Racing News

Official publication of the NMMU Racing Formula Student Team

Nelson Mandela Metropolitan University
for tomorrow

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Formula Student

- International student design competition
- Design, build and race single seater formula 1 style car
- 600cc motor cycle engine with intake restrictor
- Competition judging criteria includes design quality, costing, static & dynamic tests culminating with a four hour endurance race
- Students from a variety of disciplines involved including engineering, marketing, business, IT, finance etc.
- Funding mainly through industry sponsorships
- AIESEC supports this project with marketing and business student teams
- NMMU plans to enter the Formula Student Germany competition in Aug 2010

In this issue:

Racing Engine Technology

Hiten Parmar, our project co-ordinator and head of engine development, is completing his master's degree in electrical engineering, and his research project has focused towards engine management control of our Formula Student racing car.

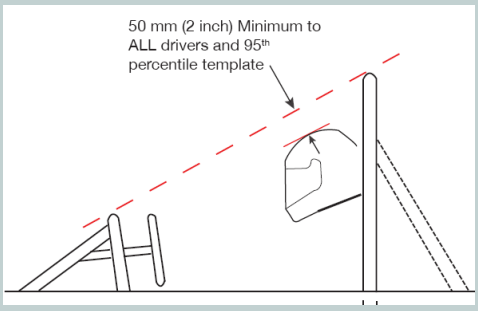
He returned in November last year after spending three months at the University of Applied Science Braunschweig/Wolfenbütel in Wolfsburg, Germany, where he worked alongside the university's WOB racing team gaining further knowledge on engine control systems using their hi-tech engine testing equipment. He was also fortunate enough to attend the 2008 Formula Student Germany International Design Competition, and was able to bring back many insights into how a Formula Student team goes about designing, building and racing a vehicle in this formula.

Since purchasing our Honda CBR600 engine, Hiten has assisted with its installation on the NMMU engine dynamometer test stand and has successfully run the engine using the original motorcycle ECU. We have also been awarded a sponsorship by Autograph Racing, suppliers of racing components and will be using a "Dictator" ECU to programme the unique calibration required for our engine due to the intake restriction in the inlet manifold.

In addition to his involvement in the Formula Student project, Hiten has recently taken on project management responsibilities for the VW Automotive Chair, to assist Prof Hinrich Holdack-Janssen with the many research projects currently underway.

Frame Design — a closer look at the rule book

The Formula Student competition places a strong emphasis on safety, illustrated clearly by the stringent rules governing frame design. These rules are designed to protect the driver in the event of roll-over, front or side impact. The main frame structure consists of a main roll hoop, front roll hoop and side impact bars, front bulkhead structure and roll hoop braces. An impact attenuator is also required at the nose of the vehicle to absorb energy in the event of a frontal impact. The driver's helmet must be 50mm below a straight line drawn between the main hoop and front hoop.



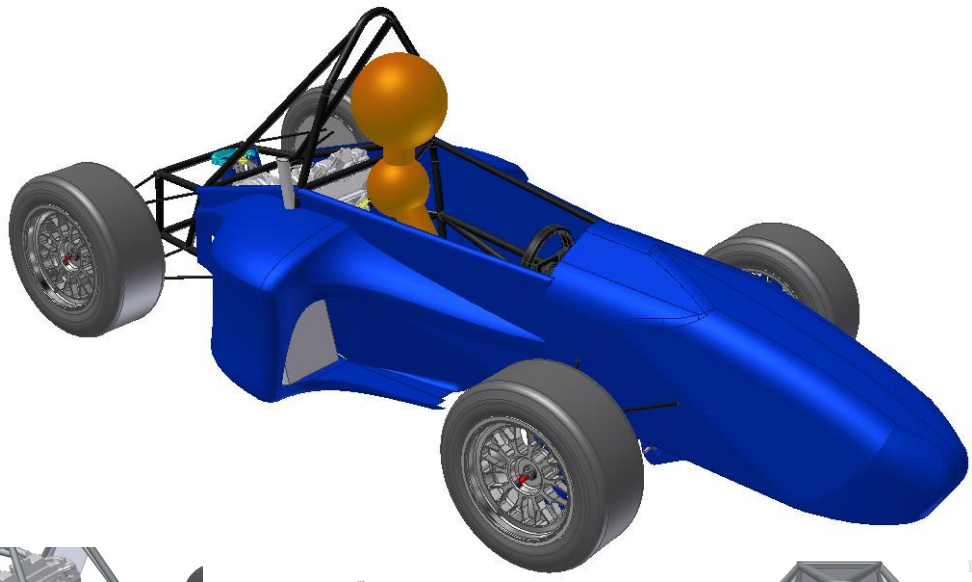
Two templates have been devised by the judges to dictate minimum interior cockpit sizes. The first is the opening where the driver sits and the second is for the footwell area. Another interesting safety requirement is that the driver needs to be able to exit the vehicle from a fully strapped-in position in under five seconds!

