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Question 2



Students/Formula One/Projects



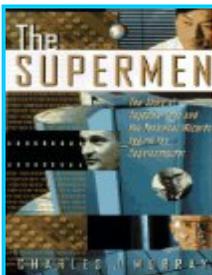
The 12th International LS-DYNA® Users Conference



Fibonacci numbers in nature



United States P-51 Mustang



**Seymour Cray,
The Father of Supercomputing**

— gas at 20°C — liquid at 35°C — radioactive																	
H															He		
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn						
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb		
		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No		

**A Comprehensive PTLP Bond
Selection Procedure**

TABLE OF CONTENTS

Articles

04	Announcements
05	FEA Platinum Participant Sponsors
06	Conference Paper Showcase – LS-DYNA® – Professional Hammer Drills
07	A Comprehensive PTLP Bond Selection Procedure
12	Oasys Seismic Software
14	Fibonacci Number Series
16	High Performance Cloud Service, by Richard Colby SGI HPC Cloud Cyclone™
18	P-51 Mustang
19	Father of Supercomputing – Seymour Roger Cray

Books for Purchase

21	Reading Reference Library
----	---------------------------

Solutions

22	Pre-Processing - Post Processing - Model Editing -
23	Software
25	Resources on Line

EVENTS

26	BETA CAE Systems SA
27	4 th Annual India Oasys & LS-DYNA Update Meetings
29	ETA China – 6 th Training of Vehicle Crash & Safety Design
30	8 th European LS-DYNA Users Conference Training Session Schedule
33	The 12th Int'l LS-DYNA® Users Conf. (2012)
34	carhs Automotive CAE Grand Challenge
36	6th International Conf. Multiphase Flow
37	China Commercial Aircraft Summit & Expo

Training Courses

38	CADFEM
39	LSTC
40	Training - ERAB
41	Training - AS+
42	Training - PhilonNet
43	Training - Shanghai Hengstar

LS-DYNA Users Challenge Your Knowledge

44	Challenge #1 Question & Answer
46	Challenge #2 Question & Answer

Formula One Student Information

48	Formula One - Universities - Projects - Teams
----	---

Directory Listings

49	FEA Consultants - Engineering Services
51	LS-DYNA Distributors

News Release

56	LSTC Model Development Team Announces Mailing List for Updates
57	Korean Air Force Selects SGI To Accelerate Weather Forecasting
59	μ ETA v6.6.4 release announcement

Announcements

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

New Format

We are receiving articles and news from FEA participants, and the engineering community. During Q2 the format will continue to change, to encompass the growth, and organization of sections format. As always, feel free to make any suggestions on format and changes you feel would be best.

We have created a section for listings of universities working on Formula 1 projects, racing, Formula 1 crash analysis. Additionally, we have added a section for the "Users Challenge Your Knowledge Questions and Answers"

April we will publish for a review trial period, an area dedicated to ATD Models information and solutions.

We are reviewing two requests and would like your feedback.

1. A request for a section listing universities and organizations relating to Biomechanical projects/solutions.
2. A Section "New Releases" A section for software new release version, date of release and the URL for more information.

Any suggestions, pro or con, please let me know Marsha mv@feainformation.com

LSTC's Model News Release

New Mailing List for Model Updates, from LSTC's Model Development Team

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

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



Rebecca, holding Cajun's head, while Cajun was sedated for treatment, by Dr. Wyborg. Cajun is usually galloping. It was nice to have him quiet. We could kiss him on the nose.



FEA Information

Platinum Participants

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



Conference Paper Showcase
Paper available for download at:
DYNALOOK
<http://www.dynalook.com/>

Usage of LS-DYNA® in the Development of Professional Hammer Drills

A. Syma, - Black & Decker GmbH, DeWALT Professional Engineering Ctr., Germany

M. Hörmann - CADFEM GmbH, Germany

<http://www.dynalook.com/international-conf-2010/Simulation-3-2.pdf>

Abstract

The development of modern electric power tools for professional use requires special attention. Characteristic aspects such as efficiency and user comfort along with robustness and durability are always of importance to the manufacturer. For the fulfillment of these attributes computer-aided simulation combined with the finite element software LS-DYNA® is a central point during the development process at Black & Decker GmbH, i.e. from the predevelopment phase up to testing near series prototypes.

The area of application of LS-DYNA® is not limited to classical drop test cases for devices (see Figure 1), but goes far beyond that. DeWALT uses LS-DYNA® for their hammer drill development in order to account for different hammer sub-assemblies and various structural mechanical concerns. Particularly during the hammer work interpretation regarding unwanted idle impacts, LS-DYNA® can simulate harmful shock waves in the drilling spindle and tool holder for the equipment. Further LS-DYNA® allows the computational illustration of the entire hammer drive

train (see Fig. 2) as well as the simulation of comprehensive misuse. Based on case examples from the daily employment of LS-DYNA® in development practice the various types of applications at Black & Decker GmbH, DeWALT are shown.

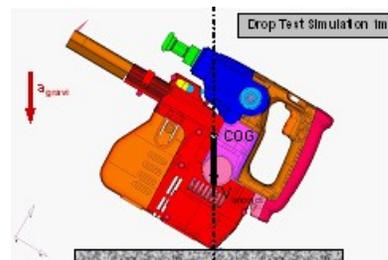


Fig. 1: Drop test simulation of a Hammer drill

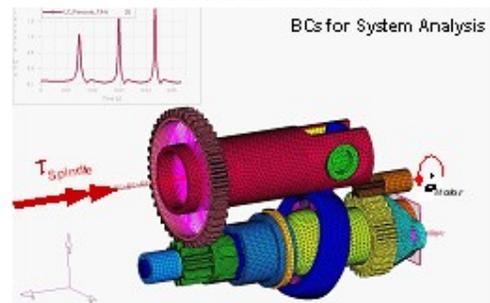


Fig. 2: Simulation model of a Hammer drill drive train

A Comprehensive PTLP Bond Selection Procedure, Part 1

Dr. Grant O. Cook III*

Dr. Carl D. Sorenson

* Correspondence Contact: goc3.engineer@mac.com

Introduction

Engineered products often contain joints or bonds that experience loads, such as those caused by structural forces, vibration, or thermal cycling. In many cases, these connections are the weak points in the assembly and require the most attention to ensure a robust product. In general, typical joining methods, such as welding, soldering, bolting, or using an adhesive, create a sufficiently strong connection. However, some assemblies, such as jet engines, endure harsh loads and environments and therefore require a high-level bonding process to function properly.

