

## MISSION ACCOMPLISHED! – FORMULA STUDENT 2004

By Guillermo Lopez

After two engine changes, five testing laps and countless late nights, Cardiff Racing lined up at Bruntingthorpe proving ground to field the team's first running entry in the competition. The team's modest hopes for the CR01B extended only as far as successfully completing all dynamic events. An outcome that seemed unlikely, given the lack of testing and the difficult weather conditions encountered at the weekend.

Not only did the team surpass expectations by finishing all events, including the notoriously difficult Endurance event, but it was a measure of how far the team had come when there was a level of disappointment at not achieving a higher classification. This despite finishing 7th among U.K. universities, surpassing more established teams from Bath, Loughborough and local rivals Swansea University.

**"the teams compete in the Acceleration, Skidpan and Autocross events"**

Preparations were hindered by what seemed to be a never ending stream of unforeseen technical problems and failures, including two unrelated lubrication problems that resulted in two engine changes.

Most problems could be put down to a lack of experience on the team's part and impartial observers agreed that the team coped admirably in the face of such adversity.

Upon arrival at the circuit, the focus of the team was to prepare the car for scrutineering. No car is allowed to take part in any dynamic event until the judges are satisfied the vehicle complies with all previously specified rules. The car is subjected to a noise test, placed on a tilt table and visually inspected. After incorporating some of the scrutineer's suggestions, the CR01B was ready to race; no mean feat, considering some teams fail to turn a wheel in anger following repeated scrutineering failures.



Most of the action takes place on Friday and Saturday, when teams compete in the Acceleration, Skidpan and Autocross events, while also taking part in Design, Costing and Presentation evaluations. Teams chose when to take part in each on-track event, so fine judgement was required to avoid being caught in the heavy showers that lingered throughout the weekend. Drivers Adam Covell, Rich Elliott, Duncan Manning, Joe Vernon and Chris Morris did a fine job in keeping the car on the island and achieving consistent scores in tricky conditions. (Continued on page 2)

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## Comment

Welcome to another year and another entry to the Formula Student Competition!

Firstly, I'd like to thank all of our sponsors from last year for the invaluable support that was given to the team. Without this help our great success at the event would not have been realised.

This year Cardiff Racing aims to build on the success of last summer. Backed by huge support from its team of undergraduates and PhD students, we are already well on track for pole position. The 2004/2005 entry will see the largest team in Cardiff's history designing and building its new race car – CR02.

Accompanying the new team is a redesigned and re-launched website and a new look brochure. In addition, The Red Line newsletter will keep everyone informed of the team's progress, as well as providing related news articles and details of Cardiff Racing sponsors.

Opposing teams beware... Cardiff Racing is back, and it's bigger and better than ever before!

David Parry, Editor

The climax of the event comes in the form of the arduous Endurance event, by far the most difficult challenge facing the teams and reflected in heavily weighted scores. This provided one of the most enduring images of the weekend, as Joe Vernon steered away from trouble to score a steady finish, while a stream of rivals retired with reliability problems.

**"We further established the reputation of Cardiff University"**

Agonisingly, a lack of pace robbed the team of valuable points, but the progress the team made wasn't lost on faculty adviser Dr. Karen Holford, 'It was a fabulous effort, we raised a few eyebrows and further established the reputation of Cardiff University.' Team consultant Rich Elliot agreed, 'I've been part of Cardiff Racing from the beginning and seeing our car out there was special, especially after overcoming so many obstacles.' Perhaps though, the spirit of the event and of Cardiff Racing is best encapsulated by a relative newcomer, Alastair Clarke, who became hooked towards the end, 'As soon as I got involved, I thought, 'Why didn't I do this sooner?''

## History of Cardiff Racing

By Yashad Bajaj

One of the features of Cardiff Racing that is hidden from most of us is its history. It has come a long way in a short period of time.

It all began in July 1999, when Dr Karen Holford attended the second U.K competition and realised the potential for providing a stupendous engineering experience for Cardiff Mechanical Engineering students and capitalise on the skills present in them. She supervised two third year projects from October 1999, which examined the feasibility of Cardiff University entering the competition. The very next year Dr Karen Holford introduced the fourth year module in

Automotive Design based around the Formula Student rules and for two years, students worked hard on the design aspects, eventually designing a complete car.

