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Engineering Journal and Website Resource

SEPTEMBER 2011

Updates

Daimler Trucks and Kamaz

jointly developed truck in Russia

Benchmark

SGI

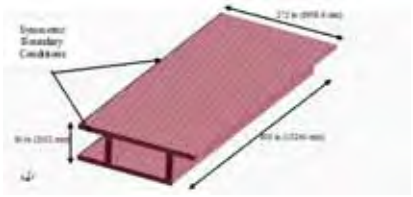
Updates

Updates

Jeff Rowe

Editor, MCADCafe.com

Publications



The J-20

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Last Notice for September and October Events – Start Date:

September 28
GUM 2011 - Simulation and Data Intensive Fair

October 6
2011 ANSA & µETA German Open Meeting

October 11
DYNAmore Nordic first LS-DYNA and ANSA Info day

October 12
German LS-DYNA Forum 2011

October 19
29th CADFEM Users´ Meeting

October 20
EnginSoft INTERNATIONAL CONFERENCE 2011

Engineering Pet of Christoph Maurath
Nina Maurath for Cardboard Box Testing - Strength & Durability

I will be attending the German LS-DYNA Forum 2011 in Stuttgart Germany, on October 12 and 13 – please feel free to say hello and discuss any ideas you have for the FEA Information Journal and websites

Sincerely, **Marsha J. Victory,** President, FEA Information Inc
mv@feainformation.com
My horses are at www.livermorehorses.com

FEA Information

Participants

Platinum

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/
GridCore AB http://gridcore.se		

Bronze Participants

Data Point Labs	APACS	Lancemore Corporation Japan
e2s Enterprise Engineering Solutions		

Conference Paper Showcase
Paper available for download at:
DYNALOOK

http://www.dynalook.com/international-conf-2010/BlastImpact-2-3.pdf

Numerical Prediction of the Dynamic Response of Prestressed Concrete Box Girder Bridges, Under Blast Loads

Ahmed Ibrahim, Research Assistant, University of Missouri
Hani Salim, Professor of Civil Engineering, University of Missouri

Abstract

Significant research has been performed on the response and retrofit of buildings under blast loads. Limited research exists on the response prediction and protection of bridges under near-field blast loads. This research focuses on the evaluation and assessment of box girder bridges under blast loads. The objective of this research is to develop a numerical model to predict the damage level in a concrete deck under blast loading and the corresponding dynamic response of the damaged bridge system. The damage level will be function of spalling/cratering the bridge will suffer under the near field detonations. The numerical analysis conducted using the explicit dynamic software LS-DYNA®, which has the abilities to model the blast load propagation towards bridge structures and to its response to these types of impulsive loads. The bridge has a simply supported span of 100 ft (30.48 m) and was designed according to the LRFD manual under HL-93 truck load. Different charge weights were located at a height of 30 inches (0.762 m) between the main vertical webs at the mid-span. The study shows that LS-DYNA predicted the damage severity under blast loads, especially since the testing under these loads might not be feasible. The studied Key parameters were the weight of the charge, and concrete deck properties. The results of this study make the finite element modeling an attractive alternative for blast testing when it is not feasible like the case of bridges. Comparisons of the numerical results are still necessary for code verification before this study can be expanded for additional parametric studies and design recommendations.

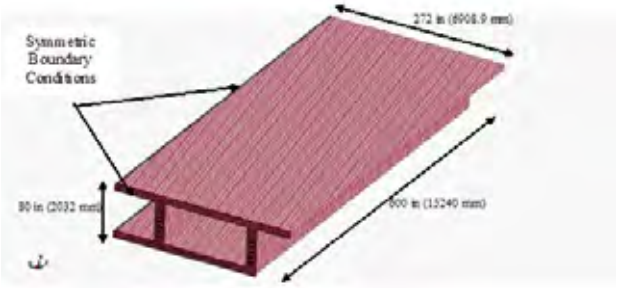


Figure 2: Isometric showing the finite element mesh of the bridge quarter symmetry model

Top Crunch.org

SGI

http://www.topcrunch.org

The TopCrunch project was initiated to track the aggregate performance trends of high performance computer systems and engineering software. Instead of using a synthetic benchmark, actual engineering software applications are used with real data and are run on high performance computer systems. The data are available for download in the form of data files for our current software suite.

Submission Date: August 23, 20111

Vendor/Submitter

SGI
Applications Engineering

Computer/Interconnect

Rackable? C2005-TY3
Mellanox® Technologies ConnectX-2® IB QDR MT26428

Processor	#Nodes x #Processors per Node x #Cores Per Processor = Total #CPU	Time (Sec)	Benchmark Problem
Intel® Xeon® Quad Core X5687 3.60GHz	8 x 2 x 4 = **64**	123	neon_refined_revised
Intel® Xeon® Quad Core X5687 3.60GHz	8 x 2 x 4 = **64**	1478	3 Vehicle Collision
Intel® Xeon® Quad Core X5687 3.60GHz	8 x 2 x 4 = **64**	13664	car2car

Update

LS-OPT® Support Site

http://www.lsoptsupport.com

New Curve Matching Metric in LS-OPT 4.2

In LS-OPT 4.2, a new curve matching metric suitable for hysteretic curves is available.

