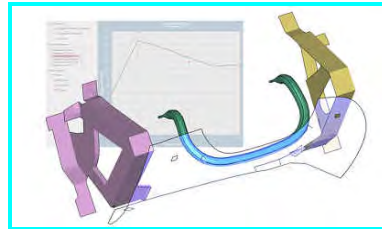
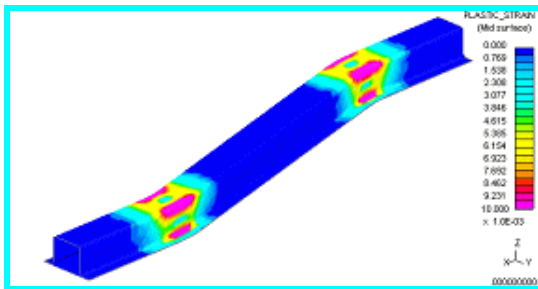


FEA Information <http://www.feainformation.com>

Engineering Journal and Website Resource

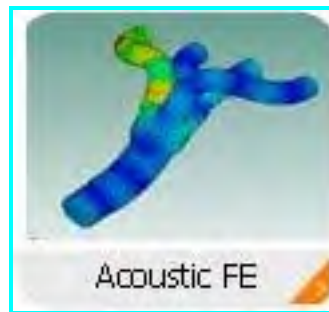


LSTC
LS-OPT® Version 4.1



JSOL - HYCRASH

ESI - VA One 2009



The Engineering Research Nordic AB
Newsletter



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*Announcements
For The Month of
February 2010*

Dr. Nielen Stander, of LSTC,

"We have released LS-OPT® Version 4.1 with significant improvements on reliability and usability when distributing solver jobs across networks.

Additionally, please join the LS-OPT User Group:

http://groups.google.com/group/lsopt_user_group

Elodie Maurer, of e-xtreme,

"Don't miss next month's 2nd DIGIMAT Technology Days, presenting DIGIMAT 4.0 capabilities and new Digimat-MX software - March 4/5, Troy (MI)":

http://www.e-xstream.com/copy_workshops-and-events/technology-days.html

FE News E-mail Correction:

The correct e-mail for Infinite, Netherlands is:

Infinite Simulation Systems, BV

Jurgen Mathijssen - j.mathijssen@infinite.nl

Website: <http://www.infinite.nl/>

Sincerely,
Marsha J. Victory, President,
FEA Information Inc



Shane



FEA Information

Platinum

Participants

| | | |
|--|---|--|
| OASYS Ltd: http://www.oasys-software.com/dyna/en/ | JSOL Corporation: http://www.jsol.co.jp/english/cae | HP: http://www.hp.com/ |
| ETA: http://www.eta.com | INTEL: http://www.intel.com | ESI Group: http://www.esi-group.com |
| BETA CAE Systems S.A.: http://www.beta-cae.com | LSTC: http://www.lstc.com | SGI: http://www.sgi.com |
| NEC: http://www.nec.com | Voltaire: http://www.voltaire.com | CRAY: http://www.cray.com |



FEATURED PAPERS

By William W. Feng

are

Available On Line

DYNALOOK

Courtesy of

LSTC & DYNAmore

The site presents papers from European and International LS-DYNA User Conferences and papers provided by other users. The papers are accessible via a search functionality. <http://www.dynalook.com>

Among the many papers you can locate publications by William W. Feng:

Numerical Modelling and Biaxial Tests for the Mullins Effect in Rubber

William W. Feng, John O. Hallquist -
Livermore Software Technology

The formulation, testing and numerical study of the Mullins effect on rubber are presented. Ogden first modelled the Mullins effect for studying the unloading in filled rubber. It has been extended here to include the Mullins effect on both unloading and subsequent loading. To demonstrate the Mullins effect experimentally, a new biaxial test, inflation of a plane circular membrane, is used. Some experimental test data are presented.

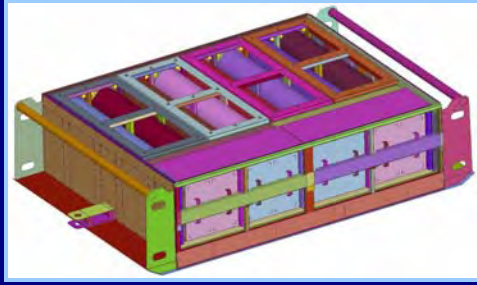
<http://www.dynalook.com/european-conf-2007/numerical-modelling-and-biaxial-tests-for-the.pdf>

A Failure of Criterion For Polymers and Soft Biological Materials.

William W. Feng, John O. Hallquist -
Livermore Software Technology Corp.

A failure criterion, for polymers and soft biological materials subjected to very large deformation, is presented in this paper. The criterion is written in terms of the strain invariants in finite elasticity. Experimental tests for determining the failure criterion of a material and some numerical results from LS-DYNA are shown.

http://www.dynalook.com/european-conf-2005/Material_Technology/Feng.pdf



AVI Library Showcase

Blast Analysis

Courtesy

X3DCAE LLC

AVI Library Blast Section: 40, 40a [<http://www.feainformation.com>]

X3Dcae LLC <http://www.X3Dcae.com>

Model Information:

Name: Blast Analysis

Units: mm, Mg, sec, N, MPa, N-mm

Blast Analysis Information:

ENCLOSURE Info

- steel protective enclosure
- containing 16 breathable-compressed-air bottles for use in coal mines
- dimensions: 3 meters x 2 meters x 0.75 meters
- enclosure thickness: several gauges
- blasted surface thickness : 4.75mm
- blasted surface supported by 7.90mm vertical c-channels
- enclosure material: MAT24 AISI1045HR
- assembly mass: 4195 kg (enclosure + 16 bottles with breathable compressed air)

BLAST Info

- 20 kg C-4 (22.8 kg TNT)
- semispherical ground level explosion
- 1 meter in front of the enclosure

X3Dcae LLC is the first and only CAE firm in West Virginia performing Finite Element Analysis with LS-DYNA since 2006

The services provided by X3Dcae LLC are LS-DYNA Analysis for Product Development and Industrial R&D, FEA training for CAE teams and High Quality Meshing

Analysis Software:

LS-DYNA (LSTC)

Pre/Post Software:

ANSA/ μ ETA (BETA CAE)

X3DCAE LLC

128 Sun Valley

Morgantown, WV 26508

(304) 594-9343 phone

[info@X3Dcae.com]



Top Crunch

Benchmark

Submitted Feb. 4, 2010

TOP Crunch for LS-DYNA software benchmarks. The TopCrunch project was initiated to track the aggregate performance trends of high performance computer systems and engineering software. Instead of using a synthetic benchmark, actual engineering software applications are used with real data and are run on high performance computer systems.

For complete information on the following benchmark visit <http://www.topcrunch.org>

Vendor/Submitter Organization

HP/IEE S.A

**#Nodes x #Processors per Node x
#Cores Per Processor = Total #CPU**

1 x 2 x 4 = 8

Computer Interconnect

Z800/Gigabit

Time (Sec)

982

Processor

Intel Xeon W5580
3.2 GHz

Benchmark Problem

Neon Refined



Highlights/Excerpts

The Engineering Research Nordic AB newsletter

Issue 28 - February 9, 2010

For the Complete Newsletter:

http://www.erab.se/documents/ERABnews/erabnews_28.pdf

If you would like to subscribe to the ERAB Newsletter send an e-mail to support@erab.se with the subject line SUBSCRIBE ERAB news

LS-DYNA Nordic Users' Forum, October 14th, 2010

We are pleased to announce the LS-DYNA Nordic Users; Forum 2010. This year it will be held October 14th at the conference hotel Fard Hatt in Kungälv (15 minutes from Gothenburg). It will be a one day conference with parallel sessions and popular keynote speakers such as Dr. John O. Hallquist (LSTC) and Dr. Nielen Stander (LSTC) among others.

The following training classes will be coordinated the same week in the vicinity of Fars Hatt: October 11-13th Introduction to LS-DYNA.
October 12-13th Introduction to ANSA.

If you want to show the community how LS-DYNA has helped you with your projects, are interested in sponsoring an event, or be one of the exhibitors, please contact our conference coordinator Marcus Redhe. Marcus.redhe@erab.se

New Releases

LSTC: The original rigid HIII dummy has been modified to also include a

standing version. A beta version is available for testing.

BETA: A new version of ANSA is releases (v.13.0.3). Updates have been made to the: CAD data translators, Batch Mesh Manager, Script collection, Documentation and many more.

A new version of mETA-Post (v.6.5.0) is also available. New features include but not limited to: improved performance in Windows workstations, support for FEMZIP files, slideshow view of .pptx files and many more.

