



**LS-DYNA® Learning Version**

**ESI Cloud**

**LS-Run**



**ETA – D-Eval-in-NX**

**ANSA PreProcessor**

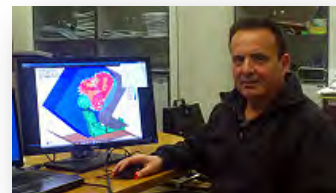


**Lancing features in LS-DYNA**  
Quanqing Yan, Li Zhang,  
Yuzhong Xiao,  
Xinhai Zhu, Philip Ho

**Extended Deadline**

**Yun Huang – NVH Class  
May – European Conf.**

**ALE – FSI -SPH  
February Classes**



### **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.

### **DYNAmore GmbH – LSTC's Master Distributor in the EU**

DYNAmore is dedicated to sales, support, training engineers with LS-DYNA to solve non-linear mechanical problems numerically. Employs 85 engineers in Europe. Co-develops the LSTC software and provide engineering services.



**FEA Information**  
Platinum Participants

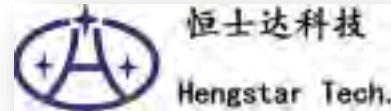
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## FEA Information News Sections

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## Articles – Blogs – News

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**Automotive News**

**Editor - Dilip Bhalsod**

**Aerospace News -**

**Editor - Marnie Azadian**

## Solutions

Participants	Distribution & Consulting	Cloud/On Demand/Subscription
ATD – Barrier - THUMS		

**Participant News Classes – Social Media**

**Editor - Aleta Hays**

**Conferences – Events -**

**LSTC Information**

**Editor – Yanhua Zhao**

**LS-DYNA Recent Developments, Features, Updates**

**Lancing features in LS-DYNA**

**Quanqing Yan, Li Zhang, Yuzhong Xiao, Xinhai Zhu, Philip Ho**

**LSTC**

## Announcements

Aleta has a few seats left in LSTC Classes : ALE – SPH - [aleta@lstc.com](mailto:aleta@lstc.com)

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<b>February</b>			
13-15	CA	ALE/Eulerian & Fluid/Structure Interaction	M. Souli
16-17	CA	Smoothed Particle Hydrodynamics (SPH)	M. Souli

### First time On Line - Two training classes– February

16-17	ONLINE	Contact in LS-DYNA	A. Tabiei
23-24	ONLINE	Implicit LS-DYNA	A. Tabiei

**Twitter** - LS-DYNA global announcements tweeted. Please sign up for notices on classes, webinars, events <https://twitter.com/LSTCandDYNAmore>

### Book Review for Girls:

For all readers with daughters interested in Engineering, Inventing, Science, we have a new section of book reviews for girls reviewed by Arthur B. Shapiro, and recommended by Rheannon Shapiro age 5,

**New Section** – LinkedIn Not to Miss – we will be posting a few notices from LinkedIn we feel it is important that you don't miss

Sincerely,

*Marsha Victory Trent Eggleston*

*Marnie Azadian Suri Bala Dilip Bhalsod Yanhua Zhao Aleta Hays*



ANSA is 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 the users' preference due to its wide range of features and tools that meet their needs. The list of productive and versatile features is long and the alternative tasks and processes to be completed using them are countless.

**Environment** - All software features are accommodated in an integrated environment, with highly customisable GUI. The software is available for all contemporary popular operating systems in 32bit and 64bit architecture with multi-core CPU usage. The accelerated graphics, the rapid confirmations and function access, the GUI customisation options, the model browser and lists handling, the filtering and modification operations, and the integrated search engine comprise a user friendly environment that ensures outstanding performance and productivity.



**CAD data input & clean up** - CAD definitions and model structure data in CATIA V4, CATIA V5, NX, Pro/ENGINEER and JT formats can be converted into ANSA files using the available translators. Moreover, custom interfaces to PDM or SDM systems,

powered by scripting, bring product and model structure data into the heart of the software.

CAD geometry can also be read in from neutral file formats (iges, step, vda-fs), manipulated and healed by the proprietary powerful built-in geometry engine. A wide range of geometry healing functions, including those for the generation of neutral fibers, deliver geometry descriptions ready to be meshed.

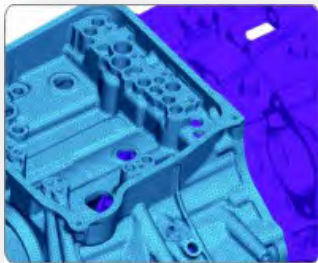
**ANSA data management** - ANSA Data Management (ANSA DM) is a centralized data management system, used to collect and store in a structured and hierarchical form all engineering data that are used during the development process of a vehicle simulation model. It assures the effective and efficient data handling throughout projects, by streamlining updated model data to engineering teams, allowing the easy sharing of common data and offering access to library items for the analysis dependent solution settings. The DM Browser, moreover, allows the browsing of the DM Root to identify the available CAD versions, study versions and representations for comparison and model update.

**Model Comparison and update** - An integrated tool that compares two models in order to identify differences in geometry, attributes, solver-specific definitions, as well as connections. User friendly navigation and identification features are provided while a complete or partial replacement can be performed, updating the model according to user directions.

**Process Automation** - Task Manager and scripting language provide a unique modeling solution for automated and effective applications.

Task Manager is an integrated workflow manager that includes all individual tasks of a simulation model development. The process template is built up by the CAE expert who sets the boundaries between distinct modeling actions and predetermines all modeling parameters that must be respected, leaving to the inexperienced user a minimum degree of interference and limited decision making.

The scripting language is an enhanced programming tool that boosts productivity providing the power to access data and perform custom operations in an automated way.



**Meshing** - The integrated Batch Meshing tool leads to controllable and effortless optimal results, for both shell and volume meshing. Following the versatile mesh area idealization, geometry can be meshed according to modeling

requirements by cutting edge surface and volume meshing and wrapping algorithms.

A unique mesh generation environment is composed by:

- proprietary shell meshing algorithms
- high performance and quality volume meshing algorithms
- state-of-the-art boundary layers elements deployment
- Hexahedral dominant meshing
- Acoustic Cavity mesher and the straight forward Wrapping tool
- one-step mesh generation on automatically extracted middle surface
- numerous mesh handling functions.

**Assembly** - Powered with fully comprehensive parts and welding management tools, accommodates parts assembly, with alternative node-dependent or independent connections types, appropriate to various disciplines. Interfaces to numerous connections data file formats allow the completion of a single stage assembly. New concepts introduced, including model hierarchy input, multiple part instances handling, parts comparison-replacement and update as well as special joining type creation. Includes configurator Different model variants or load cases can be compiled with available include files through one of ANSA's special tools. This enables the creation of particular model configuration even without loading the respective data.



**Pre-processing decks** - Pre-processing completion is achieved through the uniquely interoperable pre-processing decks for NASTRAN, LS-DYNA, PAMCRASH, RADIOSS, Abaqus/Standard, Abaqus/Explicit, PERMAS and ANSYS Structural, allowing direct model modification between solvers, including material synchronization. Numerous unique utilities facilitate laborious tasks such as the management of Includes Files, model sub-structuring, entity numbering control etc. ANSA is multidisciplinary by design, in order to simultaneously handle models for Crash, Durability, NVH analysis etc., supporting all entities required by the latest versions of solvers.

A compilation of CFD oriented features are accommodated into special CFD pre-processing decks that support the most popular codes, such as STAR-CD, CCM+, Fluent, OpenFOAM etc.



**Analysis tools** - Crash and safety modeling is assisted by user friendly features for impactors positioning, seatbelt fastening, positioning and articulation of crash test dummies and "headform" models for passenger and pedestrian safety simulation standard scenarios.

The fast and easy Kinematics tool solves sophisticated positioning problems, for seats, convertible roofs and other mechanisms.

The Laminate Tool is one more enhanced function that assists the modeling of complex parts made of composite materials.

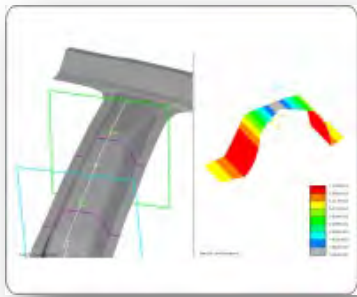
Results Mapping tool enables importing of data regarding nodal thickness, pressure distribution, stresses and plastic strain, nodal temperature, material orientation, etc. that can be mapped from an existing file to a different mesh. The tool ensures the accuracy in the mapping process and handles all major results.

**Model integrity checks** - Replicates the integrity and correctness checks performed by the solvers, reports potential modeling flaws and proceeds to model auto-correction actions.

**Solution control** - The above, along with the user-friendly solution scenario definition leads to the output of a ready to solve model. Apart from the formats of the solvers for which complete preprocessing decks exist, i.e. NASTRAN, LS-DYNA, PAM-CRASH, RADIOSS, PERMAS, Abaqus/Standard, Abaqus/Explicit and ANSYS, numerous other file formats are supported, for structural, CFD as well as other solvers.

**Morphing** - One of the most advanced tools developed to meet the needs for fast model modifications is the Morphing Tool. It expands the reusability of existing models by allowing the versatile procession of alternative variations. Morphing operations are performed on FE or geometry models. Applications include fields like optimization processes and sensitivity analysis.

**Tools** - The core preprocessing functionality is enhanced with a substantial number of other advanced tools that allow the user to complete specialized tasks without having to leave the software environment. Those tools are the Cross Section Analysis Tool, the Volume Traps Tool and the Fuel Tank Analysis Tool.



### Optimization

Numerous software features, including the Morphing Tool, the scripting and the process

automation, can be combined to offer versatile coupling with optimization codes.

