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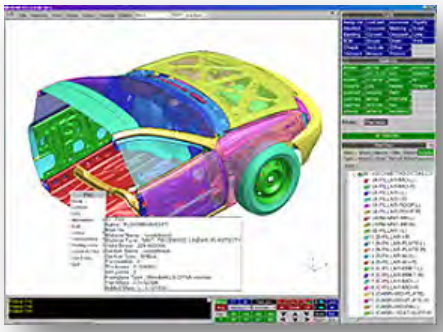
feaINFORMATION Engineering Solutions

Volume 5, Issue 03, March 2016

2016 THUMS USA Users' Meeting

Oasys 13.0 Software Suite



ESI Cloud Based Virtual Engineering Solutions

All-New 2017 Ford F-150 Raptor Race Truck

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

logo courtesy - Lancemore


BETA
CAE Systems SA


CRAY


eta


JSOL


恒士达科技
Hengstar Tech.


Oasys
The Software House of Arup


rescale


DELL

FEA Information News Sections

A new class being offered at the - 14th International LS-DYNA Conference

Airbag Folding and Morphing One Day Class – 14th Int'l LS-DYNA Conference

A new area in the FEA Information Engineering News:

Recommendations from the LS-DYNA Group – hosted by James Kennedy, KBS2

The 2016 THUMS USA Users' Meeting

To be held after the 14th International LS-DYNA Conference

Among the Papers at the 14th International LS-DYNA Conference & the presenter

- LS-DYNA Simulation of Blast Load Reduction on Walls with Foamed Concrete Insulation Boards - Jack Shi - Zodiac Aerospace
- Crash Testing and Simulation of a Cessna 172 Aircraft: Pitch Up Impact Onto Soft Soil Edwin L. Fasanella - NASA
- Crash Testing and Simulation of a Cessna 172 Aircraft: Hard Landing Onto Concrete - Karen E. Jackson - NASA
- Vehicle Seat Bottom Cushion Clip Force Study for FMVSS No. 207 Requirements - Jaehyuk Jang - GM
- Application of the Discrete Elements Method to Frequency Analysis and Use of the "Bond" Method for Fracture Modeling - Tess Legaud - DynaS+
- Battery Abuse Case Study Analysis Using LS-DYNA - James Marcicki - Ford
- Test and Numerical Simulation of Fixed Bollard and Removable Bollard Subjected to Vehicle Impact - Choon-Keat Ang - Prostruct Consulting Pte. Ltd.

Horse News, From Livermore Horses, Livermore, CA

Over The Top – Equestrian Group

On the left is my wonderful pony CODY with her rider for the day Tay

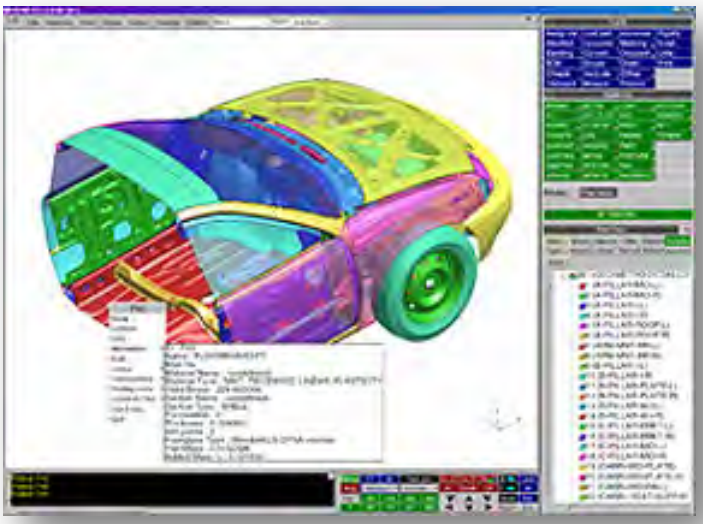
Standing – Cody's horse trainer Kylee McKee

Sincerely,

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

Oasys 13.0 Software Suite – Primer - D3PLOT – T/HIS - Reporter

www.oasys-software.com/dyna/en/software/oasys_13.shtml



Oasys 13.0 Software Suite

Oasys 13.0 is the latest version of our Oasys Software Suite for pre- and post-processing of LS-DYNA models.

Following the success of Oasys Suite version 12.1 this new version provides the user with a variety of new tools to help reduce the amount of time spent pre- and post- processing a model.

OASYS Primer pre-processor is designed to make preparation and modification of LS-DYNA models as fast and as simple as possible, improving user productivity and efficiency and reducing the time spent manipulating and developing models suitable for LS-DYNA.

This new version of Oasys PRIMER includes a number of new features such as:

- Support for LS-DYNA R8.0 keywords
- Checking of models, and various other core features are now much quicker.
- Improved BOM feature, including the ability to write images to a BOM.
- Redesigned connection creation panel to improve work flow.
- Bespoke, user defined bolted connections that can be easily applied in multiple locations in the model automatically.
- Ability to compare connection information across models easily.
- Exploded view.
- Deletion added to a number of places, and a general “undo” button has also been added (applies to all deletion).
- Improvements to Dyna Dummy Positioning:
    - Improved work flow.
    - Better handling of encrypted dummy models.
    - Ability to unlock occupant from H-point during positioning

- New element quality measures.
- "Only" button added to all edit panels to allow easier model investigations and visualisation.
- Reading of JT files has been added.
- New customisable mouse controls to allow quicker creation of entities.
- Various pedestrian markup/model build improvements.
- Made it easier to save settings and preferences from various panels.
- Added the ability to specify includes ranges for particular entity types.
- Added various new node selection methods (free edge, nodes round hole).
- Added ability to reorder include files in the model according to include name.
- Support for all keywords up to and including LS-DYNA R8.
- Seatbelt fitting improvements:
  - *PARAMETER created to hold the length of each belt segment after fitting.
  - Make fitting a seatbelt round a child dummy in a seat easier.
  - Mesh belt round a small radius as an alternative to using a slip-ring.
  - General bug fixing.

For more information and the above new features, please see the detailed PDF.

Oasys D3PLOT is a 3D visualisation and interrogation package for post-processing the results of LS-DYNA analyses. This new version of Oasys D3PLOT includes a number of new features such as:

Multiple Data Components

- Multiple components can be plotted simultaneously
- Different plotting modes can be can be set for each entity type
- Components can be turned on/off for each entity type

Composite Models

- It is easier to post-process models with *ELEMENT_SHELL_COMPOSITE
- Data can be plotted on a per ply basis
- The local axis (as defined by the beta angle) can be visualised
- Plys and layups can be blanked/unblanked and viewed in the part tree

Write Menu

- The output from the WRITE menu is now output to a table
- Data from up to 10 components can be output at a time
- The data can be sorted into ascending or descending order by clicking on column headers
- The data can be written out in text, CSV or XLSX (Excel) format
- Entities can be (un)blanked/sketched/only'd by right-clicking on the rows in the table
- The data can be copied to the clipboard and pasted in external programmes

New Data Components

- Wear Depth and Sliding Distance from the CTF (interface force) file
- Nodal Normal Velocity from the D3ACS (Acoustic FEM) file
- Pressure and Sound Pressure from the D3ATV (Acoustic Transfer Vector) file
- Current Coordinates can be contour plotted. Previously they were only availble in the WRITE and XY_DATA menus

Data Mapping

- Results from single point elements (Airbag Particles, DES and SPH) can now be contoured over a continuous mesh.
- D3PLOT creates a cellular mesh around the volume of space occupied by the elements and aggregates data from the elements in each cell into a single values. This is then used as a basis for contouring.
- It can give a much clearer view of the overall behaviour of the elements.