Curve Matching Metrics

Background

One popular use of LS-OPT is for identifying system parameters; for instance material properties. This is typically done by having one or more curves from a physical experiment. The experiment is then duplicated in LS-DYNA, and LS-OPT is used for trying to find the appropriate parameters that will generate a curve similar to the one in the experiment.

Paper published on the site:

An Effective Curve Matching Metric for Parameter Identification using Partial Mapping

Katharina Witowski, DYNAmore GmbH
Markus Feucht, Daimler AG
Nielen Stander, LSTC

Abstract:

This paper decribes a new method for curve matching essential to the solution of inverse problems represented by system parameter identification. Hysteretic response curves are specifically addressed as a general class. The method is based on Partial Curve Mapping (PCM) of the experiment curve onto the computed curve. This methodology involves a curve matching metric which is computed using the bvolume between the test curve and the computed curve section. A number of examples are presented to demonstrate the capability. These examples represent hysteretic curves which are impossible to match without mapping.

Update

LS-DYNA® Support Site

http://www.dynasupport.com for full information

September 15th:

History Variables for Certain Material Models

Below, is a sample of the table found on the LS-DYNA Support Site, including history variables of certain material models available in LS-DYNA is given.

The variables may change from release to release. There is no guarantee for completeness and correctness in connection with the release you use. For binding information please contact your local LS-DYNA distributor.

material	no.	shells	no.	solids
	eqp	stiffness component C11		
	1	stiffness component C12		
	2	stiffness component C13		
	3	stiffness component C14		
	4	stiffness component C22		
	5	stiffness component C23		
***MAT_002**	6	stiffness component C24	1..9	deformation gradient
	7	stiffness component C33		
	8	stiffness component C34		
	9	stiffness component C44		
	10	stiffness component C55		
	11	stiffness component C56		
	12	stiffness component C66		
	1	back stress component xx	1	back stress component xx
	2	back stress component yy	2	back stress component yy
***MAT_003**	3	back stress component xy	3	back stress component xy
	4	back stress component yz	4	back stress component yz
	5	back stress component zx	5	back stress component zx

Update

LS-DYNA® Examples Site

http://www.dynaexamples.com/

Welcome to LS-DYNA Examples

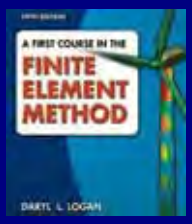
The site presents approximately 200 LS-DYNA examples from various training classes. The input files and several class notes are available for download. The download is free of charge, a login is not required. The majority of content has been contributed by LSTC. All examples are presented with a brief description. You may find an example by checking a specific class or by using the search functionality of the site.

Intro by J. Day

The examples in this section are from the introductory class of Jim Day. Dr. Day is a senior support engineer at LSTC. Since many years he is giving training classes on various topics for LS-DYNA. You may access the examples separately by the menu on the left. The examples are prepared for LS-DYNA 970 and upwards.

Among the information presented by Jim Day:

- Examples on contact modeling
- Different element types are presented
- Miscellaneous LS-DYNA models
- Download zip file (Windows) with all examples
- Examples on adaptive mesh refinement
- Different kinds of joints are shown
- Download tgz file (Unix, Linux) with all examples



Book Review

Amazon

A First Course in the Finite Element Method [Hardcover]

http://www.amazon.com/First-Course-Finite-Element-Method/dp/0495668257/ref=sr_1_1?ie=UTF8&qid=1316557780&sr=8-1#_

Amazon Editorial Review

"Logan does a very good job of keeping things simple and straight forward. Fairly well written using a simple approach without extensive theoretical and mathematical theory. The text is very complete."

"Logan has a very easy-to-read style, while retaining the precision and clarity of engineering topics without being dry."

"The author presented topics in a simple and easy-to-follow way and provided subsequently proper derivation or illustration to enhance students' understanding. I cannot find a textbook which is better than this one in the field of finite element method."

Amazon Product Description

A FIRST COURSE IN THE FINITE ELEMENT METHOD provides a simple, basic approach to the course material that can be understood by both undergraduate and graduate students without the usual prerequisites (i.e. structural analysis). The book is written primarily as a basic learning tool for the undergraduate student in civil and mechanical engineering whose main interest is in stress analysis and heat transfer. The text is geared toward those who want to apply the finite element method as a tool to solve practical physical problems.

Amazon Product Details

- Paperback: 960 pages
- Publisher: CL-Engineering; 5 edition (April 11, 2011)
- Language: English
- ISBN-10: 0495668273
- ISBN-13: 978-0495668275
- Product Dimensions: 9.2 x 7.3 x 1.6 inches

Complete Information can be found at: http://e2s.com.mx

COMPANY

e2s is an engineering services company specialized in 3D simulation models.

