COMPUMOD
MAKING IT REAL

MAKINGITREAL

6

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2012 AUSTRALASIAN ENGINEERING SIMULATION CONFERENCE REVIEW

2012 AES CONFERENCE REVIEW

INSIDE THIS ISSUE

March 29 saw the Compumod sponsored 2012 Australasian Simulation Conference held at the Conference and Exhibition Centre in Docklands Melbourne. Over 60 attendees listened to a variety of presentations from organization such as:

- Qinetiq
- Hatch
- SMR Automotive
- RMS
- RAAF
- Gexcon
- Ford Performance Racing
- Gasco
- United
- Interfleet
- Formtech Composites
- and others

These presentations covered topics from linear analysis of rolling stock and bridges, to non-linear optimisation, the use multi-body dynamics for vibration damping, blast modelling, fatigue modelling, CFD analysis and even the business of running a modern V8 Supercar team.

Following the conference many attendees joined in the lively discussion in the bar at the Hilton hotel which ran well into the night. The consensus appeared to be the conference was a great forum for both information transfer and networking and we look forward to the 2013 event!

If you are interested we have posted the photos of the event on our facebook page www.facebook.com/compumod (it would be great if you can like our page also!)

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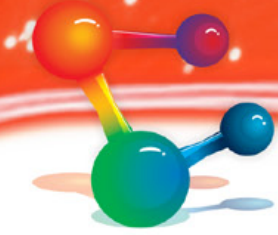
Welcome to Issue 6 of the '*Making it Real*' Newsletter for Winter 2012. This issue is released off the back of the very successful 2012 Australasian Engineering Simulation Conference held in late March in Melbourne. I was really thrilled to see so many attendees keen to learn about the latest in Engineering Simulation technology. The conference also attracted Business Review Weekly (BRW) who followed up the event with an article on CAE in their leading weekly business magazine (see right panel for a copy of the article.)

It has certainly been a tough time of late for the Australian economy and in particular the mechanical and manufacturing engineering sector. As such it is great that a leading business magazine is seeing that CAE is an important way for Australian Industries to become more competitive and more relevant in a global environment.

Compumod mission statement is:

> " TO PROMOTE AND DELIVER STATE OF THE ART COMPUTER AIDED ENGINEERING TOOLS AND SERVICES TO AUSTRALIAN AND NEW ZEALAND BUSINESSES TO HELP THEM ACHIEVE A COMPETITIVE ADVANTAGE AND SUSTAINABLE RETURN ON INVESTMENT "

As such we are committed to helping Australian organisations utilise the best available technologies in order to solve the hard problems that others cannot.

Compumod have put together a portfolio of the leading state of the art analysis programs and provide a wide range of professional services. We look forward to having the opportunity to discuss with you the best way for your organisation to gain or maintain your competitive edge.

Warwick Marx
Warwick Marx
Managing Director

THE BUSINESS END

ENGINEERING

ON TRACK FOR A QUICK SOLUTION

Computer-aided engineering is a crucial tool for upper end testing and simulation. **Report: Michael Bleby**

● The rules are getting tougher in the V8 Supercars competition. In comparison with the much higher-spending Formula 1 code, rules governing vehicles' weight and such things as aerodynamics are tightly defined in a well-enforced bid to level the playing field and keep the focus on racing, rather than money. From next year, the rules will become even tighter.

All this makes the use of computer-aided engineering for testing and simulating race conditions crucial, according to Ford Performance Racing's director of business operations, Mark Roworth.

"They're removing a number of the freedoms that allow the teams to go out and spend," he says. "We are more and more reliant on simulation today than we've ever been."

Computer-aided engineering, or CAE as it is known, is widely used in drawings and design but at the upper end is a crucial tool for testing and simulation.

It allows structures to be put through stress tests in ways once only possible by physical tests of prototypes. Virtual testing offers great savings in time and money.

Away from the glamorous world of racing cars, it has widespread application in areas such as building bridges and testing the lifespan of rail cars.

CAE is crucial to the future of manufacturing but is something many in industry fail to grasp, says RMIT University's head of aerospace, mechanical and manufacturing engineering Aleksandar Subic.

"They have this middle-aged view of manufacturing where manufacture has to happen in the same place as where the design is happening. It's ludicrous," he says.

"The whole point of digital technology is that you can do design and analysis anywhere."

Most people agree there is not enough

Fast times: Ford Performance Racing relies on computer-aided engineering

uptake of CAE in this country. While larger companies do, smaller ones lag.

"The big companies get it. It's the smaller companies where the uptake does slow a bit. They're probably the ones that need it more to be competitive," the managing director of Compumod, a Sydney-based supplier of CAE software, Warwick Marx, says.

Sydney-based consulting engineer and former academic Richard Wiltshire, who works a lot with CAE, says the cost – the software packages start at $30,000 and stretch into the hundreds of thousands of dollars – is a hurdle for smaller companies. But there is another point.

"One of the impediments to buying it is having the people to use it," he says. "I don't think the universities are doing a particularly brilliant job in solving that one either. The courses that skill people for that stuff are not what they used to be."

Subic, who sends 200 students a year to Europe on paid internships, disagrees

SIMULATION AND SPLIT SECONDS

Fast-paced games require fast solutions. In December last year, the Ford Performance Racing team arrived in Sydney for the Telstra 500, the last race of the championship calendar, and did a walk of the track. They noticed a different profile on the kerbs and raised concerns that this may have a negative effect on their cars' suspension. They were right, they discovered on the Saturday, the first of two race days that weekend.

"We were having component failure," director of business operations Mark Roworth recalls. That race was a disaster – three of the team's four cars didn't finish – but even during the race, with the use of its CAE software, the engineering team redesigned, evaluated and simulated new components that could solve the problem.

