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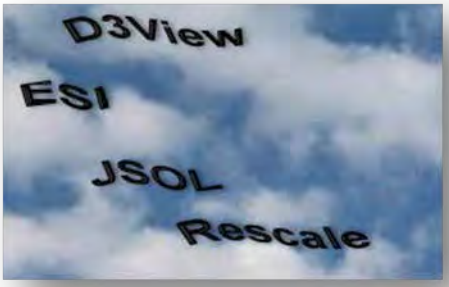
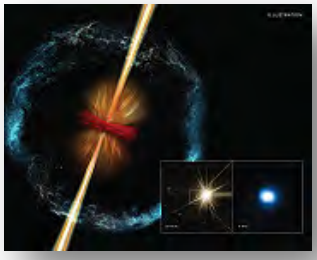
Cloud



ETA

Chandra



D3View APP

GM & NSAS

FEA Information Inc.

A publishing company founded April 2000 – published monthly since October 2000.

The publication's focus is engineering technical solutions/information.

FEA Information Inc. publishes:

FEA Information Engineering Solutions

FEA Information Engineering Journal

FEA Information China Engineering Solutions

Livermore Software Technology, Corp. (LSTC) Developer of LS-DYNA One Code Methodology.

LS-DYNA provides fully integrated, strongly coupled, solvers for extensive multiphysics capabilities. Integrated, at no additional cost. Optimized for shared and distributed memory for Unix, Linux, & Windows Based platforms.

FEA Information Engineering Solutions – Dedicated To:

Finite Element Analysis * Hardware * Software * Cloud * Consulting * CAD * CAE
Distribution* * Implicit * Explicit *Applications * Press Releases * Events * Training

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FEA Information News Sections

Announcements

FEA Information new participant China and US Editions of the FEA New:

Beijing AutoCAE Technology Co., Ltd.
1324 3rd BLDG,1st Place,Shangdi 10th Street,
Haidian District,Beijing,China 100085

France - We welcome new participant DYNAmore France

DYNAmore France SAS - +33 (0)170290818
sales@dynamore.eu

ALE/Eulerian, Fluid/Structure Interaction in LS-DYNA

Aug 15-17 Mon-Wed

ALE/Eulerian, Fluid/Structure Interaction in LS-DYNA CA

Aug 18-19 Thur-Fri

SPH: Smoothed Particle Hydrodynamics in LS-DYNA CA

Our Miniature Horses – 36" tall

Quincy and Dusty

Usually can be found doing what they shouldn't be doing.

They are the twins of mischief!

Sincerely,
Marsha Victory Trent Eggleston
Marnie Azadian Suri Bala Dilip Bhalsod Yanhua Zhao

ETA – DYNAFORM 5.9.3 Offers Automatic Springback Compensation

www.eta.com/company/eta-news/2-uncategorised/160-dynaform-5-9-3-offers-automatic-springback-compensation

Engineering Technology Associates, Inc. (ETA) released DYNAFORM Version 5.9.3.

Offers Automatic Springback Compensation

Sheet Forming Software Features Auto SCP, Process Templates & a New License Control

DYNAFORM is a simulation software solution specifically developed to simulate the sheet forming process and analyze the entire die system. This type of simulation and analysis allows organizations to bypass soft tooling, reduce tryout time, lower costs, increase productivity and improve cycle times. OfferVersion 5.9.3 promises an even more streamlined and robust experience with major improvements in blank/trim line development, the addition of Auto SCP and process templates, as well as a new license control.

DYNAFORM 5.9.3 offers major improvements in blank/trim line development including combining the interface for blank development and trim line development. Improving efficiency, in this new version it is now possible to develop the blank outline and trim line simultaneously. In addition, the user can now develop partial blank outlines and partial trim lines and develop a blank outline with a cut pattern. The new Auto SCP feature is used for automatic springback compensation iterations. When running the springback function in DYNAFORM, the user first defines the stamping stages. This is easily achieved using the step-by-step guided user interface. The user then defines the tool to be compensated, compensation zone, compensation method, scale factor and iterations for a customized and accurate result. The job is submitted and, when completed, the program automatically checks the springback amount and calls the solver to make a compensation adjustment for the tooling mesh. The compensated tool then replaces the original tool and multi-stage jobs are rerun until the ideal solution is found.

Another helpful feature in DYNAFORM 5.9.3 is the availability of process templates, which allow the user to define forming processes for typical cases. The templates allow for a more efficient and streamlined user experience by automatically creating the stages within the template for analysis. For example, a user can use a process template for a Fender/Hood inner or outer, a roof door inner or outer, a lift gate inner or outer, etc. The user can import and export to and from the saved template library.

Another exciting feature in DYNAFORM 5.9.3 is a new license control with license roaming. This allows the user to borrow a license from the server to use the software outside the network temporarily. The new license control also supports a redundant license server within the network, which minimizes license server down time.

Many features were improved and many functions added in this release. For a complete list of enhancements made in Version 5.9.3, please view the Release Notes online.

About Engineering Technology Associates, Inc. (ETA)

Advanced product development engineers working as structural analysts for the world's largest automotive manufacturers founded Engineering Technology Associates, Inc. (ETA) in 1983. ETA's expertise in the areas of vehicle durability, NVH, metal forming, crashworthiness, occupant safety and product design have provided an intimate knowledge of the challenges and needs of the product development engineer. Proactive in the creation and implementation of new analysis methods and software, ETA is the developer of DYNAFORM, PreSys and VPG. ETA is a subsidiary of Cranes Software International Limited (CSIL).

For further information about ETA and its products, please visit http://www.eta.com, email etainfo@eta.com or call (248) 729-3010.

Cloud based DOE and Optimization using LS-OPT® and d3VIEW®

Machine generated designs are on the rise and we believe this will continue to increase. At d3VIEW®, we developed an API based job submission script that is specific to LS-OPT® to allow it to seamlessly submit and track simulations while also performing cloud based extractions. The new job submission script is based on powerful d3VIEW web services to allow users to run LS-OPT® on any desktop and schedule jobs to HPC that is either on-premise and cloud that is transparent to the user.

Applications that would benefit would be un-supervised material characterization using parameter identifications, design-of-experiments, single or multiple disciplinary optimization. Manually generated designs in the form of simple CSV file as documented in LS-OPT® manual can also be used.

With access to large number of hardware capacity in the cloud, LS-OPT is an ideal tool to continuously reduce the time-to-market of new products. Please email marsha@lstc.com for more information.

The entire paper will be published on www.dynalook.com

Virtual ROPS and FOPS Testing on Agricultural Tractors According to OECD Standard Code 4 and 10

D. Hailoua Blanco*, C. Martin*, A. Ortalda* - *EnginSoft S.p.A

Abstract

The Roll Over Protection Structure (ROPS) and Falling Object Protective Structure (FOPS) are key safety features in agricultural and forestry tractors in order to avoid or limit risks to the driver in case of roll over or falling objects during normal use.

The Organization for Economic Co-operation and Development (OECD) in an effort to improve operator's safety in Agricultural and Forestry Tractors has set up harmonized testing procedures for ROPS and FOPS systems. The current OECD Codes for tractors relate to several features of performance. In particular, Code 4 and 10 are related to the strength of protective structure in case of roll over and falling objects, respectively [1-2].

On the one hand, Code 4 foresees a sequence of loadings that the protection system has to withstand until the prescribed energy or force is satisfied. The magnitude of the required energy and forces depend upon the reference mass of the tractor. In addition to successfully resist the loading sequence, the ROPS has to guarantee a clearance zone during any part of the tests around the seat index point (SIP), where the operator is placed. By fulfilling all these conditions, the structure is classed as a roll-over protective structure in accordance with the OECD Code 4.

On the other hand, Code 10 implies a series of object drop tests from a height to develop a specific energy. Likewise, the clearance zone shall not be entered by any part of the protective assembly or the impacting object itself to pass the test.

In light of the complex testing scenarios, numerical simulations with LS-DYNA® were carried out to virtually assess the performance of a ROPS and FOPS system designed by the Italian tractor manufacturer. As a matter of fact, ROPS and FOPS simulations turned out to be very useful to understand the behavior of the protection system subjected to complex loading and get valuable insights into performance. The main goal of the simulations was to virtually test the tractor according to the Code 4 and 10 prior to official test approval and, if necessary, introduce the necessary structural changes in order to successfully pass the ROPS and FOPS tests.

Keywords: ROPS, FOPS, Tractors

Introduction

The main goal of the Roll Over Protection Structure (ROPS) and Falling Object Protective Structure (FOPS) is to provide protection to the operator in case of roll-over accident and falling objects, respectively. Such passive safety features are commonly found in nowadays agricultural and forestry tractors and are conceived to protect the operator from a serious injury or even death in case of an unexpected accident. Agricultural accidents may be caused by improper maneuvers, hill falls, road accidents and in such cases the protective systems must be able to absorb the impact energy without endangering the driver.

In an effort to improve the operator's safety in agricultural and forestry tractors, the Organization for Economic Co-operation and Development (OECD) has established worldwide some standards to harmonize the protective equipment testing and therefore facilitate international trading. Since its foundation in 1961, many countries have joined and agreed on a wide range of standards other than agricultural.

In the current work, the OECD Code 4 and 10 have been numerical studied which are related to tractor ROPS and FOPS performance, respectively. The Code 4 sets up requirements in terms of energy or force for the longitudinal, lateral and vertical directions of the cabin structure, while the Code 10 implies a series of drop tests to test the upper head protective assembly against falling objects. Besides structural resistance, both codes define a clearance zone where the driver should be seated, which has not to be entered by any part of the structure or impacting object at any time.

LS-DYNA® has been demonstrated to be suitable tool to investigate the ROPS and FOPS performance in the early stage of the design phase due to several reasons:

- Robust contact algorithms.
- MPP scalability (Massively Parallel Processing).
- Available material models.
- Full-restart feature.

As stated above, the ROPS testing foresees a sequence of longitudinal, lateral and vertical loads on the cabin. By using the LS-DYNA® full-restart feature [3], the full history of the ROPS structure could be taken into account up to the restart point without having to re-run the complete sequence. By doing so, the new pushers could be added and positioned in the model to keep on with the virtual testing. This feature extremely saved CPU time and speeded up the engineering process.

Numerical simulations with LS-DYNA® virtually assessed the performance of the ROPS and FOPS structures designed by Argo Tractors S.p.A according to OECDE Code 4 and 10. Therefore, the confidence in successful ROPS and FOPS approval was raised and confirmed by experimental testing.

The current paper will show the main aspects regarding the ROPS and FOPS modeling with LS-DYNA. The correlation between experimental and numerical results will be shown for the ROPS study as there was not available experimental data for the FOPS test while writing the current paper. In the meantime, the tractor has been approved for both ROPS and FOPS and it is currently available in the market under the Landini brand.

Brief tractor description

The protective structure (ROPS) is mainly made of a reinforced tubular welded steel frame which is joined to the tractor chassis by means of the platform (See Fig.1). The platform is the lower part of the protective structure which is fixed to the tractor by four supports. Silent blocks are mounted on the front and rear supports in order to provide cushion and therefore comfort to the driver.
The protective structure (FOPS) is an assembly mainly made of plastic materials which is designed to provide overhead protection to the driver.

Fig. 1 CAD model of the tractor protective ROPS

Fig. 2 CAD model of the tractor showing the protective structure FOPS

The entire paper will be published on www.dynalook.com

Durability Study for Tractor Seat Using LS-DYNA®

Jithesh Erancheri, Ramesh Venkatesan - Kaizenat Technologies Pvt Ltd

Abstract

Today in many tractors with enclosed cabs, an extra seat named as 'instructor seat' are available. As a regular driver seat, this seat should also undergo the same testing and product validation process. This seat is incorporated to serve various purposes like enhances the training of tractor operators, facilitates communications between workers, improves the demonstration of for-sale tractors, transports workers to worksites, assists operations requiring extra help etc.

LSTC's LSDYNA introduced a powerful vibro-acoustic solver which can address almost all major problems in the frequency domain. In this paper, we used the explicit capability of LS-DYNA to model the drop of tractor Instructor seat (henceforth called a I-Seat) and then the frequency domain capability to estimate the damage of parts that undergoing steady state loading .

We have used LS-DYNA's new fatigue solver capability for SSD loading to predict the damage.

Major Keywords used:
*FREQUENCY_DOMAIN_SSD_FATIGUE,
*DATABASE_FREQUENCY_BINARY_D3SSD,
*DATABASE_FREQUENCY_BINARY_D3FTG

Introduction

LS-DYNA is one of the most widely used finite element tool to solve complex multi-physics problems. The newly introduced vibro-acoustic solver has been gaining a lot of momentum and we have decided to use this feature for performing the durability analysis of the I-seat. This seat should pass through test specification where a manikin load of 75Kg is loaded and strapped over the seat. The seat is then sopped from a height of 100mm and this loading is periodically applied for 3000 secs. The accelerometers a located at two points (point A and point B) in the bottom plate of seat assembly.

July LS-DYNA YouTube Showcase – Hailong Teng

Hailong Teng LS-DYNA on YouTube

Scientist/software developer at LSTC responsible for the development of Discrete Element Method (DEM), Particle Blast Method (PBM), and High order Element.

The Particle Blast Method (PBM) was employed to model the behavior of the detonation the bonded DEM was used to model the mortar cylinder , for more information, please refer to http://www.fragblast11.org/Media/Fragblast11/presentations/SESSION_10A_1150.pdf

Additional videos will be posted soon.

Papers by Hailong can be located on DYNALOOK www.dynalook.com

Monitor LS-DYNA® Simulations on Mobile Devices using d3VIEW®

We are excited to announce the immediate availability of d3VIEW® Mobile Application, version 1.0, on Android and Apple devices. The d3VIEW® mobile app is built on solid Rest-API based web-services that has been developed over several years. The initial version helps users to track and monitor LS-DYNA® simulations running on on-premise or cloud servers. In addition to viewing key simulation job parameters, the mobile application allows users to view and track LS-DYNA® simulation data such as Energy Balance. We hope that having this ability will help users to track anomalies in simulation and terminate early to facilitate saving of compute resources and having the ability to run newer simulation quickly.