Founded in 1994 e2s has 12 years experience in the market providing service to diverse industry segments such as: Automotive, Aerospace, Electric & Electronics, Home Appliances, Food & Drinks, Steel, Glass, Pharmaceutic, among others.

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- Solutions & Recommendations.
- Industrial Plant Design.

Amount Our Products

- DELMIA (Digital Enterprise Lean Manufacturing Interactive Application)
- CATIA MACHINING (Computer Aided Three Dimensional Interactive Application)
- SURFCAM
- LS-DYNA, LS-PrePost, LS-OPT, LS-TaSC and the LSTC ATD/Barrier Models

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Jeff Rowe - Editor, MCADCafe.com

MCADCafe's e-Magazine

Among The latest editorial from MCADCafe's e-Magazine

Each MCAD Weekly Review delivers news and editorial concerning the latest developments in the MCAD industry, MCAD product and company news, featured downloads, customer wins, and coming events, along with a selection of other articles that we feel you might find interesting.

Software Review: ZW3D Premium 2011 – Capable CAD and CAM In One Package.

Abstract: Although they do share some similarities, CAD and CAM processes are actually more different then they are similar. They have different requirements, workflows, and outputs, and very few design/engineering software packages are up to the task for performing both. ZW3D Premium 2011, however, handles them both – all in one package.

Autodesk Software Helps Develop 100 MPG Commuter Vehicle

Abstract: Green Lite Motors, a clean technology company developing new transportation alternatives for commuters, is using Autodesk Product Design Suite from Autodesk, to more efficiently design a three-wheeled hybrid vehicle capable of traveling 100 miles on a single gallon of gas, as well as achieving highway-ready speeds of 85 miles per hour and a cruising range of 250 miles.

Some Questions Answered About PTC's Creo 1.0

Abstract: A few weeks ago, we discussed the launch of PTC's Creo -- a reinvention and rebranding of several of its venerable mechatronics design products that include Pro/ENGINEER and CoCreate. The launch left a lot of unanswered questions that we posed to PTC. Since those questions were published, we spoke with Mike Campbell, PTC Divisional VP, Design and Visualization Products, who answered all of them.

More Information, Contact:

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David.Heller@mcadcafe.com

Review

China Conferences

Grace Su Software Customer Services ETA-China
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mailto:msu@eta.com.cn

The 2011 China Conference of Automotive Safety Technology

On August 24-26th, 2011, ETA-CHINA was one of the proud sponsors of the 2011 China Conference of Automotive Safety Technology, organized by the Vehicle Safety Technology Committee of Society of Automotive Engineers of China (SAE-C/STC), held in Beijing, China.

The conference was hosted by Tsinghua University, and BAIC Motor. ETA China, as a distributor of Livermore Software Technology Corp. products, in China, had the opportunity to showcase (LS-DYNA, LS-PrePost, LS-OPT, LS-Tasc and the LSTC ATD/Barrier Models to worldwide attendees. This conference is this largest annual conference on vehicle safety in China.

The conference is a forum to discuss automotive safety technologies and applications. The selected papers of the conference were recommended for publishing in journals.

Among the keynote speakers, were world renowned experts and scholars from the automotive safety field.

During the conference, attendees had the opportunity to listen to many presenters. Among the presenters were:

Mr. Yang Dong, Executive Chairman of China Auto Industry Association, started with the Prospect of The Twelfth Five Years Plan of China's Auto Industry.

Prof. Albert I. King, Member of National Engineering Academy, USA, presented the Brain Injury due to Blunt Impact and Blast Overpressure;

Mr. Jan Ivarsson, Head of Safety Strategy & Requirements of VOLVO Motor, made an exciting presentation to introduce the Driving Towards Zero - Volvo Cars' Safety Vision2020.

Active discussions were going on between the experts and participators. This conference promotes the development of auto crash safety technology and also provides a chance

for all participators to exchange technical knowledge.

The 8th International Conference of Numerical Simulation of 3D Sheet Metal Forming Processes, NUMISHEET 2011

On August 21-26th, The 8th International Conference of Numerical Simulation of 3D Sheet Metal Forming Processes, NUMISHEET 2011 was held in Seoul, Korea.

The conference featured technology and keynote programs, benchmark applications to compare numerical predictions with experiments as well as plant tours following the conference tradition.

LSTC US, Mr. Li Zhang, presented the Springback Compensation of Stamping Tools with LS-DYNA.

ETA China, presented LS-DYNA applications in Metal Forming field and the cases of LS-DYNA bundled with eta/DYNAFORM.

Among the attendees introduced to the above were GM/Korea; Hyundai Steel/Korea, and TATA Steel Limited, India etc., The introduction included Stretch Forming, Roller Hemming and Geometry Drawbead with LS-DYNA.

NUMISHEET 2011 conference is of great importance to scientists, engineers, software developers, industrial users, as well as students. Their combined participation in the event promoted exchanges of valuable experiences, new ideas on numerical methods, material modeling, as well as forming technologies.