TLP Bonding

Transient liquid phase (TLP) bonding is a relatively new joining process that was developed to improve upon existing bonding technologies. Specifically, this process was patented by Paulonis, Duvall, and Owczarski in 1971 [1] to overcome deficiencies of then-current bonding techniques in joining Ni-based and Co-based superalloys for use in land-based and aero engine turbines [2–6]. The main advantage of TLP bonding

is that resulting bonds have a higher melting point than the bonding temperature. In other words, materials can be bonded at a temperature equal to or lower than what the assembled part will experience in service. This is especially important for temperature-sensitive or heat-treated materials whose microstructures can be damaged or altered by too much thermal energy input and therefore need to be joined at lower temperatures.

TLP bonding characteristically lies between diffusion bonding and brazing—for this reason, it is commonly called diffusion brazing. The TLP bonding process involves the following steps:

- setting up the bond (a thin interlayer, on the order of 10–100 μm , between the substrate materials)
- heating the bond to the specified bonding temperature to produce a liquid in the bond region
- holding the assembly at the bonding temperature until the liquid has isothermally solidified due to diffusion
- homogenizing the bond at a suitable heat-treating temperature

The key to TLP bonding is isothermal solidification. The composition of the interlayer changes during TLP bonding, and is dictated by the solidus and liquidus lines of the appropriate phase diagram. This is what causes solidification to occur isothermally. And because the interlayer is very thin, the liquid that forms diffuses quickly into the substrate materials.

TLP bonding has been successfully used in some industrial applications. Also, it has been shown to create sufficiently strong bonds in alloys of Ni, Al, Fe, Ti, Cu, and Mg, as well as some intermetallics, pure metals, metal matrix composites, and dissimilar material combinations.

PTLP Bonding

Because TLP bonding relies on the diffusion of an interlayer into the substrate materials, it has very limited applications in joining ceramics. For this reason, partial transient liquid phase (PTLP) bonding, a variant of TLP bonding, was developed.

The PTLP bond setup (see Figure 1) generally consists of a thick refractory

core (on the order of 10–100 μm) with thin layers on each side (about two to ten percent of the refractory core thickness). On heating, the thin layers melt and diffuse into the refractory core, causing isothermal solidification, as in TLP bonding. However, these liquid layers must also adhere to (or wet) the substrate materials, and herein lies the main difficulty of PTLP bonding.

PTLP bonding has been used to successfully bond some ceramics, such as Al₂O₃ and Si₃N₄, as well as composites. It has also been used to bond metals to ceramics. However, the applications of PTLP bonding are far fewer than those of TLP bonding. Given the strengths of ceramics and other hard-to-join materials in certain applications, it is expected that there are ideal PTLP bonding applications yet to be discovered.

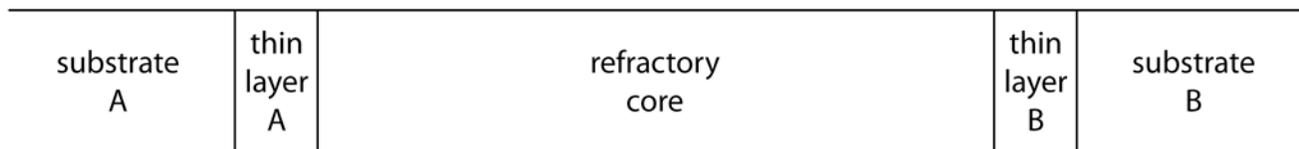


Figure 1: A general PTLP bonding setup

A Comprehensive PTLP Bond Selection Procedure

A filtering procedure has been developed to select ideal PTLP bond setups. This procedure begins with all elements of the periodic table. Only those elements that cannot be used in a PTLP bond are removed; these include elements that are gas at room temperature, toxic liquids near room temperature, or highly radioactive. After this filtering step, 73 elements remain. A typical PTLP bond setup of three layers is used (see Figure 1), resulting in $72 \cdot 73 \cdot 72$ or 378,432 possible bond setups (the thin layers cannot be the same element as the refractory core for diffusion to occur).

The 73 remaining elements are used to construct a set of all possible binary systems (2,628). About three quarters of the possible systems are included in a comprehensive phase diagram handbook [7]. Most of those that are not included are either exotic systems or systems for which experimental data is very difficult to obtain. Even some of the phase diagrams contained in this handbook include only scant data. Therefore, it is assumed that all practical binary systems are included in this subset, continuing the comprehensive nature of the filtering process.

The binary system database consists of sufficient information from each binary system to characterize it with respect to four PTLP bonding criteria, which are shown in Figures 2 and 3 and explained below:

- A: a liquid and terminal solid region must exist at the specified bonding temperature (chosen as 1000°C in

Figure 2); in this case, Pb is the thin layer element and Pd is the refractory core element

- B: a bulk liquid region must form; the concentration of the liquidus line at the bonding temperature should be at least five to ten atomic percent, preferably twenty
- C: the homogenized bond composition must lie in a solid region (C_1), preferably within the terminal solubility region (C_2)
- D: the homogenized bond composition cannot cause the precipitation of a liquid phase on cooling down (see Figure 3)

Beside the binary system filtering, other filters such as toxic elements, eutectic systems, and sessile drop test results can be used in this filtering procedure. This comprehensive PTLP bond selection routine is currently being coded and is nearing completion. It will allow for many user inputs, such as maximum permissible bonding temperature, target remelting temperature of the resulting PTLP bond, and thickness of the interlayers. Possible PTLP bond setups will then be output by the program in a sorted list that will allow for quick identification of ideal setups.

