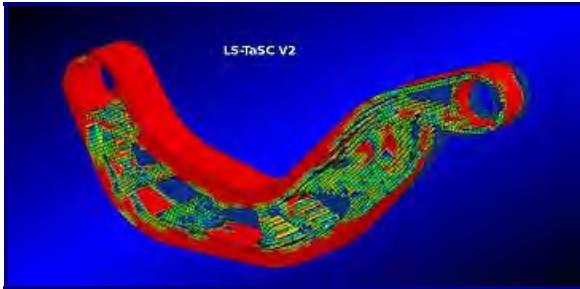# *FEA* Information

## Engineering Journal and Website Resource

**LS-TaSc V2**
**Topology**

**Willem Roux**
**Lead Developer LS-TaSC**

**The Gavel**
**Personal View Point**

**F-14A Tomcat**

**Dr. Ron Knott**
**Web Pages - Mathematics**

**Making A Difference**
**Dr. Paul Bland**

**Dr. John "Jack" Renaud**
**Remembering**

**Making A Difference**
**TATA Technologies Vehicle**
**Development Group**

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### Articles

### Solutions

### EVENTS

## Training Courses

## LS-DYNA Users Challenge Your Knowledge

## Formula One Student Information

## Directory Listings

## News Release

## Announcements

**2011 European Conference Conference Program is Available:**
   http://www.lstc.com/pdf/2011confprogram.pdf

**Fibonacci Correction:**

Special thank you to:     David Watkins - justFEA
                          Dhanavanti S. Shinde - Lear Automotive India Pvt. Ltd.

   The number 4 is not a Fibonacci number.   My fingers typed 1, 2, 3, 4, 5 out of typing habit rather then watching what are the Fibonacci numbers.

   By definition, the first two Fibonacci numbers are 0 and 1, and each subsequent number is the sum of the previous two.

   The correct sequence is 0, 1, 1, 2, 3, 5, 8, 13, .......

**Among this month's articles and features we have the following:**

   **LS-**Dyna - **T**opology **A**nd **S**hape **C**omputation  - LS-TaSC

   First Call For Papers from LSTC

   Making A Difference – A new section

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

**From engineering to horses - http://www.livermorehorses.com**



**We will miss him.**

**Our 24 year old Percheron, Jack passed away on April 16th, 2011.**

**He was a gentle giant at 6ft to reach his back, and 2,000 pounds.**

**FEA Information**

**Platinum  Participants**

| | | |
|---|---|---|
| **OASYS Ltd**:<br>http://www.oasys-software.com/dyna/en/ | **JSOL Corporation**:<br>http://www.jsol.co.jp/english/cae | **SGI:**<br>http://www.sgi.com |
| **ETA:**<br>http://www.eta.com | **DYNAmore GmbH**<br>http://www.dynamore.de | **ESI Group**:<br>http://www.esi-group.com |
| **BETA CAE Systems S.A.**:<br>http://www.beta-cae.gr | **LSTC:**<br>http://www.lstc.com | **Dalian Fukun Technology Co. Ltd.:** |
| **MICROSOFT**<br>http://www.microsoft.com | **Panasas, Inc.**<br>http://www.panasas.com | **Shanghai Hengstar Technology Co. Ltd**<br>http://www.hengstar.com/ |

## Engine Impeller Sub-Fragmentation Simulation Using EFG Method

**Shoufeng Hu,** Hamilton Sundstrand **-** sam.hu@hs.utc.com

**C. T. Wu and Yong Guo,** LSTC - ctwu@lstc.com, yguo@lstc.com

### Abstract

Engine impeller burst containment test may lead to the impeller sub-fragmentation. The containment of the impeller debris from sub-fragmentation presents a new challenge, because of the unpredictable pattern of dynamic fracture.

In this study, the capability of EFG failure method in predicting the dynamic fracture of the ductile material, used for the engine impeller under impact loading, is demonstrated. In the EFG method, the combination of fast transformation method and meshfree visibility approach with cohesive fracture is proven to be an efficient way to model the progressive fracture in a general three-dimensional problem. In this study, the Mode-I fracture is adopted and the crack is assumed to propagate cell-by-cell in the direction of maximum principal stress. The meshfree visibility approach is introduced to impose the strong-discontinuity in the meshfree approximation as well as to compute the displacement jump in the initially rigid cohesive model.

http://www.dynalook.com/international-conf-2010/Simulation-2-2.pdf

# Investigation of LS-DYNA® Modeling for Active Muscle Tissue

**Sebastian Mendes, Dr. Chiara Silvestri, Prof. Dr. Malcolm H. Ray
Department of Civil and Environmental Engineering**

## Abstract

This study is aimed at investigating and comparing one-dimensional and three-dimensional finite element models of active muscle tissue. Skeletal muscle is a very complicated biological structure to model due to its non-homogeneous and non-linear material properties as well as its complex geometry. Additionally, forces generated from muscle activation are directly related to the muscle length and contraction velocity. Finite element discrete Hill-based elements are largely used to simulate muscles in both passive and active states. There are, however, several shortfalls to utilizing one-dimensional elements, such as the impossibility to represent muscle physical mass and complex lines of action. Additionally, the use of one-dimensional elements restricts muscle insertion sites to a limited number of nodes causing unrealistic loading distributions. These limitations are partially solved with a three-dimensional solid muscle model, where discrete Hill-based elements are combined in series and parallel to solid elements possessing hypo-elastic material properties.

Despite some instability, the model was concluded to be an improvement over purely one-dimensional muscle models.

Hill-type material models MAT_S15 and MAT_156 were considered for muscle discrete representation with use of spring and beam elements, respectively. Three-dimensional muscle tissue was then represented with superposition of beam (MAT_156) and shell elements (MAT_OGDEN_RUBBER). A finite element control model was developed with the goal of employing muscle models for a simplified replication of flexion and extension movements of the tibia bone. The primary objective of the control model was to compare properties and behaviors of spring, beam, and shell-beam muscle models. Two separate simulations were performed with each of the three control models to replicate the protagonist-antagonist muscle mechanism occurring with activation. For each simulation, data such as contraction velocity, muscle force and Von Mises stresses were obtained and compared.

**Personal View Point** – Does NOT reflect opinions, of any participants, authors, companies, FEA Information personnel, the university, its SAE team and staff, The Gavel reflects only my viewpoint -  comments should be sent to **mv@feainformation.com**

Aside from horses, my loves are racecars, jet fighters, and trains.  I have a personal interest in universities that have Formula Race Car Programs, which brings me to my rant and rave for this issue.

I personally find the decision of The University of Waterloo in Waterloo, Ontario, temporarily shutting their Formula SAE team, a decision that, solely in my opinion, is poorly thought through, and not fair to the amount of time, love and energy the students, faculty have worked, and the sponsors have supported.

The decision, as reported by internet media, means the team can't compete in Michigan, for the international SAE competition.

I understand rules and regulations of a University, Company, or other institutions.  I understand it was an error in judgment, of some students, doing a photo shoot that was unauthorized and using University facilities that were unauthorized.   I feel time may be better served cleaning the campus grounds, or writing on a chalkboard 100 times (not a

keyboard using cut and paste) "We will not do it again".  Or, explain sponsor logo's that may need permission for other uses, etc.   But, to work all that time and have it scrapped, I feel is not putting their time and effort to good use based on one error in judgment, of a photo, that does not meet the description that the University has placed on it.   They have over-reacted - I strongly hope that they realize this, and allow the team to go to Michigan.

I commend the team management that moves forward, past this obstacle: Quoted directly from the Team Management Page:

..."This stumbling block has not weakened our resolve. We have not forgotten what our goal is. We have not lost as we have not competed. We have not failed as we still remain a team, strong and in one piece. We share in the victories as well as the defeats. We will emerge from this with even more passion, more drive and more focus than we had before. We intend to win..."

View The Full Message from the Team Management http://fsae.uwaterloo.ca/
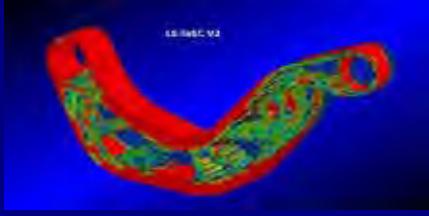
## LS-TaSC™ Version 2

## Topology Design

## using LS-DYNA®

**Author & Developer Willem Roux, PhD, willem@lstc.com**
**LS-**Dyna - **T**opology **A**nd **S**hape **C**omputation  - **LS-TaSC**

The second version of LS-TaSC has been released by Livermore Software Technology Corporation.

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

For more information, contact
sales@lstc.com

### General capabilities
- Solid design using first-order hexahedrons and tetrahedral elements
- Shell design using first-order quadrilateral and triangular elements
- Global constraints
- Multiple load cases
- Tight integration with LS-DYNA
- Large models with millions of elements

### Geometry definitions
- Multiple parts
- Extrusions
- Casting, one sided
- Casting, two sided
- Symmetry

### Postprocessing
- Design histories
- LS-PREPOST plots of the geometry evolution and the final design

### Casting Example

This example is a solid part to be manufactured as a casting, which was accordingly imposed as a casting geometry definition. Weight (material) was to be removed from the structure to obtain the best use of the material. The procedure accordingly computed an optimal design by strengthening stressed regions of the structure and removing redundant material. Alternative, this design procedure can also be viewed as computing a structure with the best load path for the given structural use.

