

HyperWorks@Uni

YOUR ACADEMIC PROGRAMME NEWSLETTER

Altair® HyperWorks® is A Platform for Innovation™

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solidThinking™

The HyperWorks suite of simulation tools is just one of the virtual design solutions that Altair is pleased to bring to UK academic institutes. In 2007, Altair acquired Italian industrial design/styling software, solidThinking, a world leader in 'ideation' technology used extensively throughout European Universities and global organisations.

What is solidThinking?

From your sketches to the final surfaces, solidThinking is a comprehensive NURBS-based 3D modelling and rendering environment for Windows and Mac that delivers all the necessary tools for the creation of high-quality, manufacturable models and the power to render them with unsurpassed photorealism. Based on our industry-leading ConstructionTree™ technology, the modelling process in solidThinking grants you the greatest freedom to experiment with shapes and innovate.

solidThinking lets you work in an intuitive and comfortable manner, allowing you to create complex scenes in the fastest way possible. The name of our product itself expresses our aim: designing a tool for you to give shape to your ideas quickly and easily.

solidThinking for Universities

We are pleased to offer a free 30 day trial of the software for all UK Universities for use throughout their engineering and industrial design courses.

To learn more about solidThinking and to download the trial, please visit:

www.solidthinking.com

Get the trial
& take it for
a test run!



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RADIOSS CHOSEN AT CRANFIELD UNIVERSITY

Altair Engineering Ltd is pleased to announce that leading UK engineering educational institute, Cranfield University, has taken the decision to adopt HyperWorks' RADIOSS non-linear technology for future engineering degree courses. Cranfield will combine HyperWorks finite element modelling software, HyperMesh, with RADIOSS to provide its Motorsport Engineering and Management students with an industry leading suite of virtual design tools during their course.

With HyperWorks and the RADIOSS solver so widely used in the commercial world, Cranfield students will gain vital experience in an industry leading virtual design suite, helping to improve their post-graduation employability.

"RADIOSS' scalability, repeatability and robustness which is essential for Motorsport related design, along with the excellent value offered by the HyperWorks University licensing system, ensured that the solution was the clear choice for Cranfield's future teaching and research programmes", says Professor Kambiz Kayvantash, Head of Centre for Automotive Technology at Cranfield School of Applied Science. Find out more about Cranfield University at www.cranfield.ac.uk/sas



Pictured: Professor Kambiz Kayvantash

OPTISTRUCT ENHANCES RAPID MANUFACTURING

Altair has recently started a collaboration with the Additive Manufacturing (AM) Research Group at Loughborough University, a world leading group in the field of rapid manufacturing and rapid tooling technologies. Among other activities, since 2006 the research group hosts an international conference dedicated to this type of technology.

OptiStruct, part of the HyperWorks suite, is currently in use at the AM group in the Atkins project. This projects seeks to migrate from the high intensive design, manufacturing and distribution methodologies to a low-carbon solution by means of rapid manufacturing techniques. One of the outcomes of this collaboration will be the incorporation of optimisation techniques within the rapid manufacturing design cycle.

In order to support this activity, Altair has carried out a series of on-site visits to the outstanding manufacturing facilities located at the Wolfson Building. Representatives from the group have since attended OptiStruct training at Altair's Leamington Spa office.

For further information about the Additive Manufacturing Research Group, please visit their website: www.lboro.ac.uk/amrg



Pictured from left to right: PhD aspirant Adedeji Aremu, Daniel Nieto and Dr. Srikanth Tadepalli

TRAINING COURSES

Develop Your Skills

Here are upcoming HyperWorks training courses.

For more details on these courses, to obtain a full schedule or to inquire about customised onsite training, call us on 01926 468 600

LEAMINGTON SPA

Essentials of Pre- and Post-Processing with HyperWorks

November 3 - 4

Solver Interfaces

On demand

Metal Forming Simulation using HyperForm

December 15

Extrusion, Moldfilling, Forging and Friction Stir Welding

On demand

Multi-body Dynamics with MotionView and MotionSolve

November 17 -18

Generating Robust Designs with HyperStudy

November 12

Design Optimisation using OptiStruct

November 10 - 11

Crash and Impact Simulation Using RADIOSS

December 1

RADIOSS Linear

December 17

Formability of Sheet Metal

On demand

PBS Professional for Workload Management

December 2 - 3

COVENTRY UNI AWARDED BEST UK ENTRY AT SHELL ECO MARATHON

Congratulations Coventry University for achieving the best UK entry in the 2009 Shell Eco Marathon! The Shell Eco Marathon is an annual fuel economy competition hosted by Shell Global Solutions. This competition takes place on both sides of the Atlantic and gathers teams from around the world. Altair is proud to be one of the partners sponsoring the team.

OptiStruct, part of the HyperWorks suite, has been used extensively to reduce the weight of the prototype, which reached the record figure of 673 mpg. Another achievement is the fact that the prototype was completed in six months, from design to construction.

Rightly so the team achieved extensive media coverage, appearing on the BBC website, ITV Central News and in a long list of newspapers.