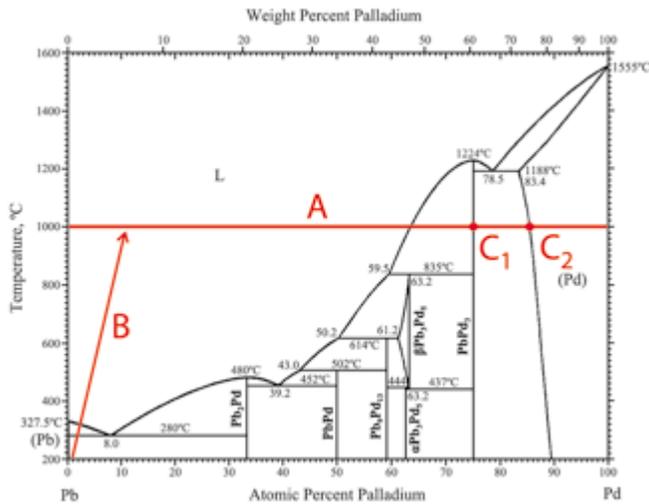


Figure 2: Pb-Pd binary system illustrating the PTLP bonding criteria A through C

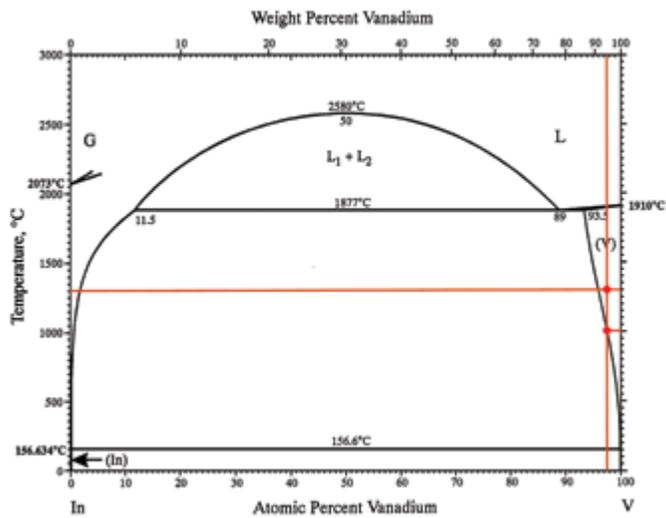


Figure 3: In-V binary system demonstrating the type of phase diagram filtered out by criterion D. Note that a bond composed of 2.5 at.% V and 97.5 at.% In (indicated by the vertical line) would solidify at 1300°C, but on cooling down it would start to melt at about 1000°C.

Summary

The goal of this generalized PTLP bond selection program is to provide lists of ideal PTLP bond setups without having to rely on empirical bonding knowledge. The quick identification of ideal bond setups for many different applications

will help PTLP bonding become a more successful industrial bonding process.

[This work is funded by the Office of Naval Research under grant number

N00014-07-1-0872, Dr. William Mullins,

References

[1] Paulonis, D., Duvall, D., and Owczarski, W., 1971, "Diffusion Bonding Utilizing Transient Liquid Phase," United States Patent 3,678,570.

[2] Zhang, L., Hou, J., and Zhang, S., 2007, "A Study on the Two-step Transient Liquid Phase Diffusion Bonding of K640 Superalloy," *China Welding*, **16**(1), pp. 63–7.

[3] Lee, B. K., Song, W. Y., Kim, D. U., Woo, I. S., and Kang, C. Y., 2007, "Effect of Bonding Temperatures on the Transient Liquid Phase Bonding of a Directionally Solidified Ni-based Superalloy, GTD-111," *Metals and Materials International*, **13**(1), pp. 59–65.

[4] Abdelfatah, M. and Ojo, O. A., 2009, "Formation of Eutectic-type Microconstituent During Transient Liquid Phase Bonding of

Program Officer]

Nickel: Influence of Process Parameters," *Materials Science and Technology*, **25**(1), pp. 61–7.

[5] Ojo, O. A., Richards, N. L., and Charturvedi, M. C., 2004, "Effect of Gap Size and Process Parameters on Diffusion Brazing of Inconel 738," *Science and Technology of Welding and Joining*, **9**(3), pp. 209–20.

[6] Dinkel, M. K., Heinz, P., Pyczak, F., Volek, A., Ott, M., Affeldt, E., Vossberg, A., Göken, M., and Singer, R. F., 2008, "New Boron and Silicon Free Single Crystal-diffusion Brazing Alloys," *Proceedings of the International Symposium on Superalloys*, pp. 211–20.

[7] Okamoto, H., 2000, *Desk Handbook: Phase Diagrams for Binary Alloys*, ASM International, Materials Park, Ohio.

Introductory information about phase diagrams can be found at the following sites:

MIT Open Course

<http://ocw.mit.edu/courses/materials-science-and-engineering/3-091sc-introduction-to-solid-state-chemistry-fall-2010/34-binary-phase-diagrams-complete-solubility/>

University of Cambridge Learning Packages

<http://www.doitpoms.ac.uk/tlplib/phase-diagrams/intro.php>

University of Virginia: chapter outline

<http://people.virginia.edu/~lz2n/mse209/Chapter9c.pdf>

This article is an extension of doctoral research that was recently completed. The associated dissertation explains an application of the filtering procedure (slightly modified) to produce a successful WC bond capable of withstanding high stress at high temperature. It also includes a detailed background of TLP and PTLP bonding. A link to this dissertation, along with additional information about the principal author, can be found on the following web site:

<http://goc3.com/engineer>



Seismic Software

GSA - Siren - Sigraph

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

GSA is a general purpose frame and finite element analysis tool, also providing steel member and reinforced concrete design. GSA allows seismic analysis via code based equivalent static loads, modal and code based response spectra.

GSA enables you to analyse and design a range of structural models composed of skeletal frames and two-dimensional finite elements, which makes it the perfect tool for the ever increasing demands placed upon structural engineers.

Originally developed in-house at Arup to meet their demanding and diverse requirements, its capabilities have been proven on thousands of complex and prestigious projects world-wide. These include the Swiss Re, Gatwick Air Bridge, Heathrow Terminal 5, Khalifa Stadium, CCTV Building Beijing, 122 Leadenhall Street, and the Angel of the North.