### Benefits

- efficient data handling for intricate model structures
- fast and high quality modeling of complex geometries
- capability to interoperate between models built for different solvers
- highly automated processes and model set-up tools in one environment
- reduced user-dependent error-prone operations
- complete model build-up for numerous solvers in one environment
- unique capability for building a common model as a basis for modeling for different disciplines
- significant modeling time reduction and quality increase
- short learning curve and deployment time

## ESI Cloud: CAE Cloud Solution

[www.esi-group.com/software-solutions/cloud-solutions/esi-cloud-cae-cloud-solution](http://www.esi-group.com/software-solutions/cloud-solutions/esi-cloud-cae-cloud-solution)



ESI Cloud for designers and engineers needing cloud-based computer aided engineering (CAE) solutions tested virtual engineering solutions integrated onto ESI's

For complete information for your ESI Cloud visit: [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, visualization, and real-time collaboration tools.

### Cloud Platform

ESI Cloud Platform is a reliable, scalable, multitenant and secure SaaS Platform designed to deliver advanced engineering simulation in the cloud. The Platform is open with service-oriented architecture and flexibility to introduce proprietary or open source geometry, meshing, physics solvers, or visualization engines. ESI Cloud Platform includes three modules: Modeling, Collaboration and Cloud services.

### Computational Fluid Dynamics Solutions

ESI Cloud offers the engineering community a comprehensive end-to-end computational fluid dynamics (CFD) cloud solution. The solution is fully accessible through a web browser with a subscription based pricing and includes geometry, meshing, solver and visualization engines with synchronous and asynchronous collaboration capabilities.

### 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.



### Stretch Forming Simulation Results From D-Eval\_in\_NX

**Consider formability early in the design cycle with CAE, in the NX environment.**

Since most tooling designs are done in a CAD environment, DYNAFORM's D-Eval-in-NX Module was specially created to support and analyze CAD based tooling and engineering designs within the native NX environment.

A CAE solution, D-Eval-in-NX is tailored to support engineers in the early stages of the product design cycle. It allows engineers to take manufacturability into consideration early in the design process, ahead of the tooling stage.

D-Eval-in-NX includes the INCSolver, which allows engineers to generate reliable formability results efficiently. The INCSolver is a nonlinear transient dynamic finite element program using an explicit method to solve equations of motion, commonly called

“incremental code”. It was developed solely for the purpose of simulating sheet metal forming processes.

Using Shared Memory Processing (SMP), users can take advantage of the multiple-CPU's, Multiple-Cores and Multiple-Threads of the latest Windows computing platform. This allows for quick and reliable results. For most cases with a 4-core CPU, results can be generated in just minutes. The INCSolver works well with non-connected mesh generated from non-conforming CAD surfaces. This solution is most suitable for CAD engineers and is directly operated in the native NX environment. In addition, the INCSolver's features and functions are excellent for early stage tooling evaluation are very simple to learn and use.

## Bird Strike – ALE & SPH Classes

Aleta Hays



**Bird Strike:** A bird strike is defined as the collision between a bird and an aircraft, which could be taking-off, in flight or landing.

Graphic by and copyright to Soubhik

### Bird Strike and LS-DYNA

On January 15, 2009, shortly after takeoff U.S. Airways Flight 1549 struck a flock of Canada Geese and lost all engine power. Fortunately, the controlled ditching of Flight 1549 was a complete success and all 155 crew and passengers on board the flight survived.

LS-DYNA is widely used for modeling bird strike incidents.

LS-DYNA provides a comprehensive list of bird strike options including ALE fluid mechanics and a particle method.

**The ALE and SPH classes will be held in Livermore, CA, February 13-17, 2017.**

### **January showcase:**

#### **1. YouTube Video by BeenuZz published October 17 2016 Bird Strike on turbojet**

[www.youtube.com/watch?v=npsSONtbWhg](http://www.youtube.com/watch?v=npsSONtbWhg)

Per BeenuZz – “This is a well known classics of SPH simulation - done with LS-DYNA The birds are modelled with water formulation (MAT\_NULL and EOS\_GRUNEISEN) and impact the blades at 80m/s”

#### **2. 14<sup>th</sup> International LS-DYNA Users Conference 2016**

These listed papers and others can be located on [www.dynalook.com](http://www.dynalook.com)

[Bird Strike Simulation for BA609 Spinner and Rotor Controls](#)

Cheng-Ho Tho, Michael R. Smith - Bell Helicopter Textron Inc.

[Simulation of Bird Strike on Airplane Wings by Using SPH Methodology](#)

M. Guler (TOBB University of Economics and Technology)

T. Kiper Elibol (Turkish Aerospace) - I. Uslan (Gazi University)

M. Buyuk (Turkish Standards Institution)

[Bird Strike Modeling Using a New Woven Glass Failure Model](#)

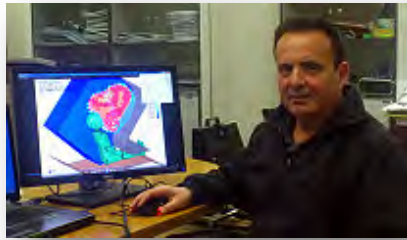
Lorenzo Iannucci, Mauricio Donadon - Imperial College London

[ALE and Fluid-Structure Interaction Capabilities in LS-DYNA](#)

M’hamed Souli - Universite d’Artois

## Meet the instructor and topics for ALE/FSI and SPH classes

Aleta Hays [aleta@lstc.com](mailto:aleta@lstc.com)



### Mhamed Souli

Mhamed has been an instructor for LSTC Classes, for the last 18 years.

With his experience as an ALE/FSI/SPH developer for 22 years, for LSTC, he incorporates into the class the development of theoretical fundamentals of ALE and FSI, including the way these fundamentals are implemented in LS-DYNA. His goal is to give LS-DYNA users a deep understanding for a smarter use of these features.

Of course, these fundamentals can only be realized through workshop and examples. Professor Souli offers approximately 22 example problems to describe each ALE/FSI/SPH LS-DYNA Keyword.

**Sign up now for the next class! [aleta@lstc.com](mailto:aleta@lstc.com)**

### Topics for ALE/FSI and SPH classes -

1- Time Integration For Explicit Methods.

2- Material Models for ALE Problems

3 - EOS for ALE Problems

- \*EOS\_LINEAR\_POLYNOMIAL

- \*EOS\_GRUNEISEN

- \*EOS\_JWL

4- Energy Equation

5- Bulk Viscosity

6- Navier-Stokes Equations

7- Properties of Fluid Material

8- Eulerian Formulation

- Advection Algorithms
- First order algorithm SALE Method
- Second order Van Leer Algorithm
- Half Index Shift.

9- ALE Smoothing Algorithms.

- Equipotential Algorithm
- Simple Average Algorithm

Volume weighting Algorithm

10- Eulerian time step

11- Multi-Material Formulation

12 Volume and Void Formulation (VOF Method)

13- Euler/Lagrange Coupling

- Acceleration Coupling
- Velocity Coupling
- Normal Constraint Coupling
- Penalty Coupling
- Coupling with Eroding Elements

Problems to solve

### SPH TOPICS

- Introduction to SPH Method
- Integral Interpolation in SPH
- Consistency in SPH
- Tensile Instability
- Boundary conditions
- Contact algorithms in SPH
- SPH Keywords
- Problems to solve

## Meet the instructor and topics for NVH Class

Aleta Hays [aleta@lstc.com](mailto:aleta@lstc.com)



**Yun Huang**

**Yun is a developer at LSTC and instructs classes in NVH**

**Sign up now for Yun's class at the 11<sup>th</sup> European LS-DYNA Conference, May 9-11, 2017 in Salzburg Austria. Contents will be taken from his 2 day class**

**The class he instructs at LSTC is a 2 day course.**

**Description:** This two day class will provide introduction to the frequency domain vibration, fatigue and acoustic features of LS-DYNA to users, and give a detailed look at the application of these features in vehicle NVH simulation.

### **2 day Course contents**

- **Introduction:** NVH theory and lab testing technology; overview of LS-DYNA frequency domain features and applications; Frequency domain vs. time domain; Fourier transforms;
- **FRF:** Modal superposition method; Damping; Nodal force / Resultant force FRF
- **SSD with harmonic loading:** Large mass method for enforced motion; ERP (Equivalent Radiated Power); Mode expansion with LS-PrePost
- **Random vibration with PSD loading: Correlated and uncorrelated multiple PSD excitations;** Shaker table testing; Acoustic waves; Pre-stress condition
- **Acoustics:** BEM, FEM; Vibro-acoustic problems; Acoustic panel contribution analysis; Muffler transmission loss analysis; ATV and MATV; Acoustic eigenvalue analysis; Incident waves
- **Response spectrum analysis:** Input earthquake spectrum; Modal combination methods (SRSS, CQC, etc.); Multi input spectra
- **Fatigue:** Fatigue analysis in harmonic / random vibration environment; Miner's rule; S-N curves; Dirlik method
- **Advanced topics:** SEA (Statistical Energy Analysis); Brake Squeal Analysis; NVH based on IGA
- **Workshop:** Hands-on exercise, post-processing of results



## LS-Run – A standalone application for running LS-DYNA

Anders Jernberg (DYNAMore Nordic)

**Download** standalone version:

[www.dynamore.de/ls-run-e](http://www.dynamore.de/ls-run-e)

**Watch tutorial** on YouTube:

<https://youtu.be/dVypwLW6gQw>

**Introduction:** LS-Run is a new graphical control center to start LS-DYNA simulations with either SMP or MPP versions of LS-DYNA. It is included in the latest LS-PrePost release v4.3 or in the developer version and can be started via “File>Run LS-DYNA”. The latest versions of LS-PrePost are found here:

<ftp://ftp.lstc.com/outgoing/lsprepost/4.3/>  
<ftp://ftp.lstc.com/outgoing/lsprepost/dev/>

Once LS-PrePost is closed, the LS-Run window will remain open for further job control. For convenience, there is also a standalone version available which can be downloaded at:

[www.dynamore.de/ls-run-e](http://www.dynamore.de/ls-run-e)

Note that the installation of the standalone version will automatically install MS-MPI such that users of Windows operating systems quickly get started using MPP versions of LS-DYNA.

