MAGAZINE 2017

Formula Student Germany

AN INTERNATIONAL DESIGN COMPETITION OF SKILLS, SPEED AND SPIRIT

8TH - 13TH AUGUST 2017 | HOCKENHEIM

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A special thanks goes to the numerous volunteers who contributed significantly in the realisation of the twelfth Formula Student Germany.

Editorial

2017 has come fast and furiously. The Driverless Concept event in 2016 was such a success that the FSG organisation decided to go for it and turn it into a full-blown autonomous event. As a result, this year, Formula Student Germany will be will be holding not one (Formula Student Combustion), not two (+ Formula Student Electric), but three competitions (+ Formula Student Driverless), in parallel, all with moving vehicles. A lot of excitement is being built up amongst the teams and within the industry about the new competition. The overall size of the Formula Student Germany event will however remain the same (115), with the number of slots for combustion (76 to 65) and electric cars (40 to 35) being reduced to allow for 15 new FSD slots. The question is, is this inline with what is really going on in the automotive industry?

Crossing new borders with introducing Formula Student Driverless is resulting in new challenges and new necessary skillsets. Why do we need to do this?

We have asked some of our sponsors to give us their opinion on these questions.

This years' FSG magazine will give you the details on the rules for the new driverless competition and describe the experiences one team had during the year in preparing for this new event.

We have also decided to put the 2016 Formula Student Combustion (FSC) and Formula Student Electric (FSE) winners side-by-side to see who really was the fastest and maybe understand why?

Despite the media and politics continuously trying to create walls between countries, FSG remains proud of promoting an international and equal environment. With teams and volunteers from over 26 countries, it is one of our biggest pleasures to be able to bring so many passionate people together and support them in helping them to develop their skills and give them better future career opportunities. Not only this, but the Formula Student community is still ever growing worldwide and this year we would like to inform you of the other events that will be taking place around the globe and what makes each and every one unique.

All in all, it has been another whirlwind of a year in preparing for this years event. The dedication of the volunteers and teams is what drives the existence of Formula Student and ensures its success.

I would like to thank our authors for their contribution to this years' edition of the FSG Magazine. I would also like to thank Alexandra Blei and Janin Liermann for all their patience in following up on all the mad ideas in creating this magazine.

I wish all those competing at this years' competition's the best of luck and those who are spectating a lot of fun and entertainment.

See you on the track!
Dipl.–Ing. Alia Pierce

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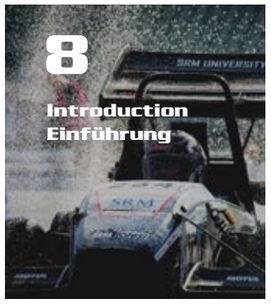

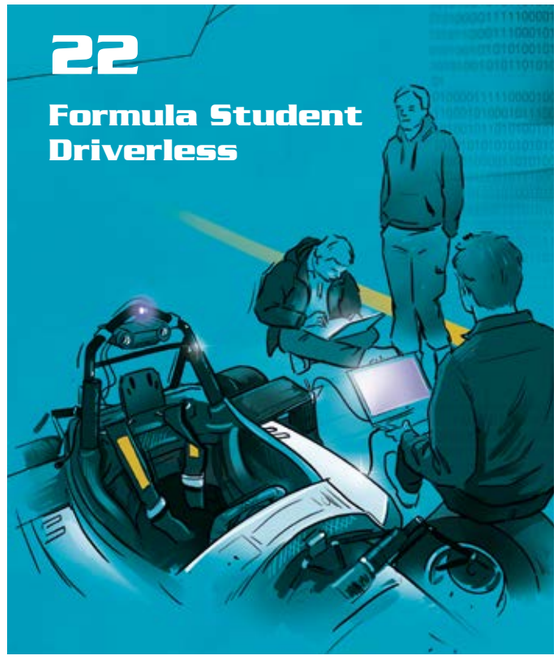

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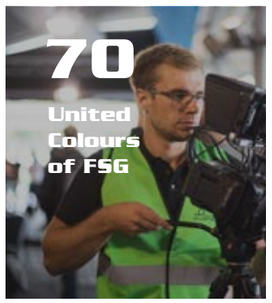
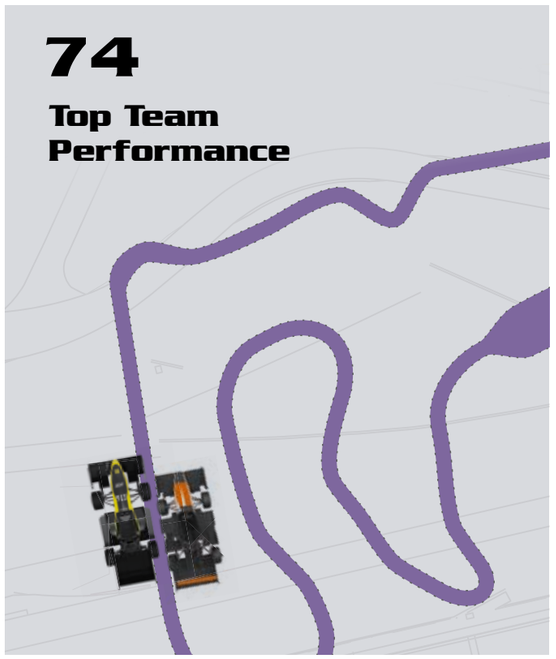




Introduction
Einführung

The Challenge

Formula Student Germany (FSG) is an international design competition for university students, based on the Formula SAE rules and guidelines. Teams from around the world have the task of designing a single-seated, formula-style car with either a combustion or electric drive train and to manufacture a functional prototype. They can then also decide if it will have autonomous features, enabling them to compete in the Formula Student Driverless competition (new for 2017!). Along with these technical aspects, the teams must develop a viable business plan and a marketing concept for batch production of the vehicle. The target group is amateur weekend racers, therefore, the racecar must not only have manageable handling and possess good acceleration and braking ability, but must also be inexpensive to buy and run. Thus, other important aspects of the vehicle that must be developed include aesthetics, ergonomics, and use of off the shelf components. The vehicle designs are judged by experts from the automobile, motorsport and supply industries. The teams are then able to score points in various static and dynamic events, which will ultimately decide the overall ranking. The team with the best overall scores from the combination of design, financial planning, marketing strategy and performance on the track will win Formula Student Germany.

Practical Experience

FSG enriches the teaching content of a course of study with challenging and practical experience in the fields of manufacturing and production, whilst not neglecting the practice-oriented requirements relating to profitability and market relevance. The aspects assessed by the competition correspond directly to the demands of the different branches of the industry for new product development, which is why they are not merely restricted to vehicle design. By working as part of an interdisciplinary team of students from different fields of study and expertise, the competitors learn first-hand how to combine the economic and technical goals of product development and at the same time, how to defend the solutions they themselves have developed and assert these against competing developments.

Herausforderung

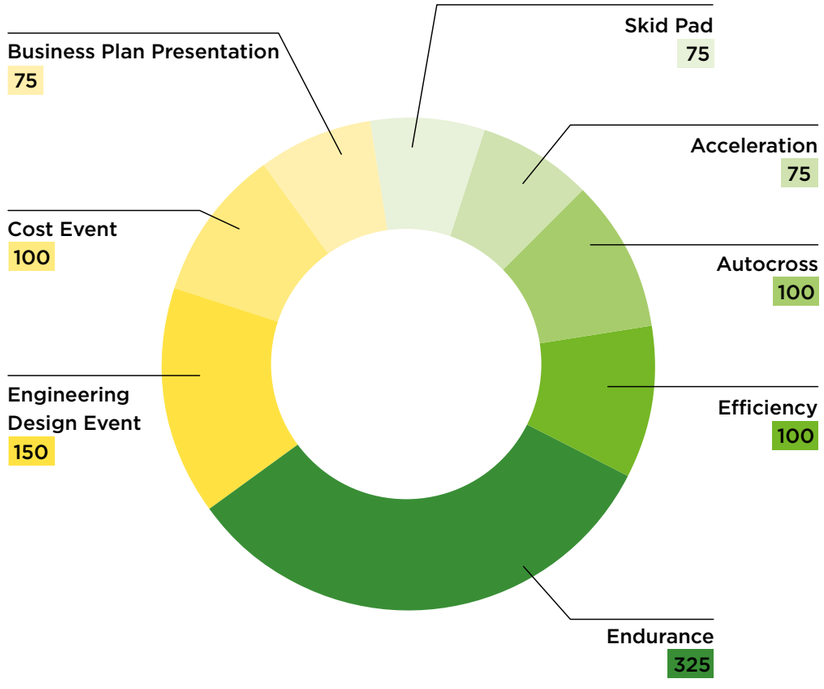
Die Formula Student Germany (FSG) ist ein internationaler Konstruktionswettbewerb für Studenten, der sich an den Formula Student Wettbewerb der amerikanischen Society of Automotive Engineers (SAE) anlehnt. Die Aufgabe für die Teams aus der ganzen Welt besteht darin, ein einsitziges Formel-Fahrzeug mit einem Elektrik- oder Verbrennermotor zu konstruieren und einen fahrfertigen Prototypen herzustellen. Zudem können sich die Teams für die Implementierung von autonomen Funktionen in ihrem Fahrzeug entscheiden, was ihnen eine Teilnahme im neuen Formula Student Driverless Wettbewerb ermöglicht. Parallel zu der technischen Entwicklung müssen die Teams einen tragfähigen Businessplan und ein Vermarktungskonzept für eine Kleinserienfertigung des Fahrzeugs entwickeln. Zielgruppe ist der nicht-professionelle Wochenendrennfahrer. Daher muss der Rennwagen nicht nur ein beherrschbares Handling, sowie gute Beschleunigungs- und Bremswerte haben, sondern auch günstig in der Anschaffung und im Unterhalt sein. Wichtige Nebenaspekte des entwickelten Fahrzeuges sind Ästhetik, Ergonomie und die Verwendung von Serienbauteilen. Bewertet werden die Fahrzeugkonzepte von Experten aus der Automobil-, Motorsport- und Zulieferindustrie. In verschiedenen statischen und dynamischen Disziplinen können die Teams wichtige Punkte sammeln, die letztlich über die Gesamtplatzierung entscheiden. Den Sieg der Formula Student Germany erringt das Team mit dem besten Gesamtpaket aus Konstruktion, Finanzplanung, Verkaufsargumentation und Rennperformance.

Praxisnahe Erfahrung

Die FSG bereichert die Lehrinhalte des Studiums um herausfordernde und praktische Erfahrungen in den Bereichen Konstruktion und Fertigung, ohne dabei die praxisrelevanten Voraussetzungen in Bezug auf Wirtschaftlichkeit und Marktrelevanz zu vernachlässigen. Die im Wettbewerb abgefragten Aspekte entsprechen den Anforderungen verschiedener Industriebereiche hinsichtlich Produktneuentwicklungen und sind sich daher nicht nur für den Fahrzeugbau anwendbar. Durch die Arbeit in einem interdisziplinären Team aus Studenten verschiedener Studien- und Fachrichtungen lernen die Teilnehmer, die wirtschaftlichen und technischen Ziele einer Produktentwicklung in Einklang zu bringen und dabei ihre selbst entwickelten Lösungen zu verteidigen und gegenüber konkurrierenden Entwicklungen durchzusetzen.

An International Design Competition

Ein internationaler Konstruktionswettbewerb



There are 1000 points to be gained in 3 static and 5 dynamic disciplines.

In den 3 statischen und 5 dynamischen Disziplinen können insgesamt 1000 Punkte erreicht werden.

Formula Student Germany is an engineering design competition for students. Students work together in teams to design and manufacture a prototype racecar, based on a hypothetical manufacturing contract. In order for the competing teams to be compared, their designs, plans and cars are judged by experts. Each team has the chance to win in total a maximum of 1,000 points over the course of three static events, four dynamic events and through proving the efficiency of their car. The team with the best overall combination of design, track performance, financial planning and marketing strategy will be the winner of FSC/FSD/FSE. In theory it is possible to win the overall competition without being the best in (or even being eliminated from) one or more events. Similarly, teams can win the top prize in one or more of the categories and still have no chance at an overall victory.

Static Events

The Formula Student Germany competition is designed to introduce the participating students to the interdisciplinary approach of today's automotive industry. This not only includes technical understanding, but also economic and communication abilities such as presentation techniques or financial planning skills. This is why the three static events demand collaboration across the team in the areas of design and layout, construction, marketing and pricing of a product. They also require specialised expertise from different technical and financial courses of study. The teams can win up to 325 points of the possible 1000 in the three static events, and each individual event is weighted differently. A panel of experienced experts from the automobile, motorsport, and supply industries judge the performance of each team.

Die Formula Student Germany ist ein Konstruktionswettbewerb für Studenten, bei dem unter der Annahme eines fiktiven Konstruktionsauftrags der Prototyp eines Rennwagens entstehen soll. Um einen Vergleich der startenden Teams zu ermöglichen, werden die Konzepte, Planungen und Fahrzeuge von Experten bewertet. Insgesamt kann jedes Team in drei statischen und fünf dynamischen Disziplinen maximal 1000 Punkte erhalten. Den Gesamtsieg über die FSC/FSD/FSE erringt das Team mit dem besten Gesamtpaket aus Konstruktion, Rennperformance, Finanzplanung und Verkaufsargumentation. Prinzipiell kann also auch ein Team den Gesamtwettbewerb gewinnen, das in einer oder mehreren Disziplinen nicht zu den Besten zählt oder sogar ausscheidet. Auf der anderen Seite können durch dieses Bewertungssystem auch Teams einen Titel in einer oder mehreren Disziplinen erringen, obwohl sie keine Chance auf den Gesamtsieg haben. Bevor es jedoch zur Siegerehrung in den einzelnen Disziplinen geht, haben die Teams einige Hürden zu überwinden, die im Folgenden näher erläutert werden.

Engineering Design – 150 points
At the start of the engineering design competition, the students must hand in an eight-page technical description of their car. It must show both their design and how the design will be applied to their chosen construction. On the basis of this document, the members of the jury will evaluate the layout, technical design, construction and implementation of the production of the actual vehicle. Then, there will be a discussion where the teams are questioned by the judges. These discussions focus on clarifying technical details, exploring the thinking behind the chosen design, as well as the corresponding technical understanding of the students. The evaluation will not only assess the quality of the technical solution in question but also the reasons behind it.

Statische Disziplinen

Der Formula Student Wettbewerb soll die teilnehmenden Studenten an die interdisziplinäre Arbeitsweise in der Industrie heranführen. Dazu zählen nicht nur technisches Verständnis, sondern auch wirtschaftliche und kommunikative Fähigkeiten, wie z. B. Präsentationstechniken oder Kompetenzen in der Finanzplanung. Daher wird in drei statischen Disziplinen sowohl die teamübergreifende Zusammenarbeit bei Konzept, Auslegung, Konstruktion, Vermarktung und Preisung eines Produktes als auch spezielles Fachwissen aus verschiedenen technischen und wirtschaftlichen Studiengängen gefördert und abgefragt. In den drei statischen Disziplinen können die Teams maximal 325 Punkte erreichen, wobei die Einzeldisziplinen unterschiedliche Gewichtungen haben. Bewertet werden die Leistungen der Teams durch eine Jury aus erfahrenen Experten der Automobil- und Zulieferindustrie sowie dem Motorsport.

Engineering Design – 150 Punkte
Zu Beginn des Engineering Design Wettbewerbs reichen die Studenten eine achtseitige technische Beschreibung zu ihrem Fahrzeug ein, um das Konzept sowie die besondere Konstruktion darzustellen. Die Juroren begutachten auf Basis der Unterlagen das technische Konzept, die Auslegung, Konstruktionen sowie Umsetzung in der Fertigung am realen Fahrzeug. Die Teams müssen ihnen dabei zu allen Fragen in einer Diskussion Rede und Antwort stehen. In den Gesprächen geht es um die Abfrage der technischen Details, die Hintergründe für die Wahl eines Konzepts und das dazugehörige technische Verständnis. In die Bewertung fließen also nicht nur die Qualität der vorliegenden technischen Lösungen ein, sondern auch die Gründe für die gewählten Lösungen.

The top teams in the Business Plan Presentation event must present their concept on the mainstage in front of judges and the public.

Die Finalisten der Business Plan-Präsentation dürfen ihr Konzept auf der Hauptbühne vor den Juroren und Publikum vorstellen.

Cost Analysis – 100 points
Kosten und Fertigung sind für Auslegung eines Produktes ein entscheidender Faktor. Bei der Disziplin Cost Analysis and Manufacturing müssen sich die Teams mit den kalkulatorischen Größen des Fahrzeugs, seiner Bauteile und der notwendigen Fertigungsschritte auseinandersetzen und diese schriftlich in einem Cost Report festhalten. Zu den eingereichten Unterlagen müssen sich die Studenten mit ihrem Prototypen einer Diskussion mit den Juroren stellen. Bewertet werden neben der Aufbereitung und Vollständigkeit des schriftlichen Reports auch das Verständnis der Fertigungsprozesse, Stücklisten sowie die Preisbildung von jährlich wechselnden Baugruppen.

Business Plan Presentation – 75 points
The teams present their business plan for the built prototype car to potential investors or partners, who are represented by the judges. The teams present their proposal for ten-minutes. They must explain why their concept is best suited to the target group and why it is a profitable investment. A five-minute discussion and question and answer session with the judges follows the presentation. In this discipline, the content, structure and preparation of the presentation, as well as the appearance of the teams and the answers to the questions from the judges are evaluated.

Cost Analysis – 100 Punkte
Die Kosten sind für Auslegung eines Produktes ein entscheidender Faktor. Bei der Disziplin Cost Analysis müssen sich die Teams mit den kalkulatorischen Größen des Fahrzeugs, seiner Bauteile und der notwendigen Fertigungsschritte auseinandersetzen und diese schriftlich in einem Cost Report festhalten. Zu den eingereichten Unterlagen müssen sich die Studenten mit ihrem Prototypen einer Diskussion mit den Juroren stellen. Bewertet werden neben der Aufbereitung und Vollständigkeit des schriftlichen Reports auch das Verständnis der Fertigungsprozesse sowie der Gesamtpreis. Darüber hinaus müssen die Teams ein Real Case Szenario bearbeiten, in dem es darum geht, kurzfristig auf veränderte Anforderungen an das Produkt zu reagieren. Die Ergebnisse werden ebenfalls benotet und fließen in die Gesamtpunktzahl ein.

Business Plan Presentation – 75 Punkte
Mit ihrem Business Plan präsentieren die Teams einem potentiellen Investor oder Partner, vertreten durch die Judges, ihren Geschäftsplan für den gebauten Prototyp. Die Teams stellen in einem zehnminütigem Vortrag dar, weshalb ihr Konzept am besten für die Zielgruppe geeignet ist und eine gewinnbringende Investition ist. Der Präsentation folgt eine fünfminütige Diskussions- und Fragerunde mit den Juroren. Bei dieser Disziplin werden Inhalt, Aufbau und Aufbereitung des Vortrags sowie der Auftritt der Teams ebenso bewertet wie die Antworten auf die Fragen der Juroren.

Dynamic Events

Of course, the cars that the students build will not only be assessed when stationary. Their performance on the racetrack will also be put to the test. Each dynamic event tests different features of the vehicles. In addition to the maximum longitudinal and lateral acceleration, race performance, efficiency and endurance of the formula cars will be examined and evaluated. For the Acceleration, Skid Pad and Autocross events, each car starts with two drivers, each of whom is allowed two attempts. The best attempt is the one on which the car will be scored. A maximum of 675 points can be scored over the course of the four dynamic events and the efficiency event.

Acceleration – 75 points
The vehicle‘s acceleration from a standing start is measured over a 75 metre straight. In addition to traction, the correct engine design is especially important, either in terms of greater power or for the highest possible torque. The fastest cars cross the line in less than four seconds and can reach speeds of over 100 km/h by the end of the stretch.

Dynamische Diszplinen

Die von den Studenten konstruierten Fahrzeuge werden natürlich nicht nur im Stand bewertet. Sie müssen ihre Performance auch auf der Rennstrecke unter Beweis stellen. In jeder dynamischen Disziplin werden andere Eigenschaften des Fahrzeugs getestet. Neben der maximalen Längs- und Querbeschleunigung werden auch die Rennperformance, Effizienz und Haltbarkeit der Formel-Rennwägen ermittelt und bewertet. Bei den Disziplinen Acceleration, Skid Pad/Wet Pad und Autocross starten je Fahrzeug zwei Fahrer, die jeweils zwei Versuche haben. Gewertet wird das beste mit dem Fahrzeug erzielte Ergebnis. In den fünf dynamischen Disziplinen können maximal 675 Punkte erzielt werden.

Acceleration – 75 Punkte
Auf einer 75 Meter langen Geraden wird die Beschleunigung der Fahrzeuge aus dem Stand gemessen. Hier kommt es neben der Traktion vor allem auf eine richtige Auslegung des Getriebes und eine möglichst hohe Leistung, bzw. ein hohes Drehmoment an. Die schnellsten Fahrzeuge absolvieren diese Prüfung in einer Zeit unter vier Sekunden und erreichen am Ende der Messstrecke Geschwindigkeiten von mehr als 100 km/h.

Spectators look on as the teams compete in the Acceleration event.

Die Zuschauer sehen zu, wie die Teams beim Acceleration-Event konkurrieren.

Skid Pad / Wet Pad – 75 points
During the Skid Pad event, the cars must drive a figure-8 circuit lined with track cones, performing two laps of each circle. In each case, the second lap will be measured. The lap time gives a comparative value for the maximum possible lateral acceleration of the car. Most of the cars use aerodynamics to raise the contact pressure and thus, increase lateral acceleration. To ensure the conditions are the same for all teams, the track is continually watered, hence the name “Wet Pad”. As with all the dynamic events, knocking over any of the cones results in a time penalty.

Autocross – 100 points
In the autocross event, the cars traverse a kilometre-long track with straights, curves, and chicanes. A fast lap time is a sign of high driving dynamics, precise handling and good acceleration and braking ability. Once again, time penalties occur for those who knock over any cones. The autocross rankings decide the starting positions for the endurance competition that follows.

Skid Pad / Wet Pad – 75 Punkte
Beim Skid Pad durchfahren die Rennwagen einen mit Pylonen begrenzten Parcours in Form einer Acht. Jeder Kreisring wird zweimal umrundet. Gemessen wird jeweils die zweite Runde. Die Rundenzeit gibt einen Vergleichswert für die maximal erzielbare Querbeschleunigung der Fahrzeuge. Bei den meisten Fahrzeugen werden durch den Einsatz aerodynamischer Hilfsmittel der Anpressdruck und damit die Querbeschleunigung erhöht. Damit die Bedingungen für alle Teams gleich sind, wird der Parcours kontinuierlich bewässert („Wet Pad“). Das Umstoßen von Pylonen wird mit einer Zeitstrafe belegt.

Autocross – 100 Punkte
Bei der Disziplin Autocross fahren die Rennwagen über einen etwa ein Kilometer langen Kurs mit Geraden, Kurven und Schikanen. Eine schnelle Rundenzeit ist ein Indikator für eine hohe Fahrdynamik, ein präzises Handling sowie gute Beschleunigungs- und Bremseigenschaften. Auch hier werden umgestoßene Pylonen mit einer Zeitstrafe geahndet. Die Platzierung im Autocross entscheidet auch über die Startreihenfolge im nachfolgenden Endurance-Wettbewerb.

Endurance – 325 Punkte
Das Endurance-Rennen stellt mit fast einem Drittel aller erreichbaren Punkte die Hauptdisziplin des Formula Student-Wettbewerbs dar. Über eine Renndistanz von 22 Kilometern müssen sich die konstruierten Rennfahrzeuge unter Dauerbelastung beweisen. Bei dieser Disziplin sind alle Eigenschaften der Prototypen wichtig, von der Beschleunigung bis zum Handling und der Fahrdynamik. Zusätzlich ist auch das Geschick der Fahrer gefragt, da die Strecke vor dem Rennen nur abgeschritten werden darf (Course Walk). Jedes Team hat einen einzigen Versuch, wobei nach der Hälfte der Distanz ein Fahrerwechsel erfolgen muss. Es sind bis zu vier Fahrzeuge gleichzeitig auf der Strecke, wodurch es oft auch zu Überholvorgängen kommt. Diese werden von der Rennleitung veranlasst und finden in eigens dafür eingerichteten Überholzonen statt, an denen die Strecke breiter ist. Das langsamere Fahrzeug bekommt dafür von den Streckenposten durch blaue Flaggen signalisiert, dass es einen schnelleren Teilnehmer überholen lassen muss. Die Teams erhalten nur dann Punkte, wenn sie höchstens ein Drittel langsamer waren als das schnellste Team. Auch hier werden Pylonenfehler durch Zeitstrafen geahndet.

Efficiency – 100 Punkte
Während des Endurance-Rennens wird der Kraftstoffverbrauch (FSC-Fahrzeuge), bzw. der Energieverbrauch (FSE-Fahrzeuge) gemessen. Bei der Berechnung der Effizienz und der Punkte wird allerdings nicht der absolute Kraftstoff-/ Energieverbrauch gemessen, sondern der Verbrauch in Relation zur Geschwindigkeit. Dadurch wird verhindert, dass Teams während des Endurance-Wettbewerbs besonders langsam fahren, um eine möglichst hohe Punktzahl in der Efficiency-Disziplin zu erreichen.

So that the teams with a later start don't have a grip advantage from the rubber left on the track by tire abrasion from the teams ahead of them, the Skidpad is continuously watered.

Damit später startenden Teams durch den Reifenabtrieb der Verausfahrenden keine Grip-Vorteile haben, wird beim Skid Pad die Strecke kontinuerlich gewässert.

Experienced judges from the world of motorsport, automotive engineering and the supplier industries know exactly where to look in order to evaluate the technical solutions.

Die erfahrenen Juroren aus dem Motorspot, Automobilbau und der Zulieferindustrie wissen genau, wo sie hinsehen müssen, um die technischen Lösungen bewerten zu können.

Endurance – 325 points
The endurance race represents almost a third of all available points and is consequently the most important event of the Formula Student Germany competition. The cars must demonstrate their capacity for endurance over a gruelling track distance of 22km and all of the prototype’s features are crucial for this event, from acceleration and handling to driving dynamics. The skill of the driver is also tested here, as they may only familiarise themselves with the track before the race by walking the length of the course (Course Walk). Each team gets just a single try and the drivers must be swapped at the halfway point. There can be up to four cars on the circuit at any given time and so overtaking manoeuvres must be performed frequently. Overtaking is signalled by a blue flag and is only permitted at specially marked sections of the track. A team will receive no points at the end if they are more than a third slower than the fastest team overall.

Efficiency – 100 points
During the endurance race, fuel consumption (FSC cars) or energy consumption (FSE cars) is precisely recorded. However, the absolute fuel and energy consumption is not what is used to calculate the efficiency score, but rather the consumption relative to speed. This is to prevent teams from driving particularly slowly in the endurance competition in order to score as highly as possible in the efficiency category.

The endurance in which the cars have to drive through harsh racing conditions is the highlight of the event.

Das Endurance-Rennen ist der Höhepunkt der Veranstaltung, bei dem die Fahrzeuge unter harten Rennbedingungen bestehen müssen.

Safety Regulations
Sicherheit und Regeln

A series of safety measures and regulations must be observed for every prototype car competing. This is to ensure safety and a level playing field between the teams. It is important as all teams are at different levels, whether it be different qualifications in terms of experience, personal ability or financial resources. Every car must pass Scrutineering in order to be allowed to participate in the dynamic categories. Teams are awarded various stickers for each safety check they pass. They must be placed on the front of their cars to show it has passed a particular test. For the FSC and FSE series, there are also system-specific differences in terms of operation safety that have to be followed during scrutineering.

Accumulator (FSE)
The 'Accumulator' is a technical term for the battery. It is built up of battery cells that can be connected in various series and parallel configurations. For the electrically powered Formula Student cars, the 'Accumulator' is the sole source of energy that enables the cars to drive. This is critical to safety if it is incorrectly designed or built. To protect for this, it is checked before the teams may compete in the dynamic events. Overheating of the cells can lead to fire. A temperature-logging device is installed by the FSG scrutineers to ensure that the monitoring of the cell temperature is accurate. The checked batteries are sealed once the inspection has been carried out. The teams must transport their "Accumulator" on a specially designed trolley so that it be moved away should there be any risk of the cells overheating.

Electrical Scrutineering (only FSE)
During electrical scrutineering, the electrical safety of the electric car is tested. That means all systems required by the regulations are checked in regard to their functional capacity. For example, system checks include the insulation-monitoring device, correct operation of the signal light (the Tractive System Active Light, which displays the status of the high voltage system) and the sound that indicates that the vehicle is ready to race. In addition, general safety aspects are checked, such as whether the line mechanics are properly laid and the high voltage energy storage device is assembled according to regulation.

Da alle Fahrzeuge Prototypen sind, müssen die Teams eine Reihe von Sicherheitsmaßnahmen und Regeln einhalten. Es wird gemacht wegen Sicherheit und auch um dass die Chancengleichheit zwischen den Teams geschaffen werden, die mit unterschiedlichen Voraussetzungen in Bezug auf Erfahrung, personellen Kapazitäten und finanziellen Ressourcen an den Start gehen. Das erfolgreiche Absolvieren des sogenannten Scrutineering ist die Grundvoraussetzung für die Zulassung eines Fahrzeugs zu den dynamischen Disziplinen. Aufklebern auf der Fahrzeugnase ist zum anerkennen dass sie den Checks bestanden haben. Bei FSC und FSE gibt es Unterschiede bei der Betriebssicherheit, die beim Scrutineering berücksichtigt werden müssen.

Batterie (FSE)
Der Akkumulator, kurz Akku, ist der technische Fachbegriff für die Fahrzeugbatterie. Dieser besteht aus einer Vielzahl an Zellen, die in Reihe oder parallel geschalten sind. Für elektrische Formula Student Fahrzeuge ist der Akkumulator die einzige Energiequelle, die das Fahrzeug antreibt. Daher ist der korrekte Aufbau des Bauteils essentiell für die Fahrzeugsicherheit. Um eventuelle Fehlfunktionen und Ausfälle zu vermeiden, werden die Akkus vor den dynamischen Disziplinen genau geprüft. Im schlimmsten Fall kann eine Überhitzung der Zellen zu einem Zellbrand führen. Um die genaue Überwachung der Zelltemperatur zu gewährleisten, wird durch die FSG Scrutineers ein Temperaturmessser am Akkumulator angebracht. Die Teams sind außerdem dazu verpflichtet, ihre Akkus auf speziellen Wägen fortzubewegen, um im Falle einer Überhitzung transportiert werden können.

Electrical Scrutineering (nur FSE)
Während des Electrical Scrutineering wird die elektrische Sicherheit der Elektrofahrzeuge überprüft, d.h. alle durch das Regelwerk vorgeschriebenen Maßnahmen werden auf ihre Funktionsfähigkeit getestet. Zu den geprüften Systemen gehören u.a. die Isolationsüberwachung, die korrekte Funktionsweise des Signallichtes (Tractive System Active Light), das die Aktivität des Hochvoltsystems anzeigt, und das Geräusch, das die Fahrbereitschaft des Fahrzeugs signalisiert (Ready To Drive Sound). Es werden aber auch allgemeine Sicherheitsaspekte wie z B. mechanisch einwandfrei verlegte Leitungen oder der regelkonforme Einbau der Hochvolt-Energiespeicher überprüft.

Every car must complete the technical inspection.

Jedes Fahrzeug muss die technischen Inspektionen vollständig bestehen.

Tech and Safety (FSC and FSE)

For this inspection, all the components and accessories of the racecar that are considered relevant to safety according to the regulations are checked. These include the framework, wheel suspension, steering, braking, rims, and tires. Other details, such as the layout of the fuel lines, the fixture of the air intake system, the observance of appropriate cockpit size and the correct functioning of the kill switch are all checked. In addition to this, all drivers must show that when in a ready-to-race condition, i.e., strapped in to the driving seat wearing their full racing suit and helmet, they can exit their vehicle within five seconds.

Tilt Table (FSC and FSE)

The tilt table test checks whether any operating fluids are leaking and roll-over protection regulations are met. The car must be brought to the test in a ready to race condition, with all fluids and a full tank of petrol. The driver is strapped in and the car is set at an angle of 45 degrees. No fuel or other fluids are allowed to leak out at this angle. After this, the angle is increased to 60 degrees, which corresponds to a lateral acceleration force of 1.7g. The race car only passes this test if the upper wheels remain on the floor.

Noise Test (only FSC)

The noise test checks that the car complies with the provisions for the acceptable noise level. In order to measure the volume, the engine is run in neutral at a rotation speed. The speed depends on the type of engine. In neutral, the noise level must not exceed 100 dBC or be any greater than 110 dBC at a specified rotation speed.

Brake testing

Brems-Test

Rain Test (only FSE)

Rain can lead to critical situations for electric cars. In order to be allowed to operate during rainfall with no reservations, the FSE cars must undergo an artificial rain shower. During the artificial rainfall, the car's high voltage system is activated and the appropriate components can be checked to see if they are sufficiently insulated and protected from water.

Brake Test (FSC and FSE)

The brake test checks whether a braking system is able to lock all four wheels of the car simultaneously and bring the vehicle to a controlled stop. However, since the FSE cars can also use their electric motor braking system, if the driver is operating an electric vehicle, in addition they must deactivate the high voltage system after accelerating and then come to a complete stop with all four wheels locked in order to demonstrate that the mechanical braking system functions properly in the case of a fault in the high voltage system.

Adherence to the Rules

Vehicles must conform to regulations and, from a technical point of view, be safe at all times, even after passing scrutineering. The authorised technical experts or the race stewards can remove a car from the competition at any time in the case of a breach of regulation or safety requirements, for example, if a car is leaking fluids, is too loud, or if the insulation is not up to standard.

The car cannot return to the competition until the fault has been repaired. Cars are also inspected again following the endurance race in order to exclude the possibility of a violation during the race. This is why the cars are placed in a parc fermé after the endurance competition, and the team members are not permitted to touch them until all the inspections have been successfully performed.

Geltungsbereich

Die Fahrzeuge müssen auch nach bestandenem Scrutineering zu jeder Zeit regelkonform und sicherheitstechnisch unbedenklich sein. Die offiziellen technischen Sachverständigen oder die Rennleitung können Fahrzeuge bei einem Verstoß gegen das Reglement oder die Sicherheitsanforderungen jederzeit aus dem Wettbewerb nehmen bis der Mangel behoben ist, z.B. wenn Flüssigkeiten austreten, das Fahrzeug zu laut ist oder die elektrische Isolation nicht gewährleistet ist. Nach dem Endurance-Rennen werden die Fahrzeuge zudem erneut geprüft, um Regelverstöße während des Rennens ausschließen zu können. Die Fahrzeuge werden nach dem Endurance-Wettbewerb in einem „Parc-Fermé" abgestellt und dürfen von den Teammitgliedern nicht mehr berührt werden bis die letzte Abnahme erfolgt ist.

Tech and Safety (FSC und FSE)

Bei dieser Abnahme werden alle sicherheitsrelevanten Bau- und Zubehörteile des Rennwagens, die durch das Regelwerk vorgeschrieben werden, geprüft. Dazu gehören die Rahmenstruktur, die Radaufhängung, Lenkung, Bremsen und Felgen sowie die Reifen. Auch Details wie die Verlegung der Kraftstoffleitungen, die Befestigung des Ansaugsystems, die Einhaltung der Cockpitgröße oder das korrekte Funktionieren der Notschalter werden geprüft. Zusätzlich müssen alle Fahrer zeigen, dass sie in „ready-to-race condition", d.h. voll eingekleidet und angeschnallt das Auto innerhalb von fünf Sekunden verlassen können.

Tilt Table (FSC und FSE)

Beim Tilt Table Test wird überprüft, ob keine Betriebsflüssigkeiten austreten und die Regeln zum Überrollschutz erfüllt werden. Die Fahrzeuge müssen startklar, mit allen Flüssigkeiten und vollgetankt, zum Test gebracht werden. Das Fahrzeug mit angeschnalltem Fahrer wird fixiert und bis zu einem Winkel von 45 Grad geneigt. Bei diesem Winkel dürfen kein Kraftstoff oder andere Flüssigkeiten austreten. Danach wird der Winkel auf 60 Grad erhöht, was einer Querbeschleunigung von 1,7 g entspricht. Nur wenn die oberen Räder auf dem Boden bleiben, besteht der Rennwagen den Tilt Table Test.

Noise Test (nur FSC)

Der Noise Test überprüft, ob das Fahrzeug den Vorschriften für die Einhaltung des Lärmpegels entspricht. Dazu wird bei laufendem Motor im Leerlauf, bei einer durch die Bauart des Motors vorgeschriebenen Drehzahl, die Lautstärke gemessen. Der Lärmpegel darf dabei im Leerlauf nicht höher als 100 dBc, bei vorgeschriebener Drehzahl nicht höher als 110 dBc sein.

Tilt table testing

Kipptischprüfung

Rain Test (nur FSE)

Regen kann bei Elektrofahrzeugen zu kritischen Situationen führen. Damit die FSE-Fahrzeuge auch bei Niederschlägen vorbehaltlos fahren können, müssen sie sich einem künstlichen Regenschauer unterziehen. Während der künstlichen Beregnung des Fahrzeuges wird bei aktiviertem Hochvolt-System kontrolliert, ob die verwendeten Komponenten ausreichend isoliert und gegen Regen geschützt sind.

Brake Test (FSC und FSE)

Der Bremstest dient zur Überprüfung, ob das Bremssystem in der Lage ist, alle vier Räder des Fahrzeugs gleichzeitig zu blockieren und dadurch das Fahrzeug zu einem kontrollierten Stillstand zu bringen. Die FSE-Fahrzeuge können den elektrischen Antrieb auch zum Bremsen verwenden. Um eine einwandfreie Funktion des mechanischen Bremssystems bei einem Fehler im Hochspannungssystem zu beweisen, muss der Fahrer nach dem Beschleunigen das Hochvoltsystem deaktivieren und anschließend mit vier blockierenden Rädern zum Stehen kommen.

It is critical for safety that the students understand the meaning of the different flags.

Aus Sicherheitsgründen ist es essentiell, dass die Studierenden die Bedeutung der verschiedenen Flaggen kennen.

Flags

During the dynamic events, flags are used to communicate with the drivers. The various colours and patterns have different meanings, and all drivers must understand and obey any flag signal they receive during the competition. Infringements of flag signals can be penalised with various penalties, ranging from time penalties to disqualification.

Flaggen

Bei den dynamischen Prüfungen werden zur Kommunikation mit den Fahrern Flaggen eingesetzt. Die verschiedenen Farben und Muster haben unterschiedliche Bedeutungen. Alle Fahrer müssen die Flaggen kennen und beachten, wenn Sie diese während des Wettbewerbs gezeigt bekommen. Verstöße gegen geschwenkte Flaggen können mit verschiedenen Sanktionen geahndet werden, die von Zeitstrafen bis zur Disqualifikation reichen können.

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 die Überholzone, damit ein schnelleres Fahrzeug überholen kann!

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!

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

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.

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. Flagge gehalten: Gefahr! Fahr langsam, sei bereit zum Ausweichen. Flagge geschwenkt: Große Gefahr! Fahr langsam, Ausweichen wird erforderlich sein. Sei bereit anzuhalten.

Formula Student Driverless (FSD)

Worldwide, automobile manufacturers are researching automated driving functions and autonomous vehicles to make road traffic safer and more comfortable.

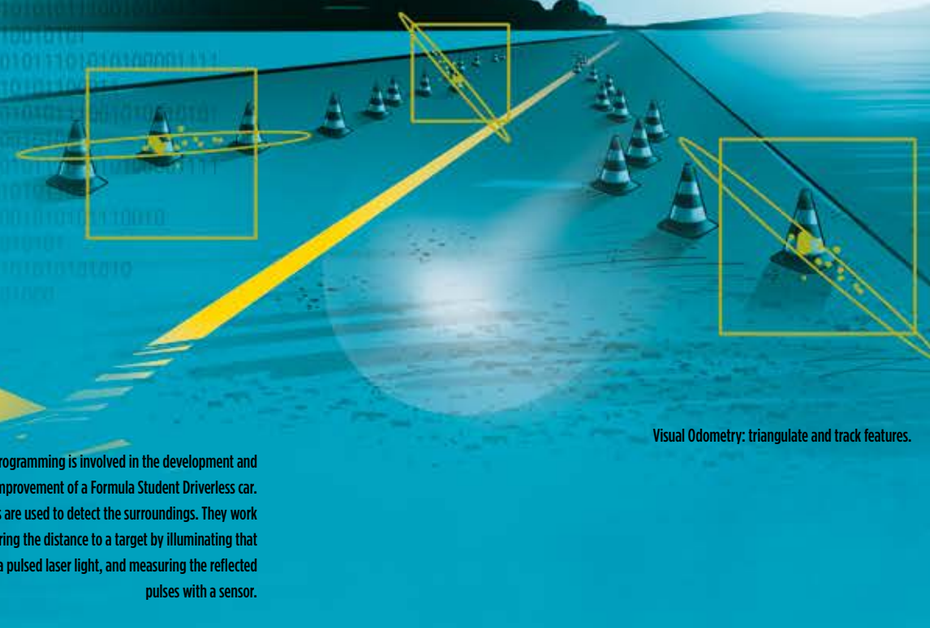
Formula Student Germany would like to open up this development and therefore, for teams with autonomous cars, have created Formula Student Driverless (FSD) for the first time in 2017. This is intended to promote the students' technological abilities while at the same time enriching the FSG with a future-oriented and attention-grabbing competition.

Weltweit forschen Automobilhersteller an automatisierten Fahrfunktionen und autonomen Fahrzeugen, um die Teilnahme am Straßenverkehr sicherer und komfortabler zu machen.

Die Formula Student Germany möchte sich dieser Entwicklung öffnen und richtet daher 2017 zum ersten Mal die Formula Student Driverless (FSD) aus, bei der die Teams mit autonomen Fahrzeugen an den Start gehen. Dadurch sollen die technologischen Fähigkeiten der Studierenden gefördert und gleichzeitig die FSG um einen zukunftsfähigen und aufmerksamkeitsstarken Wettbewerb bereichert werden.

Inertial Stereo-Camera-System
(attached to the top of the main roll hoop)

Inertial- Stereo-Camera-System
(an der Oberseite des Überrollbügels befestigt)



Visual Odometry: triangulate and track features.

A lot of programming is involved in the development and ongoing improvement of a Formula Student Driverless car. Lidar sensors are used to detect the surroundings. They work by measuring the distance to a target by illuminating that target with a pulsed laser light, and measuring the reflected pulses with a sensor.

Es steckt jede Menge Programmierung in der Entwicklung und kontinuierlichen Verbesserung der Forumla Student Driverless Fahrzeuge. Lidar Sensoren werden zur Umgebungserkennung eingesetzt. Das Ziel wird mit einem pulsierenden Laserlicht bestrahlt. Die reflektierten Impulse empfängt der Sensor und misst hierdurch den Abstand.

The Competition

As with the other two competitions of FSG, the student racing teams at FSD compete with independently designed vehicles in dynamic and static disciplines. In contrast to the FSC and FSE, the vehicles have to cope with all dynamic disciplines completely autonomously with no driver sitting in the vehicle. In principle, however, "normal" driving with the FSD cars is possible. The teams can freely select the type of drive (electric or combustion), but must comply with the safety regulations of the respective vehicle category.

Safety

Safety has top priority in all competitions of Formula Student. In order to be able to guarantee this in the operation and handling of autonomous vehicles for all parties concerned, the teams must fulfil some special requirements. Each vehicle must be equipped with a so-called RES (Remote Emergency System), which fulfils two functions. By means of this remote control, the required emergency brake system (EBS) can be triggered and the vehicle can be stopped in emergency situations. At the same time, the RES control system enables the "Go" signal to be sent to the vehicle at the start of the dynamic disciplines. Furthermore, all FSD vehicles are equipped with different coloured signal lamps, which indicate the respective operating state of the vehicle. In autonomous mode, a yellow signal is illuminated, while a blue light indicates the status of the RES.

Der Wettbewerb

Wie bei den beiden anderen Wettbewerben der FSG messen sich die studentischen Rennteams bei der FSD mit eigenständig konstruierten Fahrzeugen in dynamischen und statischen Disziplinen. Im Gegensatz zur FSC und FSE müssen die Fahrzeuge sämtliche dynamischen Disziplinen völlig autonom bewältigen und es darf kein Fahrer im Fahrzeug sitzen. Prinzipiell soll ein „normales“ Fahren mit den FSD-Autos aber möglich sein. Die Teams können die Art des Antriebs frei wählen, müssen dabei aber die Sicherheitsregularien der jeweiligen Fahrzeugkategorie einhalten.

Changes to the Event

Similar to the introduction of the Formula Student Electric (FSE) 2010, the first year will primarily serve to gain experience - both for racing teams as well as for the organiser, because the new competition is not only technologically a real challenge, but also logistically. As the event site in Hockenheim is already at capacity with the current 115 teams, the number of participants in the Formula Student Combustion (FSC) was reduced to 65 (2016: 75) and the FSE to 35 teams (2016: 40), leaving a total of 15 FSD starting slots available.
The embedding of this new competition in the event organisation, which is already complex, can only be achieved by good time scheduling to fit in the FSD disciplines. Provided they have passed the Safety Check, the FSD teams will begin with the dynamic disciplines straight away. This relieves the timetable for the occupancy of the line and allows for the safety thought, which prohibits the simultaneous driving of autonomous and conventional vehicles. On the other hand, the autonomous driving manoeuvres can be analysed by the judges and questioned in the later static disciplines.

Points and new Disciplines

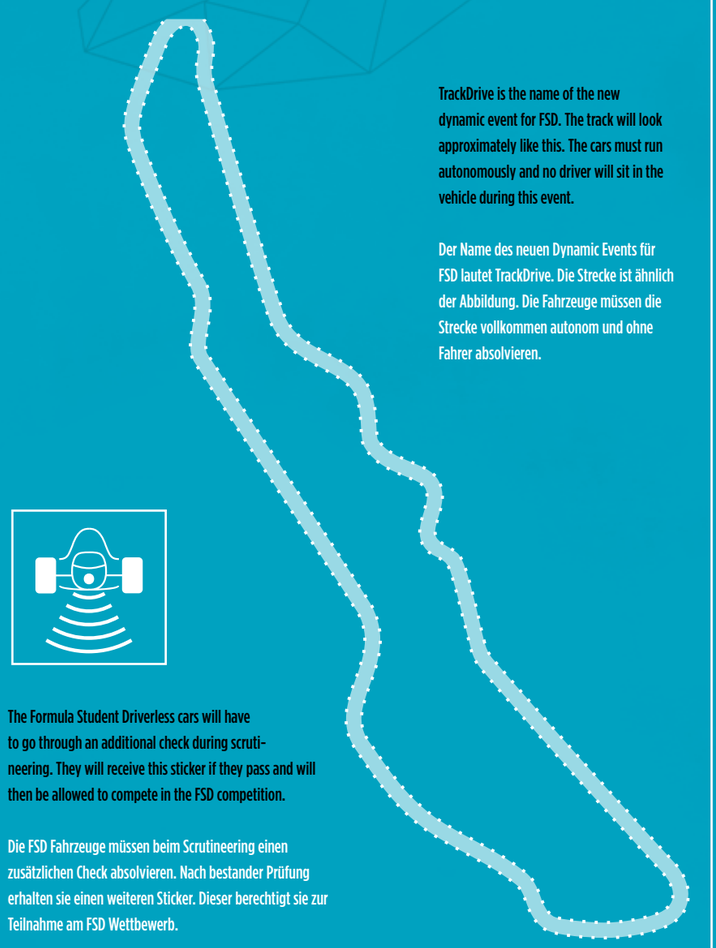
In the case of autonomous vehicles, the development focus shifts away from pure driving dynamics to an optimal adaptation of the autonomous vehicle system to the respective driving situation. FSG takes this into account when judging the FSD teams. This requires new static and dynamic disciplines, as well as a redistribution of the maximum achievable points. By maintaining as many disciplines as possible and maintaining the same maximum overall score, the comparability between all FSG competitions should at least be partially preserved.

Dynamic Disciplines

As with the other FSG competitions, the dynamic tests Acceleration (75 points) and Skid Pad (75 points) will also be held for FSD, but as a driverless event. Instead of the Endurance race, the Autonomous Vehicles will race in a Trackdrive over 10 laps on a 300 to 500 metre long coned course, which can lead to a maximum of 250 points. As in the case of the FSC and FSE, consumption-related points for the efficiency (100 points) are also added. Thus in the case of the FSD, a maximum of 500 points can be earned in all dynamic disciplines (FSE and FSC: 675 points).

