MAKINGITREAL SPRING 2012 Issue 7

MAKINGITREAL

INSIDE THIS ISSUE

COMPUMOD TURNS 30!!!

Compumod was thrilled to be able to recently celebrate its 30th anniversary. First founded in 1982 Compumod was pleased to have a number of old and new clients, ex-staff and associates join us for a party to celebrate our 30 years.

We were also pleased that Dominic Gallello CEO of MSC Software was able to send through a video message for everyone at the party talking through the changes he is implementing at MSC along with highlighting MSC's recent support for the Mars Curiosity rover landing (see article Page 3). Dominic's message can be found at http://www.youtube.com/watch?v=5pjXIjSF2Sk

Dominic Gallello President and CEO MSC Software

30 YEAR ANNIVERSARY

Compumod would like to thank everyone who has supported us over the past three decades and looks forward to continuing support for you many years into the future.

Welcome to Issue 7 of the 'Making it Real' Newsletter for Spring 2012. This issue is released on the back of Compumod's recent 30th anniversary celebrations and on the eve of MSC Software's 50th anniversary celebrations to be held in 2013.

It is amazing to think that when Compumod was founded in 1982 the first IBM 8088 PC was released with a "massive" 16KB of RAM and no hard disk. Today a fairly standard PC has almost 500,000 times more RAM and greatly increased processing power. 1982 was also the year the CD player was released by Sony, Malcolm Fraser was Prime Minister and Land Down Under was one of the top songs of the year.

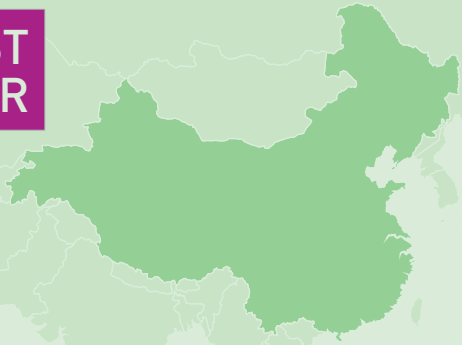
It is even more astounding to think that MSC Software has now been operating for 49 years. In 1963 when MSC was founded Sir Robert Menzies was the Australian prime Minister the Beatles were number 1 and it was just the beginning of the NASA space program.

Today we are globally interconnected, can run engineering analysis on laptops and hardware and software costs have reduced to a fraction of what they were. But even as we make software and analysis easier to use getting the right answers still comes down to having the right people driving the software. As such Compumod are now also offering to help organisations find the right people to build their computer models, run the analysis and ensure that their products work as expected. Therefore if you are interested in having Compumod find you the right driver for your analysis programs please do not hesitate to contact us.

The Australian Engineering Analysis community is a small network and Compumod is pleased to be a part of it.

Warwick Marx
Managing Director

BREAKFAST SEMINAR



In conjunction with the Society of Automotive Engineers Australasian (SAE-A), Compumod is pleased to be able to promote a special breakfast seminar entitled:

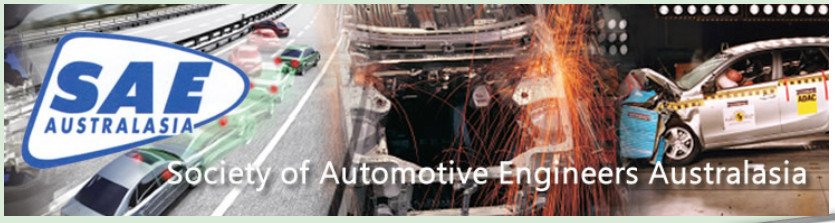
"From Made in China to Created in China."

This seminar will be presented by Mr Eric Favre Vice President Asia MSC Software.

Eric who is currently based in Shanghai is originally from France but has spent more than 10 years living and working in China for a variety of CAE and engineering related enterprises and so has a great insight into both living and doing business in China and the major changes that have taken place over the past decade.