Changes to Spotwelds

- Spotweld data can be displayed either on the spotweld entity or the underlying structural elements.
- By default spotwelds are always drawn and data plotted on them.

New JavaScript functions:

- GetMultipleData() to extract results for a range of items in a single call
- GetPlyIntPoint() returns the integration point of a composite ply in a shell
- GetElemsInPly() returns a list of the elements in a composite ply
- GetPlysInLayup() returns a list of the composite plys in a composite layup

Miscellaneous additions:

- An option has been added to the XY DATA menu to set whether to extract data from a frequency domain analysis as magnitude or magnitude * cos(phase + phi)
- In a D3PLOT-T/HIS link session the current time in D3PLOT can be displayed on a curve created using the COMbine operation as a point.
- Options have been added to the MEASURE menu to measure the shortest distance from a node to a part and between two parts.
- An option has been added to exclude parts being blanked by cut-sections.
- Individual files (family members) can now be any size up to 9 Exawords.

For more information and the above new features, please see the detailed PDF.

Oasys 13.0 Software Suite – Primer - D3PLOT – T/HIS - Reporter

www.oasys-software.com/dyna/en/software/oasys_13.shtml

Oasys T/HIS is an XY data plotting package designed primarily for use with LS-DYNA. It can read both the ASCII and binary results produced by LS-DYNA and basic CSV files.

This new version of Oasys T/HIS includes a number of new features such as:

- ATAN2 Math Operation JavaScript ATAN2 Function
- Added Triaxiality Factor component for Solids, Shells and Thick Shells
- Fast-TCF datum command to remove a datume line from graphs
- Fast-TCF command to set a user defined model prefix
- Fast-TCF command to add parts to a part group
- Added support for reading curves written to the CURVOUT_ASCII file
- Added support for reading the Multi-Physics Database ASCII files: ICFD_NODOUT, ICFD_POINTOUT, CESE_ELOUT, CESE_POINTOUT, EM_ELOUT, EM_NODOUT, EM_POINTOUT
- Added Airbag LSDA data components Translational KE, Inflator Energy and Heat Convection Energy
- Added CPM Sensor ASCII data component N Particles

For more information and the above new features, please see the detailed PDF.

Oasys REPORTER is a program that enables fast and convenient post-processing of LS-DYNA results through the use of templates and scripts. This new version of Oasys REPORTER includes a number of new features such as:

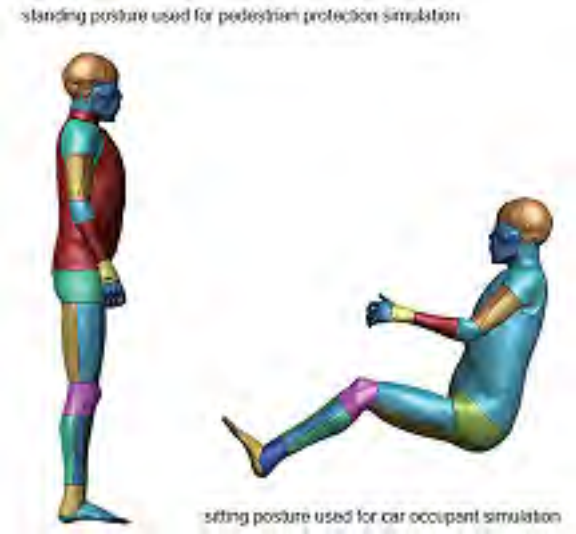
Tables are now included in the numbering of generated items on a page

- Variables can now be marked as 'temporary'.
- All temporary variables can be deleted at any point to 'clean' the template.
- Images in ImageFile, D3PLOT, T/HIS and PRIMER objects can now be justified
- The aspect ratio or size of images created in D3PLOT, T/HIS and PRIMER can now be controlled
- Files or directories can now be dragged into a template to generate a report
- Several JavaScript API additions

For more information and the above new features, please see the detailed PDF.

The 2016 THUMS USA Users' Meeting

http://ls-dyna.jsol.co.jp/en/thums/thums_um2016.html



JSOL is delighted to announce The 2016 THUMS USA Users' Meeting.

THUMS, the Total Human Model for Safety for use with LS-DYNA® is being rapidly adopted by users worldwide. A Finite Element model (FEM) jointly developed by Toyota Motor Corporation and Toyota Central R&D Labs., Inc.The model aims to simulate "human body kinematics" and "injury on human body" in response to a large impact in a car crash and so on.

We invite you to join us and share in THUMS technical information.
"The 2016 THUMS USA Users' Meeting" Being held after, The 14th LS-DYNA® International Users' Conference

Organizer: JSOL Corporation
Date: June 15th(Wed), 2016
Location: Detroit (Michigan, USA)
Participation: THUMS users. Customers who are interested in THUMS.
Venue: Edward Village Michigan
(Formerly Adoba Hotel
Dearborn / Detroit)
600 Town Center Dr.
Dearborn, MI 48126
URL: www.hotel-dearborn.com/
Reg. Fee: Free
Expected number of participants: Apprx. 50

What is THUMS? A Finite Element model (FEM) jointly developed by Toyota Motor Corporation and Toyota Central R&D Labs., Inc.The model aims to simulate "human body kinematics" and "injury on human body" in response to a large impact in a car crash and so on.

The Total Human Model for Safety ("THUMS") is the human body model for injury analysis.. The geometries of the structurally complex human body parts including the head, torso, joints and organs are represented by FE meshes. Their material properties refer the list in papers or documents and are compared with component tests listed in papers or documents for validation.THUMS is used by engineers the world over and contribute to the safety improvement of human body.

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, 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.

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

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

By Marnie Azadian

FEA Information Engineering Solutions Particpants' Sponsoring the conference

Booth	Company	URL
100	Engineering Technologies Associates (ETA)	www.eta.com
101	ARUP	www.oasys-software.com/dyna/en/
105	Rescale	www.rescale.com
107	JSOL	www.jsol.co.jp/english/cae
201	BETA CAE Systems USA, Inc.	www.beta-cae.gr
301	Predictive Engineering Associates	www.predictiveengineering.com
304	CRAY	www.cray.com
305	ESI North America	www.esi-group.com
400	LSTC & DYNAmore	www.lstc.com www.dynamore.de
401	FEA Information Inc.	www.feainformation.com

FEA Information Inc. and co-sponsors are hosting the on June 12th.

Appetizers, Soda/Beer/Wine will be served.

Come and join us for fun and an opportunity to socialize with your fellow conference attendees.

US	DYNAMAX	Bruce Zhang	bruce@dynamax-inc.com
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Germany	DYNAmore Gmbh	Uli Franz	Uli.franz@dynamore.de
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China	Hengstar	Honsheng Lu	hongsheng@hengstar.com
China	Arup		
India	Kaizenat Technologies Pvt. Ltd.	Ramesh Venkatesan	ramesh@kaizenat.com
India	Oasys Ltd. India	Lavendra Singh	Lavendra.singh@arup.com
S. Korea	THEME Engineering	Woosik Chung	wschung@kornet.net
S. Korea	KOSTECH	Hyung-Joo Lee (James Lee)	leehjoo@kostech.co.kr
Sweden	DYNAmore Nordic	Marcus Redhe	marcus.redhe@dynamore.se
UK	Oasys, Ltd.		

