FEANTM

ESI Group

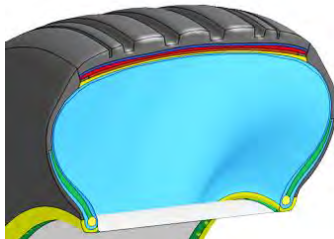**LSTC**

Rescale

12th European LS-DYNA Conference - Proceedings online

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www.feainformation.com.cn

Simplified and Traditional Chinese

The focus is engineering technical solutions/information.

LSTC - Livermore Software Technology Corp.

Development of LS-DYNA, LS-PrePost, LS-OPT,

LS-TaSC (Topology), and LSTC's Dummy &

Barrier models for use in various industries.

www.lstc.com

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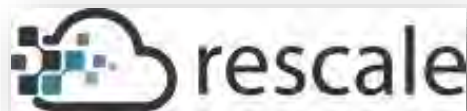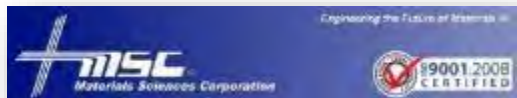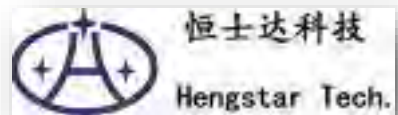
If you have any questions, suggestions or recommended changes, please contact us.

Editor and Contact: Marsha Victory - mailto:mv@feainfomation.com

Yanhua Zhao - yanhua@feainformation.com

Noi Sims – noi@feainformation.com

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DYNA MORE

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MSC Materials Sciences Corporation — Engineering the Future of Materials — ISO 9001.2008 CERTIFIED

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LANCEMORE

TERRABYTE Co.,Ltd. Customer Satisfaction by Computer Solution & Computer Simulation

仿坤软件 LS-DYNA China

DLFK

DELL

Table of contents

Announcements

Dr. John O. Hallquist is a member of National Academy of Engineering, founder and Chief Executive Officer of Livermore Software Technology Corporation. Dr. Hallquist pursued a career of challenges and intellectual discovery as the founder and Chief Executive Officer of LSTC.

John Hallquist Followed His Passion to Become an Engineer

LSTC-FCA Tire Model for all LSTC Customers

LSTC is pleased to announce the immediate availability of Tire models, jointly developed with FCA, for all customers.

The Tire models can be downloaded from http://ftp.lstc.com/anonymous/outgoing/suri/LSTC_Tire/.

Please go to page 18 to read detail information.

JSOL CAE Forum 2019   **November 6 - 8, Tokyo, Japan**

JSOL Corporation is holding the "JSOL CAE Forum" to provide our users with the latest and most comprehensive simulation technologies and case studies for various JSOL CAE packages including LS-DYNA.
Venue: Tokyo Conference Center Shinagawa
        1-9-36 Konan Minato-ku Tokyo Japan

**Conference Website: https://www.jsol-cae.com/en/event/usersevent/2019/caeforum/**

BETA CAE Systems announces the release of SPDRM v1.3.0

SPDRM v1.3.0 is now available, with numerous important enhancements in both the back-end and in the SPDRM client.

Developing CAE software systems for all simulation disciplines. Products: ANSA pre-processor/ EPILYSIS solver and META post-processor suite, and SPDRM, the simulation-process-data-and-resources manager, for a range of industries, incl. the automotive, railway vehicles, aerospace, motorsports, chemical processes engineering, energy, electronics…

BETA CAE Systems announces the release of SPDRM v1.3.0
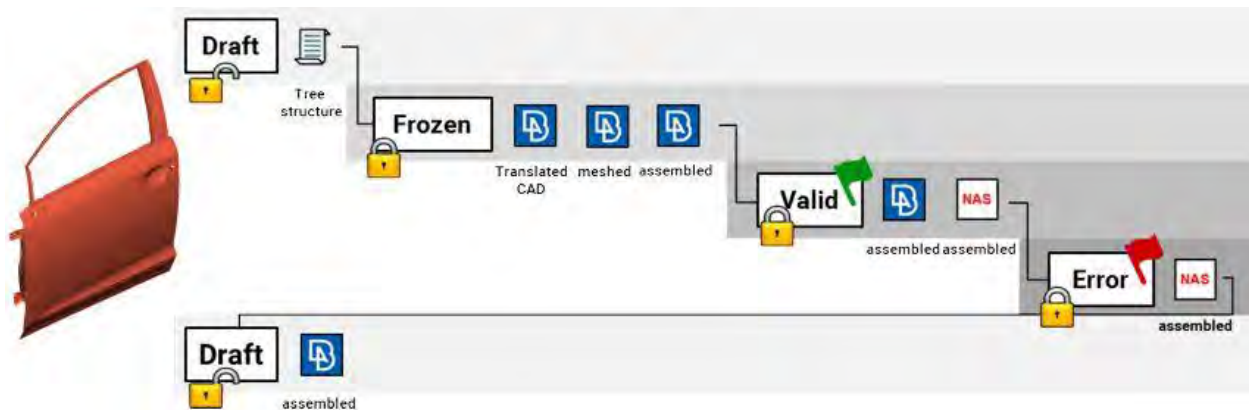
About this release

SPDRM v1.3.0 is now available, with numerous important enhancements in both the back-end and in the SPDRM client.

The new version offers integration with the well established application server WildFly, which inherits high-end technologies on the SPDRM server, as well as support of alternative application server solutions, such as JBoss, and Weblogic. Additionally, the interfacing with ANSA/META has been enriched in order to facilitate the modular management of Simulation Runs.

This new version brings new capabilities in the areas of CAE data traceability and quality management by introducing new tools for Life-cycle Management and data quality management. Exhaustive tracking of data relationships is now possible, which, in conjunction with the built-in pedigree tree, enables the graphical representation of all relations and dependencies of CAE data. Moreover, this version introduces the new Issue Tracking tool, a powerful solution for the management of data quality issues in the context of the CAE activities.

The most important software enhancements and code corrections are listed in more detail below.

Contents

Enhancements
Documentation Updates
Supported Platforms and System Requirements
Download

Website: https://www.beta-cae.com/news/20190520_announcement_spdrm_v1.3.0.htm

d3VIEW

d3VIEW is a data to decision platform that provides out-of-the box data extraction, transformation and interactive visualizations. Using d3VIEW, you can visualize, mine and analyze the data quickly to enable faster and better decisions.

Introducing Workflows
Workflows are now integrated in d3VIEW to capture and automate processes. You can now submit a job, post-process, compare and iterate seamlessly. Workflows can be used for MDO, material calibration for GISSMO, and other applications. Workflows helps standardize processes and provide repeatability.
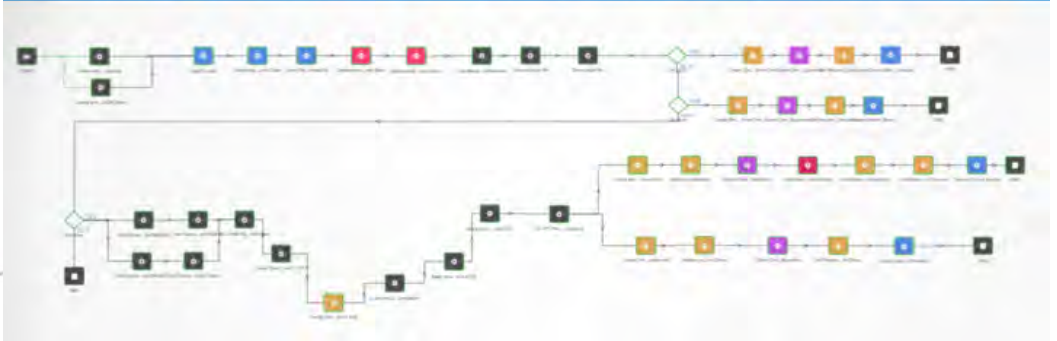
Turn LS-DYNA® data into decisions

HPC
Job Submission
Live Preview
Reporting and Statistics
On-premise and Cloud

LS-DYNA
Extract data from any file
Perform DOE using LS-OPT
Web-based 3D Visualization
Explicit and Implicit

Analytics
40+ Visualizers
Identify patterns in Data
Reporting to PDF/PPT

Workflows
Build and deploy workflows
Characterize materials
Model sequential impacts

Experiments
Manage Safety and NVH
Compare with Simulations
Search Historical data

Templates
400+ Math Expressions
Import from Library
Safety and NVH

http://www.d3view.com
contact marsha@lstc.com for more information

Author: Christian Frech christian.frech@dynamore.de

12th European LS-DYNA Conference

Proceedings online

Website: www.dynalook.com

Proceedings online

More than 60 Sessions with 200 presentations have been the foundation for the success of the 12th European LS-DYNA Conference in Koblenz, Germany. The Proceedings are now available online. Take the opportunity to read about current trends and developments at:

www.dynalook.com

Conference Review

About 500 participants and over 30 exhibitors met in Koblenz to discuss current issues and to present their achievements. In addition to networking, the main focus was on professional exchange. But also the supporting program with an stunning show on the second evening and the venue located directly at the river Rhine ensured that the conference became an unforgettable event for all participants. The conference was rounded off by the accompanying seminars, in which the participants had the opportunity to discuss questions in detail.

Vote of thanks

DYNAmore would like to thank everyone involved. Sponsors, speakers and participants have made an important contribution to the success of the conference. Without their commitment, it would not be possible to realize a conference of this size. We would also like to thank the Koblenz Congress and the Einstein Catering for the excellent support and the delicious food. The DYNAmore Team is already looking forward to the next European LS-DYNA Conference in 2021.

Contact

DYNAmore GmbH
Industriestr. 2, D-70565 Stuttgart, Germany
Tel. +49 (0) 7 11 - 45 96 00 - 0
E-Mail:conference@dynamore.de
www.dynamore.de

ESI Group
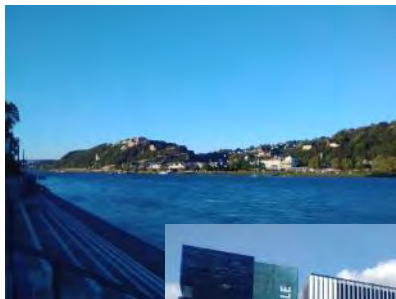
A leading innovator in Virtual Prototyping software and services. Specialist in material physics, ESI has developed a unique proficiency in helping industrial manufacturers replace physical prototypes by virtual prototypes, allowing them to virtually manufacture, assemble, test and pre-certify their future products.

ESI Visual-Environment v15.0 Updates for LS-DYNA Simulation

ESI Visual-Environment is an open CAE platform that addresses the simulation needs of multiple domains across major industries. It includes a comprehensive modeling tool to generate quality meshes on complex geometries for various engineering problems from Virtual Manufacturing to Virtual Performance: Heat Treatment, Welding, Casting, Flow, Crash, Safety, NVH (Noise, Vibration & Harshness), Electromagnetics, Fluid Dynamics (CFD), and more. An interactive post-processing module caters to the requirements of the CAE community through its multi-page / multi-plot environment.

Furthermore, a software development toolkit integrated inside Visual-Environment allows you to customize and extend this open architecture through process templates and macros. Visual-Environment incorporates the finest engineering knowledge & best practices with a process-oriented approach suited to the needs of a shop-floor user or a savvy software user alike.

Meshing

CAD Import
- Latest version of CATIA V5 (6R2018) is supported with Linux versions.
- Performance of import is improved, particularly for very large models.