Static Disciplines

FSD is an engineering competition, which is why the static disciplines Business Plan Presentation (75 points) and Cost Analysis (100 points) are integral components. Engineering Design (150 points) will also play an important role as in the other FSG competitions. Another new addition is the Autonomous Design (175 points), where the teams will also be judged on vehicle data from the dynamic disciplines. In sum, the FSD teams can reach a maximum of 500 points in the static disciplines.



TrackDrive is the name of the new dynamic event for FSD. The track will look approximately like this. The cars must run autonomously and no driver will sit in the vehicle during this event.

Der Name des neuen Dynamic Events für FSD lautet TrackDrive. Die Strecke ist ähnlich der Abbildung. Die Fahrzeuge müssen die Strecke vollkommen autonom und ohne Fahrer absolvieren.

The Formula Student Driverless cars will have to go through an additional check during scrutineering. They will receive this sticker if they pass and will then be allowed to compete in the FSD competition.

Die FSD Fahrzeuge müssen beim Scrutineering einen zusätzlichen Check absolvieren. Nach bestander Prüfung erhalten sie einen weiteren Sticker. Dieser berechtigt sie zur Teilnahme am FSD Wettbewerb.

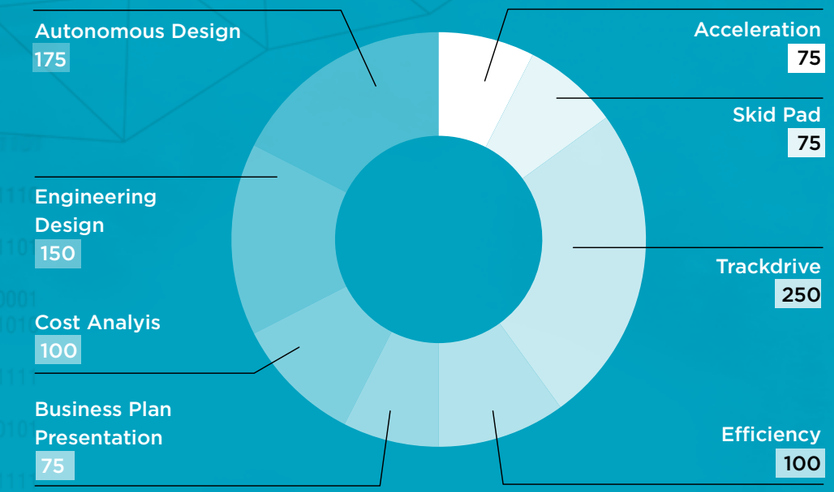
Sicherheit

Die Sicherheit hat bei allen Wettbewerben der Formula Student oberste Priorität. Um diese beim Betrieb und Umgang mit autonomen Fahrzeugen für alle Beteiligten gewährleisten zu können, müssen die Teams einige spezielle Anforderungen erfüllen. Zum einen muss jedes Fahrzeug mit einem sogenannten RES (engl. Remote Emergency System) ausgestattet sein, das zwei Funktionen erfüllt. Über diese Fernsteuerung kann das vorgeschriebene EBS (engl. Emergency Brake System) ausgelöst und das Fahrzeug in Notsituationen zum Stillstand gebracht werden. Gleichzeitig ermöglicht das RES der Rennkontrolle, beim Start der dynamischen Disziplinen das „Go“-Signal an das Fahrzeug zu senden. Weiterhin sind alle FSD-Fahrzeuge mit verschiedenfarbigen Signalleuchten ausgestattet, die den jeweiligen Betriebszustand des Fahrzeugs anzeigen. Im autonomen Modus leuchtet ein gelbes Signal, ein weiteres blaues Licht informiert über den Status des RES.

This is the other half of the RES (the receiver) that is installed in the vehicle.
Dies ist die andere Hälfte des RES (der Empfänger), der im Fahrzeug installiert ist.

This device is compulsary for every FSD car competing. It is called a remote emergency stop and is used to cut all power/drive to the vehicle in case of an emergency. Someone will be in the vicinity of the button during the course of all the dynamic events.

Dieses Gerät ist Pflicht für jedes FSD Fahrzeug. Es ist eine Fernbedienung für den Notfallstop und wird dann eingesetzt, wenn die Energieversorgung des Fahrzeugs unterbrochen werden muss. Während der dynamischen Disziplinen muss immer jemand mit dieser Fernbedienung in der direkten Nähe der Umgebung sein.



There is a different breakdown of points for FSD compared to FSC and FSE.
Im Vergleich zu FSC und FSE werden die Punkte für FSD mit einem anderen Punkteschlüssel vergeben.

Geänderter Wettbewerbsmodus

Ähnlich wie bei der Einführung der Formula Student Electric (FSE) 2010 dient das Premierenjahr vorrangig dem Erfahrungsgewinn – sowohl für die Rennteams als auch für den Veranstalter, denn der neue Wettbewerb ist nicht nur technologisch eine echte Herausforderung, sondern auch logistisch. Da das Starterfeld in Hockenheim mit 115 Teams bereits am Limit ist, wurden die Teilnehmerzahlen bei der Formula Student Combustion (FSC) auf 65 (2016: 75) und bei der FSE auf 35 Teams (2016: 40) reduziert, so dass für die FSD insgesamt 15 Startplätze zur Verfügung stehen.
Die Einbettung dieses neuen Wettbewerbs in die ohnehin schon komplexe Event-Organisation gelingt jedoch nur durch die zeitliche Versetzung der FSD-Disziplinen. Den bestandenen Safety Check vorausgesetzt werden die FSD-Teams mit den dynamischen Disziplinen beginnen. Dies entlastet einerseits den Zeitplan für die Streckenbelegung und kommt dem Sicherheitsdenken entgegen, das ein gleichzeitiges Fahren von autonomen und konventionellen Wagen untersagt. Andererseits können die autonomen Fahrmanöver von den Judges analysiert und in den späteren statischen Disziplinen hinterfragt werden.

Punktevergabe und neue Disziplinen

Bei den autonomen Fahrzeugen verschiebt sich der Entwicklungsfokus weg von der reinen Fahrdynamik hin zu einer optimalen Anpassung des autonomen Fahrzeugsystems an die jeweilige Fahrsituation. Die FSG will dies bei der Bewertung der FSD-Teams berücksichtigen. Dazu sind sowohl neue statische und dynamische Disziplinen notwendig, als auch eine Umverteilung der maximal erreichbaren Punkte. Durch Beibehaltung möglichst vieler Disziplinen und der gleichen maximalen Gesamtpunktzahl soll aber die Vergleichbarkeit zwischen allen FSG-Wettbewerben zumindest teilweise erhalten bleiben.

Dynamische Disziplinen

Wie bei den anderen FSG-Wettbewerben werden die dynamischen Prüfungen Acceleration (75 Punkte) und Skid Pad (75 Punkte) auch bei der FSD abgehalten, allerdings fahrerlos. Anstatt des Endurance-Rennens fahren die autonomen Fahrzeuge ein Trackdrive über 10 Runden auf einem etwa 300 bis 500 Meter langen Hütchenparcours, das maximal 250 Punkte einbringen kann. Wie bei der FSC und FSE kommen dazu noch verbrauchsabhängige Punkte für die Efficiency (100 Punkte) hinzu. Somit können bei der FSD in allen dynamischen Disziplinen zusammen maximal 500 Punkte errungen werden (FSE und FSC: 675 Punkte).

Statische Disziplinen

Auch die FSD ist ein ganzheitlicher Ingenieurwettbewerb, weshalb die statischen Disziplinen Business Plan Presentation (75 Punkte) und Cost Analysis (100 Punkte) feste Bestandteile sind. Auch das Engineering Design (150 Punkte) wird wie bei den anderen FSG-Wettbewerben eine wichtige Rolle spielen. Neu hinzu kommt die Punktevergabe für das Autonomous Design (175 Punkte), bei der sich die Bewertung der Judges auch auf die Fahrzeugdaten aus den dynamischen Disziplinen stützen kann und soll. In Summe können die FSD-Teams in den statischen Disziplinen maximal 500 Punkte erreichen.

Keeping up with the Megatrends

Mit den Megatrends Schritt halten

Continental AG actively supports the competition by providing highly skilled judges to judge on Engineering Design.

Die Continental AG unterstützt aktiv den Wettbewerb mit dem Einsatz von kompetenten Juroren zur Bewertung des Engineering Designs.

Interviewpartner:
Frank Steinmeier, Head of Cross Divisional Systems & Technology, Continental AG
Chen Zhang, Head of Academic Liaison (CTIU), Continental AG

Continental has been sponsoring Formula Student Germany (FSG) and enthusiastic teams since the beginning. They have been helping nurture teams over the years by pushing them through a stringent selection process and have continued to support in bringing the new and big ideas from FSG to reality. This year, they will once again be sponsoring four individual teams as well as the event and will also have their presence volunteering amongst the Judges, Media Team and Operations Team. With support coming all the way through the company, FSG investigated their views on the new Formula Student Driverless competition.

Die Continental AG ist bereits von Anfang sowohl Sponsor für die Formula Student Germany (FSG) als auch für engagierte Teams. Durch stringente Auswahlverfahren trug Continental über die Jahre hinweg zur Entwicklung der Teams bei. Sie unterstützen dabei, neue und große Formula Studenten-Ideen zum Leben zu erwecken. Auch dieses Jahr wird die AG wieder vier Teams sowie das Event als Sponsor begleiten. Viele Freiwillige, unter anderem beim Judging, dem Media oder dem Operations Team, stammen aus den Continental-Reihen. Durch die diversen Hilfestellungen aus der gesamten AG sind die FSG-Ansichten zum Formula Student Driverless Wettbewerb eruiert worden.

Why does your company support Formula Student Germany (FSG)?
We have been supporting Formula Student teams in diverse countries in all three disciplines (Combustion, Electric, Driverless) from the very beginning of this competition in terms of delivery of components and consultation of teams with technical knowhow.
In doing so, we want to get to know particularly engaged young people in the automotive field, to accompany them to find out innovative and effective solutions and to foster them to win the competition. This kind of intensive collaboration represents a win-win situation for the both sides. The students benefit from Continental's development knowledge and experiences about professional hardware, software and functional solutions, as well as direct usage of well-engineered serial products. Continental benefits from gained experiences during the collaboration with the teams, on the one hand about our current solutions in extreme racing situations and on the other hand about alternative ways of technical approaches besides our today's solutions for passenger cars.
Furthermore, it is a great opportunity for us to present ourselves as a great employer and to meet and identify the right talents for future recruitment.

Warum unterstützt Ihr Unternehmen die Formula Student Germany (FSG)?
Seit Beginn der FSG unterstützt Continental Formula Student Teams aus verschiedensten Ländern in allen drei Klassen (Combustion, Electric, Driverless) vor allem durch die Bereitstellung von Komponenten und die Unterstützung mit technischem Fachwissen.
Dabei möchten wir besonders engagierte junge Menschen im Automobilbereich kennenlernen und sie auf ihrem Weg begleiten, neue Technologien zu entdecken, effektive Lösungen zu finden und das Rennen zu gewinnen. Diese Art von intensiver Zusammenarbeit stellt für beide Seiten eine Win-Win Situation dar. Die Studiereden profitieren dabei vom Entwicklungs-Know-how, von den Erfahrungen mit professionellen Hardware-, Software-, und funktionalen Lösungen sowie dem Einsatz ausgereifter Serienprodukte. Continental profitiert vor allem von den Erfahrungen aus der aktiver Zusammenarbeit mit den Teams. Neben der Erprobung der Komponenten in extremen Rennsituationen, lernen wir aus dem alternativen Einsatz von heutigen Lösungen für Personenkraftwagen.
Darüber hinaus stellt die Formula Student Germany eine sehr gute Möglichkeit dar, uns als attraktiver Arbeitgeber zu präsentieren und zukünftige Talente kennenzulernen und zu identifizieren.

How does the new competition Formula Student Driverless benefit your company with regard to graduate recruiting?
As a tier 1 supplier of solutions for Automated Driving, we have strong core competences in the fields of sense, plan and act and have sound knowledge and experiments for industrial solutions in these fields.

Wie profitieren Sie als Unternehmen von dem neuen Wettbewerb Formula Student Driverless in Bezug auf das Recruiting von Absolventen?
Als Systemlieferant für automatisiertes Fahren liegen unsere Kernkompetenzen im Bereich der Sinneswahrnehmung, der Planung und der Ausführung von Handlungen. Dabei verfügen wir über fundiertes Wissen zu Experimenten und Branchenlösungen in diesem Feld.
Jedoch befinden wir uns in einem dynamischen und innovationsgetriebenen Zeitalter und sind daher stets an alternativen und unkonventionellen Ansätzen interessiert.
Vor allem jungen Menschen als Digital Natives sind mit den heutigen Technologien vertraut, die meist auf komplexer Software, wie selbstlernenden Lösungen anhand von künstlicher Intelligenz, basieren.
Die neue Formula Student Driverless ermöglicht es jungen, engagierten Menschen ihr Wissen unter Beweis zu stellen und sich uns mit ihren Fähigkeiten zu präsentieren. Zusammen mit diesen Nachwuchstalenten möchten wir in Zukunft weitere entscheidende Schritte in Richtung des vollautomatisierten Fahrens machen.

However, in the period of fast growing innovation we are also interested in alternative and disruptive approaches as well as young people who are native in these new technologies, which are mostly driven by complex and powerful software like learning-based solutions via Artificial Intelligence.
The new FSG discipline Driverless gives talented and engaged young people the possibility to put their skills to the test and to be visible to us in an intensive collaboration. It also gives us the opportunity to convince them to become a future member of us and to prepare an employment relationship between us. With them we want to make further great steps towards the noble objective of Fully Automated Driving.

What skills do you consider most beneficial that the students can take away with them when they compete in Formula Student Germany?
Formula Student, especially the new discipline Driverless, where all three mega trends, i.e. Automation, Electrification and Connectivity, cross at one point, provide a platform to students for conflating their theoretical knowledge gained from the university education with execution skills. The latter one is expected to be developed with a steep learning curve during the Formula Student year.
Beside the growth of technical skills, the students will also gain important project management skills like goal and efficiency oriented ways of thinking on designing solution approach and will undergo a great personal development with increase of e.g. openness, enthusiasm and endurance.

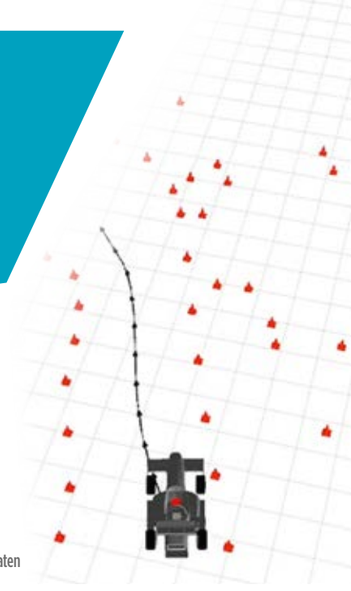
> We all know, there are three main trends the whole industry has to face: automation, electrification and connectivity. Various technologies like artificial intelligence, intelligent materials, software based development and many more are the accelerators to bring these developments to life. The autonomous race is a challenging open playground for students to get in touch and understand future technologies. I'm absolutely convinced, that this race can be the foundation for a career in R&D.
>
> Wir alle kennen die drei Trends, mit denen sich die gesamte Industrie auseinandersetzen muss: Automatisierung, Elektrifizierung und Konnektivität. Verschiedenste Technologien wie etwa künstliche Intelligenz, intelligente Materialien sowie softwarebasierte Entwicklungen stellen Beschleuniger dar, um diese Entwicklungen weiter voran zu bringen. Ein Rennen mit autonom fahrenden Fahrzeugen bietet eine herausfordernde und offene Spielwiese für Studenten, auf der sie mit Zukunftstechnologien in Berührung kommen und diese lernen zu verstehen. Ich bin überzeugt davon, dass dieser Wettbewerb einen Grundstein für eine Karriere im Bereich Forschung und Entwicklung legen kann.

Kurt Lehmann,
Corporate Technology Officer, Continental AG

Welche Fähigkeiten der Studenten, die an der Formula Student teilnehmen, erachten Sie als besonders wertvoll?
Die Formula Student und vor allem der neue Driverless Wettbewerb, bei dem die drei großen Trends Automatisierung, Elektrifizierung und Konnektivität aufeinandertreffen, bietet den Studenten eine Plattform auf der akademisch angeeignetes Wissen und praktische Umsetzung aufeinandertreffen. Die Fähigkeit beides zu verbinden wird, in einer sprunghaften Lernkurve während der Formula Student Saison entwickelt.
Neben der Vertiefung des technischen Wissens sammeln die Studenten ebenfalls wichtige Projekt Management Erfahrung. Zielorientiertes Denken in Bezug auf mögliche Konstruktionslösungen, aber auch eine starke persönliche Weiterentwicklung erleben die Teammitglieder. Offenheit, Enthusiasmus und Durchhaltevermögen sind nur einige Beispiele, die die Studenten der Formula Student auszeichnet.

The welcoming stand at the event
Der einladende Stand auf der Veranstaltung

Experiences in turning our race car driverless



A visualisation of processed data
Eine Visualisierung der verarbeiteten Daten

Can an autonomous race car drive faster on track than a comparable race car with a driver? This is a question that has likely been asked by teams of the new 2017 Formula Student Driverless (FSD) competition. For the Schanzer Racing Team from the Ingolstadt Technical University it is clear that it is an incentive for many participants in FSD to find this out. However, being the first year, many other urgent challenges needing to be solved will take priority.

"This is definitely an aspect and we will also benchmark it," Benjamin Ewert, the team lead of the Driverless team of the Schanzer Racing Team, smiles and continues to say that the competition is not only about car racing. In view of the overall challenge, however, the topic of speed in the first ever race season is low on the list.
As with all other teams, the team from Ingolstadt is designing and building a functioning FSD car based on a previous years' car. Using an electric drive will simplify things for them since no switching operations are necessary. The sensory detection of the roadway and the processing of the data by means of a separate calculation unit on the other hand, will be much more difficult to solve.

New skills required
"The focus of our development work lies clearly in the programming. This is a big difference to FSC and FSE, where the vehicle itself is the focus of the development, "explains Stefan Lambracht, Head of Electrics of the Schanzer Racing Team. The necessary know-how comes from new team members who were attracted mainly by the new racing series. "For computer scientists, the autonomous driving is the incentive and the motivation to contribute to Formula Student," explains Benjamin and Stefan. It is certain that there will be different approaches to the autonomous vehicle systems at the event in Hockenheim. In addition to the fundamental decision on how to solve the challenge via control technology and robotics or artificial intelligence, there will also be major differences in the subsystems. The Ingolstadt team however expect that every team competing this year at FSD will have some form of a camera system: "If you do not use a camera, you make your life only unnecessarily difficult. Alone from how it simplifies recognising the colour of the cones. " The Schanzer Racing Team themselves will rely on a stable lidar system with four cameras and GPS support, which should remain stable even in the event that any of the individual components should fail.

Kann ein autonom fahrender Rennwagen auf einem Parcours schneller fahren als ein vergleichbares Auto mit Fahrer? Diese Frage haben sich sicher auch einige Teams der 2017 erstmalig stattfindenden Formula Student Driverless (FSD) gestellt. Für das Schanzer Racing Team der Technischen Hochschule Ingolstadt steht fest, dass dies für viele Teilnehmer der FSD auch ein Ansporn ist. Im Premierenjahr gilt es aber zunächst viel dringlichere Herausforderungen zu lösen.

„Das ist definitiv ein Aspekt und den werden wir auch benchmarken." schmunzelt Benjamin Ewert, Leiter der Abteilung Driverless des Schanzer Racing Teams auf die Eingangsfrage, nur um gleich anzufügen, dass es beim Rennen schließlich nicht darum geht das Auto einzuparken. Angesichts der Gesamtherausforderung rückt das Thema Geschwindigkeit in der ersten Rennsaison dennoch weit nach hinten.
Wie für die anderen Teams geht es auch für die Ingolstädter erstmal darum, ein funktionierendes FSD-Fahrzeug auf Basis des Vorjahresautos auf die Beine, bzw. Räder zu stellen. Auf der Aktorik-Seite erleichtert der Elektroantrieb die Anpassungen, da keine Schaltvorgänge notwendig sind. Weitaus schwieriger zu lösen wird die sensorische Erfassung der Fahrbahn und die Verarbeitung der Daten mittels separater Recheneinheit.

Neue Kompetenzen gefordert
„Der Fokus unserer Entwicklungsarbeit liegt eindeutig in der Programmierung. Dies ist ein deutlicher Unterschied zur FSC und FSE, bei denen das Fahrzeug selbst der Entwicklungsschwerpunkt ist." erklärt Stefan Lambracht, Leiter der Abteilung Electrics beim Schanzer Racing Team. Das dazu notwendige Knowhow kommt von neuen Teammitgliedern, die vor allem von der neuen Rennserie angezogen wurden. „Gerade bei Informatikern ist das autonome Fahren der Anreiz und die Motivation, um sich bei der Formula Student einzubringen." präzisieren Benjamin und Stefan. Sie sind sich sicher, dass es beim Event in Hockenheim verschiedene Ansätze von autonomem Fahrzeugsystem geben wird. Neben der grundsätzlichen Entscheidung, die Herausforderung über Regelungstechnik und Robotik oder über

Great attention expected

The topic of automated or autonomous driving is brand-new. Almost the entire automotive industry is researching and developing in this technology field and also universities are taking up the topic and integrating it increasingly into the training of the students. A new scientific centre for vehicle safety is being developed at the Ingolstadt Technical University, which is expected to give the Schanzer Racing Team a further boost. The concept of the driverless race series is also providing a lot of support from the industry, which makes it much easier to gain sponsorship for the competition. The team from Ingolstadt are counting on there being great attention for the racing series in Hockenheim this year. Benjamin and Stefan are certain that "Many of our alumni are planning to attend the event, and many industry representatives who are interested in the FSD will certainly be amongst the spectators." The interest will not only concern the technology, but also the team members themselves. After all, the Formula Student has always been a success for sponsors when it comes recruiting.

Secure future

In the first year, we don't expect any team to give a serious estimation as to what their final placement in the competition might be. For Benjamin and Stefan it is clear that every team member will cheer if they can master all disciplines in FSD. In the coming years the demands of the teams will increase, but the fun and the spirit of Formula Student will be maintained. Like the FSG organisers, the team also sees teams engagement in FSD continuing over the next years. Considering that the whole subject of autonomous driving is still very new, FSD has a long and great future ahead, in which it will also be possible one day to test the autonomous vehicles against real life drivers.

künstliche Intelligenz zu lösen, wird es auch bei den Teilsystemen große Unterschiede geben. Ein Kamerasystem erwarten die Ingolstädter aber in irgendeiner Form bei allen Startern der FSD, und ergänzen: „Setzt du keine Kamera ein, machst du dir das Leben nur unnötig schwer. Alleine schon deshalb, weil du die Farbe der Hütchen sehr einfach erkennen kannst." Das Schanzer Racing Team selbst setzt auf ein stabiles Lidar-System mit vier Kameras und GPS-Unterstützung, das selbst beim Ausfall einzelner Komponenten eingeschränkt funktionsfähig bleiben soll.

Große Aufmerksamkeit erwartet

Das Thema automatisiertes, bzw. autonomes Fahren ist brandaktuell. Nahezu die gesamte Automobilindustrie forscht und entwickelt auf diesem Technologiefeld und auch die Hochschulen nehmen sich dem Thema an und integrieren es zunehmend in die Ausbildung der Studenten. An der Technischen Hochschule Ingolstadt entsteht derzeit ein neues wissenschaftliches Leitzentrum für Fahrzeugsicherheit, von dem sich auch das Schanzer Racing Team einen weiteren Schub erwartet. Auch seitens der Industrie findet die Idee der fahrerlosen Rennserie eine Menge Unterstützung, was die Sponsorenakquise deutlich erleichtert. Die Ingolstädter rechnen daher auch in Hockenheim mit einer großen Aufmerksamkeit für die Rennserie. „Viele unserer Alumni haben sich bereits für das Event angekündigt und sicher werden unter den Zuschauern auch viele Industrievertreter sein, die sich für die FSD interessieren." sind sich Benjamin und Stefan sicher. Das Interesse wird wohl nicht nur die Technik betreffen, sondern auch die Teammitglieder selbst, schließlich ist die Formula Student seit jeher auch unter Recruiting-Gesichtspunkten ein voller Erfolg.

Gesicherte Zukunft

Im Premierenjahr wird wohl kein Team einen ernstgemeinten Tipp auf die eigene Endplatzierung abgeben. Für Benjamin und Stefan steht fest, dass jedes Team jubeln wird, das alle Disziplinen der FSD meistern kann. In den kommenden Jahren werden die Ansprüche der Teams zwar steigen, der Spaß und der Spirit der Formula Student bleiben aber erhalten. Neben dem Veranstalter sehen nämlich auch die Rennteams das Engagement in der FSD eher langfristig. Wenn man bedenkt, dass das ganze Thema autonomes Fahren noch ziemlich am Anfang steht hat die FSD noch eine lange und großartige Zukunft vor sich, in der sich irgendwann auch zeigen wird, ob die gefahrenen Zeiten der autonomen Fahrzeuge denen der Fahrer wirklich gefährlich werden können.

The fascination of "automated driving"

Faszination „Automatisiertes Fahren"

One of the highlights of the year for me is always the Formula Student Germany event at Hockenheimring, from beginning to end. We as a company have been actively involved for many years, and we support interdisciplinary and highly motivated teams with the work they do.
Formula Student picked up on one of the automotive industry's most important trends back in 2010, when it introduced the Formula Student Electric competition. That's why I am all the happier to see regulations for Formula Student Driverless, which testify to the arrival of highly automated driving. This means aspiring students will have yet another opportunity to tackle the practical challenges of what is perhaps one of the most promising fields of the automotive industry.

Bosch, too, has a project team that has been hard at work on automated driving since early 2011. The company was the world's first supplier to test automated driving on public roads. Today, there are more than 2,800 engineers at Bosch working on driver-assistance systems, and thus on both automated driving and parking solutions.
We see automated driving as an opportunity to improve traffic flow in cities, increase safety on the road, and supply a key component of the mobility of the future. Automated driving impacts the entire car: its powertrain, brakes, steering, display instruments, navigation, and sensors, as well as connectivity inside and outside the vehicle. The key to success is an in-depth understanding of all vehicle and vehicle-related systems and how they interact.
As a driving force in this field, Bosch needs highly qualified associates with expertise in a range of areas if it is to successfully set the course toward highly automated driving. I see Formula Student as the ideal platform for young minds to acquire this kind of wide-ranging knowledge and successfully put it into practice.
I wish all the teams this season good luck. See you at the finish line!

Bernhard Bihr
President Bosch Engineering GmbH

Die Formula Student Germany mit ihrer Veranstaltung am Hockenheimring ist für mich von Beginn an ein Highlight eines jeden Jahres. Als Unternehmen sind wir bereits seit vielen Jahren aktiv dabei und unterstützen hochmotivierte und interdisziplinär arbeitende Teams in ihrer Arbeit.
Einen der wichtigsten Trends der Automobilindustrie hat die Formula Student bereits 2010 mit der Einführung der Formula Student Electric erkannt. Umso mehr begrüße ich, dass mit dem Reglement der Formula Student Driverless auch das Thema des hochautomatisierten Fahrens Einzug hält. Damit bietet sich jungen Nachwuchskräften einmal mehr die Chance, sich mit den Herausforderungen der Praxis zu beschäftigen und das in einem der vielleicht zukunftsträchtigsten Feldern der Automobilindustrie.

Auch Bosch arbeitet bereits seit Anfang 2011 intensiv mit einem eigenen Projektteam am automatisierten Fahren und war weltweit der erste Zulieferer, der automatisiertes Fahren im öffentlichen Straßenverkehr getestet hat. Heute arbeiten mehr als 2.800 Entwickler im Bereich der Fahrerassistenzsysteme und damit am automatisierten Fahren und Parken.
Mit dem automatisierten Fahren sehen wir die Chance, den Verkehrsfluss in Städten zu verbessern, die Sicherheit auf der Straße zu erhöhen und einen wichtigen Baustein für die Mobilität der Zukunft zu liefern. Automatisiertes Fahren hat Einfluss auf alle Bereiche im Auto: Antrieb, Bremse, Lenkung, Anzeigeninstrumente, Navigation und Sensorik sowie die Vernetzung innerhalb und außerhalb des Fahrzeugs. Der Schlüssel zum Erfolg ist ein tiefes Verständnis aller Systeme und Zusammenhänge im und ums Fahrzeug.
Als Treiber in diesem Feld benötigen wir als Unternehmen Bosch hochqualifizierte Mitarbeiter mit Kompetenzen aus verschiedenen Bereichen, um den Weg zum hochautomatisierten Fahren erfolgreich zu gestalten. Die Formula Student ist für mich die ideale Plattform, um sich ein derart breites Wissen anzueignen und in der Praxis erfolgreich zum Einsatz zu bringen.
Ich wünsche allen antretenden Teams der diesjährigen Saison viel Erfolg und das notwendige Quäntchen Glück ganz vorne mitzufahren.

Bernhard Bihr
Vorsitzender der Geschäftsführung
Bosch Engineering GmbH

Awards 2017

	Formula Student	Combustion	Electric	Driverless
OVERALL	1st Place Overall	SUN	SUN	SUN
	2nd Place Overall	SUN	SUN	SUN
	3rd Place Overall	SUN	SUN	SUN
DYNAMICS	Acceleration Winner	SAT	SAT	SAT
	Autocross Winner	SUN	SUN	-
	Endurance Winner	SUN	SUN	-
	Most Fuel/Energy Efficient Car	SUN	SUN	SAT
	Skid Pad Winner	SAT	SAT	SAT
	TrackDrive Winner	-	-	SAT
STATICS	Autonomous Design Winner	-	-	SUN
	Business Plan Presentation Winner	SAT	SAT	SAT
	Cost and Manufacturing Winner	SAT	SAT	SUN
	Engineering Design Winner	SAT	SUN	SUN
SPECIAL AWARDS	Best Prepared Car for Scrutineering	SAT	SAT	SAT
	FSC MTU Most Innovative Powertrain Award	SAT	-	-
	FSE Daimler Best-E-Drive Packaging Award	-	SAT	-
	FSG Audi Vorsprung Award - best lightweight concept	SUN		-
	FSG BASF Best Use of Fiber Reinforced Plastics Award	SAT		-
	FSG Opel Style Award	SAT		-
	FSG Porsche Performance Innovation Award	SAT		-
	FSG Sportsmanship Award	SUN		

STATUS/STAND: 17.07.2017

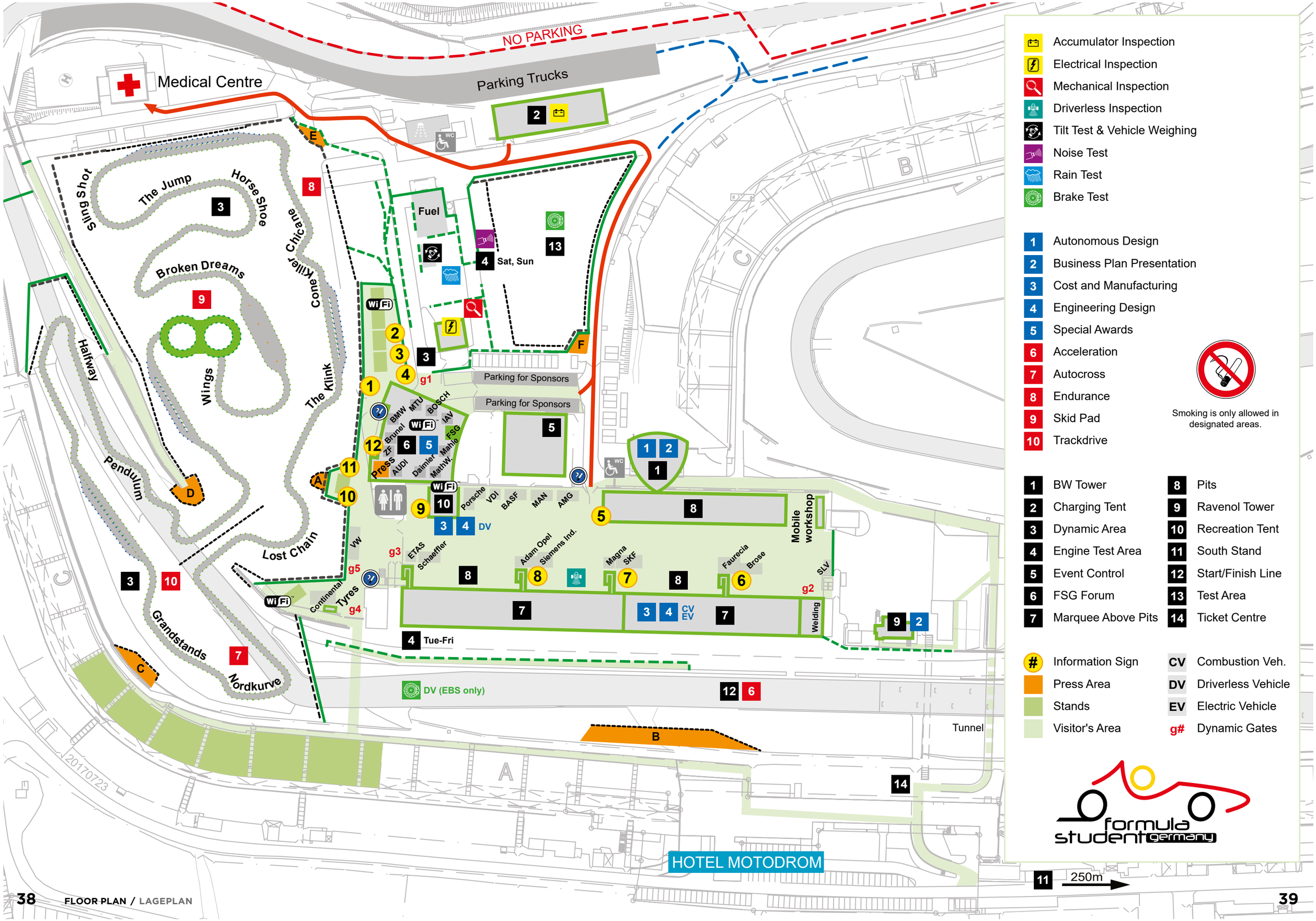
Schedule 2017

Mon, 7th of August			
08:00	Scrutineering Order, Registration- & Entrance Order Available	14	Ticket Centre
09:00 - 10:00	DV Team Registration	11	South Stand
10:00 - 11:00	Entrance for DV Team Vehicles + 5 Team Members each		Venue
10:00 - 20:00	DV Pits & Charging Area available	8	Pits
11:00 - 13:30	DV Scrutineering (Accu + E + M)	8	Pits
14:30 - 19:00	DV Scrutineering (Accu + E + M)	8	Pits
Tue, 8th of August			
08:00 - 14:00	DV Pits & Charging Area available	8	Pits
09:00 - 13:30	DV Scrutineering (Accu + E + M)	8	Pits
14:00 - 16:00	CV, EV Team Registration	14	Ticket Centre
16:00 - 19:00	Event Control, Driver & Safety Responsible Registration	5	Event Control
16:00 - 20:00	DV Scrutineering, Tilt, Noise, Rain / Fuel, Brake (manual only)	3 + 13	Dynamic Area
16:00 - 20:00	Entrance for all Teams & Vehicles		Venue
16:00 - 20:00	EV Accumulator Scrutineering	2	Charging Tent
16:00 - 22:00	Charging Tent	2	Charging Tent
16:00 - 24:00	All Pits & Recreation Tent available	8 + 10	Pits, Recreation Tent
18:00 - 20:00	Engine Test	4	Engine Test Area
21:00 - 22:00	Team Welcome	7	Marquee above pits
22:00 - 22:30	Team Briefing	7	Marquee above pits
Wed, 9th of August			
06:00 - 22:00	Charging Tent	2	Charging Tent
06:00 - 24:00	Pits & Recreation Tent available	8 + 10	Pits, Recreation Tent
07:30 - 19:00	Event Control & Ticket Centre	5 + 14	Event Control, Ticket Centre
09:00 - 13:30	Scrutineering, Tilt, Brake, Noise, Rain / Fuel	3 + 13	Dynamic Area
09:00 - 19:00	Engine Test	4	Engine Test Area
10:00 - 19:00	DV Practice Track	3	Dynamic Area
13:30 - 14:30	Staging for Panoramic Photograph	3	Dynamic Area
14:30 - 15:30	DV team photos (on demand)	3	Dynamic Area
14:30 - 19:00	Scrutineering, Tilt, Brake, Noise, Rain / Fuel	3 + 13	Dynamic Area
16:30 - 18:00	FSG Academy On Site	11	South Stand
Thu, 10th of August			
06:00 - 22:00	Charging Tent	2	Charging Tent
06:00 - 24:00	Pits & Recreation Tent available	8 + 10	Pits, Recreation Tent
07:30 - 19:00	Event Control & Ticket Centre	5 + 14	Event Control, Ticket Centre
08:00 - 08:30	Team Briefing	7	Marquee above pits
08:30 - 13:30	CV + EV Scrutineering, Tilt, Brake, Noise, Rain / Fuel	3 + 13	Dynamic Area
09:00 - 12:00	DV Practice Track	3	Dynamic Area
09:00 - 18:00	FSG Academy On Site	11	South Stand
09:00 - 19:00	CV & EV Testing	3	Dynamic Area
09:00 - 19:00	Engine Test	4	Engine Test Area
11:00 - 18:00	Special Awards	6	FSG Forum
11:00 - 18:20	CV Engineering Design & CV Cost Analysis	7	Marquee above pits
11:00 - 18:30	CV Business Plan Presentation	1 + 9	BW Tower, Ravenol Tower
13:00 - 15:30	DV Acceleration	12	Start/Finish Line
13:00 - 19:00	CV Team Photos	7	Marquee above pits
14:30 - 19:00	CV + EV Scrutineering, Tilt, Brake, Noise, Rain / Fuel	3 + 13	Dynamic Area
16:30 - 19:00	DV Skid Pad	3	Dynamic Area
20:00 - 21:00	CV Business Plan Presentation Finals	7	Marquee above pits

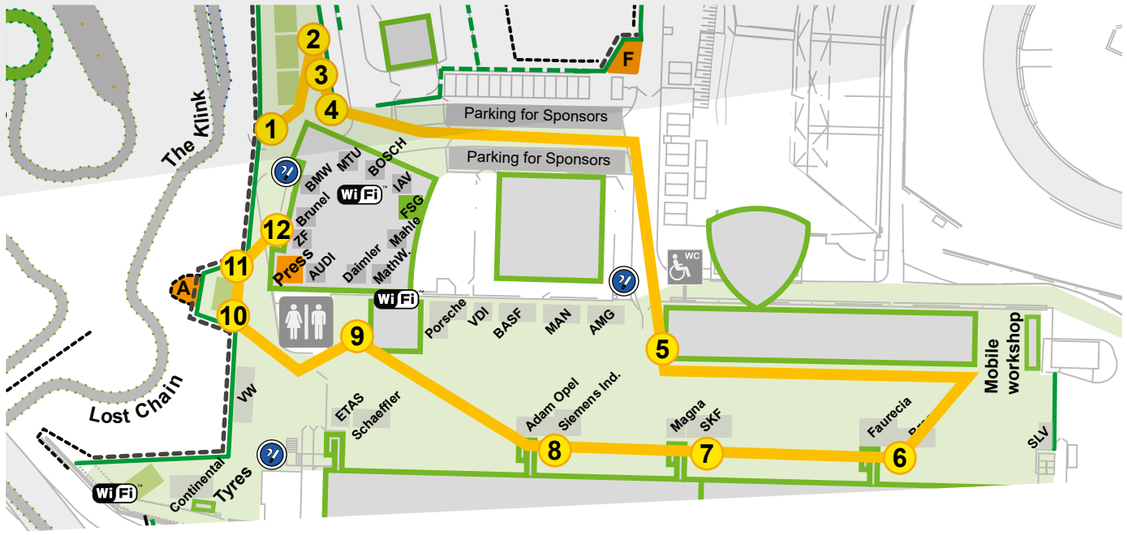
STATUS/STAND: 13.07.2017

Schedule 2017

Fri, 11th of August			
06:00 - 22:00	Charging Tent	2	Charging Tent
06:00 - 24:00	Pits & Recreation Tent available	8 + 10	Pits, Recreation Tent
07:30 - 19:00	Event Control & Ticket Centre	5 + 14	Event Control, Ticket Centre
08:00 - 08:30	Team Briefing	7	Marquee above pits
08:30 - 13:30	CV + EV Scrutineering, Tilt, Brake, Noise, Rain / Fuel	3 + 13	Dynamic Area
09:00 - 11:30	DV Practice Track	3	Dynamic Area
09:00 - 18:00	FSG Academy On Site	11	South Stand
09:00 - 18:30	CV & EV Testing	3	Dynamic Area
09:00 - 18:30	Engine Test	4	Engine Test Area
09:30 - 18:00	Special Awards	6	FSG Forum
10:00 - 11:45	DV Business Plan Presentation	1 + 9	BW Tower, Ravenol Tower
11:00 - 11:45	Press Conference	1	BW Tower, 5. floor
11:00 - 16:00	EV Engineering Design, EV Cost Analysis	7	Marquee above pits
11:00 - 18:30	CV + EV Skid Pad	3	Dynamic Area
12:00 - 12:45	Press Guided Tour	1	Assembly at entrance BW Tower
12:45 - 16:30	EV Business Plan Presentation	1 + 9	BW Tower, Ravenol Tower
13:00 - 13:30	DV Course Walk Trackdrive	3	Dynamic Area
13:00 - 14:00	VIP Reception	1	BW Tower, 5. floor
13:00 - 17:00	EV Team Photos	7	Marquee above pits
14:00 - 19:00	DV Trackdrive & Parc Fermé	3	Dynamic Area
14:30 - 19:00	CV + EV Scrutineering, Tilt, Brake, Noise, Rain / Fuel	3 + 13	Dynamic Area
19:00 - 21:30	CV Engineering Design Finals (not public)	6	FSG Forum
20:00 - 21:30	DV, EV Business Plan Presentation Finals	7	Marquee above pits
Sat, 12th of August			
06:00 - 22:00	Charging Tent	2	Charging Tent
06:00 - 24:00	Pits available	8	Pits
07:30 - 08:00	Team Briefing	7	Marquee above pits
07:30 - 19:00	Event Control & Ticket Centre	5 + 14	Event Control, Ticket Centre
08:30 - 12:30	CV & EV Acceleration	12	Start/Finish Line
08:30 - 18:30	Fuel / Engine Test / CV & EV Testing	3 + 13	Dynamic Area
08:30 - 18:30	on request: Scrutineering / Tilt, Brake, Noise, Rain	3 + 13	Dynamic Area
09:00 - 16:40	DV Engineering Design, DV Cost Analysis (not public)	10	Recreation Tent
09:00 - 18:00	FSG Academy On Site	11	South Stand
11:00 - 13:00	Worldwide Formula Student Officials Meeting	1	BW Tower, 5. floor
13:30 - 13:50	CV & EV Course Walk Autocross	3	Dynamic Area
14:00 - 19:30	CV & EV Autocross	3	Dynamic Area
19:00 - 20:30	Free BBQ powered by Conti & VW		Venue
19:00 - 21:00	EV Engineering Design Finals (not public)	6	FSG Forum
21:00 - 22:00	Awards Ceremony - Part I	7	Marquee above pits
Sun, 13th of August			
06:00 - 19:00	Charging Tent	2	Charging Tent
06:00 - 20:00	Pits & Recreation Tent available	8 + 10	Pits, Recreation Tent
07:30 - 08:00	Team Briefing	7	Marquee above pits
07:30 - 18:00	Event Control & Ticket Centre	5 + 14	Event Control, Ticket Centre
08:00 - 08:20	CV & EV Course Walk Endurance	3	Dynamic Area
08:30 - 13:00	CV & EV Endurance Morning Session & Parc Fermé	3	Dynamic Area
08:30 - 18:30	Fuel / Engine Test / CV & EV Testing	3 + 13	Dynamic Area
09:15 - 14:45	DV Autonomous Design	1	BW Tower
12:00 - 20:00	Dismantling of pits	8	Pits
13:00 - 18:00	CV & EV Endurance Afternoon Session & Parc Fermé	3	Dynamic Area
18:30 - 20:00	FSD Round Table for FSD Captains	1	BW Tower, 4. floor
21:00 - 22:00	Awards Ceremony - Part II	7	Marquee above pits
22:00 - 24:00	MAHLE-Party	7	Marquee above pits


NO PARKING
Parking Trucks
Medical Centre
Sling Shot
The Jump
Horse Shoe
Chicane
Killer Cone
Broken Dreams
Wings
The Klink
Halfway
Pendulum
Lost Chain
Grandstands
Nordkurve
Fuel
Sat, Sun
Tue-Fri
Parking for Sponsors
Parking for Sponsors
Press
Mobile workshop
Welding
Tunnel
DV (EBS only)
HOTEL MOTODROM
20170723
Accumulator Inspection
Electrical Inspection
Mechanical Inspection
Driverless Inspection
Tilt Test & Vehicle Weighing
Noise Test
Rain Test
Brake Test
1 Autonomous Design
2 Business Plan Presentation
3 Cost and Manufacturing
4 Engineering Design
5 Special Awards
6 Acceleration
7 Autocross
8 Endurance
9 Skid Pad
10 Trackdrive
Smoking is only allowed in designated areas.
1 BW Tower
2 Charging Tent
3 Dynamic Area
4 Engine Test Area
5 Event Control
6 FSG Forum
7 Marquee Above Pits
8 Pits
9 Ravenol Tower
10 Recreation Tent
11 South Stand
12 Start/Finish Line
13 Test Area
14 Ticket Centre
Information Sign
Press Area
Stands
Visitor's Area
CV Combustion Veh.
DV Driverless Vehicle
EV Electric Vehicle
g# Dynamic Gates
formula student germany
11 250m

Guided Tours
Führungen



Exploring Formula Student Germany by yourself or on a Guided Tour

Welcome to Formula Student Germany. To help you make the most of your visit, we have prepared a tour for visitors, press and sponsors. You can follow the tour by following the numbered signs across the event site (see map above). If you wish, for a more personal experience, you can also sign up to be guided by one of our experienced tour guides.

Registering for a guided tour

If you would like to sign up for a guided tour, please head to the counter in the FSG forum, where you will be able to get more information on the timetable for the daily tours.

Exploring on your own

The information signs are numbered 1 to 11. Following them in order will take you from the large dynamic area to the technical inspection and then on to the pit lane.

Along the way you will learn about the history of the competition as well as the different competitions running in parallel (Combustion, Electric, Driverless). Don't be shy to ask team members anything you would like to know about their car, however, please remember they are participating in a competition, so make sure not to hinder them!

From the pit lane, the tour takes you back to the large dynamic area. The tour will finish back at the FSG Forum, where you will be able to learn more about the background of the participants competing at Formula Student Germany 2017.

A special bonus for smartphone users: try scanning the QR- code on each sign to get more in-depth information, including an audio guide.

Entdecken Sie die Formula Student Germany auf eigene Faust oder gerne auch als geführte Tour.

Herzlich Willkommen bei der Formula Student Germany! Um das Beste aus Ihrem Besuch zu machen, haben wir verschiedene Touren für Besucher, Presse oder Sponsoren vorbereitet. Die Tour verläuft entlang nummerierter Event-Stationen, quer über das Wettbewerbsgelände (siehe Karte). Für eine noch persönlichere Erfahrung können Sie sich gerne für eine geführte Tour bei einem unserer erfahrenen Tourguides anmelden.

Registrierung für eine geführte Tour

Wenn Sie sich für eine Führung anmelden möchten, wenden Sie sich bitte an den Infostand im FSG Forum. Dort bekommen Sie weiterführende Informationen über die Uhrzeiten der täglichen Führungen.

FSG auf eigene Faust

Wenn Sie den Schildern der Reihe nach folgen (1-11), gelangen Sie vom großen fahrdynamischen Bereich (Dynamic Area) über die technische Abnahme (Technical Inspection) in die Boxengasse (Pit Lane). Auf dem Weg werden Sie einiges über die Geschichte des Events sowie die unterschiedlichen parallel stattfindenden Wettbewerbe (Combustion, Electric und Driverless) in Erfahrung bringen können. Nutzen Sie die Gelegenheit und stellen den Teammitgliedern gerne jede Frage, die Ihnen auf der Seele brennt. Vergessen Sie dabei aber bitte nicht, dass sich die Studierenden im Wettkampf befinden und nicht behindert werden sollten.