The geometry and loading conditions for this component are shown in Figure 1. The FE model has about 60 000 elements and a single linear implicit load case as shown was considered.

**Figure 1: The initial geometry and loading conditions.**



Figure 2: Convergence history
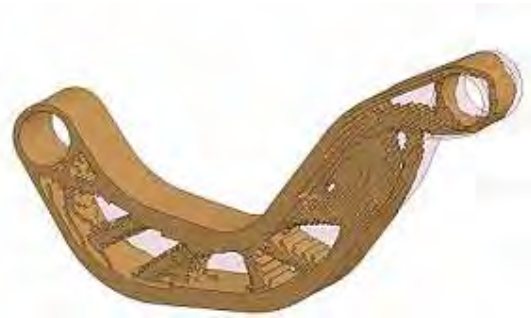


**Figure 3: Final design with casting geometry definition.**

The convergence history is shown in Figure 2, while final design is shown in Figure 3. The mass fraction specified in the history is the amount of material that the user specified should be kept – in this case half (a mass fraction of 0.5) of the structure was scheduled to be retained. The element fraction used is the fraction of the original number of elements in the part used at any point in the design cycle –this value will therefore converge to close to the requested mass fraction. The mass redistribution is the fraction of the overall mass moved around in the design cycle – a small number indicates convergence of the procedure.

**Nonlinear Mechanics Example**

It is important to model the nonlinear effects correctly, because the optimal material layout may depend on them. Fortunately, nonlinear phenomena, such as contact definitions, do not require special consideration in LS-TaSC. Competing algorithms based on design sensitivity derivations requires you to create a linear, implicit problem which may not reflect the correct load path.

In Figure 4 a design with a contact definition is shown. No special inputs to LS-TaSC or changes to the LS-DYNA input file were required to perform the design optimization – you merely have to identify the design part in the LS-TaSC user interface.
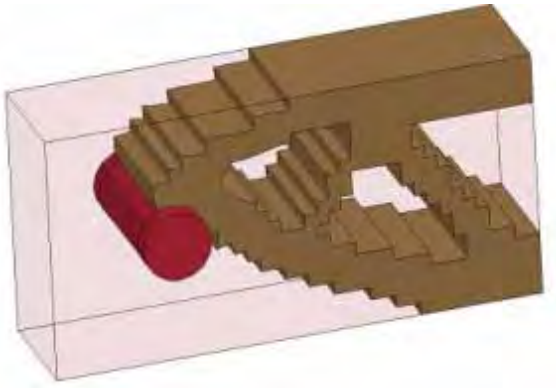
**Figure 4 Problem with contact definition. No special treatment is required for nonlinearities such as contact.**

**Summary**

Version 2 of LS-TaSC is a major step forward for the topology optimization of large models involving dynamic loads and contact conditions.

**If you know someone that is Making A Difference and would like them to be introduced, send your recommendation to mv@feainformation.com**

Dr. Paul Bland is the head of the Structural Dynamics Lab at TGGS, specializing in impact and vibration engineering.
http://mesd.tggs.kmutnb.ac.th

## Impact

Current theoretical impact research focuses on impact behavior regimes, boundaries and transitions. The most recent paper, entitled "A Study of Impact Regime Boundary Transitions" has been accepted by "The World Congress on Engineering 2011".
http://www.iaeng.org/WCE2011/index.html

Industry relevant impact work will soon be initiated with two separate one year projects.

The first is a planned project with Thai Government funding, aiming to implement the first stages of the theoretical research into improved modeling capability that can then be applied to the Thai automotive industry, as part of a PhD level research program.

The second is centered on an M.Sc student's industrial internship and thesis, with support from DAAD, for the student to spend one year in Germany. The student is an employee of the Malaysian Institute for Road Safety Research (MIROS), on leave for two years whilst studying on the TGGS MES&D Department M.Sc program. His internship will be with TTAI, a partner company with TUV Germany, conducting full crash tests and simulations. His Thesis will be jointly supervised by Paul and Prof. Rüdiger Schmidt from RWTH-Aachen University, with an industrial mentor from TTAI. The student will then return to MIROS, where he is the head of their crash simulation lab, using LS-DYNA.

## Vibration

Current theoretical vibration research focuses on non-linear and complex modal behavior.

Recently completed and ongoing industrial projects include an HDD plant wide vibration site survey, an HDD production machine vibration study, HDD product modal test and simulation, and vibration measurements of a light passenger train wheel axle for detection of wheel and track irregularities.

## Professional Engineering Institutes

Paul is also actively developing collaboration between the American, Japanese, Thai and U.K. mechanical engineering institutions, especially in the form of support for the Thai Society of Mechanical Engineering 2nd International Conference on Mechanical Engineering.
http://www.me.psu.ac.th/tsme/ocs/index.php/TSME-ICoME/2011

**Industry-University Collaboration**

Globally sourced best-practice engineering education and research methods linking Universities to Industry must be developed, arguably being a key element in the growth of the Asian region which is seen as the main driver of global growth in the coming decades. Crucially this must support human resource development, intercultural awareness and modern academic business models.

Paul is therefore interested to hear from industry that is willing to sponsor Ph.D level research or M.Sc students to study on the M.Sc program in his lab, funding of research or consultancy services.

**Contact**

For any enquiries please contact via bland.p.mesd@tggs-bangkok.org.

**Full postal address:**

Dr Paul Bland, Structural Dynamics Lab, Mechanical Engineering Simulation & Design Department,
The Sirindhorn International Thai-German Graduate School of Engineering,
King Mongkut's University of Technology North Bangkok,
1518 Pracharaj 1 Road,
Wongsawang, Bangsue,
Bangkok 10800, Thailand.

Note From Marsha Victory:  After accidently typing the 5 in the Fibonnaci series I went on a quest to learn about the Series.  Luckily, I found a website just for that purpose.  Additionally, I have learned that there is another series of numbers, The Lucas Numbers.  Edouard Lucas (1842-1891) (who gave the name "Fibonacci Numbers" to the series written about by Leonardo of Pisa) studied this second series of numbers: 2, 1, 3, 4, 7, 11, 18, .. called the Lucas numbers in his honor.

**The original problem that Fibonacci investigated (in the year 1202) was about how fast rabbits could breed in ideal circumstances.**
 http://www.maths.surrey.ac.uk/hosted-sites/R.Knott/Fibonacci/fibnat.html#rabeecow

Suppose a newly-born pair of rabbits, one male, one female, are put in a field. Rabbits are able to mate at the age of one month so that at the end of its second month a female can produce another pair of rabbits. Suppose that our rabbits **never die** and that the female **always** produces one new pair (one male, one female) Dr Ron Knott
Ph.D, M.Sc, B.Sc (Pure Maths), C.Math, FIMA, C.Eng, MBCS, CITP
 from the second month on. The puzzle that Fibonacci posed was…

How many pairs will there be in one year?

1.  At the end of the first month, they mate, but there is still one only 1 pair.
2.  At the end of the second month the female produces a new pair, so now there are 2 pairs of rabbits in the field.
3.  At the end of the third month, the original female produces a second pair, making 3 pairs in all in the field.
4.  At the end of the fourth month, the original female has produced yet another new pair, the female born two months ago produces her first pair also, making 5 pairs.
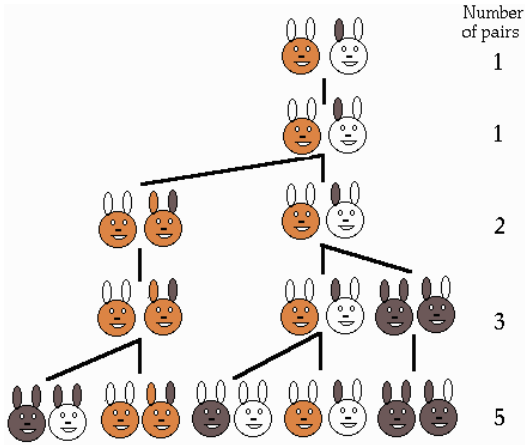
The number of pairs of rabbits in the field at the start of each month is 1, 1, 2, 3, 5, 8, 13, 21, 34, …

Another view of the Rabbit's Family Tree:
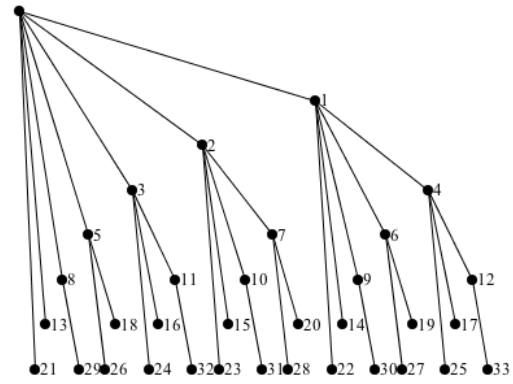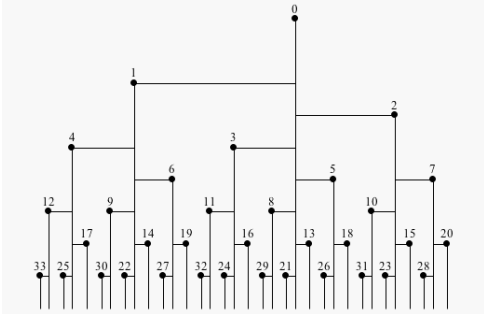


Both diagrams above represent the same information. Rabbits have been numbered to enable comparisons and to count them, as follows:

All the rabbits born in the same month are of the same generation and are on the same level in the tree.