From a simple beam to a complex multi-storey building, from a sculpture to a fabric structure or a bridge, GSA is the program to solve your engineering problem.

Siren allows investigation of a site response to a seismic event. The site is modelled as a column of soil overlying

bedrock. Excitation is assumed to apply at the bedrock level and an explicit time integration scheme is used to calculate the soil response with time.

Siren Overview

Siren allows investigation of a site response to a seismic event.

General features:

- Wizards to guide users in setting up the model
- Units can be chosen from preset SI, kN-m, kip-ft or kip-in unit sets or specified individually for each component
- Import of excitation time-histories in a variety of formats
- Graphical representation of results
- Data checking to identify invalid or inconsistent data

In Siren the site is modelled as a column of soil overlying bedrock. Properties are assigned to the bedrock and the soil which is modelled as a non-linear stress-strain curve which incorporates hysteresis effects. Excitation is assumed to apply at the bedrock level and an explicit time integration scheme is used to calculate the soil response with time.

Features

- Multiple soil stress-strain curves and transmitting or non-transmitting boundaries
- Control of integration time step and output time step
- Graphical output of time histories: displacements, velocities, accelerations, stresses and strains
- Graphical output of stress-strain histories
- Calculation of response spectra
- Export to Sigraph for post-processing
- The user documentation gives full details of the capability of Siren. This is available both in PDF format and In online format from the Help menu within the program.

Sigraph allows time-history and related data to be displayed as a series of "curves". At any point the data can be edited and manipulated in a familiar spreadsheet style.

Sigraph Overview

Sigraph is a program for manipulation and display of time history data with a particular emphasis on seismic data.

General features:

- Import and spreadsheet style input of time histories
- Mathematically defined time histories
- Import of excitation time-histories in a variety of formats

- Graphical representation of results
- Data checks to identify invalid or inconsistent data

Sigraph allows time-history and related data to be displayed and manipulated. At any point the data can be edited and manipulated in a familiar spreadsheet style. The data is a series of "curves" with no limits on the number of curves or the number of points per curve.

Features

- Scalar, vector and tensor and real or complex time-history data
- Control over which curves are shown and how these curves are displayed graphically
- Manipulation of curves for by a range of arithmetic and mathematical functions
- Differentiation and integration of time histories
- Fourier (FFT) and inverse Fourier transforms
- Specific seismic manipulation options, such as base-line correction

The user documentation gives full details of the capability of Sigraph. This is available both in PDF format and in online format from the Help menu within the program.



Fibonacci number

The Sequence

The Fibonacci Series was brought to our attention by Dr. Makino. We found it interesting and would like to share parts of the numerical series information.

Information is available at wikipedia and other sites by searching on Fibonacci numbers

By definition, the first two Fibonacci numbers are 0 and 1, and each subsequent number is the sum of the previous two. Some sources omit the initial 0, instead beginning the sequence with two 1s.

In mathematical terms, the sequence F_n of Fibonacci numbers is defined by the recurrence relation.

0,1,1,2,3,4,5,8,13,21,34,55,89,144,

This is an example of a recursive sequence, obeying the simple rule that to calculate the next term one simply sums the preceding two:

$$F(1) = 1$$

$$F(2) = 1$$

$$F(n) = F(n - 1) + F(n - 2)$$

Thus 1 and 1 are 2, 1 and 2 are 3, 2 and 3 are 5, and so on. This simple, seemingly unremarkable recursive sequence has fascinated mathematicians for centuries

Fibonacci numbers are used in the analysis of financial markets, in strategies such as Fibonacci retracement, and are used in computer algorithms

such as the Fibonacci search technique and the Fibonacci heap data structure. The simple recursion of Fibonacci numbers has also inspired a family of recursive graphs called Fibonacci cubes for interconnecting parallel and distributed systems. They also appear in biological settings, such as branching in trees, arrangement of leaves on a stem, the fruit spouts of a pineapple, the flowering of artichoke, an uncurling fern and the arrangement of a pine cone.

Fibonacci is a shortening of the Latin "filius Bonacci", used in the title of his book *Libar Abaci* (of which more later), which means "the son of Bonaccio". His father's name was Guglielmo Bonaccio. Fi'-Bonacci is like the English names of Robin-son and John-son. But (in Italian) Bonacci is also the plural of Bonaccio; therefore, two early writers on Fibonacci (Boncompagni and Milanesi) regard Bonacci as his family name (as in "the Smiths" for the family of John Smith).

He was one of the first people to introduce the Hindu-Arabic number system into Europe - the positional system we use today - based on ten digits with its decimal point and a symbol for zero:

1 2 3 4 5 6 7 8 9 0

His book on how to do arithmetic in the decimal system, called Liber abbaci (meaning Book of the Abacus or Book of Calculating) completed in 1202 persuaded many European mathematicians of his day to use this "new" system.

Fibonacci numbers create a mathematical pattern found throughout nature.





High Performance Cloud Service

Richard Colby, Freelance Writer, © RCR, November 2010 – Part 1

Automotive, Aerospace, Biomechanics, Manufacturing Processes, Civil Engineering, and consulting engineers have a main issue in common. The common need is for large scale, technical engineering productivity on a moment's notice and to reduce costs. When a job comes across your desk, that is a higher core capacity demand than the computing power in house, Cloud Computing offers supplemental core/cpu consumption. The Cloud delivery base gives technical engineers an access to computing power resources.

It is a fact that FEA simulations continue to grow in size and complexity. Along with this growth, there is a drive within the engineering community to meet this, with outside IT solutions. Traditionally, the only solution IT departments had for an unpredicted spike in needs was, in essence, to scale up in demand for hardware or find ways to share servers.

It was finally time to go back to the future. The concept of Cloud Computing, and its chosen symbol is to show that there is a point, where there is the responsibility of the provider - and the the responsibility of the end user. Among the important features that the Cloud computing "cloud" covers, is its servers, the network infrastructure, and the secure and seamless outer structure, for the end user. As the end users capacity needs scaled up quicker than

purchasing resources, the Cloud Environment solved the problem.

