

JANUARY
2008

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The 10th International
LS-DYNA® Users Conference
June 8-10, 2008
Dearborn, Michigan USA



Arup

Arup's collaboration
with Simpleware Ltd.



Visit to China

LS-DYNA
Demonstrations in China





FEA Information Announcements

LSTC's 10th Int'l LS-DYNA® Users Conference:

A Monthly Update:

Registration and Hotel **registration now available** on line at:
www.ls-dynaconferences.com

Save the Date: 19th Annual HP CAE Symposium:

The "19th Annual HP Symposium on Technology Trends in Computational Engineering" will take place Tuesday, April 8, 2008 at the Long Beach Marriott, Long Beach, CA. This symposium is the largest multi-ISV CAE event in the world, and showcases HP's leadership in the computer-aided engineering space. The symposium brings together over 20 industry experts – including technical experts from leading CAE application development teams – and more than 200 engineers and managers to discuss current trends in engineering. Complete Information will appear in the February News.

LS-DYNA® And Intel Cluster Ready Training Seminars:

LSTC is currently establishing seminar schedules for Intel® Cluster Ready training seminars at LSTC offices in California and/or Michigan.

Global Note:

1st African Conference on Computational Mechanics AfriComp'09
January 7-11, 2011 Sun City, South Africa www.africomp.com

1st International Conference on Hot Stamping Sheet Metal Forming
October 22 – 24th, 2008, Kassel, Germany
Conference Secretary: Nicolas Saba sabe@uni-kassel.de

Sincerely,

Art Shapiro art@feainformation.com - Editor
Marsha Victory mv@feainformation.com - President
Anthony Giaccana feaanswer@aol.com - Business Manager
Wayne Mindle – Graphic Design

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LS-DYNA® And Intel® Cluster Ready Training Seminars

Faster, More Efficient Deployment of LS-DYNA/MPP on Intel Based Clusters



When you're purchasing your next cluster, LSTC suggests you look to an Intel® Cluster Ready certified cluster for faster, more efficient deployment of LS-DYNA/MPP.

John O. Hallquist, President of LSTC, states "LSTC is confident that...[the] Intel® Cluster Ready program will be welcomed by LS-DYNA worldwide users. Our MPP customers and their IT support staffs will no longer be required to expend resources bringing their clusters online. Set-up and configuration time will be significantly decreased or eliminated entirely as a result of Intel's certification solution. "

LSTC Intel® Cluster Ready Training Seminars

LSTC is currently establishing seminar schedules for Intel® Cluster Ready training seminars at LSTC offices in California and/or Michigan. The seminars will demonstrate how users can maximize the benefits offered by the Intel® Cluster Ready program and FAQ on LS-DYNA installation.

If you have seminar suggestions, are interested in attending, or have any questions, feel free to send them to Marsha Victory – marsha@lstc.com

During these sessions, attendees will discover how the Intel® Cluster Ready program and technology package makes it easier to design, build, sell, program, acquire, and deploy clusters built with Intel components

Intel Corporation recently launched, with LSTC's support, Intel® Cluster Ready (www.intel.com/go/cluster), a program and technology that helps simplify the deployment, usage and management of clustered computer systems by providing a standardized and replicable way to build clusters running high performance computing applications like LS-DYNA/MPP.

The fact that LS-DYNA/MPP has been tested to run on clusters certified as Intel® Cluster Ready means you no longer have to worry "if" LS-DYNA/MPP will run on an Intel® Cluster Ready cluster; instead, you can focus on the features and performance of LS-DYNA/MPP you need to get your job done. Intel® Cluster Ready enables this unique value to LSTC's customers for a wide range of cluster configurations, ranging from 4 to 64 nodes, from any of the system suppliers listed on the Intel® Cluster Ready web page (<http://softwarecommunity.intel.com/articles/eng/1314.htm>).

To learn more about Intel® Cluster Ready you can go to

<http://softwarecommunity.intel.com/articles/eng/1296.htm>

or request a joint LSTC and Intel training session by contacting Marsha Victory marsha@lstc.com at 925 449 2500.

About Intel® Cluster Ready

Key elements of the Intel® Cluster Ready program include:

- Specification— The Intel® Cluster Ready Specification ensures that components in a cluster certified as Intel® Cluster Ready conform to industry standards, or, when no appropriate standards exist, implement best-of-class practices. The specification eliminates sources of variability that do not impact performance, usability, or utility.
- Certification— Every ISV application to be registered as Intel® Cluster Ready must be tested on an Intel® Cluster Ready certified cluster with realistic workloads. Of particular importance to you, ISV's like LSTC must describe any software dependencies beyond those required by the Intel® Cluster Ready Specification; this ensures the smooth installation and proper execution of LS-DYNA/MPP on any certified cluster.
- Tools— The Intel® Cluster Checker, a extensible tool provided free-of-charge on all clusters certified as Intel® Cluster Ready, checks the configuration and performance of the cluster. Cluster Checker provides a full range of tests, analyzing important aspects of cluster organization, functionality, and performance, ensuring consistent cluster-wide operation. When problems are found, the Intel® Cluster Checker provides detailed per-component diagnostic information in addition to the overall pass-fail status. This reporting greatly simplifies problem resolution, allowing you to quickly address the problem's source.

JANUARY Featured Paper

Numerical Modeling and Biaxial Tests for the Mullins Effect in Rubber

http://www.dynalook.com/documents/6th_European_Is-dyna/1.5.3.pdf

Authors:

William W. Feng,

John O. Hallquist

Livermore Software Technology Corporation

Abstract

The formulation, testing and numerical study of the Mullins effect on rubber are presented. Ogden first modeled 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.

An approximate solution, a relation between the inflation pressure and the

displacement at the centre for the inflation of a plane circular membrane is presented. the test data and the approximate solution are used to determine the Mullins damage material constants. For more accurate study, the material constants can also be obtained through the combination of LS-DYNA, LS-OPT and the test data.

The test data, analytical results and numerical results from LS-DYNA are shown. They agree with on another.

Keywords: Mullins effect, Rubber, Strain-energy-density function, Damage, Biaxial test, LS-DYNA

Arup's Collaboration with Simpleware Ltd.

Image-based meshing: the simple way to FEA!

Arup has been collaborating with Simpleware Ltd to bring Image-based meshing to LS-DYNA® users. Exciting new possibilities are opening up for the application of FEA and CFD to a wide range of industrial and research areas including biomechanics and material characterisation.