The above is an excerpt from the page: Please read the page for the entire understanding of the graphs and the series.

http://www.maths.surrey.ac.uk/hosted-sites/R.Knott/Fibonacci/fibnat.html#Rabbits

## Making A Difference

## TATA TECHNOLOGIES FORMS NEW VEHICLE DEVELOPMENT GROUP

**If you know a company that is Making A Difference and would like what they are accomplishing to be introduced, send your recommendation to mv@feainformation.com**

## TATA TECHNOLOGIES FORMS NEW VEHICLE DEVELOPMENT GROUP

http://www.tatatechnologies.com/global/news_view.aspx?NewsCode=156&MenuCode=2

Thursday, April 07, 2011

DETROIT, April 7 -- Tata Technologies, a global provider of engineering services, is forming a new vehicle programs group to meet the demand for faster, more complex vehicle development support within the auto industry.

Tata Technologies' Vehicle Programs & Development (VPD) Group will include more than 200 engineers operating from four automotive engineering centers of excellence worldwide -- Detroit, Coventry (UK), Pune (India) and Stuttgart (Germany).



Kevin Fisher, a senior Tata Technologies executive with more than 30 years of experience in vehicle program engineering, has been named president of the new organization and will be based in the Detroit suburb of Novi.

"Our group draws on industry-leading technology and global engineering

expertise in the places where today's automotive ideas take shape," Fisher noted.

He added that the Tata Technologies VDP Group uses a multidimensional approach to vehicle engineering and development that will leverage the company's global delivery system and proprietary Knowledge Based Engineering (KBE) platforms to develop products faster and more cost effectively.

"The next decade will see an ever increasing demand for accelerated product development that also will need to incorporate more new technology than the auto industry has seen in 30 years," Fisher said. "We are positioning the Tata Technologies VPD Group to set the pace in automotive product development and technological innovation."

Fisher reported that the new group has already won several full-vehicle programs in the United States and Europe, including development of the G2 electric car from Maryland-based Genovation Inc. European-based premium car manufacturers, North

16

American OEMs, major automotive suppliers and independent automotive start-ups are also part of the Tata Technologies VDP Group client portfolio.

The company will be an exhibitor (Booth #1015) at the 2011 SAE (Society of Automotive Engineers) World Congress taking place April 12-14 in Detroit. Members of the Tata Technologies VPD team will be on hand at the company's SAE exhibit along with a scale model of Genovation's G2 electric vehicle. An urban mobility concept model, under development at the Tata Technologies North American Styling Studio, also will be on display, to showcase the styling capabilities within the VPD Group.

Part of the Tata Group

Tata Technologies is part of the prestigious Tata group, India's oldest and most respected business group, with extensive international operations and fiscal-year revenues of more than $65 billion, 61 percent of which comes from business outside of India. Tata group companies employ about 350,000 people worldwide. Tata has been a respected name in India for more than 140 years

because of its adherence to strong business values and its dedication to ethics and social responsibility.

About Tata Technologies

Tata Technologies is a global leader in the fields of Vehicle Program Development, Engineering Services Outsourcing, Product Development IT and PLM for the global manufacturing industry. Through a pragmatic approach to engineering and manufacturing processes, it delivers best-in-class solutions to the world's leading automotive and aerospace manufacturers and their suppliers. The company is headquartered in Singapore, with regional headquarters in the United States (Novi, Mich.), India (Pune) and the United Kingdom (Coventry and Bristol). Tata Technologies has a global workforce of 4,500 employees serving clients from facilities in North America, Europe and the Asia Pacific region.

More information is available at www.tatatechnologies.com .

**Remembering**
**Dr. John Eldon "Jack" Renaud**
**Expert in design methodology**
**and optimization theory.**

**Dr. John Eldon "Jack" Renaud** (Aug. 25, 1960 - March 18, 2011)

Internationally recognized, as an expert in design methodology and optimization theory, Jack passed away peacefully at home – As always, his wife Elizabeth, by his side.

**Before we remember the engineer, I would like to bring a few things to the forefront.**

- In his personal life he was a high school football star - middle linebacker.
- Met the love of his life, Elizabeth; love at first sight - true soul mates, always by each other's side.
- Loved working on his 1870s-era farmhouse, as well as growing and canning tomatoes.
- His childhood ambition was to become a sportswriter, but he opted for the more practical field of engineering.
- He loved his dogs. O'Keefe, Mabel, Hartley, Augie and Rocky, and a collection of more. He always put up with Elizabeth's finding another misfit to take in.

**Jack had an accomplished career in industry and academia.**

His work considered fundamental design issues for:

- aircraft,
- crash-absorbent structures,
- human bone tissue,
- general mathematics associated with determining optimal designs.

**Among Many Accomplishments:**

- He with his students and colleagues authored over 65 refereed articles in the leading journals of his discipline.
- He held two U.S. patents.
- He supervised the doctoral dissertations of over ten students.
- He served on the Editorial Advisory Boards of the scholarly journals Engineering Optimization and the Journal of Aircraft.
- He was Associate Editor of the Journal of Mechanical Design.

He will be missed not only in the field of design methodology and optimization theory, but additionally for the loving animal misfits that he and Elizabeth took in and loved.

## Aerospace Information

**http://www.aerospaceinformation.com**

**F-14A Tomcat**

The picture of the month does not depict use of any software. It is chosen, based on the FEA Inc Team's interest in aerospace dynamics, aviation history, or interest. If you wish to have us show a plane, from any country, feel free to send your suggestion to mv@feainformation.com

The Grumman F-14 Tomcat is a supersonic, twin-engine, two-seat, variable-sweep wing fighter aircraft. The Tomcat was developed for United States Navy's Naval Fighter Experimental (VFX) program.

The F-14 first flew in December 1970. It first deployed in 1974 with the U.S. Navy aboard USS Enterprise (CVN-65). . The F-14 served as the U.S. Navy's primary maritime air superiority fighter, fleet defense interceptor and tactical reconnaissance platform. In the 1990s it added the Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) pod system and began performing precision strike missions.

The F-14 was retired from the active U.S. Navy fleet on 22 September 2006. The name, "Tomcat," was partially chosen to pay tribute to Admiral Connolly, as the nickname, "Tom's Cat," had already been widely used by the manufacturer, although the name also followed the Grumman tradition of naming its fighter aircraft after felines

**Among the aerospace publications presented at the LS-DYNA Conferences:**
- Investigation of *MAT_58 for Modeling Braided Composites
- http://www.dynalook.com/international-conf-2010/Aerospace-1-1.pdf
- Development of Hail Material Model for High Speed Impacts on Aircraft Engine
- http://www.dynalook.com/international-conf-2010/Aerospace-1-2.pdf
- Engine Impeller Sub-Fragmentation Simulation Using EFG Method
- http://www.dynalook.com/international-conf-2010/Aerospace-1-3.pdf
- Modeling Bird Impact on a Rotating Fan: The Influence of Bird Parameters
- http://www.dynalook.com/international-conf-2010/Aerospace-1-4.pdf
- LS-DYNA Implemented Multi-Layer Fabric Material Model Development for Engine Fragment Mitigation
- http://www.dynalook.com/international-conf-2010/Aerospace-1-5.pdf
- Predicting the Dynamic Crushing Response of a Composite Honeycomb Energy Absorber Using Solid-Element-Based Models in LS-DYNA
- http://www.dynalook.com/international-conf-2010/Aerospace-2-5.pdf