Historically, technical engineering moved from the mainframes to the PC's, and now we see a movement from the PC's to the Cloud. Today this is due to tighter budgets, larger core capacity requirements, and ways to reduce IT bottlenecks. One of the key historical blocking points, to use any structure outside the internal IT infrastructure, was the need for security. From the "time-share", "on-demand-now", "use ours, not yours" generations, the issue of security was a problem. Today's HPC Technical Engineering Cloud Services provide that you know where you data is hosted. It's urgent to do due diligence research with any Cloud Provider; asking what types of controls are in place on their infrastructure, how is your information kept secure, the type of IT support, software support, fees for the software in use, and a mechanism should be in place, by the software providers, to assist the end users on lost time under certain circumstances.

End of Part 1.



**High Performance
Cloud Service
SGI
HPC Cloud Cyclone™**

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



Aerospace Information

P-51 MUSTANG

<http://www.aerospaceinformation.com>

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

First – Guess the name of the American Car, that Ford Motor Company's Designer John Najjar, recommended be named after the P-51 Mustang?

The North American Aviation P-51 Mustang was an American long-range single-seat World War II fighter aircraft. Designed and built in just 117 days to a specification issued to NAA by the British Purchasing Commission, the Mustang first flew in Royal Air Force (RAF) service as a fighter-bomber and reconnaissance aircraft before conversion to a bomber escort, employed in raids over Germany, helping ensure Allied air superiority from early 1944

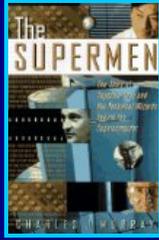
The P-51 was in service with Allied air forces in Europe. At the start of Korean War the Mustang was the United Nations' main fighter but the role was quickly

shouldered by jet fighters, including the F-86, after which the Mustang became a specialised ground-attack fighter-bomber. In spite of being superseded by jet fighters the Mustang remained in service with some air forces until the early 1980s.

As well as being economical to produce, the Mustang was a fast, well-made, and highly durable aircraft. The definitive version, the P-51D, was powered by the Packard V-1650, a two-stage two-speed supercharged version of the legendary Rolls-Royce Merlin engine, and was armed with six .50 caliber (12.7 mm) M2 Browning machine guns.

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>



Seymour Roger Cray

The Father Of Supercomputing

Cray was born in 1925 in Chippewa Falls, Wisconsin to Seymour R. and Lillian Cray. His father was a civil engineer who fostered Cray's interest in science and engineering. As early as the age of ten he was able to build a device out of Erector Set components that converted punched paper tape into Morse code signals. The basement of the family home was given over to the young Cray as a "lab".

Cray graduated from Chippewa Falls High School in 1943 before being drafted for World War II as a radio operator. He saw action in Europe, and then moved to the Pacific theatre. On his return to the United States he received a B.Sc. in Electrical Engineering at the University of Minnesota, graduating in 1949. He also was awarded a M.Sc. in applied mathematics in 1951.

In 1950, Cray joined Engineering Research Associates (ERA) in Saint Paul, Minnesota. ERA had formed out of a former United States Navy lab that had built codebreaking machines, a tradition ERA carried on when such work was available. ERA was introduced to computer technology during one such effort, but in other times had worked on a wide variety of basic engineering as well.

Cray quickly came to be regarded as an expert on digital computer technology,

especially following his design work on the ERA 1103, the first commercially successful scientific computer. He remained at ERA when it was bought by Remington Rand and then Sperry Corporation in the early 1950s. At the newly formed Sperry-Rand, ERA became the "scientific computing" arm of their UNIVAC division.

But when the scientific computing division was phased out in 1957, a number of employees left to form Control Data Corporation (CDC). Cray wanted to follow immediately, but CDC's CEO, William Norris, refused as Cray was in the midst of completing a project for the Navy, with whom Norris was interested in maintaining a good relationship. The project, the Naval Tactical Data System, was completed early the next year, at which point Cray left for CDC as well.

By 1960 he had completed the design of the CDC 1604, an improved low-cost ERA 1103 that had impressive performance for its price range. Even as the CDC 1604 was starting to ship to customers in 1960, Cray had already moved on to designing its "replacement", the CDC 6600. Although in terms of hardware the 6600 was not on the leading edge, Cray invested considerable effort into the design of the machine in an attempt to enable it to run as fast as possible. Unlike most high-end projects, Cray realized that there was considerably

more to performance than simple processor speed, that I/O bandwidth had to be maximized as well in order to avoid "starving" the processor of data to crunch. As he later noted, Anyone can build a fast CPU. The trick is to build a fast system.

The 6600 was the first commercial supercomputer, outperforming everything then available by a wide margin.

Cray continues the legacy with dedicated engineers, advanced developments, and solid history for building computers for all users, and their supercomputers.

Supercomputer 2009: Cray's XT5 supercomputer at Oak Ridge National Laboratory, referenced on the Top500 list had the "world's fastest supercomputer" and took the crown from IBM's Roadrunner. Cray's XT5 finally beat Roadrunner with a 1.75 petaflop/second performance speed running the Linpack benchmark (compared to 1.1 petaflop for Roadrunner). The Top500 list reported that Jaguar has a theoretical peak capability to 2.3 petaflop/second.

For additional information on the history of Cray visit:

<http://www.cray.com>

Book Available at Amazon

The Supermen: The Story of Seymour Cray and the Technical Wizards Behind the Supercomputer

[Go To Book at Amazon](#)

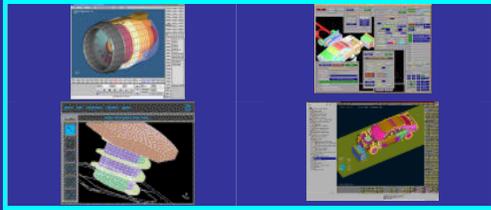
Seymour Roger Cray was a U.S. electrical engineer and supercomputer architect - Called "the father of supercomputing," -- Cray has been credited with creating the supercomputer industry.