Mr Eric Favre
Vice President Asia MSC Software

When: Thursday 15 November 2012



This breakfast is scheduled to be held on Thursday 15 November and if you are interested in finding out more about this special presentation please contact **Zigi Barrett** on **1300 965 690** or **zigi@compumod.com.au**

■ SAE-A BREAKFAST SEMINAR

MSC SOFTWARE'S ADAMS PLAYS KEY ROLE IN CURIOSITY'S DESCENT & LANDING ON MARS

Figure 1 Simulation Render of Curiosity anchoring Rover to the Surface of Mars

MSC Software Corporation was proud to announce that its Adams multibody dynamics software played a crucial role in enabling the extraordinary descent and landing of the Curiosity Rover onto Mars on Sunday evening (August 5th 2012). A team of engineers at the NASA Jet Propulsion Laboratory (JPL) performed a series of critical computer simulations of the sky crane manoeuvre sequences. In graceful fashion, the JPL team successfully and precisely placed the rover onto the Red Planet, in what many are calling an "immense technical achievement."

The computer simulations that JPL performed in Adams were essential to the mission. For instance, during the rover separation, they had to prevent the flight hardware from clashing or coming into contact with each other during the "two body phase" of the Descent Rate Limiter (DLR)/bridle deployment. Using Adams, the engineers were able to model and simulate this event, which was critical for them.

The dynamic event studies performed by the JPL team were unlike most performed for products functioning here on Earth. The team knew they needed to rely on computer simulations to study the extreme loading conditions that Curiosity potentially would face during the final descent, separation, and landing stages. Many conditions could not physically be tested anywhere on our own planet. The engineers dealt with complexities involving Martian gravity, atmosphere, surface slope, and landing velocities that could not be duplicated exactly here on Earth, and relied on the simulations to gain the insight they needed to feel confident in the execution of the mission. The series of Adams simulations took place in parallel with design - but it was insight from the simulations that helped guide the design to maturity, and to prevent any failures resulting from potentially harsh loading conditions during the mission.

In addition to the separation event, Adams simulations were used to study

Figure 2 Rover gathering and transmitting data

a complete series of events beginning with power descent to touchdown. The craft carrying the rover was travelling at a speed of 13,000 mph and had to decelerate to a speed at which the sky crane manoeuvre could lower the rover safely down onto the Mars surface. The team of engineers at JPL created several Adams sub-models including a high-fidelity detailed model of the rover itself. This effort was many times more difficult than that for previous rovers, and included development of a mobility deployment model, a model for the rover separation, and a model for touchdown.

"The employees at MSC are extremely proud of what the JPL team has accomplished," said Dominic Gallello, CEO & President at MSC Software.

> "WE CONGRATULATE THE NASA TEAM, AND ARE DELIGHTED THAT OUR SOFTWARE SUPPORTED SUCH AN EXTRAORDINARY FEAT. IT IS ALWAYS INSPIRING TO ACKNOWLEDGE THE WAYS IN WHICH OUR CUSTOMERS GAIN VALUE FROM SIMULATIONS, AND AT TIMES EVEN RELY EXCLUSIVELY ON THE TECHNOLOGY TO EXECUTE SOPHISTICATED MISSIONS LIKE CURIOSITY. IT IS AN EVENT WE WILL ALWAYS REMEMBER."

For more information go to **http://www.mscsoftware.com/About-Us/News/Default.aspx?articleid=1502**

ACTRAN FOR MUFFLERS, SILENCERS AND EXHAUST SYSTEMS

MSC has recently added Actran to its software portfolio. Actran is a general purpose finite element program for modelling sound propagation, transmission and absorption in an acoustic, vibro-acoustic or aero-acoustic context.

One of the applications where Actran can be used very efficiently is the optimisation of the design of silencers. Engines create noise by nature of the high pressures involved in the combustion process. Most of this noise exits the engine through the exhaust system (muffler). A smaller but still significant amount of noise escapes from the air intake system.

Actran can be used to change and optimise the design through simulation. The quantity of interest is the acoustic transmission loss of the system, which is a measure of the ratio of the sound power entering the system to the sound power that comes out as shown in Figure 1. A high number of TL is good, since it implies that less sound is going out of the silencer than the sound that went in.