Von der Pit Lane führt die Tour zurück zum großen fahrdynamischen Bereich und endet am FSG Forum. Hier angekommen, warten noch weitere Informationen zum Hintergrund der Formula Student Teilnehmer auf Sie.

Ein kleiner Bonus für Smartphone Besitzer: Scannen Sie gerne die QR-Codes an den Hinweis-Schildern entlang der Tour, um zusätzliche Detail-Informationen zu erhalten.

The Volunteers of FSG

Die Ehrenamtlichen der FSG

It takes around 450 volunteers to bring Formula Student Germany to life every year. The team of volunteer's function like a well-oiled machine, tackling the ever-growing challenges of the annual event with honed skill and passionate dedication.

The volunteers are divided into different groups according to their skill set. For example, there are the scrutineers, the judges, the red shirts and the white shirts. These are people who handle the many tasks of planning, organising and running the event, as well as helping out and answering questions. The colour of their shirt will tell you what their role is at FSG.

Über 450 ehrenamtliche Helfer sind Jahr für Jahr an der Organisation und der Umsetzung der Formula Student Germany beteiligt. Wie eine gut geölte Maschine meistern sie mit Leidenschaft und Engagement die stetig wachsenden Herausforderungen, die das Event jedes Jahr aufs Neue mit sich bringt.

Das eingespielte Team setzt sich aus verschiedenen Funktionsbereichen zusammen. So gibt es beispielsweise die Scrutineers, die Juroren, die Red-Shirts und die White-Shirts, welche die Vielzahl an Aufgaben beim Planen, Organisieren und bei der Umsetzung vor Ort bewältigen und welche stets für Fragen rund um das Event zur Verfügung stehen. Anhand der Farbe ihres Shirts kann man leicht ihre Rolle bei der FSG erkennen.

Pit marshals hard at work.
Die harte Arbeit der Pit Marshals.

The media team are always ready to catch that perfect moment throughout the event.
Das Media-Team ist immer bereit den perfekten Moment während des Events einzufangen.

The judges are key to evaluating the students.
Die Judges sind der Schlüssel bei der Bewertung der Studierenden.

The scrutineers are only allowed a break on Sunday night at the MAHLE party.

Die Scrutineers dürfen sich erst Sonntagnacht erholen: Während der Mahle Party!

The white shirts are in charge of the yearlong task of planning the event and of ensuring that everything falls into place as it should on race day. They are the “go-to” people for sponsors, press, participants and visitors and they ensure that the competition runs without a hitch.

The red shirts have jurisdiction over event control and event support. The support team takes care of building up and taking down of every physical transformation that turns the Hockenheim Ring into Formula Student Germany. We need them to ensure that the event runs smoothly. They also act as the track marshals during dynamic events. They are in charge of the event control team, serving as intermediaries between visitors, team members, sponsors and press, so that nobody on the FSG grounds can get left lost or stranded. The red shirts are the largest group of volunteers at FSG and are the ones who will do what it takes to overcome any challenges that might be faced during the event.

The scrutineers - the folks in green- are there to guarantee that all the vehicles are safe. They accomplish this by meticulously checking the cars for potential safety hazards and patiently assisting the teams with any technical problems (at the event as well as throughout the year). A team may not participate in the dynamic events without receiving the go-ahead from our green-shirted volunteers.

Since FSG is essentially a design competition, a team’s scoring in the static disciplines is a big factor in its overall standing. It is the job of the judges in their blue shirts to render these scorings. They look at the design, manufacturing quality and cost planning; they consider the economics of the project and whether the business plan is convincing. For this, they utilize their professional expertise, indispensible honesty and constructive criticism. Their feedback has resulted in the extensive improvements from the teams over the past years.

Behind the scenes we have the IT experts, who are tasked with timekeeping during the dynamic disciples as well as ensuring that all teams are given a fair and equal assessment. Not only this, but it is thanks to them that everyone at FSG can enjoy a high-speed Internet connection throughout the entire event site!

Finally, we have the FSG media team, whose contributions through their video and image materials of exceptional quality and creativity, allow us to relive the most stunning and unforgettable moments of the event again and again, long after the smoke from the tires of the race cars has cleared.
It is our great pleasure to prepare a week of incomparable FSG excitement and entertainment for visitors and sponsors alike, for veteran participants and for those who are entering the event for the first time.

This year, we are happy to once again be at your service with advice and assistance!

Die White-Shirts sind für die ganzjährige Planung der Veranstaltung und deren reibungslose Umsetzung an den Renntagen verantwortlich. Sie sind Ansprechpartner für Sponsoren, Medienvertreter, Teilnehmer und Besucher und stellen sicher, dass der Wettbewerb ohne Komplikationen verläuft.

Die Red-Shirts sind für die Bereiche „Event Control“ und „Event Support“ zuständig. Das Support-Team kümmert sich um den Auf- und Abbau aller infrastrukturellen Bestandteile, die den Hockenheimring in die Formula Student Germany verwandeln. Sie sind die fleißigen Helfer, welche sicherstellen, dass das Event ohne Störungen verläuft. Darüber hinaus kommen die Red-Shirts als Streckenposten während der dynamischen Disziplinen zum Einsatz. Zudem besetzen sie das Event Control-Team und bilden damit die Schnittstelle zwischen Besuchern, Teammitgliedern, Sponsoren und Medienvertretern. Sie sorgen dafür, dass niemand hilflos auf dem Gelände zurückbleibt. Die Red-Shirts stellen insgesamt die größte Gruppe ehrenamtlicher Helfer bei der FSG dar. Nur durch ihre Hilfe ist es überhaupt möglich, die vielseitigen und mitunter spontanen Herausforderungen während des Events zu meistern.

The FSG event site is created by the red-shirts.
Das FSG Event-Gelände wird durch die Redshirts aufgebaut.

Die Scrutineers – die „Jungs & Mädels in Grün“ – stellen die Sicherheit aller teilnehmenden Fahrzeuge sicher. Sie überprüfen die Boliden der Teilnehmer akribisch genau auf etwaige Sicherheitsmängel und stehen den Teams bei technischen Problemen mit ihrer Expertise helfend zur Seite (sowohl am Event selbst, wie auch während des Jahres). Als Team darf man ohne die Freigabe unserer grün gekleideten Helfer nicht an den dynamischen Disziplinen teilnehmen.

Da es sich bei der FSG im Wesentlichen um einen Konstruktionswettbewerb handelt, tragen die statischen Disziplinen in erheblichem Maße zur Gesamtwertung bei. Die in blau gekleideten Juroren bewerten die Entwicklung, Fertigungsgüte sowie das Kostenbewusstsein der Studenten. Sie betrachten die Wirtschaftlichkeit des Gesamtprojektes ebenso wie die Präsentation der detaillierten Geschäftspläne und nutzen dabei ihre Expertise und unvergleichlich ehrlich sowie konstruktive Kritik, welche bereits in vergangenen Jahren positiv zur Weiterentwicklung der Studenten beigetragen hat.

Ebenfalls oft im Verborgenen arbeiten unsere in schwarz gekleideten IT Spezialisten, welche für die Zeitnahme bei den dynamischen Disziplinen verantwortlich sind und sicherstellen, dass jedes Team eine faire und gerechte Bewertung erhält. Doch nicht nur das: Dank ihnen steht allen Anwesenden bei FSG über das gesamte Eventgelände eine Highspeed-Internet-Verbindung zur Verfügung!

Zu guter Letzt leistet das ebenfalls in schwarz gekleidete Media-Team in Form von Videos und Bildern seinen Beitrag, und sorgt mit beeindruckender Kreativität und Qualität dafür, dass wir die schönsten und unvergesslichsten Momente des Events auch lange nachdem sich der letzte Rauch qualmender Reifen verzogen hat, noch einmal durchleben können.

Es ist uns Jahr um Jahr ein großes Vergnügen diese Woche an unvergleichbarer FSG Begeisterung und Unterhaltung für Besucher und Sponsoren gleichermaßen wie für langjährige oder auch neuen Teilnehmern auf die Beine zu stellen.

Und so freuen wir uns, Ihnen auch in diesem Jahr wieder mit Rat und Tat zur Seite zu stehen.

Redshirts and Scrutineers 2017

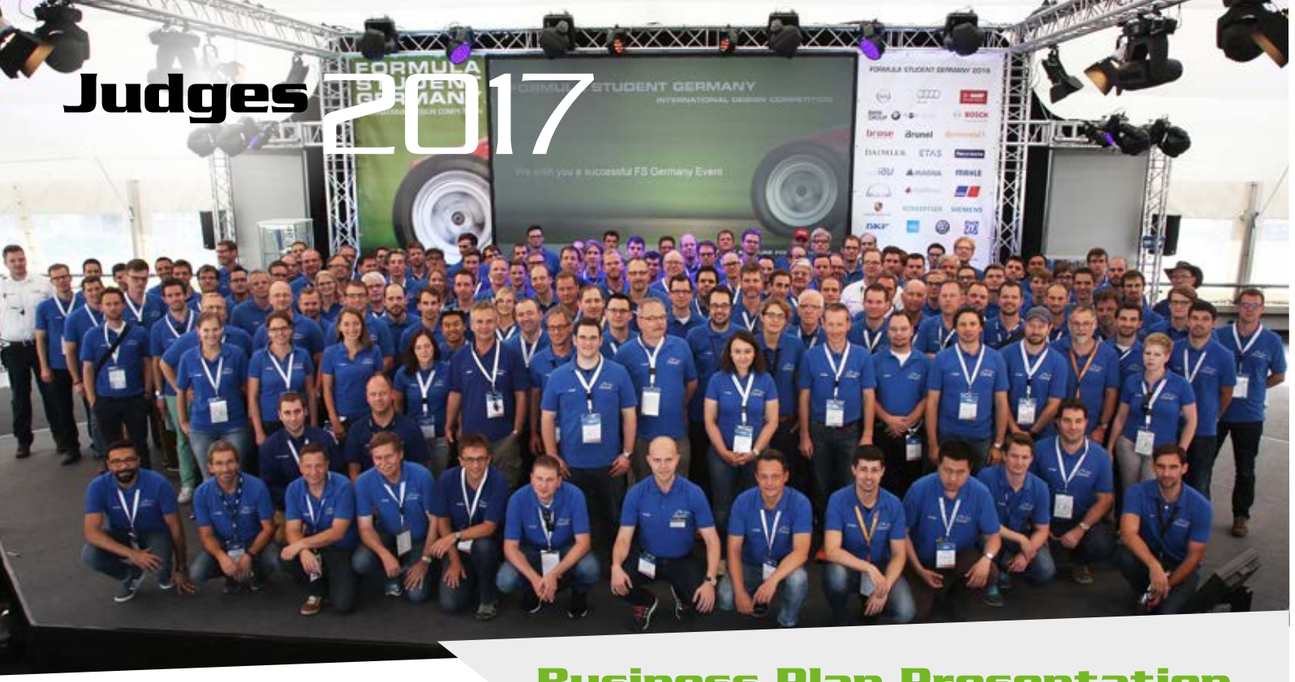
Redshirts, Media, TK & IT

AHRENS, Andreas
ANDREWS, Marie-Lene
ANDRONE, Constantin Florin
ARRASMITH, Krista
ASTAFYEVA, Anastasiya
BAGER, Magnus
BANDOW, Philipp
BARRABAS, Sascha
BAUFELD, Aaron
BAYER, Konrad
BLANCO, Aitor
BORRMANN, Daniel
BOSS, Konstantin
BRANDT JØRGENSEN, Jeppe
BRAUSER, Austin
BRUNGS, Yamina
BRUTSCHIN, Pascal
BÜTTNER, Franziska-Isabella
DE, Shidhartha
DE JONG, Stef
DEMEURICY, Paul
DIETRICH, Franziska
EFFENBERGER, Jan
EL-KHOURY, Andréa
ELTABAKH, Eslam
FINDEISEN, Jan
FISCHER, Falk
FLEMMING, Erik
FORMILAN, Vittoria
FREUDENBERG, Liz
GANDHI, Ronak
GARLICHS, Keno
GERNERT, Björn
GHANDILY, Nima
GONZÁLEZ MARTÍN, David
GONZALEZ TERUEL, Maria
GREFE, Hinrich
HASAN, Arsel
HAUFFE, Björn
HEGEDUS, Miki
HEIM, Markus
HELD, Marek
HENZEL, Judith
HIRSCHMANN, Jill
HOFMANN, Alina
HÜBNER, Tilmann
JAGADEESH, Nitesh
JANSSEN, Nele
JEITNER, Timo
JOHNSON, Kevin
JOSTEN, Jonas
KALMBACH, Manuel
KESHAVA REDDY SOPPAHALLI, Dhanush
KISS, Máté
KLEIN, Christian
KLEIN, Johannes
KREITSCH, Andrea
KRÖGER, Ole
KRÜGER, Stephan
KÜHNE, Alexander
KULESZ, Dawid
LAFOZ, Mireia
LAMPE, Jana
LANGER, Samridhi
LANSNICKER-DIETRICH, Bärbel
LEBKOWSKI JIMÉNEZ, Rosa
LERINGER, Nora
LESCHNIEWSKI, Ann-Catrin
LIEDTKE, Diana
LORENZEN, Morten
MARTYNUS, Oliver
MARU, Vivek
MEJLBJERG, Stig
MELLERGAARD, Simon Bach
MENNE, Sabine
MICHALOWSKI, Lars
MORGENROTH, Johannes
MÜLLER, Gábor
MÜLLER, György
MÜLLER, Lars
NEBEL, Dorothee
PANDEY, Rahul
PAPENHUIJZEN, Thijs
PATHNI, Charu
PETERS, Jannik
PETERS, Marcel
PISSARRECK, Mona
PÖTTNER, Wolf-Bastian
RIXEN, Sandra
SAUTTER, Nadine
SAYOVITZ, Steve
SCHÄFER, Bastian
SCHALL, Marcel
SCHILDT, Sebastian
SCHINDLER, Corvin
SCHRÖDER, Yannic
SCHULZ, Elena
SCHWARZER, Johannes
SCHWEITZER, Desirée
SEYLER, Jan
SINGH, Manpreet
SOUKUP, Markus
STAMPRATH, Christoph
STEINWEDE, Vanessa
STEMMLER, Alexander
TEWES, André
THALHÄUSER, Dana
THODE, Nils
TIMMERMANS, Tristan
VAN BALEN, Johannes
VAN DER WIJST, Hugo
VAN LEEUWEN, Tom
VAUDLET, Philipp
VOLLRATH, Rauno
VON KRÜCHTEN, Regina
WEIEN, Mira
WILDEBOER, Dominic
WINKELMANN, Daniel
ZENKER, Johannes

Scrutineers

BACHMEIR, Cornelius
BÄUERLEIN, Sonja
BERGMANN, Philipp
BÖCKLE, Bernhard
BRECHTMANN, Nick
CLAUS, Maximilian
CLAUSSNITZER, Eric
CLEMENS, Oliver
EHINGER, Christian
ELAND, Efraïm
EPPLE, Nico
FETZER, Matthias
GEBHARDT, Mathias
GOLLOWITZ, Lena
GÖTZ, Oliver
GROH, Jonas
HADER, Stefan
HOFFELNER, Eugen
HÖRSCH, Moritz
JAKOB, Dominic
KARL, Florian
KIRCHOFF, Sarah
KLATT, Stephan
KOSSEL, Joshua
KREHER, Tina
LEEB, Matthias
LEMETTER, Sebastien
MAUL, Ralf
MICHAELS, Tobias
MONN, Marcial
MÜLLER, Winfried
OCHSENDORF, Nils
PÄRSCHKE, Roman
PLETSCHKE, Tobias
RIES, Eveline
RÖMMELMAYER, Christopher
SCHIMPITZ, Christian
SCHMITZ-RODE, Benedikt
SCHMUCK, Lennart
SCHOLZ, Juergen
SCHÖNEWOLF, Stefan
SCHÜTZE, Thomas
STOLLBERGER, Martin
THOMASSEN, Kevin
TIEMANN, Maik
TORRES DA SILVA, Philipp
TUITERT, Jet
VAN DER PLOEG, Chris
VANDENHENDE, Wouter
VAUDLET, Oliver
WALETZKE, Roman
WICHTERICH, Tobias
WITTICH, Mark
WOLFSBERGER, Stefan
WRAGE, Christian
ZHANG, Camilla

Judges 2017



Autonomous Design

ABHAU, Jochen
ASCIOGLU, Andreas
BROSE, Yannic
COSTA RUIZ, Inna
CZERWIONKA, Paul
DAUTH, Florian
DENCKER, Peter
ENZWEILER, Markus
FERRONI, Francesco
FRIEDRICH, Reiner
GOLAKIYA, Nirav
HAHN, Christoph
HEPPERT, Lars
HOMOCEANU, Silviu
KASHI, Amin
LATTKE, Benedikt
MÄHLER, Mathias
NIEMEYER, Constantin
PAYERL, Christian
RAFFIN, Jean-Luc
STILLER, Johannes
WEUFFEN, Andrea
ZEISLER, Jöran
ZHANG, Chen
ZINKE, Christopher

Business Plan Presentation

BJEKOVIC, Robert
BRECHTELSBAUER, Thomas
BRUENN, Katja
DELLER, Uwe
DESS, Manfred
DIGHELLO, Alfonso
EICKHOFF, Mathias
ESSER, Klaus
FAHR, Alexander
FERKEN, Reiner
FÜLLER, Dr. Karl-Heinz
GOSSENZ, Christin
GREINER, Alexander
HAHN, Thomas
HARTHERZ, Patrik
HAYN, Bernhard
HEIDEMEYER, Peter
HERRMANN, Jesko
HODGKINSON, Philip
HODGKINSON, Raymond
JUNGE, Tobias
KAHLE, Philipp
KARSCH, Ulrich
KINSKI, Andreas
LANGE, Stephan
LENZEN, Thomas
LEYH, Michael
LÖFFLER, Maximilian
MANNHARDT, Carl
MARX, Anette
MATTLENER, Bastian
MERKL, Julia
MEZGER, Henning
MUELLER, Andreas
NÄTHER, Sylvio
NIEMEYER, Reinhard
NUSCHELER, Barbara Christine
ORTWEIN, Helena
OTT, Tobias
PETERS, Jan
PORSCH, Stefan
PRINZ, Michael
RADISIC, Ognjen
RICHTER, Christian
SCHLEMMER, Franziska
SCHMITT, Deniz
SCHULTE, Max Gerhard
SENDZIK, Susanne
STERR-BARTSCHAT, Claudia
STRATEMEIER, Frank
TABATABAI, Stefan
TEMPLIN, Nicholas
VADEHRA, Bernhard Prem
WIDDERSHOVEN, Guido
WOLFER, Richard

Cost and Manufacturing

BERTRAM, Michael
BRUNNER, Daniela
BUOB, Manuel
DEINHARDT, Till
GERHARD, Mike
GRAUEL, Patrick
GRUNDNER, Harald
HACKER, Clemens
HAGL, Markus
HERTH, Martin
KEHR, Guenter
KESORE, Kisnaduth
KOCH, Richard
KRAUSS, Heiko
KURZEN, Michael
LAUCH, Kurt
LEHR, Mario
LOEW, Jan
LOVELL, Caspar
MAYER, Fabian
MEIER, Peter
MOREL, Romain
MULLACK, Jürgen
MÜLLER, Karsten
NEUMANN, Bernd
OPPERMANN, Thilo
RAU, Fabian
RUSH, Agnes
SCHLEPPI, Roman
SCHREURS, Kathrin Maria
SCHWENKE, Henning
SIBUM, Alexander
SPAN, Benjamin
STRAUB, Christian
STRAUBERT, Alexander
WANNEMACHER, Christoph
WENSCH, André
WILDEBOER, Dominic
WINKLER, Christian-Andreas
ZIMMERMANN, Kai

Engineering Design

AERTS, Joris
AHRENHOLZ, Benjamin
ANDRES, Peter
ASCIOGLU, Andreas
BAENSCH, Simon
BÖHNERT, Andreas
BREMKAMP, Joerg
CARLESS, Owen
CHRISTOFFERSEN, Lasse
DECKERS, Jean-Noel
DLUGOSCH, Thomas
DÖLLE, Norbert
EHN, Bianca
EVANS, David
EWERT, Sebastian
FALTERMEIER, Christian
FINK, Frieder
FISCHER, Matthias
FISCHER, Raphael
FRIEDRICH, Linus
FRIES, Benedikt
GARDUNO, Luis
GICKELEITER, Michael
GIEBENHAIN, Clenn
GLOOR, Stefan
GOSLICH, Leonhard
GRAF, Michael
GRUBER, Gregor
GUPTA, Manabendra Narayan
HAHN, Christoph
HALSDORF, Georges
HANIGK, Martin
HANISCH, Thomas
HÖLZGEN, Andre
HÜGEL, Rudolf
JAKOBI, Reinhard
JENNEWEIN, Tobias
KALKOFEN, Martin
KAMENJASEVIC, Boris
KAPELLOS, Christos
KAUSSEN, Martin
KELLER, Michael
KERBER, Michael
KLEIN, Thorsten
KLUTH, Volker
KOHL, Daniel
KOOLMANN, Carsten
KORTEN, Mike
KRAMER, Jochen
LERMER, Josef
LIEBST, Fabian
LOPEZ, Jose
MÄHLER, Mathias
MAREK, Christian
MARTIN, Joe
MINK, Anne
MISSLER, Christian
MUEHL, Nils
MUELLER, Rolf
MUEMMLER, Rainer
MÜLLER, Sebastian
MUR, Lukas
NEYRINCK, Christian
NUSSBAUMER, Thomas
OEHLER, Claus
PADBERG, Jochen
PETI, Philipp
PETRY, Markus
PLAKHOTNICHENKO, Andrei
QUARZ, Philipp
REMMLINGER, Jürgen
RISING, David
ROUELLE, Claude
SANDER, Udo
SATTLER, Steve
SCHIMANSKI, Herbert
SCHIMMELS, Juergen
SCHOEN, Wolfgang
SCHULZ, Achim
SIOUD, Hassine
SMEDEK, Boris
STELZIG, Michael
STOLZ, Franz
TEUFEL, Simon
THEOBALD, Markus
TORGOVNIKOV, Eugen
TRAUB, Martin
TSIOLAKIS, Vasileios
VÖLKL, Timo
WEBER, Martin
WEBER, Thomas
WEINGART, Robert
WEINZIERL, Stefan
WEISHAUPT, Harald
WEISS, Johannes
WÖHLER, Konrad
WONNER, Valentin
WONNER, Valentin
WUNSCHHEIM, Lukas
ZANETTI, Igor
ZECHMANN, Hannes
ZÖLS, Thomas

Formula Student Germany Team 2017

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.
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.

TIM HANNIG
Board (Chairman)
Jaguar Land Rover Ltd.

DANIEL MAZUR
Board (Event Manager)
mazur | events + media

LUDWIG VOLLRATH
Board (External Relations)

RAINER KÖTKE
Board (Finance), EC (Dynamics)
Volkswagen AG

FRANK RÖSKE
Board (Rules)
Porsche Leipzig GmbH

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.
Das Executive Committee (EC) veranwortet die Ausgestaltung des Wettbewerbs. Jedes Mitglied ist für Vorbereitung und Durchführung eines Bereiches verantwortlich.

STEFFEN HEMER
EC (FS-Driverless)
TU Kaiserslautern

ROB OPDAM
EC (M & E Inspection)
RWTH Aachen University

TORSTEN RILKA
EC (Statics) & Scoring & VSV
Volkswagen AG

ULF STEINFURTH
EC (Mechanical Inspection)
University of Applied Sciences Stralsund

JOHANNES KRATZEL
EC (Event Support)
Robert Bosch GmbH

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

SEBASTIAN SEEWALDT
EC (New Rules) & Pit Marshal
Dr. Ing. h.c. F. Porsche AG

The operative team (OT) supports the board and EC in the preparation and realisation of the event throughout the year.

DANIEL AHRENS
OT (Merchandising & Guided Tours)
Dentsu Aegís Network

CHRISTIAN AMERSBACH
OT (FS-Driverless)
TU Darmstadt

Das Operative Team (OT) unterstützt das Board und das EC in der Vorbereitung übers Jahr und in der Durchführung des Wettbewerbs.

SARAH BATTIGE
OT (Electrical Inspection)
TU Dresden

CHRISTOPH BEISSWANGER
OT (Mechanical Inspection)
MCS - MICRONIC Computer Systeme GmbH

MARIA BONILLA-TORRES
OT (Electrical Inspection)

MATTHÄUS DECKER
OT (Event Support)
Siemens Industry Inc. (USA)

SIMON DENSBORN
OT (Electrical Inspection)
University of Stuttgart

KRISTINA HALBLEIB
OT (Communications)

TINE HANNIG
OT (Communications)

SEBASTIAN HOPPE
OT (Cost Event)
ZF Friedrichshafen AG

RAPHAELA BIHR
OT (Business Plan Presentation)
MAN Truck & Bus AG

MATTHIAS BRUTSCHIN
OT (Event Support)
Daimler AG

BARBARA DECKER-SCHLÖGL
OT (Event Support)
Plethora

SVEN GRUNDNER
OT (Back Office)

RAGNHEIDUR BJORK HALLDORSDOTTIR
OT (Special Awards)
Daimler AG

TANJA HOFMANN
OT (Security)
in-tech GmbH

PETER JAKOWSKI
OT (Special Tasks)
Bosch Engineering GmbH

NORINA KURTH
OT (Registration & Ticket Centre)
SICAT GmbH & Co. KG

PETER LEIPOLD
OT (Design Event)
ZF Race Engineering GmbH

BENJAMIN MÜLLER
OT (Mechanical Inspection)
Makita Engineering Germany GmbH

LEA PISSARRECK
OT (Event Control)

HELENA REINKE
OT (Event Manager Assistant)
Formula Student Germany e.V.

JOCHEN SCHMIDT
OT (Dynamics)
DLR

CHRISTOPHER SCHOENBERG
OT (FS-Driverless)
Telemotive AG

ANKE LACHMANN
OT (VIP Lounge & Culina)
Step by Step - Studio für Ballett und Bewegung

FABIAN LIESCH
OT (IT & TK)
Alpha Sigma GmbH

ALIA PIERCE
OT (Communications & Media Team)
Continental Engineering Services

JOST PHILIP PÖTTNER
OT (Design Event)
Red Bull Technology

CATHARINA SCHIFFTER
OT (Guided Tours & Merchandising)
Daimler AG

TIM SCHMIDT
OT (Back Office)
Mankiewicz Gebr. & Co.

KARSTEN STAMMEN
OT (Dynamics)
AUDI AG

WORDS FROM OUR SPONSORS

ANTJE MAAS
Director International HR Marketing, AUDI AG

The fascination of Formula Student Germany: to us, being there means being part of a truly special atmosphere that we would not want to miss for anything. This is where we meet young, ambitious people from all over the world who are just as enthusiastic about automotive technology as we are at Audi.

Faszination Formula Student Germany: Dabei zu sein bedeutet für uns, Teil einer ganz besonderen Atmosphäre zu sein, die wir um keinen Preis missen möchten. Hier treffen wir junge und ambitionierte Menschen aus aller Welt, die von automobiler Technik genauso begeistert sind wie wir bei Audi.

OLIVER FERSCHKE
Head of HR Marketing BMW Group

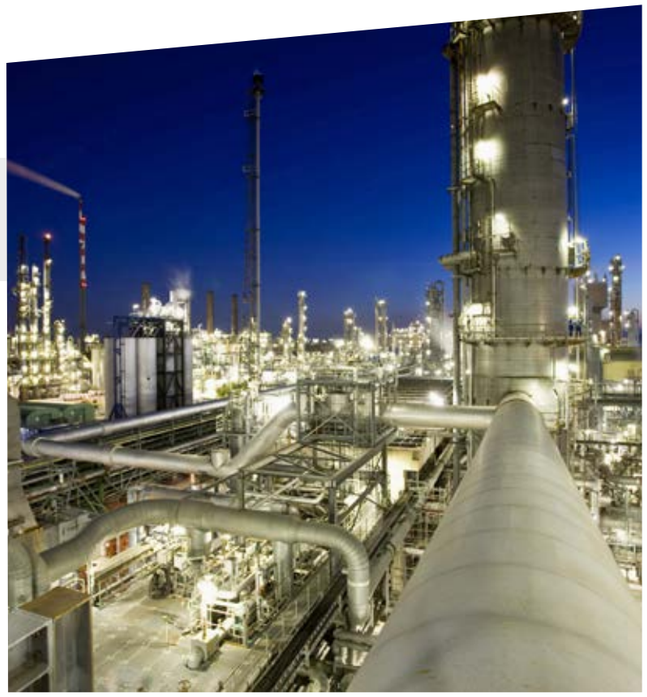
The BMW Group is very enthusiastic about its involvement in the Formula Student Germany. The challenges the teams face during the course of a season are also always faced by the BMW Group. We are, therefore, pleased when qualified participants from all over the world gain their first practical experience in the BMW Group.

Mit großer Begeisterung engagiert sich die BMW Group in der FSG. Die Herausforderungen, mit welchen sich die Teams im Laufe einer Saison konfrontiert sehen, beschäftigen auch uns bei der BMW Group immer wieder. Daher freuen wir uns, wenn qualifizierte Teilnehmer aus dem In- und Ausland ihre ersten Praxis-Erfahrungen in der BMW Group sammeln.

HANS-PETER BERINGER
Vice President, Head of Business Management Transportation, BASF SE

BASF's engineering plastics are widely used in the automotive industry for example in vehicles range from bodywork and chassis to interior trim and engine components. 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!

Die BASF bietet eine Vielzahl von Kunststofflösungen für die Automobilindustrie an, angefangen beim Karosseriebau, über das Fahrwerk bis hin zu Innenausstattung und Motoranbauteilen. „Formula Student Germany" bietet uns die Möglichkeit, mit ambitionierten und gut ausgebildeten Nachwuchskräften in Kontakt zu kommen. Wir wünschen allen viel Erfolg.

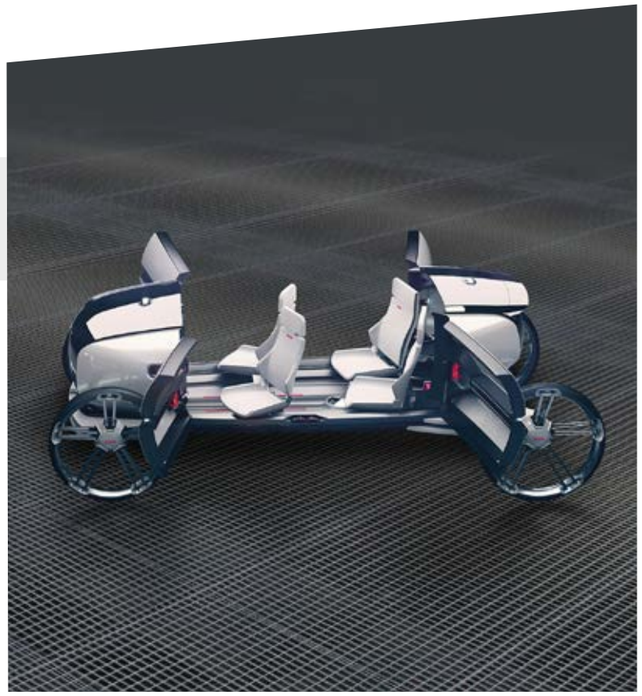


HEIDI STOCK
Human Resources Management - Talent Management and Diversity

At Bosch, we're convinced: Diversity is enrichment and prerequisite for our strive to excellence and exciting products. Diversity is also what we're counting on at Formula Student: Hence we're supporting talents who work together in a team to master interdisciplinary challenges. We wish all teams every success.

Bei Bosch sind wir davon überzeugt: Vielfalt ist Bereicherung und Voraussetzung für Spitzenleistungen und begeisternde Produkte. Vielfalt zählt auch bei der Formula Student: Daher unterstützen wir Talente, die im Team die interdisziplinären Herausforderungen gemeinsam meistern. Wir wünschen allen Teams viel Erfolg!

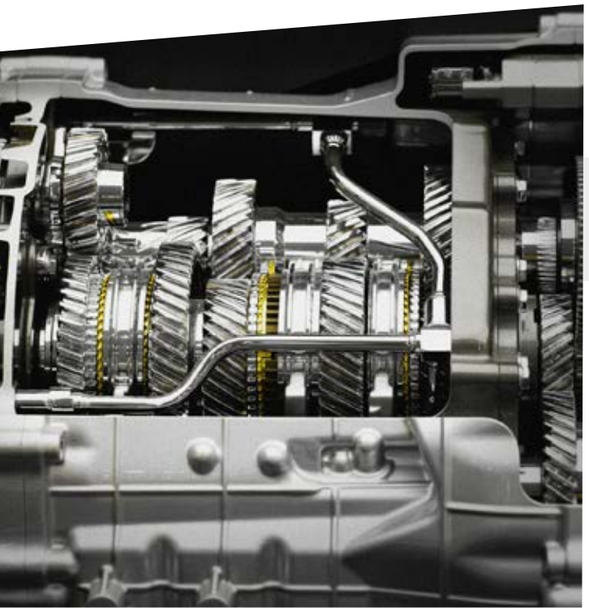
brose



ELKE SULZ
Director Recruiting, HR Marketing, Expatriate Management Brose Group

We offer committed students who are technology enthusiasts the chance to assume responsibility in an international industry and actively shape the future of the automobile. At FSG, we meet people who have what we want from our future employees: Dedication, creativity and team spirit!

Wir bieten engagierten und technikbegeisterten Studenten die Möglichkeit, in einer internationalen Branche Verantwortung zu übernehmen und die Zukunft des Automobils aktiv mitzugestalten. Bei der FSG treffen wir Menschen, die mitbringen, was wir uns von unseren zukünftigen Mitarbeitern wünschen: Einsatzbereitschaft, Kreativität und Teamgeist!



Brunel

MARKUS ECKHARDT
General Manager

We have been one of the main sponsors of the Formula Student Germany since 2006 because the creativity, passion and commitment of participating students inspires us every year. The central role of innovation prepares students for their future in the automotive industry and thus makes the competition indispensable for prospective talents.

Wir unterstützen die Formula Student Germany als Hauptsponsor bereits seit 2006, da uns die Kreativität, Leidenschaft und das Engagement der teilnehmenden Studenten immer wieder aufs Neue begeistern. Gleichzeitig bereitet der Wettbewerb auf das Arbeitsleben in der Automobilindustrie vor, denn Innovationskraft spielt auch hier eine bedeutende Rolle.

Continental
The Future in Motion

BARBARA TEXTER
Head of Employer Branding Germany, 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.

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.

DAIMLER

DR. ANNA-MARIA KARL
Head of Global Talent Sourcing, Daimler AG

Year after year we are so impressed by our FSG-teams: The future engineers are full of passion for technology and innovation, convince with their expertise and demonstrate an incredible team spirit. These are the qualities that impress us as employer and which we want to see even more of. For us, that's the connection to Daimler.

Wir sind jedes Jahr aufs Neue von den FSG-Teams begeistert: Die zukünftigen Ingenieure sind mit voller Leidenschaft für Technik und Innovation, viel Know-how und einem unglaublichen Teamgeist am Start. Es sind diese Eigenschaften, die uns als Arbeitgeber beeindrucken und die wir fördern möchten. Genau das ist für uns die Brücke zu Daimler.

ETAS

FRIEDHELM PICKHARD
President ETAS GmbH

Speed, high technology, and team spirit – what could be better than to measure oneself in these disciplines? We share the thrills with our 21 teams as – with engineering skills and passion – they show their mettle under the toughest conditions. 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? Wir fiebern mit unseren 21 Teams mit, wenn sie mit Ingenieurskunst und Herzblut unter den härtesten Bedingungen zeigen, was sie können. Wir wünschen allen Teams den Spirit und Erfolg, ganz vorne mit dabei zu sein.

automotive engineering iav

CHRISTIAN WILLENBERG
Human Resources

With over 6,500 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 more than 30 years of experience in developing innovative concepts and technologies for future vehicle generations. For further information about IAV, go to www.iav.com.

IAV ist mit über 6.500 Mitarbeitern weltweit einer der führenden Engineering-Partner der Automobilindustrie. Das Unternehmen entwickelt seit über 30 Jahren innovative Konzepte und Technologien für zukünftige Fahrzeuggenerationen. Weitere Infos zu IAV erhalten Sie über unser Karriereportal www.iav.com/karriere.

Faurecia

ANDREAS MARTI
Faurecia Group Country HR Director Germany

FSG participants and automotive supplier Faurecia share some of the most important characteristics: A passion for innovation, ambition, determination and the courage to pursue unconventional and creative solutions. We are proud to be back as a sponsor at this year's FSG and look forward to meeting the teams. Best of luck to everyone!

Die Teilnehmer der FSG und der Automobilzulieferer Faurecia haben vieles gemeinsam: Leidenschaft für Innovation, Ehrgeiz, Zielstrebigkeit und den Mut zu ungewöhnlichen und kreativen Lösungen. Wir sind stolz, dieses Jahr erneut als Sponsor der FSG dabei zu sein und freuen uns auf den Austausch mit den Teams. Wir wünschen allen viel Erfolg!

MAGNA

GÜNTHER APFALTER
President Magna Europe

Magna provides you an opportunity to drive real change in a dynamic industry. As one of the world's largest automotive parts suppliers, we deliver results today while innovating for the vehicle of tomorrow. We are proud to support FSG and learn how the next generation will transform mobility.

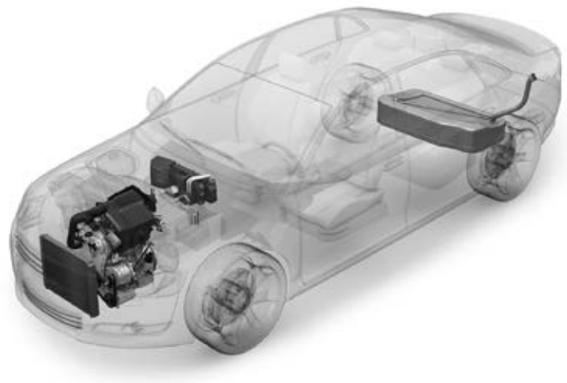
Magna bietet Dir die Möglichkeit, Veränderungen in einer dynamischen Industrie mitzugestalten. Als einer der größten Automobilzulieferer weltweit liefern wir heute schon Innovationen für das Auto von morgen. Wir sind stolz darauf, die FSG zu unterstützen und daraus zu lernen, wie die nächste Generation den Wandel der Mobilität umsetzt.

MAHLE

JOACHIM REICHLE
Vice President Corporate Personnel Development and Learning

If you want to make a decisive move, you need to have innovative ideas, courage, endurance and drive. If the environment fits and the team is right, innovative and convincing ideas emerge from visions. Our aim is to support talented and enthusiastic specialists and future executives in achieving their ambitious goals.

Wer Entscheidendes bewegen will, braucht Ideen, Mut, Ausdauer und Biss. Wenn dann noch das Umfeld stimmt und das Team das Richtige ist, werden aus Visionen innovative und überzeugende Lösungen. Unser Ziel ist es, talentierte und begeisterungsfähige angehende Fach- und Führungskräfte bei der Erreichung ihrer ehrgeizigen Ziele zu unterstützen.



MAN

YVONNE BENKERT
Head of HR Innovation 4.0: Talent Relations, HR Marketing, Employer Reputation, HR Communications, HR Digital, Diversity & Inclusion

Respect, team spirit, and determination as well as integrity — all these qualities bring a team to success at the Formula Student challenge. At MAN, we place an emphasis on these values for our new employees; that is why we consider sponsoring the Formula Student a valuable investment in our own future.

Respekt, Teamgeist, Entschlossenheit, Integrität–diese Eigenschaften bringen ein Team bei der Formula Student zum Erfolg. Wir gewinnen und verlieren gemeinsam! Auf diese Werte legen wir bei MAN den Fokus bei unseren neuen Mitarbeitern/innen und sehen deshalb das Sponsoring der Formula Student als eine wertvolle Investition in unsere eigene Zukunft.

MathWorks®

CHRISTOPH HAHN
Automotive Competition Technical Lead

Employing a Model-Based Design approach to the automotive design process enables teams to design, test, validate and share their models within one environment. Using industry-standard tools such as MATLAB and Simulink help students tackle real engineering problems. www.mathworks.com/fsg

Mit MATLAB und Simulink lösen Teams der Formula Student Germany reale, automobiltechnische Probleme. Studenten, die modell-basierte Entwicklung einsetzen, entwickeln schneller und besser. Modell-basierte Entwicklung (Model-Based Design) erlaubt Lösungen zu testen und zu validieren bevor diese im Fahrzeug eingesetzt werden. www.mathworks.com/fsg

mtu

VANESSA WÜNSCHE
Manager HR Marketing and Employer Branding

MTU is one of the world's leading manufacturers of large diesel engines and complete propulsion systems. We are pleased to support this event and the upcoming engineers again in 2017. Karl Maybach, founding father of MTU and technical pioneer, would certainly love Formula Student Germany. And so do we. We wish all participants the best of luck!

MTU zählt zu den weltweit führenden Herstellern von Großdieselmotoren und kompletten Antriebssystemen. Wir freuen uns das Event und hochmotivierte Nachwuchsingenieure erneut zu unterstützen. Karl Maybach, MTU-Gründervater und Technikpionier, wäre begeistert. Wir sind es auch! Wir wünschen allen Teams einen erfolgreichen Wettbewerb!

ULRICH SCHUMACHER
Vice President HR and Labor Director, Member of the Management Board of Opel Automobile GmbH

For the Opel Automobile GmbH the sponsorship of Formula Student competition is a core element of promoting the development and education of young engineers. As one of Europe's largest automakers with more than 150 years company tradition we offer young people a great variety of opportunities to work on high-tech technologies as well as future concepts.

Das Engagement im Formula Student-Wettbewerb ist für die Opel Automobile GmbH ein zentrales Element der Nachwuchsförderung. Als einer der größten Automobilhersteller in Europa mit einer über 150-jährigen Unternehmenstradition bieten wir jungen Menschen vielfältige Möglichkeiten, an Hightech-Themen zu arbeiten und Zukunftskonzepte zu entwickeln.

CORINNA SCHITTENHELM
Chief Human Resources Officer

Team spirit, commitment, and a love of technology – those are the qualities that our employees and the Formula Student teams share. As a sponsor we are in close contact with the teams and support them financially and with our expertise. We want the participants to become passionate about our company, and applications from them are very welcome.

Teamgeist, Engagement und Leidenschaft für Technik – das sind Eigenschaften, die unsere Mitarbeiter und die Formula-Student-Teams verbinden. Als Sponsor stehen wir in engem Kontakt mit den Teams und unterstützen diese finanziell sowie mit unserem Know-how. Die Teilnehmer sind gern gesehene Bewerber, die wir für unser Unternehmen begeistern möchten.

KONSTANZE MARINOFF
Director Human Resource Marketing

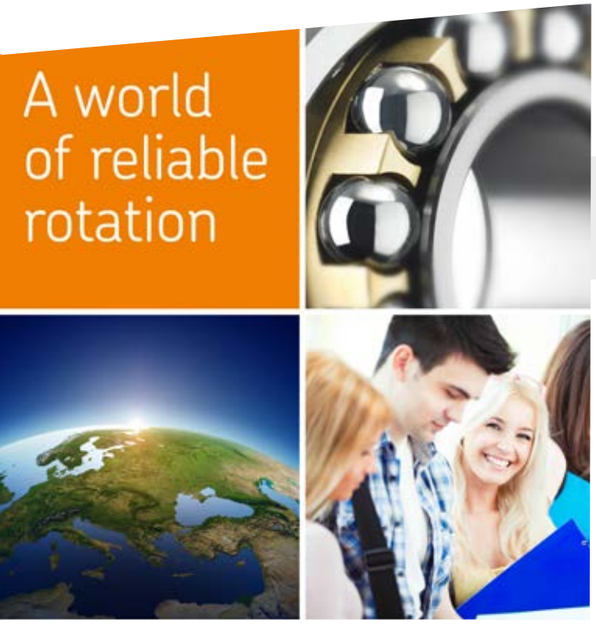
With more than 30.000 victories, Porsche, as the most successful manufacturer in motorsports, stands for Intelligent Performance and extraordinary team spirit. Become part of it and define the next chapter of the future of sportscar engineering – at the Formula Student competition and at Porsche. We wish good luck and success to all teams.

Mit mehr als 30.000 Rennsiegen steht Porsche als der erfolgreichste Hersteller im Motorsport nicht nur für Intelligent Performance sondern auch für einzigartige Teamleistungen. Werden Sie Teil davon. Schreiben Sie mit am nächsten Kapitel der Zukunft des Sportwagens - bei Formula Student und bei Porsche. Wir wünschen allen Teams viel Glück & Erfolg.

THORSTEN WALZ
Director Channel Business Development

Team spirit, an infectious enthusiasm and the impressive professionalism of all the teams – that is what distinguishes the FSG. Siemens PLM Software is very proud of being the sponsor of this extraordinary competition since 2015 and is looking forward to the week in Hockenheim, which is a real highlight for us. Come and talk to us – it's worth it!

Teamgeist, eine ansteckende Begeisterung und die beeindruckende Professionalität aller Teams – das ist es, was die FSG auszeichnet. Siemens PLM Software ist sehr stolz darauf, seit 2015 Sponsor dieses außergewöhnlichen Wettbewerbs zu sein und freut sich auf die Woche in Hockenheim, die für uns ein echtes Highlight ist. Kommen Sie mit uns ins Gespräch – es lohnt sich!



JANA HUEMMER
Business Communication Specialist

It requires courage and endurance but also creativity and teamwork to face the challenges in the Automotive Industry. Qualities that you demonstrate already today. We are pleased to support young students from all over the world with such an ambitious project like Formula Student. On behalf of the SKF team we wish all participants good luck!

Es benötigt vor allem Mut und Ausdauer aber auch Kreativität und Teamwork um sich den Herausforderungen der Automobilindustrie zu stellen. Fähigkeiten die Sie bereits heute demonstrieren. Wir freuen uns daher sehr, Studenten auf der ganzen Welt bei einem so ambitionierten Projekt wie Formula Student unterstützen zu können und wünschen viel Erfolg!

PROF. DR. STEFAN GIES
Head of Chassis Engineering Passenger Car,
Volkswagen AG

A great event - the Formula Student Germany! We are looking forward to the exchange with creative and dedicated team members and technology enthusiasts from all over the world. Everybody is welcome to visit us on site. Volkswagen wishes the participants a lot of success and an exciting race!

Ein tolles Event – die Formula Student Germany! Wir freuen uns auch in diesem Jahr wieder sehr auf den Austausch mit kreativen sowie engagierten Teammitgliedern und Technikbegeisterten aus aller Welt. Alle sind herzlich eingeladen, uns vor Ort zu besuchen. Volkswagen wünscht den Teilnehmern viel Erfolgt und ein spannendes Rennen!

DIPL.-ING. CHRISTOF KERKOFF
VDI-Society Automotive and Traffic Systems
Technologies

VDI, the Association of German Engineers, is proud to be a partner and sponsor for Formula Student Germany since the very beginning. This competition is a model for other programs we run to stimulate interest in the engineering profession and to lend a hand to the future generation, and our members follow it keenly every year.

Der Verein Deutscher Ingenieure (VDI) ist stolz darauf, die Formula Student Germany seit Ihren Anfängen als ideeller Träger und Sponsor zu unterstützen. Dieser Wettbewerb ist ein Vorbild für andere Programme, mit denen wir das Interesse für Technikberufe wecken, den Nachwuchs fördern und er begeistert unsere Mitglieder jedes Jahr aufs Neue.

MARTIN FRICK
Head of Talent Attraction

As one of the biggest automotive suppliers, ZF is dealing with digitizing mechanical systems, pushing forward e-mobility, and reducing road accidents and emissions. We support Formula Student to give the participants an early insight in our activities that shape the future of mobility.

Als einer der weltgrößten Automobilzulieferer beschäftigt sich ZF mit der Digitalisierung mechanischer Systeme, dem Forcieren der Elektromobilität und der Reduzierung von Verkehrsunfällen und Emissionen. Bei der Formula Student engagieren wir uns, um den Teilnehmern frühzeitig Einblicke zu geben, wie wir die Zukunft der Mobilität mitgestalten.