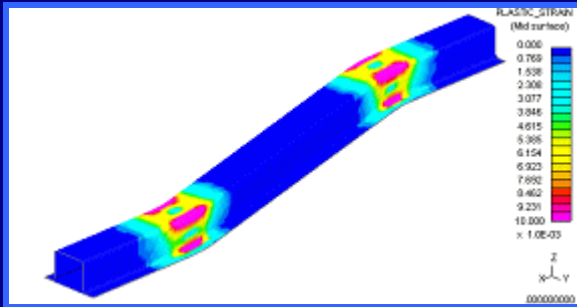
Training Classes 2010

The training schedule for 2010 is now available on line.

Recruitment – ERAB is expanding – Joining the ERAB team we are pleased to welcome:

Dr. Marcus Redhe, as Sales Manager. Marcus will be responsible for sales of software and consulting services. Marcus.redhe@erab.se

Dr. Jimmy Forsberg, as a specialist of automotive safety focusing on impact and reconstruction simulations. Jimmy.forsberg@erab.se



HYCRASH

Stamping-Crash Coupled Analysis

JSOL CORPORATION

Excerpt from the website: <http://ls-dyna.jsol.co.jp/en/hycrash/index.html>

The effect of residual strain distribution and non-uniform thickness due to sheet metal forming - the manufacture process for most of the automotive parts for crash energy absorption - is well known as one of the most affecting factors for correlations between analysis and tests. So that some tries are carried out to calculate the initial strain and thickness before the crash/strength analysis.

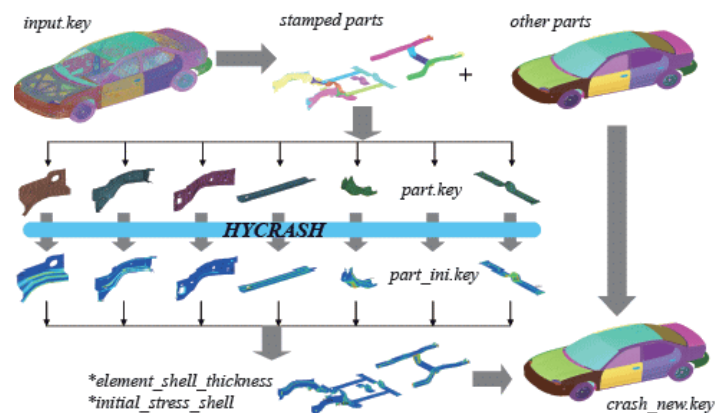
Usually, the element size for crash analysis and metal forming analysis are different due to their difference in geometrical information (R size etc.), so after forming analysis, stress, strains, and thickness are mapped to the structural analysis. However, this process costs pretty much and not very effective. Moreover, the information of die geometry is required for the forming analysis, which usually doesn't exist in structural analysis phase.

To overcome this, JSOL Corp. has developed "HYCRASH", easy-to-use one step solver.

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.

HYCRASH Execution process



The good points of HYCRASH: ,

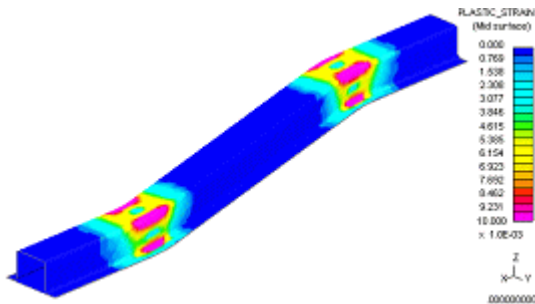
Only part geometry is required; die geometry, holder force are not needed. Special skill for forming analysis I not required. Only crash data is needed. Very quick calculation time; a few minutes to a few ten minutes in Windows desktop computer.

Table, Incremental analysis/HYCRASH forming Analysis

| | Die Geometry | Forming analysis data construction | Calculation Time | Mapping physical variables | Accuracy |
|-------------|--------------|------------------------------------|---------------------|----------------------------|----------|
| Incremental | Required | Required | A few hours | Required | High |
| HYCRASH | Non required | Non required | ~ a few ten minutes | Non required | Enough |
| | | | | | |

EXAMPLE1 :

S FRAME collapse



Working group of structure and strength: "Collapse property of light-gage and skew beam (vol1. test condition and result)", Society of Automotive Engineers of Japan. Inc., 1986.

EXAMPLE2 :

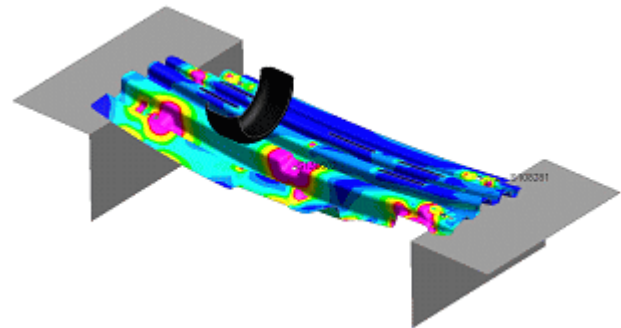
Mitsubishi Motors Corporation / Vehicle Crash Analysis

"The effect of press forming work effect for crash analysis" Katsuhiko Takashina, Kazuhiro Ueda, Tatero Otsuka, Mitsubishi Motors Corporation Technical Review 2008 No20.

<http://www.mitsubishi-motors.co.jp/corporate/technology/report/index.html>

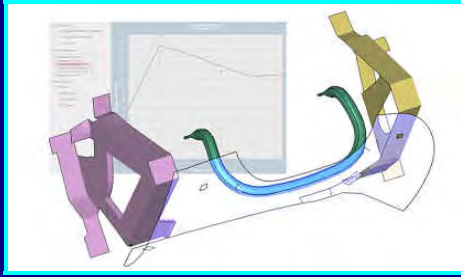
EXAMPLE 3 :

Car Interior parts supplier, Knee bolster strength analysis



Complete Information on the above excerpt and full Example information can be found on the HYCRASH page of JSOL

<http://ls-dyna.jsol.co.jp/en/hyccrash/index.html>



Release of LS-OPT®

Version 4.1

Livermore Software Technology Corporation is glad to announce the release of LS-OPT® Version 4.1.

The main focus of the V4.1 development has been to further expand the graphical postprocessor and to significantly improve reliability and usability when distributing solver jobs across networks. Much of the latter has been accomplished through industrial collaboration. While LS-OPT originated as an LS-DYNA® based tool, new features are increasingly being developed to facilitate interfacing with non-LS-DYNA solvers. This is necessitated by the increasing requirement for conducting multidisciplinary optimization, thereby involving more than one solver type. Therefore, in V4.1, LS-OPT now has MSC NASTRAN support for mode tracking and frequency extraction. A generic extractor has also been added to aid result extraction from text files.

Several other important features are summarized in the following overview.

Design Sampling

Discrete sampling can now be done on a variable-by-variable basis. This feature allows the user to flag those discrete variables which require sampling with the exact discrete values, e.g. number of ribs in a vehicle part. The D-Optimality

criterion, Space Filling, Full Factorial and Monte Carlo schemes are supported under this feature.

The .csv text format for a user-defined point selection table, has been added.

Job distribution

Because the logistics of job distribution plays a crucial role in simulation-based optimization/analysis, the relevant modules have been reworked to improve reliability and diagnostics for distributing solver jobs across a network. For convenience the user can now specify environment variables to be exported to the solver job (e.g. running on a cluster). This feature is convenient for setting up a job configuration which can be mobilized using a simple file with name=value type variable definitions or a more convenient GUI customized by the user/system administrator. Job monitoring has also been made more transparent by labeling each progress bar with the Iteration number, Case name and Job number. During and after runtime, the solver log (e.g. LS-DYNA® output) can be easily displayed for each job, allowing error terminations to be diagnosed immediately. As in the past,

jobs can be distributed through a number of standard queuing interfaces that allow automatic monitoring and file transfer with minimal user effort or a so called Blackbox interface for systems with firewalls in which the user is responsible for job monitoring/file transfer.

Result interfaces

A full mode tracking and frequency extraction interface has been added for the MSC NASTRAN solver. Mode tracking is required for frequency constraints because vibration modes may switch between designs. The procedure operates the same as the current LS-DYNA mode tracking feature, i.e. it allows the user to identify any mode (e.g. twisting mode or bending mode) of interest and then to automatically track the selected mode for all the designs being simulated for optimization or reliability.