Simpleware (www.simpleware.com) software modules ScanIP, +ScanFE and +ScanCAD provide all the necessary tools for going from 3D image data (as obtained from MRI, CT, XMT or serial sectioning for example) right through to meshes suitable for use in FE and CFD simulations. In effect Simpleware provides an integrated environment for reverse engineering parts (including biological structures) into simulation models with robust surface and volume meshing capabilities based on proprietary algorithms.

The procedure for generating models is very simple and consists of the following steps which are illustrated in Figure 1 for the case of an engine inlet manifold. (1) Obtain a 3D image of part (e.g. from MRI, CT) (2) Import into ScanIP and segment structures of interest (3) Mesh using +ScanFE module and export nodes, elements material properties and contact surfaces directly to LS-DYNA.

Arup and Simpleware Ltd collaborated to generate FEA models for case studies in materials and biomechanics. The studies demonstrate the potential of image-based meshing across a range of applications, and illustrate some advantages of using Simpleware tools in combination with LS-DYNA for image-based modelling, including the ability to:

- Mesh topologically and geometrically complex problems with a high degree of accuracy.
- Mesh multiple components, allowing for user defined contact surfaces at interfaces.
- Assign material properties within a given structure based on signal strength.
- Export resulting meshes *directly* to LS-DYNA and other commercial FEA and CFD solvers.
- Reverse engineer physical components robustly into meshes in a fraction of the time.

-Exploring large strain behaviour of open celled foam under loading

Open celled foams are used in industrial applications, (e.g. seating, helmets, space vehicles) as well as commonly found in natural structures (e.g. bone, plant stalks, corals). However, the difficulty of meshing the complex topologies of foam micro-architectures (and composites) has proved, until recently, a barrier to effectively using FEA for mechanical characterisation. In the present study, image-based meshing software +ScanFE developed by Simpleware was used to obtain geometrically and topologically accurate finite element meshes of open celled foams based on 3D imaging data. The meshes were then imported into LS-DYNA to characterise the quasi-static through to dynamic stress-strain behaviour of the materials for various compression velocities and for both linear elastic and elasto-plastic material properties from small strains right through to strains well into the compaction regime. Both end-plate contacts and general foam to foam contact of the cell walls with sliding were modelled (see Figure 2). Image to mesh

generation was performed in less than 10 minutes.

-Pressure response analysis in head injury

High resolution T1-weighted whole head MRI scans of a normal young male volunteer were obtained *in vivo*, and 3D patient-specific finite element models were generated using Simpleware ScanIP and +ScanFE software. The resulting models are geometrically very accurate as can be seen in Figure 3 and were used to explore the intra-cranial response to impact in LS-DYNA. A rapid prototyped model of the finite element mesh was

also generated in parallel to provide experimental corroboration for some of the finite element results obtained.

The ease and accuracy with which models can be generated opens up a wide range of previously difficult or intractable problems to FEA and CFD. Simpleware software improves productivity, leads to significantly more accurate results for image based models and enables engineers to focus on the analysis and generation of results rather than on the geometry definition and mesh creation.

For further information please contact either Brian Walker at Arup (brian.walker@arup.com) or Philippe Young at Simpleware (p.young@simpleware.com).

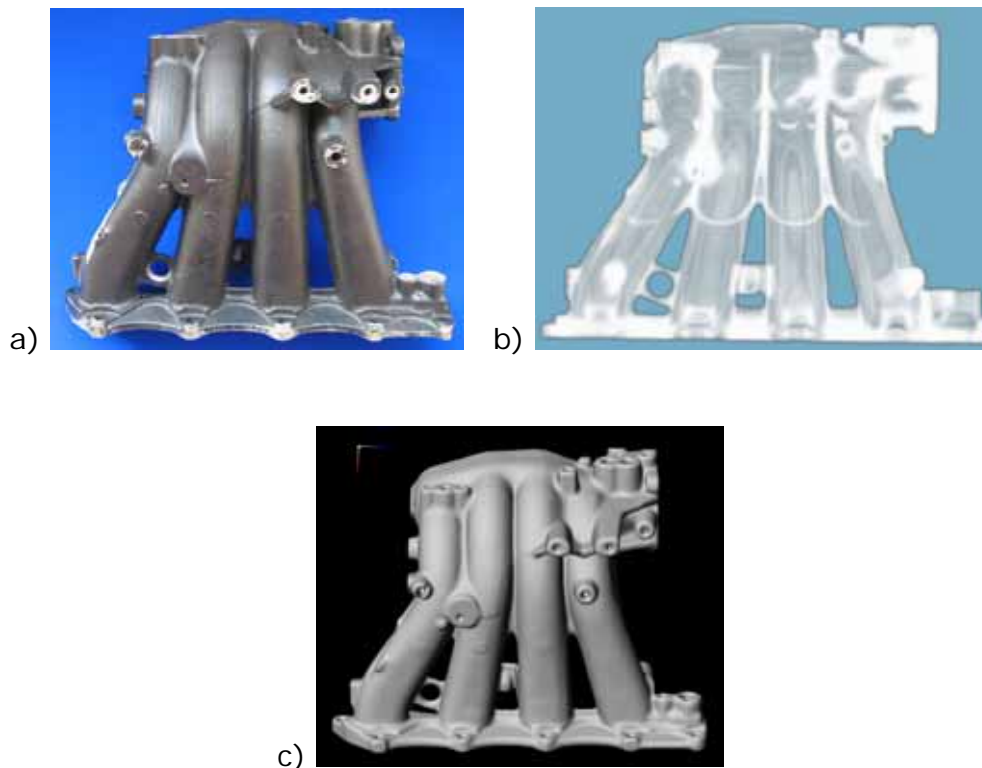


Figure 1: a) Original part, b) CT scan, c) Volume or surface mesh.