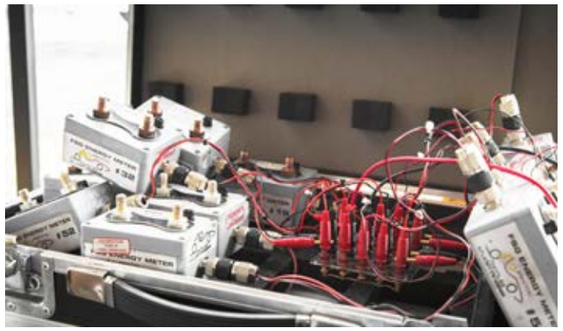
Impressions

The FSG Team and Sponsors work hard transforming the Hockenheim Ring to FSG. They are racing against the clock as in just a few hours, the teams will be entering the site.

The teams start to enter the event site.

Stretch! Wake up! FSG hasn't started yet!

Welcome ceremony time!



The E-scrutineers prepare.

FSG recreation area

Technical inspection

The dynamic and timekeeping teams are setting up and testing the track.

Panorama

The anticipation as they await to see their car again.

The cars that have been shipped internationally are delivered to the boxes ready for unloading.

FSG campsite life

Smiling team members

A race to be at the front of the photo


0W-20
HOCKENHEIMRING
Baden-Württemberg Center
FAN-SHOP
F-I-N RACING
E34
340
280

Drivers briefing at Acceleration event

The patience that is required for the scrutineering queue.

Passed scrutineering - test track time

Special awards judging!

Team members getting some advice from the Chief Design Judge.

Wetpad! Skidpad!

Sleepy driver

Green flag! Warming up for WetPad (SkidPad) event

United Colours of FSG

In our currently unstable western world with constant threats of violence, extremist politicians and negativity towards the movement of immigrants and refugees Formula Student Germany (FSG) stands strong with their multi-cultural views.

The best part of competing or volunteering at FSG is that you aren't only participating or supporting a great event that offers students the opportunity to develop themselves in ways that are purely beneficial for their future careers, but also that you can use this time for self-development and in more ways than you think. Our volunteers and competitors are female, male, tall, short, fat, thin, speak one language, two languages or even five languages and will travel from all around the world, bringing their experiences and skills to ensure that the event run as optimally as possible. Everyone comes together and works together to reach one goal and it is great. We at FSG are proud to show that, despite the continuous pressure around the world to create lines when it comes to sex, race, creed, religion, colour and dress preferences, we look past this and create an ideal cosmopolitan event. When it comes to developing the next generation, all that matters is that we push them to their limits, we teach them new skills and we give them one of the best weeks of their lives.

Some of us are lucky to grow up in international environments, where we understand cultures and behaviours of others. Some of us aren't. A great skill that is often ignored is the ability to work together with each and everyone, to respect the ways of others and to use everyone's strengths to reach the highest level of success. This is a key skill for success in the engineering industry, where crossing the borders of countries can be a daily occurrence, whether it be via teleconferences or in person.

Formula Student Germany is a great platform to practise these skills. The campsite lifestyle where the teams have the opportunity to meet new people, try new food, learn new games and make new friends is just part of this. Or on the track, the "healthy event relationships", where they are competing head to head against each other, but at the end of the day will still "cheers" each other at the MAHLE party when they trade their team-shirts and party the night away together.

Ultimately it doesn't matter who you are or where you are from, we love to work together with and support our Formula Student family.

Das Leben in der westlichen Welt ist derzeit geprägt von Instabilität, ständig drohender Gewalt, extremistischen Politikern und Vorurteilen gegenüber Einwanderern und Flüchtlingen. Formula Student Germany (FSG) distanziert sich davon und begegnet dieser Bewegung mit multikulturellen und weltoffenen Ansichten.

Das Beste daran, Wetteifernder oder Ehrenamtlicher bei FSG zu sein, ist, dass man nicht nur an einem großartigen Event teilnimmt. Wenn man als Freiwilliger Formula Student unterstützt, bedeutet das, dass man dabei hilft, den Studierenden einzigartige Möglichkeiten zur persönlichen Weiterentwicklung zu bieten, welche in besonderem Maße fördernd für deren beruflichen Werdegang ist. Und darüber hinaus entwickelt man sich als Freiwilliger selbst auf vielfältige Art und Weise weiter – und bei Weitem mehr, als man auf den ersten Blick vermuten mag.

Unsere freiwilligen Unterstützer und Wettbewerbsteilnehmer sind vielfältig: egal ob sie weiblich, männlich, groß, klein, dick oder dünn sind. Es spielt keine Rolle ob sie eine Sprache sprechen, zwei oder vielleicht sogar fünf. Alles was zählt, ist, dass sie ein Ziel haben: Sie reisen aus aller Welt an, um ihre Erfahrungen und Fähigkeiten für ein erfolgreiches FSG-Event einzubringen. Alle kommen als ein großes Team zusammen.

Wir bei FSG sind stolz darauf, zu zeigen, dass wir der weltweiten Tendenz des Grenzenschaffens, wenn es um Geschlecht, Rasse, Glaubensbekenntnis, Religion, Hautfarbe und Kleiderpräferenzen geht, trotzen und jedes Jahr aufs Neue eine weltoffene Veranstaltung für jedermann kreieren.

Wenn es darum geht, die nächste Generation hervorzubringen und zu fördern, ist alles, was zählt, dass wir sie an ihre Grenzen bringen - wir helfen ihnen dabei, sich neue und nie erahnte Fähigkeiten anzueignen und bieten ihnen beim Wettbewerb auf diese Weise eine der besten Wochen ihres Lebens. Einige von uns sind in der glücklichen Lage, in einem internationalen Umfeld aufzuwachsen, in welchem sie Kulturen und Verhaltensweisen anderer von klein auf verstehen lernen. Andere haben dieses Glück nicht. Die Fähigkeit zur Zusammenarbeit, der Respekt vor der Individualität eines jeden und den gezielten Einsatz der persönlichen Stärken um das größtmögliche Erfolgslevel zu erreichen – all das sind Fertigkeiten, die oft unterschätzt werden. Dabei stellen sie den Schlüssel zum Erfolg im Ingenieurwesen dar. Denn genau hier werden Landesgrenzen täglich aufs Neue überquert – sei es per Telefonkonferenz oder auf Geschäftsreise.

Formula Student Germany ist eine großartige Plattform, um diese Fähigkeiten zu erlernen und zu verbessern. Neben der Rennstrecke ist es vor allem der Campingplatz, der die Kulturen verschmelzen lässt: man trifft andere Teams, lernt neue Menschen kennen, kommt in den Genuss neue Speisen auszuprobieren, entdeckt neue Spiele und lernt ganz nebenbei Freunde fürs Leben aus der ganzen Welt kennen.

Und wenn auf der Rennstrecke der Ernst des Lebens beginnt, stellt man auch hier ganz schnell fest: Fairness geht über alles. Man kämpft gegeneinander, Kopf an Kopf. Aber am Ende der Anstrengung, wenn die MAHLE-Party zum ausgelassenen Feiern ruft, stoßen alle gemeinsam an. Die Nacht wird zum Tag, man feiert ausgelassen und alle Anspannung des Wettkamps fällt endlich ab. Genau wie die Team-Shirts, die auf diese Weise neue Besitzer finden.

Letztlich spielt es keine Rolle, wer du bist oder woher du kommst, wir lieben es, mit unserer Formula Student-Familie zusammenzuarbeiten und sind gerne für sie da.

Success Story:

How Formula Student helped in reaching my career goals in Formula 1.

Pete May
Direzione PowerUnit– ERS Design & Development
Head of ERS Design & Development
Ferrari S.p.A.

Pete's team in 2002

BURT04 out on the track

Pete May, once a Formula Student team member, now living and working in Italy for Ferrari Formula 1. We were very fortunate when Pete agreed to answer our interview questions on his experiences as part of Formula Student. Pete was once part of the Bath University Racing Team (BURT04) during his studies at the University of Bath. We asked him about his experiences within the team and at competition, how he thinks this helped in his career success in Formula 1 and also for some tips for those who are looking for a similar career path.

Tell us a bit about your experiences in the team?

I began the project in 2002 working on the design of the chassis, the original design was a steel spaceframe then evolving to become Bath's 1st Carbon fibre "tub", with a tubular steel spaceframe at the rear.

In the 2nd phase of the project, I moved on to Engine Development activities in the technical aspect, taking responsibility for building and testing of the Turbo Charged Yahama R6 Engine.

Alongside this technical work, I also took on the role of Team manager, pulling together and coordinating the relatively small 12 person team.

What do you remember about the Formula Student events you competed in?

I competed in the UK competition in 2003 and 2004, and it was pretty much the first time which I had been inside the paddock of competition racing. I remember being impressed by the level of professionalism many of the teams were showing and the different technical solutions which were arrived at. In the events themselves there are many different competitive elements and being organized and prepared with everything ready and the right people in the right places at the right times is a challenge not to forget.

This year Formula Student Germany will hold three competitions in parallel. What is your opinion of the advancement of the traditional competition with a combustion car and driver to electric and driverless cars?

I think it is absolutely correct and inevitable that the evolution of the Formula Student competition follows the general evolutions in the motor industry and in motorsport in general.

We are seing already that success in the world's top race series (Formula1, WEC, FormulaE) is now inextricably linked to capabilities in electrification on the drivetrain.

The increasing "artificial" intelligence of vehicles is also present within these series and with the birth of projects such as Roborace, I believe we will see these "driverless" technologies also being big performance differentiators in the future.

From a personal point of view, rather than 3 parallel competitions I would like to see the Formula Student organization create a regulatory environment in which these different technologies can compete against each other, thus demonstrating the advantages and compromises of the different technologies.

What skills did you learn during your time competing at Formula Student that you believe have influenced your career success?

There are 3 key abilities which you need to master to be successful in motorsport, these are:

- Team work.
- Preparation.
- Attention to detail.

Formula Student gives the environment to be able to understand and develop skills in these areas.

Team Work- probably Formula Student will be the smallest team developing one complete racecar, which you will work in during your career. This gives you invaluable exposure to many different technical areas but more importantly allows you to understand the importance of the way in which you build relationships and collaborate with others on a technical project, since one bad working relationship in a small team is a significant impact of the success of the project.

> **The increasing "artificial" intelligence of vehicles is also present within these series and with the birth of projects such as Roborace, I believe we will see these "driverless" technologies also being big performance differentiators in the future.**

Preparation- I remember from my own experience that we were so focused on perfecting every technical detail or the design and build of the car, that it was finished only hours before needing to be loaded into the truck ready to transport to the competition. Thus leaving no time for substantial testing, and arriving at the competition, sleep deprived and not on top form. In motorsport, there is NEVER enough time to execute all the things which you want to before the next race. Therefore, it is essential to pick the things which are most valuable, executing completely and arriving at the event perfectly prepared. Attention to Detail- During the endurance event at the 2004 UK FS event, our car completely shut down on circuit, 5laps from the end. The result was that instead of a top 10 finish in the event overall, the team finished 26th in the final standings. On post-race analysis, we found that a battery cable had become loose and rubbed on the ground causing the battery to be disconnected. For the sake of 30seconds and a €0.02 cable tie, 2years of work was compromised. This lesson was a reminder that in motor racing, every detail counts and attention to them all is a huge contribution to success or failure.

What tips can you give to students who are competing to help them with their future career success?

Formula Student will give you the opportunity to decide if a future in Motorsport is for you or not. For many employers the experienced gained in Formula Student can be seen as an advantage, however it is not a guarantee to be able to walk into the job which you would covert. If you decide that motorsport is the career for you, then you have to be prepared for the knockbacks, keeping this target strong in your head, without being tempted other financially attractive options like accountancy or banking. Make your dream, follow it stubbornly and eventually you will succeed.

Is there anything else you would like to say?

I wish all the teams competing a successful and safe competition. FORZA FS!

Top Team Performance

To finish 1st
you've got to finish first

TUFast
Technical University of Munich,
Winner FSC 2016

KA-RaceIng
Karlsruhe Institute for Technology,
Winner FSE 2016

To finish 1st you've got to finish first. Formula Student Germany is not about winning every discipline, but gaining the highest number of points. We took the two winners of FSG 2016 and compared their results in the dynamic events.
We asked each of the teams to provide some hints on how they achieved these positions. We also included the times so you can see a comparison of the performance between the top electric and combustion cars of 2016.

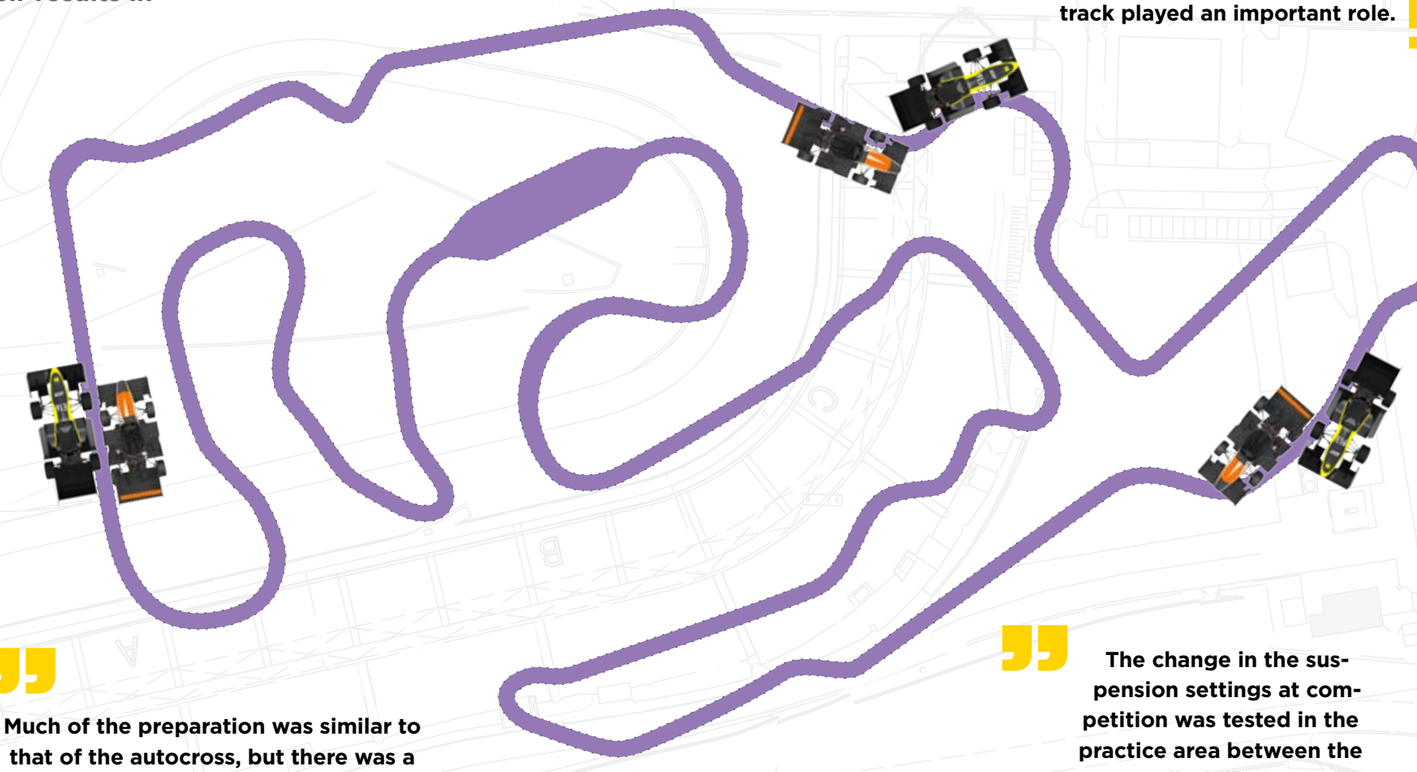
Endurance

Track length (m):		22000
Times:	TUFast (s)	1341,2
	KA-RaceIng (s)	1344,2
avg speed:	FSC (km/h)	59,1
	FSE (km/h)	58,9
★ Overall position in event:		
	TUFast	1
	KA-RaceIng	2
• Points:	TUFast	325
	KA-RaceIng	310,53
🏆 Winner of Endurance (if not overall winner):		
FSC	TUFast	
FSE	TU Delft	

Much of the preparation was similar to that of the autocross, but there was a greater focus on slow tire heating. This should not increase too much over a longer period of time and the resulting increased air pressure change in order to counteract any drop in tire performance at end of the endurance.

In autocross, the most important thing was: never touch the ground. Therefore, at the beginning of the test phase many bump tests were carried out in order to adjust spring hardness and driving height. Only when the minimum values for these variables had been determined, could the further setup be continued. By driving in circles with different radii in quasy-steady state conditions, the vehicle balance could be coordinated with the aerodynamics. Fine tuning was done using a Super-8 course.

It was important not only to improve the vehicle behaviour, but also to bring the tires as quickly as possible into a desired temperature window and to hold them there. Here air pressure and track played an important role.



The change in the suspension settings at competition was tested in the practice area between the disciplines.

Target the areas in the competition where you can score the most points. It is not only about looking at the chance to win/get the cup. Sometimes an improvement from the 20th to the 10th place is more important (because of points) than from the 5th place to the 3rd.

Drive a point optimal Endurance. Consider Efficiency and Endurance as a single event and choose the best compromise: Optimal lap times with a given target fuel consumption. Consider relative competition.

Auto X

Track length (m):		1500
Times:	KA-RaceIng (s)	68,4
	TUFast (s)	70,9
avg speed:	FSE (km/h)	79,0
	FSC (km/h)	76,2
★ Overall position in event:		
	KA-RaceIng	1
	TUFast	6
• Points:	KA-RaceIng	100
	TUFast	88,27
🏆 Winner of Auto X (if not overall winner):		
FSE	KA-RaceIng (s)	
FSC	OSU Corvallis	

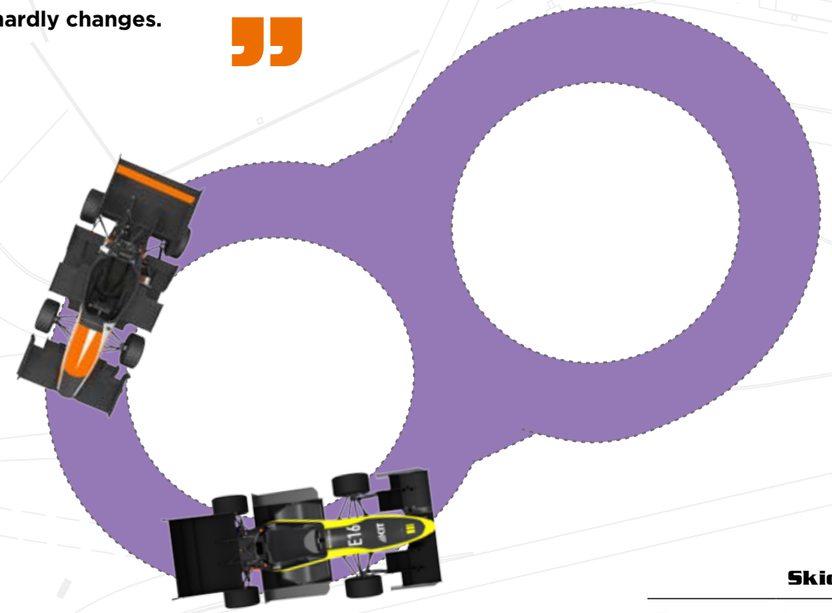
Efficiency

★ Overall position in event:		
	TUFast	1
	KA-RaceIng	2
• Points:	TUFast	100
	KA-RaceIng	98,46
🏆 Winner of Efficiency (if not overall winner):		
FSC	TUFast	
FSE	Terrassa ESEIAAT	

During the individual test runs, the vehicle data was recorded and evaluated immediately on site. The evaluation was carried out using Vector Canape and Matlab and the results between the electric and the combustion test team were compared.

At the events the suspension was adjusted before each dynamic discipline and a complete check for possible loose connections, cracks or other damages was carried out. Before the endurance, the complete check was particularly intensive and various wear parts were replaced if necessary. One of the most important.

Your start time for Wetpad doesn't matter, because the track doesn't/ hardly changes.



Very special conditions: very wet! For this purpose, data of the rain tires were collected on an irrigated tire test bench and the suspension was adjusted accordingly.

The data could not be evaluated from dry, static figure of eight testing, as the addition of water changes a lot and the performance almost exclusively depended on the driver's feeling and ability.

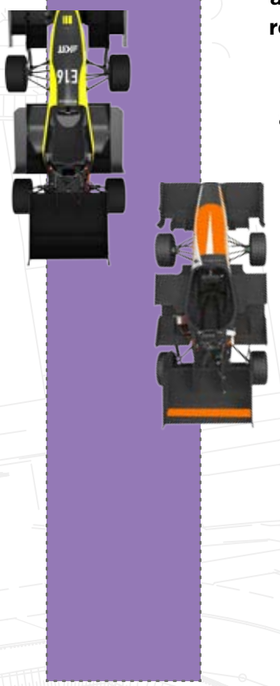
Skidpad

Track length (m):		114
Times:	KA-RaceIng (s)	5,2
	TUFast (s)	5,8
avg speed:	FSE (km/h)	78,5
	FSC (km/h)	70,5
★ Overall position in event:		
	KA-RaceIng	1
	TUFast	10
• Points:	KA-RaceIng	75
	TUFast	49,64
🏆 Winner of Skidpad (if not overall winner):		
FSE	KA-RaceIng	
FSC	KIT - Karlsruhe	

Acceleration

Track length (m):		75
Times:	KA-RaceIng (s)	3,601
	TUFast (s)	17,861
avg speed:	FSE (km/h)	75,0
	FSC (km/h)	15,1
★ Overall position in event:		
	KA-RaceIng	3
	TUFast	60
• Points:	KA-RaceIng	65,17
	TUFast	3,5
🏆 Winner of Acceleration (if not overall winner):		
FSE	ETH Zuerich	
FSC	TU Wroclaw	

As the traction control and power limitation were perfectly adjusted, the suspension set-up could be finalized. Depending on the basic settings of the dampers, they were adjusted in such a way that chassis movements in the starting phase of the run were minimised. In addition, the static camber could be calculated over the spring travel, so that the perfect camber of 0° could be achieved during the drive as a result of the kinematic values.



The problem arose before the noise test and became apparent by an irregular shutdown of the engine due to the complete failing of the wiring system voltage. Prior to the Acceleration, the "ECU" and "Power Distribution Module" were replaced. However, the problem remained unchanged. Even in the best autocross race, the engine stalled 12 times. Nevertheless, a 6th place in the Auto could be reached (!!!). Due to the design finals in the evening, there was barely any time to find the fault. Finally it was spotted that there was an issues with a contact. After this was repaired just before midnight, we were able to tackle the Endurance as the only discipline with our full potential and take first place in Endurance and Efficiency.

Final Points

Total (out of 1000):		
	KA-RaceIng	917,87
	TUFast	852,42
From dynamics (675 max):		
	KA-RaceIng	649,16
	TUFast	566,41
From statics (325 max):		
	KA-RaceIng	649,16
	TUFast	566,41

Conclusion

Every team has their ups and downs - even the overall winners! The important message to take away is that at FSG, if you have one bad event, that particular battle may be lost, but looking at the big picture, you still have the opportunity to win the war and become an FSC/FSE (FSD!) champion.

Participating Formula Student Combustion TEAMS 2017

Car	City/University	Country	Pit	Page
202	Stuttgart U	Germany	55	102
203	Graz UAS	Austria	51	90
211	Sevilla U	Spain	52	101
213	Corvallis OSU	United States	53	88
214	Lund U	Sweden	50	94
216	Bursa U	Turkey	56	87
217	Auburn U	United States	60	85
219	Haifa Technion	Israel	58	91
220	Magdeburg OvGU	Germany	59	94
222	Tyumen TYUIU	Russia	61	103
224	Hatfield UH	United Kingdom	62	91
226	Loughborough U	United Kingdom	57	94
227	Mumbai Somaiya	India	63	97
231	München TU	Germany	66	97
233	Shanghai Tongji U	China	65	101
235	Maribor U	Slovenia	64	95
237	Modena UNIMORE	Italy	67	95
239	Heilbronn UAS	Germany	68	92
242	Darmstadt UAS	Germany	69	89
243	Pisa U	Italy	70	99
244	Ulm UAS	Germany	71	103
246	Arnhem UAS	Netherlands	72	84
248	Bochum U	Germany	73	86
249	Erlangen U	Germany	74	89
250	Bath U	United Kingdom	78	85
252	Moscow PT	Russia	76	96
253	Graz TU	Austria	77	90
254	Vellore VIT	India	75	104
258	Nevers ISAT	France	82	98
262	Regensburg OTH	Germany	80	99
265	Wiesbaden UAS	Germany	81	105
269	Seattle U Washington	United States	79	101
270	Coburg UAS	Germany	83	88

Car	City/University	Country	Pit	Page
274	Toronto U	Canada	84	102
279	Győr U	Hungary	100	90
280	Kassel U	Germany	101	93
285	Padova U	Italy	102	98
287	Moscow PFUR	Russia	103	96
288	Bologna U	Italy	104	87
292	Oxford Brookes U	United Kingdom	105	98
294	Esslingen UAS	Germany	106	89
296	Hamburg UAS	Germany	107	91
297	Schweinfurt UAS	Germany	108	100
299	Brno TU	Czech Republic	109	87
300	Berlin HTW	Germany	110	86
307	Karlsruhe KIT	Germany	111	92
308	Wrocław TU	Poland	112	105
313	Berlin TU	Germany	113	86
314	Vigo U	Spain	114	104
317	Stralsund UAS	Germany	115	102
319	Roma U Sapienza	Italy	116	100
321	San Sebastián TECNUN	Spain	117	100
324	Zagreb U	Croatia	118	105
330	Akron U	United States	119	84
333	Moscow MADI	Russia	120	96
340	Istanbul YTU	Turkey	121	92
343	Konstanz UAS	Germany	122	93
347	Mumbai DJSCE	India	123	97
350	Belgrade U	Serbia	124	85
360	Weingarten UAS	Germany	125	104
369	Coimbatore COT	India	126	88
379	Pforzheim U	Germany	127	99
390	Milano PT	Italy	128	95
395	Valéncia UPV	Spain	129	103
399	Karlsruhe UAS	Germany	130	93

STATUS/STAND: 23.07.2017

Participating Formula Student Electric TEAMS 2017

Car	City/University	Country	Pit	Page
9	Göteborg Chalmers	Sweden	4	110
11	Thessaloniki U	Greece	2	116
12	New Delhi IIT	India	3	114
13	München UAS	Germany	1	114
16	Hannover U	Germany	5	111
17	Karlsruhe KIT	Germany	6	112
18	Dresden TU	Germany	12	109
19	Braunschweig TU	Germany	10	107
21	Bayreuth U	Germany	11	107
23	Amberg OTH	Germany	9	106
26	Stuttgart U	Germany	24	116
31	München TU	Germany	17	113
33	Zürich ETH	Switzerland	18	117
34	Ingolstadt UAS	Germany	22	111
41	Wien TU	Austria	23	117
42	Darmstadt TU	Germany	16	108
45	Sankt Augustin UAS	Germany	25	115
46	Köln TH	Germany	26	112

Car	City/University	Country	Pit	Page
50	Lisboa IST	Portugal	27	113
54	Barcelona UPC	Spain	28	107
63	Trondheim NTNU	Norway	30	116
64	Kaiserslautern TU	Germany	29	111
66	Augsburg UAS	Germany	32	106
67	Osnabrück UAS	Germany	31	114
72	Bremen U	Germany	33	108
76	Freiberg TU	Germany	34	109
77	Stuttgart DHBW	Germany	35	115
78	Hamburg TU	Germany	36	110
85	Delft TU	Netherlands	42	108
96	Zwickau UAS	Germany	41	117
97	Landshut UAS	Germany	46	112
119	Mülheim a. d. Ruhr HRW	Germany	40	113
181	Göttingen HAWK	Germany	47	110
186	Patras U	Greece	48	115
192	Diepholz UAS	Germany	49	109

STATUS/STAND: 19.07.2017

Participating Formula Student Driverless TEAMS 2017

Car	City/University		Country	Pit	Page
413	München UAS	ELECTRIC	Germany	15	122
414	Deggendorf UAS	ELECTRIC	Germany	44	120
416	Hannover U	ELECTRIC	Germany	39	120
417	Karlsruhe KIT	ELECTRIC	Germany	13	121
426	Stuttgart U	ELECTRIC	Germany	37	122
431	München TU	ELECTRIC	Germany	38	121
433	Zürich ETH	ELECTRIC	Switzerland	43	123
434	Ingolstadt UAS	ELECTRIC	Germany	20	121
441	Wien TU	ELECTRIC	Austria	19	122
442	Darmstadt TU	ELECTRIC	Germany	21	119
469	Augsburg UAS	ELECTRIC	Germany	8	119
478	Hamburg TU	ELECTRIC	Germany	7	120
485	Beijing IT	ELECTRIC	China	14	119
499	Aachen RWTH	ELECTRIC	Germany	45	118
542	Firenze U	COMBUSTION	Italy	54	118

STATUS/STAND: 19.07.2017

Team Profiles

Combustion

1990 students

65 teams

20 nations

AKRON

University of Akron

Car 330 **Pit 119** **WRL 113** United States

The Zips Racing team has produced its 26th vehicle since 1990, the ZR17. The design of the ZR17 revolves around our main philosophy of developing a vehicle that is simple yet lightweight and reliable. Placing a strong focus on design integration and advanced manufacturing processes has enabled us to produce a vehicle far superior to any in the past.

FRAME CONSTRUCTION Tubular Space Frame with Bonded CFRP Honeycomb Composite Panels
MATERIAL 4130, CFRP, Ti, Al, Polymers
OVERALL L / W / H 2540mm / 1377mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1529mm / 1219mm / 1219mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 119kg / 119kg
SUSPENSION Double Unequal Length A-Arms, Pull rod Actuated Coilover
TYRES (Fr / Rr) Hoosier 6.0/19.0-10 LCO
WHEELS (Fr / Rr) 7.0x10, 50mm Offset, 3pc Al
ENGINE Yamaha WR450F
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 63.4mm / 1 cylinder / 450cc
COMPRESSION RATIO 16.25:1
FUEL SYSTEM Student Designed Fuel Pump Control With Sequential Staged Injection
FUEL E85
MAX POWER/TORQUE DESIGN 10500 rpm/ 7500rpm
DRIVE TYPE 520 Roller Chain
DIFFERENTIAL Drexler Formula Student, Salisbury Type
COOLING Dual Side Mounted Single Pass Radiators With Controlled Fan
BRAKE SYSTEM Gary Cast Iron Floating Discs, ISR Brake Calipers
ELECTRONICS Motec M150 ECU, ACL, VIM, PDM

ARNHEM

HAN University of Applied Sciences Arnhem

Car 246 **Pit 72** **WRL 288** Netherlands

The HAN Formula Student Team is a young and motivated team competing for the second time in FSG. The goal is to continue the succes of the first year and improve the team and car in every aspect. Reducing weight is the main goal for the second car, as the first car was a hefty 300 kilograms. Other goals are to improve team management and knowledge transfer. So far, the goals are achieved.

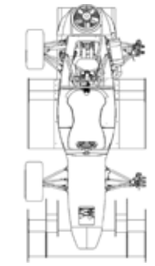
FRAME CONSTRUCTION Full Tubular Space Frame
MATERIAL 25x2.5mm S235, 25x1.6mm DP600, 25x1.2mm DC01, 14x1.5mm DP600
OVERALL L / W / H 2757mm / 1456mm / 1047mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1250mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 127kg / 141kg
SUSPENSION Double unequal length A-Arm. Direct acting spring and damper.
TYRES (Fr / Rr) 18x6 R10, Hoosier R25B / 18x6 R10, Hoosier R25B
WHEELS (Fr / Rr) 6x10 ET-5, -5mm offset, 1pc, Al Rim / 6x10 ET-5, -5mm offset, 1pc, Al Rim
ENGINE Stock KTM 690 2008
BORE / STROKE / CYLINDERS / DISPLACEMENT 102mm / 80mm / 1 cylinder / 654cc
COMPRESSION RATIO 11.8:1
FUEL SYSTEM 2010 yamaha R1 original fuelpump, single Keihin injector(original KTM)
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 7500 rpm/ 6500rpm
DRIVE TYPE Sprockets and Chain
DIFFERENTIAL Quaife QDF7ZR Helical LSD Differential
COOLING Single original KTM radiator in the left sidepod, single ECU activated fan
BRAKE SYSTEM 4-Disc system, ISR calipers and discs, Floating discs
ELECTRONICS Wiring harness sealed to IP67, Built-in ECU 38 channel 4Mb data logging, KMS CAN Display

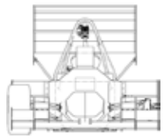
AUBURN

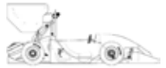
Auburn University

Car 217 **Pit 60** **WRL 50** United States

Auburn University Formula SAE storms the beaches of Europe with an all new design in AU-2017! Featuring a Yamaha FZ-07 powerplant with custom cylinder tuning, a full CFRP monocoque, improved driver controls and wheelset design, and the 2nd generation of Auburn aerodynamics, AU-2017C continues a storied history of Auburn racecars! Thank you to Futek, Seimens, the Auburn Department of Mechanical Engineering, Dr. Peter Jones, Symmetrix, Wesley Hunko, Walt Woltosz, GKN aerospace, and AUFSAE alumni.







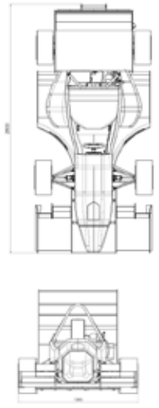
FRAME CONSTRUCTION CFRP and Al honeycomb core full monocoque
MATERIAL Hexcel and Toray woven and uni fibers, Hexcel core
OVERALL L / W / H 2969mm / 1420mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1537mm / 1219mm / 1194mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 126kg / 160kg
SUSPENSION short-long arm, pull rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) Hoosier R25B 18.0 x 8.0-10
WHEELS (Fr / Rr) 17.7 cm wide, 3 piece aluminum, cutsom CNC center
ENGINE 2015 Yamaha FZ-07
BORE / STROKE / CYLINDERS / DISPLACEMENT 80mm / 68.6mm / 2 cylinders / 689cc
COMPRESSION RATIO 12.5:1
FUEL SYSTEM Motec m800 with sequential injection and wasted-spark ignition
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 8000 rpm/ 6000rpm
DRIVE TYPE chain drive
DIFFERENTIAL Drexler FSAE Salisbury-style LSD
COOLING Rear mounted single core triple-pass radiator, 1200 cfm fan mounted to CFRP shroud
BRAKE SYSTEM 4 disk, self developed rotors with 190.5 mm diameter (F) and 177.8mm (R); ISR calipers
ELECTRONICS Multifunctional Steering Wheel, Electropneumatic Shifting System, Live-Telemetry

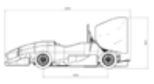
BATH

University of Bath

Car 250 **Pit 78** **WRL 5** United Kingdom

Team Bath Racing 2017's goal throughout the project has been to improve transient performance as a result of maximising lateral and longitudinal accelerations. Key design features on TBR17 include Team Bath Racing's first full carbon fibre monocoque, a switch to 10" Avon tyres,full aerodynamic package producing almost double the downforce compared to the 2016 car and Turbocharged KTM 500 EXC engine producing 56kW.





FRAME CONSTRUCTION Full carbon fibre/aluminium honeycomb monocoque
MATERIAL Solvay MTM49-3 based CFRP with different weaves, with 12mm and 18mm corex aluminium honecomb
OVERALL L / W / H 2933mm / 1383mm / 1197mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1180mm / 1140mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 114kg / 124kg
SUSPENSION Double unequal length A-Arms. Pull/push (F/R) rod, actuated vertical Spring/dampers
TYRES (Fr / Rr) Avon A92 10.0/16.0-7.0 Front & Rear
WHEELS (Fr / Rr) 10
ENGINE KTM 500 EXC with Garrett MGT1238 Turbocharger
BORE / STROKE / CYLINDERS / DISPLACEMENT 95.0mm / 72.0mm / 1 cylinder / 510cc
COMPRESSION RATIO 11.8
FUEL SYSTEM Custom multi-point fuel injection
FUEL E85
MAX POWER/TORQUE DESIGN 8500 rpm/ 8000rpm
DRIVE TYPE Single 520 Chain
DIFFERENTIAL Drexler V3 Limited Slip Differential
COOLING Twin Side mounted 1074cc radiators
BRAKE SYSTEM 4 hub mounted, fully floating stainless steel 191mm dia discs. Adjustable brake balance
ELECTRONICS Modular wire harness, aerospace spec connectors, high-spec motorsport control units

BELGRADE

University of Belgrade (Универзитет у Београду)

Car 350 **Pit 124** **WRL 193** Serbia

Formula Student team Road Arrow is the first Serbian FS team ever representing University of Belgrade. Our team is competing in C category since 2011, and we are proud to present to you our 6th vehicle that takes part for the first time in FSG! While bringing our work on this vehicle to an end, we have upgraded our suspenison and brake system, aerodynamics, sleeping for 2 hours per day and successfully finishing our tasks right before deadlines.

FRAME CONSTRUCTION steel space-frame
MATERIAL E235 and T45 steel
OVERALL L / W / H 3050mm / 1420mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1600mm / 1250mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 141kg / 154kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated in front and directly actuated on rear
TYRES (Fr / Rr) Avon 7.2/20.0-13
WHEELS (Fr / Rr) OZ Superleggera 13"
ENGINE Yamaha YZFR-R6
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42,5mm / 4 cylinders / 599cc
COMPRESSION RATIO 13.1
FUEL SYSTEM OEM Injectors actuated via ECU
FUEL RON 98
MAX POWER/TORQUE DESIGN 13000 rpm/ 9000rpm
DRIVE TYPE Chain driven LSD
DIFFERENTIAL Torque sensitive limited slip bevel gear differential with internal preload adjustment
COOLING right side pod mounted radiator
BRAKE SYSTEM self developed rotors with 220mm diameter, adjustable brake balance, Brembo calipers
ELECTRONICS Multifunctional Steering Wheel,Electropneumatic Shifting System, selfdesigned Telemetry

BERLIN

Hochschule für Technik und Wirtschaft Berlin

Car 300 **Pit 110** **WRL 221** Germany

This year we present you the lightest and most aggressive racecar we have ever developed. The Berlin Race Car 2017 combines optimized aerodynamics with a newly created wheel assembly. But these are not the only highlights which the BRC17 offers. Find out yourself and visit us at our pit! Have you ever seen a real unicone? #300thisisberlin #BecauseRaceCar #vespertheke

FRAME CONSTRUCTION Hybrid Monocoque: Front CFRP Monocoque / Rear Steel Tube Frame
MATERIAL CFRP, Rohacell foam core; Steel Tubing
OVERALL L / W / H 2936mm / 1421mm / 1190mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1250mm / 1250mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 118kg / 125kg
SUSPENSION front:unequal-length double A-arm, pull-rod ac; rear:unequal-length double A-arm, pushrod
TYRES (Fr / Rr) 10
WHEELS (Fr / Rr) 10
ENGINE KTM SX-F 505
BORE / STROKE / CYLINDERS / DISPLACEMENT 100mm / 60.8mm / 1 cylinder / 477cc
COMPRESSION RATIO 13.5:1
FUEL SYSTEM student built, Bosch injectors
FUEL E85
MAX POWER/TORQUE DESIGN 9250 rpm/ 6500rpm
DRIVE TYPE chain drive
DIFFERENTIAL Drexler
COOLING mounted inside rearframe
BRAKE SYSTEM 4 Disk System
ELECTRONICS Two way telemetric system,

BERLIN

Technische Universität Berlin

Car 313 **Pit 113** **WRL 84** Germany

The FT17 is the newest single-seater FS racing car from FaSTTUBe, the 12th vehicle in the team's history. More of an evolutionary rather than a revolutionary model, it retains the reliable single-cylinder turbocharged BMW engine, which has been optimized during a period of 2 years. The main goal was to lower mass, increase power and squeeze even more efficiency from the all-round package.

FRAME CONSTRUCTION Tubular Steel Frame
MATERIAL 25CrMo4
OVERALL L / W / H 3067mm / 1478mm / 1198mm
WHEELBASE / TRACK (Fr / Rr) 1575mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 118kg / 139kg
SUSPENSION Double unequal length A-Arm. Push rod (Fr) and Pull rod (Rr) actuated spring and damper.
TYRES (Fr / Rr) 18.0x7.5-10 Hoosier R25B / 18.0x7.5-10 Hoosier R25B
WHEELS (Fr / Rr) Custom built 7.5x10, 25mm offset, Keizer Wheel Al Rim/ Custom built 7.5x10, 25mm offset
ENGINE 2007 BMW G 450 X
BORE / STROKE / CYLINDERS / DISPLACEMENT 98mm / 59.6mm / 1 cylinder / 449cc
COMPRESSION RATIO 12,5:1
FUEL SYSTEM Self build aluminium tank, external fuel pump, two injectors, pressure regulator
FUEL E85
MAX POWER/TORQUE DESIGN 7500 rpm/ 7000rpm
DRIVE TYPE Chain drive, original gearbox
DIFFERENTIAL Drexler differential, limited slip
COOLING Self build water-intercooler and cooler in the side box with fan mounted on cooling hood
BRAKE SYSTEM 4-Disk system, self developed and optimized rotors, ISR Calipers, Cockpit adjustable brake
ELECTRONICS Multifunctional steering wheel, electronic throttle, electronic wastegate, DRS, Shifting

BOCHUM

Ruhr University Bochum

Car 248 **Pit 73** **WRL 176** Germany

The all new RUB 17 is our attend to create a successful season for RUB Motorsport. We focused on the most important aspects of racing: lightweight design, low CoG, high reliability. Furthermore the RUB 17 has a lot of technical highlights such as the aerodynamic package which harmonizes perfectly with the cars suspension to ensure high traction. After all the hard work we want to thank our sponsors and our university for their dedication and great support

FRAME CONSTRUCTION Tubular Steel Spaceframe
MATERIAL 25CrMo4
OVERALL L / W / H 2970mm / 1485mm / 1210mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1227mm / 1192mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 120kg / 128kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) Hoosier 18.0 x 6.0 - 10 R25B
WHEELS (Fr / Rr) 10
ENGINE KTM 450 SXF
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mmmm / 63.4mm / 1 cylinder / 449cc
COMPRESSION RATIO 12.6:1
FUEL SYSTEM BOSCH MS3 Sport sequential injection and single coil ignition system
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 9000 rpm/ 7500rpm
DRIVE TYPE #428 Chaindrive 4spd sequential gearbox
DIFFERENTIAL Drexler limited slip differential (FS2010 V.2), Preload 30 Nm, 50% Locked
COOLING Side mounted water and oil radiator, single fan
BRAKE SYSTEM 4/2 piston ISR calipers, 196mm/182mm self developed rotors, adjustable brake balance
ELECTRONICS Fully sealed Harness. Electric Shifting, Clutching, Throttle and Brake Balance adjustment

BOLOGNA

University of Bologna

Car 288 **Pit 104** **WRL 95** Italy

Innovation, history, love and will to win: these are the three most important "components" of UniBo Motorsport. Since 2010 our project, in cooperation with the University of Bologna, is a concrete reality which helped not only the engineering students to approach how to be in a team and to achieve important goals. UBM17 Felsinea is our latest creation, with a name that takes origins directly from the past, a tribute that brings together the city of Bologna and the Motorvalley legacy.

FRAME CONSTRUCTION front carbon fiber monocoque / rear steel tubular space frame
MATERIAL Carbon fiber with aluminum honeycomb core / AISI 4125 steel round tubing
OVERALL L / W / H 2984mm / 1452mm / 1180mm
WHEELBASE / TRACK (Fr / Rr) 1560mm / 1200mm / 1160mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 130kg / 160kg
SUSPENSION Duble unequal lenght A-Arm. Pull rod in front and Push rod in rear
TYRES (Fr / Rr) Hoosier 190x42 R10
WHEELS (Fr / Rr) 7x10 27mm offset, 2pc Al rim
ENGINE Modified Suzuki GSX-R600 K6
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 14,5:1
FUEL SYSTEM Student built ,fuel injection, common rail
FUEL Ethanol 85
MAX POWER/TORQUE DESIGN 11500 rpm/ 8500rpm
DRIVE TYPE Regina 520 Steel Drive Chain
DIFFERENTIAL Drexler Formula SAE Specific Clutch Pack Limited Slip Differential
COOLING One right side pod radiator with electric fan and electric pump
BRAKE SYSTEM 4-Disk system, Brembo calipers, adjustable brake balance
ELECTRONICS Student built ECU with built-in data logging; Student built Lambda Controller

BRNO

Technical University of Brno

Car 299 **Pit 109** **WRL 79** Czech Republic

„One team, one cylinder, one heart." This is a definition of TU Brno Racing. We have built seven single seaters for the Formula Student competition in the past seven years. Our team philosophy is a development of a lightweight car equipped with an aerodynamic package and a turbocharged single cylinder engine. This year we managed to build our first carbon fibre monocoque. A higher value of torsional stiffness was achieved thus the weight of the car remains at 180 kg.

FRAME CONSTRUCTION Composite monocoque with steel tube rear frame
MATERIAL CFRP with aramid/aluminum Honeycomb; E355+N - tubes; EN AW 6082 - square tubes
OVERALL L / W / H 2912mm / 1522mm / 1170mm
WHEELBASE / TRACK (Fr / Rr) 1532mm / 1210mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 128kg / 123kg
SUSPENSION Double unequal length Al/CFRP A-Arm, pull rod actuated, longitudinally oriented damper
TYRES (Fr / Rr) 205/470 R13, Continental C17 / 205/470 R13, Continental C17
WHEELS (Fr / Rr) 7,0x13, 30 mm ET, OZ racing, Magnesium / 7,0x13, 30 mm ET, OZ racing, Magnesium
ENGINE Husqvarna FE 501 / Turbocharged
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mmmm / 72mmmm / 1 cylinder / 510cc
COMPRESSION RATIO 9.5:1
FUEL SYSTEM Port fuel injection using Bosch injectors (EV12 353 g/min 2-Spray and EV14 765)
FUEL ethanol
MAX POWER/TORQUE DESIGN 10500 rpm/ 7500rpm
DRIVE TYPE Chain size 520 DID ERT-2
DIFFERENTIAL Drexler formula student limited slip
COOLING Right sidepod mount. 420x217mm core U-flow radiator, 596 cfm fan mount.to backg.
BRAKE SYSTEM 4-Disk system, self developed rotors with 210mm diameter, brake balance, ISR Calipers
ELECTRONICS Raychem Spec 44 wires, shrink tubing, Deutsch motorsport conectors, LifeRacing F88 ECU

BURSA

University of Uludağ

Car 216 **Pit 56** Turkey

In UR04 we focused on cornering stability and acceleration. 13 inches tires, unequal double wishbone a arms, adjustable camber thanks to shimsa and aerodynamic improvement were used for better cornering and driveability. Composite material for reducing weight, ECU tuning, electropneumatic shifter mechanism was performed in order to better race conditions.

FRAME CONSTRUCTION Space frame steel tubes.
MATERIAL Steel
OVERALL L / W / H 2996mm / 1518mm / 1075mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1303mm / 1270mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 140kg / 170kg
SUSPENSION Double unequal length A-Arm. Push rod actuated angular oriented damper system.
TYRES (Fr / Rr) 160x530 R13, Pirelli / 180x560 R13, Pirelli
WHEELS (Fr / Rr) 5.5x13, -15 mm offset, 2pieces Al Alloy, 5.5x13, -15 mm offset, 2pieces Al Alloy
ENGINE Modified Honda CBR600RR/2008
BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12.2:1
FUEL SYSTEM Sequential Multi Point İnjection and İgnition
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 8500 rpm/ 6000rpm
DRIVE TYPE Chain
DIFFERENTIAL Drexler limited slip differential
COOLING Single side pod mounted radiators with thermostatic controlled electric fans
BRAKE SYSTEM 4-Disk system, 220-200mm(Front-Rear) diameter, adjustable brake balance
ELECTRONICS wiring harness sealed to IP77, Electropneumatic Shifting System, modified tele-com system

COBURG

University of Applied Sciences Coburg

Car 270 **Pit 83** **WRL 3** Germany

For the 10th anniversary car of CAT-Racing we took the willpower of the Panther, the Leopard's strength, the Tiger's wild heart, the Jaguar's elegance, the Puma's speed, the Luchs' motivation, the Gepard's innovation, the Manul's passion and the success of the Karakal to unite it for the C-17. Back to our roots it's a Panther, a Pink Panther!Everybody loves cat - animals, do you? Our claws are sharpened, our meow is trained for noise and our purring is ready for FSG!