One Day Pre Conference - Airbag Folding and Morphing Class

Sunday, June 12th - Limited Space - fee $300
Reserve now! Contact class@lstc.com
Subject line: Airbag Folding and Morphing
Registration on line will be available Monday, March 7th

Airbag Folding and Morphing

Airbags come in different shapes and sizes and are utilized to prevent injury to occupants in a vehicle. Some of the bags are currently standard in Vehicles are, Driver, Passenger, Side, Roof Rail and Knee Airbags. Bags have to meet both performance and packaging criteria to be fit into interior trim compartments. Folding of these bags into tight spaces without affecting their behavior is important for both OEMs and Airbag manufacturers. Folding can be carried out using PreProcessors or by running a LS-Dyna simulation. Simulation based folding is gaining foothold in complex folding patterns and crush folding of bags. LS-Prepost has both Pre-Processor based folding and has recently added an interface for Simulation based folding called DynFold.

Folding using either of these methods can cause some elements to shrink or get severely distorted. To avoid this and to make sure the bag shape and volume is retained LS-Dyna utilizes reference geometry. By changing the reference geometry of the bag its volume and shape can be changed. This can help in making quick studies on bag deployment and interaction with the Occupant. LS-Prepost has morphing capabilities that have been adapted to change the Shape of reference geometries.

Length of class will be 1 day. Introduction of folding methods followed by hands-on workshops. Prior knowledge of LS-DYNA and LS-PREPOST will help students focus on learning folding techniques.

This class will introduce

- Preprocessor Based Folding
  - Thin, Thick, Tuck and Spiral Folding Patterns
- DynFold for Simulation Based folding
  - SPC, Rollers, Tuck folds, Crush Folding, Zig-Zag folding
- Morphing methods
  - RRAB and PAB

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 Nordic Open Meeting
Gothenburg, Sweden
April 5, 2016
Lindholmen Conference Center & Science Park
Gothenburg, Sweden
hosted by BETA CAE Nordic

BETA CAE Open Meeting Korea
May 10, 2016
InterContinental Seoul COEX
Seoul, S. Korea
hosted by Hankook AAC

BETA CAE Open Meeting Turkey
June 3, 2016
Byotell - Istanbul, Turkey
hosted by A-Z Tech

BETA CAE Open Meeting - Italy
June 28, 2016
NH Torino Lingotto Tech
Torino, Italy
hosted by BETA CAE Italy

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

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

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

LS-DYNA Recommendations - LS-DYNA Group

Author: James Kennedy, KBS2 jmk@kbs2.com

Extrapolation and interpolation

Some notes that may be of interest on extrapolation and interpolation:
[http://blog2.d3view.com/curve-extrapolation/]

Polymer material law for simulation:

A paper which offers comments on selecting a polymer material law for simulation:

Lobo, H., and Hurtado, J.A., "Characterization and Modeling of Non-Linear Behavior of Plastics", DatapointLabs, Ithaca, New York, 2006.
[www.testpaks.com/Lobo-Hurtado/Lobo-Hurtado_paper.html]

***MAT_089 as a substitute for the *MAT_024**

The pros and cons of *MAT_089 as a substitute for the *MAT_024 model and the value conferred by its flexibility were investigated:

Lobo, H., "Methodology for Selection of Material Models for Plastic Impact Simulation", DatapointLabs, Ithaca, New York, 2007.
[www.testpaks.com/LS-Dyna07/LS-Dyna07_paper.htm]
[www.datapointlabs.com/TestPakDetails.asp?TestPakId=164]

Tutorials on how to access results from nodout:

[www.lstc.com/lspp/content/pages/1/ascii/ascii.shtml]
[www.lstc.com/lspp/content/tutorials/9/t9p3.shtml]

Tutorial on how to get history plots from d3plot:

[www.lstc.com/lspp/content/pages/1/history/history.shtml]

Rescale Cloud HPC - Manor Racing

This article was written by Rescale. www.rescale.com

Manor Racing Partners with Rescale Cloud HPC For Trackside Simulation Advantage
Rescale - March 16, 2016

San Francisco, CA – Manor Racing is partnering with San Francisco based Rescale as a key technology provider for its 2016 FIA Formula 1 World Championship challenge.

Manor Racing will use Rescale's cloud high performance computing (HPC) platform to enable trackside simulation on a whole new scale for the team. Working in tandem with Manor Racing's existing race strategy simulation software, the Rescale cloud HPC platform will enable its engineers to evaluate thousands of simulations and strategies, placing the team to be at the cutting edge of innovative decision making during a Grand Prix weekend.

The whole process is executed from a laptop web browser by Rescale's massively scalable cloud infrastructure and computer environment.

Dave Ryan, Racing Director: "We're aiming for steady progress up the grid in the seasons ahead and our new partnership with Rescale is key to helping us engineer that transformation. It's all about optimization and the areas of mathematical modelling and computational fluid dynamics (CFD) can help provide rapid growth and constant evolution. Evaluating results in real-time using Rescale's cloud HPC platform gives us a real breakthrough in our simulation capabilities, and without adding weight to our trackside infrastructure."

Pascal Wehrlein (GER) Manor Racing MRT05. 18.03.2016.
Formula 1 World Championship, Rd 1, Australian Grand Prix, Albert Park, Melbourne, Australia, Practice

The Rescale team have quickly understood the complexity of Formula 1 racing, where every thousandth of a second counts.

Rescale CEO Joris Poort: “Using the Rescale platform requires zero IT footprint trackside. With just a laptop and an internet connection, Manor Racing has a global computer platform at their fingertips to provide a strong competitive edge in simulation. By using Rescale’s cloud HPC during the race in real-time, the engineer is provided with an equivalent of a semi-truck full of computers, instantly deployed from their laptop. Putting in place a physical high performance compute cluster would have cost millions of dollars in upfront capital investment.”

Joris calls the partnership between Rescale and Manor Racing a perfect match. “The cloud market is moving at the speed of Formula 1. We are continually challenging ourselves to enable our customers to achieve better results faster by leveraging and deploying the latest technologies in computing hardware and simulation software to the industry leaders. We are now doing this with Manor Racing and not only deploying cutting edge technology, but also technology that delivers direct and tangible results through the sport. It’s very exciting for all of us.”

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 www.rescale.com

About Manor Racing: Manor Racing is small but is aiming to fight big in 2016. The team has new blood alongside Manor Racing’s loyal pros. All drawn to a love of Formula 1’s original essence. Formula One is the sum of countless components – mechanical and mental. It requires mental agility – swift problem solving. It requires mental strength – battling past challenges and disappointments. For Manor Racing it is about meticulous attention to detail, eking out every single opportunity to close every single gap. Car and driver, factory and team. All spurred by imagining what might just be possible. It has partnered Mercedes-Benz for race power and Williams for transmission. New owners have put Manor Racing back on track – literally and figuratively – with solid planning and sound investment. It is in good shape, ready to compete, ready to race.

MANOR RACING MEDIA ¦ Tracy Novak, , tracy.novak@manorracing.com
RESCALE MEDIA ¦ Zack Smocha, zack@rescale.com

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

Announcement and invitation to present a paper

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

14th International LS-DYNA Users Conference

Welcome The conference will host a forum for engineers, professors, students, consultants, industry leaders, and interested parties to exchange their ideas, and listen to the latest in industry and academic presentations..

Corporate Participation: Platinum, Gold, Silver, Bronze

Conference Dates

Sunday, June 12th

- **Pre Conference Classes**
- Registration
- Exhibition Area,
- Reception

Monday, June 13th

- Registration,
- Conference,
- Banquet

Tuesday, June 14, 2016.