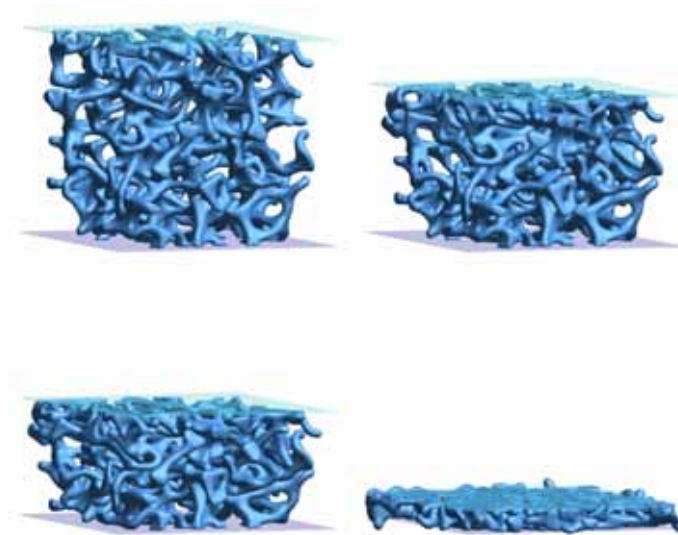


Figure 2: Large strain analysis of foam in LS-DYNA.

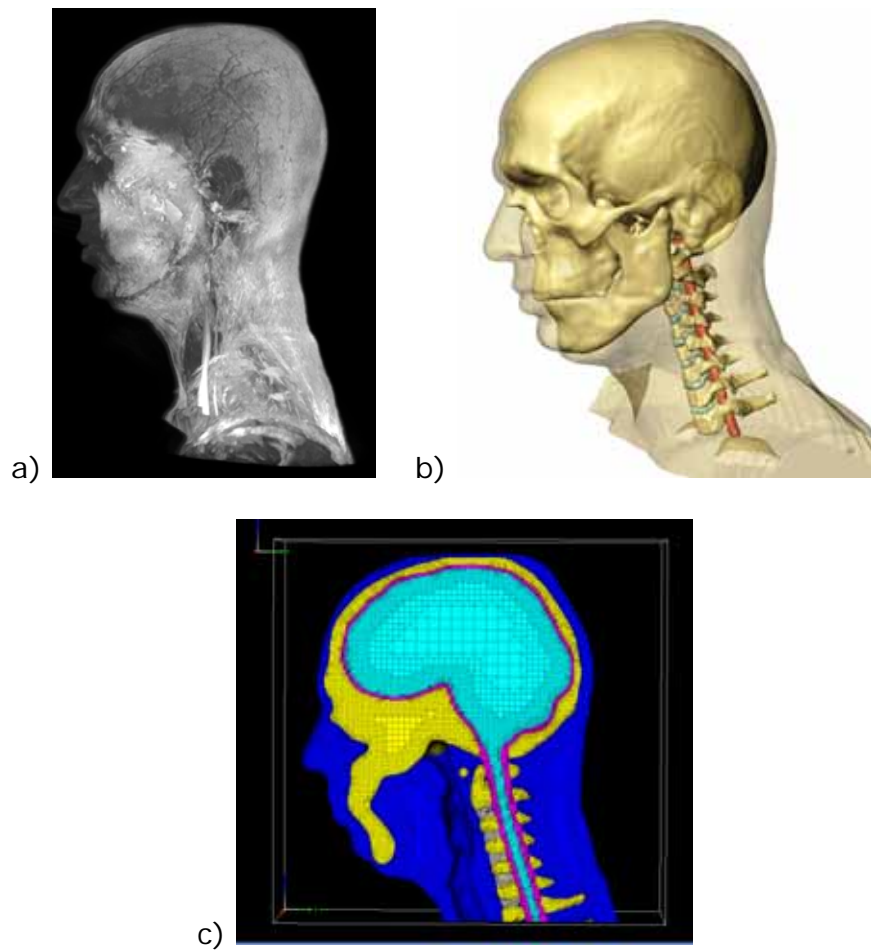


Figure3: a) MRI scan in ScanIP, b) Rendered model of whole head in ScanIP, c) +ScanFE Mesh.



Arup & Oasys LS-DYNA® Environment® Environment Services in India

Arup is expanding its Oasys LS-DYNA® Environment software activities in India through its local office nHance Engineering Solutions Pvt Ltd. Arup expanded Oasys Ssoftware development activities to India nearly 4 years ago followed by sales and support of the Oasys LS-DYNA® Environment LS-DYNA software environment in February, 2007. Mr. Lavendra Singh, Manager-Sales has been leading this effort. Lavendra says *"Most OEMs in India are now users of Oasys and LS-DYNA environmental software. To offer same high-quality of support to our Indian customers, we are establishing a local support team for LS-DYNA software."*

Oasys LS-DYNA® LS-DYNA Update meeting in India: Arup will repeat the "Oasys LS-DYNA Update Meeting" held on 16th January 2008 at Arup's Solihull Campus in U.K. for our Indian customers during the first week of April 2008 in Pune.

nHance is moving to a new larger premises located in Ananth Infopark in Hitec City, Hyderabad. Following are the contact details for information on Oasys LS-DYNA® Environment LS-DYNA and Oasys LS-DYNA environment software: .



Arup is multidisciplinary consulting engineering firm and has been expanding its activities in India. A recent infrastructure project where Arup has been providing complete multidisciplinary engineering services is the new Hyderabad Airport.

Apart from the Oasys LS-DYNA® Environment LS-DYNA environment software, nHance works with Oasys' team to develop a number of software solutions for Arup and external customers. One such productivity tool, **Oasys Mail Manager** is to simplify and speed-up the process of filing, finding and sharing emails. The Outlook plug-in encourages users to treat email with the same care afforded to paper documents.

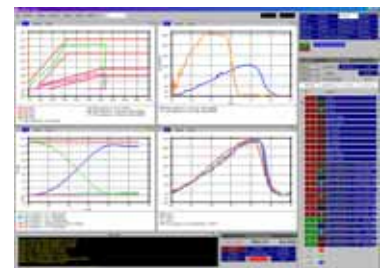
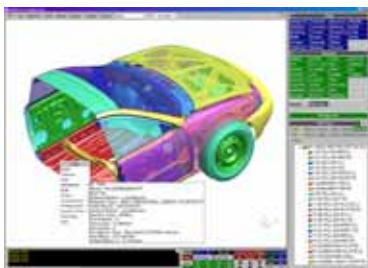
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January Update

The 10th International LS-DYNA® Users Conference June 8-10, 2008 – Dearborn, Michigan

We have opened the registration form on line. www.ls-dynaconferences.com

If you have any questions on registration, training classes, or the conference, please feel free to contact me.

