FORMULA STUDENT GERMANY 2013

Audi

AUTODESK

BASF
The Chemical Company

BMW GROUP | Rolls-Royce

BOSCH
Invented for life

Brunel
access to excellence

Continental

DAIMLER

DEKRA
On the safe side.

ETAS
DRIVING | EMBEDDED EXCELLENCE

HARTING

Henkel

automotive engineering iav

MAHLE

MAN

MathWorks

PORSCHE

PTC

SKF

Tognum
HOME OF POWER BRANDS

ZF

in cooperation with VDI

Avisaro | fishfarm netsolutions | Hockenheimring | Isabellenhütte | Kautex Textron
Linde Material Handling | Omni-ID | RIEDEL Communications | SLV Mannheim

audimax MEDIEN | campushunter media | HI:TECH Campus | Top Career Guide Automotive

FORMULA STUDENT GERMANY

INTERNATIONAL DESIGN COMPETITION

July 30th – August 4th 2013
Hockenheim

formula student germany

PROGRAMME 2013

WE WOULD PARTICULARLY LIKE TO THANK
THE SPONSORS OF FORMULA STUDENT GERMANY 2013 FOR ALL THEIR SUPPORT

Audi

AUTODESK

BASF
The Chemical Company

BMW GROUP | MINI | Rolls-Royce

BOSCH
Invented for life

Brunel
access to excellence

Continental

DAIMLER

DEKRA
On the safe side.

ETAS
DRIVING EMBEDDED EXCELLENCE

HARTING

Henkel

automotive engineering iav

MAHLE

MAN

MathWorks

PORSCHE

PTC

SKF

Tognum
HOME OF POWER BRANDS

ZF

in cooperation with VDI

Avisaro | fishfarm netsolutions | Hockenheimring | Isabellenhütte | Kautex Textron
Linde Material Handling | Omni-ID | RIEDEL Communications | SLV Mannheim

audimax MEDIEN | campushunter media | HI:TECH Campus | Top Career Guide Automotive

A SPECIAL THANKS GOES TO THE NUMEROUS VOLUNTEERS WHO CONTRIBUTED SIGNIFICANTLY IN THE REALISATION OF THE EIGHTH FORMULA STUDENT GERMANY

GREETINGS
GRUSSWORT

Tim Hannig

Dear Teams, Friends and Guests of Formula Student,

This year's event has once again set new records. More teams, with more team members from more nations than ever before will compete to show the judges that they have developed the best overall design and speed package.

The event itself, however, is not the whole story. The exceptional work of the teams throughout the year is also a mark of their outstanding performance. For some German teams, the event preparation phase has been affected by the unexpected extra burden of flood disaster. Many students put all their effort into flood prevention and therefore had less time to finish their race cars. Not only this, but some teams were directly affected by the catastrophe itself. For example, the team from Deggendorf fought the flood on the banks of the river Danube whilst their workshop stood under 1.5 metres of water. All their hard work from the last months was washed away.

But help was on hand. After they had worked to fight the flood, a wave of community aid reached out to help. More than 15 Formula Student teams spontaneously contacted Deggendorf and offered their help. From private fund raising, to car parts, tools and machines as well as support from their own sponsors. The team of Deggendorf was not left to cope alone.
Thanks to their unbroken will to take part and the selfless help of the other Formula Student teams Deggendorf is able to compete at Hockenheim.

The help and support between teams, be it in extreme situations such as a flood catastrophe or the countless other occasions, constitutes Formula Student Germany. Therefore confirming that what is exceptional and extraordinary for others is quite normal for those in Formula Student.

Have fun and good luck to all.

Tim Hannig (FSG e.V.)
and the Formula Student Germany Team

Liebe Teams, Freunde und Gäste der Formula Student,

das diesjährige Formula Student Germany Event stellt wieder Rekorde auf. So viele Teams wie noch nie, aus so vielen Nationen wie noch nie, mit so vielen Teammitgliedern wie noch nie treten miteinander an, um der Jury und den Messuhren zu beweisen, dass sie das beste Gesamtpaket entwickelt haben. Soweit so „normal".

Aber nicht nur das Event zählt. Die Arbeit der Teams über das ganze Jahr ist geprägt von herausragenden Leistungen. Die letzten Monate der Vorbereitungsphase zum Event waren durch die Hochwasserwasserkatastrophe in Deutschland für manche Teams eine unvorhergesehene Doppelbelastung. Viele Studenten unterstützten den Hochwasserschutz mit allen Kräften und hatten so weniger Zeit, ihre Boliden weiterzubauen. Und manche Teams waren selbst von der Katastrophe betroffen. Das Team aus Deggendorf beispielsweise kämpfte am Deich der Donau gegen die Wassermassen, während in der Teamwerkstatt 1,5 m hohes Wasser die Arbeit der letzten Monate einfach fortspülte.

So selbstverständlich gemeinsam gegen das Wasser gekämpft wurde, so setzte nach Ablauf des Wassers eine gemeinschaftliche Welle der Hilfe für Deggendorf ein. Mehr als 15 Teams meldeten sich initiativ und boten ihre Unterstützung an. Von privaten Geldspenden, über Teile, Werkzeuge und Maschinen bis zur Empfehlung bei eigenen Sponsoren wurden die Deggendorfer nicht allein gelassen.
Dem ungebrochenen Willen der Deggendorfer, dabei zu sein, und der selbstlosen Hilfe anderer Teams ist es zu danken, dass sie in Hockenheim teilnehmen können.

Die Hilfe und Unterstützung der Teams untereinander, ob nun in Extremsituationen wie des Hochwassers oder bei unzähligen anderen Gelegenheiten macht die Formula Student Germany schon lange aus. Daher gilt auch hier festzustellen: Soweit so „normal".

Erleben Sie das Besondere, das so besonders ist, eben weil es in der Formula Student so normal ist.

Viel Spaß und viel Erfolg,

Tim Hannig (FSG e.V.)
und das Formula Student Germany Team

Powerful ideas become reality.

Good luck to all Formula Student teams!

Come and join a unique company.

As one of the world's biggest carmakers, Volkswagen offers you everything you need for a successful career. Become part of a unique company and help us shape the automotive future.

Apply at www.volkswagen-karriere.de

Das Auto.

CONTENTS
INHALT

FORMULA STUDENT GERMANY - AN INTRODUCTION
FORMULA STUDENT GERMANY - EINE EINFÜHRUNG

Formula Student Germany consists of two competitions that run in parallel: Formula Student Combustion – with combustion engines – and Formula Student Electric – with electric motors. What both competitions have in common is that as a team effort, students build a single seated formula-style race-car with which they compete against teams from all over the world. The competition, however, is not simply won by the team with the fastest car, but rather by the team with the best overall package of design, race performance, cost management and sales planning. To succeed in this, interdisciplinary teamwork and an efficient team structure in particular are crucial.

Formula Student Germany complements the students' theoretical education with a challenging and intensive practical experience in designing and manufacturing as well as considering the economic aspects of automotive engineering. For the competition, the teams have to assume that they develop a race-car prototype which will be evaluated for series production. The target customer group is the non-professional weekend-racer, for whom the race-car must offer very good driving characteristics regarding to acceleration, braking and handling. Furthermore, it should be offered at a reasonable price and be reliable as well as dependable. Additionally, the car's market value increases due to other factors such as aesthetics, ergonomics and the use of available standard purchase components.

The competition

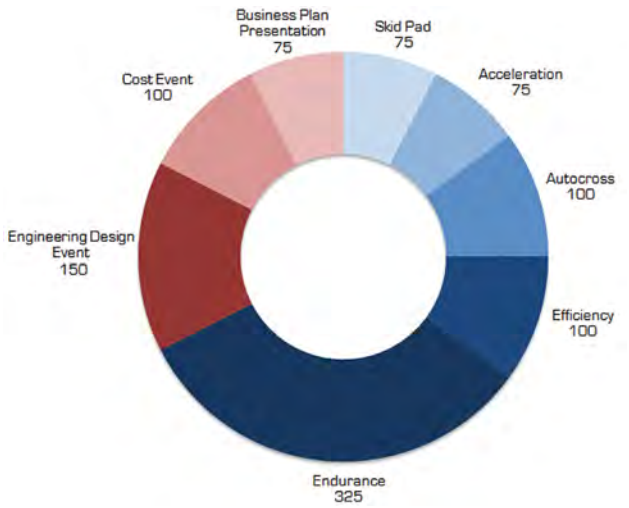
The challenge the teams face is to construct and build a prototype that best matches these given criteria. To determine the winner, a jury of experts from the motorsport, automotive and supplier industries judge every design, cost planning and business plan in comparison to the other competing teams. Furthermore, the performance on the racetrack is decisive; here the students' self-built single-seaters prove how well they hold up under real-life conditions in a number of so called dynamic disciplines.

Die Formula Student Germany besteht aus zwei parallel stattfindenden Wettbewerben: die Formula Student Combustion – mit Verbrennungsmotoren – und die Formula Student Electric – mit Elektromotoren. Bei beiden Wettbewerben bauen Studenten in Teamarbeit einen einsitzigen Formelrennwagen, mit dem sie gegen Teams aus der ganzen Welt antreten. Doch nicht unbedingt das schnellste Auto gewinnt, sondern das Team mit dem besten Gesamtpaket aus Konstruktion, Rennperformance, Finanzplanung und Verkaufsargumentation. Hierfür sind insbesondere interdisziplinäre Teamarbeit und eine effiziente Teamstruktur von großer Bedeutung.

Die Formula Student Germany ergänzt das Studium um herausfordernde und intensive praktische Erfahrungen mit Konstruktion und Fertigung sowie den wirtschaftlichen Aspekten des Automobilbaus. Die Studenten sollen in Vorbereitung auf den Wettbewerb annehmen, dass sie den Prototypen eines Rennwagens bauen, der ebenfalls daraufhin bewertet wird, ob er in Kleinserie produziert werden kann. Zielgruppe ist der nicht-professionelle Wochenendrennfahrer, für den der Rennwagen unter anderem sehr gute Fahreigenschaften hinsichtlich Beschleunigung, Bremskraft und Handling aufweisen muss. Außerdem sollte das Fahrzeug wenig kosten sowie zuverlässig und einfach zu unterhalten sein. Weiterhin wird sein Marktwert durch Faktoren wie Ästhetik, Ergonomie und den Einsatz üblicher Serienteile gesteigert.

Der Wettbewerb

Die Herausforderung für die Teams besteht darin, einen Prototypen zu konstruieren und zu bauen, der diesen Anforderungen am besten entspricht. Um den Sieger zu ermitteln, bewertet eine Jury aus Experten der Motorsport-, Automobil- und Zulieferindustrie alle Konstruktionen, Kostenpläne und Verkaufspräsentationen im Vergleich zu den konkurrierenden Teams. Zusätzlich beweisen die Studenten auf der Rennstrecke in unterschiedlichen sogenannten dynamischen Disziplinen, wie sich ihre selbstgebauten Einsitzer in der Praxis bewähren.



With different disciplines the competition reflects all aspects which have to be kept in mind when constructing and building a car.

Der Wettbewerb spiegelt mit seinen verschiedenen Disziplinen alle Aspekte wider, die bei Konstruktion und Bau eines Fahrzeugs bedacht werden müssen.

The first lesson in successful sports car engineering:
how to think outside the box.

Porsche is seeking interns (f/m).

For further information visit www.porsche.com/careers

or join us on www.facebook.com/porschekarriere

PORSCHE

THE DISCIPLINES AT A GLANCE
DIE DISZIPLINEN IM ÜBERBLICK

Altogether, in FSG there are eight disciplines. Of these, three are static in which the teams and their cars are judged based on reports, discussions and presentations. The other five disciplines are called dynamic disciplines involving a moving car and thus evaluating different performance aspects of the car.

Bei der FSG gibt es insgesamt acht Disziplinen. In dreien werden die Teams und ihre Autos in Präsentationen und Diskussionen bewertet. Dies sind die statischen Disziplinen. Die anderen fünf sind dynamisch und bewerten verschiedene Aspekte des fahrenden Autos.

The static disciplines

During the three static disciplines the students present their engineering design, cost planning and business plan. These are discussed with a jury of experts from motorsports, automotive and supplier industries.

Engineering Design: In the Design Report the students set their solutions and the resulting advantages out in writing. Eight pages of text and technical drawings have to convince the judges of the construction of the car and its qualities. At the competition the judges examine the constructive solutions and discuss them with the students. The scoring regards the written report, the answers in the discussion and the inspection of the car.

Cost Analysis: Costs are an important factor in building a race car. Hence, the students have to deal with cost estimations, different manufacturing techniques and processes in the Cost Event. The discipline consists of a written report (the cost report) and a discussion with the judges around the manufactured prototype. The cost report contains a list of all components of the car: from wheels to process labour costs for special tooling. The judging comprises the organisation of the cost report, the comprehension of manufacturing processes and the price as well as the performance of a real case task for reducing costs.

Business Plan Presentation: The teams present their business plans of the built prototype to an assumed manufacturer represented by the judges. The goal is to convince the judges that their car meets the demands of the target group of the non-professional weekend autocross driver best and that it can be produced and marketed profitably. Usually, one or two members of the team give a presentation for ten minutes and are questioned by the judges for an additional five minutes. Content, structure, organisation and performance of the talk are judged as well as the answers the students give.

Statische Disziplinen

In den drei statischen Disziplinen präsentieren die Studenten ihre Konstruktionen und Kostenplanung sowie ihr Geschäftsmodell. Diese werden mit einer Jury aus Experten der Motorsport-, Automobil- und Zuliefererindustrie diskutiert.

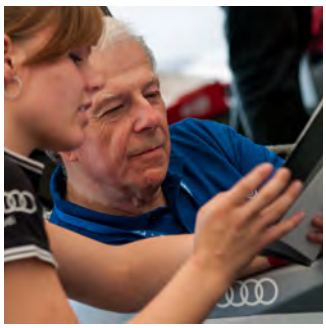
Engineering Design: Im Design Report dokumentieren die Studenten ihre Lösungen und deren Vorteile. Acht Seiten Text und technische Zeichnungen sollen die Juroren von den Konstruktionen und ihren Vorzügen überzeugen. Beim Wettbewerb werden die Konstruktionen von den Juroren am Fahrzeug begutachtet und mit den Studenten diskutiert. Die Bewertung erfolgt anhand des Design Reports, der Antworten in der Diskussion und der Begutachtung des Fahrzeugs.

Cost Analysis: Die Kosten sind für den Bau eines Rennwagens ein entscheidender Faktor. Beim Cost Event beschäftigen sich die Studenten mit Kalkulation, Fertigungstechniken und -prozessen. Die Disziplin besteht aus einem schriftlichen Bericht (dem Cost Report) und einer Diskussion mit den Juroren am gebauten Prototypen. Der Cost Report enthält eine Auflistung aller Teile: vom Reifen bis zu den Herstellungskosten für Spezialwerkzeuge. Bewertet wird die Aufbereitung des Cost Reports, das Verstehen von Fertigungsverfahren zur Kostenoptimierung, der Preis sowie die Lösung einer Real Case Aufgabe zur Kostenreduktion.

Business Plan Presentation: Bei der Business Plan Presentation stellen die Teams einer fiktiven Herstellerfirma, vertreten durch die Juroren, ihren Geschäftsplan für den gebauten Prototypen vor. Mit diesem wollen sie die Juroren davon überzeugen, dass ihr Fahrzeug am besten die Anforderungen der Zielgruppe, des nicht-professionellen Wochenendrennfahrers, erfüllt und gewinnbringend produziert sowie vermarktet werden kann. Die Präsentation der Teams dauert zehn Minuten, gefolgt von einer fünfminütigen Frage- und Diskussionsrunde mit den Juroren. Bewertet werden Inhalt, Aufbau, Aufbereitung und Darbietung des Vortrags sowie die Antworten des Teams auf Fragen.

At the competition Design and Cost Judges take a closer look at the prototype and discuss the solutions with the students. Both events are based on written reports. However, the Business Plan is presented and closes with questions from the judges.

Beim Wettbewerb betrachten die Design und die Cost Juroren die Prototypen genau und diskutieren die Lösungen mit den Studenten. Beide Events basieren auf schriftlichen Berichten. Dagegen wird bei der Businessplan Prensentation der Geschäftsplan präsentiert und endet mit Fragen der Juroren.



Dynamic disciplines

During the dynamic disciplines the cars have to prove the performance capabilities of the students' design on the race track. The disciplines demand different qualities of the car. In each discipline two drivers have two runs (except in the Endurance Event). The best run of the four will be counted as the optimum the car can achieve.

Acceleration: The race cars prove their accelerating abilities over a distance of 75 meters from a standing start. The fastest cars cover the distance in less than 4 seconds and achieve a maximum velocity of more than 100km/h.

Skid Pad / Wet Pad: The student-built cars drive on a course in the shape of an eight. Two consecutive laps on each circle are driven, with the second lap being timed. The cars demonstrate the steady-state lateral acceleration they can generate. The Skid Pad is carried out on a continuously watered surface ("Wet Pad") to make sure the conditions are constant for all teams.

Autocross: The cars drive on a course of perhaps one kilometre through straights and turns, chicanes and slaloms. The lap time serves as an indicator for driving dynamics and handling qualities. The results of the Autocross discipline also determine the starting order in the Endurance.

Endurance: Providing the highest number of points, the Endurance is the main discipline. Over the course of 22 kilometres the cars have to prove their durability under long-term conditions. Acceleration, speed, handling, dynamics, fuel efficiency and most importantly the reliability of the cars are put to their limits. The Endurance also demands handling skills of the driver as the course can only be walked in preparation. Up to four cars are allowed on the track at the same time. Each team has only one attempt, the drivers change after 11 kilometres. Teams more than one third slower as the fastest team, will just receive the minimum number of points.

Fuel / Energy Efficiency: During the Endurance the fuel consumption (FSC vehicles) / energy consumption (FSE vehicles) is measured. The points' calculation does not only evaluate fuel / energy consumption, but puts it in relation to speed.

Flags
Flaggen

Your session has started, enter the course!
Deine Fahrt beginnt. Fahr auf die Strecke!

Your session has been completed. Exit the course!
Deine Fahrt ist beendet. Verlass die Strecke!

Pull into the passing zone to be passed by a faster competitor!
Fahr in der Überholzone, damit ein schnelleres Fahrzeug überholen kann!

Pull into the penalty box for a mechanical inspection of your car!
Fahr in die Kontrollzone für eine Untersuchung des Fahrzeugs!

Pull into the penalty box for discussion concerning an incident that may cause a time penalty!
Fahr in die Kontrollzone zur Diskussion eines Vorfalls! Ggf. Zeitstrafe!

Come to an immediate safe controlled stop on the course! Pull to the side of the course.
Komm sofort kontrolliert zum Stehen. Halte die Strecke frei.

Dynamische Disziplinen

In den dynamischen Disziplinen müssen die studentischen Konstruktionen ihre Praxistauglichkeit auf der Rennstrecke beweisen. Mit jeder Disziplin werden unterschiedliche Eigenschaften des Autos getestet. Grundsätzlich starten zwei Fahrer mit je zwei Versuchen (außer im Endurance-Rennen). Gewertet wird der jeweils beste Versuch als das Optimum, welches das Fahrzeug erzielen kann.

Acceleration: Auf einer 75 Meter langen Geraden müssen die Rennwagen zeigen, wie schnell sie aus dem Stand beschleunigen können. Die Besten bewältigen die Strecke in einer Zeit von unter vier Sekunden und erreichen dabei eine maximale Geschwindigkeit von mehr als 100km/h.

Skid Pad / Wet Pad: Die selbstgebauten Rennwagen durchfahren einen Parcours in Form einer Acht. Jeder Kreisring wird zweimal nacheinander umrundet. Gemessen wird jeweils die zweite Runde. Die Rundenzeit zeigt, welche statische Querbeschleunigung das Fahrzeug erreichen kann. Die Oberfläche des Parcours wird kontinuierlich bewässert („Wet Pad"), um sicherzustellen, dass die Bedingungen für alle Teams gleich sind.

Autocross: Über eine etwa 1 Kilometer lange Runde fahren die Rennwagen durch Geraden, Kurven und Schikanen. Eine schnelle Rundenzeit ist sowohl ein Indikator für eine gute Fahrdynamik als auch für gute Handling- und Beschleunigungseigenschaften. Die Platzierung im Autocross entscheidet über die Startreihenfolge in der Endurance-Disziplin.

Endurance: Das Endurance-Rennen stellt mit der höchsten erreichbaren Punktzahl die Hauptdisziplin dar. Über eine Renndistanz von 22 Kilometern muss sich die Gesamtkonstruktion unter Dauerbelastung beweisen. Hier sind alle Eigenschaften von der Beschleunigung bis hin zu Handling und Fahrdynamik gefragt. Das Rennen erfordert ebenfalls besonderes Fahrgeschick des Fahrers, da die Strecke als Vorbereitung nur abgeschritten werden darf. Während des Rennens sind bis zu vier Fahrzeuge gleichzeitig auf der Strecke. Jedes Team hat einen einzigen Versuch, die Fahrer wechseln nach 11 Kilometern. Die Teams erhalten nur dann Punkte, wenn sie höchstens ein Drittel langsamer waren als das schnellste Team.

Fuel / Energy Efficiency: Während des Endurance-Rennens wird der Kraftstoffverbrauch (FSC Fahrzeuge) / Energieverbrauch (FSE Fahrzeuge) gemessen. Bei der Berechnung der erreichten Punkte, zählt nicht einfach der Verbrauch, sondern vielmehr der Verbrauch in Relation zur Geschwindigkeit.

Something is on the track that should not be there. Be prepared for evasive maneuvers to avoid debris or liquids!
Es ist etwas Unerwartetes auf der Strecke. Sei bereit Flüssigkeiten oder Bruchstücken auszuweichen!

Something has happened beyond the flag station. No passing unless directed by the track marshals. Stationary: Danger! Slow down, be prepared to take evasive action. Waved: Great Danger! Slow down, evasive action is most likely required, be prepared to stop.
Etwas ist jenseits der Flagge passiert.Fahr nicht vorbei ohne Anweisung der Streckenposten. Feststehend: Gefahr! Fahr langsam, sei bereit zum Ausweichen. Geschwenkt: Große Gefahr! Fahr langsam, Ausweichen wird erforderlich sein. Sei bereit anzuhalten.

There is a slow moving vehicle on the course. Be prepared to approach it at a cautious rate.
Es ist ein langsames Fahrzeug auf der Strecke. Nähere dich vorsichtig an.

Bring die Welt in Sicherheit!

UNIVERSUM TOP 100 ARBEITGEBER 2013 STUDENT SURVEY

trendence Graduate Barometer 2013 DEUTSCHLANDS 100 Top-Arbeitgeber

Offizieller Technischer Partner der Formula Student Germany

Entdecke die besten Seiten deiner Karriere.

Über 490 Standorte in Deutschland, Weltmarktführer mit 22 Millionen Fahrzeugprüfungen – und auch im Internet ist DEKRA in seiner ganzen Vielfalt vertreten. Mach dir am besten selbst ein Bild. Informiere dich über deine Karriere-Möglichkeiten bei einem der größten Prüfdienstleister Europas.

Nähere Infos findest du unter: **www. bringdieweltinsicherheit.de**

www.dekra.de Automotive — Industrial — Personnel

DEKRA

OFFIZIELLER TECHNISCHER PARTNER

formula student germany

Formula Student Germany

Audi ultra „Best Lightweight Concept“	II
BASF “Best Use Of Fiber Reinforced Plastic”	I
Henkel “Best Use Of Adhesives”	I
FSG Sportsmanship Award presented by FSG Executive Committee	II
FSG Media Award powered by FSG Communication Team	W
FSG Best Overall Dynamic	II

Formula Student Combustion

Formula Student Combustion Champion	II
Formula Student Combustion – 2nd	II
Formula Student Combustion – 3rd	II
FSC Business Plan Presentation Award – 1st	I
FSC Business Plan Presentation Award – 2nd	I
FSC Business Plan Presentation Award – 3rd	I
FSC Cost Analysis Award – 1st	II
FSC Cost Analysis Award – 2nd	II
FSC Cost Analysis Award – 3rd	II
FSC Engineering Design Award – 1st	II
FSC Engineering Design Award – 2nd	II
FSC Engineering Design Award – 3rd	II
FSC Acceleration Winner	II
FSC Autocross Winner	II
FSC Endurance Winner	II
FSC Skid Pad Winner	I
Dekra “Best Prepared Car For Scrutineering”	I
Kautex „Most Fuel Efficient Car“	II
Tognum „Most Innovative Powertrain“	II

The letter behind the award states at which time the award will be presented.
I - Award Ceremony - Part I (Friday)
II - Award Ceremony - Part II (Sunday)
W - FSG Workshop

Formula Student Electric

Formula Student Electric Champion	II
Formula Student Electric – 2nd	II
Formula Student Electric – 3rd	II
FSE Business Plan Presentation Award – 1st	I
FSE Business Plan Presentation Award – 2nd	I
FSE Business Plan Presentation Award – 3rd	I
FSE Cost Analysis Award – 1st	I
FSE Cost Analysis Award – 2nd	I
FSE Cost Analysis Award – 3rd	I
FSE Engineering Design Award – 1st	I
FSE Engineering Design Award – 2nd	I
FSE Engineering Design Award – 3rd	I
FSE Acceleration Winner	II
FSE Autocross Winner	II
FSE Endurance Winner	II
FSE Skid Pad Winner	I
Bosch Engineering „Best Power System“	I
Daimler „Best E-Drive Packaging“	I
Dekra “Best Prepared Car For Scrutineering”	I
Harting „Most Energy Efficient Car“	II

Der Buchstabe hinter dem Preis gibt an, zu welchem Zeitpunkt der Preis verliehen wird.
I - Award Ceremony - Teil I (Freitag)
II - Award Ceremony - Teil II (Sonntag)
W - FSG Workshop

development loves inspiration

Whether it's in research, maintenance, or engineering, engineers at BASF carry out a broad range of duties with passion and responsibility. From day one you'll be servicing and developing production plants worldwide. And we're all motivated by the same thing: succeeding together. When inspiration is the beginning of great developments, that's how we create chemistry. At BASF. Find out more now and apply at: **www.basf.com/career**

Visit us on Facebook: www.facebook.com/basfkarriere

BASF
The Chemical Company

SCHEDULE 2013
ZEITPLAN 2013

TUESDAY, 30TH OF JULY 2013

14:00	Scrutineering, Registration & Entrance Order Available	1 Ticket Centre
16:00 – 18:00	FSC & FSE Team Registration	1 Ticket Centre
18:00 – Sun 20:00	FSC & FSE Pits Available	4 19 Pits
18:00 – 20:00	Event Control, Driver & Safety Responsible Registration	2 Event Control
18:00 – 22:00	Entrance for Team Vehicles	
20:00	Charging Tent opens	
21:00 – 22:00	Team Welcome	5 Marquee above Pits

WEDNESDAY, 31ST OF JULY 2013

07:30 – 19:00	Ticket Centre & Event Control	1 2 Ticket Centre / Event Control
09:00 – 13:00	Scrutineering / Tech Inspection / Tilt, Brake, Noise, Rain / Fuel	9 10 11 12
13:00 – 14:00	Lunch Break & Staging for Panoramic Photograph	17 Big Dynamic Area
14:00 – 19:00	Scrutineering / Tech Inspection / Tilt, Brake, Noise, Rain / Fuel	9 10 11 12
14:00 – 19:00	Engine Test	17 Big Dynamic Area

THURSDAY, 1ST OF AUGUST 2013

07:30 – 19:00	Ticket Centre & Event Control	1 2 Ticket Centre / Event Control
08:00 – 08:30	Team Briefing	5 Marquee above Pits
08:30 – 19:00	Scrutineering / Tech Inspection / Tilt, Brake, Noise, Rain / Fuel	9 10 11 12
09:00 – 19:00	Engine Test / Testing	17 Big Dynamic Area
11:00 – 12:30	Judge Briefing: Business Plan, Cost & Design	7 BW Tower
12:00 – 13:00	Scrutineering Lunch Break	
13:30 – 18:10	FSE Engineering Design & FSE Cost Analysis	5 Marquee above Pits
13:30 – 18:10	FSE Business Plan Presentation	7 8 BW Tower, Race Control Tower
18:30 – 20:30	Judge Briefing: Cost & Design	7 BW Tower
19:00 – 20:30	FSE Business Plan Presentation Finals	5 Marquee above Pits
20:30 – 21:30	Get-together for all Volunteers	7 BW Tower

FRIDAY, 2ND OF AUGUST 2013

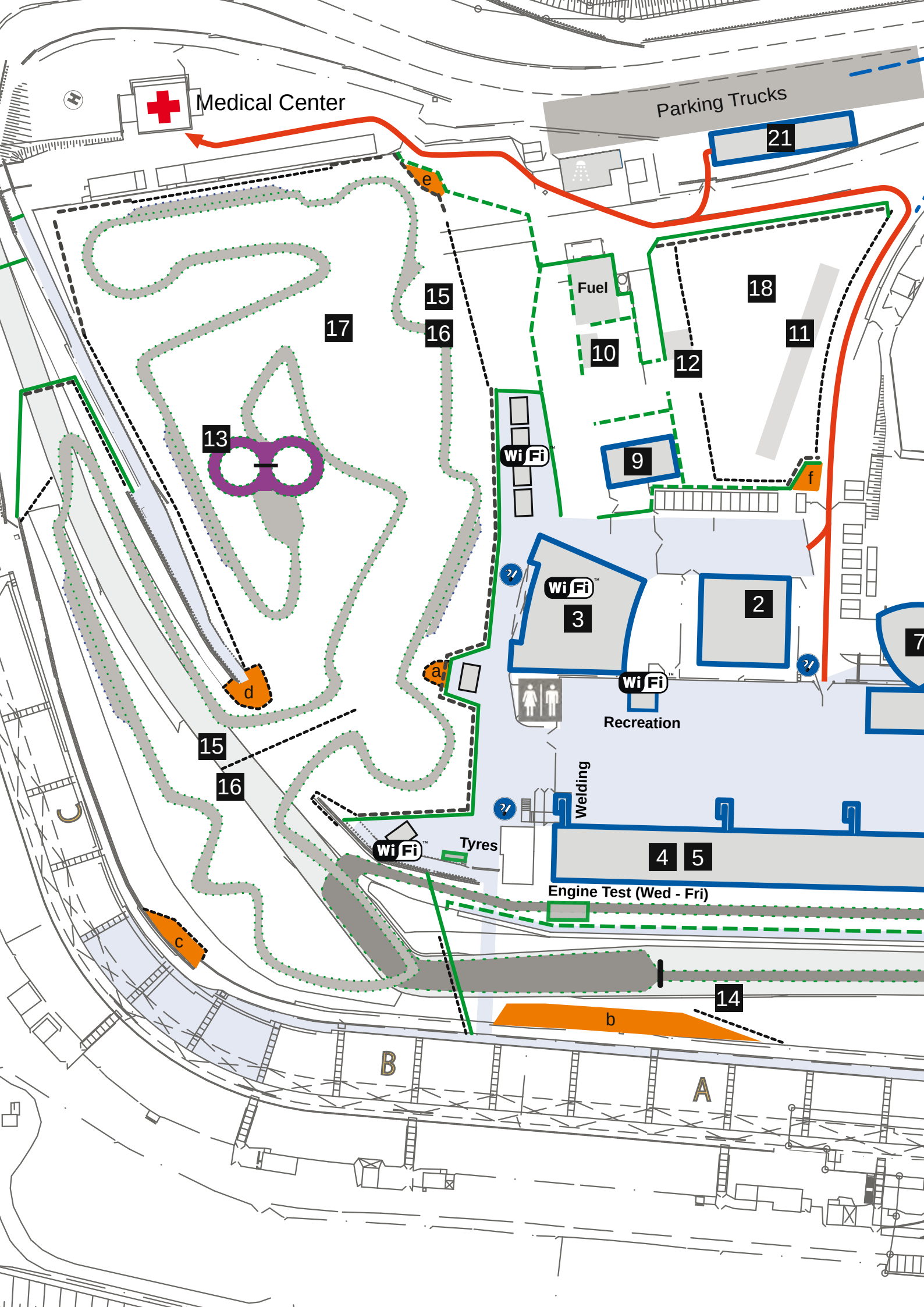
07:00 – 19:00	Ticket Centre & Event Control	1 2 Ticket Centre / Event Control
07:30 – 08:00	Team Briefing	5 Marquee above Pits
08:00 – 08:45	Judge Briefing: Business Plan Presentation	7 BW Tower
08:30 – 18:40	FSC Engineering Design, FSC Cost Analysis	5 Marquee above Pits
08:30 – 19:00	Scrutineering / Tech Inspection / Tilt, Brake, Noise, Rain / Fuel	9 10 11 12
09:00 – 18:40	FSC Business Plan Presentation	7 8 BW Tower, Race Control Tower
09:00 – 18:30	Engine Test/Testing	17 Big Dynamic Area
10:00 – 12:00	Worldwide Formula Student Officials Meeting	Motodrom Hotel
11:00 – 18:30	Skid Pad	13 Dynamic Area
12:00 – 13:00	Scrutineering Lunch Break	
15:00 – 17:00	World Council Meeting	Motodrom Hotel
19:00 – 20:30	FSE Engineering Design Finals (not public)	3 FSG Forum
20:00 – 21:00	FSC Business Plan Presentation Finals	5 Marquee above Pits
21:00 – 22:00	Award Ceremony - Part I	5 Marquee above Pits
22:00 – 23:00	Get-together for all Judges	7 BW Tower

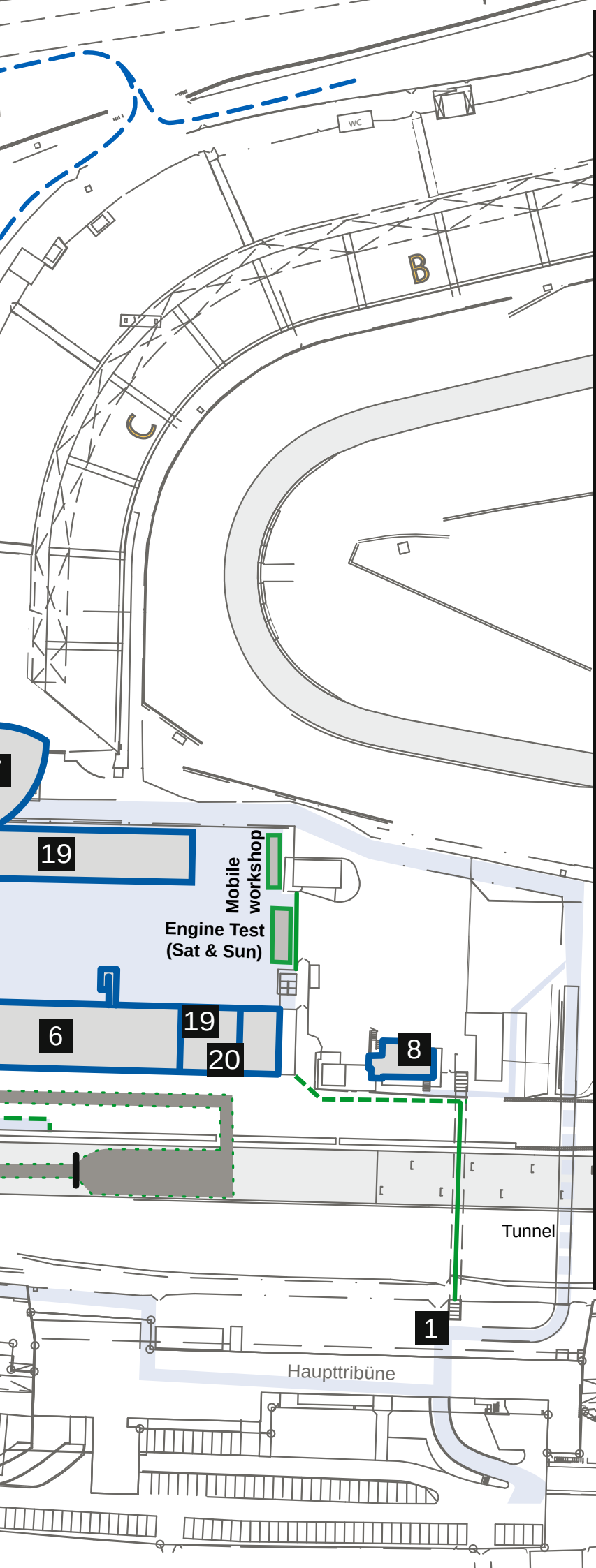
SATURDAY, 3RD OF AUGUST 2013

07:00 – 19:00	Ticket Centre & Event Control	1 2 Ticket Centre / Event Control
07:30 – 08:00	Team Briefing	5 Marquee above Pits
08:30 – 18:30	Fuel / Engine Test / Testing	18 Small Dynamic Area
08:30 – 18:30	on request: Scrutineering / Tech Inspection / Tilt, Brake, Noise, Rain	
08:30 – 13:00	FSC & FSE Acceleration	14 Start / Finish Line
11:00 – 11:45	Press Guided Tour	8 BW Tower (basement)
12:00 – 12:45	Press Conference	8 BW Tower (4th floor)
13:00 – 14:00	VIP Reception	8 BW Tower (5th floor)
13:05 – 13:25	Coursewalk Autocross	15 Big Dynamic Area
13:30 – 18:30	FSC & FSE Autocross	15 Big Dynamic Area
19:00 – 21:30	FSC Engineering Design Finals (not public)	3 FSG Forum

SUNDAY, 4TH OF AUGUST 2013

07:00 – 19:00	Ticket Centre & Event Control	1 2 Ticket Centre / Event Control
07:30 – 08:00	Team Briefing	5 Marquee above Pits
08:00 – 08:20	Coursewalk Endurance	16 Big Dynamic Area
08:30 – 18:30	Fuel / Engine Test / Testing	18 Small Dynamic Area
08:30 – 13:00	FSC & FSE Endurance Morning Session & Parc Fermé	16 Big Dynamic Area
13:00 – 18:00	FSC & FSE Endurance Afternoon Session & Parc Fermé	16 Big Dynamic Area
19:30 – 20:30	Design Review	3 FSG Forum
21:00 – 22:00	Award Ceremony - Part II	5 Marquee above Pits
22:00 – 01:00	MAHLE-Party	5 Marquee above Pits


Medical Center
Parking Trucks
21
e
15
16
17
Fuel
18
11
10
12
13
Wi Fi
9
f
Wi Fi
3
2
7
a
d
Wi Fi
Recreation
15
16
Welding
Wi Fi
Tyres
4
5
Engine Test (Wed - Fri)
c
14
b
B
A



1 Ticket centre

2 Event control

3 FSG forum

4 FSC pits (ground floor)

5 Marquee above pits (first floor)

6 Engineering design event & cost analysis event (first floor)

7 Business plan presentation event (BW tower)

8 Business plan presentation event (Race control tower)

9 Technical inspection

10 Tilt table / rain test

11 Brake test

12 Noise test

13 Skid pad (Friday)

14 Acceleration (Saturday)

15 Autocross (Saturday)

16 Endurance (Sunday)

17 Dynamic area

18 Test area

19 FSE pits (ground floor)

20 E-scrutineering (ground floor)

21 FSE charging & accumulator workshop

Visitor's area

Press area

Stands

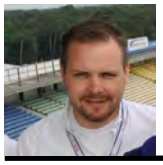
formula student germany

Please note:

Formula Student Germany is a non-smoking event. Smoking is only allowed in designated areas.

Thank you.

FORMULA STUDENT GERMANY TEAM



Tim Hannig
Board (Chairman)
Linde China

Rainer Kötke
Board (Finance & Dynamics)
Volkswagen AG

Daniel Mazur
Board (Event Manager)
mazur | events + media

Frank Röske
Board (Rules)
Porsche Leipzig GmbH

Ludwig Vollrath
Board
(External Relations & Academy)

Julien van Campen
EC (Public Relations)
Daimler AG

Matthäus Decker
EC (Personnel & Event Support)
Siemens AG Österreich

Barbara Decker-Schlögl
EC (Statics)
MAGNA STEYR AG & Co KG

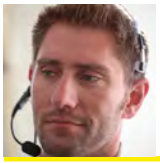
Lukas Folie
EC (FS-Electric)
Audi AG

Tobias Michaels
EC (FS-Electric)
IAV GmbH

Henning Nissen
EC (Scoring)
SAT Anlagentechnik GmbH

Konrad Paule
EC (FS-Academy & Pit Marshal)
Dr. Ing. h.c. F. Porsche AG

Ulf Steinfurth
EC (Technical Inspection)
University of Applied Sciences
Stralsund



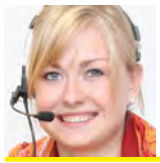
Daniel Ahrens
OT (Event Control)
Aegis Media Central Services GmbH

Raphaela Bihr
OT (Business Plan)
Karlsruhe Institute of Technology

Matthias Brutschin
OT (Event Support)
MBtech Group GmbH & Co. KGaA

Cas Droogendijk
OT (Design Event)
DAF Trucks N.V.

Leona Ehrenreich
OT (Registration, Visa)
Secondary Modern School



Hannah Esser
OT (Public Relations)
Chatham University in Pittsburgh

Jürgen Falb
OT (E-Scrutineering)
G-velop GmbH i.Gr.

Robert Fromholz
OT (Cost Event)
H&D International Group

Emil Kleijn
OT (Energy Meter)
Eindhoven University of Technology

Ann-Christin Michaels
OT (Guided Tours)
TU Braunschweig

Jost Philip Pöttner
OT (Design Event)
Volkswagen AG

Torsten Rilka
OT (Special Awards & Cost Event)
IAV GmbH

Klaus Scheuplein
OT (Photographers)
Euro Engineering

Tim Schmidt
OT (Event Control (Back Office))
Diehl Comfort Modules GmbH

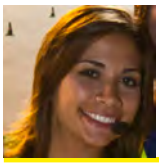
Karsten Stammen
OT (Dynamics)
Audi AG

Karl Weinreich
OT (Technical Inspection)
Shell Global Solutions GmbH

The team behind Formula Student Germany is divided into three groups.The board is responsible for Formula Student Germany, its operations, finances, sponsoring and overall strategy.The executive committee (EC) is responsible for the design and development of the competition. Each member of the EC is responsible for one of the fields of the competition and its organisation.The operative team (OT) supports the board and EC in the preparation and realisation of the event throughout the year.

Peter Jakowski
OT (Security)
Bosch Engineering GmbH

Johannes Kratzel
OT (Event Support)
Robert Bosch GmbH



Alia Pierce
OT (FSG TV, Event Speaker)
Fraunhofer-Institut für Chemische Technologie

Wolf-Bastian Pöttner
OT (Timekeeping, WLAN, RFID)
TU Braunschweig

Johanna Scheider
OT (Editorial Office)
BOROS GmbH

Jochen Schmidt
OT (Dynamics)
German Aerospace Center (DLR)

Sebastian Seewaldt
OT (Pit Marshal)
KS engineering & consulting GmbH

Lena Töppich
OT (Press Office)
ABB AG

Stefan Windt
OT (Timekeeping)
Volkswagen AG

Das Team der Formula Student Germany ist in drei Gruppen unterteilt.Das Board trägt die Verantwortung für die Formula Student Germany und ihre Kooperationen sowie für Sponsoring, Finanzen und Strategie.Das Executive Committee (EC) veranwortet Ausgestaltung des Wettbewerbs. Jedes Mitglied ist für Vorbereitung und Durchführung eines Bereiches verantwortlich.Das Operative Team (OT) unterstützt das Board und das EC in der Vorbereitung übers Jahr und in der Durchführung des Wettbewerbs.

JUDGES AND SCRUTINEERS 2013
JUROREN UND SCRUTINEERS 2013


Business Plan Presentation Judges 2012

Business Plan Presentation (56)

Berg, Alexander
Bertram, Michael
Bjekovic, Robert
Brand, Johann-Diedrich
Bruenn, Katja
Diethert, Alexander
Esser, Klaus
Fahr, Alexander
Fees, Wolfram
Fichtl, Katrin
Frank, Detlef
Grauel, Patrick
Greiner, Alexander
Hahn, Thomas
Hannig, Peer
Hayn, Bernhard
Heidemeyer, Peter
Herrmann, Jesko
Herrmann, Susanne
Herzog, Florian
Hieber, Frank
Huber, Andreas
Käfer, Timo Michael
Karsch, Ulrich
Kinski, Andreas
Klasen, Jennifer
Klug, Jens
Kraemer, Clemens
Kraft, Florian
Lange, Stephan
Lattemann, Frank
Lenzen, Thomas
Lusseault, Yvon
Maidorn, Gerd
Mattlener, Bastian
Maurer, Andreas
Möhler, Markus
Mueller, Andreas
Näther, Sylvio
Nuscheler, Barbara
Christine
Ott, Tobias
Recha, Martina
Rettich, Thorsten
Richter, Ralf
Rinka, Carsten
Ruehl, Stephan
Schneider, Isabel
Siebert, Kai
Sommer, Jochen
Tabatabai, Stefan
Thater, Gerald
Tillack, Karola
Vadehra, Bernhard Prem
Wagner, Thomas
Wapstra, Henk
Wolff, Frank


Scrutineers 2012

Scrutineering (48)

Amboß, Ralf
Amend, Werner
Bosch, Thomas
Braus, Friedemann
Dammert, Wolfgang
Derichs, Wolfgang
Drop, Frank
Endreß, Joachim
Falb, Jürgen
Geipel, Sven
Goyal, Vandit
Granzow, Pit
Härtel, Detlef
Hech, Angelika
Hegedus, Miki
Jeitner, Timo
Kirchoff, Sarah
Kleijn, Emil
Kleppe, Sebastian
Köhne, Yvonne
Kusstatscher, Gerd
Lidzba, Thomas
Maul, Ralf
Möller, Benjamin
Müller, Winfried
Opdam, Rob
Parmar, Hiten
Paß, Julian
Pfefferle, Sebastian
Pohl, Wolfgang
Priggem-Schürmann, Andreas
Sagawe, Tassilo
Scheifele, Christoph
Schmidt, Reinhold
Schmidt, Ronny
Schoen, Wolfgang
Schütze, Thomas
Shetty, Keerthan
Speer, Lutz
Steinfurth, Ulf
Stenner, Patrick
Steuernagel, Peter
Struck, Axel
Thomassen, Kevin
Trappmann, Gerd
Wagner, Günther
Weinreich, Karl
Ziebell, Alexander

Cost Analysis & Engineering Design Judges 2012

Cost Analysis (35)

Azahaf, Hicham
Bremmer, Thomas
Buob, Manuel
Drescher, Benjamin
Grundner, Harald
Hagl, Markus
Hahn, Thomas
Hartmann, Klaus
Herth, Martin
Hey, Matthias
Hofmeister, Jörg
Hoppe, Sebastian
Klein, Christian
Koenig, Ilja
Kotzian, Andreas
Löffler, Markus
Meier, Stefan
Metz, Simon
Möll, Winfried
Müller, Karsten
Pälmer, Reinhard
Piltzing, Roger
Regh, Fabian
Reubold, Philipp
Rosenau, Bernhard
Scharff, Robert
Schnabel, Matthias
Scigalla, Philipp
Span, Benjamin
Stein, Marcus
Tesch, Anke Martina
Timm, Martin
Vogel, Jens
Winkler, Tino
Wruck, Sebastian

Engineering Design (104)

Ahola, Mikko
Barrera-Medrano, Daniel
Bayer, Bernward
Beck, Markus
Blonn, Markus
Bolz, Peter
Bremkamp, Joerg
Carless, Owen
Clarke, Pat
Daniel, Marc
Deckers, Jean-Noel
Dölle, Norbert
Elsinga, Gerrit
Enning, Norbert
Ewert, Sebastian
Friedrich, Linus
Frommer, Armin
Gerhardt, Andreas
Gerth, Hendrik
Gesele, Frank
Giebenhain, Clenn
Goslich, Leonhard
Graf, Michael
Grams, Sebastian
Grassinger, Thomas
Gupta, Manabendra
Narayan
Halsdorf, Georges
Hanigk, Martin
Hickson, Alex
Hollmann, Falco
Hölzgen, Andre
Huhn, Werner
Jakobi, Reinhard
Jauns-Seyfried, Stefanie
Jennewein, Tobias
Kamath, Vinayak
Kaussen, Martin
Kerber, Michael
Kern, Henning
Klaus, Hartmut
Klink, Holger
Klöss, Karl
Knipp, Christian
Kolb, Hartmut
Krappel, Michael
Krato, Tanja
Kudritzki, Detlef
Küppers, Jörg
Ladda, Josefine
Löser, Stefan
Lück, Peter
Maas, Gerhard
Meier, Thomas
Miksch, Rainer
Milke, Burkhard
Mueller, Rolf
Müller, Christoph
Nilsson, Lars
Nowicki, Daniel
Pälmer, Oliver
Petrich, Florian
Petz, Andreas
Pfisterer, Richard
Prehl, Christoph
Rahlf, Björn
Reetz, Volker
Reitz, Jörg Andre
Riderer, Dominic
Roepke, Tobias
Roquette, David
Rouelle, Claude
Sachse, Mick
Sander, Udo
Sattler, Steve
Sayovitz, Steve
Schäfer, Stephan
Schäffler, Klaus
Schenk, Juergen
Schimmels, Juergen
Schmid, Tobias
Schneider, Thomas
Schöniger, Sebastian
Schreckeneder, Johannes
Schweigert, Waldemar
Seib, Timo
Simonian, Samo
Soens, Andreas
Spoida, Thomas
Stammen, Karsten
Stange, Michael
Stolz, Franz
Strasser, Roman
Thevenet, Mael
Vogel, Thomas
Völkl, Timo
Volle, Carsten
Wagner, Thomas
Ward, Gavin
Weber, Thomas
Weiß, Tobias
Wenzel, Frank
Windisch, Gordon
Wunschheim, Lukas
Zöls, Thomas

Status at the time of going to press.
Status bei Redaktionsschluss

Audi

Michael Groß
Head of HR Marketing, AUDI AG

FSG – five days of tinkering, technology and teamwork! We at Audi are awaiting the event just as eagerly as the participating teams. After all, the pit lanes and race track are the perfect places to meet dedicated students and get to know them where our heart beats – working on cars. What we share is a love of technology – of "Vorsprung durch Technik". At the same time, all the participants have exactly what we are looking for in future employees: specialist knowledge, innovative and creative solutions coupled with good teamwork and communication skills. And those who are able to put our brand values of sportiness, progressiveness and sophistication onto the race track are a good match for Audi as well. We offer tomorrow's engineers the chance to tackle exciting tasks in innovative areas. We look forward to an exciting event and wish all the teams every success!