Key Features

- Secure Login from any mobile device
- Track Key Job Parameters
- View LS-DYNA® Energy Balance or Implicit Data

Benefits

- Track simulations on the go
- Identify anomalies and terminate early
- Iterate quickly and save compute resources

LOGIN

ALL SIMULATIONS

SIMULATION VIEW

July CAE Associates - The Internet of My Refrigerator

Nick Veikos https://caeai.com/blog/internet-my-refrigerator

It's summertime and there is a crisis at our house. The state of the ice cream in the freezer alternates between mushy and frozen. My wife sees this as an opportunity to get a new refrigerator, but, as an engineer, I need to understand why this is happening and see if I can fix it-inexpensively.

First, I need to get a handle on what the temperature in the freezer looks like over a period of 24 hours – opening the door and checking every half hour is a) not practical and b) will affect the very thing I'm trying to measure. I need to go wireless. A quick internet search comes up with a wireless sensor that will download the temperature and humidity history to my cell phone for less than 30 bucks! Much less than the price of a service call. Without realizing it, I have just made my first conscious foray into "the Internet of Things", or "IoT" to the cognoscenti.

Since my professional world pretty much revolves around engineering, this experience got me thinking about how IoT is going to change how industry and academia consider the traditional engineering disciplines. Typically, we think about engineering in a siloed manner – there are electrical engineers, mechanical engineers, chemical engineers, civil engineers, etc. Each discipline pretty much stays within their own physics, dabbling in the other disciplines when required, but not really playing an active role. The trend towards a holistic, system-level, multi-physics approach to design is slowly changing this thinking, and I believe IoT is going to help blur the boundaries even more.

From a competitive perspective, those that measure and can effectively use those measurements as a predictive tool will have the advantage. An organization that can reliably predict via actual data when a component must be replaced is going to be in a much better position than one that simply provides a standard service interval. Companies traditionally working in the traditional "nut and bolts" world will need to transition to including software and electronics in their products, or risk being left behind.

July CAE Associates - The Internet of My Refrigerator

Nick Veikos https://caeai.com/blog/internet-my-refrigerator

Engineers of all disciplines are going to have to learn a lot more about sensors and wireless transmitters. Which ones to use, what to measure, where to place them, how to create designs which can use them effectively, how to keep them working properly under different environmental conditions, how to make sure they don't interfere with one another or other wireless devices, complying with FCC emissions regulations, and the list goes on!

In addition, engineers must be familiar with how to make sense of all of the data that is collected. This ranges from handling the data, statistically analyzing the data, and being able to relate the data to physical processes in order to draw accurate predictive conclusions.

Over the past several years, engineering schools have been trending to a more multi-physics approach towards educating engineers in response to industry requirements.

Hopefully, they are also making the required changes to prepare young engineers to meet the challenges and opportunities of IoT.

What do you think about the Internet of Things? What is the IoT strategy at your organization? It would be great to hear from others on this topic.

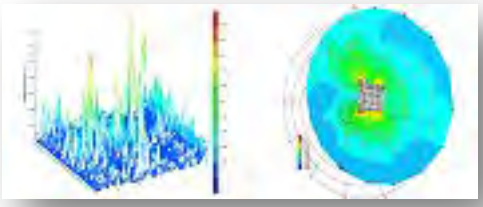
For those who want to learn more about IoT, here's some helpful information to help get you started.

I'll let you know how the freezer problem turns out – hopefully I can just replace the start relay. Otherwise, I may end up with one of those refrigerators that senses what I need to shop for at the grocery store!

July - BETA CAE Systems - release of the v17.0.0 of its software suite

www.beta-cae.com/news/20160718_announcement_suite_v17.0.0.htm

July, 2016 - About this release



BETA CAE Systems announces the release of the new ANSA / Eπilysis / μETA v17.0.0 suite. Loyal to our commitment to deliver best-in-class software, we achieve our goal by providing complete solutions in the CAE field, as an on-going effort to significantly facilitate and accelerate the CAE modeling process.

Enhancements in ANSA

Data Management: New data types in the Model Browser have been added. With the new entities, Simulation Model, Load-case, and Simulation Run, the set-up of solver runs (main files) is further facilitated.

Connections and assembly: Several new FE representations for spot-welds and seamlines, as well as for bolt models, such as the SOLID-WELD, SPR-RIVET, and PRESTRESSED ABAQUS BOLT, significantly accelerate the model build up phase and reduce the human error factor to the minimum.

Solutions for Durability Analysis: A new Plugin item, named Test Impactor Positioner, has been added to simulate the positioning of a test device onto defined target points. This offers significant Output options related to target points, a defined SET item or even transformation cards (NMAP etc).

Laminates: A brand new algorithm, Laminate Convert, converts shell single elements to multiple shell/solid/tshell elements with various connection types. This tool comes as an addition to the already existing one, Volumize Composites, to offer a complete and automated solution to the laminates conversion process.

Morphing: Morphing capabilities are expanded with the addition of new tool called Parametric Design Change tool. With two main options, the Cross Section and the Position, constraints and flanges are automatically detected and modified accordingly, while smooth transition zones accelerate the mesh refinement process even more.

Kinetics: Significant boost in Flex Body Simulation, as deformable bodies are now included in simulations. Through wizards, the user can create new or convert existing bodies to flex.

Furthermore, the Flex Tools Interface allows the display, transformation, comparison or conversion of existing flex bodies or modal reduced bodies.

July - BETA CAE Systems - release of the v17.0.0 of its software suite

www.beta-cae.com/news/20160718_announcement_suite_v17.0.0.htm

Enhancements in Eπilysis

This version features a radical improvement in the stability and quality of Contact Capability, solved in SOL 400, NL-Static, as a small displacement formulation. There is a speed gain whenever Grid-Point Forces, Displacements and Element Strain Energy Data recovery is requested, throughout the available solutions.

For more details about the new software features, enhancements and corrections please, refer to the Release Notes document.

Enhancements in μETA

Assembly-Loadcase Points (A/LC Points)

A new tool handles and visualizes important nodes for assemblies and loadcasing. The tool also supports the automatic creation and listing of Groups of nodes based on their names read from ANSA comments or from NASTRAN Field 10.

Display Mesh

A new tool has been introduced for the creation or modification of 1D-element display models. The reduced model can be exported as a PLOTEL model in NASTRAN or UNV82 format.

NVH Calculators & tools

The Modal Response and the FRF Assembly tools now support AVL Excite results in NASTRAN format and reading rpm information, order and excitation data when plotting curves.

The Modal Response and the Modal/FRF Correlations tools can now exclude residual modes from calculations, while the FRF Assembly tool can now perform load or sub-load participation analyses.

A new user-toolbar, named Directivity Plot, has been introduced to create directivity and intensity plots.

Managing Curve Data

3D (three-axis) Plot types are now available. The new plot types are Waterfall, Colormap and MAC 3D. Additionally, for 2D Plots a new plot type named Nyquist is available for plotting Real value X-axis vs Imaginary value Y-axis.

Project Files

μETA Projects now support saving the per-solver type module structure, e.g. PamCrash MODULE, Abaqus INSTANCE, RADIOSS ID POOL, etc.

Optimization

Three new User Toolbars are now available:

The Panel Thickness optimization, for processing NASTRAN SOL200 property thickness changes from .pch files. The Check Termination, for checking the termination status from Nastran SOL200 .f06 files. And SOL200 Plot, for creating design response, design variable, sensitivity, saturation index, design objective and max. design constraint curves from Nastran SOL200 optimization results from the .f06 or .csv file produced by the PARAM XYUNIT parameter.

For more details about the new software features, enhancements and corrections please, refer to the Release Notes document.

July - BETA CAE Systems - release of the v17.0.0 of its software suite

www.beta-cae.com/news/20160718_announcement_suite_v17.0.0.htm

Compatibility and Supported Platforms

- ANSA files saved by all the first and second point releases of a major version are compatible to each other. New major versions can read files saved by previous ones but not vice versa.
- To read μETA Project files by versions earlier than v17.0.0, they have to be saved selecting the option "Version <17.0.0".
- Support for 32-bit platform has been discontinued for all operating systems.

New & updated documents

New tutorial: ANSA / μETA for OptiStruct
New Eπilysis Reference Guide

Download

Customers who are served directly by BETA CAE Systems, or its subsidiaries, may download the new software, examples and documentation from their account on our server. They can access their account through the "user login" link at our web site.

Contact us if you miss your account details. The [PublicDir] link will give you access to the public downloads area.

Customers who are served by a local business agent should contact the local support channel channel for software distribution details.

What to download

All files required for the installation of this version reside in the folder named "BETA_CAE_Systems_v17.0.0" and are dated as of July 18, 2016. These files should replace any pre-releases or other files downloaded prior to that date.

The distribution of this version of our pre- and post-processing suite is packaged in one, single, unified installation file, that invokes the respective installer and guides the procedure for the installation of the required components.

For the installation of the software on each platform type, the.sh installer file residing in the folder with respective platform name, for Linux and MacOS or the respective .msi installer file for Windows, 64bit, have to be downloaded.

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July - BETA CAE Systems - release of the v17.0.0 of its software suite

www.beta-cae.com/news/20160718_announcement_suite_v17.0.0.htm

In addition to the above, optionally, the μETA Viewer is available to be downloaded for each supported platform.

The tutorials and the example files reside in the folder named "TUTORIALS". This folder includes the complete package of the tutorials and example files, and a package with only the updated ones.

The Abaqus libraries required for the post-processing of Abaqus .odb files are included in the installation package and can be optionally unpacked.

Earlier software releases are also available in the sub-directory called "old" or in a folder named after the product and version number.

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Rescale - Zack Smocha, VP of Marketing

Cloud HPC Leader Rescale Closes $14 Million Funding Round to Fuel Global Expansion

Investment led by TransLink Capital confirms enterprise adoption of Rescale's cloud HPC platform and global expansion.

San Francisco, CA, June 16, 2016 — Rescale, the leader in cloud HPC, secures $14 million in Series A funding led by TransLink Capital with participation from Microsoft Ventures, Jump Capital, ITOCHU Technology Ventures, Two Roads Group, and Data Collective. Rescale's expansion plans will help meet the escalating worldwide customer demand for enterprise-class HPC platforms to help large enterprises transition from expensive legacy on-premise systems to scalable, agile, and high performing cloud computing infrastructure. The Series A funding adds to existing seed investments from Sam Altman, Jeff Bezos, Richard Branson, Data Collective, Paul Graham, and Peter Thiel among others – with a total of over $20 million raised to date. TransLink Capital co-founder and Managing Director, Toshi Otani, will join the board of directors.

"High performance computing is a $20 billion market dominated by legacy on-premise IT players with minimal cloud penetration today. Rescale's platform solution addresses the key security and performance challenges that have historically held back enterprises from pushing their HPC data centers into the cloud. As the industry-leading platform solution for enterprise HPC, Rescale has demonstrated to be uniquely well positioned as HPC makes the inevitable transition to the cloud." said Toshi Otani, Managing Director at TransLink capital. "The unique underlying network of global HPC infrastructure has allowed Rescale to build a strong business several regions including North America, Europe, and Japan – providing low-latency access to local infrastructure and meeting regional security requirements, while providing access the best cost and performance of compute on a global scale. The turn-key software layer and platform SaaS features on top, has made the solution a must-have for leading enterprises in numerous verticals."

Rescale Closes $14 Million Funding Round to Fuel Global Expansion

"We are very excited to add these new strategic investors to our team. Toshi is a welcome addition to our board as he brings years of experience with enterprise cloud solutions and expertise in global market expansion" said Joris Poort, CEO of Rescale. "We are excited to be investing further in our geographic expansion to help serve the global demand for our platform and continuing to make our customers successful. Our customers run simulations which continue to break technology barriers and are setting record product development timelines in their respective industries. From automotive design to drug discovery and even actual rocket science – we are very excited to continue to help the leading and most innovative enterprises empower their teams to accomplish more innovation faster."

About Rescale: Rescale is the world's leading cloud platform provider of simulation software and high performance computing (HPC) solutions. Rescale's platform solutions are deployed securely and seamlessly to enterprises via a web-based application environment powered by preeminent simulation software providers and backed by the largest commercially available HPC infrastructure. Headquartered in San Francisco, CA, Rescale's customers include global Fortune 500 companies in the aerospace, automotive, life sciences, marine, consumer products, and energy sectors. For more information on Rescale products and services, visit http://www.rescale.com.

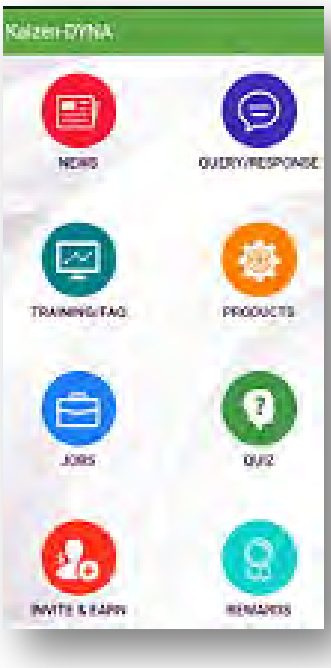
Rescale media contact:
Zack Smocha, VP of Marketing
Email: zack@rescale.com
Phone: +1.855.737.2253×704 (+1.855.RES.CALE)

For on line Article: https://blog.rescale.com/cloud-hpc-leader-rescale-closes-14-million-funding-round-to-fuel-global-expansion/

Run LSTC's LS-DYNA and LSTC's software products on Rescale Cloud Simulation Platform

www.rescale.com

July Kaizen-DYNA mobile & web app built to help LS-DYNA Users



Among the important features of the App are the following:

- **NEWS** - Technical & General news related to CAE.
- **QUERY/RESPONSE**- Post query, get instant response and earn coupons
- **TRAINING /FAQ** - Learn LSTC suite of products easily through training videos and FAQs & Answers.
- **PRODUCTS** – Check and know the best product that suits your requirements.
- **JOBS** - Apply and Post jobs specific to LS-DYNA.
- **QUIZ** – Participate and test your LS-DYNA Knowledge & earn coupons.
- **INVITE AND EARN** - Invite your friends and earn coupon
- **REWARDS** – Redeem your Rewards.