Marsha Victory marsha@lstc.com

HOTEL: Hyatt Regency

The hotel is now set up for on line registrations

<http://dearborn.hyatt.com/groupbooking/livs2008>

Conference Rates Available From:

06/06/08 - 06/13/08

Conference Rates:

\$155 Single

\$180 Double

\$205 Triple

\$230 Quad

Regency Club \$40 additional per night

If you are interested in a Sponsorship or Exhibitor booth, please contact me as soon as possible. I am finalizing all Sponsorships and Exhibitor Booth requests.

Confirmed Sponsors:

Platinum: Microsoft

Gold: ETA

Gold: HP

Bronze: ARUP

Bronze: NEC

Bronze: SUN

January Update (cont'd)

The 10th International LS-DYNA® Users Conference June 8-10, 2008 – Dearborn, Michigan

Confirmed Exhibitors:

HP	DataPoint	ETA
FTSS	ARUP	CEI
NEC	Microsoft	Mellanox
ESI	MSC.Software	SUN
BETA	Altair	

2-day Training Courses Available June 11-12th

- Advanced Crashworthiness
- ALE
- Heat Transfer Analysis
- Implicit Analysis
- LS-OPT
- LS-PrePost
- Metal Forming

February Update announcement will include Keynote Speakers, Agenda, Sponsors and Exhibitors.

Yahoo Group Yammerings

Note: LS-DYNA Yahoo Group is neither owned nor operated by LSTC, and LSTC has no control over the content.

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Len Schwer
Schwer Engineering & Consulting
Services
Len@Schwer.net

The LS-DYNA Yahoo Group archive contains a wealth of information that can be helpful to any LS-DYNA user. We suggest you review the archives when you are seeking help on any topic related to LS-DYNA. *NOTE: Questions and responses may have been edited for clarity & brevity.*

This installment of "Yahoo Yammerings" features several questions and responses from the past month of postings to the LS-DYNA Yahoo Group:

1. *Move Rigid Body along Certain Curve?*
2. *Moments of Inertia in Rigid Parts in Rollover?*
3. *LSDYNA VS RADIOSS?*
4. *Membrane Element?*

Move Rigid Body along a Prescribed Curve?

How do you move a rigid body along a prescribed curve? In the LS-DYNA User Manual, there are several ways to prescribe motion using the following cards:

- *Boundary_Prescribed_Motion_Rigid
- *Define_Vector
- *Define_Curve

However, these have some disadvantages due to the curve being divided into small linear paths (i.e. the curve is not continuous).

Reply by Jim Kennedy

Please see the *DEFINE_CURVE_FUNCTION on page 11.45 of the LS-DYNA Version 971 User's Manual. If you are attempting a metal forming simulation or something with similar loading, you also might consider *DEFINE_CURVE_SMOOTH which is given on page 11.54 of the LS-DYNA Version 971 User's Manual.

Some additional help may be obtained from the following links:

http://blog.d3view.com/2006/09/28/examples-of-define_curve_function/
<http://www.dynamore.de/download/af04/papers/A-II-3.pdf>

Moments of Inertia for Rigid Parts in Rollover?

In a vehicle rollover analysis, should moments of inertia for rigid parts (e.g. engine, seats, radiator, etc.) be defined in the LS-DYNA input file?

Reply by Denis Corkery

If you model parts as non-deformable (rigid), and do not specify the moment of inertia tensor, then LS-DYNA will calculate them automatically. These are normally reported in the D3HSP or OTF file depending on which platform you are using. These calculated inertias may not be comparable to the real values; as your representation of these parts in the model may be greatly simplified. This also applies to the component masses. You can over-ride the calculated part masses, part center of gravities, and inertial tensors by invoking the PART_INERTIA card. Be aware that this card is only valid for parts that are defined with MAT_RIGID.

LS-DYNA VS RADIOSS?

Can anyone compare the features of both and say which is the best one for nonlinear applications? What about other nonlinear FEM software.

Reply by Jim Kennedy

Perhaps of some interest is a recent paper which describes a method for systematically comparing high-energy physics codes.

<http://www.inl.gov/technicalpublications/Documents/3772062.pdf>

Lacy, J.M., Novascone, S.R., Richins, W.D., and Larson. T.K., "A Method for Selecting Software for Dynamic Event Analysis I: Problem Selection," 19th International Conference on Structural Mechanics in Reactor Technology, Toronto, Canada, August, 2007.

Membrane Element?

How do you define membrane elements in LS-DYNA.

Reply by Jim Kennedy

I suggest that you study the element formulation options, ELFORM variable, given on page 29.30 of the LS-DYNA Version 971 User's Manual; ELFORM=5 provides the Belytschko-Tsay membrane while ELFORM=9 provides the fully integrated Belytschko-Tsay membrane. Also, I believe that, for those element formulations which offer through thickness integration points (NIP variable on pages 29.31 and 29.32), you will have no bending in the element if you specify NIP=1.

Reply by Len Schwer: Membrane response can be obtained from a shell element formulation by using only one integration point through the thickness.

LS-DYNA Yahoo Groups: You can subscribe to the group by sending an email request to LS-DYNA-subscribe@yahoogroups.com or by visiting the Yahoo Groups web site <http://groups.yahoo.com> Generally, the quickest/best responses are to those questions posed with the most specifics. General questions such as "How do I use XXX feature?" either go unanswered, or are answered by Jim Kennedy with links to appropriate references in the growing LS-DYNA related literature, e.g. see the archive of LS-DYNA Conference proceedings at www.dynalook.com

LS-DYNA DEMO Support Site

[LS-DYNA Demo Support Site](#)

All you need to get started with a free full version of LS-DYNA, LS-OPT and LS-PrePost.

After filling out the demo form, downloading the software and sending in the lstdc.log file you will be ready to start modeling, learning, practicing.

Starting out modeling is not always an easy task and therefore the demo period comes with technical support, as well as many links on-line for immediate assistance.