FSG – fünf Tage Tüfteln, Technik und Teamwork. Wir bei Audi fiebern dem Event mindestens genauso aufgeregt entgegen wie die teilnehmenden Teams. In der Boxengasse und auf der Rennstrecke treffen wir engagierte Studenten und lernen sie dort kennen, wo auch unser Herz schlägt: Beim Tüfteln am Automobil. Die Begeisterung für Technik – für „Vorsprung durch Technik" – ist das, was uns dabei verbindet. Gleichzeitig bringen die Teams all das mit, was wir uns von unseren zukünftigen Mitarbeitern wünschen: Fachliches Wissen, innovative und kreative Lösungen, aber auch Team- und Kommunikationsfähigkeit. Und wer es schafft, unsere Markenwerte Sportlichkeit, Progressivität und Hochwertigkeit auf die Rennstrecke zu bringen, der passt auch gut zu Audi. Bei uns warten auf die Ingenieure von morgen spannende Aufgaben an innovativen Themen. Wir freuen uns auf das Event und wünschen den Teams viel Erfolg

AUTODESK.

Don Carlson
Director Post Secondary Education, Autodesk

Autodesk Education Initiatives

Autodesk wants students of all ages to imagine, design and create a better world. By partnering with academic leaders and institutions, Autodesk is helping educators to build skills and engagement, both in and out of the classroom, in order to prepare for successful careers in architecture, engineering, and digital arts. Autodesk offers the technology and learning resources that inspire the next generation of professionals, while providing institutions with educational pricing, training, curricula and community resources. For more information about Autodesk education programs and solutions, visit www.autodesk.com/education.

Über Autodesk Education

Autodesk hilft Studenten jeden Alters dabei, sich eine bessere Welt vorzustellen, diese zu gestalten und zu schaffen. Außerdem unterstützt Autodesk durch die Kooperation mit akademischen Leitern und Institutionen Pädagogen dabei, die Fähigkeiten der Studenten weiterzuentwickeln und ihr Engagement zu stärken – sowohl im Hörsaal als auch außerhalb – und diese auf erfolgreiche Karrieren als Architekten, Ingenieure oder Digital Artists vorzubereiten. Autodesk bietet die Technologie und die Lehrmittel an, die die zukünftige Expertengeneration inspirieren soll. Institutionen profitieren von Sonderkonditionen, Trainings, Lehrplänen und Communities. Weitere Informationen zu Autodesk Education unter www.autodesk.com/education

Hans-Peter Beringer
Vice President, Head of Business Management Automotive, BASF SE

For BASF it´s a pleasure to support "Formula Student Germany", because we want to share our passion for automotive technology! Our engineering plastics are widely used in the automotive industry for example in vehicles range from bodywork and chassis to interior trim and engine components. Using plastics instead of other materials reduces vehicle weight and helps to conserve energy and reduce emissions.

As a global chemical company BASF particularly focuses on science education, realizing that today's students will be the thinkers, innovators, discoverers and leaders of the future. We consider "Formula Student Germany" to be a great opportunity to get in contact with ambitious and well-educated young people.
Good luck to all teams for this extraordinary competition!

Wir freuen uns „Formula Student Germany" zu unterstützen - und so unsere Begeisterung für Technologie rund um das Automobil zu teilen! Die BASF bietet eine Vielzahl von Kunststofflösungen für die Automobilindustrie an, angefangen beim Karosseriebau, über das Fahrwerk bis hin zu Innenausstattung und Motoranbauteilen. Der Einsatz von Kunststoffen reduziert das Fahrzeuggewicht und trägt auf diese Weise zur Ressourcenschonung bei.
Als ein globales Unternehmen der Chemieindustrie schätzen wir die universitäre Forschung, insbesondere die Ingenieurswissenschaften. Hier sehen wir die Denker, Erfinder und Führungspersönlichkeiten der Zukunft. „Formula Student Germany" bietet uns die Möglichkeit, mit ambitionierten und gut ausgebildeten Nachwuchskräften in Kontakt zu kommen. Wir wünschen allen Teilnehmern viel Glück in diesem außergewöhnlichen Wettbewerb!

Michael Albrecht
Head of HR Marketing International and Recruiting, BMW Group

It is with great pleasure that the BMW Group supports initiatives such as Formula Student which combine acquired theory with practical experience in an exemplary manner. The acquisition of skills and key expertise such as interdisciplinary thinking, problem-solving and business knowledge is realized in an exemplary fashion in this competition.
We are only too familiar with these requirements of teams from our own company. We therefore welcome applications from qualified Formula Student participants both from Germany and abroad for practical internships as well as job vacancies. We are looking for enthusiastic young engineers in various departments such as research and development who, like our own staff, enjoy being involved in innovative projects at the very highest level.

Mit großer Freude unterstützt die BMW Group die Formula Student Initiative, da sie Studenten auf einzigartige Weise die Möglichkeit gibt, theoretisches Wissen mit gelebter Praxis zu verbinden. Hier, in der praktischen Anwendung, werden mit Begeisterung Fähigkeiten und Schlüsselkompetenzen wie z.B. fächerübergreifendes Denken, Problemlösefähigkeit oder wirtschaftliche Kenntnisse erlernt und erweitert.
Diese Anforderungen an Teams kennen wir in der BMW Group nur zu gut. Daher freuen wir uns, wenn sich qualifizierte Teilnehmer aus dem In- und Ausland bei uns für Praxiseinsätze oder auf offene Stellen bewerben. Verschiedene Bereiche wie z. B. Forschung und Entwicklung suchen begeisterte Nachwuchsingenieure, die genauso wie unsere Mitarbeiter Spaß daran haben, auf höchstem Niveau an innovativen Themen mitzuwirken.

BOSCH
Invented for life

Bernhard Bihr
President, Bosch Engineering GmbH

Diversity is one of our values, as well as a component part of our strategy: at Bosch, there is a mix of individual abilities, experience, and work styles. It is this that gives us our innovative strength and secures our global success.

Diversity is also what we're looking for at Formula Student: it's not the fastest car that wins, but the team with the best overall combination of design, race performance, financial planning, and selling points. That's why we're glad to support talented young people who are innovative and committed, and who work together in a team to master interdisciplinary challenges.

We are looking forward to stimulating discussions with the students attending, and wish all the teams every success.

Vielfalt gehört zu unseren Werten und zu unserer strategischen Ausrichtung: Bei Bosch wirken individuelle Kompetenzen, Erfahrungen und Arbeitsstile zusammen. Das macht uns innovativ und sichert unseren weltweiten Erfolg.

Um Vielfalt geht es auch bei der Formula Student: Nicht das schnellste Auto gewinnt, sondern das Team mit dem besten Gesamtpaket aus Konstruktion und Rennperformance, Finanzplanung und Verkaufsargumenten. Daher freuen wir uns, innovative und engagierte Nachwuchskräfte zu unterstützen, die in Teamarbeit die interdisziplinären Herausforderungen gemeinsam meistern.

Wir freuen uns auf anregende Gespräche mit den Studierenden und wünschen allen Teams viel Erfolg!

Brunel
access to excellence

Dr. Ralf Napiwotzki
General Manager, Brunel GmbH

Brunel has once again signed up as a sponsor as the Formula Student Germany (FSG) goes into its eighth round at the legendary Hockenheimring. Again and again, we are thrilled to see the creativity, passion and team spirit demonstrated by the students who take part. Technical skills and strength of will are essential assets without which the challenges posed by this design competition could never be mastered. Direct and personal contact with the teams also gives us the chance to both position Brunel as an attractive employer and offer the students an initial insight into the world of work. At the same time, the FSG is an important barometer of the latest technological developments. What the students here come up with – from combustion engines to alternative drive systems – testifies to their impressive innovative skills and augurs well for our future engineers.

Auch bei der achten Auflage der Formula Student Germany (FSG) am legendären Hockenheimring ist Brunel wieder als Sponsor dabei. Die Kreativität, Leidenschaft und der Teamgeist der teilnehmenden Studenten begeistert uns immer wieder aufs Neue. Fachkompetenz und Willensstärke sind die Grundlagen, die gestellten Herausforderungen bei diesem Konstruktionswettbewerb überhaupt zu meistern. Der direkte und persönliche Kontakt zu den Teams gibt uns die Möglichkeit, Brunel als attraktiven Arbeitgeber zu präsentieren sowie den Studenten erste Einblicke in die Berufswelt zu ermöglichen. Zudem ist die FSG ein wichtiger Gradmesser für technische Neuentwicklungen: Ob Verbrennungsmotoren oder alternative Antriebe – was die Studierenden hier entwickeln, zeugt von hoher Innovationskraft und damit großem Potenzial für unseren Ingenieurnachwuchs.

Barbara Texter
Teamleader Strategic University Relations, Continental AG

For over 140 years, Continental has been working on motorized individual mobility of the future. In order to continue this success story, we are constantly looking for qualified technical and management personnel.

Top talent of the kind we are seeking can be found at the Formula Student competition. There, working in teams, the students experience the values that are also indispensible for a successful career at Continental: teamwork, for one another, freedom to act and passion to win. In addition to this, a large international project like Formula Student hones the social skills that we look for in all our employees.

With this in mind, we support the teams by providing material and expertise, now and in the future, and wish everyone success for the Formula Student Germany at the Hockenheimring.

Seit über 140 Jahren arbeitet Continental erfolgreich an der individuellen Mobilität der Zukunft. Um diese Erfolgsstory weiterzuschreiben sind wir ständig auf der Suche nach qualifizierten Fach- und Führungskräften.

Diese Toptalente finden wir beim internationalen Konstruktionswettbewerb Formula Student. Durch die Arbeit in den Teams erleben die Studierenden die Werte, die auch für eine erfolgreiche Karriere bei Continental unerlässlich sind: Teamwork, Verbundenheit, große gestalterische Freiräume und die Leidenschaft, Projekte zum Erfolg zu führen. Zudem schärft ein derartiges internationales Großprojekt wie Formula Student die Sozialkompetenzen, die wir bei allen unseren Einsteigern suchen.

Daher unterstützen wir jetzt und in Zukunft die Teams mit Material und Know-How und wünschen allen viel Erfolg bei der Formula Student Germany auf dem Hockenheimring.

Peter Berg
Senior Manager Global Talent Acquisition and Development, Daimler AG

Enthusiasm and passion for innovation and technology are the driving force of the Automotive Industry.

This eagerness is felt among the participants that show enormous engagement and endurance when working on their racing cars. Excellent knowledge of their field of activity, the comprehension of complex dependences and team work are decisive qualities shown in this competition. This exactly matches our requirements of gaining qualified staff.

With our engagement we wish to make a contribution to bring forward the innovation force and enhance the passion of these talents for the Automotive Industry. At the Formula Student event we are looking forward to interesting discussions with the participants in order to show them the possibilities of starting their career with Daimler.

We wish all participants a huge amount of energy and a successful event!

Begeisterung und Leidenschaft für Innovationen und Technik sind der Motor der Automobilindustrie.

Diesen Enthusiasmus spüren wir bei den Teilnehmern, die mit viel Engagement und Ausdauer an ihren Rennwagen arbeiten. Exzellentes Fachwissen, das Erfassen komplexer Zusammenhänge und Teamwork sind entscheidende Qualitäten, die bei diesem Wettbewerb unter Beweis gestellt werden. Diese entsprechen genau unseren Anforderungen an qualifizierte Nachwuchskräfte.

Wir möchten mit unserem Engagement einen Beitrag dazu leisten, die Innovationskraft dieser Talente und ihre Begei terung für die Automobilindustrie zu fördern. Wir freuen uns auf interessante Gespräche während des Formula Student Events mit den Teilnehmern, rund um die Themen Einstieg und Karriere.

Wir wünschen den Teilnehmern eine ganze Ladung Energie und ein erfolgreiches Event!

DEKRA
On the safe side.

Clemens Klinke
Chairman of the board of managing directors, DEKRA Automobil GmbH
Member of the board, DEKRA SE

DEKRA supports Formula Student Germany from the outset as technical partner. Our engineers have well grounded know how and expertise in professional motor racing, for example as technical supervisors in the German Touring Car Masters (DTM) championship. In 2013 again the structure of all vehicles has been proven at the DEKRA Technology Centre regarding safety in rollover, side and frontal impacts. Approx. two dozen teams brought the frontal crash attenuators of their bolides for testing directly to the DEKRA Technology Center. This way Formula Student provides the students the opportunity to make their first personal contacts with DEKRA.

As Europe's largest organisation of technical experts, DEKRA is constantly on the lookout for highly motivated employees who have a high level of knowledge, teamwork skills and initiative - and, as we say in Germany, "who have petrol in the veins".

DEKRA engagiert sich als Offizieller Technischer Partner von Beginn an bei der Formula Student Germany. Unsere Ingenieure verfügen über umfangreiches Know-how und Erfahrungen im professionellen Rennsport, unter anderem als Technische Kommissare der Deutschen Tourenwagen Masters (DTM). Das DEKRA Technology Center hat auch im Jahr 2013 alle Fahrzeugstrukturen im Hinblick auf die Sicherheit beim Fahrzeugüberschlag, beim Seitenanprall und beim Frontalanprall überprüft. Rund zwei Dutzend Teams ließen die energieabsorbierenden Frontalaufprallstrukturen ihrer Boliden direkt im DEKRA Technology Center testen. So bietet die FSG den Studierenden die Möglichkeit, erste persönliche Kontakte zu DEKRA zu knüpfen.

Als Europas größte Sachverständigen-Organisation ist DEKRA ständig auf der Suche nach motivierten Mitarbeitern mit hohem Wissensstand, Teamfähigkeit und Eigeninitiative, die "Benzin im Blut" haben.

ETAS
DRIVING | EMBEDDED EXCELLENCE

Friedhelm Pickhard
President, ETAS GmbH

Speed, high technology, and team spirit – what could be better than to measure oneself in these disciplines? ETAS is proud to be a main sponsor of Formula Student Germany. We share the thrills with our 18 teams as – with engineering skills and passion – they show their mettle under the toughest conditions.

Awards go not only to the fastest cars, but also to the best combination of design, performance, finance, and business planning. And for ETAS, these disciplines are part of everyday life. Only companies that take on global competition with commitment will continue to operate successfully and produce innovations – in our case integrated tools, tool solutions, and services for the development and maintenance of embedded systems.

We wish all teams the motivation, enthusiasm, and success required to be front-runners in the field.

Geschwindigkeit, Spitzentechnologie und Team-Spirit – was kann es Schöneres geben, als sich in diesen Disziplinen zu messen? Mit Stolz unterstützt ETAS als ein Hauptsponsor die Formula Student Germany. Wir fiebern mit unseren 18 Teams mit, wenn sie mit Ingenieurskunst und Herzblut unter den härtesten Bedingungen zeigen, was sie können.

Ausgezeichnet werden nicht nur die schnellsten Boliden, sondern die beste Kombination aus Konstruktion, Leistung, Finanzen und Businessplanung. Für ETAS gehören diese Disziplinen zum Alltag. Nur wer ihnen engagiert begegnet und sich dem globalen Wettbewerb stellt, wird auch künftig weltweit erfolgreich wirtschaften und Innovationen hervorbringen – in unserem Fall integrierte Tools, Werkzeuglösungen und Services für die Entwicklung und Wartung von Embedded Systemen.

Wir wünschen allen Teams den Spirit und Erfolg, ganz vorne mit dabei zu sein.

Janine Hempelmann
Consultant Online Communication, HARTING Electronics GmbH & Co. KG

HARTING technology group develops innovative solutions and technologies for connectivity and networks. Highly motivated young professionals are necessary to create innovations for our customers. Formula Student is considered by HARTING as an outstanding opportunity to encourage the young generation of engineers we regularly seek as an employer. In Formula Student, the participants can prove in practice their professional knowledge and management by developing new solutions through team work.

When technical aspects of a solution are addressed, energy efficiency and conservation of resources should play a central role. Therefore, HARTING will award the FSE team that will realise a solution with the best energy efficient values.

Die HARTING Technologiegruppe entwickelt innovative Lösungen und Technologien in der Verbindungstechnik. Damit wir auch zukünftig unsere Kunden mit Innovationen versorgen können, braucht es junge, motivierte Menschen. Die Formula Student ist eine hervorragende Möglichkeit, um den technischen Nachwuchs zu fördern, den wir als Unternehmen suchen. Hier können die Studenten in der Praxis demonstrieren, wie sie in Teamarbeit neue Lösungen entwickeln – und dabei ihr technisches Fachwissen und betriebswirtschaftliches Know-how unter Beweis stellen.

Wenn es um neue technische Lösungsansätze geht, sollten auch immer Energieeffizienz und Ressourcenschonung eine zentrale Rolle spielen. HARTING wird deshalb einen Preis an das Team verleihen, das bei der Formula Student Electric den geringsten Energieverbrauch realisiert.

Anke Barkmann
Junior Employer Branding Manager, Human Resources,
Henkel AG & Co. KGaA

For years, global adhesives market leader Henkel has been supporting the contest, the events and the competing teams around the world.

Why? We love the energy-laden, electrifying atmosphere where young, talented people who are fascinated by technology set themselves a goal and follow their vision through with passion and dedication. They are our kind of people. We want to get to know them and perhaps even help them to start their careers at Henkel.

Above all, we want to encourage them, give them access to the latest solutions from research and development, and share our expertise with them. Advanced high-performance adhesives and sealants from Henkel have long been an indispensable part of our daily lives. The knowledge gained about them here can later inspire many of the participating young engineers to create groundbreaking engineering applications and MRO solutions.

Schon seit Jahren unterstützt Klebstoff-Weltmarktführer Henkel den Wettbewerb, das Event und die beteiligten Teams rund um die Welt.

Warum? Uns begeistert die energiegeladene, elektrisierende Atmosphäre, in der sich junge talentierte, Technik-faszinierte Menschen einer Vision verschreiben und ihr Ziel konsequent und voller Leidenschaft bis zur Umsetzung verfolgen. Solche Menschen passen zu uns. Wir möchten sie kennenlernen und ihnen vielleicht sogar den Einstieg in eine Karriere bei Henkel ermöglichen.

Vor allem aber möchten wir sie fördern und ihnen neueste Lösungen aus Forschung und Entwicklung sowie unser Know-how zur Verfügung stellen. Moderne Hochleistungskleb- und -dichtstoffe von Henkel sind aus dem Lebensalltag längst nicht mehr wegzudenken. Vielen der hier teilnehmenden Nachwuchsingenieure werden sie später als Rüstzeug für zukunftsweisende Ingenieursleistungen und MRO-Lösungen dienen.

automotive engineering iav

Christian Willenberg
Human Resources, IAV GmbH

With over 5,000 members of staff, IAV is one of the world's leading providers of engineering services to the automotive industry. The company can look back on 30 years of experience in developing innovative concepts and technologies for future vehicle generations. Core competencies include perfected, production-ready solutions in all fields of powertrain, electronics and vehicle development.

IAV supports Formula Student Germany and individual teams to produce interest to take part in the engineering departments of the company. To name one example from the motorsport segment: IAV was involved in developing a 2-liter four-cylinder high-speed engine for mass production. Powered by this engine, the BMW 320si went into mass production as the base vehicle for touring-car racing. For further information about IAV, go to www.iav.com.

IAV ist mit über 5.000 Mitarbeitern weltweit einer der führenden Engineering-Partner der Automobilindustrie. Das Unternehmen entwickelt seit 30 Jahren innovative Konzepte und Technologien für zukünftige Fahrzeuggenerationen. Zu den Kernkompetenzen gehören perfekte, serientaugliche Lösungen in allen Bereichen der Antriebsstrang-, Elektronik-, und Fahrzeugentwicklung.

IAV unterstützt die Formula Student Germany und einzelne Teams – auch um das Interesse an einer Mitwirkung in den Fachabteilungen zu erwecken. Um ein Beispiel aus dem Bereich Motorsport zu nennen: IAV war bei der Serienentwicklung eines 2-Liter-Vierzylinder-Hochdrehzahlmotors beteiligt. Als Grundlage für den Tourenwagensport ging der BMW 320si mit diesem Motor in Serie. Weitere Infos zu IAV erhalten Sie über unser Karriereportal www.iav.com/karriere.

MAHLE

Joachim Reichle
Director Corporate Personnel Development, MAHLE International GmbH

The MAHLE Group is one of the top 30 automotive suppliers and the globally leading manufacturer of components and systems for the internal combustion engine and its peripherals.

MAHLE has enjoyed close ties to motor sport activities since the early days. Thus we know: if you want to do something decisive, you need a vision, topped with courage, perseverance, and drive. When the environment fits and the team is right, ambitious projects and convincing solutions emerge from innovative ideas. As a company with a passion for the automobile, we are proud to be part of the Formula Student Germany. We support formula student teams who are fascinated by the automotive world and who want to achieve more by working together – the same way we are. We are happy to support talented and enthusiastic engineers in reaching their ambitious goals and we wish all participants an successful Event!

Der MAHLE Konzern zählt zu den 30 größten Automobilzulieferern und ist der weltweit führende Hersteller von Komponenten und Systemen für den Verbrennungsmotor und dessen Peripherie.

Als ein von Anfang an dem Motorsport verbundenes Unternehmen wissen wir: Wer Entscheidendes bewegen will, braucht eine Vision. Und dazu Mut, Ausdauer und Biss. Wenn dann noch das Umfeld stimmt und das Team das richtige ist, werden aus innovativen Ideen ehrgeizige Projekte und überzeugende Lösungen. Als ein Unternehmen mit einer Leidenschaft für das Automobil, sind wir stolz, ein Teil der Formula Student zu sein. Wir unterstützten Teams, die – genauso wie MAHLE – fasziniert sind vom Automobil und gemeinsam mehr bewegen wollen. Wir freuen uns, talentierte und enthusiastische angehende Ingenieure bei der Erreichung ihrer ehrgeizigen Ziele zu unterstützen und wünschen allen Teilnehmern ein erfolgreiches Event.

Dr. Bernhard Frey
Head of Human Resources Marketing & Recruiting, MAN Truck & Bus AG

„MAN Truck & Bus is a leading international supplier of commercial vehicles and transport solutions. The consistently efficient trucks, buses and engines from MAN put the engineering skills of our outstanding employees on to the road. Combined with reliable and innovative technologies and the highest level of customer orientation, these have provided the basis for our success for over 250 years.

MAN Truck & Bus has many years' experience in the field of motor sports. Every year, MAN successfully leads the way at the Truck Race European Championships. That is why MAN sponsors talented young people at Formula Student who develop sophisticated vehicle concepts with passion and technical expertise. We are looking forward to four exciting race days at the Hockenheimring and wish all the teams every success!"

„Die MAN Truck & Bus AG ist einer der führenden internationalen Anbieter von Nutzfahrzeugen und Transportlösungen. Die konsequent effizienten Lkw, Busse und Motoren von MAN bringen die Ingenieurskunst unserer hervorragenden Mitarbeiter auf die Straße. In Kombination mit zuverlässigen und innovativen Technologien sowie höchster Kundenorientierung bilden diese seit mehr als 250 Jahren die Basis unseres Erfolgs.

MAN Truck & Bus verfügt über langjährige Erfahrungen im Motorsportbereich. Jedes Jahr fährt MAN bei den Truck Race Europameisterschaften erfolgreich voraus. Aus diesem Grund sponsert MAN junge Talente bei Formula Student, die mit Leidenschaft und technischem Sachverstand ausgeklügelte Fahrzeugkonzepte entwickeln. Wir freuen uns auf vier spannende Renntage auf dem Hockenheimring und wünschen allen Teams viel Erfolg!"

Lauren Tabolinsky
Student Competition Program Specialist, MathWorks

Employing a Model-Based Design approach to automotive design process for the Formula Student Germany Competition enables teams to design, test, validate and share their models within one environment. Competitions like Formula Student Germany present a unique engineering challenge that requires months of intense focus and hard work. Using industry-standard tools such as MATLAB and Simulink helps students tackle real engineering problems and acquire the collaboration, time-management, and leadership skills they will need for careers in industry.
Learn more about how MathWorks support Formula Student Germany:
www.mathworks.com/academia/student-competitions/formula-student-germany/

Formula Student Germany bietet Studententeams eine einzigartige Herausforderung, die innerhalb einer kurzen Vorbereitungs- und Entwicklungszeit und mit großem Engagement und Motivation bewältigt wird. Der modellbasierte Entwicklungsansatz mit MATLAB und Simulink erlaubt es den Teams, im Rahmen dieses Wettbewerbs ihre Simulationsmodelle in einer integrierten Plattform zu entwickeln, zu testen und zu validieren. Zusätzlich zu den großen Herausforderungen im Ingenieursbereich, sammeln die Teams wertvolle Erfahrungen in Teamwork, Leadership, und Zeitmanagement. Erfahrungen die helfen, sich erfolgreich auf den Arbeitsmarkt vorzubereiten.
Lernen Sie mehr zum Thema: MathWorks unterstützt die Formula Student Germany:
www.mathworks.com/academia/student-competitions/formula-student-germany/

PORSCHE

Konstanze Marinoff
Director Human Resource Marketing, Dr. Ing. h.c. F. Porsche AG

Porsche stands for Intelligent Performance – for maximum power and efficiency at the same time. With more than 30.000 victories, Porsche, as the most successful manufacturer in motorsports, also stands for extraordinary team spirit. With our return to the LMP1-Series of the World Sportscar Championship and the 24h of Le Mans in 2014, we will continue our long tradition in motorsports.
Formula Student is also based on excellent engineering skills. More important than a fast car, is an intelligent package of team performance and innovative ideas. These factors will lead to success.
We are looking forward to welcoming ambitious participants of the Formula Student at Porsche in line with various career entry opportunities. Define the next chapter of the future of sportscar engineering – at the Formula Student competition and at Porsche.
We wish all the teams good luck and success!

Porsche steht für Intelligent Performance – für maximale Leistung bei gleichzeitiger Effizienz. Mit mehr als 30.000 Rennsiegen steht Porsche als der erfolgreichste Hersteller im Motorsport darüber hinaus für einzigartige Teamleistungen. Mit der Rückkehr in die LMP1-Serie der Sportwagen-Weltmeisterschaft und den 24 Stunden von Le Mans 2014, setzen wir unsere lange Tradition im Spitzen-Motorsport fort.
Auch in der Formula Student geht es um Ingenieurskunst. Nicht nur ein schnelles Auto ist entscheidend, sondern ein intelligentes Gesamtpaket aus Teamfähigkeit und innovativen Ideen bestimmt den Erfolg.
Wir freuen uns, engagierte Formula Student Teilnehmer im Rahmen vielfältiger Einstiegsmöglichkeiten bei Porsche begrüßen zu dürfen. Schreiben Sie mit am nächsten Kapitel der Zukunft des Sportwagens - bei der Formula Student und bei Porsche.
Wir wünschen allen Teams viel Glück und Erfolg!

PTC®

John D. Stuart
SVP Global Academic Program, PTC Inc.

PTC is very pleased to support the Formula Student Germany competition. Formula Student Germany is so important because it replicates the needs of our 10,000 customers in Europe. Students learn how to design, build and compete on the track just like our manufacturing customers design, build and compete in the marketplace. Formula Student Germany is a great test bed for the Engineers of the Future. It provides you with the essential skills to compete for jobs and then once you have a job, compete in the marketplace.

PTC ist sehr erfreut den Formula Student Germany Wettbewerb zu unterstützen. Die Formula Student Germany ist sehr wichtig, weil es die Bedürfnisse unserer 10.000 Kunden in Europa repliziert. Die Studenten lernen, planen, bauen und konkurrieren auf der Strecke genauso wie unsere Kunden aus der Fertigungsindustrie planen, bauen und auf dem Markt konkurrieren. Formula Student Germany ist ein großer Prüfstand für die Ingenieure der Zukunft. Studenten erwerben durch Formula Student Germany die notwendigen Skills, um sich auf dem Arbeitsmarkt zu positionieren.

Klaus Hofmann
Product Manager ECO Competition Cars Sponsoring ECO Competition Cars/ ACS-P, SKF GmbH

The challenges in the automotive industry are diverse: The globalisation is changing the production and the markets around the world. Climate change and the shortage of fossil fuels require new and better technologies. At the same time, manufacturers must be flexible enough to meet the high demands that each customer has on individuality and comfort of a car.
To face these challenges it requires courage, strength and endurance, but also creativity, teamwork and vision. Qualities that you, dear participants, demonstrate already today. We are pleased to support young students from all over the world with such an ambitious project as the Formula Student. On behalf of the SKF team, we wish all participants good luck!

Die Herausforderungen in der Automobilindustrie sind vielfältig: Die Globalisierung verändert die Produktions- und Absatzmärkte auf der ganzen Welt. Der Klimawandel und der Mangel an fossilen Brennstoffen erfordern neue, bessere Technologien. Gleichzeitig müssen die Hersteller flexibel genug sein, um die hohen Ansprüche zu erfüllen, die jeder einzelne Kunde an Individualität und Komfort eines Automobils hat.
Sich diesen Herausforderungen zu stellen verlangt Mut, Kraft und Ausdauer, aber auch Kreativität, Teamarbeit und Weitsicht. Eigenschaften die Sie, liebe Teilnehmer, mit Ihrem Engagement bereits heute beweisen. Dazu möchten wir Ihnen schon jetzt gratulieren. Wir freuen uns, junge Studenten aus allen Teilen der Welt bei einem so ambitionierten Projekt wie der Formula Student unterstützen zu können. Im Namen des gesamten SKF Teams wünschen wir allen Teilnehmern viel Erfolg!

Regine Siemann
Head of Global Employer Branding, Tognum AG

„We accept the challenge!" This holds true for the teams at Formula Student Germany, which have invested one year of hard work into the development of their racing cars, as well as for the Tognum engineers.
This year, 115 teams from all over the world are facing the multiple challenges for humans and technology – connected by the shared passion for technology. Tognum supports the event for the sixth time already and, for the third time, rewards outstanding engineering skills with the „Most Innovative Power Train Award."

Personally, I am fascinated each year anew by the harmonic coexistence of the will to succeed and team spirit. I am looking forward to eventful days and interesting conversations in this unique atmosphere, to seeing familiar and new faces, who want to move the world with Tognum. I wish all teams the best of luck and a podium position!

„Wir stellen uns der Herausforderung!" Das gilt sowohl für die Teams der Formula Student Germany, die ein Jahr harte Arbeit in die Entwicklung ihrer Rennwagen gesteckt haben, als auch für die Tognum-Ingenieure.
Den vielfältigen Herausforderungen an Mensch und Technik stellen sich in diesem Jahr in Hockenheim 115 Teams aus aller Welt – verbunden durch ihre gemeinsame Leidenschaft für Technik. Tognum unterstützt den Event bereits zum sechsten Mal und belohnt zum dritten Mal herausragende Ingenieurkunst mit dem „Most Innovative Powertrain Award".

Persönlich fasziniert mich jedes Jahr aufs Neue das harmonische Miteinander von Erfolgswillen und Teamgeist. Ich freue mich auf ereignisreiche Tage und interessante Gespräche in dieser einzigartigen Atmosphäre, auf bekannte und neue Gesichter, die mit Tognum die Welt bewegen möchten. Ich wünsche allen Teams einen Platz auf dem Siegertreppchen!

Thomas Albrecht
VDI-Society Automotive and Traffic Systems Technologies, VDI e.V.

If Formula Student didn't exist it ought to be invented on the spot. It epitomizes everything that makes the engineering profession so exhilarating: the cool, scientific pursuit of the optimum result, as measured against the irrefutable, objective scale of physical measurement, combined with the highly emotional values of imagination and inventiveness and the focused and frantic co-operation within a team of like-minded companions, who together will face the heat of the competition, and share the elation of success, or the burden of failure, in solidarity.
VDI with its Society for Vehicle and Transport Technology have established Formula Student Germany in its beginning, and continue as its spiritual sponsors, because it provides engineering students with an opportunity to live their passion, and to strive for excellence in a very early stage of their careers.

Wenn es die Formula Student nicht gäbe, man müsste sie auf der Stelle erfinden. Sie bringt auf den Punkt, was den Ingenieurberuf so begeisternd macht: das kühle, wissenschaftliche Streben nach optimalen Ergebnissen, gemessen am unwiderlegbaren, objektiven Maßstab physikalischer Größen, gepaart mit den hochemotionalen Werten der Phantasie, des Einfallsreichtums und der konzentrierten Zusammenarbeit in einem Team aus Gleichgesinnten, in dem auch hoher Druck gemeinsam ausgehalten und Erfolg wie Misserfolg zusammen errungen und ertragen werden.
Der VDI mit seiner Fachgesellschaft für Fahrzeug- und Verkehrstechnik hat die Formula Student Germany etabliert und ist ihr ideeller Träger, weil sie dem Nachwuchs im Ingenieurberuf eine Chance gibt, diese Begeisterung zu leben und schon früh in der eigenen Laufbahn nach Exzellenz zu streben.

Thomas Lieber
Head of Electro-Traction, Volkswagen AG

Volkswagen is once again at the Formula Student Event at the Hockenheimring to support and to look for an open dialogue with young talents.
Alongside their expert knowledge, these aspiring engineers have innovative power and creativity as well as team and communication skills, which is exactly what is needed for a career and for working successfully in our company.
We are therefore happy to support highly-motivated young engineers with our expert knowledge, to inform them about the varied and individual opportunities to start a career in our company and to encourage their enthusiasm for Volkswagen as an attractive employer.
And we always have the same common denominator: The enthusiasm for „Das Auto".

We wish all teams a successful and exciting competition!

Volkswagen fördert bei der Formula Student hoffnungsvolle Talente und tritt mit ihnen in den Dialog. Die angehenden Ingenieurinnen und Ingenieure bringen Fachwissen mit, Innovationskraft, Kreativität, Team- und Kommunikationsfähigkeit. Das sind genau die richtigen Stärken für eine erfolgreiche Karriere bei Europas größtem Automobilhersteller.

Wir unterstützen die Nachwuchskräfte mit dem Wissen unserer Experten und informieren sie über die vielfältigen Einstiegs- und Entwicklungsmöglichkeiten bei Volkswagen. Einen gemeinsamen Nenner haben wir in unseren Gesprächen auf dem Hockenheimring auf jeden Fall: die Begeisterung für Das Auto.

Wir wünschen allen Teams einen erfolgreichen und spannenden Wettbewerb!

Martin Frick
Head of Talent Attraction & Social Media, ZF Friedrichshafen AG

As a global leader in driveline and chassis technology, ZF is permanently looking for highly qualified, creative, and motivated junior staff.
Team players with key competences such as organizational skills as well as well-founded knowledge in project management and cost optimization are just what we need. As a result of the fact that we find exactly such key qualifications with the Formula students, we have been committed to those undertakings for years. Moreover, we perceive this commitment as an important contribution to enhancing the education quality as well as practice orientation at the universities.
FSG makes it possible to link the engineer training and qualification with motorsports - a highly emotional and fascinating topic. I am personally convinced that the entire business site is profiting from such projects, but, primarily us, the ZF Group, as a technology-oriented company.

ZF als ein weltweit führender Technologiekonzern in der Antriebs- und Fahrwerktechnik ist permanent auf der Suche nach qualifizierten, kreativen und motivierten Nachwuchskräften.
Gefragt sind Schlüsselkompetenzen wie Teamfähigkeit, Organisationstalent und solide Kenntnisse in Projektmanagement und Kostenoptimierung. Da wir genau diese Schlüsselqualifikationen bei den Formula Studenten finden, engagieren wir uns seit vielen Jahren. Wir sehen darin einen wichtigen Beitrag, die Ausbildungsqualität und Praxisnähe an den Hochschulen zu stärken.
Das Projekt Formula Student ermöglicht es, die Ingenieursausbildung mit dem Rennsport zu verknüpfen, einem emotionalen und faszinierenden Thema. Ich bin davon überzeugt, dass hiervon der ganze Wirtschaftsstandort profitiert, aber natürlich auch wir als Technologiekonzern.

LIVE TIMING AT FSG
DAS FSG LIVE TIMING

During the dynamic events a website for the FSG live timing will be available online.

On http://tk.formulastudent.de you will continuously find the latest lap times, of the teams on track at that specific moment in time. The personal best of the teams will be shown in green. An overall best time in the respective class (FSC or FSE) will be displayed in pink.

To stay informed, the overall best lap times will always be shown, regardless of the level of lap times achieved at the time.

Während der dynamischen Events wird im Internet eine Webseite fürs Live Timing verfügbar sein.

Unter http://tk.formulastudent.de erfährt man immer die neuesten Rundenzeiten, die von den Teams zum jeweiligen Zeitpunkt gefahren werden. Dabei wird die persönliche Bestzeit eines Teams in grüner Farbe markiert. Eine neu gefahrene absolute Bestzeit in der jeweiligen Fahrzeugklasse (FSC oder FSE) wird in Pink dargestellt.

Um den Überblick behalten zu können, werden die absoluten Bestzeiten immer dargestellt, unabhängig von den aktuell gefahrenen Zeiten.

In 2013, several displays are again available on the dynamics area.
Auch in 2013 wird es wieder mehrere Displays bei den dynamischen Disziplinen geben.

Car	University	Best	Time	Lap
94	Rennstall Esslingen		START	1
20	LUMotorsport		54.69	PIT
2	University Of Hertfordshire		53.72	8
69	University of Wisconsin-Madison		52.69	PIT
76	Racetech Racing Team TU Bergaka		51.53	FIN
110	DMS Racing Team		61.12	28
35	CTU CarTech		58.86	FIN
39	E-Team Squadra Corse		54.59	7
74	High-Octane Motorsports e.V.		67.56	PIT
36	High Speed Karlsruhe		71.70	PIT
43	Brunel Racing		56.12	19
15	University of Strathclyde Motor		58.21	FIN
19	Sapienza Corse		61.81	FIN
55	Riteh Racing Team		60.95	FIN

Endurance | overview | Best: - FSG Live Timing *beta*

In addition, the latest lap times will be available online on http://tk.formulastudent.de.
Zusätzlich sind die aktuellen Rundenzeiten unter http://tk.formulastudent.de verfügbar.

FORMULA NORTH

How did it begin?

FSG 2010 was the last competition in which I participated in, as a member of the University of Toronto Racing Team, before I embarked like many others to become an alumnus of the Formula Student series.

I can speak for all FS Alumni when I say that there was a constant nagging feeling as to what would I do and where would I go after I graduated. In this mood I asked my colleague as to why was it that Canada did not have any platform such as Formula Student. He basically replied, 'Why don't you start one?' And I took it a bit too literally.

What is the motivation behind Formula North?

The majority of the people I interacted with in Canada had no idea what Formula Student was about. All this talent here in Canada, and there was no platform to showcase it! Formula North was created of two reasons: for the purpose of spreading awareness of the FS series and of providing a fair competitive platform for teams to compete within.

What obstacles did you face while organizing the first event in 2012?

In the beginning it was finding the right people to build a team to organize the event. Only 5 of us on the final team had past FS experience. For the others this was an adventure and they weren't sure of what to expect.

The biggest obstacle after that was finding a venue. We approached many venues, but it was one dismissal after the other. I scouted race tracks all over Ontario, but none fit the profile for an FS event and the requirements on our list. We did not get a definite answer for our chosen location until 3 months before the actual event in 2012! The uncertainty surrounding the location of the event really hurt us when we approached companies for sponsorship. Between March and June of 2011 alone we had received close to 52 sponsorship proposal rejections.

There were other obstacles we ran into, the final blow being the loss of a $15000 sponsor, three weeks prior to the event. We had to face a huge dilemma – should we go ahead and organize the event knowing that we would go into debt, or should we back out and ruin any chances for another FS Canadian event to ever be organized. We chose the former. It was a huge sacrifice for most of us, but it was a very important one.

Was FN2013 any easier?

Yes 2013 was a bit easier, to say the least. I didn't realize this earlier last year, however. I was so burnt out after FN2012 that I quit my day job and arrived at FSG2012 to volunteer. I had already made up my mind that FN2013 would not be happening. And had it not been for a few amazing FSG officials, it probably wouldn't have. I was advised (scolded) that every new venture is hard in the beginning because you have to prove yourself. And once you have shown the world

Wie hat alles angefangen?

FSG 2010 war der letzte Wettbewerb an dem ich als Mitglied des University of Toronto Racing Team teilgenommen habe. Danach wurde ich Alumni der Formula Students Serie. Ich denke, ich kann für alle FS Alumni sprechen, wenn ich sage, dass nachdem Ausstieg einen konstant Gedanken plagen was wohl als nächstes und ganz besonders nach dem Abschluss kommt. In dieser Stimmung fragte ich meinen Kollegen, warum es in Kanada keinen Wettbewerb wie die Formula Student gibt. Er antwortete nur ,,Warum gründest du nicht einen?". Seine Antwort nahm ich ein wenig zu wörtlich.

Welche Motivation steckt hinter der Formula North?

Die meisten Leute, mit denen ich in Kanada gearbeitet habe, hatten keine Ahnung, um was es bei Formula Student geht. All diese Talente hier in Kanada, und keine Möglichkeit, sie zu präsentieren! Die Formula North wurde aus zwei Gründen gegründet. Zum einen um die FS Serie auch in Kanada bekannter zu machen und zum anderen um eine faire wettbewerbsfähige Plattform zu schaffen, innerhalb der die Teams miteinander in Wettbewerb treten können.

Welche Hürden musstest du während der Organisation der ersten Veranstaltung 2012 überwinden?

Am Anfang war es schwierig die richtigen Leute für das Organisationsteam der Veranstaltung zu finden. Nur fünf von uns hatten FS Erfahrung. Für die anderen war es eher ein Abenteuer von dem sie nicht wussten, was sie erwarten würde.

Das größte Hindernis danach war die Suche nach einem Veranstaltungsort. Wir haben uns viele potentielle Austragungsorte angeschaut, aber keiner kam infrage. Ich habe mir Rennstrecken in ganz Ontario angesehen, aber keine passte in das Profil für eine FS Veranstaltung und kam auch unseren Anforderungen nicht entgegen. Von dem Standort, den wir uns letztendlich ausgesucht haben, haben wir erst 3 Monate vor dem Event eine definitive Zusage bekommen! Dass wir so lange nicht wussten, ob und wo der Event nun wirklich stattfindet, hatte einen negativen Einfluss während unserer Suche nach Sponsoren. Allein zwischen März und Juni 2011 erhielten wir 52 Ablehnungen von Sponsoren.

Es gab noch andere Hindernisse, aber das Schlimmste war der Verlust eines $ 15.000 Sponsors nur drei Wochen vor der Veranstaltung. Das bescherte uns ein riesiges Dilemma - sollten wir weitermachen und die Veranstaltung in dem Bewusstsein ausrichten, dass wird uns verschulden oder lassen wir es sein. Wir entschieden uns für die erste Möglichkeit. Es war ein großes Opfer für die meisten von uns, aber es war eine sehr wichtige Entscheidung.

War FN2013 einfacher?

Ja man kann sagen, dass 2013 ein bisschen einfacher war. Mir war das zu Beginn des letzten Jahres nicht wirklich be-

A strong connection.

HARTING and Harting - we share much in common in terms of outperforming the competition. **Pushing Performance** means continuously reaching new heights and ensuring optimum achievement.

The **HARTING** Technology Group develops, manufactures and sells sophisticated solutions for the electrical and electronical industry. Over 3,500 employees in 37 national subsidiaries successfully collaborate worldwide.
HARTING is growing and is constantly on the lookout for new employees.

www.HARTING.com

Auszeichnung im Ludwig Erhard Preis 2009

Hermes Award 2006

Great Place to Work Institute Deutschland: Deutschlands Beste Arbeitgeber 2011

Die Fabrik des Jahres – Global Excellence in Operations – Produktion – A.T. Kearney – Kategorie-Sieger 2010 – Hervorragende Großserienfertigung

Klimaschutz Unternehmen – Die Klimaschutz- und Energieeffizienzinitiative der Deutschen Wirtschaft

that you have got what it takes, you should move forward and continue to strive for the best.

Were you able to introduce improvements in the 2013 event?
We tried to tackle all the points mentioned in teams' feedback. We trained our volunteers on track on important areas of the rules booklet, we invested in a grandstand, purchased new cones, etc. We introduced a media segment that included daily highlights which many of the teams enjoyed. Some

teams complained last year that they were bored during some parts of the day. So we introduced a Lectureship event and had speakers from the automotive and motorsports industry present. We had a local Cruiser club display their old-school muscle cars on one day and on another, we had a display of electric vehicles and conversions.

What is your vision for Formula North's future?
My vision is to elevate the experience we provide to participating students at Formula North - from the educational aspect to the track events.

Would you do it again?
I would regret it for the rest of my life if I didn't.

Thank you for the opportunity.

Cathy D'Souza
Event Manager, Formula North

wusst. Nach FN2012 war ich so ausgebrannt, dass ich meinen festen Job gekündigt habe und erst einmal als Volunteer zur FSG gefahren bin. Bis zu diesem Zeitpunkt war ich davon überzeugt, dass es kein FN2013 geben wird. Und wenn es nicht ein paar wirklich tolle FSG Organisatoren gegeben hätte, dann wäre es vielleicht auch so gekommen. Sie erklärten mir, dass jedes neue Wagnis am Anfang hart ist und man sich erst einmal selbst beweisen muss. Und wenn man sich bewiesen und der Welt gezeigt hat was man kann, sollte man nach vorne sehen und nach dem besten streben.

Wurden in 2013 beim Event Verbesserungen eingeführt?
Wir haben versucht alle Punkte, die uns die Teams als Feedback gegeben haben, anzugehen. Wir trainierten unsere freiwilligen Helfer auf der Strecke zu wichtigen Punkten des Regelwerks, investierten in eine Tribüne, kauften neue Pylonen usw. Wir führten einen Mediabereich mit täglichen Highlights ein, die viele der Teams genossen haben. Außerdem haben sich im letzten Jahr einige Teams darüber beklagt, dass sie während des Events manchmal gelangweilt waren. Aus diesem Grund führten wir eine Vortrags-Veranstaltung ein. Hier hatten wir Referenten aus der Automobil- und Motorsportindustrie zugegen. Außerdem gaben wir an einem Tag einem lokalen Cruiser-Club die Möglichkeit ihre alten Muscle-Cars zu zeigen und an einem anderen hatten wir eine kleine Ausstellung von Elektroautos und umgebauten Fahrzeugen.

Wie sieht die Zukunftsvision für die Formula North aus?
Meine Vision ist es unsere bisherigen Erfahrungen, die wir den teilnehmenden Studenten der Formula North bisher zur Verfügung stellen, weiter auszubauen – insbesondere vom aus- und weiterbildendem Aspekt der Rennveranstaltungen aus.

Würden Sie es wieder tun?
Ich würde es für den Rest meines Lebens bereuen, wenn ich es nicht wieder tun würde.

Danke für die Gelegenheit.

Cathy D'Souza
Event Manager, Formula North

PAT'S CORNER - MECCANO®

This picture will probably bring a smile of recognition to the faces of the older Design Judges at FSG, but may well get just a passing disinterested glance from the student competitors. They do not realise how important this toy was in the education of young engineers of an earlier generation!

This is what my box of Meccano looked when I was a boy.
So sah meine Meccano Box aus als ich ein kleiner Junge war.

When I was a kid this was my favourite toy! In those days Meccano was literally a box full of perforated metal strips, brackets, gears, wheels and nuts and bolts. What you constructed was entirely up to your own imagination, unlike the Meccano 'kits' sold today where you buy a pre-designed model and assemble it from the pieces supplied.

While building something from your imagination, there were lessons learned that would stay with you for life… starting with knowing which way to turn the spanner! (A private joke here… The mentor of so many of us senior Judges was Carroll Smith. He claimed that the Universities were turning out young engineers who could calculate the stresses in a bolt but didn't know which way to turn the spanner!)

I learned that when bolting together a structure, if I counted three holes along one arm and four holes down the other and put a five hole brace between those points, not only did I have a stiff, triangulated structure, but I also had a square right angle. This was many years before I ever heard of Pythagoras!

Beim Anblick dieses Bildes werden die älteren Design Juroren der FSG wahrscheinlich wissend lächeln, während die teilnehmenden Studenten es wohl höchstens beiläufig betrachten. Sie wissen nicht wie wichtig dieses Spielzeug für die Ausbildung einer früheren Generation von Ingenieuren tatsächlich war!

Dies war mein Lieblingsspielzeug als ich klein war. Früher war Meccano eine Box mit vorgestanzten Metallstreifen, Klammern, Zahnrädern, Rädern, Muttern und Schrauben. Damit konntest du deiner Fantasie freien Lauf lassen und alles bauen, was dir in den Sinn kam – im Gegensatz zu den Meccano „Sets", die heute auf dem Markt sind und mit denen man lediglich ein vorgefertigtes Modell nachbaut.

