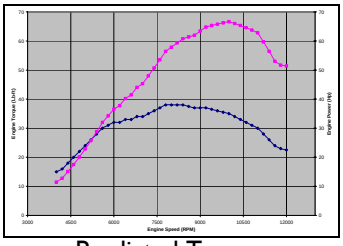
FORMULA UBC

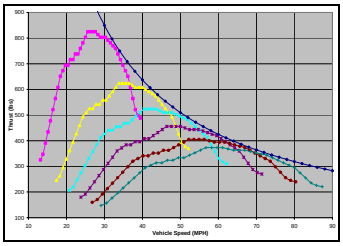
PRESS RELEASE – WINTER 2007

2007 Race Car Design Report

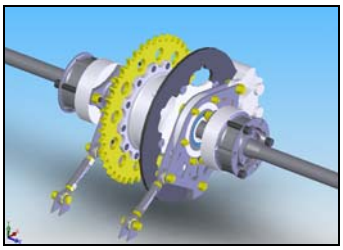
Engine Dynamometer Testing



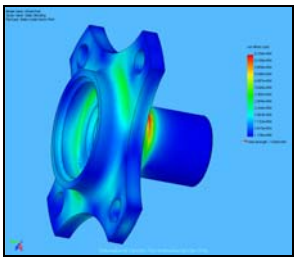
Predicted Torque and HP Curves



Predicted Thrust Curves



Drivetrain Assembly Model



Rear Wheel Hub FEA

Over the past few months, Formula UBC members have been hard at work on new designs for the 2007 racecar. In accordance with the design goals set at the beginning of the season, the focus for each individual sub system has been on simplicity, reliability, and ease of manufacture. In addition, each component is being modeled in SolidWorks, with the aim of completing a full car model and eliminating any packaging issues before they occur.

The power plant for the 2007 race car will be the 2004 Kawasaki ZX-6RR engine, which features a 13.5:1 compression ratio, adjustable dual overhead camshafts, a back-torque limiting (slipper) multi-plate wet clutch, and an overall weight of less than 125 lbs. Formula UBC has a long history working with the 599cc Kawasaki engines, and the ZX-6RR was used in the 2006 car, on a turbocharged air intake setup. The 2007 engine will be run naturally aspirated, with a custom electronic fuel injection system tuned on the schools dynamometer, and a custom intake and exhaust, all designed to optimize engine performance under the restrictions of the competition. Understanding the design and smoothing out the torque curve were considered the most important goals for the 2007 engine design. GT Power 1D simulation software was used to build a full engine simulation, and to optimize intake and exhaust designs. Additionally, modifications to the oil pan have been successfully tested, and will allow a 2 inch lowering of the engine in the chassis.

The electro-pneumatic shifting system has been redesigned for 2007, with major work being done to the shift controller in order to implement a fully automatic up-shift system with carefully selected shift points, primarily for use in the acceleration event. Simulations have been created in order to choose an appropriate final drive ratio to optimize drivability and minimize lap times based on the existing ZX-6RR transmission ratios. The results are a predicted acceleration ability of 0-60 mph in 3.7 seconds, and a top speed of 87.5 mph in 6th gear at 12000 engine RPM.

The Torsen limited slip differential will be run once again with a custom gear carrier to reduce weight, and testing plans have been laid out to optimize differential performance by testing various torque bias ratios. Other drivetrain components have been changed in an effort to increase reliability and simplicity by including the use of as many OEM components as possible. Finite element method simulations have been run to minimize drivetrain weight, showing where it is safe to remove material from OEM and custom designed components.

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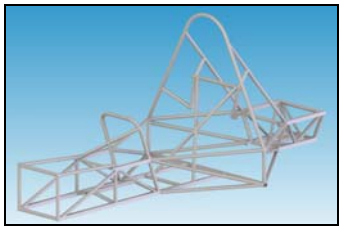
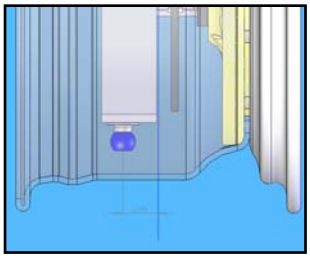
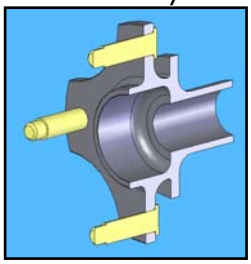


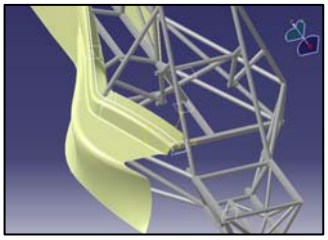
Chassis Model



Improved Suspension Geometry



Live Spindle Design



Body Design

New and Interested Members Recruitment Meeting

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The 2007 chassis will again be a mild steel space frame construction. The new design features a significant improvement in manufacturability without significant weight gain by increasing the use of square tubing while reducing the overall number of tubes. Progress has also been made in the packaging, and therefore in-car maintenance ability, of the engine, suspension, and drivetrain. Additionally, an increase in stiffness will be seen in the diff box and front suspension area, due to an improvement in chassis node geometry and tube triangulation relative to the load paths in those areas.

Significant improvements have been made to the suspension system for the 2007 racecar over previous year's designs. With the acquisition of new racing wheels from BBS America, the suspension team was able to drastically improve the wheel assembly geometry and packaging. Furthermore, wheel assembly stiffness has been notably increased through a new live hub/spindle design and optimized upright geometry.

The braking system has undergone a major revision for 2007. The rotors and calipers are being completely changed, as it has been decided to switch from aluminum to steel brake rotors, with the expectation of a more solid and direct feel to the driver, as well as increased braking performance over the course of the race. Changes in suspension geometry are expected to yield a favorable change in steering effort and feel, and improvements have been designed into the steering system in terms of packaging and construction.

With chassis design finalized efforts on body design have recently commenced. The body group hopes to improve assembly methods while retaining or improving the aesthetic appeal of the 2006 body. Theoretical efforts are being concentrated on optimizing the radiator ducting shape, and potentially including an aerodynamic underbody to improve cornering ability.

In addition to completing designs, senior team members have been working hard to train new members, as a large portion of the team will be graduating at the end of this year. The new member application process has been improved drastically over previous years. Formula UBC first hosted an orientation meeting to familiarize the applicants with the project. Applicants were then required to complete two small projects to prove they were willing to make the time commitment to the team. Successful applicants were then interviewed and assigned to the most suitable group. Currently Formula UBC is the largest student design team at UBC with 55 active members, with a substantial amount being new this year.