About NUMISHEET: In the era of ever more rapid development of science and technology, the numerical technology might be one of most significant advancement, contributing in all engineering areas. Especially, in the field of sheet metal forming, the progress of numerical methods during the last half a century was so immense, changing all academic and industrial practices in this field. Amid such numerical technology advancement, the NUMISHEET conferences have been established as a triennial world-class forum ever since 1989, making major contribution in the field of the numerical modeling of sheet metal forming processes.

Daimler Trucks and Kamaz unveil jointly developed truck in Russia

Daimler Trucks and Kamaz unveil jointly developed truck in Russia
Stuttgart/Chelny - Sep 16, 2011

- Expanded strategic cooperation between Daimler Trucks and Kamaz
- Presentation of new Kamaz vehicle featuring components from Daimler Trucks
- Daimler Trucks and Kamaz sign memorandum of understanding (MoU) concerning their collaboration on truck cabs
- Andreas Renschler, Daimler Board of Management member responsible for Daimler Trucks and Daimler Buses: "We're delighted to further expand our cooperation with Kamaz. Russia remains the largest truck market in Europe."

Stuttgart/Chelny – At the COMTRANS commercial vehicle show in Moscow, Daimler Trucks and the Russian truck manufacturer Kamaz presented another milestone of their partnership: the public unveiling of their first jointly developed truck. The new Kamaz truck is equipped with Daimler Trucks components which Kamaz has modified for the Russian market.

In order to produce the new Kamaz truck, the two partners will work together even more closely in the future. In addition to the axle joint venture concluded in December 2010, Daimler Trucks and Kamaz will closely collaborate on truck cabs in the future. The two companies therefore singed a memorandum of understanding (MoU) on cab production today. Mercedes-Benz will begin delivering cabs to Kamaz in the second half of 2012. Later on, the cabs will be assembled at the Kamaz production plant in Chelny in the Russian republic of Tatarstan and will subsequently be industrially manufactured at the plant. The new Kamaz truck series featuring components from Daimler Trucks which will go into effect in Russia in 2014, meets the Euro V emissions limit.

Andreas Renschler, Daimler Board of Management Member responsible for Daimler Trucks and Daimler Buses, said, "We're delighted to further expand our cooperation with Kamaz. Russia remains the largest truck market in Europe, with a market volume of 79,000 units over six tons GVW last year and almost 190,000 units forecast for 2020. Together with our partner, we are on the right track to offer state-of-the-art trucks for the Russian market."

Sergey Kogogin, Director General of Kamaz, added, "The launch of another cooperative project, this time for cabs, will further strengthen the strategic

partnership between Daimler Trucks and Kamaz. We're proud to present our new Kamaz truck as early as this year. The vehicle is benefiting from the cooperation with Daimler Trucks and is optimally tailored to the needs of the Russian market."

The foundation of Daimler Trucks' strategic involvement in Kamaz was put in place in December 2008. After the increase of their stake in the Russian company in June 2010, Daimler AG and the European Bank for Reconstruction and Development have jointly held 15 percent of the shares in Kamaz.

The strategic partnership between Daimler Trucks and Kamaz began with the Fuso Kamaz Trucks Rus and Mercedes-Benz Trucks Vostok joint ventures in 2010. The subsequent launch of series production for Fuso and Mercedes-Benz truck models was very successful. Fuso Kamaz Trucks Rus sold about 600 Fuso trucks during the first half of 2011, while Mercedes-Benz Trucks Vostok sold about 1,000 Mercedes-Benz trucks during the same period. The plant at Chelny in the Russian republic of Tatarstan was established in 2010 and serves as the production location for both the Fuso and the Mercedes-Benz brand trucks. The trucks are series-produced at the plant from CKD kits.

Aerospace Information

The J-20

Review - A. Giaccana.

The following information, on the J-20, does not represent any software, participating company, or person thereof, or of FEA Information news.. It is solely based on staff choice of a Jet Fighter to give information to the readership.

The J-20 prototype stealth fighter, is being developed by the Chinese military,

Although many of the development details are being kept under proprietary information, it is known as being developed as a high performance aircraft.

The J-20's second outing took place in Chengdu located in southwest China's Sichuan province in April of this year.

A quote by Chinese military sources, advise that the military has plans to deploy the jet as early as 2017, if continued development and outings continue at the pace, now observed.

A few years ago, the deputy head of China's air force, General He Weirong, said the country's stealth fighter would be operational sometime between 2017 and 2019.

A fast summary of the exciting new development of the J-20:

The J-XX/J-20 is a large fighter. This first-of-type aircraft presents with a large dihedral canard-delta wing configuration; with a pair of outward/rearward canted all moving combined vertical/horizontal tails; and, similarly large, outward canted ventral fins/strakes which, if all moving like the tails and retained on any production version, will make for some quite advanced capability options in the areas of controllability and maneuverability.

This type of configuration generally provides well sustained supersonic cruise performance, with a suitable engine type, and good maneuver performance in transonic and supersonic regimes.

