

# HyperWorks@Uni

YOUR ACADEMIC PROGRAMME NEWSLETTER

Altair® HyperWorks® is A Platform for Innovation™

Issue 1  
2009



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**Altair**

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



**HyperWorks® 10**

A Platform for Innovation™



Built on a foundation of **design optimization, performance data management** and **process automation**, Altair HyperWorks is an **enterprise simulation solution for rapid design exploration and decision-making.**

Following the release of HyperWorks 10.0, we are pleased to invite you to attend our rollout webinar series. These twelve online sessions taking place throughout July are a must attend for all organisations using virtual design technology today. Each live presentation from our product experts requires you to spend just 40 minutes finding out what's new and how it can help your business become even more efficient and innovative.

HyperWorks 10.0 further expands its solver solutions and computation speed, launches several first-to-market design optimisation advancements, introduces a new mathematical analysis software technology, HyperMath, and extends its leading position in modelling and visualisation technologies.

[www.altairhyperworks.co.uk/hw10](http://www.altairhyperworks.co.uk/hw10)

## VIRTUAL DESIGN BEST PRACTICE - SEE HOW THE EXPERTS DO IT!

In May 2009, Altair UK held the 6th Altair CAE Technology Conference at the Heritage Motor Centre in Gaydon Warwickshire. The event was attended by over 300 engineers from across UK industry making it our most successful to date.

4 keynote speakers and 14 technical papers demonstrated how leading companies are implementing the latest virtual design techniques to improve their product and business performance. We are pleased to announce that these papers are now available to download from the HyperWorks website for all those who were unable to make the day.

Papers from:

- Amsafe Bridport
- ARRK R&D
- Beru F1 Systems
- Bombardier Transportation
- Cranfield Impact Centre
- Force India F1
- Ford Motor Company
- Jaguar Land Rover
- SAIC Motor
- Tecosim
- ThyssenKrupp Tallent
- Unilever & more



[Download the Papers Here](#)

## HYPERWORKS TRAINING

The Department of Earth Sciences from the University of Bristol has taken part in the HyperMesh training course during March. Their research involves constant usage of CAE tools.

The Department of Earth Sciences is one of the most innovative departments in the UK academic landscape; 75% of its research activities are to be considered in the top two categories (4\* & 3\*) of the RAE2008. In addition its submission rate to RAE2008 reached the 100% mark of eligible researchers.

For further information about the Palaeobiology and Biodiversity Research Group, please visit their web portal:

<http://palaeo.gly.bris.ac.uk/index.html>

***Pictured from left to right: Jen Bright, Phillip Anderson, Daniel Nieto (Altair) and Pam Gill***



## 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

August 4 - 5

#### Solver Interfaces

On demand

#### Metal Forming Simulation using HyperForm

September 22

#### Extrusion, Moldfilling, Forging and Friction Stir Welding

On demand

#### Multi-body Dynamics with MotionView and MotionSolve

August 18 - 19

#### Generating Robust Designs with HyperStudy

September 17

#### Design Optimisation using OptiStruct

September 15 - 16

#### Crash and Impact Simulation Using RADIOSS

August 11

#### RADIOSS Linear

September 24

#### Formability of Sheet Metal

On demand

#### PBS Professional for Workload Management

September 1 - 2

## ALTAIR SPONSOR 1000MPH BLOODHOUND SSC

Altair has become a product sponsor of the BLOODHOUND SSC project, which aims to set a new land speed record. The BLOODHOUND SSC vehicle is set to achieve a staggering 1000 mph while inspiring a new generation of engineers along the way.

As part of the sponsorship activities, at the beginning of April a number of engineers involved in the design of the car have undergone a workshop in pre-processing methods and techniques at the University of West England (UWE) located in Bristol. In addition, the design team will make use of OptiStruct to optimise a number of components.

For further information about the BLOODHOUND SSC project, please visit their website - [www.bloodhoundssc.com](http://www.bloodhoundssc.com)



Product | Sponsor



Daniel Nieto at BLOODHOUND's HQ

## ALTAIR IN THE NEWS

**Defense Department High-Performance Computing Centers Extend Their Contract with Altair for a Third Year**  
June 15, 2009

**Altair Releases HyperWorks 10.0 with Powerful New Solver Capabilities and Technology Innovations**  
June 3, 2009

**Altair, TARDEC Emphasize Need for Increased Modeling and Simulation in the Development of Military Ground Vehicles**  
May 15, 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



## ADDITIONAL HYPERWORKS MACROS

### Line.zip:

This macro creates a mid-line between two selected lines. [Download](#)

### DeleteUnusedEmpty.zip:

This utility will find and delete empty and unused entities in HyperMesh session.