Links:

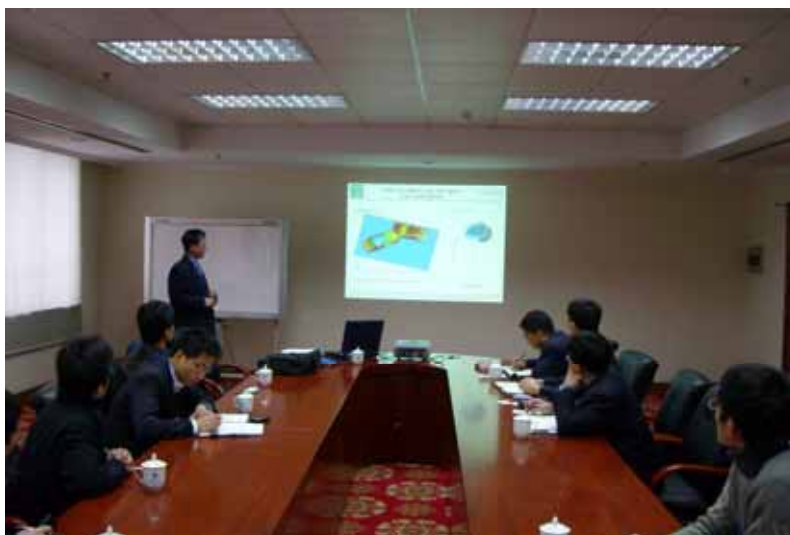
- [LS-DYNA PrePost Support Site](#)
- [LS-DYNA Support](#)
- [LS-DYNA Technical Conference Papers](#)
- [LS-DYNA Examples](#)
- [LS-DYNA Application Site](#)
- [LS-DYNA AVI Lib](#)
- [LS-OPT Website](#)
- [LS-DYNA Consulting Companies](#)
- [LS-DYNA Classes - CA and MI](#)

Engineering Technology Associates – China

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LS-DYNA 971's Demonstration at SSC and SAIC

On January 21st, 2008, Livermore Software Technology Corporation (LSTC) software engineers, Dr. Isheng Yeh and Dr. Hongshen Lu visited Shanghai Supercomputer Center (SSC) and Shanghai Automotive Industry Corporation (SAIC), demonstrating the capabilities in the latest version of LS-DYNA 971. ETA was also invited to attend the seminar. It provided a "face to face" opportunity for the present CAE users, helped them to acquire more knowledge about the new characteristics of LS-DYNA, the most powerful solver among the CAE field. Future seminars will be scheduled by LSTC, in China, at customer sites.



carhs.training GmbH – Press Release

www.carhs.de



carhs.training GmbH publishes new edition of „SafetyCompanion“ – the reference book for automotive engineers

24 pages of SafetyWissen in the field of active and passive vehicle safety. Extended course offering: over 75 specialist seminars for automotive engineers

Alzenau, 18.1.2008 - carhs.training GmbH, a specialised provider of courses, events and training programmes in the area of vehicle safety and CAE-based product development, has published a new edition of the reference book SafetyCompanion. The SafetyCompanion 2008 is available in the handy DIN A5 format and now offers 24 pages of hands-on knowledge, presented in the form of concise tables and charts for topics such as crash legislation, Euro NCAP, requirements and development strategies for different crash types, dummies and testing procedures, vehicle electronics and vehicle communication.

Furthermore, the SafetyCompanion offers a detailed description of over 75 specialist courses, training programmes and events in the field of passive and active safety, dummy and crash tests as well as engineering and simulation.

A new offer in 2008 is the 3 ½ week intensive training programme for CAE engineers, offered by carhs.training in cooperation with their partner TECOSIM. Here, engineers will not only be taught to use CAE tools but will also learn about the engineering processes of the automotive industry.

Vehicle safety has become an important selling point for today's automotive industry and the requirements from legislation and organisations such as EuroNCAP are continuously increasing. Therefore, the training and continuous qualification of engineers in the area of vehicle safety is becoming increasingly more important. The new edition of the SafetyCompanion accommodates this development.

The SafetyCompanion 2008 can be ordered free of charge on: www.carhs.de

carhs.training GmbH

carhs.training GmbH has been offering an extensive education and training programme in the area of vehicle safety and simulation since 1999. All major automotive manufacturers and suppliers in Germany and Europe are qualified and train their engineers together with carhs.training.

Our course instructors are renowned experts from industry, universities, and public institutions. In addition to over 75 specialist courses, carhs.training also organises events, conferences and congresses around specific topics and offers tailored in-house seminars on-site.

Contact –

carhs.training GmbH

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Siemensstr. 12, D-63755 Alzenau

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Participant LS-DYNA Resource Page (alpha order)

Fully QA'd by Livermore Software Technology Corporation

SMP and MPP Hardware and OS

HP

HP PA-8X00	HP-UX 11.11. and above
HP IA-64	HP-UX 11.22 and above
HP Opteron	Linux CP4000/XC
HP Alpha	True 64

INTEL

INTEL IA32	Linux, Windows
INTEL IA64	Linux
INTEL Xeon EMT64	Linux, Windows 64

NEC

NEX SX6	Super-UX
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SGI

SGI Mips	IRIX 6.5X
SGI IA64	SUSE 9 w/Propack 4 Red Hat w/ Propak 3

SUN

SUN Sparc	5.8 and above
SUN Opteron	5.8 and above

Participant LS-DYNA Resource Page (alpha order)

Fully QA'd by Livermore Software Technology Corporation

MPP and Interconnect MPI

HP

	O/S	HPC Interconnect	MPI Software
HP PA8000	HPUX		
HP IA64	HPUX		
HP Alpha	True 64		

INTEL

	O/S	HPC Interconnect	MPI Software
INTEL IA32	Linux, Windows	InfiniBand (Voltaire), MyriCom	LAM/MPI, MPICH, HP MPI, SCALI
INTEL IA64	Linux		LAM/MPI, MPICH, HP MPI
INTEL Xeon EMT 64	Linux	InfiniBand(Topspin, Voltaire), MyriCom, PathScale InfiniPath	LAM/NPI, MPICH, HP MPI, INTEL MPI, SCALI

NEC

	O/S	HPC Interconnect	MPI Software
NEX SX6	Super-UX		

SGI

SGI Mips	IRIX 6.5 X	NUMalink	MPT
SGI IA 64	SUSE 9 w/Propack 4 RedHat w/Propack 3	Numalink, InfiniBand(Voltaire)	MPT, Intel MPI, MPICH

SUN

Sun Sparc	5.8 and above		
Sun Opteron	5.8 and above		LAM/MPI

LS-DYNA Resource Page - Participant Software

Interfacing or Embedding LS-DYNA - Each software program can interface to all, or a very specific and limited segment of the other software program. The following list are software programs interfacing to or having the LS-DYNA solver embedded within their product. For complete information on the software products visit the corporate website.