Although in the development stage, its “indigenous design” development structure, is striking. A clear beauty of design to be targeted, for future reporting..

Agenda

German LS-DYNA Forum 2011

German LS-DYNA Forum 2011

Attendance of the complete event, or a part of it, is free of charge.

October 12 and 13, 2011 in Stuttgart, Germany

The German LS-DYNA Forum will consist of the following three parts:

Developers' Forum (October 12, 1:00 – 6:00 pm)

A developers' meeting on 'Background information and new developments with regard to LS-DYNA and LS-OPT' will take place in the afternoon of October 12. Recent developments will be introduced to the participants by program developers. The lectures shall encourage discussions and the exchange of experiences between users and developers.

Selective Mass Scaling (SMS) in LS-DYNA to Reduce Non-Physical Inertia Effects
T. Borrvall (DYNAmore Nordic)

Review of Solid Element Formulations in LS-DYNA: Properties, Limits, Advantages Disadvantages
T. Erhart (DYNAmore)

Introduction to Isogeometric Elements in LS-DYNA
S. Hartmann (DYNAmore)

GISSMO – Material Modeling with Enhanced Failure Criteria
A. Haufe (DYNAmore)

New Developments on Identification of Material and System Parameter with LS-OPT
K. Witowski (DYNAmore)

Hybrid Version of LS-DYNA to Combine SMP and MPP Parallelization Technologies
J. Wang (LSTC)

Evening Event (October 12, 7:00 – 11:30 pm)

In the evening of October 12, DYNAmore would like to invite to a gala dinner including entertainment program at 'Alte Reithalle' in Stuttgart. Please feel encouraged to make new contacts and meet old friends at this occasion.

LS-DYNA Forum (October 13, 9:00 am – 5:45 pm)

DYNAmore has asked customers and employees of LSTC to share about their work on October 13. Many interesting presentations on recent developments regarding vehicle safety and manufacturing engineering will be given. You will learn about different simulation methods and other aspects of LS-DYNA.

The attendance will be worthwhile for all LS-DYNA users.

Recent Developments in LS-DYNA
J. Hallquist (LSTC)

Critical Issues for a Robust Component Design in Passive Safety
M. Feucht, F. Neukamm (Daimler AG); P. DuBois (Consultant); A. Haufe (DYNAmore)

CAE Process and Data Management – DYNAmore Software Development at AUDI
K. Gruber, S. Bauer, W. Schabenberger (AUDI AG)

Application of Simulation for Forming Processes at BMW Group
M. Fleischer, T. Panico, J. Meinhardt, A. Lipp (BMW Group)

Development of Detailed AM50%ile Hybrid III Dummy FE Model
T. Komamura, H. Kaneko, M. Mohri, M. Shirooka, T. Yasuki (Toyota Motor Corporation)

State of the Art for Simulation of Composite Structures
Prof. R. Rolfes, M. Vogler, E. Jansen (Universität Hannover)

Fabric Drape Simulation of Preforms with LS-DYNA
S. Schönen, J. Böke (Benteler SGL GmbH & Co. KG)

Optimization of Plastic Components for Crash: Current State and Outlook
T. Hensel, A. Wüst, S. Glaser (BASF SE); S. Frik (Adam Opel AG)

Out of Position – Merits and Limits of Numerical Simulation
A. Heym, S. Al-Samarae (Takata-Petri AG)

A New Model of the Small Female Frontal Crash Dummy
K. Koschdon, B. Watson, F. Chang (Humanetics Europe GmbH)

LS-OPT: MDO Applications in Crashworthiness and Outlook
N. Stander (LSTC)

New Developments on the Simulation of High Strength Steels for Car Bodies
Prof. W. Volk, R. Golle, Y. K. Kim, J. Suh, A. Mackensen (TU München)

Thermal Design of Forming Tools for Partial Press Hardening to Achieve Optimal Component Properties
P. Feuser (Daimler AG)

Hot Stamping with LS-DYNA – Theory and Practical Applications
P. Weigert, H. Verhoeven (Volkswagen AG); D. Lorenz (DYNAmore)

Experience in Calibration of Material Models for Steels
L. Keßler, T. Beier (ThyssenKrupp Steel Europe AG)

Virtual Layout of Adaptive Deep Drawing Processes
C. Annen, M. Wahl, (AUDI AG); P. Köbel, Prof. P. Hora (ETH Zürich)

New Modelling Technique for Tailor Heat Treated and Prestrained Aluminum Sheets
R. Govindarajan, M. Zubeil, K. Siefert, T. Kleeh (Daimler AG)

Several lectures will be in English language. We kindly asked the presenters to use English slides, even if the presentation is in German. In case there is a significant demand on a translation service will be organized.

The LS-DYNA Forum will be accompanied by an exhibition featuring the latest software and hardware developments related to LS-DYNA and LS-OPT.