Solid Combine
- Basic patterns of solid combine are supported: 4 Hexa to 1 Hexa, 8 Hexa to 1 Hexa, 3 Hexa to 1 Hexa, 4 Hexa to 1 Hexa Trans.

Tetra Mesh Creation with Baffle
- Respecting baffles in tetra mesh is supported.
- Automatic identification of baffles among the selected volumes is supported.
- Option is provided to add or delete the auto identified baffles to volumes.

Boundary Layer
- Generation of boundary layers extending up to the exterior surface of excluded surfaces is supported along with automatic management of symmetry.
- This is applicable for models that have circular symmetry and works for cases where the excluded mesh form two groups of elements, each forming one side of the section and fully planar in shape.

GUI Modifications
- Surface Normal GUI: A new GUI is provided to change the orientation of connected sections of surfaces
- Surface Offset GUI Modifications :
  - Intelligent part management is done while offsetting with the help of a new option for Part ID, '+', to add generated offset surfaces of each part to a new part.
  - Offset functionality is improved to retain the connectivity at sharp corners.
- Drop GUI : Copy and move of 1D ,2D Elements and Solid Faces is supported
- Morphing Mesh: A new GUI is provided to morph mesh by applying rotational deformation at corner locations of a surrounding box. It supports morphing of 1D, 2D and 3D elements.

Crash/Safe/Impact

Info: In addition to providing a crash module dedicated to ESI Virtual Performance Solution, Visual-Environment also supports LS-DYNA, MADYMO and RADIOSS users.

Seat Belt Enhancements

- Adding slip rings at the intermediate points between Retractor and Dring is now supported for Continuous belt type.
- Setting names to entities created during belt creation is improved to use Belt Name provided in Seat Belt panel, as name prefix followed by entity type. E.g. SeatBelt_2_2DPart_PartID.

Identify Parts with Initial Stress and Strain

- Identifying parts with initial stress and strain in a model is now made available.
- Contour visualization is enhanced to support all *INITIAL_STRESS/STRAIN_ options.
- Contour Layers option is supported to visualize stress and strain values on different layers.

File Export Improvements

- New User Defined export option is supported.
- User Defined option allows you to change the order of keyword, during export and the same is retained for subsequent export operation, unless the order is modified.
- All Entities option is also provided to create and save keywords order for all LS-DYNA keywords even if they are not present in the loaded model.
- Writing of *INCLUDE keywords at beginning of the file is supported with a new Export INCLUDE Keywords at beginning toggle under Advanced Options.
- This new toggle is available for ESI Standard and User Defined export options.

Post-Processing

Contour Visualization without Initial Frame Values

- Allows direct visualization of any result without initial frame values

Spectrum Control & 'Out of Range' Status

- Out of range entities can be displayed in 'Custom Color' or 'Part Color' as per your choice

Overlay Enhancement

- Overlay dialog is enhanced to set/rest the display method for all the layers

Miscellaneous

- 'fzip' file extension supported in File filters along with '.fz' for loading of FEMZIP files.
- Improved UI for Video/Image Settings and Align.

Process Automation

Visual-Process Executive refers to CAE Process Automation. Automate repetitive and cumbersome CAE tasks in virtual product development. Engineers can capitalize, share and deploy their organization's best practices within their extended ecosystem, thanks to this versatile module. It is commonly used for regulatory test simulation such as FMVSS, IIHS, EURO NCAP, etc… Simulation setups are captured and automated in Visual-Environment and can be coupled with Simulation Data Management.

There are several process templates delivered by standard Visual-Environment distribution which help to achieve high productivity for standard regulation. Visual-Environment provides also a software development environment (Visual-SDK) which enables you to integrate their best practices.

FEA Information Engineering Solutions

Software Development Toolkit
Visual-SDK is the software development toolkit available on demand. This module provides a complete tool set required for authoring, debugging and execution of process templates. Visual-SDK toolbox gives you a comprehensive tool to design graphical user interface, integrate Python scripting and access to Visual API's online documentation.

Visual-SDK Batch is a Python interface to APIs that facilitates access to Visual-Environment's Core Data-Model. This interface allows you to import the APIs as a Python module namely VistaDb in the Python scripts. The scripts can be run directly from console without launching VE.
VistaDb Python module provides access to around 2,000 APIs using which files can be imported, required operations can be performed on any entity and finally, the data can be exported back into a file.

Simulation Lifecyle Management
Visual-Composer refers to the Multi-Domain Compute Model Management and is a Simulation Lifecycle Management tool that aims at providing end-to-end decision-making support for simulations. Engineers can smartly build and maintain the two-directional link between CAD data stored in PLM systems and simulation domains. Visual-Composer allows propagation of design and engineering changes across the virtual tests, while maintaining traceability of data throughout the virtual product development process.
It further provides a local data management, called "Simulation Content Manager (SCM)", which manages the simulation content locally.

System Modeling
Visual-Systems focuses on the collaboration between System Modeling (0D/1D) and FEM (3D), provides the Modelica Standard Libraries and the CosimVPS library but is able also to load non-commercial third-party Modelica libraries and access to SimulationX models through FMI. Visual-Systems enables a direct access to Virtual Performance Solution 3D models through the common Visual-Environment platform and the post-processing for results from both solutions.

Computational Fluid Dynamics
Visual-CFD is a state-of-the-art multi-window / multi-model environment for carrying out CFD simulations by coupling OpenFOAM solver into Visual-CFD. The current release targets CFD applications for External Aerodynamics, Flows with Heat Transfer, Conjugate Heat Transfer modeling, Gravity-driven flows, modeling moving meshes, multi-phase flow modeling with VoF and Eulerian methods and Overset modeling.

ESI is continuously expanding the capabilities of Visual-Environment to support new physics in CAE, enabling customers to work with different physics in a single simulation environment, with the ability to virtually build and test a full Virtual Prototype, all around a single core model, delivering tremendous gains in productivity and accuracy.

ESI's customer portal myESI is available for all ESI customers to access updated product information, tips & tricks, training information, and selected software downloads.
For additional product information, please feel free to visit our website or contact any of the local ESI subsidiaries.
For more ESI news, visit www.esi-group.com/press

ETA has impacted the design and development of numerous products - autos, trains, aircraft, household appliances, and consumer electronics. By enabling engineers to simulate the behavior of these products during manufacture or during their use, ETA has been involved in making these products safer, more durable, lighter weight, and less expensive to develop.

Dynaform Modules - Die System Analysis

The Finite Element Analysis approach to die system design is an efficient way to predict and resolve many stamping related concerns within the die production line. Die System Analysis (DSA) simulations streamline die system design through the analysis of scrap shedding/removal, structural integrity and sheet metal transferring/handling. DSA's process guidance approach allows engineers to use simple graphic interfaces to execute complicated preparation and simulation processes.
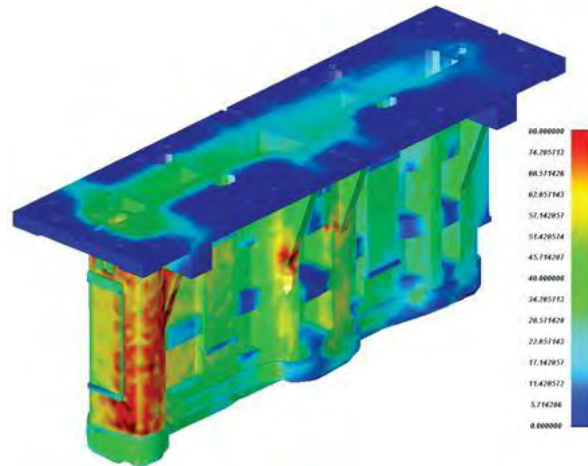
Scrap Shedding & Removal (SHR)

The number one cause of stamping line shutdown is the failure of scrap to exit the workstation. This problem can be predicted and corrected in the trim die design stage to avoid troubleshooting in the stamping plant. SHR streamlines model generation for scrap, trim dies, chutes and trim steel. Trimming operations and shedding simulations can be easily setup in the scrap shedding graphic interface.

Die Structural Integrity (DSI)

DSI simulates operational loads to analyze the design integrity of the die. DSI can generate FEA models of the die structure, define operational/stamping loads and evaluate the die structure strength and durability by using implicit and explicit solutions.

Sheet Metal Transferring & Handling (SMTH)

SMTH simulates the transfer of metal as it progresses through the manufacturing process. It simulates the transfer of the work-piece to the initial die station, movement between stations, pick-up of the finished part and placement on the shipping rack. Part deformation generated in the simulation is used to predict interference between the work-piece and tools. The stress/strain results can be used to prevent damage during transportation, as well as loading and unloading operations.

FEA Not To Miss, is a weekly internet blog on helpful videos, tutorials and other Not To Miss important internet postings. Plus, a monthly email blog.

Start your Monday with coffee or tea reading our engineering blog, at the FEA Not To Miss coffee shop.
Postings every Monday on what you have missed

www.feantm.com

Monday 06/17/2019   And here we are on a Monday with FREE Coffee AND Free Tire Models!! GO US
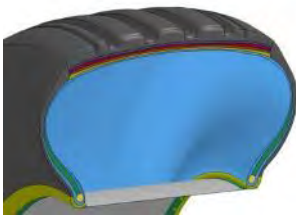
PDF:Immediate Availability of LSTC-FCA Tire Model for all LSTC Customers

LS-DYNA Demo License - mv@feainformation.com

Monday 06/10/2019   We're having a heat wave, a tropical heat wave (yes,that was an old song) NOW, makes one want to swim in the Ocean Waves below, with a cup of ice coffee called Paz-Mocha Ocean with Vanilla twizzle. Hmmmm, heading to YouTube right after I create that coffee!
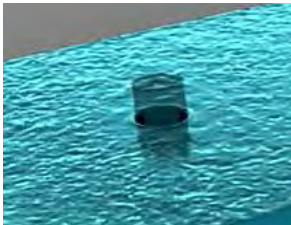
Ocean Waves (jonswap spectrum) impacting a flexible pillar: FSI solution and high end rendering

Monday 06/03/2019   Now, the only thing missing in the below video is a cup of coffee, with my vanilla bean coffee blend.   So, everyone reading my blog remember to follow your passion - and drink your favorite coffee flavor - Oh, and write to me mv@feainformation.com since I love email and blogging! Now, below is my YouTube blog news!

John Hallquist Followed His Passion to Become an Engineer

Shanghai Hengstar & Enhu Technology sells and supports LSTC's suite of products and other software solutions. These provide the Chinese automotive industry a simulation environment designed and ready multidisciplinary engineering needs, and provide a CAD/CAE/CAM service platform to enhance and optimize the product design and therefore the product quality and manufacture.