Reading Reference Library

Available From
Amazon

	<p>Finite Element Analysis Theory and Application with ANSYS (3rd Edition)</p>		<p>Arbitrary Lagrangian-Eulerian and Fluid Structure Interaction.</p>
	<p>Isogeometric Analysis: Toward Integration of CAD and FEA</p>		<p>NURBS for Curve & Surface Design: From Projective Geometry to Practical Use</p>
	<p>A First Course in Finite Elements</p>		<p>Engineering Numerical Analysis</p>
	<p>The Supermen: The Story of Seymour Cray and the Technical Wizards Behind the Supercomputer</p>		
	<p>Go To Book at Amazon</p> <p>Seymour Roger Cray was a U.S. electrical engineer and supercomputer architect - Called "the father of supercomputing," -- Cray has been credited with creating the supercomputer industry.</p>		



Solutions

Pre-Processing
Post Processing
Model Editing

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

BETA CAE Systems S.A.

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

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

Engineering Technology Associates, Inc.

<http://www.inventiumsuite.com>

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

Oasys, Ltd

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

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

JSOL Corporation

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

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

Livermore Software Technology Corporation

<http://www.lstc.com>

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



Solutions Software

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.

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

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.

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.



Solutions Software

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



Information Solutions Site Directory

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/lsp
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



June 1-3 2011
BETA CAE Systems SA
4th ANSA & μ ETA Int'l Conference
Makedonia Palace
Thessaloniki, Greece

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 & μ ETA 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 & μ ETA. 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 & LS-DYNA

4th Annual Update Meetings India:

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



ETA-China

The 6th Training of Vehicle Crash Safety Design.

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

ETA-China - sole sponsor – The 6th Training of Vehicle Crash Safety Design.

Engineering Technology Associates (China), Inc. - www.eta.com
39B, Shangshi Bldg, No.18 Caoxi Rd.(N.), Shanghai
Contact: msu@eta.com

ETA China is proud to be the sole sponsor of the 6th Training of Vehicle Crash Safety Design. The annual event is organized by China Mechanical Engineering Society (CMES).

This year on April 18th to April 22nd CMES has chosen Shanghai for the location. The timing of this training brings two important events together:

- The 14th Shanghai International Automobile Industry Exhibition
- 6th Training of Vehicle Crash Safety Design

Initial estimates, have more than 50 engineers, from China's main automobile manufacturers, participating in the 6th Training of Vehicle Crash Safety Design

Several experts in the field of Vehicle Crash Safety Design will be speakers and share other topics during the training sessions. These topics include:

- The Latest Vehicle Active Safety Technology,
- NCAP Crash Testing,
- LS-DYNA Application,
- Vehicle Structure CAE & Modeling,
- Car crash cases etc.

As the CAE technology developer and service provider in China, our team is devoted to CAE software promoting, training and consulting for the Auto Industry, Tooling Industry and Electronics Industry etc.

We sponsored and organized many specialized seminars & trainings in the past years. ETA China is focusing on their clients needs and, today our main automobile manufacturers and tooling factories are our important - we are now involved in many of the new car developments



**May 23rd & 24th, 2011
The 8th European
LS-DYNA Users Conference
hosted by ALYOTECH
Strasbourg (France)**

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.lsdynauc.alyotech.fr



May 23rd & 24th, 2011
The 8th European
LS-DYNA Users Conference
hosted by ALYOTECH
Strasbourg (France)

Training Sessions:

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

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



2012
The 12th International
LS-DYNA® Users Conference
June 3rd, 4th, and 5th of 2012

The 12th International LS-DYNA® Users Conference.

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

The First Call for Papers will be in the April Issue

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.



**2011
carhs
Automotive CAE Grand Challenge
April 19, 2011**

http://www.carhs.de/de/training/seminar_functions.php?sem_code=1669

For Complete Information please visit their website.

Excerpt:...

The Expert Dialog

In the last 20 years computer simulation has become an indispensable tool in automotive development. Tremendous progress in software and computer technology make it possible today to access product and process performance before physical prototypes have been built. Applications of computer simulation cover nearly all aspects of product and process design from crashworthiness to manufacturability.

Challenges in virtual vehicle development

Despite of significant progress in simulation technology and impressive results in industrial application there remains a number of problems (challenges) which prevent the move to a "100% digital prototyping".

Grand Challenge as a platform for dialog

The automotive CAE Grand Challenge stimulates the dialog between users, scientists and software developers in order to promote the solution of these challenges.

Annually the most important (grand) challenges – whose resolution would

further increase the possibilities of computer simulation in automotive development – are being identified through a survey among simulation experts of the automotive industry. The challenges identified in 2011 are:

- Crash: Models of Connections (spot welds etc.)
- Durability: Influence of Manufacturing Effects
- NVH: Models for Damping Materials
- Stamping: Material Models (including Failure)
- Optimization: Topology and Shape Optimization
- Analysis Process: Model Building, Process Automation, Quality Assurance

In the conference one session will be dedicated to each "Grand Challenge". In each session a simulation expert from the automotive industry will first explain the importance of the individual challenge. Next a researcher will explain the state of research on the subject. This will be followed by presentations from the software companies involved in the discipline on their efforts to solve the individual challenge.

Challenge 1 –

Crash:

Models of Connections (e.g. spot welds) in Crash Analysis

Challenge 2 –

Durability:

Influence of Manufacturing Effects in Durability Analysis

Challenge 3 –

NVH:

Models for Acoustic Damping Materials in Acoustic Analysis

Challenge 4 –

Stamping:

Material Laws including Failure in Stamping Simulation

Challenge 5 –

Optimization:

Topology and Shape Optimization

Challenge 6 –

Process:

Model Building, Process Automation + Quality Assurance

Among the exhibitors and/or presenters are:

- BETA CAE Systems
- Datapoint Labs
- Dynamore
- ESI
- MSC.Software
- Scapos / Fraunhofer SCAI



**2011
6th International Conference
on
Multiphase Flow**

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.



**April 7-8th, 2011
3rd Annual
China Commercial Aircraft
Summit & Expo**

April 7-8th InterContinental Pudong Shanghai China

<http://www.opplandcorp.com/aero/>

China is the world's most dynamic market for commercial airplanes, forecasted to require for 3,770 new commercial airplanes valued at \$490 billion over the next 20 years.