Seminars

ALE and Fluid-Structure-Interaction in LS-DYNA

October 10 and 11, 2011, Stuttgart, lecturer: Prof. Dr. M. Souli (University of Lille/LSTC) – Online registration

CPM Corpuscular Method - Simulate Airbag Unfolding

October 14, 2011, Stuttgart, lecturer: Dr. J. Wang (LSTC) – Online registration

Registration

The attendance at the developers' forum, the event evening as well as the LS-DYNA Forum is free of charge.
In order to simplify our preparations, your registration kindly requested. It is possible to register separately for each event.

Online registration at:
www.dynamore.de/forum2011

Only for the seminars a fee applies.

Contact and Information

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E-Mail: forum@dynamore.de
www.dynamore.de/forum2011

ALE and Fluid-Structure-Interaction in LS-DYNA

October 10 and 11, 2011, Stuttgart, Germany

This course covers the features in the solver provided to analyse fluids and, in particular, the interaction of fluids and structures using the Arbitrary Lagrangian Eulerian (ALE) capabilities. The theoretical background to fluid modeling in LS-DYNA is presented and illustrated with several practical applications; problems solved during the workshop include tank sloshing, tank dropping (partial and complete fill), viscous flow in a channel, underwater explosion, bird strike, ship collision and acoustics in air and water. A specialized knowledge of fluid dynamics is not required.

The lecturer Prof. Dr. M. Souli is professor at Lille University in France. His focal points of research are fluid dynamics and fluid-structure interaction. In addition, he works as software developer for LSTC and is involved in the implementation of ALE in LS-DYNA.

The course content is as follows

- Introduction of Eulerian and Lagrangian formulations
- ALE smoothing algorithms (simple average, volume weighting, equipotential)

  Advection algorithms (first order donor SALE, second order Van Leer, second order + half index shift)
- Material and void (advection algorithm in voided material
- Multi-material formulation (advection in multi-material formulation, pressure equilibrium)
- Fluid/Structure Coupling

Online registration:
http://www.dynamore.de/seminars/new-methods/ale

Corpuscular Method (CPM)
Simulate Airbag Unfolding for Out of Position Load Cases

October 14, 2011, Stuttgart, Germany

In addition to the ALE method for simulation of out-of-position load cases, which has been available for a number of years, the corpuscular method (CPM), which is based on a particle approach, was developed by LSTC for simulation of airbag deployment processes. This method is distinguished by extremely simple handling and reduced computing times compared to the highly variable and widely applicable ALE approach. Based on this molecule approach, it is now possible to set up simulations for OoP load cases in an extremely simple manner with just a few changes to the uniform pressure input file. Experience with the method has been excellent to date. The accuracy and efficiency of the

method in particular are persuasive. It permits realistic calculations of many new load cases – to supplement the established ALE method. The one day class presents basics of the new corpuscular method and a brief introduction on the ALE method. Emphasis is on the steps from a uniform pressure input to a simulation considering also the gas flow.

The lecturer Dr. J. Wang (LSTC) has been working as software developer at LSTC for many years. He was and is instrumental in the development and implementation of the corpuscular method in LS-DYNA.

The course content is as follows
Overview

- Basic theoretical aspects
- Application of the method in LS-DYNA
- Merits and limits of the methodology
- Comparison to uniform pressure approach
- Exercises - OoP examples

Online registration: http://www.dynamore.de/seminars/passive-safety/cpm-airbag

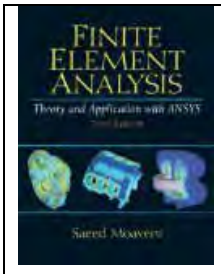
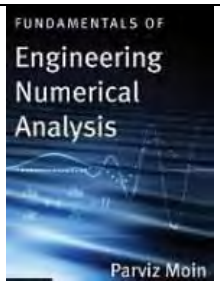
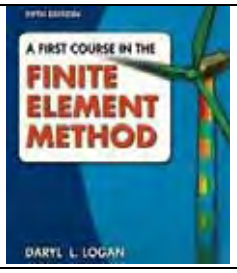
Contact and Information

DYNAmore GmbH, Industriestr. 2, D-70565 Stuttgart, Germany
Tel.: +49 (0)7 11 - 45 96 00 – 0, Fax: +49 (0)7 11 - 45 96 00 - 29
E-Mail: seminar@dynamore.de
www.dynamore.de/seminars