For further information about the prototype, team and the event, please visit their website:

www.cuae.co.uk



Pictured: Coventry University Shell Eco Marathon Team

ALTAIR IN THE NEWS

TECOSIM establishes RADIOSS Competence Center in Cologne, Germany

October 6, 2009

MECAPLAST Group, France, extends use of HyperWorks to optimize automotive equipment

September 17, 2009

EADS Innovation Works, Hamburg, Uses Altair's CAE Suite HyperWorks for Optimization and Stochastic Applications

September 14, 2009

REGISTER TODAY

If you are new to this site or have not registered as an Insider user, we invite you to complete a brief sign-up form. As a registered user, you will have access to other support resources, including documentation, tutorials, software updates and macros. You will also have access to the iExchange message board.



Be Part of the Altair Client Community Online

LOGIN REGISTER

Login to Altair Client Center online

ADDITIONAL HYPERWORKS MACROS

Centerline.zip:

This HyperMesh macro allows users to quickly create centerline for arbitrary tube sections.

[Download](#)

exportStressResult.zip:

This HV macro allows users to export stress results into a CSV file.

[Download](#)

SUPPORT TIPS & TRICKS

Create and Edit Derived Loadstep Utility in HyperView.

[Download](#)

Create boundary condition cards within HyperMesh for RADIOSS Block user profile.

[Download](#)

TUTORIALS

Every month, we will post a new HyperWorks tutorial, freely available for all students & teachers using the software. Each download contains an engineering task based on real world design problems and includes ready to use HyperWorks model files to explore and edit as you like.

This month's tutorial:

'Conservation of Momentum & Mechanical Work' [Download](#)



Our latest magazine - out now **SUBSCRIBE FREE**

OPTIMISATION OF FORMULA STUDENT CAR COMPONENTS

PETER ITALIANO – MENG. CARDIFF UNIVERSITY

Introduction

The front and rear uprights are structural components in a Formula Student race car that tend to be over designed and are therefore overweight. The front uprights connect the wheels to the suspension system, hold the brake callipers and are a key component for steering; the rear uprights have the same functionally excluding the steering capability.



Figure 1: Cardiff University CR4 2007/2008

The objective of this project was to reduce the weight of these components in order to improve the performance of the Cardiff University Formula Student race car.

Approach

The first step was to perform a static analysis to verify the suitability of the components for optimisation. This was achieved by identifying areas of unstressed material when loading.

This was followed by a topology optimisation of the uprights and subsequently validation of results. The validation involved re-analysis the optimised components as well as an additional buckling analysis.

HyperMesh was used extensively in every aspect of the pre-processing of the models, from importing and repairing the geometry to generating a solid finite element representation of the uprights using tetra elements.

HyperView and OSsmooth were also used to post-process the optimisation results and recover optimised geometry respectively.

Topology Optimisation

Topology optimisation was performed on the components in order to reduce their weight without compromising their performance. The topology optimisation starts with a design envelope which encloses the component material. The reduction of weight is achieved by varying the density of the component material in response to the loads experienced by the upright component.

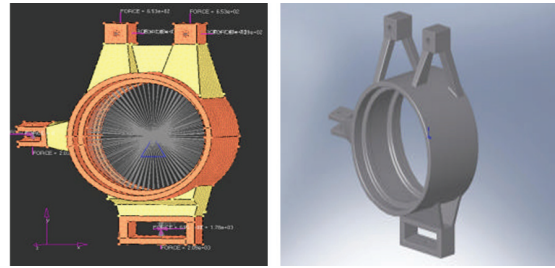


Figure 2: Fig 2: Design Envelope (left) and Rear Upright Final Design

Results

The results obtained from OptiStruct suggested a reduction of weight of the front and rear uprights of 14% and 13% respectively.

These results were further validated when loading and buckling conditions were applied to the optimised components. The maximum stresses experienced by the components were half of the yield value of the upright components material.

OptiStruct was further employed to investigate alternative designs for the engine mount within this project. This study showed that this component was also susceptible to weight reduction.

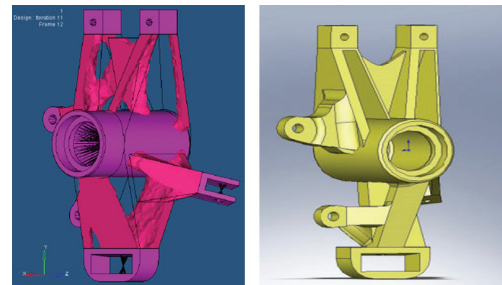


Figure 3: Front Upright OptiStruct Result (left) and Final Design (right)

Conclusion

The optimisation results provided by OptiStruct demonstrated that the weight of the front and rear uprights could be reduced to improve the performance of the race car.

The OptiStruct results demonstrated that racing car components can be improved by reducing their weight while maintaining their structural performance.

Formula Student racing cars can greatly benefit from incorporating optimisation technology within their design cycle.

HyperWorks is a division of  Altair

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To learn more about Altair Engineering, visit us at www.uk.altair.com.

CASE STUDY