Tests complete, they manufactured two new steering arms, one for each side of the car, at the team's Melbourne base and got them on a 10pm flight that night to Sydney. To give the pit crew a choice, they worked overnight on second versions, which were put on a 6am flight the next day. The pit crew chose version A for Sunday's race, which FPR driver Mark Winterbottom then won.

"We went from the losing position on Saturday to winning the race on Sunday," Roworth smiles.

Michael Bleby

vehemently. The problem, he says, is that there are too few graduates coming out of the system. "Half of the jobs in Australia are met by migrants," he says.

While there is not enough appreciation of CAE and the high-end niche of design, testing and simulation it permits, Australian manufacturing will continue to flail around in the lower-end, widget-producing industries that unsuccessfully attempt to compete on price, Subic says.

"When you own the IT and value-added technology being sold worldwide, you don't care whether they're producing that component," he says.

Back at the racing track, Roworth endorses Subic's view. Not only does Ford Performance Racing have a "large number" of highly skilled Australian engineers but other codes do, too, Roworth says.

"There is a large volume of Australians in Formula 1 because they get such great training and education here," Roworth says. BRW

44 April 19-25 2012 | www.brw.com.au

Post-Conference Drinks - AES Conference 2012

ON TRACK FOR A QUICK SOLUTION

MSC SOFTWARE ANNOUNCES NEW ADAMS/MACHINERY

MSC Software Corporation recently announced Adams/Machinery 2012, a new functional virtual prototyping and multibody dynamics solution for high-fidelity modelling and simulation automation of common machinery components in equipment, such as robotics, conveyors, agricultural equipment and industrial machinery.

Adams/Machinery 2012 is a fully-integrated set of tools within MSC's Adams multibody dynamics software to assist engineers with virtual test and prototyping, and mechanical system simulation in general.

Valuable product attributes for engineers include the following:

- High-fidelity simulation of common mechanical parts, such as gears, belts, and chains

- Enhanced productivity with incredibly quick model-solve-evaluate process times

- An automated, wizard-driven model creation process for ease-of-use

- Straightforward evaluation of results in Adams/Postprocessor

With this solution suite, equipment and machinery manufacturers will be able to design, model, and evaluate common mechanical components with relative ease in a world-class CAE environment.

This first release of Adams/Machinery 2012 includes belts, chains, and gears, with bearings, cables, motors and other common machinery components planned for future releases.

### Custom Suite of Modelling Productivity Tools

The Adams/Machinery solution provides designers and engineers with a custom set of tools for rapid modelling and pre-processing through automation of activities including geometry creation and establishing subsystem connections. The new offering also assists users with post-processing by providing automated plotting and reporting commonly needed by machinery equipment manufacturers and their suppliers to communicate system performance. Modelling productivity tools in this first release include the following:

Gear Module: model and evaluate the behaviour of gear pairs for a variety of gear types, including spur, helical, and straight/spiral bevel;
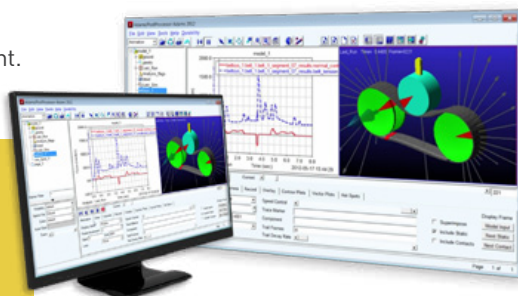
Belt Module: examine planar dynamic behaviour of belt-pulley systems for a range of belt types, including smooth, poly-V groove, and trapezoidal-toothed designs;
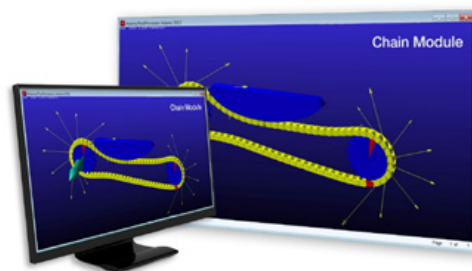
Chain Module: model and evaluate the dynamics for both roller and involute, i.e., silent, chain types.

### Easy-to-Use Interface for Engineers

With the productivity tools for modelling and pre-processing of chain, gear, and belt components, Adams/Machinery provides an extremely approachable, easy-to-use interface with in-line help and useful information about the components, their connections, and applicability of modelling fidelity options. Wizards help guide users through model setup and provide the ability to quickly edit, modify, and/or change modelling fidelity options.

System-level Optimization within Adams

The Adams/Machinery components are parameterised and compatible with multi-run options for design studies and optimisation simulations using Adams/Insight. Engineers can take advantage of the full set of functional virtual prototyping features within Adams and seamlessly extend activities into full system-level simulations to assess overall design performance.

For more information contact Compumod on **info@compumod.com.au** or **call 1300 965 690**

MSC SOFTWARE ANNOUNCES NEW ADAMS/MACHINERY

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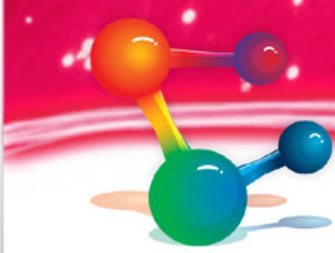
VI-CAR REAL TIME SEMINAR AT FORD PERFORMANCE RACING

Compumod are pleased to have Diego Minen from Italy visiting us in July. Diego is one of the founders of VI-Grade and whilst in Australia he will be conducting a Seminar on Tuesday July 3 at Ford Performance Racing HQ in Campbellfield, Melbourne.
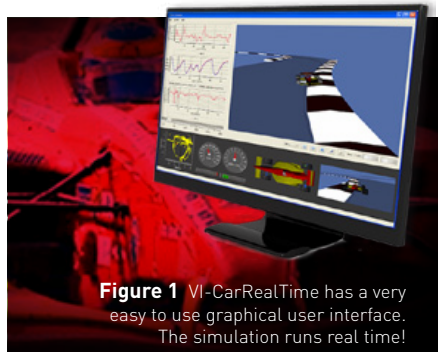

Figure 1 VI-CarRealTime has a very easy to use graphical user interface. The simulation runs real time!