FRAME CONSTRUCTION rear spaceframe decoupled from main structure, front monocoque
MATERIAL 200g/m² twill weave carbon fiber, mild steel E355/S235 JR +C
OVERALL L / W / H 3020mm / 1520mm / 1190mm
WHEELBASE / TRACK (Fr / Rr) 1555mm / 1150mm / 1120mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 115kg / 143kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated spring and damper. adjustable ARB
TYRES (Fr / Rr) Hoosier 10'' LC0/WET
WHEELS (Fr / Rr) 7.5x10.22mm, 3pc Al Rim custom center
ENGINE Yamaha R6 YZF
BORE / STROKE / CYLINDERS / DISPLACEMENT 44.5mm / 65.5mm / 4 cylinders / 600cc
COMPRESSION RATIO 13:1
FUEL SYSTEM Multipoint fuel injection with Bosch EV14 and Bosch MS6
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 12000 rpm/ 7000rpm
DRIVE TYPE Roller - Chain 520
DIFFERENTIAL Drexler Slip Differential with reworked Locks
COOLING Splittet cooling conecept with one 180mm Radiator each side
BRAKE SYSTEM 4-Disk system, floating, steel, hub mounted,
ELECTRONICS reworked wire crosssection,self delveloped dash board for driver Infroamtion

COIMBATORE

PSG College of Technology

Car 369 **Pit 126** **WRL 396** India

PEGASUS RACING, team representing PSG TECH, Coimbatore is a well-knit team comprising of multi-talented students, strongly believing that racing machines built with passion can be a wonderful learning experience. Our chase for attaining perfection and excellence began with our first car built in 2009 .Further improvements in 2011 helped us achieve the second spot nation-wide. We are a team with unconditional desire for racing. We dream, we build, we race. We are Pegasus racing.

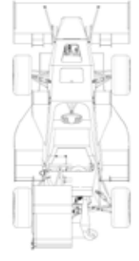
FRAME CONSTRUCTION Complete Tubular Frame Structure
MATERIAL Mild Steel AISI 1020 tubings
OVERALL L / W / H 2770mm / 1325mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1080mm / 1020mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 160kg / 108kg
SUSPENSION inboard SLA suspension with pullrod geometry with antiroll bar in rear and Pull in front
TYRES (Fr / Rr) 152x67 R10, Hoosier R25B / 191x53 R10, Hoosier R25B
WHEELS (Fr / Rr) 6.0x10, 5mm offset, 3 pc Al Rim / 6.5x13, 20mm offset, 3pc Al Rim
ENGINE KTM 530 EXC
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 72mm / 1 cylinder / 510cc
COMPRESSION RATIO 11.8:1
FUEL SYSTEM Sequential Electronic fuel injection with wasted spark ignition
FUEL 95 octane gasoline
MAX POWER/TORQUE DESIGN 8000 rpm/ 6000rpm
DRIVE TYPE 520 grade X Ring
DIFFERENTIAL Clutch type Limited Slip Differential
COOLING Twin Side Pod mounted radiatior with electronic fan controlled by thermistor
BRAKE SYSTEM 4-Disk system with rotor 153mm diameter
ELECTRONICS Bi-directional LoRa, Low Power Wide Area Network(LPWAN), Maximum speed: 300 kbps

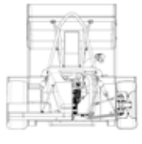
CORVALLIS

Oregon State University

Car 213 **Pit 53** **WRL 17** United States

Global Formula Racing is an internationally collaborative FSAE team from Oregon State University and DHBW Ravensburg. Together we build two cars, one combustion, one electric, every year, sharing chassis, aerodynamics and suspension packages. GFR17c is equipped with more power at less weight. We are looking forward to seeing you in Hockenheim and we are pleased to answer any of your questions about our team and the car so stop by our pit!





FRAME CONSTRUCTION CFRP monocoque with steel main and aluminum front hoop
MATERIAL Toray T700, aluminum and nomex core, various thicknesses
OVERALL L / W / H 2865mm / 1350mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1145mm / 1145mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 94kg / 116kg
SUSPENSION Double unequal length a-arms, direct acting air suspension
TYRES (Fr / Rr) Hoosier 6.0/18.0-10 LC0
WHEELS (Fr / Rr) Student Designed 3 pc Al-CFRP Rim
ENGINE KTM
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 63.4mm / 1 cylinder / 450cc
COMPRESSION RATIO 12,6:1
FUEL SYSTEM Honda CRF450R injector, in tank fuel pump
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 10000 rpm/ 8500rpm
DRIVE TYPE Chain drive
DIFFERENTIAL Drexler limited slip differential
COOLING Side mounted oil and water coolers
BRAKE SYSTEM Brembo and AP calipers, Tilton master cylinders, student designed rotors
ELECTRONICS Motec

DARMSTADT

University of Applied Sciences Darmstadt

Car 242 **Pit 69** **WRL 145** Germany

After a great 12th place at FSG 2016, we're back for more!Building on its successful predecessor, the F17 offers many technical improvements in all areas of the car. New pneumatic shifter, new airbox, new sidepods, new electronics, new steering wheel... the list goes on. With a lighter and more performant car, we're ready to compete with the best teams of the world and look forward to a great event!A special thanks goes to our sponsors and supporters, who make this amazing experience possible!

FRAME CONSTRUCTION Tubular space frame
MATERIAL E235
OVERALL L / W / H 2940mm / 1430mm / 1170mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1205mm / 1205mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 136kg / 126kg
SUSPENSION Double unequal length A-Arm, actuation via push rods, adjustable dampers, anti-roll bar
TYRES (Fr / Rr) 18 x 8,5 R10 Hoosier R25B/18 x 8,5 R10 Hoosier R25B
WHEELS (Fr / Rr) Aluminium center lock wheel star, CFRP rim shells
ENGINE KTM SX-F 450 (modified)
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 72mm / 1 cylinder / 510cc
COMPRESSION RATIO 14,3:1
FUEL SYSTEM Dual injection (1x port, 1x inside plenum), dash fittings
FUEL E85
MAX POWER/TORQUE DESIGN 9500 rpm/ 7000rpm
DRIVE TYPE Sequential 4 speed gear box, 428 chain
DIFFERENTIAL Drexler Limited Slip Differential, custom made preload adjustment
COOLING Side mounted radiator, thermostatic controlled electric fan
BRAKE SYSTEM 4 disk system, self-developed floating rotors, adjustable brake balance
ELECTRONICS 4,2'' touch display, self-developed FPGA board and CAN measurement system

ERLANGEN

Friedrich-Alexander-Universität Erlangen-Nürnberg

Car 249 **Pit 74** **WRL 19** Germany

This year we decided not only to improve our last years car, but in some points to completely renew our design. Therefore we changed major components and established small innovations. For example we have a new engine and rear frame concept.We hope to create a lighter, faster and overall more compact racecar than last year.We call it FAUmax KappaWe want to thank our sponsors for their unbelievable support and for joining us on our journey!

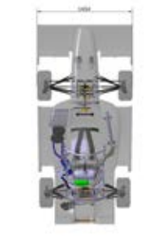
FRAME CONSTRUCTION Monocoque driver´s cell; seperate rear monocoque
MATERIAL CFRP monocoque with aluminium honeycomb core
OVERALL L / W / H 2900mm / 1554mm / 1190mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1240mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 105kg / 126kg
SUSPENSION Double unequal length A-Arm, directly actuated spring / damper
TYRES (Fr / Rr) 18x6.0 R10 Hoosier / 18x6.0 R10 Hoosier
WHEELS (Fr / Rr) 6.0x10, +50,3mm offset, 1 pc CFRP / 6.0x10, +50,3mm offset, 1 pc CFRP
ENGINE KTM SX-F 450 2016
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 63.4mm / 1 cylinder / 449cc
COMPRESSION RATIO 12.85:1
FUEL SYSTEM Bosch ev 14
FUEL E 85
MAX POWER/TORQUE DESIGN 10000 rpm/ 9000rpm
DRIVE TYPE Self-designed bevel gear drive
DIFFERENTIAL Self-designed stiff axle drive
COOLING Middle mounted 500cc radiator and 11
BRAKE SYSTEM Self-made master cylinders, self-designed stainless steel floating rotors
ELECTRONICS Dezentralized control units, custom Vehicle Information System, electro-mechanic shifting

ESSLINGEN

University of Applied Sciences Esslingen

Car 294 **Pit 106** **WRL 9** Germany

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. With the experiences, the simulation results and collected data from our previous cars, the goals we set forour car development include making best use of tires to run on a high grip level, decrease of mass, yaw-inertia and height of the COG in Addition to a high-power engine with good fuel-efficiency.



FRAME CONSTRUCTION Modular chassis consisting of a one piece Monocoque and a tubular rear frame
MATERIAL CFRP Monocoque with UD and fabric fibre, Nomex Honeycomb, 4130 steel rear frame
OVERALL L / W / H 2990mm / 1454mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1600mm / 1208mm / 1148mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 117kg / 140kg
SUSPENSION SLA with pushrod actuated Kaz/Penske 7800 dampers / 3-damper system
TYRES (Fr / Rr) Hoosier, 18 x 7,5 R10 R25B
WHEELS (Fr / Rr) 7,5x10, 51mm offset, Al Rim, Al center
ENGINE FuT 610ccm based on Honda CBR 600RR PC-37
BORE / STROKE / CYLINDERS / DISPLACEMENT 67,5mm / 42,5mm / 4 cylinders / 603cc
COMPRESSION RATIO 14,1:1
FUEL SYSTEM fuel injection, walbro GSL392
FUEL gasoline
MAX POWER/TORQUE DESIGN 10000 rpm/ 8000rpm
DRIVE TYPE 520 chain
DIFFERENTIAL clutch pack limited slip, adjustable preload, adjustable bias ratio
COOLING custom u-flow water in left side pod and straight flow oil radiator at left rear
BRAKE SYSTEM Stainless Steel, floating, 195 outer diam., 142 inner diam.
ELECTRONICS Bidirectional point-to-multipoint connection via radio modul Xbee Pro 868MHz

GRAZ

Graz University of Technology

Car 253 | **Pit 77** | **WRL 2** | Austria

TU Graz Racing Team is a team that is rich in tradition. Every year, we build on the excellent cars from the past and try to continuously improve. This year, like every year we are trying to build a car that maintains or exceeds the performance compared to past cars. We try to meet the challenges of a Formula Student season by clearly dividing the upcoming work into 7 different modules. The heads of the respective modules act as connectors and coordinators.

FRAME CONSTRUCTION one-piece CFRP monocoque
MATERIAL carbon fibre prepregs, nomex and aluminium honeycombs, structural foam, cfrp and titanium inserts
OVERALL L / W / H 2915mm / 1413mm / 1180mm
WHEELBASE / TRACK (Fr / Rr)
1550mm / 1180mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 104kg / 113kg
SUSPENSION double unequal lengh A-Arm, pushrod actuated horizontal orientated spring and damper
TYRES (Fr / Rr) 18 / 6 - 10 Hoosier LC0 / 18 / 6 - 10 Hoosier LC0
WHEELS (Fr / Rr) CFRP
ENGINE KTM SX-F 450
BORE / STROKE / CYLINDERS / DISPLACEMENT
95mm / 72mm / 1 cylinder / 500cc
COMPRESSION RATIO 15,13:1
FUEL SYSTEM inlet manifold injection
FUEL E85
MAX POWER/TORQUE DESIGN 9000 rpm/ 6500rpm
DRIVE TYPE chain drive
DIFFERENTIAL limited slip differential
COOLING aluminium core oil and water radiator, water radiator with selfmade fan on the suction side
BRAKE SYSTEM 4 disk system, electric adjustable brake balance, weight optimized rear calipers
ELECTRONICS multifunctional steering wheel, electric clutch actuation, live telemetry, ETC

GRAZ

University of Applied Sciences Joanneum Graz

Car 203 | **Pit 51** | **WRL 4** | Austria

joanneum racing graz and its members - „The Weasels" - have been building racecars since 2003. The team consists of students of the U.A.S Graz in Austria, who are alternating every year. Their cars have always been super- or turbocharged. The Weasels are currently on the 3rd place in the WRL. Their newest member, the jr17, is equipped with a turbocharged Rotax engine and a CFRP gearbox housing, it has a CFRP chassis with optimized suspension and aerodynamics for the 2017 season #NeverStopPushing

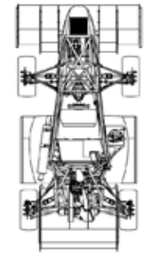
FRAME CONSTRUCTION CFRP monocoque sandwich construction with steel tube rear frame
MATERIAL High-tensile-strength carbon fibre prepregs, Rohacell and aramid honeycomb core
OVERALL L / W / H 2920mm / 1434mm / 1200mm
WHEELBASE / TRACK (Fr / Rr)
1580mm / 1220mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 134kg / 139kg
SUSPENSION Double unequal length A-Arm, Pull rod actuated spring/damper (ZF Sachs), Adj. Roll bar
TYRES (Fr / Rr) Continental 205/470 R13 - 34M
WHEELS (Fr / Rr) 7 inch wide, one piece handlaminated CFRP Rim
ENGINE Modified Rotax 602 ACE with Turbocharger
BORE / STROKE / CYLINDERS / DISPLACEMENT
74mm / 69mm / 2 cylinders / 593cc
COMPRESSION RATIO 8.6:1
FUEL SYSTEM Port injection system, Bosch injectors, one injector per cylinder, aluminum rail
FUEL 100 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 6000 rpm/ 5500rpm
DRIVE TYPE via gearwheels, integrated in gearbox
DIFFERENTIAL 2010 DREXLER limited slip differential integrated in gearbox
COOLING two undertray-mounted one core radiators with fan on each
BRAKE SYSTEM 4-Disk system, floating, heat-treated laser cut rotors with 240 and 210 mm diam., aluminium
ELECTRONICS Multifunctional steering wheel with display, Motorsport ABS, Electropneumatic Shifting Sys

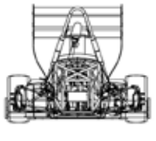
GYŐR

Széchenyi István University Győr

Car 279 | **Pit 100** | **WRL 70** | Hungary

Arrabona Racing Team, established in 2014, has been the most successful Hungarian combustion team in Formula Student since its foundation. Our 28-person strong 2017-team built upon the experience gathered in the past 3 seasons to create our ultimate vehicle. With a unique engine supplied as part of an intra-university collaboration with SZEngine, this year`s ART_04 shows the biggest leap forward with a full aerodynamic package, redesigned suspension and new tires.





FRAME CONSTRUCTION Structural steel space frame with aluminium honeycomb impact attenuator
MATERIAL Structural steel and aluminium honeycomb
OVERALL L / W / H 2860mm / 1446mm / 1180mm
WHEELBASE / TRACK (Fr / Rr)
1550mm / 1200mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 114kg / 119kg
SUSPENSION Double unequal length A-Arm, Direct actuated spring and damper
TYRES (Fr / Rr) 470x34 R13, Continental C17 / 470x34 R13, Continental C17
WHEELS (Fr / Rr) 7x13, 30mm offset, 1ps Mg Rim / 7x13, 30mm offset, 1ps Mg Rim
ENGINE SZEngine EVO5
BORE / STROKE / CYLINDERS / DISPLACEMENT
95mm / 72mm / 1 cylinder / 510cc
COMPRESSION RATIO 13:1
FUEL SYSTEM Intake pipe injection with optional airbox injektion
FUEL RON 100, gasoline
MAX POWER/TORQUE DESIGN 8200 rpm/ 7100rpm
DRIVE TYPE 4-speed sequential gearbox, chain drive
DIFFERENTIAL Drexler FS Limited slip differential
COOLING Side mounted single radiator with 398 cfm temperature controlled electric fan
BRAKE SYSTEM 4-floating disk system with self-developed rotors, 217.5 mm diameter, ISR brake calipers
ELECTRONICS Spec44 wires, heat shrink tubing, braided wire sleeves, custom data logger, launch control

HAIFA

Technion - Israel Institute of Technology

Car 219 | **Pit 58** | **WRL 82** | Israel

Formula Technion is an Israeli-based team out of the Technion: Israel Institute of Technology. This will be the team's fifth year competing in Formula Student. A significant change in the vehicle concept was made as the team moved to a single cylinder engine from a four-cylinder. As a result, the entire vehicle was redesigned and the team is excited to compete for the first time at Formula Student Germany.

FRAME CONSTRUCTION Steel Space Frame
MATERIAL Chromoly Steel
OVERALL L / W / H 3020mm / 1420mm / 1185mm
WHEELBASE / TRACK (Fr / Rr)
1560mm / 1200mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 129kg / 119kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated vertically oriented spring and damper
TYRES (Fr / Rr) Hoosier 20.0 X 7.5 - 13
WHEELS (Fr / Rr) OZ Magnesium Rim
ENGINE KTM 450 EXC-F (2017)
BORE / STROKE / CYLINDERS / DISPLACEMENT
95mm / 63.4mm / 1 cylinder / 450cc
COMPRESSION RATIO 11.8:1
FUEL SYSTEM PE3 ECU with semi-sequential injection and wasted-spark ignition
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 8000 rpm/ 6000rpm
DRIVE TYPE 510 Chain
DIFFERENTIAL Drexler Limited-Slip DIfferential
COOLING Rear mounted radiator with 5
BRAKE SYSTEM 3-disc system (mono-rear brake)
ELECTRONICS Wiring Harness IP67, Telemetry, CAN-Bus, Electric gear shifting system

HAMBURG

University of Applied Sciences Hamburg

Car 296 | **Pit 107** | **WRL 15** | Germany

A new star is born. On may 19th, we presented our new race car called „Nyala". This race car impresses with a further weight reduction on the chassis and a breathtaking design. The focus is on easy drivability with high downforce. We are looking forward to the event in HAWKenheim and the reunion with the other FS teams. 69!!! HAWKS!!!

FRAME CONSTRUCTION full body CFRP monocoque and CFRP rear support frame
MATERIAL E323 prepreg, HRH10 aramide & PAMG-XR1 aluminum Honeycomb, IG-F foam
OVERALL L / W / H 3138mm / 1435mm / 1200mm
WHEELBASE / TRACK (Fr / Rr)
1635mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 125kg / 133kg
SUSPENSION Double unequal length A-Arm with pull rod acuated, vertically oriented spring and damper
TYRES (Fr / Rr) Continental 20 x 7.0 - R13
WHEELS (Fr / Rr) 7x13 - 22mm offset, 2pc CFRP Rim
ENGINE Kawasaki ZX6R 636B (2003/2004)
BORE / STROKE / CYLINDERS / DISPLACEMENT
68.0mm / 43.8mm / 4 cylinders / 636cc
COMPRESSION RATIO 12.8:1
FUEL SYSTEM Student built, port fuel injection, one injector per runner, full sequential
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 10000 rpm/ 8500rpm
DRIVE TYPE DID Racing Chain 520ERS2
DIFFERENTIAL Limited slip differential (Drexler), acc. 40° -> 60%, decelleration 50° -> 42%
COOLING Side mounted radiator, electric water pump, 2 self designed fans
BRAKE SYSTEM 4-Disk-system, self designed, rotors with 270mm diameter, adjustable brake balance
ELECTRONICS Traction control, launch control, ABS, electronic throttle control

HATFIELD

University of Hertfordshire

Car 224 | **Pit 62** | **WRL 65** | United Kingdom

This year celebrates our 20th anniversary competing at formula student events since its inception in 1998. The 2017 contender will aim to continue UH Racing's strong heritage by improving on last year's 14th place with a podium result.The main focus this year was to increase the power and drive-ability of the existing power unit.Our team consists of a mixture of 31 new and returning students from a diverse range of backgrounds combining experience, a new way of thinking and innovation.

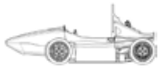
FRAME CONSTRUCTION Tubular Steel Spaceframe
MATERIAL Steel
OVERALL L / W / H 2840mm / 1400mm / 1190mm
WHEELBASE / TRACK (Fr / Rr)
1580mm / 1200mm / 1140mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 100kg / 109kg
SUSPENSION Double unequal length wishbones. Direct damping setup with coil-under custom dampers.
TYRES (Fr / Rr) 205/470 R13 Continental C17 Front and Rear
WHEELS (Fr / Rr) 7" wide OZ Racing 13" Magnesium 1pc rim
ENGINE Honda CBR500R Twin
BORE / STROKE / CYLINDERS / DISPLACEMENT
67mm / 66.8mm / 2 cylinders / 471cc
COMPRESSION RATIO 10.7:1
FUEL SYSTEM OEM Honda Multi-point fuel injection
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 8000 rpm/ 7000rpm
DRIVE TYPE 520 Chain Drive
DIFFERENTIAL Spool
COOLING Side Mounted Radiator and Oil Cooler
BRAKE SYSTEM Student designed. 2 x 4-pot hub mounted / 1 x 4-pot inboard mounted
ELECTRONICS Raychem 25 Complying to IP67, Life Racing F88 ECU & PDU-16, Student Designed Dashboard

HEILBRONN

Heilbronn University

Car 239 **Pit 68** **WRL 389** Germany

HHN Racing is the Formula Student team of the UAS Heilbronn is one of the biggest university of applied sciences in Germany. Thanks to all sponsors and our university. Our goal was to build a car that is easy to understand and reliable. Every newbie should easily understand the technic. With this priority we optimised the service ability.



FRAME CONSTRUCTION Tubular steel space frame with aluminium endplate
MATERIAL E355 / EN-AW 7075
OVERALL L / W / H 2740mm / 1398mm / 1081mm
WHEELBASE / TRACK (Fr / Rr) 1525mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 128kg / 131kg
SUSPENSION unequal length A-Arm. (Fr) Pull rod (Rr) Push rod actuated. Fully adj. Damper. Adj. ARB
TYRES (Fr / Rr) 18.0
WHEELS (Fr / Rr) 13"
ENGINE SWM 500
BORE / STROKE / CYLINDERS / DISPLACEMENT 97mmmm / 67.8mm / 1 cylinder / 501cc
COMPRESSION RATIO 13,3:1
FUEL SYSTEM Bosch fuel injection EV14 L-Valve in student designed housing in manifold
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 7600 rpm/ 5500rpm
DRIVE TYPE 520 motorcycle chain
DIFFERENTIAL Drexler FS limited slip differential
COOLING Self designed Radiator with aluminium hard tubes
BRAKE SYSTEM 4-Disk system, self-developed rotors with front 218 mm and rear 208 mm diameter, adj. brak
ELECTRONICS Bosch MS6 ECU, self progammed 5" Touch Display, electro-pneumatic Shifting System

ISTANBUL

Yıldız Technical University

Car 340 **Pit 121** **WRL 255** Turkey

Behold the YTR04, fourth car of the most successful Turkish team. With already having a reliable engine unit, which made it possible to finish all the dynamic events last year, the main emphasis for this year had been to increase grip. The never-ending quest for finding speed leads to development of first ever aero package of the team. Various driving aids are added to tame this beast by upgrading the electronics. We can't wait to visit free Magnum stand.PS: It is Yildiz TU, not Istanbul TU

FRAME CONSTRUCTION One piece tubular steel space-frame
MATERIAL St44-2, E420, DP600 and ST52 steel round tubing 14mm to 28mm diameter
OVERALL L / W / H 3072mm / 1389mm / 1182mm
WHEELBASE / TRACK (Fr / Rr) 1620mm / 1200mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 137kg / 156kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) 175x55 R13 (20.5 x 7.0-13) Hoosier / 195x45 R13 (20.0 x 7.5-13) Hoosier
WHEELS (Fr / Rr) 7x13, 22mm offset, 1 pc Al rim / 7x13, 22mm offset, 1 pc Al rim
ENGINE 2008 Honda CBR 600RR
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42,5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12.2:1
FUEL SYSTEM Student des/built multipoint injection
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 11500 rpm/ 10500rpm
DRIVE TYPE 520 Chain Drive
DIFFERENTIAL Drexler Clutch Pack Limited Slip. with internal preload adjustment
COOLING Twin side pod mounted radiators with thermostatic controlled electric fans
BRAKE SYSTEM 4-Disk system, self developed rotors with ont 240mm, rear 210mm diameter, adjustable brake
ELECTRONICS Electropneumatic Shifting System

KARLSRUHE

Karlsruhe Institute of Technology

Car 307 **Pit 111** **WRL 13** Germany

KA-RaceIng is building three cars in the season 2017 with a team of about 85 members. We design, manufacture and test the KIT17c, KIT17e, and KIT17d. The KIT17c will be our 11th race car with a combustion engine. A lightweight design, best packaging and a focus on aerodynamic are the key facts for this year.

FRAME CONSTRUCTION CFRP monocoque frontmodule and a steel tubular rearend
MATERIAL HT and HM fibres, twill unidirectional plies, kevlar-carbon hybrid twill
OVERALL L / W / H 2867mm / 1510mm / 1190mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1220mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 106kg / 124kg
SUSPENSION double unequal length A-Arm. Pull-Rod actuated ZF Damper with coil spring
TYRES (Fr / Rr) Continental C17
WHEELS (Fr / Rr) Student design CFRP-Rim 7.5" wide,
ENGINE KTM 450 SX-F
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 63.4mm / 1 cylinder / 449cc
COMPRESSION RATIO 12,75:1
FUEL SYSTEM intake manifold port injection with an electronic low pressure pump
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 9500 rpm/ 9000rpm
DRIVE TYPE chain
DIFFERENTIAL Drexler
COOLING Side pod mounted air water radiator
BRAKE SYSTEM 4-Disk system, self developed rotors, adjustable brake
ELECTRONICS Multifunctional steering wheel, electropneumatic shifting system, electronic clutch actuat

KARLSRUHE

University of Applied Sciences Karlsruhe

Car 399 **Pit 130** **WRL 110** Germany

High Speed Karlsruhe, founded in 2006, is entering its 11th season in the Formula Student combustion competition. About 50 students of the UAS Karlsruhe have been working together to build the new racecar, named F-111. As a new highlight the F-111 comes up with a titan-carbon exhaust system, new dampers and a reveised areodynamics package. We are looking forward to the FSG, FSA and FSS competitions.

FRAME CONSTRUCTION Full CFRP monocoque
MATERIAL Carbon with rohacell aramid honeycomb core
OVERALL L / W / H 2890mm / 1356mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1570mm / 1140mm / 1140mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 104kg / 118kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated spring/damper
TYRES (Fr / Rr) 155/67 R10 Hoosier LC0
WHEELS (Fr / Rr) 6.0x10, 4mm offset, 2pc Al/C Rim
ENGINE Suzuki RM-Z 450
BORE / STROKE / CYLINDERS / DISPLACEMENT 100mm / 62.1mm / 1 cylinder / 487cc
COMPRESSION RATIO 12,2:1
FUEL SYSTEM Student des./built system, fuel injection, 1 injectors, full sequential
FUEL 98 octane
MAX POWER/TORQUE DESIGN 9000 rpm/ 7500rpm
DRIVE TYPE Chain GB520MxZ4
DIFFERENTIAL clutch pack limited slip, 10Nm preload, adjustable ratios
COOLING sidepod mounted water-air radiator
BRAKE SYSTEM 4-Disk system, self developed brake 2-piston calipers (FA & RA), adjustable brake balance
ELECTRONICS self designed control units and dash panel

KASSEL

University of Kassel

Car 280 **Pit 101** **WRL 89** Germany

We proudly present the HRT17! It's the seventh car buildt by the Herkules Racing Team. Based on lap time simulations we developed a new racecar with the overall goal of a high reliability in addition to low unsprung mass, a high power-to-weight ratio and high stiffness. Thats why we realised among other improvements a dry sump system and build a chassis that consits of a monocoque and a steeltube rearframe for the first time in our team history. We are looking forward to the FSG!

FRAME CONSTRUCTION front Carbon Monocoque, rear steel space frame
MATERIAL CFRP with honeycomb sandwich material (Schütz Cormaster C1), E235, E355 and 25CrMo4
OVERALL L / W / H 2910mm / 1395mm / 1160mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1200mm / 1160mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 114kg / 145kg
SUSPENSION Double A-arm suspension, push rod linked on the lower A-arm, third element
TYRES (Fr / Rr) Continental C17 205/470 R13
WHEELS (Fr / Rr) 7x13, 30mm offset, OZ Magnesium Rim, 4 Hole
ENGINE Modified Suzuki GSXR 600
BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 13.6:1
FUEL SYSTEM Fully sequential injection with Bosch, injectors and a Hptech ,fuel pump
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 12400 rpm/ 8130rpm
DRIVE TYPE chain drive (pitch: 15,875mm ; width 18m
DIFFERENTIAL limited slip differential by drexler, adjustable preload, Castrol Syntrax Limited Slip 75W
COOLING side mounted radiator and one shot brazed oil cooler with 1244.396 cfm/988,349 cfm custom build fans
BRAKE SYSTEM 4 Disk system, self developed rotors with 240/227,5mm diameter, adjustable brake balance
ELECTRONICS wiring harness with lightweight FEP coated wires, full programmable dashboard

KONSTANZ

University of Applied Sciences Konstanz

Car 343 **Pit 122** **WRL 161** Germany

Founded at the University of Applied Sciences Konstanz in 2006, Bodensee Racing Team proudly presents its 12th racecar, the ILTIS 17. At the start of the season our team welcomed many motivated rookies and now consist of about 50 students from all faculties. We make great effort to transfer knowldege to the new team members and together we made this year´s ILTIS possible. Our design goals focus on enhancing last year's concept in terms of reliability and reducing weight.

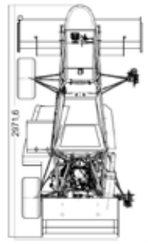
FRAME CONSTRUCTION Tubular space frame
MATERIAL SAE 4130
OVERALL L / W / H 3006mm / 1410mm / 1185mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1209mm / 1151mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 137kg / 137kg
SUSPENSION Double wishbone suspension, CFK tubes, aluminum inserts, steel a-arms, pullrod actuation
TYRES (Fr / Rr) Continental 205/470 R13 34M / Continental 205/470 R13 34M
WHEELS (Fr / Rr) 7x13, Mg Rim, OZ S.p.A.
ENGINE Suzuki GSX-R 600 K8
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42,5mm / 4 cylinders / 599cc
COMPRESSION RATIO 13,1:1
FUEL SYSTEM Aluminum tank with an internal fuel pump, intake-manifold fuel injection
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 12000 rpm/ 8200rpm
DRIVE TYPE Chain Type 520, custom 4 speed gear box
DIFFERENTIAL Drexler LSD - Formula Student
COOLING separated water and oil radiators, each with an electric fan
BRAKE SYSTEM 4-Disk system, self developed rotors with 225mm diameter, adjustable brake balance
ELECTRONICS self-designed PDM, steering wheel with integrated display, self-designed Live Telemetry

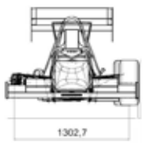
LOUGHBOROUGH

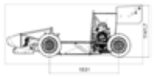
Loughborough University

Car 226 **Pit 57** **WRL 214** United Kingdom

LUMotorsport is made up of around 20 dedicated undergraduate Automotive, Electrical, Aeronautical and Mechanical Engineers from Loughborough University. LFS17 aims to improve on the team's first boosted powertrain developed for LFS16, whilst maintaining high levels of drivability. The 2017 Design features a fully structural composite floor, an up-rated aerodynamics package, refined engine mapping to run at significantly higher boost levels and improved Anti-roll bar design.







FRAME CONSTRUCTION Hybrid Steel Spaceframe, CFRP Sandwich Panel Floor and SIS
MATERIAL T45 / Mild Steel.
OVERALL L / W / H 2950mm / 1479mm / 980mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1200mm / 1181mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 139kg / 139kg
SUSPENSION Double Unequal Length A-Arm Pull Rod Actuated Ohlins Cane Creek Dampers Front and rear ARB
TYRES (Fr / Rr) Hoosier R25B 20.5 x 7.0 - 13
WHEELS (Fr / Rr) Braud Sturace 16
ENGINE Modified, Turbocharged, Triumph Daytona 675
BORE / STROKE / CYLINDERS / DISPLACEMENT 76.0mm / 44.7mm / 3 cylinders / 607cc
COMPRESSION RATIO 10:1
FUEL SYSTEM Custom MoTeC System with Denso Injectors
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 8000 rpm/ 7750rpm
DRIVE TYPE Renthal RR4 520 Road Race SRS Chain
DIFFERENTIAL 2010 Drexler FSAE LSD
COOLING Side Mounted Marston Radiator with twin SPAL fans
BRAKE SYSTEM AP Racing 4-Piston / 2-Piston Calipers, Custom Mild Steel Laser Cut Floating Discs
ELECTRONICS Custom loom incorporating MoTeC M800 ECU, PDM15, ADSL3 and MDD. Solenoid Gearshift

LUND

Lund University

Car 214 **Pit 50** **WRL 238** Sweden

Lund Formula Student was formed in 2006. This year's team consists of 30 students from five different engineering faculties and have now built the ninth car in one year. The focus has been on function and reliability. The car, LFS-17, uses an open steel space-frame with a composite body and is powered by a 600 cc Honda engine.The news for this year is the de-dion axel in the rear and a vastly different aero-package, which is tailored specifically for the LFS-17 car.

FRAME CONSTRUCTION CFRP reinforced one piece tubular steel space frame
MATERIAL Seamless cold drawn steel tubes (EN 10305-1/4)
OVERALL L / W / H 2900mm / 1393mm / 1168mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1160mm / 1160mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 139kg / 144kg
SUSPENSION Double unequal length A-Arm in front, 4 link de-dion
TYRES (Fr / Rr) 191x53 R10, Hoosier R25B / 191x53 R10, Hoosier R25B
WHEELS (Fr / Rr) 7.0x10, 3 pc Al Rim
ENGINE Honda CB600F
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12.0:1
FUEL SYSTEM Port injection, OEM fuel rail, OEM injectors
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 10500 rpm/ 7000rpm
DRIVE TYPE 520 Chain - Sprocket
DIFFERENTIAL Drexler LSD
COOLING 683 cm^2 core aluminium radiator, electric fan
BRAKE SYSTEM ISR calipers, 4 piston front/ 2 in rear. Hub mounted drilled steel disks,
ELECTRONICS Multifunctional steering wheel with paddels, electronically actuated gear and clutch

MAGDEBURG

Otto von Guericke University of Magdeburg

Car 220 **Pit 59** **WRL 298** Germany

We are the UMD Racing Team, the Formula Student Team of the Otto-von-Guericke University Magdeburg. This years development of the car was characterized by increasing the reliability and ease the manufacturing of all the components. Due to many old team members leaving the team at the end of this season we tried to teach all new members as much as possible in all our knowledge in designing and building a car. Good luck and have fun at FSG 2017 ;)

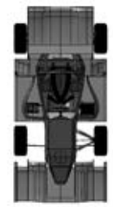
FRAME CONSTRUCTION Tubular profile space frame
MATERIAL Steel - E235+C
OVERALL L / W / H 2727mm / 1430mm / 1115mm
WHEELBASE / TRACK (Fr / Rr) 1600mm / 1230mm / 1230mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 148kg / 160kg
SUSPENSION Double A-Arm, Front push rod, Rear push rod, adjustable camber/toe/spring rate/damper rate
TYRES (Fr / Rr) Pirelli DM 540x200-13 / Pirelli DM 540x200-13
WHEELS (Fr / Rr) 7.0x13, 22mm offset, Al Rim / 7.0x13, 22mm offset, Al Rim
ENGINE Suzuki GSR 600 K6
BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12,5:1
FUEL SYSTEM Open-source MegaSquirt system with sequential injection
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 10500 rpm/ 8200rpm
DRIVE TYPE 520 Chain
DIFFERENTIAL Drexler Formula SAE Limited Slip Differential 2010
COOLING Left side mounted radiator with 285mm electric fan
BRAKE SYSTEM 4-Disk system, self developed brake caliper / rotors, AP Racing master zylinders
ELECTRONICS Custom wiring harness, electric actuated clutch and gearshift

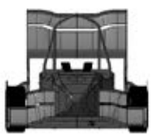
MARIBOR

University of Maribor

Car 235 **Pit 64** **WRL 194** Slovenia

Since 2011, Grand Prix Engineering team from University of Maribor is successfully competing in Formula Student combustion class. Their newest vehicle, GPE17, is showing off all of their knowledge, gathered through years of experience and learning. It is powered by a naturally aspirated Single cylinder engine, featuring a custom Akrapovic exhaust system. Their goal is to complete the Endurance and reach a good overall result at FSG.





FRAME CONSTRUCTION Single full composite Monocoque
MATERIAL Aluminium and Aramid honeycomb
OVERALL L / W / H 2917mm / 1380mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 125kg / 130kg
SUSPENSION Double unequal length a-arm, pullrod actuated horizontally oriented dampers and springs
TYRES (Fr / Rr) Hoosier 6.0 X 18.0 X 10
WHEELS (Fr / Rr) 7
ENGINE Modified KTM 505 SX-F 2007
BORE / STROKE / CYLINDERS / DISPLACEMENT 100mm / 61mm / 1 cylinder / 480cc
COMPRESSION RATIO 51.1:1
FUEL SYSTEM self designed port injection using primary and secondary Bosch EV14
FUEL E85
MAX POWER/TORQUE DESIGN 6000 rpm/ 5500rpm
DRIVE TYPE Chain drive with serial KTM gear box
DIFFERENTIAL Drexler limited slip
COOLING Side mounted 40mm core aluminium radiator, 235 cfm fan mounted to frame
BRAKE SYSTEM Self developed rotors with 194mm diameter, AP Racing calipers
ELECTRONICS Motec M800 ECU with custom dashboard and wiring

MILANO

Polytechnic University of Milan

Car 390 **Pit 128** **WRL 163** Italy

Dynamis PRC, Politecnico di Milano racing team, for the third time takes part to the FSG. This year we present the DP9, a prototype that embodies the evolution of concepts and project philosophy of its predecessor. Key features designed to improve performance are custom developed tires, a lightweight complete aero package and engine fine tuning. Unique elements are the carbon fiber monocoque chassis and our student designed and built electro-actuated system for clutch and gearshift management.

FRAME CONSTRUCTION Carbon fiber reinforced polymer monocoque
MATERIAL High strenght carbon fiber (including UD M40J), epoxy resin, Nomex®, Al honeycomb
OVERALL L / W / H 3010mm / 1415mm / 1192mm
WHEELBASE / TRACK (Fr / Rr) 1600mm / 1200mm / 1160mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 124kg / 124kg
SUSPENSION Double Carbon Fiber Wishbone, Pull-Rod, Double Horizontal Shock Absober, Ti ARB
TYRES (Fr / Rr) 180x55 R13, Pirelli 5Z791
WHEELS (Fr / Rr) 7.0x13, 30 mm offset, Mg Alloy
ENGINE Modified Aprilia RXV550
BORE / STROKE / CYLINDERS / DISPLACEMENT 80mm / 55mm / 2 cylinders / 553cc
COMPRESSION RATIO 12,5:1
FUEL SYSTEM EFI Euro4, full sequential fuel injection
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 10250 rpm/ 8750rpm
DRIVE TYPE Chain drive
DIFFERENTIAL Torque sensitive limited slip bevel gear differential with internal preload adjustment
COOLING Right sidepod mounted custom core radiator, 320 cfm fan mounted to radiator
BRAKE SYSTEM 4 floating, AISI 420, hub mounted disks. Brembo P4.24 and P2.24 axial mounted calipers
ELECTRONICS Launch control, Electronic brake balancing and graphic TFT display,Custom telemetry system

MODENA

University of Modena and Reggio Emilia

Car 237 **Pit 67** **WRL 132** Italy

MoRe Modena Racing was born in 2003 in the heart of the Italian Motor Valley. Built around passion and teamwork, the new M17L reflects the leading design principles of our city. It aims to inspire authentic emotions through a high performance powertrain featuring a longitudinal engine with a bevel gear transmission. It includes a mold-free carbon panel monocoque combined with in-house manufactured aero package and electronic elements.#aviapervia

FRAME CONSTRUCTION Monocoque constructed of flat panels glued together
MATERIAL Rohacell WF51, Toray T700, Toray M30SC
OVERALL L / W / H 2902mm / 1408mm / 1160mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1260mm / 1220mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 134kg / 163kg
SUSPENSION Double unequal lenght wishbone. Pull rod (front) and push rod (rear) actuated coilover.
TYRES (Fr / Rr) Hossier R25B 18x7.5-10 for both front and rear
WHEELS (Fr / Rr) 7x10", magnesium rim for both front and rear
ENGINE 2007 Suzuki GSX-R 750 4 cylinder, modified to
BORE / STROKE / CYLINDERS / DISPLACEMENT 70mm / 48.7mm / 4 cylinders / 750cc
COMPRESSION RATIO 12.5:1
FUEL SYSTEM Indirect Fuel Injection, dual rail with two injectors per cylinder
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 9500 rpm/ 7000rpm
DRIVE TYPE Bevel gear
DIFFERENTIAL Clutch pack limited slip, 35 Nm preload, from 30% up to 88% lock up torque
COOLING Twin sidepod mounted radiators with thermostatic controlled electric pump and fans
BRAKE SYSTEM Front and rear: Floating, Inox, hub mounted, 190 outer, 135 inner, holed
ELECTRONICS Self designed GBU with electropneumatic shifting, steering wheel integrated dashboard.

MOSCOW

Moscow Polytechnic University

Car 252 **Pit 76** **WRL 319** Russia

Probably you remember us as FDR MAMI, but our name was replaced according to the merger of our university into the Moscow Polytechnic University. This year our team is introducing to you the 10th racing prototype - Iguana G10.30 members of our team have brought in this jubilee car a lot of new things for our evolution: carbon fuel tank, DRS system, Power Box and Power Distribution Module of our own production, new engine of larger volume KTM 690 with turbo supercharging and carbon disks.

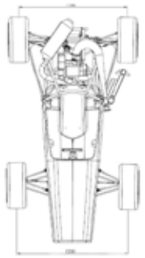
FRAME CONSTRUCTION Front and rear tubular space frame
MATERIAL 9MnSi5 Steel round tubing
OVERALL L / W / H 2745mm / 1200mm / 1178mm
WHEELBASE / TRACK (Fr / Rr) 1525mm / 1200mm / 1100mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 133kg / 130kg
SUSPENSION Unequal Double A-Arms with push rod
TYRES (Fr / Rr) 6.0/18.0-10 LCO Hoosier
WHEELS (Fr / Rr) 10 carbon wheels with aluminum central part by milling
ENGINE KTM 690 SM 2007
BORE / STROKE / CYLINDERS / DISPLACEMENT 102mm / 80mm / 1 cylinder / 654cc
COMPRESSION RATIO 10,1:1
FUEL SYSTEM Keihin 420cc/min (3.5bar) saturated type injector. KTM OEM fuel rail
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 6500 rpm/ 5000rpm
DRIVE TYPE chain(520), light-weight
DIFFERENTIAL Clutch pack limited slip, Pre-load 20-25 Nm on delivery and 10 Nm after initial
COOLING One-side pod mounted 25mm core aluminium radiator , 745 cfm fan mounted to radiator
BRAKE SYSTEM 4-Disk system, fully flown rotors 190mm and 180mm,adjustable brake balance, ISR calipers
ELECTRONICS Power Box,Power Distribution Module(PDM),selfdesigned Steering Wheel board

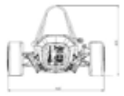
MOSCOW

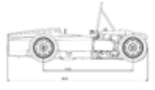
Moscow State Technical University (MADI)

Car 333 **Pit 120** **WRL 474** Russia

We are the first team founded in Russia and the first racing team that started to use CFRP monocoque. Since the founding of the team, our graduates are traditionally valued at a high level. Our goal is to provide students with the opportunity to develop themselves, to gain practical skills and invaluable experience.







FRAME CONSTRUCTION CFRP-monocoque front section / Rear tubular space frame
MATERIAL carbon&carbon-aramid fiber, armd-honey / carbon-steel,Al tube (16-25mm diam.)
OVERALL L / W / H 2769mm / 1485mm / 1026mm
WHEELBASE / TRACK (Fr / Rr) 1575mm / 1230mm / 1160mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 138kg / 140kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) Hoosier 520,7 x 177,8 - 13 R25A
WHEELS (Fr / Rr) 7.5x13, 24mm offset, 4pc Al rim/7.5x13, 24mm offset, 4pc Al rim
ENGINE Yamaha YFZ450R
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 63,4mm / 1 cylinder / 449cc
COMPRESSION RATIO 11,6:1
FUEL SYSTEM Yamaha injector, in Yamaha injector body
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 9000 rpm/ 6500rpm
DRIVE TYPE Chain drive, chain #520
DIFFERENTIAL no differential
COOLING One radiator with thermostatic controlled electric fan on the left side of the car
BRAKE SYSTEM 3-Disk system, floating, steel, 225mm/210mm outer diam.,173mm/163mm inner diam.
ELECTRONICS n/a

MOSCOW

Peoples‘ Friendship University of Russia

Car 287 **Pit 103** **WRL 410** Russia

Formula Student RUDN is a perspective team consists of young engineers from People's Friendship University of Russia, studying at the engeneering facuilty. We united by the same interest and dreams, that's why our car is done with attention to details. All departments of our team work together, that influence on teambuilding and knowledges according to sport cars. Every year we replace old techologies and inject bold techical decisions to our cars. We run towards the top.

FRAME CONSTRUCTION Tubular space frame
MATERIAL steel AISI 1020 round tubing
OVERALL L / W / H 2888mm / 1363mm / 1244mm
WHEELBASE / TRACK (Fr / Rr) 1600mm / 1197mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 146kg / 152kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) 205x70 r13, Hoosier R25A / 205x70 r13, Hoosier R25A
WHEELS (Fr / Rr) 7x13 30mm offset, Mg Rim
ENGINE 2003 Honda CBR 600 f4i
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 13:1
FUEL SYSTEM Student built, fuel injection, sequential, original injectors
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 12000 rpm/ 10000rpm
DRIVE TYPE Chain 520 x-ring, 6-speed gearbox
DIFFERENTIAL Designed by students limited slip differential
COOLING In side pod mounted AL radiator with fan
BRAKE SYSTEM 4-Disk system, self developed rotors with 240mm diameter, adjustable brake balance
ELECTRONICS n/a

MUMBAI

Dwarkadas. J. Sanghvi College of Engineering

Car 347 **Pit 123** **WRL 412** India

DJS Racing is a formula-style race car design team from D.J. Sanghvi College of Engineering, India, initiated in 2012. FS events are an immaculate platform to display your technical as well as managerial skills. Team firmly believes that such competitions make you industry ready. Business prospectives are imbibed in each and every team member, making them value of all available resources and how to get best out of it. Team structure & bonding helps one to understand a real organisation structure

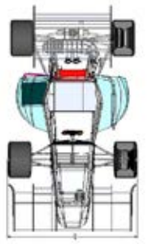
FRAME CONSTRUCTION Tubular Space Frame
MATERIAL AISI 1018 steel round tubing
OVERALL L / W / H 2787mm / 1340mm / 1124mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1142mm / 1104mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 127kg / 116kg
SUSPENSION Double unequal length A-Arm. F- Pullrod (vertical) R-Pushrod (Horz) oriented spring-damper
TYRES (Fr / Rr) 18.0x6.0 R10.0, Hoosier R25B
WHEELS (Fr / Rr) 6.0x10, 25mm offset, 3 pc Al Rim
ENGINE 2016 KTM RC390
BORE / STROKE / CYLINDERS / DISPLACEMENT 89mm / 60mm / 1 cylinder / 373cc
COMPRESSION RATIO 12.6:1
FUEL SYSTEM PE3 8400 ECU with Bosch Fuel and Wasted Spark Ignition System, 2.7 Bar
FUEL RON95
MAX POWER/TORQUE DESIGN 9500 rpm/ 7000rpm
DRIVE TYPE Chain Drive
DIFFERENTIAL Drexler LSD
COOLING Side mounted down flow dual core radiator with 2400CFM Fan.
BRAKE SYSTEM ISR Calipers with AP Racing Master Cylinders, 4 Disk, Custom SS 410, 184mm Dia,
ELECTRONICS Custom Wiring Harness, RaceCapture Data Logger and Telemetry, Electroninc Button Shifting

MUMBAI

K. J. Somaiya College of Engineering

Car 227 **Pit 63** **WRL 259** India

This year we enter the competition with the ORI'17. Equipped with a full aerodynamic package, a 650cc engine, and agile vehicle dynamics, which plants every bit of power to the ground, the ORI'17 is fully equipped to roar on the FSG track.The aim of the design, this year was to have just enough complexities in the car to execute better lap times, but to keep the car concept as simple as possible. DRS, variable brake bias system, and shift without lift were implemented successfully on the car.