The 12th European LS-DYNA Conference 2019 was held successfully

From May 14th to 16th, the 12th European LS-DYNA Conference was successfully held in Koblenz, which is a historic city in Germany. The conference assembles more than 450 international experts, professors and engineers, and carries out more than 200 parallel sessions which covered the various functional modules of the LS-DYNA software. Recently, the new energy vehicle is a hot topic around the world. Hence, the organizer sets up a parallel session for this purpose, and launched in-depth discussions on the collision safety of electric vehicles and battery protection. At the conference, we are also glad to see some Chinese companies, such as Geely CEVT, NIO Automobile and so on.
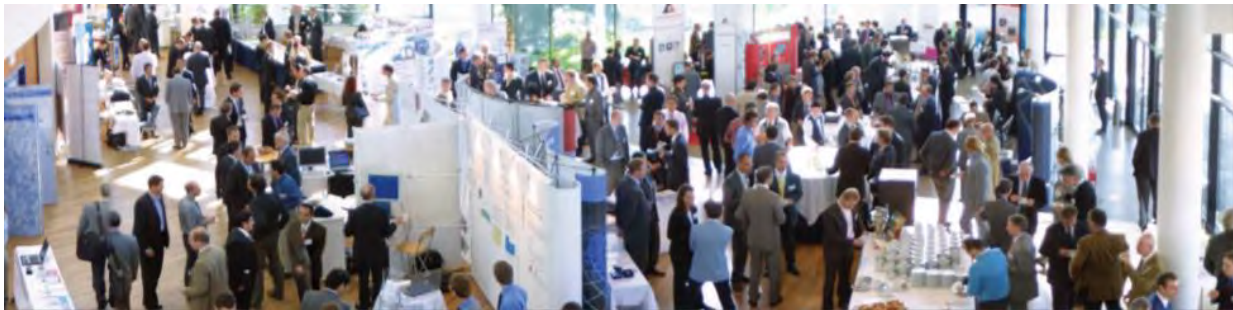
Shanghai Enhu and Shanghai Hengstar Technology Co., Ltd. attended the conference as sponsors and organized a morning run with our American partner, Predictive Engineering. The theme of the running was "Love Engineering, Love Sports." During the conference , lots engineers came to our booth and asked about our new CAE service platform (Enhu Platform), hoping to get cooperate in the future.

Shanghai Hengstar Technology Co., Ltd   hongsheng@hengstar.com   http://www.hengstar.com

JSOL supports industries with the simulation technology of state-of-the-art. Supporting customers with providing a variety of solutions from software development to technical support, consulting, in CAE (Computer Aided Engineering) field. Sales, Support, Training.

JSOL CAE Forum 2019 in TOKYO
11/6 WED ▶ 8 FRY 📍 Tokyo Conference Center SHINAGAWA, JAPAN

JSOL CAE Forum 2019

JSOL Corporation is holding the "JSOL CAE Forum" to provide our users with the latest and most comprehensive simulation technologies and case studies for various JSOL CAE packages including LS-DYNA. Until last year, we had held user's events individually for each package, like LS-DYNA & JSTAMP Forum, J-OCTA Users Conference, and Moldex3D technology exchange. In 2019, we decided to hold a comprehensive and unified event called "JSOL CAE Forum" at Shinagawa, Tokyo, from November 6 through 8. During the three-day event we will showcase a wide range of information to our structural, manufacturing, and material CAE package users all together.

We will start accepting applications in late September. A detailed program will be published on this page around the same time.

We encourage our users to take advantage of this opportunity and look forward to your attendance at the event.
JSOL Corporation
Engineering Technology Division

J-OCTA Feature enhancement: Finite Element Method (FEM) simulation

Interface for LS-DYNA supports large-deformation simulation

Recently, it is in high demand to estimate and evaluate the behavior during large deformation of micro-structured composites which contain phase separation and filler, by performing simulations.
Existing FEM engine of J-OCTA, "MUFFIN-Elastica" is for elastic simulation and is specialized for the behavior during a small deformation.
To extend its applicability to FEM simulation, the updated J-OCTA 4.1 version will provide the interface for a multi-purpose nonlinear structural analysis engine "LS-DYNA".
The phase-separated structure computed by "COGNAC or "SUSHI" can be output as a mesh data for LS-DYNA simulation. After the user specifies the material properties for each component and deformation (boundary) condition, LS-DYNA simulation can be started from J-OCTA directly. As a material model being appropriate for nonlinear structural simulation, materials including elastoplastic, viscoelastic, and hyperplastic such as rubber are available for use.
From version 4.1, J-OCTA can deal a large-deformation FEM calculation of a multi-phase structure which contains phase separation and filler dispersed structure.

KAIZENAT Technologies Pvt Ltd is the leading solution provider for complex engineering applications and is founded on Feb 2012 by Dr. Ramesh Venkatesan, who carries 19 years of LS-DYNA expertise. KAIZENAT sells, supports, trains LS-DYNA customers in India. We currently have office in Bangalore, Chennai, Pune and Coimbatore.

Turning Simulation in LS-DYNA

To enhance the machining capabilities in LS-DYNA we have done Turning simulation that removal of metal from the outer diameter of a rotating cylindrical workpiece, here we have used the following important keywords to model this simulation.

- CONTACT_ERODING-_NODES_SURFACE
- BOUNDRAY_PRESCRIBED_MOTION_RIGID
- MAT_RIGID
- MAT_PLASTIC_KINEMATIC
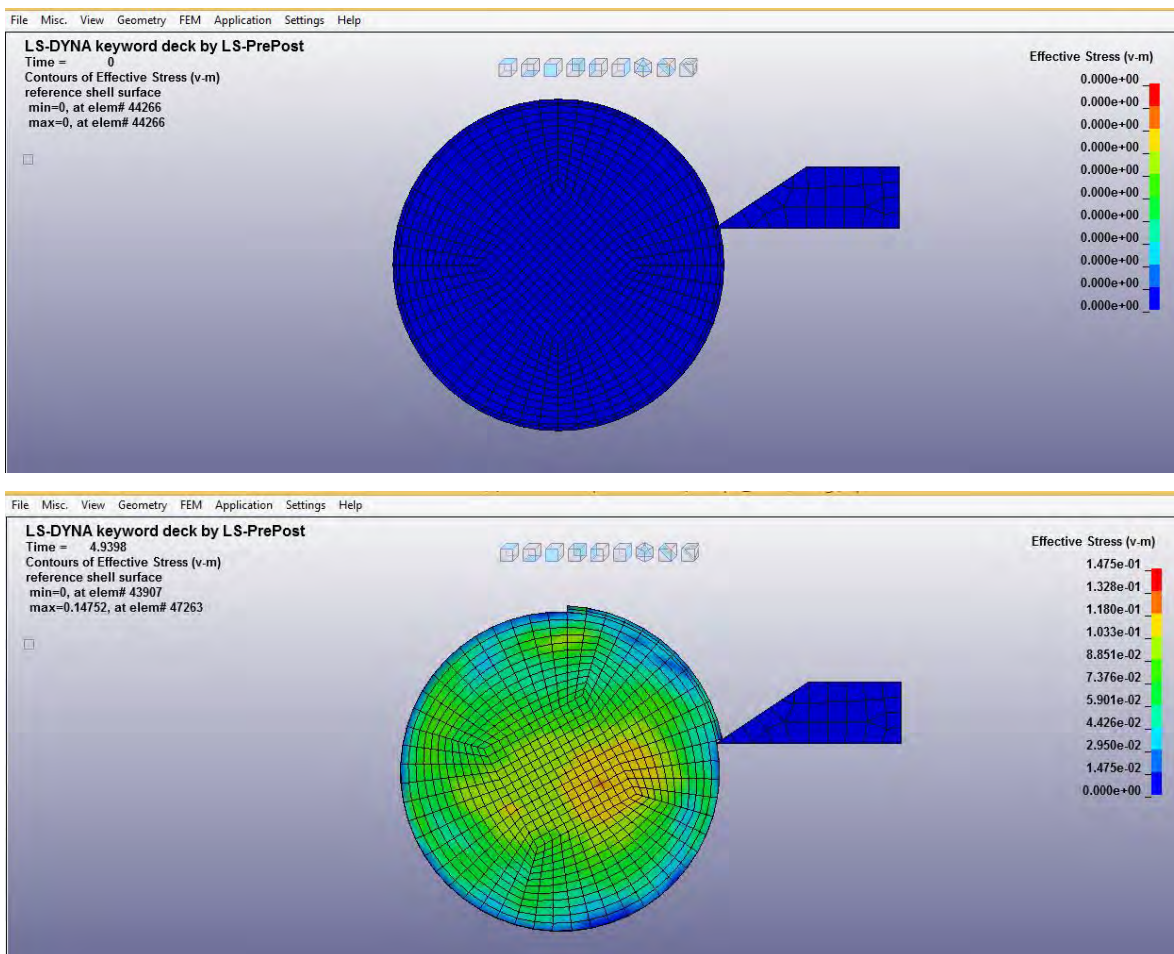
Figure: Turning Simuaton in LS-DYNA

To know more about the simulation, please contact support@kaizenat.com

A team of engineers, mathematicians, & computer scientists develop LS-DYNA, LS-PrePost, LS-OPT, LS-TaSC, and LSTC's Dummy & Barrier models.

LSTC-FCA Tire Model for all LSTC Customers

Authors: Mike Berger and Suri Bala - LSTC
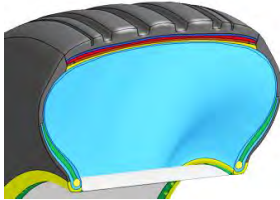
LSTC is pleased to announce the immediate availability of Tire models, jointly developed with FCA, for all customers.

The Tire models, can be downloaded from
http://ftp.lstc.com/anonymous/outgoing/suri/LSTC_Tire/.

Introduction

The LSTC Tire models, jointly developed with FCA, is based on a series of material, verification and component level tests. The finite element mesh was developed based on 2D CAD data of the Tire section. All major components of the Tire uses 8-noded hexahedron elements. The elastomers are modeled using *MAT_SIMPLIFIED_RUBBER and the plies are modeled using MAT_ORTHOTROPIC_ELASTIC

Tire Model Features

Following list broadly identifies the major features of the Tire model

- 240,000 elements comprising mainly of 8-noded hexahedron elements using element formulation -2
- Inflation is based on *AIRBAG_HYBRID with mass-flow using *DEFINE_CURVE_FUNCTION to achieve desired initial pressure
- Deflation is based on *SENSOR to trigger leakage (venting or porosity). The sensors track the peak Tire pressure (1.4*initial_pressure as default) and the separation of the Tire from the wheel which is tracked using FORCE_TRANSDUCERS. Peak pressure triggers venting and wall separation triggers porosity-based leakage that accounts for contact blocking.
- No additional contacts are required to model the interaction with vehicle and other components
- Elastomers are modeled using *MAT_SIMPLIFIED_RUBBER with rate-dependency and the plies are modeled using *MAT_ORTHOTROPIC_ELASTIC
- Mounting of the Tire on the wheel is modeled using *LOAD_THERMAL_VARIABLE and initial temperature imposed on the steel beads to model initial compressive stress
- The initial version do not include material failure

Available Tire Sizes

Based on a single tire, different tire sizes were geometrically transformed. The library of Tires currently available include the following.
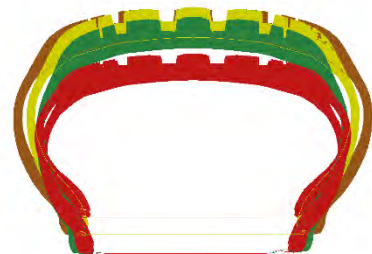
LSTC_FCA_Tire_P235_45_R19.k   LSTC_FCA_Tire_P245_75_R17.k
LSTC_FCA_Tire_P235_55_R19.k   LSTC_FCA_Tire_P255_70_R18.k
LSTC_FCA_Tire_P235_65_R17.k   LSTC_FCA_Tire_P275_65_R18.k
LSTC_FCA_Tire_P245_50_R20.k   LSTC_FCA_Tire_P305_35_R20.k

LS-DYNA® Implicit Mechanical Analysis

APPLICATIONS:

Implicit Mechanical Analysis can be used on a wide variety of application areas, including but not limited to;

Automotive
- Gravity Loading
- Dummy Seating
- Door Sag
- Roof Crush
- Seat Pull

Aerospace
- Fuselage Drop Test
- Jet Engine Start Up
- Analysis of Seats
- Satellite Stress and Vibration Tests

Consumer Goods
- Drop Test
- Vibration computations for Acoustical Analysis

FEATURES:
- Linear and Nonlinear Analysis
- Buckling, Vibration and Modal Analysis
- Shared Memory Parallel (SMP)
- Massive Parallel Processing (MPP)
- Hybrid Parallel-combines SMP and MPP for scalability that can exceed 10K cores.