Während man etwas aus seiner Vorstellung heraus baute, lernte man seine Lektionen fürs Leben… angefangen damit, dass man herausfindet, in welche Richtung der Schraubenschlüssel gedreht werden muss! (Das ist ein Insider… Caroll Smith war Mentor von vielen von uns. Er war der Meinung, dass Universitäten junge Ingenieure ausbilden, die zwar die Spannung in einer Schraube berechnen können, aber nicht wissen, in welche Richtung sie den Schraubenschlüssel drehen müssen!)

Beim Zusammenschrauben einer Struktur habe ich gelernt: Wenn ich drei Löcher an einer Strebe und vier Löcher an einer anderen abzähle und eine 5-löchrige Strebe zwischen

We learned about Newton's Laws of Motion when all we knew about him was as an old Englishman who had an apple fall on his head! We learned about the orders of levers before we knew such things existed! We learned about geared reduction and RPM and Torque, you could have one or the other with the same electric motor, but not both.

These skills were learned intuitively and without conscious effort, yet the lessons remained subliminally with us forever. They made understanding the complexities of a formal engi-

diese Punkte stecke, bekomme ich nicht nur eine feste triangulierte Struktur sondern auch einen rechten Winkel. Das war lange bevor ich das erste Mal von Pythagoras gehört habe.

Wir haben Newtons Gesetz der Bewegung schon damals gelernt, als wir ihn nur als den alten Engländer kannten, dem ein Apfel auf dem Kopf fiel. Wir haben die Hebelgesetze gelernt bevor wir wussten, dass sie überhaupt existieren. Wir lernten von Übersetzungen und Drehzahlen im Dreh-

neering education much easier to grasp.

In the 21st century, young engineers 'play' with computers. There is nothing wrong with this and I am certainly not going to state that "Things were better in my day!" They weren't, they were just different.

So, why do I mention this?
Well, something I have noticed repeatedly over the years is the difficulty that many students have is 'seeing' load paths.

A good example of this is where many teams position the suspension bell-crank pivots on the chassis. They often do not see where the forces are going, assuming they will go 'around corners' without any vector forces incurred. This can be seen in the picture below where the designer hasn't taken into account the forces at the pivot which will bend the chassis tube. I think the 'Meccano' generation of engineers see this intuitively, whereas the computer engineers do not.

I will give you another example.
When I was young, I made my model differential from Meccano, today's young engineer models his in Solidworks or something similar.

So what is the difference? None, really.
Both models show how a differential works, what clearances are required, allow it to be viewed from all angles etc. But mine allowed me to pick it up, to touch it, to get a real 'feel' for it, something that cannot be done with its digital cousin.

Historically, there is a tenuous connection between Meccano and Computers.
In the 1930s, 'Differential Analysers' (mechanical computers) were built at Manchester and Cambridge Universities in the UK using only Meccano parts. I am sure the scholars there learned a lot about logic calculations that could be later incorporated in semi conductor devices. They also learned some practical engineering lessons!

Other skills learned as a youth using Meccano were related to tools and fasteners. The nuts and bolts supplied with the kits were rubbish, as were the tools. The threads were coarse (Whitworth?) and unsuitable for the application. The screws were soft with slotted heads and they burred easily. The nuts were stamped square items and turned by spanners stamped from sheet steel. Rubbish!

I quickly learned the value of quality fasteners with appropriate threads which were available from the local bicycle

moment, man kann das eine oder das andere aus einem elektrischen Motor erhalten, aber nicht beides.

Diese Fähigkeiten haben wir intuitiv und ohne Anstrengung erlernt, trotzdem lernten wir unterbewusst fürs Leben. Dadurch konnten wir die Komplexität der Ingenieurausbildung sehr viel einfacher greifen.

Im 21. Jahrhundert „spielen" junge Ingenieure mit Computern. Das ist nicht verkehrt und ich bin sicher nicht einer von denen, die sagen: „Früher war alles besser!" Das stimmt nicht, die Dinge waren einfach anders.

Nun, warum sage ich das?
Also, mir ist im Laufe der letzten Jahre aufgefallen, dass viele Studenten Schwierigkeiten haben, Lastpfade zu „sehen".

Ein gutes Beispiel ist die Stelle am Rahmen, auf die viele Teams die Drehpunkte ihrer Umlenkhebel platzieren. Sie erkennen oft nicht, wohin die Kräfte gehen und nehmen an, dass sie „um die Ecke" gehen, ohne die auftretenden Kraftvektoren zu berücksichtigen… Das kann man im Bild unten sehen. Hier hat der Designer nicht die Kräfte auf der Achse beachtet, die das Rahmenrohr biegen. Ich glaube, dass die Meccano-Generation von Ingenieuren das intuitiv erkennt, wohingegen die „Computer-Ingenieure" dies nicht erkennen.

Hier kommt ein weiteres Beispiel.
Als ich klein war, baute ich mir ein Differential mit Meccano, heute modellieren junge Ingenieure so etwas mit Solidworks oder ähnlichem.

Und was ist der Unterschied? Eigentlich gibt es keinen.
Beide Modelle zeigen, wie ein Differential funktioniert, welche Spiele notwendig sind, sie lassen sich von allen Seiten betrachten usw. Aber ich konnte mein Modell hochheben, anfassen, um ein richtiges Gefühl dafür zu bekommen. Das ist etwas, was man mit dem „digitalen Bruder" nicht machen kann.

Es gibt einen feinen Unterschied zwischen Meccano und dem Computer – seit jeher
In den 1930er Jahren wurden „Differential Analysierer" (mechanische Computer) an den britischen Universitäten Manchester und Cambridge nur aus Meccano-Teilen gebaut. Ich bin mir sicher, dass die Wissenschaftler dort sehr viel über logische Berechnungen lernten, die sie später in die Halbleiterteile einfließen ließen. Außerdem lernten sie Einiges über angewandte Ingenieurwissenschaften!

Zusätzlich eignete man sich mit Meccano früh weitere Fähigkeiten an, die mit der Nutzung und dem Einsatz von Werkzeugen oder Verbindungselementen zusammenhängen. Die Muttern und Schrauben, die im Meccano - Kasten mitgeliefert wurden, waren Schrott, so wie auch die Werkzeuge. Die Gewinde waren grob und nicht geeignet für die Anwendung. Die Schrauben waren weich mit geschlitzten Köpfen und somit schnell ausgelutscht. Die Muttern waren gestanzte rechteckige Objekte und wurden mit aus Blech gestanzten

LOCTITE®

Trouble with a cracked fender, or trying to secure a bolt against intense vibration? High-performance adhesives and sealants from global market leader Henkel can help even when things look just about impossible. Because they have the power to be in every car everywhere. Loctite offers complete product range and system solutions in the area of industrial adhesives and sealants, from design and product development to the production process and simulation tests.

At the Formula Student event, we not only offer you the opportunity to try out our fastest helpers. We also show you how to use them – either in your pit or at our stand. All you need to do is ask! As in previous years, our technical experts will be happy to share their expertise with all contestants and anyone else seeking advice.

And who knows? Making contact here might just be the first step to a career at Henkel. For more than 130 years, we have been among Germany's top employers. A global leader with brands and technologies in three business areas – Laundry & Home Care, Beauty Care and Adhesive Technologies – **Henkel is a great place to work, for young professionals too.**

Henkel Excellence is our Passion

www.henkel.com

shop and quality tools which were available from my father's toolbox until I could afford to get my own or until Santa Claus brought them to me. Those lessons have stayed with me for life and are reflected in the criticism I make of FS cars that are assembled using unsuitable tools on unsuitable fasteners, for instance, that Metric fasteners are not necessarily best!

These are certainly benefits that can never come from a 'virtual model'. The lack of ability to 'touch and feel' the model may result in the engineer becoming more remote from his production and it can be argued that as a result, much of the 'artistic' element of engineering is being lost.

But a counter argument says that the old truism that 'Something that looks good probably is good' has been shown to be nonsense. Computerised design sometimes results in components that look decidedly odd to experienced eyes, yet proves to perform better than a traditional design. We may bemoan the loss of drawing skills at the drawing board, but modern computerised engineering can turn out better drawings faster and with more adaptability. Sure, they may lack the artistic flourish that hand drawn documents might have had, but that was a luxury, not a necessity.

However, progress does not stand still and the ability to iterate a design rapidly in the computer is something we could not imagine years ago and the idea of simulations was also unheard of, so the computer engineer has the tools to make him a better engineer than we ever could be.

As a result, structures are stiffer, lighter and easier to make and as we watch the young engineers competing here we can rest assured the future of engineering is in good hands… virtually speaking.

But, despite those benefits, nothing beats the lessons learned through real hands-on experience so essentially, FSG is replacing the practical engineering skills originally thought with Meccano to an earlier generation!

And that is exactly why Formula Student Germany was established!

Pat Clarke
FSG Chief Design Judge

Schraubenschlüsseln gedreht. Richtig schlecht!

Ich lernte schnell den Wert von Qualitäts-Verbindungen mit geeigneten Gewinden kennen, die es im Fahrradladen bei mir um die Ecke gab, und Qualitäts-Werkzeug, das ich im Werkzeugkasten meines Vaters fand bis ich mir mein eigenes leisten konnte, bzw. bis ich es vom Weihnachtsmann geschenkt bekam. Diese Lektionen lernte ich fürs Leben und sie offenbaren sich in der Kritik, die ich an FS Autos übe, die mit ungeeigneten Werkzeugen und ungeeigneten Verbindungselementen gebaut werden. Zum Beispiel sind metrische Verbindungselemente nicht unbedingt die besten!

Dies sind mit Sicherheit Vorteile, die man nicht durch ein „virtuelles Modell" lernt. Dadurch, dass Ingenieure ihre Modelle nicht mehr anfassen und fühlen können, entfernen sie sich von ihren Produkten. Das bedeutet wahrscheinlich, dass das "künstlerische" Element der Ingenieurwissenschaften verloren geht.

Ein Gegenargument ist sicherlich, dass die Binsenweisheit „Alles, was gut aussieht, ist wahrscheinlich auch gut" Blödsinn ist. Durch computergesteuertes Design schaffen wir manchmal Komponenten, die ehrlich gesagt seltsam aussehen, aber dennoch besser funktionieren als im traditionellen Design. Wir können den Verlust von Fähigkeiten am Zeichenbrett bedauern, aber durch moderne, computergestützte Konstruktion bekommen wir bessere und schnellere Zeichnungen mit mehr Flexibilität. Sicherlich fehlt dann hier meist der künstlerische "Touch" von Hand-Zeichnungen, aber dieser ist nicht unbedingt notwendig.

Wie dem auch sei, Fortschritt steht nicht still und die Möglichkeit, ein Design im Computer schnell zu variieren, ist etwas, was wir uns vor einigen Jahren noch nicht vorstellen konnten. Auch hatte damals noch niemand von Simulationen gehört – der Ingenieur, der am Computer arbeitet, hat also die Möglichkeiten, ein besserer Ingenieur zu sein als wir es je hätten sein können.

Das Ergebnis ist: Strukturen sind steifer, leichter und einfacher herzustellen und während wir am Hockenheimring den jungen Ingenieuren zusehen, können wir sicher sein, dass die Zukunft der Ingenieurwissenschaften in guten Händen ist. …virtuell gesprochen.

Aber trotz aller Vorteile: Nichts schlägt die Lektionen, die man durch echte, praktische Erfahrungen lernt. FSG ersetzt die praktischen Konstruktions-Fähigkeiten, die eine ältere Generation ursprünglich durch Meccano gelernt hat.

Und genau aus diesem Grund wurde die Formula Student Germany ins Leben gerufen!

Pat Clarke
FSG Chief Design Judge

NMMU - PORT ELIZABETH (SOUTH AFRICA)

How did you learn about Formula Student and especially Formula Student Germany?
Our university is funded by the Volkwagen Chair in South Africa. They proposed that we start a project similar to Ostfalia University who were competing in Formula Student Germany. We liked this idea and decided to take part.

Why did you choose to participate in FSC/FSE?
After competing in FSC in 2011, we decided to compete in the FSE class. We wanted to be the first African team that is doing FS Electric. Additionally we wanted to increase our research and knowledge of electric vehicles for our university.

What are your goals for this competition?
Our goal for our first participation in FSE is not only to complete the event, but to compete with our international counterparts. We want to achieve the best result as possible.

Who supported you? Who did you ask for advice?
Our main support comes from our university, VW Racing, Continental and our local municipality. When we asked VW Racing and local suppliers for their advice, they were willing and happy to help us.

Did you ask other teams for advice? If so, how did they react?
We have a great collaboration with 2 German universities. We were first helped out by Ostfalia University, where a few of our team members went on exchange programmes and some of their students came to South Africa and helped to design our first car. Furthermore, we collaborate with UAS Ingolstadt. Three of our students went to Ingolstadt to assist them while building their first car. They especially gave us support in terms of building an electric car.

Was it easy to get support from your university? Was it easy to find sponsors?
To get sponsors was not easy, as we are competing for funding with many different projects on campus. But the University has been a major supporter in terms of finance. For our electric car it has been very difficult finding funds due to the expense of the batteries and motor, which we had to import, as the technology is new to South Africa.

What was the most difficult thing you had to manage on your way to your first participation?
Getting the finance. As we have a good design the components are hard to find in South Africa for an electric car.

Wie seid Ihr auf die Formula Student und insbesondere die Formula Student Germany aufmerksam geworden?
Unsere Universität wird durch Volkswagen Süd Afrika finanziell unterstützt. Sie schlugen uns vor ein Projekt ähnlich dem an der Hochschule Ostfalia aufzubauen, die an der Formula Student Germany teilnahmen. Uns gefiel diese Idee und wir beschlossen uns ebenfalls zu beteiligen.

Warum habt Ihr Euch für die Formula Student Combustion/ Electric entschieden?
Nach dem wir in 2011 an der Formula Student Combustion teilgenommen haben, beschlossen wir von nun an in der FSE Klasse anzutreten. Wir wollten das erste afrikanische Team sein, das an der FSE teilnimmt. Außerdem wollten wir die Forschungsaktivitäten und das Wissen zum Thema Elektrofahrzeuge an unserer Universität erhöhen.

Was sind Eure Ziele für den Wettbewerb, was wollt Ihr erreichen?
Unser Ziel für unsere erste Teilnahme an der FSE ist nicht nur in allen Disziplinen erfolgreich anzutreten, sondern mit den anderen internationalen Teams zu konkurrieren. Wir wollen unser Bestes geben!

Wer hat Euch unterstützt? Wen konntet Ihr um Rat fragen?
Der größte Anteil an Unterstützung kommt von unserer Universität, VW Racing, Continental und unseren Stadt. Als wir VW Racing und lokalen Firmen angesprochen haben, ob sie uns helfen, waren sie bereit und glücklich, uns zu helfen.

Habt Ihr andere Teams um Rat gefragt? Wenn ja, wie waren die Reaktionen?
Wir haben eine gute Zusammenarbeit mit 2 deutschen Hochschulen. Zuerst hat uns die Hochschule Ostfalia bei der Konstruktion unseres ersten Autos mitgewirt: einige unserer Team-Mitglieder waren im Rahmen eines Austauschprogrammes in Deutschland, und einige ihrer Studenten kamen nach Südafrika, um zu uns vor Ort zu unterstützen. Darüber hinaus arbeiten wir mit der Hochschule Ingolstadt zusammen. Drei unserer Studenten gingen nach Ingolstadt, um beim Aufbau ihres ersten Autos zu unterstützen, und sie haben uns im Gegenzug beim Bau unseres Elektroautos geholfen.

War es leicht, Unterstützung von der Hochschule und Sponsoren zu bekommen?
Es war nicht einfach Sponsoren zu finden, da wir mit vielen anderen Projekten auf dem Campus um finanzielle Unterstützung konkurrieren, die Universität ist dabei ein wichtiger Unterstützer in finanzieller Hinsicht. Für das Elektro-Auto war es ziem-

Describe your last year in one sentence.
Finding the finance!

Which advice would you like to give to new teams who prepare for their first participation?
Before you begin make sure you recruit an efficient team in all areas not just for the design of the car. The better the team, the better the performance.

lich schwierig die notwendigen Mittel für Batterien und Motor zusammenzubekommen, da diese importiert werden müssen, denn diese Technik ist in Südafrika nicht heimisch.

Was war das Schwerste auf dem Weg zu Eurer ersten Teilnahme?
Die Finanzen. Da wir ein komplexes Konzept haben, war es schwierig die Komponenten für das elektrische Auto in Südafrika zu bekommen.

Euer letztes Jahr in einem Satz:
Beschafft die Finanzen!

Welchen Tipp möchtet Ihr neuen Teams geben, die sich auf die erste Teilnahme an einem Wettbewerb vorbereiten?
Am Anfang steht die Rekrutierung des Teams: dieses muss in allen Bereichen leistungsfähig sein, nicht nur bezüglich Konstruktion und Fertigung des Autos. Denn je besser das Team ist, desto größer ist die Leistung.

GUIDED TOURS
FÜHRUNGEN

The simply staggering acceptance of the guided tours with almost 350 guided visitors, representatives of the press and sponsors as well as the throughout positive feedback of all tour participants will again be aimed to achieve during Formula Student Germany 2013. For this purpose the "Formula Student Basic Tour" will be offered again for all interested visitors, sponsors and press.

Formula Student Basic Tour
The 45-minute Formula Student Basic Tour offers a comprehensive insight into Formula Student Germany with its two vehicle classes, the Formula Student Combustion and the Formula Student Electric. Additional to the explanation of basic idea and competition history the interested visitor gets an overview of the different static and dynamic disciplines. While visiting the scrutineering and touring the pit lane, the participants get the chance to soak up the unique atmosphere of the competition and to discuss the characteristics of the different racecars. The focus towards electro or combustion racecars will be adjusted individually as requested by the tour group.

The starting point for each guided tour is the info counter inside the FSG Forum. There you will also find schedules with all times and dates for guided tours.

Die Überwältigende Annahme des Führungsangebots von beinahe 350 geführten Besuchern, Pressevertretern und Sponsoren im Jahr 2012 und die durchweg positive Resonanz aller Teilnehmer soll auch bei der Formula Student Germany 2013 erreicht werden. Hierfür gibt es auch in diesem Jahr für interessierte Besucher, unsere Sponsoren und die Pressevertreter die „Formula Student Basic Tour".

Formula Student Basic Tour
Während der 45-minütigen Formula Student Basic Tour erhalten die Führungsteilnehmer einen umfassenden Einblick in die Formula Student Germany mit ihren zwei Fahrzeugklassen, der Formula Student Combustion und der Formula Student Electric. Neben der Darstellung von Grundidee und Historie des Events, werden die verschiedenen dynamischen und statischen Disziplinen des Wettbewerbs erläutert. Beim Besuch der technischen Abnahme und dem Gang durch die Boxengasse bekommen die Teilnehmer die Möglichkeit die besondere Atmosphäre der Veranstaltung aufzusaugen und sich die Besonderheiten der einzelnen Klassen und Fahrzeuge hautnah erläutern zu lassen. Ob der Fokus einer jeden Führung eher auf Verbrennungs- oder Elektrofahrzeugen gelegt werden soll, kann von der Besuchergruppe individuell entschieden werden.

Der Startpunkt für die Führungen befindet sich am Infocounter im FSG Forum. Hier können auch die Startzeiten einer jeden Führung eingesehen werden.

Tognum

HOME OF POWER BRANDS

For the third time in a row, Tognum provides a special price for engineering spirit at this year's FSG. In which field do the awarded teams excel?

a) engine and transmission

b) drive shaft

c) whole powertrain system

d) all are possibilities

Empower your Career

Find us on Facebook

Thinking ahead – getting ahead.

Our 10,000-strong workforce transforms fascinating ideas into powerful technology – from 10,000 kW diesel engines to climate-friendly cogeneration plants. Comprising the MTU and MTU Onsite Energy brands, Tognum is one of the world's leading suppliers of engines, complete propulsion systems, and distributed energy solutions. Innovative fuel-injection systems from L'Orange round off our drive technology portfolio. Join in as we move the world!

Whether you want to start your career, join a trainee program, do an internship, or write your thesis: At Tognum, we have an offer for you. Find out more on our website or on our Facebook site: www.facebook.com/tognum.

Welcome to Tognum in Friedrichshafen, Germany.

We look forward to hearing from you.

Tognum AG • HR Marketing • Regine Siemann • Maybachplatz 1 • D-88045 Friedrichshafen
regine.siemann@tognum.com • phone +49 (0) 7541 / 90-6513

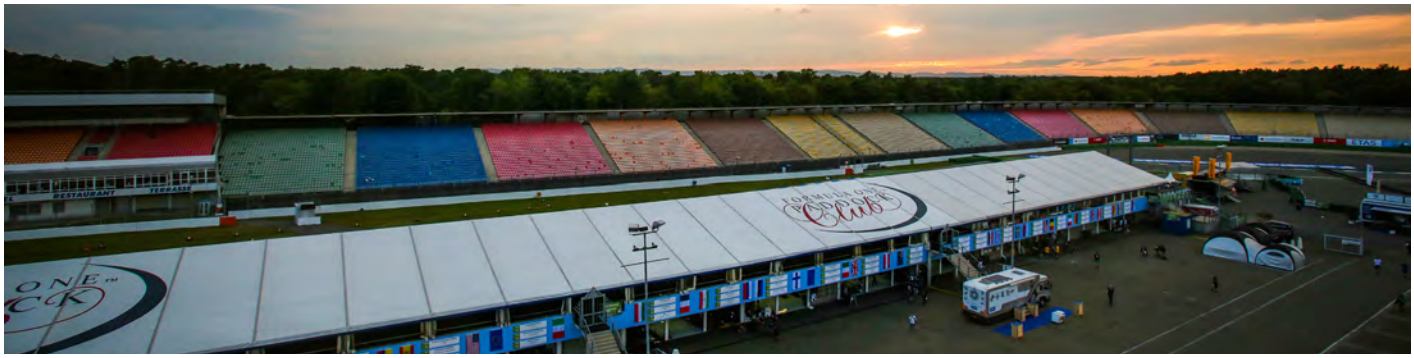
mtu

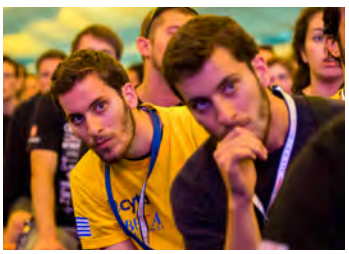
mtu onsite energy

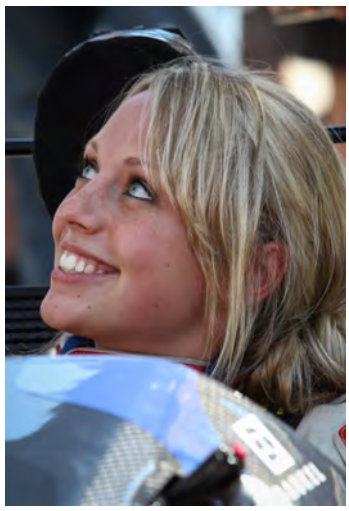
L'orange
YOUR POWERFUL INJECTION

www.tognum.com

FSG 2012 - IMPRESSIONS
FSG 2012 - IMPRESSIONEN



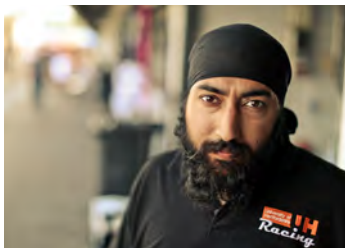






Hoosier





IH
Racing













NO STANDING
AREA





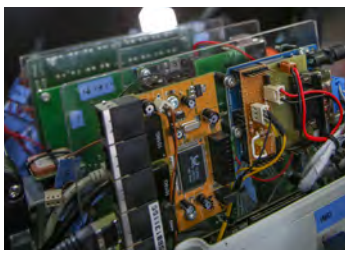

Hansestadt
Stralsund


RMANY 2012
CREATING A


MAHLE


ETAS


54
62
E26
35

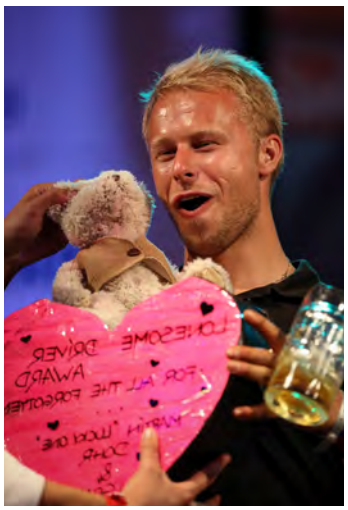



RECREATION AREA


E37


DANGER
High voltage


Formula Student Electric
Champion




MAHLE
PARTY


TU GRAZ

Our special thanks goes to Harald Almonat, Ingo Reichmann Klaus Scheuplein, Ole Kroeger, Pierre Buck, Richard Grams for the amazing photos of FSG 2012.

Unser spezieller Dank gilt Harald Almonat, Ingo Reichmann Klaus Scheuplein, Ole Kroeger, Pierre Buck, Richard Grams, die diese Impressionen von der FSG 2012 in Bildern festgehalten haben.

More pictures on: media.formulastudent.de
Mehr Bilder unter: media.formulastudent.de

IMPRINT

Formula Student Germany Programme 2013

Publisher
Formula Student Germany e.V.

Editorial
Johanna Scheider
scheider@formulastudent.de
Julien van Campen
vancampen@formulastudent.de

Design
Daniel Mazur
mazur@formulastudent.de

Translation
Johanna Scheider
Ann-Christin Bartölke
Julien van Campen

Proofreading
Johanna Scheider
Lena Töppich

Photos*
Formula Student Germany:
Harald Almonat
Ingo Reichmann
Klaus Scheuplein
Ole Kroeger
Pierre Buck
Richard Grams
* if without reference; excluding team profiles

Team profiles
Text and pictures provided by the teams (June 2013)

Advertising
mazur | events + media
Daniel Mazur
Niedersachsenstr. 8
D-30853 Langenhagen
Mobile: +49 (175) 5085001
Phone: +49 (511) 2351-8890
Fax: -8891
mazur@formulastudent.de

Print, Processing
Maul-Druck GmbH
Senefelderstraße 20,
D-38124 Braunschweig
Printed on acidfree and chlorine-free bleached paper.

Print run
8,000 copies

Date of publication
30th of July 2013

Disclaimer
The publisher reserves the right not to be responsible for the topicality, correctness, completeness or quality of the information provided by third parties.

Further information
www.formulastudent.de
contact@formulastudent.de

IMPRESSUM

Formula Student Germany Programm 2013

Herausgeber
Formula Student Germany e.V.

Redaktion
Johanna Scheider
scheider@formulastudent.de
Julien van Campen
vancampen@formulastudent.de

Gestaltung
Daniel Mazur
mazur@formulastudent.de

Übersetzung
Johanna Scheider
Ann-Christin Bartölke
Julien van Campen

Korrektur
Johanna Scheider
Lena Töppich

Fotos*
Formula Student Germany:
Harald Almonat
Ingo Reichmann
Klaus Scheuplein
Ole Kroeger
Pierre Buck
Richard Grams
* wenn ohne Angabe; Teamprofile ausgenommen

Team-Profile
Text und Bilder bereitgestellt von den Teams (Juni 2013)

Anzeigen
mazur | events + media
Daniel Mazur
Niedersachsenstr. 8
D-30853 Langenhagen
Mobile: +49 (175) 5085001
Phone: +49 (511) 2351-8890
Fax: -8891
mazur@formulastudent.de

Druck, Verarbeitung
Maul-Druck GmbH
Senefelderstraße 20,
D-38124 Braunschweig
Gedruckt auf säurefreiem und chlorarm gebleichtem Papier.

Auflage
8.000 Exemplare

Erscheinungstermin
30. Juli 2013

Haftungsausschluss
Der Herausgeber übernimmt keinerlei Gewähr für die Aktualität, Korrektheit, Vollständigkeit oder Qualität der von Dritten bereitgestellten Informationen.

Weitere Informationen
www.formulastudent.de
contact@formulastudent.de

PARTICIPATING FSC TEAMS 2013
TEILNEHMENDE FSC TEAMS 2013

Car	City / University	Country	Pit	Page
1	Stuttgart U	Germany	34	87
2	München TU	Germany	64	80
3	Göteborg Chalmers	Sweden	4	66
5	Rochester IT	United States	33	83
6	Hatfield UH	United Kingdom	22	68
7	Montréal ETS	Canada	36	78
10	Ann Arbor U MI	United States	16	54
11	Corvallis OSU	United States	28	61
12	Loughborough U	United Kingdom	51	73
13	Wuppertal U	Germany	29	90
15	Glasgow U Strath	United Kingdom	9	65
16	Edmonton U Alberta	Canada	2	62
17	Trondheim NTNU	Norway	53	88
18	Chennai IITM	India	50	60
19	Roma U Sapienza	Italy	13	84
20	Magdeburg OvGU	Germany	72	74
21	Heilbronn U	Germany	20	69
22	Gießen UAS THM	Germany	47	65
23	Bath U	United Kingdom	73	55
24	Liverpool U	United Kingdom	24	72
25	Mumbai Somaiya	India	17	79
26	Krefeld HSNR	Germany	65	71
27	Rom U Tor Vergata	Italy	43	84
29	Graz TU	Austria	27	66
30	Karlsruhe KIT	Germany	21	70
31	Navi Mumbai BVCOE	India	37	80
32	Liverpool LJMU	United Kingdom	41	72
33	Prague CTU	Czech Republic	70	82
34	Białystok TU	Poland	8	57
36	Dortmund UAS	Germany	62	62
37	Modena UNIMORE	Italy	25	77
38	Berlin UAS	Germany	48	56
40	Graz UAS	Austria	26	67
41	Wien TU	Austria	35	90
42	Aachen RWTH	Germany	58	52
43	Konstanz UAS	Germany	54	71
46	Regensburg UAS	Germany	46	83
47	Uxbridge U Brunel	United Kingdom	55	88

Car	City / University	Country	Pit	Page
48	Bochum U	Germany	23	57
49	Erlangen U	Germany	45	64
50	Akron U	United States	19	53
51	Alexandria U	Egypt	31	53
52	Moscow MAMI	Russia	61	79
53	Berlin TU	Germany	63	56
55	Bari PT	Italy	18	54
57	Metz ENIM	France	74	77
58	Paderborn U	Germany	69	81
59	Weingarten UAS	Germany	44	89
60	Mannheim UAS	Germany	14	76
61	Beijing THU	China	5	55
62	Indore SGSITS	India	42	69
63	Aachen UAS	Germany	38	52
64	Zagreb U	Croatia	32	91
65	Weihai HIT	China	60	89
66	Shanghai Tongji U	China	59	86
67	Shiyan HUAT	China	3	86
68	Patiala U Thapar	India	6	82
69	Hamburg UAS	Germany	57	67
70	Coburg UAS	Germany	10	60
71	Maribor U	Slovenia	49	76
72	Dortmund TU	Germany	75	61
73	Montréal U McGill	Canada	12	78
74	Brno TU	Czech Republic	7	59
77	Seattle U Washington	United States	68	85
81	Stralsund UAS	Germany	39	87
84	Hannover UAS	Germany	1	68
86	Madrid TU	Spain	66	73
87	Cardiff U	United Kingdom	71	59
88	Bologna U	Italy	67	58
92	Oxford Brookes U	United Kingdom	56	81
94	Esslingen UAS	Germany	40	64
96	Manipal U	India	30	74
97	Schweinfurt UAS	Germany	15	85
99	Karlsruhe UAS	Germany	11	70
104	Bratislava TU	Slovakia	52	58

Innovative ideas require people willing to venture into new directions. People determined to reach their destination and move beyond. From the optimization of existing technologies to the development of new technologies, MAHLE is the leading global manufacturer of components and systems for the internal combustion engine and its peripherals. Our company has successfully developed and produced future-oriented solutions for well-known customers for many years – building on the expertise and skills of approximately 48,000 employees at over 100 production plants and 7 research and development centers. Today, our products can be found in every other car worldwide. Our excellent market position will benefit you, also: We offer you a work environment that thrives on fast decision-making and individual freedom which values each individual’s performance. Seize this opportunity and let your drive shape our future.

www.jobs.mahle.com

MAHLE

Driven by performance

PARTICIPATING FSE TEAMS 2013
TEILNEHMENDE FSE TEAMS 2013

Car	City / University	Country	Pit	Page
E1	Delft TU	Netherlands	E30	97
E6	München TU	Germany	E31	106
E7	Osnabrück UAS	Germany	E37	107
E10	Ravensburg DHBW	Germany	E11	109
E11	Odense SDU	Denmark	E40	107
E12	Köln UAS	Germany	E16	103
E13	Hannover U	Germany	E22	100
E14	Deggendorf UAS	Germany	E36	96
E15	Bayreuth U	Germany	E20	94
E17	Dresden TU	Germany	E9	98
E19	Braunschweig TU	Germany	E17	95
E21	Madrid TU	Spain	E14	104
E22	Amberg UAS	Germany	E26	92
E23	Hamburg TU	Germany	E24	100
E25	Saarbrücken U Saarland	Germany	E12	109
E26	Stuttgart U	Germany	E1	111
E27	Port Elizabeth NMMU	South Africa	E38	108
E31	Ilmenau TU	Germany	E5	101
E33	Zürich ETH	Switzerland	E2	113
E34	Ingolstadt UAS	Germany	E19	101

Car	City / University	Country	Pit	Page
E35	Wolfenbüttel UAS Ostfalia	Germany	E21	112
E40	Eindhoven TU	Netherlands	E34	99
E44	Stuttgart DHBW	Germany	E4	110
E50	Lisboa IST	Portugal	E10	104
E53	Kiel UAS	Germany	E3	103
E54	Barcelona UPC	Spain	E27	94
E56	Darmstadt UAS	Germany	E25	96
E64	Turin PT	Italy	E39	111
E66	Duisburg U	Germany	E33	98
E67	Augsburg UAS	Germany	E23	92
E69	Diepholz UAS	Germany	E29	97
E76	Freiberg TU	Germany	E18	99
E86	Patras U	Greece	E15	108
E96	Zwickau UAS	Germany	E32	113
E99	Siegen U	Germany	E6	110
E101	Darmstadt TU	Germany	E7	95
E104	Wiesbaden UAS	Germany	E28	112
E106	Kaiserslautern TU	Germany	E35	102
E110	München UAS	Germany	E13	106
E121	Karlsruhe KIT	Germany	E8	102

With a trained eye and a flexible outlook, you've got the future in sight.

EXPLORING UNCHARTED TERRITORY IS NO DESK JOB.

SHARE YOUR PASSION FOR INTERDISCIPLINARY WORK.

At the BMW Group, the future is reinvented every day. With specialists who are sure-footed enough to confidently go beyond the beaten path. In flexible teams, where intellect and intuition combine to create solutions that have never before been imagined. Discover excellent development opportunities with the BMW Group engineering team. Join us and shape the future of automotive design. We want to enter the future even stronger, so our team in Munich is currently seeking **Development engineers** specialised in:

– Electric drivetrains
– Power electronics
– Electric machines
– High-volt storage
– Electro-chemical cell research
– Fuel-cell technology
– Lightweight design

Your skills and your experience will help us to get exceptional ideas and innovations off the drawing board and onto the road. Redefine mobility with us.

You can apply for this position online at www.bmwgroup.jobs. Here, you can also find out more about BMW as an employer, our various entry programmes and other job opportunities. Alternatively, you can scan the QR code to directly access our application system.

www.facebook.com/bmwkarriere

BMW GROUP
Recruiting

Rolls-Royce
Motor Cars Limited

AACHEN
RWTH Aachen University

Car 42 Pit 58

Germany

Having built our 10th combustion car in our team history, we can proudly present our jubilee team this year. This year we reached for higher goals, trying to improve our results from the last years and to create a special anniversary gift to ourselves. Usually studying at the University of Aachen in western Germany, a part of our frame group spent half a year designing and building our frame in Salzburg (Austria) at one of our sponsors. The largest part of the team worked in our home city Aachen, coordinating the events and building all other technical parts of the eac10, the ecurie aix car no. 10. Regarding the highly improved results on the test block, the accurately planned suspension and smart constructed frame, we hope to be able to put our hard work into success. Lots of work, lots of fun and not least grown friendships now culminate in a great event at Hockenheim that we are looking forward to.

FRAME CONSTRUCTION Monocoque and Rearframe

MATERIAL CFRP

OVERALL L / W / H (mm) 3040 / 1440 / 952

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1250 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 118 / 145

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 205x70 R13, Hoosier R25B

WHEELS (Fr / Rr) 7x13,-25mm offset, 1 pc Al Rim

ENGINE Modified Kawasaki ZX600R-9F

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13,3:1

FUEL SYSTEM self-designed rail & footings, Conti twin-spray injectors, aftermarket fuel pump

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 12000

MAX TORQUE DESIGN (rpm) 10500

DRIVE TYPE chain

DIFFERENTIAL Drexler clutch pack limited slip, adjustable preload

COOLING side pod mounted single core crossflow radiator, 625 cfm fan behind the radiator

BRAKE SYSTEM 4-Disk system, self developed rotors with 240mm/220mm diameter, adjustable brake balance

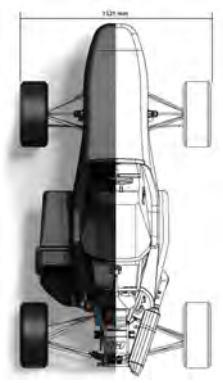
ELECTRONICS switch currents by self-designed fusebox,Shift without Lift,traction control, Live-Telemtry via WLAN

AACHEN
University of Applied Sciences Aachen

Car 63 Pit 38

Germany

Aixtreme Racing represents the UAS Aachen in Formula Student events. Founded in May 2007 and consisting of around 30 members, the team now comprises 40 students from the departments mechanical and electrical engineering, computer science and design. The AIX FS613 is designed with a huge focus on the teams future. We tried to keep the car very simple to create a good base for the following cars of Aixtreme Racing. The decision to do without any kind of aerodynamics in this design step led us to our very ruduced bodywork. Further significant design changes were done in the field of drivers working place. We switched from a three pedal to a two pedal System to give our drivers a more defined feeling and an more comfortable of their legs as well. The new seat, which has a very simple basic configuration, with an additional individual foam pad for every driverwill continue this design direction. We are looking forward to the challenges that are still to come.



FRAME CONSTRUCTION Tubular frame structure and CNC aluminum subframe

MATERIAL 4130 steel round tubing 16mm to 25.4mm and Aluminum (2A12) CNC

OVERALL L / W / H (mm) 2803 / 1521 / 1034

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1750 / 1250 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 135 / 165

SUSPENSION Double A-Arms with push-rod actuated vertical orientated coilspring and damper

TYRES (Fr / Rr) 20.5x7.0-13, Hoosier R25B (Dry) / 21.0x6.5-13, Hoosier (Wet)

WHEELS (Fr / Rr) 7.0×13, 114.3mm offset, 1 pc Al Rim

ENGINE 2005 Yamaha R6 (RJ09)

BORE / STROKE / CYLINDERS / DISPLACEMENT 65mm / 45mm / 4 cylinders / 597cc

COMPRESSION RATIO 12,4:1

FUEL SYSTEM Purchased fuel injection System with sequential injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 12000

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE Chain Drive with original gearbox

DIFFERENTIAL Drexler torque sensitive limited slip differential. Clutch style.

COOLING Side mounted custom made radiator. Core size 0.09 m^2. 225mm electrical fan.

BRAKE SYSTEM 4-Disk system, adjustable brake balance.

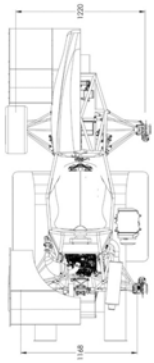
ELECTRONICS Wiring harness sealed to IP67. RPM-Display as colored LED-Bar, electronic shifting pedals

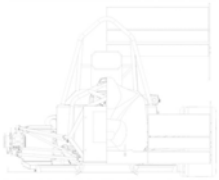
AKRON
University of Akron

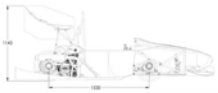
Car 50 Pit 19

United States

For the 2013 season, Zips Racing has revolutionized their design philosophy to create a world class competitive car. The team focussed on implementing new ideas and technology in ways never accomplished before. The product is a vehicle that is both elegant and technologically advanced. This vehicle is sure to carry Zips Racing to new levels of worldwide achievement.







FRAME CONSTRUCTION Steel space frame w/hybrid composite stressed panels

MATERIAL 4130, CFRP, Ti, Al, Plastic

OVERALL L / W / H (mm) 3020 / 1220 / 1145

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1220 / 1168

WEIGHT WITH 68kg DRIVER (Fr / Rr) 114 / 114

SUSPENSION Double unequal/non parallel wishbone. Pullrod actuated coilover.

TYRES (Fr / Rr) 18x6.0 R10 Hoosier LCO/18x6.0 R10 Hoosier LCO

WHEELS (Fr / Rr) 7.0x10, 50mm offset, 3pc Al Rim/7.0x10, 50mm offset, 3pc Al Rim

ENGINE Modified Yamaha WR450F

BORE / STROKE / CYLINDERS / DISPLACEMENT 95.0mm / 63.4mm / 1 cylinders / 450cc

COMPRESSION RATIO 14,0:1

FUEL SYSTEM Sequential injection and ignition

FUEL E85

MAX POWER DESIGN (rpm) 9500

MAX TORQUE DESIGN (rpm) 6500

DRIVE TYPE Chain drive, Drexler FS Differential

DIFFERENTIAL Salisbury Limited Slip w/TBR adjustable

COOLING Single side mounted radiator with controlled fan

BRAKE SYSTEM 4-Disk system, adjustable brake balance, ISR calipers

ELECTRONICS M400, ACL, Electropneumatic shifting, TC,

ALEXANDRIA
University of Alexandria

Car 51 Pit 31

Egypt

Alexandria University Motorsports (AUM) is a highly motivated team that aims to design a simple, functional and reasonable cost car and take part in FSG 2013. Enriching members' knowledge and practical experience is a major goal of our team along with teaching them team work. AUM 2013's car has new design objectives on the team and differs a lot from 2010 and 2012 car. Aerodynamic devices, Vehicle dynamics data acquisition system and many other things make this car an important shift in the team's career. To achieve light weight concept while maintaining stiffness we use materials like 4130 steel, 2024-T4 aluminum and composite material. Suspension Geometry and chassis dimensions have selected carefully to ensure the driver's comfort, car stability and smooth operation at all driving conditions.

FRAME CONSTRUCTION Tubular space frame Chassis

MATERIAL AISI 4130 Chromoloy steel, 25.4mm outer diam., Thickens varies from 1.25 to 2.4mm

OVERALL L / W / H (mm) 3122 / 1450 / 1113

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1250 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 127 / 138

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 183/71 R13 AVON / 183/71 R13 AVON

WHEELS (Fr / Rr) 6x13, 35 mm offset, 1 pc Advanti Al Rim / 6x13 35 mm offset, 1 pc Advanti Al Rim

ENGINE 2007 Suzuki GSX-R600.

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.5:1

FUEL SYSTEM OEM ECU with fuel module, Two banks sequential injection and sequential ignition

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 7000

MAX TORQUE DESIGN (rpm) 6500

DRIVE TYPE 6-speed sequential gear box, 520 chain

DIFFERENTIAL Quaife torque sensing helical gear LSD

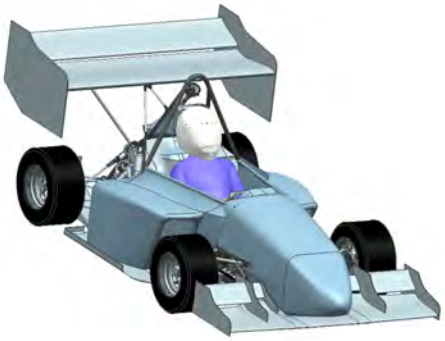
COOLING Side pod mounted radiator with thermostatic controlled electric fan

BRAKE SYSTEM 4 disc system, Honda CBR 100 rear rotors with 220 mm OD and 115 mm ID, hub mounted

ELECTRONICS Electric shifting system, OEM Wiring Harness,Digital self built dash board, students made DAQ

ANN ARBOR

University of Michigan - Ann Arbor



This is the 27th season for MRacing, and after a successful season last year the team decided to go the route of BFWs. As a first year aero team we look forward to proving that mad down-pounds is the way to go. Shake and bake baby!

Car 10 Pit 16

United States

FRAME CONSTRUCTION Tubular steel space-frame

MATERIAL 4130 Chrome Moly

OVERALL L / W / H (mm) 2839 / 1459 / 1103

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1206 / 1181

WEIGHT WITH 68kg DRIVER (Fr / Rr) 122 / 138

SUSPENSION Double unequal length A-Arm. Push/pull rod actuated spring/damper. Adj. T-/ U-type roll bars

TYRES (Fr / Rr) 18x7.5-10 Hoosier R25B

WHEELS (Fr / Rr) 18x7.5-10 Hoosier R25B

ENGINE Honda CBR 600 RR

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.2:1

FUEL SYSTEM Bosch multipoint port, closed loop

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 10500

MAX TORQUE DESIGN (rpm) 9200

DRIVE TYPE 520 chain

DIFFERENTIAL Drexler clutch-type limited slip, adj. ramp angles

COOLING Side pod-mounted radiator (330mm x 254mm) with thermostatic electric fan (254mm)

BRAKE SYSTEM Floating HSLA-80 hat-mounted rotor w/ ISR 4-piston front and wilwood 2-piston rear calipers

ELECTRONICS Bosch MS 4.4 ECU, C40 data logger w/ traction control, launch control, and no-lift shift

BARI

Polytechnic University of Bari

We are a group of students moved by the same fiery passion and we understand that any teaching would besterile if he had not been fulfilled. This is the idea behind the adventure started back in 2006 by some guys of the Polytechnic of Bari. Coming aware of the Formula SAE, they decided to encountering the same. Thus was born the Poliba Corse. In the coming years, the team has been able to count on the support of fifteen members, growing further in the academic year just past, and with satisfactions and defeats we kept this dream alive. The skills required, as we understand, are very different and apply to all fields of engineering, with only one purpose: the construction of a vehicle, year after year, more and more efficient. The word „static" certainly does not belong to the vocabulary of the team: the challenge would otherwise be lost in departure. That's why the project PolibaCorse is synonymous of dynamism: the evolution is the fundamental step to make it better.

Car 55 Pit 18

Italy

FRAME CONSTRUCTION Tubolar space frame

MATERIAL 25CrMo4

OVERALL L / W / H (mm) 3130 / 1495 / 1130

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1680 / 1250 / 1230

WEIGHT WITH 68kg DRIVER (Fr / Rr) 145 / 158

SUSPENSION Double unequal length A-Arm.Push rod actuated longitudinally oriented spring and damper.

TYRES (Fr / Rr) 180x510 R13, Bridgestone YGS

WHEELS (Fr / Rr) 13"x8"; 0.25" positive offset; 3 pc Mg-Al Rim centerlock

ENGINE Honda CBR 600 F4i Sport 2001

BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12:1

FUEL SYSTEM EFI Technology EURO2 with sequential injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 9800

MAX TORQUE DESIGN (rpm) 8000

DRIVE TYPE 15.87 mm x 6.35 mm non sealed chain

DIFFERENTIAL clutch pack limited slip, 35 Nm preload, 4 bias ratio

COOLING left sided pod-mounted radiator with thermostatic controlled electric fan

BRAKE SYSTEM Brembo floating disc, tempered stainless steel, hub mounted, 218mm diam. 4 pistons x 1" dia. Caliper

ELECTRONICS Multifunctional Steering Wheel, Electropneumatic Shifting System, Student made datalogger &Telemetry

BATH
University of Bath

Car 23 Pit 73

United Kingdom

Team Bath Racing have high hopes for their 13th entry into Formula Student. For the first time, a CFRP monocoque and rear steel space frame chassis forms the foundation of the TBR13 vehicle. Coupled a lightweight Aprilia 55RX powertrain, the team believe that they have the perfect balance between innovation and reliability, in a package that is not only lighter but also considerably stiffer than the previous 2012 Team Bath Racing entry. As well as the move to a hybrid composite chassis, advancements in vehicle aerodynamics, vehicle dynamics and powertrain systems such as variable intake geometry mean that the team of 25 engineers are developing upon the success of vehicles from previous years to ensure that they remain one of the top Formula Student teams in the UK. The advancements made by Team Bath Racing have remained possible due to the continued support of our sponsors.

FRAME CONSTRUCTION Hybrid one-piece composite sandwich panel front monocoque with rear space frame

MATERIAL Hexcel M21 CFRP and 16.8mm aluminium honeycomb, 4130 steel tubing

OVERALL L / W / H (mm) 2845 / 1324 / 1194

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1535 / 1118 / 1050

WEIGHT WITH 68kg DRIVER (Fr / Rr) 114 / 114

SUSPENSION Front Pull and Rear Push Rod, SLA Double Wishbones. Coil over Ohlins Dampers, Anti-roll Bar

TYRES (Fr / Rr) Hoosier 18.0/6.0-10 LC0

WHEELS (Fr / Rr) 2 piece - CFRP and Aluminium Centre, 10" x 6.5"

ENGINE Aprilia 55RX

BORE / STROKE / CYLINDERS / DISPLACEMENT 80mm / 55mm / 2 cylinders / 553cc

COMPRESSION RATIO 12.5:1

FUEL SYSTEM Stock Aprilia Injectors with Sequential Injection

FUEL 99 RON unleaded gasoline

MAX POWER DESIGN (rpm) 9500

MAX TORQUE DESIGN (rpm) 7000

DRIVE TYPE 420 Chain Drive

DIFFERENTIAL Drexler V3 Limited Slip Differential

COOLING Side mounted radiator, electric water boost pump, smart thermostat valve, oil-water heat exchanger

BRAKE SYSTEM Floating, Steel, Front 180mm dia. (hub mounted), Rear 160 mm dia. (Inboard)

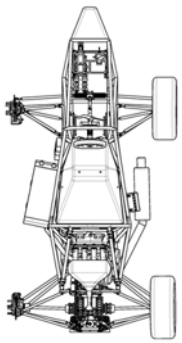
ELECTRONICS Pectel SQ6 ECU, Omega D4 Dash Display.