The Seminar will primarily focus on VI-Car Real Time which is a software solution that can solve real world vehicle dynamics problems in real time – enable it to be used for large scale optimisation, to power the physics behind advanced driving simulators or to test hardware and software in the loop control systems.

Automotive customers of this technology include Audi, Ferrari, Hyundai and Volvo.

Figure 2
VI-CarRealTime is used by many racing teams world-wide to optimise the performance of a car before and also during the racing weekends

Figure 3
VI-CarRealTime provides an all-in-one integrated platform for optimising the performance of a car

SOFTWARE-IN-THE-LOOP

DOE & OPTIMISATION

HARDWARE-IN-THE-LOOP

DRIVING SIMULATOR

VEHICLE DYNAMICS, RIDE, DURABILITY, FUEL CONSUMPTION

In fact VI-grade's breakthrough driving simulator technology has been awarded "Development Tool of the Year 2012" by the Vehicle Dynamics International magazine. The prestigious award has been assigned to VI-DriveSim out of a short list of four finalists through a voting process undergone by an international and independent judging panel composed by 15 automotive professionals.

The 1 hour seminar will conclude with a short tour of the FPR V8 Supercar build and maintenance facility.

For more information contact Zigi Barrett on **1300 965 690** or email **zigi@compumod.com.au**

■ VI-CAR REAL TIME SEMINAR AT FPR
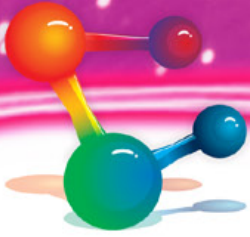
MARC 2012 - LATEST RELEASE

MSC Software's recent release of Marc 2012 delivers dramatic performance improvements plus increased nonlinear capability robustness

This new release of Marc provides engineers with significant performance improvements for the desktop and enhanced robustness for a broad range of nonlinear finite element analysis applications.
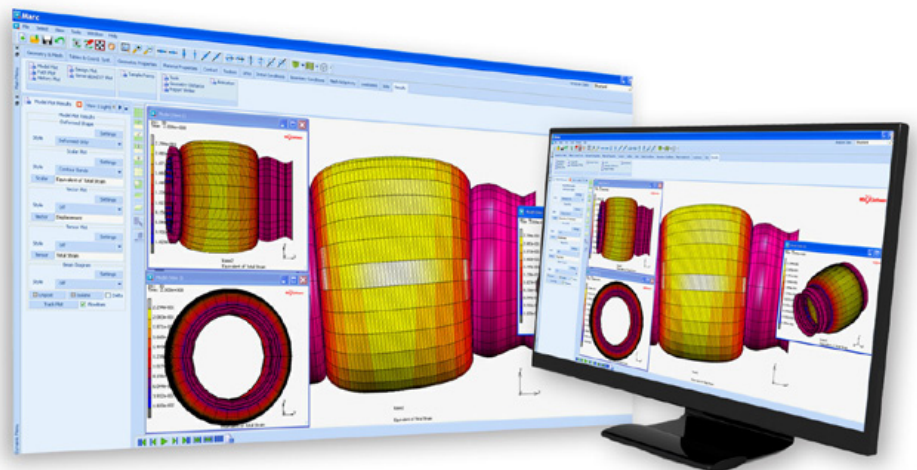

Figure 1 The Marc 2012 Interface

Performance for the Desktops

The GPGPU (General Purpose Graphics Processing Unit) capability implemented in Marc 2012 helps users take advantage of the graphics processors available on most desktop machines to achieve significantly better performance. This feature, available for Intel-based Windows 64-bit and Linux 64-bit versions, can create performance improvement in the range of 200% to 500%. By using this capability with the DDM parallelisation of Marc, users can solve larger problems faster and achieve higher productivity.
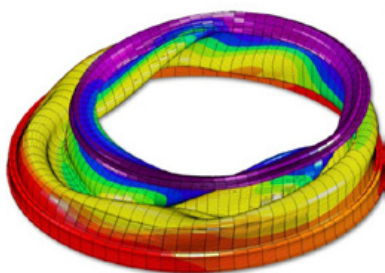
Nonlinear Robustness

Several quality improvements and graphical user interface (GUI) enhancements have been implemented to provide engineers with a more productive experience. This includes enhancements like:

Figure 3 Support for multiple failure indices providing users with additional flexibility in failure modelling

- ▶ Smarter contact detection at hard edges of shell elements for improved accuracy
- ▶ Support for multiple failure indices providing users with additional flexibility in failure modelling
- ▶ Faster dynamic modelling and improved user feedback for actions like duplicate entity removal

Figure 2 An example of non-linear robustness

For more details about the new release contact Compumod on 1300 965 690 or email info@compumod.com.au

MARC 2012 – LATEST RELEASE

COMPUMOD

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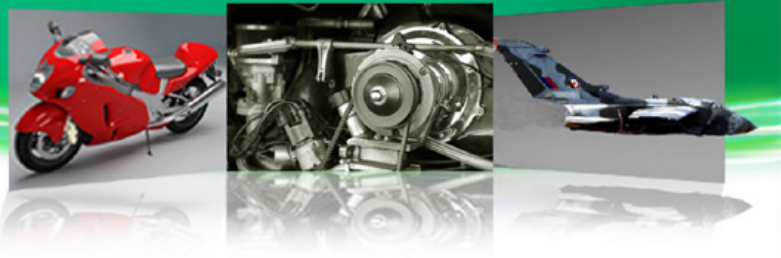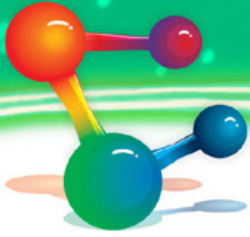
ZW3D 2012 CAD/CAM JUST GETS EASIER!