**Employment Opportunity**

**ARUP**

**Oasys LS-DYNA Environment**

For Information Contact :   Carol.Lloyd@arup.com

| Job Description | |
| --- | --- |
| **Group** | Technology Group |
| **Job title** | Software Developer |
| **Job grade** | **EDT 3/4** |
| **Job brief/ purpose** | The main part of the job is writing software for the "Oasys LS-DYNA Environment", e.g. Primer. This software is sold commercially; the income from sales funds a continuous program of improvements and new releases. The software is an expert, niche product; it is the team's deep understanding of the needs of customers that gives the software its commercial edge. The post-holder will be expected to develop such understanding over time.<br><br>The software development team sits within Advanced Technology & Research, performing a wide range of consultancy work based largely on numerical simulation. |
| **Relationships** | The post holder will liaise continuously with other members of the software development team who are working on the same products. The team is led by an Associate Director and a Director, with whom the post holder will be in daily contact. |
| **Responsibilities** | The post holder will take responsibility for particular functions within the software, including some new functions that the post-holder will develop, as well as contributing to the general development effort (e.g. debugging, testing, and contributing to the design of new features).<br><br>The role also includes some customer support of the products with which the post holder is familiar. |

| | |
|---|---|
| **Scope** | This post is newly created in response to growing sales and demand.<br><br>Support will be given to achieve chartered status with an appropriate Institution.<br><br>The post offers scope in the short term for increasing levels of responsibility within the software team. For example, responsibility for software releases, and for particular software products. There will also be opportunities to supervise junior staff, for example during testing, and there is the possibility of involvement in managing developers overseas. In the longer term, the specialist nature of the work does not constitute a barrier to promotion within Arup. |
| **Contacts** | The post-holder will have regular contact with other members of the AT&R Group within Campus, Japan, India and the USA and external clients who are users of the software. The post-holder will also have frequent contact with customers, for example answering support questions, and at meetings to understand customer needs. |
| **Environment** | The post is within the Advanced Technology & Research Group at the Arup Campus, a purpose-built office accommodation on the outskirts of Solihull, in the West Midlands, near junction 4 of the M42 and Widney Manor Station.  The Campus is a non-smoking environment. |

**For Information Contact:** :  Carol.Lloyd@arup.com

LSTC welcomes you to participate in the 2012, 12th International LS-DYNA® Users Conference. Hosted by LSTC, the venue will again be The Hyatt Regency, Dearborn, MI. For Sponsor and Exhibitor Booth Information contact Marsha Victory vic@lstc.com

All questions pertaining to the conference, abstracts, papers, exhibit and sponsor opportunities please send to Marsha Victory vic@lstc.com and Cathie Walton cathie@lstc.com with the subject line: 2012 LSTC Conference

**First Call For Papers – Abstracts are now being accepted and reviewed.**

**Abstract guidelines write to Marsha Victory:**
**vic@lstc.com    Subject Line:   2012 LSTC Conference**

Paper Guidelines will be posted on the LSTC Site May 15, 2011 http://www.lstc.com

**Application Areas Being Accepted for Paper Submission:**

| | | |
|---|---|---|
| Aerospace | Heat Transfer | Seismic Engineering |
| Automotive Crashworthiness | Impact & Drop Testing | Ship Building |
| Ballistic & Penetration | Manufacturing Processes | Transportation |
| Biomechanics | Metal Forming | Virtual Proving Ground |
| Civil Engineering | Modeling Techniques | Nuclear Applications |
| Electro Magnetics | Occupant Safety | |

**Abstracts received with correct formatting will be reviewed within eight weeks of receipt, with early notification.**

- Abstracts will be due no later then November 15th 2011
- Notification of acceptance, if not prior, will be no later then December 15th, 2011.
- Paper Deadline will be March 15th, 2012

Conference Papers: The presenter of each accepted paper will receive free admission to the conference, provided that the presenter registers for a room at the Hyatt Regency Dearborn under LSTC Conference registration

If you have any questions on paper submissions write to:
 vic@lstc.com  and  Cathie@lstc.com Subject line: 2012 LSTC Conference

Submit your abstract to papers@lstc.com with **Subject Line: 2012 LSTC Conference**.
If you do not receive a confirmation of receipt within 48 hours, please contact Marsha Victory vic@lstc.com

| | | | |
|---|---|---|---|
| | [Finite Element Analysis Theory and Application with ANSYS (3rd Edition)](#) | | [Arbitrary Langrangian-Eulerian and Fluid Structure Interaction](#). |
| | [Isogeometric Analysis: Toward Integration of CAD and FEA](#) | | [NURBS for Curve & Surface Design: From Projective Geometry to Practical Use](#) |
| | [A First Course in Finite Elements](#) | | [Engineering Numerical Analysis](#) |
| | [Go To Book at Amazon](#) | | |
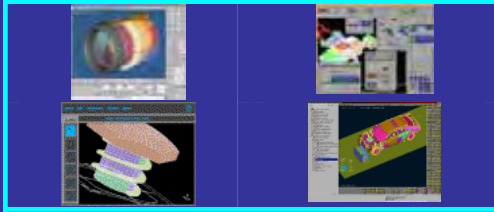
A preprocessor is a program that processes its input data to produce output. This data is then used as input to another program.

**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. μETA, 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-PrePostis an advanced interactive program for preparing input data for LS-DYNA and processing the results from LS-DYNA analyses.

## 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.

## 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

**Complete Information can be found on the SGI Website including:**

- Cyclone™ and LS-DYNA® Success Story
- IDC White Paper  -  Cyclone Supported Applications
- Cyclone Usage Diagram
  http://www.sgi.com/products/hpc_cloud/cyclone/index.html

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.

**SGI SMP & MPP Hardware & OS For LS-DYNA**

| | |
| --- | --- |
| SGI Mips | IRIX 6.5 X |
| SGI IA64 | SUSE 9 w/Propack 4 RedHat w/Propack 3 |

**SGI MPP and Interconnect  and MPI  For LS-DYNA®**

| SGI | O/S | HPC Interconnect | MPI Software |
| --- | --- | --- | --- |
| SGI Mips | IRIX 6.5 X | NUMAlink | MPT |
| SGI IA64 | SUSE 9 w/Propack4 RedHat w/Propack 3 | NUMAlink, InfiniBand (Voltaire) | MPT, Intel MPI, MPICH |

**LS-DYNA® Implicit Hybrid Technology on Advanced SGI® Architectures***
  White Paper pdf format is at URL:  http://www.sgi.com/pdfs/4231.pdf
      Olivier Schreiber, Scott Shaw, Brian Thatch - SGI Application Engineering
      Bill Tang, -  SGI System Engineering

| LS-DYNA Application/Capability | http://www.ls-dyna.com/ |
|---|---|
| LS-DYNA LS-DYNA Benchmarks | http://www.topcrunch.org/ |
| LS-DYNA Publications | http://www.dynalook.com/ |
| LS-DYNA Consulting Companies | http://www.ls-dynaconsulting.com/ |
| LS-DYNA Examples | http://www.dynaexamples.com/ |
| LS-OPT Support | http://www.lsoptsupport.com |
|   LS-OPT User Group | http://groups.google.com/group/lsopt_user_group |
| LS-PrePost Support | www.lstc.com/lspp |
| LS-DYNA Support | http://www.dynasupport.com/ |

## ATD – Pedestrian – Barrier Models

| ATD LSTC Models: | http:www.lstc.com/models |
|---|---|
|   ATD LSTC Mailing List | atds@lstc.com |
| ATD Models - DYNAmore | http://dummymodels.com |
| Pedestrian Impact Model - ARUP | http://oasys-software.com/en/fe-models/pedestrian.shtml |
| Cellbond Barrier Models - ARUP | http://oasys-software.com/en/fe-models/barrier.shtml |
| RCAR Barrier Model - ARUP | http://oasys-software.com/en/fe-models/rcar.shtml |

## Other

| High Strain Rate Testing of Advanced High Strength Steels | http://thyme.ornl.gov/ASP_Main/crashtests/crashtests_main.cgi |
|---|---|
| High Strain Rate Characterization of Mg Alloys | http://thyme.ornl.gov/Mg_new |
| (FEM) models of semitrailer trucks for simulation of crash events | http://thyme.ornl.gov/FHWA/TractorTrailer |
| Single Unit Truck crash model documentation | http://thyme.ornl.gov/FHWA/F800WebPage |

**For Complete Information and full conference announcement:**
http://www.beta-cae.gr/conference04_announcement.htm

Being consistent to our biannual appointment, it is our pleasure to invite you to attend the 4th ANSA & µETA International Conference that will be held from June 1st to June 3rd 2011, in Classical Makedonia Palace Hotel, Thessaloniki, Greece.

The principal aims of this event are to bring the CAE Community together with BETA CAE Systems S.A. and to promote an international exchange of the latest concepts, knowledge and development requirements on our flagship software products, ANSA & µETA. Technical papers will be presented outlining the latest advances in CAE strategy, methodology, techniques and applications related to our products. Participants will have the opportunity to be informed about the latest software trends, demonstrate their concepts and achievements and present new development requirements.

Following the success of our previous events and after the request of the majority of the participants, the duration of our 4th conference will be of three days. The closer technical communication with the software developers' team of our products, within the framework of a technical forum, features this three-day conference.

Further discussions, sessions, meetings and events will allow the interaction between participants and organizers. Senior executives of our company, the engineers from the development and services teams and our business agents from around the world will be glad to meet with customers and users, to discuss the applications, the existing functionality, latest enhancements and future development plans of our software products. We expect that this will be a unique opportunity for you to share your success and for us to share our vision.

The attire of the event is business casual. The language of the event is English.

**Important Dates:**

**Abstracts: February 25th 2011**
Acceptance: March 11th 2011
Registration: April 15th 2011
Final manuscripts: April 29th 2011
Presentations files: April 29th 2011
Event: June 1st to June 3rd 2011

Oasys Ltd and nHance Engineering Solutions Pvt. Ltd. are pleased to announce the 4th Oasys LS-DYNA Update meetings in India:

**Pune** - free of charge event
   Tuesday, May 3rd 2011
   The Ista Hotel, 88/4 Nagar Road,
   Adjacent to Aga Khan Palace Pune.