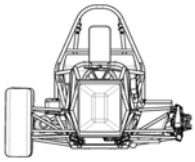
BEIJING
Tsinghua University

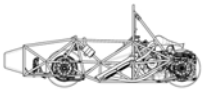
Car 61 Pit 5

China

THU Racing is a first year competitor in the Formula Student Germany competition while the team has three years' experience in taking part in the Formula Student China competition. After the review of the design and results of the past two races, the team carried out the brand new THR04 which inherited the tradition of excellent safety while embracing a further enhancement of power, agility and reliability, drivability as well.







FRAME CONSTRUCTION Steel tube space frame with Aluminium sub-frame

MATERIAL SAE4130 , 2A12 Aluminium

OVERALL L / W / H (mm) 2880 / 1378 / 1124

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1598 / 1210 / 1170

WEIGHT WITH 68kg DRIVER (Fr / Rr) 160 / 160

SUSPENSION Double unequal length A-Arms. Pull/Push-rod actuated horizontal orientated coilspring and damper

TYRES (Fr / Rr) 20.5x7.0-13 Hoosier R25B/20.5x7.0-13 Hoosier R25B

WHEELS (Fr / Rr) 7.0×13, 114.3mm offset, 3 pc Al (Keizer) / 7.0×13, 114.3mm offset, 3 pc Al (Keizer)

ENGINE Honda CBR600RR

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12:1

FUEL SYSTEM Purchased fuel injection sequential

FUEL RON95 gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE 5 gear sequential

DIFFERENTIAL Torsen LSD

COOLING leftside mounted radiator equiped with one fan two fans

BRAKE SYSTEM Wilwood, 19 mm bore front & rear, adjustable bias bar,260-3374

ELECTRONICS 2D Datalogger with High-Speed CAN-Bus, 8 analog, 3 dig. inputs, gps & gyroscope

BERLIN
Technische Universität Berlin

Car 53 Pit 63

Germany

FaSTTUBe´s 8th car, the FT2013, unites revolution and evolution. After changing the overall-concept from a four-cylinder engine to a single-cylinder engine in 2012, the FT2013 is the next step of our new concept. The revolutionary part of the car is the completely new developed 10"-wheel suspension. The evolution is clearly evident in the drivetrain, the air-intake system, the exhaust-system, the vehicle control units, the engine mapping and the lightweight concept. Still, we have nothing to hide: our aim was to maintain our high manufacturing-quality and the transparent bodywork, allowing spectators to have a look at the car´s technology. FT2013 - built out of experience, knowledge, passion and dedication. Because racing is a state of mind.

FRAME CONSTRUCTION Tubular Space Frame

MATERIAL 25CrMo4 steel round tubing

OVERALL L / W / H (mm) 2661 / 1406 / 1118

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 124 / 124

SUSPENSION Double unequal length carbon tube A-Arm. Push rod actuated 4-way adjustable dampers

TYRES (Fr / Rr) 6.0/18.0-10 Hoosier LCO

WHEELS (Fr / Rr) 6.0x10, 25.4mm offset, 3 pc AL Rim / 6.0x10, 25.4mm offset, 3 pc AL Rim

ENGINE 2007 BMW G 450 X

BORE / STROKE / CYLINDERS / DISPLACEMENT 98.0mm / 59.6mm / 1 cylinders / 450cc

COMPRESSION RATIO 12.0:1

FUEL SYSTEM ECU with sequential injection and ignition, adhesive bonded fuel tank

FUEL RON 98

MAX POWER DESIGN (rpm) 10800

MAX TORQUE DESIGN (rpm) 8000

DRIVE TYPE Chain drive, original gearbox

DIFFERENTIAL Drexler differential, limited slip

COOLING ne side pod mounted radiator with water temperature controlled electric fan

BRAKE SYSTEM Floating discs, 193mm(front) & 163mm(rear) diameter, 4 callipers, adjustable brake balance

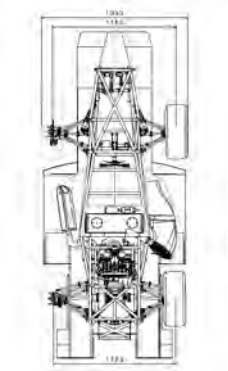
ELECTRONICS multifunctional steering wheel, electropneumatic shifting system, selfdesigned live-telemetry system

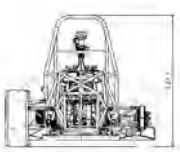
BERLIN
University of Applied Sciences Berlin

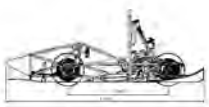
Car 38 Pit 48

Germany

HTW Motorsport – the Formula Student Team of the UAS Berlin – looks back at an exciting year 2012. They already won their second award: the FSG Media Award 2012! Moreover the team participated in two Formula Student competitions for the first time in their history! In addition to the FSG in Hockenheim the team embarked on the journey to Györ to the Formula Student Hungary (FSH). In 2013 HTW Motorsport takes even one more: they compete in three competitions! Their event phase starts with the FSG in Hockenheim, only four days later the team from Berlin sends their race car on the track in Hradec Krávolé at the Formula Student Czech Republic. The FSH is the crowing glory at the end of the season 2013. HTW Motorsport will give everything to expand their collection of Formula Student Awards and to achieve new best performances. A special thank you goes out to all our cooperation partners and sponsors whose generous support enables us to continue operating this great project!







FRAME CONSTRUCTION tubular space frame

MATERIAL 25CrMo4 SAE4130 round tubing

OVERALL L / W / H (mm) 3135 / 1395 / 1211

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1590 / 1185 / 1165

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 160

SUSPENSION Unequal length A-arms, pull rod actuated Sachs Damper

TYRES (Fr / Rr) 7.5x13, -13mm offset, 2pc Al Rim, Continental

WHEELS (Fr / Rr) 7.5x13, -18mm offset, 2pc Al Rim, Continental

ENGINE modified 2005 Yamaha R6 4Zylinder

BORE / STROKE / CYLINDERS / DISPLACEMENT 65.5mm / 44.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13,5:1

FUEL SYSTEM AME Motronic, student designed fuel rail, sequential fuel injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11050

MAX TORQUE DESIGN (rpm) 9300

DRIVE TYPE 520 chain drive

DIFFERENTIAL Drexler Formula Student 2010, limited slip

COOLING Side mounted water cooler with ECU controlled electric fan and electric waterpum

BRAKE SYSTEM 4-Disk system, adjustable brake balance, mono-block calipers

ELECTRONICS sequential electronical shifting, electronical brake balance, ECU controlled fan on water cooler

BIAŁYSTOK
Białystok University of Technology

Car 34 Pit 8

Poland

As a first-year team, we obtained many design issues while constructing the car. Most of them were new to us, but we did everything to make the CMS-01 as efficient as possible. Thanks to the experience shared with us by other teams, training organized by FSG officials and our own knowledge, we built the vehicle, which complies with the FSAE rules and is competitive. We focused on every judged event during competition, because they all test the features which real, well-designed sports car should have. We took into consideration as many issues as we could, in every stage of designing and manufacturing. Especially interesting experience was to build the car with very limited funds and technology. Not only did we learn a lot while realizing the project, we also consider competing with other teams, when gaining knowledge and experience can be more valuable than those which we learned during regular studies.

FRAME CONSTRUCTION 2 piece tubular space frame with aluminum sub frame

MATERIAL Steel, Aluminium, Composites, Plastics

OVERALL L / W / H (mm) 3036 / 1444 / 1220

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1585 / 1258 / 1133

WEIGHT WITH 68kg DRIVER (Fr / Rr) 128 / 190

SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented damper, adjustable sway bars

TYRES (Fr / Rr) 6.2x20.0-13/7.2x20.0-13 A45 AVON

WHEELS (Fr / Rr) Keizer 4L 13x6 3 piece aluminum

ENGINE 2007 Suzuki GSX-R 600 4-stroke inline four

BORE / STROKE / CYLINDERS / DISPLACEMENT
67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12,5:1

FUEL SYSTEM Ecumaster EMU system with full sequential injection and sequential ignition

FUEL 98 ROZ Unleaded Gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE Single 520 chain

DIFFERENTIAL Student designed spool

COOLING Liquid cooling, side mounted radiator with ducted electric fan

BRAKE SYSTEM 3-disc system, double front 220mm discs with P34 calipers, rear single 220mm disc with P34 caliper

ELECTRONICS Selfdesigned Telemetric System

BOCHUM
Ruhr University Bochum

Car 48 Pit 23

Germany

We are RUB Motorsport, the Formula Student Team from the Ruhr University in Bochum, Germany. With our new hand-optimized frame and well thought-through suspension, we emphasize on reliability and endurance in this year's competition. Furthermore a new airbox has been designed to push the car's parameters closer to the theoretical limit. We set a high value on careful computer aided design of the car, which enabled us to work with new renowned partners from industry. With their support we are confident to reach the goals, that have been set by the team, like for example building a solid base for the next season to build upon. We would like to use this opportunity to thank all of our sponsors as well as the university for their financial and technical support, that opened the doors to Formula Student for RUB Motorsport.

FRAME CONSTRUCTION Tubular space frame

MATERIAL 25CrMo4

OVERALL L / W / H (mm) 2760 / 1374 / 1233

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1187 / 1161

WEIGHT WITH 68kg DRIVER (Fr / Rr) 150 / 191

SUSPENSION Unequal length double wishbone with pushrods

TYRES (Fr / Rr) Hoosier R25B 20.5x7.0-13

WHEELS (Fr / Rr) Team Dynamics 7.0x13.0CH

ENGINE GSXR 600 K4

BORE / STROKE / CYLINDERS / DISPLACEMENT
67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.5/1

FUEL SYSTEM Fuel Injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 9000

DRIVE TYPE Chain 520mm

DIFFERENTIAL Drexler Formula Student Differential

COOLING single Sidepod mounted Radiator with electric fan

BRAKE SYSTEM 4 Disk System self developed rotors, 220mm diameter, adjustable brake balance

ELECTRONICS Custom built wiring harness with automotive sealed connectors and electronic steering wheel

BOLOGNA
University of Bologna

Car 88 Pit 67

Italy

FRAME CONSTRUCTION Front Steel tubular space frame/Rear alluminum structure

MATERIAL AISI 4130 steel round tubing/Alluminum Alloy

OVERALL L / W / H (mm) 2689 / 1370 / 1129

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1525 / 1180 / 1175

WEIGHT WITH 68kg DRIVER (Fr / Rr) 162 / 151

SUSPENSION double unequal length A-Arm. Pull rod actuated spring/damper. Adj. Roll bar

TYRES (Fr / Rr) Hoosier 20.5x7.0 R13 inch /20.5x7.0 R13 inch

WHEELS (Fr / Rr) 7.0x13, 22mm offset, 7inch Rim / 7.0x13, 22mm offset, 7inch Rim /

ENGINE Suzuki GSX-R600 k6/k7

BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 14.0:1

FUEL SYSTEM Student designed/built fuel injection system, one injector per cylinder

FUEL ethanol E85

MAX POWER DESIGN (rpm) 11500

MAX TORQUE DESIGN (rpm) 9000

DRIVE TYPE Regina 520 Steel Drive Chain

DIFFERENTIAL Drexler Formula SAE specific Limited Slip Differential, Clutch Pack, TBR

COOLING Single custom radiator with thermostatically controlled fan speed, electric water pump

BRAKE SYSTEM Floating, Inox steel, hub mounted, 218 mm diameter

ELECTRONICS Electrical Shift and Clutch, Traction Control, Launch Control,Wireless real-time Telemetry system

Team UniBo Motorsport was born 4 years ago by a group of 15 students of Mechanical Engineering. In 2013 our team consists of 70 team members divided in 4 groups: Electronic Division, Vehicle Division, Powertrain Division, Marketing Division. Powertrain Division develops engine control system, calibrates and tests the engine's performances. Vehicle Division designs, builds and tests all the mechanical components of the car. Electronic Division designs, builds and tests all electronics boards in the car and developed the telemetry system. Marketing Division finds sponsors and establishes a relationship with them. It also organises events, manages the website and prepares all paper brochures about the team. Lots of professors of the University support the project and let team members make recruiting and explain project to other students. Second UniBo race car (2012-2013) has been designed as an evolution of the previous prototype: robotized gearbox, improved lubrication system etc.

BRATISLAVA
Slovak University of Technology in Bratislava

Car 104 Pit 52

Slovakia

FRAME CONSTRUCTION Front and rear tubular space frame

MATERIAL ISO 630:1980 steel round tubing 16mm to 25mm

OVERALL L / W / H (mm) 2740 / 1400 / 1240

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 150 / 188

SUSPENSION double wishbone with pullrod - vertically oriented spring and damper

TYRES (Fr / Rr) Goodyear Eagle 20.0x7.0 R13 / Goodyear Eagle 20.0x7.0 R13

WHEELS (Fr / Rr) Braid 7 x 13 inches

ENGINE 2002 Honda CBR 600F

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.0:1

FUEL SYSTEM student design

FUEL gasoline

MAX POWER DESIGN (rpm) 12500

MAX TORQUE DESIGN (rpm) 10000

DRIVE TYPE Chain

DIFFERENTIAL Drexler Formula Sae Differential 2010

COOLING twin side radiators with thermostatic controlled electric fans

BRAKE SYSTEM 4 steel rotors, diam 230mm/60mm, Master cylinders AP Racing 23mm, Calipers Nissin, 2x24, floating

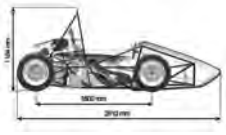
ELECTRONICS Traction control, Launch control, Multifunctional Steering Wheel, Telemetry System, Electronic Shift

AM Team is a group of enthusiastic students who are connected by the love for motorsport and fast cars. We come from the Faculty of Applied Mechanics and Mechatronics of the Slovak University of Technology in Bratislava. This year AM Team is entering Hockenheim with its fifth generation vehicle full of innovative technologies and materials. We would like to highlight the use of software system Ansys Fluent to design the most suitable intake manifold and the application of traction-slip control system. That gives us a great pleasure to introduce a car that charms you at the first sight not only by its look, but also by its quality. We are looking forward to meeting you soon and hope to have a good time.

BRNO
Technical University of Brno

Car 74 Pit 7

Czech Republic



The Formula Student team from Brno University of Technology - TU Brno Racing - was established in autumn 2010. The first competition, which we took part in, was Formula Student UK in 2011. The whole team is excited to start at the Formula Student Germany 2013 event, we are attending FSG for the first time. Except the FSG, TU Brno Racing will start also at FSCZ and FSH this season. The main goal for this season is to successfully finish all the competitions and to improve last years results. We got many experience from testing the previous car which we tried to involve in design of the new car. We aimed on the suspension components to improve reliability of the car and tubular space frame to increase torsional stiffness. A lot of effort was put to single cylinder engine Husaberg FE 570 to improve engine characteristics.

FRAME CONSTRUCTION Front and rear tubular space frame

MATERIAL 1.0553 steel tound tubing 20mm to 25 mm; 1.0045 steel square tubing 25mm

OVERALL L / W / H (mm) 2810 / 1447 / 1164

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1260 / 1190

WEIGHT WITH 68kg DRIVER (Fr / Rr) 136 / 136

SUSPENSION double unequal length A-Arms, pullrod design in front, pushrod in rear

TYRES (Fr / Rr) 20.5 x 7.0-13 Hoosier R25B / 20.5 x 7.0-13 Hoosier R25B

WHEELS (Fr / Rr) 7.0x13, 15mm offset, 3 pc Al Rim / 7.0x13, 8mm offset, 3 pc Al Rim

ENGINE 2012 Husaberg FE 570

BORE / STROKE / CYLINDERS / DISPLACEMENT 100mm / 72mm / 1 cylinders / 566cc

COMPRESSION RATIO 12.2:1

FUEL SYSTEM Student designed/built ,electronic fuel injection by single injector

FUEL 98 octane gasoline

MAX POWER DESIGN (rpm) 8800

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE 5/8" x 1/4" chain

DIFFERENTIAL clutch pack limited slip, 50 Nm preload

COOLING Right side pod mounted radiator with thermostatic controlled electric fan

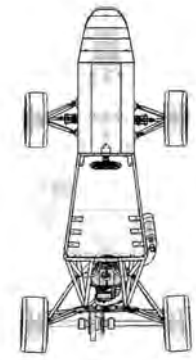
BRAKE SYSTEM 4-Disk system, with floating rotors, adjustable brake balance, 4-piston calipers Fr, 2-piston Rr

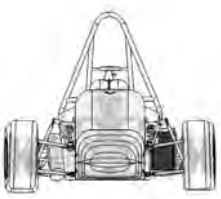
ELECTRONICS self-designed shifting management, self-designed telemetry system. Wiring harness sealed to IP67,

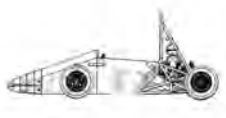
CARDIFF
Cardiff University

Car 87 Pit 71

United Kingdom







Cardiff Racing is a team of multi-disciplined engineering students including first year undergraduates up to final year masters and postgraduate students that returns to Silverstone and Germany this year with their latest concept, CR09, determined to give Cardiff University its best ever result. Due to the lack of dynamic testing time in previous years, the team was determined to ensure that CR09 was finished the earliest of all previous Cardiff Racing cars, and the car, designed by the final-year masters students, reflects this goal. Building upon the previous experiences and skills within the team, an evolutionary design philosophy was adopted; focusing upon simplifying designs to reduce manufacturing time while also removing previously unreliable complexities. The chassis once again uses a combination of an aluminium sandwich panel front monocoque while a rear steel spaceframe houses the Aprilia SXV 550 V-Twin engine, custom SLS intake plenum, exhaust and differential.

FRAME CONSTRUCTION Aluminium honeycomb sandwich panel front monocoque, steel roll hoops and rear spaceframe

MATERIAL 5251 and 6082 aluminium cellite panels (19mm core, 0.5mm and 1mm skins), ERW mild steel tubes

OVERALL L / W / H (mm) 2749 / 1341 / 1138

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1610 / 1150 / 1120

WEIGHT WITH 68kg DRIVER (Fr / Rr) 119 / 124

SUSPENSION Front and Rear unequal length steel A-Arms. Push rod actuated. Fox Vanilla RC spring/damper units.

TYRES (Fr / Rr) Hoosier C2000 R25B (18x6.0-10/18x7.5-10)

WHEELS (Fr / Rr) 7075 Aluminium machined with hard anodize finish (6.0

ENGINE 2010 Aprilia SXV 550 V-twin

BORE / STROKE / CYLINDERS / DISPLACEMENT 80mmmm / 55mmmm / 2 cylinders / 553cc

COMPRESSION RATIO 12.5:1

FUEL SYSTEM Bosch spark amplifier, external coils, iridium spark plugs

FUEL 99 RON Unleaded

MAX POWER DESIGN (rpm) 10750

MAX TORQUE DESIGN (rpm) 7960

DRIVE TYPE Single 520 Chain

DIFFERENTIAL Student designed, Custom Clutch Pack

COOLING Sidepod mounted, dual 40mm core aluminium radiator

BRAKE SYSTEM 4 hub mounted custom steel floating discs, 188.5mm front, 200mm rear diameter.

ELECTRONICS Custom wiring loom, Deutsch industrial micro connectors, Race Technology DASH2 and DL1 data logger

CHENNAI

Indian Institute of Technology Madras

Car 18 Pit 50

India

FRAME CONSTRUCTION Tubular Spaceframe

MATERIAL Steel

OVERALL L / W / H (mm) 2600 / 1500 / 1300

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1200 / 1100

WEIGHT WITH 68kg DRIVER (Fr / Rr) 180 / 180

SUSPENSION Double unequal length A-arm. Pull rod actuated spring/damper front,Push rod actuated rear

TYRES (Fr / Rr) Hoosier R25B 20.5 x 6.0-13

WHEELS (Fr / Rr) Hoosier R25B 20.5 x 6.0-13

ENGINE Honda / CBR250R

BORE / STROKE / CYLINDERS / DISPLACEMENT 76mmmm / 55mmmm / 1 cylinders / 250cc

COMPRESSION RATIO 11.1:1

FUEL SYSTEM Keihin, Port Fuel Injection

FUEL Unleaded gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 8000

DRIVE TYPE Rear wheel driven

DIFFERENTIAL Torque sensing limited slip differential with custom housing.

COOLING Radiator,mounted in the right sidepod.Water cooled

BRAKE SYSTEM 4-Disk system, adjustable brake balance. Wilwood fixed type calipers.

ELECTRONICS Electropneumatic Shifting System

FSG13 brought with it a new challenge to Team Raftar, as we redefined our goals & objectives, while retaining our passion and commitment. We began our Formula Student journey last year at the Silverstone and this year continue it at the Hockenheimring with a team of 30 enthusiastic and hardworking young minds. Our aims include large scale weight reduction, greater serviceability, and a balance between performance efficiency and driver convenience. We spent a large part of the year in detailed design and analysis leading to major changes in almost every subsystem. These included a changeover to the Honda CBR250R Engine, a new aerodynamics package comprising of wings designed to ensure better cornering, an optimized space frame chassis, an extremely lightweight and trustworthy suspension setup, streamlined FRP bodyworks and a careful study of ergonomics and driver comfort. We hope to outdo our expectations and lay a solid foundation for the evolution of the team over the year's to come.

COBURG

University of Applied Sciences Coburg

Car 70 Pit 10

Germany

FRAME CONSTRUCTION tubular steel space frame

MATERIAL Mild steel S235 and S355

OVERALL L / W / H (mm) 2601 / 1433 / 1158

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1526 / 1210 / 1160

WEIGHT WITH 68kg DRIVER (Fr / Rr) 123 / 140

SUSPENSION Double unequal length anti-parallel A-Arm. Pull rod actuated, adjustable anti-roll bar

TYRES (Fr / Rr) 20.0 x 7.5 - 13 R25B Hoosier, 21x6.5-13 WET Hoosier

WHEELS (Fr / Rr) 7.0 inch wide, AL Rim, 31 mm neg.

ENGINE Yamaha YZF-R6/RJ09

BORE / STROKE / CYLINDERS / DISPLACEMENT 65.5mm / 44.5mm / 4 cylinders / 600cc

COMPRESSION RATIO 12,4:1

FUEL SYSTEM BOSCH MS4, multi point fuel injection

FUEL 95 RON unleaded gasoline

MAX POWER DESIGN (rpm) 12000

MAX TORQUE DESIGN (rpm) 10000

DRIVE TYPE Taylor race constant velocity joint

DIFFERENTIAL Limited slip differential, 30 Nm preload

COOLING One custom made radiator; mounted in right sidepod with 180 mm fan

BRAKE SYSTEM 4-Disk system, self developed rotors with 238/212 mm OD, adjustable brake bias, ISR calipers

ELECTRONICS wiring harness (IP66), electropneumatic shifting system, launch control, Live-Telemetry System

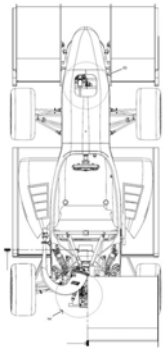
CAT-Racing enters FSG for the sixth season and all of the members are keen on performing on the international stage of formula student with the C-13 Luchs. Increasing performance season by season is not just a question of wise planning and designing but also of deep data analysis and not least a direct feedback from the car to the driver. Therefore understanding the car's behavior and the influence of each single component on it as well as enhancing feedback for the driver and decreasing the strain driving leads to the modification of certain key features, advancing straight line and cornering performance. Therefore lowering the engine, shortening the wheelbase, revising intake and shifting system will enhance the physical capabilities to a new level. Redesigning steering kinematics and design in combination with stiffened up seat paddings and pedals as well as raised shift paddle feedback will keep the drivers concentration on the track using the car's potential to at its best.

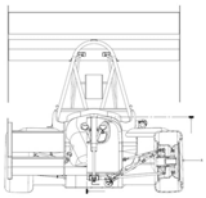
CORVALLIS
Oregon State University

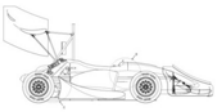
Car 11 Pit 28

United States

Global Formula Racing is the first international collaboration of its kind in the history of both, the US-based Formula SAE and the EU-based Formula Student programs. The former BA-Racing-Team from Duale Hochschule Baden-Württemberg (DHBW) and the Beaver Racing team from Oregon State University (OSU) have combined forces to compete as a single entity 2010. The two universities share physical and intellectual resources by using advanced communication-technology to create a highly competitive vehicle. Design, manufacturing, and testing occur simultaneously at both schools. The supply chain management is unique in Formula Student and very important for cross-border cooperation. The 2010 car laid down a foundation, that since, is being continuously improved. In 2013 we will, for the third time, build a combustion car at OSU and an electrical car at DHBW.







FRAME CONSTRUCTION CFRP/honeycomb monocoque with steel hoops

MATERIAL Toray T700 Plain Weave, T700 Uni and M40J Uni. Nomex honeycomb core.

OVERALL L / W / H (mm) 3040 / 1330 / 1400

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1555 / 1120 / 1120

WEIGHT WITH 68kg DRIVER (Fr / Rr) 105 / 118

SUSPENSION Unequal length non-parallel a-arms, horizontal pullrod actuated shock, anti roll bar

TYRES (Fr / Rr) Hoosier LC0

WHEELS (Fr / Rr) 10" Keizer

ENGINE Honda CRF450x

BORE / STROKE / CYLINDERS / DISPLACEMENT 96mm / 61.7mm / 1 cylinders / 449cc

COMPRESSION RATIO 13.5:1

FUEL SYSTEM Honda CFR450 fuel pump, bosch injector

FUEL gasoline

MAX POWER DESIGN (rpm) 9500

MAX TORQUE DESIGN (rpm) 8000

DRIVE TYPE 520 chain

DIFFERENTIAL Drexler with custom end caps

COOLING Side mounted water and oil coolers

BRAKE SYSTEM 4 disc floating rotor, Brembo front calipers, AP rear

ELECTRONICS Motec

DORTMUND
Technical University of Dortmund

Car 72 Pit 75

Germany

The GET racing team, founded in 2005, consists of 15 highly motivated students from different faculties, e.g. mechanical, industrial and electrical engineering. The FS213 is the fifth car for the team and the third one fitted with the Yamaha R6 600cc 4 cylinder engine. The engine was chosen for supreme acceleration and driveablity. Moreover the car comes along with some innovative features, like an evolutionary optimised frame, using our self developed algorithm. Easy adjustable ergonomics or the new developed electronic system are other noteworthy improvements. So we are optimistically looking forward to the Hockenheim event and want to thank all our sponsors for their support.

FRAME CONSTRUCTION Tubular space frame

MATERIAL 25CrMo4 (1.7218 / SAE 4130 / AFNOR 25CD4) 12 mm to 30 mm diameter

OVERALL L / W / H (mm) 2823 / 1364 / 1025

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1208 / 1130

WEIGHT WITH 68kg DRIVER (Fr / Rr) 131 / 153

SUSPENSION Double unequal length A-Arm, push rod actuated nearly horizontally oriented springs and dampers

TYRES (Fr / Rr) 20.5 x 6 Hoosier R25B / 20.0 x 7.5 Hoosier R25B

WHEELS (Fr / Rr) 6.0x13, 10.8 mm offset, 1 pc steel Rim/ 8.0x13, 2.6 mm offset, 1pc steel rim

ENGINE Yamaha RJ05

BORE / STROKE / CYLINDERS / DISPLACEMENT 65.5mm / 44.5mm / 4 cylinders / 600cc

COMPRESSION RATIO 12.4:1

FUEL SYSTEM OEM Yamaha quad coils, DTAfast ECU, sequential spark

FUEL 98 octane

MAX POWER DESIGN (rpm) 10250

MAX TORQUE DESIGN (rpm) 7700

DRIVE TYPE 520 roller chain, 52 links

DIFFERENTIAL Drexler limited slip multiplate/clutch pack differential, 35 Nm preload

COOLING left side pod mounted radiator with a single controlled electric fan

BRAKE SYSTEM 4-disk system, self developed rotors, adjustable bias bar, 4/2 piston calipers, fixed mounting

ELECTRONICS electric waterpump, live telemetry, custom build gear control unit

DORTMUND

University of Applied Sciences
Dortmund

Car 36 Pit 62

Germany

The Race-Ing. Team of UAS Dortmund is a group of engaged students of different fields of study. Beside our study we develop racecars to take part in the Formula Student competition. The project should give us the possibility to apply theoretical knowledge from the studies practically. We want to compile technical know-how and make important experiences in view of our professional future. With an average number of team-members of about 15 over the years, the Race-Ing. Team is working in two year development periods. This means a fully new developed race car every two years with a forceful optimized second year version in between. Our car for this FS-season is the RI-12evo. It is based on the first year car RI-12. Like every vehicle made by Race-Ing. the RI-12evo has a cfrp-monocoque. The aim is a consistent weight reduction while not losing durability to provide high racing-performance.

FRAME CONSTRUCTION carbon fibre Monocoque with removable section

MATERIAL cfrp prepreg 400g/m² with aramid honeycomb core

OVERALL L / W / H (mm) 2720 / 1392 / 1128

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1640 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 152 / 168

SUSPENSION Double unequal length A-Arm. Push/Pull rod actuated horizontal spring / damper

TYRES (Fr / Rr) 20,5x7-13, Hoosier R25B / 20,5x7-13, Hoosier R25B

WHEELS (Fr / Rr) 6,5 inch wide,3 pc Al Rim w, Mg-centre / 6,5 inch wide,3 pc Al Rim w, Mg-centre

ENGINE Honda / PC 35 / 4 cylinder in-line / inclined 31°

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12:1

FUEL SYSTEM trijekt ECU, sequential injection & igniton timing

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 13500

MAX TORQUE DESIGN (rpm) 10500

DRIVE TYPE Chain drive

DIFFERENTIAL Drexler F-Student limited slip differential / max. Torque 1200Nm / Preload: 10Nm

COOLING side pod mounted radiator with thermostatically regulated speed fan

BRAKE SYSTEM 4-Disc-system, 245mm diameter, floating hub mounted, 34mm opposing pistons / calipe

ELECTRONICS selfdesigned datalogger, bidirectional WLAN streaming, multifuntional display, el. shifting System

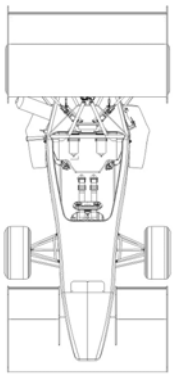
EDMONTON

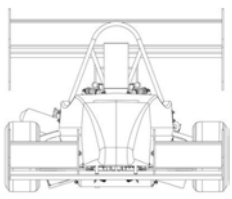
University of Alberta

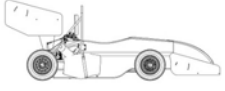
Car 16 Pit 2

Canada

A performance-at-all-costs approach was taken to create a car capable of winning. This was made possible through the use of a custom lap time simulator. The 2013 car is affectionately named „Sexy Beast“. Come stop by our paddock to see the „Sexy Beast“ and have a friendly chat! We would like to thank all of our sponsors and our Faculty advisor for making another season of racing possible. For more details please see our website: http://www.ualbertafsae.com







FRAME CONSTRUCTION Carbon fiber monocoque

MATERIAL Oxeon TeXtreme, Toray T800, Aluminium honeycomb thicknesses vary

OVERALL L / W / H (mm) 3042 / 1388 / 1141

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1524 / 1168 / 1162

WEIGHT WITH 68kg DRIVER (Fr / Rr) 104 / 110

SUSPENSION up (All about the Aero!)

TYRES (Fr / Rr) Hoosier 6.0/18-10.0 LCO

WHEELS (Fr / Rr) 6.5x10, 3 pc Al

ENGINE Modified Yamaha WR450F

BORE / STROKE / CYLINDERS / DISPLACEMENT 98.0mm / 63.4mm / 1 cylinders / 478cc

COMPRESSION RATIO 13,5:1

FUEL SYSTEM Single port fuel injection, MAP based, dynamometer calibrated

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 8100

MAX TORQUE DESIGN (rpm) 7100

DRIVE TYPE 420 Chain to Drexler differentain

DIFFERENTIAL Salisbury

COOLING Dual side mounted Al radiators. Single oil cooler and electric fan.

BRAKE SYSTEM Floating rotors, Tilton 77 series MC, AP racing calipers

ELECTRONICS Custom Datalogger, Custom power PCB, Custom Clutch/Shift controller

Tognum

HOME OF POWER BRANDS

First-Class-Support: Womit unterstützt Tognum seine gesponserten Teams aus Braunschweig, Graz, Karlsruhe, München, Nürnberg-Erlangen, Ravensburg und Stuttgart?

a) „Kohle" | **b) Know-how**

c) Karriereplanung | **d) in allen drei Bereichen**

Empower your Career

Find us on Facebook

Neues schaffen. Weiter denken. Vorwärtskommen.

Aus faszinierenden Ideen machen unsere rund 10.000 Mitarbeiter kraftvolle Technik – vom 10.000-kW-Dieselmotor bis zum klimafreundlichen Blockheizkraftwerk. Mit den Marken MTU und MTU Onsite Energy ist Tognum einer der weltweit führenden Anbieter von Motoren, kompletten Antriebssystemen und dezentralen Energieanlagen. Innovative Einspritzsysteme von L'Orange vervollständigen unser Technologie-Portfolio rund um den Antrieb. Bewegen auch Sie mit uns die Welt!

Berufseinstieg, Traineeprogramm, Praktikum, Abschlussarbeit: Tognum bietet Ihnen alle Möglichkeiten. Informieren Sie sich näher über unsere Website oder auf unserer Facebook-Seite: www.facebook.com/tognum

Willkommen bei der Tognum AG in Friedrichshafen.

Wir freuen uns, von Ihnen zu hören.

Tognum AG • Personalmarketing • Regine Siemann • Maybachplatz 1 • 88045 Friedrichshafen

regine.siemann@tognum.com • Tel. 07541/90-7888

mtu | mtu onsite energy | L'orange YOUR POWERFUL INJECTION

www.tognum.com

ERLANGEN

Friedrich-Alexander-Universität
Erlangen-Nürnberg

High-Octane Motorsports is the University of Erlangen-Nurembergs's FSC Team. We will be competing with our sixth car in 2013. The most outstanding technical feature of our car is the powertrain. The modified Aprillia V2 engine is mounted longitudinally and transmits its power to the rear wheels through a bevel gear. This concept was awarded with the „Most Innovative Powertrain Award" in 2011. With the first prechamber spark ignition system in Formula Student we won this award again in the following year. The 2013 car combines these features with a CFRP monocoque, self designed 10" wheels, decentralized control units and wings.

Car 49 Pit 45

Germany

FRAME CONSTRUCTION CFRP Monocoque with tubular steel rear frame

MATERIAL CFRP Inserts and Nomex honeycombs

OVERALL L / W / H (mm) 2830 / 1360 / 1100

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1220 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 111 / 116

SUSPENSION Double A-Arms; Pull-/Pushrod actuated Öhlins TTX25;

TYRES (Fr / Rr) 10

WHEELS (Fr / Rr) selfdesigned aluminum rim center + CFRP rim well

ENGINE Aprilia SXV 550 (modified)

BORE / STROKE / CYLINDERS / DISPLACEMENT 80mm / 55mm / 2 cylinders / 553cc

COMPRESSION RATIO 16,1:1

FUEL SYSTEM self-designed fuel injection system using DTAfast S80 Pro ECU

FUEL E85

MAX POWER DESIGN (rpm) 11500

MAX TORQUE DESIGN (rpm) 8000

DRIVE TYPE bevel gear drive with claw coupling

DIFFERENTIAL self-made limited slip differential with Drexler inner life

COOLING Aluminium counter-stream radiator; ECU controlled fan&pump

BRAKE SYSTEM 4 stainless steel disks; 200mm (Fr) 170mm (Rr) dia.; adj. proportioning valve; 4 one-piston caliper

ELECTRONICS Dezentralized control unit CAN-Network, W-LAN live telemetry & logging, high-speed shifting servo

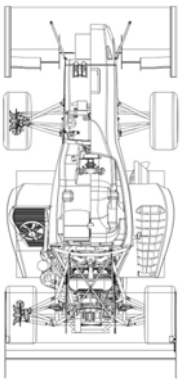
ESSLINGEN

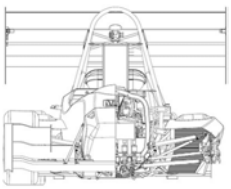
University of Applied Sciences
Esslingen

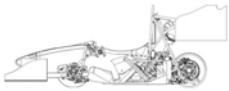
In 2006 the first building blocks for the foundation of the Rennstall Esslingen were placed at the UAS Esslingen. Meanwhile, it is the largest project at the university. The development of the Stallardo ‚13 started with the slogan: Revolution instead of Evolution! On this basis we designed and built our first light weight CFRP Monocoque in combination with a tubular rear space frame. Even though this was a huge step for the team, we also didn´t leave the suspension untouched. The Stallardo ‚13 stands on a completely newly developed 10 inch based suspension which reduces among others the unsprung mass dramatically. The Stallardo ‚13 is the consequence of hard work, innovation, smart ideas, reducing weight, passion for beautiful racecars, interdisciplinary cooperation and an unique team spirit.

Car 94 Pit 40

Germany







FRAME CONSTRUCTION CFRP Monocoque front end and tubular rear space frame

MATERIAL Nomex Honeycomb

OVERALL L / W / H (mm) 2968 / 1390 / 1098

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1170 / 1110

WEIGHT WITH 68kg DRIVER (Fr / Rr) 121 / 132

SUSPENSION Double unequal length A-Arm, pull/push rod actuated Kaz/Penske 7800 2-way adjustable damper

TYRES (Fr / Rr) Hoosier 18 x 6.0-10 R25B

WHEELS (Fr / Rr) Hoosier 18 x 7.5-10 R25B

ENGINE Modified Honda CBR600RR (PC37)

BORE / STROKE / CYLINDERS / DISPLACEMENT 67,5mm / 42,5mm / 4 cylinders / 608cc

COMPRESSION RATIO 14,1:1

FUEL SYSTEM Bosch MS4, fuel injektion, Walbro GSL392

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 10500

MAX TORQUE DESIGN (rpm) 8500

DRIVE TYPE 520 Chain

DIFFERENTIAL Clutch pack limited slip

COOLING Student designed custom U-Flow radiator, electric fan

BRAKE SYSTEM 4 Disc self developed rotors, adjustable brake balance, ISR Calipers

ELECTRONICS Bosch MS4 ECU, electro mechanical shifting and clutch, self designed power and control electronics

GIESSEN

Technische Hochschule Mittelhessen
UAS

Car 22 Pit 47

Germany

THM Motorsport was founded in 2009. At the moment our 25 team members are constructing the 4th vehicle. The basic concept for the season 2013 is to focus mainly on testing the current car from 2012, in order to do proper driver training, troubleshooting, work on the reliability and try to understand the cars basic characteristics and to do basic setup work. The previous cars including the 2012 model haven't done a lot of mileage so far and testing before the events was always limited to several days which in fact had to be used for troubleshooting and not for setup work. Furthermore we have been focusing on fixing the main problems of our 2012 vehicle, namely engine cooling and lubrication system and improving our power to weight ratio by developing a carbon-fiber suspension.

FRAME CONSTRUCTION Space frame

MATERIAL Steel S 355

OVERALL L / W / H (mm) 2665 / 1471 / 1064

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1240 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 172 / 158

SUSPENSION Double unequal length A-arm, Pushrod actuated spring/damper, adjustable roll bar

TYRES (Fr / Rr) 20,5x7-13 R25B Hoosier/ 20x7,5-13 R25B Hoosier

WHEELS (Fr / Rr) 7" wide, 12" diameter, 22mm Offset, 9" wide, 13" diameter, 22mm offset

ENGINE 9Modified Honda CBR 600 (PC 40

BORE / STROKE / CYLINDERS / DISPLACEMENT 62mmmm / 42,5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12,2:1

FUEL SYSTEM Sequential fuel injetion

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11500

MAX TORQUE DESIGN (rpm) 8500

DRIVE TYPE Chain drive,

DIFFERENTIAL Drexler Formula Student differential

COOLING Frame mounted AL radiator, speed fan

BRAKE SYSTEM 4-Disk break system, driver adjustable break balance, diameters: front 232mm, rear 210mm

ELECTRONICS 2D-Datarecording-system with GPS, fully programmable ECU, Electropneumatic shifting System

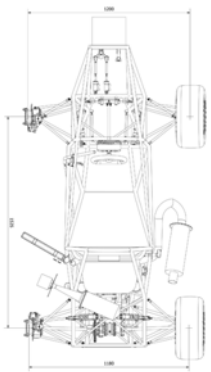
GLASGOW

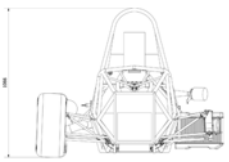
University of Strathclyde

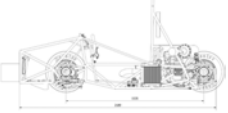
Car 15 Pit 9

United Kingdom

University of Strathclyde Motorsport's 13th Formula Student entry is the team's first ground-up redesign since its formation in 1999. USM13 will be competing at both Silverstone and Hockenheim this year and features a Suzuki LT-R450 single-cylinder engine and Hoosier 10" tyres. This concept was selected with the intention of developing USM's focus on cost and reliability while improving on-track performance. The team worked closely with University of South Florida Racing throughout the season to ensure a smooth transition to the new engine, sharing time, experience and resources to develop a collaborative engine package. After winning the Cost Analysis event at FSG2012, USM are determined to maintain a strong performance in Static events for 2013 and beyond. The team has worked hard to improve knowledge transfer by restructuring into technical sub-groups, compiling a comprehensive Engineering Report and establishing a dedicated IT suite with support from the Alumni Fund.







FRAME CONSTRUCTION Steel tube space frame

MATERIAL Cold drawn seamless BS4T45-BS5T100 steel

OVERALL L / W / H (mm) 2488 / 1413 / 1067

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1535 / 1200 / 1180

WEIGHT WITH 68kg DRIVER (Fr / Rr) 114 / 114

SUSPENSION Unequal wishbones, pull/push-actuated Cane Creek Double Barrel shocks, steel U-bar ARB

TYRES (Fr / Rr) Hoosier LCO 6.0/18-10

WHEELS (Fr / Rr) Hoosier LCO 6.0/18-10

ENGINE Suzuki LT-R450 2006

BORE / STROKE / CYLINDERS / DISPLACEMENT 95.5mm / 62.8mm / 1 cylinders / 450cc

COMPRESSION RATIO 11.7:1

FUEL SYSTEM DTA S80 PRO ECU, Wasted spark ignition

FUEL 98 RON gasoline

MAX POWER DESIGN (rpm) 9000

MAX TORQUE DESIGN (rpm) 8000

DRIVE TYPE Chain #525

DIFFERENTIAL Drexler Formula Student LSD, clutch type, 60% drive, 42% brake

COOLING Sidepod mounted single core aluminium radiator, stock fan mounted to rear of radiator

BRAKE SYSTEM 184mm OD cast iron rotors, ISR 22-048 front calipers, Wilwood PS-1 rear calipers

ELECTRONICS Traction/launch control, flat shifting, RPM LEDS, fully customisable smart dash display

GÖTEBORG
Chalmers University of Technology

Car 3 Pit 4

Sweden

FRAME CONSTRUCTION Rear steel spaceframe and front CFRP monocoque hybrid

MATERIAL 4130 Steel Tubing, 6082 Al. Front Roll Hoop, Al. & Foam Core, HS-CFRP Skins

OVERALL L / W / H (mm) 3040 / 1410 / 1230

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1210 / 1210

WEIGHT WITH 68kg DRIVER (Fr / Rr) 96 / 99

SUSPENSION Double unequal length A-Arm. Pull(front)/ push(rear) rod actuated spring / damper. Adj. Roll bar.

TYRES (Fr / Rr) 18.0 x 7.5-10 R25B Hoosier

WHEELS (Fr / Rr) 10

ENGINE Yamha / Fazer FZ6

BORE / STROKE / CYLINDERS / DISPLACEMENT 65.5mm / 44.5mm / 4 cylinders / 600cc

COMPRESSION RATIO 12.1:1

FUEL SYSTEM Denso, sequential fuel injection

FUEL 98 RON Unleaded

MAX POWER DESIGN (rpm) 13000

MAX TORQUE DESIGN (rpm) 9000

DRIVE TYPE Chain drive 428 motorcycle chain

DIFFERENTIAL Limited Slip (clutch type), accel/decel options: 51/29%, 60/42%, 88/51%, reversible

COOLING One side pod mounted 320 x 322 mm core , 11

BRAKE SYSTEM 4 floating rotors, driver adjustable bias bar, AP racing calipers and master cylinder.

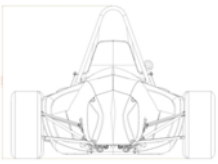
ELECTRONICS Adaptive TC, pneumatic shifting and clutch, launch control, wireless data logging and monitoring.

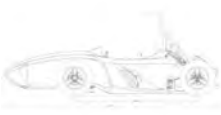
Starting with a new team every year, in Chalmers Formula Student we have a great challenge in front of us. Since last year's team was very successful, there is a lot of pressure to build an even better vehicle. To further increase performance, a thorough analysis of the factors that make a formula student car fast was undertaken. The result of this study was a vehicle weighing almost 20% less than the previous year, as well as increased aerodynamic downforce while maintaining high power output. Two major design decisions were large contributors to the decrease in weight. Firstly, going from a tubular space frame to a space frame/carbon fiber hybrid, and secondly, using 10 inch instead of 13 inch wheels. Carbon fiber has also been used in the rim shells, intake system, seat, and aerodynamic devices. The true goal of this project is to allow students to gain valuable experience in a real engineering project at a competitive level. We deliver the engineers of tomorrow.

GRAZ
Graz University of Technology

Car 29 Pit 27

Austria





FRAME CONSTRUCTION one piece composit monocoque

MATERIAL carbon fiber prepregs, Nomex and Aluminium honeycombs, carbon and titanium inserts

OVERALL L / W / H (mm) 2678 / 1375 / 1022

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1180 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 107 / 102

SUSPENSION Double unequal length CFRP A-Arms. (fr) Pull- (re) Push-rod actuated spring and Öhlins damper

TYRES (Fr / Rr) 152x66 R10 , Hoosier LC0

WHEELS (Fr / Rr) 6,5x10 , 6 mm offset, 1 piece CFRP Rim in 3-spoke design

ENGINE KTM / 500 EXC 2012

BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 72mm / 1 cylinders / 510cc

COMPRESSION RATIO 12,5:1

FUEL SYSTEM 2 Spray Keihin Injector

FUEL 100 octane petrol

MAX POWER DESIGN (rpm) 9500

MAX TORQUE DESIGN (rpm) 7000

DRIVE TYPE 4 gear transmission and chain drive

DIFFERENTIAL Drexler multiplate LSD, 49% slip

COOLING Twin sidepod mounted aluminium core WP radiator , 106 cfm fan mounted to suction side

BRAKE SYSTEM 4 self developed rotors with 200mm &180 mm dia, adjustable brake balance, AP Racing calipers

ELECTRONICS Multifunctional Steering Wheel, Electropneumatic Shifting System, Live-Telemetry System

This year, the TUG Racing Team started with high hopes and expectations. We started off with the celebrations for 10 years of TUG Racing Team, driving and comparing all the cars we have built in our longtime history. Then, when designing the new car, we took all those information we gathered in those 10 years to build and optimize the new car, the TANKIA 2013. This season, we again concentrated on lightweight design. This resulted in a lot of newly designed parts for our car. The newest TANKIA features 10" carbon rims, each weighing less than 800 grams and the one piece monocoque. Also we implemented some of our old parts again, such as the titanium uprights and the multifunctional steering wheel. Livetelemetry and reliability were the main focus for our electronics team. The powertrain focused on improving and testing the 1-cylinder KTM engine we already used in last year's car.

GRAZ

University of Applied Sciences
Joanneum Graz

Car 40 Pit 26

Austria

Joanneum racing graz is a highly motivated team from the UAS „FH Joanneum“, Graz. The team is well known as „The Weasels“ and has been competing in Formula Student since 2004. A new car has been built every year since then. The team members change every year, which brings a lot of new ideas into the team. The basic team consists of approximately 40 Automotive Engineering students supported by students from other study courses from the UAS Graz. The car for 2013, called the jr13 is now the second car, which is powered by a self-developed turbocharged 2-cylinder engine with direct injection. The chassis of the car is a lightweight one-piece CFRP-monocoque. Last year's car showed that the combination of a lightweight chassis and efficient but also powerful turbocharged engine is competitive. The team 2013 enhanced engine technology and is keen on proving the competitiveness of their car!