ZW3D is cost-effective CAD/CAM software for 3D modelling, mold design, and machining, which takes engineers from concept to finished product in one easy-to-use, single collaborative environment. Supported by its Show-n-Tell™ built-in learning system, ZW3D includes data exchange to allow efficient reuse and sharing of designs, hybrid modelling with its unique Overdrive™ kernel, mold and die design with cavity preparation tools and component libraries, and intelligent, adaptive CNC machining from 2-axis through to 5-axis.

Powerful Data Exchange

- Directly read many 3D CAD software formats, such as NX, SolidWorks, CATIA, Creo, and Inventor.
- Support 3D exchange standards, including DWG, STEP, IGES, ACIS, DXF, Parasolid, SAT, and STL.
- Export models in PDF and raster images.

Productive Hybrid Modelling with Direct Edit

- Seamlessly work with 3D solid, surface, and wireframe models.
- Enjoy design flexibility with hybrid modelling.
- Quickly and easily edit all imported geometry through direct edit.
- Generate smooth surfaces with freeform surfacing and dynamic shape morphing.
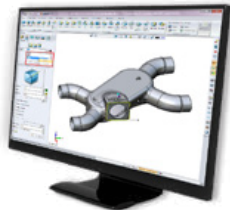
Flexible Assembly Design

- Deal easily with large assemblies using ZW3D Burst™ technology.
- Validate and animate assemblies with built-in motion simulation.
- Simplify design work with a large amount of standard parts from PartSolutions™ library.

Fast 2D Sheet Production

- Quickly lay out drawing views, add dimensions, and generate BOM tables.
- Instantly create associative sections and detail views.
- Access built-in translators for leading CAD formats.

Whole-process Mold Design

- Split any 3D model, not just solid models.
- Rapidly create parting lines and faces, cores, and cavities using a variety of flexible methods.
- Employ many kinds of standard mold bases, such as DME, HASCO, LKM, and MISUM.
- Speed up preparation time through multiple electrode extraction.

**Figure 2** The mold design process illustrated: Split part - Create core and cavity - Design mold base
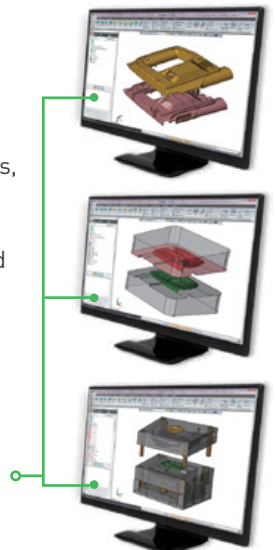
Efficient 2-5X Milling and Turning

- Increase machining efficiency with integrated CAD.
- Dramatically reduce programming time through automatic hole tactics.
- Generate powerful milling functions with 2-axis to 5-axis machines.
- Improve productivity by 30% through QuickMill™ technology's efficient roughing, rest-roughing, and quality of milled surfaces.
- Employ the new turning module.

■ ZW3D 2012 IS LIVE!
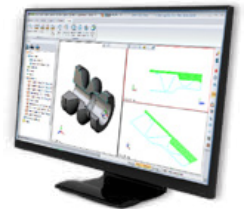
If you would like to find out more contact Steve at Compumod on **1300 965 690** or email **steve@compumod.com.au**
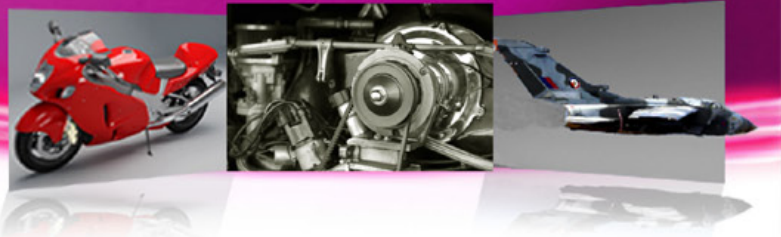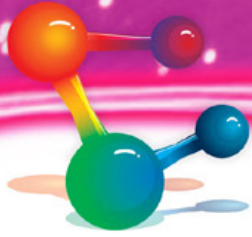
CONVEYOR BELT, CHUTE AND BULK MATERIAL FLOW SIMULATION WITH APPLIED DEM

As you may know, Compumod is the exclusive distributor of Applied DEM Bulk Flow Analyst™ in Australia and New Zealand.

Bulk Flow Analyst™ is software based upon the Discrete Element Method and developed for the simulation of bulk material flow. With Bulk Flow Analyst™, users can take advantage of the benefits Virtual Prototyping has to offer to particle flow system analysis. Users can evaluate design concepts by creating an assortment of simulations using different material size ranges, chute materials, belt speeds, flow rates, and other factors.
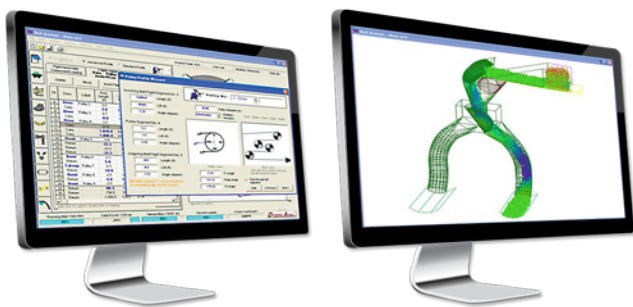