YouTube Channel:
www.youtube.com/channel/UCPuoss 7k_-IouTDXGT2EFiw

Twitter:
https://twitter.com/LSTCandDYNAmore

www.lstc.com
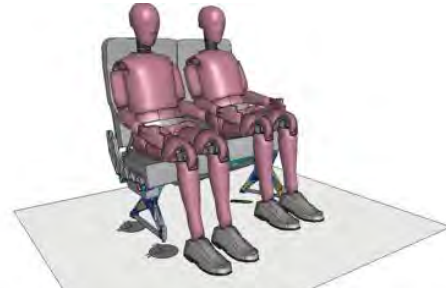
Aerospace Seat Pre-Loading

RollOver Protection Structure

Door Sag

Crank Shaft

LSTC Livermore Software Technology Corp.

Providing engineering services to the composites industry since 1970. During this time, we have participated in numerous programs that demonstrate our ability to perform advanced composite design, analysis and testing; provide overall program management; work in a team environment; and transition new product development to the military and commercial sectors.

Progressive Composite Damage Modeling in LS-DYNA (MAT162 & Others)

Bazle Z. (Gama) Haque, Ph.D.
Senior Scientist, University of Delaware Center for Composite Materials (UD-CCM)
Assistant Professor of Mechanical Engineering, University of Delaware, Newark, DE 19716
P: (302) 690-4741 | E: bzhaque@udel.edu

In House Course Dates
July 17, 2019 | 9am-5pm
November 20, 2019 | 9am-5pm

2019 Workshops:
Webinar Course Dates
July 16, 2019 | 9am-5pm
November 19, 2019 | 9am-5pm

Cost: In-House Class: $695 per person
Includes: Coffee, Lunch, Parking, USB with Course Content
Email Robin Mack for driving direction.

Web Conference: $695 per person
Includes: CD with Course Content

Description:

Progressive damage modeling of composites under low velocity impact, and high velocity impact is of interest to many applications including car crash, impact on pressure vessels, perforation and penetration of thin and thick section composites. This course will provide a comparison between available composite models in LS-DYNA for shell and solid elements, e.g., MAT2, MAT54, MAT59, & MAT162. Among these material models, rate dependent progressive composite damage model MAT162 is considered as the state of the art. This short course will include the theory and practice of MAT162 composite damage model with applications to low and intermediate impact velocities, understanding the LS-DYNA programming parameters related to impact-contact, damage evolution, perforation and penetration of thin- and thick-section composites. Printed copies of all lecture notes will be provided along with a CD containing all example LS-DYNA keyword input decks used in this short course.

Topics Covered in this Short Course:
- Impact and Damage Modeling of Composites
  Application of MAT162 in Engineering and Research Problems
- Introduction to Composite Mechanics
  Introduction to Continuum Mechanics and Composite Mechanics

- Composite Material Models in LS-DYNA for Shell and Solid Elements
  Discussion on MAT2, MAT54, MAT59, & MAT162
- Theory and Practice in MAT162 Progressive Composite Damage Model for Unidirectional and Woven Fabric Composites
  MAT162 User Manual – Version 15A 2015
  Progressive Damage Modeling of Plain-Weave Composites using LS-Dyna Composite Damage Model MAT162
  Unit Single Element Analysis
- Comparison between Different LS-DYNA Composite Models
  Sphere Impact on Composite SHELL & SOLID Plates
- Low Velocity Impact and Compression after Impact Applications
  Modeling the Low Velocity Impact and Compression after Impact Experiments on Composites Using MAT162 in LS-DYNA
- Perforation Mechanics of 2-D Membrane and Thin Composites
- Penetration Mechanics of Composites and Soft-Laminates
- Introduction to LS-DYNA (Document Only)

To register, email [Robin Mack](#) your full name, and if you're attending in house or web conference.

Engineering Services

MSC brings a long-range perspective to its engineering services clients. We understand the history of our core technologies, and can project likely new developments, and seek to provide innovation. A keen appreciation of the materials and structures state-of-the-art gives us the ability to create a development roadmap that efficiently reaches the clients goal, while taking full advantage of what already exists. We have an unusually broad exposure to materials applications; we have been involved with everything from infrastructure applications to spacecraft. This broad perspective allows us to draw on approaches and trends in one application area, and apply it to another. This helps our clients avoid pitfalls, and make exceptionally rapid technological progress. The same broad reach allows us the opportunity to interact with, and evaluate a wide range of suppliers.
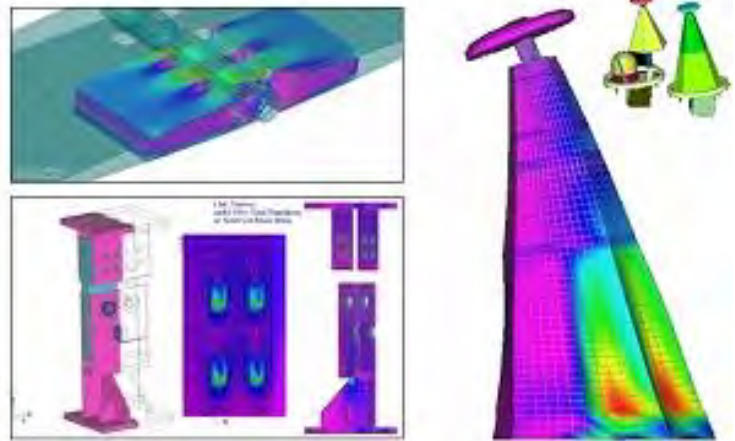
Oasys Ltd is the software house of Arup and distributor of the LS-DYNA software in the UK, India and China. We develop the Oasys Suite of pre- and post-processing software for use with LS-DYNA.

Oasys Suite version 16.0 now released

The Oasys Suite v16.0 includes a number of exciting new features and updates for PRIMER, D3PLOT, T/HIS, REPORTER and SHELL. Key highlights include:

PRIMER highlights:

Multiple stages can now be defined in simulation-based occupant positioning and seatsquash.
Full keyword support for R11 of LS-DYNA
Speed improvements for reading, writing and viewing models – now significantly faster for larger models
Morphing improvements – higher order morph boxes and integration with LS-OPT
Added the ability to mesh whole CAD components
New ICFD setup tool to allow easy creation of a CFD LS-DYNA analysis
Support for LS-DYNA IsoGeometric analysis models
Spotwelds and adhesive can now be created between solid parts and NURBs parts and well as shell parts
Speed improvements for model checking
New element quality checks added
New contouring options for forming analysis results, shell loading direction and element normals
Timestep information now read from the LS-DYNA output file for investigation within PRIMER along with error and warning messages

D3PLOT highlights:

New Material Attributes panel improves part-specific colour and lighting control
New capability to save and restore D3PLOT sessions
Loads can be displayed and contoured
Support for new database files and new data components added
Enhanced Measure menu
Enhanced Write menu
Support for rigid body data compression
Antialiasing

T/HIS highlights:

New capability to save and restore T/HIS sessions:
Extensive enhancements to the Curve Table
New data types and data components supported
Regression fit of data added
Block moving of curves
Antialiasing
Substantial enhancements to FAST-TCF and JavaScript functionality

REPORTER highlights:

Supports more fonts, giving you greater creative control over your reports, and allowing you to create templates that match your organisation's branding
Table and Autotable items can now be exported in Microsoft Excel format, complete with formatting (cell size, text alignment, font style, borders, colours, merged cells).
Various new functions have been added to the Item class of the JavaScript API to enable full control over Table and Autotable items. For example, it is now possible to:
Insert/delete/resize rows/columns
Merge/unmerge cells
Get/set cell properties (e.g. text, alignment, font, colour, border width)
Get/set cell conditions

Website:
https://www.oasys-software.com/dyna/news/oasys-suite-version-16-now-released/

Predictive Engineering

Predictive Engineering provides FEA and CFD consulting services, software, training and support to a broad range of companies.

Who We Are

We are experienced simulation engineers that have successfully analyzed and validated hundreds and hundreds of finite element analysis (FEA) projects. With decades of experience in FEA and CFD, we know how to optimize your design to deliver every last bit of performance and to ensure that it will meet your service requirements whether in Aerospace, Marine, Energy, Automotive, Medical or in Consumer Products.

Our History

Since 1995, Predictive Engineering has continually expanded its client base. Our clients include the total spectrum from large Fortune 500 companies to start-ups looking to launch the next generation of satellites. We are also proud of work in the renewable energy fields from wind to solar. Over the years, one of our core strengths is in the vibration analysis of composite structures, aerospace electronic components and large industrial machinery. What has set us apart from the competition is our experience in the successful completion of more than 800 projects.

View our portfolio

FEA, CFD and LS-DYNA consulting projects

Composite Engineering   Nonlinear Dynamics   Aerospace
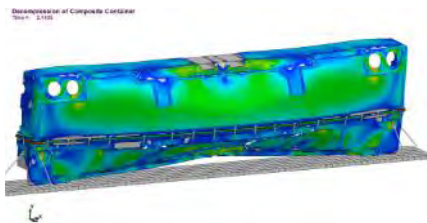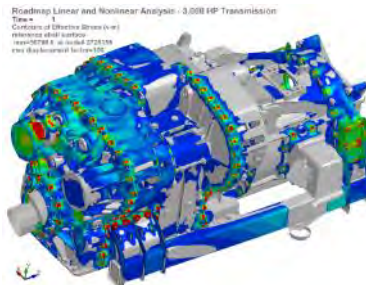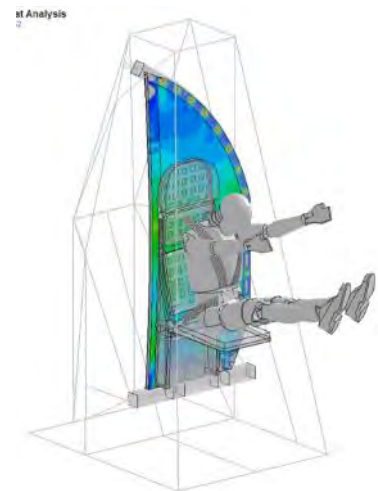
Posted By George Laird : June 1, 2019

12th European LS-DYNA Conference, Koblenz, Germany

The LS-DYNA Conference in Koblenz, Germany was the usual blend of great presentations and even greater social events. The location was beautiful and the Conference was especially well-organized by DYNAmore, Germany (co-sponsored with LSTC, Livermore, CA). Predictive with ENHU, China hosted a morning run event with T-shirts to whoever could show up at 6:45 am. Besides the run, we had our "booth" to support the LS-DYNA North American Team and on the technology side, we presented two papers: Impact Analysis of Polymeric Additive Manufactured Lattice Structures and Transient Dynamic Implicit Analysis for Durability Testing of Bus Seats.