FRAME CONSTRUCTION Full CFRP monocoque sandwich construction

MATERIAL high-tensile-strength carbon fiber prepregs, Rohacell and aramid honeycomb core

OVERALL L / W / H (mm) 2970 / 1423 / 1070

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1220 / 1180

WEIGHT WITH 68kg DRIVER (Fr / Rr) 128 / 156

SUSPENSION Double unequal length A-Arm, Pull rod actuated spring / damper (Öhlins TTX25)

TYRES (Fr / Rr) Hoosier 20.5 x 7 R13 - R25B

WHEELS (Fr / Rr) 6 x 13, one piece handlaminated CFRP Rim

ENGINE student designed engine

BORE / STROKE / CYLINDERS / DISPLACEMENT 83mm / 55mm / 2 cylinders / 595cc

COMPRESSION RATIO 10,2:1

FUEL SYSTEM high pressure direct injection with piezoelectric injectors

FUEL RON 100

MAX POWER DESIGN (rpm) 7000

MAX TORQUE DESIGN (rpm) 4000

DRIVE TYPE Finaldrive via gearwheels

DIFFERENTIAL 2010 DREXLER LSD, integrated in gearbox

COOLING side mounted radiator with electric fan and electric water pump

BRAKE SYSTEM 4-Disk system, self developed rotors, adjustable brake balance

ELECTRONICS multifunctional steering wheel, electropneumatic shifting and clutch system

HAMBURG

University of Applied Sciences
Hamburg

Car 69 Pit 57

Germany

After the Formula Student debut of HAWKS Racing in 2004, the H09 represents our latest evolution of racing cars. In result the design of every single component includes our extensive know-how and experience gained within the past years. The ply-book of our CFRP-monocoque is calculated via topological layer optimization resulting in an overall reduced weight. Our aerodynamic package including an undertray, front and rear wings is designed using 3D-simulation. Powered by a Kawasaki ZX6R-engine featuring different maps for each dynamic event and a homogenous torque curve, we achieve increased performance and drivability. For the first time our brake system includes a Bosch M4 ABS controlling each wheel individually. The driver-seat, steering wheel and adjustable pedalbox are designed for optimised ergonomics in order to furthermore support the overall drivability. Our bodywork does not only support the cooling-system but as well an appealing style.

FRAME CONSTRUCTION Hybrid frame with CFRP monocoque in the front and tubular steel space frame in the rear

MATERIAL Prepreg / honeycomb sandwich and S235

OVERALL L / W / H (mm) 3224 / 1397 / 1071

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1659 / 1170 / 1138

WEIGHT WITH 68kg DRIVER (Fr / Rr) 131 / 142

SUSPENSION Double unequal lenght A-Arm. Pull rod actuated longitudinally/vertically oriented spring and damper

TYRES (Fr / Rr) 20.0 x 7.0 R13 Goodyear

WHEELS (Fr / Rr) 7.0 x 13, -22mm offset 1 pc Mg rim

ENGINE Kawasaki ZX6R

BORE / STROKE / CYLINDERS / DISPLACEMENT 66.0mm / 43.8mm / 4 cylinders / 599cc

COMPRESSION RATIO 12,8:1

FUEL SYSTEM Student designed custom rubber safety cell, sequential injection

FUEL 98 RON

MAX POWER DESIGN (rpm) 10100

MAX TORQUE DESIGN (rpm) 8700

DRIVE TYPE 520 Chain

DIFFERENTIAL Drexler limited slip differential

COOLING Left side mounted student designed radiator with electric fan

BRAKE SYSTEM Student desigend brake calipers, 250mm rotors, adjustable brake bias, ABS

ELECTRONICS Mechatronic clutch and shifter, Data logger, Live- Telemety, CAN bus, multifunctional display

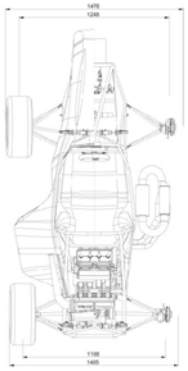
HANNOVER

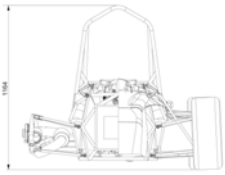
University of Applied Sciences
Hannover

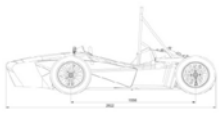
In the 2013 season our team consists of 25 active members from a variety of different fields of studies. Our new car is the fourth and it is an improvement of our 2012 car 'Totti'. We modified a lot of parts – with the aim to reduce weight and increase driveability. The engine has been tuned to deliver more torque using an improved airbox and exhaust manifold design, which works from hand to hand with the drivetrain modifications and the semi automatic electric shifting system. Furthermore we decided to use a data recording system which allows us to log engine and chassis parameters. It is connected to a driver information system using CAN-bus. W-LAN technology gives the oppurtunity for wireless services and tuning. The chassis setup aims for maximum driveability and extreme cornering. To improve our practical engineering skills, basically all of the car has been manufactured in our own workshop.

Car 84 Pit 1

Germany







FRAME CONSTRUCTION Tubular frame structure

MATERIAL Seamless steel E355

OVERALL L / W / H (mm) 2622 / 1476 / 1164

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1556 / 1248 / 1188

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 160

SUSPENSION Double unequal length A-Arms. Push-rod actuated horizontal orientated coilspring and damper

TYRES (Fr / Rr) 205x510 R13 Continental 2013 mold / 205x510 R13 Continental 2013

WHEELS (Fr / Rr) 7.0×13, 30mm offset, 1 pc Al Rim (OZ) / 7.0×13, 30mm offset, 1 pc Al Rim (OZ)

ENGINE Kawasaki / ZX-6R (2000)

BORE / STROKE / CYLINDERS / DISPLACEMENT 66mm / 43.8mm / 4 cylinders / 599cc

COMPRESSION RATIO 11.8:1

FUEL SYSTEM Student built fuel injection, sequenti

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 10000

DRIVE TYPE 6 gear sequential

DIFFERENTIAL Drexler Formula Student 2010 type

COOLING leftside mounted radiator equiped with a 90W fan

BRAKE SYSTEM self developed rotors, floating, water-jet cutted, 220mm diameter, adjustable brake balance

ELECTRONICS 2D Datalogger with High-Speed CAN-Bus, CAN-Bus controlled Display and paddel shifter

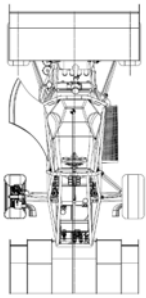
HATFIELD

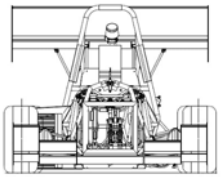
University of Hertfordshire

UH Racing has only one aim and that is to become the first UK team to win Formula Student Germany. Following last year's successful collaboration of Masters and Undergraduate students, UH Racing is looking to build upon our 6th place overall at FSG. The team has a well-defined structure including a core managerial team overseeing all aspects of the car. The broad knowledge of its 30 team member's makes UH Racing a strong contender and one to watch this year. Drawing upon a wealth of existing Formula Student knowledge the team has focused its attention on data driven designs. Strict performance targets were identified for each vehicle subsystem and every design has been reviewed with respect to the original design criteria. This year's strategy continues to develop statics but focus heavily on the overall dynamics of the team in order to operate efficiently and realise our full potential. Winning is the only thing that matters, everything else is a consequence of that.

Car 6 Pit 22

United Kingdom





FRAME CONSTRUCTION 2 piece steel tubular space-frame with bonded composite floor panel.

MATERIAL Mild Steel (EN10305-1 & T45)

OVERALL L / W / H (mm) 2939 / 1423 / 1126

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1190 / 1140

WEIGHT WITH 68kg DRIVER (Fr / Rr) 126 / 134

SUSPENSION Double unequal length A-Arm. Pull Fr Push Rr rod actuated spring & coil-over damper, adjustable ARB

TYRES (Fr / Rr) 18.0x6.0-10 Hoosier R25B

WHEELS (Fr / Rr) 7x10. 3pc Al Rim

ENGINE 2010 Yamaha YZF-R6

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 14.11:1

FUEL SYSTEM Custom Designed multi-point fuel delivery system

FUEL 98 Ron Unleaded Petrol.

MAX POWER DESIGN (rpm) 12000

MAX TORQUE DESIGN (rpm) 9500

DRIVE TYPE 520 Chain - Single

DIFFERENTIAL Salisbury Type, Externally adjustable preload.

COOLING Single sidepod mounted radiator with ECU controlled electric fan

BRAKE SYSTEM Bobbin float laser cut 304 stainless steel, hub mounted, 191mm OD/140mm IDx 4mm thick crossdrilled

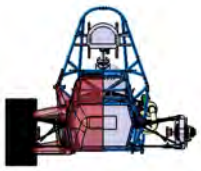
ELECTRONICS Student designed telemetry system & data acquisition system including lap time/split dash readout.

HEILBRONN
Heilbronn University

Car 21 Pit 20

Germany

In 2007 two students had the idea to found a Formula Student team representing the University of Applied Science Heilbronn. During the following years they achieved to build a team which has about 15 team members today. The most important improvement of the Raptor 2013 is the frame which is designed according to the Alternative Frame Rules to decrease weight without losing stiffness. Furthermore, we designed new uprights with center-lock wheel hubs, optimized wiring harness, steering wheel with integrated multifunctional display, optimized suspension mounting and the bodywork made of carbon. The one cylinder engine from Husqvarna is modified with two injection valves, a 6-liter airbox and a 4-gear-transmission based on the original gearbox to improve the performance in the dynamic events. In addition to that an automatic clutch system will help the driver to focus on the track. We are also well-prepared for the static events with a detailed Cost Report and an elaborate Business Plan.



FRAME CONSTRUCTION tubular steel frame

MATERIAL E355 C1

OVERALL L / W / H (mm) 2340 / 1440 / 1200

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1525 / 1284 / 1240

WEIGHT WITH 68kg DRIVER (Fr / Rr) 139 / 156

SUSPENSION Double unequal length A-Arm. Push rod actuated Adjustable in compression and in rebound range

TYRES (Fr / Rr) 20.5x7 - R13 Hoosier

WHEELS (Fr / Rr) 7x13" ET5, 3 pc Al-Mg Rim

ENGINE Modified Husqvarna 510 SMR 2008

BORE / STROKE / CYLINDERS / DISPLACEMENT 97mm / 67,8mm / 1 cylinders / 501cc

COMPRESSION RATIO 13.5

FUEL SYSTEM Bosch MS4 ECU, Mikuni Injection System

FUEL E85

MAX POWER DESIGN (rpm) 8150

MAX TORQUE DESIGN (rpm) 7150

DRIVE TYPE chain drive 520 motorcycle chain

DIFFERENTIAL Drexler FS limited slip differential

COOLING side mounted radiator with fan

BRAKE SYSTEM floating 220mm brake disks, AP Racing brake calipers, adjustable brake balance

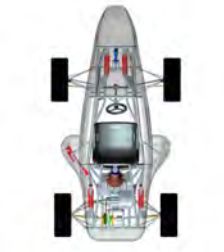
ELECTRONICS display integrated to steering wheel, live telemetry system, self-developped Gear Control Unit

INDORE
Shri G.S. Institute of Technology and Science Indore

Car 62 Pit 42

India

GSRacers is a first year team participating in the formula student design competition.In 2012, a bunch of ambitious engineering students from Mechanical and Production Engineering streams got together in an effort to boost the already strong knowledge base built with eight successful years in Mini Baja, and undertook the task of designing a formula style vehicle. After exhaustive study and iterations the team came up with a base design which served as a datum to which the inventive thinking added a lot of new concepts and methodologies.The team's goal for the 2013 design season is to get familiarized with the concepts of advanced design while being competitive at the international level from the first event.



FRAME CONSTRUCTION Tubular Spaceframe

MATERIAL SAE 1018

OVERALL L / W / H (mm) 2890 / 1550 / 1422

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1625 / 1320 / 1270

WEIGHT WITH 68kg DRIVER (Fr / Rr) 122 / 228

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented coil over shock

TYRES (Fr / Rr) 20.5x7-13 Hoosier R25B/ 185-65R13 Bridgestone

WHEELS (Fr / Rr) 6x13, 20mm offset, 1 pc Al Rim

ENGINE Honda CBR 600F (PC35)

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.9:1

FUEL SYSTEM Student Designed sequential fuel injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 9000

DRIVE TYPE Chain Drive

DIFFERENTIAL Open Differential

COOLING single side pod mounted with thermostat controlled fan

BRAKE SYSTEM 4-Disk system,rotors with 220mm diameter, floating type dual piston calipers

ELECTRONICS

KARLSRUHE
Karlsruhe Institute of Technology

Car 30 Pit 21

Germany

KA-RaceIng - two cars, one passion! Being a team of about 70 students, KA-RaceIng builds two cars every year: one with a combustion engine and one with an electric drivetrain. The KIT13c is our 7th combustion car, the KIT13e is our 4th electric car and both combine the best of new ideas and tested concepts of the last years. The KIT13c combines the best of new ideas and tested concepts. As we are building two cars, we develop several parts which meet the requirements of both cars and improve testing time and manufacturing effort. Since March 2011 we have been developing a 2-cylinder, turbocharged, direct injected combustion engine at Mercedes-AMG GmbH especially for the use in formula student vehicles. The KIT13c is developed and manufactured to run with this engine. We would like to thank all supporters and are looking forward to an exciting event in Hockenheim.

FRAME CONSTRUCTION Front: Carbonfiber Monocoque / Rear: Space frame

MATERIAL CFRP, Round steel tubing

OVERALL L / W / H (mm) 3215 / 1407 / 1369

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1565 / 1220 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 118 / 144

SUSPENSION Double unequal length A-Arm, pull/ push rod actuated KAZ damper with coil spring

TYRES (Fr / Rr) Front: 20.5x7 R13 R25B Hoosier - Rear: 20.5x7.5 R13 R25B Hoosier

WHEELS (Fr / Rr) Student designed/ built CFRP rim 7x13"

ENGINE Self developed engine, gearbox and differential in

BORE / STROKE / CYLINDERS / DISPLACEMENT 83mm / 55mm / 2 cylinders / 595cc

COMPRESSION RATIO 10:2

FUEL SYSTEM Direct Injection

FUEL E85

MAX POWER DESIGN (rpm) 5500

MAX TORQUE DESIGN (rpm) 4800

DRIVE TYPE Gearbox with spur gear stage

DIFFERENTIAL Drexler clutch pack limited slip differential, preloaded, adjustable bias ratio drive:

COOLING Side pod mounted radiator, electric fans&water pump with student designed controller

BRAKE SYSTEM Floating carbon-steel rotors, outer diameter 230mm/220mm (F/R), ISR four/two (F/R) piston caliper

ELECTRONICS self developed live telemetry&remote parametrization,electrical actuated clutch&shifting mechanism

KARLSRUHE
University of Applied Sciences Karlsruhe

Car 99 Pit 11

Germany

Founded in 2006, High Speed Karlsruhe is entering its 7th season in the Formula Student competition. Forty motivated students of the University of Applied Science Karlsruhe have been working together for one year to build the new racecar, named F - 107. The F - 107 is a direct decedent of its predecessors. All our cars imply the 600cc four cylinder engine and 13" wheels. As the second generation, the F - 107 is featuring an improved CFRP monocoque chassis which provides additional stiffness. Another feature is our CAN bus system which connects all control units and actuators. The electronic system is equipped with advanced data logging, traction and launch control. A Wi-Fi system enables the engineers to monitor the vitals of the car in real time. This season, we are proud to present our most obvious innovation: our new invented aero kit which enhances the dynamic performance. We would like to thank all our sponsors and supporters for their efforts. Your support is greatly appreciated.

FRAME CONSTRUCTION Front: CFRP Monocoque, Rear: Steel Spaceframe

MATERIAL Front: CFRP Tenax-IMS65/-HTA40,Gimapox EL-3,Rohacell31/71/110 Rear:E235+C

OVERALL L / W / H (mm) 2958 / 1382 / 1156

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1585 / 1190 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 128 / 139

SUSPENSION Double unequal length A-Arm. Pull rod actuated spring / damper. Adj. roll bar.

TYRES (Fr / Rr) 20.5 x 7 - 13 R25B Hoosier

WHEELS (Fr / Rr) 7 x 13, 18 mm offset, 2 pc Al Rim, spinforged

ENGINE 2003-2006 Honda CBR 600 RR (PC37)

BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.0:1

FUEL SYSTEM Student des./built system, fuel injection, 4 injectors, full sequential

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 9000

DRIVE TYPE Chain 520KZU with U-Ring, tensile str. 3

DIFFERENTIAL clutch pack limited slip, 10 Nm preload, 2.3 bias ratio

COOLING sidepod mounted radiator, 300 mm x 260 mm x 50 mm core, PWM controlled fan, back of radiator

BRAKE SYSTEM

ELECTRONICS Automatic Fusebox, Electropneumatic Shifting System, CAN-Bus

KONSTANZ
University of Applied Sciences
Konstanz

Since our foundation in 2005 our ambitious aim is continuous improvement and development in all disciplines of the Formula Student. New members stand for new ideas and knowledge – in 2013 we reached an all-time high of 66 team members. The Iltis13 combines all our strength and starts lighter and faster than ever in the season 2013. With a Suzuki GSX-R engine and a weight of 207 kilogram we are well prepared. The special hybrid wheels made of carbon and aluminum are only one reason for our successful lightweight implementation. Different to our last-season-car we switched from push rods to pull rods. This modification promises an improvement on track through agile and easy handling. Our self-made live telemetry system enables a specific car setup for every track requirement. A special thanks to all our sponsors and supporters. The Bodensee Racing Team looks forward to a great season 2013 and a successful event in Hockenheim.

Car 43 Pit 54

Germany

FRAME CONSTRUCTION Tubular space frame

MATERIAL S235JR steel round tubing with 1

OVERALL L / W / H (mm) 2815 / 1417 / 1065

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1642 / 1202 / 1210

WEIGHT WITH 68kg DRIVER (Fr / Rr) 119 / 156

SUSPENSION Double wishbone independent unequal length CFK A-Arm. Pull rod, TTX25 MkII FSAE damper

TYRES (Fr / Rr) 205x7.0 R13, Hoosier R25B / 205x7.0 R13, Hoosier R25B

WHEELS (Fr / Rr) Aluminum-CFRP Hybrid Rim/Aluminum-CFRP Hybrid Rim

ENGINE modified Suzuki GSXR 600 K3

BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.5:1

FUEL SYSTEM Student des/built ,fuel injection, sequential

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 13000

MAX TORQUE DESIGN (rpm) 10500

DRIVE TYPE 40x 11 sprocket with 520er chain

DIFFERENTIAL Drexler, clutch pack limited slip

COOLING one side pod mounted radiator with thermostatic controlled electric fan

BRAKE SYSTEM 4-Disk system, self developed rotors with 238 diameter, adjustale break balance

ELECTRONICS Multifunctional Steering Wheel, selfdesigned shifting unit, Live-Telemetry

KREFELD
Hochschule Niederrhein

We are going to start our engine for the second time. We, meaning Hochschule Niederrhein's Racing Team, are powered by highoctaned, motivated students from seven different faculties. An explosive mixture! Mixed up with passion for racing and the enthusiasm to give the best for a car, which takes our need for speed to the track. From nearly 12.000 students we found the right ones, namely 40 students. We gained a lot of experience from our first event, which showed us how to improve. We are even lighter, faster and mellower due to the support of our sponsors. We are looking forward seeing you in Hockenheim.

Car 26 Pit 65

Germany

FRAME CONSTRUCTION Full Tubular space frame

MATERIAL S235 JR steel, round and square tubing

OVERALL L / W / H (mm) 2825 / 1352 / 1160

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1525 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 129 / 129

SUSPENSION Pull rod actuated spring/damper. Roll bar (Fr)

TYRES (Fr / Rr) Hoosier, R25B, 18 inch x 6 inch - 10 in

WHEELS (Fr / Rr) 10x6 in, 3 pc Al Rim, 4.5 in backspacing (Fr), 2.5 in bachspacing (Rr)

ENGINE 2013 KTM 500 EXC

BORE / STROKE / CYLINDERS / DISPLACEMENT 95mmmm / 72mmmm / 1 cylinders / 510cc

COMPRESSION RATIO 11,8:1

FUEL SYSTEM Student Built Fuel System (Injection System), driven by Trijekt

FUEL E85

MAX POWER DESIGN (rpm) 8700

MAX TORQUE DESIGN (rpm) 780

DRIVE TYPE chain drive, original KTM gearbox

DIFFERENTIAL Drexler Limited Slip Differential

COOLING left-side mounted 2016 ccm core radiator, electrical

BRAKE SYSTEM Student designed rotors, adjustable brake balance, 4 pistons (Fr), 2 pistons (Rr)

ELECTRONICS Traction Control, Launch Control, Automatic up/ downshift

LIVERPOOL
Liverpool John Moores University

Car 32 Pit 41

United Kingdom

Since the start of the team's class 1 career in 2010, the team has gone from strength to strength managing to achieve a 12th place finish in Formula Student UK 2012. Aiming to continue and sustain the trend of improving of competition results, LJMU13 features a number of improvements over its predecessors to provide weight and performance improvements. With a redesigned spaceframe chassis retaining the handling performance of previous years, whilst reducing its weight, this has been paired with a modified and retuned Honda CBR600RR engine, with improved torque characteristics to allow the maximum performance of LJMU13 to be realised. True to one of the central principles behind the team, we aim to manufacture more of each yearly entry in-house as possible, introducing our own designed and manufactured light-weight hubs this year. Having last competed in Formula Student Germany in 2011, LJMU Racing is looking forward to returning and to improving on its past performance.

FRAME CONSTRUCTION Tubular steel space frame

MATERIAL Cold drawn seamless mild steel tubing

OVERALL L / W / H (mm) 2850 / 1300 / 1015

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1525 / 1200 / 1185

WEIGHT WITH 68kg DRIVER (Fr / Rr) 136 / 142

SUSPENSION Double unequal lenght A-Arm, Push rod actuated spring damper. Adjustable in compression and rebound

TYRES (Fr / Rr) 508 x 182-330 A45 Avon

WHEELS (Fr / Rr) 13" Keizer Kosmo wheel, 6" wide. 3pc aluminium rim with magnesium alloy centres

ENGINE Modified Honda CBR600RR4

BORE / STROKE / CYLINDERS / DISPLACEMENT
67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.5:01

FUEL SYSTEM DTA 80pro with sequential injection and spark ignition

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 10500

MAX TORQUE DESIGN (rpm) 8900

DRIVE TYPE Single 520 chain

DIFFERENTIAL Hub mounted brakes. Using 10

COOLING Side mounted, custom radiator with electrical fan and mechanical water pump

BRAKE SYSTEM Hub mounted brakes. Using 10

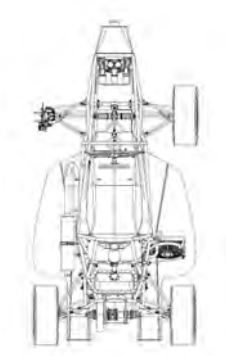
ELECTRONICS IP67 sealed wiring harness, electro-magnetic gear shifter and a self designed telemetry system

LIVERPOOL
University of Liverpool

Car 24 Pit 24

United Kingdom

The University of Liverpool Motorsport team are proud to be at competition with their 8th car for the team's 2nd year at FS Germany. The team of 40 comprises primarily of 3rd & 4th year Mechanical Engineering students working towards their MEng Degrees. The team's strategy for 2013 has been focused on striving for design optimisation, as such ULM008, has been designed with both dynamic performance and product viability as priorities. The team has moved to a 4 cylinder engine to deliver the power and reliability required, with a student designed sump ensuring it is perfectly suited to the car. Dynamic performance has been a particular focus for the driver integration, including a reclined driver position & more dedicated race controls. The team's move to CFRP bodywork has resulted in a stunningly sleek car, whilst allowing for a reduced overall weight. The team wish to thank their sponsors for their continued support. Without their help, the team's efforts would not be possible.



FRAME CONSTRUCTION One piece tubular steel spaceframe

MATERIAL AISI 1020 Steel

OVERALL L / W / H (mm) 2930 / 1430 / 1150

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1700 / 1220 / 1180

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 148

SUSPENSION Double, unequal, non-parallel A-Arm suspension, pullrod-actuated Ohlins shock absorbers

TYRES (Fr / Rr) 20 x 7.5 -13 R25B Hoosier

WHEELS (Fr / Rr) Aluminium split-rim, custom Al 2014 centre

ENGINE 2008 Yamaha YZF R6

BORE / STROKE / CYLINDERS / DISPLACEMENT
67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.1:1

FUEL SYSTEM Student designed stacks, Yamaha injectors controlled by DTA S80 ECU

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11500

MAX TORQUE DESIGN (rpm) 9000

DRIVE TYPE Single 520 chain, Yamaha gear box

DIFFERENTIAL 2010 FSAE Drexler LSD

COOLING Sidepod mounted, single core crossflow radiator, 779 cfm fan mounted to radiator

BRAKE SYSTEM AP Racing, double POT front, single POT rear, 220mm dia.

ELECTRONICS Wiring harness sealed to IP67, DTA SX Dash display, electromagnetic shifting system with shift cut

LOUGHBOROUGH
Loughborough University

Car 12 Pit 51

United Kingdom

FRAME CONSTRUCTION Tubular spaceframe with Tubular Rear Plate

MATERIAL Hybrid CDS and T45

OVERALL L / W / H (mm) 2800 / 1470 / 1020

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1535 / 1300 / 1180

WEIGHT WITH 68kg DRIVER (Fr / Rr) 139 / 139

SUSPENSION Double unequal A-Arm, Pullrod Front/Pushrod Rear, Ohlins Cane Creek FSAE Spring Damper Unit

TYRES (Fr / Rr) Hoosier R25A 20.5

WHEELS (Fr / Rr) Braid 2 Piece 13

ENGINE Modified Honda CBR600RR10

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.2:1

FUEL SYSTEM Custom MPI / MoTeC Management

FUEL 98RON

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 7000

DRIVE TYPE Single 520 Chain

DIFFERENTIAL Drexler FSAE LSD Mk1

COOLING Side mounted radiator with electric water pump and fan

BRAKE SYSTEM In house steel rotors (220mm Front, 205mm Rear) with AP Racing Calipers (4 Pot Front, 2 Pot Rear)

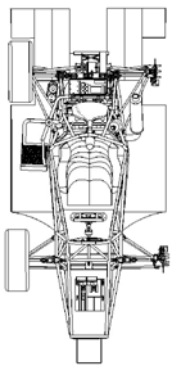
ELECTRONICS MoTec ECU and Dash Display, gear shift spark cut, traction control and launch control

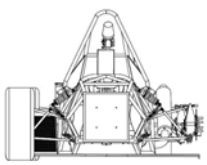
LUMotorsport is proud to present LFS13, its first all-new car in four years. The team has pushed hard this year to achieve this, and is confident that it will bring great success. The engine remains unchanged, as the venerable Honda CBR600RR unit; however the chassis, suspension and driveline have all received major overhauls. The ethos with LFS13 is for simplicity. With this in mind, the new suspension design does away with anti-roll bars in favour of innovatively designed quick-change rockers. Significant weight savings in the steel spaceframe chassis, billet aluminium uprights, wheels, bodywork and wiring loom have resulted in our lightest car ever. The team at Loughborough operates as a small close-knit group, voluntarily and entirely in its spare time. This breeds impeccable care and attention to detail in every single component, ensuring a strong pride in what we produce. We will be attending both Silverstone and Hockenheim this year, and as ever aim to place top UK University.

MADRID
Technical University of Madrid (UPM)

Car 86 Pit 66

Spain





FRAME CONSTRUCTION Tubular space frame / Carbon fiber floor and side pans / Aluminum back plate

MATERIAL AISI 4130 Alloy steel round tubing 16mm to 25mm diameter / Carbon fiber / 7075-T6 Aluminum

OVERALL L / W / H (mm) 3077 / 1404 / 1031

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1230 / 1160

WEIGHT WITH 68kg DRIVER (Fr / Rr) 124 / 152

SUSPENSION Double unequal length A-Arms. Push rod actuated spring/damper F-SAE specific units

TYRES (Fr / Rr) 20.5x7.0, R13 Hoosier R25B / 20.5x7.0, R13 Hoosier R25B

WHEELS (Fr / Rr) 7.0x13, -33 mm offset, 3pc Al&Mg / 7.0x13, -2 mm offset, 3pc Al&Mg

ENGINE 2003 Yamaha R6

BORE / STROKE / CYLINDERS / DISPLACEMENT 65.5mm / 44.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.4:1

FUEL SYSTEM Student designed / built fuel injection system using BOSCH MS3-ECU

FUEL 98 octane petrol

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 7000

DRIVE TYPE 520 roller chain

DIFFERENTIAL Drexler limited slip differential 30Nm preload

COOLING Side pod mounted 900 cc radiator with liquid-to-liquid oil cooler

BRAKE SYSTEM 4-Disk system, hub mounted, adjustable balance bar and rear proportioning valve

ELECTRONICS AIM EVO 4, telemetry system, electronic cut fuel during gear, launch control, speed limit

UPM Racing celebrates its 10th anniversary in 2013 by participating in FS Germany with two cars: one with a combustion engine and another with electric drivetrain. Each of our teams is composed of 20 automotive-passionated students who work part-time in the project, combining it with their degrees. The team members belong to the Technical University of Madrid, so the project lays on varied skills and knowledge. With a fairly tight budget, UPM Racing tries to introduce improvements in their new cars each year. In the UPM10 we have changed the ECU for a new one (Bosch Sport MS3 ECU) and with the help of a sponsor we recalibrated the engine. We remain at your disposition during the competition for any additional information. Finally, we would like to be grateful with all our sponsors, without them this project wouldn't be possible. We hope to see you all in Hockenheim!

MAGDEBURG

Otto von Guericke University of Magdeburg

It´s the 4th year for UMD Racing, the Formula Student team from the Otto-von-Guericke University from Magdeburg, Germany. We are happy and proud to cooperate with the lightweight construction and industrial design faculties from the University of Applied Science located in Magdeburg. With the help of our sponsors and new team members, we concentrated on designing our parts more simple and reliable while keeping our main concept, the side engine, alive. The frame is made of space tubes and at critical points, like the suspension attachments, square profiles. To keep the car balanced although the engine is located on the side of the car, the frame is built asymmetrically. As said before we like to thank our sponsors and most of all the Otto-von-Guericke University for supporting us with knowledge, manpower and manufacturing sites. Good luck to all and see you on track!

Car 20 Pit 72

Germany

FRAME CONSTRUCTION Tubular and square profile space frame

MATERIAL Steel

OVERALL L / W / H (mm) 1850 / 1445 / 1185

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1525 / 1250 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 125 / 180

SUSPENSION Double unequal length A-Arm. Pull rod actuated.

TYRES (Fr / Rr) 20x6.5-13 R25A Hoosier / 20x6.5-13 R25A Hoosier

WHEELS (Fr / Rr) 7,0 x 13 pc CFRP Rim / 7,0 x 13 pc CFRP Rim

ENGINE Husaberg FE550

BORE / STROKE / CYLINDERS / DISPLACEMENT 100mm / 70mm / 1 cylinders / 549cc

COMPRESSION RATIO 13:1

FUEL SYSTEM Student built ,fuel injection, sequential, intake-manifold fuel injection

FUEL 98 Octane unleaded gasoline

MAX POWER DESIGN (rpm) 8000

MAX TORQUE DESIGN (rpm) 6500

DRIVE TYPE RWD (2 chain drive, 1 Jackshaft),6-speed

DIFFERENTIAL Multi-disk limited-slip

COOLING Liquid cooled, right side pod mounted radiator with temperature electric controlled fan

BRAKE SYSTEM 4-Disk System, self developed rotors, adjustable break balance

ELECTRONICS Multifunctional dashboard, indicatorlights for gearshift, electric gearshift, onboard data logging

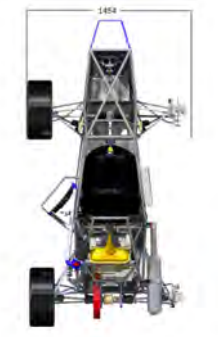
MANIPAL

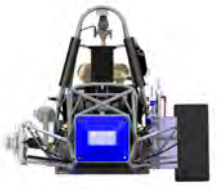
Manipal University

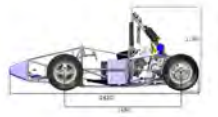
Formula Manipal is the official FSAE team of the Manipal University, Manipal, India. Formula Manipal came into existence in the year 2007. Since then, the team has gone to four different Formula Student events namely: FSAE Italy in 2008, FS UK in 2009, FS Austria in 2010 and FSAE Italy in 2011. It is for the first time that Formula Manipal team is competing in FS Germany. After the FSAE Italy competition in 2011, the team decided to shift to a 2-year project so that it could focus more on manufacturing a reliable and efficient car than all the previous seasons. Refining upon the last season's design, the team has innovated and fabricated a car of more compact design with reduced weight and a lighter bodywork. The team has also incorporated the Drexler Differential on the car along with the pneumatic gear shifting.

Car 96 Pit 30

India







FRAME CONSTRUCTION Front and rear Single piece Tubular space frame

MATERIAL 4130 steel round tubing,16mm to 26mm diameter

OVERALL L / W / H (mm) 2820 / 1454 / 1190

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1650 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 128 / 192

SUSPENSION Double wishbone, Unequal type, Pull Rod actuated vertically/horizontally oriented spring and damper

TYRES (Fr / Rr) 205x60 R13, Hoosier R25B / 205x60 R13, Hoosier R25B

WHEELS (Fr / Rr) 6.0x13, 108mm offset , 3 pc Al Rim / 6.0x13, 108mm offset , 3 pc Al Rim

ENGINE 2006 MODEL HONDA CBR600RR

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12:1

FUEL SYSTEM Student design/built ,fuel injection, semi sequential, In-tank fuel pump

FUEL Unleaded gasoline

MAX POWER DESIGN (rpm) 8900

MAX TORQUE DESIGN (rpm) 8800

DRIVE TYPE Chain Drive, 520 series X-ring chain

DIFFERENTIAL Drexler Limited Slip Differential, Clutch Type, 3 pairs of torque biasing ratio

COOLING Single side pod mounted radiator with 10 inch electric fan

BRAKE SYSTEM 4-Disk system,rotors with 240mm and 200mm diameter,adjustable brake balance,Wilwood 2 piece calipers

ELECTRONICS Aerograde wiring harness,Multifunctional display, Electropneumatic Shifting System,self designed DAQ

Are you auto-motivated?
Welcome!

Bewegt vom Motor des Fortschritts und im Fokus die automobilen Megatrends Sicherheit, Umwelt, Information und kostengünstige Autos entwickelt Continental die Zukunft der Mobilität für jedermann. Willkommen an einem Ort, wo Ihre Ideen willkommen sind und die Welt verändern können:
www.continental-karriere.de | www.facebook.com/ContinentalKarriere | www.continental-people.de

UNIVERSUM TOP 100 ARBEITGEBER 2013 STUDENT SURVEY
trendence Graduate Barometer 2012 DEUTSCHLANDS 100 Top-Arbeitgeber
FAIR COMPANY Die bessere Chance für Absolventinnen Eine Initiative von karriere.de

Continental

MANNHEIM

University of Applied Sciences Mannheim

Car 60 Pit 14

Germany

The home-event in Hockenheim is the season highlight for the Delta Racing Team from the University of Applied Sciences Mannheim. Located around 30 km from the track, we are highly motivated to show the capability and performance of our 2013 car. Our most distinguishing feature is the in-line drive train composed of an intercooled turbo charged two cylinder twin engine and a separated 4-speed gearbox, which shows around 110 Nm torque at only 4500 rpm. Our main goals for this season is to improve reliability, reduce weight and finish all dynamic events. To reach this, we massively increased our use of composites, worked out weight reduction for many parts by not degrading stability and optimized the engine performance. The car was built to give our drivers a fast, spicy and reliable car. Ergonomics and suspension setup were further improved to last year. In order to learn more about our car, we invite you to come over to our pit so we can proudly present you our new DR13 turbo charged!

FRAME CONSTRUCTION Tubular Space Frame

MATERIAL 4130 steel round tubing 25mm dia

OVERALL L / W / H (mm) 3007 / 1446 / 1108

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1532 / 1227 / 1127

WEIGHT WITH 68kg DRIVER (Fr / Rr) 154 / 194

SUSPENSION Double, unequal length A-Arms. Push rod actuated horizontally oriented spring and damper.

TYRES (Fr / Rr) 7.5/20.0-13, Hossier R25B

WHEELS (Fr / Rr) OZ Racing, 7x13, 22 mm offset, 1 pc Al Rim

ENGINE Weber Motor / MPE610

BORE / STROKE / CYLINDERS / DISPLACEMENT 85.0mm / 53.5mm / 2 cylinders / 607cc

COMPRESSION RATIO 10,2:1

FUEL SYSTEM Student design/built, map based, multipoint electronic fuel injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 7000

MAX TORQUE DESIGN (rpm) 4500

DRIVE TYPE Transaxle gearbox with included LSD

DIFFERENTIAL Salisbury type limited slip differential, 60 degree ramp angle

COOLING Side mounted radiator with thermostatic controlled electric fans and forward air duct

BRAKE SYSTEM 4-disk system, self developed floating rotors, 220/210mm dia, adjustable balace bar.

ELECTRONICS Self developed data logger with steering wheel display, el. controlled clutch and shifting system

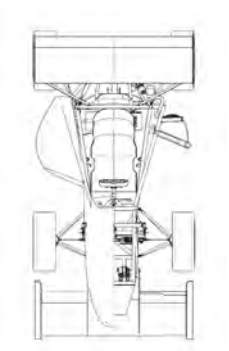
MARIBOR

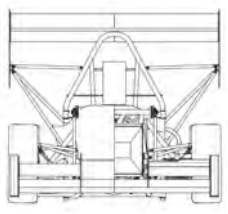
University of Maribor

Car 71 Pit 49

Slovenia

UNI Maribor Grand Prix Engineering has made a third car. We are entering FSUK, FSG and FSA this year. The highlight remains on the unique aluminum spaceframe which we were able to make even lighter and twice as stiff as before. Composite materials were used on suspension arms, bodywork, seat, floor, intake, steering wheel and various small parts to lower the car's mass. A lot of work was done on the engine (change from Honda CBR600RR to KTM 450 SX-F) to gain maximum performance and reduce fuel consumption. The suspension aims to provide optimal camber curves and the ability to offer different heave and roll stiffness. Improved self designed quick shifter is made with a simple DC motor, changing gears in less than 100 ms. By using a sophisticated data acquisition system, logging all the important sensors, we were able to analyze the data off track and get the maximum out of the car on track.





FRAME CONSTRUCTION Aluminium Tubular spaceframe

MATERIAL Aluminium 6061 - T6 30,5/3 mm, 34/3mm and 30.5/1.5mm

OVERALL L / W / H (mm) 2670 / 1390 / 1115

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1200 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 119 / 119

SUSPENSION Double unequal length A-Arm. Pull rod actuated front & rear

TYRES (Fr / Rr) Front & Rear - 20.5 x 7.0 - 13 R25B Hoosier

WHEELS (Fr / Rr) 7 inch wide, aluminium OZ-Racing

ENGINE Modified 2007 KTM 450 SX-F

BORE / STROKE / CYLINDERS / DISPLACEMENT 100mm / 60.8mm / 1 cylinders / 477cc

COMPRESSION RATIO 12.5:1

FUEL SYSTEM Bosch injectors (High and low injection), adjustable fuel pressure regulator

FUEL RON 98

MAX POWER DESIGN (rpm) 7000

MAX TORQUE DESIGN (rpm) 5500

DRIVE TYPE Stock KTM sequential gearbox, Chain

DIFFERENTIAL Adjustable Limited Slip Differential - Drexler, 10 Nm preload

COOLING Sidepod mounted 1 core Aluminium radiator, 410 cfm fan mounted to backside of radiator

BRAKE SYSTEM 4-Disk system, self developed rotors with 220mm diameter front and 200mm rear, AP Racing calipers

ELECTRONICS Electronic Shifting System, Multifunctional Steering Wheel, DAQ System

METZ
National Engineering School of Metz

Each year the international competition „Formula Student“ is another step in the progress and the improvement of our performance. The fundamental choices undertaken on the project EFS005 Fearless gave us good results so this year will be the continuity of the previous one. For the EFS006 DragonBlast our objectives are: o Optimize the engine performance by modifying the intake and exhausto Improve the ground contact system o Increase the overall efficiency of the car by integrating a telemetry system o Reduce the overall schedule by three months to be able to run and debug the car from April onwards.

Car 57 Pit 74

France

FRAME CONSTRUCTION Steel Tubular Frame

MATERIAL 25CrMo4 round & square tubing, 25 CrMo4 added axis, mild steel added plates

OVERALL L / W / H (mm) 2755 / 1410 / 1061

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1620 / 1180 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 130 / 130

SUSPENSION Double equal length A-Arm, pull rod actuated spring / damper, adjustable roll bar

TYRES (Fr / Rr) 19,5x6,5-10 R25B Hoosier

WHEELS (Fr / Rr) 19,5x6,5-10 R25B Hoosier

ENGINE KTM 525 EXC

BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 75mm / 1 cylinders / 510cc

COMPRESSION RATIO 11:01

FUEL SYSTEM Electronic fuel injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 9500

MAX TORQUE DESIGN (rpm) 6000

DRIVE TYPE Chain Drive #520

DIFFERENTIAL Drexler limited slip differential

COOLING Aluminum radiator with thermostatically controlled fan

BRAKE SYSTEM AP Racing, 25,4 mm bore, 2-piston front and rear

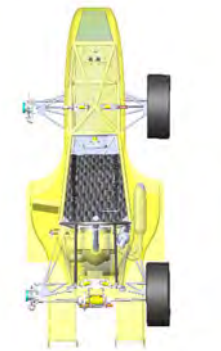
ELECTRONICS Student des. datalogger, Multi-functionnal steering wheel.

MODENA
University of Modena and Reggio Emilia

We are MoRe Modena Racing Team, from the Università di Modena e Reggio Emilia. Our team consists of over 30 people from several engineering schools. We all have in common the passion for autovehicles and the world beyond, to prove our abilities, work and to improve our academic skills on practical activities such as Formula SAE project. Our job is possible thanks to the support of our university, sponsors and fellow teams.

Car 37 Pit 25

Italy



FRAME CONSTRUCTION Front and rear aluminum Tubular space frame, with glued and riveted aluminum panels

MATERIAL 6063-T6 round tubing 0.79-1.26“ diam / 6082-T6 and 1050 0.032-0.16“ panels and plates

OVERALL L / W / H (mm) 2758 / 1741 / 1100

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1541 / 1169 / 1135

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 160

SUSPENSION Double unequal length A-Arm. Pushrod actuated inboard springs and dampers (coil over).

TYRES (Fr / Rr) 20.0x7.2“ R13 Avon, both Fr/Rr

WHEELS (Fr / Rr) 7x13

ENGINE Suzuki GSX-R 600 (K7)

BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.5:1

FUEL SYSTEM EFI Euro6 controlled, OEM indirect fuel injection, dual rail with two injectors per cylinder

FUEL 95 octane unleaded gasoline

MAX POWER DESIGN (rpm) 10000

MAX TORQUE DESIGN (rpm) 9000

DRIVE TYPE 520 roller chain

DIFFERENTIAL Drexler FS2010 limited slip differential limited slip bevel gear with internal preload adjustment

COOLING Chassis mounted 2 core aluminum radiator, 410 cfm fan mounted to radiator.

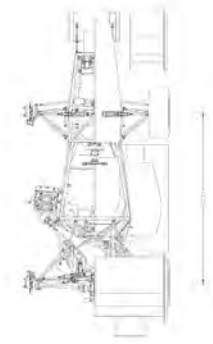
BRAKE SYSTEM 4-Disks system, self developed rotors 220mm diamater, adjustable brake balance, APracing calipers

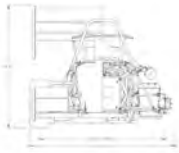
ELECTRONICS Electropneumatic shifting, selfdesigned live telemetry system, self built display in steering wheel

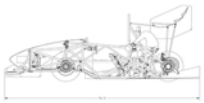
MONTRÉAL
McGill University

Car 73 Pit 12

Canada







The MRT15 combustion prototype will mark the McGill Racing Team's 15th entry into the FSAE series. For the first time, MRT and the former McGill Hybrid Racing Team have joined forces to design and build both an electric and a combustion vehicle from the ground up. MRT15 is powered by the Rotax DS450 single-cylinder engine and features a full aerodynamics package. Focus has been set on developing a reliable yet competitive package backed by simulation and physical validation.

FRAME CONSTRUCTION Steel space frame

MATERIAL AISI 1020 Mild Steel Tubing

OVERALL L / W / H (mm) 2876 / 1380 / 1164

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1194 / 1194

WEIGHT WITH 68kg DRIVER (Fr / Rr) 125 / 124

SUSPENSION Double unequal length A-Arm. Push rod actuated spring and damper.

TYRES (Fr / Rr) 216x47 R10, Hoosier LC0 / 216x47 R10, Hoosier LC0

WHEELS (Fr / Rr) 7.0x10, 25.4 mm offset, 3 pc Al Rim / 7.0x10, 25.4 mm offset, 3 pc Al Rim

ENGINE Rotax DS450

BORE / STROKE / CYLINDERS / DISPLACEMENT 97.0mm / 60.8mm / 1 cylinders / 449cc

COMPRESSION RATIO 13.0:1

FUEL SYSTEM Injection

FUEL 95 octane

MAX POWER DESIGN (rpm) 8500

MAX TORQUE DESIGN (rpm) 7000

DRIVE TYPE Slipper Clutch, Sequential Gearbox

DIFFERENTIAL Torsen Differential

COOLING Water Cooled

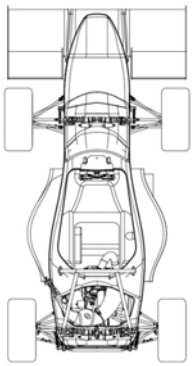
BRAKE SYSTEM AP Racing Master Cylinders & CP4227/ CP4226

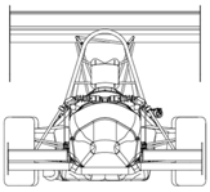
ELECTRONICS Vi-Pec V88 ECU; AiM Data Acquisition

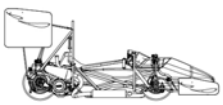
MONTRÉAL
University of Québec - ETS

Car 7 Pit 36

Canada







The AXF13 design is based on ambitious competition objectives. The result is a compact, lightweight, efficient, fast race car. Using a numerical approach, backed by extensive experimental validation the team is able to always push the limits further and further. The AXF2013 marks a new era in the ETS history, being the first car with aerodynamic devices. Using extensive Computational fluid dynamics (CFD) the team managed to design a well balanced and lightweight package.

FRAME CONSTRUCTION Single piece carbon fiber Monocoque

MATERIAL Carbon fiber, Aluminium Honeycomb

OVERALL L / W / H (mm) 2827 / 1321 / 1194

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1162 / 1043

WEIGHT WITH 68kg DRIVER (Fr / Rr) 108 / 108

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) Hoosier, 18x6.0-10, LC0

WHEELS (Fr / Rr) 7x10, 5mm offset, 3 pc Al Rim

ENGINE 2011 Yamaha WR450

BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 62.4mm / 1 cylinders / 443cc

COMPRESSION RATIO 12.5:1

FUEL SYSTEM Student Built port injection, electronically controlled

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 9200

MAX TORQUE DESIGN (rpm) 900

DRIVE TYPE Chain Drive

DIFFERENTIAL Drexler Limited-Slip, Salisbury-type

COOLING Twin side pod mounted radiators

BRAKE SYSTEM 4-Disk system with adjustable brake balance

ELECTRONICS Custom dash display, Electropneumanic shifting system, Power management unit

MOSCOW

Moscow State Technical University (MAMI)

Car 52 Pit 61

Russia

It's the sixth season of the team of Moscow UMech MAMI participating in Formula Student Germany event. You have known us as FS-MAMI team, but everything is progressing. So we are glad to present you FDR MAMI team (Formula Dream Russia MAMI team). Lots of things have changed, FDR MAMI is a new concept of team organization, methods of designing and as a result of our progress you will see the new Iguana G6 race car which is extremely lightweight, reliable and fast. A lot of time-proved solutions were realized in this season, but more new features came. We started to use hybrid construction of the frame, added aerodynamic elements and changed our wheels from 13" to 10". These significant changes are inspiring to show the team's resoluteness at the competition. We're looking forward to the FSG competition. See you in our pit!