**What does it do?** LS-Run has a parametric LS-DYNA command line builder making it easy to create the command and change the most common arguments such as “memory”, “ncpu” and the solver executable. Herein, previously used parameter values and

expressions are available from the drop-down menus and favorite solvers and expressions can be pinned to the history list.

When jobs are started, they are added to the job table and started in the order they are added, provided there are enough resources available. Simply by pressing buttons a interaction is possible to send sense switches, to remove a job from the job table, to restart a job, to open a d3plot results in LS-PrePost and to open keyword files in LS-PrePost or user-defined ASCII-Editors.

### Features of LS-Run

- Parametric LS-DYNA command line builder
- Supports SMP/MPP
- Supports combination of Windows/Linux hosts
- Run command on local or remote host
- Administrate running jobs
- Open result files for jobs
- Jobs in queue are run in sequential order
- User can limit the number of simultaneous jobs

Watch tutorial on YouTube

<https://youtu.be/dVypwLW6gQw>



Editor: Marsha J. Victory [livermorehorses@aol.com](mailto:livermorehorses@aol.com)



### **Elin Ekman - DYNAmore Nordic**

#### **ICFD video: How to set up a 2D CFD case in LS-DYNA**

Watch this ICFD video, on how to set up a 2D CFD case in LS-DYNA here: [www.youtube.com/watch?v=8p929ke3gU&feature=youtube](http://www.youtube.com/watch?v=8p929ke3gU&feature=youtube) and download the example here: [http://www.dynaexamples.com/icfd/basics-examples/cylinder\\_flow](http://www.dynaexamples.com/icfd/basics-examples/cylinder_flow)

### **Seminar in "Crash Analysis" - March 28-31 (Sweden)**

March 28-31 it's time for Paul Du Bois "Crash Analysis". This time he will have help from Suri Bala, who works at LSTC. The seminar will take place at DYNAmore Nordic's office in Linköping, Sweden. Read more about it, and register here: <https://dynamore.se/en/training/seminars/crash/crash-analysis> and since it is a popular seminar we recommend you register as soon as possible to guarantee your spot.

### **Marsha Victory - LSTC**

#### **ALE -SPH Class**

Pleased to have Mhamed Souli come to LSTC, Ca to teach ALE, SPH Feb 13-15 Not to miss these classes...and you can visit my horses!! for information [vic@lstc.com](mailto:vic@lstc.com)

### **Rakesh Patil - Kaizenat Technologies Pvt. Ltd**

#### **Android version Kaizen-DYNA 2.2.2 - Update to new version & enjoy the benefits!**

This update includes implementation of user's feedback like

- 1.Global LS-DYNA expertise through local languages like Chinese version
- 2.Improved web-app to access in computer
- 3.Simplified User Interface
- 4.Quicker User Interface Response time
- 5.Get your LS-DYNA knowledge tested & more...

## LS-DYNA Learning Version for students, and engineers



**LS-DYNA®, LS-OPT®, LS-PrePost, LS-TASC®,  
LSTC ATD and Barrier Models  
Manual Getting Started with LS-DYNA**

**Learning Version for Students, Engineers.  
NON-COMMERICAL USE**

**Full Capabilities-not limited to versions/applications-all LSTC software included**

**All sales are subject to eligibility and export control verification**

### **US Pricing**

<b>One core</b>	<b>10,000 Elements</b>	<b>Annually</b>	<b>\$100</b>	<b>Six months \$ 50</b>	<b>Three months \$25</b>
<b>Two cores</b>	<b>20,000 Elements</b>	<b>Annually</b>	<b>\$200</b>	<b>Six months \$100</b>	<b>Three months \$50</b>

### **Annual Version is delivered with Getting Started with LS-DYNA**

- US– Payment by credit card ONLY – Visa, Master Card or American Express
- Limited to elements. Other capabilities available.
- Node-Locked License option ONLY.
- LS-DYNA is provided electronically.
- Manuals electronically with permission to copy.

In any papers published containing data obtained using LS-DYNA we would be pleased if you would reference LS-DYNA and the LS-DYNA User's Manual.

**For the form to purchase the learning version please contact**

[vic@lstc.com](mailto:vic@lstc.com)

Kaizenat is happy to conclude the summary of the conference happened last week in India( Bangalore & Pune). Mr Satish Pathy Sr. Scientist, LSTC clearly outlined the road map and current development progress of LSTC products. It also reinforced in the minds of attendees that LSTC products suite is a multi-physics, multi- stage, multi-scale FE Solution with Pre & Post processing along with breadth of optimization



Mr. Umamaheswar, Executive Chief Consulting Er, GE Aviation in Bangalore Conference and Mr. Atul Patil, Managing Director IKSC delivered an extra ordinary key note address & made a perfect platform for this year's LSDYNA technical summit.



Kaizenat Customers showcased their innovative way of using LS-DYNA for various applications:

- **Autoliv** - Co-Simulation between LS-DYNA & MADYMO
- **GTRE** - Impact studies on Aero engine components
- **SABIC** - Usage of new elements for 3D printed Parts
- **ARAI** - Accident Re-Construction
- **Jyoti Toolings** - Virtual Die Validation
- **Tech Mahindra** -Bus Roof tracking study

Kaizenat Technologies Pvt Ltd additionally demonstrated its indigenously developed productivity improvement tools for LS-DYNA users. If you are interested to grab a copy of the same, kindly write to us at [support@kaizenat.com](mailto:support@kaizenat.com)

## January Book Review – The Most Magnificent Thing

Reviewed by: Arthur B. Shapiro Recommended by Rheannon Shapiro, age 5



**STEM – Science, Technology, Engineering and Math**

**Book of the Month**

[The Most Magnificent Thing! By: Ashley Spires](#)

**“...the sometimes-frustrating process of translating ideas to reality and shows how a new perspective can help problem solve and rekindle enthusiasm and joy. Grades K-2.”**

**-Shelle Rosenfeld.**

Award-winning author and illustrator Ashley Spires has created a charming picture book about an unnamed girl and her very best friend, who happens to be a dog. The girl has a wonderful idea. She is going to make the most MAGNIFICENT thing! She knows just how it will look. She knows just how it will work. All she has to do is make it, and she makes things all the time. Easy-peasy!?! But making her magnificent thing is anything but easy, and the girl tries and fails, repeatedly. Eventually, the girl gets really, really mad. She is so mad, in fact, that she quits. But after her dog convinces her to take a walk, she comes back to her

project with renewed enthusiasm and manages to get it just right.

For the early grades' exploration of character education, this funny book offers a perfect example of the rewards of perseverance and creativity. The girl's frustration and anger are vividly depicted in the detailed art, and the story offers good options for dealing honestly with these feelings, while at the same time reassuring children that it's okay to make mistakes. The clever use of verbs in groups of threes is both fun and functional, offering opportunities for wonderful vocabulary enrichment..

## Websites of Interest For Girls

If you have a website in the US or your country you would like listed please send it to [yic@lstc.com](mailto:yic@lstc.com)  
It does not have to be in English.

<a href="#">Girls In Engineering</a> /	Participants in GiE learn about a range of engineering topics, from bioengineering and robotics to nuclear engineering and chemical engineering.
<a href="#">Girls Who Code</a>	Whether it's a game or a website, our girls create technology that makes the world a better place.
<a href="#">The EngineerGirl</a>	Designed to bring national attention to the exciting opportunities that engineering represents for girls and women
<a href="#">GoldieBlox: Adventures in Coding</a>	A story-driven gameplay to assist you while your girl(s) develop knowlege and coding skills needed for a future in software coding .

## **AUTOMOTIVE NEWS & EVENTS**

**Editor: 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](mailto:agiac99@aol.com) - Subject Line please use "Automotive News"

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

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## DAIMLER World premiere of next generation smart electric drive



**US-VERSION: World premiere of next generation smart electric drive: Electrification of all smart models**

**Electric energy consumption: 13.1 – 12.9 kWh/100 km; CO2 emissions, combined: 0 g/km**

Stuttgart/Paris. The new smart electric drive makes opting into electric mobility more attractive than ever, combining overall agility with emission-free driving as an ideal combination for urban mobility. The smart fortwo electric drive is now available on the new-generation smart platform in both the smart fortwo coupe and cabrio models and, for the first time, in the smart forfour (not available in the U.S.). With this next generation, smart will be the only car manufacturer worldwide to offer its entire model range with both combustion engines and pure battery-electric drive. The smart electric drive will celebrate its world premiere at the Paris Motor Show and U.S. premiere at the Los Angeles Auto Show. The smart fortwo coupe electric drive will launch in the U.S. by spring 2017 and the smart fortwo cabrio electric drive by summer 2017.

"The smart is the ideal city car, and with electric drive it becomes a little bit more

perfect," says Annette Winkler, Head of smart. "This is why we will soon be offering our entire range – smart fortwo, smart cabrio and even our smart forfour\* – as all-electric versions. Together with lots of smart fans and enthusiastic drivers of the predecessor generations, we are looking forward to the unique driving fun offered by the new smart electric drive at very attractive prices, especially in countries where there is a buyer's premium."

The most important information at a glance:

smart is the only car manufacturer worldwide to offer its entire model range with both combustion engines and pure battery-electric drive.

The smart fortwo cabrio ED is the only electric cabriolet on the market.

With 118 lb-ft torque and 80 hp, the electric car boasts exceedingly agile acceleration.

## DAIMLER World premiere of next generation smart electric drive

The fully charged battery has sufficient power to cover between approximately 70-80 miles, more than enough in urban areas for which the smart was tailor-made. Confirmed U.S. range will be announced at launch.