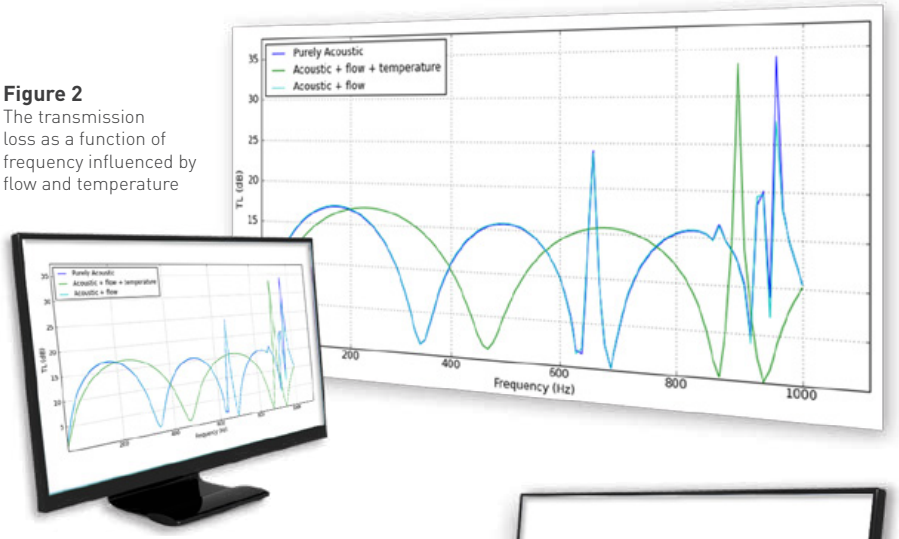


Figure 2
The transmission loss as a function of frequency influenced by flow and temperature

Actran can also include the interaction between the vibration of the structure and the noise in a coupled vibro-acoustic analysis. Flow and temperature effects can be included as well. Figure 2 shows a TL graph where flow and temperature have an effect on the transmission loss.

Perforated plates can be included through a simple transfer admittance equation as shown in Figure 4. (Of course they could also be modeled explicitly, but this would normally result in a large and complicated 3D mesh).

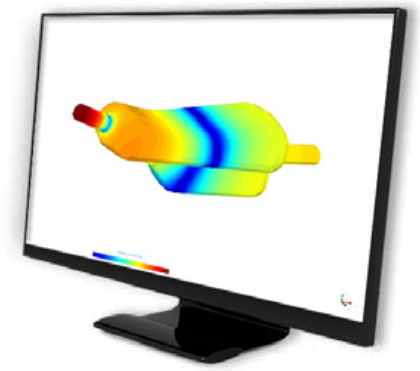


Figure 3
A contour plot of the acoustic pressure in the muffler

Transmission Loss (TL) = 10 x log10($W_{incident}/W_{transmitted}$)

Figure 1
Transmission loss in an engine silencer

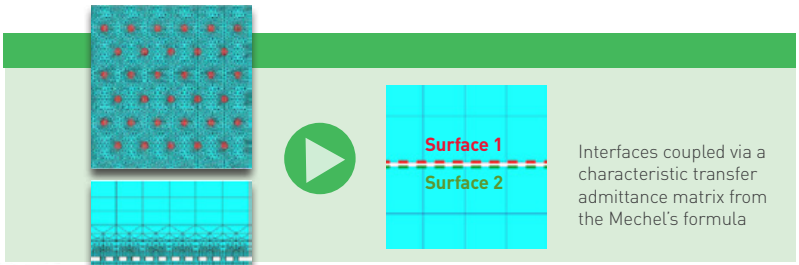
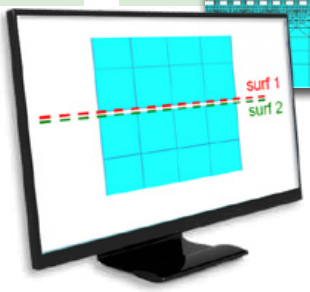


Figure 4
Replace a full 3D model of a perforated plate by a simple model with a transfer admittance

Actran uses modal basis components at both the inlet and outlet sections to model semi-infinite ducts. The advantage of this method is that it allows separation of incident and non-reflecting boundary waves.



For more information, contact Peter Brand at peter@compumod.com.au.

UPDATE:
FORD PERFORMANCE RACING

SUPPORTING PARTNER

Ford Performance Racing (FPR) has built on a fantastic start to the 2012 V8 Supercars Championship by preparing for 2013 in style. FPR has become the first team to build and run a final specification V8 Supercar Car of the Future (COTF) after drivers Mark Winterbottom and Will Davison unveiled the team's 2013-spec machine at Winton raceway.

The COTF Falcon was revealed at the factory Ford team's home test track at Winton in northern Victoria wearing Ford's unique EcoBoost motorsport livery.

FPR Team Principal Tim Edwards praised the team for finishing the car on schedule in its final specification.