Offering industry-leading software platforms and hardware infrastructure for companies to perform scientific and engineering simulations. Providing simulation platforms that empower engineers, scientists, developers, and CIO and IT professionals to design innovative products, develop robust applications, and transform IT into unified, agile environments.

Rescale Enables Faster Time to Market for Nissan

June 12, 2019, Shawn Hansen

Leading automotive company selects Rescale's ScaleX platform on AWS to increase innovation and engineering capabilities

San Francisco, CA, June 12, 2019 – Rescale, the leader in enterprise big compute in the cloud, today announced that Nissan Motor Co., Ltd. selected Rescale and AWS to extend its fixed on-premise high performance computing (HPC) systems to the cloud.

Nissan sought a solution to support its massive simulation needs requiring unlimited computing capabilities. With Rescale and AWS, Nissan changed to a fully integrated production hybrid environment in the cloud to deliver its high-quality products on time. The automaker is transforming HPC in automotive with its in-production use in the cloud to increase its innovation and engineering capabilities.

"Automotive companies are under pressure to remain flexible and agile as innovations impact and disrupt the market," said Joris Poort, CEO, Rescale. "Leading companies need to dynamically access computing resources to match their increasing simulation requirements in order to test and launch new products. Rescale is transforming how today's leading enterprises innovate and deploy their digital transformation strategy. It is exciting to see that our hybrid platform on AWS will help Nissan immediately reduce time to market for their newest innovations, while getting access to unlimited computing resources on demand."

Nissan experienced an immediate positive impact upon implementing Rescale's platform on AWS, integrated by ISID. In less than three months, the global organization was in a fully integrated production hybrid environment with the ability to run hundreds of jobs using thousands of CPU cores per hour in the cloud to support their massive simulation needs to deliver high-quality products on time. In addition, their development productivity increased because their engineers were no longer waiting for resources to become available, and because Rescale's platform continuously offered the latest computing technology.

"The challenges we faced at Nissan revolved around managing our in-house HPC system alongside keeping up with the latest technology innovations needed to meet market demands," said Seiji Kawachiya, General Manager of Engineering and Quality System Department, Nissan. "We selected the Rescale ScaleX® platform running on AWS because it enables a smooth transition into a cloud environment, resulting in Nissan being able to run hundreds of simulations with on-demand agility and flexibility, without exhausting capacity, to accelerate innovation." Nissan was also able to achieve these performance enhancements with an improved cost compared to their previous on-premise computing systems.

Nissan chose Rescale for their journey to the cloud for their overall HPC system because of the cloud expertise, improved total cost of computing, and hybrid model approach. The hybrid approach will allow for an overall smoother transition from an on-premise HPC environment to a cloud HPC environment.

Shanghai Fangkun

LS-DYNA China, as the master distributor in China authorized by LSTC, is fully responsible for the sales, marketing, technical support and engineering consulting services of LS-DYNA in China.

2019 4th China LS-DYNA Users' Conference
Call for Paper

The 4th China LS-DYNA Users' Conference will be held on October 21st - 23rd, 2019 in Shanghai. During this conference LSTC will share the details of its latest product developments as well as its road map for the future. At this conference engineers and scientists from LSTC and customers from all over the world will meet to share their experiences and successful cases with LS-DYNA, to discuss the latest features and developments in LS-DYNA, and to explore industrial development trends.

This conference aims to promote interaction and communication among developers and end users. Therefore, we call for papers with topics covered but not limited to the automotive industry, aerospace and aeronautics, electronics industry, daily consumer goods, biomechanics, locomotive, shipbuilding, civil engineering, and general machinery.

LSTC, Shanghai Fangkun Software Technology, Ltd., and Dalian Fukun Technology Development Corporation wholeheartedly welcome your paper submission and attendance.

Hosts:	**Livermore Software Technology Corp. USA**
	Shanghai Fangkun Software Technology, Ltd. China
	Dalian Fukun Technology Development Corp. China
Date:	**October 21st- 23rd, 2019**
Location:	**Pullman Shanghai South Hotel** (http://www.pullmzxhotel.com/)
	No.1 Pubei Road, Xuhui District, Shanghai, China, 200235
Training:	There will have pre and post-conference training classes being held on Oct. 21st, 24th and 25th.

Conference Website: http://www.conference.lsdyna-china.com/
Contact us: conf@lsdyna-china.com

Call for Paper

Overview. This conference covers all topics related to LS-DYNA. At this conference our developers will review the current developments and share their plans for the future. One of the major goals of this conference is to give users a chance to provide feedback, but most of all we hope that users, and especially students, will have an enjoyable opportunity to showcase the creative things that they are doing with LS-DYNA.

Topics. In the boxes below we list some of the topics that we expect submissions will cover. Topics not in the lists are also welcome. Authors of accepted submissions will be invited to present during the Technology and Application Sessions.

Submissions:

- **Submit abstracts to http://conference.lsdyna-china.com/.**
- Submission can be in Chinese or English. Submission of both Chinese and English versions is greatly appreciated but not mandatory.
- Elva Yu is responsible for processing submissions.

  Tel: 15001986675

  Email: conf@lsdyna-china.com

- **Abstract submission deadline — 20th August 2019**
- **Notice of acceptance deadline — 1st September 2019**
- **Full paper submission deadline — 20th September 2019**

Excellent Paper Awards. We will be giving prizes for the best papers. Award winners will be announced at the banquet on October 22nd. The best paper in English will be published in the English edition of FEA Information Engineering Journal (ISSN #2167-1273) and the best paper in Chinese will be published in the FEA Information Chinese edition.

- One first prize will be awarded. The winner will receive RMB 5,000.00 and a free trip to the 2020 international LS-DYNA Users' Conference including round-trip ticket and hotel fee.
- Two second prizes will be awarded. The winners will receive RMB 3,000.00.
- Three third prizes will be awarded. The winners will receive RMB 2,000.00.

Conference Website: http://conference.lsdyna-china.com/
Contact us: conf@lsdyna-china.com

CAE software sale & customer support, initial launch-up support, periodic on-site support. Engineering Services. Timely solutions, rapid problem set up, expert analysis, material property test Tension test, compression test, high-speed tension test and viscoelasticitiy test for plastic, rubber or foam materials. We verify the material property by LS-DYNA calculations before delivery.

CAE consulting - Software selection, CAE software sale & customer support , initial launch-up support, periodic on-site support.

Engineering Services - Timely solutions, rapid problem set up, expert analysis - all with our Engineering Services. Terrabyte can provide you with a complete solution to your problem; can provide you all the tools for you to obtain the solution, or offer any intermediate level of support and software.

FE analysis
- LS-DYNA is a general-purpose FE program capable of simulating complex real world problems. It is used by the automobile, aerospace, construction, military, manufacturing and bioengineering industries.
- ACS SASSI is a state-of-the-art highly specialized finite element computer code for performing 3D nonlinear soil-structure interaction analyses for shallow, embedded, deeply embedded and buried structures under coherent and incoherent earthquake ground motions.

CFD analysis
- AMI CFD software calculates aerodynamics, hydrodynamics, propulsion and aero elasticity which covers from concept design stage of aerocraft to detailed design, test flight and accident analysis.

EM analysis
- JMAG is a comprehensive software suite for electromechanical equipment design and development. Powerful simulation and analysis technologies provide a new standard in performance and quality for product design.

Metal sheet
- JSTAMP is an integrated forming simulation system for virtual tool shop based on IT environment. JSTAMP is widely used in many companies, mainly automobile companies and suppliers, electronics, and steel/iron companies in Japan.

Pre/ Post
- **PreSys** is an engineering simulation solution for FE model development. It offers an intuitive user interface with many streamlined functions, allowing fewer operation steps with a minimum amount of data entry.
- **JVISION** - Multipurpose pre/post-processor for FE solver. It has tight interface with LS-DYNA. Users can obtain both load reduction for analysis work and model quality improvements.

Biomechanics
- **The AnyBody Modeling System™** is a software system for simulating the mechanics of the live human body working in concert with its environment.

The Multipurpose Offshore Patrol Ship "Thaon Di Revel" Launched In Muggiano

TRIESTE, Italy --- The launching ceremony of the Multipurpose Offshore Patrol Ship (PPA) "Paolo Thaon di Revel" took place today at Fincantieri's shipyard in Muggiano (La Spezia), in the presence of the Italian Minister of Defence Elisabetta Trenta. Godmother of the ceremony was Mrs. Irene Imperiali, [niece] of Admiral Paolo Thaon di Revel.

The ceremony was attended among others by the Chief of Staff of the Italian Navy, Admiral Valter Girardelli, by Fincantieri's Chairman Giampiero Massolo and CEO Giuseppe Bono.

The PPA, first of seven units, will be delivered in 2021 and it is part of the renewal plan of the operational fleet of the Italian Navy vessels, approved by the Government and Parliament and started in May 2015 ("Naval Act").

Vessel's characteristics: PPA – Multipurpose Offshore Patrol Ship: The multipurpose offshore patrol vessel is a highly flexible ship with the capacity to serve multiple functions, ranging from patrol with sea rescue capacity to Civil Protection operations and, in its most highly equipped version, first line fighting vessel.

There will be indeed different configurations of combat system: starting from a "soft" version for the patrol mission, equipped with a self-defence capability, to a "full" one, equipped for a complete defence capability.

The vessel is also capable of operating high-speed boats such as RHIB (Rigid Hull Inflatable Boat) up to 11 meters long through lateral cranes or a hauling ramp located at the far stern.

- 132.5 meters long
- Speed more than 31 knots according to vessel configuration and operational conditions
- 171 persons of the crew
- Equipped with a combined diesel, a gas turbine plant (CODAG) and an electric propulsion system
- Capacity to supply drinking water to land
- Capacity to provide electricity to land with 2000 kw of power
- 2 modular zones at the stern and at the center of the ship that allow the embarking of various types of containerized operating/logistic/residential/healthcare modules (in particular, the stern area may receive and handle within a covered area up to 5 modules in ISO 20" containers, while the central zone may receive and handle up to 8 ISO 20" containers)

The PPAs will be built at the Integrated Shipyard of Riva Trigoso and Muggiano, with delivery expected, for the first vessel of the class, in 2021, while the following deliveries will take place in 2022, 2023, 2024 (two units), 2025 and 2026.

TOYOTA GAZOO Racing commits to endurance racing - TOYOTA GAZOO Racing will continue its participation in the FIA World Endurance Championship (WEC) beyond 2020 following the confirmation of new technical regulations.

The team already announced its participation in the 2019-2020 season, the final campaign with the current-specification LMP1 regulations, and today confirms it will be present on the grid when the new generation of top-class endurance race cars make their WEC debut in autumn 2020.

Earlier today in Le Mans, the Automobile Club de l'Ouest revealed final details of the new technical regulations following detailed discussions with several stakeholders, including newly-crowned World Champions TOYOTA GAZOO Racing.

As a result, TOYOTA GAZOO Racing is delighted to confirm it will participate in the 2020-2021 season with a hybrid-powered prototype based on the GR Super Sport road car. Both road and race car are undergoing design and intensive development at the company's technical centres in Toyota City, Higashi-Fuji and Cologne.

TOYOTA GAZOO Racing enthusiastically welcomes the future challenge of competing against other sportscar manufacturers in the new top category of WEC and the Le Mans 24 Hours and is confident in an exciting, successful period for endurance racing.