China has also become the largest aircraft manufacturer in Asia. According to a report released by Frost & Sullivan, the center of aircraft manufacturing in the Asia-Pacific area is rapidly shifting to China and the country earned \$13.1 billion from the industry in 2009, surpassing Japan, to become the No.1 manufacturer in Asia.

Aircraft manufacturers are rushing into China to cut costs in a short term, and secure future growth in a long term. China Commercial Aircraft Summit has become an unparalleled platform for Chinese and international aerospace manufacturers to gain first-hand informations of aerospace development plans & strategies of China and schedule meetings with each other.

**WHY YOU CAN'T AFFORD MISSING
2011 EVENT**

- Updates on the suppliers selection work of China's C919 program
- The changing global aerospace landscape: Technology innovation for green aviation
- AVIC's strategy of fully engaging into the global aerospace industry chain
- Aircraft mfg. subcontracting in China: opportunities and challenges ahead
- Cost optimization and supply chain management strategy for aircraft manufacturing in China
- Next generation aero engine technology
- Material technology innovation in pursuit of energy efficient airplanes



Training Courses

CADFEM GmbH

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

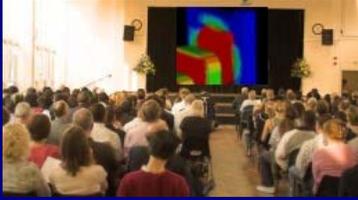
Parametric simulation and optimization with optiSLang
optiSLang is one of the most popular solver for optimization and robust design analyses

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



Training Courses

**Livermore Software
Technology Corporation**

Start Date	Location	
4/11/2011	MI	Advanced Options in LS-DYNA
4/13/2011	MI	Implicit
5/02/2011	CA	LS-PrePost (no charge with Intro to LS-DYNA)
5/3/2011	CA	Intro to LS-DYNA (3-1/2 days; half day on Friday)

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



Training Courses

Engineering Research AB ERAB

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

Among the many course offering are the following:

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 Implicit &
Explicit Solver

June 20-23

November 21-24

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

Switch to LS-DYNA

April 4-5

October 5-6

Switch from LS-PrePost 2.X to 3.X
April 6

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

April 7

September 29

December 15

LS-DYNA User Options

June 8-9

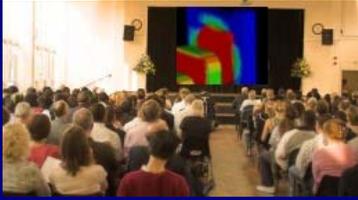
LS-DYNA – Plasticity, Damage & Failure

– By Paul DU BOIS

October 3-4

LS-DYNA – Polymeric materials – By Paul
DU BOIS

December 12-13



Training Courses

PhilonNet Engineering Solutions

<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

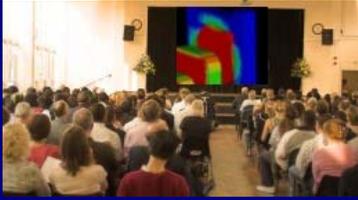
Date: 6-7 May 2011,

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												



Question 2

LS-DYNA Users

Challenge Your Knowledge

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 $TSSFAC=1.1$?



Answer to Question #2

LS-DYNA Users

Challenge Your Knowledge

Solutions:

1a.) analytical:

$$dt = l * \sqrt{\text{density} / \text{youngs_modulus}} = 10.0 * \sqrt{0.785E-5 / 210.0} = 0.19334E-02$$

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 -



North America

Finite Element Analysis Consulting - Consultants

LS-DYNA Consulting FEA Consultants

- 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
 Contact: info@caeai.com
- USA** AEG Product Engineering Services
 Contact: support@engineering-group.com



EUROPE

Finite Element Analysis Consulting - Consultants

LS-DYNA Consulting FEA Consultants

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UK OVE ARUP & PARTNERS
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Asia Pacific

Finite Element Analysis Consulting - Consultants

LS-DYNA Consulting FEA Consultants

AUSTRALIA Leading Engineering Analysis Providers, LEAP
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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



LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT - LS-PrePost
LSTC Dummy & Barrier Models

Alpha Order by Country

Australia	Leading Eng. Analysis Providers - LEAP http://www.leapaust.com.au/ info@leapaust.com.au
Canada	Metal Forming Analysis Corp - MFAC http://www.mfac.com/ galb@mfac.com
China	ETA China http://www.eta.com.cn/ lma@eta.com.cn
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Japan	ITOCHU Techno-Solutions Corp. http://www.engineering-eye.com/ ls-dyna@ctc-g.co.jp
Japan	FUJITSU http://jp.fujitsu.com/solutions/hpc/app/lodyna/



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Netherlands	Infinite Simulation Systems, BV http://www.infinite.nl/ j.mathijssen@infinite.nl
Sweden	Engineering Research AB http://www.erab.se/ sales@erab.se
Taiwan	Flotrend Corporation http://www.flotrend.com.tw/ gary@flotrend.tw
Russia	State Unitary Enterprise –STRELA info@ls-dynarussia.com



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USA	Engineering Tech. Assc. Inc. – ETA http://www.eta.com/ sales@eta.com
USA	DYNAMAX http://www.dynamax-inc.com/ sales@dynamax-inc.com



LSTC Mailing List For Models News



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 are 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



Korean Air Force Selects SGI To Accelerate Weather Forecasting

http://www.sgi.com/company_info/newsroom/press_releases/2011/march/korean_airforce.html

SGI® Altix® ICE Doubles Compute Power for More Immediate Results and Analysis

Fremont, Calif. — March 24, 2011 — SGI (NASDAQ: SGI), a trusted leader in technical computing, today announced that the Korean Air Force's 73rd Weather Group has purchased and begun operations with a high performance computing (HPC) solution consisting of an SGI® Altix® ICE 8400 system to accelerate production and distribution of long-term weather forecasts to the country's defense forces.