**Bangalore** - free of charge event
   Thursday, May 5th 2011
   The Taj Vivanta,
   Whitefield, Bangalore.

**Full day, free of charge events, covering LS-DYNA and Oasys software.**

The conference days are the perfect opportunity to find out about current and future developments, in addition to how the software is being used in the engineering community.

**Guest Speakers from:**

- General Motors Ltd,
- Infotech Enterprises Ltd,
- Mahindra & Mahindra Ltd,
- Mercedez Benz Ltd,
- Tata Johnson Controls Ltd
- Tata Motors Ltd.

**Additional Speakers from:**

- Arup
- Livermore Software Technology Corporation(LSTC).

**Registration by email:**

Send information to
india.support@arup.com

- Your name,
- Company/affiliation,
- Telephone number
- e-mail address
- your choice for event.

**Venue**

**The event in Pune:**

To be held at The Ista Hotel, which Situated in the heart of the city, 10 minutes drive from the airport and adjacent to the tranquil Aga Khan Palace.

The Ista Hotel
88/4, Pune-Nagar Road (Adj. Aga Khan Palace) Yerwada Pune –
 411 006,India
Tel: 91(20) 41418888

**The event in Bangalore:**

To be held at The Taj Vivanta, Whitefield which stands right at the main entrance to the International Tech Park, Bangalore.

The Taj vivanta
ITPB, Whitefield
Bangalore 560 066,India
Tel No.:91-80-6693-3333

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

For further details Kindly visit our website:

http://www.oasys-software.com/dyna

**Contact Details**

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

Mr. Asif Ali
nhance Engineering Solutions(P)Ltd.
   (Part of the ARUP Group)
   Plot No. 39, Ananth Info Park,
   HiTec    City-Phase ll
   Madhapur, Hyderabad-500081,India
   Tel: +91 (0) 40 44369797/8
    Email: india.support@arup.com

**ETA-China**

**The 6<sup>th</sup> Training of Vehicle Crash Safety Design.**

**Success**

**By Grace Su, ETA China – Martin Ma, ETA china**

## ETA-China - sole sponsor – The 6<sup>th</sup> Training of Vehicle Crash Safety Design.

The 6th Training of Vehicle Crash Safety Design has been held during Apr. 17th to Apr. 22nd, 2011 in Shanghai. This is annual training which organized by China Mechanical Engineering Society (CMES), this time it was chosen in Shanghai and ETA-China was proud to be the sole sponsor of it.

More than 50 engineers participated this training, they are from China's main automobile manufactures, such as FAW Haima, FAW VW, FAW Car, Beijing Auto, Guangzhou Auto, PATAC, Brilliance Auto, Jiangling Auto, Shenzhen BYD etc., and some auto parts manufactures.

Several experts in the field of Vehicle Crash Safety Design were the keynote speakers. The experts are:
- PhD. Chanxi Zhu, the Professor of Auto School of Tongji University
- PhD. Andy Piper, the Senior Manager Vehicle Safety Dep. of the Chery- Quantum Auto Co.
- PhD. Hua Wang, the Director of Passive Safety Dep. Of Shanghai East Joy Long Motor Airbag Co.
- PhD. Yuanzhi Hu, Vice Supervisor of Auto Engineering Dep. of China

Auto Technology & Research Center.

These experts shared many topics during the training sessions. These topics included:
The Latest Vehicle Active Safety Technology and Impact Technology
NCAP Crash Testing,
- LS-DYNA Application,
- Vehicle Design Theory of Front and Side Impact Safety
- CAE Simulation Method and Modeling Technology for Automobile Structure Impact
- Impact Analysis and Safety Development Case Study on Classic Vehicles

After the training, all experts and participates visited The 14th Shanghai International Automobile Industry Exhibition. This is the most important and biggest vehicles show in China this year. As China Auto Industry is booming, more than 1100 vehicles are on this show and 75 new car models first globally launched during this exhibition.

**8th European LS-DYNA© Users Conference Strasbourg — France**

The 8th European LS-DYNA Users Conference hosted by ALYOTECH with the support of ARUP, DYNAMORE, ERAB and LSTC. The conference will be an excellent occasion to meet LS-DYNA© users from all over the world and to share LS-DYNA© applications in different areas.

Presentations will cover various LS-DYNA© related topics, new developments and new applications from academic and industrial engineers. An exhibition area will allow to obtain information about the latest software and hardware developments related to LS-DYNA©.

Several training classes will be held immediately before or after the Conference:

- Crash & Impact Modeling
- FSI & ALE in LS-DYNA
- Material Modeling and User-Defined Materials in LS-DYNA

- Modeling & Simulation with LS-DYNA
- SPH & EFG Methods in LS-DYNA
- Optimization with LS-OPT
- Sheet Metal Forming with LS-DYNA & DYNAFORM
- LS-PrePost
- Using LS-DYNA for Heat Transfer with Hot Stamping Applications
- LS-DYNA Applications to Protective structures, blasts, vehicle mines, …

Known as the European Capital, Strasbourg is home to the Council of Europe, the Human Rights Building and the European Parliament. It is a major hub, making for an easy access to the European LS-DYNA© meeting!

We hope to count you among our participants very soon!

Additional information/ registration:
www.lsdynaeuc.alyotech.fr

**Training Sessions:**

**Crash & Impact Modeling** - 4 days, May, 17-20th   -   Mr Paul DU BOIS

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=99373378-7c30-47cb-896e-04bcde8c4c93&groupId=10583

**FSI & ALE in LS-DYNA**
   2 days, May, 19-20th -  Mr Mhamed SOULI

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=e4c57963-7d85-4734-ae15-4df416dfd38b&groupId=10583

**Material Modeling and User-Defined Material in LS-DYNA**
   2 days, May, 19-20th -   Mr Ala TABIEI

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=9f889b49-d7cb-4791-a6a3-78d3207dd218&groupId=10583

**Modeling & Simulation with LS-DYNA**
   2 days, May, 25-26th - Mr Len SCHWER & Paul DU BOIS

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=ea0f4a69-808b-4d5d-8bfa-ffee04ff3844&groupId=10583

**SPH & EFG Methods in LS-DYNA**
   2 days, May, 25-26th - Mr Mhamed SOULI & Mr CT WU

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=3cc88d81-b50c-48f6-ae79-c8b4f33076fa&groupId=10583

**Optimization with LS-OPT**
   **2 days, May, 25-26th - Mr Nielen STANDER**

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=68a712a1-aced-45fb-8f81-d540504c3add&groupId=10583

**Sheet Metal Forming Simulation with LS-DYNA & DYNAFORM**
   2 days, May, 25-26th - Mrs Jeanne HE & Mr Xinhai ZHU

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=5074c4ba-bca4-4f80-9d73-23c961116ff7&groupId=10583

**LS-PrePost 3.0**
   2 days, May, 25-26th  -  Mr Philip HO

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=8226048e-9f8e-42f7-8d98-c70f5273fcbf&groupId=10583

**Using LS-DYNA for Heat Transfer with Hot Stamping Applications**
   2 days, May, 25-26th  -  Mr Arthur SHAPIRO

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=bff53ba0-cabc-4fa5-8882-e42d9b29f61d&groupId=10583

**Training in LS-DYNA applications to Protective Structures, Blasts, Vehicles (IED and mines) and Home Land Security**
   2 days, May, 25-26th  -  Mr Ala TABIEI

http://www.lsdynaeuc.alyotech.fr/c/document_library/get_file?uuid=716e9d98-24d6-494b-b105-e374593a5480&groupId=10583

**Korean LS-DYNA Conference
KOSTECH**

**June 23, 2011**

**2011 Korean LS-DYNA Conference**

Kostech invites you to the 2011 Korean LS-DYNA Users Conference, which will take place in Korea (Seoul) on 23 June 2011.

The conference will offer an excellent occasion to meet LS-DYNA users in Korea and to share LS-DYNA applications in different areas.

**Presentations:**

Presentations will cover various LS-DYNA related topics, new developments and new applications from academic and industrial engineers.

**LS-DYNA professional Seminars:**

KOSTECH will offer LS-DYNA Professional Seminars on 21st, 22nd June, before the conference. (in Kostech training center)

Register to 2011 Korea LS-DYNA users conference and other information can be found at:

http://kostech.co.kr/skin17/sub_page.php?page_idx=149

**LS-DYNA 2011
Taiwan User Conference**

**April 28-29, 2011**

http://flotrend.com.tw/

**LS-DYNA 2011 Taiwan User Conference**

Flotrend thanks its LS-DYNA users, for the many years of support and contributions to science and technology.

We are honored to invite you to participate in the April 28-29, "LS-DYNA 2011 Taiwan User Conference".

Invited experts from LSTC Corporation, Livermore, CA and other global experts will attend and present information. Additionally, representatives from Taiwan in the various trades and occupations will assemble to share innovative technology developments on LS-DYNA user ideas and applications.

The conference will cover LS-DYNA New Features, and cover topics such as PrePost Modeling, Optimization and other virtual product analysis.