"Today's reveal and shakedown is the result of many months of design and manufacturing by our team and they should all be praised for their efforts," Edwards said.

"While there is still a lot of work to be done to understand the new car ahead of next season our ability to have the car on track running what we hope will be the final specification of many parts will give us the best chance of starting 2013 at the head of the field.

> "OUR PLAN FOR THE SHAKEDOWN IS TO CHECK THE CAR'S SYSTEMS SO WE HAVE SOME DATA AND FEEDBACK FROM THE DRIVERS AHEAD OF OUR FIRST PROPER TEST."

Figure 1 FPR unveil car of the future

FPR was also recently buoyed by the news that they will be running four cars in the championship next year after the team reached a multi-year agreement with Racing Entitlements Contract owner Charlie Schwerkolt to run his entry.

FPR Team Principal Tim Edwards said the team's expansion to four cars has been a long-held desire and comes at the perfect time with the impending introduction of the Car of the Future program.

"We are very pleased that Charlie has chosen FPR to run his entry from next season as not only is he a great friend of the team, it is well known we have a long-held desire to be a four car team," Edwards said.

"Regardless of the economic benefit of running four cars, rather than two or three, having an additional car from next season will be vital when it comes to collecting data on the new Car of the Future chassis."

> "AN EXTRA CAR-WORTH OF DATA WILL GIVE US THE BEST CHANCE TO QUICKLY GET THE MOST OUT OF THE NEW CARS WE WILL ALL BE RUNNING NEXT YEAR."

Compumod is proud to support Ford Performance Racing who utilise MSC Adams and Adams/Car to virtually test the designs of their pack leading vehicles. Adams provides FPR with valuable insight into their vehicle designs, helping to squeeze every last ounce of performance out of their cars and give them the edge over their competition.

For more details contact Compumod on 1300 965 690 or go to www.fpr.com.au

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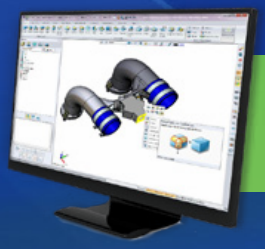

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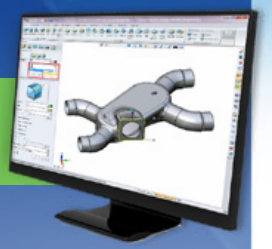
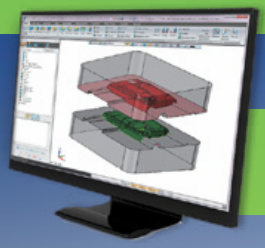


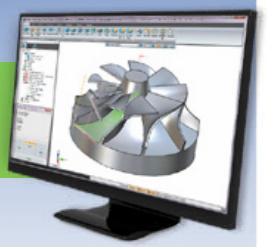
ZW3D Professional

Has everything included in Standard, plus mold design, and point cloud processing.



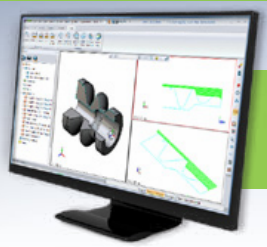
ZW3D Premium

Has everything in Professional, plus extensive integrated manufacturing and machining capabilities, hole machining, 2-3X milling, and now including lathe turning.



ZW3D 2X Machining

Has 2X turning, 2X milling, hole machining operations, and auto-feature tactics. Includes a basic CAD system for modifying models easily during machining preparation.



ZW3D 3X Machining

Has QuickMill technology with 2X turning, 2X and 3X milling operations, hole making, including feature recognition, roughing, finishing, and high speed machining.

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ZWSOFT Design More. Pay Less.

COMPUMOD MAKING IT REAL

MSC SOFTWARE ANNOUNCES NEW VERSION OF ITS ADVANCED WIND TURBINE SIMULATION SOLUTION

MSC Software Corporation recently announced the new 2012 version of its Advanced Wind Turbine Modeling (AdWiMo) solution. AdWiMo allows rapid modeling and accurate system simulation of wind turbines. As a plug-in to Adams, the multibody dynamics analysis software from MSC, the new version of AdWiMo fully supports the new Adams 2012 interface and better addresses areas of the certification process for wind turbines.