'Kaizenat-DYNA" is a mobile & web application which is built to help LS-DYNA Users to get instant answers for technical query from experts. Instead of support engineers spending couple of hours / days to duplicate the query & trying to find answer, this app aims at leveraging some other's knowledge who had already explored that particular topic. Though, Android version was launched during Nov 2015, IOS & web version was launched during this conference along with many enhancements requests of users.

For Information Contact: Ramesh@kaizenat.com

BETA CAE Open Meetings 2016 - White Papers – Case Studies

www.beta-cae.com/ourevents.htm

Recent white papers:

- ANSA & µETA for Fatigue analyses
- The µETA ASAM ODS Browser
- Multivariant / Multidiscipline Modeling
- Modeling for Nastran Embedded Fatigue

Case Studies:

- Honda R&D: Exterior Acoustics full vehicle model generation
- Opel: ANSA in Pedestrian Safety Analysis
- Selected cases from the
- Automotive Industry

BETA CAE Open Meeting NA
October 11, 2016
The Inn at St. John's
Plymouth, MI, USA
hosted by BETA CAE Systems USA

BETA CAE Open Meeting Beijing China
November 22, 2016
Beijing, China
hosted by Beijing E&G Software

BETA CAE Open Meeting Japan
November 8, 2016
Nagoya, Japan
hosted by TOP CAE Corp.

BETA CAE Open Meeting Shanghai China
November 25, 2016
Shanghai, China
hosted by Shanghai Turing Info. Tech.

SPONSORED EVENTS: BETA CAE Systems participation

NAFEMS India Conference 2016 - August 29-31, Bangalore, India: Don't miss this opportunity to be updated or introduced by our agent, Xitadel CAE Technologies, to the latest advances of our software products and find out the benefits realized by employing our solutions. www.nafems.org

The 14th International Symposium CMBBE - September 20-22, Tel Aviv, Israel: Use this unique opportunity to be introduced or updated to the latest developments and existing functionality that can propagate our 20 years CAE experience and know how to the biomechanics industry. www.cmbbe2016.com

BETA CAE Open Meetings 2016 - White Papers – Case Studies

www.beta-cae.com/ourevents.htm

SPONSORED EVENTS: BETA CAE Systems participation

FISITA 2016 - September 26-30, Busan, Korea: As a major Automotive Industry supplier, showcases its innovative CAE software solutions for this sector, at the exhibition that runs during FISITA 2016. Don't miss our presentation with title: "Rapid NVH design improvements through a unified environment for handling full FE and reduced models". www.fisita2016.com

German LS-DYNA forum 2016 - October 10-12 2014, Bamberg, Germany:
Meet the experts of LASSO Ingenieurgesellschaft mbh and BETA CAE Systems and discuss the benefits and the updates of our software suite. Our presentation: "Model Set-up analysis tools for Squeak and Rattle in LS-DYNA", will feature at the event's agenda. www.dynamore.de

FFT Acoustic Simulation conference & ACTRAN Users' meeting 2014 October 11-13, Brussels, Belgium

BETA CAE Systems is pleased to participate, as a Gold Sponsor, to the 2016 FFT Acoustic Simulation conference & ACTRAN Users' meeting. Take advantage of this opportunity to discuss with our expert engineers the benefits of employing our suite for exterior acoustic analyses using ACTRAN and NASTRAN.
www.fft.be

SIMVEC - Simulation und Erprobung in der Fahrzeugentwicklung – Nov. 22-23, Baden Baden, Germany

BETA CAE Systems, once again, takes its place in this event, organized by VDI, as a major Automotive Industry supplier, and showcases the latest solutions and applications for this sector.
More information: www.vdi-wissensforum.de

LS-DYNA Recommendations - LS-DYNA Group

Author: James Kennedy, KBS2 jmk@kbs2.com

Please note below is a short excerpt of an internet thread – an excerpt does not reflect the full information, or explanation. Further solutions or corrections may have been posted after this excerpt.

Some good introductory readings associated with bird-strike and the different formulations considered:

Goyal, V.K., Huertas, C.A. and Vasko, T.J.,
"Bird-Strike Modeling on the Lagrangian Formulation Using LS-DYNA",
American Transaction on Engineering & Applied Sciences,
Vol. 2, No. 2, pp.57-81, April, 2013.
http://TuEngr.com/ATEAS/V02/057-081.pdf

Goyal, V K., Huertas, C.A., and. Vasko, T.J.,
"Arbitrary Lagrange Eulerian Approach for Bird-Strike Analysis Using LS-DYNA",
American Transaction on Engineering & Applied Sciences,
Vol. 2, No. 2, pp. 109-132, April, 2013.
http://tuengr.com/ATEAS/V02/109-132.pdf

Goyal, V K., Huertas, C.A., and. Vasko, T.J.,
"Smooth Particle Hydrodynamic for Bird-Strike Analysis Using LS-DYNA",
American Transaction on Engineering & Applied Sciences,
Vol. 2, No. 2, pp. 83-107, April, 2013.
http://tuengr.com/ATEAS/V02/083-107.pdf

Wang, J., Chen, H., Xu, J., Aquelet, N., and Souli, M.,
"New Features in ALE and SPH in LS-DYNA",
DynaMore Forum, September, 2013.
www.dynamore.de/de/download/papers/2013-ls-dyna-forum/documents/new-features-in-ale-and-sph-in-ls-dyna

Prato, A., Anghileri, M., Milanese, A., and Castelletti, L.-M.L.,
"FE-to-SPH Approach Applied to the Analysis of Soft Body Impact: Bird Strike & Hail Impact",
29th Congress of the International Council of the Aeronautical Sciences,
St. Petersburg, Russia, September, 2014.
http://www.icas.org/ICAS_ARCHIVE/ICAS2014/data/papers/2014_0241_paper.pdf

Sincerely, James M. Kennedy KBS2 Inc.

DYNAmore14th German LS-DYNA Forum

Author: Albert Oswald albert.oswald@werbos.de Conference Contact: forum@dynamore.de

14th GERMAN LS-DYNA® FORUM 2016

October 10 - 12 2016, Bamberg, Germany

Conference website - www.dynamore.de/forum2016-e

DYNAmore kindly invites you to participate at the 14th German LS-DYNA Forum and encourages you to actively contribute to the conference agenda by submitting a presentation about your experience with the LSTC product range. Participation without a presentation is also worth-while to exchange your knowledge and discuss new solution approaches with other users.

Besides presentations from users, there will be also selected keynote lectures of renowned speakers from industry and universities as well as developer presentations from LSTC and DYNAmore. The popular workshops on various topics will also be continued.

We hope that we have stimulated your interest and are looking forward to receiving your abstract and to seeing you in Bamberg.

Attending

In user presentations from industry and academia you will learn more about the software packages LS-DYNA®, LS-OPT®, LS-TaSC™ und LS-PrePost® as well as their application possibilities for virtual product design.

Presenting

Communicate your work with international colleagues to share knowledge and to stimulate discussions with other users about new solution approaches.

Exhibiting and sponsoring - If you want to contribute, please request additional exhibitor and sponsoring information.

Venue - Welcome Kongresshotel Bamberg Mußstraße 7, 96047 Bamberg, Germany

Conference language - German and English

Participant fees

Industry speaker:	€ 360 -
Academic speaker:	€ 260
Industry:	€ 510 [1] / € 580
Academic:	€ 360 [1] / € 410

[1] Registration before 27 June 2016.
All prices excluding VAT.

Important dates

Presentation submission:	30 May
Author notification:	17 June
Two-page abstract:	5 Sept.
Conference dates:	10-12 Oct.

To Submit A Presentation:

Please send us title, author(s) and short description of approximately 300 words
E-Mail to forum@dynamore.de
or submit it online - www.dynamore.de/forum2016

Contact and registration - DYNAmore GmbH, Industriestr. 2, D-70565 Stuttgart, Germany
E-Mail: forum@dynamore.de

AUTOMOTIVE NEWS & EVENTS

Dilip Bhalsod

The purpose of this section is to provide a place, for our automotive readers, to share news and events relative to their company and/or products.

The criteria for submitting information is as follows:

- It has to be public information
- Published on the Internet
- Be automotive informational, or human interest.
- We do not accept financial quarterly information

We would welcome the opportunity to share information about your company with our readership.

You may send Title to your information and the accompanying URL to aqiac99@aol.com - Subject Line please

use " Automotive News"

Submissions should be received by the 15th of each month, of the month you want your article placed

Submission publications is at the sole discretion of FEA Information Inc.

Ford GT Wind Tunnel Testing

Jul 13, 2016 | Allen Park, Mich.

Ford GT Wind Tunnel Testing Continues to Tune Supercar's Functional Design and Active Aerodynamics

Development of the all new Ford GT continues unabated, with the carbon fiber supercar expected to go on sale before the end of this year. An innovation showcase in efficient EcoBoost engines, lightweighting and aerodynamics, the Ford GT is a study in functional design and active airflow management.

Ford engineering supervisor Nick Terzes takes us behind the scenes at Wind Tunnel 8 in Allen Park, Michigan, where a Ford GT pre-production verification prototype undergoes wind tunnel testing. The footage is of just one of multiple sessions to prove out the extensive computer aided aerodynamic models with physical wind tunnel data, at airspeeds approaching 125 mph (200 km/h).

Part of working on a program with compressed timing, Terzes and the Ford GT engineering team were in the Allen Park facility in the early a.m. hours of a Monday, demonstrating the non-stop nature of vehicle development. "Being the GT program," Terzes said, "we effectively test 24/7."

The prime reason we come to the tunnel is to get the actual physical data on the vehicle," Terzes explained. "We'll look at interior wind-noise acoustics, and the aerodynamics of the vehicle."

Footage in the clip demonstrates the active rear wing, part of a suite of active aerodynamic features on the 2017 Ford GT, designed to improve performance, stability and efficiency.

"One of the great things about this car, as dynamic and beautiful as the design is, every single opening has a purpose on the car. So If you see a large grille, if you see a scoop, it's wasn't just put there to look good," Terzes said. "It was put there because it has a function."

"In the end, all these late hours, all these weekends that we work, are absolutely worth it to be a part of a program like this, and to create the ultimate GT."

About Ford Motor Company: Ford Motor Company is a global automotive and mobility company based in Dearborn, Michigan. With about 201,000 employees and 67 plants worldwide, the company's core business includes designing, manufacturing, marketing, financing and servicing a full line of Ford cars, trucks, SUVs and electrified vehicles, as well as Lincoln luxury vehicles. At the same time, Ford aggressively is pursuing emerging opportunities through Ford Smart Mobility, the company's plan to be a leader in connectivity, mobility, autonomous vehicles, the customer experience, and data and analytics. The company provides financial services through Ford Motor Credit Company. For more information regarding Ford and its products worldwide or Ford Motor Credit Company, visit www.corporate.ford.com

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GM-NASA Space Robot Partnership

2016-07-06 - DETROIT

Marty Linn, General Motors manager of advanced technology and principal engineer for robotics, shakes hands with Robonaut 2 (R2), a humanoid robot developed by GM and NASA during a nine-year collaboration that also led to development of the RoboGlove, an exo-muscular device that enhances strength and grip through leading-edge sensors, actuators and tendons that are comparable to the nerves, muscles and tendons in a human hand. GM is licensing the RoboGlove intellectual property to Bioservo Technologies AB

GM-NASA Space Robot Partnership Brings 'Power' Glove to Life RoboGlove licensed to Swedish Medtech company Bioservo Technologies AB

Robotic glove technology developed out of a partnership between General Motors and NASA for use on the International Space Station is finding new life on Earth in health care, manufacturing and other industrial applications though a licensing agreement between GM and Bioservo Technologies AB, a Swedish medical technology company.

Working with GM, Bioservo will combine technology from its SEM GloveTM (Soft Extra Muscle) technology with the RoboGlove, a force-multiplying battery-powered wearable developed by GM and NASA during a nine-year collaboration that included the launch of the humanoid robot called Robonaut 2 (R2) into space in 2011.

The RoboGlove uses leading-edge sensors, actuators and tendons that are comparable to the nerves, muscles and tendons in a human hand. One design requirement for R2 was to operate tools designed for humans, and developers achieved unprecedented hand dexterity. That technology was applied to the RoboGlove.

Bioservo will initially develop a new grasp assist device for industrial use that could increase human operator efficiency while reducing fatigue in hand muscles. Research shows fatigue can occur within a few minutes of continuously gripping a tool.

"Combining the best of three worlds – space technology from NASA, engineering from GM and medtech from Bioservo – in a new industrial glove could lead to industrial scale use of the technology," said Tomas Ward, CEO of Bioservo Technologies.

Ward described the technology combination as a major step toward introducing soft exoskeleton technology globally.

GM intends to be the first U.S. manufacturing customer for the refined robotic glove and will test it in some of its plants. Bioservo will make and sell the new glove for a variety of uses including medical rehabilitation and any place additional gripping strength is needed.

"The successor to RoboGlove can reduce the amount of force that a worker needs to exert when operating a tool for an extended time or with repetitive motions," said Kurt Wiese, vice president of GM Global Manufacturing Engineering.

GM briefly tested RoboGlove in a preproduction plant before looking for a partner to help refine it to fit different size hands and address other issues.

About General Motors: General Motors Co. (NYSE:GM, TSX: GMM) and its partners produce vehicles in 30 countries, and the company has leadership positions in the world's largest and fastest-growing automotive markets. GM, its subsidiaries and joint venture entities sell vehicles under the Chevrolet, Cadillac, Baojun, Buick, GMC, Holden, Isuzu, Jiefang, Opel, Vauxhall and Wuling brands. More information on the company and its subsidiaries, including OnStar, a global leader in vehicle safety, security and information services, can be found at http://www.gm.com.

About Bioservo Technologies: Bioservo Technologies AB is a leader in soft exoskeleton technology and combines medical know-how of people's needs with modern robotics technology to create innovative, strength-enhancing products. The award-winning SEM GloveTM is used as an occupational back to work aid, in healthcare and in the home by people with impaired muscular strength or in need of additional strength and endurance. The patented SEM™ (Soft Extra Muscles) technology is being put to use in innovative products in a number of international projects, including the HandinMind project for more effective stroke rehabilitation and IronHand project for Activities for Daily Living (ADL). The unique technology has its origin from the Swedish Royal Institute of Technology (KTH) and the Swedish Karolinska University Hospital. The HandinMind and IronHand projects have financial contribution by the European Commission.