- Registration,
- Conference
- Closing session - about 3pm

Wednesday, June 15 & Thursday, June 16

- 1& 2-day Training at U-M Dearborn

Contact Information

Abstracts & papers:
papers@lstc.com

Participation, Registration:
Marsha Victory
vic@lstc.com

Oasys LS-DYNA 9th Annual Update Meetings in India

Pune – Tuesday, 26th April 2016 – The Le Méridien Pune, Raja Bahadur Mill Road,Pune-411001

Bangalore – Thursday, 28th April 2016 – The Zuri Whitefield, ITPL Road, Whitefield, Bangalore- 560 048.

Oasys Ltd and Arup India Pvt Ltd are pleased to announce the 9th Oasys LS-DYNA Update meetings in India for the year 2016. First meeting shall be held at Pune on Tuesday 26th April 2016 at The Le Méridien and second meeting shall be held at Bangalore on Thursday 28th April 2016 at The Zuri Whitefield.

Each of these is a full day free of charge event covering both LS-DYNA and Oasys software and is a perfect opportunity to find out about current and future developments and how the software are being used in the engineering community.

The presentations will mainly cover LS-DYNA updates by LSTC, Oasys suite updates by Arup & technical lectures by Arup, LSTC and Industry.

Detailed agenda is available on our website http://www.oasys-software.com/dyna/en/events/ .

Registration

Please send your registration to this event by email to india.support@arup.com with your name(First Name, Last Name), company/affiliation, telephone number and your choice for the location of event.

Last date for registration is 18th April,2016.

Venue

Pune will be held at The Le Méridien hotel, which is situated in the heart of the city.

The Le Méridien hotel Hotel
Raja Bahadur Mill Road, Sangamvadi, Pune, Maharashtra-411001 India
Tel: 91-20- 6641 1111

Bangalore will be held at The Zuri, Whitefield, which is quite close to international Tech park, Bangalore.

The Zuri Whitefield
ITPL Road, Whitefield, Bangalore - 560 048
India
Tel: +91-806-665-7272

If you plan to stay over before or after the event, we are pleased to confirm that we have negotiated a special rate for attendees of the Oasys LS-DYNA Update meeting. Please contact us for assistance.

Contact Details: If you have any queries regarding this event you can contact:

Mr. Asif Ali - Arup India Pvt Ltd
Plot No. 39, Ananth Info Park, HiTec City-Phase 2
Madhapur, Hyderabad-500081,India
Tel: +91 (0) 40 44369797/8
Email: india.support@arup.com

CRAY – I/O Accelerator Boosts MSC Nastran Simulations

www.cray.com/blog/io-accelerator-boosts-msc-nastran-simulations/ **For article Graphics**

From the website of Cray - March 21, 2016 by Greg Clifford

MSC Nastran is a widely used structural analysis applications, especially for large modal analysis (i.e., eigenvalue) simulations. It requires a high-capability I/O system for good throughput performance. However, good I/O performance on a cluster architecture can be a challenge, since clusters are often configured to maximize compute scalability and have relatively weak I/O capability per node.

To address this challenge, Cray introduced the Cray® DataWarp™ I/O acceleration capability, offered in Cray® XC40™ supercomputers. The DataWarp applications I/O accelerator leverages features of the Cray Linux® environment, solid-state storage (SSD) and the Cray high-speed network to enable high-performance I/O at every node in the system without the need for SSDs on every node. The DataWarp accelerator also works with the underlying parallel file system (e.g., Lustre®) to automatically stage data in/out of the flash storage tier as jobs begin and end.

Unlike computational fluid dynamics and explicit structural applications (e.g., crash simulations), most implicit structural simulations do not scale to hundreds of cores, and I/O performance is critical. In this post I'll share the results of a recent test that put Cray's DataWarp technology to work on a large MSC Nastran simulation.

Improved I/O performance for NVH: This example is based on an MSC Nastran "noise, vibration and harshness" (NVH) simulation of an automotive floor pan. NVH simulation is a core technology in the automotive design process, and fast turnaround is especially important. The simulation was run twice, first using only the spinning disk in a high-performance Lustre file system for I/O and then using the DataWarp feature on the XC40 system. The use of DataWarp acceleration significantly reduced I/O time and, most importantly, the simulation finished in half the elapsed time.

With over 19 million degrees of freedom the MSC Nastran NVH simulation is typical of the size of models that are now common in the automotive industry. The Lanczos algorithm was used to extract the first 10 modes. That's a relatively small number of modes for this size model, but when using Lustre alone the I/O requirements still account for over half the execution time. For this example the simulation elapsed time went from 17,000 seconds with Lustre alone to 8,500 seconds with DataWarp technology.

What is requiring this much I/O? Analysis of this simulation showed that the files being read forward and backward multiple times in the Lanczos eigenvalue algorithm dominated the I/O time. While Lustre is optimized for performance while streaming data sequentially forward through the file, the backward read pushes the load into more of a transactional form. The DataWarp accelerator's solid-state storage and specialized file system work well in this domain and allow the backward reads to go dramatically faster.

In this case, DataWarp technology is the perfect complement to Lustre to offload the I/O-intensive portions of Nastran to the flash storage tier.

This is illustrated in the following image, generated with the IOT toolkit from I/O Doctors, LLC. The two plots depict the MSC Nastran read and write access patterns versus time of the SCR300 scratch file. The upper plot shows the job utilizing DataWarp technology. The lower plot shows the job using Lustre only. Note the behavior of the Lustre job during the backward read after the client cache is exceeded. The data delivery rate becomes much slower, as indicated by the shallow slope. This is because Lustre does no prefetching when a file is accessed backward.

DataWarp accelerator overview: Of course, using SSDs to reduce I/O is not a new approach. Indeed, Cray first introduced SSDs in the early 80s, and in previous blog posts we have discussed the performance of the Cray® CS400™ system running MSC Nastran using SSDs configured on the node.

What is new is the use of the DataWarp I/O accelerator. A key advantage of the DataWarp technology is you do not have to configure an SSD on each node of the system to get SSD performance on every node. SSDs offer great I/O performance, but they cost significantly more than spinning disks, and hence are expensive to configure if they are not going to be fully utilized. With DataWarp technology, a limited number of SSDs are configured in the system and can be allocated at run time to the nodes and applications that require enhanced I/O performance. This is achieved via a combination of Cray technologies:

- The XC40 system's high-speed interconnect for fast data movement between nodes
- Cray Data Virtualization Service (DVS), I/O forwarding and software infrastructure used to project an underlying file system to a group of compute nodes at run time
- A tightly integrated hardware and software environment for HPC efficiency

CRAY – I/O Accelerator Boosts MSC Nastran Simulations

Cray systems are engineered for production HPC environments, which involve running a wide variety of applications with a wide variety of performance requirements. As users increase the fidelity of their simulations, including those that do not scale well across nodes, Cray's DataWarp technology can help them address the full range of HPC applications.

About Greg Clifford:

Greg Clifford is the Manufacturing Segment Manager at Cray Inc. ("Cray"). His postings solely reflect his own personal opinions and do not represent Cray's or Cray's management's views, positions, strategies or opinions. Links to third party sites, and references to third party trademarks, are provided for convenience and illustrative purposes only. Unless explicitly stated, Cray is not responsible for the contents of such links, and no third party endorsement of Cray or any of its products is implied.

Fracture, Damage and Failure Using LS-DYNA

Course from www.lsdyna-online.com owned and operated by Instructor Al Tabiei

This course will allow LS-DYNA users to model Fracture, Damage, and Failure. The different methodology to model failure and fracture in LS-DYNA will be presented and discussed. All formulation in LS-DYNA including Lagrangian, Eulerian, SPH, XFEM, EFG, and the DEM methods etc. will be discussed. Various examples will be presented.