With the high-performance on-board charger, the smart electric drive can be charged in half the time as before (U.S. preliminary new generation charge time: 2.5 hours / previous generation charge time: 5.5 hours)

smart electric drive: agile, quiet and emission-free urban driving

The driving characteristics are as agile and lively as ever. The ultra-small turning circle also contributes to this, and at 22.8 feet for the two-seater it corresponds precisely to that of its sibling with conventional drive. Electric driving at smart offers maximum options for customization with regard to colors and optional equipment due to exclusive options and tridion paint colors offered on the electric drive model.

Charging time is an important factor for electric vehicle customers and the new smart electric drive also boasts major improvements here. All models have a new, powerful on-board charger as a standard feature. In the U.S., charging time is an estimated 2.5 hours – twice as fast as the predecessor.

The smart fortwo electric drive models are series produced at smart's Hambach plant. The smart is equipped with a battery from the

Daimler subsidiary Deutsche ACCUMOTIVE. The company based in Kamenz, Saxony has been building the electric heart of the smart electric drive since 2012.

An 80 hp electric motor is situated at the rear of the smart electric drive and transmits its power via a constant ratio to the wheels. Powerful torque of 118 lb-ft is immediately available from a standstill, a 23% increase over the 96 lb-ft offered by the previous generation smart ED. The electric drive has a range of approximately 70-80 miles – ideal for emission-free mobility in urban areas. The maximum speed is electronically limited to 81 mph to maximize the range. U.S. range and overall electric motor specifications will be announced at the time of launch.

Thanks to the power characteristics of the electric motor, the smart needs just one single fixed gear ratio. There is no need for any gear changing – a major advantage in dense city traffic. To reverse, the engine's direction of rotation changes.

In addition to the basic transmission mode, the driver can select ECO mode, which is designed for a particularly efficient driving style. In addition, the maximum speed is limited, the accelerator pedal curve adjusted and the maximum recuperation level is pre-selected. In overrun mode or when braking, the vehicle's kinetic energy is converted into electrical energy – this is called recuperation.



## DAIMLER World premiere of next generation smart electric drive

To save energy and extend the range, the smart electric drive also features pre-entry climate control, which enables the desired temperature to be reached in the interior while the vehicle is still charging at a socket.

With the "smart control" app, electric drive information can be called up via smartphone, tablet or PC and functions such as pre-entry climate control or intelligent charging can be conveniently controlled remotely. The new model has more operating options than the predecessor. For example, two programmable departure times mean that intelligent charging and pre-entry climate control do not always need to be reset for frequent journeys. Specific functions of the smart control app for the U.S. market will be announced at launch.

The smart electric drive models surpass the extensive standard equipment of the other smart fortwo models with conventional drive as they additionally have a dashboard instrument with power meter and battery status display (standard) and winter package with heated steering wheel for maximum climate comfort (optionally available). The electric drive design package (optionally available) gives the vehicle an expressive look with tridion safety cell and door mirror caps painted in exclusive electric green.

After its world premiere in Paris, the new smart fortwo electric drive will be launched in the

U.S. by spring 2017 and the smart fortwo cabrio electric drive by summer 2017.

**Electric history at smart:** With the start of the first electrically driven test fleet in 2007 in London, smart also took on a pioneering role in the field of electric mobility when 100 smart fortwo electric drives took to the roads of the British capital with great success.

As early as 2009 smart launched the second generation of the smart fortwo electric drive, with the model being introduced in 18 markets. The objective was to gather as much experience as possible about how customers use and charge electric vehicles. The huge demand exceeded all expectations. Instead of the planned 1,000 vehicles, more than 2,000 smart fortwo electric drives were produced in Hambach.

From June 2012 the third generation of the smart fortwo electric drive also succeeded in winning wide-ranging buyers for its innovative and forward-looking drive concept. Moreover, in 2013 the smart fortwo was the first all-electric vehicle from a European importer in China. In Germany, the electric smart established itself as the market leader among battery-electric vehicles within a very short space of time with a market share of around 40 percent and was able to maintain this position for three years in a row.

\*smart forfour not planned for the U.S. market

# AEROSPACE NEWS & EVENTS

**Editor: Marnie Azadian**

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Submissions should be received by the 15<sup>th</sup> 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 15<sup>th</sup>, 2015 to be featured in the December 2015 FEA newsletter.

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### Kalvari-Class Submarines

(Source: Indian Ministry of Defence; issued Jan 12, 2017)

## Kalvari-Class Submarines a Key Milestone in Self-Reliance & Indigenisation for Country: Dr Subhash Bhamre

The second of six Scorpene-class submarines on order for the Indian Navy, Khanderi, was launched this morning at the Mazagon Dock Shipyard. The first boat, Kalvari, is presently undergoing sea trials and is to be commissioned by mid-2017. (Twitter photo)

Khanderi, the second of Indian Navy's Scorpene-class stealth submarine, was launched today by the Hon'ble Raksha Rajya Mantri, Dr Subhash Bhamre, paving the way for her sea trials. Admiral Sunil Lanba, Chief of the Naval Staff and a host of other dignitaries witnessed the launch at Mazagon Dock Shipyard Limited today.

The submarine is expected to be delivered to Navy by the year end. She has been christened after her illustrious predecessor, an erstwhile 'Foxtrot' class submarine decommissioned in 1989, which is as per the traditions of Indian Navy.

The construction of six Scorpene submarines is presently being progressed at Mazagon Dock Shipyard Limited (MDL), under Project 75 with Transfer of Technology from M/s DCNS, France as the Collaborator. The first of class submarine, Kalvari, is presently undergoing sea trials and likely to be commissioned into Navy by mid-2017. These submarines, post induction, would form the core of Navy's conventional Submarine Arm.

## Kalvari-Class Submarines a Key Milestone in Self-Reliance & Indigenisation

Speaking on the occasion Dr Subhash Bhamre said that Project 75 Kalvari is a key milestone in self-reliance and indigenisation for the country. Admiral Sunil Lanba, Chief of the Naval Staff said during his address that the fact that Submarine ‘‘Khanderi’’ compares with the best in the world, speaks highly of the experience and expertise our shipbuilders have gained over the years.

He added that as Indian Navy celebrates Golden Jubilee of the submarine arm in 2017, the induction of Project 75 submarines would mark the beginning of a new chapter in our submarine capabilities.

-ends-

The launching of Khanderi also marks a critical milestone event for the Shipyard which earlier has delivered two Shishumar-class submarines in the 90s and has now strengthened its position as a submarine building yard for Indian Navy.

Started as a small dry dock facility for East India Company, MDL today has established itself as a forefront Defence Public Sector Undertaking, with indigenous construction of several ships and submarines for Navy such as P 15 B Destroyers and P 17 A class stealth Frigates being the latest.

## China FEA News –Events - Participants

Editor: Yanhua Zhao – China FEA Information Engineering Solutions

迪艾工程技术软件(上海)有限公司 (ETA)  
奥雅纳工程咨询(上海)有限公司 (ARUP中国)  
上海恒士达科技有限公司 (HengStar)  
大连富坤科技开发有限公司 (Dalian Fukun)  
势流科技股份有限公司 (Flotrend Corp.)  
安捷新科技股份有限公司 (AgileSim)  
鑫威資訊股份有限公司 (SimW@re)  
北京思诺信科技有限公司 (AutoCAE)  
磐翼信息科技(上海)有限公司 (PAN-I)



ARUP



恒士达科技  
Hengstar Tech.



AgileSim



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**BETA CAE Systems.**

[www.beta-cae.com](http://www.beta-cae.com)

### **BETA CAE Systems - 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.

#### **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

### **BETA CAE Systems 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



**CRAY**

**[www.cray.com](http://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](http://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](http://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](http://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 multi-threaded 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](http://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 company 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**

[etainfo@eta.com](mailto:etainfo@eta.com)

[www.eta.com](http://www.eta.com)

### **Inventium Suite™**

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

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

### **PreSys**

Inventium's core FE modeling toolset. It is the successor to ETA's VPG/PrePost and FEMB products. PreSys offers an easy to use interface, with drop-down menus and toolbars,

increased graphics speed and detailed graphics capabilities. These types of capabilities are combined with powerful, robust and accurate modeling functions.

### **VPG**

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

### **DYNAFORM**

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



## Latest Release is ESI Visual-Environment 12.0

### ESI Group

[www.esi-group.com](http://www.esi-group.com)

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

**Visual-Crash DYNA** provides advanced preprocessing functionality for LS-DYNA users, e.g. fast iteration and rapid model revision processes, from data input to visualization for crashworthiness simulation and design. It ensures quick model browsing, advanced mesh editing capabilities and rapid graphical assembly of system models. Visual-Crash DYNA allows graphical creation, modification and deletion of LS-DYNA entities. It comprises tools for checking model quality and simulation parameters prior to launching calculations with the solver. These

tools help in correcting errors and fine-tuning the model and simulation before submitting it to the solver, thus saving time and resources.

Several high productivity tools such as advanced dummy positioning, seat morphing, belt fitting and airbag folder are provided in **Visual-Safe**, a dedicated application to safety utilities.

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

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



## Latest Release is ESI Visual-Environment 12.0

### ESI Group

[www.esi-group.com](http://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.

**VisualDSS** 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. **VisualDSS** supports seamless connection with various CAD/PLM systems to extract the data required for building virtual tests as well as building and chaining several virtual tests upstream and downstream to achieve an integrated process. It enables the capture, storage and reuse of enterprise knowledge and best practices, as well as the automation of repetitive and cumbersome tasks in a virtual prototyping process, the propagation of engineering changes or design changes from one domain to another.