Bioservo Technologies AB has its head office and production facilities in Stockholm, Sweden. More information on the company can be found at http://www.bioservo.com/en

Alan Adler
Autonomous and R&D Communications

alan.adler@gm.com

Düsseldorf/Stuttgart. With 80 kW/109 hp, the new smart BRABUS is among the sportiest vehicles in its segment. Alongside the powerful turbo engine, this is down to the BRABUS Performance sports suspension with specially adapted ESP®, the sports power steering and sporty configuration of the twinamic dual-clutch transmission with Race Start function.

The vehicle also comes as standard with a sporty look both inside and out. Available in fortwo, fortwo cabrio and forfour versions, the new smart BRABUS celebrated its world premiere at the Beijing Automotive Exhibition (25 April to 4 May 2016). The first models will be in European dealers' showrooms from July 2016.

Anyone for a spot more driving enjoyment? The new smart BRABUS models are more powerful than any previous standard smart. That's because, compared with the previous model, rated power and maximum torque have been increased by 5 kW and 23 Nm, respectively, to 80 kW/109 hp at 5750 rpm and 170 Nm at 2000 rpm. The result is a correspondingly sporty level of performance, with the smart BRABUS fortwo accelerating from 0 to 100 km/h in 9.5 seconds, while the smart BRABUS forfour boasts a top speed of up to 180 km/h.

Yet the more powerful turbo engine is not the only technical highlight. The sporty performance is due also to the following extensive modifications:

- The fuel pressure has been raised by 2 bar. The air supply to the engine has been optimised.
- The springing/damping of the BRABUS Performance sports suspension are 20 percent firmer than the BRABUS sports suspension, with the anti-roll bar on the front axle reducing the roll tendency by 9%, while the ESP® has been specially adapted.
- The sports-tuned Direct-Steer system with speed-sensitive power assistance and variable steering ratio comes with a specially increased return torque for the smart BRABUS. This means that the steering gives even stronger feedback on the current grip status of the tyres, thereby improving the communication between driver and vehicle. This allows better control over the vehicle while making for enhanced driving enjoyment.
- With an up to 40 percent faster response time and shorter-legged ratios than in the 66 kW model, the twinamic 6-speed dual-clutch transmission is configured for sporty performance. It also features a Race Start function, which automatically sets the optimal rpm and clutch slip for maximum acceleration from rest. To use the Race Start function, the driver simply needs to release the brake pedal after previously depressing it and flooring the accelerator.
- The BRABUS sport exhaust system has been optimized in terms of back-pressure.

The sporty top models of the latest smart generation stand out visually through their matt grey rear diffuser insert with chrome-look tailpipe trims as well as their grey, high-sheen and matt painted BRABUS Monoblock IX light-alloy wheels. The smart fortwo comes with Yokohama sports tyres of size 185/50 R 16 H (front) and 205/40 R 17 H (rear). The smart forfour is shod with 185/45 R 17 H (front) and 205/40 R 17 H (rear). All smart BRABUS models come as standard with a lockable glove compartment, the Cool & Audio package and the proximity warning function. The smart BRABUS fortwo coupé and forfour also sport a panoramic roof ex factory.

smart BRABUS Xclusive: the new premium equipment line

The new high-end equipment line BRABUS Xclusive makes for even greater sporty elegance in the city. The special features:

- BRABUS sport seats with upholstery in perforated nappa leather/black leather with specific grey topstitching
- BRABUS instrument panel with a material mix of man-made leather/fabric
- BRABUS dashboard instrument with cockpit clock and rev counter
- BRABUS floor mats
- Xclusive badges in mirror triangle and B-pillar

The BRABUS Xclusive also comes as standard with LED & Sensor package, heated seats for driver and front passenger, while the smart forfour readyspace features rear seats with a removable cargo box.

Long-standing cooperation: smart-BRABUS GmbH

smart-BRABUS GmbH is a joint venture of smart and BRABUS and stands for automotive refinement at the highest level. In the last twelve years, over 60,000 customers have opted for products that were developed or produced in cooperation with BRABUS engineers.

The smart BRABUS tailor made individualization program enables creative customers to configure their smart entirely in accordance with their personal preferences.

AEROSPACE NEWS & EVENTS

Marnie Azadian

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- An internet URL
- Be technical, informational, or human interest.
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We would welcome the opportunity to share information about your company with our readership.

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Submissions should be received by the 15th of each month, of the month you want your article placed. For example: We would need the title of the news or event by December 15th, 2015 to be featured in the December 2015 FEA newsletter.

Submission publications is at the sole discretion of FEA Information Inc.

LM-100J Super Hercules commercial freighter aircraft from Lockheed Martin

Bravo Industries Announces Purchase of 10 LM-100J Commercial Freighters from Lockheed Martin
(Source: Lockheed Martin; issued July 12, 2016)

FARNBOROUGH, United Kingdom --- Bravo Industries, LLC, announced that it will purchase 10 LM-100J Super Hercules commercial freighter aircraft from Lockheed Martin here today.

Bravo is a logistics and defense group with operations in and focused on Brazil. Bravo's Logística division, which consists of Bravo Cargas and Bravo MRO (maintenance, repair and overhaul), will operate the LM-100J for air cargo operations in Brazil.

"When we examined the market and regional demands for our logistics operations, there was only one aircraft that could do all the jobs we needed it to do to serve our customers: the LM-100J." said JR Pereira, president and CEO of Bravo Industries. "The LM-100J is uniquely suited to reach Brazil's underserved regions where we do business. These are areas that lack ground support and certain critical infrastructure required by other commercial freighters. The LM-100J was designed to meet the varying needs of the Brazilian landscape, in turn, allowing Bravo to deliver vital goods and services where they are needed most."

Bravo's air cargo services include scheduled and route-specific solutions (same-day, next-day, etc.), as well as special cargo handling (heavy, odd-shaped, hazardous, refrigerated, etc.) and custom operations.

"Bravo Industries is a natural and welcome addition to the global Super Hercules family," said Orlando Carvalho, executive vice president, Lockheed Martin Aeronautics. "Like the C-130J on which it is based, the LM-100J is built to go where other aircraft can't, don't and won't. The LM-100J is the only commercial freighter that can fully meet the varying demands of the Brazilian market. Bravo is the ideal operator to introduce the LM-100J's unmatched capabilities in this pivotal region of the world."

Bravo is partnered with Height Securities, a Washington, D.C.-based broker-dealer serving the company as exclusive financial advisor and placement agent. Both organizations are working directly with Lockheed Martin on this acquisition. Global law firm Squire Patton Boggs is providing legal counsel to Bravo.

"We are honored to support Bravo as it delivers reliable, principled heavy air cargo and aircraft maintenance solutions to its customers," said John Akridge, founder and managing partner of Height. "Our colleagues at Lockheed Martin are playing an integral role in deploying this uniquely suited aircraft to the Brazilian marketplace and broader Latin American arena, and Bravo — through its use of this distinctive aircraft — is poised to revolutionize logistics offerings to achieve a better tomorrow for the region's economies, businesses and people."

Lateral Investment Management, a San Mateo, California-based investment firm, is providing funding to Bravo for the LM-100J acquisition.

"We see tremendous opportunities for civilian application of the Super Hercules platform," said Kenneth Masters, managing partner of Lateral. "We are excited to provide the capital solution behind Bravo's procurement of this exceptional aircraft."

The LM-100J is the civil-certified version of Lockheed Martin's proven C-130J Super Hercules aircraft. The first LM-100J is currently in production and will undergo an FAA type certificate update prior to delivery in 2018. Through select design innovations, the LM-100J will perform as a commercial multi-purpose air freighter capable of rapid and efficient cargo transport.

The LM-100J incorporates technological developments and improvements over the existing L-100s that result from years of military C-130J operational experience, including more than 1.3 million flight hours by operators in 16 nations. The result of this experience and advancement translates to an aircraft that will deliver reliable service in a multi-role platform for decades to come.

Bravo Industries, LLC, is a logistics and defense group with operations primarily focused on the Federative Republic of Brazil. Bravo is headquartered in Arlington, Virginia.

Height Securities, LLC, is a Washington, D.C.-based broker-dealer. Founded in 2008, Height is a premier provider of research and capital markets services, assisting institutional investors, public and private companies, and government agencies in navigating through an ever-changing global economic and regulatory environment.

Based in San Mateo, California, Lateral Investment Management, LLC, is a private credit firm that provides growth capital for leading middle market companies in the United States. Lateral partners with owner-operated businesses to navigate through a well-defined growth event.

Headquartered in Bethesda, Maryland, Lockheed Martin is a global security and aerospace company that employs approximately 125,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services.

Chandra Finds Evidence for Violent Stellar Merger

Chandra Finds Evidence for Violent Stellar Merger

Gamma-ray bursts, or GRBs, are some of the most violent and energetic events in the Universe. Although these events are the most luminous explosions in the universe, a new study using NASA's Chandra X-ray Observatory, NASA's Swift satellite and other telescopes suggests that scientists may be missing a majority of these powerful cosmic detonations.

Chandra Finds Evidence for Violent Stellar Merger - Astronomers think that some GRBs are the product of the collision and merger of two neutron stars or a neutron star and a black hole. The new research gives the best evidence to date that such collisions will generate a very narrow beam, or jet, of gamma rays. If such a narrow jet is not pointed toward Earth, the GRB produced by the collision will not be detected.

Collisions between two neutron stars or a neutron star and black hole are expected to be strong sources of gravitational waves that could be detected whether or not the jet is pointed towards the Earth. Therefore, this result has important implications for the number of events that will be detectable by the Laser Interferometry Gravitational-Wave Observatory (LIGO) and other gravitational wave observatories.

On September 3, 2014, NASA's Swift observatory picked up a GRB – dubbed GRB 140903A due to the date it was detected. Scientists used optical observations with the Gemini Observatory telescope in Hawaii to determine that GRB 140903A was located in a galaxy about 3.9 billion light years away, relatively nearby for a GRB.

The large panel in the graphic is an illustration showing the aftermath of a neutron star merger, including the generation of a GRB. In the center is a compact object – either a black hole or a massive neutron star – and in red is a disk of material left over from the merger, containing material falling towards the compact object. Energy from this infalling material drives the GRB jet shown in yellow. In orange is a wind of particles blowing away from the disk and in blue is material ejected from the compact object and expanding at very high speeds of about one tenth the speed of light.

The image on the left of the two smaller panels shows an optical view from the Discovery Channel Telescope (DCT) with GRB 140903A in the middle of the square and a close-up X-ray view from Chandra on the right. The bright star in the optical image is unrelated to the GRB.

The gamma-ray blast lasted less than two seconds. This placed it into the "short GRB" category, which astronomers think are the output from neutron star-neutron star or black hole-neutron star collisions eventually forming either a black hole or a neutron star with a strong magnetic field. (The scientific consensus is that GRBs that last longer than two seconds result from the collapse of a massive star.)

About three weeks after the Swift discovery of GRB 140903A, a team of researchers led by Eleonora Troja of the University of Maryland, College Park (UMD), observed the aftermath of the GRB in X-rays with Chandra. Chandra observations of how the X-ray emission from this GRB decreases over time provide important information about the properties of the jet.

Specifically, the researchers found that the jet is beamed into an angle of only about five degrees based on the X-ray observations, plus optical observations with the Gemini Observatory and the DCT and radio observations with the National Science Foundation's Karl G. Jansky Very Large Array. This is roughly equivalent to a circle with the diameter of your three middle fingers held at arms length. This means that astronomers are detecting only about 0.4% of this type of GRB when it goes off, since in most cases the jet will not be pointed directly at us.

Previous studies by other astronomers had suggested that these mergers could produce narrow jets. However, the evidence in those cases was not as strong because the rapid decline in light was not observed at multiple wavelengths, allowing for explanations not involving jets.

Several pieces of evidence link this event to the merger of two neutron stars, or between a neutron star and black hole. These include the properties of the gamma ray emission, the old age and the low rate of stars forming in the GRB's host galaxy and the lack of a bright supernova. In some previous cases strong evidence for this connection was not found.

New studies have suggested that such mergers could be the production site of elements heavier than iron, such as gold. Therefore, the rate of these events is also important to estimate the total amount of heavy elements produced by these mergers and compare it with the amounts observed in the Milky Way galaxy.

A paper describing these results was recently accepted for publication in The Astrophysical Journal and is available online. NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, controls Chandra's science and flight operations.

Credits: Illustration: CXC/M. Weiss; X-ray: NASA/CXC/Univ. of Maryland/E. Troja et al, Optical: Lowell Observatory's Discovery Channel Telescope/E. Troja et al.

Read More from NASA's Chandra X-ray Observatory. For more Chandra images, multimedia and related materials, visit: http://www.nasa.gov/chandra Last Updated: July 14, 2016 Editor: Lee Mohon

China FEA News –Events - Participants

Yanhua Zhao

CHINA

Beijing AutoCAE Technology Co., Ltd.
www.autocae.cn

ETA – China
www.eta.com/cn

Oasys Ltd. China
www.oasys-software.com/dyna

Pan Information Technology(Shanghai) Co., Ltd.
www.pan-i.com

Shanghai Hengstar Technology
www.hengstar.com

TAIWAN

AgileSim Technology Corp.
www.agilesim.com.tw

Flotrend Corporation
www.flotrend.com.tw

Simware Inc.
www.simware.com.tw

For Questions and/or Participation contact yanhua@feainformation.com

LS-DYNA Resource Links

LS-DYNA Multiphysics YouTube Facundo Del Pin

https://www.youtube.com/user/980LsDyna

FAQ LSTC Jim Day

ftp.lstc.com/outgoing/support/FAQ

LS-DYNA Support Site

www.dynasupport.com

LS-OPT & LS-TaSC

www.lsoptsupport.com

LS-DYNA EXAMPLES

www.dynaexamples.com

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www.dynalook.com

ATD –DUMMY MODELS

www.dummymodels.com

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AEROSPACE WORKING GROUP

http://awg.lstc.com/tiki/tiki-index.php

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Arup **(corporate)**	www.oasys-software.com/dyna/en/training
BETA CAE Systems S.A. **(corporate)**	www.beta-cae.com/training.htm
DYNAmore **(corporate)**	www.dynamore.de/en/training/seminars
ESI-Group **(corporate)**	https://myesi.esi-group.com/trainings/schedules
ETA **(corporate)**	www.eta.com/support2/training-calendar
LSTC **(corporate)**	www.lstc.com/training
LS-DYNA OnLine **(Al Tabiei)**	www.LSDYNA-ONLINE.COM

ARUP Visit the website for complete listings/changes/locations

www.oasys-software.com/dyna/en/training

To enrol on any of these courses please email Dyna Support at dyna.support@arup.com.