ANSYS - ANSYS/LS-DYNA ANSYS/LS-DYNA

Built upon the successful ANSYS interface, ANSYS/LS-DYNA is an integrated pre and postprocessor for the worlds most respected explicit dynamics solver, LS-DYNA. The combination makes it possible to solve combined explicit/implicit simulations in a very efficient manner, as well as perform extensive coupled simulations in Robust Design by using mature structural, thermal, electromagnetic and CFD technologies.

AI*Environment:

A high end pre and post processor for LS-DYNA, AI*Environment is a powerful tool for advanced modeling of complex structures found in automotive, aerospace, electronic and medical fields. Solid, Shell, Beam, Fluid and Electromagnetic meshing and mesh editing tools are included under a single interface, making AI*Environment highly capable, yet easy to use for advanced modeling needs.

ETA – DYNAFORM

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

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.

MSC.Software - MSC.Dytran LS-DYNA

Tightly-integrated solution that combines MSC.Dytran's advanced fluid-structure interaction capabilities with LS-DYNA's high-performance structural DMP within a common simulation environment. Innovative explicit nonlinear technology enables extreme, short-duration dynamic events to be simulated for a variety of industrial and commercial applications on UNIX, Linux, and Windows platforms. Joint solution can also be used in conjunction with a full suite of Virtual Product Development tools via a flexible, cost-effective MSC.MasterKey License System.

MSC.Software - MSC.Nastran/SOL 700

The MSC.Nastran™ Explicit Nonlinear product module (SOL 700) provides MSC.Nastran users the ability access the explicit nonlinear structural simulation capabilities of the MSC.Dytran LS-DYNA solver using the MSC.Nastran Bulk Data input format. This product module offers unprecedented capabilities to analyze a variety of problems involving short duration, highly dynamic events with severe

geometric and material nonlinearities.

MSC.Nastran

Explicit Nonlinear will allow users to work within one common modeling environment using the same Bulk Data interface. NVH, linear, and nonlinear models can be used for explicit applications such as crash, crush, and drop test simulations. This reduces the time required to build additional models for another analysis programs, lowers risk due to information transfer or translation issues, and eliminates the need for additional software training.

MSC.Software – Gateway for LS-DYNA

Gateway for LS-DYNA provides you with the ability to access basic LS-DYNA simulation capabilities in a fully integrated and generative way. Accessed via a specific Crash workbench on the GPS workspace, the application enhances CATIA V5 to allow finite element analysis models to be output to LS-DYNA and then results to be displayed back in CATIA. Gateway for LS-DYNA supports explicit nonlinear analysis such as crash, drop test, and rigid wall analysis.

Oasys software for LS-DYNA

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.

EASi-CRASH DYNA

EASi-CRASH DYNA is the first fully integrated environment for crashworthiness and occupant safety simulations with LS-DYNA, and covers the complete CAE-process from model building and dataset preparation to result evaluation and design comparisons.

EASi-CRASH DYNA can be used for concept crash, FE crash and coupled rigid body/FE crash simulations in conjunction with MADYMO.

Full capability to handle IGES, CATIA V4, CATIA V5, UG and NASTRAN files.

APTEK

The MMCD is a graphics-based and menu-driven program that interfaces with the LS-DYNA library of material models and the LS-OPT optimization code. The core of the MMCD is the driver, which calculates the stress-strain behavior of material models driven by combinations of strain increments and stress boundary conditions, i.e. pure shear stress, and combinations of uniaxial, biaxial, and triaxial compression and tension. MMCD input and output is accessed via pre- and post-processors; graphical user interfaces (GUIs) for easily selecting the material model parameters and load histories, and for plotting the output in both two (stress-strain curves) and three (yield surfaces) dimensions. The pre-processor, driver, and post-processor are combined into a web downloadable software package that operates seamlessly as a single code.

FEA Information Participants – **Company name takes you directly to Website**

[OASYS Ltd](#): Markets engineering software products. Consulting engineers, planners and project managers working in all areas of the built environment.

[JRI Solutions Ltd.](#): Specializing in Research & Consulting; System Consulting, Frontier Business, System Integration and Science Consulting.

[Hewlett Packard](#): Personal computing, mobile computing, network management, 3-D graphics and information storage.

[ANSYS Inc.](#): Develops, markets, supports and delivers collaborative analysis optimization software tools.

[SGI](#): Silicon Graphics, Inc., is a leader in high-performance computing, visualization, and storage.

[MSC.Software](#): Information technology software and services provider.. Products & services used to enhance & automate the product design/manufacturing process.

[NEC](#): A history of more than 100 years of leadership/innovation in the core high-technology sectors of communications, computers/electronic components

[INTEL](#): For more than three decades, Intel Corporation has developed technology enabling the computer and Internet revolution that has changed the world.

[Engineering Technology Associates, Inc.](#): Provides engineering & IT services & has created the streamlined simulation software packages DYNAFORM and VPG

[ESI Group](#): A software editor for the numerical simulation of prototype and manufacturing process engineering in applied mechanics.

[Microsoft](#): For customers solving complex computational problems, Microsoft Windows Compute Cluster Server 2003 accelerates time-to-insight.

[BETA CAE Systems S.A.](#): Specialized in the development of state of the art CAE pre- and post-processing software systems.

FEA Information Participants – **Company name takes you directly to Website**

[SUN Microsystems Inc.](#): Provides network computing infrastructure solutions that include computer systems, software, storage, and services.

[Detroit Engineered Products](#): A Michigan based engineering consulting and software products firm specializing in the area of Product Development products and solutions.

[APTEK](#): Among the software developed APTEK develops and licenses an interactive program for driving LS-DYNA material models - the Mixed Mode Constitutive Driver (MMCD).

[PANSAS](#): High performing Parallel Storage for scalable Linux clusters. Delivering exceptional scaling in capacity and performance for High Performance Computing (HPC) organizations.