Course Outline

- Introduction and Historical Review
  - Brittle Failure
  - Ductile Failure
- Introduction and Fundamental Theoretical Concepts
  - Failure Theories
  - Damage Models
  - Fracture Mechanics
- Element Erosion Advantages & Short Comings
- Current LSDYNA Capabilities to Model Failure and Damage
- Current LSDYNA Capabilities to Model Fracture
- Fracture in Lagrangian, Eulerian, SPH, XFEM, EFG, and DEM Methods
- LSDYNA Fracture Capabilities Verification examples
- MAT_ADD_EROSION and the GISSMO Model
- Material Models with Failure
  - Isotropic Materials
  - Hyperelastic Materials
  - Composite Materials
  - Geotech Materials
- Modeling Delamination and Debonding in LSDYNA
  - Cohesive Elements
  - Tied Contact with Failure
- Summary and Concluding Remark

Workshop: There will be several examples, which are designed to understand and reinforce the lectures and the concepts presented in the course.

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

Material Models in LS-DYNA

Course from www.lsdyna-online.com owned and operated by Instructor Al Tabiei

This course will allow LS-DYNA users to use the code with more understanding of the material models. The most various material models in LS-DYNA will be presented in the 16 hours. There are workshops that will be provided with this course..

Chapter-0 Outline
Chapter-1 Introduction & Continuum Mechanics
- – Stresses, strains, and failure theories

Chapter-2 Material Constitutive Equations
- – Introduction to Constitutive equations
- – Introduction to experimental testing

Chapter-3 Introduction to Plasticity
- – Von-Mises and Isotropic hardening algorithm

Chapter-4 LS-DYNA Material Library
- – List of LS-DYNA material models and their usage

Chapter-5 Visco-Elasticity
- – Selected viscos models (mat 6,61,76)
- – parameter identification
- – Creep and relaxation models

Chapter-6 Plasticity, Plastics, and Visco-Plasticity
- – Selected plasticity models (mat 3,24,15, 81,114,123,124)
- – Modeling plastics (mat 89, 187)
- – Anisotropic plasticity models (mat 37,122)
- – Visco-plasticity (mat 224)

Chapter-7 Foams and Honeycomb
- – Classification of foams
- – Selected foam models (mat 5,38,53,57,62,63,73,75,83)
- – Similarities and differences of the models
- – Selected honeycomb models (mat 26,126)
- – Parameter identification

Chapter-8 Rubber
- – Classification of rubber
- – Selected rubber models (7,27,31,77,87,127,181,183)
- – Similarities and differences of the models

Chapter-9 Fiber Reinforced Composites
- – Classification of composites
- – Selected composite models (22,54,55,58,59,221)
- – Similarities and differences of the models
- – Parameter identification

Chapter-10 Material Failure
- – Failure criterion
- – Mat_Add_erosion
- – Non-local formulations
- – Material and contact

Chapter-11 Strain Rate Models & Effect
- – Strain rate models
- – Material characterization
- – Rate effect examples

Chapter-12 Geotech Materials
- – (only description with input)
- – Discussion of the most popular materials for soil
- – Discussion of the most popular materials for concrete

Chapter-13 References & Other Courses

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

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 agiac99@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 - All-New 2017 Ford F-150 Raptor Race Truck

Mar 15, 2016

The all-new Ford F-150 Raptor race truck competes in the grueling Best in the Desert Mint 400 off-road race in Primm, Nev., March 12, 2016.

Piloted by drivers Greg Foutz and Tim Casey, Ford F-150 Raptor race truck is the only stock truck competing in the Best in the Desert factory stock class for full-sized trucks (Class 1200), making it the first such vehicle to finish a race in this class.

The Ford F-150 Raptor race truck is one of only 19 teams in the limited group – out of a total of 68 – to finish the 2016 Mint 400.

"We're really pleased with the F-150 Raptor's performance," said Foutz. "The all-new F-150 Raptor race truck was strong throughout, and its new high-output EcoBoost® engine and transmission are seriously impressive."

The new factory stock class is the most production-specification class in the history of Best in the Desert. F-150 Raptor race truck leverages the built-in capability and features of the production F-150 Raptor, including:

- Fully boxed, high-strength steel frame
- High-strength, military-grade, aluminum-alloy body
- All-new high-output 3.5-liter EcoBoost engine paired with all-new 10-speed transmission and torque-on-demand transfer case

Ford Performance 17-inch beadlock-capable wheels

Other factory stock features include:

- Windshield, air conditioning, power windows and door locks
- Instrument panel and dashboard, including Sirius-XM satellite radio
- LED headlamps and taillamps

Modifications to the race truck include:

- Race-optimized three-inch-diameter external-bypass front and rear FOX Racing Shox similar to stock F-150 Raptor's segment-exclusive, three-inch-diameter internal-bypass FOX Racing Shox
- Race-optimized front and rear springs raise ride height for additional ground clearance, and provide increased compression rate to handle extreme terrain and additional weight of competition-required roll cage
- Custom-fabricated roll cage
- MasterCraft seats with five-point harness safety belts and window nets
- Rigid LED light bars, racing fuel cell, Lowrance GPS, Racepak digital dash and data logger

AEROSPACE NEWS & EVENTS

Marnie Azadian

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
- An internet URL
- Be technical, informational, or human interest.
- We do not accept financial quarterly information

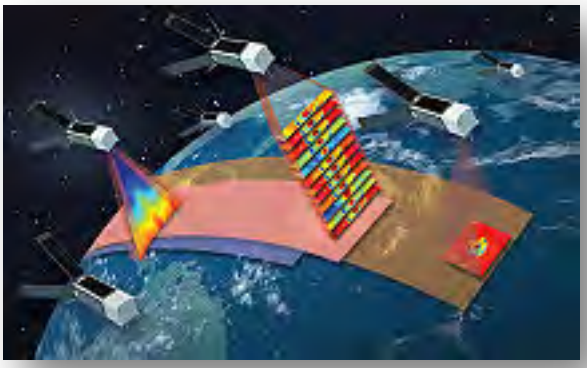
We would welcome the opportunity to share information about your company with our readership.

You may send Title to your information and the accompanying URL to Marnie Azadian at agiac99@aol.com - Subject Line please use "Aerospace News"

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.

NASA Selects Instruments to Study Air Pollution, Tropical Cyclones



The Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS) investigation, 12 CubeSats about a foot long each, will study the development of tropical cyclones by taking measurements of temperature, precipitation and cloud properties as often as every 21 minutes.
Credits: MIT Lincoln Laboratory

NASA has selected two proposals for new Earth science investigations that will put new instruments in low-Earth orbit to track harmful particulate air pollutants and study the development of tropical cyclones.

Observations of small atmospheric aerosols from the Multi-Angle Imager for Aerosols (MAIA) will be combined with health information to determine the toxicity of different particulate matter types in airborne pollutants over the world's major cities. David Diner of NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, is the principal investigator.

The Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS) investigation will develop and launch a constellation of CubeSats to study the development of tropical cyclones through rapid-revisit sampling. William Blackwell of the Massachusetts Institute of Technology's Lincoln Laboratory in Lexington is the principal investigator.

The instruments were competitively selected from 14 proposals submitted to NASA's Earth Venture Instrument-3 program. Earth Venture investigations are small, targeted science investigations that complement NASA's larger missions. The National Research Council recommended in 2007 that NASA undertake this type of regularly solicited, quick-turnaround project.

"We are excited to make selections that expand the use of CubeSats for Earth sciences and that make measurements and perform analyses that will have direct societal benefit," said Geoffrey Yoder, deputy associate administrator of NASA's Science Mission Directorate in Washington. "These innovative Earth Venture Instruments will join and expand our growing suite of NASA Earth-observing sensors."