Date	Training Class
Scheduled on request	Oasys PRIMER - An Introduction
Scheduled on request	Oasys PRIMER - Automatic Assembly of Multiple Crash Cases
Scheduled on request	Oasys PRIMER - Spotwelds and Connections
Scheduled on request	Oasys PRIMER - Seat and Dummy Positioning
Scheduled on request	Oasys PRIMER & D3PLOT - An Introduction to JavaScripting

BETA CAE Visit the website for complete listings/changes/locations

www.beta-cae.com/training.htm

Basic and advanced training courses can be scheduled upon request. A variety of standard or tailored training schedules, per product or per discipline, are being offered to meet customers needs.

A number of recommended training courses offered are described below. The list is not exhaustive and more courses can be designed according to your needs.
Please, contact ansa@beta-cae.gr for further details.

Recommended Training Courses (Complete information on website)

- SPDRM
- ANSA / μETA Basics
- ANSA / μETA for CFD
- ANSA / μETA for Crash & Safety simulation
- ANSA / μETA for Durability simulation
- ANSA / μETA for NVH analyses
- Multi-Body Dynamics
- Laminated Composites
- Morphing and Optimization
- Automation
- Additional special sessions

Submitted: Albert Oswald

DYNAmore Visit the website for complete listings / changes / locations

www.dynamore.de/seminars

Download full seminar brochure (pdf): www.dynamore.de/seminars-2016

We are pleased to offer you a selection of seminars and free-of-charge information & support.

If not otherwise stated, the event location is Stuttgart (S), Germany. Other event locations are:
L = Linköping, Sweden; V = Versailles, France; Z = Zurich, Switzerland; T = Turin, Italy

Overview and registration: www.dynamore.de/seminars

If the offered seminars do not fully suit your needs, we are pleased to meet your individual requirements by arranging tailored on-site training courses on your company premises.

DYNAmore hopes that our offer will meet your needs and would be very pleased to welcome you at one of the events.

https://myesi.esi-group.com/trainings/schedules

Latest Release is ESI Visual-Environment 12.0

Farmington Hills, Detroit, MI

Basic PAM-STAMP
17 Aug 2016 to 18 Aug 2016

Introduction to QuikCAST
29 Aug 2016 to 31 Aug 2016

Weld Distortion Engineering - Shrinkage Method
14 Sep 2016 to 16 Sep 2016

Introduction to ProCAST
20 Sep 2016 to 22 Sep 2016

Basic PAM-STAMP
21 Sep 2016 to 22 Sep 2016

High frequency automotive interior acoustics
29 Sep 2016 to 30 Sep 2016

VA One: Coupled FEA/SEA Training
12 Oct 2016 to 13 Oct 2016

Basic PAM-STAMP
19 Oct 2016 to 20 Oct 2016

A One: SEA Training
24 Oct 2016 to 25 Oct 2016

Tabiei	Implicit	CA	July 28-29
Yan / Ho	Intro to LS-PrePost	CA	August 1
Tabiei	Intro to LS-DYNA	CA	Aug 2-5
Yan / Ho	Intro to LS-PrePost	MI	August 8
Tabiei *** FULL ***	Intro to LS-DYNA	MI	Aug 9-12
Souli	ALE/Eulerian, Fluid/Structure Interaction in LS-DYNA	CA	Aug 15-17
Souli	SPH: Smoothed Particle Hydrodynamics in LS-DYNA	CA	Aug 18-19
Basudhar	Optimization, Probabilistic Design Using LS-OPT (3.5 days)	MI	Oct 25-28
Yan / Ho	Intro to LS-PrePost	CA	Oct 31
Tabiei	Intro to LS-DYNA	CA	Nov 1-4
Y Huang	NVH and Frequency Domain Analysis with LS-DYNA	CA	Nov 7-8
Tabiei	Adv Impact	MI	Dec 8-9
Yan / Ho	Intro to LS-PrePost	MI	Dec 12
Tabiei	Intro to LS-DYNA	MI	Dec 13-16

LS-DYNA On Line Visit the website for complete listings/changes/locations

www.LSDYNA-ONLINE.COM

For Information contact: courses@lsdyna-online.com or 513-3319139

Composite Materials In LS-DYNA

This course will allow first time LS-DYNA users to use composite materials. The most important elements to start using all the composite material models in LS-DYNA will be presented in the 8 hours.

Foam & Viscoelastic Materials in LS-DYNA

Objective of the course: Learn about several foam material models in LS-DYNA to solve engineering problems. Detailed descriptions are given of the data required to use such material in analysis. Examples are used to illustrate the points made in the lectures

Plasticity, Plastics, and Viscoplastics Materials in LS-DYNA

Objective of the course: Learn about several plasticity based material models in LS-DYNA to solve engineering problems. Detailed descriptions are given of the data required to use such material in analysis. Examples are used to illustrate the points made in the lectures.

Rubber Materials in LS-DYNA

Objective of the course: Learn about several rubber material models in LS-DYNA to solve engineering problems. Detailed descriptions are given of the data required to use such material in analysis. Examples are used to illustrate the points made in the lectures.

BETA CAE Systems S.A. **www.beta-cae.gr**

BETA CAE Systems S.A.– ANSA

An advanced multidisciplinary CAE pre-processing tool that provides all the necessary functionality for full-model build up, from CAD data to ready-to-run solver input file, in a single integrated environment. ANSA is a full product modeler for LS-DYNA, with integrated Data Management and Process Automation. ANSA can also be directly coupled with LS-OPT of LSTC to provide an integrated solution in the field of optimization.

BETA CAE Systems S.A.– μETA

Is a multi-purpose post-processor meeting diverging needs from various CAE disciplines. It owes its success to its impressive performance, innovative features and capabilities of interaction between animations, plots, videos, reports and other objects. It offers extensive support and handling of LS-DYNA 2D and 3D results, including those compressed with SCAI's FEMZIP software

Solutions for:

Process Automation - Data Management – Meshing – Durability - Crash & Safety NVH - CFD - Thermal analysis - Optimization - Powertrain Products made of composite materials - Analysis Tools -

Maritime and Offshore Design - Aerospace engineering - Biomechanics

CRAY www.cray.com

THE CRAY® XC™ SERIES: ADAPTIVE SUPERCOMPUTING ARCHITECTURE

The Cray® XC™ series delivers on Cray's commitment to an adaptive supercomputing architecture that provides both extreme scalability and sustained performance. The flexibility of the Cray XC platform ensures that users can precisely configure the machines that will meet their specific requirements today, and remain confident they can upgrade and enhance their systems to address the demands of the future.

Cray® XC40™ and XC40-AC™ supercomputers are enabled by a robust Intel® Xeon® processor road map, Aries high performance interconnect and flexible Dragonfly network topology, providing low latency and scalable global bandwidth to satisfy the most challenging multi-petaflops applications.

While the extreme-scaling Cray XC40 supercomputer is a transverse air-flow liquid-cooled architecture, the Cray XC40-AC air-cooled model provides slightly smaller and less dense supercomputing cabinets with no requirement for liquid coolants or extra blower cabinets. A reduced network topology lowers costs, and the system is compatible with the compute technology, OS, ISV and software stack support of high-end XC40 systems.

MAXIMIZE PRODUCTIVITY WITH CRAY CS SERIES SUPERCOMPUTERS

Understanding the need for nimble, reliable and cost-effective high performance computing (HPC), we developed the Cray® CS™ cluster supercomputer series. These systems are industry-standards-based, highly customizable, and expressly designed to handle the broadest range of medium- to large-scale simulation and data analytics workloads.

All CS components have been carefully selected, optimized and integrated to create a powerful HPC environment. Flexible node configurations featuring the latest processor and interconnect technologies mean you can tailor a system to your specific need — from an all-purpose cluster to one suited for shared memory, large memory or accelerator-based tasks.

Innovations in packaging, power, cooling and density translate to superior energy efficiency and compelling price/performance. Expertly engineered system management software instantly boosts your productivity by simplifying system administration and maintenance.

Maximize your productivity with flexible, high-performing Cray CS series cluster supercomputers.

CRAY www.cray.com

CRAY® SONEXION® SCALE-OUT LUSTRE®STORAGE SYSTEM

Brought to you by Cray, the world's leading experts in parallel storage solutions for HPC and technical enterprise, the Cray® Sonexion® 2000 system provides a Lustre®-ready solution for popular x86 Linux® clusters and supercomputers through Cray Cluster Connect™. As a leader in open systems and parallel file systems, Cray builds on open source Lustre to unlock any industry-standard x86 Linux compute cluster using InfiniBand™ or 10/40 GbE utilizing proven Cray storage architectures.

The Cray Sonexion 2000 system provides 50 percent more performance and capacity than the Sonexion 1600 system in the same footprint.

Simplify

- Through its fully-integrated and pre-configured design, Cray Sonexion storage gets customers deployed faster and reduces the total number of components to manage.
- The Sonexion system's compact design reduces the total hardware footprint of petascale systems by 50 percent over component-based solutions.

Scale

- Performance scales from 7.5 GB/s to 1.7 TB/s in a single file system.
- Capacity scales in modular increments; the Sonexion 2000 system stores over two usable petabytes in a single rack. Fewer drives and components reduce capital costs as capacity grows.

Protect

- New software-based GridRAID offers higher levels of data protection and up to 3.5 times faster rebuild times than traditional RAID6 and MD-RAID storage.
- Cray ensures quality, reliability and stability at scale through exhaustive thermal and real-world stress testing, system hardening and availability, and tight hardware and software integration.

OPEN ARCHIVE AND TIERED STORAGE SYSTEM FOR BIG DATA AND SUPERCOMPUTING

Cray Tiered Adaptive Storage (TAS), powered by Versity, is designed to meet the expansive data preservation and access needs driven by big data, where data needs to migrate fluidly from high performance storage to deep tape archives, while always being accessible to users.

CRAY www.cray.com

With Cray TAS you can:

- Deploy tiered storage and archives faster
- Feel confident preserving and protecting data into the future, using Linux®
- Simplify managing data using familiar tools for years to come

CRAY® URIKA-XA™ EXTREME ANALYTICS PLATFORM

Pre-integrated, open platform for high performance analytics delivers valuable business insights now and into the future

The flexible, multi-use Cray® Urika-XA™ extreme analytics platform addresses perhaps the most critical obstacle in data analytics today — limitation. Analytics problems are getting more varied and complex but the available solution technologies have significant constraints. Traditional analytics appliances lock you into a single approach and building a custom solution in-house is so difficult and time consuming that the business value derived from analytics fails to materialize.

In contrast, the Urika-XA platform is open, high performing and cost effective, serving a wide range of analytics tools with varying computing demands in a single environment. Pre-integrated with the Apache Hadoop® and Apache Spark™ frameworks, the Urika-XA system combines the benefits of a turnkey analytics appliance with a flexible, open platform that you can modify for future analytics workloads. This single-platform consolidation of workloads reduces your analytics footprint and total cost of ownership.

Based on pioneering work combining high-performance analytics and supercomputing technologies, the Urika-XA platform features next-generation capabilities. Optimized for compute-heavy, memory-centric analytics, it incorporates innovative use of memory-storage hierarchies and fast interconnects, which translates to excellent performance at scale on current as well as emerging analytics applications.

Additionally, the enterprise-ready Urika-XA platform eases the system management burden with a single point of support, standards-based software stack and compliance with enterprise standards so you can focus on extracting valuable business insights, not on managing your environment.

CRAY www.cray.com

THE URIKA-GD™ GRAPH DISCOVERY APPLIANCE IS A PURPOSE-BUILT SOLUTION FOR BIG DATA RELATIONSHIP ANALYTICS.

The Urika-GD™ appliance enables enterprises to:

- Discover unknown and hidden relationships and patterns in big data
- Build a relationship warehouse, supporting inferencing/deduction, pattern-based queries and intuitive visualization
- Perform real-time analytics on the largest and most complex graph problems

The Urika-GD system is a high performance graph appliance with a large shared memory and massively multithreaded custom processor designed for graph processing and scalable I/O.

With its industry-standard, open-source software stack enabling reuse of existing skill sets and no lock in, the Urika-GD appliance is easy to adopt.

The Urika-GD appliance complements an existing data warehouse or Hadoop® cluster by offloading graph workloads and interoperating within the existing enterprise analytics workflow.

Realize rapid time to powerful new insights.

DatapointLabs **www.datapointlabs.com**

Testing over 1000 materials per year for a wide range of physical properties, DatapointLabs is a center of excellence providing global support to industries engaged in new product development and R&D.

The compary meets the material property needs of CAE/FEA analysts, with a specialized product line, TestPaks®, which allow CAE analysts to easily order material testing for the calibration of over 100 different material models.

DatapointLabs maintains a world-class testing facility with expertise in physical properties of plastics, rubber, food, ceramics, and metals.

Core competencies include mechanical, thermal and flow properties of materials with a focus on precision properties for use in product development and R&D.

Engineering Design Data including material model calibrations for CAE Research Support Services, your personal expert testing laboratory Lab Facilities gives you a glimpse of our extensive test facilities Test Catalog gets you instant quotes for over 200 physical properties.

ETA – Engineering Technology Associates **www.eta.com**
etainfo@eta.com

Inventium Suite™

Inventium Suite™ is an enterprise-level CAE software solution, enabling concept to product. Inventium's first set of tools will be released soon, in the form of an advanced Pre & Post processor, called PreSys.

Inventium's unified and streamlined product architecture will provide users access to all of the suite's software tools. By design, its products will offer a high performance modeling and post-processing system, while providing a robust path for the integration of new tools and third party applications.

PreSys

Inventium's core FE modeling toolset. It is the successor to ETA's VPG/PrePost and FEMB products. PreSys offers an easy to use interface, with drop-down menus and toolbars, increased graphics speed and detailed graphics capabilities. These types of capabilities are combined with powerful, robust and accurate modeling functions.