Track testing of the new race car, the name of which will be revealed at a later date, will begin next year prior to the start of the 2020-2021 season while further details of the GR Super Sport road car will be issued by TOYOTA GAZOO Racing in due course.

Shigeki Tomoyama, GAZOO Racing Company President: "I am pleased to confirm that TOYOTA GAZOO Racing will continue its challenge in endurance racing beyond the current regulations. Thank you to the ACO and FIA for their hard work in finalising these regulations, which we hope will bring about a new golden age of endurance racing, with several manufacturers fighting for Le Mans and the FIA World Endurance Championship. For TOYOTA GAZOO Racing, this new era of competition is a fantastic opportunity to demonstrate our credentials not only as a race team against some of the best in the business, but also as a sportscar manufacturer. I am sure I join fans and competitors in welcoming the new regulations and looking forward to an exciting era of competition in WEC and at Le Mans."

Alastair Moffitt
alastair.moffitt@toyota-motorsport.com

FEA Not To Miss   www.feantm.com

YouTube Tutorials

Webinars - Workshops

June

ICFD	New Solution Explorer in LS-PrePost to set up an LS-DYNA ICFD simulation
Oasys Post	Oasys Post Processing v16 Updates
SPH	Cutting by the SPH method in LS-DYNA
Oasys PRIMER	Tools for PrePost Pedestrian Impact Analysis

Previous Months

DES	Set-up of LS-DYNA DES simulations
ICFD	ICFD sloshing
CFD	Solution Explorer Dam break example
LS-RUN	How to use/setup LS-Run
LS-TaSC	LS-TaSC An introduction - Laura Crespo
EFG	LS-DYNA: Implicit element-Free Galerkin (EFG) - Cutting Simulation
SPH	Modeling Splashing and Sloshing in LS-DYNA using Smoothed Particle Hydrodynamics (SPH) - Erik Svenning
Implicit	Intro to the use of implicit analysis in LS-DYNA
Composite	Intro to LS-DYNA composites modelling
FSI	Setting up a simple FSI problem set up with ICFD-LS-DYNA
EM	LS-DYNA EM : Tutorial for Metal forming application (Part I)
Occupant	Occupant Modeling Workshops

**Start your Monday with coffee reading our engineering blog,
FEA Not To Miss coffee shop.**

mv@feainformation.com

Locations:
   Livermore Software Technology Corp.
   7374 Las Positas Rd. Livermore, CA 94551
   1740 West Big Beaver Road Troy, MI 48084 Contact: classes@lstc.com
   www.lstc.com/training

Introduction to Passive Safety - Aug 26 & 27

Instructor: Alexander Gromer 2 Days - LSTC Michigan Office

 Objective:

- The important features of LS-DYNA® with respect to occupant safety simulations.
- Insights how to deal with the various components involved, such as airbags, seatbelts, crash-test dummies and seats.
- Particular emphasis on modeling methods for practical application.

Description:
- Designed for beginners working in the field of occupant safety (especially dealing with side, frontal and rear impact).
- An overview of state-of-the-art airbag modeling and explain the fundamentals regarding the composition of a LS-DYNA® occupant safety simulation.
- Class includes the positioning and fitting of seatbelts to the dummy and the definition of recommended contacts between the safety systems.
- The opportunity to apply your newly acquired knowledge in sample exercises.

PDF - Introduction to Passive Safety

LS-DYNA - Resource Links

mv@feainformation.com

LS-DYNA   Multiphysics   YouTube

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

FAQ   LSTC

ftp.lstc.com/outgoing/support/FAQ

LS-DYNA Support Site

www.dynasupport.com

LS-OPT & LS-TaSC

www.lsoptsupport.com

LS-DYNA   EXAMPLES

www.dynaexamples.com

LS-DYNA   CONFERENCE   PUBLICATIONS

www.dynalook.com

ATD –DUMMY   MODELS

www.dummymodels.com

LSTC   ATD   MODELS

www.lstc.com/models   www.lstc.com/products/models/mailinglist

AEROSPACE WORKING GROUP

http://awg.lstc.com

mv@feainfomation.com

www.fujitsu.com/jp	www.infinite.nl

www.dynamax-inc.com	www.dynasplus.com

www.beta-cae.com	www.dynamore.de
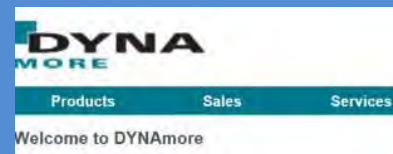
www.materials-sciences.com	www.kaizenat.com

www.eta.com	www.lancemore.jp/index_en.html
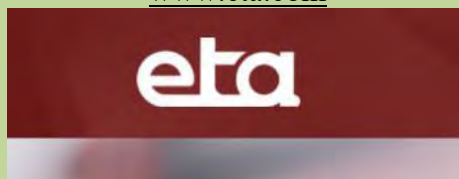
mv@feainfomation.com
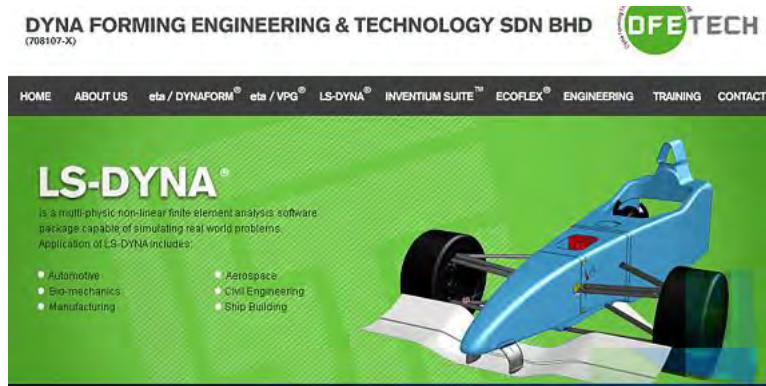
Email: jenson@dfe-tech.com

URL: www.dfe-tech.com

DFETECH is a technical engineering firm which was commenced in 2005 to cater to the fast growing demand of CAE technology in South East Asia.

With head office located in Seremban, Malaysia, DFETECH distribute the most advanced engineering software from sheet stamping and vehicle design and development to civil engineering and defense.

DFETECH also specializes in Draw Die Development, Die Design, and Stamping Simulation. We offer expert design and analysis services for stamped and hydroformed parts from Class A panels to the smallest parts in the automotive spectrum. Our technical team specializes in various CAE analysis for automotive, electronics and defense industries.

Aided with the most powerful design and simulation tools, and years of design and engineering experiences we can substantially reduce our clients' product time to market and product development risks.

DFETECH Training offers various of training courses in the field of sheet metal stamping and vehicle engineering. Some of the courses are listed below:

- Introduction to LS-DYNA®
- Fundamental of eta/DYNAFORM®
- Fundamental of eta/VPG™
- Basic of Impact Analysis
- Vehicle Crashworthiness Analysis
- Modern Formability Integrated Draw Die Development and Simulation

- Tailor-Welded Blank Application
- Advanced Circle Grid and Thinning Strain Analysis
- Fundamental of Die Design
- Fundamental of Hydroforming
- Formability Engineering Analysis

Training - Webbinars

Participant's Training Classes

Webinars

Info Days

Class Directory

Directory

BETA CAE Systems	www.beta-cae.com/training.htm
DYNAmore	www.dynamore.de/en/training/seminars
Dynardo	http://www.dynardo.de/en/wost.html
ESI-Group	https://myesi.esi-group.com/trainings/schedules
ETA	http:///www.eta.com/training
KOSTECH	www.kostech.co.kr
LSTC - (corporate)	www.lstc.com/training
LS-DYNA OnLine - (Al Tabiei)	www.LSDYNA-ONLINE.COM
OASYS	www.oasys-software.com/training-courses
Predictive Engineering	www.predictiveengineering.com/support-and-training/ls-dyna-training

Training - Dynamore

Author: Christian Frech christian.frech@dynamore.de

Seminars 2019

Visit the website for complete overview and registration www.dynamore.de/seminars

Selection of trainings for July/September

Introduction

Introduction to LS-DYNA	16-18 July
	17-19 September (Tr)
	24-26 September
Introduction to Implicit Analyses	19 July
Introduction to Simulation Technology	30 September

Crash

Contact Definitions	29 September

Passive Safety

Introduction to Passive Safety	10-20 September

Metal Forming

Applied Forming Simulation with eta/DYNAFORM	8-9 July
Sheet Metal Forming in OpenForm	10 July
Hot Forming with LS-DYNA	11-12 July

Implicit Capabilities

Implicit Analysis using LS-DYNA	16-17 September

Particle Methods

Discrete Element Method	18 September
Smoothed Particle Hydrodynamics	19-20 September

Multiphysics

ALE and FSI	17-18 September
CESE Compressible Fluid Solver	25 September

Optimization

GENESIS – Structural Optimization	23-24 July

Information days and Webinars (free of charge)

Information day: Material Characterization and Measurement Technology	22. July
Webinar: New Features in LS-DYNA	13 September
Information day: Drop Tests	23 September

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

If not otherwise stated, the event location is Stuttgart, Germany. Other event locations are:
A = Aachen, Germany, Ba = Bamberg, Germany, G = Gothenburg, Sweden; Ko = Koblenz, Germany;
L = Linköping, Sweden, V = Versailles, France; T = Turin, Italy, Tr = Traboch, Austria, Z = Zurich, Switzerland

Training - LSTC

July 2019

Date				Location	Course Title	Days	Instructor(s)
Jul 9	Jul 10	Tu	Wed	MI	SPG and Peridynamics for Material Failure Analysis	2	Y. Wu, J. Xu
Jul 11	Jul 12	Th	Fri	MI	Introduction to Metal Forming	2	Q. Yan, L. Zhang
Jul 17		Wed		CA	Introduction to LS-Pre-Post	1	P. Ho, Q. Yan
Jul 17	Jul 18	Wed	Th	MI	Contact Modeling in LS-DYNA®	2	N. Karajan
Jul 23	Jul 26	Tu	Fri	MI	Introduction to LS-DYNA®	4	A. Nair
Jul 29	Jul 30	Mon	Tu	MI	Advanced LS-PrePost	2	A. Nair
Jul 31	Aug 1	Wed	Th	MI	Advanced LS-DYNA®	2	S. Bala

Training - LSTC

August 2019

Date				Location	Course Title	Days	Instruc-tor(s)
Aug 7	Aug 8	Wed	Th	MI	Rubber, Foam, and Viscoelas-tic Materials in LS-DYNA®	2	A. Tabiei
Aug 12	Aug 13	Mon	Tu	MI	Plasticity, Plastics, and Vis-coplastic Materials in LS-DY-NA®	2	A. Tabiei
Aug 12	Aug 14	Mon	Wed	CA	ALE, Eulerian, and Fluid-Structure Interaction in LS-DY-NA®	3	M. Souli
Aug 14	Aug 15	Wed	Th	MI	Composite Materials in LS-DYNA®	2	A. Tabiei
Aug 15	Aug 16	Th	Fri	CA	Smoothed Particle Hydrody-namics (SPH) in LS-DYNA®	2	M. Souli
Aug 19	Aug 20	Mon	Tu	MI	Fracture, Failure, and Damage in LS-DYNA®	2	A. Tabiei
Aug 26	Aug 27	Mon	Tu	MI	Introduction to Passive Safety	2	A. Gromer
Aug 26	Aug 29	Mon	Th	CA	Introduction to LS-DYNA®	4	A. Nair

Machine Learning Data-Driven Discretization
Theories, Modeling and Applications

We cordially invite your participation in a short course "**Machine Learning Data-Driven Discretization Theories, Modeling and Applications**" as part of the pre-congress activities of 15th U.S. National Congress on Computational Mechanics Conference to be held on **July 28, 2019** at Austin, Texas.