**JSOL Corporation**

[www.jsol.co.jp/english/cae/](http://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](http://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

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 de-penetrate impactors at multiple locations and produce many input decks

[www.oasys-software.com/dyna](http://www.oasys-software.com/dyna)

- 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](http://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

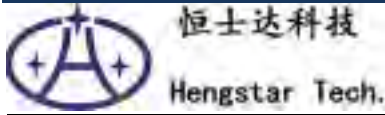
Key benefits:

- 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

**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..

[www.hengstar.com](http://www.hengstar.com)

**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 focuses 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](http://www.lenovo.com)

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

Dedicated to building exceptionally engineered PCs, mobile Internet devices and servers spanning entry through supercomputers, Lenovo has built its business on product innovation, a highly efficient global supply

chain and strong strategic execution. The company develops, manufactures and markets reliable, high-quality, secure and easy-to-use technology products and services.

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

Canada      **Metal Forming Analysis Corp MFAC**      [galb@mfac.com](mailto:galb@mfac.com)  
[www.mfac.com](http://www.mfac.com)

LS-DYNA                                      LS-OPT                                      LS-PrePost                                      LS-TaSC  
 LSTC Dummy Models                      LSTC Barrier Models                      eta/VPG  
 eta/DYNAFORM                                      INVENTIUM/PreSys

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**Mexico**      **COMPLX**                                      Armando Toledo  
[www.complx.com.mx/](http://www.complx.com.mx/)                                      [armando.toledo@complx.com.mx](mailto:armando.toledo@complx.com.mx)

LS-DYNA    LS-OPT                                      LS-PrePost  
 LS-TAsc Barrier/Dummy Models

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**United States**      **CAE Associates Inc.**      [info@caeai.com](mailto:info@caeai.com)  
[www.caeai.com](http://www.caeai.com)

ANSYS Products                                      CivilFem                                      Consulting ANSYS  
 Consulting LS-DYNA

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**United States**      **DYNAMAX**                                      [sales@dynamax-inc.com](mailto:sales@dynamax-inc.com)  
[www.dynamax-inc.com](http://www.dynamax-inc.com)

LS-DYNA                                      LS-OPT                                      LS-PrePost                                      LS-TaSC  
 LSTC Dummy Models                                      LSTC Barrier Models

United  
States

ESI Group N.A [info@esi-group.com](mailto:info@esi-group.com)

[www.esi-group.com](http://www.esi-group.com)

PAM-STAMP

QuikCAST

SYSWELD

PAM-COMPOSITES

CEM One

VA One

CFD-ACE+

ProCAST

Weld Planner

Visual-Environment

IC.IDO

United  
States

Engineering Technology Associates – ETA [etainfo@eta.com](mailto:etainfo@eta.com)

[www.eta.com](http://www.eta.com)

INVENTIUM/PreSy

NISA

VPG

LS-DYNA

LS-OPT

DYNAform

United  
States

Livermore Software Technology Corp

[sales@lstc.com](mailto:sales@lstc.com)

LSTC [www.lstc.com](http://www.lstc.com)

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

LSTC Dummy Models

LSTC Barrier Models

TOYOTA THUMS

United  
States

Predictive Engineering [george.laird@predictiveengineering.com](mailto:george.laird@predictiveengineering.com)

[www.predictiveengineering.com](http://www.predictiveengineering.com)

FEMAP

NX Nastran

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

LSTC Dummy Models

LSTC Barrier Models

<b>France</b>	<b>DynaS+</b>		<a href="mailto:v.lapoujade@dynasplus.com">v.lapoujade@dynasplus.com</a>	
	<a href="http://www.dynasplus.com">www.dynasplus.com</a>		Oasys Suite	
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	DYNAFORM	VPG	MEDINA	
	LSTC Dummy Models		LSTC Barrier Models	

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<b>France</b>	<b>DYNAmore France SAS</b>		<a href="mailto:sales@dynamore.eu">sales@dynamore.eu</a>	
	<a href="http://www.dynamore.eu">www.dynamore.eu</a>			
	LS-DYNA, LS-PrePost	LS-OPT	Primer	DYNAFORM
	DSDM Products		LSTC Dummy Models	FEMZIP
	LSTC Barrier Models		DIGIMAT	

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<b>Germany</b>	<b>CADFEM GmbH</b>		<a href="mailto:lsdyna@cadfem.de">lsdyna@cadfem.de</a>	
	<a href="http://www.cadfem.de">www.cadfem.de</a>			
	ANSYS	LS-DYNA	optiSLang	
	ESAComp	AnyBody		
	ANSYS/LS-DYNA			

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**Germany****DYNAmore GmbH**[uli.franz@dynamore.de](mailto:uli.franz@dynamore.de)[www.dynamore.de](http://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	

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**The Netherlands****Infinite Simulation Systems B.V**[j.mathijssen@infinite.nl](mailto:j.mathijssen@infinite.nl)[www.infinite.nl](http://www.infinite.nl)

ANSYS Products	CivilFem	CFX	Fluent
LS-DYNA	LS-PrePost	LS-OPT	LS-TaSC

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**Russia****STRELA**[info@dynamorussia.com](mailto:info@dynamorussia.com)

LS-DYNA	LS-TaSC	LS-OPT	LS-PrePost
LSTC Dummy Models		LSTC Barrier Models	

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<b>Sweden</b>	<b>DYNAmore Nordic</b>		<a href="mailto:marcus.redhe@dynamore.se">marcus.redhe@dynamore.se</a>	
	<a href="http://www.dynamore.se">www.dynamore.se</a>		Oasys Suite	
	ANSA	μETA	LS-DYNA	LS-OPT
	LS-PrePost	LS-TaSC	FastFORM	DYNAform
	FormingSuite		LSTC Dummy Models LSTC Barrier Models	
<b>Switzerland</b>	<b>DYNAmoreSwiss GmbH</b>		<a href="mailto:info@dynamore.ch">info@dynamore.ch</a>	
	<a href="http://www.dynamore.ch">www.dynamore.ch</a>			
	LS-DYNA		LS-OPT	LS-PrePost
	LS-TaSC		LSTC Dummy Models LSTC Barrier Models	
<b>UK</b>	<b>Ove Arup &amp; Partners</b>		<a href="mailto:dyna.sales@arup.com">dyna.sales@arup.com</a>	
	<a href="http://www.oasys-software.com/dyna">www.oasys-software.com/dyna</a>		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	

<b>China</b>	<b>ETA – China</b>		<a href="mailto:lma@eta.com.cn">lma@eta.com.cn</a>		
	<a href="http://www.eta.com/cn">www.eta.com/cn</a>				
	Inventium	VPG	DYNAFORM	NISA	
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost	
			LSTC Barrier Models	LS-TaSC	
<b>China</b>	<b>Oasys Ltd. China</b>		<a href="mailto:Stephen.zhao@arup.com">Stephen.zhao@arup.com</a>		
	<a href="http://www.oasys-software.com/dyna">www.oasys-software.com/dyna</a>				
	PRIMER	D3PLOT	HYCRASH	T/HIS REPORTER	SHELL
	LS-DYNA		LS-OPT	LSTC Dummy Models	LS-PrePost
	DIGIMAT		FEMZIP	LSTC Barrier Models	LS-TaSC
<b>China</b>	<b>Shanghai Hengstar Technology</b>		<a href="mailto:info@hengstar.com">info@hengstar.com</a>		
	<a href="http://www.hengstar.com">www.hengstar.com</a>				
	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			

<b>India</b>	<b>Oasys Ltd. India</b>	<a href="mailto:lavendra.singh@arup.com">lavendra.singh@arup.com</a>		
	<a href="http://www.oasys-software.com/dyna">www.oasys-software.com/dyna</a>			
	PRIMER	D3PLOT	T/HIS	
			LS-OPT	LSTC Dummy Models
				LS-PrePost
			LS-DYNA	LSTC Barrier Models
				LS-TaSC

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<b>India</b>	<b>CADFEM Eng. Svce</b>	<a href="mailto:info@cadfem.in">info@cadfem.in</a>		
	<a href="http://www.cadfem.in">www.cadfem.in</a>			
	ANSYS	VPS	ESAComp	optiSLang
	LS-DYNA	LS-OPT	LS-PrePost	

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<b>India</b>	<b>Kaizenat Technologies Pvt. Ltd</b>	<a href="mailto:support@kaizenat.com">support@kaizenat.com</a>		
	<a href="http://kaizenat.com/">http://kaizenat.com/</a>			
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
	Complete LS-DYNA suite of products		LSTC Barrier Models	LS-TaSC

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Distribution/Consulting	Asia Pacific	Distribution/Consulting
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<b>Japan</b>	<b>CTC</b>	<a href="mailto:LS-dyna@ctc-g.co.jp">LS-dyna@ctc-g.co.jp</a>		
	<a href="http://www.engineering-eye.com">www.engineering-eye.com</a>			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	CmWAVE	

<b>Japan</b>	<b>JSOL</b>		Oasys Suite	
	<a href="http://www.jsol.co.jp/english/cae">www.jsol.co.jp/english/cae</a>		JMAG	
	JSTAMP	HYCRASH	LS-PrePost	LS-TaSC
	LS-DYNA	LS-OPT		
	LSTC Dummy Models	LSTC Barrier Models	TOYOTA THUMS	

<b>Japan</b>	<b>FUJITSU</b>	<a href="http://www.fujitsu.com/jp/solutions/business-technology/tc/sol/">http://www.fujitsu.com/jp/solutions/business-technology/tc/sol/</a>		
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	CLOUD Services	

<b>Japan</b>	<b>LANCEMORE</b>	<a href="mailto:info@lancemore.jp">info@lancemore.jp</a>		
	<a href="http://www.lancemore.jp/index_en.html">www.lancemore.jp/index_en.html</a>			
	<b>Consulting</b>			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models		