VPG

Advanced systems analysis package. VPG delivers a unique set of tools which allow engineers to create and visualize, through its modules--structure, safety, drop test, and blast analyses.

DYNAFORM

Complete Die System Simulation Solution. The most accurate die analysis solution available today. Its formability simulation creates a "virtual tryout", predicting forming problems such as cracking, wrinkling, thinning and spring-back before any physical tooling is produced

Latest Release is ESI Visual-Environment 12.0

ESI Group **www.esi-group.com**

Visual-Environment is an integrative simulation platform for simulation tools operating either concurrently or standalone for various solver. Comprehensive and integrated solutions for meshing, pre/post processing, process automation and simulation data management are available within same environment enabling seamless execution and automation of tedious workflows. This very open and versatile environment simplifies the work of CAE engineers across the enterprise by facilitating collaboration and data sharing leading to increase of productivity.

Visual-Crash DYNA provides advanced preprocessing functionality for LS-DYNA users, e.g. fast iteration and rapid model revision processes, from data input to visualization for crashworthiness simulation and design. It ensures quick model browsing, advanced mesh editing capabilities and rapid graphical assembly of system models. Visual-Crash DYNA allows graphical creation, modification and deletion of LS-DYNA entities. It comprises tools for checking model quality and simulation parameters prior to launching calculations with the solver. These tools help in correcting errors and fine-tuning the model and simulation before submitting it to the solver, thus saving time and resources.
Several high productivity tools such as advanced dummy positioning, seat morphing, belt fitting and airbag folder are provided in **Visual-Safe,** a dedicated application to safety utilities.

Visual-Mesh is a complete meshing tool supporting CAD import, 1D/2D/3D meshing and editing for linear and quadratic meshes. It supports all meshing capabilities, like shell and solid automesh, batch meshing, topo mesh, layer mesh, etc. A convenient Meshing Process guides you to mesh the given CAD component or full vehicle automatically.

Visual-Viewer built on a multi-page/multi-plot environment, enables data grouping into pages and plots. The application allows creation of any number of pages with up to 16 windows on a single page. These windows can be plot, animation, video, model or drawing block windows. Visual-Viewer performs automated tasks and generates customized reports and thereby increasing engineers' productivity.

Latest Release is ESI Visual-Environment 12.0

ESI Group **www.esi-group.com**

Visual-Process provides a whole suite of generic templates based on LS-DYNA solver (et altera). It enables seamless and interactive process automation through customizable LS-DYNA based templates for automated CAE workflows.

All generic process templates are easily accessible within the unique framework of Visual-Environment and can be customized upon request and based on customer's needs.

Visual*DSS* is a framework for Simulation Data and Process Management which connects with Visual-Environment and supports product engineering teams, irrespective of their geographic location, to make correct and realistic decisions throughout the virtual prototyping phase. Visual*DSS* supports seamless connection with various CAD/PLM systems to extract the data required for building virtual tests as well as building and chaining several virtual tests upstream and downstream to achieve an integrated process. It enables the capture, storage and reuse of enterprise knowledge and best practices, as well as the automation of repetitive and cumbersome tasks in a virtual prototyping process, the propagation of engineering changes or design changes from one domain to another.

JSOL Corporation **www.jsol.co.jp/english/cae/**

HYCRASH

Easy-to-use one step solver, for Stamping-Crash Coupled Analysis. HYCRASH only requires the panels' geometry to calculate manufacturing process effect, geometry of die are not necessary. Additionally, as this is target to usage of crash/strength analysis, even forming analysis data is not needed. If only crash/strength analysis data exists and panel ids is defined. HYCRASH extract panels to calculate it's strain, thickness, and map them to the original data.

JSTAMP/NV

As an integrated press forming simulation system for virtual tool shop the JSTAMP/NV meets the various industrial needs from the areas of automobile, electronics, iron and steel, etc. The JSTAMP/NV gives satisfaction to engineers, reliability to products, and robustness to tool shop via the advanced technology of the JSOL Corporation.

JMAG

JMAG uses the latest techniques to accurately model complex geometries, material properties, and thermal and structural phenomena associated with electromagnetic fields. With its excellent analysis capabilities, JMAG assists your manufacturing process

Livermore Software Technology Corp. **www.lstc.com**

LS-DYNA

A general-purpose finite element program capable of simulating complex real world problems. It is used by the automobile, aerospace, construction, military, manufacturing, and bioengineering industries. LS-DYNA is optimized for shared and distributed memory Unix, Linux, and Windows based, platforms, and it is fully QA'd by LSTC. The code's origins lie in highly nonlinear, transient dynamic finite element analysis using explicit time integration.

LS-PrePost: An advanced pre and post-processor that is delivered free with LS-DYNA. The user interface is designed to be both efficient and intuitive. LS-PrePost runs on Windows, Linux, and Macs utilizing OpenGL graphics to achieve fast rendering and XY plotting.

LS-OPT: LS-OPT is a standalone Design Optimization and Probabilistic Analysis package with an interface to LS-DYNA. The graphical preprocessor LS-OPTui facilitates definition of the design input and the creation of a command file while the postprocessor provides output such as approximation accuracy, optimization convergence, tradeoff curves, anthill plots and the relative importance of design variables.

LS-TaSC: A Topology and Shape Computation tool. Developed for engineering analysts who need to optimize structures, LS-TaSC works with both the implicit and explicit solvers of LS-DYNA. LS-TaSC handles topology optimization of large non-linear problems, involving dynamic loads and contact conditions.

LSTC Dummy Models:

Anthropomorphic Test Devices (ATDs), as known as "crash test dummies", are life-size mannequins equipped with sensors that measure forces, moments, displacements, and accelerations.

LSTC Barrier Models: LSTC offers several Offset Deformable Barrier (ODB) and Movable Deformable Barrier (MDB) model.

Oasys Ltd. LS-DYNA Environment **www.oasys-software.com/dyna**

The Oasys Suite of software is exclusively written for LS-DYNA® and is used worldwide by many of the largest LS-DYNA® customers. The suite comprises of:

Oasys PRIMER

Key benefits:

- Pre-Processor created specifically for LS-DYNA®
- Compatible with the latest version of LS-DYNA®
- Maintains the integrity of data
- Over 6000 checks and warnings – many auto-fixable
- Specialist tools for occupant positioning, seatbelt fitting and seat squashing (including setting up pre-simulations)
- Many features for model modification, such as part replace
- Ability to position and depenetrate impactors at multiple locations and produce many input decks automatically (e.g. pedestrian impact, interior head impact)
- Contact penetration checking and fixing
- Connection feature for creation and management of connection entities.
- Support for Volume III keywords and large format/long labels
- Powerful scripting capabilities allowing the user to create custom features and processes

www.oasys-software.com/dyna

Oasys D3PLOT

Key benefits:

- Powerful 3D visualization post-processor created specifically for LS-DYNA®
- Fast, high quality graphics
- Easy, in-depth access to LS-DYNA® results
- Scripting capabilities allowing the user to speed up post-processing, as well as creating user defined data components

Oasys T/HIS

Key benefits:

- Graphical post-processor created specifically for LS-DYNA®
- Automatically reads all LS-DYNA® results
- Wide range of functions and injury criteria
- Easy handling of data from multiple models
- Scripting capabilities for fast post-processing

Oasys REPORTER

Key benefits:

- Automatic report generation tool created specifically for LS-DYNA®
- Automatically post-process and summarize multiple analyses
- Built-in report templates for easy automatic post-processing of many standard impact tests

Shanghai Hengstar

www.hengstar.com

Center of Excellence: Hengstar Technology is the first LS-DYNA training center of excellence in China. As part of its expanding commitment to helping CAE engineers in China, Hengstar Technology will continue to organize high level training courses, seminars, workshops, forums etc., and will also continue to support CAE events such as: China CAE Annual Conference; China Conference of Automotive Safety Technology; International Forum of Automotive Traffic Safety in China; LS-DYNA China users conference etc.

On Site Training: Hengstar Technology also provides customer customized training programs on-site at the company facility. Training is tailored for customer needs using LS-DYNA such as material test and input keyword preparing; CAE process automation with customized script program; Simulation result correlation with the test result; Special topics with new LS-DYNA features etc..

Distribution & Support: Hengstar distributes and supports LS-DYNA, LS-OPT, LS-Prepost, LS-TaSC, LSTC FEA Models; Hongsheng Lu, previously was directly employed by LSTC before opening his distributorship in China for LSTC software. Hongsheng visits LSTC often to keep update on the latest software features.

Hengstar also distributes and supports d3View; Genesis, Visual DOC, ELSDYNA; Visual-Crash Dyna, Visual-Process, Visual-Environment; EnkiBonnet; and DynaX & MadyX etc.

Consulting

As a consulting company, Hengstar focus on LS-DYNA applications such as crash and safety, durability, bird strike, stamping, forging, concrete structures, drop analysis, blast response, penetration etc with using LS-DYNA's advanced methods: FEA, ALE, SPH, EFG, DEM, ICFD, EM, CSEC**.**.

Lenovo www.lenovo.com

Lenovo is a USD39 billion personal and enterprise technology company, serving customers in more than 160 countries.

Dedicated to building exceptionally engineered PCs, mobile Internet devices and servers spanning entry through supercomputers, Lenovo has built its business on product innovation, a highly efficient global supply chain and strong strategic execution. The company develops, manufactures and markets reliable, high-quality, secure and easy-to-use technology products and services.

Lenovo acquired IBM's x86 server business in 2014. With this acquisition, Lenovo added award-winning System x enterprise server portfolio along with HPC and CAE expertise.

Canada	**Metal Forming Analysis Corp MFAC** galb@mfac.com www.mfac.com			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	
	eta/DYNAFORM	INVENTIUM/PreSys		
Mexico	**COMPLX** Armando Toledo **www.complx.com.mx** / armando.toledo@complx.com.mx			
	LS-DYNA LS-OPT		LS-PrePost LS-TAsc Barrier/Dummy Models	
United States	**CAE Associates Inc.** info@caeai.com www.caeai.com			
	ANSYS Products	CivilFem	Consulting ANSYS Consulting LS-DYNA	
United States	**DYNAMAX** sales@dynamax-inc.com www.dynamax-inc.com			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models		LSTC Barrier Models	

United States	**ESI Group N.A** info@esi-group.com www.esi-group.com			
	PAM-STAMP			
	QuikCAST	SYSWELD	PAM-COMPOSITES	CEM One
	VA One	CFD-ACE+	ProCAST	
		Weld Planner	Visual-Environment	IC.IDO

United States	**Engineering Technology Associates – ETA** etainfo@eta.com www.eta.com			
	INVENTIUM/PreSy	NISA	VPG	LS-DYNA
	LS-OPT	DYNAform		

United States	**Livermore Software Technology Corp** sales@lstc.com **LSTC** www.lstc.com			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	TOYOTA THUMS	

United States	**Predictive Engineering** george.laird@predictiveengineering.com www.predictiveengineering.com			
	FEMAP	NX Nastran	LS-DYNA	LS-OPT
	LS-PrePost	LS-TaSC	LSTC Dummy Models	
			LSTC Barrier Models	

France	**DynaS+**		v.lapoujade@dynasplus.com	
	www.dynasplus.com		Oasys Suite	
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	DYNAFORM	VPG	MEDINA	
	LSTC Dummy Models		LSTC Barrier Models	

France	**DYNAmore France SAS**	sales@dynamore.eu	
	www.dynamore.eu		
	LS-DYNA, LS-OPT LS-PrePost	Primer	DYNAFORM
	DSDM Products	LSTC Dummy Models	FEMZIP
	LSTC Barrier Models	DIGIMAT	

Germany	**CADFEM GmbH**	lsdyna@cadfem.de	
	www.cadfem.de		
	ANSYS	LS-DYNA	optiSLang
	ESAComp	AnyBody	
	ANSYS/LS-DYNA		

Germany	**DYNAmore GmbH**		uli.franz@dynamore.de	
	www.dynamore.de			
	PRIMER	LS-DYNA	FTSS	VisualDoc
	LS-OPT	LS-PrePost	LS-TaSC	DYNAFORM
	Primer	FEMZIP	GENESIS	Oasys Suite
	TOYOTA THUMS		LSTC Dummy & Barrier Models	

The Netherlands	**Infinite Simulation Systems B.V**		j.mathijssen@infinite.nl	
	www.infinite.nl			
	ANSYS Products	CivilFem	CFX	Fluent
	LS-DYNA	LS-PrePost	LS-OPT	LS-TaSC

Italy	**EnginSoft SpA**		info@enginsoft.it	
	www.enginsoft.it			
	ANSYS	MAGMA	Flowmaster	FORGE
	CADfix	LS-DYNA	Dynaform	Sculptor
	ESAComp	AnyBody	FTI Software	
	AdvantEdge	Straus7	LMS Virtual.Lab	ModeFRONTIER

Russia	**STRELA**		info@dynarussia.com	
	LS-DYNA	LS-TaSC	LS-OPT	LS-PrePost
	LSTC Dummy Models		LSTC Barrier Models	
Sweden	**DYNAmore Nordic**		marcus.redhe@dynamore.se	
	www.dynamore.se		Oasys Suite	
	ANSA	µETA	LS-DYNA	LS-OPT
	LS-PrePost	LS-TaSC	FastFORM	DYNAform
	FormingSuite		LSTC Dummy Models	
			LSTC Barrier Models	
Switzerland	**DYNAmoreSwiss GmbH**		info@dynamore.ch	
	www.dynamore.ch			
	LS-DYNA		LS-OPT	LS-PrePost
	LS-TaSC		LSTC Dummy Models	
			LSTC Barrier Models	
UK	**Ove Arup & Partners**		dyna.sales@arup.com	
	www.oasys-software.com/dyna		TOYOTA THUMS	
	LS-DYNA		LS-OPT	LS-PrePost
	LS-TaSC	PRIMER	D3PLOT	T/HIS
	REPORTER	SHELL	FEMZIP	HYCRASH
	DIGIMAT	Simpleware	LSTC Dummy Models	
			LSTC Barrier Models	