For the purpose of vehicle safety design, various vehicle injury criteria have been added, namely the Viscous Criterion, Chest Compression criterion and A3ms criterion. More criteria are being added to Version 4.2

Users can now extract SPH (for fluid structure interaction) and acoustics related responses.

GenEx (LS-OPT generic extractor)

GenEx is a generic extractor packaged with LS-OPT to enable extraction of response quantities from text output files. The tool enables the user to create a template in which the location (anchor points) of the numeric fields of interest are defined. The extractor is useful when

running a simulation package which produces text output files, but for which a dedicated LS-OPT interface is not yet available. The selected responses are automatically imported in the LS-OPT GUI.

***CASE support and multi-stage analysis**

Multiple cases can be defined in a LS-DYNA keyword file using the *CASE keyword. LS-OPT supports the extraction of responses for a specific LS-DYNA case, thereby facilitating multi-stage analysis. Parameter Identification

Radial Basis Function Networks are now supported in addition to polynomials for the history-based Mean Squared Error composite function. The accuracy of parameter identification has also been improved by the addition of Virtual Histories, i.e. histories interpolated from response surface approximations. Virtual Histories (as e.g. displayed in Figure 0-6) are available based on linear or quadratic polynomials or Radial Basis Function networks.

Viewer

The purpose of the LS-OPT Viewer is to provide an integrated visualization aid for making design decisions. The new Viewer, which was first released in Ver. 4, has now been significantly expanded through the addition of six options (see Plot Selector in Figure 7-1). These are a Parallel Coordinate plot for simulation results, history plots (for both computed and predicted histories), a 2-Dimensional Interpolator, Global Sensitivity Analysis and Variable Values/Confidence intervals (for parameter identification problems). The window on the left allows the

selection of previously saved setups. These can be saved from any multi-

window display

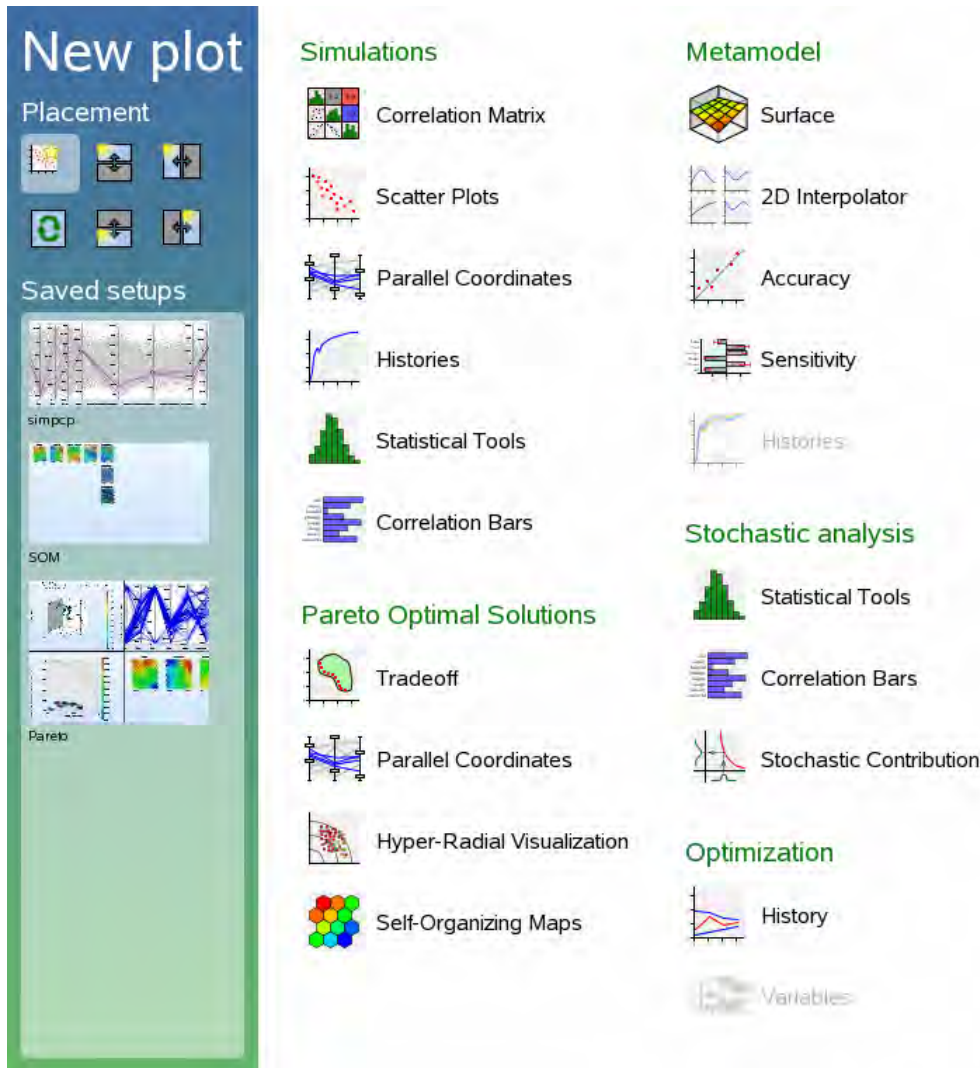


Figure 7-1: Plot selector showing the various plot categories, placement options and saved setups.

1. Integration of Self Organizing Maps (SOM) with the Pareto Optimal Frontier (POF) tools. The Pareto set is a set of optimal points generated by solving a *multi-objective optimization* problem and is typically displayed in the objective function space. After

computing the POF, it is still up to the user to select the best design from the set. Because of the possibility of having more than 3 objectives, visualization of the Pareto set can be problematic. LS-OPT therefore provides four different types of Pareto displays offering different visualization perspectives of the POF. The methods are integrated in the sense that selecting a group of points in the one type also highlights the same group

in the other types. *SOM* has been added in V4.1 because it allows the user to simultaneously visualize the tradeoff properties for all objectives, constraints, variables and any other response defined by the user. The selected points can be

exported in the form of a simulation-ready .csv file. The four methods are shown in Figure Figure 7-2 with *SOM* at the bottom right. These can of course be displayed individually.

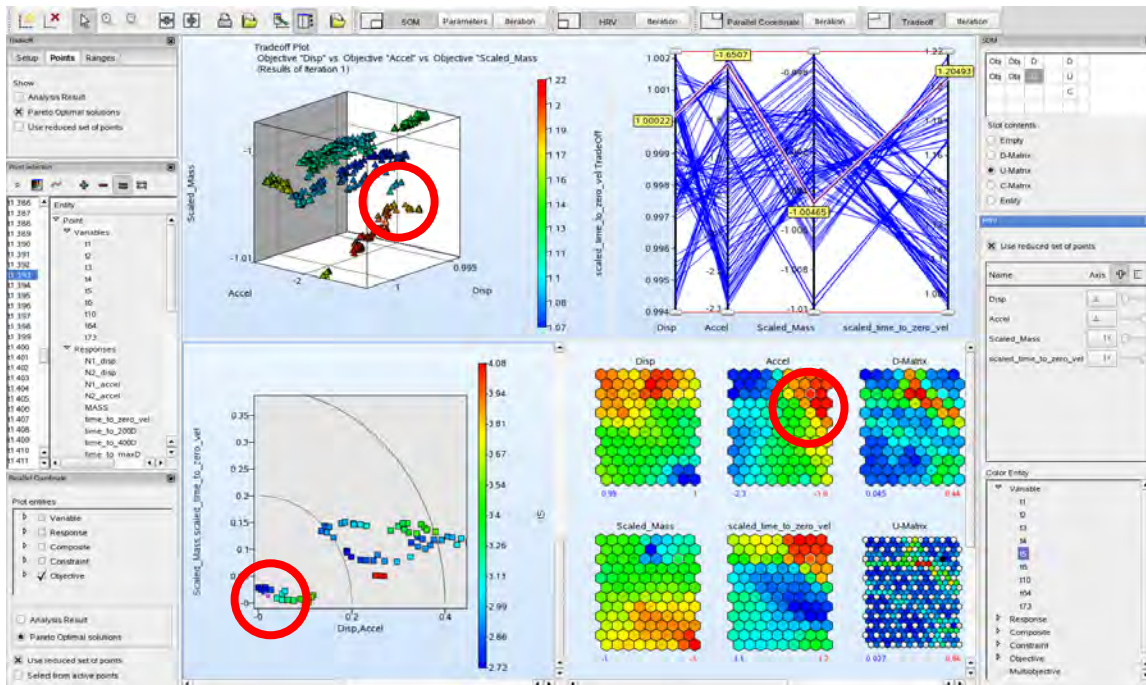


Figure Figure 7-2: *Integrated Visualization of the Pareto Optimal Front.* A selected point (circled in red) is highlighted on all the plots to facilitate selection of a suitable point. The plot types are (clockwise from top left) (i) 4D Scatter plot (ii) Parallel Coordinate plot, (iii) Self Organizing Maps (new) and (iv) Hyper-Radial Visualization (HRV).