The seeds which had been sown sprouted and Cardiff Racing was born in September 2002, with the aim of entering a finished car as a Class 1 entry (dynamic and static events) in July 2003. On a small budget, volunteers enthusiastically began constructing the car, whilst fourth year students studying Automotive Design continued to generate concept designs for future years. Sadly, they had underestimated the time required to finish the build, but remained positive and submitted a Class 2 entry (static events only), which was very well received and attracted excellent feedback on many design aspects. The members of Cardiff Racing who attended the event showed us the true meaning of strength as it is always difficult to start something new.



In October 2003 the legacy of Cardiff Racing continued and the resulting car, CR01b competed as a Class 1 entry in July 2004 and Cardiff Racing was placed 7th among all U.K teams and it was one of the 18 teams that competed and finished all static and dynamic events out of 80 entries. This is an extraordinary achievement in the short time frame since Cardiff Racing was born. The Formula Student activity requires dedication, commitment and hard work, but in return you gain enormous engineering knowledge, all sorts of transferable skills and a deep sense of satisfaction. Above all – it's fun! The students who took part last year all agreed it was the best experience of their entire university career, and they were so attached to the car that they didn't like leaving it out of their sight even after graduation!

## Team Torque

In each issue we will be focussing on one of the new sponsors to join Cardiff Racing. For the first issue the headlight is pointing towards Trittech Precision Products.

### TRITECH PRECISION PRODUCTS



Trittech Precision Products, a leading investment casting company, have kindly produced some excellent castings for the front and rear uprights for our new car, CR02, using their rapid prototyping and investment casting expertise.

Trittech produces investment castings (precision metal shapes in aluminium and steel) principally for the aerospace industry. The company has a number of high profile aerospace customers, including BAE Systems, Airbus and Dowty, and over the years has worked on many prestigious aerospace projects such as the Eurofighter. The range of applications for Trittech's products are however, virtually endless, and they vary from castings for the motor racing industry, to spurs for horse riders! Further information about the company can be found on their website at the address below.

[www.tritechgroup.co.uk](http://www.tritechgroup.co.uk)

## New Sponsor?

If you are interested in becoming part of the Cardiff Racing Team through sponsorship please get in touch via the contact details at the back of this newsletter. Alternatively, log on to our new website which contains all the information about sponsorship opportunities at the address below:

[www.cardiffracing.co.uk](http://www.cardiffracing.co.uk)

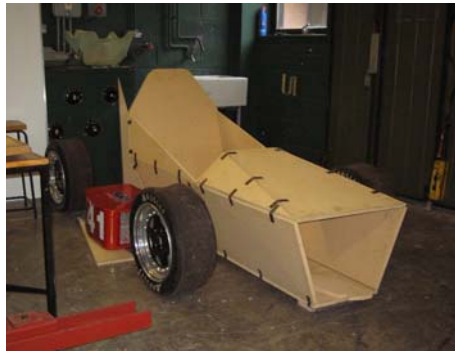
# CR02 TEAMS IN FOCUS

## Chassis and Structure Team Update

By Karl Carter

So far the car has got off to a great start. We commenced the year with a well established concept that could be built upon. The first stage was to make a mock up of the chassis to ensure that all the separate components would fit together and the driver is suitably positioned. The mock up was constructed out of MDF and plastic pipe, it has been decided that if all else fails we can use the mock up to race!

The chassis itself is a monocoque spaceframe hybrid. The tub is made from aluminium honeycomb sandwich panel and internal steel tube spaceframe, acting as the roll hoops, side impact protection and engine mounting.



**"The mock up of the chassis was the first stage in the process"**

The main build has just started and the team is extremely busy cutting the necessary sections of metal, getting stuck into the adhesive and generally feeling the pressure of the impending deadline. The quicker the car is built, the more time available for track testing!