Design validation and certification of wind turbines is mandatory in almost all countries and is essential to designing a mechanically reliable wind turbine. Certification involves the testing of operation and safety concepts as well as design loads and load calculations. As part of a certification, more than 1,000 simulation runs may be necessary. AdWiMo helps to manage and simplify this process. With the new Load and Analysis Manager (LAM) within AdWiMo, wind turbine analysts can import their model, setup, execute and post process the simulations they need for a certification, based on different norms and guidelines.

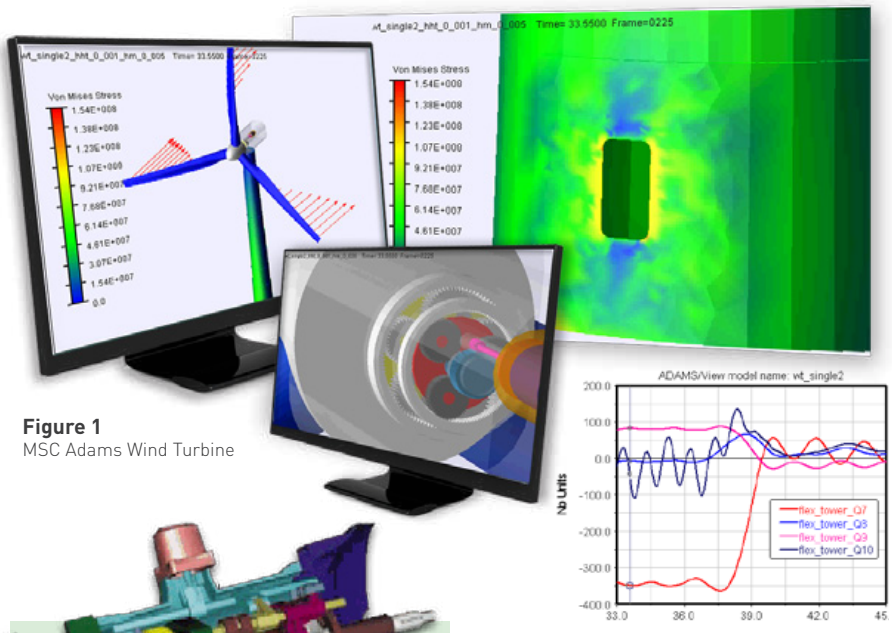


Figure 1
MSC Adams Wind Turbine

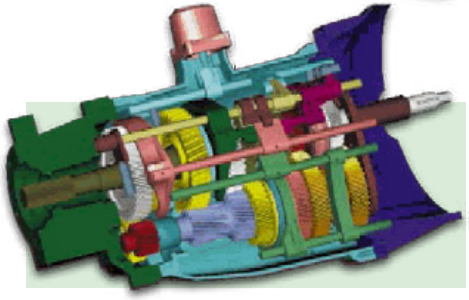


Figure 2
This cutaway view of the ADAMS transmission model shows the action of gears, shift rails, and other parts so New Venture Gears' engineers can evaluate the full-motion operation of the assembly as it goes through its shifting sequence

Other enhancements of the new version include an updated topology for direct drive turbines, the ability to introduce smoothened aerodynamic forces via a step function, automatic calculation of the fatigue limit summary, and first level integration of MSC Fatigue for post processing.

AdWiMo considers every major aspect of turbine design including tower, blades,

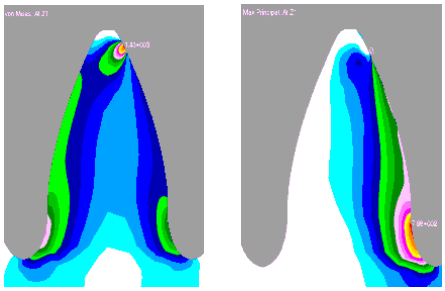
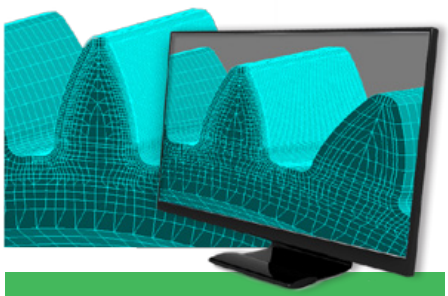


Figure 3 Gear Tooth Stress Concentration

hub, mainframe, gearbox housing, bearings, transmission, controls (generator, pitch, yaw), aerodynamic and centrifugal forces, coriolis acceleration, gyroscopic moments, point loads, gravity, thermal loads, and wave loads from 3rd parties. The tool offers a user-friendly and scalable solution for the complete design process of a wind turbine. This means that a simplified wind turbine in a conceptual design phase can be expanded to a fully detailed design by introducing more complex subsystems such as gears and rolling bearings and/or by replacing rigid bodies with flexible bodies.