FRAME CONSTRUCTION Full Tubular Space Frame
MATERIAL DIN 2391-st52 Cold Rolled round steel tubing
OVERALL L / W / H 2879mm / 1357mm / 1150mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1200mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 127kg / 149kg
SUSPENSION Double unequal length A-Arm.Pull Push rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) 150x45 B10, Hoosier R25B / 150x45 B10, Hoosier R25B
WHEELS (Fr / Rr) 7x10, 20mm offset, 3 piece Al rim / 7x10, 27mm offset, 3 piece Al rim
ENGINE 2011 Kawasaki Ninja 650 R
BORE / STROKE / CYLINDERS / DISPLACEMENT 83mmmm / 60mmmm / 2 cylinders / 650cc
COMPRESSION RATIO 11.3:1
FUEL SYSTEM Kawasaki Stock Fuel System
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 9000 rpm/ 6750rpm
DRIVE TYPE Chain Drive
DIFFERENTIAL clutch pack limited slip
COOLING Sidepod Mounted Radiator with electric fan
BRAKE SYSTEM 4-Disk System with adjustable brake balance
ELECTRONICS Multi Purpose steering wheel, Solenoid Shifting system

MÜNCHEN

Technical University of Munich

Car 231 **Pit 66** **WRL 58** Germany

The TUfast Racing Team from the TU Munich consists of 80 team members who compete in all three classes every year (electric + combustion + driverless) . The main goals of the TUfast nb017 were lightweight, vehicle control, focused on driveability and adaptivity, and an aerodynamic package well-balanced between high downforce and efficiency. To achieve these goals: KTM one-cylinder engine, full CFRP- monocoque, Hoosier LC0 on CFRP Rims, Spool, DRS. Feel free to come to our pit and talk to us!

FRAME CONSTRUCTION One piece CFRP monocoque
MATERIAL CFRP: Spread toe, twill weave, unidirectional, aluminium honey comb-/foam core; CFRP and al inserts
OVERALL L / W / H 2933mm / 1417mm / 1186mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 105kg / 114kg
SUSPENSION Double unequal length A-Arms, pull rod actuacted, horizontally orientated spring & damper
TYRES (Fr / Rr) 10'' Hoosier / 10'' Hoosier
WHEELS (Fr / Rr) CFRP shells 7x10
ENGINE KTM
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 72mm / 1 cylinder / 510cc
COMPRESSION RATIO 13:1
FUEL SYSTEM Port Fuel injection
FUEL E85
MAX POWER/TORQUE DESIGN 10000 rpm/ 10000rpm
DRIVE TYPE 520 chain
DIFFERENTIAL Spool
COOLING rearduct mounted 30 core water-air radiator , 0.445 cfm fan mounted to radiator-duct
BRAKE SYSTEM 3-Disk-System, single rear inboard brake
ELECTRONICS Motec PDM 15, monitored via telemetry, Loom designed in CAD, heat-shrink tubing

NEVERS

University of Burgundy - ISAT

Car 258 **Pit 82** **WRL 240** France

The 2017 ISAT Formula Team with 29 fresh new members, all in first year of the engineering curriculum. We represent the only state-owned French engineering school specialized in automotive engineering. We take part in FSG, FSN, and FSCz after a year of hard work with our Internal Combustion Engine car. All the while, we are working on a FSE car, which would make us the first French team with two cars. We're the 15th generation of our Team and we think we can be even better than our predecessor

FRAME CONSTRUCTION Tubular Space Frame
MATERIAL Steel 25CrMo4S
OVERALL L / W / H 2733mm / 1400mm / 1017mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 129kg / 139kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) 6.0x18.0 R10, Hoosier LC0 / 6.0x18.0 R10, Hoosier LC0
WHEELS (Fr / Rr) 6,5*10, 75 mm offset, 3pc / 6,5*10, 75 mm offset, 3pc
ENGINE 2010 Yamaha XJ6 inline four, four strokes
BORE / STROKE / CYLINDERS / DISPLACEMENT 65.5mm / 44.5mm / 4 cylinders / 600cc
COMPRESSION RATIO 12,2:1
FUEL SYSTEM Student designed/built fuel line with Yamaha injection system, Bosch MS4 ECU
FUEL 98 RON
MAX POWER/TORQUE DESIGN 9500 rpm/ 7500rpm
DRIVE TYPE Chain RK 520 mxz4, 48 links
DIFFERENTIAL Multi-disc clutches limited slip differential by Drexler, preload of 35Nm
COOLING 954cm² right side mounted 1 core water beam radiator, controlled 1041cfm fan
BRAKE SYSTEM 4-Disk system, self developed rotors with 180mm diameter, adjustable brake balance
ELECTRONICS Traction control 11 positions, launch control, gear cut, MS4 & DDU7 Bosch data logger

OXFORD

Oxford Brookes University

Car 292 **Pit 105** **WRL 146** United Kingdom

Oxford Brookes Racing was founded in 1999. Since then, the team has gone on to become one of the top UK teams, and widely known to have a consistently competitive car. With 2016 being a frustrating year for OBR with a fast car but no reliability, the team has firstly focused on fixing the issues, before moving on to performance. with this attitude, the team believes that it will be able to regain the title of Top UK team, and prove a force to be reckoned with across the international paddock.

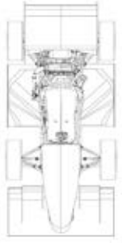
FRAME CONSTRUCTION Carbon Fibre Skinned 'Cut & Fold' sandwich panel Monocoque w/ Steel roll hoops
MATERIAL Tencate woven 245 GSM, UD 150 GSM. 20mm/15mm x 19.1mm/6.4mm Alu. Honeycomb. 250g Glue Film
OVERALL L / W / H 2938mm / 1446mm / 1198mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1230mm / 1230mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 119kg / 124kg
SUSPENSION Double unequal length wishbones w/ F push/R pull rod actuated spring-dampers, U-Bar ARB
TYRES (Fr / Rr) 6.0/18.0-10 LC0 Hoosier
WHEELS (Fr / Rr) 7
ENGINE 2017 KTM 450 SXF
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 63.4mm / 1 cylinder / 449cc
COMPRESSION RATIO 12.7:1
FUEL SYSTEM Student designed single point injection system w/ custom CFRP fuel tank & Bosch Injector
FUEL 98 RON Unleaded
MAX POWER/TORQUE DESIGN 9500 rpm/ 7000rpm
DRIVE TYPE Single chain driven, 520 pitch
DIFFERENTIAL Drexler Formula SAE Limited Slip Differential
COOLING 2x Side mounted 2r18 core radiator, 2x 255 cfm fan mounted to ducting
BRAKE SYSTEM Discs - Floating, Cast Iron, Hub mounted, 180mm dia. Drilled. Calipers - ISR front/AP Rear
ELECTRONICS Modular harness w/ Deutsch connectors, DDU7 Data Logging, Electropneumatic Shifting System

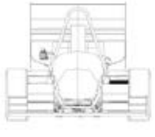
PADOVA

University of Padova

Car 285 **Pit 102** **WRL 73** Italy

Race UP Team started participating in Formula SAE ruled competition since 2003. This year the team is coming back to Formula Student Germany with its 12th car, starting from the experience of the good project of last year. All the components are designed to be as light as possible and to reach the best integration in the car. The goal of this year is to improve reliability and to gain the maximum performance from the new car with an efficient testing phase.





FRAME CONSTRUCTION Tubolar spaceframe
MATERIAL Steel AISI4130 (25CrMo4)
OVERALL L / W / H 2998mm / 1446mm / 1199mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1220mm / 1190mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 136kg / 147kg
SUSPENSION Double unequal length A-Arm. Pull-rod actuated.
TYRES (Fr / Rr) 20.5 x 7.0 R13 Hoosier / 20.5 x 7.0 R13 Hoosier
WHEELS (Fr / Rr) 7.0 x 13" / 7.0 x 13" magnesium
ENGINE Honda CBR 600 RR PC40 2007/2008
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO
FUEL SYSTEM Single injector per cylinder, low pressure
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN rpm/ rpm
DRIVE TYPE
DIFFERENTIAL Limited slip, 15 Nm Preload, 51% drive - 29% decel interlock value
COOLING Left mounted 30 core long 360mm aluminum radiator , 735 cfm electric fan
BRAKE SYSTEM ISR calipers, 4 self developed rotors with 230 mm rear/220 mm diameter, adjustable brake
ELECTRONICS

PFORZHEIM

Pforzheim University

Car 379 **Pit 127** **WRL 201** Germany

The "Rennschmiede Pforzheim" was founded in September 2009. The "RSP17 Onyx" is our fifth car. Our main goal is to build a reliable and cost efficient car. To reach this goal, we simplified our parts to reduce the manufacturing time. We used this time mainly for testing and improvement of our suspension and engine setup. This time, we built our car over a period of two years. The „RSP17 Onyx" is also the first car of our team with aerodynamic devices.

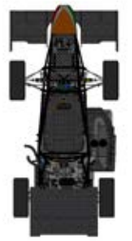
FRAME CONSTRUCTION Tubular space frame
MATERIAL steel E355
OVERALL L / W / H 2751mm / 1425mm / 1162mm
WHEELBASE / TRACK (Fr / Rr) 1558mm / 1180mm / 1140mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 133kg / 117kg
SUSPENSION Double A-Arm, pull rod actuated spring/ damper, adjustable anti-roll bar
TYRES (Fr / Rr) 18 x 6-10, Hoosier R25B
WHEELS (Fr / Rr) 6.5" width, carbon fibre rim with cnc milled inner piece
ENGINE KTM 450 SX-F single cylinder
BORE / STROKE / CYLINDERS / DISPLACEMENT 95mm / 36.5mm / 1 cylinder / 449cc
COMPRESSION RATIO 12.83:1
FUEL SYSTEM Bosch MS4 ECU,fuelpump,pressure-regulator, self desinged injector mounting
FUEL 98 octane
MAX POWER/TORQUE DESIGN 9500 rpm/ 7000rpm
DRIVE TYPE Chain drive 520 chain
DIFFERENTIAL Drexler limited slip differential
COOLING side pot mounted radiator , 413 cfm fan mounted to hot air side of the radiator
BRAKE SYSTEM 4-disk system, self designed brake disks, adjustable bias bar
ELECTRONICS multifunctional steering wheel, electrical shifting system, GPS assisted data logging

PISA

University of Pisa

Car 243 **Pit 70** **WRL 234** Italy

The E-Team Squadra Corse was founded in 2007 and this year is the our first decennial. We aim to celebrate this event and thank our University and our sponsors by getting a great result in FSG. This year our car will be Kerub X. Racing with number 243, Kerub X is a 55kw/600cc car powered by a Honda engine. It is capable of developing 55KW and can be tuned to reach the speed of 180 km/h with 0-100 km/h in 4,6s of acceleration. It is supported by a steel tubular frame and it weighs about 230 kg.



FRAME CONSTRUCTION Steel circolar cross section tubing spaceframe
MATERIAL Steel AISI 4130
OVERALL L / W / H 3016mm / 1391mm / 1170mm
WHEELBASE / TRACK (Fr / Rr) 1536mm / 1210mm / 1110mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 139kg / 156kg
SUSPENSION Double unequal length A-Arm. Push rod actuated laterally oriented spring dampers.
TYRES (Fr / Rr) 20.5x7.0/13R25B Hoosier
WHEELS (Fr / Rr) 7" wide, 43.25 mm offset, 1 pc Mg Rim
ENGINE Honda CBR60RR 2003
BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 11,8:1
FUEL SYSTEM Injection regulated by ECU F88 Life Racing, ignition regulated by ECU through CAM sensor
FUEL RON 98
MAX POWER/TORQUE DESIGN 11500 rpm/ 9990rpm
DRIVE TYPE 520 chain, 15,875 mm pitch
DIFFERENTIAL Limited slip differential 30-35 Nm preload after initial run in. Ramp angle setup 40°/50°
COOLING 750cc core water radiator with 700 CFM fan. 300cc core oil radiator with 300 CFM fan.
BRAKE SYSTEM 4-Disk system, self developed rotors, 230mm front, 210mm rear. Adjustable brake balance.
ELECTRONICS Multifunctional student made Steering Wheel, Electropneumatic Shifting System

REGENSBURG

Ostbayerische Technische Hochschule Regensburg

Car 262 **Pit 80** **WRL 38** Germany

The Dynamics e.V. was founded in 2006 and is now competing in the Formula Student Germany Event for the 10th time. Goal for the season of 2017 is to build on past successes and reach again the Top 10 at FSG to become one of the German top teams. With a highly motivated and strong team and a reliable concept of our combustion race car RP17c we are able to meet our target.

FRAME CONSTRUCTION Full CFRP monocoque
MATERIAL CFRP: twill prepreg nad UD prepreg; shaped Rohacell core
OVERALL L / W / H 3005mm / 1410mm / 1194mm
WHEELBASE / TRACK (Fr / Rr) 1575mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 124kg / 133kg
SUSPENSION Double unequal length A-Arm.Pushrod actuated horizontally oriented spring & damper
TYRES (Fr / Rr) 205/470 R13 C17 Slick Continental
WHEELS (Fr / Rr) 205/470 R13 C17 Slick Continental
ENGINE Modified Honda CBR 600RR (PC37)
BORE / STROKE / CYLINDERS / DISPLACEMENT 67.5mm / 42.5mm / 4 cylinders / 608cc
COMPRESSION RATIO 13,5:1
FUEL SYSTEM CFRP fuel tank with pressure controlled electric pump; intake-manifold fuel injection
FUEL 98 octane unleaded
MAX POWER/TORQUE DESIGN 10500 rpm/ 9000rpm
DRIVE TYPE carbon fiber reinforced belt drive
DIFFERENTIAL self designed semiactive limited slip, quick adjustment
COOLING two sidepod mounted radiators with PWM controlled waterpump and fan
BRAKE SYSTEM front: Tilton 77-625 front bore 15,9 rear:Tilton 77-625 front bore 22,2
ELECTRONICS self developed Main Controll Unit, Data Logger, Live Telemetry

ROMA

Sapienza University of Rome

Car 319 **Pit 116** **WRL 337** Italy

Sapienza Corse means challenging the norm: Gajarda 2017 is an AWD FSAE vehicle with an electronically controlled torque vectoring. Our prototype features an extensive use of carbon fibre, e.g. monocoque, wheel assembly, airbox and suspension wishbones. A strong passion and drive towards continuous research of new solutions distinguish each member: everyone has a specific role, but is also able to collaborate for the collective aim.

FRAME CONSTRUCTION CFRP/Honeycomb monocoque
MATERIAL
OVERALL L / W / H 2960mm / 1410mm / 1164mm
WHEELBASE / TRACK (Fr / Rr)
1550mm / 1200mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 153kg / 125kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and dampers
TYRES (Fr / Rr) 457x152 R10 LC0 Hoosier
WHEELS (Fr / Rr) 185 mm wide, 10
ENGINE Honda CBR 600F4i
BORE / STROKE / CYLINDERS / DISPLACEMENT
67mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 13:1
FUEL SYSTEM Electronic Injection with Mectronik MKE6
FUEL E85
MAX POWER/TORQUE DESIGN 10500 rpm/ 9000rpm
DRIVE TYPE Left: Gear transmission/Right: 415 chain
DIFFERENTIAL Open. 48:52 F/R static bias on side diff's. Slipping clutch R/L torque vectoring
COOLING 382x370mm radiator, 1310 cfm fan mounted to radiator backside, mechanic pump
BRAKE SYSTEM 4-disk, 220mm diameter front, 190mm diameter rear, adjustable brake bias.
ELECTRONICS Electro-actuated Shifting and Torque Vectoring, Selfdesigned Live-Telemetry and Dashboard

SAN SEBASTIÁN

TECNUN - University of Navarra

Car 321 **Pit 117** **WRL 274** Spain

Tecnun Motorsport is a team with a passion for racing and learning. With the FSTEC17, our 9th and last c-car, we aim to end a period. The car is a refinement of the concepts developed in the past three seasons intended to achieve the highest score to date. #FarewellRON98 #GAS #FSTEC17 #TecnunMotorsport

FRAME CONSTRUCTION Tubular space frame with CFRP sandwich reinforcement
MATERIAL 4130 Steel
OVERALL L / W / H 2943mm / 1415mm / 1185mm
WHEELBASE / TRACK (Fr / Rr)
1580mm / 1200mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 143kg / 155kg
SUSPENSION Double unequal length, non parallel A-arm. Push rod actuated spring and Damper. ARB
TYRES (Fr / Rr) 18.0x6.0-10 Hoosier R25B / 18.0x6.0-10 Hoosier R25B
WHEELS (Fr / Rr) 7.25
ENGINE 2011 Suzuki GSX-R 600 4 cylinder
BORE / STROKE / CYLINDERS / DISPLACEMENT
67.0mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12.5:1
FUEL SYSTEM Stock GSX-R injectors and fuel rail
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 11000 rpm/ 8500rpm
DRIVE TYPE Chain (520)
DIFFERENTIAL Salisbury type Limited Slip Differential. Adjustable bias ratio, 30Nm preload
COOLING Two sided mounted radiators, thermostatic controlled electric fans and electric water pump
BRAKE SYSTEM 4 floating disk system, hub mounted, 185 OD, 96,75 ID, vented
ELECTRONICS Upshift cut-off, clutch-assisted downshift, DRS, CAN communication, Dash2pro data logging

SCHWEINFURT

University of Applied Sciences Würzburg-Schweinfurt

Car 297 **Pit 108** **WRL 226** Germany

Mainfranken Racing e.V. was founded in 2006 out of the idea of some motor sport enthusiastic students from the University of Applied Sciences Schweinfurt. The team consist of 45 motivated students building the 10th racecar, the MF10 wild hog. Our main goal is to improve the 10" concept. We also want to reduce the overall car weight and finish the manufacturing process a lot sooner to have more time for tests. This season we are happy to participate at FSCz, FSG and FSH.

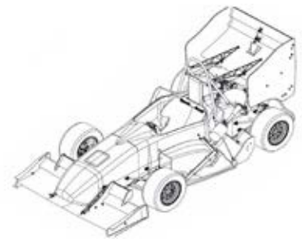
FRAME CONSTRUCTION tubular space frame
MATERIAL steel E355
OVERALL L / W / H 3030mm / 1400mm / 1200mm
WHEELBASE / TRACK (Fr / Rr)
1540mm / 1170mm / 1170mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 140kg / 140kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) Hoosier 18.0x7.5-10 R25B / Hoosier 18.0x7.5-10 R25B
WHEELS (Fr / Rr) 7.0x10, 22mm offset, 1 pc Mg Rim / 7.0x10, 22mm offset, 1 pc Mg Rim
ENGINE Yamaha R6 RJ05
BORE / STROKE / CYLINDERS / DISPLACEMENT
65.5mm / 44.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 13.4:1
FUEL SYSTEM Student des. dual stage sequential injection, 3-D mapping with MoTec M800
FUEL 98 octance unleaded gasoline
MAX POWER/TORQUE DESIGN 8500 rpm/ 8000rpm
DRIVE TYPE Chain
DIFFERENTIAL limited slip differential (Drexler)
COOLING Twin side pod mounted radiators with thermostatic controlled electric fans
BRAKE SYSTEM 4-Disk system with 4-piston calipers / 2-piston calipers (front/rear)
ELECTRONICS Dashboards with LED-bars, Electropneumatic Shifting System, Live-Telemetry

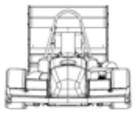
SEATTLE

University of Washington

Car 269 **Pit 79** **WRL 86** United States

The UWashington Formula Motorsports team has prepared our most advanced and high quality car yet for FSG 2017. The car features new sidewings and a larger undertray for more downforce with no added weight, a stiffer and lighter suspension system, and utilized new technologies like soluble carbon molds and topology optimization programs. We would like to thank our families, sponsors, and Harambe for enabling us to continue competing internationally!





FRAME CONSTRUCTION Full carbon fiber/aluminum honeycomb monocoque
MATERIAL Toray T700s/T700g PW/UD fiber (2510 Resin), Cytek FM300-2 Adhesive, Al honeycomb
OVERALL L / W / H 2883mm / 1410mm / 1158mm
WHEELBASE / TRACK (Fr / Rr)
1562mm / 1219mm / 1143mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 111kg / 113kg
SUSPENSION Double unequal length A-Arms, pull rod actuated front, push rod actuated rear
TYRES (Fr / Rr) Hoosier LC0 6.0/18.0-10
WHEELS (Fr / Rr) 10"x7" carbon fiber shells with aluminum wheel centers
ENGINE 2014 Yamaha YFZ-450R, bored to 478cc
BORE / STROKE / CYLINDERS / DISPLACEMENT
98mm / 68.5mm / 1 cylinder / 478cc
COMPRESSION RATIO 13.6
FUEL SYSTEM Student developed algorithm, Siemens Deka VII Injector (2-4 cone elliptical)
FUEL 92 (R + M)/2 Gasoline
MAX POWER/TORQUE DESIGN 10000 rpm/ 8500rpm
DRIVE TYPE 520 chain drive, stock 5 speed gearbox
DIFFERENTIAL Drexler Salisbury LSD, hydraulic active differential, variable bias ratio
COOLING Side mounted CBR radiator, 553 cfm fan mounted rear of radiator ducting
BRAKE SYSTEM Ductile Iron floating rotors, Tilton 78 series master cylinders, Brembo and AP calipers
ELECTRONICS Custom 22AWG weatherproof harness, Deutsch and LEMO connectors, custom battery and dash

SEVILLA

University of Seville

Car 211 **Pit 52** **WRL 312** Spain

We are ARUS Andalucía Racing, from the University of Seville. Our team was founded in 2012. This is our fourth year taking part in FSAE competitions. Now we present the ART-17. It gathers the experience from our last three cars, focusing specially on reliability in order to avoid past breakdowns. This is the result of exploiting our resources without compromising manufacturing viability.

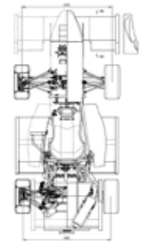
FRAME CONSTRUCTION Tubular space frame
MATERIAL E355 steel round tubing
OVERALL L / W / H 3046mm / 1442mm / 1190mm
WHEELBASE / TRACK (Fr / Rr)
1535mm / 1250mm / 1175mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 144kg / 150kg
SUSPENSION Double wishbone, Pull-rod front and push-rod rear configuration. U-bar ARB
TYRES (Fr / Rr) 18.0x6.0-10" R25B Hoosier / 18.0x6.0-10" R25B Hoosier
WHEELS (Fr / Rr) 7.0x10.0,19 mm offset, 3 pc Al Rim / 7.0x10.0,19 mm offset, 3 pc Al Rim
ENGINE 2006 Honda CBR600RR
BORE / STROKE / CYLINDERS / DISPLACEMENT
67.0mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12,7:1
FUEL SYSTEM Sequential Fuel injection, fuel pressure regulator in the OEM fuel rail.
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 11500 rpm/ 7500rpm
DRIVE TYPE 520 Chain drive
DIFFERENTIAL Drexler LSD
COOLING 270x260 core, dual pass radiator and electric fan
BRAKE SYSTEM 4-Disk system, floating rotors and dual piston calipers
ELECTRONICS Self-developed electronics: Power Management System, e-clutch, telemetry & data logger

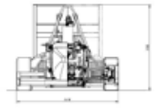
SHANGHAI

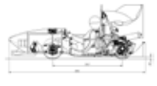
Tongji University

Car 233 **Pit 65** **WRL 87** China

TJU Racing Team is a non-commercial formula racing team founded in 2007. In FSAE Japan 2016, TJU Racing took the 1st place in Acceleration, 2nd in Skid-pad and 3rd in Suspension Design. Since FSAE was first introduced into China in 2010, TJU Racing team has been playing an important role as the pioneer, promoting and also helping develop the competition. Since then, FSAE China has been held for 7 times, and our team has achieved lots of prizes. In FSAE China 2016, we've won the championship!







FRAME CONSTRUCTION Aluminium sandwich panel box structure with tubular steel spaceframe
MATERIAL CFRP & 4130
OVERALL L / W / H 3017mm / 1415mm / 1183mm
WHEELBASE / TRACK (Fr / Rr)
1547mm / 1215mm / 1185mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 125kg / 153kg
SUSPENSION Short-Long Arm,push rod,adjustable stab bars
TYRES (Fr / Rr) 18x6.0-10 LC0 Hoosier/18x6.0-10 LC0 Hoosier
WHEELS (Fr / Rr) 10×7inch, offset 1.5 inch, cast aluminum/10×7inch, offset 1.5 inch, cast aluminum
ENGINE Suzuki GSX-R600
BORE / STROKE / CYLINDERS / DISPLACEMENT
67.0mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12.8:1
FUEL SYSTEM Bosch Injector,two nozzles per cylinder,maniford multi-point injection
FUEL 95# gasoline
MAX POWER/TORQUE DESIGN 12000 rpm/ 7500rpm
DRIVE TYPE Sequential 6-speed gearbox, chain drive
DIFFERENTIAL Cusco limited slip differential,splash oiling, 0.8bias ratio,100Nm preload
COOLING Side mounted core dual radiator
BRAKE SYSTEM 4-Disk system, rotors with F:195/R:192mm diameter, adjustable brake balance, ISR calipers
ELECTRONICS Pneumatic Shifting System, Auto blip, Start Limiter, 3-Axises Acceleration Sensor

STRALSUND

University of Applied Sciences Stralsund

Car 317 **Pit 115** **WRL 286** Germany

As the first German Formula Student team we have brought this competition to Germany and ever since then we have participated in FSG. Thanks to our long history we can look back to many achievements in the past and are looking forward to a great season with our new car – the TY17. Again we have been working very hard to exceed last year's performance.We are more than happy to have the privilege of being part of this great competition and can't wait for catching up with all our friends.

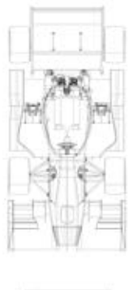
FRAME CONSTRUCTION Tubular space frame
MATERIAL 25CrMo4
OVERALL L / W / H 2820mm / 1450mm / 1075mm
WHEELBASE / TRACK (Fr / Rr) 1556mm / 1250mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 132kg / 148kg
SUSPENSION double unequal length, nonparallel A-Arms; pull rod actuated; Oehlins TTX 25 damper
TYRES (Fr / Rr) 205/470 R13, carbon black based, Continental
WHEELS (Fr / Rr) 7x13, 22mm offset, AlSi7 machined
ENGINE 2013 Street Triple 675
BORE / STROKE / CYLINDERS / DISPLACEMENT 74.0mm / 52.3mm / 3 cylinders / 675cc
COMPRESSION RATIO 12.7:1
FUEL SYSTEM Original fuel injection system using EcuMaster ECU, Partial sequential
FUEL gasoline
MAX POWER/TORQUE DESIGN 8500 rpm/ 6000rpm
DRIVE TYPE Chain #520 MAD6
DIFFERENTIAL torque biasing Torsen B (Quaife), selfmade 7075 T6 hard-anodized housing
COOLING leftside mounted 1 core aluminium radiator , 1354 cfm fan mounted to radiatorframe
BRAKE SYSTEM 4-disk system, self developed rotors with d=200mm, t=3, X46Cr13, adjustable balance bar
ELECTRONICS Electrical shifting system+clutch, self developed chassis control unit

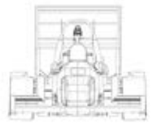
STUTTGART

University of Stuttgart

Car 202 **Pit 55** **WRL 1** Germany

We - the Rennteam Uni Stuttgart - are very proud to be part of the Formula Student Germany for the twelfth time now. After the most successful season of our team history last year, we still need to prove that we can win with our concept on the extremely demanding track of Hockenheim and improve our second place from 2016. A lot of effort was put in the package of the car and the vehicle dynamics so that we can perform even better, when it comes to the dynamics. Complete - Finish - Win!





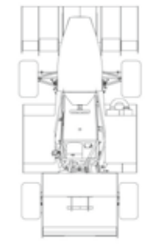
FRAME CONSTRUCTION Singlepiece Monocoque with tubular rearframe
MATERIAL CFRP Sandwich Monocoque, steel rearframe
OVERALL L / W / H 3050mm / 1447mm / 1187mm
WHEELBASE / TRACK (Fr / Rr) 1630mm / 1200mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 127kg / 130kg
SUSPENSION unequal length A-Arms, pushrod actuated damper, adjustable T-ARB, heave spring
TYRES (Fr / Rr) 10x7.5 - 18 R25B Hoosier
WHEELS (Fr / Rr) 10x7.5 - 18 R25B Hoosier
ENGINE Modified Yamaha YZF-R6
BORE / STROKE / CYLINDERS / DISPLACEMENT 65,5mm / 44,5mm / 4 cylinders / 599cc
COMPRESSION RATIO 14,5:1
FUEL SYSTEM student build fuel injection system using MoTec, fully sequential
FUEL E85
MAX POWER/TORQUE DESIGN 9500 rpm/ 7500rpm
DRIVE TYPE Sequential 4-speed gearbox, chain drive
DIFFERENTIAL adjustable preload Drexler limited slip differential
COOLING side mounted core dual radiator , fan mounted to back of each radiator
BRAKE SYSTEM 4-Disk system, adjustable brake balance, self designed rotors
ELECTRONICS digital multifunctional Steering wheel, self developed display system

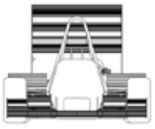
TORONTO

University of Toronto

Car 274 **Pit 84** **WRL 155** Canada

The University of Toronto FSAE team looks to build on their success of the 2016 season. This year the team focused on weight reduction, driver ergonomics and downforce. This year the team features a hybrid carbon-steel chassis with the team's first aerodynamics package. Out team would like our sponsors and supporters for the 2017 season. We look to make you proud in Hockenheim.





FRAME CONSTRUCTION Hybrid steel space frame with integrated carbon-fiber sandwich panels
MATERIAL 1020 DOM Steel, 1" closed cell PVC foam core, student designed carbon laminate schedule
OVERALL L / W / H 2923mm / 1430mm / 1184mm
WHEELBASE / TRACK (Fr / Rr) 1537mm / 1226mm / 1152mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 106kg / 107kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring
TYRES (Fr / Rr) 18 x 6-10 Hoosier R25B
WHEELS (Fr / Rr) 3-Pc., 177mm Wide, Keizer Shells, Custom Center, 20mm Offset
ENGINE Honda TRX 450
BORE / STROKE / CYLINDERS / DISPLACEMENT 96mmmm / 62mmmm / 1 cylinder / 450cc
COMPRESSION RATIO 12.5:1
FUEL SYSTEM Student developed tank and routing
FUEL 93 Octane
MAX POWER/TORQUE DESIGN 9000 rpm/ 6500rpm
DRIVE TYPE 5 speed sequential
DIFFERENTIAL Adjustable clutch pack differential, 45 degree accel ramp, 60 degree decel ramp
COOLING 1130 cc side mounted radiator with 200mm fan
BRAKE SYSTEM 4-Disk system, self developed rotors, Adjustable bias bar, Al. machined calipers
ELECTRONICS Student made harness. Battery, fusebox, relays, ECU, datalogger

TYUMEN

Tyumen Industrial University

Car 222 **Pit 61** **WRL 547** Russia

Neftegaz Engineering team was organized in 2012 in Tyumen State Oil and Gas University and in the beginning was called Formula Neftegaz. The team has already taken part in 8 Formula Student events in 4 countries (they're Italy, Hungary, China and Russia). The team is also an organizer of a special Formula Student Festival called Formula Tyumen hold in Tyumen city for 4 times.Neftegaz Engineering team has already realized 3 racing cars. New racing car of 2017 will take place in FSG 2017.

FRAME CONSTRUCTION Tube Space Frame
MATERIAL Steel
OVERALL L / W / H 2769mm / 1450mm / 1120mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1225mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 80kg / 215kg
SUSPENSION Double unequal length A-Arm, Push rod and Rocker Arms
TYRES (Fr / Rr) Hoosier R13, 20.5x7
WHEELS (Fr / Rr) OZ Magnesium, 7x13
ENGINE Honda CBR600RR
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12.2:1
FUEL SYSTEM Dual-Stage Fuel Injection
FUEL 98 oct. gasoline
MAX POWER/TORQUE DESIGN 16000 rpm/ 11250rpm
DRIVE TYPE sequential gearbox
DIFFERENTIAL Drexler (SAE) Preloaded
COOLING Radiator, Fan
BRAKE SYSTEM 4-Disk, Self Developed
ELECTRONICS PowerCommander, QuickShifter, Ignistion Module

ULM

University of Applied Sciences Ulm

Car 244 **Pit 71** **WRL 232** Germany

The Einstein Motorsport Team was founded in 2006. The first car built by students from Ulm started at Hockenheim in 2006. The actual car for 2017 is car number eleven in the team's history. Starting with the Al'06 (ALbert), every car was a continuous development with adoption of the parts which were proved in former cars.

FRAME CONSTRUCTION Full CFRP Monocoque
MATERIAL Carbon fibre, Rohacell Core with variable thicknesses and densities
OVERALL L / W / H 2916mm / 1374mm / 1190mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1180mm / 1140mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 126kg / 128kg
SUSPENSION Double unequal length A-Arms. Front pull rod / Rear push rod actuated.
TYRES (Fr / Rr) 18 x 6.0 R10, Hoosier
WHEELS (Fr / Rr) FSAE Mg CAST 7x10 Wheel
ENGINE 2010 Husaberg FE570
BORE / STROKE / CYLINDERS / DISPLACEMENT 100mm / 72mm / 1 cylinder / 565cc
COMPRESSION RATIO 12,1:1
FUEL SYSTEM Bosch, manifold sequential fuel injection
FUEL unleaded fuel 98 ROZ
MAX POWER/TORQUE DESIGN 5900 rpm/ 5000rpm
DRIVE TYPE Chain drive
DIFFERENTIAL GKN limited slip differential, student built housing, drive TBR 3.88, decel TBR
COOLING Right side mounted aluminium radiator with termostatic controlled 246mm electric fanh
BRAKE SYSTEM 4-Disk system, self-dev. rotors, floater-fix; FRONT: 4 piston ; REAR:2 Piston
ELECTRONICS Selfdesigned PDS, Live Telemetry, Electropneumatic Shifting, Multifunctional Steering

VALÉNCIA

Universitat Politécnica de Valéncia

Car 395 **Pit 129** **WRL 154** Spain

Since 2014 the FSUPV Team takes part in FSG. For the fourth season, new objectives have been established in order to obtain big competition results: weight reduction, to increase the total amount of kilometers and to make a reliable car easy to drive. According to these ideals, this year the whole chassis has been redesigned and it has been improved the aerodynamic interaction between elements as well as reduced the CoG.

FRAME CONSTRUCTION Front monocoque / rear tubular space frame
MATERIAL Carbon Fiber prepreg and aluminum honeycomb core / high grade steel round tubing
OVERALL L / W / H 3075mm / 1408mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1585mm / 1200mm / 1170mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 120kg / 163kg
SUSPENSION Double unequal length A-arm. Push rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) 178x58 R13, Hoosier R25B / 178x58 R13, Hoosier R25B
WHEELS (Fr / Rr) 7.0x13, 30mm offset, Mg Rim / 7.0x13, 30mm offset, Mg Rim
ENGINE 2006 Honda CBR 600 RR
BORE / STROKE / CYLINDERS / DISPLACEMENT 67.0mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12:1
FUEL SYSTEM Student des/built, fuel injection
FUEL 95 octane
MAX POWER/TORQUE DESIGN 11500 rpm/ 9750rpm
DRIVE TYPE 520 x-ring chain
DIFFERENTIAL Limited slip, 30-35 Nm preload, torque bias 1.4
COOLING Two radiators with single electric fan
BRAKE SYSTEM 4-Disk system, self developed rotors with 220 mm diam., adjustable brake balance
ELECTRONICS Traction Control, Full Throttle Shifting, Launch Control, Steering wheel display

VELLORE

VIT University - Vellore

Car 254 **Pit 75** **WRL 282** India

'Pravega' is a Sanskrit term for "Acceleration". Recently, crowned as the National Champions we have come a long way since 2009. We are also the fastest accelerating combustion car manufactured in India. PRV'16 was one of our finest creations. Coming into our 8th season we hope to achieve more awards and laurels in the future.

FRAME CONSTRUCTION Tubular Space frame
MATERIAL AISI4130
OVERALL L / W / H 3013mm / 1400mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1560mm / 1200mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 142kg / 162kg
SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper (co
TYRES (Fr / Rr) 205/470 R13, Continental 34M / 205/470 R13, Continental 34M
WHEELS (Fr / Rr) 7x13, 24.3mm offset, 3 pc Al Rim / 7x13, 24.3mm offset, 3 pc Al Rim
ENGINE Honda CBR600RR
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12.2:1
FUEL SYSTEM Multipoint Port Fuel Injection System
FUEL RON 98
MAX POWER/TORQUE DESIGN 10000 rpm/ 9500rpm
DRIVE TYPE Chain type drive
DIFFERENTIAL Drexler FSAE Limited Slip Differential , 30Nm preload.
COOLING Side mounted radiator with 800 cfm and 254mm electric fan
BRAKE SYSTEM Custom floating AISI 4140 rotors,Calipers - ISR in front, Willwood in Rear
ELECTRONICS Student built pneumatic gear shifter, Self built Power Distribution Modules

VIGO

University of Vigo

Car 314 **Pit 114** **WRL 392** Spain

UVigo Motorsport is the first Formula Student team in the Spanish region of Galicia, facing the third season since our formation. Despite of being so new, we already attended the FSG in 2015 with our first vehicle, the UM15. Then, with the UM16 we jumped to a top vehicle in terms of design, with carbon fiber monocoque and a complete aerodynamic pack. This season, with the UM17 our goal is to combine complex design, high performance and maximum reliability, in order to get our highest score ever.

FRAME CONSTRUCTION Front fibre monocoque with tubular steel sub-frame
MATERIAL PVC DIAB D/60 core and prepreg sandwich panel (15mm core, sides 1.3mm and 1.
OVERALL L / W / H 3044mm / 1422mm / 1187mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1210mm / 1100mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 125kg / 153kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated horizontally oriented spring and adjustable
TYRES (Fr / Rr) 20.5 x 7 - 13
WHEELS (Fr / Rr) Mg CAST 7x13, 30mm offset / Mg CAST 7x13, 30mm offset
ENGINE Modified Kawasaki ER6-n
BORE / STROKE / CYLINDERS / DISPLACEMENT 83mm / 60mm / 2 cylinders / 649cc
COMPRESSION RATIO 11.3:1
FUEL SYSTEM Open-source Motec system with semi-sequential injection and wasted-spark ignition
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 10000 rpm/ 7000rpm
DRIVE TYPE Manual sequential gearbox
DIFFERENTIAL Limited sleep differential with internal preload adjustment
COOLING Lateral mounted 800cc dual radiator and 130 mm electric fan at each
BRAKE SYSTEM 4-Disk system, selfmade laser cut rotors 220 mm diámeter, adjustable brake balance
ELECTRONICS wiring harness sealed to IP66, selfdesigned telemetry system, paddle shift ETC

WEINGARTEN

University of Applied Sciences Ravensburg-Weingarten

Car 360 **Pit 125** **WRL 25** Germany

The Formula Student Team Weingarten was founded in 2008. Today the team counts 70 team members who are divided into six subteams. The teams' car concept is based on a 4 cylinder PC40 engine and a steel space frame. Main targets for the "Stinger17" were further weight reduction as well as a modified 4 cylinder engine. The FSG event each year forms a highlight for the FSTW. After a great season, the team now is striking for a TopTen result in Hockenheim '17.

FRAME CONSTRUCTION tubular steel space frame, reinforced with CFRP panels structurally bonded
MATERIAL E355 and 25CrMo4
OVERALL L / W / H 3148mm / 1431mm / 1194mm
WHEELBASE / TRACK (Fr / Rr) 1580mm / 1200mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 68kg / 98kg
SUSPENSION Double unequal length A-Arm, Pull-Rod actuated horizontally oriented
TYRES (Fr / Rr) 205/470 R13 Continental C17 Slick
WHEELS (Fr / Rr) 6.5x13 O.Z. Magnesium or 6.5x13 Hybrid CFRP
ENGINE 2007 Honda CBR 600 RR 4 cylinder, (PC 40)
BORE / STROKE / CYLINDERS / DISPLACEMENT 69.0mm / 42.5mm / 4 cylinders / 636cc
COMPRESSION RATIO 13.5:1
FUEL SYSTEM two self designed rails, witch each 4 denso injection valves
FUEL E85
MAX POWER/TORQUE DESIGN 9000 rpm/ 11000rpm
DRIVE TYPE chain drive
DIFFERENTIAL self designed, spool drive
COOLING two symmetric mounted, core double pass radiator, 285 cfm fan mounted to both radiators
BRAKE SYSTEM 3-Disk system, self developed rotors, proportioning valve
ELECTRONICS self designed PDM: Stinger contorl unit

WIESBADEN

University of Applied Sciences RheinMain

Car 265 **Pit 81** **WRL 141** Germany

The Scuderia Mensa Racing Team is proud to present their tenth Formula Student car, SPR17. The team counts 40 students from various courses of studies. The SPR17 is the answer to the quote „revolution instead of evolution". We made many changes in our powertrain system and focused on weight reduction. On top of that, we built our first hybrid monocoque and 10" wheel sized racecar which surely will suprise you!

FRAME CONSTRUCTION Singlepiece Monocoque with tubular rear space frame
MATERIAL CFRP Monocoque, steel rear frame
OVERALL L / W / H 2901mm / 1411mm / 1197mm
WHEELBASE / TRACK (Fr / Rr) 1575mm / 1220mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 158kg / 158kg
SUSPENSION Double unequal length A-Arm. Pull/Push rod actuated horizontally/longitudinally oriented
TYRES (Fr / Rr) Hoosier 6.00x18 R10 R25B
WHEELS (Fr / Rr) OZ 7x10
ENGINE KTM LC4 690
BORE / STROKE / CYLINDERS / DISPLACEMENT 102mm / 84,5mm / 1 cylinder / 658cc
COMPRESSION RATIO 12.4:1
FUEL SYSTEM Fuel injection
FUEL 98 octane
MAX POWER/TORQUE DESIGN 8000 rpm/ 5500rpm
DRIVE TYPE chain drive (D.I.D. 520 ert2)
DIFFERENTIAL Drexler LSD
COOLING Diffusor mounted radiator
BRAKE SYSTEM 4-Disk system
ELECTRONICS Self-developed data logging and telemetry, Multifunctional steering wheel

WROCŁAW

Wrocław University of Technology

Car 308 **Pit 112** **WRL 83** Poland

PWR Racing Team was founded in 2008, since that we designed and built six class 1 cars. In 2016 we were the fastest combustion car in Formula Student Germany and Formula Student UK in acceleration event. We also win Skidpad event in Formula Student Czech Republic. In RT08 we upgraded aerodynamic package and CFRP monocoque. This year we rely on the ergonomics of our car.

FRAME CONSTRUCTION Monocoque in front and space frames; one safety frame and second as engine cage
MATERIAL Monocoque: CFRP; core: aluminum honeycomb, structural foam ; Frame: CrMo steel
OVERALL L / W / H 2929mm / 1440mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1525mm / 1230mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 127kg / 129kg
SUSPENSION Double unequal length A-Arm. Push rod actuated hor. spring and damper to lower wishbone
TYRES (Fr / Rr) Hoosier 18.0x7.5-10 R25B
WHEELS (Fr / Rr) 7.25x10, 59mm offset, 3 pc Al Rim
ENGINE Modified Honda CBR600RR (PC40)
BORE / STROKE / CYLINDERS / DISPLACEMENT 67mm / 42.5mm / 4 cylinders / 599cc
COMPRESSION RATIO 12,2:1
FUEL SYSTEM Standalone ECU Motec M130
FUEL 98 octane unleaded gasoline
MAX POWER/TORQUE DESIGN 11000 rpm/ 10000rpm
DRIVE TYPE 520 non-oring chain, 3 gear gearbox
DIFFERENTIAL Drexler LSD, 30% lock
COOLING left side mounted (H400:mm, W:265mm, D:28mm); radiator duct with spal fan
BRAKE SYSTEM 4-Disk system, Fully floating, 205mm dia., 4mm thick, steel, drilled
ELECTRONICS TC, LC, dash display in steering wheel, Student built data logger and power dis. unit

ZAGREB

University of Zagreb

Car 324 **Pit 118** **WRL 62** Croatia

FSB Racing Team is the first and most successful Croatian Formula Student team, representing UNI Zagreb since 2004. With 13 years of continuous growth and four cars behind us, each showing significant progress over its predecessor, we present our newest, and hopefully greatest achievement so far - FSB-RT05 Strix.

FRAME CONSTRUCTION Space frame tubular chassis
MATERIAL 25CrMo4 steel round tubing
OVERALL L / W / H 3005mm / 1536mm / 1180mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1300mm / 1240mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 121kg / 147kg
SUSPENSION Double wishbone, unequal lenght A-Arm. Direct acting damper. Composite leaf spring.
TYRES (Fr / Rr) 18x7.5-10, R25B, Hoosier / 18x7.5-10, R25B, Hoosier
WHEELS (Fr / Rr) 8x10, ET= 16.5, 3 pc Al Rim / 8x10, ET=16.5, 3 pc Al Rim
ENGINE Modified Husqvarna TE610
BORE / STROKE / CYLINDERS / DISPLACEMENT 98mm / 76.4mm / 1 cylinder / 576cc
COMPRESSION RATIO 13.2:1
FUEL SYSTEM VEMS ECU, Bosch 627cc fuel injection
FUEL E85
MAX POWER/TORQUE DESIGN 7300 rpm/ 5700rpm
DRIVE TYPE Gear drive
DIFFERENTIAL ZF limited slip differential
COOLING Central mounted single core radiator with 2 ECU controlled fans
BRAKE SYSTEM 4-disk system, self developed rotors, AP racing calipers
ELECTRONICS Electropneumatic shifting system, Selfmade control board, wiring harness sealed to IP65

Team Profiles

Electric

1258 students

35 teams

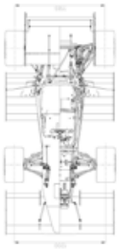
10 nations

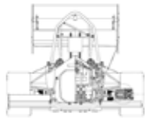
AMBERG

Ostbayerische Technische Hochschule Amberg-Weiden (OTH)

Car 23 **Pit 9** **WRL 8** **Germany**

The Running Snail Racing Team was established in August 2004 at the OTH Amberg-Weiden in eastern Bavaria. After building eight combustion cars, the „RS17“ is our fifth generation electric powered racecar. With further weight reduction, new motors, improved control systems and a new aerodynamics package, we hope to be able to confirm or even surpass last year's results. For further information please visit us on Facebook or our website www.running-snail.de.





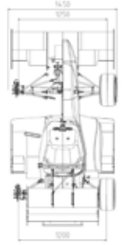
FRAME CONSTRUCTION Composite CFRP/aluminium sandwich monocoque
MATERIAL aluminium honeycomb, prepreg CFRP
OVERALL L / W / H 2922mm / 1451mm / 1183mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 82kg / 122kg
SUSPENSION Double unequal length A-Arm, Pushrod actuated ZF/Sachs damper-unit, U-type anti-roll-bar
TYRES (Fr / Rr) Hoosier 18.0x7.5-10 R25B
WHEELS (Fr / Rr) 7.0x10, 21.4 mm offset, CFRP-Al rim
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / wheelhub / 29.9 kW
MOTOR TYPE Fischer Elektromotoren, TI085-052-070-04B6S
MAX MOTOR RPM 16700
MOTOR CONTROLLER Lenze Mobile DCU 60/60
MAX SYSTEM VOLTAGE 600V
ELECTRODE MATERIALS LiCoO2 - graphite
COMBINED ACCUMULATOR CAPACITY 7.45 kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 11569 / N/A
DRIVE TYPE planetary gearbox
DIFFERENTIAL N/A
COOLING twin side pod mounted radiator
BRAKE SYSTEM fr: 4 piston; fr: 2 piston; semi-floating, hub mounted, 175mm diameter, adjustable brake
ELECTRONICS data logging system, selfdesigned telemetry, CAN, safety monitoring

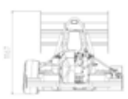
AUGSBURG

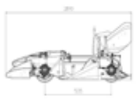
University of Applied Sciences Augsburg

Car 66 **Pit 32** **WRL 48** **Germany**

The Starkstrom team was established in 2010 and originates at the University of Applied siences Augsburg. With this seasons car under the code name UASA1706 the team has kept the four wheel-drive concept from the last season and has bulid its 6th car. Having improved performance, reliability and functionality of the system, the team is proud to present its success.