NASA Selects Instruments to Study Air Pollution, Tropical Cyclones

MAIA uses a twin-camera instrument that will make radiometric and polarimetric measurements needed to characterize the sizes, compositions, and quantities of particulate matter in air pollution. As part of the MAIA investigation, researchers will combine MAIA measurements with population health records to better understand the connections between aerosol pollutants and health problems such as adverse birth outcomes, cardiovascular and respiratory diseases, and premature deaths.

The MAIA team has extensive experience in polarimetry, air pollution, and human health. Diner has led numerous polarimetry observations from sub-orbital platforms throughout his career. The team includes partnerships with NASA's Langley Research Center in Hampton, Virginia, and Goddard Space Flight Center in Greenbelt, Maryland, as well as several universities, federal research organizations and international partners.

TROPICS will consist of 12 CubeSats, each about one foot long and weighing just 8.5 pounds, that use scanning microwave radiometers to measure temperature, humidity, precipitation and cloud properties. The CubeSats will be launched into three separate orbital planes to enable the overall constellation to monitor changes in tropical cyclones as frequently as every 21 minutes.

The TROPICS team has previous experience developing CubeSats and analyzing satellite measurements of storms, and includes partnerships with NASA's Wallops Flight Facility in Wallops Island, Virginia, Goddard, several universities and the National Oceanic and Atmospheric Administration.

The two investigations were selected from NASA's third Earth Venture Instrument competition. The first Earth Venture Instrument investigation, selected in 2012, the Tropospheric Emissions: Monitoring of Pollution (TEMPO) mission, will be the first space-based sensor to monitor major chemical air pollutants across North American hourly during daytime. It will share a ride on a commercial satellite as a hosted payload and orbit about 22,000 miles above the equator.

The second set of investigations selected in 2014 were the Global Ecosystem Dynamics Investigation (GEDI) and ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS). These instruments will measure changes in global vegetation from the International Space Station, illuminating how forests and ecosystems are affected by changes in climate and land use.

NASA Selects Instruments to Study Air Pollution, Tropical Cyclones

Earth Venture missions are managed by NASA's Earth System Science Pathfinder program located at Langley for the Science Mission Directorate. The missions in this program provide an innovative approach to address Earth science research with periodic windows of opportunity to accommodate new scientific priorities. For more information, visit:

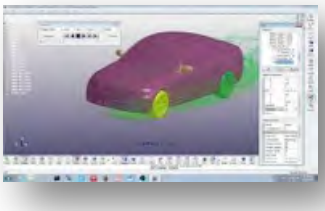
http://go.nasa.gov/MKvgJO

NASA uses the vantage point of space to increase our understanding of our home planet, improve lives, and safeguard our future. NASA develops new ways to observe and study Earth's interconnected natural systems with long-term data records. The agency freely shares this unique knowledge and works with institutions around the world to gain new insights into how our planet is changing.

For more information about NASA's Earth science activities, visit:

http://www.nasa.gov/earth

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



ICFD Post treatment with LSPP4.3

Electromagnetism (EM) Playlist:

- Sheet Forming on conical die
- LS-DYNA CFD & EM thermal coupling
- Resistive heating problem
- 15 videos are available

Tutorial video Available for viewing

ICFD Post treatment with LSPP4.3 - Duration: 21 minutes.•216 views
•1 month ago

ICFD and DEM coupling - Duration: 8 seconds.•351 views
•4 months ago

ICFD coupled with DEM (LS-DYNA) - Duration: 40 seconds.•431 views
•6 months ago

Electric Kettle simulation using Ls-Dyna - Duration: 42 seconds.•609 views
•8 months ago

FAQs

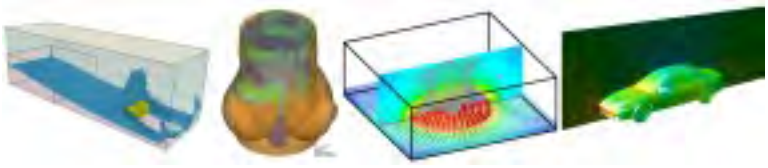
LSTC provide a huge number of FAQs at the ftp site ftp.lstc.com/outgoing/support/FAQ . Many thanks to Jim Day of LSTC for making this information available.

Some specific popular FAQs include:

consistent units
ftp://ftp.lstc.com/outgoing/support/FAQ/consistent_units
An overview of Contact
ftp://ftp.lstc.com/outgoing/support/FAQ/contact.overview
Soft Contact
ftp://ftp.lstc.com/outgoing/support/FAQ/contact.soft1
General guidelines for Crash Analysis
ftp://ftp.lstc.com/outgoing/support/FAQ/guidelines.pdf
Hourglass Control
ftp://ftp.lstc.com/outgoing/support/FAQ/hourglass_condensed
Dealing with Instabilities
ftp://ftp.lstc.com/outgoing/support/FAQ/instability.tips
Dealing with long run times
ftp://ftp.lstc.com/outgoing/support/FAQ/long_run_times
Mass Scaling
ftp://ftp.lstc.com/outgoing/support/FAQ/mass_scaling
Negative Volume in Brick Elements
ftp://ftp.lstc.com/outgoing/support/FAQ/negative_volume_in_brick_element.tips
Quasi-static simulations
ftp://ftp.lstc.com/outgoing/support/FAQ/quasistatic
Restarting Analyses
ftp://ftp.lstc.com/outgoing/support/FAQ/restart
Modeling spinning bodies
ftp://ftp.lstc.com/outgoing/support/FAQ/spin
Spring Back
ftp://ftp.lstc.com/outgoing/support/FAQ/springback
Stress vs Strain for plasticity models
ftp://ftp.lstc.com/outgoing/support/FAQ/stress_vs_strain_for_plasticity_models
User-defined materials
ftp://ftp.lstc.com/outgoing/support/FAQ/user_defined_materials.faqFAQs

LS-DYNA Support Site

www.dynasupport.com



LS-DYNA Support

At this site you will find answers to basic and advanced questions that might occur while using LS-DYNA, information about new releases and ongoing developments**.**

March 03, 2016 LS-DYNA R8.1.0 (R8.105896) released

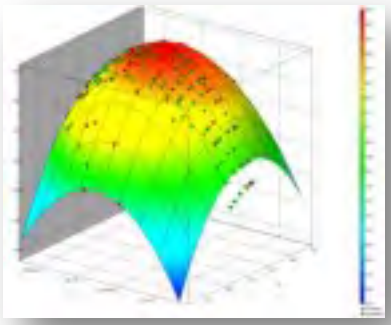
Feb 22, 2016 Recent Changes History Variables for Certain Material Models

Jan 22, 2016 - Rich document History Variables for Certain Material Models

TUTORIALS - http://www.dynasupport.com/tutorial

Getting started with LS-DYNA

LS-DYNA is used to solve multi-physics problems including solid mechanics, heat transfer, and fluid dynamics either as separate phenomena or as coupled physics, e.g., thermal stress or fluid structure interaction. This manual presents very simple examples to be used as templates (or recipes). This manual should be used side-by-side with the LS-DYNA Keyword User s Manual . The keyword input provides a flexible and logically organized database. Similar functions are grouped together under the same keyword. For example, under the keyword, *ELEMENT, are included solid, beam, and shell elements. The keywords can be entered in an arbitrary order in the input file. However, for clarity in this manual, we will conform to the following general block structure and enter the appropriate keywords in each block. 1. define solution control and output parameters 2. define model geometry and material parameters 3. define boundary conditions



LS-OPT

LS-OPT, the graphical optimization tool that interfaces perfectly with LS-DYNA,

Allows the user to structure the design process, explore the design space and compute optimal designs according to specified constraints and objectives. The program is also highly suited to the solution of system identification problems and stochastic analysis.