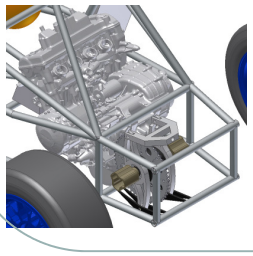
Our vehicle frame has taken all these rules into consideration, and in addition to the main structure, the front and rear double-wishbone suspension members have now been added. There are also many other small components to design into the vehicle such as the fuel tank, steering rack, engine mountings and rear differential. Key to a successful frame design is understanding the forces that will be applied to the vehicle, and ensuring that the frame is strong and rigid enough to withstand these forces.

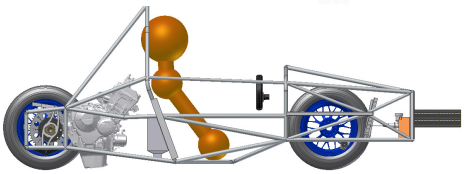
Continental to Supply Purpose-built Racing Tyres

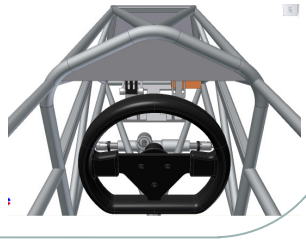
One of our key sponsors, Continental Tyres, is developing racing slick tyres specifically for the Formula Student competition in Germany. Continental will be supplying our racing team with four sets of these purpose-developed tyres, two for dry, and two for wet weather - a total of sixteen tyres. Due to the low speeds and tight corners in a Formula Student race, a unique racing compound is being developed to optimise the tractive and cornering forces available to the vehicle under these conditions.

Our formula student car









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NMMU Racing Formula Student Sponsors

- **VW Racing**: technical support and racing vehicle components
- **Continental Tyres**: racing tyres
- **Dana Spicer Axles:** rear differential
- **General Motors:** test facility use
- **F1 Outdoor Karting:** race track use & driver training
- **Terry Moss Racing:** technical and racing support from Terry Moss and Michael Stephen
- **Dicktator Engine Management Systems:** engine ECU
- **AIESEC:** student society that provides business and marketing support by mobilising students on campus
- **DAAD:** German research funding
- **AIDC:** financial support
- **NRF:** research funding

Automotive Industry Development Centre

Baja 2009 Project Update

Our sister project has taken up the challenge of building three off-road vehicles for the 2009 national Baja competition. The three student teams are in the process of manufacturing the frames and mounting suspension and drivetrain components to the mini Baja off-road vehicles.

The Baja project runs on an annual basis and each university team competes in a national competition held in Pretoria around October. The vehicle designs are scrutinised by the judges before each team competes in an arduous four-hour off-road endurance event, which takes the vehicles through a course consisting of sand, gravel and water crossings.

The vehicles are powered by 15hp Briggs and Stratton engines, through a constantly variable transmission (CVT), and have generous suspension travel to cope with the off-road terrain. Safety considerations include a sturdy roll-cage, brakes capable of locking all four wheels and a five-point racing harness for the driver. NMMU students are afforded the opportunity of gaining practical experience on this project in support of their mechanical engineering qualification.

NMMU hopes to better its previous best result of second overall during the 2009 event and we wish the teams all the best for the race!