[Intelligent Light](#): A world leader in the development and delivery of software for computational fluid dynamics (CFD) users. We help the world's best engineering and research organizations maximize the productivity and impact of their CFD capabilities

LS-DYNA Software Distributors - Alphabetical order by Country

Australia	<u>Leading Engineering Analysis Providers</u>
Canada	<u>Metal Forming Analysis Corporation</u>
China	<u>Arup</u>
France	<u>CRIL TECHNOLOGY (Groupe ALYOTECH France)</u>
Germany	<u>CAD-FEM</u>
Germany	<u>DynaMore</u>
India	<u>Oasys, Ltd.</u>
India	<u>Cranes Software International Limited (CSIL),</u>
Italy	<u>EnginSoft Spa</u>
Japan	<u>The Japan Research Institute</u>
Japan	<u>ITOCHU Techno-Solutions Corporation</u>
Korea	<u>Korean Simulation Technologies</u>
Korea	<u>Theme Engineering</u>
Netherlands	<u>Infinite Simulations Systems B.V.</u>
Russia	<u>State Unitary Enterprise - STRELA</u>
Sweden	<u>Engineering Research AB</u>
Taiwan	<u>Flotrend Corporation</u>
USA	<u>Engineering Technology Associates, Inc.</u>
USA	<u>Dynamax</u>
USA	<u>Livermore Software Technology Corp.</u>
UK	<u>ARUP</u>

Consulting and Engineering Services

Australia Manly, NSW	<u>Leading Engineering Analysis Providers (LEAP)</u> Greg Horner info@leapaust.com.au 02 8966 7888
Canada Kingston, Ontario	<u>Metal Forming Analysis Corp. - (613) 547-5395</u> Chris Galbraith galb@mfac.com
France	<u>CRIL TECHNOLOGY (Groupe ALYOTECH France)</u> +33.(0)1.30.67.23.44 <u>produit@alyotech.fr</u>
Germany Alzenau	<u>CARHS - 49 6023 96 40 60</u> <u>info@carhs.de</u>
Italy Firenze	<u>EnginSoft Spa - 39 055 432010</u> <u>info@enginsoft.it</u>
UK Solihull, West Midlands	<u>ARUP - 44 (0) 121 213 3317</u> Brian Walker brian.walker@arup.com
USA Austin, TX	KBEC L.C - (512) 363-2739 Khanh Bui kdbui@sbcglobal.net
USA Windsor, CA	<u>SE&CS - (707) 837-0559</u> Len Schwer len@schwer.net
USA Troy, MI	<u>Engineering Technology Associates, Inc:</u> (248) 729-3010
USA Corvallis, OR	<u>Predictive Engineering - (1-800) 345-4671</u> George Laird george.laird@predictiveengineering.com
USA Troy, MI	<u>Detroit Engineered Products</u>
USA Troy, MI	<u>Engineering Technology Associates, Inc.</u> (248) 729-3010 <u>sales@eta.com</u>
USA Austin, TX	<u>Friedman Research Corporation - (512) 247-2277</u>

Educational & Contributing Participants

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Russia	Dr. Alexey I. Borovkov	St. Petersburg State Tech. University
USA	Dr. Ted Belytschko	Northwestern University
USA	Dr. David Benson	University of California – San Diego
USA	Dr. Bhavin V. Mehta	Ohio University
USA	Dr. Taylan Altan	The Ohio State U – ERC/NSM
USA	Dr. Ala Tabiei	University of Cincinnati

Informational Websites

The LSTC LS-DYNA Support site: www.dynasupport.com

_LS-DYNA Support Site	FEA Informationwebsites
_LS-DYNA Examples (more than 100 Examples)	LS-DYNA Conference Site
TopCrunch – Benchmarks	LS-DYNA Publications to Download On Line
LS-DYNA Publications	LSTC LS-PrePost Tutorials
CADFEM GmbH Portal	

ANSYS® AQWA

Excerpt from ANSYS Website – for complete information visit

www.ansys.com

AQWA is a suite of integrated modules which addresses the vast majority of analysis requirements associated with the hydrodynamic assessment of all types of offshore/marine structure from spars to FPSOs, from mooring systems to buoys, from TLPs to semi-submersibles, from fishing vessels to large ships and from large ships to structure interaction.

Two packages are available. ANSYS AQWA Diffraction provides an integrated facility for developing the primary hydrodynamic parameters required for undertaking complex motions and response analysis. ANSYS AQWA Suite extends ANSYS AQWA Diffraction to include analysis modules for frequency and time domain with random waves (incl. slow drift), nonlinear time domain with large waves, as well as static and dynamic stability including mooring lines. Model creation can be performed either in the Graphical Supervisor module of AQWA or via ANSYS®. Hydrodynamic analysis results (i.e., motions and pressures) can be transferred to ANSYS, ASES or Nastran for subsequent structural analysis.

Compelling Features – For the complete list of features please visit:

<http://www.ansys.com/products/aqwa-features.htm>

Hydrodynamic Interaction between floating bodies

AQWA can take account of hydrodynamic interaction between adjacent structures. Thus the motions of one structure can affect the motions

of another. The structures can be articulated, connected by cables or independent. A typical application would be shielding effects. Note that hydrodynamic interaction with forward speed is currently not available.

Multiple Body Articulations

AQWA has the ability to handle articulated structures. Up to 10 of these structures can be diffracting/radiating structures. Up to a further 40 can be mechanical structures such as cranes and other rigid connects etc. This permits the modeling of combined hydrodynamic and mechanical dynamic configurations. Articulations can have friction and damping included. If the mechanical connections are represented as tubes these are allowed to become wholly or partially submerged and Morison types forces calculated.

Total Capability for all Hydrodynamic Applications

AQWA is not just for moorings or diffraction radiation but is a general purpose hydrodynamics analysis suite providing enormous flexibility to address most types of problem. Examples of its use include:

- Design and analysis of mooring systems
- Motions analysis of FPSOs
- Determination of Air Gaps
- Calculation of Shielding Effects of ships and barriers
- Multiple Body Interactions during LNG transfer
- Coupled mooring line-structure interaction

- Cable Dynamics with intermediate buoys
- Splitting Force calculations for Semi-Submersibles
- TLP concept design
- TLP tether analysis
- Dropped object trajectory calculations
- Concept design and analysis of Wave Energy systems
- Simulation of lifting operations between floating vessels
- Discharging landing craft from mother ships
- Transportation of large offshore structures using barges/ships
- Float over analyses
- Motions analysis of Spar vessels

Get Productive From The Start Ring in the new year with HP business desktop PC's and options

by Susan Twombly, Dec. 2007

Complete Article can be read at

www.hp.com/hpinfo/newsroom/feature_stories/2007/07businessdt.html

Jump start the new year with HP business desktop PCs, then hit the ground running with these add-on options/accessories that can increase productivity. With a wide range of business desktops and options — from displays, keyboards and mice to some features and functions you won't find elsewhere — you can create the computing solution that's ideal for your business. So, start exercising your options for the new year today!