Figure 1 Examples demonstrate Applied DEM interface

Bulk Flow Analyst™ enables the simulation of sticky particles and structures, the use of moving system components (such as mixer blades, screens, gates, etc.), and the analysis of particle forces placed upon the system.
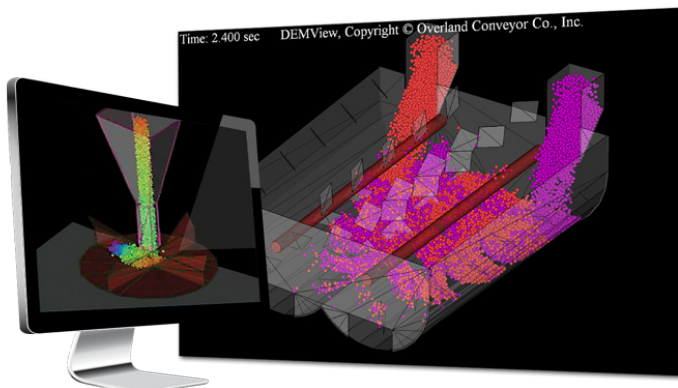

Figure 2 Virtual Prototyping of particle systems

Benefits of Bulk Flow Analyst include:

- ▶ Identify common chute flow issues:
  - ▶ plugging
  - ▶ off-center belt loading
- ▶ material loss
- ▶ Identify regions of severe wear
- ▶ Characterise wider range of materials, including stickiness
- ▶ Analyse performance of systems with moving components such as screw conveyors, gates, or bucket elevators
- ▶ Analyse performance of systems with unique performance requirements such as mixers

OVERLAND CONVEYOR COMPANY, INC | **Applied DEM**

Applied DEM Inc. is a subsidiary of Overland Conveyor Company, an engineering consultancy and software development company headquartered in Lakewood, Colorado, USA. Applied DEM develops and markets Bulk Flow Analyst™ to engineering companies designing and analysing bulk material handling systems worldwide. Bulk Flow Analyst™ is one of the first simulation tools to provide the Discrete Element Method for use outside of academia.

For more information contact Compumod by emailing **info@compumod.com.au** or **call 1300 965 69**

SIMULATION WITH APPLIED DEM

COMPUMOD ENGINEERING SERVICES

Did you know that along with software, Compumod offer a complete range of Engineering services?

This could range from performing analysis for you on a project basis, through to providing full time staff member to help you.

Simulation Projects

If you only need to do analysis infrequently, the Compumod Engineering Services team offers Simulation Projects and consulting to tackle your toughest problems. Our services team will work with you to understand your goals and your design problem first. Once we know what you are trying to accomplish, we will gather from you the necessary data such as CAD models, physical test data and materials data, and then run your simulation for you. We can also use the simulations as a base for transferring knowledge to your staff.
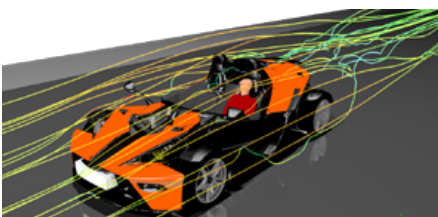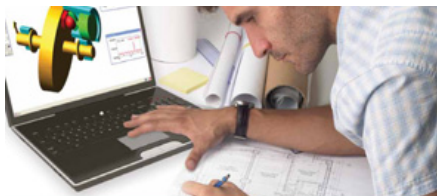
Meshing and Model Building

If you have meshing or model building that you would like to outsource, we have very affordable resources based both locally and offshore. Compumod will manage the project and make sure the quality of the mesh/model meets your analysis requirements. This is a great way to ensure that your investment in local expertise remains focused on problem solving and analysis rather than model building.

Mentoring; on-site or over the web

The Compumod Engineering Services team provides mentoring services to our customers using our software products or 3rd party products. The mentoring can be on-site, where one of our specialists comes to your office for a period of time to provide support, or over the web with one of our expert consultants.

Staff Augmentation

The Compumod Engineering Services team can become an extension of your team and provide on-site or off-site resources to augment your current staff.

Customisation & Process Automation

Compumod's products are highly customisable and extendable. Customisation allows customers to create specialised applications for proprietary processes within the software tools. This can include custom user interfaces, automated reports, standardised modelling and simulation techniques, and specialised algorithms. Compumod can then help you deploy and manage these customisations across your entire enterprise.

Training

To further meet your specific requirements, we offer the following options for live instruction.

▶ **Public Classroom Training** – Choose from our wide selection of courses offered at different sites throughout the country;

▶ **Training at Your Facility** – If you have a number of employees who need training, we offer the cost effective option of bringing our class to your facility. This eliminates employee travel costs, minimizes time away from work, and can be arranged at your convenience.

▶ **Custom Courses** – If our standard seminar offerings do not meet your training requirements, Compumod can develop a course or set of courses tailored to your specific needs. A custom course might include a combination of topics from several standard courses or specialised material not found in any of our standard seminars. Compumod will work with your staff to design the course you need.

We look forward to partnering with you to help you achieve your goals.

COMPUMOD ENGINEERING SERVICES

If you have any questions or are interested in using some of our services please contact Peter Brand on 1300 965 690 or email peter@compumod.com.au or find him on skype: peter.brand9

ACTRAN

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.

Figure 1 Examples of acoustic simulation

Some examples for Actran applications include:

▶ Sound radiation by vibrating structures: powertrain, engine components, compressors, electrical motors, loudspeakers etc;

▶ Intake and exhaust noise, including complex mufflers and silencers;

▶ Air conditioning units and distribution systems;

▶ Sound absorption inside passenger compartment of cars, trains and aircraft;

▶ Sound propagation in complex media with mean flow or temperature gradient;

▶ Audio devices such as telephones, hearing aids or musical instruments.