The graphical tool LS-OPTui interfaces with LS-DYNA and provides an environment to specify optimization input, monitor and control parallel simulations and post-process optimization data, as well as viewing multiple designs using LS-PREPOST.

Optimization

- Size-/Shape optimization
- Constraints, mixed continuous/discrete variables, multiple load cases, etc.
- Multi-Objective optimization (Pareto Frontier)
- Reliability based design optimization

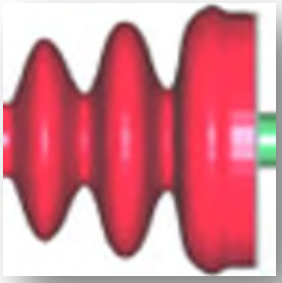
LS-TaSC - LS-TaSC 3.1 released

Topology Optimization

A tool for the topology optimization of non-linear problems involving dynamic loads and contact conditions. It can be used to find a concept design for most structures analyzed using LS-DYNA.

LS-DYNA EXAMPLES

www.dynaexamples.com



LS-DYNA Examples

The site presents approximately 200 LS-DYNA examples from various training classes. The input files and several class notes are available for download.

The download is free of charge, a login is not required. The majority of content has been contributed by LSTC/DYNAmore. The content is prepared for educational purposes. Hence, material properties and other parameters might be non-physic for simplification.

Among the files and Sections:

LS-DYNA Keyword Search If you are looking for an example containing some specific LS-DYNA keyword you may use the site search in the header section of this page.

Show Cases This folder contains several LS-DYNA examples focusing on specific load cases or keywords.

Metal Forming The examples in this section are from the introductory class on metal forming from LSTC. You may access the examples separately by the menu on the left. The examples are prepared for LS-DYNA 970 and upwards.

ALE The examples in this section are from the ALE (Arbitrary Lagrangian Eulerian Method) class of M'hamed Souli. M'hamed Souli is Professor at the University in Lille France. Both authors are key developers for the powerful capabilities of the Eulerian Methods in LS-DYNA. You may access the examples separately by using the menu on the left. The examples run with LS-DYNA 970 and upwards.

Thermal The examples in this section present examples about the thermal capabilities of LS-DYNA. The examples are provided by Dr. Art Shapiro. Art is working since decades on topics reated to DYNA3D, LS-DYNA and TOPAZ. He is the key developer for the thermal capabilites of LS-DYNA. Art is one of the co-founders of LSTC. You may access the examples separately by using the menu on the left.

LS-DYNA CONFERENCE PUBLICATIONS

www.dynalook.com

DYNAlook

DYNAlook

The site presents papers from European and International LS-DYNA User Conferences and papers provided by other users. 1604 papers are available.

The papers are from LS-DYNA Conferences and are accessible via the search functionality.

13th International LS-DYNA Conference Detroit, 2014	**12th International LS-DYNA Conference** Detroit, 2012	**11th International LS-DYNA Conference** Detroit, 2010
10th Eurpoean LS-DYNA Conference Wurzburg 2015	**9th European LS-DYNA Conference** Manchester, 2013	**8th European LS-DYNA Conference** Straßburg, 2011 …

ATD –DUMMY MODELS

www.dummymodels.com

DUMMY Model Support - Currently, the manuals of models developed by DYNAmore are available.

This site provides detailed information on dummy models for LS-DYNA. In the near future the models developed by LSTC will be added. The LSTC dummy and barrier are models are no fee and included with the LS-DYNA license.

To license the models we kindly ask to contact your local LS-DYNA distributor. Any kind of proposal or enhancements for the models and this site is very welcome.

Among the Dummy Models on this site you can find:

Side Impact Dummies

ES2/ES2re -
DYNAmore

World SID 50%
DYNAmore

US-SID
DYNAmore

Rear Impact Dummies

BioRID-II V3.
DYNAmore

Child Dummies

P-1.5
DYNAmore
P-3.0
DYNAmore

LSTC ATD MODELS

www.lstc.com/models

LSTC Models Overview

Free or low cost FE models are important to LS-DYNA users in various fields. Therefore, LSTC is developing models with the help and support of our customers. Some of the models are joint developments with our partners.

LSTC's Models are available at no cost to licensees of LS-DYNA who are current with their annual license fees (Annual License) or maintenance fees (Paid-up License). Models are fully unencrypted and accessible. LSTC endeavors to make the models as complete, accurate, reliable, and easy to use as possible.

This section of our site was created to keep users informed about our models. It will be updated periodically to reflect changes to existing models and announce newly released models.

Feedback about the models is welcome and will be used to improve future releases. To submit questions, suggestions, or feedback about LSTC's models, please send an e-mail to: atds@lstc.com.

For news and updates about our dummy models, please join our models news mailing list.
www.lstc.com/products/models/mailinglist

Barrier Models

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

AEROSPACE WORKING GROUP

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

The LS-DYNA® Aerospace Working Group (AWG) is a partnership of federal agencies, corporations, and universities working together to develop and publish aerospace test cases and modeling guidelines for finite element analyses with LS-DYNA®.

The actions of the AWG serve to support the use, development, and reliability of LS-DYNA® for aerospace numerical analyses.

Some participants are partially or fully funded by the Federal Aviation Administration (FAA) in the National Aviation Research Plan 'Aircraft Catastrophic Failure Prevention Research' program, or by the National Aeronautics and Space Administration (NASA), or associated with the participants as LS-DYNA® users.

Engine Related Impact Failure (ERIF) - Arizona State University (ASU)

- Boeing
- Central Connecticut State University (CCSU)
- Federal Aviation Administration (FAA)
- General Electric Aviation
- George Mason University (GMU)
- Honda Aircraft Engine
- Honeywell
- Livermore Software Technology Corporation (LSTC)
- National Aeronautics and Space Administration (NASA)
- Ohio State University (OSU)
- Pratt & Whitney
- Pratt & Whitney Canada
- Rolls-Royce
- University of Akron
- Williams International

Cabin Interior (CI)

- B/E Aerospace
- Boeing
- Bombardier
- Central Connecticut State University
- Cessna
- Federal Aviation Administration (FAA)
- Humanetics
- National Aeronautics and Space Administration (NASA)
- Wichita State University
- Zodiac Aerospace

Participant's Training Classes

Webinars

Info Days

Class Directory

Participant Class Directory

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

Seminars, information & support days in April - May

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 days in April - May 2016.

Trainings

Contact Definitions in LS-DYNA	5 April (L) / 15 April
PRIMER as Preprocessor for LS-DYNA	14 April
Introduction to LS-DYNA	19-21 April / 10-11 May (T)
User Materials in LS-DYNA	22 April
LS-OPT – Optimization and Robustness	26-28 April / 2-4 May (L)
Modeling Metallic Materials	10-11 May
Introduction to Nonlinear Implicit Analysis	12 May (T)
Damage and Failure Modeling	12-13 May
Smoothed Particle Hydrodynamics (SPH)	23-24 (V)
Metal Forming with LS-DYNA	30-31 May

Information days (free of charge)

Webinar: New Multiphysics Features in LS-DYNA	4 April
Webinar: LS-OPT: Optimization/DOE/Robustness	11 April
Webinar: New Features in LS-DYNA R8.1	13 April
Information day: Welding and Heat Treatment	14 April (Z)

Support days (free of charge)

· LS-DYNA	15 April / 20 May

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

Basic OpenFOAM training for application engineers
2 Mar 2016 to 3 Mar 2016
CFD & Multiphysics
Pune, India

VA One: Coupled FEA/SEA Training
3 Mar 2016 to 4 Mar 2016
Vibro-Acoustics
Farmington Hills, Detroit, MI

VPS - Getting started with CRASH simulation
7 Mar 2016
Crash, Impact & Safety
Seoul, Korea

LSTC Visit the website for complete listings/changes/locations

www.lstc.com/training

March

- **MI Intro LS-PrePost**
- **MI Intro LS-DYNA**

May

- **CA Intro LS-PrePost**
- **CA Intro LS-DYNA**
- **MI Contact**
- **MI Composite**

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

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.