2. Interpolation Matrix (2D). The 2D Interpolator displays cross-sections of the metamodels. This display is in the

form of a matrix, here shown with variables in the columns and the responses represented by the rows. A slider control can be used to adjust the variable values (vertical purple line). To enable the user to move the design within a feasible region, the feasibility is displayed by coloring the plot in green for the feasible range and red for the infeasible range.

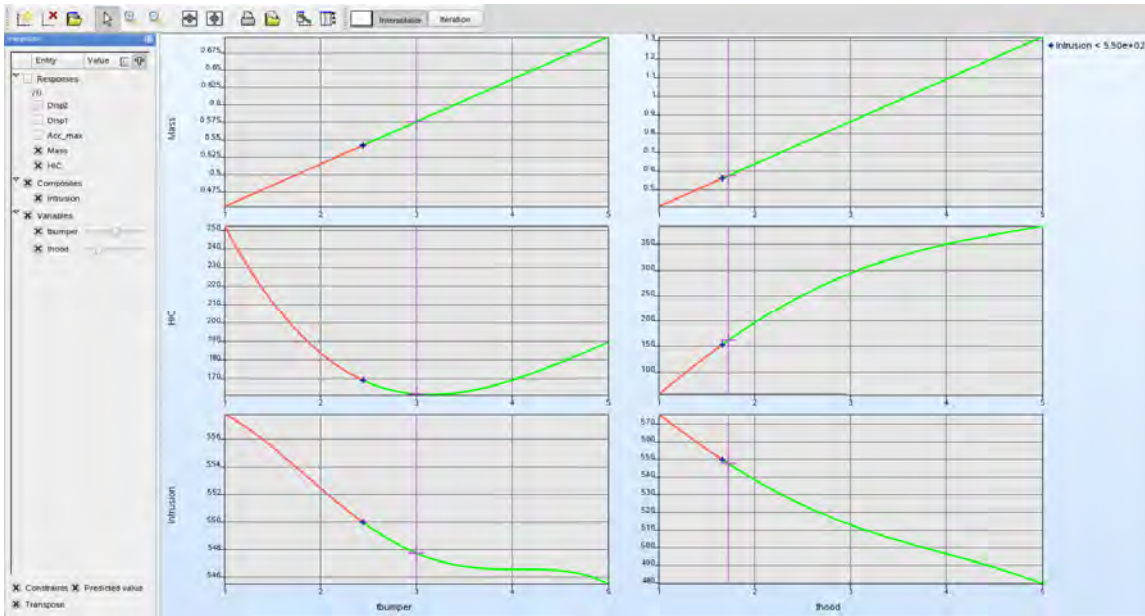


Figure 7-3: 2D interpolation matrix showing cross-sections at selected variable values for three responses and two variables. Green represents the feasible region

3. Global Sensitivities. Global response sensitivities are computed using the Sobol Sensitivity Index method and can be used to screen design variables, thereby accelerating the

optimization procedure with only those variables which are deemed significant. The sensitivity bar charts represent the variability of each response with respect to each variable and can be plotted either with each bar representing a variable and showing the responses (Figure 7-4) or each bar representing a response/composite and showing the relative importance of the variables.

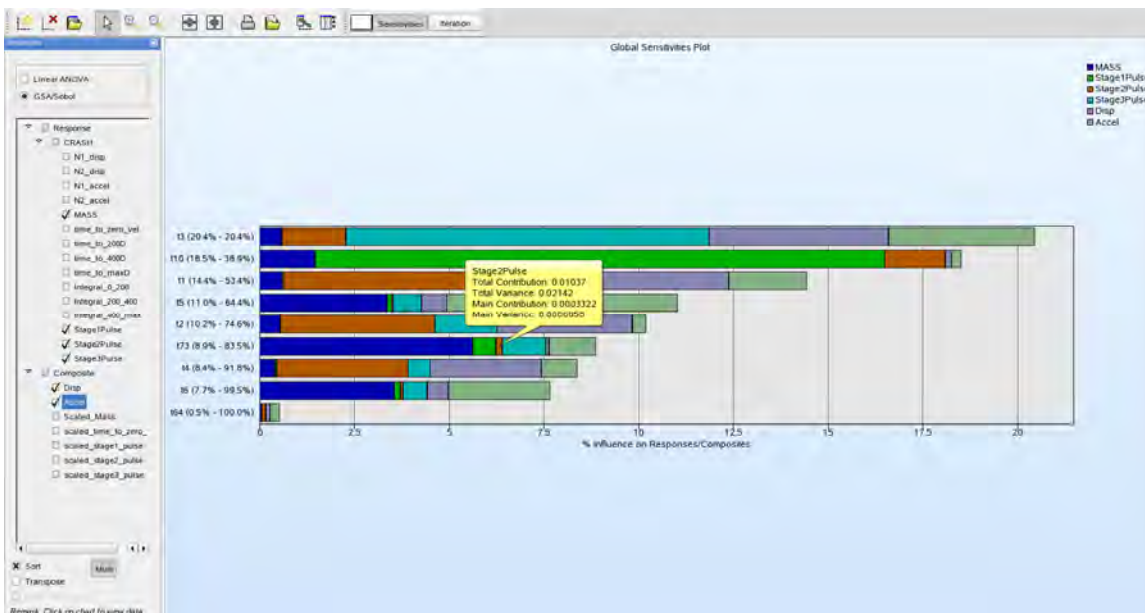


Figure 7-4: Global Sensitivity Analysis (GSA) plot showing the sensitivity of 6 responses as a function of 9 variables. The x-axis shows the fraction of influence of each variable. The balloon shows Total and Main contributions and variance values.

4. Histories. Both computed (Figure 7-5) and predicted (i.e. interpolated) histories (Figure 7-6) can be displayed. The histories can be color-highlighted with variable values, feasibility and iteration number. Clicking a history plot will bring up the parameter list for the selected design.

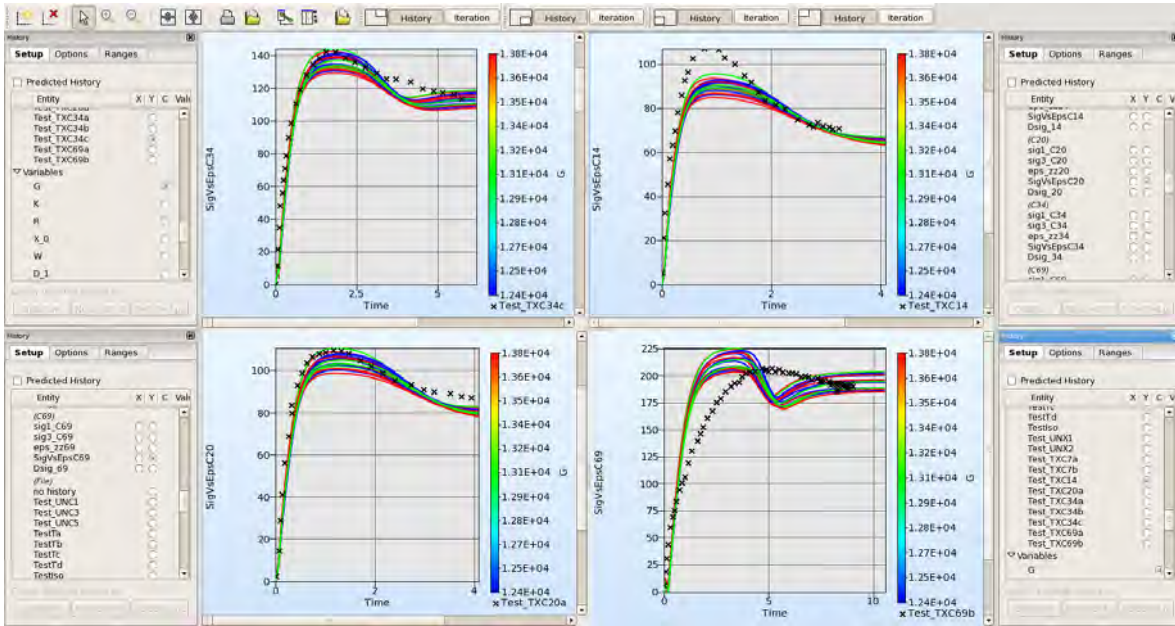


Figure 7-5: Multi-window plot of computed histories for a parameter identification problem (selected

iteration). The test values are shown as black crosses.