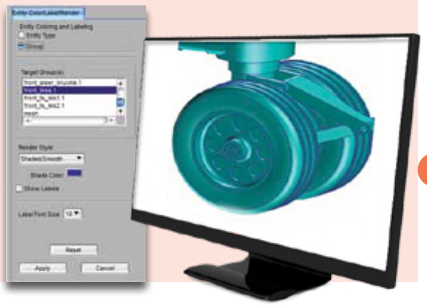


For more Information go to
http://www.mscsoftware.com/About-Us/News/Default.aspx?articleid=1497

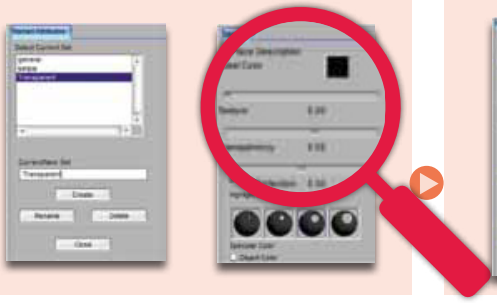
TIPS AND TRICKS!
PATRAN GETTING EFFICIENT WITH PATRAN

Transparent Display

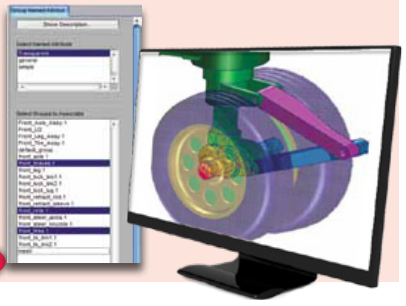
Have you ever wanted to set up the display in Patran so that part of your model is transparent?
You can, with the appropriate commands. First, set up groups for the parts of the model you want to be transparent, and set group display mode (under Display / Entity/Color/ Label/Render).



In Display/Shading, we can set transparency for the whole model. In order to apply it only to certain parts, we first need to use another option: Display/Named Attributes. Create a new Named Attribute called Transparent:

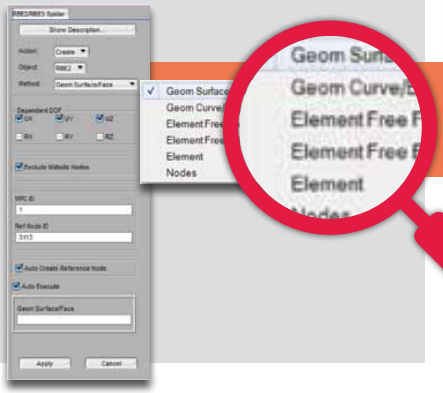


Now set the transparency in Display/ Shading. This is stored in the current Named Attribute. To set it for individual parts of the model, go to Utilities/Group/ Group/Named Attributes. Here we can assign the "Transparent" attribute to the required groups - and that's it!



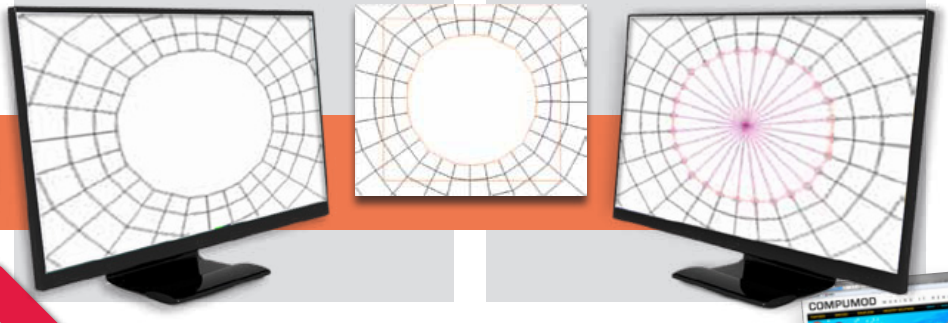
Quick RBE Creation

Patran 2011 introduced a new utility for quickly creating RBE2s and RBE3s. Starting from the selection of geometry faces/edges, or element free faces/edges, it will quickly create an RBE "spider", automatically generating the reference node (or optionally using an existing node).