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.

Latest Release is Visual-Environment v11.0

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.

www.penguincomputing.com

Penguin Computing provides customized build-to-order server solutions for enterprises and institutions with special hardware requirements. We complement our hardware and software solutions with Penguin Computing on Demand (POD)—a public HPC cloud that provides supercomputing capabilities on-demand on a pay-as-you-go basis.

Penguin is a one-stop shop for HPC and enterprise customers, providing solutions for a wide array of computing needs and user profiles:

HPC and cloud solutions optimized for industry-specific uses

High-powered workstations for individual power users

Highly power-efficient server platforms for enterprise computing

Private and public cloud solutions, including hybrid options.

Focus

Penguin Computing is strictly focused on delivering Linux-optimized enterprise solutions. We use a thorough, proven hardware qualification and testing process to ensure that our solutions deliver optimal performance and robustness.

Penguin's in-house development team is dedicated to providing a complete highly interoperable software stack that is tuned for Penguin hardware. As a result our solutions are easy-to-use and "just work." Our integrated approach even extends to our hybrid compute solutions, which combine local and cloud computing resources, taking ease-of-use and cost-effectiveness to the next level. Penguin customers can reduce capital expenditures by right-sizing clusters for average resource utilization and easily and quickly offload excess workload into the cloud.

Penguin also offers a full range of services and support that is backed by a seasoned team of Linux, HPC and application experts.

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		
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** www.esi-group.com			
	QuikCAST	SYSWELD	PAM-RTM	PAM-CEM
	VA One	CFD-ACE+	ProCAST	Visual-Process
	VisualDSS	Weld Planner	Visual-Environment	IC.IDO
United States	**Engineering Technology Associates – ETA** www.eta.com		etainfo@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** www.predictiveengineering.com		george.laird@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	

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://jp.fujitsu.com/solutions/hpc/app/lsdyna			
	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

POD (Penguin Computing on Demand) offers software including LSTC's LS-DYNA

www.penguincomputing.com/services/hpc-cloud

Penguin HPC clusters are optimized for engineering workloads and offer:

- Instant access to an HPC Cloud Cluster
- High performance InfiniBand bare-metal compute
- Free support from HPC experts
- No charges for network transfers
- Cost-effective, pay-per-use billing model
- Secure environment for private data
- Detailed billing reports for user groups and projects

Self Registration Portal – featuring rich--documentation, wiki, FAQ, pricing and more.

https://pod.penguincomputing.com/

POD Software Applications and Libraries (visit site for complete listing)

FEA, CFD and FDTD Modeling

- **LS-DYNA** / LS-PrePost LS-DYNA is an advanced general-purpose multiphysics simulation software package. Its core-competency lie in highly nonlinear transient dynamic finite element analysis (FEA) using explicit time integration. LS-PrePost is an advanced pre and post-processor that is delivered free with LS-DYNA.
- **OpenFoam:** OpenFOAM (Open source Field Operation And Manipulation) is a C++ toolbox for the development of customized numerical solvers, and pre-/post-processing utilities for the solution of continuum mechanics problems, including computational fluid dynamics (CFD).

- **ANSYS HFSS:** ANSYS HFSS software is the industry standard for simulating 3-D full-wave electromagnetic fields. Its gold-standard accuracy, advanced solver and compute technology have made it an essential tool for engineers designing high-frequency and high-speed electronic components.
- **ANSYS Fluent** ANSYS Fluent software contains the broad physical modeling capabilities needed to model flow, turbulence, heat transfer, and reactions for industrial applications.
- **Star-CD** and **Star-CCM+:** STAR-CCM+ is CD-adapco´s newest CFD software product. It uses the well established CFD solver technologies available in STAR-CD, and it employs a new client-server architecture and object oriented user interface to provide a highly integrated and powerful CFD analysis environment to users.
- **Convergent:** CONVERGE is a Computational Fluid Dynamics (CFD) code that completely eliminates the user time needed to generate a mesh through an innovative run-time mesh generation technique.
- **Lumerical:** Simulation tools that implement FDTD algorithms.

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

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

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.

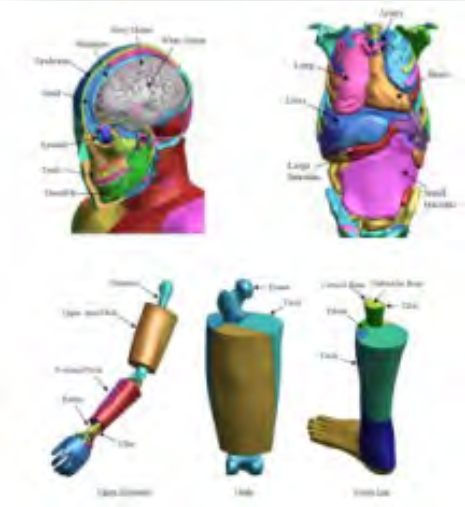
- Manage engineering teams with user authentication and administrative controls
- Data is secure every step of the way with end-to-end data encryption
- Jobs run on isolated, kernel-encrypted, private clusters
- Data centers include biometric entry authentication
- Platforms routinely submit to independent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

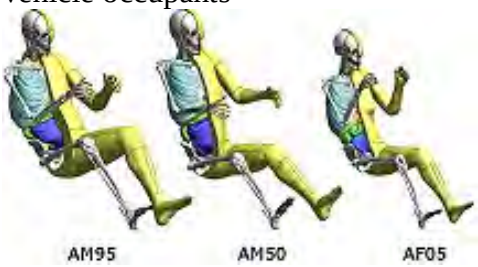
Rescale, Inc. - 1-855-737-2253 (1-855-RESCALE) - info@rescale.com - 944 Market St. #300, San Francisco, CA 94102 USA

TOYOTA - Total Human Model for Safety – THUMS

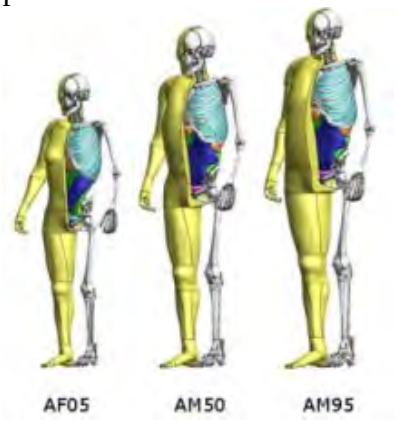


The Total Human Model for Safety, or THUMS®, is a joint development of Toyota Motor Corporation and Toyota Central R&D Labs. Unlike dummy models, which are simplified representation of humans, THUMS represents actual humans in detail, including the outer shape, but also bones, muscles, ligaments, tendons, 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**

BETA CAE SYSTEMS SA | CADFEM | Cray Inc.

ESI Group | Lenovo

 **TWITTER**

BETA CAE SYSTEMS SA | Cray Inc. | ESI Group

ETA | CADFEM | Lenovo

 **LINKEDIN**

BETA CAE SYSTEMS SA | CADFEM | Cray Inc.

DYNAmore Nordic | ETA | Oasys

 **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	