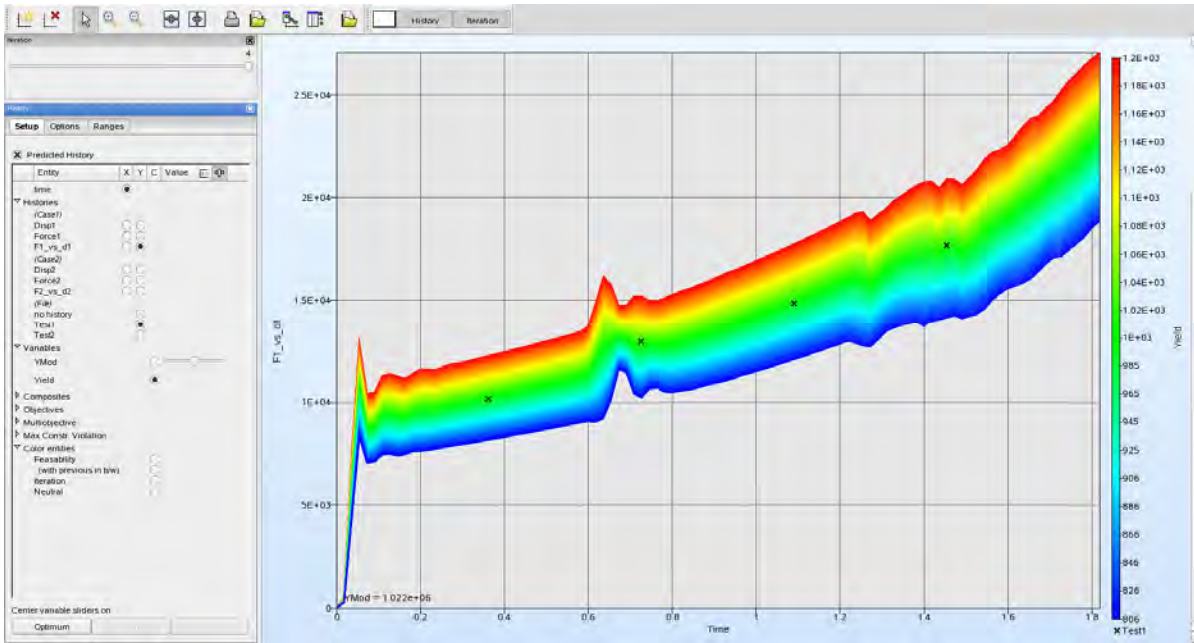


Figure 7-6: Plot of a predicted history for a parameter identification problem (selected iteration). The plot shows the variation of the history over the design range of a selected variable (see legend on right).

for the simulation points (see Figure 7-7). The plot opens with pre-set constraint bounds, thereby highlighting the feasible points. Selected point sets (such as is highlighted in Figure 7-7) can be exported to a simulation-ready text file (in .csv format).

Parallel Coordinate Plot: A Parallel Coordinate plot feature has been added

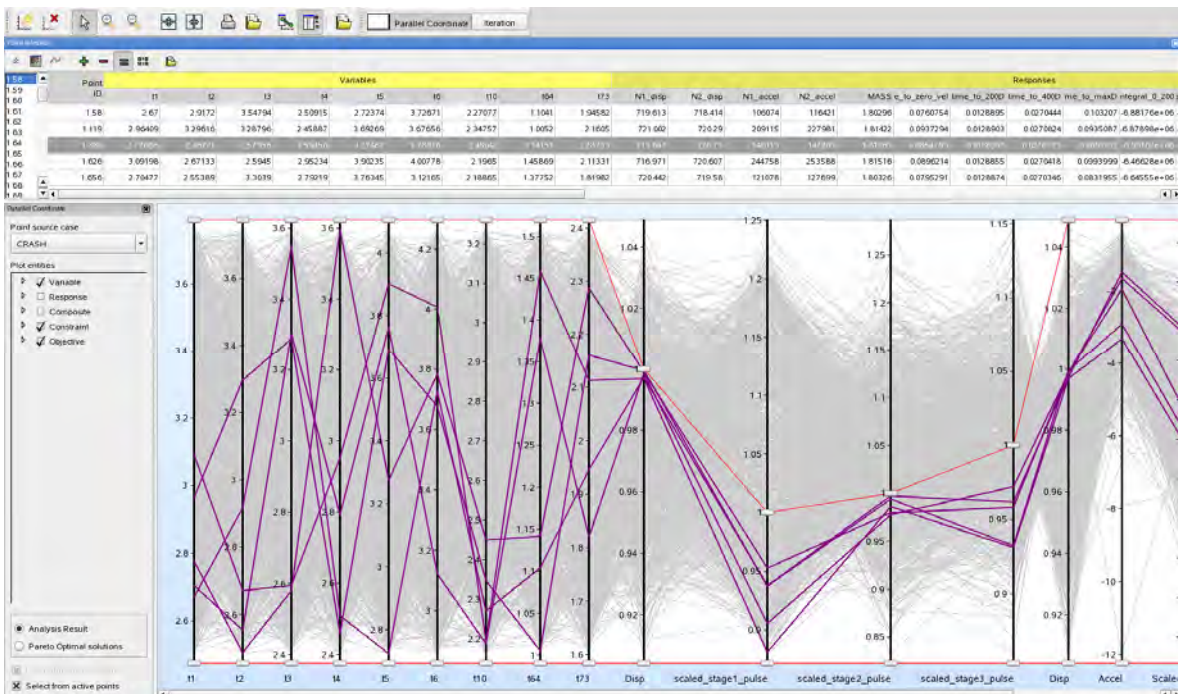


Figure 7-7: Parallel Coordinate Plot of 1000 simulation points. The red line represents the constraint bounds, in this case leaving only five feasible points (highlighted). An exportable table is shown above the chart.

5. Variable Bar Chart. This chart (not depicted) shows the values of the variables at a selected iteration. For parameter identification, error bars are used to display confidence intervals.

Download and support:

Downloads of V4.1 of LS-OPT are available for Linux and Microsoft Windows operating systems at <http://ftp.lstc.com/beta/lsopt/4.1> .

Further information and support can be found at www.lsoptsupport.com .

Interested users are invited to join the LS-OPT User Group at http://groups.google.com/group/lsopt_user_group .

Nielen Stander and Tushar Goel
nielen@lstc.com



ESI Announces VA One

V2009.0

Excerpt - For complete article without edits visit:

<http://www.esi-group.com/corporate/news-media/press-releases/2010-english-pr/esi-announces-va-one-v2009.0>

Paris, France – February 16, 2010 – ESI Group (ISIN FR0004110310), supplier of digital simulation software for prototyping and manufacturing processes, announced today the release of VA One 2009.

VA One is a complete solution for simulating the response of vibro-acoustic systems across the full frequency range. VA One seamlessly combines Finite Elements (FE), Boundary Elements (BEM) and Statistical Energy Analysis (SEA) in ONE model. It is the only simulation code on the market today that contains the complete spectrum of vibro-acoustic analysis methods within ONE common environment.

The core functionality of VA One is contained in 6 main modules:

- Structural FE
- Acoustic FE
- Acoustic BEM
- Hybrid
- SEA
- FOAM
- A number of advanced extension modules are also available

For the complete article and information visit

<http://www.esi-group.com/products/vibro-acoustics/va-one>



FEA Thailand www.feathailand.com is owned and operated by Noi Sims. Additionally serving Malaysia, Singapore

We are starting 2010 with special pricing for educational institutions in Malaysia, Singapore, and Thailand.. Contact me for information noi@lstc.com I will be pleased to assist your university. The commercial and university package is complete with LS-DYNA, LS-OPT, LS-PrePost and LSTC Dummy and Barrier Models. LS-DYNA has been the software of choice in these regions.

Information and sales are directly available through me, Noi Sims, through L.P.E. Engineering, a Thai Limited Liability Partnership, or directly from LSTC.

For local support/sales/training, I work closely with Jenson Chen of DFETECH.

You may contact Jenson Chen for sales and support of LS-DYNA as well as consulting and training. Additionally, Jenson handles sales, supports and does training on ETA's software products.

Please contact me for a demo license at no fee, pricing and suggestions. Or, contact Jenson and we will be pleased to assist you.

For Thailand, Singapore, Malaysia and LS-DYNA contact us.