Actran consists of the following modules:

▶ **Actran Acoustics:** Standard package;

▶ **Actran VibroAcoustics:** Extended tool for fluid-structure coupling;

▶ **Actran for Nastran**: Advanced VibroAcoustics tool combining Actran and Nastran;

▶ **Actran AeroAcoustics**: Complex flow noise simulation tool (see Figure 3);

▶ **Actran DGM**: Jet engine exhaust noise modelling;

▶ **Actran TM**: Turbomachinery noise prediction;

▶ **Actran VI**: Pre-and-post processor for Actran.

Actran is characterized by:

A large material library

▶ acoustic fluid;

▶ thin acoustic layer and narrow tubes (or channels) including viscothermal effects;

▶ visco-elastic solids, solid shells, thin shells and beams;

▶ incompressible solids;

▶ composite materials;

▶ lumped mass and springs (discrete structural elements);

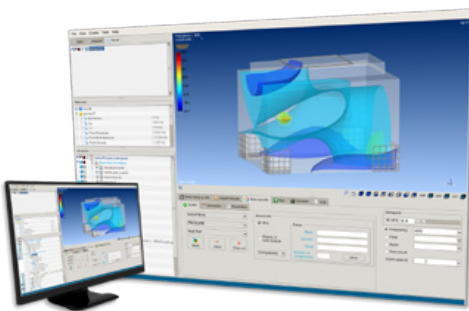▶ rigid porous, lumped porous and poro-elastic materials (Biot theory);
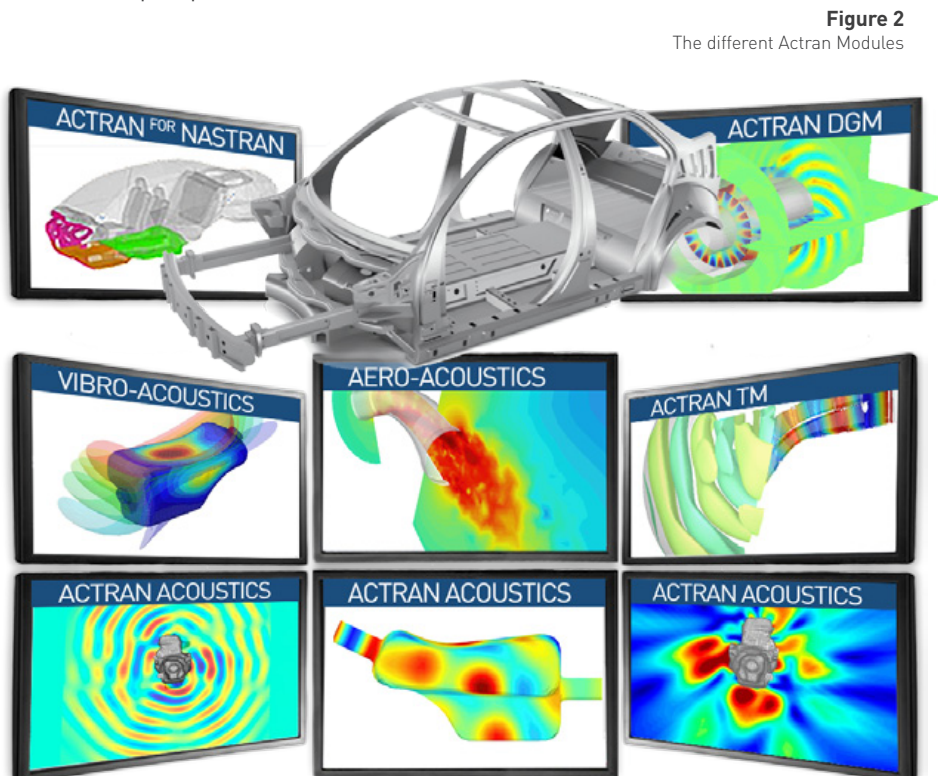
Figure 2
The different Actran Modules

◾ ACTRAN

A complete element library:

- ▶ linear and quadratic;
- ▶ 2D, 3D and axisymmetric;
- ▶ standard volume elements and special transverse elements for the accurate modelling of special configurations: shells, stiffeners, thin acoustic layers, etc
- ▶ conjugated infinite elements for acoustic radiation (see Figure 4);

A rich set of boundary conditions, operating conditions and sources:

- ▶ acoustic sources;
- ▶ incident and free duct modes for rotating machines;
- ▶ pressure, velocity, acceleration and admittance boundary conditions;
- ▶ kinematical excitations : imposed displacements and rotations;
- ▶ mechanical excitations : point load, distributed load, distributed pressure, momentums;
- ▶ in-build models of real-life excitations : incident diffuse sound field or turbulent boundary layer (Corcos model);
- ▶ interface with the leading structural FEA software packages (Nastran, Ansys and Abaqus) for the import of dynamical results;
- ▶ interface with the leading CFD software packages (among others: Fluent, star-CD and CFX) for the import of the heterogeneities of the acoustic medium and the computation of the aero-acoustic sources;
- ▶ volume-based and surface-based aerodynamic source terms (Lighthill's and Möhring's analogies) for analysing broad-band noise generation by turbulent flows;

Figure 3
Flow Noise in HVAC duct system. An example of AeroAcoustics where Actran was coupled to a CFD code. The sound was generated by the turbulent flow

Several unique features (non exhaustive list):

- ▶ sound propagation and absorption in a non-uniformly moving fluid;
- ▶ sound propagation in non-isothermal conditions;
- ▶ sound propagation taking into account visco-thermal losses occurring in thin air layers or tubes;
- ▶ random acoustics in both modal and physical coordinates;