FRAME CONSTRUCTION Hybrid tubular spaceframe

MATERIAL 1020 steel, aluminum AlMg5 round tubing 16 mm to 30 mm dia, carbon fiber

OVERALL L / W / H (mm) 3135 / 1425 / 1134

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1220 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 131 / 149

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper and anti roll

TYRES (Fr / Rr) 457 153 R10 Hoosier/ 457 153 R10 Hoosier

WHEELS (Fr / Rr) 6 10, +40 mm offset, 1pc Al Braid/ 6 10, 0 mm offset, 1pc Al Braid

ENGINE Modified Honda CBR 600F4i

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.0:1

FUEL SYSTEM DTA S80Pro ECU,sequential fuel injection,190 CC/min Denso injectors

FUEL 98 octane

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 10000

DRIVE TYPE Chain #520

DIFFERENTIAL Drexler limited slip differential, 25Nm preload, adjustable bias ratio

COOLING One side pod mounted radiator with thermostatic controlled electric fan

BRAKE SYSTEM 4-Disk system, perforated rotors with 180mm dia, Wilwood GP200 and Wilwood PS1 calipers (Fr/ Rr)

ELECTRONICS Race Technology DL1 Mk3 datalogger, Steering wheel mounted display, Electropneumatic shifting system

MUMBAI

K. J. Somaiya College of Engineering

Car 25 Pit 17

India

Orion Racing India was kick started in 2006 by a group of ambitious engineering students from K. J. Somaiya College of Engineering. They aimed to rise above the confines of a suffocating education system by arming themselves with the practical knowledge of their everyday studies. Seven years since its inception, team Orion Racing India has grown significantly in size, improved its organization & structure and gained a lot of experience through international exposure.This year the project timeline was revised in order to reduce the time spent on design & manufacturing and increase the time spent on vehicle testing. The increased focus on testing is aimed at ensuring reliability and extensive use of sensors. The ORI-13 boasts several new features such as student built live telemetry, pull rod front suspension system, ergonomic driver interface with led rpm shift lights with a performance tuned engine and the eccentric chain tensioning mechanism providing finest adjustability.

FRAME CONSTRUCTION Tubular Spaceframe

MATERIAL DIN 2391 St 52

OVERALL L / W / H (mm) 2970 / 1423 / 1185

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1580 / 1220 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 170

SUSPENSION Double unequal length A-arm. Pull rod actuated Front, Push Rod Actuated Rear

TYRES (Fr / Rr) 205x510 R13 Continental 34M Front and Rear

WHEELS (Fr / Rr) 7x13, 22mm offset, 1 pc Al Rim Front and Rear

ENGINE 2006 Honda CBR 600 F4i

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12:1

FUEL SYSTEM Honda stock fuel rail, Electronic fuel injection, sequential

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 12000

MAX TORQUE DESIGN (rpm) 8500

DRIVE TYPE Chain Drive

DIFFERENTIAL Clutch pack Limited Slip Differential, 30Nm preload, 1.5 bias ratio

COOLING Chassis mounted, side pod enclosed single radiator with electric waterpump and fan

BRAKE SYSTEM 4-disk system, 4-piston Wilwood calipers and AP Racing spherical bearing mounted master cylinders

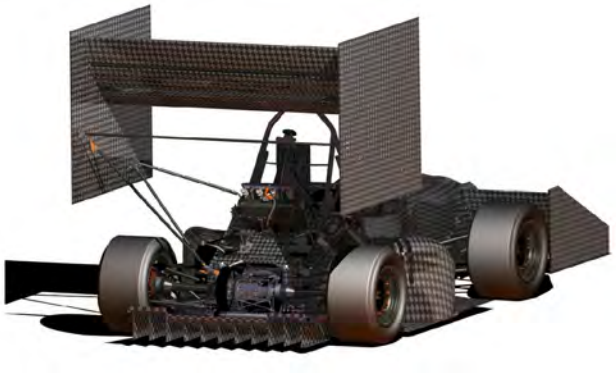
ELECTRONICS Self designed data logger and telemetry system, Paddle-shifting, MoTeC M400 ECU

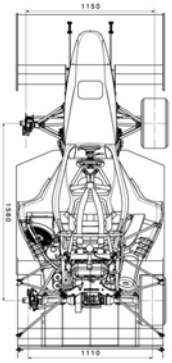
MÜNCHEN

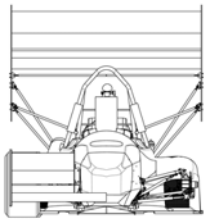
Technische Universität München

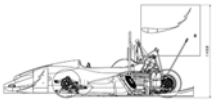
Car 2 Pit 64

Germany









FRAME CONSTRUCTION One piece prepreg monocoque

MATERIAL CFRP aluminum honeycomb sandwich

OVERALL L / W / H (mm) 3084 / 1390 / 1459

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1580 / 1150 / 1110

WEIGHT WITH 68kg DRIVER (Fr / Rr) 123 / 133

SUSPENSION double unequal length A-Arms, Pullrod actuated horizontally oriented Sachs F3 Throughrod Spring/dam

TYRES (Fr / Rr) 7.5x10 R25B Hoosier

WHEELS (Fr / Rr) 7.5x10 R25B Hoosier

ENGINE Kawasaki ZX-6R 2007

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.3:1

FUEL SYSTEM student built, two stage injection, MoTec M800 controlled

FUEL E85

MAX POWER DESIGN (rpm) 10500

MAX TORQUE DESIGN (rpm) 90000

DRIVE TYPE Chain DID 520 ERT2

DIFFERENTIAL Drexler Formula Student Limited Slip,

COOLING Seperate Water and Oil coolers with fans, Electrical waterpump (ECU controlled)

BRAKE SYSTEM disk diameter 180mm (FR)/156mm(RR), adjustable brake balance, Titlon master cylinders, ISR calipers

ELECTRONICS Telemetry system, MoTec ADL3 dash logger, launch control, automatic upshift, electrical shifting

In October 2012 a team of 65 young and motivated students started to develop the 10th Formula Student Combustion car of the TUfast Racing Team. After a lot of hard work we were proud to roll out the nb013 out of our workshop in June 2013. The challenge for this year was to reduce weight even more, aiming for less than 190kg with a aero package. Therefore we implemented some innovative designs e.g. for the rims and the driveshafts. The full aero package is also a first in TUfast history. So now we are excited to compete with all the other teams and see if we did a good job. And after a hard day full of work, we would be happy to chat with some of you guys about our favorite topic and have a good time. Just come over and have a beer with us.

NAVI MUMBAI

Bharati Vidyapeeth College of Engineering

Car 31 Pit 37

India

FRAME CONSTRUCTION Tubular space frame

MATERIAL ST-52, AISI 1018

OVERALL L / W / H (mm) 2945 / 1375 / 1115

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1580 / 1220 / 1220

WEIGHT WITH 68kg DRIVER (Fr / Rr) 160 / 160

SUSPENSION Double unequal length A-arms. Push rod actuated spring and damper (Coil over)

TYRES (Fr / Rr) 195x60 R13 front and rear

WHEELS (Fr / Rr) 6x13 32mm offset aluminium alloy

ENGINE Royal Enfield Classis 500 EFI

BORE / STROKE / CYLINDERS / DISPLACEMENT 84mm / 90mm / 1 cylinders / 499cc

COMPRESSION RATIO 8,5:1

FUEL SYSTEM

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 5250

MAX TORQUE DESIGN (rpm) 4000

DRIVE TYPE 5 speed gearbox

DIFFERENTIAL Stock open differential (TATA NANO)

COOLING Natural convection air cooled

BRAKE SYSTEM 4-Disk system, stock HONDA rotors with 220mm diameter, adjustable brake balance

ELECTRONICS Custom wiring Harness, stock EFI ECU

Triumphant Racers from the Bharati Vidyapeeth College of Engineering, Navi Mumbai, India entering into their second year of competition, intend to apply the experience gained from previous competitions. The next car from the Triumphant Racers stable is named tvakSa and is supposed to be simple yet reliable as well as cost and fuel efficient. Numerous hours of research as well as decision-making have gone into it. The philosophy of the team to use all things available indigenously and produce custom made parts with simple and easy to manufacture designs. The teams wishes to clear all the dynamic events and bring back a large pot of knowledge to apply in its future cars.

OXFORD
Oxford Brookes University

Car 92 Pit 56

United Kingdom

OBR returns to Formula Student this year with our new car, Isis 13. Buoyed by the success of our strong finishes in 2012, we've attempted to refine the strengths of the car that brought us our first silverware in five years and develop the weaker areas that were discovered at competition. The car itself is very much an ‚evolution, not revolution'. This was, in part, to help integrate new members into the project, having bid farewell to many of our most experienced members at graduation last summer. With some guidance from Alumni, we've worked on developing our tried-and-tested chassis to produce our first full Aluminium monocoque. Our development hasn't only been mechanical though. Aerodynamic devices make their first appearance on an Isis car for over 10 years. With our new diffuser we hope to boost overall car performance in Autocross, and the improved drivability paired with more driver seat time sees us aiming for a strong showing out on track.

FRAME CONSTRUCTION Aluminium sandwich panel Monocoque with Steel roll hoops

MATERIAL 6082 - T6 Aluminium Skins, perforated Aluminium honeycomb core, 4130 steel tubes

OVERALL L / W / H (mm) 2716 / 1319 / 1130

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1125 / 1095

WEIGHT WITH 68kg DRIVER (Fr / Rr) 85 / 92

SUSPENSION Double unequal length wishbones w/pushrod actuated spring-dampers. U-Bar FARB, T-Bar RARB

TYRES (Fr / Rr) 20.0/6.2-R13 Avon FITO 9241 F&R

WHEELS (Fr / Rr) 2pc Home Made Carbon Rim 6' wide with 8-spoke aluminium centre, 14.2mm offset F&R

ENGINE KTM 530 EXC - 2010

BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 72mm / 1 cylinders / 510cc

COMPRESSION RATIO 11.9

FUEL SYSTEM Student designed single point port injection system

FUEL 99 RON Unleaded

MAX POWER DESIGN (rpm) 7500

MAX TORQUE DESIGN (rpm) 5250

DRIVE TYPE Single 520 Chain

DIFFERENTIAL Drexler Formula SAE Limited Slip Differential

COOLING Side mounted 2r12 core radiator, 850 cfm fan mounted to ducting

BRAKE SYSTEM Floating, Cast Iron, hub mounted, 220 mm dia. vented discs with ISR Front & AP Racing Rear calipers

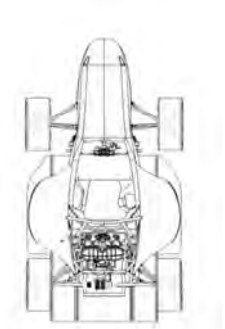
ELECTRONICS 22 & 23 AWG / twin leg: high and low current. Electropneumatic shifting system. Bosch DDU7 Dash.

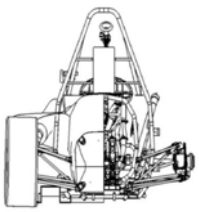
PADERBORN
University of Paderborn

Car 58 Pit 69

Germany

In 2006 the UPBracing Team e.V. was founded by seven students of the University of Paderborn. Today the team exists of about 180 members of whom about 30 students are involved in the development and organization. Good results could be achieved with the 13th place in Silverstone (GB) and the 7th place in Györ (HU)in the year 2011. The UPBracing Team is strong-minded and also this year they stress their aims: „Every year we try to inspire students and companies for this huge project. On account of our many activity areas in the team we are grateful for every other support. One of our biggest aims is to reduce to every component so much weight as possible as well as to discover new innovations to score with specific features at the events. Of course it is also important for us to reach a good place in the dynamic and static events, because here the car is tested on its functionality and the team on its teamwork."





FRAME CONSTRUCTION Hybrid Frame with CFRP monocoque in the front and tubular steel frame in the rear

MATERIAL CFRP SIGRATEX-Prepreg by SGL, CORMASTER NOMEX honeycomb sandwich panels, E355 tube

OVERALL L / W / H (mm) 2800 / 1400 / 1100

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1170 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 137 / 136

SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented adjustable spring and damper.

TYRES (Fr / Rr) 20,5 x 7,0-13 R25B Hoosier / 20,5 x 7,0-13 R25B Hoosier

WHEELS (Fr / Rr) 3 pc. CFRP Wheel Rim base and Al Wheel center

ENGINE Suzuki GSR600 K6, modified for E85

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42,5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13,85:1

FUEL SYSTEM open-source MegaSquirt system with semi sequential injection and wasted spark ignition

FUEL E85

MAX POWER DESIGN (rpm) 11200

MAX TORQUE DESIGN (rpm) 9200

DRIVE TYPE chain drive

DIFFERENTIAL Drexler Formula Student Differential

COOLING side mounted 3300cc radiator and 255mm electric fan

BRAKE SYSTEM 4-Disk system, self developed rotors with 220mm diameter, adjustable balance,AP Racing monoblock cal

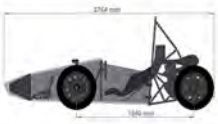
ELECTRONICS eletromagnetic shifting system, self designed Live-Telemetrysystem, monitoring for CAN bus via WIFI

PATIALA
Thapar University

Car 68 Pit 6

India

Team Fateh is the FSAE team of Thapar University, India. Team Fateh started participating in Formula Student events in the year 2008. The team received the Toyota Best Endeavour Award, in the very first attempt at Formula Student UK and have never looked back ever since. This year the team comes to FS Germany for the first time. In the 2013 season, the team has achieved a new high in the field of technical advancement, design and manufacturing. The car boasts of an aluminium honeycomb monocoque, a first for any Indian team; and a brand new 510cc single cylinder KTM engine. These changes have achieved an incredible reduction in weight in this year's car, making it the lightest car rolling out of Team Fateh's workshop. The 2013 car is a result of the hard work, determination and innovation of all the members of the team. The team would like to thank all the sponsors and partners for their help and support. This wouldn't have been possible without your assistance.



FRAME CONSTRUCTION Front Aluminium sandwich panel monocoque integrated with rear spaceframe

MATERIAL Aluminium sandwich panel (23mm core,1mm skins), 1020 steel spaceframe

OVERALL L / W / H (mm) 2754 / 1427 / 1099

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1540 / 1250 / 1185

WEIGHT WITH 68kg DRIVER (Fr / Rr) 121 / 137

SUSPENSION Double unequal length A-Arm Push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 20.5x7 R13, Hoosier R25B / 20.5x7 R13, Hoosier R25B

WHEELS (Fr / Rr) 7x13, -22mm offset / 7x13, -22mm offset

ENGINE 2013 KTM EXC 500, single cylinder

BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 72mm / 1 cylinders / 510cc

COMPRESSION RATIO 11.8:1

FUEL SYSTEM Motec M84 ECU controlled gasoline fuel injection

FUEL 95 octane gasoline

MAX POWER DESIGN (rpm) 9000

MAX TORQUE DESIGN (rpm) 7000

DRIVE TYPE Single 520 chain

DIFFERENTIAL Drexler LSD Formula Student,

COOLING Side mounted single radiator with electronic controlled electric fan

BRAKE SYSTEM 4-Disk system, AP racing master cylinders and trunion type bias bar, Willwood brake calipers

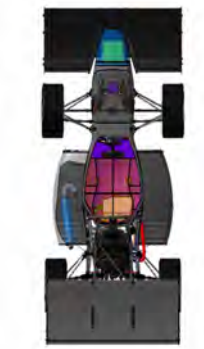
ELECTRONICS Wiring harness with MOTEC M84 ECU, button operated solenoid gear shiifting,

PRAGUE
Czech Technical University in Prague

Car 33 Pit 70

Czech Republic

The CTU CarTech Formula Student Combustion Team was founded in 2008 at the Czech Technical University in Prague as the first Formula SAE/Student team in the Czech Republic. CTU CarTech is a student project with the support from many industry companies from the Czech Republic and abroad. After the most successful year in CTU CarTech history, when our Combustion team was on the 18th place in the world ranking list, the team of 30 young and motivated students started to prepare its fifths formula car for the 2013 season called FS.05. All the efforts are aimed to improve the chassis and to investigate the aerodynamics influence on the vehicle dynamics. FS.05 will have the first monocoque which was designed and ever built in the Czech Republic. All members give their best to improve the result from previous year and to defend the position of most successful Czech team. We are excited to take part in the Formula Student Germany event and to compete with the best teams across the world.



FRAME CONSTRUCTION Semi-monokok (front part monocoque structure + rear space frame)

MATERIAL CFRP prepreg EHKF 420C-20; Airex R82.60; Al Honeycomb EC 8464; ST tubes 15CDV6;

OVERALL L / W / H (mm) 3130 / 1430 / 1160

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1650 / 1260 / 1180

WEIGHT WITH 68kg DRIVER (Fr / Rr) 141 / 152

SUSPENSION Double unequal length A-Arm. Push rod actuated transversely oriented spring and damper

TYRES (Fr / Rr) Hoosier 20.5 x 7.0 – 13 R25B

WHEELS (Fr / Rr) Hoosier 20.0 x 7.5 – 13 R25B

ENGINE Yamaha YZF R6

BORE / STROKE / CYLINDERS / DISPLACEMENT 65.5mm / 44.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.1:1

FUEL SYSTEM Student built manifold, fuel injection with 4 original injectors

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 12500

MAX TORQUE DESIGN (rpm) 9500

DRIVE TYPE Chain Drive

DIFFERENTIAL Limited Slip Drexler diferential

COOLING right side mounted x core 38mm radiator , fan mounted to output duct

BRAKE SYSTEM 4-floating disk system, self developed rotor, adjustable brake balance

ELECTRONICS Electropneumatic shifting system, launch rev limiter, doubled-independent pneumatic clutch

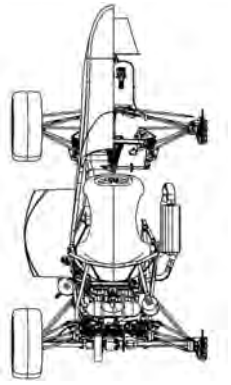
REGENSBURG

University of Applied Sciences Regensburg

Car 46 Pit 46

Germany

The Dynamics e.V. is one of two FSAE teams at the University of Applied Sciences Regensburg. With the RP13c (Racing Performance 2013 Combustion), we have built our 6th car since the foundation in 2006, while our partner team regenics e.V. has built their third electrically powered car. Creating innovation and participating in challenging competitions have always been our motivation. Driven by accuracy with fastidious attention to detail, we are looking forward to a great event at the Hockenheim Ring in 2013.



FRAME CONSTRUCTION Hybrid CFRP-Monocoque with tubular steel rear

MATERIAL Flexcore aluminium honeycomb

OVERALL L / W / H (mm) 2700 / 1432 / 1086

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1250 / 1250

WEIGHT WITH 68kg DRIVER (Fr / Rr) 130 / 147

SUSPENSION rear; ARB front and rear

TYRES (Fr / Rr) Continental C13

WHEELS (Fr / Rr) 7.0x13

ENGINE Honda CBR 600 RR PC37, 2003-2005

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13,5:1

FUEL SYSTEM Mass Air, Manifold Pressure, Throttle Pos., Crank Pos.

FUEL 99 RON Unleaded

MAX POWER DESIGN (rpm) 68 kW

MAX TORQUE DESIGN (rpm) 65 Nm

DRIVE TYPE Belt drive

DIFFERENTIAL Optimized clutch pack limited slip differential

COOLING Rear mounted radiator and electric fan

BRAKE SYSTEM Hub mounted rotors with 245mm diameter in front and 214 mm diameter in the rear

ELECTRONICS Live Telemetry, self-designed wiring harness with motorsport connectors

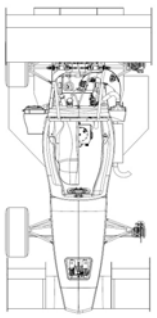
ROCHESTER

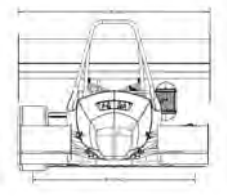
Rochester Institute of Technology

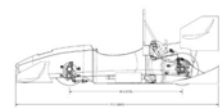
Car 5 Pit 33

United States

The RIT Formula Racing Team builds upon last season's Endurance victory at Formula Student Germany with our 2013 entrant to the Formula Student Series. A product of extensive simulation, design, and testing, the RIT vehicle exhibits many unique characteristics. A carbon fiber monocoque utilizing unidirectional fiber maintains sufficient stiffness while significantly reducing weight. A lightweight aerodynamic package verified through wind tunnel testing generates 330 N of downforce at Skidpad speed. The vehicle's entire braking system is custom designed in house, allowing for component level optimization. The turbocharged single-cylinder engine is light, fuel efficient and produces 75% of its peak torque across a very broad RPM range. Composite driveshafts and a lightweight differential allow for a mass efficient, tunable drivetrain. These features have created a race vehicle with a focus on scoring potential, performance, efficiency, and drivability, a winning combination for FSG.







FRAME CONSTRUCTION Composite Monocoque

MATERIAL Unidirectional pre-impregnated carbon fiber, epoxy film adhesive, aluminum honeycomb core

OVERALL L / W / H (mm) 2837 / 1532 / 1062

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1143 / 1143

WEIGHT WITH 68kg DRIVER (Fr / Rr) 107 / 115

SUSPENSION Double unequal length A-arm, pull rod actuated front, push rod actuated rear

TYRES (Fr / Rr) 18x7-10 LCO Hoosier

WHEELS (Fr / Rr) 7.0x10, 25 mm offset, 3 piece alumium

ENGINE 2013 Yamaha WR-450F, turbocharged

BORE / STROKE / CYLINDERS / DISPLACEMENT 95.0mm / 63.4mm / 1 cylinders / 449cc

COMPRESSION RATIO 12,3:1

FUEL SYSTEM RIT developed dual stage sequential injection, MoTeC M400 ECU, speed density calibration

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 7500

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE Single reduction chain

DIFFERENTIAL Limited slip, Drexler clutch-type, adjustable torque bias ratio

COOLING Side mounted single core YFZ-450F radiator, YZF-R6 cooling fan mounted to radiator outlet

BRAKE SYSTEM RIT custom aluminum monoblock calipers, driver-adjustable pedalbox with adjustable brake bias

ELECTRONICS Racepak Smartwire programmable current protection, logic based relays, data logging with Motec M400

ROM
University of Rome Tor Vergata

Car 27 Pit 43

Italy

For the first time in its history, Scuderia Tor Vergata, a.k.a. STV, makes it to Germany and gets there with class: a space frame chassis has been optimized in order to obtain a better torsional rigidity and better ergonomics. We enwrapped the chassis with a stylish CFRP bodywork. Moreover, we made a massive engine tuning using our computational skills and testing our HONDA CBR F-SPORT engine, equipped with intake manifolds in polyamine, on a test bench. The 2013 car also includes: titanium exhaust system, which makes our car even lighter and powerful; a CAN bus system to connect all the electronic devices, adopting a data logging system to optimize the vehicle dynamics; limited slip differential. With an enthusiastic team and with our sponsors' support we are looking forward to having a great season.

FRAME CONSTRUCTION Frt and rear Tubular space frame with Aluminium panels

MATERIAL 4130 steel round tubing 25 mm dia 2 and 2.5 mm thk

OVERALL L / W / H (mm) 2610 / 1390 / 1100

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1578 / 1266 / 1128

WEIGHT WITH 68kg DRIVER (Fr / Rr) 153 / 164

SUSPENSION Double unequal length A-Arm. Push rod actuated spring / damper. Adj. Roll bar.

TYRES (Fr / Rr) 20x7.2-13 A45 Avon

WHEELS (Fr / Rr) 20x7.2-13 A45 Avon

ENGINE Honda CBR F Sport year 2002 4 cylinder

BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13:1

FUEL SYSTEM Student designed rapid prototyping intake air system (airbox, manifolds, restrictor)

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11500

MAX TORQUE DESIGN (rpm) 10000

DRIVE TYPE DID 520 steel chain

DIFFERENTIAL Drexler Limited Slip Differential V1

COOLING left side pod mounted radiator with ECU controlled electric fan

BRAKE SYSTEM Floating rotors, Cast Iron, hub mounted, 160mm dia. X 4mm, drilled, with phonic wheel function

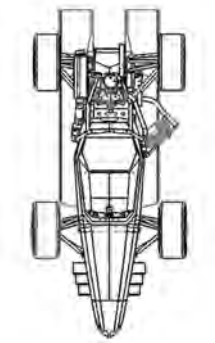
ELECTRONICS Dashboard RgDashColors, Lead-acid battery, Alternator

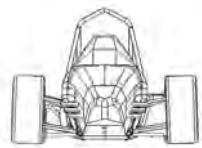
ROMA
Sapienza University of Rome

Car 19 Pit 13

Italy

Sapienza Corse racing team is the FStudent team of the University of Rome, established in 2008, participating at FSG since 2009. After the first year of experience, in the last four years our team followed a positive trend that let us reach the 17th place overall in FSG2011 and the 8th overall at FSAE Italy2011 and lead us to the top 60 in the world ranking. The 2012 team has worked hard to design and build a top level car, following ambitious technical goals. The 2013 Team decided to concentrate on weight reduction, while still maintaining reliability on a high level and on increasing performance with a new shifting system and further engine innovations. Sapienza Corse's definitely ready for FSG2013... what about you?





FRAME CONSTRUCTION CFRP Monocoque

MATERIAL carbon fiber lay-up with aluminium honeycomb core

OVERALL L / W / H (mm) 2930 / 1400 / 1030

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1560 / 1222 / 1202

WEIGHT WITH 68kg DRIVER (Fr / Rr) 130 / 138

SUSPENSION Double A-arm, pull rod actuated. Adjustable Antiroll bar and camber

TYRES (Fr / Rr) Hoosier 20x7.5 R25B

WHEELS (Fr / Rr) 7.5x13, 25mm offset Carbon Fiber rims

ENGINE Modified Honda CBR 600F

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42,5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13,5:1

FUEL SYSTEM Electronic Injection Mectronik MKE6

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 10500

DRIVE TYPE 4/8" Chain Drive

DIFFERENTIAL Open Diff., Electronic self-locking control, Dinamically variable bias ratio

COOLING One radiator, mechanic pump, electronc flow controller

BRAKE SYSTEM Disk System, Steel, 240 mm diam. front hub mounted/190 mm diam. rear diff housing mounted

ELECTRONICS Mectronik MKE6 ECU, Electronic Shifting System, Electronic Differential Control

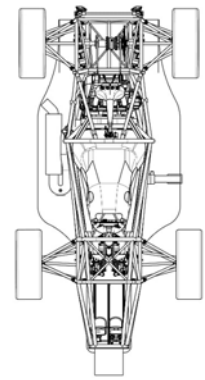
SCHWEINFURT

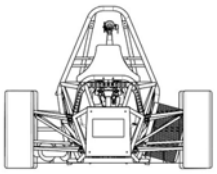
University of Applied Sciences
Würzburg-Schweinfurt

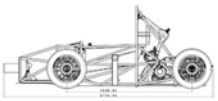
Mainfranken Racing e.V., founded in 2006 in the small city of Schweinfurt in Bavaria, was born out of the idea of some motor sport enthusiastic students. Currently the team consists of 30 motivated students who developed and built the sixth Formula Student racecar, the MFSix. The main features are our innovative intake manifold, extraordinarily economical steering wheel and our new pedal system, which makes it possible to set it up easily to exactly suit the driver's needs. The steering-wheel is equipped with entirely self-developed hard- and software and a multifunctional display. We are very proud to present our work at the Formula Student Events in Germany, the Czech Republic and Spain. We can look back at an exhausting and sweaty, but also funny and friendly season. We had an amazing time and achieved great experience in many different areas. We thank all our sponsors, supporters and families!

Car 97 Pit 15

Germany







FRAME CONSTRUCTION Tubular steel space frame

MATERIAL S235, round tubing

OVERALL L / W / H (mm) 2755 / 1383 / 1087

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1650 / 1210 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 160

SUSPENSION Double unequal length A-Arm, Pull rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 205x51 R13,Continental 34M

WHEELS (Fr / Rr) 205x51 R13,Continental 34M

ENGINE Yamaha YZF-R6 rj05, with modified camshafts

BORE / STROKE / CYLINDERS / DISPLACEMENT
65.5mm / 44.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.4:1

FUEL SYSTEM Bosch injection valves and ignition coils, dual stage sequential injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 12600

MAX TORQUE DESIGN (rpm) 8700

DRIVE TYPE Original transmission (Gears: N-1-2-3-4)

DIFFERENTIAL Limited slip differential (Formula student specific differential from Drexler)

COOLING Self developed radiator in left side pod with 210mm electric fan

BRAKE SYSTEM 4-Disk system. Floating self developed brake rotors. adjustable break balance. Calipers: dual piston

ELECTRONICS Wiring harness, electrified shifting system, multifunctional steering wheel, 2D data logger

SEATTLE

University of Washington

With an iterative car for 2013, the UWashington Formula Motorsports team is excited to show off our best car yet. Building off of 24 years of innovation, our car runs a single-cylinder motor, and has a carbon fiber chassis, integrated CV/hubs, a full aero package, pneumatic paddle shifting, and a tightly-packaged drivetrain. Relying heavily on physical testing to validate analysis, a great deal of care and attention to detail went into every part on the car. With one of the earliest assembly completions in recent team history, ample time has been spent testing and tuning the car for ultimate speed, reliability, and overall success. This is the team's second time attending Formula Student Germany.

Car 77 Pit 68

United States

FRAME CONSTRUCTION Carbon Fiber Monocoque

MATERIAL Torray T700 Unidirectional Fiber, Hexcel Aluminum Honeycomb

OVERALL L / W / H (mm) 2970 / 1415 / 1241

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1537 / 1219 / 1168

WEIGHT WITH 68kg DRIVER (Fr / Rr) 110 / 128

SUSPENSION Double Unequal A-Arm, Pull Rod Actuated Horizontally Oriented Spring And Damper

TYRES (Fr / Rr) 20.5x7-13 R25B Hoosier

WHEELS (Fr / Rr) 20.5x7-13 R25B Hoosier

ENGINE Modified Yamaha WR45F

BORE / STROKE / CYLINDERS / DISPLACEMENT
98mm / 63,4mm / 1 cylinders / 449cc

COMPRESSION RATIO 13,5:1

FUEL SYSTEM EngineLab Vehicle Control System, Integrated Fuel, Spark, Shift, DRS, Data Logging, and Aux Control

FUEL 95 Octane Unleaded Gasoline

MAX POWER DESIGN (rpm) 8300

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE Chain Drive

DIFFERENTIAL Salisbury Type Drexler Differential with Replaceable Ramps

COOLING Singe Rear Mounted, PWM Fan, .17 m^3/sec

BRAKE SYSTEM 4-Disk Floating Cast Iron, Hub Mounted

ELECTRONICS EngineLab EL140 ECU, Student Designed Dash, Steering Wheel, PWM Drivers, and Telemetry System

SHANGHAI
Tongji University

Car 66 Pit 59

China

The new vehicle is a revolutionally new design in comparison to the car last year. In this year we managed to use several modelling and simulation softwares to optimize our design, and made great progress in weight reduction, ergonomics, engine power, handling performance etc.

FRAME CONSTRUCTION tubular steel roll bars

MATERIAL 4130 steel

OVERALL L / W / H (mm) 2480 / 1408 / 1027

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 135 / 165

SUSPENSION Double unequal length A-Arm. Pull(Fr)/ Push(Rr) rod-Bellcrank construction.

TYRES (Fr / Rr) 21X8-13 R25A Continental

WHEELS (Fr / Rr) 8 inch wide, 3 pc Al Rim,0mm neg. offset

ENGINE Honda CBR 600 rr (2005)

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12,0:1

FUEL SYSTEM

FUEL 97 octane unleaded gasoline

MAX POWER DESIGN (rpm) 13000

MAX TORQUE DESIGN (rpm) 12500

DRIVE TYPE chain transmission

DIFFERENTIAL Torsen limited slip differential

COOLING One side pod mounted radiators with thermostatic controlled electric fans

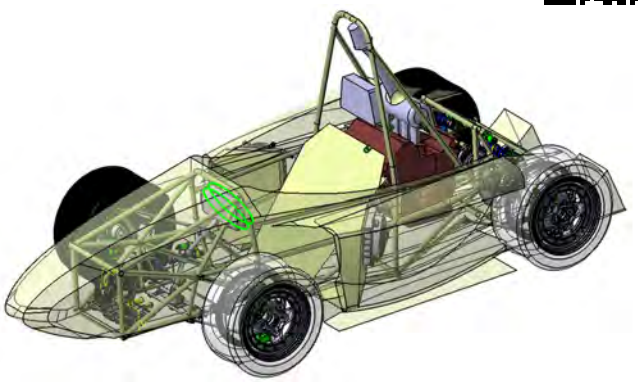
BRAKE SYSTEM 4-Disk system, self developed rotors with 254mm diameter, Willwood calipers & balance bar

ELECTRONICS Selfbuilt data logge,CAN-TCP/IP Transfer ,Gear/ Rotation Rate independent-display

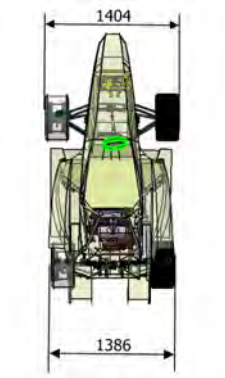
SHIYAN
Hubei University of Automotive Technology

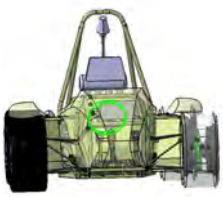
Car 67 Pit 3

China



In March 2011, the "DONG FENG AN SHENG" FSAE team of Hubei University of Automotive Technology was founded with the support of DONGFENG Commercial Vehicle and the attention of the university. We have fully participated in the "2011 KunLun Lubricant FSC" Competition and achieved the top 20 in the overall results and the second place as a rookie. In 2012, the FSC team of Hubei University of Automotive Technology changed its name to "HUAT", and fully participated in the competition. We got the first prize both in the Autocross Event and the Cost and Manufacturing Event and the second prize in the Acceleration Event. We are also the champion of FSC (FSAE China) 2012.





FRAME CONSTRUCTION Tubular steel space frame

MATERIAL 4130 seamless steel

OVERALL L / W / H (mm) 2924 / 1445 / 1188

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1555 / 1210 / 1155

WEIGHT WITH 68kg DRIVER (Fr / Rr) 144 / 152

SUSPENSION Double unequal length A-Arm.Pull Fr /Push Rr rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 205x70 R13, Hoosier R25A / 200x75 R13 Hoosier R25A

WHEELS (Fr / Rr) 7.5x13, 60mm offset ,4 pc Al Rim/7.5x13, 60mm offset ,4 pc Al Rim

ENGINE Honda CBR600RR

BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.2:1

FUEL SYSTEM The injector,pump, fuel rail are from the original car ,student built fuel tank,sequential injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 12500

MAX TORQUE DESIGN (rpm) 10500

DRIVE TYPE Chain drive

DIFFERENTIAL Clutch pack limited slip,Drexler

COOLING Twin side pod mounted radiators with thermostatic controlled electric fans

BRAKE SYSTEM 4-Disk system,H-type arrangement for dual-circuit braking system

ELECTRONICS wiring harness ,MoTeC M84 control unit,selfdesigned electronic instrument

STRALSUND

University of Applied Sciences
Stralsund

Car 81 Pit 39

Germany

In 1999, the first initiations of Baltic Racing were placed at UAS Stralsund. Meanwhile, it's the largest project at the university and one of the flagship projects. The "TY2013", the 14th race car from Stralsund, will start at this year's FSC. The knowledge and experience of many FS years are reflected in this car. The concept with a 4-cylinder-engine and 13" wheels remains the same. However, we have revised and optimized each component to be more environmentally sustainable and lighter. That's why we developed new camshafts to reduce the fuel consumption and use Jute for the whole bodywork and seat instead of CFRP only as a few highlights. The "TY2013" is the consequence of hard work, experience, sound ideas and interdisciplinary cooperation of about 20 students combined with plenty of good mood. We would like to thank our sponsors, the university and its staff, our alumni & close friends and our beloved families for making this project possible year after year.

FRAME CONSTRUCTION tubular space frame

MATERIAL 25CrMo4

OVERALL L / W / H (mm) 2865 / 1414 / 1050

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1650 / 1250 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 137 / 148

SUSPENSION Double unequal lenght, nonparallel A-Arm. Push-Rod actuated. Öhlins TTX 25 damper

TYRES (Fr / Rr) 205/510 R13, Continental

WHEELS (Fr / Rr) BBS 3 pc Al-Mg, 7x13, 12.5mm offset

ENGINE 2001 Honda CBR600 F4i PC35

BORE / STROKE / CYLINDERS / DISPLACEMENT
67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12:1

FUEL SYSTEM selfdesigned fuel injection system using Walbro ECU, full sequential injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 9000

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE Chain drive

DIFFERENTIAL Quaife torque sensitive Torsen B; adj. preload, self-designed 7075 T6 hard-anodized housing

COOLING left side mounted aluminium radiator, electronic fan integrated in nozzle of cooling duct

BRAKE SYSTEM 4 disc system; 220 mm front discs, 190 mm rear discs; ISR brake calipers, APRacing Master Cylinders

ELECTRONICS multifunctional display with live data from various sensors

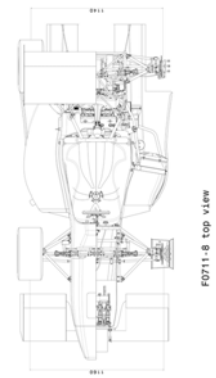
STUTTGART

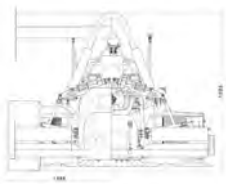
University of Stuttgart

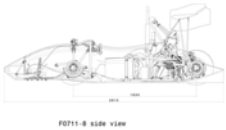
Car 1 Pit 34

Germany

Since the foundation in 2005 one of the most important reasons for success of Rennteam Uni Stuttgart was to set clear goals and milestones right from the beginning of the development of every new car. Get the car done in time. Finish the endurance and win the competition. The long period of intensive car testing ensures a reliable and powerful racecar. The concept is a lightweight 10" wheeled car with a powerful 4 Cylinder Honda CBR engine. The CFRP Monocoque with a tubular space frame rear was chosen to improve accessibility and maintenance of the entire powertrain. Through optimization our wings guarantee a well balanced aerodynamic package with maximized efficiency, regarding downforce to drag ratio. Looking forward to meeting the international competition, the team is excited for the Formula Student Germany Event 2013. We will try our best to defeat our overall victory from 2012. Thanks to all our sponsors who gave us the opportunity to build the FO711-8.







FRAME CONSTRUCTION front: single piece CFRP monocoque, rear: steel space frame

MATERIAL front: carbon fibre prepregs, aluminum honeycombs, rear: 25CrMo4 tubing

OVERALL L / W / H (mm) 2919 / 1355 / 1119

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1630 / 1160 / 1140

WEIGHT WITH 68kg DRIVER (Fr / Rr) 122 / 131

SUSPENSION double unequal length A-Arms, pushrod actuated ZF Sachs F3 2-way TRD, adjustable U-type ARB

TYRES (Fr / Rr) 18.0 x 7.5 - 10 R25B Hoosier

WHEELS (Fr / Rr) 10 x 7.0

ENGINE 2005 Honda CBR 600RR PC 37

BORE / STROKE / CYLINDERS / DISPLACEMENT
67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.6:1

FUEL SYSTEM student built fuel injection system using MoTec, fully sequential

FUEL E85

MAX POWER DESIGN (rpm) 10500

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE chain drive

DIFFERENTIAL Drexler limitited slip differential

COOLING mounted in left side pod, separated cooling cycles, electric water pump, electric fan

BRAKE SYSTEM aluminium floaters, fixed mounted brake calipers

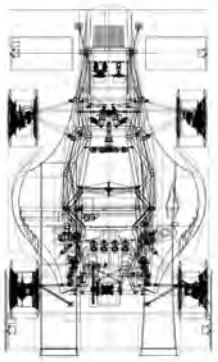
ELECTRONICS self made wiring harness, multifunctional steering wheel, live telemetry system, using CAN bus

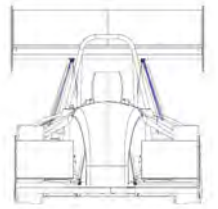
TRONDHEIM

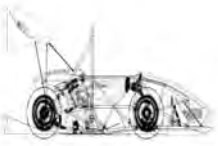
Norwegian University of Science and Technology

Car 17 Pit 53

Norway







FRAME CONSTRUCTION One piece tubular spaceframe

MATERIAL Steel

OVERALL L / W / H (mm) 3212 / 1432 / 1371

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1566 / 1178 / 1178

WEIGHT WITH 68kg DRIVER (Fr / Rr) 138 / 150

SUSPENSION Double wishbone. Pull rod actuated horizontally / Pull rod. Electronically adjustable dampers.

TYRES (Fr / Rr) Hoosier 521x178-300 mm, R25B

WHEELS (Fr / Rr) 3 pc Aluminium with magnesium centre

ENGINE Suzuki GSX-R 600 four stroke

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 41.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.3:1

FUEL SYSTEM DTA S80 sequential fuel injection, stock injectors

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 13000

MAX TORQUE DESIGN (rpm) 7500

DRIVE TYPE Chain drive,modified gear drum

DIFFERENTIAL Drexler, limited slip differential

COOLING Single sidepod mounted, 35mm core radiator, 1370 m^3/h fan

BRAKE SYSTEM Cast iron, hub mounted, 235mm front diameter and 215mm rear diameter

ELECTRONICS Multifunctional steering wheel, electropneumatic shifting system, selfdesigned live-telemetry system

Revolve NTNU is a highly motivated and passionate team of 46 students from ten different engineering disciplines. Revolve NTNU is competing in Formula Student for the second time. The first year was very successful, and they won “Best newcomer” at Formula Student UK 2012. This year the team has built a faster and lighter car by improving and further developed last years design. In addition the car has plenty of new features. The team has expanded their focus on electronics, and also established a group that works with aerodynamics. The research and development group is developing electronically adjustable dampers for this year‘s car. The team is not just focusing on developing a fast car, but also the way the students work as a team and help them become the best engineers possible. Revolve NTNU think it is important for the students to get work experience through their studies, and wish to contribute to this at their home university.

UXBRIDGE

Brunel University

Car 47 Pit 55

United Kingdom

FRAME CONSTRUCTION Steel tubular spaceframe

MATERIAL BS4 T45 to T100 tubing

OVERALL L / W / H (mm) 2800 / 1370 / 1090

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1580 / 1200 / 1175

WEIGHT WITH 68kg DRIVER (Fr / Rr) 133 / 150

SUSPENSION Double unequal length A-arm. Front pull/rear push rod actuated spring and damper.

TYRES (Fr / Rr) 20.0x7.5-13 R25B Hoosier

WHEELS (Fr / Rr) Braid 13-inch Al rim

ENGINE Modified Yamaha YZF-R6

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 14.1:1

FUEL SYSTEM Common rail port fuel injection, Bosch multi point fuel injection

FUEL 98 RON unleaded

MAX POWER DESIGN (rpm) 10000

MAX TORQUE DESIGN (rpm) 8500

DRIVE TYPE 520 chain and sprocket

DIFFERENTIAL Drexler limited slip differential, clutch type, adjustable bias ratio

COOLING Side mounted 1300cc radiator and 190mm fan

BRAKE SYSTEM Floating, cast iron, hub mounted, 220mm diameter discs. AP Racing master cylinders and calipers

ELECTRONICS Bosch MS4 Sport, Bosch C60 data logger, solenoid shifting system

Brunel Racing has gone back to basics this year, with the aim of bringing a reliable and tested car to the event. The team has opted to move away from the hybrid chassis design used for the past few years, in favour of a simpler tubular spaceframe design. Despite the car being called BR14, this will in fact be the teams 15th year building a car. However, only a few team members actually have any experience of Formula Student, with most of the team being new arrivals this year. The team are hoping this year will become the first chapter in a new era of success for Brunel Racing. Everyone at Brunel Racing would like to thank all of our partners for their support, without which none of what we have achieved would be possible.

WEIHAI

Harbin Institute of Technology at Weihai

We are Harbin Institute of Technology Racing Team from Harbin Institute of Technology at Weihai. In line with Harbin Institute of Technology which is one of China's top universities, Weihai campus (HITWH) has a pragmatic and rigorous spirit. As a young team with a four year history, we have great passion, amazing talent and enormous potential. Being the pioneers of China FSAE, we possess technology of carbon fiber and a great dream. Now we come here, with the dream and the unique Monocoque of China regional tournament. This time we will show you our passion and demonstrate our ability. Let us enjoy our wonderful racing show from China!

Car 65 Pit 60

China

FRAME CONSTRUCTION Rear Tubular space frame/Monocoque front section

MATERIAL 4130 steel round tubing 12mm to 25.4mm dia / aluminium honeycomb sandwich panel

OVERALL L / W / H (mm) 3045 / 1385 / 1483

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1200 / 1175

WEIGHT WITH 68kg DRIVER (Fr / Rr) 126 / 154

SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and damper (coil-over).

TYRES (Fr / Rr) 13*7.0 R13, Hoosier R25B / 13*7.0 R13, Hoosier R25B

WHEELS (Fr / Rr) 7.0x13, 35.5 mm offset, 1 pc Al-Mg Rim / 7.0x13, 35.5mm offset, 1 pc Al-Mg Rim

ENGINE 2008 YAMAHA YZF-R6 4

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mmmm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.1 1

FUEL SYSTEM Student built ,fuel injection, sequential

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 11000

MAX TORQUE DESIGN (rpm) 10500

DRIVE TYPE 47teeth/12teeth chain drive

DIFFERENTIAL Torque sensitive limited slip bevel gear differential with internal preload adjustment

COOLING Rear mounted 1940cc Mini radiator and 270mm electric fan

BRAKE SYSTEM self-designed blance bar,AP Racing master cylinder,front 4-piston radial calipers ,rear 2-piston ra

ELECTRONICS Electropneumatic Shifting System, selfdesigned CAN node ,home-made data logger

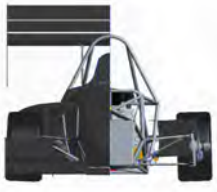
WEINGARTEN

University of Applied Sciences Ravensburg-Weingarten

The Formula Student Team Weingarten consists of about 45 students, who spent one year to build their own Formula Student car. The main aim of the 2013 car, the Stinger 13 was to understand how a formula car works, especially to simulate and validate as much as possible. All in all the goal was to reduce our weight, but still prevent the stability of the car. To improve our performance on the track an aerodynamic package was developed and the driving dynamics were improved radically. As every year the car is power by a Honda CBR 600 RR 4-cylinder engine. It is the first year that not only automotive and mechanical engineering students take part, but also students from the management faculty of our university.

Car 59 Pit 44

Germany



FRAME CONSTRUCTION Tubular steel space frame

MATERIAL S355

OVERALL L / W / H (mm) 2900 / 1370 / 1305

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1623 / 1180 / 1140

WEIGHT WITH 68kg DRIVER (Fr / Rr) 148 / 154

SUSPENSION Double unequal length A-Arm, Pull rod actuated spring and damper

TYRES (Fr / Rr) 20.5x7.0 - 13, Hoosier, R25B / 21.0x6.5 - 13, Hoosier, R25B

WHEELS (Fr / Rr) 7.0x13, 22mm offset, 1pc Mg Rim / 7.0x13, 22mm offset, 1pc Mg Rim

ENGINE Honda CBR 600 RR PC 40

BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.2:1

FUEL SYSTEM Student designed/built, fuel injection

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 10500

MAX TORQUE DESIGN (rpm) 8000

DRIVE TYPE XW-Ring Chain 520

DIFFERENTIAL Drexler limited slip differential

COOLING Side pod mounted radiator, controlled electric fan

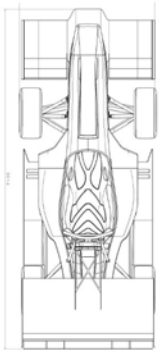
BRAKE SYSTEM 4-Disk system, self developed rotors with 243/221 mm diameter, adjustable brake balance, ISR caliper

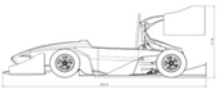
ELECTRONICS Bosch MS4 Ecu, CAN-Bus datalogger, Bluetooth Telemetrie, Electropneumatic shifting, GPS

WIEN
Vienna University of Technology

Car 41 Pit 35

Austria





FRAME CONSTRUCTION CFRP monocoque with integrated engine bay

MATERIAL T300 prepreg

OVERALL L / W / H (mm) 3014 / 1420 / 1116

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1200 / 1160

WEIGHT WITH 68kg DRIVER (Fr / Rr) 105 / 123

SUSPENSION Double unequal length A-Arms. Pull-rod actuated horizontal orientated coilspring and damper

TYRES (Fr / Rr) 18.0x7.5-10 Hoosier R25B

WHEELS (Fr / Rr) 7.0x10 CFRP one-piece

ENGINE KTM 690 LC4 with modified crank drive

BORE / STROKE / CYLINDERS / DISPLACEMENT 102mm / 74,6mm / 1 cylinders / 609cc

COMPRESSION RATIO 11,5:1

FUEL SYSTEM Bosch MS4 Sport with intake manifold injection

FUEL RON95

MAX POWER DESIGN (rpm) 9500

MAX TORQUE DESIGN (rpm) 8000

DRIVE TYPE 5 gear sequential

DIFFERENTIAL Drexler Formulas Student 2010 limited slip with modified housing

COOLING Left side mounted radiator equiped with one fan

BRAKE SYSTEM AP-Racing 4227 & 4226 calipers with student designed rotors

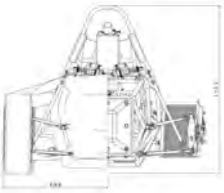
ELECTRONICS Bosch C60 data-logger and MoTeC PDM15 power distribution module

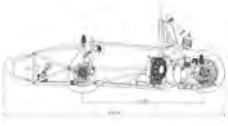
Back in black! The fifth car - edge5 - from TUW Racing marks a new beginning in car philosophy. Single piece monocoque, 10“ wheels, natural aspirated single cylinder KTM LC4 and a decent aerodynamic bodywork mark the cornerstones of this year‘s car from Vienna. Even though many things have changed, you can immediately hear and see that it is a full member of the edge family.