FRAME CONSTRUCTION One piece Composite monocoque with anti rollbar structures
MATERIAL Carbon Fiber with honeycomb/ S355 steeltubing roolbars 25mm diam. / EN-AW-6061
OVERALL L / W / H 2888mm / 1425mm / 1030mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1250mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 132kg / 178kg
SUSPENSION Double unequal A-Arms, Push Rod, horizontal Damper
TYRES (Fr / Rr) continental c16 slick (205/470R13)
WHEELS (Fr / Rr) 7Jx13 magnesium oz rim
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / wheel hub motors / 36kW
MOTOR TYPE AMK - DD5-14-10-POW
MAX MOTOR RPM 18617
MOTOR CONTROLLER AMK - KW26-S5-FSE-4Q
MAX SYSTEM VOLTAGE 600V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 6,7kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:13,65 / N/A
DRIVE TYPE planetary gear
DIFFERENTIAL N/A
COOLING side pod mounted radiators, self developed motor cooling jackets
BRAKE SYSTEM 4 disc brake system, self developed rotors with 232mm diameter front and 228 rear
ELECTRONICS Multifunctional Steering Wheel, self designed control units, control system

BARCELONA

PT University of Catalonia - Engineering School of Barcelona

Car 54 **Pit 28** **WRL 15** **Spain**

ETSEIB Motorsport is a FSE team established in 2007 at Barcelona. Since our foundation we have developed a new car every year and for this season we are proud to introduce you the CAT10e. With a great basis from last year design, the new CAT keeps on the same philosophy but improves lots of details to achieve the best performance on track. After a year of hard work, the team is willing to see the CAT10e doing its best. Looking for further information about us? Do not hesitate to visite our pit.

FRAME CONSTRUCTION CFRP single piece monocoque with Aluminium Front Hoop and Steel Main Hoop
MATERIAL CFRP and aluminium honeycomb
OVERALL L / W / H 2870mm / 1440mm / 1150mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1200mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 131kg / 152kg
SUSPENSION Double unequal length A-Arm. Push rod
TYRES (Fr / Rr) 18x7,5 R10 Hoosier R25B
WHEELS (Fr / Rr) 7x10 ET35 Laminated carbon fiber rim
NUMBER OF MOTORS / LOCATION / MAX POWER 1 / rear axel / 100kW
MOTOR TYPE Enstroj EMRAX 228 LC
MAX MOTOR RPM 5500
MOTOR CONTROLLER Unitek Bamocar D3
MAX SYSTEM VOLTAGE 436V
ELECTRODE MATERIALS
COMBINED ACCUMULATOR CAPACITY
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:3,67 /
DRIVE TYPE
DIFFERENTIAL mechanical differential
COOLING Twin side pod including radiators. PWM controlled
BRAKE SYSTEM 4-Disk System, adjustable brake balance
ELECTRONICS self-developed BMS, dashboard, live-telemetry and rear ECU.

BAYREUTH

University of Bayreuth

Car 21 **Pit 11** **WRL 45** **Germany**

Elefant Racing e.V. was founded in spring 2004 at the University of Bayreuth. Since 2010/11 we develop electrically powered vehicles. For our latest race car, the “FR17 Wotan”, we focused on weight reduction of the chassis. Furthermore, our car features a self-developed and programmed battery management system. For further information, or to just to have a good time with us, you are very welcome to visit our pit.

FRAME CONSTRUCTION Full CFRP monocoque with aluminum Front and steel Main Hoop
MATERIAL CFRP & C/AFRP hyprid prepreg,Al-honeycomb, Rohacell structural foam, Epoxy adhesive and surface film
OVERALL L / W / H 2920mm / 1388mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1180mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 126kg / 137kg
SUSPENSION Double unequal length A-Arm.Front Pull rod/ rear Push rod actuated spring and damper.
TYRES (Fr / Rr) 18.0 x 7.5 -R10 Hoosier R25B (both)
WHEELS (Fr / Rr) 8.0 x 10, 35.0 mm offset, 2 pc CFRP rim with aluminium wheel center. (both)
NUMBER OF MOTORS / LOCATION / MAX POWER 1 / Rear / 80kW
MOTOR TYPE permanent excitated watercooled synchronous
MAX MOTOR RPM 6500
MOTOR CONTROLLER Unitek Bamocar D3
MAX SYSTEM VOLTAGE 588
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 6,50kwh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:3,5 / n/a
DRIVE TYPE Polychain belt drive
DIFFERENTIAL Drexler formula student clutch pack limited slip, 60%/42% acceleration/deceleration
COOLING Two side pod mounted radiators
BRAKE SYSTEM 4-Disk system, self developed 42CrMo4 rotors, adjustable brake balance
ELECTRONICS Driver Interface with E-Ink Display, selfdesigned distributed Sensorsystem, Live-Telemetry

BRAUNSCHWEIG

Technische Universität Braunschweig

Car 19 **Pit 10** **WRL 78** **Germany**

Founded in 2000, the Lions Racing Team from the TU Braunschweig is the 2nd oldest Formula Student team in Germany. In 2012, we switched from combustion to electric driven vehicles, since 2016 our car is four-wheel driven and the steel frame was replaced by a monocoque. About 50 team members have been working passionately the last year to reach our goals of becoming more reliable, building a well maintainable car and getting faster and lighter.

FRAME CONSTRUCTION Full monocoque
MATERIAL CFRP with aluminium honeycomb
OVERALL L / W / H 2946mm / 1388mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1164mm / 1138mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 145kg / 145kg
SUSPENSION Double unequal length A-Arm, pushrod actuated spring/damper
TYRES (Fr / Rr) Continental 205 / 470 R13 (front&rear)
WHEELS (Fr / Rr) 7x13, 22 mm Offset, 1 Pc Al Rim (front&rear)
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / FR, FL, RR, RL / 4x 35kW
MOTOR TYPE Permanent magnet synchronous motor
MAX MOTOR RPM 20000
MOTOR CONTROLLER AMK KW26-S5-FSE-4Q 2
MAX SYSTEM VOLTAGE 598V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 7.03kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 15.88 / n/a
DRIVE TYPE Planetary gear drive and stepplanets
DIFFERENTIAL Electronic differential
COOLING Twin side pod mounted radiators
BRAKE SYSTEM 4-Disk System, self-developed rotors
ELECTRONICS Self-developed control units, live telemetry, multiple motion sensors, gps sensor

BREMEN

University of Bremen

Car 72 **Pit 33** **WRL 87** **Germany**

Bremergy was founded in 2012 and is meanwhile made up of around 70 students from several different studies at the University of Bremen. The BreMo17 is the 4th car we built for the Formula Student Electric. We redesigned and improved the electronical system, to make it safer and more reliable. Additionally minor mechanical parts were exchanged and enhanced. We learned a lot from the last year and with this knowledge the team is looking forward to a great FSG event 2017.

FRAME CONSTRUCTION Full CFRP-monocoque with foam sandwich structure
MATERIAL UD, Biax, twill, coppermesh, rohacell foam
OVERALL L / W / H 3172mm / 1320mm / 1190mm
WHEELBASE / TRACK (Fr / Rr) 1730mm / 1140mm / 1130mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 143kg / 175kg
SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) 18.0x6.0-10 / 18.0x7.5-10 Hossier R25B
WHEELS (Fr / Rr) 5.75x10 / 7.75x10, 30mm offset. self-designed inner Al rim
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / rear right, rear left / 80 kW
MOTOR TYPE Enstroj Emrax 207 HV LC
MAX MOTOR RPM 6000
MOTOR CONTROLLER self-designed motor controller
MAX SYSTEM VOLTAGE 432V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 6,9 kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:4,05 / n/a
DRIVE TYPE one step planetary gear drive
DIFFERENTIAL torque vectoring
COOLING watercooled motors and motor controller, twin side pod mounted radiators
BRAKE SYSTEM 4-Disk system, floating self developed rotors, adjustable brake balance
ELECTRONICS CAN-Bus, live telemetry

DARMSTADT

Technische Universität Darmstadt

Car 42 **Pit 16** **WRL 20** **Germany**

So, we had the goal to hit into space. The universe is huuuuuge, you know. Real big and wide. So we build this tiny spaceship. Which can be operated by only one single person! It's like a real spaceship, but much smaller. So it safes fuel for our environment. It`s driven by electricity and has four wheels. With motors in each single one. And there`s a gearbox in each of this tiny wheels. It`s f****** awesome! I tell you! The guys who build it are heroes!

FRAME CONSTRUCTION Monocoque
MATERIAL Single-piece CFRP with Aluminium Honeykomcombs
OVERALL L / W / H 3100mm / 1400mm / 1100mm
WHEELBASE / TRACK (Fr / Rr) 1585mm / 1220mm / 1170mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 134kg / 134kg
SUSPENSION Double A-Arm
TYRES (Fr / Rr) Pirelli 185/40 R13
WHEELS (Fr / Rr) (Aluminiun-CFRP Hybrid / Aluminiun-CFRP Hybrid
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / Wheel-Hub / 52kW
MOTOR TYPE PermMagnet Synchronous Machine
MAX MOTOR RPM 24000
MOTOR CONTROLLER BRUSA dmc 514
MAX SYSTEM VOLTAGE 420
ELECTRODE MATERIALS LiPo
COMBINED ACCUMULATOR CAPACITY 6.99kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 18:1 / 1:1
DRIVE TYPE 1.5 Planetary Gearbox
DIFFERENTIAL Electronic Differential
COOLING two seperate water-cooling circuit
BRAKE SYSTEM 4-Disk system, self developed rotors, adjustable brake balance, RIT de
ELECTRONICS selfdesigned Live-Telemetry System, Multifunctional Steering Wheel

DELFT

Delft University of Technology

Car 85 **Pit 42** **WRL 2** **Netherlands**

Formula Student Team Delft returns to Hockenheim with the DUT17. The newest car has an improved aerodynamic package, an ergonomic chassis shape, single stage planetary gearset and the tyres to match. These features make the DUT17 a lightweight and agile car, in line with our design philosophy.

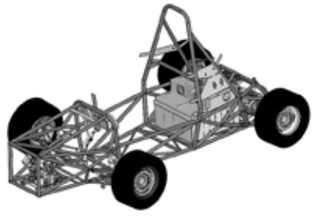
FRAME CONSTRUCTION Full CFRP single piece monocoque with aluminium honeycomb core
MATERIAL TeXtreme 100gsm weave, DeltaTech M46J + STS UD prepregs impregn. with MTC510, Plascore Al5052 core
OVERALL L / W / H 2867mm / 1442mm / 1190mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 110kg / 115kg
SUSPENSION Double unequal length A-arms, pullrod (front) and pushrod (rear) acting on vertical SDS
TYRES (Fr / Rr) 225x368-R10, Vredestein Slick Compound Front and Rear
WHEELS (Fr / Rr) 214mm, self-made 2-piece CFRP rim Front and Rear
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / Centre of each wheel / 35kW per motor
MOTOR TYPE 4x AMK DT5-14-10-POW-14000-B5
MAX MOTOR RPM 4x 20,000
MOTOR CONTROLLER AMK KW26-S5-FSE-4Q
MAX SYSTEM VOLTAGE 600V
ELECTRODE MATERIALS LiCoO2 - Graphite
COMBINED ACCUMULATOR CAPACITY 6.7kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 10.82 / n/a
DRIVE TYPE Single-stage planetary
DIFFERENTIAL Electronically actuated slip ratio and yaw rate controller
COOLING Two sidepod-mounted custom radiators with temperature-controlled fans
BRAKE SYSTEM Floating steel brake disks, single piston half-caliper per wheel, adjustable brake balance
ELECTRONICS Self-made ECU, AMS, BMS, Sensornodes and DRS power stage, 200+ channel CAN logging

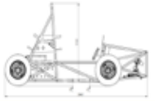
DIEPHOLZ

University of Applied Sciences Diepholz/Oldenburg/Vechta

Car 192 **Pit 49** **WRL 64** **Germany**

The formula student team of the UAS Diepholz – Deefholt Dynamics – is an interdisciplinary engineering team of 48 people. The race car is designed and manufactured in 6 - 7 months with a limited budget. A major challenge is the university's requirement of a comparably low voltage of 120 V. This year's car – PHWT-10e – has major changes compared to its predecessor.





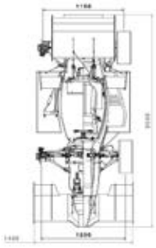
FRAME CONSTRUCTION Tubular space frame
MATERIAL 25CrMo4
OVERALL L / W / H 3100mm / 1510mm / 1226mm
WHEELBASE / TRACK (Fr / Rr) 1590mm / 1300mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 145kg / 205kg
SUSPENSION Double wishbone, Push-rod, Pull-rod
TYRES (Fr / Rr) 18.0x6.5-10 Hoosier R25B / 19.5x6.5-10 Hoosier WET
WHEELS (Fr / Rr) 10.0x6.5 CFK Rim
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / N/A, N/A, 150kW, 150kW
MOTOR TYPE RR, RL: Enstroj EMRAX 208 LV LC
MAX MOTOR RPM RR, RL: 7000
MOTOR CONTROLLER Emsiso emDrive 500
MAX SYSTEM VOLTAGE 128
ELECTRODE MATERIALS LiFeYPO4 - ????
COMBINED ACCUMULATOR CAPACITY 7680
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:4 / N/A
DRIVE TYPE planet gear
DIFFERENTIAL N/A
COOLING In sidepots mounted radiator
BRAKE SYSTEM 4-Disk system, floated, 190mm diameter, 4mm thickness, 41CrMo4
ELECTRONICS Display in dashboard,

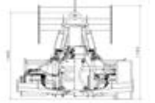
DRESDEN

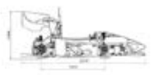
Technische Universität Dresden

Car 18 **Pit 12** **WRL 17** **Germany**

Meet EmilE our 10th racecar, 205 kg of finest Saxonian engineering. Her newly developed traction control system and improved aerodynamics keep her right-on track. She has been training hard to reach her peak form bringing tires and drivers to the limits. EmilE is the basis for our three-year masterplan to catch up with the top teams. This year we aim to make our way into the top 10 of FSE. With EmilE's successors Elbflorace is going to achieve a place among the top 3 eventually.







FRAME CONSTRUCTION full size CFRP Monocque
MATERIAL Pre-impregnated CFRP with Aluminium honeycomb as core material
OVERALL L / W / H 3035mm / 1405mm / 1153mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1200mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 136kg / 136kg
SUSPENSION Double unequal length A-Arm, Pushrod
TYRES (Fr / Rr) 205/ 470 R13 Continental
WHEELS (Fr / Rr) 7x13, 30mm offset, Mg rim
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / Wheel Hubs, FL FR RR RL / 35kW, 35kW, 35kW, 35kW
MOTOR TYPE AMK / DD5-14-POW-19000
MAX MOTOR RPM FL, FR, RR, RL: 20.000
MOTOR CONTROLLER AMK Inverter / PDK_205481_ KW26-S5
MAX SYSTEM VOLTAGE 600V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 7
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:15,32 / N/A
DRIVE TYPE 1 stage planetary gear integrated to upr
DIFFERENTIAL n/a
COOLING two seperated cooling circles for motors and inverters, Radiators mounted at side
BRAKE SYSTEM 4-Disk system, self developed rotors and self developed front brake caliper
ELECTRONICS selfdesigned Live-Telemetry System via WLAN, Kalman filter for determining velocity

FREIBERG

TU Bergakademie Freiberg

Car 76 **Pit 34** **WRL 40** **Germany**

Racetech Racingteam was founded in 2005 and has built eleven cars since. With our sixth electric car,the RT11, we focused on refining our overall concept and adding a few innovations. Our car once again features a sheet metal monocoque and a casted rear frame. Furthermore the car is equipped with a rear wheel steering system and a refined aero package. The RT11 will take on the competition in Netherlands, Germany, Hungary and Spain. We look forward to meeting you in our pit for some great chats!

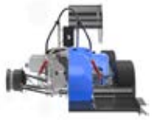
FRAME CONSTRUCTION Monocoque with casted rear frame
MATERIAL magnesium (AZ31) / aluminum (5754) sheets and aluminum honeycomb core
OVERALL L / W / H 2978mm / 1405mm / 1194mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1160mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 139kg / 144kg
SUSPENSION Double unequal length A-Arm. Pushrod actuated oriented coilovers. U-shaped anti-roll-bars.
TYRES (Fr / Rr) 205x34 R13, Continental C17
WHEELS (Fr / Rr) 7x13, 34mm offset, 2pc - CFRP shell, Mg-center
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / 50kW, 50kW
MOTOR TYPE RL,RR: Bosch SMG138-FSE
MAX MOTOR RPM 16000
MOTOR CONTROLLER Bosch INV2.2
MAX SYSTEM VOLTAGE 403V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 7,05kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:8,38 / N/A
DRIVE TYPE two stage spur gearbox
DIFFERENTIAL torque vectoring
COOLING twin sidepod mounted radiators, independent circuits for motors and inverters
BRAKE SYSTEM 4-Disk System, self-developed Al-casted calipers, 4 pistons (front), 2 pistons (rear)
ELECTRONICS self-developed vehicle dynamics control unit (adjustable via dashboard), live telemetry

GÖTEBORG

Chalmers University of Technology

Car 9 | **Pit 4** | **WRL 22** | **Sweden**

It's the 15th year of Chalmers Formula Student and we present our 3rd rear wheel driven electric car. With a new team formed every year, the team members depend on the knowledge from previous years and experience a steep learning curve during the project life cycle. This year's car, aimed at being reliable & low weight, will feature custom made high power density motors coupled to compact planetary gearboxes. DRS, CFRP rims, Datalogger, Nodes & BMS are the other highlights; all self-developed.



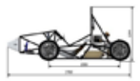
FRAME CONSTRUCTION CFRP single piece monocoque with Al honeycomb core and integrated front hoop
MATERIAL CFRP pre-pregs and Al honeycomb (1/2 and 1 inch) sandwich panels
OVERALL L / W / H 2891mm / 1465mm / 1183mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1250mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 115kg / 141kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated spring and damper.
TYRES (Fr / Rr) Hoosier R25B 18x10x6
WHEELS (Fr / Rr) 10x6 CFRP Custom made rims, +4.7mm offset / 10x6 CFRP Custom made rims, +4.7mm offset
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / 40kW, 40kW
MOTOR TYPE Custom made PMSM from AROS Electronics AB
MAX MOTOR RPM RR,RL: 20000
MOTOR CONTROLLER IGBT based 3 phase inverter
MAX SYSTEM VOLTAGE 580V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 7,66kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 16:1 / n/a
DRIVE TYPE Compound Planetary Gearbox
DIFFERENTIAL n/a
COOLING Water cooled with 2 side-mounted radiators in sidepods with 150mm electric fans
BRAKE SYSTEM Toolex 33 steel, Floating 195x4(fr) 186x4(rr) rotors, 4(fr) & 2(rr) piston calipers
ELECTRONICS Live-Telemetry, Datalogger, Nodes, BMS and Torque Vectoring; all self-developed

GÖTTINGEN

Hochschule für angewandte Wissenschaft und Kunst Hildesheim/ Holzminden/Göttingen

Car 181 | **Pit 47** | **WRL 66** | **Germany**

The Team Blue Flash Mobility Concepts was founded in 2015. 40 Students from three faculties of the HAWK Goettingen collaborate in realizing their second race car. In 2016 the team was able to build the lightest first year car in formula student history. For the eHAWK_17 this unique design was refined and improved. The team stays pioneer in low Voltage technology in the Formula Student competition. We are looking forward to exciting days at FSG 2017. Thanks to all who support us during the season



FRAME CONSTRUCTION Front and rear Tubular space frame
MATERIAL S235 +C , S355 +N ; 26x2, 26x1.2, 28x2
OVERALL L / W / H 2780mm / 1393mm / 1244mm
WHEELBASE / TRACK (Fr / Rr) 1555mm / 1190mm / 1140mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 125kg / 127kg
SUSPENSION double A-arm, unequal length, Push rod, Spring and Damper horrizontally
TYRES (Fr / Rr) 205/470 R13, Continental C16 / 205/470 R13, Continental C16
WHEELS (Fr / Rr) 7x13, 30mm offset, 1pc Al Rim / 7x13, 30mm offset, 1pc Al Rim
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / 50kW
MOTOR TYPE Compact Dynamics/Dynax/MGI 25-48
MAX MOTOR RPM 1000
MOTOR CONTROLLER Dynacontrol PE 40-48
MAX SYSTEM VOLTAGE 58V
ELECTRODE MATERIALS LiPo - Cobalt Oxide
COMBINED ACCUMULATOR CAPACITY 6,17
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:6 / N/A
DRIVE TYPE Chain
DIFFERENTIAL Torque sensitive limited slip bevel gear differential with internal preload adjustment
COOLING Rear mounted self developed radiator with 80mm electric fan
BRAKE SYSTEM 4-Disk system, self dev. rotors with 197,4/200mm (f/r) diameter, adj. brake balance
ELECTRONICS wiring harness sealed to IP67, anti-slip regulation, dashboard controller

HAMBURG

Hamburg University of Technology

Car 78 | **Pit 36** | **WRL 30** | **Germany**

e-gnition is the Formula Student Electric Team of the TU Hamburg. This year we built our sixth electronic car. After the most succesful year in our history with one of the best rear-wheel driven cars of the competition field, we decided to take the next step on the evolutionary ladder. We are now running a four-wheel drive, a DRS, an undertray and a new monocoque. We are pleased to present you our new egn17!

FRAME CONSTRUCTION Monocoque structure with prepreg and aluminium honeycomb material
MATERIAL IMS65 UD Fibres
OVERALL L / W / H 2925mm / 1415mm / 1140mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1150mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 141kg / 142kg
SUSPENSION Double unequal length A-Arm. Push rod actuated air spring and damper
TYRES (Fr / Rr) Continental C17
WHEELS (Fr / Rr) 13
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / Each Wheelhub / 30kW each
MOTOR TYPE AMK DD5-14-10-POW
MAX MOTOR RPM 20000
MOTOR CONTROLLER AMK Wechselrichter KW26-S5-FSE-4Q
MAX SYSTEM VOLTAGE 600V
ELECTRODE MATERIALS LiCoO2 - Graphite
COMBINED ACCUMULATOR CAPACITY 6,7kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:12,6 / N/A
DRIVE TYPE One stage planetary gear system in wheel
DIFFERENTIAL Software actuated electrical differential
COOLING Water cooling. Two motors and one motorcontroller each.
BRAKE SYSTEM Self developed rotors with 191mm diameter, adjustable breake balance
ELECTRONICS ECU, AMS, IMU and sensor boards self designed.

HANNOVER

Leibniz Universität Hannover

Car 16 | **Pit 5** | **WRL 53** | **Germany**

HorsePower Hannover e.V. was founded in 2007 by a group of 10 engineering students. Our first events were Silverstone and Hockenheim in 2009 with the RacePony09, a combustion racecar. Step by step we learned about building an electric racecar. By retaining the know-how and establishing new structures of organisation, our team of more than 50 interdisciplinary students is improving the all wheel driven, single CFRP monocoque every year.

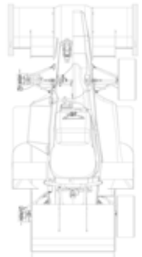
FRAME CONSTRUCTION single piece Monocoque CFRP-Aluminum Honeycomb-Sandwich
MATERIAL K200K 1200 CP004 42 (CFRP Prepreg), PAMG-XR1-6.1-1/8-15-N-5056 (Aluminium Honeycomb)
OVERALL L / W / H 2939mm / 1432mm / 1088mm
WHEELBASE / TRACK (Fr / Rr) 1555mm / 1220mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 149kg / 155kg
SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented air spring damper
TYRES (Fr / Rr) Continental C17 205/470 R13
WHEELS (Fr / Rr) 7J x 13 offset, 46mm offset, 3pc, Al Rim
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / wheel hub motors / 30 kW, 30kW, 30kW, 30kW
MOTOR TYPE FL,FR: AMK / DT5-14-10-POW
MAX MOTOR RPM 20000
MOTOR CONTROLLER AMK KW26-S5-FSE
MAX SYSTEM VOLTAGE 588V
ELECTRODE MATERIALS LiPo
COMBINED ACCUMULATOR CAPACITY 6 kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:13,2 /
DRIVE TYPE planetary gearbox
DIFFERENTIAL electric
COOLING Water-cooling for motors and inverters, Accumulator air-cooling
BRAKE SYSTEM Regenerative braking + 4-Disk system
ELECTRONICS Multifunctional steering wheel, speed sensor with GPS

INGOLSTADT

Technische Hochschule Ingolstadt

Car 34 | **Pit 22** | **WRL 36** | **Germany**

The FS Team "Schanzer Racing Electric" will participate for the sixth time in the FS Germany. We proudly join the competition with two cars for the first time in the Schanzer Racing history.We decided to take the next step in terms of technology: with the improved CFRP chassis, 4WD, rearranged battery package and the new aerodynamics we expect to close the gap to the top teams.We are looking forward to a great season with all of you - especially the Rennteam Aalen #HOBELBANK #SCHANZERPOWER.



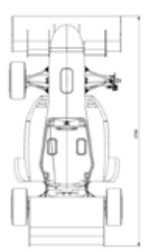
FRAME CONSTRUCTION Monocoque sandwich construction with tubular steel roll bars
MATERIAL Rohacell sandwich panel
OVERALL L / W / H 2868mm / 1456mm / 1196mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1378mm / 1335mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 135kg / 140kg
SUSPENSION double A-Arm, Push rod actuating Spring-damper
TYRES (Fr / Rr) 205/470 R13 Continental
WHEELS (Fr / Rr) 7 x13, 30mm offset, 1pc Mg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / 2 fr/ 2rr (right/left) / 35 kW, 35kW, 35kW, 35kW
MOTOR TYPE AMK / DD5-14-10-POW / synchronous motor
MAX MOTOR RPM 20000
MOTOR CONTROLLER AMKASYN Inverter KW26-S5-FSE-4Q
MAX SYSTEM VOLTAGE 600
ELECTRODE MATERIALS LiNiCoAlO2
COMBINED ACCUMULATOR CAPACITY 7.8 kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:4,667 / 1:3,5
DRIVE TYPE 2-stage planetary gearbox
DIFFERENTIAL virtual via torque vectoring
COOLING laterally mounted radiators
BRAKE SYSTEM 4 Disk system, self developed rotors, adjustable brake balance, ISR Racing Calipers
ELECTRONICS multifunc.steering wheel;CAN-to-WLAN live telemetry;decentr.Sensor-to-CAN PCBs;IP67 wiring

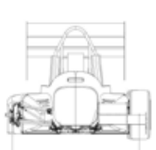
KAISERSLAUTERN

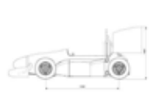
Kaiserslautern University of Technology

Car 64 | **Pit 29** | **WRL 61** | **Germany**

The Kaiserslautern Racing Team is a collaboration of 45 active members from both the TU and UAS Kaiserslautern, located in south-western Germany. The Electronyte e17 marks the 10th anniversary of KaRaT, continuing a design philosophy started in 2014: It features independently driven rear wheels, a carbon fibre monocoque and 10" pullrod suspension. The design focus is on reliability and compact packaging to achieve maximum performance in the dynamic events.







FRAME CONSTRUCTION Single piece monocoque, tubular steel roll bars
MATERIAL Carbonfibre twill weave and unidirectional prepreg, Aluminium honeycomb sandwich core
OVERALL L / W / H 2784mm / 1360mm / 1087mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1150mm / 1100mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 123kg / 139kg
SUSPENSION Double unequal length A-Arm. Pullrod actuated horizontally oriented spring and damper (c
TYRES (Fr / Rr) 18.0x6.0-10 Hoosier R25B / 18.0x6.0-10 Hoosier R25B
WHEELS (Fr / Rr) 7x10, 00mm offset, CFRP shell+AL center
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Left and Right / 2x 40kW
MOTOR TYPE VUES AFW507D mod.
MAX MOTOR RPM 7500
MOTOR CONTROLLER Unitek Bamocar D3-700
MAX SYSTEM VOLTAGE 403V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 7,03kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:4,9 / N/A
DRIVE TYPE Single-stage spur gear
DIFFERENTIAL Electronic torque distribution, torque vectoring
COOLING Watercooled motors and motor-controllers, sidepod-mounted dual radiators
BRAKE SYSTEM 4-Disk system, self-designed rotors, adjustable brake balance, 4 piston Fr+2 piston Rr
ELECTRONICS self-developed control system for data aqcuisition and processing

KARLSRUHE

Karlsruhe Institute of Technology

Car 17 | **Pit 6** | **WRL 1** | **Germany**

KA-RaceIng is the Formula Student team of the Karlsruhe Institute of Technology, founded in 2006. Since 2010 we stand for „one team - two cars“ and since this year even „one team - three cars“ designing, manufacturing and competing with a FSE and a FSC car every year. The KIT17e is the consequent development of the dual-x-drive, our unique motor-gearbox concept.We would like to thank all our supporters for the enormous help throughout the season!

FRAME CONSTRUCTION CFRP sandwich monocoque, motor-gear-units mounted centraly underneath
MATERIAL HT and HM fibres, twill and unidirectional plies, kevlar twill
OVERALL L / W / H 2917mm / 1566mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1220mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 105kg / 105kg
SUSPENSION Double unequal length A-Arm. Pull rod damper.
TYRES (Fr / Rr) Hoosier 18.0x7.5-10 R25B
WHEELS (Fr / Rr) Selfmade carbon rims
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / under the monocoque / 29,7KW
MOTOR TYPE internal permanent magnets synchronous moto
MAX MOTOR RPM 30000 rpm
MOTOR CONTROLLER Self designed SiC Controller
MAX SYSTEM VOLTAGE 588V
ELECTRODE MATERIALS Lithium-Polymer
COMBINED ACCUMULATOR CAPACITY 6,5kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:22 / N/A
DRIVE TYPE double staged planetary gear
DIFFERENTIAL N/A
COOLING 2 radiators, Powerelectronics water cooled, Motors oil cooled
BRAKE SYSTEM 4 floating disks and two piston calipers on the front, 4 pistons at the rear
ELECTRONICS Live-Telemetry, Traction Control, Active Yaw Control, Torque Vectoring, modular hardware d

KÖLN

Technische Hochschule Köln

Car 46 | **Pit 26** | **WRL 63** | **Germany**

With „Umicore Loup“, the first four-wheel-driven Formula-Student-Electric vehicle built by eMotorsports Cologne, we want to achieve a new level of performance and competitiveness. „Umicore Loup“ is the 8th generation of electric vehicles coming from the TH Köln. The newest car is the result of all engineering experiences and knowlegde accumulated by the team over the last years. The 30 members of eMotorsports Cologne are looking forward to an exciting competition in Hockenheim! #46backontrack

FRAME CONSTRUCTION Monocoque
MATERIAL carbon fibre
OVERALL L / W / H 2937mm / 1372mm / 1190mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 130kg / 140kg
SUSPENSION Double unequal lenght A-Arm. Push Rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) Avon 7.0/16.0-10
WHEELS (Fr / Rr) 7.0 x 10'' OZ Magnesium Center Lock
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / wheel hub / 32 kW
MOTOR TYPE AMK
MAX MOTOR RPM FL, FR: 18.00
MOTOR CONTROLLER AMK
MAX SYSTEM VOLTAGE 600V
ELECTRODE MATERIALS LiNiMnCoO2
COMBINED ACCUMULATOR CAPACITY 9.36kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:12.6 /
DRIVE TYPE Gearbox
DIFFERENTIAL none
COOLING three times water-cooled circuit
BRAKE SYSTEM 4-Disk System, adjustable brake balance
ELECTRONICS self developed PCBs, live telemetry system, fire-extinguisher system in AcC

LANDSHUT

University of Applied Sciences Landshut

Car 97 | **Pit 46** | **WRL 58** | **Germany**

LA eRacing, the electric racing team of the UAS Landshut, was founded in 2010 with the aim to provide a practical environment for students to implement knowledge and create an intensive experience in building and manufacturing a racecar. A big thank to our sponsors to give us this possibility.The main goal this season is to take part and finish the three races in Germany (Hockenheimring), Hungary (Györ-Gönyü Harbour) and Spain (Barcelona – Circuit de Catalunya).#WE-ELECTRIFY-YOU

FRAME CONSTRUCTION Tubular space frame
MATERIAL steel tubes with different size and thickness
OVERALL L / W / H 2850mm / 1410mm / 1081mm
WHEELBASE / TRACK (Fr / Rr) 1600mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 146kg / 219kg
SUSPENSION Double unequal lenght A-Arm. Pull rod actuated horizontally oriented spring and damper, adjustable.
TYRES (Fr / Rr) 20.5x7.0 R13, Hoosier R25B / 21.0x6.5 R13, Hoosier WET
WHEELS (Fr / Rr) OZ Superleggera 7x13, ET 22, 1 pc Al-Rim
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Left, Rear Right / 40kW, 40kW
MOTOR TYPE Dynax MG40-400
MAX MOTOR RPM 10.000 rpm
MOTOR CONTROLLER Dynacontrol PE120-400
MAX SYSTEM VOLTAGE 400V
ELECTRODE MATERIALS LiNiCoAlO2
COMBINED ACCUMULATOR CAPACITY 6,3kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:2,6 / 1:2,7
DRIVE TYPE Spur Gear
DIFFERENTIAL Torque vectoring
COOLING Side mounted radiators. System A: Accumulator cooling. System B: Motor & Converter cooling.
BRAKE SYSTEM 4-disc system, modified rotos with 240mm and 230mm dia., adjustable brake balance, Brembo calipers
ELECTRONICS Self developed AMS system, slaves integrated into accumulator-packs.

LISBOA

Technical University of Lisbon - IST

Car 50 | **Pit 27** | **WRL 28** | **Portugal**

FST Lisboa (previously Projecto FST Novabase) is the team from the University of Lisbon. We have been taking part in Formula Student competitions every year since 2002 - first with combustion cars, and since 2010 with electric cars.In 2017, we will be racing our 4th electric car - the FST 07e. It will feature 4 electric motors for the first time in the team's history. Our aim is to make a good impression and take the opportunity to learn from the best teams in the world - and be back in 2018.

FRAME CONSTRUCTION Monocoque with steel main hoop and aluminium front hoop
MATERIAL Prepreg CFRP, Aluminium honeycomb
OVERALL L / W / H 3140mm / 1475mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 129kg / 139kg
SUSPENSION Double unequal length A-Arm
TYRES (Fr / Rr) Hoosier R25B R10
WHEELS (Fr / Rr) 8.0x10, 2 pc CFRP rim + aluminium center
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / Wheel hubs / 32.5kW
MOTOR TYPE AC Perm Magnet
MAX MOTOR RPM 20000
MOTOR CONTROLLER AMK
MAX SYSTEM VOLTAGE 600
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 8kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 15:1 / -
DRIVE TYPE Planetary gear train
DIFFERENTIAL Electronic - torque vectoring
COOLING 2 independent circuits - Pump - Inverter - Motor - Radiator
BRAKE SYSTEM 4-Disk system, self developed rotors with 196mm diameter, APRacing calipers
ELECTRONICS Fully self designed, CAN communication on essential modules, bluetooth on periferals

MÜLHEIM A. D. RUHR

Hochschule Ruhr West - University of Applied Sciences

Car 119 | **Pit 40** | **WRL 98** | **Germany**

The eMotion Racing HRW team consists of thirty students of different MINT-disciplines. In teamwork the electrical racing vehicle "EM02" was designed and constructed by our young, passionate engineers. The main focus was on low weight, innovative designed electronics and a solid general concept to provide the outstanding driving experience.

FRAME CONSTRUCTION Tubular Steel Frame
MATERIAL S355J2H
OVERALL L / W / H 2602mm / 1619mm / 1183mm
WHEELBASE / TRACK (Fr / Rr) 1655mm / 1409mm / 1423mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 154kg / 174kg
SUSPENSION Double unequal length A-Arm. Push rod actuated vertical oriented spring and damper.
TYRES (Fr / Rr) 20.5x7.0 R13, Hoosier R25B / 20.5x7.0 R13, Hoosier R25B
WHEELS (Fr / Rr) MONO 7x13 ET11 AL Rim / MONO 7x13 ET11 AL Rim
NUMBER OF MOTORS / LOCATION / MAX POWER 1 / Rear Left / 55kW
MOTOR TYPE Enstroj EMRAX 228 MV LC
MAX MOTOR RPM 5500
MOTOR CONTROLLER Unitek Bamocar D3 400/400
MAX SYSTEM VOLTAGE 400V
ELECTRODE MATERIALS Li-Ion NCA
COMBINED ACCUMULATOR CAPACITY 4,32kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:2 / n/a
DRIVE TYPE 10B1 5/8 x 3/8
DIFFERENTIAL Clutch pack limited slip, 1200 Nm maximum torque
COOLING Side mounted raditors for direct water cooling of the battery pack, inverter and electric drive.
BRAKE SYSTEM 4-Disk system each with 2 pistion calipers, adjustable brake balance
ELECTRONICS Selfdesigned Accumulator Management System, CANopen compliant CAN-BUS integration

MÜNCHEN

Technical University of Munich

Car 31 | **Pit 17** | **WRL 4** | **Germany**

The TUfast Racing Team from the TU Munich consists of 80 team members who compete in all three classes (electric + combustion + driverless) every year. The main design focus of the TUfast eb017 is on lightweight design, vehicle control and an aerodynamic package, which is well-balanced between high downforce and efficiency. To achieve these goals: Wheel hub Drive, full CFRP- monocoque, Hoosier R25B on CFRP Rims, Planetary Gears, DRS. Feel free to come to our pit and talk to us!

FRAME CONSTRUCTION CFRP Monocoque with aluminium honeycomb
MATERIAL carbon fibre reinforced plastic
OVERALL L / W / H 2933mm / 1417mm / 1186mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1200mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 140kg / 140kg
SUSPENSION Double unequal length A-Arm. Front: Pull rod actuated. Rear: Push rod actuated.
TYRES (Fr / Rr) 18x6.0-10 R25B Hoosier / 18x6.0-10 R25B Hoosier
WHEELS (Fr / Rr) 6,0 x 10, 1pc: CFRP Shells / 6,0 x 10, 1pc: CFRP Shells
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / one in each wheel / 26
MOTOR TYPE Fischer TI085-052-070-04B6S-08S04BA2
MAX MOTOR RPM 20000
MOTOR CONTROLLER TUfast MC017 (self-developed)
MAX SYSTEM VOLTAGE 571
ELECTRODE MATERIALS LiPo
COMBINED ACCUMULATOR CAPACITY 7,2
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:13,8 / N/A
DRIVE TYPE stacked planetary gearing system
DIFFERENTIAL N/A
COOLING Rear mounted radiators with ducting
BRAKE SYSTEM self-built aluminium calipers, drilled floating rotors, adjustable brake balance.
ELECTRONICS Multifunctional Steering Wheel and Dashboard, drag reduction system

MÜNCHEN

University of Applied Sciences München

Car 13 | **Pit 1** | **WRL 11** | **Germany**

PassionWorks - not only the name of our cars but also our guiding principle! Last season we took a big step forward with our four wheel driven car. This year we designed a car that signifies an evolutionary step. Our main goal was to design a reliable, high aerodynamic downforce car and to omit the mistakes we made last season. Combined with many testing kilometers and a strong team, we want to improve upon last year's results.

FRAME CONSTRUCTION Monocoque with tubular Front & Mainhoop
MATERIAL CFRP sandwich structure, aluminium honeycomb
OVERALL L / W / H 2887mm / 1395mm / 1147mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1150mm / 1128mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 129kg / 134kg
SUSPENSION Double unequal lenght A-Arm, Push rod actuated spring and dampers
TYRES (Fr / Rr) 18.0x7.5-10 Hoosier R25B / x7.5-10 Hoosier R25B
WHEELS (Fr / Rr) 7.5x10, 2pc CFRP/ Aluminium hybrid rim / 7.5x10, 2pc CFRP/ Aluminium hybrid rim
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / Wheelhub mounted motors / 32kW
MOTOR TYPE AMK / DT5-14-10-POW
MAX MOTOR RPM 20000
MOTOR CONTROLLER AMK / KS26-S5-FSE-4Q
MAX SYSTEM VOLTAGE 579
ELECTRODE MATERIALS LINiMgCo02
COMBINED ACCUMULATOR CAPACITY 7.5kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:14.06 / n/a
DRIVE TYPE planetary gearbox with step planets
DIFFERENTIAL torque vectoring
COOLING seperate cooling circuits for each side radiators with controlled electric fans
BRAKE SYSTEM AP racing two piston calipers, AP racing master cylinders
ELECTRONICS 4x highspeed CAN, live telemetry via wlan, recuperation, traction control

NEW DELHI

Indian Institute of Technology Delhi

Car 12 | **Pit 3** | **WRL 99** | **India**

Axlr8r Formula Racing(AFR) is the FS team of IIT Delhi. Our journey began in 2006 and we have produced 5 combustion cars and an electric car till now. This year we are presenting our 2nd electric car, Atharva, a Sanskrit word signifying something meaningful to the society and by turning our focus to electric cars, this is our way to contribute to the society. With our immense hardwork and support from our sponsors, we hope this is just a beginning, in what is going to be a very fruitful journey.

FRAME CONSTRUCTION Front and rear tubular space frame
MATERIAL ASTM A179 grade B steel. Round tubing 25.4 mm outer dia
OVERALL L / W / H 2850mm / 1450mm / 1114mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1260mm / 1200mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 111kg / 167kg
SUSPENSION Double unequal length A-Arm. Pull rod actuated vertically oriented spring and damper
TYRES (Fr / Rr) Continental 205/470 R13 for both front and Rear.
WHEELS (Fr / Rr) 7x13, 22mm offset Al Rim for both front and Rear.
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right and Rear Left. / 36(Rated Power); 72(Peak)
MOTOR TYPE Permanent Magnet Brushed DC
MAX MOTOR RPM 4400
MOTOR CONTROLLER Kelly KDH14601E (Opto-isolated)
MAX SYSTEM VOLTAGE 110V
ELECTRODE MATERIALS LiCoO2- graphite
COMBINED ACCUMULATOR CAPACITY 7326
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:4 / n/a
DRIVE TYPE Single reduction Gearbox.
DIFFERENTIAL Electronic Differential
COOLING Forced Convection cooling in Battery by electric fan.
BRAKE SYSTEM 4 disk system,self developed rotors by laser cut, Adjustable Brake Bias, floating rotors.
ELECTRONICS Custom built data logger, Hall effect current sensor, Beaglebone micro-processor.

OSNABRÜCK

University of Applied Sciences Osnabrück

Car 67 | **Pit 31** | **WRL 18** | **Germany**

The Ignition Racing Team is the FSE Team of the UAS Osnabrück and was founded in 2006. The completely new developed Monocoque of the IR17 - Lizard optimized our Packaging of Components and decrease the CoG. The driver handle the vehicle in a much more laying position and new accumulators are placed in the sidepods. Rear wheel steering and a new aeropackage increase our performance and the new CAN-Bus system decrease the wires. We are looking forward to see you at FSG!

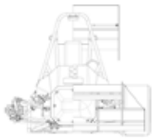
FRAME CONSTRUCTION Two piece cfrp monocoque
MATERIAL CFRP with core material
OVERALL L / W / H 2848mm / 1436mm / 1136mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1190mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 130kg / 143kg
SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper.
TYRES (Fr / Rr) 18x6-10, Hoosier R25B
WHEELS (Fr / Rr) 7.0x10, 2pc carbon fibre wheel
NUMBER OF MOTORS / LOCATION / MAX POWER 1 / Rear / 100kW
MOTOR TYPE Enstroj Emrax 228
MAX MOTOR RPM 6500
MOTOR CONTROLLER Unitek Bamocar D3
MAX SYSTEM VOLTAGE 596V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 6.409kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:3,73 / -
DRIVE TYPE Carbon fibre dirve belt 800x36mm
DIFFERENTIAL Drexler Limited Slip Differential with adjustable torque bias
COOLING Radiators on sidepod mounted
BRAKE SYSTEM 4-Disk system, self developed rotors with 189mm diameter, adjustable brake balance
ELECTRONICS Live-Telemetry, Traction Controll, individualy controlled rear wheel steering system

PATRAS

University of Patras

Car 186 | **Pit 48** | **WRL 32** | **Greece**

UoP Racing is one of the most unconventional teams in the electric class of Formula Student. Our design mentality could be summarized as resource efficiency; using unconventional design and manufacturing methods to achieve the best performance/cost ratio. Reliability and sustainability are top priorities as well. Point sensitivity analysis indicated the areas of focus, where clever solutions and sound engineering practices were applied, allowing for the manufacturing of a 210kg electric car.



FRAME CONSTRUCTION 5-piece aluminum panel monocoque, bonded and riveted aluminum lap joints
MATERIAL 5052 aluminum skin with aluminum honeycomb core, 23mm core/0.8mm skin on sides a
OVERALL L / W / H 2762mm / 1405mm / 1195mm
WHEELBASE / TRACK (Fr / Rr) 1580mm / 1165mm / 1095mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 114kg / 164kg
SUSPENSION Double unequal length carbon fiber A-arms with direct acting Ohlins TTX25 damper attached
TYRES (Fr / Rr) 18.0x7.5-10, Hoosier R25B / 18.0x7.5-10, Hoosier R25B
WHEELS (Fr / Rr) 7x10
NUMBER OF MOTORS / LOCATION / MAX POWER 1 / Rear interior / 80kW
MOTOR TYPE ENSTROJ/EMRAX 228 HV CC, Brushless PM AC
MAX MOTOR RPM 4700
MOTOR CONTROLLER Unitek Bamocar D3
MAX SYSTEM VOLTAGE 504V
ELECTRODE MATERIALS Lipo
COMBINED ACCUMULATOR CAPACITY 7,104kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:3,625 / -
DRIVE TYPE Self developed parallel axis 2-stage str
DIFFERENTIAL Clutchpack limited slip differential, 50Nm preload, 45/60 Deg. ramp angle
COOLING Single radiator integrated in the rear interior, fed via custom airduct
BRAKE SYSTEM Floating, Cast Iron, hub mounted, 180mm outer diam drilled rotors,adjustable brake balance
ELECTRONICS Smart torque truncation based on batery state, Traction Control (TC), multimap switch

SANKT AUGUSTIN

University of Applied Sciences Bonn-Rhein-Sieg

Car 45 | **Pit 25** | **WRL 9** | **Germany**

BRS Motorsport is the Formula Student team of UAS Bonn-Rhine-Sieg with about 70 students of all faculties, who share their love for designing, developing and manufacturing their first all-wheel driven electric car. It sticks out with its CFRP monocoque with 10" aluminium wheels, heave-spring system, a powertrain package by AMK combined with a compound planetary gearbox in the uprights and an aerodynamic package. A special feature is the inertial system, which displaces a correvit sensor.

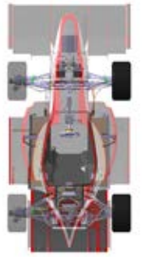
FRAME CONSTRUCTION Composite monocoque
MATERIAL CFK Prepreg with Rohacell core
OVERALL L / W / H 2918mm / 1416mm / 1156mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1240mm / 1220mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 133kg / 145kg
SUSPENSION Double whishbone pushrod acuated heave-spring
TYRES (Fr / Rr) 18x6- R10 hoosier R25B
WHEELS (Fr / Rr) 18x6- R10 hoosier R25B
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / uprights / 36,75Kw (each)
MOTOR TYPE AMK DD5
MAX MOTOR RPM 20000
MOTOR CONTROLLER AMK
MAX SYSTEM VOLTAGE 588V
ELECTRODE MATERIALS Lipo
COMBINED ACCUMULATOR CAPACITY 5,8kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 13.6 / n/a
DRIVE TYPE compound plantary gearbox
DIFFERENTIAL electrical differential (software)
COOLING two self developed side mounted radiators
BRAKE SYSTEM four self developed disks with 4 piston calipers in the front 2 in the rear
ELECTRONICS 3D wiring harness, self developrd ECU's, multifunctional steering wheel and dashboard

STUTTGART

Baden-Württemberg Cooperative State University Stuttgart

Car 77 | **Pit 35** | **WRL 16** | **Germany**

Almost one hundred team members, organized in eight sub teams, joined up in the DHBW Engineering Stuttgart e.V. to build the new eSleek17, the sixth electric vehicle in the history of DHBW Engineering Stuttgart e.V. The creation of a stronger link between the different parts of the vehicle setup is one of this season's main goals in order to retrieve the full performance capability of the eSleek17.