In collaboration with the volunteers, we have begun testing the sections of the honeycomb which will form the crush structure and preliminary designs of the nosecone have been considered. Also, we have been busy ordering the components for the fuel system and plan to start manufacturing within the next few weeks.

The chassis team plays an integral role within Cardiff Racing as we have to accommodate everything that attaches to the car. This requires good communication channels with all of the other teams and a dynamic element capable of changing the design at the drop of a hat, especially with the suspension team! We are hoping to build a kick-ass car this year that will place Cardiff University in the top three for the UK and top ten overall.

## Electronics, Data Acquisition and Control Team Update

By Tristan Tremethick

The team's key roles are:

- To use data acquisition to provide analysis of Cardiff Racing vehicle performance.
- To optimise engine management "maps".
- To set-up control systems on the car e.g. launch and traction control.
- To build the wiring loom.

To this end we have created an engine test cell and are currently carrying out final preparation work which sees us working very closely with the engine team.

We are installing a PI Research data acquisition system on CR01b for analysis of forthcoming track testing. Mounts and brackets have been designed, sensors calibrated and software set-up.

We have also documented CR01b's Wiring loom and corrected minor problems. Last years entry will be used as a test bed for new technologies so it was important for the team to ensure that data could be successfully acquired from the car during testing.

The designs for CR02's wiring loom have been completed and the necessary components have been ordered. These parts have been arriving over the past few weeks which have allowed our team to begin the manufacturing stage of the process.

The team is also building a custom set of rev lights that will take the place of a traditional tachometer. A sequence of LEDs corresponds to the engine speed, critical shift and rpm limits. This system has advantages in lightness, ease of reading and is much more compact than the traditional gauge.

The circuit has been designed and etched in-house and final assembly is now being carried out.



**Part of the team gets to work soldering the new wiring loom**

We hope to have the wiring loom finished in the next few weeks before Easter.

## IN THE NEXT ISSUE...

Look out for the next issue of The Red Line and the following features:

- CR02 Manufacturing Report
- News from our sponsors
- CR01b Development
- Team Torque
- Technology behind the car
- Suspension Team Update
- Engine Team Update and
- The key role of volunteers

## CARDIFF RACING 2004/2005 Management Team

**Phil Box**  
**Karl Carter**  
**Alastair Clarke**  
**Richard Elliott**  
**Duncan Manning**  
**Richard Owen**



## CONTACT THE TEAM

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## MEET THE TEAM



The return of the newsletter sees the return of our meet the team section. In this issue, Gui Lopez talks to Karl Carter, member of the Cardiff Racing management team and 4<sup>th</sup> Year MEng Mechanical Engineering Student...

### Why did you become involved in Cardiff Racing?

I like solving problems, building a car is simply solving one big problem. I especially like the practical side. It gives me a chance to put some of my welding and fabricating skills to good use.

### What exactly are these skills?

Prior to starting my course, I was a Welder and Fabricator at Redler. They helped me attain my formal qualifications. In fact, they sponsor my studies at university.

**"I don't get involved in anything unless I can be the best"**

### Do Redler have any involvement in Cardiff Racing?

They have donated use of their facilities and made some components for the exhaust, which is a surprisingly complex bit of kit!

## With your studies and your Cardiff Racing commitments, do you have any time to relax?

Sure! Much of the work I do with Cardiff Racing helps in my understanding of other Engineering subjects, so there's plenty of time for hobbies. My favourite is Kickboxing.

### Sounds very relaxing...

Kickboxing is a great way to relieve stress and channel aggression. I'm heavily involved in the Cardiff University team and I've taken part in some competitions.

**"It really helps to develop young people into confident engineers"**

### With any success?

Well (smiling), I've won the odd medal... I don't really get involved in anything unless I can be the best. My time is just too precious and I don't want to waste it. Otherwise, I wouldn't do it; I wouldn't be involved with Cardiff Racing if I didn't believe we could be the best.



### That can't be easy?

No, that's why we need all the support we can get to show that a team from Cardiff or South Wales or the U.K. can be the best in the world. I really do believe in *Formula Student*; I've seen how it really helps to develop young people into confident engineers. Now, can I carry on with the car...?