WUPPERTAL
University of Wuppertal

Car 13 Pit 29

Germany





FRAME CONSTRUCTION Tubular steel space frame

MATERIAL E355+N, round tubing 25mm diameter

OVERALL L / W / H (mm) 2818 / 1388 / 1113

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 126 / 154

SUSPENSION unequal length, double wishbones, pushrod front and rear actuated Oehlins dampers

TYRES (Fr / Rr) Dry: 20.5x7 Hoosier R25B, Wet: Avon A15

WHEELS (Fr / Rr) OZ Racing Superleggera 13x7 (front and rear)

ENGINE modified 2008 Yamaha R6

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 13.3:1

FUEL SYSTEM student build fuel injection system using Bosch MS4 Sport, fully sequential, variable runner length

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 12000

MAX TORQUE DESIGN (rpm) 9500

DRIVE TYPE X-Ring Chain #520

DIFFERENTIAL Torque sensitive limited slip differential with adjustable TBR

COOLING Single side pod mounted radiator with ECU controlled electric fan

BRAKE SYSTEM 4-Disk system, self developed rotors with 250/200mm diameter (f/r), driver adjustable brake balance

ELECTRONICS Multifunctional display, wireless engine setup/ telemetry, electric shift and clutch system

After the successful debut in FSG2012 with the 37th place, we aim for an even better result this season. Our goal is the Top20. To achieve this, we kept the main concept of the 2012 car and added a lot of punctual improvements. We significantly reduced the weight, added features like an electric shift/clutch system via steering wheel peddles, variable intake runner length and an improved cooling system. Additionally we were able to improve the packaging a lot which results in a shorter wheelbase. Also our electric department added functions like a student build multipurpose display and, as a highlight, wireless engine parameter modification and live telemetry. We are really looking forward to this event, we want to bring Formula Student Racing from Wuppertal to the next level. We invite you all to visit our pit for further information. Finally, we would like to thank all our supporters and sponsors. None of this would be possible without them.

ZAGREB
University of Zagreb

Car 64 Pit 32

Croatia

This our fourth car and first participation in Formula Student Germany. In previous years we participated in Formula student UK in 2006, 2007 and 2012. This year our team is mixed with new members and few experienced members and our goal for this season is to establish a consistent participation and results at Formula Student competitions. Our car is partly evolution of our last year car but most of it is newly designed and manufactured. Like most of the other FS teams, we decided to give a chance to aero devices, and that is the most notable and visible change to our car. Other components were heavily optimized and designed to achieve our aimed weight and performance. As stated before, this is our first FSG and we're looking forward to this competition and we're hoping to have a great time both on and off track!

FRAME CONSTRUCTION Tubular spaceframe

MATERIAL 25CrMo4 steel round tubing 22mm to 25,4mm dia

OVERALL L / W / H (mm) 2895 / 1480 / 1150

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1300 / 1250

WEIGHT WITH 68kg DRIVER (Fr / Rr) 135 / 165

SUSPENSION Double unequal length A-Arm. Push rod (pull rod-rear) actuated horizontally oriented spring and damp

TYRES (Fr / Rr) Hoosier R25B 20.5x6.0-13

WHEELS (Fr / Rr) 6x13, ET=18mm, 2 pc Al Rim

ENGINE Honda CBR600RR

BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc

COMPRESSION RATIO 12.2:1

FUEL SYSTEM VEMS with sequential injection and team designed CDI

FUEL 98 octane unleaded gasoline

MAX POWER DESIGN (rpm) 12000

MAX TORQUE DESIGN (rpm) 9000

DRIVE TYPE 525 chain

DIFFERENTIAL Clutch pack limited slip, preload and bias adjustment

COOLING Side pod mounted radiator and fan

BRAKE SYSTEM 4 - disk system, AP Racing calipers and Main cylinders

ELECTRONICS Steering wheel mounted dashboard, DC motor shifting system, self developed Android telemetry app

WI-FI
WLAN

Instruction for the use of Wi-Fi

To use Wi-Fi in the Wi-Fi Zones on the FSG campus (see floor plan on page 14), registered FSG participants need to follow these steps:

1. Select the **„FSG_Wifi“** network.
2. Log in with your formulastudent.de account credentials.
3. Accept the certificate for fsgctrl.event.formulastudent.de (on some devices only).

In case you are not registered for the event or the procedure above does not work, we offer the unprotected network „FSG_Welcome“. To use this network follow these steps:

1. Select the „FSG_Welcome“ network.
2. Open any web page in your browser.
3. Log into the portal with your formulastudent.de account credentials.

After a successful login into “FSG_Welcome” the network “FSG_Wifi” works as well. Visitors without an account for formulastudent.de redeem one-time-only 15 minutes free Wi-Fi on the „FSG_Welcome“ network to create and activate an account.
Please always use „FSG_Wifi“ if possible since it provides secure and better Wi-Fi service.

Technical details for advanced users

Standard: IEEE 802.11 g/n
Security: WPA2 Enterprise/WPA2 with IEEE 802.1x
Authentication: Tunnelled TLS (TTLS)/Protected EAP (PEAP)
Inner Authentication: MSCHAPv2

Anleitung zur WLAN Nutzung

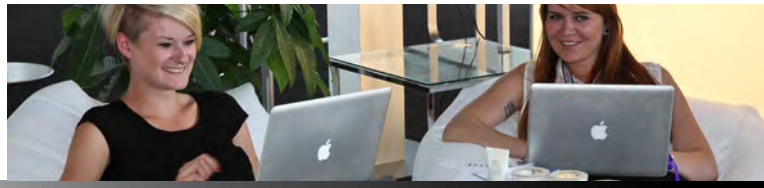
Um als registrierter FSG-Teilnehmer in den Wi-Fi Zonen (siehe Lageplan auf Seite 14) auf dem FSG Gelände WLAN zu nutzen, sind folgende Schritte notwendig:

1. Das Netzwerk **„FSG_Wifi“** auswählen.
2. Mit den Zugangsdaten für formulastudent.de einloggen.
3. Akzeptieren des Zertifikates für fsgctrl.event.formulastudent.de (auf manchen Geräten).

Für nicht registrierte Besucher oder falls die obigen Schritte nicht funktionieren, gibt es das unverschlüsselte Netzwerk „FSG_Welcome“. Dazu sind die folgenden Schritte notwendig:

1. Das Netzwerk „FSG_Welcome“ auswählen.
2. Beliebige Internetseite im Browser aufrufen.
3. Mit den Zugangsdaten für formulastudent.de auf dem erscheinenden Portal einloggen.

Nach erfolgreichem Login bei „FSG_Welcome“ funktioniert auch das „FSG_Wifi“. Besucher ohne Zugangsdaten für formulastudent.de erhalten in „FSG_Welcome“ einmalig 15 Minuten Internetzugang, um sich einen Account anzulegen und diesen zu bestätigen.
Bitte nach Möglichkeit immer „FSG_Wifi“ verwenden, da es höhere Sicherheit und bessere Verfügbarkeit bietet.



AMBERG

University of Applied Sciences
Amberg-Weiden

Since the foundation of the Running Snail Racing Team in 2004 the existing knowledge base has been used for the construction of the race car and is continuously being expanded. Aside our annual gain in students, the racing team is countinuously increasing the development and number of innovations. With assistance of companies we manage to move developments to the limit of performance. The enormous extra work that every member of the team achieves, overruns the dimension of effort of a normal student by far. This is how unexpected revolutions occur in automotive engineering as well as in marketing and organizational strategies. References for these are our full monocoque, our very first electric powertrain since foundation and the worldwide unique centerless wheel carrier, as well as the considerable organizational effort that is necessary to keep driving this project forth successfully.

Car E22 Pit E26

Germany

FRAME CONSTRUCTION Composite full-Monocoque with bended Aluminium Front Hoop and Steel Main Hoop

MATERIAL pre-impregnated CFRP and aluminium honeycomb

OVERALL L / W / H (mm) 2518 / 1408 / 1230

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1540 / 1210 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 128 / 144

SUSPENSION Double unequal length custom winded a-arms. Pull rod actuated Öhlins TTX25, Centerless Uprights

TYRES (Fr / Rr) 20,5x7,0x13 Hoosier R25B

WHEELS (Fr / Rr) 7,0x13, 10mm offset, 1pc CFRP rimbase front, 2pc Al-CFRP rim rear

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear / 100 kW reduced to 80 kW

MOTOR TYPE Enstroj Emrax Standard LC

MAX MOTOR RPM 4000

MOTOR CONTROLLER One Unitek Bamocar D3-700-400

MAX SYSTEM VOLTAGE 504

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY Li(NiMnCo)O2- graphite / 7.55 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:3.36 / n/a

DRIVE TYPE Chain drive, DID 520 ERT 2

DIFFERENTIAL Drexler limited slip formula student differntial

COOLING 2 rear mounted radiators, 2 seperate circuites one for motor and one for inverter cooling

BRAKE SYSTEM 4-Disk system, self developed, front: 201 and rear : 161mm outer diameter; 4 x ISR 2piston calipers

ELECTRONICS self-designed telemetry with a radio transmission of 868 MHz, 2x Highspeed CAN 2.0 B; Baudrate: 250

AUGSBURG

University of Applied Sciences
Augsburg

This year we are at the Hockenheimring for the second time, and we can proudly say, we improved our skills and our operating range to a higher level. We constructed our first monocoque and manufactured it in our workshop by vacuum infusion. Such an achievement cannot be taken for granted from a team in the second year; The motivation and commitment shown is impressive. Next to the machanical parts our electrical system made substantial progress as well. Most parts of the tractive system remained unchanged so here we could build on our accomplishments from last year. Big innovations were made in the LV-System by the transmission of each signal by CAN-Bus, and the implementation of an error memory which monitors the systems and detects their failures. Most of the hardware and software is selfmade. Only the controlunit is still realised on a Mikroautobox. We confidently look forward to the competition and would like to thank all our sponsors and our university for the great support.

Car E67 Pit E23

Germany

FRAME CONSTRUCTION Monocoque

MATERIAL CFK

OVERALL L / W / H (mm) 3194 / 1433 / 1472

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1620 / 1210 / 1210

WEIGHT WITH 68kg DRIVER (Fr / Rr) 133 / 157

SUSPENSION Short-long arm suspension with pull-rod

TYRES (Fr / Rr) 530/180-R13 Pirelli

WHEELS (Fr / Rr) 530/180-R13 Pirelli

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / rear right, rear left / 60 kW

MOTOR TYPE 1FE11082-6W.10 Siemens

MAX MOTOR RPM 9000

MOTOR CONTROLLER Infineon Hybridkit

MAX SYSTEM VOLTAGE 403V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5.33 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:6.47 / n/a

DRIVE TYPE helical gear unit

DIFFERENTIAL n/a

COOLING watercooled controller and motors, two coolers in the side boxes, no fans

BRAKE SYSTEM 4-Disk System, Diskmatirial 4mm 42CrMo4, brake calliper front Brembo P30 - rear Brembo P32

ELECTRONICS torque vectoring, error memory, selfdesigned live-telemetry system, Signaltransmission by CANopen

Audi
Vorsprung durch Technik

A thrilling 24 hours crystallised in that one second when I realised: Audi just made history.

From an early age, I wanted to become an engineer. Even as a little girl growing up in India, I disassembled and then reassembled our radio. I have since become an Audi racing engineer. I blend not only technology but also strategic and organisational skills in the name of Audi. The objective remains the same: ensuring that even the tiniest details are perfect. Doing so allows us to rewrite motorsport history. After all, the Audi R18 e-tron quattro was the first hybrid vehicle to ever win Le Mans.

Leena Gade
Racing engineer for Audi Sport Team Joest
Degree: Aerospace Engineering

You Tube

Experience your own magical moments.
For more information visit: **audi.com/careers**
or **www.facebook.com/audikarriere**

BARCELONA

PT University of Catalonia -
Engineering School of Barcelona

ETSEIB Motorsport, founded in 2007, is the Formula Student Team of the Engineering School of Barcelona. 35 students were involved in this year's prototype: the CAT06-e. It is our second electric car. After a great experience with our first, the aims of this year are to improve reliability and to improve the performance of the car. Even though we focused on the systems that caused problems during last year's competitions, all other parts of the car have been redesigned and optimized as well. We worked really hard this season in order to have enough testing time in June to make sure it is fully operative during competitions. This gives us even more credit considering that we have manufactured more and more parts than ever, including our second carbon fiber monocoque and our self-designed motor controllers. Finally, we would like to thank all our sponsors who make our project become a reality specially these complicated years.

Car E54 Pit E27

Spain

FRAME CONSTRUCTION Front CFRP Monocoque. Rear Steel tubular space frame. Structural CFRP floor.

MATERIAL 245 T2 carbon prepreg. Steel round tubing St-52. Diameter 25 mm.

OVERALL L / W / H (mm) 3122 / 1304 / 1203

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1535 / 1095 / 1065

WEIGHT WITH 68kg DRIVER (Fr / Rr) 142 / 174

SUSPENSION Double unequal length A-Arm. Pull rod actuated spring and damper. Rear anti-roll bar

TYRES (Fr / Rr) 20.5x7 R13 Hoosier R25A / 20.5x7 R13 Hoosier R25A

WHEELS (Fr / Rr) 7.0x13, 22 mm offset, Al-Mg Rim / 7.0x13, 22 mm offset, Al-Mg Rim

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 40kW, 40kW

MOTOR TYPE Mavilor modified

MAX MOTOR RPM 6000

MOTOR CONTROLLER Self-designed

MAX SYSTEM VOLTAGE 590

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePO4 / 4.5 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:4.5 / N/A

DRIVE TYPE Two independent pulley belt transmission

DIFFERENTIAL N/A

COOLING Motors and inverters watercooled. Batteries aircooling.

BRAKE SYSTEM 4-Disk system, self developed steel rotors, adjustable brake balance.

ELECTRONICS Selfdesigned Dash Panel, LV board, control box and data acquisition. dSPACE main ECU and TC.

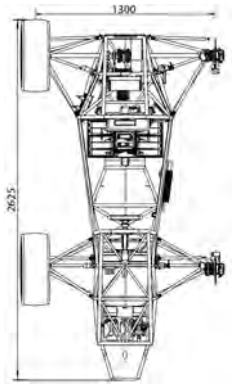
BAYREUTH

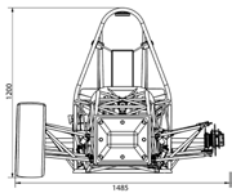
University of Bayreuth

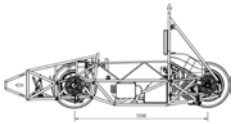
In spring 2004 a small group of students, at the University of Bayreuth, founded "Elefant Racing e.V.". The name is derived from the Faculty of Applied Sciences, abbreviation FAN, which shares its letter string with the clever and powerful animal. Starting into season 2010/11 we decided to break with our tradition of building combustion cars and developed our first electrically powered vehicle. With the "FR13 Cyrano", our third high performance electric race car, the main attention was directed at weight reduction of the electrical power train. Furthermore, our car features an innovative driver interface based on a smart phone. It supplies the driver with real-time information about the car via display and computer-generated audio feedback. Additionally we designed a cable-based steering system, to achieve a more direct feedback, by eliminating the steeringplay. For further information or just to have a good time, you are very welcome to visit our pit.

Car E15 Pit E20

Germany







FRAME CONSTRUCTION Tubular steel space frame

MATERIAL E355

OVERALL L / W / H (mm) 2221 / 666 / 1150

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1300 / 1300

WEIGHT WITH 68kg DRIVER (Fr / Rr) 101 / 114

SUSPENSION Double unequal length A-Arm. Pull rod actuated in plane oriented spring and damper

TYRES (Fr / Rr) 205x70 R13, Hoosier R25B

WHEELS (Fr / Rr) 205x70 R13, Hoosier R25B

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear / 85 kW

MOTOR TYPE Enstroj Emrax

MAX MOTOR RPM 4800

MOTOR CONTROLLER Unitek BAMOCAR D3

MAX SYSTEM VOLTAGE 554

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5,9kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:3,5 /

DRIVE TYPE Electric

DIFFERENTIAL Torque sensitive limited slip bevel gear differential with internal preload adjustment

COOLING Rear mounted, 225mm electric fan

BRAKE SYSTEM 4

ELECTRONICS selfdesigned Live-Telemetry Software, intuitive driver interface, all-in-one wiring harness

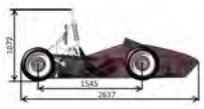
BRAUNSCHWEIG

Technische Universität Braunschweig

Car E19 Pit E17

Germany

The Lions Racing Team was founded in 2000. Since 2002 the team participated in many events. This season 40 team members worked hard to build the LR13, which is the 11th car of the team and the second one with an electric drive train. As a consequence of the new design and its dense package, the tubular space frame is 4kg lighter. The electric motor with a maximum torque of 220Nm is powered by a 5.5kWh accumulator, which is controlled by a self-developed battery management system. For an ideal dynamic performance, the suspension geometry was determined by tire testing and extensive simulations. Furthermore, we want to thank our sponsors who supported us over the last years!



FRAME CONSTRUCTION tubular space frame

MATERIAL 25CrMo4

OVERALL L / W / H (mm) 2637 / 1346 / 1072

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1545 / 1140 / 1140

WEIGHT WITH 68kg DRIVER (Fr / Rr) 143 / 175

SUSPENSION Double antiparallel unequal length A-Arm. Push rod actuated spring Öhlins / damper, anti-roll bar

TYRES (Fr / Rr) 205/510 R 13, Continental / 205/510 R 13, Continental

WHEELS (Fr / Rr) 7 inch, 3 pc Al Rim, 0mm offset / 7 inch, 3 pc Al Rim, 0mm offset

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Center Rear / 96kW

MOTOR TYPE Brusa HSM1-6.17.12

MAX MOTOR RPM 13000

MOTOR CONTROLLER Brusa DMC 524

MAX SYSTEM VOLTAGE 420V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePo4 / 5.5kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:4.5 / n/a

DRIVE TYPE gear drive

DIFFERENTIAL Torque sensitive torsen differential, 3:1 bias ratio (25%)

COOLING Side pod mounted radiator and electric fan

BRAKE SYSTEM Brembo P32, two opposing pistons, 32mm dia

ELECTRONICS multifunctional steering wheel, chassis sensors for setup, intelligent fuse control unit

DARMSTADT

Technische Universität Darmstadt

Car E101 Pit E7

Germany

The TU Darmstadt Racing Team (DART) is now participating in the Formula Student Germany for the eighth time. Over 50 highly motivated students from various fields of study are working on this year's car, the theta2013. By creating a completely new chassis and suspension, we decided to take the know-how from last year`s electrical powertrain and start with a new model. We have set our focus on a two-motor concept, in order to apply torque vectoring. The main component of our drive train will be a self-designed gear box, providing each wheel at the rear axle with the power of one motor. Following last year's development of an aerodynamically optimized undertray, we are introducing a full aerodynamic package, including rear and front wings. Despite all these features our main aim was to reduce the weight of the car to minimum in team history. Therefore DART-Racing is looking forward to an interesting and hopefully successful Formula Student Germany competition.

FRAME CONSTRUCTION single piece carbon fibre Monocoque

MATERIAL CFRP, aluminium honeycomb

OVERALL L / W / H (mm) 2840 / 1400 / 1055

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1525 / 1220 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 124 / 143

SUSPENSION Double uneaqual length A-Arm. Pull rod. Air Spring

TYRES (Fr / Rr) Pirelli 185/40 R15 low section

WHEELS (Fr / Rr) 7x15, 15mm offset, 2pc Al/CFRP hybrid Rim

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / rear, inside chassis / 85kW

MOTOR TYPE permanent magnet synchronous axial flux

MAX MOTOR RPM 4000

MOTOR CONTROLLER Bamocar D3

MAX SYSTEM VOLTAGE 600V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPO / 5,3kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:2,68 / n/a

DRIVE TYPE spur gear drive

DIFFERENTIAL n/a

COOLING Water, rear mounted mini radiator

BRAKE SYSTEM Front: 220mm outer diameter, 170 inner diameter; Rear 200mm outer diameter, 150mm inner diameter

ELECTRONICS adjustable Torque Vectoring, Dashboard, TSAL, Brake light

DARMSTADT

University of Applied Sciences
Darmstadt

This year the Formula Student Team Darmstadt (FaSTDa) will take part in the annual event of Formula Student with its electric car, „E13“, for the first time. Since this is our second electric race car our first goal was the opportunity to learn out of our last year design problems and to build up a car with respect to more stability and improvements made on the handling of the car. One of our highlights this season is our custom removable battery pack that is positioned around the driver. Also safety is an absolute necessity. The whole team appreciates much internal help and would like to sincerely thank all our partners for the great support his year! Regards FaSTDa

Car E56 Pit E25

Germany

FRAME CONSTRUCTION Frt and rear Tubular space frame

MATERIAL 1020 steel round tubing .75

OVERALL L / W / H (mm) 2688 / 2080 / 1138

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1650 / 1250 / 1250

WEIGHT WITH 68kg DRIVER (Fr / Rr) 165 / 236

SUSPENSION Double unequal length A-Arm. Pushrod actuated spring7damper

TYRES (Fr / Rr) 175/50 R13 Dunlop

WHEELS (Fr / Rr) 175/50 R13 Dunlop

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Middle rear with diff / 60kW

MOTOR TYPE Axial flux synchronous Motor Emrax

MAX MOTOR RPM 4000

MOTOR CONTROLLER Unitek Bamocar D3

MAX SYSTEM VOLTAGE 416V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePo4 / 6,7kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:3,1 / 1:3,1

DRIVE TYPE chain drive

DIFFERENTIAL Drexler Formula Studen 2010 V.1 bevel differential gear

COOLING Aircooling benefit through aerodynamics of car, watercooling separate

BRAKE SYSTEM Four piston, AP racing CP4227 front and Dual piston rear with 220/3 crossdrilled wave design

ELECTRONICS Wiring sealed to IP 67, Torque Commands via Can Bus

DEGGENDORF

University of Applied Sciences
Deggendorf

Fast Forest represents the UAS Deggendorf in all the Formula Student events. Founded in June 2008, our fifth season's team consists of 65 active team members. In 2010 we decided to build an electric car in addition to the combustion car. 2012 we made the choice to focus our full concentration on electric cars only. With FF05e we managed to optimize last year's design. The construction consists of a monocoque front and a steel tube rear frame by which weight is saved. The power unit consists of two one stage planetary gearboxes and the power is lead to the wheels mounted on a double wishbone suspension with a pull rod-actuated damping system. We want to thank our sponsors for their great cooperation. Furthermore we want to express our gratitude to all the other teams who offered their help after our workshop was flooded. With regard to the great atmosphere and the gathered experience of the last years' events we are proud to present our new car at the FSG in 2013.

Car E14 Pit E36

Germany

FRAME CONSTRUCTION Hybrid construction: monocoque front and steel tube rear frame

MATERIAL Carbon fiber and honeycomb sandwich, S355 steel tube frame

OVERALL L / W / H (mm) 2933 / 1403 / 1192

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1552 / 1210 / 1160

WEIGHT WITH 68kg DRIVER (Fr / Rr) 115 / 125

SUSPENSION Unequal length double wishbone suspension; pull rod actuated spring and damper

TYRES (Fr / Rr) Braid Formrace 16, 13x7J ET 18, Al Rim (one piece)

WHEELS (Fr / Rr) Braid Formrace 16, 13x7J ET 18, Al Rim (one piece)

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 38 kW, 38 kW

MOTOR TYPE Continental BAS+, asynchronous motors

MAX MOTOR RPM 19000

MOTOR CONTROLLER Continental REX

MAX SYSTEM VOLTAGE 353

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY Lithium-NMC / 6,96 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:10 / n/a

DRIVE TYPE Planetary drive, student designed

DIFFERENTIAL virtual electronic diff with torque vectoring, yaw rate sensetive

COOLING Center mounted radiator (300mm x 400mm)

BRAKE SYSTEM 4-Disk system, self developed rotors, adjustable brake balance, front ISR and rear AP calipers

ELECTRONICS Torque vectoring, anti-slip control, CAN-Bus Data logging, selfdesigned Live-Telemetry System

DELFT
Delft University of Technology

Car E1 Pit E30

Netherlands

The Delft University of Technology (DUT) Racing Team consists of seventy students from different faculties of the TU Delft. The team has a record of building lightweight and agile cars. The last two years, the team took on the challenge of taking the lightweight concept to the electric racing class and implementing full torque vectoring with four-wheel-drive. This year, we integrated aerodynamics in the overall concept of the car. The DUT13 is the result of 12 years of experience, a systemic approach in design and project management and a year of hard work. By combining four-wheel-drive, aerodynamics and advanced control systems whilst sticking true to the Delft Concept (Lightweight, efficient and fast!) the team has been able to design their most competitive car so far. With features such as regenerative braking, slip ratio control, torque vectoring and a wing-shaped underbody the DUT13 is a worthy addition to the DUT Racing fleet.

FRAME CONSTRUCTION Full carbon fiber monocoque with integrated aluminium front hoop

MATERIAL TeXtreme 100gsm SpreadTow fabric, 300gsm UD, 10~25mm Rohacell IG51 core

OVERALL L / W / H (mm) 2907 / 1415 / 1077

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1200 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 123 / 123

SUSPENSION Double unequal length A-Arms. Spring-damper: front push rod actuated in-line, rear direct actuated

TYRES (Fr / Rr) 18x6 R10 Hoosier LC0

WHEELS (Fr / Rr) 7.0x10, 2 pc Al-CFRP Rim, 67mm / 75mm offset

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 4 / 4x hub mounted motors / 4x 26kW

MOTOR TYPE 4x modified AMK DT5-14-10

MAX MOTOR RPM 4x 20.000RPM

MOTOR CONTROLLER 4x AMK KW26. Single cooling plate

MAX SYSTEM VOLTAGE 600V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiCoO2 / 6.29kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:14.15 / n/a

DRIVE TYPE Spur and planetary gear system

DIFFERENTIAL Electronic Differential (Active Yaw Rate Control)

COOLING 2x Side mounted 750cc radiator

BRAKE SYSTEM 50kW regenerative braking. Aluminium composite rotors. AP Racing CP7003 casted aluminium calipers

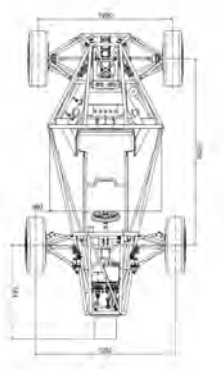
ELECTRONICS Self-designed Electronics Control Unit and sensor nodes system. 5.2" LCD display. 3 colour LED-bar

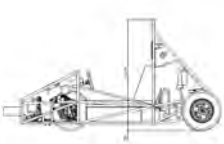
DIEPHOLZ
University of Applied Sciences
Diepholz/Oldenburg/Vechta

Car E69 Pit E29

Germany

Fadeless and dynamic. This is Deefholt Dynamics from Northern Germany. Since 2010 our team has participated in the Formula Student Electric. Every year, we are eager to build a progressive car. With a new motor and an active cooling concept, our car is focused on endurance. 41 students with competences in mechatronics, electrical and mechanical engineering have worked on the FHWT-06e to optimize the performance and agility. Based on weight reduction we changed to 10 inch wheels. The connection between the tires and the frame is a double wishbone suspension. The new motor offers us higher performance and better efficiency, but also requires higher voltage. We have two accumulator containers with 200 cells in total, which deliver a voltage of 370V. In order to establish a modular and reliable system, the components are connected via CAN bus. A wireless connection allows the team to monitor the vehicle status, keep track of important parameters and help optimize future designs.





FRAME CONSTRUCTION Tubular space frame

MATERIAL 15CDV6

OVERALL L / W / H (mm) 2610 / 1403 / 1305

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1250 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 136 / 167

SUSPENSION Double unequal length wishbone. Push rod actuated lateral, horizontally oriented spring + damper

TYRES (Fr / Rr) 18.0 x 6.0 - 10 Hoosier R25B

WHEELS (Fr / Rr) 6.0 x 10, 30.4 mm offset, 3 pc Al-Rim

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear Center / 100kW

MOTOR TYPE Permanent excited synchronous Motor

MAX MOTOR RPM 2000

MOTOR CONTROLLER Sevcon Gen4 Size 8

MAX SYSTEM VOLTAGE 370V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 7.4kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:1 /

DRIVE TYPE Direct drive

DIFFERENTIAL Compact torque sensitive limited slip differential with internal preload adjustment

COOLING Rear mounted radiator and coolant pump

BRAKE SYSTEM 4-Disk system, self developed rotors with 190 mm diameter, adjustable brake balance

ELECTRONICS Traction Control System, CAN bus, Live-Telemetry System

DRESDEN
Technische Universität Dresden

Car E17 Pit E9

Germany

Elbflorace consists of 60 members. Although about 95% is male, we are proud to have a female Team Captain. She is responsible for coordinating the entire project and represents the team. The Chief Engineer supports the Team Captain & coordinates the technical division manager. They are, as well as the economical division manager, subordinated to the team captain. "Evolution" is playing a big role this year. The third electric race car will pay tribute to what worked well in the past and surprise with new, innovative parts and qualities. The students work covered, amongst others, the refining of the self-developed Battery Management System and improved bonding of the advanced cells by switching to a crimp connection. The maximum performance of the engine increased from 72 kW up to 100 kW. The motors and inverters are easier to maintain and we will use them by 600V to be more efficient. With our guideline "E-Star"-Education,Safety,Team,Award and Reliability-we defined our goals.

FRAME CONSTRUCTION whole monocoque

MATERIAL aramid honeycomb, foam

OVERALL L / W / H (mm) 2690 / 1405 / 1150

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 137 / 160

SUSPENSION double unequal length A-Arm, pull-rod actuated, vertically orientated damper/spring

TYRES (Fr / Rr) 205/510 R 13 Continental / 205/510 R 13 Continental

WHEELS (Fr / Rr) 6.5x13, 3 piece, aluminium, central nut / 6.5x13, 3 piece, aluminium, central nut

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / at each rear wheel / 50 kW per motor

MOTOR TYPE Siemens 1FE1064 Synchronous machine

MAX MOTOR RPM 4300 1/min

MOTOR CONTROLLER 2 Siemens SINAMICS S120

MAX SYSTEM VOLTAGE 480

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5,3

TRANSMISSION RATIO (PRIMARY / SECONDARY) 5,8 : 1 / -

DRIVE TYPE one level spur gear

DIFFERENTIAL Torque

COOLING twin side mounted 1650cc Mini radiator

BRAKE SYSTEM 4 Disk system, self made rotors with O.D. 239mm(Fr) or 235 mm (Re), alloy steel and floating

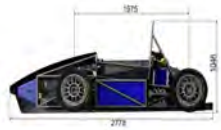
ELECTRONICS data logger designed by team, live monitoring with WLAN, SmartSensor-PCB's

DUISBURG
University of Duisburg-Essen

Car E66 Pit E33

Germany

The A40 Electra is the first car of the formula student electric team from the University of Duisburg-Essen. Founded in the end of 2010, we are going to participate in the Formula Student Event in Hockenheim 2013 for the first time. Ever since we started designing an electric racing car we constantly enhanced our knowledge and manpower, now we are nearly 30 Students. Our A40 Electra is driven by two 30kW electric motors that are transmitting their power through a 7:1 ratio planetary gearbox. Noticeable is our new, self-designed and self-produced skin and the new, casted wheel carriers that were designed by our team as well. All major electronic parts offer a maximum of safety and serviceability. We are hoping to achieve our aims and show a memorable performance in Hockenheim this year!



FRAME CONSTRUCTION Tubular space frame

MATERIAL S355 and E335, 15mm to 25 diameter

OVERALL L / W / H (mm) 2778 / 1375 / 1046

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1200 / 1180

WEIGHT WITH 68kg DRIVER (Fr / Rr) 181 / 242

SUSPENSION Double unequal length A-Arms, Push and pull rod acutated horizontally oriented damper

TYRES (Fr / Rr) Dunlop, 175/505R13 / Dunlop, 175/505R13

WHEELS (Fr / Rr) OZ Formula Student 7Jx13 / OZ Formula Student 7Jx13

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 30kW

MOTOR TYPE Heinzmann PMS 156, synchronous

MAX MOTOR RPM 6000

MOTOR CONTROLLER Bamocar D3

MAX SYSTEM VOLTAGE 600

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePo4-graphite / 6.5 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:7 / -

DRIVE TYPE Planetary gearbox CVT

DIFFERENTIAL -

COOLING water cooled, side mounted radiators

BRAKE SYSTEM 4-Disks, self developed floating rotors (front: 220mm., rear: 202mm dia.), conventional calipers

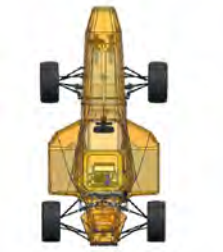
ELECTRONICS CAN-Steering sensor, Rapid prototyping ECU, BMS with WLAN monitoring, CAN compatible inverters

EINDHOVEN
Eindhoven University of Technology

The URE08 is the fourth electric car of University Racing Eindhoven (URE). All 60 students work together to achieve the ambitious main goal of this year: decreasing the weight of the car by astonishing 60 kilograms. To realize this, every part of the car has been redesigned; starting with a full carbon fiber chassis as a lightweight foundation. Next to that, the Oxford YASA-750 electric motor together with a self-developed inverter, to assure enough power. Battery cells with an higher energy density are used to save even more weight. As for the suspension, the car is provided with a double wishbone suspension together with a URE-first: 10 inch wheels. As previous years, they are custom designed for our car and performance. An ECU is responsible for traction control, launch control and regenerative braking to ensure every last bit of tire performance will be used.

Car E40 Pit E34

Netherlands



FRAME CONSTRUCTION full carbon fiber monocoque with steel main hoop en aluminium front hoop

MATERIAL Unidirectional dominated prepreg carbon fiber sandwich panel with aluminium honeycomb

OVERALL L / W / H (mm) 2592 / 1399 / 1021

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1535 / 1180 / 1139

WEIGHT WITH 68kg DRIVER (Fr / Rr) 113 / 144

SUSPENSION Double wishbone unequal length, pullrod acutuated damper

TYRES (Fr / Rr) Apollo R&D 10x7.5

WHEELS (Fr / Rr) 10

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / inline with rear wheels / 100 kw

MOTOR TYPE YASA-750

MAX MOTOR RPM 2500

MOTOR CONTROLLER Prodrive Custom Developed

MAX SYSTEM VOLTAGE 398

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY Li(NiCoMn)O2 / 7,05

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:1.6 /

DRIVE TYPE Planetairy gear set

DIFFERENTIAL Drexler Formula Student 2010 limited slip

COOLING Dielectric oil cooled motor and motor controller, in combination with rear mounted radiator

BRAKE SYSTEM full floating180mm, 126mm costum designed, AP Racing CP4227 2x25.4mm, AP Racing CP7854 16.8mm bore

ELECTRONICS traction control, launch control, regenerative braking, dSPACE MicroAutoBox II (ECU),MoTeC ADL3

FREIBERG
TU Bergakademie Freiberg

After a very successful start into electrical racing our team from the TU Freiberg is proud to participate again in the FSE with our second electrical racecar. The RTo7 is a consequent development of our last year's car, combining the experience of 2012 with new ideas and our traditional focus on a wide range of materials and manufacturing methods as well as a high degree of self-developed parts. As a result of this guidelines we developed our own casted brake calipers and self routed, assembled and programmed VCU and BMS. The most obvious and unique technical highlight on our new car is the casted aluminum gear box housing which includes the motor mountings and all rear suspension parts. In addition the gear box housing contains a self-designed titanium-aluminum hybrid gear box. A great Thanks to our sponsors, families and alumni for making all of this possible. We are looking forward to an exciting event season 2013 and wish all teams unforgettable days.

Car E76 Pit E18

Germany

FRAME CONSTRUCTION tubular steel space frame with CFRP reinforcements

MATERIAL 25CrMo4 and CFRP

OVERALL L / W / H (mm) 2800 / 1404 / 1118

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 163 / 163

SUSPENSION Double unequal length A-Arm. Pull/Push rod actuated spring and damper

TYRES (Fr / Rr) 20.5x7.0 R13, Hoosier R25B

WHEELS (Fr / Rr) 7.0x13, 34mm offset, 2pc CFRP-Mg Rim

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 80kW

MOTOR TYPE Bosch SMG 180/120

MAX MOTOR RPM 6000

MOTOR CONTROLLER Bosch INVCON 2.3

MAX SYSTEM VOLTAGE 330

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5,7kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 2,58:1 /

DRIVE TYPE self designed two-stage gearbox

DIFFERENTIAL torque vectoring

COOLING water cooling; twin side pod mounted radiators

BRAKE SYSTEM self designed casted calipers and rotors with 210mm diameter

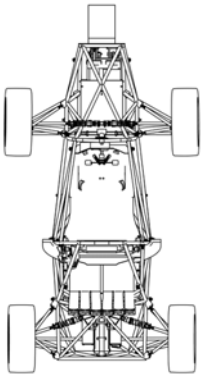
ELECTRONICS self developped VCU, MCU, BMS, infotainment system

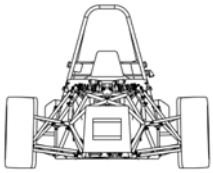
HAMBURG
Hamburg University of Technology

Car E23 Pit E24

Germany

The egn13 is the 2nd Formula Student race car of the Hamburg University of Technology. The main improvements are a higher reliability of all electrical and mechanical components and a much better service facility, for example by new battery design which can be easily removed through the bottom of the frame.





FRAME CONSTRUCTION Tubular space frame

MATERIAL S355 mild steel round tubing 10mm to 25mm diameter

OVERALL L / W / H (mm) 2866 / 1454 / 1167

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1625 / 1250 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 167 / 181

SUSPENSION Anti-parallell double wishbone axis, push rod, no sway bars

TYRES (Fr / Rr) 7.0x20-13, Avon Tyres FSAE

WHEELS (Fr / Rr) 7.0x20-13, Avon Tyres FSAE

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear right and rear left / 80kW/30kW for 1min/contin

MOTOR TYPE Enstroj EMRAX Air cooled

MAX MOTOR RPM 3000RPM

MOTOR CONTROLLER UNITEK BAMOCAR-D3-400-400

MAX SYSTEM VOLTAGE 390

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePo4 / 7.12 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 2,5:1 / n/a

DRIVE TYPE Transmission with gear wheels

DIFFERENTIAL Software controlled differential

COOLING Air cooled accumulator and motor controllers, each with 6 high performance fans

BRAKE SYSTEM 4-Disk system, thickness 3mm, diameter 125mm, high-alloy steel, not vented, not coated

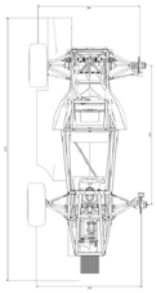
ELECTRONICS wiring harness sealed to IP67, failsafe bus system,Live-Telemetry System with data export to website

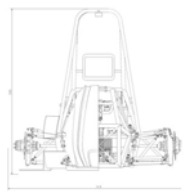
HANNOVER
Leibniz Universität Hannover

Car E13 Pit E22

Germany

HorsePower Hannover e.V. was founded in 2007 by a group of 10 engineering students. Only two years later the „RacePony09“ was presented. Featuring a combustion engine it was our first step into the Formula Student. During the season the team got the know-how to produce a winner's car: the "RaceHorse10", which won in Barcelona in 2010. After this major success HorsePower decided to take on a new challenge: an all-electric race car. Thus the "electricHorse11" was born. After two successful seasons at FSUK and FSS with the eH11 and a Best Teamwork Award at FSS with its successor, the eH12, the team now proudly presents the third generation of electric horses: the eH13. Featuring a self-made Battery Management System, an improved sensory system and a high production integration from casting magnesium parts to milling on self-constructed CNC machines, 45 students are eager to prove themselves in Silverstone, Hockenheim and Barcelona.





FRAME CONSTRUCTION Steel tubular space frame

MATERIAL 1.0562 steel round tubing 15mm to 30mm outer dia.

OVERALL L / W / H (mm) 2917 / 1410 / 1285

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1220 / 1180

WEIGHT WITH 68kg DRIVER (Fr / Rr) 146 / 157

SUSPENSION Double unequal length A-Arm, Pull rod (Fr) / Push rod (Rr) actuated horiz. orientated spring/damper

TYRES (Fr / Rr) 205/510R13 Conti FSAE Race Tire, C13 / 205/510R13 Conti FSAE Race Tire, C13

WHEELS (Fr / Rr) 7 in. wide, 3 pc Al/Mg star, -18,7mm offset / 7 in. wide, 3 pc Al/Mg star, -18,7mm offset

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 43kW, 43kW

MOTOR TYPE RR, RL: PMSM, AMK DT5-26-10-W VAC HPH

MAX MOTOR RPM RR, RL: 150200

MOTOR CONTROLLER AMK KW26-S5-FSE

MAX SYSTEM VOLTAGE 588

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 7,7kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:8,47 / n/a

DRIVE TYPE student built spur gear

DIFFERENTIAL electrical differential

COOLING Rear mounted 140x300mm radiator, 2x 208.9 cfm fan mounted to air duct on radiator

BRAKE SYSTEM 4-Disk system, 220mm dia. (Fr), 210mm dia. (Rr), adjustable brake balance

ELECTRONICS Multifunctional Steer. Wheel, Live-Telemetry System, self built AMS, wiring harn. ultra sonic welded

ILMENAU

Ilmenau University of Technology

Car E31 Pit E5

Germany

Team StarCraft e.V. proudly presents our second fully electrically driven Formula Student car - the TSC-02e. About 60 engineering, social studies and economics students of Ilmenau University of Technology build our multidisciplinary team. After gaining a lot of experience due to and through our first electrical car, this year we want to solve the challenge to be on the top of the international ranking of the Formula Student. Using innovative technologies in manufacturing the CFRP monocoque, working with extraordinary materials for our body work and the usage of a well-adapted and improved accumulator box, created by our own, enable a significant reduction of weight. With our self-developed direct drive and special bearings we achieve an exceptional efficiency factor. The modular setting of our car allows us an easy maintenance. Our fresh ideas and smart solutions build an excellent platform for a successful future.

FRAME CONSTRUCTION CFRP monocoque, tubular steel front and main hoop

MATERIAL CFRP; structural foam (PMI)/ balsa wood, thickness 10mm and 20mm

OVERALL L / W / H (mm) 2616 / 1417 / 1217

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1545 / 1220 / 1220

WEIGHT WITH 68kg DRIVER (Fr / Rr) 143 / 175

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper (coil-over).

TYRES (Fr / Rr) 175x55 R13, Dunlop A8D / 175x55 R13, Dunlop A8D

WHEELS (Fr / Rr) 6.5x13, 24mm offset, 4 pc Al Rim / 6.5x13, 24mm offset, 4 pc Al Rim

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 40 kW, 40 kW

MOTOR TYPE RR, RL:

MAX MOTOR RPM RR, RL: 1600

MOTOR CONTROLLER TSC Motor Controller

MAX SYSTEM VOLTAGE 600V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5,2kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:1 / 1:1

DRIVE TYPE Direct Drive

DIFFERENTIAL electronic differential (independently driven rear wheels)

COOLING Single rear top mounted radiator with thermostatic controlled electric fans

BRAKE SYSTEM 4-Disk system, self developed rotors with 200mm/120mm diameter, adjustable brake balance

ELECTRONICS Self-designed motor controller, self-designed CAN-sensor-actor board

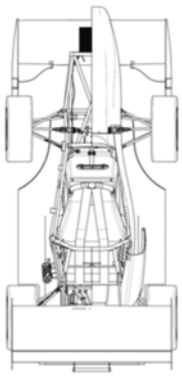
INGOLSTADT

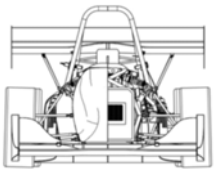
Technische Hochschule Ingolstadt

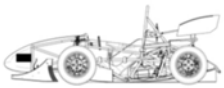
Car E34 Pit E19

Germany

Schanzer Racing Electric e. V. (SRe) will participate in Formula Student Electric for the second time. The team of about 70 students of the „Technische Hochschule“ Ingolstadt developed its second car in its second Formula Student Season ever. With a weight decrease of about 70kg, aerodynamic devices, torque vectoring and lots of new developments, Schanzer Racing wants to tie in with the really good results of the last season. The team is split into 4 departments - mechanics, electrics, business and organisation. About 45 students are working in the technical departments to design and build up the SRe13. The other 25 students are working on business and organisation topics - e. g. finance, sponsoring, businessplan or personal coordination. Schanzer Racing Electric e. V. is really looking forward to the event and wishes all teams good luck and a fair competition. eCellerate your life!!







FRAME CONSTRUCTION steel tube space frame

MATERIAL E355

OVERALL L / W / H (mm) 2966 / 1402 / 1082

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1200 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 158 / 142

SUSPENSION Double unequal length A-Arm. Push rod (Fr: near vertically oriented; Rr: near horizontally oriented)

TYRES (Fr / Rr) Hoosier 20.0x7.0-13 R25B

WHEELS (Fr / Rr) Hoosier 20.5x7.5-13 R25B

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / rear right, rear left / 50kW (for 60s per motor)

MOTOR TYPE Enstroj EMRAX (perm excited sync motor)

MAX MOTOR RPM 4000 RPM

MOTOR CONTROLLER Infineon Hybrid Kit 1 (Pin Fin)

MAX SYSTEM VOLTAGE 360V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePo / 6,24kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:1 / 1:2,5

DRIVE TYPE gear box

DIFFERENTIAL virtual with torque vectoring

COOLING one Bühler water pump and two radiators

BRAKE SYSTEM 4-Disk system, self developed rotors 218mm diameter, adj brake balance, brembo mono block calipers

ELECTRONICS Multi Functional Steering Wheel, DRS, Torque Vectoring

KAISERSLAUTERN

Kaiserslautern University of Technology

The Kaiserslautern Racing Team was founded in 2007 as the team of the Technical University. In 2008 we started with the first first-year car with monocoque at the Formula Student competitions. Since the beginning of 2010 we are also officially working together with the UAS Kaiserslautern. After building four combustion cars we developed our first electric car for last year's competition on basis of the slightly adapted combustion chassis. This year we made a huge step and designed a completely new monocoque and kinematics to be able to deal with the specific problems of an electrically driven car better. The accumulator concept got a little more progressiv and was also completely manufactured by ourselves this year. Our concept furthermore includes several improvements in the two motors that drive the rear wheels as well as in the inverters controlling them and that have been programmed to realize an electric differential.

Car E106 Pit E35

Germany

FRAME CONSTRUCTION one piece monocoque with integrated rear and accumulator container as frame element

MATERIAL monocoque made by carbon fibre prepregs and foam core, Impact Attenuator made by aluminium-honeycomb

OVERALL L / W / H (mm) 2500 / 1335 / 1135

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1525 / 1150 / 1050

WEIGHT WITH 68kg DRIVER (Fr / Rr) 132 / 161

SUSPENSION Double unequal length A-Arm, Pull rod front and rear, Mountain bike dampers

TYRES (Fr / Rr) 18.0x6.0-10 R25B Hoosier

WHEELS (Fr / Rr) Keizer CL 10

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 28,9kW, 28,9kW

MOTOR TYPE RR, RL: Vues AFW 507G

MAX MOTOR RPM 7500

MOTOR CONTROLLER 2x UniTek BamocarD3

MAX SYSTEM VOLTAGE 563V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY Lithium Polymer / 6.8 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 4:1 / -

DRIVE TYPE single stage spur gear

DIFFERENTIAL electronic: one motor per each rear wheel

COOLING Two mini radiators air cooled with 120mm fans on top of the power electronics tunnel

BRAKE SYSTEM 4-Disk system, self developed rotors with diameter 200mm front/ 180mm rear, adjustable brake balance

ELECTRONICS selfdesigned dashboard with color LCD, UI at steering wheel and live telemetry system

KARLSRUHE

Karlsruhe Institute of Technology

KA-RaceIng – two cars, one passion! As a team of 70 Students from the Karlsruhe Institute of Technology (KIT), we are building one car every year since 2007 with combustion engine and additional one with electrical drivetrain since 2010. The team is organized by a board called "Assembly", combining our team leaders and the executive board. The team itself is managed in different departments, led by a team leader. This season the team's focus is on the KIT13e. According to this, this car will have four synchronous motors, one for each wheel, mounted in the center of our new designed full-monocoque, with steered driveshafts at the front axle and fully adjustable active aerodynamics. As we are building two cars, we develop several parts which meet the requirements of both cars and improve testing time and manufacturing effort. We would like to thank all supporters and are looking to an exciting event in Hockenheim.