<b>Japan</b>	<b>Terrabyte</b>	<b>English:</b>		
	<a href="http://www.terrabyte.co.jp">www.terrabyte.co.jp</a>	<a href="http://www.terrabyte.co.jp/english/index.htm">www.terrabyte.co.jp/english/index.htm</a>		
	<b>Consulting</b>			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	AnyBody	

<b>Korea</b>	<b>THEME</b>	<a href="mailto:wschung7@gmail.com">wschung7@gmail.com</a>		
	<a href="http://www.lsdyna.co.kr">www.lsdyna.co.kr</a>		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			

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<b>Korea</b>	<b>KOSTECH</b>	<a href="mailto:young@kostech.co.kr">young@kostech.co.kr</a>		
	<a href="http://www.kostech.co.kr">www.kostech.co.kr</a>			
	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	

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**Taiwan**      **AgileSim Technology Corp.**

[www.agilesim.com.tw](http://www.agilesim.com.tw)

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

LSTC Dummy Models

LSTC Barrier Models

eta/VPG

FCM

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**Taiwan**      **Flotrend**

[www.flotrend.com.tw](http://www.flotrend.com.tw)

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

LSTC Dummy Models

LSTC Barrier Models

eta/VPG

FCM

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**Taiwan**      **SiMWARE Inc..**

[www.simware.com.tw](http://www.simware.com.tw)

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

LSTC Dummy Models

LSTC Barrier Models

eta/VPG

FCM

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Contact: JSOL Corporation Engineering Technology Division [cae-info@sci.jsol.co.jp](mailto:cae-info@sci.jsol.co.jp)



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

**JSOL Corporation is cooperating with chosen  
cloud computing services**

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

LS-DYNA customers in industries / academia / consultancies are facing increased needs for additional LS-DYNA cores

In calculations of optimization, robustness, statistical analysis, we find that an increase in cores of LS-DYNA are needed, for short term extra projects or cores.

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

This service is offered to customers using Cloud License fee schedule, the additional fee is less expensive 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/](http://jpn.nec.com/manufacture/machinery/hpc_online/)

**Focus**

Foundation for Computational Science

<http://www.j-focus.or.jp>

**Platform Computation Cloud**

CreDist.Inc.

**PLEXUS CAE**

Information Services International-Dentsu, Ltd.

(ISID) <https://portal.plexusplm.com/plexus-cae/>

**SCSK Corporation**

<http://www.scsk.jp/product/keyword/keyword07.html>



## Rescale: Cloud Simulation Platform

### 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](mailto:info@rescale.com)

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

## ESI Cloud Based Virtual Engineering Solutions



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

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

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

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

### **Virtual Performance Solution:**

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

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

### **The benefits of VPS hybrid on ESI Cloud include:**

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

## ESI Cloud Based Virtual Engineering Solutions

[www.esi-group.com/software-solutions/cloud-solutions/esi-cloud](http://www.esi-group.com/software-solutions/cloud-solutions/esi-cloud)

### VPS On Demand

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

#### Key solution capabilities:

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

### Result visualization

ESI Cloud deploys both client-side and server-side rendering technologies. This enables the full interactivity needed during the simulation workflow along with the ability to handle large data generated for 3D result visualization in the browser, removing the need for time consuming data transfers. Additionally

ESI Cloud visualization engine enables the comparisons of different results through a multiple window user interface design.

#### Key result visualization capabilities:

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

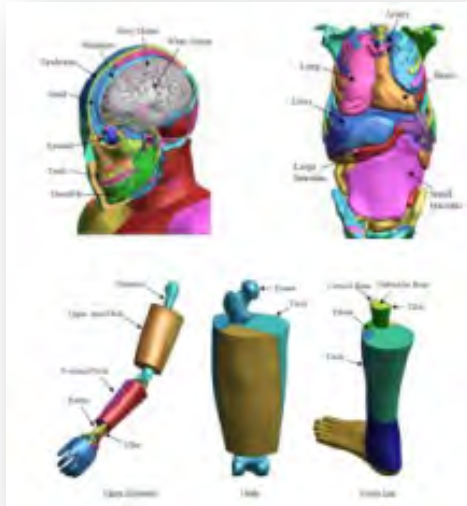
### Collaboration

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

#### Key collaboration capabilities:

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

**TOYOTA - Total Human Model for Safety – THUMS**

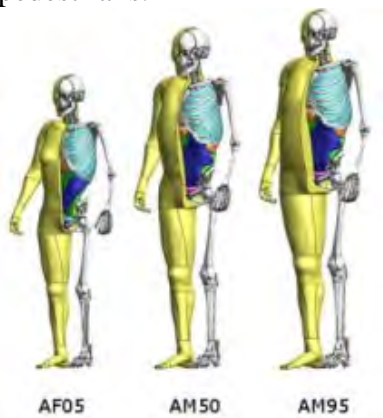


The Total Human Model for Safety, or THUMS®, is a joint development of Toyota Motor Corporation and Toyota Central R&D Labs. Unlike dummy models, which are simplified representation of humans, THUMS represents actual humans in detail, including the outer shape, but also bones, muscles, ligaments, tendons,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

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



and as standing model to represent pedestrians.



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

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

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

For information please contact: [THUMS@lstc.com](mailto: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](mailto: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](mailto:atds@lstc.com).



Keep up to date on upcoming

**Conferences**

**Meetings**

**Events**

We will be adding to this section monthly – if you have a new event to be listed please send to [aqiac99@aol.com](mailto:aqiac99@aol.com)

**7th BETA CAE International Conference**

30 May - 1 June, 2017

Thessaloniki, Greece

**SPONSORED EVENTS: BETA CAE Systems participation**





## Call for Papers – **Extended Deadline**

### 11<sup>th</sup> European LS-DYNA<sup>®</sup> Conference

May 9 - 11 2017, Salzburg, Austria

Conference Website: [www.dynamore.de/conf2017](http://www.dynamore.de/conf2017)

#### Call for Papers

We kindly invite all users of LS-DYNA, LS-OPT, and LS-TaSC to take advantage of this fantastic opportunity to showcase their work. The conference is your chance to talk with industry experts, catch up with colleagues and enjoy time exploring new ideas. In addition, attendees can meet with exhibitors to learn about the latest hardware and software trends as well as additional services relating to the finite element solver LS-DYNA, the optimization codes LS-OPT and LS-TaSC, and the pre- and postprocessor LS-PrePost. Training courses and workshops will take place in the week before, during and after the conference.

#### Venue

Salzburg Congress is located in the center of Salzburg. Salzburg can be reached easily via freeway, the high speed train ICE, and the international airports of Salzburg or Munich.

[www.salzburgcongress.at](http://www.salzburgcongress.at)

#### Review of the 2015 Conference

Get an impression of the 10<sup>th</sup> European LS-DYNA Conference 2015 in our review on YouTube:

<https://youtu.be/Mw5Dm-SXcWo>

#### Abstract submission

Please submit your abstract (maximum length 2,500 characters) by E-Mail to [conference@dynamore.de](mailto:conference@dynamore.de) or online at [www.dynamore.de/conf2017-submit](http://www.dynamore.de/conf2017-submit)

#### Important dates

**Extended** Abstract submission:

**17 February 2017**

Author notification: 27 February 2017

Final paper deadline: 27 March 2017

#### Participant fees

Industry speaker: 400 Euro

Academic speaker: 340 Euro

Industry: 590 Euro <sup>1)</sup> / 640 Euro

Academic: 440 Euro <sup>1)</sup> / 490 Euro

<sup>1)</sup> Registration before 1 April 2017.

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Please request further information.

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## Training and Social Media Section

Aleta Hays



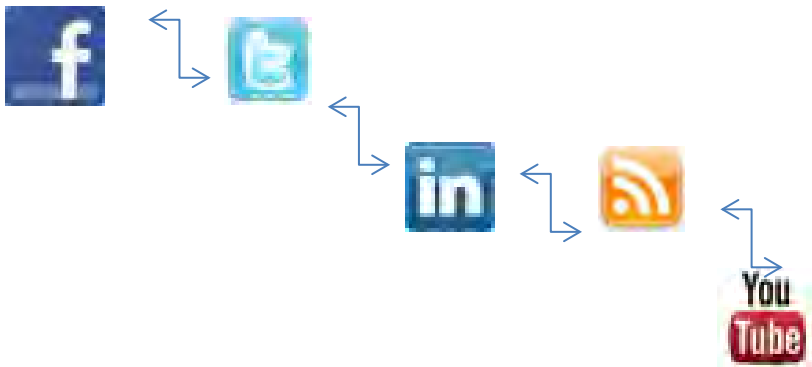
### Training

#### Classes

#### Webinars

#### On Site – On Line

We will be adding to this section monthly – if you have a new event to be listed please send to Aleta [ayh225@aol.com](mailto:ayh225@aol.com) and cc Anthony [agiac99@aol.com](mailto:agiac99@aol.com)





**Participant’s Training Classes**

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**Class Directory**

**Participant Class Directory**

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

**ARUP** Visit the website for complete listings/changes/locations

[www.oasys-software.com/dyna/en/training](http://www.oasys-software.com/dyna/en/training)

Arup offers a wide range of training for new and existing users of the Oasys LS-DYNA Environment software who are seeking to improve their understanding and application of these powerful analysis tools. New users will benefit from our introductory courses and can quickly become effective in other areas of application through the range of courses on offer. The courses will also provide existing users with knowledge of how to use the latest features in Oasys and LS-DYNA.

**26-27 January 2016**

**Paul Du Bois Courses**

**Polymeric Material Modelling in LS-DYNA**

**2 days Cost: £1,000**

**BETA CAE  
SYSTEMS**

Visit the website for complete listings/changes/locations

[www.beta-cae.com/training.htm](http://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.com](mailto:ansa@beta-cae.com) for further details.