China	**ETA – China**		lma@eta.com.cn	
	www.eta.com/cn			
	Inventium	VPG	DYNAFORM	NISA
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
			LSTC Barrier Models	LS-TaSC
China	**Oasys Ltd. China**		Stephen.zhao@arup.com	
	www.oasys-software.com/dyna			
	PRIMER D3PLOT	HYCRASH	T/HIS REPORTER	SHELL
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
	DIGIMAT	FEMZIP	LSTC Barrier Models	LS-TaSC
China	**Shanghai Hengstar Technology**		info@hengstar.com	
	www.hengstar.com			
	LS-DYNA	LS-TaSC	LSTC Barrier Models	D3VIEW
	LS-PrePOST	LS-OPT	LSTC Dummy Models	
	Genesis	VisualDoc		ELSDYNA
	Visual-Crahs DYNA	Visual-Proeces		DynaX & MadyX
	Enki Bonnet	Visual Environement		

India	**Oasys Ltd. India**		lavendra.singh@arup.com	
	www.oasys-software.com/dyna			
	PRIMER	D3PLOT	T/HIS	
			LS-OPT	LSTC Dummy Models	LS-PrePost
			LS-DYNA	LSTC Barrier Models	LS-TaSC

India	**CADFEM Eng. Svce**		info@cadfem.in	
	www.cadfem.in			
	ANSYS	VPS	ESAComp	optiSLang
	LS-DYNA	LS-OPT	LS-PrePost	

India	**Kaizenat Technologies Pvt. Ltd**		support@kaizenat.com	
	http://kaizenat.com /			
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
	Complete LS-DYNA suite of products		LSTC Barrier Models	LS-TaSC

Distribution/Consulting	Asia Pacific	Distribution/Consulting

Japan	**CTC**	LS-dyna@ctc-g.co.jp		
	www.engineering-eye.com			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	CmWAVE	

Japan	**JSOL**			
	www.jsol.co.jp/english/cae		Oasys Suite	
	JSTAMP	HYCRASH	JMAG	
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	TOYOTA THUMS	

Japan	**FUJITSU**			
	http://www.fujitsu.com/jp/solutions/business-technology/tc/sol/			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	CLOUD Services	

Japan	**LANCEMORE**	info@lancemore.jp		
	www.lancemore.jp/index_en.html			
	Consulting			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models		

Japan	**Terrabyte**	**English:**		
	www.terrabyte.co.jp	www.terrabyte.co.jp/english/index.htm		
	Consulting			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	AnyBody	

Korea	**THEME**	wschung@kornet.com		
	www.lsdyna.co.kr		Oasys Suite	
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	Planets
	eta/DYNAFORM	FormingSuite	Simblow	TrueGRID
	JSTAMP/NV	Scan IP	Scan FE	Scan CAD
	FEMZIP			

Korea	**KOSTECH**	young@kostech.co.kr		
	www.kostech.co.kr			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	FCM
	eta/DYNAFORM	DIGIMAT	Simuform	Simpack
	AxStream	TrueGrid	FEMZIP	

Taiwan	**APIC**			
	www.apic.com.tw			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	FCM

Contact: JSOL Corporation Engineering Technology Division cae-info@sci.jsol.co.jp

Cloud computing services
for
JSOL Corporation LS-DYNA users in Japan

JSOL Corporation is cooperating with chosen cloud computing services

JSOL Corporation, a Japanese LS-DYNA distributor for Japanese LS-DYNA customers.

LS-DYNA customers in industries / academia / consultancies are facing to the increase use of LS-DYNA more and more in recent years.

In calculations of optimization, robustness, statistical analysis, larger amount of LS-DYNA license in short term are required.

JSOL Corporation is cooperating with some cloud computing services for JSOL's LS-DYNA users and willing to provide large in short term license.

This service is offered to the customers by the additional price to existence on-premises license, which is relatively inexpensive than purchasing yearly license.

The following services are available (only in Japanese). HPC OnLine:

NEC Solution Innovators, Ltd.
http://jpn.nec.com/manufacture/machinery/hpc_online/

Focus
Foundation for Computational Science
http://www.j-focus.or.jp

Platform Computation Cloud
CreDist.Inc.
http://www.credist.co.jp /

PLEXUS CAE
Information Services International-Dentsu, Ltd. (ISID) https://portal.plexusplm.com/plexus-cae/

SCSK Corporation
http://www.scsk.jp/product/keyword/keyword07.html

Rescale Cloud Simulation Platform

www.rescale.com

Rescale: Cloud Simulation Platform

The Power of Simulation Innovation
We believe in the power of innovation. Engineering and science designs and ideas are limitless. So why should your hardware and software be limited? You shouldn't have to choose between expanding your simulations or saving time and budget.

Using the power of cloud technology combined with LS-DYNA allows you to:
· Accelerate complex simulations and fully explore the design space
· Optimize the analysis process with hourly software and hardware resources
· Leverage agile IT resources to provide flexibility and scalability

True On-Demand, Global Infrastructure
Teams are no longer in one location, country, or even continent. However, company data centers are often in one place, and everyone must connect in, regardless of office. For engineers across different regions, this can cause connection issues, wasted time, and product delays.

Rescale has strategic/technology partnerships with infrastructure and software providers to offer the following:
· Largest global hardware footprint – GPUs, Xeon Phi, InfiniBand
· Customizable configurations to meet every simulation demand
· Worldwide resource access provides industry-leading tools to every team
· Pay-per-use business model means you only pay for the resources you use
· True on-demand resources – no more queues

ScaleX Enterprise: Transform IT, Empower Engineers, Unleash Innovation
The ScaleX Enterprise simulation platform provides scalability and flexibility to companies while offering enterprise IT and management teams the opportunity to expand and empower their organizations.

ScaleX Enterprise allows enterprise companies to stay at the leading edge of computing technology while maximizing product design and accelerating the time to market by providing:

- Collaboration tools
- Administrative control
- API/Scheduler integration
- On-premise HPC integration

Industry-Leading Security

Rescale has built proprietary, industry-leading security solutions into the platform, meeting the needs of customers in the most demanding and competitive industries and markets.

- Manage engineering teams with user authentication and administrative controls
- Data is secure every step of the way with end-to-end data encryption
- Jobs run on isolated, kernel-encrypted, private clusters
- Data centers include biometric entry authentication
- Platforms routinely submit to independent external security audits

Rescale maintains key relationships to provide LS-DYNA on demand on a global scale. If you have a need to accelerate the simulation process and be an innovative leader, contact Rescale or the following partners to begin running LS-DYNA on Rescale's industry-leading cloud simulation platform.

LSTC - DYNAmore GmbH JSOL Corporation

Rescale, Inc. - 1-855-737-2253 (1-855-RESCALE) - info@rescale.com

944 Market St. #300, San Francisco, CA 94102 USA

ESI Cloud Based Virtual Engineering Solutions

www.esi-group.com/software-solutions/cloud-solutions/esi-cloud

ESI Cloud offers designers and engineers cloud-based computer aided engineering (CAE) solutions across physics and engineering disciplines.

ESI Cloud combines ESI's industry tested virtual engineering solutions integrated onto ESI's Cloud Platform with browser based modeling,

With ESI Cloud users can choose from two basic usage models:

- An end-to-end SaaS model: Where modeling, multi-physics solving, results visualization and collaboration are conducted in the cloud through a web browser.
- A Hybrid model: Where modeling is done on desktop with solve, visualization and collaboration done in the cloud through a web browser.

Virtual Performance Solution:

ESI Cloud offers ESI's flagship Virtual Performance Solution (VPS) for multi-domain performance simulation as a hybrid offering on its cloud platform. With this offering, users can harness the power of Virtual Performance Solution, leading multi-domain CAE solution for virtual engineering of crash, safety, comfort, NVH (noise, vibration and harshness), acoustics, stiffness and durability.

In this hybrid model, users utilize VPS on their desktop for modeling including geometry, meshing and simulation set up. ESI Cloud is then used for high performance computing with an integrated visualization and real time collaboration offering through a web browser.

The benefits of VPS hybrid on ESI Cloud include:

- Running large concurrent simulations on demand
- On demand access to scalable and secured cloud HPC resources
- Three tiered security strategy for your data
- Visualization of large simulation data sets
- Real-time browser based visualization and collaboration
- Time and cost reduction for data transfer between cloud and desktop environments
- Support, consulting and training services with ESI's engineering teams

ESI Cloud Based Virtual Engineering Solutions

www.esi-group.com/software-solutions/cloud-solutions/esi-cloud

VPS On Demand

ESI Cloud features the Virtual Performance Solution (VPS) enabling engineers to analyze and test products, components, parts or material used in different engineering domains including crash and high velocity impact, occupant safety, NVH and interior acoustics, static and dynamic load cases. The solution enables VPS users to overcome hardware limitations and to drastically reduce their simulation time by running on demand very large concurrent simulations that take advantage of the flexible nature of cloud computing.

Key solution capabilities:

- Access to various physics for multi-domain optimization
- Flexible hybrid model from desktop to cloud computing
- On demand provisioning of hardware resources
- Distributed parallel processing using MPI (Message Passing Interface) protocol
- Distributed parallel computing with 10 Gb/s high speed interconnects

Result visualization

ESI Cloud deploys both client-side and server-side rendering technologies. This enables the full interactivity needed during the simulation workflow along with the ability to handle large data generated for 3D result visualization in the browser, removing the need for time consuming data transfers. Additionally ESI Cloud visualization engine enables the comparisons of different results through a multiple window user interface design.

Key result visualization capabilities:

- CPU or GPU based client and server side rendering
- Mobility with desktop like performance through the browser
- 2D/3D VPS contour plots and animations
- Custom multi-window system for 2D plots and 3D contours
- Zooming, panning, rotating, and sectioning of multiple windows

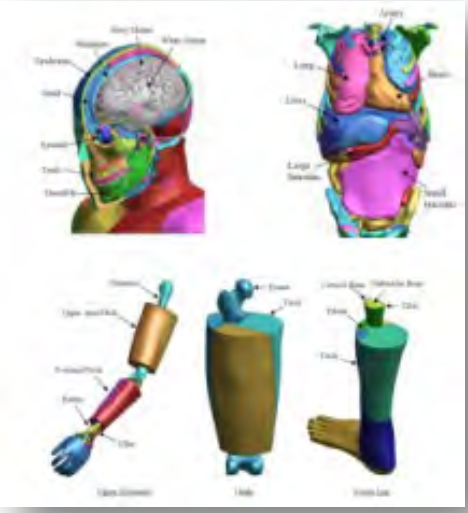
Collaboration

To enable real time multi-user and multi company collaboration, ESI Cloud offers extensive synchronous and asynchronous collaboration capabilities. Several users can view the same project, interact with the same model results, pass control from one to another. Any markups, discussions or annotations can be archived for future reference or be assigned as tasks to other members of the team.

Key collaboration capabilities:

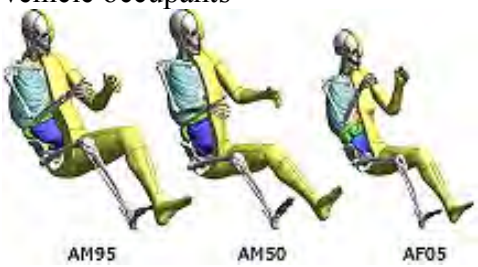
- Data, workflow or project asynchronous collaboration
- Multi-user, browser based collaboration for CAD, geometry, mesh and results models
- Real-time design review with notes, annotations and images archiving and retrieval
- Email invite to non ESI Cloud users for real time collaboration

TOYOTA - Total Human Model for Safety – THUMS

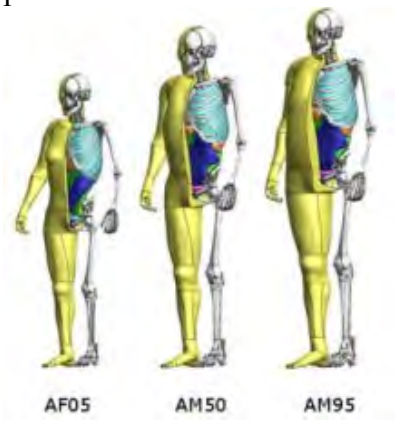


The Total Human Model for Safety, or THUMS®, is a joint development of Toyota Motor Corporation and Toyota Central R&D Labs. Unlike dummy models, which are simplified representation of humans, THUMS represents actual humans in detail, including the outer shape, but also bones, muscles, ligaments, tendons, and internal organs. Therefore, THUMS can be used in automotive crash simulations to identify safety problems and find their solutions.

Each of the different sized models is available as sitting model to represent vehicle occupants



and as standing model to represent pedestrians.



The internal organs were modeled based on high resolution CT-scans.

THUMS is limited to civilian use and may under no circumstances be used in military applications.

LSTC is the US distributor for THUMS. Commercial and academic licenses are available.

For information please contact:
THUMS@lstc.com

THUMS®, is a registered trademark of Toyota Central R&D Labs.

LSTC – Dummy Models

LSTC Crash Test Dummies (ATD)

Meeting the need of their LS-DYNA users for an affordable crash test dummy (ATD), LSTC offers the LSTC developed dummies at no cost to LS-DYNA users.

LSTC continues development on the LSTC Dummy models with the help and support of their customers. Some of the models are joint developments with their partners.

e-mail to: atds@lstc.com

Models completed and available (in at least an alpha version)

- Hybrid III Rigid-FE Adults
- Hybrid III 50th percentile FAST
- Hybrid III 5th percentile detailed
- Hybrid III 50th percentile detailed
- Hybrid III 50th percentile standing
- EuroSID 2
- EuroSID 2re
- SID-IIs Revision D
- USSID
- Free Motion Headform
- Pedestrian Legform Impactors

Models In Development

- Hybrid III 95th percentile detailed
- Hybrid III 3-year-old
- Hybrid II
- WorldSID 50th percentile
- THOR NT FAST
- Ejection Mitigation Headform

Planned Models

- FAA Hybrid III
- FAST version of THOR NT
- FAST version of EuroSID 2
- FAST version of EuroSID 2re
- Pedestrian Headforms
- Q-Series Child Dummies
- FLEX-PLI

LSTC – Barrier Models

Meeting the need of their LS-DYNA users for affordable barrier models, LSTC offers the LSTC developed barrier models at no cost to LS-DYNA users.