FRAME CONSTRUCTION unibody monocoque with integrated front hoop
MATERIAL HM/ HT Carbon fibres/ Aluminium honeycomb
OVERALL L / W / H 2908mm / 1442mm / 1128mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1220mm / 1220mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 133kg / 126kg
SUSPENSION Double A-Arm,Pushrod actuated spring-damper-system,horizontal spring &damper,independent w
TYRES (Fr / Rr) dry: Hoosier 18.0x7.5 R10 ... wet: Continental 205/470 R13
WHEELS (Fr / Rr) 7x10,38mm offs,2-pcs. Al star,CFK bed
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / FR, FL, RR, RL / 40kW, 40kW, 40kW, 40kW
MOTOR TYPE AMK, DT5
MAX MOTOR RPM 20000 for all
MOTOR CONTROLLER AMK KW 26
MAX SYSTEM VOLTAGE 604V
ELECTRODE MATERIALS LiPo - graphite
COMBINED ACCUMULATOR CAPACITY 6.67 kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 12.69 / -
DRIVE TYPE reduced planetary gearbox
DIFFERENTIAL none
COOLING Watercooling, Twin side pod mounted radiators
BRAKE SYSTEM 4-Disk system, floating rotors with 184.4mm outer diameter, adjustable brake balance
ELECTRONICS Multifunctional Steering Wheel, selfdesigned 4CAN Datalogger,Live Telemetry, smart sensors

STUTTGART

University of Stuttgart

Car 26 **Pit 24** **WRL 6** **Germany**

For eight years, the GreenTeam participates at Hockenheim. With the new E0711-8 we continue our successful story. With our 8th generation car we combined the benefits of its predecessor with new convincing innovations. The overall focus was set on performance and reliability for the E0711-8. Highlights this year are the aerodynamic package, vehicle dynamics, improved oil cooled accumulator and lightweight design.

FRAME CONSTRUCTION Carbon fiber sandwich structure monocoque
MATERIAL Aluminum honeycomb sandwich panel
OVERALL L / W / H 3000mm / 1400mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1160mm / 1160mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 120kg / 125kg
SUSPENSION Double unequal length A-Arm. Push rod actuated monospring system with additional roll damp
TYRES (Fr / Rr) 18 x 7.5 - 10, Hoosier R25B / 18 x 7.5 - 10, Hoosier R25B
WHEELS (Fr / Rr) 8.0 wide 2 pc Hybrid (Al, CFRP) / 8.0 wide 2 pc Hybrid (Al, CFRP)
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / Wheel hub mounted / 34.5 per Motor
MOTOR TYPE permanently excited synchronous machine
MAX MOTOR RPM 20000
MOTOR CONTROLLER KW26-S5-FSE-4Q
MAX SYSTEM VOLTAGE 592
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 6.8 kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:13.5 / -
DRIVE TYPE 2-stage planetary gearbox
DIFFERENTIAL -
COOLING Oil and water circuit
BRAKE SYSTEM 4-Disk system, self developed coated aluminum brake disks
ELECTRONICS self-designed system electronics, wireless CAN and live video feed

THESSALONIKI

Aristotle University of Thessaloniki

Car 11 **Pit 2** **Greece**

Aristurtle was founded in 2013 by students of the Aristotle University of Thessaloniki. Our team's goal is to design and manufacture electric single seated racing cars, to compete in Formula Students Events and to promote electro mobility worldwide and in especially Greece. This year, we've designed and manufactured our second racing car which features a monocoque chassis and 2 electric motors. Responsibility, Organization, Loyalty and Teamwork are the fundamentals of Aristurtle.

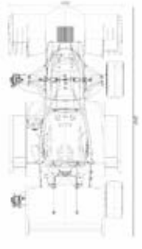
FRAME CONSTRUCTION Monocoque
MATERIAL Aluminium honeycomb sandwich panel (Al-6082-T6 1mm skins, Al-3003 core 6,4mmx20mm)
OVERALL L / W / H 3052mm / 1320mm / 1173mm
WHEELBASE / TRACK (Fr / Rr) 1575mm / 1180mm / 1150mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 136kg / 232kg
SUSPENSION Indepedent double wishbone pushrod suspension
TYRES (Fr / Rr) 20.5 x 7.0-13 Hoosier / 20.5 x 7.0-13 Hoosier
WHEELS (Fr / Rr) 7 in. , 22 mm offset, forged aluminum / 7 in. , 22 mm offset, forged aluminum
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / 55kW, 55kW
MOTOR TYPE Enstroj - EMRAX 228 MV CC
MAX MOTOR RPM 5500
MOTOR CONTROLLER Unitek - BA-MOCAR-D3-400-200/400
MAX SYSTEM VOLTAGE 357V
ELECTRODE MATERIALS CoNiMg - graphite
COMBINED ACCUMULATOR CAPACITY 7,459 kW
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:3,2 / -
DRIVE TYPE Planetary Gearbox
DIFFERENTIAL Electronic Differential
COOLING Sidepod mounted 1030cc radiator passively cooled
BRAKE SYSTEM ISR (diam 250mm) floating brake rotors, 4-piston calipers front, 2-piston calipers rear
ELECTRONICS Custom designed uController, Passive balancing BMS, Custom designed BMS, Dashboard Display

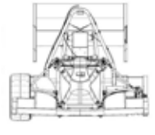
TRONDHEIM

Norwegian University of Science and Technology

Car 63 **Pit 30** **WRL 21** **Norway**

RevolveNTNU's long-term goal has always been to develop every part of its race car in house and in 2017 they are one step closer to achieving this. Their in-house developed inverters and ongoing motor development project are representative of this. Now there are only a few components on the vehicle that are produced by external companies and they are headed towards being completely independent in terms of production. The team is self-sustaining during events and production.





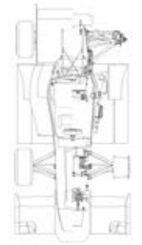
FRAME CONSTRUCTION CFRP monocoque.
MATERIAL CFRP, AlHC and Rohacell sandwich construction
OVERALL L / W / H 2907mm / 1400mm / 1180mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1180mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 122kg / 121kg
SUSPENSION Double unequal length a-arm. Push rod actuated horizontally oriented spring and damper.
TYRES (Fr / Rr) 205/470 R13 Continental C17 front and rear
WHEELS (Fr / Rr) 7.0x13", 2pc Al/CFRP rim front and rear.
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / FR,FL.RR,RL / 4x37kW
MOTOR TYPE 4 x AMK/DD5-14-10-POW
MAX MOTOR RPM 20000
MOTOR CONTROLLER AMK /KW26-S5-FSE-4Q
MAX SYSTEM VOLTAGE 588
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 6.79kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 15.48:1 / N/A
DRIVE TYPE Hub mounted compound planetary gear box
DIFFERENTIAL N/A
COOLING Dual cycle water cooling on motor and controller. Air cooled Accumulator
BRAKE SYSTEM Self developed discs(186) and brake balance adjuster. ISR front and rear calipers.
ELECTRONICS Most electronics student made, including BMS, Telemetry unit, ADC's and Dashboard

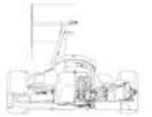
WIEN

Vienna University of Technology

Car 41 **Pit 23** **WRL 27** **Austria**

Since the decision to participate in FS Electric in 2014 TU Wien Racing focused on sophisticated in-house development. This year, our well proven and completely self-developed motors are complemented with self-designed inverters, allowing higher top speeds. The radically changed aerodynamics package for 2017 includes a monkey seat, laminated carbon tubes for additional accumulator cooling and a DRS. 5 standardized CAN nodes upgrade our wiring harness and simplify data processing.





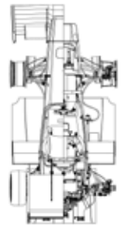
FRAME CONSTRUCTION CFRP monocoque (one piece)
MATERIAL CFRP in sandwich structure with aluminium honeycomb and rohacell core of different thickness
OVERALL L / W / H 2860mm / 1402mm / 1167mm
WHEELBASE / TRACK (Fr / Rr) 1575mm / 1200mm / 1160mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 95kg / 133kg
SUSPENSION double unequal length A-Arm, Pull rod actuated horizontally oriented spring and damper
TYRES (Fr / Rr) 6.0/18.0-10 Hoosier
WHEELS (Fr / Rr) 7.0x10, 25mm offset, one piece CFRP rim
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / 30kW (10s), 13.3kW cont.
MOTOR TYPE TUW Racing / TUWR-E3
MAX MOTOR RPM RR:16000, RL: 16000
MOTOR CONTROLLER TUW Racing / TUWR-I1
MAX SYSTEM VOLTAGE 529V
ELECTRODE MATERIALS LiPo
COMBINED ACCUMULATOR CAPACITY 6.5
TRANSMISSION RATIO (PRIMARY / SECONDARY) 1:12,51 / n/a
DRIVE TYPE two-stage planetary gearbox
DIFFERENTIAL n/a
COOLING radiator with electric fan, electric waterpump, fans for accumulator cooling
BRAKE SYSTEM 4-Disk system, self designed brake discs, adjustable brake balance, AP calipers F/R
ELECTRONICS standardized sensor nodes, dashboard with telemetry- and tuning capability, Live-telemetry

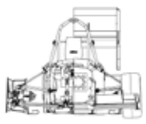
ZÜRICH

Swiss Federal Institute of Technology Zurich

Car 33 **Pit 18** **WRL 3** **Switzerland**

The AMZ Racing team was founded in 2006 by students of ETH Zurich. After three combustion cars, the AMZ switched to electric racing cars in 2010 and started an ongoing collaboration with the University of Lucerne. The active team counts approximately 35 people, backed by the crucial support of their alumni. AMZ grew up to the new challenge as „official" raclette (swiss molten cheese) provider of FSG, FSA and FSS.





MAX SYSTEM VOLTAGE 462V
ELECTRODE MATERIALS LiPo
COMBINED ACCUMULATOR CAPACITY 6.19kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 18.28 / N/A
DRIVE TYPE planetary gear with staged planets
DIFFERENTIAL N/A
COOLING Single serial cooling circuit with two radiators actively cooled by two fans, mounted on the back
BRAKE SYSTEM Self developed callipers, CMC rotors, 190mm diameter floating rotors, adjustable brake
ELECTRONICS in-house optical BMS, live telemetry system, CAN communication, self developed can modules

ZWICKAU

University of Applied Sciences Zwickau

Car 96 **Pit 41** **WRL 23** **Germany**

11 years of engineering „Made in Zwickau" – „edgar" is the twelfth racecar with its origins in the Westsaxon automotive city. The FP11.17e, or „edgar" as we call him, is characterized by a four-wheel-drive and high-level safety features with our battery cooling system. As in the previous seasons we focused on building a reliable but also lightweight car. Thanks to whole body simulations we were able to revise our aerodynamic package and optimize it.

FRAME CONSTRUCTION single piece CFRP monocoque
MATERIAL Carbon Fibre Monocoue with aluminium honeycomb core material
OVERALL L / W / H 2876mm / 1376mm / 1179mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1140mm
WEIGHT WITH 68kg DRIVER (Fr / Rr) 67kg / 68kg
SUSPENSION Double unequal length A-Arm. Push rod actuated horizontally oriented spring and damper (co
TYRES (Fr / Rr) Continental C17 205x35 R13
WHEELS (Fr / Rr) 7x13, 30mm offset, 3pc carbon/AL rim / 7x13, 30mm offset, 3pc carbon/AL rim
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / on each wheel / 4 x 38kW
MOTOR TYPE self developed and made motors: ZRM HS4.2
MAX MOTOR RPM 19200 U/min
MOTOR CONTROLLER Lenze Schmidhauser Mobile DCU 60/
MAX SYSTEM VOLTAGE 600V
ELECTRODE MATERIALS LiCoO2
COMBINED ACCUMULATOR CAPACITY 8kWh
TRANSMISSION RATIO (PRIMARY / SECONDARY) 13.95 / -
DRIVE TYPE Electric Four-Wheel-Drive
DIFFERENTIAL no Diff., Motor Control due Toque Vectoring
COOLING watercooled motors and inverters with twin side pod mounted radiators
BRAKE SYSTEM 4-Disk System, self developed rotors, adjustable brake balance,
ELECTRONICS self-developed ECUs and driver info system, selfdesigned live-telemetry system

Team Profiles
Driverless

359 students

15 teams

5 nations

FIRENZE
Università degli Studi di Firenze

Car 542 **Pit 54** Italy

Firenze Race Team was the first italian team to partecipate in a Formula Student competition in 2002. The team regularly participates in european FSAE competitions in combustion class, in 2015 was the 3rd italian team and il 2016 was the 1st italian team. In 2017 the Florence Univerity's team decided to partecipate at the driverless competition. the most interesting features of FRT car are our semiactive differential and our kalman filter and predictive control for the autonomus system.

DRIVERLESS COMBUSTION

FRAME CONSTRUCTION Steel tubolar frame
MATERIAL AISI 4130/ 25CrMo4 Steel
OVERALL L / W / H 2720mm / 1386mm / 1230mm
WHEELBASE / TRACK (Fr / Rr) 1600mm / 1200mm / 1100mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 105kg / 112kg
ENGINE Beta 520RR
BORE / STROKE / CYLINDERS / DISPLACEMENT 102mm / 63.4mm / 1 cylinder / 520cc
BRAKE SYSTEM Floating, 200x3mm, stainless steel, 6 float buttons
PROCESSING UNITS MicroAtoboxII, jetson, custom ECUs
PERFORMANCE OF PUs 156 GFLOPS
POWER CONSUMPTION OF PUs 200 W
CAMERAS 1xCM3-U3-13Y3C
RADAR
LIDAR
OTHER SENSORS
HIGHLIGHTS OF THE DV SYSTEM Kalman filter, predictive control

AACHEN
RWTH Aachen University

Car 499 **Pit 45** Germany

Ecurie Aix is the Formula Student Team of RWTH Aachen University and was founded in 1999. Since then, the team has designed and built 10 cars with IC engines and 6 with electric engines and one driverless car. With our current car, the eace04.d aka „Maren" (converted old electric car from 2015), we participate in the Formula Student competition at Hockenheim.

DRIVERLESS ELECTRIC

FRAME CONSTRUCTION Two Piece CFRP Frame
MATERIAL Rohacell and aluminium honeycomb sandwich
OVERALL L / W / H 2980mm / 1380mm / 1175mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1250mm / 1200mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 125kg / 151kg
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear / 42kW each
COMBINED ACCUMULATOR CAPACITY 6.7kWh
BRAKE SYSTEM 42CrMo4 Laser Cut, floating, outer 240mm hub mount, adjustable brake balance
PROCESSING UNITS Neousys Car PC
PERFORMANCE OF PUs 2064 GFLOPS
POWER CONSUMPTION OF PUs 160 W
CAMERAS 2x Stereolabs ZED camera
RADAR n/a
LIDAR n/a
OTHER SENSORS IMU, wheel speed sensor, (odometer), RTK GPS
HIGHLIGHTS OF THE DV SYSTEM For perception we are only using two stereocameras, no Lidar. Detection is done via a neural network. Actuation of the steering is realized with a servomotor, actuation of the brake system is hydraulic.

AUGSBURG
University of Applied Sciences Augsburg

Car 469 **Pit 8** Germany

The base vehicle we use is named Silencio, according to a character from Augsburger Puppenkiste. Our race car from 2016 was our first with electric four wheel drive. The upgrade to drive autonomously is another chance to show the underestimated potential of this vehicle. The autonomous system was designed to tackle the challenges of a race driver. Map the track, calculating a driving strategy and control the actuators in real-time are the major challenges in designing the autonomous system.

DRIVERLESS ELECTRIC

FRAME CONSTRUCTION One piece Composite monocoque with tubular roll bars
MATERIAL Carbon fiber with aluminum honeycomb core / S355 steel main hoop / EN AW 6061 aluminum front hoop
OVERALL L / W / H 2893mm / 1448mm / 1145mm
WHEELBASE / TRACK (Fr / Rr) 1535mm / 1250mm / 1200mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 112kg / 148kg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / all wheels driven / 20
COMBINED ACCUMULATOR CAPACITY 6,67kWh
BRAKE SYSTEM 4-Disk system, self developed rotors, adjustable brake balance
PROCESSING UNITS IBM PPC 750GL, Intel i7-3517UE, NVIDIA Jetson TX2
PERFORMANCE OF PUs >1,500 GFLOPS
POWER CONSUMPTION OF PUs >50 W
CAMERAS 1, 10m, 90°, 1080p/60fps/VC
RADAR 1, 70m/250m, 120°/9°, 77GHz long range
LIDAR 2, 13m, 27°, infrared short range
OTHER SENSORS 1, unlimited, 360°, differential GNSS
HIGHLIGHTS OF THE DV SYSTEM keep it simple but fast!

BEIJING
Beijing Institute of Technology

Car 485 **Pit 14** China

Beijing Institute of Technology FSD is a new team for the FSD competition. We built up in the last year and design the formula student racing car is based on the electric racing car of FSAE team in our school. In our FSAE team, combustion car called black shark, electric car called sliver car, but we decide the car name is smart shark! This year, we will bring the smart shark I to FSG and learn more knowledge about driverless car.

DRIVERLESS ELECTRIC

FRAME CONSTRUCTION 4130 tubes welded.
MATERIAL 4130 steel
OVERALL L / W / H 2803mm / 1370mm / 1047mm
WHEELBASE / TRACK (Fr / Rr) 1676mm / 1225mm / 1175mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 128kg / 136kg
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / 80kw,80kw
COMBINED ACCUMULATOR CAPACITY 4032
BRAKE SYSTEM 4-Disk system, self developed rotors with 245mm diameter, mom-adjustable brake balance.
PROCESSING UNITS Intel Core i7-6820HK
PERFORMANCE OF PUs 83.20 GFLOPS
POWER CONSUMPTION OF PUs 550 W
CAMERAS 1,U3S 1600-H 1,60 degree
RADAR n/a
LIDAR 1,Encradar-Zen-1 1,360 degree
OTHER SENSORS n/a
HIGHLIGHTS OF THE DV SYSTEM lidar and camera in detective environment and the servo-system for the steering and braking; the people can operat

DARMSTADT
Technische Universität Darmstadt

Car 442 **Pit 21** Germany

We did reconstruct the lambda2016 to become the first autonomously driving car in the history of our association. To be part of the FSD from the first year on was a concern of ours, since DART always was a participant of the first minuet. The main changes regarding the lambda2016 was, the additional actuators for braking and steering together with an autonomous system.

DRIVERLESS ELECTRIC

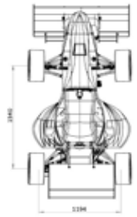
FRAME CONSTRUCTION Monocoque
MATERIAL Single-piece CFRP with Aluminium Honeycomby
OVERALL L / W / H 2966mm / 1345mm / 1038mm
WHEELBASE / TRACK (Fr / Rr) 1525mm / 1183mm / 1162mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 120kg / 130kg
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Back / 52kW
COMBINED ACCUMULATOR CAPACITY 7kWh
BRAKE SYSTEM 4-Disk system, self developed rotors , adjustable brake balance
PROCESSING UNITS Intel NUC, Jetson TX1, Jetson TX2, NI sb-RIO 9627
PERFORMANCE OF PUs 1160 GFLOPS
POWER CONSUMPTION OF PUs 150 W
CAMERAS 1 * Stereo Labs ZED 20m FoV, 110° Opening Angle, Stereo Camera
RADAR -
LIDAR -
OTHER SENSORS Swift Navigation Piksi Multi RTK GNSS Module
HIGHLIGHTS OF THE DV SYSTEM Image Processing

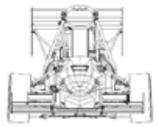
DEGGENDORF

University of Applied Sciences Deggendorf

Car 414 **Pit 44** Germany

Fast Forest is the Formula Student Team of the Deggendorf Institute of Technology. Our autonomous car Jenny8GD was build upon our existing last year's electric formula student vehicle Jenny8X. The race track is sampled by mono cameras, capturing 180° in front of the car. Objects are detected by fast machine vision algorithms and passed to our lane estimation. Software modules are connected over our messaging middleware JennyNet. We thank all our Sponsors for their great support all season long.





DRIVERLESS ELECTRIC

FRAME CONSTRUCTION monocoque
MATERIAL preimpregnated fibres with aluminum honey comb
OVERALL L / W / H 2850mm / 1370mm / 1130mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1194mm / 1196mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 74kg / 171kg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / in the wheel hubs / 32kW, 32kW, 32kW, 32kW
COMBINED ACCUMULATOR CAPACITY 7,25 kW
BRAKE SYSTEM self developed rotors, adjustable brake balance, ISR front and self-developed rear caliper
PROCESSING UNITS DATALynx; BeagleBone
PERFORMANCE OF PUs 4134 GFLOPS
POWER CONSUMPTION OF PUs 135 W
CAMERAS 2x Optitrack Slim 3U
RADAR n/a
LIDAR n/a
OTHER SENSORS speed measuring unit
HIGHLIGHTS OF THE DV SYSTEM high-speed cameras with 120Hz, own camera driver, realtime performance analytics

HAMBURG

Hamburg University of Technology

Car 478 **Pit 7** Germany

Many Formula Student veterans made a return to the team to take on this fascinating new challenge. Together with some newly found team-mates we turned „Uwe", our very reliable last year's car, the egn16, into the egn_dv17. Giving it a bunch of new sensors and actuators as well as a lot of additional processing power, „Uwe" will face his new task. We can't wait to see all the different approaches the teams have taken to make their FS car drive autonomously!

DRIVERLESS ELECTRIC

FRAME CONSTRUCTION Carbon fibre monocoque
MATERIAL HTS Fibres with Rohacell IGF-71 Core
OVERALL L / W / H 2336mm / 1385mm / 1125mm
WHEELBASE / TRACK (Fr / Rr) 1560mm / 1200mm / 1150mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 80kg / 140kg
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / 2x 40kW
COMBINED ACCUMULATOR CAPACITY 6,7 kWh
BRAKE SYSTEM 4-Disk system, self developed rotors
PROCESSING UNITS LPC 4337, Intel Core i7-6700K, Nvidia GTX 1070
PERFORMANCE OF PUs 6573 GFLOPS
POWER CONSUMPTION OF PUs 300W W
CAMERAS 1x Basler - acA1300-200uc. Industrial high speed CMOS camera with global shutter. USB3
RADAR
LIDAR 2x Ibeo Lux 2010. 4 Layer rotating mirror LIDAR scanner.
OTHER SENSORS 1x Xsens - MTi-G-710-GNSS/INS (IMU), wheel speed sensors, angle sensor at steering wheel
HIGHLIGHTS OF THE DV SYSTEM Redundant multi-sensor perception system, highly adaptive path finding, ideal racing line generation

HANNOVER

Leibniz Universität Hannover

Car 416 **Pit 39** Germany

HorsePower Hannover has followed the trend of future technologies since 2011 with its first electric-powered racecar. Now, six years later, this will once again be part of our agenda. Starting with the 2017 season, HorsePower Hannover took on the challenge of equipping one of our racecars with the technology to drive autonomously. We would like to especially thank our supporters: Volkswagen, Faurecia, hannoverImpuls, Nvidia, IDS Imaging, iMar Navigation, Phoenix Contact and dSpace.

DRIVERLESS ELECTRIC

FRAME CONSTRUCTION two-piece Monocoque CFRP-Aluminum Honeycomb-Sandwich
MATERIAL K200K 1200 CP004 42 (CFRP; Prepreg); Aluminum Honeycomb (Al5056)
OVERALL L / W / H 2592mm / 1428mm / 998mm
WHEELBASE / TRACK (Fr / Rr) 1555mm / 1225mm / 1185mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 133kg / 133kg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / wheel hub / 32kW
COMBINED ACCUMULATOR CAPACITY 6,821
BRAKE SYSTEM 4-Disk System, floating, stainless steel X46Cr13, 203mm outer diam., 152mm inner diam.
PROCESSING UNITS Nvidia Jetson TX1
PERFORMANCE OF PUs 2000 GFLOPS
POWER CONSUMPTION OF PUs 13 W
CAMERAS 2 IDS UI-5240RE-C-HQ PoE Rev.2, 30m, 81,9°, CMOS Color global shutter system and SXGA resolution
RADAR N/A
LIDAR Ibeo Lux 2008, 50m, 4 layers, 110 degrees times 3.2 degrees field of view
OTHER SENSORS one IMU: iNAT-M200-SLC with Range +-450 degrees and +-18g, GPS and RTK support
HIGHLIGHTS OF THE DV SYSTEM Highly adaptable system, that allows the implementation of many concepts in the fields of path planning, image processing or positioning.

INGOLSTADT

Technische Hochschule Ingolstadt

Car 434 **Pit 20** Germany

Of course Schanzer Racing electric wasn't able to hide from the new challenges introduced by the new Driverless Class of FSG and the advancements in the automotive industry.The Driverless Division is the new department of Schanzer Racing electric, which consists of 21 team members with a focus on computer science skills. Most team members were recruited new, but we also have veterans from the last seasons. Based on our 2016 car we were able to build our driverless car on a solid foundation.

DRIVERLESS ELECTRIC

FRAME CONSTRUCTION CFRP Monocoque
MATERIAL Carbon Fibre Reinforced Plastic
OVERALL L / W / H 2449mm / 1436mm / 1134mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1214mm / 1176mm
WEIGHT WITHOUT DRIVER (Fr / Rr) kg / kg
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / rear right, rear left / 80kW, 80kW
COMBINED ACCUMULATOR CAPACITY 7,2kWh
BRAKE SYSTEM 4-Disk system, self developed rotors with 195mm diameter, adjustable brake balance
PROCESSING UNITS NVIDIA DRIVE PX2
PERFORMANCE OF PUs GFLOPS
POWER CONSUMPTION OF PUs 250 W
CAMERAS 2x 60° >150m front facing, 2x 100° rear facing
RADAR
LIDAR
OTHER SENSORS 1x dGPS
HIGHLIGHTS OF THE DV SYSTEM Our Highlights are the two rear-facing cameras that are used - amongst other things - to evaluate the driven lane. We also feature a high definition mapping approach as a base for our trajectory calculations.

KARLSRUHE

Karlsruhe Institute of Technology

Car 417 **Pit 13** Germany

KA-RaceIng is the Formula Student team of the Karlsruhe Institute of Technology, founded in 2006. Since 2010 we are designing, manufacturing and competing with a FSC and FSE car each year and since this year also with a driverless car for the FSD. The KIT17d is KA-RaceIng's first fully autnomous racecar and is based our the KIT15e. We would like to thank all our supporters for the enormous help throughout the season!

DRIVERLESS ELECTRIC

FRAME CONSTRUCTION CFRP sandwich monocoque, motor-gear-units mounted underneath
MATERIAL HT and HM fibres, twill and unidirectional plies, kevlar twill
OVERALL L / W / H 2907mm / 1455mm / 1566mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1220mm / 1150mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 120kg / 98kg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / Mounted on the chassis / 23kW
COMBINED ACCUMULATOR CAPACITY 6.5kWh
BRAKE SYSTEM 4 floating disks and two piston calipers on each wheel
PROCESSING UNITS Nvidia Drive PX 2 and existing Main Control Unit in car
PERFORMANCE OF PUs 16000 GFLOPS
POWER CONSUMPTION OF PUs 150 W
CAMERAS one forward looking with 60° opening angle; two side looking with 100°
RADAR N/A
LIDAR two Ibeo LUX; combined opening angle of 160° at angular resolution of 0.25°
OTHER SENSORS Tightly Coupled GPS/INS
HIGHLIGHTS OF THE DV SYSTEM - fully redundant emergency brake system, - cone detection with Deep Neuronal Network, - completely self developped framework, - Software in the Loop simulation with IPG Carmaker, - self-developed interface to IPG carmaker

MÜNCHEN

Technical University of Munich

Car 431 **Pit 38** Germany

The TUfast Racing Team from TU Munich consists of 80 team members who design and build three race cars. One Team - Three Cars - TUfast. One of our main goals in designing the db017 - our self developed perception system is especially tailored to a Formula Student track. To achieve these goals, we implemented an array of sensors used for autonomous driving, tested and simulated our planning algorithms, and updated the ECU with latest TUfast software. Feel free to come to our pit and talk to us!

DRIVERLESS ELECTRIC

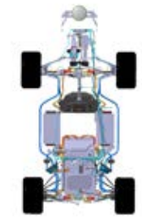
FRAME CONSTRUCTION CFRP Monocoque with aluminium honeycomb
MATERIAL carbin fibre reeinforced plastic
OVERALL L / W / H 2930mm / 1410mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1550mm / 1200mm / 1200mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 70kg / 97kg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / 4, mounted within Chassis / 32kw
COMBINED ACCUMULATOR CAPACITY 7.67
BRAKE SYSTEM 4-Disk system, self developed, floating, drilled, 182x4mm, steel S355, hydraulic actuated
PROCESSING UNITS Jetson TX, Vector VN8912, Arduino Due
PERFORMANCE OF PUs 3656 GFLOPS
POWER CONSUMPTION OF PUs 52 W
CAMERAS 3, Range.. 0.1m - ∞/horizon, view angle 50.8° x 38.6°, BFS PGE 13Y3C-C
RADAR -
LIDAR 1, range 50m, opening angle 270deg, Sick lms151 2D Laser rangefinder
OTHER SENSORS
HIGHLIGHTS OF THE DV SYSTEM The highlight of our DV system is our perception system specifically tailored for a Formula Student track, which was tested extensively in a self developed simulation environment. Furthermore, the DV system is based on a low energy and lightwight Hardware(hw) design. This easens integration into the car and helps finding the most suitable hw setup.

MÜNCHEN

University of Applied Sciences München

Car 413 **Pit 15** Germany

Autonomous driving vehicles are currently thought to be the future and even if they weren't we would still be taking on this new challenge of Formula Student Driverles. We are a small group of technology enthusiasts who see Formula Student as a unique experience and a chance to prove ourselves at the same time, which is why we decided early on that we wanted to be part of this awesome new category!Remember: If you can't win with a driver, you have to do it without.



DRIVERLESS ELECTRIC

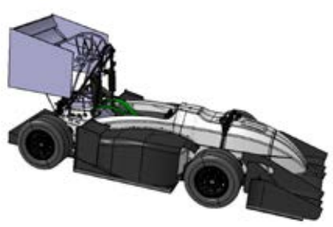
FRAME CONSTRUCTION Monocoque with tubular front & mainhoop
MATERIAL CFRP sandwich structure, rohacell core
OVERALL L / W / H 2563mm / 1374mm / 1338mm
WHEELBASE / TRACK (Fr / Rr) 1540mm / 1150mm / 1128mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 94kg / 117kg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / FL, FR, FL, RR / 32kW
COMBINED ACCUMULATOR CAPACITY 7.45KWh
BRAKE SYSTEM AP racing four/two piston callipers, AP racing master cylinders, self developed rotors
PROCESSING UNITS dSPACE MicroAutoBox II, 2x Jetson TX1
PERFORMANCE OF PUs > 2000 GFLOPS
POWER CONSUMPTION OF PUs max. 55 W
CAMERAS TAMRON MP1010M-VC (50m range) monocular camera, Stereolabs ZED (20m range) stereo camera
RADAR
LIDAR
OTHER SENSORS Leica GPS1200+ differential GPS system, Kistler Correvit SFII P
HIGHLIGHTS OF THE DV SYSTEM We reinvented a few things we thought we could do well, such as the mapping and pathfinding library - if we were right remains to be seen. Also, our system is very cost effective (and we're from Munich!) but fulfils all requirements we found.

STUTTGART

University of Stuttgart

Car 426 **Pit 37** Germany

May we present: The E7000, the driverless racecar based on the last years E0711-7. Our 22 team members aimed for not to crash the car while trying to drive autonomously. This has been achieved by the extensive use of Overengineering, gaffer and by colleagues asking questions like ‚is the weight important without a driver?' The overwhelming result: A nonetheless amazing autonomous car full of intended and unintended special features, a year full of work and fun.



DRIVERLESS ELECTRIC

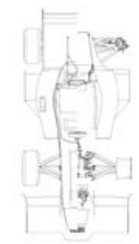
FRAME CONSTRUCTION one-piece monocoque with tubular steel main roll hoop and aluminium fr-roll hoop
MATERIAL CFRP and aluminium honeycomb sandwich
OVERALL L / W / H 2925mm / 1399mm / 1200mm
WHEELBASE / TRACK (Fr / Rr) 1560mm / 1160mm / 1160mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 100kg / 110kg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / wheel carriers / 34
COMBINED ACCUMULATOR CAPACITY 6.8kWh
BRAKE SYSTEM self-developed rotors and adjustable pedalbox, adjustable brake balance
PROCESSING UNITS NVIDIA Drive PX2
PERFORMANCE OF PUs 8000 GFLOPS
POWER CONSUMPTION OF PUs 200 W
CAMERAS 2 cameras for 30m range and 60° as a stereo pair. 2 cameras ->10m range and 110° range
RADAR n/a
LIDAR n/a
OTHER SENSORS n/a
HIGHLIGHTS OF THE DV SYSTEM Staying within the track limits and minimizing the lap time are our main goals. In order to achieve this we focused the concept of the autonomous systm to build a car that is just limited by the physical boundaries and not by the Driver.

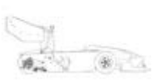
WIEN

Vienna University of Technology

Car 441 **Pit 19** Austria

Back in October, Alumni and some of the members of the 2016 electric team decided to attempt the upgrade of EDGE8 to an autonomous vehicle. Since the team remained strong in the 2016/17 season and accumulated high interest from students, university and companies, we soon began redesigning the vehicle, and continued to maintain and test it alongside the new electric car. We welcomed the challenge to combine the design of the vehicle with new developments in control engineering and robotics.





DRIVERLESS ELECTRIC

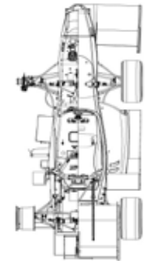
FRAME CONSTRUCTION one piece CFRP Monocoque
MATERIAL sandwich structure with aluminum honeycomb and rohacell core
OVERALL L / W / H 2845mm / 1395mm / 1118mm
WHEELBASE / TRACK (Fr / Rr) 1575mm / 1200mm / 1160mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 73kg / 91kg
NUMBER OF MOTORS / LOCATION / MAX POWER 2 / Rear Right, Rear Left / 2x40kW
COMBINED ACCUMULATOR CAPACITY 4,66 kWh
BRAKE SYSTEM 4-Disk system, self designed brake disks, adjustable brake balance, AP calipers F/R
PROCESSING UNITS Nvidia Jetson TX2
PERFORMANCE OF PUs 1500 GFLOPS
POWER CONSUMPTION OF PUs 30 W
CAMERAS 1x ZED Stereo Camera
RADAR -
LIDAR 1x Hokuyo 30LX
OTHER SENSORS 1x Correvit
HIGHLIGHTS OF THE DV SYSTEM Motion-aware perception systems for significant reduction of required processing power in the vision system; landmark-based SLAM

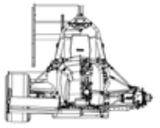
ZÜRICH

Swiss Federal Institute of Technology Zurich

Car 433 **Pit 43** Switzerland

The AMZ Racing team was founded in 2006 by students of ETH Zurich. In 2010 AMZ switched to electric vehicles and started an ongoing collaboration with the University of Lucerne. For the first time in 2017, the team enters the competition with a second vehicle: flüela driverless. Based on the 2015 car a fully autonomous vehicle is designed and tested. The team consists of former electric members as well as new students from Robotics, Systems and Controls.





DRIVERLESS ELECTRIC

FRAME CONSTRUCTION CFRP single piece monocoque with integrated suspension brackets
MATERIAL Intermediate and high modular CFRP-prepreg (twill and UD) with aluminium honeycomb core
OVERALL L / W / H 2870mm / 1438mm / 1139mm
WHEELBASE / TRACK (Fr / Rr) 1530mm / 1200mm / 1180mm
WEIGHT WITHOUT DRIVER (Fr / Rr) 82kg / 103kg
NUMBER OF MOTORS / LOCATION / MAX POWER 4 / wheel hub mounted / 4 x 37 kW
COMBINED ACCUMULATOR CAPACITY 6.46 kWh
BRAKE SYSTEM Self developed floating rotors, 190mm diameter, adjustable brake balance
PROCESSING UNITS Robust Master and high-performance Slave
PERFORMANCE OF PUs 368 GFLOPS
POWER CONSUMPTION OF PUs 136 W
CAMERAS Self-developed inertial stereo camera based on synchronized grey-scale FLIR Blackly
RADAR -
LIDAR Velodyne Puck VLP-16, mounted above the front wing
OTHER SENSORS SBG Ellipse-N Inertial Navigation System, Kistler Correvit SFII Velocity Sensor
HIGHLIGHTS OF THE DV SYSTEM Custom computing and sensor setup, robust against single sensor failure, LiDAR SLAM, Visual-Inertial SLAM, Nonlinear Model Predictive Contouring Control, total weight of DV system: 12 kg

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* if without reference; excluding team profiles

Team profiles
Text and pictures provided by the teams (July 2017)

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* wenn ohne Angabe; Teamprofile ausgenommen

Team-Profile
Text und Bilder bereitgestellt von den Teams (Juli 2017)

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Formula Student International –

Top trumps for careers

Ein Trumpf für die Karriere

There were just six proud teams competing when the first ever-Formula Student competition was launched in the USA in 1981. No one could have guessed that it would grow to today's officially listed number of 660 teams worldwide, competing with not only the conventional combustion cars, but also hybrid electric cars and pure electric cars.

A few years ago, the interested spectators could focus on a handful of venues for the event. Now however, it is considerably more difficult to keep track of the ever-increasing new competitions.
Teams can often be found pitching their tents in the same locations as where a few days or weeks earlier, the Formula 1 teams had been fighting their victory's. In well-known locations such as Silverstone, Hockenheim, Spielberg or Catalonia, young motorsport talents from across the globe are spreading their dreams with their own racing car.
Though it appears to all be the same, in fact every competition has its own differences and charm. It is the flair that each competition brings with it that is both amazing and impressive.

For example, in the past, special fire protection regulations had to be adhered to in Spain, due to hot summer temperatures. The teams were required to set up their catering tent on a concrete plateau to minimise the risk of forest fires around the Catalonia Circuit. As a result, in order to make the best of the situation, a great event was conjured up and the "Cultural Dinner" was born. For this, every team offers a country-specific meal and together, they create a cultural feast for everyone.
A scenic contrast can be experienced in Austria at the Red Bull Ring - amidst the breath-taking mountain landscape of Upper Styrian Aichfeld; where you can breathe in a scenic atmosphere. It is a one of a kind location compared to the other racetracks around the world. In 2011, the name Red Bull also took on a bigger part of the program, as the energy drink was the only available soft drink on the entire ring.
The Italians have also shown great humour in the past. A ramp specially built to bridge a dirt track could not be used due to structural issues in the way it had been built. So the teams chose the pragmatic approach and simply lifted up and carried their vehicles across by hand.

It is also unique that an organiser had a racetrack specially built for the event. Through this, China managed to lure the international competition into the Middle Kingdom.

Als 1981 der erste Formula Student Wettbewerb in den USA ins Leben gerufen wurde, waren es gerade einmal stolze 6 Teams, die sich dem sportlichen Wettstreit stellten. Dass sich dieses Engagement einmal auf eine offiziell gelistete Anzahl von über 660 Teams weltweit ausweiten würde, die sich sowohl mit konventionellem Verbrennungsmotor, Hybridfahrzeugen als auch rein elektrischem Antrieb gegeneinander messen, hätte damals wohl niemand erwartet.

Konnte sich der interessierte Zuschauer vor einigen Jahren noch auf eine Hand voll an Austragungsorten konzentrieren, so fällt es mittlerweile bedeutend schwerer, mit den stets neu entstehenden Wettbewerben Schritt halten zu können. Nicht selten schlagen die Teams ihre Zelte da auf, wo nur wenige Tage oder Wochen zuvor Formel 1 Teams um den Sieg gekämpft haben. An klangvollen Orten wie Silverstone, Hockenheim, Spielberg oder Katalonien eifern über den gesamten Globus verteilt junge Motorsporttalente ihrem Traum vom eigenen Rennwagen nach. Dreht es sich letzten Endes doch immer um dasselbe, so gleicht trotzdem kein Wettbewerb dem anderen und der Unterschied in Charme und Flair, den jeder Wettbewerb mit sich bringt, ist gleichermaßen erstaunlich wie auch beeindruckend.

Beispielsweise mussten in Spanien in der Vergangenheit aufgrund von heißen Sommertemperaturen spezielle Brandschutzregelungen eigehalten werden. Die Teams waren angehalten, ihre Verpflegungszelte auf einem Betonplateau aufzuschlagen, um das Waldbrandrisiko rund um den Catalunya Circuit zu minimieren. Um aus der Not eine Tugend zu machen, dachte man sich, dass sich daraus doch ein tolles Event zaubern ließe: Das Cultural Dinner war geboren, in dessen Rahmen bei allen Teams eine landesspezifische Mahlzeit angeboten und für jedermann zum bunten Schmaus bereitgestellt wird. Ein landschaftliches Kontrastprogramm kann man in Österreich am Red Bull Ring erleben – inmitten der atemberaubenden Berglandschaft des obersteirischen Aichfelds kann man eine landschaftliche Atmosphäre spüren, die ihres gleichen auf den Rennstrecken der Welt sucht. 2011 war der Name Red Bull tatsächlich auch Programm, denn der Energy-Drink war der einzig verfügbare Softdrink auf dem gesamten Ring. Auch die Italiener haben in der Vergangenheit bereits mehrfach großen Humor bewiesen. Eine eigens zur Überbrückung eines Schotterstückes gebaute Rampe konnte auf Grund ihrer Bauart nicht genutzt werden. Die Teams wählten den pragmatischen aller Ansätze und trugen ihre Fahrzeuge

ACE RACER

Any number of people can play Top Trumps, that's what makes it the world's coolest card game! Here are instructions on how to play Top Trumps.
To start the game, shuffle and deal all the cards face down. Each player holds their cards so that they can see the top card only.
The player to the dealer's left starts by reading out a category from the top card. The other players then read out the same category from their cards. The one with the best or highest value wins, and that player collects all the top cards, including their own, and moves them to the bottom of their pile. It is then their turn again to choose a category from the next card.
If two or more cards share the top value or data is not available for that particular subject then all the cards are placed in the middle and the same player chooses again from the next card. The winner of the hand takes the cards in the middle as well.
The person with all the cards at the end is the winner.

Source: http://www.toptrumps.com/how-to-play-top-trumps/

The multitude of narrative stories seems almost endless and the sum of beautiful memories is one of the best things that students can take away with them.
Whether it be the Air Force One continuously doing their manoeuvres through the air above the Formula Student event in Lincoln, USA, be it the muddy campsite at Silverstone in typical British weather or the "G'day Mate" from the Australian team, echoing over in a friendly manner across to other side of the dormitory in Hungary, Formula Student writes the greatest stories. With all the numerous hours of jointly invested blood and sweat, all the countless friendships and this one big family with whom every one who once participated seems to feel connected to for a lifetime.

einfach darüber. Einzigartig ist sicher auch, dass ein Veranstalter eigens für das Event eine Rennstrecke bauen ließ. Auf diese Weise lockte China die internationale Konkurrenz in das Reich der Mitte.
Die Vielzahl an erzählenswerten Geschichten erscheint fast endlos und die Summe an schönen Erinnerungen ist eines der höchsten Güter, welches die Studenten auf ihrem Weg erhalten können. Sei es die Air Force One in permanentem Durchstartemanöver auf dem Fluggelände des Formula Student Events in Lincoln, sei es der Matsch des Campingplatzes in Silverstone bei typisch Britischem Wetter oder sei es das „G'day Mate" vom Australischen Team, welches in freundlicher Manier von der anderen Seite des Wohnheim-Ganges in Ungarn zu einem herüber schallt - die größte Geschichte schreibt doch die Formula Student selbst, mit all den zahlreichen Stunden an gemeinsam investiertem Blut und Schweiß, all den unzählig entstandenen Freundschaften und dieser einen großen Familie, mit denen sich jeder, der einmal teilgenommen hat, ein Leben lang verbunden zu fühlen scheint.

FSAE Brazil

Piracicaba Esporte Clube

Date:	Nov. 23 - 26, 2017
Since:	2004
Teams:	C) 40
	E) 10
★ **Special:**	50
🏆 **2017:**	---

http://portal.saebrasil.org.br/programas-estudantis/formula-sae-brasil

FS Spain

Circuit de Barcelona - Catalunya

Date:	Aug. 23 - 27, 2017
Since:	2010
Teams:	C) 34
	E) 33
	67
★ **Special:**	---
🏆 **2017:**	

http://www.formulastudent.es/

FS Czech

Autodrom Most

Date:	Aug. 02 - 05, 2017
Since:	2013
Teams:	C) 36
	E) 14
	50
★ **Special:**	---
🏆 **2017:**	

http://www.fsczech.cz/

FS Japan

Shizuoka ECOPA

Date:	Sep. 05 - 09, 2017
Since:	2003
Teams:	C) 83
	E) 15
	98
★ **Special:**	---
🏆 **2017:**	

www.jsae.or.jp/formula/en/


FSAE
Italy
Varano de Melegari
Riccardo Paletti Circuit
Date: July 19 - 23, 2017
Since: 2005
Teams: C) 57
E) 24
81
Special: Class 3 / Hybrid
2017:
www.ata.it/content/event-formula-ata/formula-sae-italy-formula-electric-italy-2017
FS
EAST
Eurorıng - Pest Country
Date: July 20 - 23, 2017
Since: 2016
Teams: C) 40
E) 20
60
Special: ---
2017:
http://formulastudent.com/
FSAE
Electric
Lincoln, NE
Lincoln, Airpark
Date: June 21 - 24, 2017
Since: 2013
Teams: C) ---
E) 30
30
Special: ---
2017:
http://students.sae.org/cds/formulaseries/electric/
FSAE
Michigan
Brooklyn, MI
Michigan Int. Speedway
Date: May 10 - 13, 2017
Since: 1981
Teams: C) 120
E) ---
120

Special:
2017:
http://students.sae.org/cds/formulaseries/fsae/

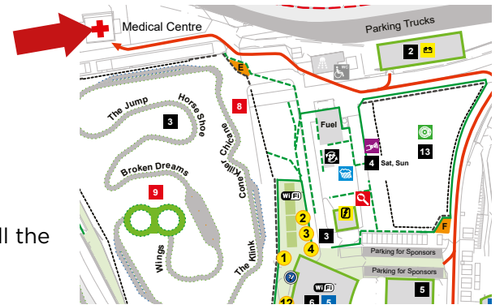

FS
Germany
formula student germany
Hockenheim, Hockenheimring
Date: Aug. 08 - 13, 2017
Since: 2006
Teams: C) 65
E) 35
D) 15
115
★ Special: Driverless
2017:
www.formulastudent.de/
FS
Austria
Spielberg Red Bull Ring
Date: July 31 - Aug. 3rd, 2017
Since: 2009
Teams: C) 30
E) 20
50

★ Special:
2017:
www.fsaustria.at
FS
Hungary
FORMULA STUDENT HUNGARY
Győr, Győr-Gönyü Harbor
Date: Aug. 17 - 20, 2017
Since: 2010
Teams: C) 30
E) 14
44
★ Special: ---
2017:
http://fshungary.com/
FSAE
Australasia
SAE AUSTRALASIA
Melbourne Calder Park Raceway
Date: Dec. 07 - 10, 2017
Since: 2000
Teams: C) 23
E) 09
32
★ Special: ---
2017:
www.saea.com.au/formula-sae-a/

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
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.

112

Officials

Pit Marshal - Konrad Paule	+49 (151) 560 747 00
Pit Marshal - Sebastian Seewaldt	+49 (151) 560 747 01
Event Control - Lea Pißareck	+49 (151) 560 747 02
Back Office - Sven Grundner	+49 (151) 560 747 03

(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!

FORMULA STUDENT GERMANY 2017

Supporter: fishfarm netsolutions | Gross-Funk | Hockenheimring | Isabellenhütte Heusler | Kautex Textron | Kube Ingenieurbüro | Linde Material Handling | Maxim Integrated | RIEDEL Communications | SLV Mannheim | Vector Informatik