Kanda Chusook-Sims (Noi)
LSTC
L.P.E. Engineering



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DFETECH

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chinchun2328@yahoo.com



Cyclone™—HPC Cloud
results on demand™

SGI

HPC Cloud

Cyclone™

Article how LS-DYNA is one of the premium offerings will be published soon.

http://www.sgi.com/products/hpc_cloud/cyclone/

Cyclone™ is the world's first large scale on-demand cloud computing service specifically dedicated to technical applications. Cyclone capitalizes on over twenty years of SGI HPC expertise to address the growing science and engineering technical markets that rely on extremely high-end computational hardware, software and networking equipment to achieve rapid results. Cyclone supports a number of leading applications partners and five technical domains, including computational fluid dynamics, finite element analysis, computational chemistry and materials, computational biology and ontologies.

Two Service Models: Cyclone is available in two service models: Software as a Service (SaaS) and Infrastructure as a Service (IaaS). With SaaS, Cyclone customers can significantly reduce time to results by accessing leading-edge open source applications and best-of-breed commercial software platforms from top Independent Software Vendors (ISVs). The IaaS model enables customers to install and run their own applications.

Applications Domain Expertise: With Software as a Service, Cyclone delivers access to leading-edge open source applications and best-of-breed commercial software platforms from top Independent Software Vendors (ISVs).

Supported applications in these domains include OpenFOAM®, NUMECA, Acusolve, LS-Dyna®, Gaussian, Gamess, NAMD, Gromacs, LAMMPS, BLAST, FASTA; HMMER, ClustalW and OntoStudio.

Technical Computing Requires a Dedicated Cloud: The SGI technology at Cyclone's core is comprised of some of the world's fastest supercomputing hardware architectures, including Intel® Xeon® and Itanium® processors-based SGI® Altix® scale-up, Altix® ICE scale-out and Altix® XE hybrid clusters. The hybrid architecture offers either NVIDIA® Tesla GPUs or AMD FireStream™ GPU Compute Accelerators, both for floating point double precision; Tiler accelerators are supported for integer workloads. High performance SGI InfiniteStorage systems are available for scratch space and for long-term archival of customer data.

At the system software level, Cyclone offers a flexible computing environment with the choice of Novell® SUSE® or Red Hat® Linux® operating systems, further performance-optimized through the addition of SGI® ProPack™. Altair PBS Professional® and SGI® ISLE™ Cluster Manager provide system scheduling and management.



Oasys
and
nhance Engineering Solutions Pvt Ltd

LS-DYNA Training India

nhance Engineering Solutions Pvt. Ltd. offers sales, consulting, training and services for LSTC's suite of software in India.

Oasys and nhance Engineering Solutions Pvt Ltd are pleased to announce the Training classes of LS-DYNA at Hyderabad in India.

LS-DYNA Training March, 2010

LS-DYNA-Introductory Course
Hyderabad
March 3 to 4
2 Days

Airbag Modeling with LS-DYNA
Hyderabad
March 17 to 18
2 Days

Automotive Crashworthiness using LS-DYNA
Hyderabad
March 23 to 26
3½ Days

The size of class is limited to 10 trainees only. Details of registration, cost etc can be found at:

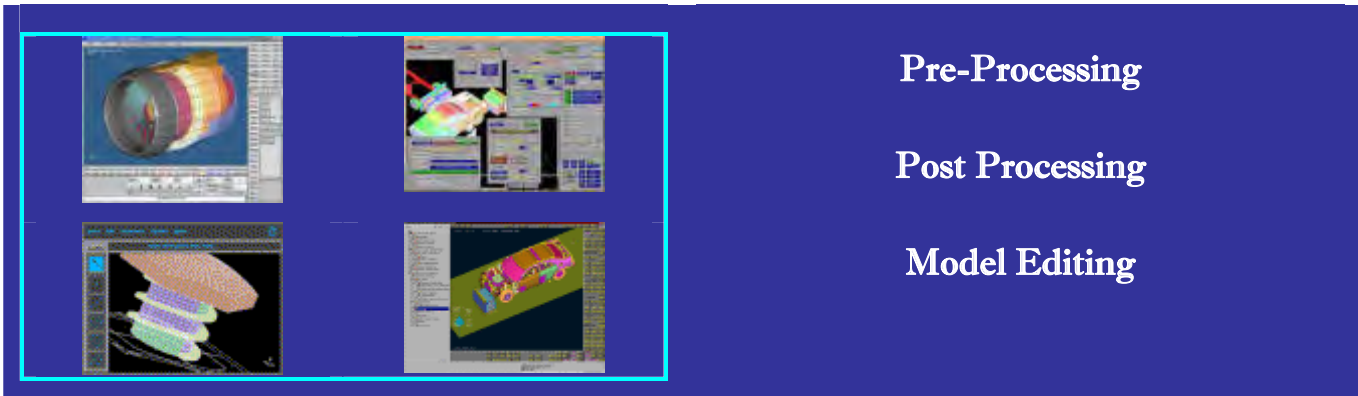
<http://www.oasys-software.com/dyna/en/training/worldwide.shtml>

Corporate training at client's premises can also be arranged.

Contact Details:

Ms. Rafia Sultana,
nhance Engineering Solutions Pvt Ltd
(Part of Arup Group),
Plot No. 39, Ananth Info Park, Hi-tec
City, Madhapur Phase 2,
Hyderabad,
India-500081

Tel: +91-40-44369797/98
Fax: +91-40-23111213
Email: India.support@arup.com



Pre-Processing

Post Processing

Model Editing

A preprocessor is a program that processes its input data to produce output. This data is then used as input to another program.

BETA CAE Systems S.A.

<http://www.beta-cae.gr/>

Provides complete CAE pre- and post-processing solutions. ANSA, the world wide standard pre-processor and full product modeler for LS-DYNA, with integrated Data Management and Task Automation. μ ETA, with special features for the high performance an effortless 3D & 2D post-processing of LS-DYNA results.

Engineering Technology Associates, Inc.

<http://www.inventiumsuite.com>

PreSys is an advanced Pre/Post Processor. PreSys is a full-featured, core solution that can be used on its own or with a variety of available add-on applications. The system offers advanced automeshing tools to provide the highest quality mesh with little CAD data preparation. It also features a scripting interface and model explorer feature for in-depth data navigation.

Oasys, Ltd

<http://www.oasys-software.com/dyna/en/>

Oasys Primer is a model editor for preparation of LS-DYNA input decks. - Oasys D3Plot is a 3D visualization package for post-processing LS-DYNA analyses using OpenGL® (SGI) graphics.

JSOL Corporation

<http://www.jsol.co.jp/english/cae/>

JVISION is a general purpose pre-post processor for FEM software. Designed to prepare data for, as well as support, various types of analyses, and to facilitate the display of the subsequent results.

Livermore Software Technology Corporation

<http://www.lstc.com>

LS-PrePost is an advanced interactive program for preparing input data for LS-DYNA and processing the results from LS-DYNA analyses.



LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT

LS-PrePost

LSTC Dummy & Barrier Models

Alpha Order by Country

| | |
|------------------|---|
| Australia | Leading Eng. Analysis Providers - LEAP http://www.leapaust.com.au/ info@leapaust.com.au |
| Canada | Metal Forming Analysis Corp - MFAC http://www.mfac.com/ galb@mfac.com |
| China | OASYS Ltd. (software house of Arup) http://www.oasys-software.com/dyna/en stephen.zhao@arup.com |
| France | ALYOTECH TECH. http://www.alyotech.fr nima.edjtemai@alyotech.fr |
| France | ALLIANCE SVCE. PLUS - AS+ http://www.asplus.fr/ls-dyna v.lapoujade@asplus.fr |
| Germany | CADFEM http://www.cadfem.de/en lsdyna@cadfem.de |
| Germany | DYNAMore http://www.dynamore.de/ uli.franz@dynamore.de |



LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT

LS-PrePost

LSTC Dummy & Barrier Models

| | |
|--------------|---|
| India | OASYS Ltd. (software house of Arup) http://www.oasys-software.com/dyna/en lavendra.singh@arup.com |
| India | EASi Engineering http://www.easi.com/ rvenkate@easi.com |
| India | CADFEM Eng. Svce India http://www.cadfem.in/ info@cadfem.in |
| Italy | EnginSoft SpA http://www.enginsoft.it/ info@enginsoft.it |
| Japan | JSOL Corporation http://www.jsol.co.jp/english/cae cae-info@sci.jsol.co.jp |
| Japan | ITOCHU Techno-Solutions Corp. http://www.engineering-eye.com/ ls-dyna@ctc-g.co.jp |
| Japan | FUJITSU http://jp.fujitsu.com/solutions/hpc/app/lodyna/ |



LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT

LS-PrePost

LSTC Dummy & Barrier Models

| | |
|--------------------|---|
| Korea | Theme Engineering http://www.lsdyna.co.kr/ wschung@kornet.com |
| Korea | Korean Simulation Tech. http://www.kostech.co.kr young@kostech.co.kr |
| Netherlands | Infinite Simulation Systems, BV http://www.infinite.nl/ j.mathijssen@infinite.nl |
| Sweden | Engineering Research AB http://www.erab.se/ sales@erab.se |
| Taiwan | Flotrend Corporation http://www.flotrend.com.tw/ gary@flotrend.tw |
| Russia | State Unitary Enterprise –STRELA info@ls-dynarussia.com |



LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT

LS-PrePost

LSTC Dummy & Barrier Models

| | |
|-----------------------|---|
| United Kingdom | OVE ARUP & PARTNERS http://www.oasys-software.com/dyna/en/ dyna.sales@arup.com |
| USA | Livermore Software Tech. Corp. - LSTC http://www.lstc.com/ sales@lstc.com |
| USA | Engineering Tech. Assc. Inc. – ETA http://www.eta.com/ sales@eta.com |
| USA | DYNAMAX http://www.dynamax-inc.com/ sales@dynamax-inc.com |



Finite Element Analysis
North America
FEA Consulting/Consultants
&
Engineering Services

FEA Consultants use a wide range of software simulation programs. Their expertise using specific programs for their customers offers the ability for controlling the modeling and analysis of structures, systems, products and many other applications. Consultants and Engineering Services are used by government, homeland security, court trials, and a number of industries needing to have outside sources for expertise in FEA

<http://www.fea-consulting.com>

North America

Located: California'

Karagozian & Case - (K&C)
<http://www.kcse.com>

Shangrui Lan
 (818) 303-1268

Located: Connecticut

CAE Associates
<http://www.caeai.com>

(203) 758-2914

Located: Oregon

Predictive Engineering
<http://predictiveengineering.com>

George Laird
 (800) 345-4671

Located: California

Schwer Engineering
<http://schwer.net>

Len Schwer
 (707) 837-0559

Located: Texas

KBEC
Khan Bui

(512) 363-2739

Located: Ohio

AEG Product Engineering Svce.
<http://engineering-group.com>
support@engineering-group.com



Software & Hardware Alliances

Software Solutions

SMP/MPP Hardware & OS

MPP & Interconnect MPI

ETA – DYNAFORM & VPG

<http://www.eta.com>

Includes a complete CAD interface capable of importing, modeling and analyzing, any die design. Available for PC, LINUX and UNIX, DYNAFORM couples affordable software with today's high-end, low-cost hardware for a complete and affordable metal forming solution.

ETA – VPG

<http://www.eta.com>

Streamlined CAE software package provides an event-based simulation solution of nonlinear, dynamic problems. eta/VPG's single software package overcomes the limitations of existing CAE analysis methods. It is designed to analyze the behavior of mechanical and structural systems as simple as linkages, and as complex as full vehicles.

OASYS software for LS-DYNA

<http://www.oasys-software.com/dyna/en/>

Oasys software is custom-written for 100% compatibility with LS-DYNA. Oasys PRIMER offers model creation, editing and error removal, together with many

specialist functions for rapid generation of error-free models. Oasys also offers post-processing software for in-depth analysis of results and automatic report generation.



Software & Hardware Alliances

Software Solutions

SMP/MPP Hardware & OS

MPP & Interconnect MPI

ESI Group Visual-CRASH For DYNA

<http://www.esi-group.com>

Visual-Crash for LS-DYNA helps engineers perform crash and safety simulations in the smoothest and fastest possible way by offering an intuitive windows-based graphical interface with customizable toolbars and complete session support. Being integrated in ESI

Group's Open VTOS, an open collaborative multi-disciplinary engineering framework, Visual-Crash for DYNA allows users to focus and rely on high quality digital models from start to finish. Leveraging this state of the art environment, Visual Viewer, visualization and plotting solution, helps analyze LS-DYNA results within a single user interface.

BETA CAE Systems S.A.– ANSA

<http://www.beta-cae.gr>

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

BETA CAE Systems S.A.– μETA

<http://www.beta-cae.gr>

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



SMP & MPP Hardware & OS Listing

Specifically for LS-DYNA

SMP & MPP Hardware and OS

FUJITSU

Prime Power

Sun OS 5.8

SGI

LINUX

WINDOWS

INTEL

IA 32

Linux, Windows

INTEL

IA64

Linux

INTEL

Xeon EMT64

Linux, Windows 64

HP

PA-8X00

HP-UX 11.11.
and above

HP

Opteron

Linux

HP

Alpha

True 64

HP

IA-64

HP-UX 11.22
and above



MPP And Interconnect MPI

Specifically for LS-DYNA

MPP and Interconnect MPI

| Company | O/S | HPC Interconnect | MPI Software |
|---------|-----|------------------|--------------|
|---------|-----|------------------|--------------|

| CRAY | | | |
|-------------|--------------------------------|------------|--------------------------|
| CX1 | Linux Windows HPC Server 2008, | InfiniBand | MSMPI, HP MPI, INTEL MPI |
| XT5 | Linux | SeaStar2 | Cray MPI |
| XT5M | Linux | SeaStar1 | Cray MPI |

| FUJITSU | | | |
|----------------|------------|--|--|
| Prime Power | SUN OS 5.8 | | |

| HP | | | |
|-----------|------|--|--|
| PA8000 | HPUX | | |
| IA64 | HPUX | | |

Continued on next Page



MPP And Interconnect MPI

Specifically for LS-DYNA

MPP and Interconnect MPI

| INTEL | | | |
|--------------|----------------|--|-----------------------------------|
| IA32 | Linux, Windows | InfiniBand (Voltaire), MyriCom | MPICH, HP MPI, OpenMPI |
| IA64 | Linux | | MPICH, HP MPI, OpenMPI |
| Xeon EMT 64 | Linux | InfiniBand (Voltaire), MyriCom, PathScale InfiniPath | MPICH, HP MPI, OpenMPI, INTEL MPI |

| SGI | | | |
|-----------------|-----------------|------------------------------------|---|
| Altix 4700, 450 | Linux | NUMalink 4 | SGI MPT, OpenMPI, Intel MPI, MPICH, Platform MPI 7 (HP-MPI) |
| Altix UV | Linux | NUMalink 5 | SGI MPT, OpenMPI, Intel MPI, MPICH, Platform MPI 5.6 (Scali MPI), 7 (HP-MPI) |
| Altix ICE | Linux | GigE QDR Mellanox Infiniband | SGI MPT, OpenMPI, Intel MPI, MPICH, Platform MPI 5.6 (Scali MPI), 7 (HP-MPI) |
| Altix XE | Linux & Windows | GigE QDR Mellanox Infiniband | SGI MPT, OpenMPI, Intel MPI, MPICH, Platform MPI 5.6 (Scali MPI), 7 (HP-MPI), MSMPI |
| CloudRack X2 | Linux & Windows | GigE | SGI MPT, OpenMPI, Intel MPI, MPICH, Platform MPI 5.6 (Scali MPI), 7 (HP-MPI), MSMPI |
| Octane III | Linux & Windows | GigE QDR Mellanox Infiniband | SGI MPT, OpenMPI, Intel MPI, MPICH, Platform MPI 5.6 (Scali MPI), 7 (HP-MPI), MSMPI |



Training Courses

March 2010

Alpha Order by
Country

India

Oasys and nance Engineering Solutions Pvt. Ltd.