**Recommended Training Courses (Complete information on website)**

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

Author: Nils Karajan [nik@dynamore.de](mailto:nik@dynamore.de)

**DYNAmore** Visit the website for complete overview and registration  
[www.dynamore.de/seminars](http://www.dynamore.de/seminars)

**New seminar brochure for 2017 published by DYNAmore**

Download full seminar brochure (pdf): [www.dynamore.de/seminars2017](http://www.dynamore.de/seminars2017)



**Selection of trainings from January to March**

Element Types and Nonlinear Aspects	8 Feb.
Introduction to LS-PrePost	13 Feb. / 13 March / 24 April
Introduction to LS-DYNA	14-16 Feb. / 14-16 March / 25-27
AprilUser Interfaces in LS-DYNA	20 Feb.
Joining Techniques for Crash Analysis	6-7 March, 4-5 April (G)
Introduction to Passive Safety Simulation	9-10 March
CPM for Airbag Modeling	17 March
Contact definitions in LS-DYNA	20 March (L)
ALE and Fluid-Structure Interaction	21-22 March (V)
LS-OPT – Optimization and Robustness	22-24 March, 4-6 April (L)
Damagae and Failure Modeling of Metallic Materials	23-24 March (T)
Modeling Polymers & Elastomers in LS-DYNA	27-28 March
Simulation of Short Fiber Reinforced Polymers	29 March
Simulation of Continuous Fiber Reinforced Polymers	30-31 March
Implicit Analysis using LS-DYNA	4-5 April
Introduction to PRIMER for LS-DYNA	6 April
Contact Definitions for Crash Analysis	7 April
Modeling Metallic Materials in LS-DYNA	26-27 April (T)
User Materials in LS-DYNA	28 April

**Information days or Webinars (free of charge)**

Integrated Optimization with ANSA & LS-OPT	20 Feb. (webinar)
Composites Analysis with LS-DYNA	13 March
Mapping tool ENVYO	13 March
Cloud Solutions for LS-DYNA	27 March
Optimization/DOE/Robustness with LS-OPT	30 March (V)

**Support days (free of charge)**

LS-DYNA	17 Feb. / 21 April
Occupant Safety	17 March

If not otherwise stated, the event location is Stuttgart, Germany. Other event locations are:  
 G = Göteborg, Sweden; L = Linköping, Sweden V = Versailles, France; T = Turin, Italy,

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.

We hope that our offer will meet your needs and are looking forward to welcoming you at one of the events.

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

Please visit the website for complete information on all the classes and locations

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

**Introduction to QuikCAST**

**7 Feb 2017 to 9 Feb 2017  
Casting**

**VA One: Coupled FEA/SEA Training**

**16 Mar 2017 to 17 Mar 2017  
Vibro-Acoustics**

**Basic PAM-STAMP**

**15 Feb 2017 to 16 Feb 2017  
Sheet Metal Forming**

**Basic PAM-STAMP**

**22 Mar 2017 to 23 Mar 2017  
Sheet Metal Forming**

**Introduction to ProCAST**

**7 Mar 2017 to 9 Mar 2017  
Casting**

**Basic PAM-STAMP**

**26 Apr 2017 to 27 Apr 2017  
Sheet Metal Forming**

**VA One: FE/BEM Training**

**14 Mar 2017 to 15 Mar 2017  
Vibro-Acoustics**

**Basic PAM-STAMP**

**17 May 2017 to 18 May 2017  
21 Jun 2017 to 22 Jun 2017  
Sheet Metal Forming**

## LSTC 2017 Training

Date	Location	Class	Instructor(s)	Price
<b>January</b>				Students 50%
23	MI	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
24-27	MI	Intro to LS-DYNA	A. Nair	\$750
<b>February</b>				
13-15	CA	ALE/Eulerian & Fluid/Structure Interaction	M. Souli	\$750
16-17	CA	Smoothed Particle Hydrodynamics (SPH)	M. Souli	\$400
16-17	ONLINE	Contact in LS-DYNA	A. Tabiei	\$1,000
23-24	ONLINE	Implicit LS-DYNA	A. Tabiei	\$1,000
<b>March</b>				
13	CA	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
14-17	CA	Intro to LS-DYNA	J. Reid	\$750
20	MI	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
21-24	MI	Intro to LS-DYNA	A. Nair	\$750
<b>April</b>				
6-7	MI	Intro to LS-OPT	I. Gandikota	\$750
10-11	MI	Airbag Folding	R. Chivukula	\$750
<b>11-13</b>	CA	Advanced ALE Applications	I. Do / H.Chen	\$600
12-13	MI	NVH and Frequency Domain Analysis	Y. Huang	\$400
17-18	MI	LS-DYNA Advanced Class	S. Bala	\$750
19	MI	Electromagnetics	I. Caldichoury	\$100
20-21	MI	ICFD	I. Caldichoury	\$200
<b>May</b>				
2-3	MI	Composite LS-DYNA	A. Tabiei	\$1,250
4-5	MI	Rubber, Foam, & Viscoelastic Materials	A. Tabiei	\$1,250
8-9	MI	Fracture, Failure & Damage	A. Tabiei	\$1,250
10-11	MI	Plasticity, Plastics, Visco-plastic Materials	A. Tabiei	\$1,250
15	CA	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
16-19	CA	Intro to LS-DYNA	A. Nair	\$750
16-18	MI	Advanced ALE Applications	I. Do / H. Chen	\$600
22-23	CA	Blast in LS-DYNA	A. Tabiei	\$1,000
24-25	CA	Penetration Using LS-DYNA	A. Tabiei	\$1,000



## LSTC 2017 Training

<b>June</b>				
1-2	CA	User Materials in LS-DYNA (UMAT)	A. Tabiei	\$1,250
1-2	MI	Contact	S. Bala	\$200
9	MI	Material Characteristics for Metals Plastics and Polymers - Test Data to Material Model	S. Bala	\$200
15-16	MI	Introduction to Metal Forming	L. Zhang / Q Yan	\$400
19	MI	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
20-23	MI	Intro to LS-DYNA	J. Reid	\$750
<b>July</b>				
10-11	MI	Occupant Simulation	S. Guha	\$400
24	MI	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
25-29	MI	Intro to LS-DYNA	A. Tabiei	\$750
<b>August</b>				
1-2	CA	Rubber, Foam & Viscoelastic Materials	A. Tabiei	\$1,250
3-4	CA	Plasticity, Plastics, Visco-plastic Materials	A. Tabiei	\$1,250
8-9	CA	Fracture, Failure, Damage	A. Tabiei	\$1,250
10-11	CA	Composite LS-DYNA	A. Tabiei	\$1,250
14-15	CA	Implicit LS-DYNA	A. Tabiei	\$750
21-23	CA	ALE/Eulerian & FSI Interaction in LS- DYNA	M. Souli	\$750
24-25	CA	Smoothed Particle Hydrodynamics (SPH)	M. Souli	\$400
28	CA	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
Aug29-Sep1	CA	Intro to LS-DYNA	A. Nair	\$750
<b>September</b>				
12-13	MI	Airbag Modeling	A. Nair	\$400
13	CA	Material Characteristics for Metals, Plastics, and Polymers - Test Data to Material Model	S. Bala	\$200
14-15	CA	Contact	S. Bala	\$200

## LSTC 2017 Training

<b>October</b>				
11-13	MI	Optimization and Probabilistic Analysis using LS-OPT	A. Basudhar	\$750
16	MI	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
17-20	MI	Intro to LS-DYNA	A. Nair	\$750
17-18	CA	NVH and Frequency Domain Analysis	Y. Huang	\$400
<b>November</b>				
6	CA	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
7-10	CA	Intro to LS-DYNA	A. Nair	\$750
13-14	CA	LS-DYNA Advanced	S. Bala	\$400
Nov 30- Dec 1	CA	Advanced Metal Forming	L. Zhang / X.Zhu	\$400
<b>December</b>				
11	MI	Intro to LS-PrePost	P. Ho / Q. Yan	\$100
12-15	MI	Intro to LS-DYNA	A. Nair	\$750

**LS-DYNA** Visit the website for complete listings/changes/locations  
**On Line** [www.LSDYNA-ONLINE.COM](http://www.LSDYNA-ONLINE.COM)

For Information contact: [courses@lsdyna-online.com](mailto: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.



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[ETA:](#)



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<a href="#">CADFEM</a>	<a href="http://www.cadfem.de">www.cadfem.de</a>
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<a href="#">ESI Group</a>	<a href="http://www.esi-group.com">www.esi-group.com</a>
<a href="#">ETA</a>	<a href="http://www.eta.com">www.eta.com</a>
<a href="#">Lancemore</a>	<a href="http://www.lancemore.jp/index_en.html">www.lancemore.jp/index_en.html</a>
<a href="#">Lenovo</a>	

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## LS-DYNA Resource Links

LS-DYNA Multiphysics YouTube Facundo Del Pin

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

FAQ LSTC Jim Day

<ftp.lstc.com/outgoing/support/FAQ>

LS-DYNA Support Site

[www.dynasupport.com](http://www.dynasupport.com)

LS-OPT & LS-TaSC

[www.lsopstsupport.com](http://www.lsopstsupport.com)

LS-DYNA EXAMPLES

[www.dynaexamples.com](http://www.dynaexamples.com)

LS-DYNA CONFERENCE PUBLICATIONS

[www.dynalook.com](http://www.dynalook.com)

ATD –DUMMY MODELS

[www.dummymodels.com](http://www.dummymodels.com)

LSTC ATD MODELS

[www.lstc.com/models](http://www.lstc.com/models)    [www.lstc.com/products/models/maillinglist](http://www.lstc.com/products/models/maillinglist)

AEROSPACE WORKING GROUP

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

Editor: Yanhua Zhao

### Lancing features in LS-DYNA

Quanqing Yan, Li Zhang, Yuzhong Xiao, Xinhai Zhu, Philip Ho  
LSTC

**Previously Presented:** For a copy write to [yanhua@feainformation.com](mailto:yanhua@feainformation.com)

December

Thermal Coupling Method Between SPH Particles and Solid Elements  
in LS-DYNA

Jingxiao Xu, Jason Wang, LSTC

November

Introduction to second order Lagrangian elements in LS-DYNA

Hailong Teng - Livermore Software Technology Corp.