You are invited you to attend this grand event.

Please visit our website http://flotrend.com.tw/ or complete information on our conference and training classes.

Sincerely,
Brian Hsiao
Business Director
Flotrend Cooperation
Mail: brian@flotrend.com.tw

## The 12<sup>th</sup> International LS-DYNA® Users Conference.

Hosted by LSTC, the venue will again be The Hyatt Regency, Dearborn, MI

Abstracts will be due November 2011
Notification of acceptance will be January 01, 2012.
Paper Deadline will be mid March 01, 2012

Among the application areas being accepted for paper submission are the following:
   Additional ones may be added next month

| Aerospace | Heat Transfer | Seismic Engineering |
| --- | --- | --- |
| Automotive Crashworthiness | Impact & Drop Testing | Ship Building |
| Ballistic & Penetration | Manufacturing Processes | Transportation |
| Biomechanics | Metal Forming | Virtual Proving Ground |
| Civil Engineering | Modeling Techniques | Nuclear Applications |
| Electro Magnetics | Occupant Safety | |

At this time if you have any questions on paper submissions write to Cathie Walton – LSTC – Cathie@lstc.com

We will be posting all requirements for abstracts, paper submission including an FAQ in the April news and automating many features.

**Organised By:**

University of New Mexico, USA
& Wessex Institute of Tech., UK

**Sponsored By:**

WIT Transactions on Engineering Sciences

View the conference website, which has full details about the conference objectives, topics and submission requirements at:

http://www.wessex.ac.uk/multiphase2011rem4.html

**Conference Topics:**

- Bubble and drop dynamics
- Flow in porous media
- Turbulent flow
- Multiphase flow simulation
- Image processing
- Heat transfer

- Interaction of gases, liquids and solids
- Interface behaviour
- Small scale phenomena
- Atomization processes
- Liquid film behaviour

**Conference Secretariat:**

Irene Moreno Millan,
Conference Coordinator,
Multiphase Flow
Wessex Institute of Technology,
Ashurst Lodge, Ashurst
Southampton, SO40 7AA

Telephone: 44 (0) 238 029 3223
Fax: 44 (0) 238 029 2853
Email: imoreno@wessex.ac.uk

Please circulate this announcement to colleagues who may be interested in this conference.

They can subscribe by e-mailing enquiries@wessex.ac.uk with 'Subscribe - Multiphase Flow' as the subject line.

The Complete Training Courses Offered Can Be Found At:  http://www.cadfem.de
Please check the site for accuracy and changes.
Among the many course offering are the following:

**Explicit structural mechanics with ANSYS Workbench and LS-DYNA**

Beside the trainings on all aspects of short time dynamics we offer also various seminars on new methods available in LS-DYNA.

- Seminar: Introduction to explicit structural mechanics with ANSYS LS-DYNA and LSTC LS-DYNA
- Seminar: Material modeling with LS-DYNA
- Seminar: Simulation of composites with ANSYS Composites PrepPost and LS-DYNA
- Online-Seminar: Contact modeling with LS-DYNA
- Online-Seminar: Modeling joints with LS-DYNA
- Seminar: Crash simulation with LS-DYNA

**optiSLang**

Parametric simulation and optimization with optiSLang optiSLang is one of the most popular solver for optimization and robust design analyses

Online-Seminar: Advanced parametric simulation with ANSYS Workbench and optiSLang

**AnyBody**

With AnyBody it is possible to simulate the kinematics of a human body like computing muscle forces for example.

- Seminar: Introduction to simulation of joint- and muscle- forces with AnyBody
- Seminar: Efficient coupling of AnyBody with ANSYS Workbench

Advanced Options in LS-DYNA
   MI
   4/11/2011
   4/12/2011 Mon-Tue

Implicit
   MI
   4/13/2011 4/14/2011
   Wed-Thurs

LS-PrePost
   (no charge with Intro to LS-DYNA)
   CA 5/2/2011
   5/2/2011 Mon
Intro to LS-DYNA
   (3-1/2 days; half day on Friday)
   CA 5/3/2011 5/6/2011
   Tue-Fri

LS-PrePost
   (no charge with Intro to LS-DYNA)
   MI
   6/13/2011 6/13/2011 Mon
Intro to LS-DYNA
   (3-1/2 days; half day on Friday)
   MI
   6/14/2011 6/17/2011 Tue-Fri

Composite Materials
   CA
   6/21/2011 6/22/2011
   Tue-Wed

Material Modeling Using User-Defined
Options
   CA
   6/23/2011 6/24/2011
   Thurs-Fri

Contact in LS-DYNA
   MI
   6/27/2011 6/28/2011
   Mon-Tue

LS OPT (Introduction;
   3 1/2 days half day on Friday)
   CA
   6/28/2011 7/1/2011
   Tue Fri

Classes Offered by Paul Du Bois and Len
Schwer:

Concrete & Geomaterials
      10/4/2011 10/5/2011 Tue-Wed
Modeling & Simulation
      10/6/2011 10/7/2011 Thurs-Fri
Blast Modeling
      10/11/2011 10/12/2011 Tue-Wed
Penetration Modeling
      10/13/2011   10/14/2011   Thurs-Fri

The Complete Training Courses Offered Can Be Found At http://www.erab.se/courses/
Please check the site for accuracy and changes.

Webex seminar:  New features in LS-DYNA R5.1.1
                New features in LS-DYNA, LS-PrePost and LS-OPT.

April 19 and May 4. Note, maximum 25 attendees can participate to each seminar.
    April 19, time 10.00 (Stockholm)
    May 4, time 10.00 (Stockholm)

————————————————————-

LS-DYNA, Simulation of sheet metal forming processes
    May 3, 2011

LS-DYNA, Material modeling
    May 10, 2011

LS-PrePost 3, introduction
    September 12, 2011

LS-DYNA, introductory
    September 13, 2011

LS-DYNA, Adv. training in impact analysis
    September 20, 2011

LS-DYNA, implicit analysis
October 11, 2011

ANSA & Metapost, Introductory
    October 25, 2011

LS-OPT, Optimization and robust design
    November 14, 2011

**Training Courses**

**Alliance Services Plus (AS+)**

The complete Training Courses offered can be found at
http://www.asplus.fr/ls-dyna

Please check the site for accuracy and changes.

Among the many course offerings are the following:

**Other regular courses (in Paris)** …

LS-DYNA Unified Introduction Implcit & Explicit Solver
   June 20-23
   November 21-24

LS-OPT & LS-TaSC Introduction
   October 19-20

Switch to LS-DYNA
   October 5-6

Switch from LS-PrePost 2.X to 3.X
   September 28
   December 14

LS-DYNA Advanced Implicit Solver
   September 27

LS-DYNA ALE / FSI
   October 17-18

LS-DYNA SPH
   June 6-7
   November 8-9

LS-PrePost 3.0 – Advanced meshing capabilities
   September 29
   December 15

LS-DYNA User Options
   June 8-9

LS-DYNA – Plasticity, Damage & Failure – By Paul DU BOIS
   October 3-4

LS-DYNA – Polymeric materials – By Paul DU BOIS
   December 12-13

http://www.philonnet.gr/training/index.html

In the framework of the 5th PhilonNet CAE Conference Drive Innovation with Simulation in ATHENS, in May 2011 Simulation, experts from all over the world will gather in Athens to transfer their knowledge in advanced professional trainings in LS DYNA, Design for Six Sigma (DFSS) and more

Training Location is Athens, Greece – See website for up to date information

**Advanced Crashworthiness and Impact with LS-DYNA**

**Paul A. Du Bois**

**Date: 10-13 May 2011,**

**Automotive Safety Basic Concepts and Current Developments**

**Rainer Hoffmann**

**Date: 6-7 May 2011,**

**Synthesis and Design of Mechanisms**

**Dr. Andreas Vlahinos**
**Date: 6 May 2011,**

**Training Courses**

**Shanghai Hengstar Technology Co. Ltd.**

Email: info@hengstar.com
Phone: +86-021-61630122

| 2011 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| An Introduction to LS-DYNA(High Level) | ■ | | | | | | | | | | | |
| Crashworthiness Simulation with LS-DYNA | | ■ | | | | | | | | | | |
| Passive Safety and Restraint Systems Design | | | | | | | | | | | | ■ |
| LS-Prepost, LS-DYNA MPP, Airbag Simulation with LS-DYNA | | | | | ■ | | | | | | | |
| Pedestrian Safety and Passive Safety Simulation with LS-DYNA | | | | | | | | ■ | | | | |
| Crashworthiness Theory and Technology, Introduction of LS-OPT which is based on LS-DYNA | | | | | | | ■ | | | | | |
| Concrete & Geomaterial Modeling, Blast Modeling with LS-DYNA | | | | ■ | | | | | | | | |
| Frontal Restraint Systems according to FMVSS 208 and Euro NCAP | | | | | | | | ■ | ■ | | | |
| Crashworthy Car Body disinterested, Simulation, Optimization | | | | | | | | | | ■ | ■ | |
| Hot stamping with LS-DYNA | | | | | | ■ | ■ | | | | | |

45

LS-DYNA professional Seminar in Korea

We are offering professional LS-DYNA seminar on June 21 to June 22, 2011 in Kostech. This seminar is focused on Foams, Elastomers, Thermoplastics simulation for 2 days. Foams and Elastomers are well settled in simulation but Thermoplastics simulation is still on the challenge research stage. Seminar attendees will get more information from the lecture and from questioning and answering.