Solutions

Available Books

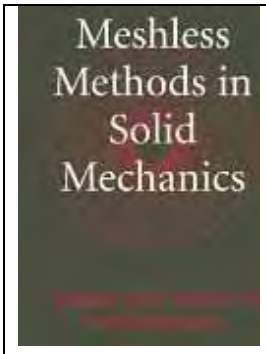
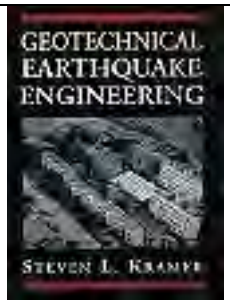
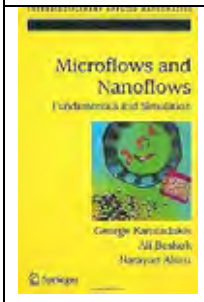
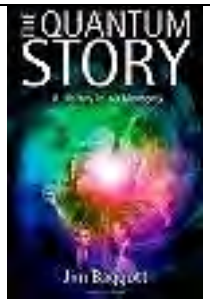
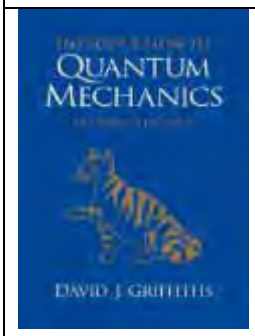
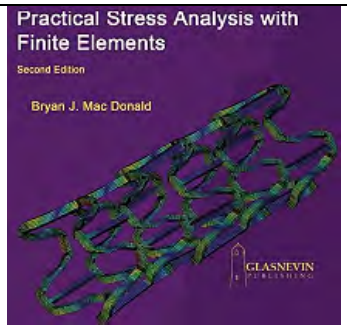
Available From Amazon

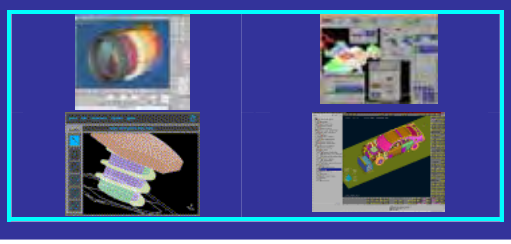
	Finite Element Analysis Theory and Application with ANSYS (3rd Edition)		Arbitrary Langrangian-Eulerian and Fluid Structure Interaction.
	Isogeometric Analysis: Toward Integration of CAD and FEA		NURBS for Curve & Surface Design: From Projective Geometry to Practical Use
	A First Course in Finite Elements		Engineering Numerical Analysis
	Go To Book at Amazon		A first Course in The Finite Element Method

Solutions

Available Books

Available From Amazon

 [Meshless Methods in Solid Mechanics]	 [Principles of Geotechnical Engineering]	 [Geotechnical Earthquake Engineering]
 [Microflows and Nanoflows]	 [The Quantum Story: A History in 40 Moments]	 [The Quantum World: Quantum Physics for Everyone]
 [Introduction to Quantum Mechanics (2nd Edition]	 [Practical Stress Analysis With Finite Elements]	



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. 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-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.

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.

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

Solutions
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.

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

Solutions
Cloud Service
Gridcore AB

Sweden

Gompute on demand®

A Cloud HPC service oriented to Technical and Scientific users.

Gompute is owned, developed and operated by Gridcore AB in Sweden. Founded in 2002, Gridcore is active in three areas: Systems Integration, Research & Development and HPC as a service.

Gridcore has wide experience of different industries and applications, developed a stable product portfolio to simplify an engineer/scientist's use of computers, and has established a large network of partners and collaborations, where we together solve the most demanding computing tasks for our customers. Gridcore has offices in Gothenburg (Sweden), Stuttgart (Germany), Durham NC (USA) and sales operations in The Netherlands and Norway.

The Gridcore developed E-Gompute software for internal HPC resources gives end users (the engineers) a easy to use and complete environment when using HPC resources in their daily work, and enables collaboration, advanced application integrations, remote pre/post, accounting/billing of multiple teams, license tracking, and more, accelerating our customers usage of virtual prototyping.

Website: www.gompute.com
Website: www.gridcore.se

Information Solutions
FEA Participants

Site Directory

LS-DYNA On Demand Additional Core (cloud) Services

US	http://www.sgi.com/products/hpc_cloud/cyclone/index.html
Sweden **Germany**	http://www.gompute.com

LS-DYNA Information Sites

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

Information Solutions

Site Directory

Additional LS-DYNA Information Sites

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

Call for Papers / Announcement
June 3-5, 2012
Dearborn, Michigan, USA

12th International LS-DYNA® Users Conference

Livermore Software Technology Corp.

http://www.ls-dynaconferences.com

The 12th International LS-DYNA® Users conference will be held in Dearborn, Michigan, USA, June 3-5, 2012.

The conference will provide an ideal forum for LS-DYNA worldwide users to share technology. Providing a venue to learn new features, and applications of LS-DYNA, LS-OPT, LS-PrePost, LS-TaSC, LSTC Dummy and Barrier Models, as well as the many software and hardware alliances of LSTC's products.

All of our users from industry, research and academia are invited to present a paper.

The exhibition area hosts the latest software and hardware developments providing you the opportunity to speak directly with the company about their products.