October

An Introduction to \*CONSTRAINED\_BEAM\_IN\_SOLID

Hao Chen - Livermore Software Technology Corp

September:

*Introduction to the new framework for User Subroutine Development of LS-DYNA*

Zhidong Han and Brian Wainscott

*New Features in \*ELEMENT\_LANCING*

Xinhai Zhu, Li Zhang, Yuzhong Xiao

August :

*Equivalent Radiated Power calculation with LS-DYNA*

Yun Huang, Zhe Cui - Livermore Software Technology Corporation

July:

*Recent Developments for Laminates and TSHELL Forming*

Xinhai Zhu, Li Zhang, Yuzhong Xiao - LSTC

# Lancing features in LS-DYNA

Quanqing Yan, Li Zhang, Yuzhong Xiao, Xinhai Zhu, Philip Ho

LSTC

## Introduction

Lancing the blank in the sheet metal forming can be strategically used under controlled conditions to alleviate the thinning and necking of the sheet metal panels. A brief introduction of the lancing features (instant lancing, progressive lancing and the lancing with trimming) in LS-DYNA will be presented as below, along with the Graphical User Interface for the lancing definition in LS-PrePost EZSetup.

## Keywords for the lancing feature in LS-DYNA

To use the lancing feature in LS-DYNA, \*ELEMENT\_LANCING and \*DEFINE\_CURVE\_TRIM\_3D would be needed. In \*ELEMENT\_LANCING, the blank to be lanced (IDPT), the lancing path (IDCV) and the starting time (AT) can be defined. The lancing path can be specified in \*DEFINE\_CURVE\_TRIM\_3D. An excerpt of the keyword is shown as below:

```
*ELEMENT_LANCING
$      IDPT      IDCV      IREFINE      SMIN      AT      ENDT      NTIMES
      &blk1pid      90953      1      &at      &endt      &ntimes
*DEFINE_CURVE_TRIM_3D
$#      tcid      tctype      tflg      tdir      tctol      tolcn      nseed1      nseed2
      90953      1      1      0
$#      cx      cy      cz
      -3.253909e+001      8.811000e+000      3.907000e+001
      -3.288404e+001      8.831327e+000      3.907000e+001
.....
```

If the ending time (ET) is left blank, the instant lancing will be performed; otherwise the progressive lancing will be performed. The cutting times in this process can be further defined by specifying the NTIMES.

If the lancing is followed by the trimming process, the remaining zone in the blank can be specified in

```
*DEFINE_LANCE_SEED_POINT_COORDINATES
$#      NSEED      X1      Y1      Z1      X2      Y2      Z2
      1      -50.6727      19.58      39.07
```



\*DEFINE\_LANCE\_SEED\_POINT\_COORDINATE, as show below:

More details and the examples of the lancing feature can be found in the LS-DYNA Keyword User's Manual Vol.1.

It should be emphasized that the adaptivity (\*CONTROL\_ADAPTIVE) of the blank mesh should always be enabled in the lancing simulation.

## The Graphical User Interface for the lancing setup

To simplify setting up the lancing process in LS-DYNA, the graphical user interface (GUI) is implemented in LS-PrePost EZSetup. The lancing process can be defined in the Punch page of the Forming in the EZSetup, as shown in Fig. 1.

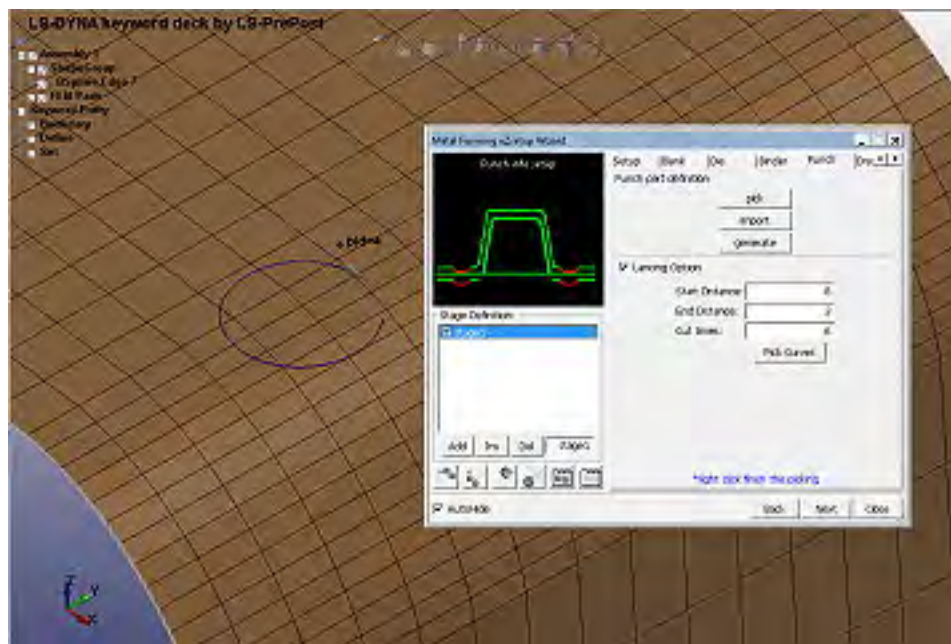


Fig. 1 the lancing setup in LS-PrePost EZSetup

For the instant lancing, the path can be defined by picking the curve in the IGES format in LS-PrePost. Instead of specifying the starting time, the distance to the tool home position is used in EZSetup to specify the starting of the lancing process. The corresponding keywords will be generated by EZSetup in the inputdeck of the forming process..

For the progressive lancing, the End Distance and the Cut Times would be further needed. As shown in Fig. 1, the direction of the lancing path can also be previewed in the main window. If necessary, the lancing direction can be reversed via LS-PrePost: GeoTol->Rever. Setting up the lancing with trimming would be supported in the later version of LS-PrePost EZSetup.

Currently for simulation of the lancing with trimming, manual modification of the generated keyword file would be necessary to include the following keyword as mentioned above:  
\*DEFINE\_LANCE\_SEED\_POINT\_COORDINATES.

## Examples of the lancing simulations

An example of the instant lancing with trimming is given in Fig.3. The blank is lanced and trimmed when the upper tool is at 5mm to the home position,. Fig.4 shows a progressive lancing process, in which the blank is lanced when the upper tool is moving from 8mm to 2mm until its home position.

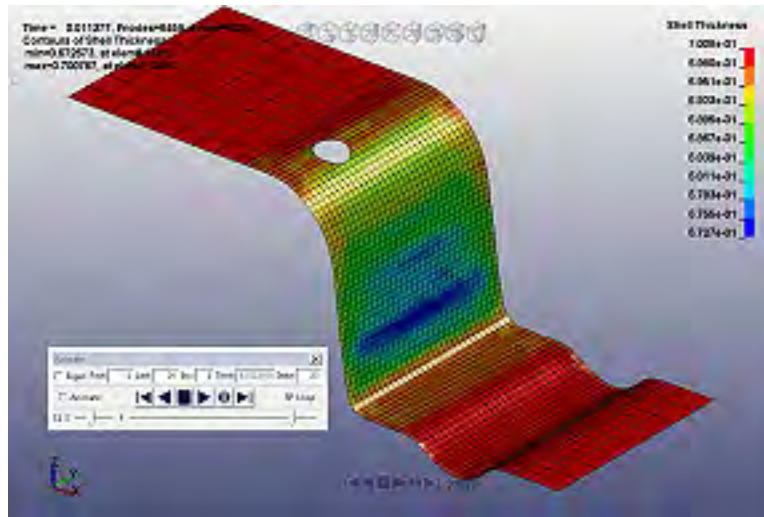


Fig. 3 the instant lancing with trimming

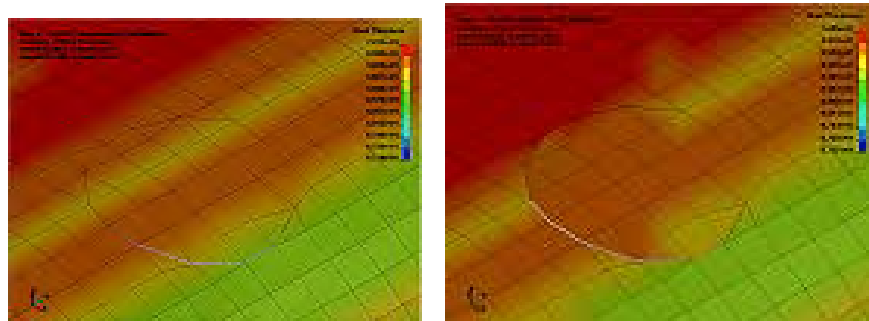


Fig.4 the progressive lancing

## Revisions

The lancing feature in LS-DYNA is available starting in Revision 83562 for SMP, and Revision 94383 for MPP. For lancing with trimming, Revision 107262 or later is required. The newest beta solver is recommended due to the continuous improvements.

The GUI of lancing setup can be found in LS-PrePost 4.3 -> Applications -> Metal Forming: EZSetup

## Summary

The keywords for the lancing feature of LS-DYNA, and the setting up via the GUI in LS-PrePost EZSetup, were briefly presented. With the lancing feature, the capability of the LS-DYNA in simulating the metal forming is further enhanced. The GUI in LS-PrePost EZSetup would efficiently help the users set up the lancing process in a straightforward manner.