Multiple calculation procedures:

- ▶ direct frequency response analysis;
- ▶ modal frequency response analysis using existing Actran, Ansys or Nastran normal modes;
- ▶ compressible flow analysis;
- ▶ modal extraction;

Various solution strategies:

- ▶ restart capability;
- ▶ multiple load capability;
- ▶ strong or weak vibro-acoustic coupling;
- ▶ multi-level sequence tree to avoid unnecessary re-computations;
- ▶ hybrid Modal/Physical approaches;
- ▶ in-core and out-of-core solvers supporting sequential and parallel (SMP and DMP) computer architectures;
- ▶ fast frequency response synthesis using the KRYLOV solver.
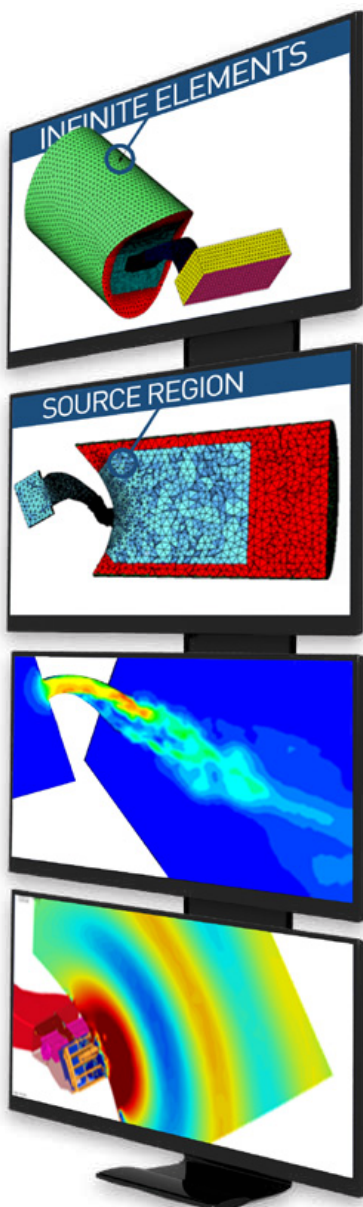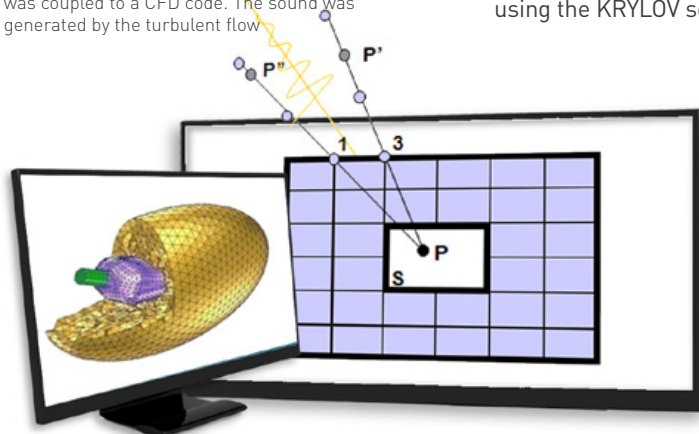
ACTRAN

Figure 4
Actran infinite elements

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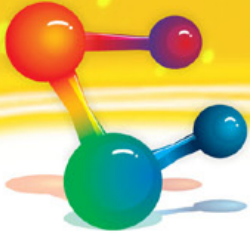
TIPS AND TRICKS!
MODEL BROSWER TREE IN PATRAN

The Model Browser Tree (MBT) is now available in Patran2012 and allows the user to quickly see what is in the current database in a user-friendly tree structure. Not only can the database contents be viewed from the tree structure, but by right clicking on the elements of the tree the user can create, copy, paste, modify, or delete those database entities and more easily navigate through different forms.

Easily visualising, accessing, and manipulating database entities through the model tree reduces learning times, increases productivity and makes Patran even more intuitive to use. The Model Browser Tree is available on Windows and Linux platforms.

To view the Model Browser Tree, select the Show/Hide Model Browser button after creating or opening a Patran database. The Model Browser Tree appears directly on the graphics screen on Windows machines and in a left justified form on Linux machines. The following 2 images show how to activate Model Browser Tree on the windows platform.

Highlights

The **Model Browser Tree** supports the functionalities below:

▶ **Visibility** – Entire tree can be made visible or hidden through an option to show/ hide tree from graphics preferences and from toolbar/ribbon button.

Turns Tree ON/OFF

Access Configuration Settings

▶ **Configuration** – The entire container is transparent by default but can also be docked next to the graphics screen or moved anywhere on the graphics screen using the middle mouse button. Its size can also be changed by using "Show Border" option in the configuration settings and then manipulating the border.

▶ **Tree items** – Each item in the tree is displayed with text and an icon and connecting lines to its children. Items highlight when cursor runs over them.
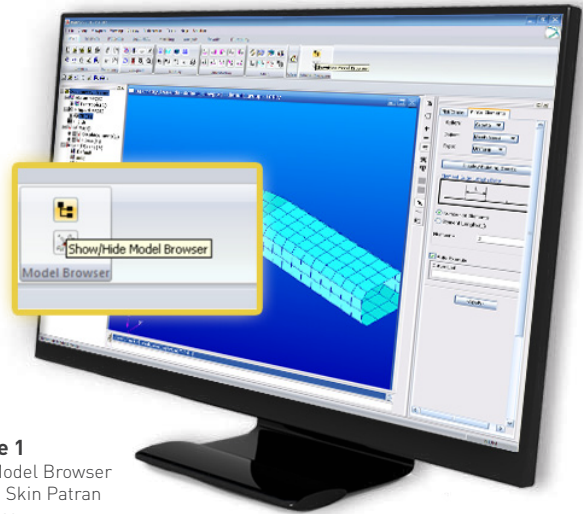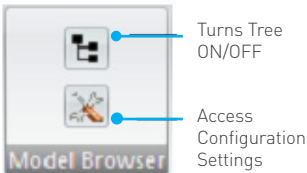
▶ **Toggle Buttons** – Database entities which support post/ unpost capabilities can be toggled ON/OFF.