[Download](#)

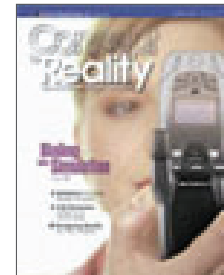
## SUPPORT TIPS & TRICKS

Create and Edit Derived Loadstep Utility in HV.

[Download](#)

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

[Download](#)



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# STRESS DISTRIBUTION IN CERAMIC SEALS

SHAUN SINGH – MENG. UNV. LOUGHBOROUGH

## Introduction

Ceramic tiled surfaces are one of the most preferable coverings for floors and walls, especially in demanding conditions where durability, chemical resistance and hygiene control are required. Due to the instabilities in the dimensions of the tiles, a void is required in between the tiles during installation to ensure that the tiles appear in a linear formation. This void is then filled with specific grout materials, depending on the required specification, to seal the tiled surface. However, it is the grouting that proves to be a weak link within the surface.

The objective of this project was to determine the best shape profile for the grout in order to distribute the external stresses efficiently. The grout was generated by a novel laser enamelling process.

## Approach

Test samples were made using laser enamelling techniques followed by physical tests to determine the point of failure of the seal. Finite element analysis (FEA) was then used to simulate the loading within a virtual environment by comparing the results of the physical test against those from the FEA.

Once validated, the FEA model was optimised using Optistruct, part of the HyperWorks suite of software, to try and increase the load bearing capacity of the enamel seal. The optimised geometry was then utilised in the validated FEA model to measure the performance difference.

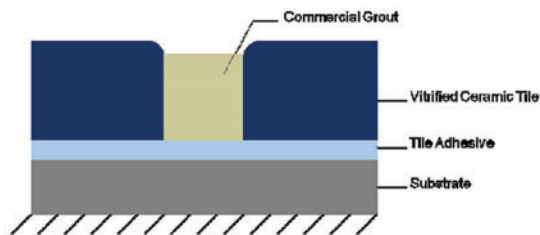


Figure 1: Schematic cross-section of a conventional grouting technique

## Shape Optimisation - OptiStruct

A free shape optimisation was performed in order to try and relieve the stress concentration within the grout and enamel. The objective was to reduce the stress upon the top face of the enamel seal.

Manufacturing constraints were added such as extrusion and symmetry that would ensure the optimiser would produce realistic results.

Further nodal constraints were added to restrict the movement of the nodes as the ceramic tiles would act as physical constraint in reality.

## Results

The results obtained from Optistruct showed that the maximum Von Mises stress was reduced between 5% and 7% depending on the laser enamelling technique used.

As the stresses from the optimised design were lower than the predicted failure stress, the static loads could be increased to determine the new load bearing capacity for the optimised results.

In addition, the shape optimisation results have led to an increase in the load bearing capacity of up to 6%.

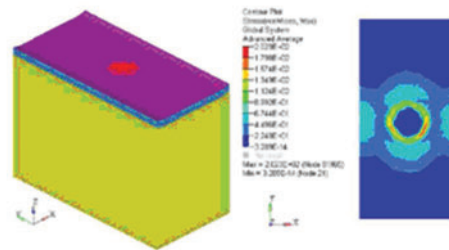


Figure 2: Load Bearing Capacity Results for Optimised Results

**“The combination of easy model manipulation, solving and optimising within one single suite of software proved critical in the success of this project.”**

Shaun Singh

## Conclusion

The shape optimisation results from Optistruct demonstrated that a flat surface of the modelled contact area would be optimal with curved edges where the grout and enamel meet the ceramic tile.

This fact was further supported by the gain in load bearing capacity of up to 6%, highlighting the benefits of using shape optimisation studies performed with Optistruct.

## Final Thoughts

By showing that a change in the shape profile of the seal could result in an increase in the load bearing capacity, the project can be deemed a success. This can be attributed to the use of OptiStruct and RADIOSS.

HyperWorks is a division of  Altair

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CASE STUDY