**Material laws for polymers in LS-DYNA - June 21, 2011 – June 22, 2011**
   Lecturer: Paul.Dubois (LSTC)
   Location: KOSTECH training center

**Registration due date: April 29, 2011**

| Day | Time | Contents |
|-----|------|----------|
| **1** | 09:00-10:30 | Overview of foam materials |
| | 11:00-12:30 | Review of the German FAT research project<br>How accurate can foam simulation get ? |
| | 13:30-15:00 | Data preparation for elastic foams (MAT_083) |
| | 15:30-17:00 | Unloading models and<br>Simulation of airflow in porous foams |
| **2** | 09:00-10:30 | Overview of polymeric materials |
| | 11:00-12:30 | Thermoplastics : visco-elastic simulation (MAT_076) |
| | 13:30-15:00 | Thermoplastics : visco-plastic simulation<br>MAT_024 and MAT_187 |
| | 15:30-17:00 | Elastomers : simulation of rubbers (MAT_181) |

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www.kostech.co.kr
 For further information please call us at +82 (0)31-903-2069

The following question was sent by Uli Franz of DYNAmore – DYNAmore is headquartered in Germany.  http://www.dynamore.de

You may answer the questions and write the answers in the boxes below. The LS-DNYA Keyword User's Manual will help you to succeed.

| C | O | N | T | R | O | L | _ | | | | | | | | | | | | | | | | | | | |
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**QUESTIONS**

Line 1:  In which card can you specify that a highly distorted shell element will be deleted if its Jacobian is negative?

Line 2:  Where can you set a flag  for additional NaN checks in the force and moment arrays?

Line 3:  Which material in LS-DYNA has a hyphen in the name?

Line 4:  What is the name of material 181?

Line 5:  In which card can you switch bulk viscosity for shells on?

Line 6:  What is the variable (flag) name to force the contact algorithms to take the initial penetrations during the simulation into account, instead of moving the nodes to a non-penetration position at the beginning of a simulation?

Line 7:  In which card can you switch the time-stepping scheme?
E.g. from explicit to implicit?

**ANSWER Question #1:**

**QUESTION BOX**

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| C | O | N | T | R | O | L | _ | | | | | | |

**Answers:**

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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| M | A | T | _ | S | I | M | P | L | I | F | I | E | D | _ | R | U | B | B | E | R | / | F | O | A | M |
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**Tobias Graf  - DYNAmore GmbH**

Carrying out a FE simulation using an explicit time integration method, one of the main issues for stability is the upper limit of the time step, the so-called critical time step. This critical time step depends on a characteristic length of the elements and the wave speed, which is determined by the density and the stiffness of the material. The limitation of the time step is also known as the Courant-Friedrichs-Lewy (CFL) condition.

It is a necessary condition to make useful simulations. You may check detail in literature or at:

http://www.dynasupport.com/tutorial/ls-dyna-users-guide/time-integration.

By default, the appropriate time step is determined by LS-DYNA automatically. In addition, LS-DYNA allows the user to modify the time step size with several parameters.

A.  Please download the LS-DYNA input file beam.k
   (http://www.dynasupport.com/links/fea-information-examples/beam.k)

B.  Answer the following questions.

**The exercise intends to explain the CFL condition
   and its application in LS-DYNA.**

1.) Compute the critical time step of the beam and compare your result with the "smallest timestep" in LS-DYNA. Why is there a difference?

2.) How can you prompt LS-DYNA to output the analytical solution?

3.) Carry out a simulation, where DT2MS=-1.0E-3. Why is this time step not considered?

4.) How can you define a maximum time step size?

5.) What happens, if you carry out a simulation without mass scaling and TSSFAC=1.1?
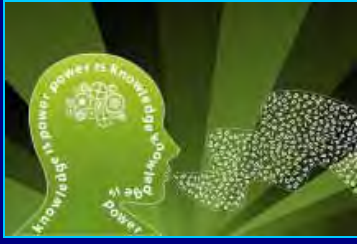
Solutions:

1a.) analytical:
dt=l*sqrt(density/youngs_modulus)=10.0*sqrt(0.785E-5/210.0)=0.19334E-02

LS-DYNA:     dt=0.17372E-02

1b.) Scale factor for computed time step is by default TSSFAC=0.9

2.) Include *CONTROL_TIMESTEP keyword and define TSSFAC=1.0

3.) LS-DYNA chose the greatest possible time step and the computed critical time step is greater than the one defined via DT2MS.

4.) Define a load curve that limits the maximum time step size
(*CONTROL_TIMESTEP, LCTM)

5.) Error termination due to "out-of-range (rotational) velocities" --> simulation gets unstable

**Students**

**Formula One**

If your University is working on a Formula One please consider listing it here. Send the information to mv@feainformation.com

**Brigham Young University:**



PACE Formula One Race Car Project begins a new year. The prior year was a success of many collaborative efforts. C. Greg Jensen, Professor, Mechanical Engineering, Brigham Young University and his students studied crash analysis and built a model. Among the collaboration Suri Bala led the LS-DYNA effort with his software, D3VIEW, an online collaboration tool for LS-DYNA projects

Last Year's Article    http://www.lstc.com/pdf/a_pace_car.pdf

**Slovak University of Technology**

Stuba GreenTeam is a racing team representing Slovak University of Technology in Bratislava. Our goal is to develop, design and manufacture a racing, participate on Formula Student electric and take the challenge to compete other racing teams from all over the world.   www.sgteam.eu  -

**Canada**          Metal Forming Analysis Corporation - MFAC -
                    Contact:   galb@mfac.com

**USA**             Engineering Technology Associates, Inc
                    Contact:     sales@eta.com

**USA**             SE&CS
                    Contact:    len@schwer.net

**USA**             Predictive Engineering
                    Contact:  george.laird@predictiveengineering.com

**USA**             CAE Associates
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**USA**             AEG Product Engineering Services
                    Contact:   support@engineering-group.com

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**FRANCE**   ALLIANCE SERVICES PLUS
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**ITALY**   EnginSoft SpA
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| | |
|---|---|
| **AUSTRALIA** | Leading Engineering Analysis Providers, LEAP |
| | Contact:  info@leapaust.com |
| **China** | Ove Arup & Partners |
| | Contact: |
| **China** | ETA China |
| | Contact: |
| **INDIA** | nHance Engineering Solutions Pvt Ltd |
| | Contact:  lavendra.singh@arup.com |
| **INDIA** | EASi Engineering |
| | Contact:  rvenkate@easi.com |
| **JAPAN** | JSOL Corporation |
| | Contact:  cae-info@sci.jsol.co.jp |
| **JAPAN** | Itochu Techo-Solutions Corp. |
| | Contact:  ls-dyna@ctc-g.co.jp |
| **KOREA** | THEME Engineering |
| | Contact:  wschung@kornet.net |
| **KOREA** | KOREAN SIMULATION TECHNOLOGIES |
| | Contact:  young@kostech.co.kr |

Alpha Order by Country

| Australia | Leading Eng. Analysis Providers - LEAP <br> http://www.leapaust.com.au/    info@leapaust.com.au |
|-----------|---------------------------------------------------------------------------------------------|
| Canada    | Metal Forming Analysis Corp - MFAC <br> http://www.mfac.com/        galb@mfac.com |
| China     | ETA China <br> http://www.eta.com.cn/    lma@eta.com.cn |
| China     | OASYS Ltd. (software house of Arup) <br> http://www.oasys-software.com/dyna/en    stephen.zhao@arup.com |
| France    | ALYOTECH TECH. <br> http://www.alyotech.fr      nima.edjtemai@alyotech.fr |
| France    | ALLIANCE SVCE. PLUS - AS+ <br> http://www.asplus.fr/ls-dyna          v.lapoujade@asplus.fr |
| Germany   | CADFEM <br> http://www.cadfem.de/en      lsdyna@cadfem.de |
| Germany   | DYNAmore <br> http://www.dynamore.de/    uli.franz@dynamore.de |
| Greece    | PhilonNet Engineering Solutions <br> http://www.philonnet.gr        stavroula.stefanatou@philonnet.gr |

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

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

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

The LSTC Models Development Team has decided to formalize the procedure of distributing news about LSTC's models in order to handle the increased number of recipients.

Previously, you have received news about LSTC's models, via direct e-mails from Sarba Guha.  The previous mailing list was retired, as of the first invitation to the new mailing list.

If you arel interested in receiving the LSTC Models News:

1. **Subscribe** to this new mailing list at the following website:

   http://listserv.lstc.com/mailman/listinfo/lstc_models_news

2. **Receive:**  You will receive an e-mail from the mail program
             with the following sender address:
                 [lstc_models_news-request@listserve.lstc.com]
             with the subject line
                 "confirm" and an alpha-numerical code.