Car E121 Pit E8

Germany

FRAME CONSTRUCTION CFRP monocoque (VARI), drive units underneath, integrated battery carrier

MATERIAL HT/HM/kevlar fibres, twill/unidirectional plies, weights 100-600gr/sqm)

OVERALL L / W / H (mm) 3003 / 1454 / 1168

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1220 / 1150

WEIGHT WITH 68kg DRIVER (Fr / Rr) 129 / 140

SUSPENSION Double unequal length A-Arm. Pull-/Push rod actuated KAZ damper with coil spring

TYRES (Fr / Rr) Hoosier 18.0x7.5-10 R25B

WHEELS (Fr / Rr) Hoosier 18.0x7.5-10 R25B

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 4 / two front, two rear / 84 kW

MOTOR TYPE internal permanent magnets synchronous motors

MAX MOTOR RPM 20000

MOTOR CONTROLLER Aradex Vectopower 100 A2

MAX SYSTEM VOLTAGE 403V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 6,4kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 12,6 /

DRIVE TYPE planetary gear, spur gear

DIFFERENTIAL n/a

COOLING radiator behind driver, stainless steel pipes

BRAKE SYSTEM -

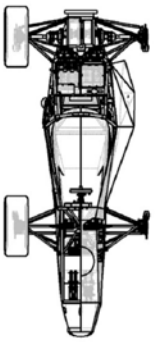
ELECTRONICS Live Telemtry, remote parameterization via WLAN, Modular hardware design

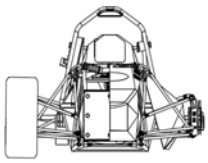
KIEL
University of Applied Sciences Kiel

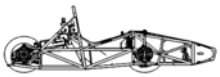
Raceyard is Germany´s northernmost Formula Student team. We are located in Kiel, the sailing city of Germany. We are organized in six departments: Suspension, Frame, Electric, Power Train, Accumulator and Non-Constructive. This year we paid special attention to the electrical part of our car. We designed our own BMS and developed a torque-vectoring-system. With the BMS we were able to save weight by customizing it to our individual requirements. To improve the handling we added to our adaptive slip control the newly developed torque-vectoring-system. A further innovation is our bodywork. It is based on polypropylene Twin-Wall Sheets which provides the benefits of weight (1 kg/sqm) and savings of time, money and weight.

Car E53 Pit E3

Germany







FRAME CONSTRUCTION tubular space frame

MATERIAL S235JR

OVERALL L / W / H (mm) 2794 / 1420 / 953

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1200 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 148 / 151

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 20.5x70 R13, R25B, Hoosier

WHEELS (Fr / Rr) 20.5x70 R13, R25B, Hoosier

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear right, Rear left / 70 per motor

MOTOR TYPE Emrax (produced by Enstroj)

MAX MOTOR RPM 3300

MOTOR CONTROLLER Unitek, BAMOCAR d$

MAX SYSTEM VOLTAGE 345

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePO4 / 6,3333

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:2,22 / n/a

DRIVE TYPE spur gear

DIFFERENTIAL electronic differential, torque vectoring

COOLING left side pod mounted radiator

BRAKE SYSTEM 4-Disk system, adjustable brake balance

ELECTRONICS Self-designed: Torque vectoring, Launch control, Traction control, 2.4GHz XBee Live-Telemetry, BMS,

KÖLN
University of Applied Sciences Köln

Welcome to the new age! This year we engineered a car we can be proud of. The team eMotorsports Cologne includes 50 students with a great variety of different fields to pool the best possible knowledge. To build up a car it is not enough to be a bunch of people. What makes us special is friendship. Everybody talks about green energy but we take care about it. This year our goal was to raise the efficiency of our car and save earth's resources. Therefore we decided to build a recyclable steel frame and no cost wasting monocoque. Furthermore the car is equipped with a single high efficient motor and patented driveshafts. For outstanding driving performance, we built in a self developed ABS System which additionally ensures us safe handling for every driver. Throughout our developement we contribute to the progress of e-mobility. We want to thank every sponsor, supporter, friends and family to let our dream come true!

Car E12 Pit E16

Germany

FRAME CONSTRUCTION complete space frame; cfrp sandwich underbody to compensate shear forces

MATERIAL 4130 steel 25,4 x0,9 to 28,6x2,1mm; 243g/m^2 pre preg cfrp, rohacell core

OVERALL L / W / H (mm) 2659 / 1495 / 1089

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1560 / 1292 / 1229

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 172

SUSPENSION Double A-Arm. Cfk/Alu Hybrid manufactured. Pullrod actuated vertical oriented spring/damper

TYRES (Fr / Rr) Hoosier 20.5x7.0-13

WHEELS (Fr / Rr) 7x13, 22 mm offset, 1 pc AlSi7Mg

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear / 85kW

MOTOR TYPE Powerd by Munch Racing

MAX MOTOR RPM 12700

MOTOR CONTROLLER Powerd by Munch Racing

MAX SYSTEM VOLTAGE 298.

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 10,5kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:9,9 /

DRIVE TYPE Two-stage spur gear with integrated LSD

DIFFERENTIAL lutch pack limited slip, 100Nm preload, 1.4 bias ratio

COOLING water cooling with integrated radiator and thermostatic controlled electric fan

BRAKE SYSTEM 4-Disk system, self developed rotors with 220mm diameter, AP Racing calipers, Self developed ABSsys

ELECTRONICS Launch control, Multifunctional Steering Wheel, selfdesigned 4,5

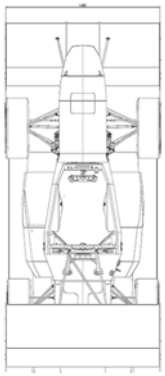
LISBOA

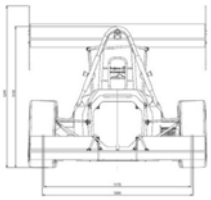
Technical University of Lisbon - IST

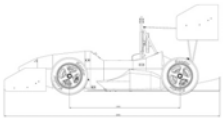
Car E50 Pit E10

Portugal

The FST 05e is the 5th car built by Projecto FST Novabase, during our 12 years of history. After participating in Germany and Spain in 2011 and Silverstone in 2012 with our first electric car, we decided to build a much more competitive and lightweight prototype. FST05e achieved an Overall win in Class 2 in FS UK 2012 (including a win in the Design and Business Plan events). We are now aiming to present a reflection of that result this year in Germany. Our team consists of 21 enthusiastic students, all extra-curricular, from Mechanical, Electrical and Aerospace Engineering.Feel free to stop by our box, and have a chat with us, whether you are a visitor, a judge, or from a FS team! We are eager to learn as much as possible during this participation in FSE, and feedback about our car is much appreciated! We also want to leave a word of gratitude to our Sponsors, always believing in our project, and making it a reality.Visit our team on www.projectofst.com or www.facebook.com/projectofst







FRAME CONSTRUCTION CFRP Monocoque

MATERIAL Non-Crimp Unidireccional and Bidiagonal Carbon Fibre

OVERALL L / W / H (mm) 3098 / 1403 / 1299

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1590 / 1200 / 1170

WEIGHT WITH 68kg DRIVER (Fr / Rr) 130 / 138

SUSPENSION Double unequal non-parallel A-arms. Front Pull-rod and rear Pushrod actuating oriented Shocks and ARB

TYRES (Fr / Rr) Hoosier 20.5x7.0-13 R25B, cross-ply soft compound (Front and Rear)

WHEELS (Fr / Rr) 7.0x13, 10mm offset, CFRP rim with aluminium insert

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right and Rear Left / 32kW

MOTOR TYPE Siemens 1FE1 AC Synchronous

MAX MOTOR RPM 40000

MOTOR CONTROLLER Siemens 1TE26

MAX SYSTEM VOLTAGE 600V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY Ion Polymer / 4,8 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 4,2:21 / 1:4,2

DRIVE TYPE Two Stage Helical Gears

DIFFERENTIAL Electronic

COOLING Water cooled, Double side mounted Radiator 120x240mm

BRAKE SYSTEM 4 self developed floating rotors with 220mm, adjustable brake balance, 4 double Piston Calipers

ELECTRONICS Torque vectoring, Multifunctionig Dashboard, Data logging System, Self developed AMS

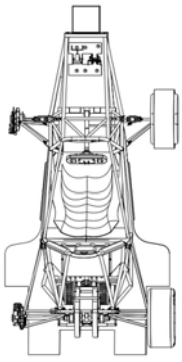
MADRID

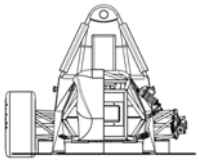
Technical University of Madrid (UPM)

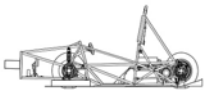
Car E21 Pit E14

Spain

UPM Racing celebrates in 2013 its 10th anniversary by participating in FSAE Germany with two cars: one with a combustion engine and the other with an electric drivetrain. Each of our teams is composed of 20 automotive-passionated students who work part-time in the project, combining it with their degrees. The team members belong to the Technical University of Madrid, so the project lays on varied skills and knowledge. With a fairly tight budget, UPM Racing tries each year to introduce improvements in their new cars. In our electric prototype, the evolution comes through a save-weight program in order to reduce 30% of it (compared with UPM001-E), thanks to an extensive use of carbon fiber in car parts and new batteries. We remain at your disposition during the competition for any additional information. Finally, we are grateful for all our sponsors, without them this project won't be possible. We hope to see you all in Hockenheim!







FRAME CONSTRUCTION Tubular frame

MATERIAL 4130 steel round tubing

OVERALL L / W / H (mm) 2814 / 1343 / 1200

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1535 / 1193 / 1143

WEIGHT WITH 68kg DRIVER (Fr / Rr) 126 / 154

SUSPENSION Double unequal length A-Arm. Push rod actuated vertically oriented spring and damper

TYRES (Fr / Rr) 450x152 R10, Hoosier LC0

WHEELS (Fr / Rr) 6x10, 70mm offset, 1 pc Al Rim

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Left and right independen / 32KW per motor

MOTOR TYPE DC Motors

MAX MOTOR RPM 2600

MOTOR CONTROLLER Kelly Controllers

MAX SYSTEM VOLTAGE 108V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePo4 / 6.4

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1 / 4.5

DRIVE TYPE Chain

DIFFERENTIAL Electronic Torque Sensing Custom Build

COOLING Air Cooled

BRAKE SYSTEM 4-Disk system, self developed rotors with 190mm diameter, adjustable brake balance

ELECTRONICS Traction Control, Launch Control, Electronic Differential

Typical engineer?

Ulrike Krafft
ESP-Applicator
Bosch Engineering

Racing Driver
FIA-ETCC-Series

Strong characters with versatile interests make a career at Bosch. You also prefer dynamics, team spirit and flexible possibilities? Then you will find a modern working culture with plenty of room for personality.

Every success story has a beginning. Start yours with us, here and now.
www.bosch-career.de

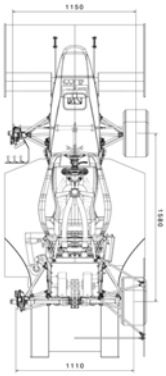
BOSCH
Invented for life

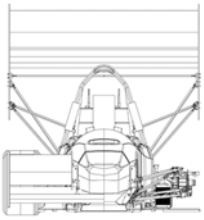
MÜNCHEN
Technische Universität München

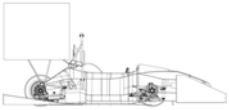
In October 2012 a team of 65 young and motivated students started to develop the 3rd electric car of the TUfast Racing Team. And after a lot of hard work we were proud to roll out the eb013 out of our shop in June 2013. The challenge for this year was to reduce weight even more, aiming for less than 190kg with a aero package. Therefore we implemented some innovative designs e.g. for the rims and the driveshafts. The full aero package is also a first in TUfast history. So now, we are excited to compete with all the other teams and get to know if we did a good job. And after a hard day full of work, we would be happy to chat with some of you guys about our favorite theme and have a good time. Just come over and have a beer with us.

Car E6 Pit E31

Germany







FRAME CONSTRUCTION CFRP Monocoque

MATERIAL texTreme with rohacell and aluminium honeycomb as sandwich core

OVERALL L / W / H (mm) 3084 / 1390 / 1459

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1580 / 1150 / 1110

WEIGHT WITH 68kg DRIVER (Fr / Rr) 123 / 126

SUSPENSION double unequal length A-Arms, Pullrod actuated horizontally oriented Sachs Throughrod dampers

TYRES (Fr / Rr) Hoosier 10", width 7.5", R25B

WHEELS (Fr / Rr) 7,5", CFRP SMC Shell, Al Center

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 60

MOTOR TYPE Enstroj Emrax

MAX MOTOR RPM 4000

MOTOR CONTROLLER Infineon Hybrid Kit 1

MAX SYSTEM VOLTAGE 400V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY - / 5.3 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1 / 2.0

DRIVE TYPE 2 stage gearbox

DIFFERENTIAL single wheel drive

COOLING sidepod mounted radiator and fan

BRAKE SYSTEM 4 disks, 4 piston front, 2 piston rear, ISR

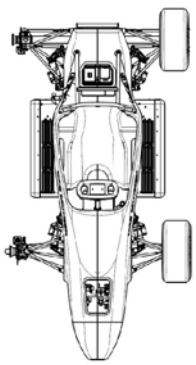
ELECTRONICS student build control unit, display and steering wheel unit

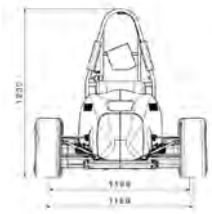
MÜNCHEN
University of Applied Sciences München

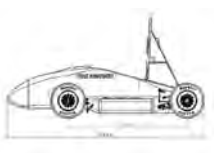
The Formula Student Racing Team of the University of Applied Sciences was founded in 2005 and participates at the FS events since 2006. Actually the team consists of 80 members of many different faculties such as vehicle technology, mechanical engineering, electrical engineering or business studies. Professors act for our interests towards the university and support us. Our aim is to create a car which represents our team, the university and our sponsors. The reason why we take part in FS events is to demonstrate our skills and abilities, share experiences and to increase our knowledge. In addition we want to know how our work behaves in practice, be present beyond the borders of Germany, represent our sponsors and acquire new supporters. We`re also interested in comparing us with other racing teams, enjoy having fun with friends and other persons from all over the world and get connected to them.

Car E110 Pit E13

Germany







FRAME CONSTRUCTION

MATERIAL

OVERALL L / W / H (mm) 2540 / 1335 / 1230

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1150 / 1100

WEIGHT WITH 68kg DRIVER (Fr / Rr) 109 / 134

SUSPENSION rear and front pullrod horizontally oriented spring and damper. Adjustable in compression and in reb

TYRES (Fr / Rr) 18 x 6 10", R25B& LCO front and rear

WHEELS (Fr / Rr) 6 x 10 Keizer (Alu) + self-made rim star/ 6 x 10 Keizer (Alu) + self-made rim star

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / rear / 60kW each

MOTOR TYPE Enstroj/EMRAX

MAX MOTOR RPM 4000 each

MOTOR CONTROLLER 3 phase IGBT inverter

MAX SYSTEM VOLTAGE 378V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiCoO2 /

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:2.04 /

DRIVE TYPE

DIFFERENTIAL

COOLING liquid, behind driver

BRAKE SYSTEM Ø190 mm od rotors front/ Ø180 mm od rotors rear. 4 piston caliper each

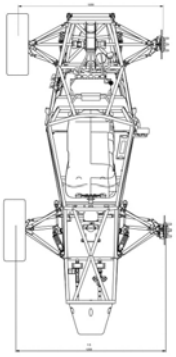
ELECTRONICS

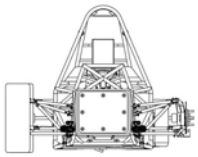
ODENSE
University of Southern Denmark

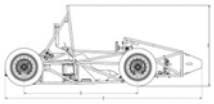
Car E11 Pit E40

Denmark

The current car is the 6th generation racing car from SDU Vikings. It has been developed by a team of 21 mechanical students and 19 electronic students. The new features on this years car includes regenerative braking along with a sophisticated traction control system in order to „tame" the 750 Nm that the motor produces. One of the major changes compared to last years car, has been to switch from LiFePo4 batteries to Li-Po, which has a higher energy density. This along with the regenerative braking makes it possible to reduce the total weight of the car and make it more competitive. That is also why the main objective for the Viking VI is to end up in the top 10 of the electrical cars. We are convinced that this year's car is most competitive car so far, so we are very much looking forward to the competition.







FRAME CONSTRUCTION One piece tubular spaceframe

MATERIAL 25CrMo4

OVERALL L / W / H (mm) 2725 / 1428 / 1073

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1535 / 1250 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 146

SUSPENSION Double unequal length A-Arms. Pull rod actuated Öhlins TTX 25 FSAE, horizontally oriented.

TYRES (Fr / Rr) 20.5x7.0-13 Hoosier R25B

WHEELS (Fr / Rr) 13" x 6" Keizer 3pc. AL-Mg

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear / 100 kW

MOTOR TYPE Axial-flux, permanently excitated, Yasa-750

MAX MOTOR RPM 2500

MOTOR CONTROLLER Sevcon Gen 4 Size 8

MAX SYSTEM VOLTAGE 403V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5.7 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1 / 1

DRIVE TYPE Direct

DIFFERENTIAL Limited Slip Differential

COOLING Side pod mounted oil radiator

BRAKE SYSTEM Full floating hub mounted Ø240mm custom discs, 4 piston calipers, adjustable brake bias

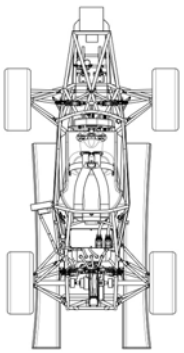
ELECTRONICS Student designed/built FPGA based Ethernet Powerlink network, Datalogging - 500 Hz, Live-telemetry

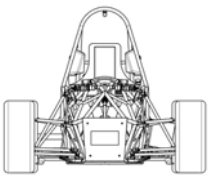
OSNABRÜCK
University of Applied Sciences Osnabrück

Car E7 Pit E37

Germany

The Green Garnet is the third full electric car from the Ignition Racing Team electric. With a team of about 35 enthusiastic students we use the opportunity to improve a lot since the forerunner of 2012. For this year's development the design goals of overriding importance were the improvement of the efficiency and a more compact and maneuverable car. Based on experiences of recent years we had the aim to build a sophisticated car with great capabilities of development. Another important goal was a further weight reduction of the vehicle. We strived for a mass reduction of 7kg in comparison to the last year's car. In addition to the mass reduction we wanted to make the car more compact which was realized by the reduction of the wheelbase by 90mm. We would like to thank our University, our Sponsors and everyone who supported us building this car and we are looking forward to an exciting FSE competition.





FRAME CONSTRUCTION Tubular Steel Space Frame

MATERIAL 25CrMo4

OVERALL L / W / H (mm) 2928 / 1460 / 1202

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1535 / 1241 / 1195

WEIGHT WITH 68kg DRIVER (Fr / Rr) 139 / 168

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 20.5x7 - 13; Hoosier R25B / 20.5x7 - 13; Hoosier R25B

WHEELS (Fr / Rr) 7.0x13; 10.0mm offset; 2 pc Al Rim / 7.0x13; 10.0mm offset; 2 pc Al Rim

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear Center / 100 kW

MOTOR TYPE PMSM - YASA 750

MAX MOTOR RPM 2000

MOTOR CONTROLLER Sevcon Size4 Gen8

MAX SYSTEM VOLTAGE 420V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5,9 KWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1,86:1 / -

DRIVE TYPE Planetary Gear Drive

DIFFERENTIAL Limited Slip Differential

COOLING Oil cooling system with side mounted radiator

BRAKE SYSTEM 4-Disk system; self developed rotors with 220mm diameter; adjustable brake balance

ELECTRONICS Traction Control; Wiring harness sealed to IP67; 2xCAN-Bus

PATRAS
University of Patras

Car E86 Pit E15

Greece

With the powertrain being completely new grounds for the team, UoP4e is an evolution of the designs developed over the last years, a carbon fiber monocoque chassis, combined with lightweight but powerful motor and 10" wheels, focused on being simple, reliable and adjustable. Keeping in mind the targets set at the very beginning of the design process, the team refined neuralgic areas to aid the vehicles' overall performance. UoP4e is based on the 3rd generation of the CF monocoque chassis and is powered by a single YASA 750 electric motor and a self-developed battery pack with Li-Po cells. Torque is transmitted by a modified Drexler LSD, placed inside the motor, to the 10" aluminum wheels. A number of sensors signals are logged and transmitted over WiFi in real time. Adjustable Steering wheel and seat padding improve driver's ergonomics. We would like to thank the University of Patras and our sponsors for their support on tackling this design and motorsport challenge.

FRAME CONSTRUCTION 2-piece carbon fiber monocoque sandwich structure

MATERIAL 200gr/m^2 carbon fiber plain weave, AIREX C70.75 rigid Cross-linked 75 kg/m^3, Balsa wood 200kg/m^3

OVERALL L / W / H (mm) 2630 / 1430 / 1135

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1240 / 1220

WEIGHT WITH 68kg DRIVER (Fr / Rr) 123 / 162

SUSPENSION Double unequal length A-Arm. Pull/Push rod actuated (F/R), vertically oriented spring and damper

TYRES (Fr / Rr) 18x6-10 LC0 Hoosier slicks/19.5x7.5-10 hoosier R25B

WHEELS (Fr / Rr) 6x10in./7x10in (F/R), Single lug 3 piece design, 46mm offset, Al Rim, AL7075 center

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear, on center of car / 85kW

MOTOR TYPE YASA-750, Permanent Magnet Asychronous

MAX MOTOR RPM 2000

MOTOR CONTROLLER Sevcon GEN4 Size 8 AC Motor control

MAX SYSTEM VOLTAGE 403V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 6,45kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:1 / 1:1

DRIVE TYPE Direct Drive, motor integrated diff.

DIFFERENTIAL Drexler FSAE LSD, 60Nm preload, 60%/40% lockup

COOLING Sidepod mounted 13row radiator, Electric Pump, 2x120 fans, Opticool coolant, 0,4bar relief valve

BRAKE SYSTEM 4-Disk system, ISR 180mm floating rotors, ISR 4pot calipers, AP Racing pull type MC, adj. balance

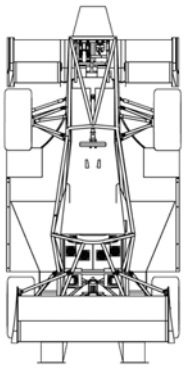
ELECTRONICS Motec ADL3 data logger/ECU, CAN bus network, WiFi data transmission, AWG 5/17/20/22 wiring

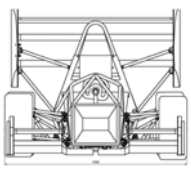
PORT ELIZABETH
Nelson Mandela Metropolitan University

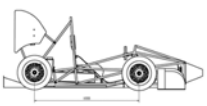
Car E27 Pit E38

South Africa

Nelson Mandela Bay, located on the sunshine coast at the southern tip of Africa, is home to NMMU racing which was formed with the goal of being the first African team to design, build and race a Formula student electric vehicle. Formula for success has been the motto that we have adopted throughout the construction of DiBaGT. Our team has worked long and hard to deliver our second car, our first electric car. The team's main goal with the second car is to start competing against other fellow teams. We believe we may have a few tricks up our sleeve and given a lot of time to developing the various systems on the car.







FRAME CONSTRUCTION Tubular steel space frame with composite stress panels

MATERIAL 4130 and Carbon Fibre

OVERALL L / W / H (mm) 3060 / 1466 / 1230

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1555 / 1214 / 1172

WEIGHT WITH 68kg DRIVER (Fr / Rr) 165 / 153

SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and damper (coil-over).

TYRES (Fr / Rr) Continental, 205/510 R13

WHEELS (Fr / Rr) Magnesium Alloy, BBS, 8.0x13

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear / 100kW

MOTOR TYPE YASA 750 BLDC Motor

MAX MOTOR RPM 2400 RPM

MOTOR CONTROLLER Sevcon Gen4 Size8

MAX SYSTEM VOLTAGE 400

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY Lithium-Polymer / 6.9kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:1 /

DRIVE TYPE Direct Drive

DIFFERENTIAL

COOLING Rear Mounted 3L radiator with electric fan

BRAKE SYSTEM 4-Disk system, student made solid disks (Benox), Wilwood calipers, 250mm

ELECTRONICS Self-developed active drag reduction system, self-developed battery management system

RAVENSBURG

Baden-Württemberg Cooperative State University Ravensburg

Car E10 Pit E11

Germany

Global Formula Racing is the first international collaboration of its kind in the history of both, the US-based Formula SAE and the EU-based Formula Student programs. The former BA-Racing-Team from Duale Hochschule Baden-Württemberg (DHBW) and the Beaver Racing team from Oregon State University (OSU) have combined forces to compete as a single entity 2010. The two universities share physical and intellectual resources by using advanced communication-technology to create a highly competitive vehicle. Design, manufacturing, and testing occur simultaneously at both schools. The supply chain management is unique in Formula Student and, as well as the English language, the team language, very important for cross-border cooperation. The 2010 car laid down a foundation, that since, is being continuously improved. In 2013 we will, for the third time, build a combustion car at OSU and an electrical car at DHBW. In 2013, we will reconfirm our successful seasons from the past two years.

FRAME CONSTRUCTION Full Monocoque / Steel Roll Hoops

MATERIAL Toray T700H-6k PW/3900 Plain Weave, Hexcel nomex honeycomb, 1020 DOM mild steel

OVERALL L / W / H (mm) 3040 / 1330 / 1400

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1555 / 1120 / 1120

WEIGHT WITH 68kg DRIVER (Fr / Rr) 116 / 142

SUSPENSION Double unequal length A-Arm. Pull and push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 6/18.0-10 LC0 Hoosier

WHEELS (Fr / Rr) 6/18.0-10 LC0 Hoosier

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear / 90

MOTOR TYPE ZF EVD1

MAX MOTOR RPM 22000

MOTOR CONTROLLER ZF PUM-X45

MAX SYSTEM VOLTAGE 403

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiCoO2 / 7,1 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:4 / 1:2,75

DRIVE TYPE 520 non-O-ring chain

DIFFERENTIAL Drexler clutch pack limited slip with custom end caps

COOLING Two passive air cooled radiators located in a scoop on the right

BRAKE SYSTEM 4-Disk system, custom floating rotors 168mm (FR), 163mm(RR), Brembo (FR) and AP (RR) calipers

ELECTRONICS Wiring Harness in Aerospace Std, Live-Telemetry System, Modular Battery Design, Self-designed CCU

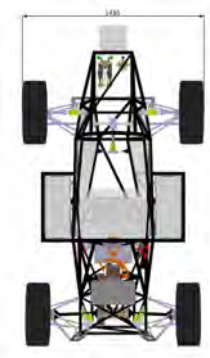
SAARBRÜCKEN

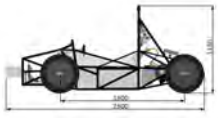
Saarland University

Car E25 Pit E12

Germany

The Saar Racing Greenteam from the Saarland University is a team of young and dedicated students from many different fields of study. Founded in 2011, we now proudly present our second electric race car, built in cooperation with the Saar Racing Team from the UAS Saarbrücken. Our car has a tubular space frame that has been optimized in lightweight in comparison to our first electric race car. As energy storage we use an accumulator with LiFePo4 cells supervised by a self-developed Accumulator Management System. We use an EMRAX Enstroj Motor with a maximum power of 85kW and the for electrical motors typical high torque of 240Nm throughout the entire rpm range. We thank our sponsors for making it possible to compete in this event with our race car.





FRAME CONSTRUCTION Tubular Space Frame with glass fibre floor panels and firewalls

MATERIAL Steel for precision application E255 and 25CrMo4

OVERALL L / W / H (mm) 2750 / 1400 / 1127

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1250 / 1200

WEIGHT WITH 68kg DRIVER (Fr / Rr) 140 / 145

SUSPENSION unequal length A-arms, push-rod actuated Oehlins TTX 25 damper units

TYRES (Fr / Rr) Hosier 10.5x7.0-13 R25B / Hoosier 10.5x7.5-13 R25B

WHEELS (Fr / Rr) Braid Formrace 13

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear / 85 kW

MOTOR TYPE Enstroj Emrax

MAX MOTOR RPM 3000

MOTOR CONTROLLER Piktronik SAC41

MAX SYSTEM VOLTAGE 324

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePo4 / 5.184 kW

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:2 / n/a

DRIVE TYPE Chain drive, 520 - 5/8

DIFFERENTIAL Drexler Motorsport Formula Student Limited Slip Differential, adjustable, 3 setups

COOLING Rear mounted radiator with thermostatic controlled electric fan

BRAKE SYSTEM Tailor made rotors of professional manufacture, 220 mm dia.

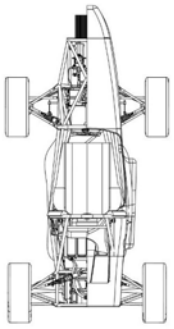
ELECTRONICS Steering wheel with resistive touchscreen, self-developed AMS, lightweight GLVS battery with BMS...

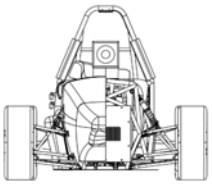
SIEGEN
University of Siegen

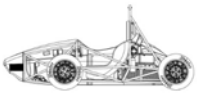
The Speeding Scientists Siegen built their fifth formula student race car this year. It is called the “s3-13e” and is moreover their third electric car. The start of the designing was in September 2012 and ended in January 2013. After a four month’s manufacturing and assembling phase, the car was presented to public on May, 29 2013. With a revised transmission, a shrunk accumulator package, a lighter frame and a desired total weight of 230kg the s3-13e will achieve a good performance on track and the new carbon fiber bodywork will care for an impressive appearance.

Car E99 Pit E6

Germany







FRAME CONSTRUCTION Steel space-frame construction with round and square tubes

MATERIAL E235 + CR1S2 frame tubing / Carbon fiber sandwhich floor panel / Carbon fiber bodywork

OVERALL L / W / H (mm) 2768 / 1424 / 1230

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1620 / 1200 / 1155

WEIGHT WITH 68kg DRIVER (Fr / Rr) 130 / 158

SUSPENSION Double wishbone, push rod actuated spring and damper, adjustable in compression and rebound range

TYRES (Fr / Rr) 205x70 R13, Hoosier R25B

WHEELS (Fr / Rr) 7.0x13, 22mm offset, 1 pc OZ Racing Aluminium Rim

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right and Left / 40kW per Motor

MOTOR TYPE VUES AFW507M

MAX MOTOR RPM 9000

MOTOR CONTROLLER KEB Combivert H6

MAX SYSTEM VOLTAGE 600V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo - aluminium / 6,4 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:7,03 /

DRIVE TYPE two stage spur gear pairing gearbox

DIFFERENTIAL

COOLING one radiator beyond the drivers shoulders with circuits for each motor and frequency converter

BRAKE SYSTEM 4 disk system, self developed rotors with 240 / 220 (F/R) mm diameter, adjustable brake balance

ELECTRONICS Self developed, 3rd generation model-based drive control system, system sealed to IP67

STUTTGART
Baden-Württemberg Cooperative State University Stuttgart

200 kg - 600V – 1000 Nm these figures should give you an idea of the eSleek13, the fifth and latest development of DHBW Engineering Stuttgart. Throughout the design process our main goals were to create a high performance, lightweight concept to perfectly match the demands of the formula student competition. Equipped with two highly efficient motors our interpretation of a formula style racecar has a total system power of 66 kW (90 hp) resulting in an impressive power to weight ratio of 2.2 kg/hp. The Chassis, which now consists of a hybrid structure made of a carbon fiber monocoque and a tubular steel frame is undoubtedly the most significant innovation to this season’s eSleek. This gave us the opportunity to develop great know how in the field of carbon fiber reinforced plastic and offers great potential for eSleek14. We would like to thank FSG and our sponsors for making it possible to participate in this great event and wish all teams the best of luck for the competition!

Car E44 Pit E4

Germany

FRAME CONSTRUCTION Hybrid frame with CFRP monocoque in front and tubular steel space frame in the rear

MATERIAL CFRP, aluminium honeycomb / 25CrMo4 steel space frame

OVERALL L / W / H (mm) 2825 / 1400 / 1150

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1150 / 1100

WEIGHT WITH 68kg DRIVER (Fr / Rr) 134 / 134

SUSPENSION Double unequal length A-Arm. Pull rod. actuated spring / damper. Adj. Roll bar.

TYRES (Fr / Rr) 20.5x7.0 (R13), R25B, Hoosier / 20.5x7.5 (R13), R25B, Hoosier

WHEELS (Fr / Rr) 7x13, Mg Rim, 22mm neg. offset / 7x13, Mg Rim, 22mm neg. offset

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 33 kW

MOTOR TYPE AMK DT5-20 / perm.-magnet synchronous motors

MAX MOTOR RPM RR, RL: 16.000

MOTOR CONTROLLER AMK KW26 S

MAX SYSTEM VOLTAGE 600V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5,3kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:13,30 /

DRIVE TYPE two stage gearbox

DIFFERENTIAL fully adjustable electronic software differential

COOLING central mounted radiator without fan

BRAKE SYSTEM 4-Disk system, self developed rotors, front 230mm, rear 205mm, adjustable brake balance

ELECTRONICS Torque Vectoring, Traction Control, Model-Driven SW, Live-Telemetry System

STUTTGART
University of Stuttgart

Car E26 Pit E1

Germany

After long days and nights in our workshop the E0711-4 is ready for competition. We spent a lot of time to design the new race car, which is absolutely able to compete. This year we designed a four-wheel-drive, optimized the aerodynamics and downsized to 10" rims. Our self-made control is the brain of the car, equipped with software for torque vectoring, traction control. For the mono-coque we continued our sandwich-technology and decided for a full monocoque. Consequent lightweight-design in every part of the car lead to cutting the 200kg-line, saving about 40kg to the last years car "E0711-3". The most noticeable innovation is our aerodynamic package which includes wings at the front and the rear. Now it is time for the E0711-4 to show its many improvements on the track!

FRAME CONSTRUCTION Full composite monocoque

MATERIAL Carbonfiber Prepregs with aluminum honeycombs

OVERALL L / W / H (mm) 2900 / 1418 / 1102

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1210 / 1160

WEIGHT WITH 68kg DRIVER (Fr / Rr) 126 / 132

SUSPENSION Double unequal length A-arm. Pushrod actuated ZF Sachs Formula Student damper

TYRES (Fr / Rr) 190,5 x 53 R10 Hoosier R25B / 190,5 x 53 R10 Hoosier R25B

WHEELS (Fr / Rr) 7x10; 3 pc Al/Carbon Fibre; Offset 63 m / 7x10; 3 pc Al/Carbon Fibre; Offset 63 m

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 4 / front outside,rear inside / Front: 20kW , rear: 26kW

MOTOR TYPE AMK, DT5-14, AMK DT5-26

MAX MOTOR RPM Front: 14000, Rear: 11000

MOTOR CONTROLLER 4 x AMK KW26

MAX SYSTEM VOLTAGE 600

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 6,18

TRANSMISSION RATIO (PRIMARY / SECONDARY) F:1:7,4 / R:1:6,5

DRIVE TYPE 4WD

DIFFERENTIAL Torque Vectoring with all four motors

COOLING 1 radiator on each side

BRAKE SYSTEM 4-Disk system, self developed rotors with 190mm diameter, adjustable brake balance

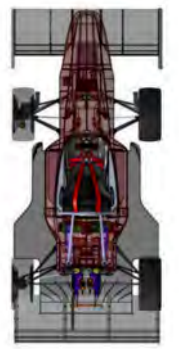
ELECTRONICS self-developed AMS and control unit, Dash-boardDisplay,

TURIN
Polytechnic University of Turin

Car E64 Pit E39

Italy

SquadraCorse of Politecnico di Torino was founded in 2004 and untill 2011 has manufactured internal combustion engines pro-totypes. After a short but successful experience in 2010 with a hybrid vehicle, finally in 2012 the team switched from the internal combustion engine to the full electric propulsion. When last year the SC12e came to life it was the first electric prototype ever produced by an Italian Formula SAE team and after the successful season the team carried on the electric project with the SCR. The 2013 team is interdisciplinary and international as always but the organization after the passage to an electric vehicle, has been revised giving more importance to the electrical and electronic divi-sion. Several improvements have been adopted for the new vehicle to increase the perfomance and the efficiency; the most important one is the transition from a steel tubular chassis to a carbon fiber monocoque. The SCR has two independent motors with a new double stage transmission.



FRAME CONSTRUCTION One piece Composite monocoque with anti rollbar structures

MATERIAL Carbon fiber with Aluminium Honeycomb core / Steel Tubular anti rollbars

OVERALL L / W / H (mm) 3194 / 1433 / 1472

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1620 / 1210 / 1210

WEIGHT WITH 68kg DRIVER (Fr / Rr) 133 / 157

SUSPENSION Double unequal length A-Arms. Spring-damper: front pull rods, rear push rods

TYRES (Fr / Rr) 530/180- R13

WHEELS (Fr / Rr) 7.0x13, OZ magnesium wheel, 43mm offset

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / rear right, rear left / 2x60 kW

MOTOR TYPE Magneti Marelli TMG low

MAX MOTOR RPM 16000

MOTOR CONTROLLER Magneti Marelli

MAX SYSTEM VOLTAGE 400V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 6.9kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:9 / n/a

DRIVE TYPE Bevel and spur gears system

DIFFERENTIAL n/a

COOLING back mounted radiator

BRAKE SYSTEM 4 titanium rotors, adjustable brake balance

ELECTRONICS Self developed control units

WIESBADEN

University of Applied Sciences RheinMain

Germany

Car E104 Pit E28

FRAME CONSTRUCTION Steel Spaceframe

MATERIAL S355JR

OVERALL L / W / H (mm) 3018 / 1422 / 1080

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1575 / 1219 / 1181

WEIGHT WITH 68kg DRIVER (Fr / Rr) 115 / 200

SUSPENSION Double unequal length A-Arm. Pull rod actuated almost horizontally oriented spring and damper

TYRES (Fr / Rr) 20.5x7.0-13 R25B C2500 Hoosier

WHEELS (Fr / Rr) 20.5x7.0-13 R25B C2500 Hoosier

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 1 / Rear, middle / 100 kW

MOTOR TYPE YASA 750

MAX MOTOR RPM 2000

MOTOR CONTROLLER Sevcon Evolution 5

MAX SYSTEM VOLTAGE 345V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiFePo4 / 6,9 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:1,44 / N/A

DRIVE TYPE Electric motor with a planetary gear

DIFFERENTIAL Drexler formula student differential

COOLING One radiator mounted on the left side of the car with air tunnel integrated under the body.

BRAKE SYSTEM 4-Disk system, self developed rotors with 232mm and 220mm diameter, adjustable brake balance

ELECTRONICS self designed accumulator and BMS as well as HMI, wiring harness sealed to IP66 easily removable

You know us! We are the team with the yellow racing cars! With the experience of the past two seasons of building electric race cars, we start into the new season. Powered by a brushless DC engine, the SPR13E features programmable and adapted power electrics. The multi-disc, self-locking, differential causes reduced revolutions per minute and an increased maximum torque up to 1100 Nm. The battery and the battery management system are both self-developed. Double wishbone suspension made of stainless steel. The dampers are actuated by pushrods. Complete re-design of uprights and wheel hubs. Tyre and rim data are better used for simulation purposes as well as final suspension setup. Increased use of carbon fiber parts. FE-analysis of entire frame. TiG-welded space frame made of E355. Weight loss of 10 kg. Better center of gravity by centering battery packs. Our first lightweight aeropack will gives us as much downforce as possible while not adding too much drag.

WOLFENBÜTTEL

University of Applied Sciences Ostfalia

Germany

Car E35 Pit E21

FRAME CONSTRUCTION tubular space frame front and rearwith bolt mounted rear module

MATERIAL E355 round tubin with 10-26mm dia, 1-2.5 wall thickness

OVERALL L / W / H (mm) 2758 / 1452 / 1043

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1600 / 1260 / 1240

WEIGHT WITH 68kg DRIVER (Fr / Rr) 161 / 197

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 20.5x7 - 13 R25B Hoosier

WHEELS (Fr / Rr) 20.5x7 - 13 R25B Hoosier

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / rear / each 38kW

MOTOR TYPE SEW

MAX MOTOR RPM 10000

MOTOR CONTROLLER modified industrial

MAX SYSTEM VOLTAGE 504

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiCoO2 / 8 kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1 : 8 / -

DRIVE TYPE spur gear

DIFFERENTIAL electric differential

COOLING passive cooling system with radiator

BRAKE SYSTEM 2 discs front 226mm OD 2 discs rear 210mm OD, 4 pistons callipers front, 2 pistons callipers rear

ELECTRONICS IP67 harness, self-developed control units, self designed measuring system

Wob-racing is the Formula Student Team of the University of Applied Sciences Ostfalia in Wolfsburg. Founded in 2003, this year we celebrate our 10-Year anniversary. At the same time we present our tenth car, the WR09-E. This electrically driven car is our 3rd with this drive concept, having built seven combustion cars before that. Right now our team consists of about 35 members, who designed, built and tested our newest prototype. The team is divided into a technical and a business part, both sections headed by a project leader. To support those two, the construction and production coordinator helps two keep the deadlines at the back of our minds and supports our team members. The WR09-E has a self-developed electronic system (e.g. telemetry, measuring unit), uses adapted industry components and has an advanced chassis. After two years of using the distinctive skin design wob-racing developed in 2010, we decided to take on to something new altogether this year. See you in Hockenheim!

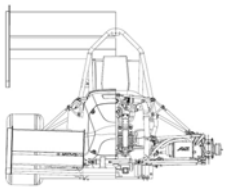
ZÜRICH

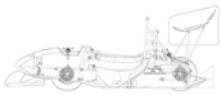
Swiss Federal Institute of Technology Zurich

Founded in 2007, the AMZ is still the „Swiss National Team“ of Formula Student. Students of several universities come together to represent Switzerland. After two successful seasons in 2011 and 2012, the team improved the whole car, screw by screw. Keypoints of „julier“ are a very lightweight single-piece CFRP monocoque (13kg) and four self-developed motors(AMZ M3) which are placed in each wheel. The suspension layout consists of 10inch carbon rims, a self-designed steering system and tailor made air springs. After the successful introduction of the aerodynamics in 2012, the new car features a completely new package to further improve the performance. We are looking forward to compete in FSE 2013!

Car E33 Pit E2

Switzerland





FRAME CONSTRUCTION Single Piece CFRP Monocoque

MATERIAL Prepreg carbon (twill and unidirectional) with various thickness aluminum honeycomb

OVERALL L / W / H (mm) 2942 / 1408 / 1169

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1550 / 1200 / 1160

WEIGHT WITH 68kg DRIVER (Fr / Rr) 113 / 134

SUSPENSION Double unequal length A-Arm. Push rod actuated spring / damper. Adj. Rollbar

TYRES (Fr / Rr) Hoosier 18.0 x 6.0-10

WHEELS (Fr / Rr) 6.5 inch wide, 10inch Single Piece CFRP

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 4 / One at every wheel / 4*37kW

MOTOR TYPE AMZ M3

MAX MOTOR RPM 17000rpm

MOTOR CONTROLLER Lenze Schmidhauser Dual DCU

MAX SYSTEM VOLTAGE 470V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 6.22kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:11.68 / -

DRIVE TYPE 1.5-stage planetary gear

DIFFERENTIAL none

COOLING Two Sidepod mounted radiators, independent cooling cycles, one pump each

BRAKE SYSTEM Front: AP-Racing CP 4227 (4pod), Rear: AP-Racing CP 4226 (2pod), Steel discs (190mm), hubmounted

ELECTRONICS Self-programed VCU and Telemetry, adjustments and readouts on steering wheel and dashboard

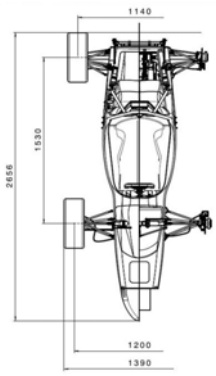
ZWICKAU

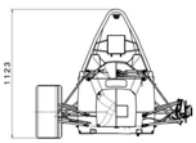
University of Applied Sciences Zwickau

„Innovation meets Tradition” - if you look at Zwickau’s automotive history you can easily find out why we picked out this slogan for our team. Zwickau is the birth place of Horch and Audi, and furthermore in the 1930s, it was the domicile of the Auto Union race cars which dominated the race tracks in Europe. Almost 70 years later our WHZ Racing Team was founded. Now in 2013, we bring our fourth full electric car to the tracks. The FP713e is a further development of last year’s successful cars, concentrating on lightweight, packaging and reliability. We created a fast and dynamic car with two independent motors and self-developed electronic components.

Car E96 Pit E32

Germany





FRAME CONSTRUCTION CFRP monocoque with integrated energy storage container

MATERIAL sandwich construction with prepreg carbon and aluminum honeycomb

OVERALL L / W / H (mm) 2656 / 1390 / 1123

WHEELBASE (mm) / TRACK (Fr / Rr) (mm) 1530 / 1200 / 1140

WEIGHT WITH 68kg DRIVER (Fr / Rr) 109 / 118

SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper

TYRES (Fr / Rr) 18.0x6.0-10 R25B Hoosier

WHEELS (Fr / Rr) 6,5

NUMBER OF MOTORS / LOCATION / MAX MOTOR POWER 2 / Rear Right, Rear Left / 2x 40 kW

MOTOR TYPE RR, RL: self-designed

MAX MOTOR RPM RR, RL: 12000

MOTOR CONTROLLER Industrial, adapted to the car

MAX SYSTEM VOLTAGE 600V

ELECTRODE MATERIALS / COMBINED ACCUMULATOR CAPACITY LiPo / 5,3kWh

TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:10,8 / -

DRIVE TYPE two-stage spur gearbox

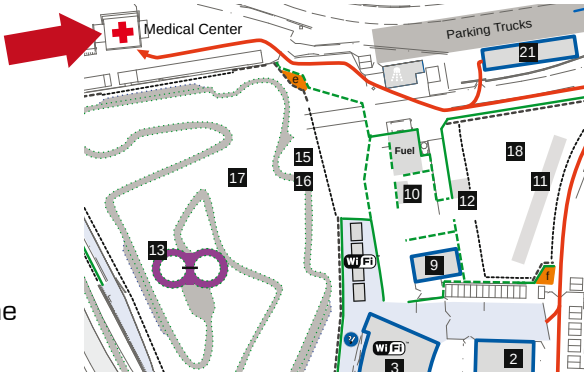
DIFFERENTIAL self developed vehicle dynamic drive control (VDDC) with torque vectoring

COOLING radiator mounted centrally behind the driver

BRAKE SYSTEM Cast iron, disc hub mounted, front 200mm, rear 170mm dia

ELECTRONICS Vehicle Dynamic Drive Control (VDDC), BMS, Wiring Harness sealed to IP67, WLAN telemetry system

EMERGENCY INFORMATION



Minor Injury
Medical Centre:
Please accompany the injured person to the Medical Centre. Emergency aid is provided there.
The Medical Centre is occupied each day round-the-clock.

Severe Injury
Contact someone with a two-way radio:
Every Official and Security has two-way radio. Ask them to call the Medical Centre or an ambulance on channel 11.

Call an ambulance:
Call an ambulance yourself if someone is severely injured and needs urgent help. The Emergency Number for every phone and mobile phone is **112**.

During dynamics:
On Saturday and Sunday an ambulance is on site during the dynamic events. To contact them ask someone with a two-way radio (Official, Security) to call them.

Hospital:
Main Hospital, Kreiskrankenhaus (Schwetzingen), Bodelschwinghstrasse 10, 68723 Schwetzingen
phone: +49 (0) 6202 / 84-30

Emergency Numbers

112

In case of an emergency beyond competition times call 112. This number works with each phone, also with mobile phone or coin-operated telephone as international GSM-standard. It is alway free of charge.

Officials

Pit Marshal Konrad Paule:	+49 (170) 3043619
Pit Marshal Sebastian Seewaldt:	+49 (151) 68184825
Event Control Daniel Ahrens:	+49 (172) 5328399
Event Control Tim Schmidt:	+49 (176) 24316857

(In case of an emergency please call one of them, no matter what time it is.)

Emergency Call Contents

The emergency control centre will ask you some questions to ensure proper help for you. To support you at your call, here are some standard questions and some hints for your answers in English and German.

Who is calling? *(Wer ruft an?)*
Say your name and your telephone number for callbacks. Digits in German: 0 (null), 1 (eins), 2 (zwei), 3 (drei), 4 (vier), 5 (fünf), 6 (sechs), 7 (sieben), 8 (acht), 9 (neun)

Where did it happen? *(Wo ist es passiert? / Wo ist es geschehen?)*
the event site has the adress "Hockenheimring, Sachshaus, Am Motodrom", make it more precise!:
pit lane (Boxengasse), dynamic area (Fahrerlager);
the adress for campsite C2 near the Motodrom Hotel " Hockenheimring, Zeltplatz C2 beim Motodrom Hotel"
and for campsite C3 on the other site of the highway "Hockenheimring, Zeltplatz C3 an der Continental Straße"

What happened? *(Was ist passiert? / Was ist geschehen?)*
accident (Unfall), traffic accident (Verkehrsunfall), fire (Feuer), fall (Sturz), explosion (Explosion)

How many people are affected? *(Wie viele Personen sind betroffen?)*
1 (eins), 2 (zwei), 3 (drei), 4 (vier), 5 (fünf), 6 (sechs), 7 (sieben), 8 (acht), 9 (neun), 10 (zehn)

What kind of injury has happened? *(Welche Verletzung liegt vor?)*
fracture (Knochenbruch), bleeding (Blutung), unconsciousness (Bewusstlosigkeit), burn (Verbrennung), electric shock (Stromschlag), suffocation (Ersticken), heart attack (Herzinfarkt), shock (Schock)

Don't hang up after answering these questions! Wait to hear if the control centre has further questions!

www.career.daimler.mobi

Finding new solutions to sustainable mobility.
With You.

We have a unique compass for the best path to the future of mobility – the ideas of our employees. Due to the skills of each individual and the opportunities for constant development, our teams are able to produce sustainable products and realise unconventional solutions. Not only in Research & Development, but also in areas such as Manufacturing, Logistics, Sales, Procurement, and Information Technology. This is the only way to keep on convincing our customers with automobile products of state of the art with respect to comfort, safety and fuel economy. Your road to the future starts here. With a company in which anything is possible, because you make it possible.

Apply online now at: www.career.daimler.com

DAIMLER