LSTC offers several Offset Deformable Barrier (ODB) and Movable Deformable Barrier (MDB) models:

- ODB modeled with shell elements
- ODB modeled with solid elements
- ODB modeled with a combination of shell and solid elements

- MDB according to FMVSS 214 modeled with shell elements
- MDB according to FMVSS 214 modeled with solid elements
- MDB according to ECE R-95 modeled with shell elements
- AE-MDB modeled with shell elements

- IIHS MDB modeled with shell elements
- IIHS MDB modeled with solid elements
- RCAR bumper barrier

- RMDB modeled with shell and solid elements

e-mail to: atds@lstc.com.

 **FACEBOOK**

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 **NEWS FEEDS** ETA:

YOUTUBE

YOUTUBE Channel	WebSite URL
BETA CAE SYSTEMS SA	www.beta-cae.gr
CADFEM	www.cadfem.de
Cray Inc.	www.cray.com
ESI Group	www.esi-group.com
ETA	www.eta.com
Lancemore	www.lancemore.jp/index_en.html
Lenovo	

Recent Developments, Features, Updates, News, Presentations

LS-DYNA and LS-DYNA's, fully integrated, strongly coupled, solvers

The purpose of the following section is to provide an updated news section regarding LS-DYNA and LS-DYNA's, fully integrated, strongly coupled, solvers for extensive multiphysics capabilities.

All LS-DYNA Solvers are strongly coupled and integrated.

July Presentation

Recent Developments for Laminates and TSHELL Forming

Xinhai Zhu, Li Zhang, Yuzhong Xiao
LSTC

Recent Developments for Laminates and TSHELL Forming

Xinhai Zhu, Li Zhang, Yuzhong Xiao
LSTC

INTRODUCTION

New features have been developed for forming of laminates and TSHELL (thick shell elements). Specifically, mesh adaptivity, 2D and 3D trimming are now available for laminates; 2D trimming is now available for TSHELL.

Laminates, also called "sandwiched" part, is defined as a core of solid elements, sandwiched on both top and bottom surface by a layer of thin shell elements. Both solids and shells share the same node at the solid and shell interface. In this article, the mesh adaptivity is applicable to only one layer of solid elements while 2D and 3D trimmings are developed for both adaptive-meshed laminates and multiple layers of non-adaptive-meshed laminates.

Thick shell elements (*SECTION_TSHELL) have only one layer of solid elements but can have many through the thickness integration points.

MAIN FEATURES/EXAMPLES

2D and 3D trimming of laminates:

Trimming curve preparation, file inclusion

The requirement for trimming curves definition for laminates in case of 3D trimming is different from that of shell trimming. The trim curve should be projected onto either the top or bottom layer of shells to enable a successful trimming resulting in a smooth trim edge. This is especially true if wrinkles are present in the panels to be trimmed. *LS-PrePost* can be used to project the curves to the part, via menu option: *GeoTol → Project → Closest proj → Project to Element*. Either top or bottom side of the part can be selected as "*Element*" *by part*. The curves may need to be refined with more points before projection, using *LS-PrePost* menu option: *Curves → Method: Respace → By number*. Sufficient number of points may be entered to capture the sheet metal surface contour.

2D and 3D trimming of non-adaptive-meshed laminates

2D and 3D trimming of non-adaptive-meshed laminates are available starting in Revision 92289. Trimming of the laminates can have multiple layers of solid elements, sandwiched by a top and a bottom layer of shell elements. The input deck is similar to those used for trimming of solid elements, except the variable ITYP under *CONTROL_FORMING_TRIMMING should be set to "1" to activate the trimming of laminates in both 2D and 3D conditions:

```
*CONTROL_FORMING_TRIMMING
$---+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
$     PSID                ITYP
```

```
&blksid                  1
```

Again, in the case of 3-D trimming, the projection of trim curves onto either the top or bottom surface of the blank is important to ensure a successful trim with smooth edge.

2D and 3D trimming of adaptive-meshed laminates

2D and 3D trimming of adaptive-meshed laminates are available starting in Revision 108770. Trimming of the laminates is limited to one layer of solid elements, sandwiched by a top and a bottom layer of shell elements.

Note elements are refined automatically along the trim curves (Figure 1) until no slave nodes would be cut by the trim curves. In addition, *CONTROL_ADAPTIVE_CURVE cannot be used, since it is only applied to shell elements, and will cause error termination.

Unlike the mesh refinement along the trim curve during shell element trimming, this trimming requires no additional adaptivity-related keyword inputs (as it is done automatically). An example of the 3D trimming on the 2005 NUMISHEET Cross Member is shown in Figure 1.

Again, in the case of 3D trimming, the projection of trim curves onto either the top or bottom surface of the blank is important to ensure a smooth and successful trim.

In summary:

1) Trimming input files for laminates and shells are different in a few ways. For laminates, in addition to setting the ITYP=1 in *CONTROL_FORMING_TRIMMING, both *SECTION_SHELL and *SECTION_SOLID need to be defined.
2) Adaptive-meshed sandwiched parts (limit to a core of one layer of solid elements with outer layers of shell elements) can be 2D or 3D trimmed with adaptive mesh refinement along the trim curves.
3) Non-adaptive-meshed sandwiched parts (a core of multiple layers of solid elements with outer layers of shell elements) can be 2D and 3D trimmed.
4) Only dynain file is written out (no d3plot files will be output), and finally, *INCLUDE_TRIM (not *INCLUDE) is to be used.
5) In the case of 3D trimming, the projection of trim curves onto either the top or bottom surface of the blank is important to ensure a smooth and successful trim.

2D trimming of thick shell elements (TSHELL):

2D trimming of TSHELL is supported starting from Revision 107957. Note by definition, TSHELL has only one layer of solid elements, and is defined by keyword *SECTION_TSHELL. Note also *INCLUDE_TRIM (not *INCLUDE) must be used to include the dynain file to be trimmed.

Input deck for 2D trimming of TSHELL is similar to what is used for trimming of shell elements. An example is shown in Figure 2.

Adaptive refinement of laminates:

Starting in Rev 104365 this feature is available in both SMP and MPP versions. Currently mesh adaptivity is limited to only one layer of solid element with mesh refinements in-plane on both solids and shells.

In a typical forming set up, the following cards need to be changed to activate the sandwiched part mesh adaptivity:

```
*CONTROL_ADAPTIVE
$# adpfreq    adptol    adpopt    maxlvl    tbirth    tdeath     lcadp    ioflag
   &adpfq 4.0000E+00         1         4     0.0001.0000E+20         0         0
$# adpsize    adpass    ireflg    adpene     adpth    memory    orient     maxel
   0.90000         1            10.00000     0.000         0         0         0
$# ladpn90    ladpgh    ncfred    ladpcl    adpctl    cbirth    cdeath     lclvl
        -1         0         0         1     0.000     0.0001.0000E+20         0
$                                                                        IFSAND
                                                                              1

*PART
One mid-core layer of solid elements
$       PID     SECID       MID     EOSID      HGID      GRAV    ADPOPT      TMID
          1         1         1                                       1
Top layer of shell elements
        100       100         1                                       1
Bottom layer of shell elements
        101       100         1                                       1
```

Note “IFSAND” in *CONTROL_ADAPTIVE is set to “1” to activate the sandwich part adaptivity; ADPOPT under *PART are all set to “1” to activate both solid and shell adaptivity. An example of the adapted mesh after forming is shown in Figure 3.

Update on solid element trimming:

Starting in Revision 104362, solid trimming of double-attached parts (“two-out”) is available. Both seed point coordinates can be specified in *DEFINE_TRIM_SEED_POINT_ COORDINATES to define a seed coordinate for each part, as shown below:

```
*DEFINE_TRIM_SEED_POINT_COORDINATES
$    NSEED        X1        Y1        Z1        X2        Y2        Z2
         2  -184.565    84.755    78.392  -1038.41   119.154    78.375
```

An example of such application is shown in Figure 4.

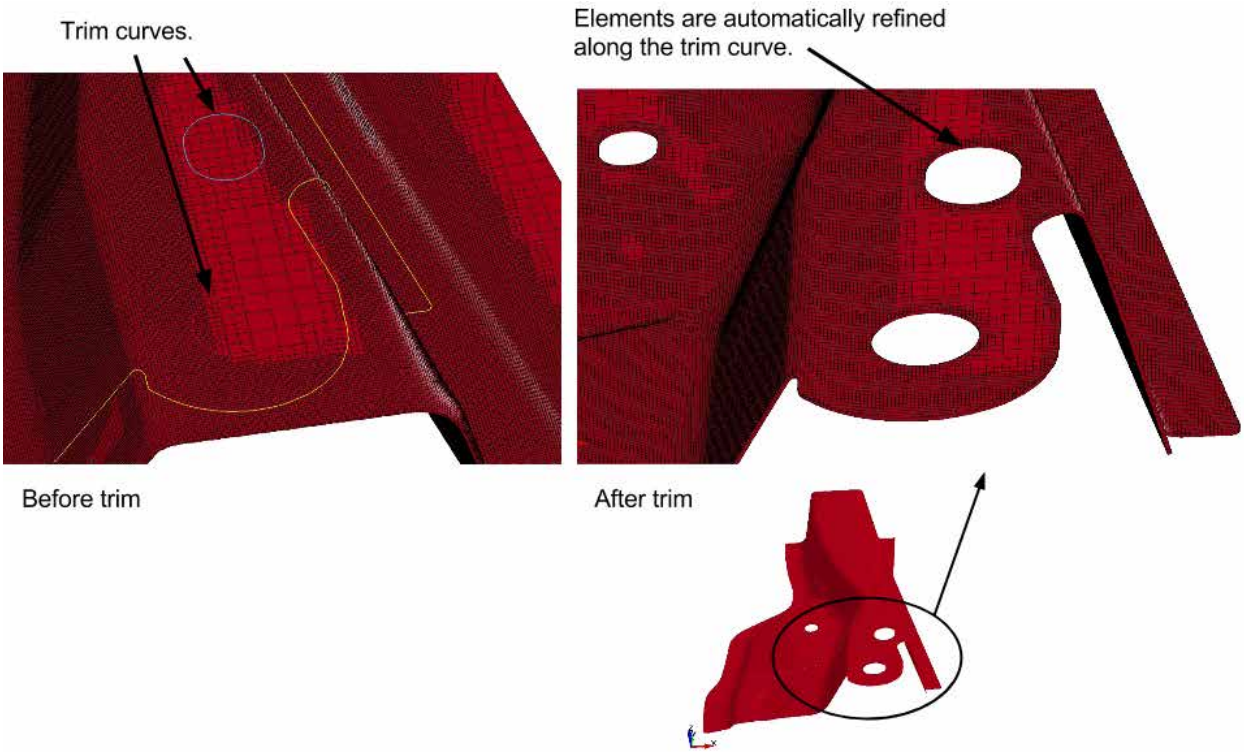

Figure 1. 3D trimming of adaptive-meshed laminates on the 2005 NUMISHEET Crossmember.

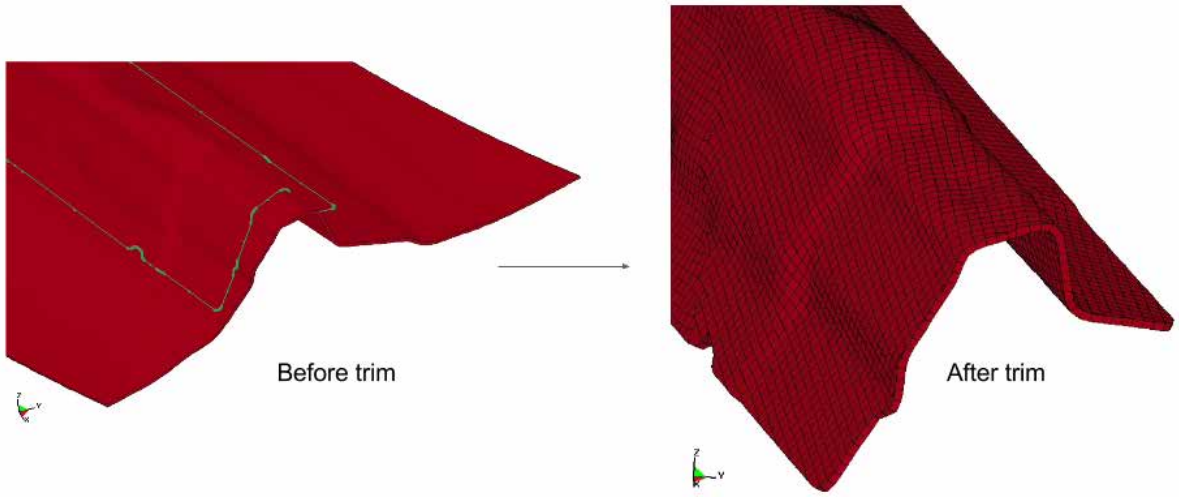

Figure 2. 2D trimming of TSHELL (part shape courtesy of J-Sol).

Figure 3. Adaptive mesh refinement of laminates (2005 NUMISHEET Crossmember).

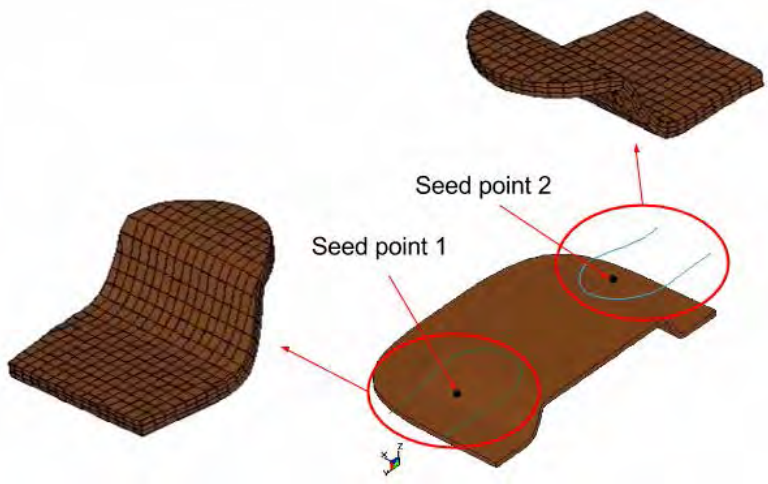

Figure 3. Solid trimming of doubly-attached parts (2-outs).