3. **Confirm:**  Per the instructions in that e-mail, please confirm your e-mail address

4. **Address Book:**  To ensure receipt of emails from LSTC Models News, add
                 [lstc_models_news@listserv.lstc.com]
                 to your address book or safe list

5. **Confidentiality:**  Your e-mail address will not be distributed outside of LSTC
                  and only used for the LSTC Models News.

Thank you for your interest in our products!

**Best regards,  LSTC Models Development Team**

http://investors.cray.com/phoenix.zhtml?c=98390&p=irol-newsArticle&ID=1546935&highlight=

SEATTLE, WA, Apr 05, 2011 -- Global supercomputer leader Cray Inc. (NASDAQ: CRAY) today announced that the Cray CX1000 supercomputer is now available with the new Intel® Xeon® processor E7 family-based platform. Designed for data-demanding workloads and featuring advanced reliability and new levels of scalability, the new Intel® Xeon® processor E7 family will be featured in the Cray CX1000-S compute configuration of the Cray CX1000 system.

The symmetric multiprocessing (SMP)-based Cray CX1000-S configuration provides users with up to 128 cores of "big memory" computing built on Intel's QuickPath Interconnect (QPI) technology. The Cray CX1000-S system, which is one of the most dense large SMP solutions in the market, delivers maximum performance on scale-up jobs.

"Engineers, researchers and scientists want an affordable, mid-range high performance computing system that is architected with the latest technology, and the Cray CX1000-S system is designed to meet these evolving needs," said Barry Bolding, vice president of Cray's products division. "With advanced CPU, GPU and now symmetric multiprocessing solutions based on today's launch of the latest Intel Xeon processors, Cray CX1000 customers can apply a customized supercomputing resource built with cutting-edge processing technology to their unique set of scientific challenges."

The Cray CX1000 supercomputer is priced starting at under $100,000, and provides high performance computing (HPC) users with a hybrid supercomputing architecture. Each configuration allows Cray CX1000 customers to architect a supercomputing system designed to solve computationally intensive problems with scale-out, scale-up or accelerated computing solutions.

"There is growing user demand for more affordable high performance computing," said Raj Hazra, general manager of High Performance Computing at Intel. "Cray and Intel are providing opportunities for a whole new segment of the market to address complex problems with the Cray CX1000 based on the Intel® Xeon® processor E7 family."

Available in one to four chassis in a single, standalone cabinet, the three compute configurations for the Cray CX1000 system include the Cray CX1000-C, Cray CX1000-G and the Cray CX1000-S. The compute-based Cray CX1000-C features the dual-socket Intel Xeon Processor 5600 series for scale-out cluster computing; the Cray CX1000-G utilizes the NVIDIA® Tesla™ GPUs for accelerator-based HPC; and the Cray

CX1000-S features the Intel Xeon Processor E7 family. These complimentary technologies can be configured together to provide one system to meet a broad range of HPC application workloads.

About Cray Inc.

As a global leader in supercomputing, Cray provides highly advanced supercomputers and world-class services and support to government, industry and academia. Cray technology is designed to enable scientists and engineers to achieve remarkable breakthroughs by accelerating performance, improving efficiency and extending the capabilities of their most demanding applications. Cray's Adaptive Supercomputing vision is focused on delivering innovative next-generation products that integrate diverse processing technologies into a unified architecture, allowing customers to surpass today's limitations and meeting the market's continued demand for realized performance. Go to www.cray.com for more information.

Cray is a registered trademark, and Cray CX1000, Cray CX1000-S, Cray CX1000-C and Cray CX1000-G are trademarks of Cray Inc. Other product and service names mentioned herein are the trademarks of their respective owners.

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April 2011 – Visit Us At The Following Events and/or Trade Shows.

Panasas, Inc., the leader in high-performance scale-out NAS storage solutions, enables enterprise customers to rapidly solve complex computing problems, speed innovation and bring new products to market faster.

**Panasas Executive Seminar Series**
Bethesda, Md., USA
        May 19, 2011
        Bethesda Marriott | Potomac Room

 **EAGE 2011**
Vienna, Austria
        May 23-26, 2011
        Booth #1642
        Request a meeting with a Panasas Storage Expert at EAGE 2011

**2011 European LS-DYNA Conference**
Strasbourg, France
        May 23-24, 2011

**ISC 2011**
Hamburg, Germany
        June 19 - 23, 2011
        Booth #340
        Request a meeting with a Panasas Storage Expert at ISC '11

http://www.sgi.com/company_info/newsroom/press_releases/2011/april/sel.html

## Semiconductor Energy Laboratory Selects SGI to Accelerate Creation of Advanced R&D Technology Solutions

Leading Japanese Semiconductor Innovator Expects Up To 10X Performance Gain

Fremont, Calif. — April 18, 2011 — SGI (NASDAQ: SGI), a trusted leader in technical computing, today announced that Japan's Semiconductor Energy Laboratory (SEL) has purchased a high performance computing (HPC) solution consisting of an SGI® Altix® ICE 8400 to accelerate the research and development of semiconductor technology.

The system will have 3,840 processor cores built with Intel® Xeon® processor 5600 series, along with up to 15TB of memory, and is projected to achieve up to a ten-fold increase in application performance over the previous solution. It will be used for research and development work on thin-film integrated circuits, liquid crystal and electroluminescent displays, semiconductor thin-film transistors, solar cells, and batteries.

"Having previously used an SGI Altix 4700 system, we wanted the fastest available cluster system for achieving the results we need, and expect to gain up to ten times the application performance over our previous system," said Shunpei Yamazaki, president of Semiconductor Energy Laboratory. "We expect to achieve these results and more with this new system, to the benefit of our customers and the end users of the technologies we will be able to create."

Semiconductor Energy Laboratory referenced both SGI's history of product performance, and in particular, SGI Japan's technical support and the value of their ongoing relationship in choosing SGI for this new deployment. The system is expected to be in place and operational in July 2011.

"The business-critical technical computing challenges our customers face demand solutions that offer a dramatic increase in speed and performance," said Nobuhiko Nakatsu, president of SGI Japan. "With the SGI Altix ICE 8400 series we are able to offer our customers the high end of design and development compute solutions in a very flexible and robust platform."

"Semiconductor research and development applications benefit from the raw computing performance delivered by the Intel® Xeon® processor 5600 series," Rajeeb Hazra, general manager of High Performance Computing at Intel. "We're excited to see more

customers benefit from the SGI Altix 8400 series' capability to scale out to support HPC applications like those being run at SEL."

About SGI

SGI, a trusted leader in technical computing, is focused on helping customers solve their most demanding business and technology challenges. Visit www.sgi.com for more information.

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http://www.datapointlabs.com/2011-04-20Workshop.pdf

**Mr. Hubert Lobo will present a workshop on Testing and Material Modeling Software for Crash & Safety Simulation at the CARHS Automotive CAE Grand Challenge 2011 - April 20, 10:45 - 12:15, Conference Room 5**

Testing and Material Modeling Software for Crash & Safety Simulation
DatapointLabs/Matereality – Hubert Lobo

### Introduction

The testing of materials for use in crash and safety simulations and the conversion of test data into material models is a process that is not well standardized in the industry. Consequently, CAE users face uncertainty and risk in this process that can have a negative impact on simulation quality. In this workshop, we present approaches currently used in the US for the gathering of high quality test data plus the acclaimed Matereality CAE Modeler software that is used to transform high strain-rate data into crash material cards.

The workshop will feature live demonstration and training in the use of the CAE Modelers for LS-DYNA, PAMCRASH, Abaqus and ANSYS. This will give the attendee a working knowledge of how to model their materials to give accurate and predictable simulation results. The workshop will also touch on newly developed Reverse Material Modeling technology that permits the import of a material model from one CAE software to another.

The second part of the workshop will illustrate standardized methods for testing of materials for crash. This will include comments about testing philosophy, experimental technique, sampling and specimen geometry. The benefits and limitations of some commonly used crash material models will be discussed. Model selection criteria for different kinds of material behaviors will be presented. Methods for assessing data quality will also be covered.

### Material Modeling Software for Crash Simulation – 45 min

Matereality's CAE Modeler software used for the conversion of rate dependent properties into material models for different CAE software products used in crash simulation. The live session will include:

- How to pick the correct material model to represent the observed behavior
- Interactive model tuning and export ·

- Crash material modeling for LS-DYNA, PAMCRASH, Abaqus and ANSYS CAE ·
- Reverse material modeling: how to import a material model from one CAE software to another ·
- Copy and edit whereby the user can modify and save a personal copy of raw material data for advanced material modeling and transformation.

**Material Testing for Crash Simulation – 40 min**

Testing methodologies employed at DatapointLabs for the testing of ratedependent properties of materials for use in crash and safety simulation. ·
- A test philosophy for representing rate dependency of materials

- Experimental technique including sampling and specimen geometries
- Overcoming material model limitations when representing nonlinear materials
- Assessment of crash material data quality, expected trends & validation
- Specific comments for unfilled and fiber-filled polymers, foams, rubber and metals

http://www.datapointlabs.com for all your up to date news information, on products, product releases, events/tradeshows.