<http://www.oasys-software.com>

March 03 – 04

Introduction to LS-DYNA

March 17-18

Airbag Modelling with LS-DYNA

March 23-26

Automotive Crashworthiness
using LS-DYNA

France

Alyotech Technologies

March 18 – 19

Concrete & Geo Materials
Modeling

March 24-15

Modeling & Simulation with
LS-DYNA

Germany

Dynamore

March 02

User Materials

March 10

ANSA/LS-OPT/META

March 19

Contact Definitions

March 22

Spotwelds

March 24

Introduction to LS-DYNA

March 30

Identification LS-OPT

SWEDEN

Engineering Research AB

<http://www.erab.se>

March 16

Introduction to LS-DYNA

US

LSTC

<http://www.lstc.com>

March 15

LS-PrePost

March 16 –19

Introduction to LS-DYNA

March 25 - 26

Implicit

March 30 - April 01

ALE Advanced Option in
LS-DYNA

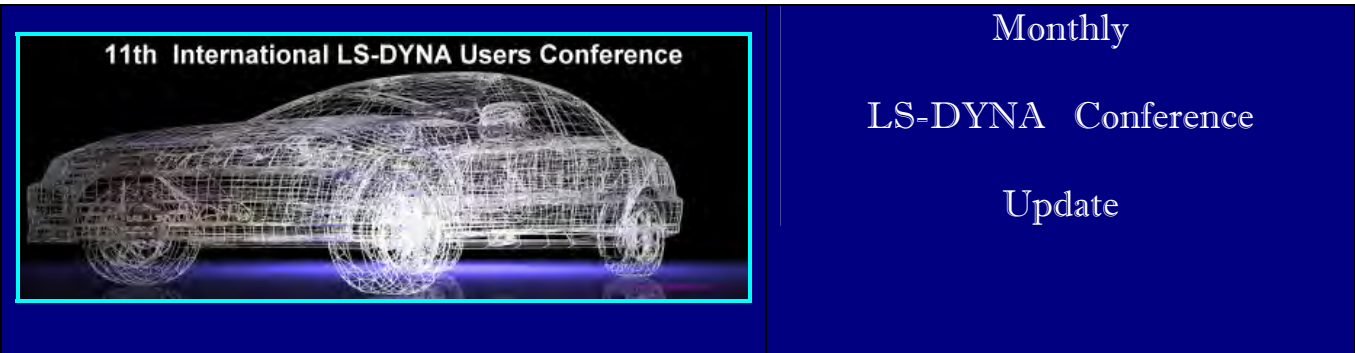
US

ETA

<http://www.eta.com>

March 02–03

Introduction to DYNAFORM



Monthly Update from your LSTC Conference Team.

Weekly updates <http://www.ls-dynaconferences.com/pages/blog.htm>

Welcome to the first update in our monthly countdown to June 6th – 8th.

The conference, starting on Monday, begins our two days of technically excellent presentations, from the over 100 papers we have received.

The conference will begin with three Plenary speakers:

- Thomas J.R. Hughes,
University of Texas at Austin
- David J. Benson,
University of California at San Diego
- Thomas J. Lange,
Procter & Gamble, Ohio

Our first two Plenary speakers will be covering “Isogeometric Analysis I & II”.

- I: Introduction and Overview
by Thomas J.R. Hughes.
- II: New Developments in LS-DYNA
by David J. Benson.

Abstract of our first plenary presentation:

Isogeometric Analysis I
Introduction and Overview.
Thomas J.R. Hughes
Institute for Computational
Engineering and Sciences
University of Texas at Austin

Keywords: computer aided design, geometry, finite element analysis, NURBS, T-Splines, mesh refinement, structures, solids, fluids, fluid-structure interaction, patient-specific cardiovascular simulation.

Geometry is the foundation of analysis yet modern methods of computational geometry have until recently had very little impact on computational mechanics. The reason may be that the Finite Element Analysis (FEA), as we know it today, was developed in the 1950’s and 1960’s, before the advent and widespread use of Computer Aided Design (CAD) programs, which occurred in the 1970’s and 1980’s. Many difficulties encountered with FEA emanate from its approximate, polynomial based geometry, such as, for example, mesh generation, mesh refinement, sliding contact, flows about aerodynamic shapes, buckling of thin shells, etc., and it’s disconnect with CAD. It would seem that it is time to look at more powerful descriptions of geometry

to provide a new basis for computational mechanics.

The purpose of this talk is to explore the new generation of computational mechanics procedures based on modern developments in computational geometry. The emphasis will be on Isogeometric Analysis in which basis functions generated from NURBS (Non-Uniform Rational B-Splines) and T-Splines are employed to construct an exact geometric model. For purposes of analysis, the basis is refined and/or its order elevated without changing the geometry or its parameterization. Analogues of finite element h- and p-refinement schemes are presented and a new, more efficient, higher-order concept, k-refinement, is described. Refinements are easily implemented and exact geometry is maintained at all levels without the necessity of subsequent communication with a CAD description.

In the context of structural mechanics, it is established that the basis functions are complete with respect to affine transformations, meaning that all rigid body motions and constant strain states are exactly represented. Standard patch tests are likewise satisfied. Numerical examples exhibit optimal rates of convergence for linear elasticity problems and convergence to thin elastic shell solutions. Extraordinary accuracy is noted for k-refinement in structural vibrations and wave propagation calculations. Surprising robustness is also noted in fluid and non-linear solid mechanics problems. It is argued that Isogeometric Analysis is a viable alternative to standard, polynomial-based, finite element analysis and possesses many advantages. In

particular, k-refinement seems to offer a unique combination of attributes, that is, robustness and accuracy, not possessed by classical p-methods, and is applicable to models requiring smoother basis functions, such as, thin bending elements, and strain-gradient and various phase-field theories.

An initial example of Isogeometric Design-to-Analysis Integration, in which output files from a CAD code (Rhino/T-Splines) are utilized directly in an FEA code (LS-DYNA), completely avoiding mesh generation, is presented, and efforts to "finite elementize" NURBS and T-Splines are described. A modelling paradigm for patient-specific simulation of cardiovascular fluid-structure interaction is reviewed, and a précis of the status of current mathematical understanding is presented.

March will continue with the abstract by David J. Benson and our other keynote speaker introductions.

11th International LS-DYNA Users Conference



Monthly

LS-DYNA Conference

Update

The conference will follow the successful venue of the 10th International LS-DYNA Users conference at the Hyatt Regency Dearborn, Dearborn Michigan. Hotel reservations are convenient and special pricing is being offered. The hotel registration page is available on the conference website <http://www.ls-dynaconferences.com>

Again, the conference registration completely covers all technical sessions, breakfasts, breaks, lunches, the conference reception and conference banquet.

Training seminars are optional (2 days) following the conference – March 15th the conference site will have pdf descriptions of each course offered. If you have questions in reference to classes contact Cathie@lstc.com

- Impact/Dummies and Barriers
- Heat Transfer & Hot Stamping
- Implicit Analysis
- LS-OPT
- LS-PrePost
- Metal Forming
- ALE
- Polymers

11th International LS-DYNA Users Conference



Monthly

LS-DYNA Conference

Registration Form

If you would prefer not to fill in the form on line, please print out, fill in the following form. Fax the form to Marsha Victory at LSTC (925) 961-0806

Page 1 of 2

Name as you want it to appear on the name badge

Full Name: _____

Company _____

University _____

Department _____

Additional Information

Address: _____

City: _____ State/Province _____

Zip/Postal _____ Country _____

Telephone _____

e-mail: _____

| | Non - Student | Student with Valid Student ID |
|---|----------------------|--------------------------------------|
| Conference Only | _____ \$450 | _____ \$250 |
| Training Only Seminar After Conference | _____ \$450 | _____ \$250 |
| Conference & Training | _____ \$900 | _____ \$500 |
| TOTAL | | |

Conference Options (not available with Training Only)

| Reception June 6 th at 6pm | Banquet June 7 th at 7pm | | | | | | | | | | | | | | | |
|--|---|-------|-----------|-------|--|------|--|--|------|--|--|---------|--|--|------------|--|
| 1. _____ I will NOT attend | 1. _____ I will NOT attend | | | | | | | | | | | | | | | |
| 2. _____ I will attend | 2. _____ I will attend | | | | | | | | | | | | | | | |
| 3. _____ I will bring a guest | 3. _____ I will bring a guest | | | | | | | | | | | | | | | |
| | <table border="1" style="width: 100%;"> <thead> <tr> <th>YOU</th> <th>MEAL TYPE</th> <th>GUEST</th> </tr> </thead> <tbody> <tr> <td></td> <td>Beef</td> <td></td> </tr> <tr> <td></td> <td>Fish</td> <td></td> </tr> <tr> <td></td> <td>Chicken</td> <td></td> </tr> <tr> <td></td> <td>Vegetarian</td> <td></td> </tr> </tbody> </table> | YOU | MEAL TYPE | GUEST | | Beef | | | Fish | | | Chicken | | | Vegetarian | |
| YOU | MEAL TYPE | GUEST | | | | | | | | | | | | | | |
| | Beef | | | | | | | | | | | | | | | |
| | Fish | | | | | | | | | | | | | | | |
| | Chicken | | | | | | | | | | | | | | | |
| | Vegetarian | | | | | | | | | | | | | | | |

After the Conference Training Seminar Choice:

_____ None – I will not be attending the training

| | |
|------------------------------------|---------------------|
| _____ Impact/Dummies & Barriers | _____ LS-OPT |
| _____ Heat Transfer & Hot Stamping | _____ LS-PrePost |
| _____ Implicit Analysis | _____ Metal Forming |
| _____ ALE | _____ Polymers |

Additional Comments _____
