University of Patras
Department of Mechanical Engineering & Aeronautics

Laboratory for Manufacturing Systems & Automation

Newsletter No.6

January-May '08

UoP Racing

After five months of hard work we finally see our efforts to be effective. Uop2 car will be ready for race soon and the construction of the Uop3 chassis is about to finish. Having only one month for our last preparations the productivity of our team has been maximized and we are looking forward to the Formula Student and Formula Student Germany.

UoP2:

Frame:

The rebuild process of the frame has been completed successfully and now the frame is ready to accommodate all the necessary parts of the car.

The torsional stiffness has been increased and the new engine position will eliminate any over-heating problems. Moreover the reallocation of the engine leads to a better usage of the tight space provided from the rear subframe. So the assembly of the car continues at a higher pace and we will have a running car quite soon.

Engine:

The engine has been fully rebuilt and mounted to the frame.

Along with the engine reallocation, all the parts that are required to be reconstructed or modified are completely ready and mounted to the frame. Some of these parts are the runners, injector mounts, exhaust tube etc. The ECU program is being further optimized in order to increase the engine efficiency and the intake system is almost ready to be mounted onto the frame. The first engine test is planned to take place shortly.

Transmission:

As long as the design of the drivetrain system didn't need any changes, the only issue that is considered is the weight reduction. Thus the endcaps and differential mounts are being reconstructed using 7075 aluminium alloy.

An early analysis showed us a 60% weight reduction relative to last year's design. We also saved off weight by modifying our CV joints.

Brakes:

The new design of the pedal box has been finalized and the manufacturing process is about to begin.

The new design consists of a 7075 aluminum brake pedal and mounts combined with a carbon fiber throttle pedal. We decided to use last year's master cylinders due to their small weight and size, combined with three Brembo P32 calipers (identical to the ones

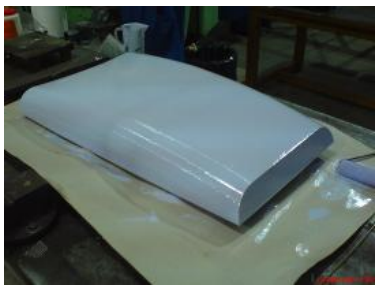
2007). The other major change is that we abandoned the idea of wave brake discs, since they didn't work properly with our calipers. Also a new hub mounting is being designed for the front discs.

Suspension:
Great progress has been made with the suspension system. The new upright design has been completed and the manufacturing process has already started. The suspension mounting points on the frame are finished and we are about to begin with the manufacturing of the A-arms

UoP3:

Frame:
After running several structural and ergonomic analyses, we have ensured the quality of the design, and now we are making great progress with the construction of the moulds.

The main and front hoop will be incorporated into the monocoque structure. At the moment, the hoops are being manufactured in INTRAKAT. Moreover we are studying the possibility of incorporating the wiring loom and other parts into the monocoque structure rendering the frame into a multifunctional part of the car.



Engine:
The Yamaha WR450F engine just arrived in our lab and now we are considering the tuning possibilities using the know-how from our last car.

More specifically, the ECU set up will be similar to UoP2 set up and the intake system is being redesigned and optimized in order to match the WR450F engine specs. At the moment a Ricardo Wave model is being created and we look for the best setup for maximum performance, keeping in mind the events' demands. We have finished the design of the oil tank (same design philosophy with the UoP2 car) and chosen the capacity of the fuel tank. At the moment we are on the design process of the latter, based on the UoP2 design but adapted to the WR specific needs. Also the market search for aftermarket racing parts and peripherals is continued.

Transmission:
Along with the engine we received our Cusco type RS LSD differential and the design process has been successfully completed.

We decided to apply the same design philosophy of UoP2 in our third car, yet further analyzed and optimized. The differential housing will be removed and a new one, made from advanced aluminium alloy will be constructed, incorporating sprocket and rear disc brake mounts to further decrease the rotating masses. The halfshafts will be made of carbon fiber and tripod CV joints will be utilized, due to their small size and weight.

Suspension:
The last modifications have been made to the suspension geometry in order to comply with the final frame design and regarding the last kinematic analysis we are very close to a final design. Most parts used in UoP2 suspension, such as shocks, bearings, rod ends, steering rack etc, will be used (in an optimized version) in UoP3 as well, making it easier to incorporate them in our design.

A major difference that led to a different design approach of the manufactured parts, is the use of 10 inch wheel instead of 13 inch. **<u>Brakes:</u>** **The main concept behind the UoP3 braking system is identical to those of our two previous cars. The design of the pedal box has been finished. It is basically the same as our Class 1-200 car, with some minor ergonomic changes. The design will be evaluated at the UoP2 car and any necessary modifications will be done. We have also decided to utilize two Magura 908.2 160mm discs at the front and one Braking disc of 256mm diameter at the rear with three Brembo P32B 2-piston calipers.**		

UoP Racing is proudly sponsored by:

Grand Sponsors:

UNIVERSITY OF PATRAS

Laboratory for Manufacturing Systems & Automation

YAMAHA Touching Your Heart MOTODYNAMICS S.A.

SILVERSTONE HIGH PERFORMANCE TYRES

Sponsors:

HALTECH ENGINE MANAGEMENT SYSTEMS

EUROCARBON advanced fibre braiding and weaving technology

INTRAKAT

RS

Supporters:

BRAKE SHOP

RICARDO

SNR

TORSEN® TRACTION

JENVEY

AURORA BEARING COMPANY

DRAKOS since 1963

DOUGES

ALEPIS Motorsport

ΕΛΠΑ

www.extreme-tuners.com

Contact Information:

LABORATORY FOR MANUFACTURING SYSTEMS and AUTOMATION (LMS)
Director: Professor George Chryssolouris
Department of Mechanical Engineering and Aeronautics
University of Patras
Patras 26110, GREECE
Tel.: +30-2610-997262, 997264
Fax: +30-2610-997744
Email: xrisol@mech.upatras.gr
www.lms.mech.upatras.gr