The Altix ICE 8400 system has more than 1,700 processor cores built with Intel® Xeon® processors 5600 series, and 800 TB of SGI InfiniteStorage and Spectra Logic tape storage. It will be used for numerical weather forecasting and is projected to achieve twice the performance of the previous solution. The weather forecasting results obtained from this new system will be shared with other meteorological administrations to provide more accurate data for the Korean peninsula.

"Having previously used a government supercomputing facility, we wanted the fastest available cluster system for weather forecasting," said the head of the group responsible for weather forecasting for the Korean Air Force.

"This will provide us with faster and more immediate computing power and shorter analysis times, and will enable us to produce longer term forecasts in greater detail. Additionally, the project includes not only compute but also monitoring and administration services, plus archiving and security systems, as well as interconnection to outside agencies."

"SGI Korea has done an outstanding job of understanding the customer's needs and exceeding expectations," said Philip Chua, managing director and vice president of Asia Pacific sales at SGI. "The SGI Altix ICE 8400 solution provided will accelerate results in both low altitude and high altitude weather forecasting for the Korean Air Force."

The Korean Air Force selected a combination of SGI InfiniteStorage 4600 and Spectra Logic T380 and T50e to provide the highest degree of performance, reliability and flexibility for its storage requirements.

"The ability to quickly and accurately forecast the weather is critical to the livelihoods of hundreds of millions of people in East Asia and the entire Pacific

Rim," said Rajeeb Hazra, general manager of High Performance Computing at Intel. "We are pleased to work with SGI to provide an HPC solution powered by Intel Xeon processors 5600 series that can intelligently adjust performance to data-intensive applications like those used by the Korean Air Force's 73rd Weather Group."

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.

Contact Information:

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μETA v6.6.4 release announcement

μETA v6.6.4 release announcement - March 1, 2011

New features introduced

- Support of the LS-Dyna *INCLUDE_PATH keyword

Known issues resolved

- Incorrect reading of NASTRAN INCLUDEs
- Incorrect calculation of NASTRAN Random Analysis results
- Crash reading certain RADIOSS D00 files
- Incorrect reading of results from Universal files using the Average, Compute option

μETA post processor is a thriving 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.

User interface

A flexible and fully customisable interface provides the option to dock existing toolbars anywhere on the working area and even create new ones, to suit diverse needs. Post-processing work is accelerated significantly through a multiple window environment with window dependent model attributes and

smart functionality for the fast handling of entities' visibility.

3D field post-processing

The top quality graphics, the high performance and the efficient handling of large, multiple models and data, form a productive working environment. Model management, conducted on entity property or material level, is greatly assisted by a tree structure hierarchy group tool that reflects the ANSA Part Manager hierarchy and provides among others connections management capabilities.

2D plot post-processing

A complete, comprehensive graph tool is integrated within μETA without the need to start a separate program. As many 2D plot windows as necessary can be opened, each one hosting multiple different plots. This tool supports direct reading of time history results from NASTRAN punch files, Abaqus/Standard, Abaqus/Explicit, LS-DYNA, PAM-CRASH, RADIOSS, MADYMO, as well as PAM-VIEW ascii files, ISO DATA files or common column ASCII files. Its unparalleled speed in interactive handling of large number of curves, as well as its extensive interoperability with the 3D field module, boosts productivity and simplifies parallel 3D and 2D post-

processing. Information can be passed from one module to the other and curve data can be directly associated to the 3D geometry. Mathematical operations and a broad range of built-in or custom functions can be applied on curves or a field deck.

Calculations on field results

New stress fields can be calculated in μ ETA as a linear combination of existing stress fields or through any mathematical operations applied on loaded results. Forces on any section can be calculated from original results stemming from NASTRAN, Abaqus, LS-DYNA or PAM-CRASH. NVH analysis is accelerated by the fast calculation of 3D and 2D structural and acoustic responses, the generation of structure-fluid coupling data and the modal correlation capabilities (MAC calculation).

Advanced filtering and communication of results

μ ETA offers extended interactive identification and filtering capabilities on part and element level. Areas of interest and the corresponding Maximum / Minimum values can be marked and traced easily through the run-time annotation tool and the fast creation of iso-contour lines and surfaces. Advanced filtering is available within several μ ETA tools, with which even extreme cases of entities selection and information extraction can be realized with a single click based on combined queries. An overview of hot-spot results as well as spreadsheet properties is achieved through multiple statistics tables which also provide an efficient means for fast comparison of results.

Output options

Geometry and results data can be saved and appended in the native binary format of μ ETA. The content of these files can also be viewed with a freely available viewer.

Geometry can be output in NASTRAN bulk data or PAM CRASH input file format. Data related to identified entities as well as curve data can be output in ASCII text, while data from the spreadsheet-form tools can be output both in ASCII and HTML format. μ ETA provides also image saving for tif, jpg, ppm, png, bmp, PostScript, encapsulated PostScript, vrml, rgb and gif formats and video recording for avi, mpeg and gif formats.

Automation

μ ETA provides advanced capabilities for process automation through custom user toolbars, session files and scripts. A simple-to-use toolbar designer ensures the fast creation of custom toolbars. Significant time saving and work simplification can be achieved through the session file editor for the effortless creation, editing, parameterization and debugging of sessions. A scripting language, same as the ANSA scripting language, extends further the automation capabilities. Scripts can also be promptly created through the embedded script editor.

Other tools

Other tools such as the multiple clipping-plane-cuts with its advanced functionality, the explode feature with the numerous options for parts and models and the section force calculator provide the means for a closer insight of

the results. Furthermore, a camera tool ensures the accurate management of the perspective view of the model.

Correlation studies using videos & images

A number of specially developed embedded tools are available to significantly simplify the conducting of correlation studies between simulation results and physical test data. Using these tools, the exact and effortless matching of the model's perspective view with that of an image can be achieved and the synchronisation of the animation simulation with a test video can be set.

Additionally, features can be traced on videos and the tracking results can be plotted automatically in a 2D plot.

Reporting

Using the embedded report composer, template-based reports in HTML or PostScript or MS Office PowerPoint pptx format can be generated in a direct way. The reports can be created interactively, taking advantage of the complete text editor in addition to the interoperability between the different tools of μ ETA, or automatically through the use of session files.