In this short **course**, we will introduce the participants to the latest efforts on data-driven methods for mechanical and material sciences. The course will cover topics on

1. mechanistic data-driven clustering methods, direct and reduced order modeling techniques,
    2. physics-informed neural networks, multi-fidelity Gaussian processes,
    3. deep material networks and multiscale material failure analysis.

Some benchmarks on nano-polymer composites, polymer matrix composites, additive manufactured alloys will be demonstrated. For more details, please visit the website, http://15.usnccm.org/sc15-005.

The course number of this short class is SC15-005. You may register for this short course while registering for the congress at the USNCCM15 website:

http://15.usnccm.org/registration_information.

This is a great opportunity for researchers, graduate students and post docs who are interested in studying how machine learning techniques are used in mechanics and mechanical science. Please also share the information with your colleagues and friends. We look forward to your participation!

Short Course Organizers

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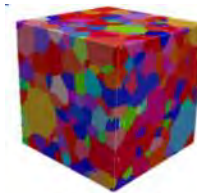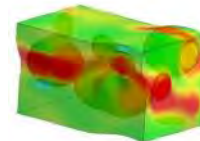
DynaS+

Complementary tools

OUT-06

Underwater Shock Analysis with USA/LS-DYNA

Goal

Be able to run underwater explosions analysis with USA software and understand the underlying theory

Contents

1. Introduction
2. Doubly Asymptotic Approximation (DAA) Field Solver
3. Nonreflecting Boundary (NRB) Solver
4. Miscellaneous Topics
5. Optional - Cavitating Acoustic Fluid Element (CAFÉ and CASE) Field Solver
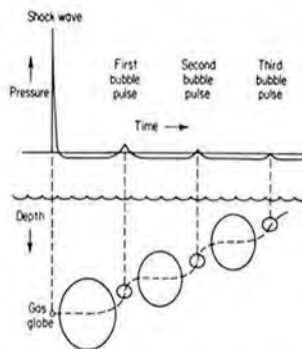
The key points of the training will be illustrated with practical exercises.

DynaS+ Catalogue Formation 2018 v2.0 - Réf : T/DIV/CMI/DYNAT/17/0238/2.0

LSTC
Livermore Software
Technology Corp.

Audience

CAE Engineers / Researchers

Prerequisites

Operationnal knowledge of LS-DYNA *(Preliminary follow-up of the course* **BASE-01** *or* **BASE-03** *advised)*

Specific registration conditions submitted to the agreement of American Defence Department for USA software use

Duration

3 days

Trainers

External expert
(Tom LITTLEWOOD –LSTC)

The training being provided by an external expert, DynaS+ reserves right to cancel within the 2 weeks notice if there is not enough attendees.

Training provided in English, English course material

Contact information:

Training Manager: **Charlotte MICHEL**   E-mail: c.michel@dynasplus.com

Tel: +33 5 61 44 54 98 / Fax: +33 5 61 44 74 88   Website: www.dynasplus.com

Address: 5, avenue Didier Daurat - 31 400 TOULOUSE

Structured ALE Solver with Large Models

Hao Chen   (hao@lstc.com)

Livermore Software Technology Corporation, Livermore, California 94551

S-ALE solver

In the past two decades, we have observed quite some changes in the simulations our ALE solver users. First, ALE model size has grown rapidly. Sixteen years ago when the author started his career as ALE developer, a typical model was of several hundred thousand elements and ran on 8 or 16 cores. Today, 10 million element models is considered normal if not small. And running with thirty or forty-some cores is definitely a start point. Secondly, the type of applications changed. Twenty years ago, people used ALE ELFORM=5 to study severely deformed Lagrange solid parts. Nowadays, most, if not all ALE users, running their models with ALE multi-material formulation (ELFORM=11), to simulate multiple fluids flowing in a ALE mesh. Finally, mesh also changed. While in the past, in quite some models, meshes were constructed to conform the material interfaces; now more than 90% of models are using rectilinear, structured ALE meshes.

This motivated LS-DYNA to develop a separate solver dedicated to solve ALE problems using structured mesh with multi-material formulations. The idea was, the logical regularity of the mesh could lead to algorithmic simplifications, memory reductions, and performance enhancements, which are impossible in unstructured mesh geometries. In 2015, LSTC introduced a new structured ALE (S-ALE) solver option dedicated to solve the subset of ALE problems where a structured mesh is appropriate. As expected recognizing the logical regularity of the mesh brought a reduced simulation time for the case of identical structured and unstructured mesh definitions.

To handle large models

S-ALE solver could handle large models much better. First, the mesh is generated in the solver, not by reading in each element and node. This reduced the geometry and connectivity information from gigabytes of data to almost nothing. Before, the process was to a). generate the mesh using pro-processor; b). save the mesh in a keyword input file; c). LS-DYNA reads in the keyword input file and generates its meshing database. Now, the S-ALE solver simply reads in the user-provided mesh spacing info along 3 directions, the origin and the local coordinate system. Then it generates the mesh and store it in the database. The reduction in time and storage made handling large models much easier.

Secondly, the regularity of the mesh could bring huge reductions on memory usage too. In the solver, there are quite some memory used to store the geometry and connectivity data, also bookkeeping arrays. The author put in a lot of effort to minimize the memory usage, and in the meantime, applying minimum changes to the overall LS-DYNA structure. The memory reduction project, is still an ongoing process and not yet completely finished.

Finally, efforts are being made for a better post-processing for S-ALE models. It is a joint project by the LS-PrePost team and the S-ALE developer. The idea is to one the server size, come up with a much more compact post-processing database; and on the LS-PrePost side, optimize the algorithm and reduce the memory usage by taking advantages of regularity of the mesh.

Memory is the bottle neck

The major obstacle to run a huge model is the memory limitation. Please note here as MPP has to be used to run large models we limit the discussion in this paper to MPP simulations. In a LS-DYNA MPP run, the maximum memory requirement mostly likely happens in the PHASE 1 of the initialization process. In this phase, the head node (processor 0) reads in the model and constructs the database to store it. Later, the whole model is decomposed into small, separate models to be run on each individual processors. And by that time, the memory burden is much more alleviated. So one way to overcome the memory limitation is to build our computing system so that the head node is equipped with a huge memory. This way, in PHASE 1, the head node has enough memory to hold the whole model and later all nodes only use much less memory to handle their pieces of the model.

However it is not practical and also quite wasteful. Another way used was to find a standalone machine with a huge memory. Do decomposition there and store the decomposition file. Later at the cluster machine, jump the decomposition phases and instruct each processor to read the decomposition file and start from the small, decomposed model directly. It is quite a cuber-some process so that even the most experienced user needs to go through a few iterations before a final success.

Memory reduction in S-ALE

S-ALE handled today's ALE models with no problem. Typically the number of elements goes from several million to 10, 20 million. But realizing the rapid growth in model size which is supported by growing computing power, the author decided to overhaul the initialization process for S-ALE solver to better prepare it for the future.

The idea is quite simple. The maximum memory usage is at PHASE 1, while the head node needs to store the whole model. So the only way to reduce the memory usage is to reduce the model size in this phase. While it is quite difficult, if not impossible for unstructured meshes, it is relatively simple and definitely doable for S-ALE meshes. As the mesh is constructed by the solver, at which phase we construct it is at our discretion. So why do not we construct the S-ALE mesh at each core instead of construct the whole mesh at core 0? This way, the huge memory needed to process the whole S-ALE mesh on the head node is not needed any more. And the memory requirement on the head node is reduced to like a hundredth of the original one.

At the beginning of this year, the author finally found some time to put these thoughts into action. By overhauling the whole initialization process, S-ALE mesh only comes to live at the very end of initialization process. At that time, each processor has its own sub-model and only needs much less memory to handle that sub-model.

A 200 million test model

For illustration purpose, the author picked a small projectile penetration model which is composed of 387,000 elements and refined it 8 times in each direction to get a model containing 198,144,000 elements. The input deck and problem description could be downloaded from http://ftp.lstc.com/anonymous/outgoing/hao/sale/models/cthrod/. The executable used is MPP-DYNA dev version 134214 single precision. It was run on a cluster contains 768 cores and each 12 cores resides at one of 72 nodes. It was built using Xeon(R) CPU E5620 and each node has ~ 100GB memory.

Five runs were made, using 36, 72, 144, 288, 576 cores, respectively. Below are the running times and MPP convergence plot.

# of cores	36	72	144	288	576
Total time(s)	84473	45711	32113	17738	9738
Time per cycle (s)	10.056	5.4405	3.7014	2.0785	1.1761
Speedup	1.0	1.8484	2.7168	4.8381	8.5503

Convergence rate of 200 million model

rate ~= 0.78
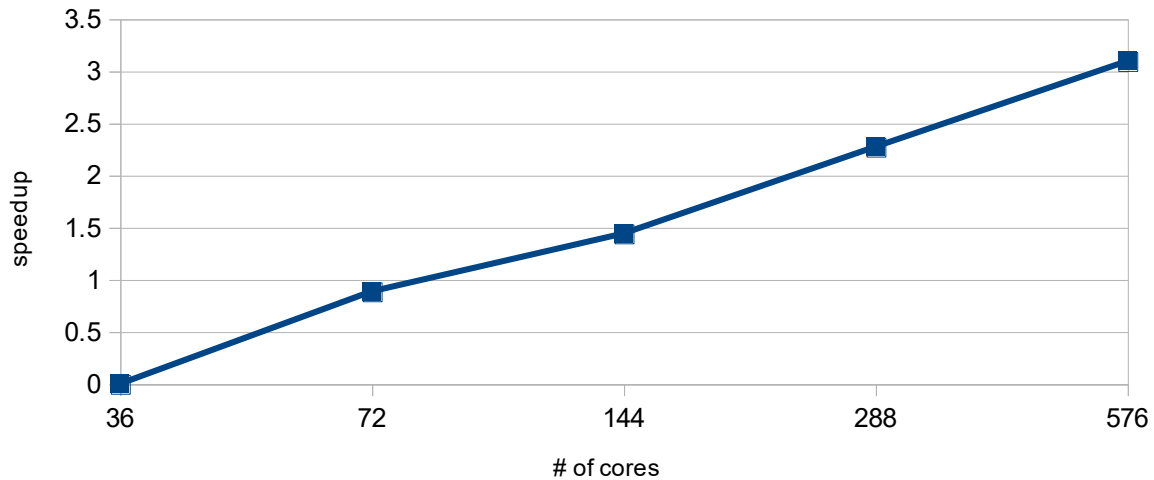
Projectile penetrating steel plate

Author: Dr. Hao Chen, joined LTSC in 2003 and has been working as the ALE developer since then. Starting from 2015, he developed the Structured ALE solver to shorten the simulation time and provide a better user experience. For more information about the S-ALE solver, please visit:
http://ftp.lstc.com/anonymous/outgoing/hao/sale/

BETA CAE Systems.   **www.beta-cae.com**

BETA CAE Systems - ANSA

BETA CAE Systems µETA

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.