Access it under Utilities / FEM-General / RBE2/RBE3 Spider.

For example, using the "Element Free Edge" option: simply put a selection box around the required free edges, and there's your RBE!



If you're using an older version of Patran then 2011, this tool can easily be retrofitted to that version.

Contact your local MSC technical representative for details.

If you would like to know more about Actran please email **Peter Brand** at **peter@compumod.com.au**

TIPS AND TRICKS!
MSC NASTRAN VISUALISE GLUED CONTACT

Glued contact in MSC Nastran is a powerful tool to join dissimilar meshes. It saves a lot of meshing effort: the meshes for different parts need not be congruent. You only need to define a contact body for each part and set the contact to "glued" in the contact table. This process can be accelerated by the automatic contact table, which is available in SimXpert. So you save time on the modeling side, but on the other hand you need more time for post processing. How can you verify that all parts are correctly connected? MSC Nastran outputs the contact status at the end of the job. Contact status = 1 indicates a tied node (slave), contact status = 0 indicates a retained node (master). No data means that the node is not in contact. But the contact status is normally available only at the end of the analysis. For a large job, you might wait a few hours to find that the contact status is not as expected, and you need to improve the contact definition. How can you see this already before the analysis, and get more insight? There are different variants.

Figure 1
Example model with 4 contact bodies

PRINT INTERNAL MPC EQUATIONS

Glued contact is internally represented by MPC equations.
The case control command NLOPRM MPCPCH=BEGN will output these MPC equations to the punch file. You can examine them in a text editor, or import them into your preprocessor to view graphically which nodes are connected. This requires a Nastran job to be run, but it's possible to use a dummy job which contains only the glued contact.

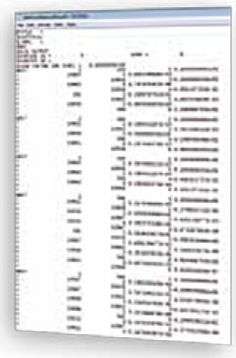


Figure 2
PCH file with MPC equations

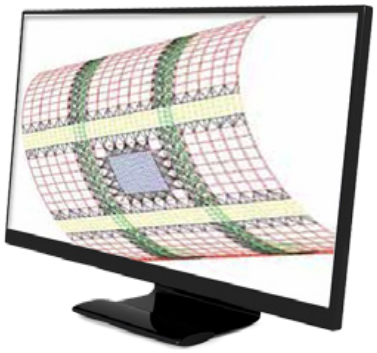


Figure 3
MPCs displayed on model

CONTACT STATUS PLOT BEFORE THE ANALYSIS

If you use SimXpert as pre-/postprocessor, you can find a new tool in version 2012: Advanced Tools – Contact Status. It creates a dummy Nastran job which only calculates glued contact, attaches the result file and shows a fringe and scalar plot of the contact status. You can modify the settings of this plot in the results menu. The scalar plot, which uses only markers, gives the clearest picture. Note that with the default contact settings in MSC Nastran, the slave node connects to a master surface (element), and all of the master surface's nodes are shown to be in contact. So you will often see markers on two master nodes per one slave node. The contact status tool makes use of the NLOPRM MPCPCH=BEGN method described above, and also the MPC equations are automatically imported into the database.

INTERMEDIATE OUTPUT FOR NONLINEAR JOB

The contact status tool is intended for glued contact, which is calculated by MSC Nastran before the actual analysis begins. If you work not with glued but with touching contact in a nonlinear SOL400 analysis, there is also a method to see contact results before the job has finished. The case control command NLOPRM OUTCTRL = INTERM gives you a separate op2 file for each increment of the analysis.

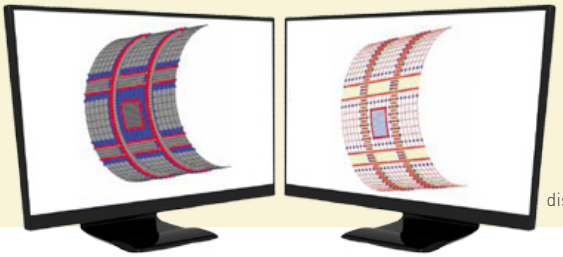


Figure 1
Contact status plot in SimXpert – 2 display variants