With a wide range of business desktops and options — from displays, keyboards and mice to some features and functions you won't find elsewhere — you can create the computing solution that's ideal for your business. So, start exercising your options today!

Help reduce data theft with HP – only technology

PC theft can seriously compromise your critical company information. That's why it's important to have the security tools you can count on to protect your valuable data.

With our exclusive Drive Encryption for HP ProtectTools software, you can encrypt everything on your entire hard drive volume to make it unreadable and inaccessible to unauthorized users. Easy password access lets authorized users in.

Drive Encryption for HP ProtectTools is the industry's only full volume encryption software to come as a standard feature on a PC and is now

available on dc7800 series HP business desktop PCs. To enhance and simplify security, it integrates HP ProtectTools solutions with the SafeBoot® Device Encryption™, a leading data encryption solution.

Thanks to an agreement with SafeBoot®, you can take advantage of the pre-installed client version of Drive Encryption — unavailable alone from any other PC provider — without incurring the cost of a full enterprise version. If you want to purchase the enterprise software, SafeBoot offers discounts to HP customers that have dc7700 series platforms. Whichever you choose, you can have a robust, more affordable data security solution.

Device Access Manager for HP ProtectTools is another HP-only security offering. Released for business users in September, this software offers further protection for valuable data and information.

It is especially suited for an office cube environment, where nearly anyone can walk up to a PC, insert removable media, and copy any information from the PC or the connected network.

With Device Access Manager, only authorized users are allowed to copy and store data on devices ranging from USB drive keys, personal music players, CD or DVD writers or other devices. You selectively control the use of these writable storage devices based on a range of profiles, including individual users and user types, as well as individual devices or device class

Storage and memory options to maximize performance and productivity

Upgrading your memory can be a cost-effective way to boost system performance without having to upgrade your processor. Choose from 512MB, 1GB or 2GB HP PC2-5300 (DDR2 667 or DDR2 800 MHz) Memory DIMMs for faster start-up times with fewer delays during routine operations — enabling you to run more programs simultaneously.

With HP SuperMulti⁽²⁾ LightScribe⁽³⁾ DVD drives, you can now write to most DVD formats, including DVD-RAM. You can also burn your own disc labels from right inside your DVD drive. With the ability to store up to 8.5GB of data and record up to four hours of DVD-quality video, this technology offers you unprecedented storage capacity: nearly twice that of previous-generation drives. Faster transfer rates, combined with conformance to worldwide DVD standards, can make HP SuperMulti LightScribe DVD Drives a highly efficient and cost-effective storage solution for your business.

HP now has SMART IV technology built into 3.5" 7200rpm hard drives on its dc7800 business desktop PC series. With SMART, which stands for Self Monitoring Analysis and Reporting Technology, hard drives monitor their own health. If imminent failures are predicted, SMART sends alerts to IT support staff or users for preventive action. SMART IV technology will further enhance end-to-end error detection for more reliable desktop computing.

High-performance graphics cards to show your best work

Need maximum screen real estate to display your 3D graphics? HP is one of the only companies to offer the NVIDIA® GeForce® 8400 GS Single Head 256MB Graphics Card. This lower-cost dual-link card supports a 30-inch diagonal DVI dual-link LCD monitor. Its low-profile format fits into a small form factor PC chassis for space-constrained workspaces. You can upgrade to this card now when you buy a dc7800 small form factor or convertible micro tower HP business desktop PC (PCIe x 16 graphics slot required).

New industry-standard graphics capabilities featured on select HP business desktop PCs enable you to boost graphics performance. With DirectX® 10 support, you can render powerful, more true-to-life 3D images.⁽⁴⁾ Hi-def (HD) Decode support enables you to run multiple applications while watching an HD movie.⁽⁵⁾ And, with HD Copy Protection support, you can play Blu-Ray and HD DVD movie content.⁽⁶⁾

HP Total Care Advisors to keep productive

HP Total Care Advisor serves as your PC 'cockpit.' It's a desktop tool that puts support, system health and services information in one place for you — greatly simplifying how you get relevant information about your PC, such as warranty status. Pre-installed on all HP business PCs, it helps you set up automatic PC care, health and security checks, prioritizes system alerts and recommends problem-solving actions. It also makes shopping for PC accessories, software and services easier.

Proven to work better together

These add-on options are tested and qualified to work better together with HP business desktop PCs. So, you can count on them for the compatibility and reliability you need to focus on business, not worry about technology.

- (1) Except where noted, all prices are estimated U.S. HP prices. Actual prices from other locations or websites may vary.
- (2) Note that DVD-RAM cannot read or write to 2.6GB Single Sided/5.2 GB Double Sided – Version 1.0 media.
- (3) LightScribe creates a monochrome image. LightScribe media required and sold separately.
- (4) DirectX 10 available with Windows Vista only.
- (5) GeForce card required.
- (6) To run Blu-Ray or DVD movies properly, the graphics card and monitor must also support the HD Copy Protection feature. Available for all cards manufactured after August, 2007.

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LSTC Training Classes **California** and **Michigan**

Feb 13-15	CA	ALE/Eulerian & Fluid Structure Interaction
April 08-11	MI	Intro to LS-OPT
March 18-21	MI	Intro to LS-DYNA
March 27-28	MI	Contact
May 06-09	CA	Introduction to LS-DYNA
June 17-20	MI	Introduction to LS-DYNA
June 23-24	CA	Advanced Options
June 25-26	CA	Composite
July 22-25	CA	Introduction to LS-DYNA
June 30-July 01	CA	Material Modeling Using User Defined Options
Aug 12-13	CA	Implicit
Aug 14-15	CA	Contact
Sept 09-12	MI	Intro to LS-DYNA
Sept 09-12	CA	Intro to LS-OPT
Sept 16-17	MI	Contact
Sept 25-26	CA	Concrete and Geomaterial Modeling
Nov 11-14	CA	Introduction to LS-DYNA
Dec 09-12	MI	Intro to LS-DYNA
Dec 15-16	MI	Advanced Options