▶ **Selection** – Tree items are selected and highlighted by mouse left click and combination of "shift" and "ctrl" keys in case of multiple selections.

▶ **Scroll** – Vertical and horizontal scrollbars will display automatically when items goes beyond the size of tree view window.

▶ **Drag/Drop** – Drag and drop is supported for certain tree items when creating associativities.

▶ **Popup Menu** – Context sensitive popup menu is displayed by mouse right-clicking on selected tree item.

▶ **Collapse/Expand tree nodes** – Image (+ and -) is displayed for the tree parent items (items which has child) to expand/ collapse child items

Figure 1
View Model Browser Tree in Skin Patran Interface

▶ **Search/Sort/Filter** - From the popup menu, it is possible to search for, sort and filter tree entities.

▶ **Create/Modify/Show/ Delete** - From the popup menu, general capabilities are accessible to create and manipulate the selected database entities from the tree items. The appropriate action is either executed or the necessary forms are automatically displayed for data input. The capabilities are available for materials, properties, loads and boundary conditions, load cases, fields, groups, simulations (analysis jobs), and result plots.

▶ **Customisation** - All right mouse button (RMB) popup menus are configurable through xml files located in the P3_HOME/rmb_menu directory delivered with Patran for those wishing to change or add functionality. All MBT xml file names begin with a mbt prefix.

TIPS AND TRICKS!

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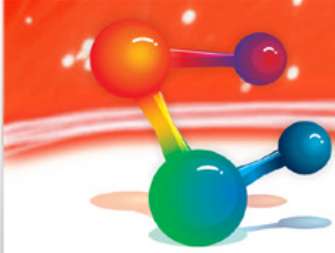
TIPS AND TRICKS!
ADAMS/VIEWFLEX FLEXIBLE BODY GENERATOR

Adams/ViewFlex is a new module which enables users to create flexible bodies without leaving the Adams environment and without requiring any external finite element modelling (FEM) or analysis (FEA) software. The flexible bodies created by Adams/ViewFlex are the same format as traditional flexible bodies in Adams via Adams/Flex; that is, they are based on a modal neutral file (MNF). A key beneficial feature of the ViewFlex process is that the finite element meshing and solving required to produce an MNF are performed directly from the Adams pre-processor – Adams/View or Adams/Car. The necessary FEA is powered by embedded MSC Nastran technology and run wholly in the background of the Adams session. You need only have a basic understanding of finite element theory to generate flexible bodies efficiently via Adams/ViewFlex.

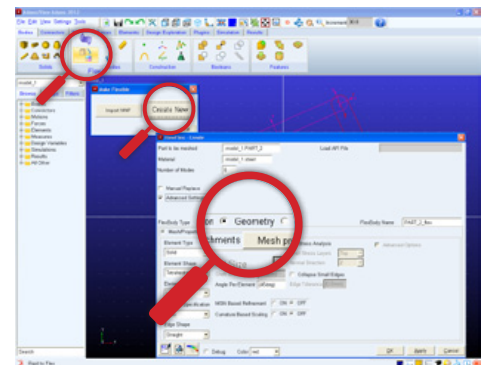How to access to this feature in Adams2012 is shown in the image on the right.

Figure 1 Accessing the View Flex feature with the 3 methods supported - Extrusion, Geometry & Import Mesh

Three methods of flexible body construction are supported:

▶ **Geometry**: In this method the user specifies pre-existing geometry in the Adams model as the basis for the mesh and eventually the flexible body. The geometry selected for use here should be well formed.

▶ **Extrusion**: No preexisting geometry is required. The user is allowed to specify a 2D cross sectional geometry and a straight line or curve along which it is to be extruded. No intermediate geometry is created but, rather, a mesh and MNF are created directly.

▶ **Mesh Import**: This option allows the user to specify the mesh directly from an external .bdf or .dat formatted file. ViewFlex will generate the MNF.

Flexible bodies created by Adams/ViewFlex are based on the same MNF-based flexible body formulation used by Adams/Flex. This is an assumed modes method of modelling flexible bodies. This method of representing flexible bodies is called modal flexibility. Modal flexibility assigns a set of mode shapes, frequency eigenvectors, to a flexible body. The flexible-body modelling element designates a system state variable to each eigenvector and calculates the relative amplitude of each eigenvector during a time analysis. The principle of linear superposition is then used to combine the mode shapes at each time step to reproduce the total deformation of the flexible body.

This modal method of modelling flexibility can be very useful in problems that are characterised by high elasticity and moderate deflections (deflections less than 10% of a characteristic length of the body). Modal flexibility also provides a means of directly correlating Adams flexibility results with FEA results.

An example presented in this newsletter shows how Adams/ViewFlex creates an MNF-based flexible body directly from the Adams/View environment. A landing gear has been modeled. It uses various joints to connect the parts comprising the retract mechanism. The rigid part named upper_link (shown here in yellow) is the one which will be replaced with a flexible body created from within the Adams/View environment via Adams/ViewFlex.

■ TIPS AND TRICKS!

1 - Creating Flexible Body
2 - Selecting Method
3 - Set the Variables
4 - Pick the part 'upper_link'
6 - Define Attachment Points
7 - Inspect Mode Shapes