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

Solutions for:

Process Automation - Data Management – Meshing – Durability - Crash & Safety NVH - CFD - Thermal analysis - Optimization - Powertrain

Products made of composite materials   - Analysis Tools -

Maritime and Offshore Design - Aerospace engineering - Biomechanics

DatapointLabs   www.datapointlabs.com

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

The 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   **www.eta.com**

etainfo@eta.com

Inventium Suite™

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

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

PreSys

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

VPG

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

DYNAFORM

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

ESI Group

get it right® **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.

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

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

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

JSOL Corporation

HYCRASH

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

JSTAMP/NV

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

JMAG

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

Livermore Software Technology Corp.   www.lstc.com

LS-DYNA

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

LS-PrePost

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

LS-OPT

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

LS-TaSC

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

LSTC Dummy Models

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

LSTC Barrier Models

LSTC offers several Offset Deformable Barrier (ODB) and Movable Deformable Barrier (MDB) model.
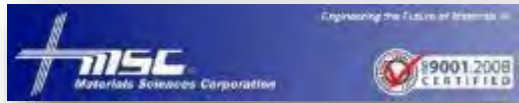
Material Sciences Corporation

Materials Sciences Corporation has provided engineering services to the composites industry since 1970. During this time, we have participated in numerous programs that demonstrate our ability to: perform advanced composite design, analysis and testing; provide overall program management; work in a team environment; and transition new product development to the military and commercial sectors. MSC's corporate mission has expanded beyond basic research and development now to include transitioning its proprietary technologies from the research lab into innovative new products. This commitment is demonstrated through increased staffing and a more than 3-fold expansion of facilities to allow in-house manufacturing and testing of advanced composite materials and structures.

Materials Sciences Corporation (MSC) MAT161/162 - enhanced features have been added to the Dynamic Composite Simulator module of LS-DYNA.

This enhancement to LS-DYNA, known as MAT161/162, enables the most effective and accurate dynamic progressive failure modeling of composite structures to enable the most effective and accurate dynamic progressive

failure modeling of composite structures currently available.

MSC/LS-DYNA Composite Software and Database -
   Fact Sheet: http://www.materials-sciences.com/dyna-factsheet.pdf
- MSC and LSTC have joined forces in developing this powerful composite dynamic analysis code.
- For the first time, users will have the enhanced ability to simulate explicit dynamic engineering problems for composite structures.
- The integration of this module, known as 'MAT 161', into LS-DYNA allows users to account for progressive damage of various fiber, matrix and interply delamination failure modes.
- Implementing this code will result in the ability to optimize the design of composite structures, with significantly improved survivability under various blast and ballistic threats.

MSC's LS-DYNA module can be used to characterize a variety of composite structures in numerous applications—such as this composite hull under blast.

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 depenetrate impactors at multiple locations and produce many input decks automatically (e.g. pedestrian impact, interior head impact)

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- 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

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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

www.predictiveengineering.com

Predictive Engineering provides finite element analysis consulting services, software, training and support to a broad range of engineering companies across North America. We strive to exceed client expectations for accuracy, timeliness and knowledge transfer. Our process is both cost-effective and collaborative, ensuring all clients are reference clients.

Our mission is to be honest brokers of information in our consulting services and the software we represent.

Our History

Since 1995, Predictive Engineering has continually expanded its client base. Our clients include many large organizations and industry leaders such as SpaceX, Nike, General Electric, Navistar, FLIR Systems, Sierra Nevada Corp, Georgia-Pacific, Intel, Messier-Dowty and more. Over the years, Predictive Engineering has successfully completed more than 800 projects, and has set itself apart on its strong FEA, CFD and LS-DYNA consulting services.
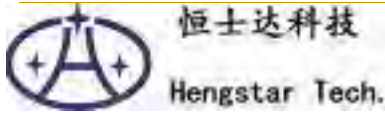
Shanghai Hengstar   www.hengstar.com

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

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

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

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

Consulting

As a consulting company, Hengstar 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.

Lenovo is a USD 39 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 ortfolio along with HPC and CAE expertise.

Lenovo Attains Status as **Largest** Global Provider of Top500 SuperComputers

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

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

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

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

LS-DYNA customers in industries / academia / consultancies are facing 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/

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

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www.rescale.com

Rescale: Cloud Simulation Platform

The Power of Simulation Innovation

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

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

True On-Demand, Global Infrastructure

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

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

ScaleX Enterprise: Transform IT, Empower Engineers, Unleash Innovation

The ScaleX Enterprise simulation platform provides scalability and flexibility to companies while offering enterprise IT and management teams the opportunity to expand and empower their organizations.

Rescale Cloud Simulation Platform   www.rescale.com

ScaleX Enterprise allows enterprise companies to stay at the leading edge of computing technology while maximizing product design and accelerating the time to market by providing:
- Collaboration tools
- Administrative control
- API/Scheduler integration
- On-premise HPC integration

Industry-Leading Security
Rescale has built proprietary, industry-leading security solutions into the platform, meeting the needs of customers in the most demanding and competitive industries and markets.
- Manage engineering teams with user authentication and administrative controls
- Data is secure every step of the way with end-to-end data encryption
- Jobs run on isolated, kernel-encrypted, private clusters
- Data centers include biometric entry authentication
- Platforms routinely submit to independent external security audits

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

LSTC - DYNAmore GmbH   JSOL Corporation

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

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

ESI Cloud Based Virtual Engineering Solutions   www.esi-group.com

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

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

Distribution, Consulting

Canada   **Metal Forming Analysis Corp MFAC**   galb@mfac.com

         www.mfac.com

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

Mexico   **COMPLX**   Armando Toledo

    www.complx.com.mx /   armando.toledo@complx.com.mx

    LS-DYNA LS-OPT   LS-PrePost

                             LS-TAsc Barrier/Dummy Models

United States   **DYNAMAX**   sales@dynamax-inc.com

    www.dynamax-inc.com

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

United States   **Livermore Software Technology Corp**   sales@lstc.com

    LSTC   www.lstc.com

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

United States   **ESI Group N.A**   **info@esi-group.com**

         www.esi-group.com

    PAM-STAMP

QuikCAST	SYSWELD	PAM-COMPOSITES	CEM One
VA One	CFD-ACE+	ProCAST	
	Weld Planner	Visual-Environment	IC.IDO

United States   **Engineering Technology Associates – ETA** etainfo@eta.com

    www.eta.com

INVENTIUM/PreSy	NISA	VPG	LS-DYNA
LS-OPT	DYNAform		

United States	**Predictive Engineering** www.predictiveengineering.com	info@predictiveengineering.com

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LSTC Barrier Models   LSTC Dummy Models

Distributor for Siemens PLM Software at www.AppliedCAx.com (FEMAP, NX Nastran, STAR CCM+, NX CAD/CAM/CAE)

France	**DynaS+** www.dynasplus.com	v.lapoujade@dynasplus.com Oasys Suite

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DYNAFORM   VPG   MEDINA

LSTC Dummy Models   LSTC Barrier Models

France	**DYNAmore France SAS** www.dynamore.eu	sales@dynamore.eu

LS-DYNA,   LS-OPT   Primer   DYNAFORM
   LS-PrePost

DSDM Products   LSTC Dummy Models   FEMZIP

LSTC Barrier Models   DIGIMAT

Germany	**CADFEM GmbH** www.cadfem.de	lsdyna@cadfem.de

ANSYS   LS-DYNA   optiSLang

              AnyBody

ANSYS/LS-DYNA

Germany	**DYNAmore GmbH** www.dynamore.de	uli.franz@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

Distribution, Consulting

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

Russia	**Limited Liability DynaRu**		office@lsdyna.ru	
	http://lsdyna.ru/			
	LS-DYNA	LS-TaSC	LS-OPT	LS-PrePost
	LSTC Dummy Models		LSTC Barrier Models	

Spain	**DYNAmore France SAS**		sales@dynamore.eu	
	www.dynamore.eu			
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Sweden	**DYNAmore Nordic**		marcus.redhe@dynamore.se	
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	FormingSuite		LSTC Dummy Models	
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Switzerland	**DYNAmoreSwiss GmbH**	info@dynamore.ch	
	www.dynamore.ch		
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Distribution, Consulting

UK	**ARUP**	dyna.sales@arup.com		
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	REPORTER	SHELL	FEMZIP	HYCRASH
	DIGIMAT	Simpleware	LSTC Dummy Models	
			LSTC Barrier Models	

China	**Shanghai Fangkun Software Technology Ltd.**		
	www.lsdyna-china.com		
	LS-DYNA	LS-TaSC	LSTC Barrier Models
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	LSTC Dummy Models		

India	**Oasys Ltd. India**		lavendra.singh@arup.com	
	www.oasys-software.com/dyna			
	PRIMER D3PLOT	T/HIS		
		LS-OPT	LSTC Dummy Models	LS-PrePost
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India	**CADFEM India**		info@cadfem.in
	www.cadfem.in		
	ANSYS	VPS	optiSLang
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India	**Kaizenat Technologies Pvt. Ltd**		support@kaizenat.com	
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	Complete LS-DYNA suite of products		LSTC Barrier Models	LS-TaSC

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	LSTC Dummy Models	LSTC Barrier Models	CmWAVE	

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Japan	FUJITSU			
	http://www.fujitsu.com/jp/solutions/business-technology/tc/sol/			
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Japan	LANCEMORE		info@lancemore.jp	
	www.lancemore.jp/index_en.html			
	Consulting			
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Japan	Terrabyte		English:	
	www.terrabyte.co.jp		www.terrabyte.co.jp/english/index.htm	
	Consulting			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	AnyBody	

Distribution, Consulting

Korea	**THEME**	wschung7@gmail.com		
	www.lsdyna.co.kr		Oasys Suite	
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
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	JSTAMP/NV	Scan IP	Scan FE	Scan CAD
	FEMZIP			

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

Taiwan	**AgileSim Technology Corp.**			
	http://www.agilesim.com.tw			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	FCM

Taiwan	**Flotrend**			
	www.flotrend.com.tw			
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Taiwan	**SiMWARE Inc..**			
	www.simware.com.tw			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
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TOYOTA - Total Human Model for Safety – THUMS

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

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

and as standing model to represent pedestrians.

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

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

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

For information please contact: THUMS@lstc.com

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

LSTC – Dummy Models

LSTC Crash Test Dummies (ATD)

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

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

e-mail to: atds@lstc.com

Models completed and available
(in at least an alpha version)
- Hybrid III Rigid-FE Adults
- Hybrid III 50th percentile FAST
- Hybrid III 5th percentile detailed
- Hybrid III 50th percentile detailed
- Hybrid III 50th percentile standing
- EuroSID 2
- EuroSID 2re
- SID-IIs Revision D
- USSID
- Free Motion Headform
- Pedestrian Legform Impactors

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

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

LSTC – Barrier Models

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

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

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

- MDB according to FMVSS 214 modeled with shell elements
- MDB according to FMVSS 214 modeled with solid elements

- MDB according to ECE R-95 modeled with shell elements

- AE-MDB modeled with shell elements

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

- RMDB modeled with shell and solid elements

LSTC ODB and MDB models are developed to correlate to several tests provided by our customers. These tests are proprietary data and are not currently available to the public.

All current models can be obtained through our webpage in the LSTC Models download section or through your LS-DYNA distributor.

To submit questions, suggestions, or feedback about LSTC's models, please send an e-mail to: atds@lstc.com. Also, please contact us if you would like to help improve these models by sharing test data.

Social Media

FACEBOOK

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YOUTUBE

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