Call For Papers

Application areas being accepted for submission:

- Aerospace
- Automotive Crashworthiness
- Ballistic/Penetraion
- Bimechanics
- Civil Engineering
- Compressible Fluid Dynamics
- Electro Magnetics
- Heat Transfer
- Impact/Drop Testing
- Manufacturing Processes
- Metal Forming
- Modeling Techniques
- Nuclear Applications
- Occupant Safety
- Seismic Engineering
- Ship Building
- Transportation
- Virtual Proving Ground

Paper Submission*

For submission details contact Hpapers@lstc.comH

Sponsorship

For sponsor and/or Exhibit booth information contact Hconference@lstc.comH

Registration Fees*

Conference Only	$450
Training Only	$450
Conference/Training	$900

Hotel Accomodations

Conference attendees will be able to reserve a discounted room rate. Contact: Hconference@lstc.com

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

Suggested Post-Conferences Courses: Impact/Dummies & Barriers - Heat Transfer & hot stamping – ALE – EFG – SPH - Polymeric Material with LS-DYNA – Ballistics/Penetration – contact Hconference@lstc.comH with questions/course requests.

Conference Venue

Hyatt Regency Dearborn
600 Town Center Drive
Dearborn, MI
48126-2793, USA
Hwww.dearborn.hyatt.com

IMPORTANT DATES

Abstract Deadline
Nov. 11, 2011
Acceptance Notification
January 5, 2012
Final Paper Deadline
March 1, 2012

AGENDA

Sunday, June 3
Registration
Pre-Conference Seminars
Reception/Entertainment

Monday, June 4
Registration
Plenary Presentations
Keynote Presentations
Technical Sessions
Exhibit Area
Banquet/Entertainment

Tuesday, June 5
Registration
Exhibition Area
Presentations:

- John O. Hallquist
- Sponsors

POST CONFERENCES COURSES

Wed/Thurs June 6-7

Contact: Hconference@lstc.comH
e-mail: Hpapers@lstc.comH **tel**: 925-449-2500 **Fax**: 925-961-0806
Livermore Software Technology Corp., 7374, Las Positas Rd, Livermore, CA 94551 USA

ENGINSOFT International Conference 2011

CAE Technologies for Industry

EnginSoft INTERNATIONAL CONFERENCE 2011
CAE Technologies for Industry
and ANSYS Italian Conference

Fiera Verona – Verona, Italy
20–21 October 2011

2nd Announcement and Invitation

Mark your diary for one of the most important events in the global CAE Calendar ! The 2 parallel Conferences present a wide range of Virtual Prototyping applications, with a large presence of both technical experts and business decision makers.

The provisional List of Papers already includes contributions from key companies: Ansaldo Breda - Franco Tosi Meccanica - Magneti Marelli – Piaggio - Nuovo Pignone - Tetra Pak – Iveco – Continental and many more to come.

Deadline for early bird registrations:
5th September 2011

Exhibition

The accompanying exhibition will see the world's leading solution providers showcasing products and services covering all aspects of CAE technologies and their successful implementation.
Delegates and exhibitors use the exhibition as an international networking forum. It is here where the experts meet and discuss:

How Virtual Prototyping can speed up design and product development delivering ROI in many forms - in just days!

Do not miss this opportunity to present your products and services to a highly selective audience!

Visit www.caeconference.com to plan your attendance, stay tuned to the Conference Program and for more information on the exhibition..

2011 ANSA & µETA Japanese Open Meetings

2011 ANSA & µETA Japanese Open Meetings

November 8th, 2011 Shin Yokohama Kokusai Hotel, Shin-Yokohama &
November 11th, 2011, Nagoya Urban Institute, Nagoya

Events hosted by TOPCAE Corp.

BETA CAE Systems S.A. has the pleasure to invite you to the 2011 open meetings in Japan, hosted by TOPCAE Corporation. The two events event will take place:
on November 8th at Shin Yokohama Kokusai Hotel, in Shin-Yokohama, and
on November 11th at Nagoya Urban Institute, in Nagoya.

These events aim to introduce the latest developments in ANSA and ?ETA Pre- and Post-Processing suite and to showcase its application in various CAE disciplines. The "Technical Discussions" session that will follow each event's closing will give participants the opportunity to meet in person with our engineers and discuss about the software features and their application.

BETA CAE Systems S.A. and TOPCAE Corp. would like to express their appreciation to Mr. Y. Nakagawa of Honda R&D Co., Ltd. and to Mr. C. Otomo of Nissan Techno Co., Ltd. for their contributions.

There is no participation fee for these events. However, for the better organization of the event, we would appreciate if you regsiter by email to info@top-cae.co.jp, no later than November 1st, 2011.

The language of the event will be Japanese. The attire will be business casual.

Coffee servings and lunch are courtesy of TOPCAE Corporation.

Venue
November 8th, Shin-Yokohama
Shin Yokohama Kokusai Hotel
Yokohama, Kanagawa, Japan
Tel: +81-(0)45-473-1311

Venue
November 11th, Nagoya
Nagoya Urban Institute 1-1-1
Nagoya, Aichi, Japan
Tel: +81-(0)-52-678-2200

Registration until: November 1st, 2011
Events:
November 8th, 2011, Shin-Yokohama
November 11th, 2011, Nagoya

Information & Registration
Mrs. Kimie Nishizawa and Mr. Shingo Komatsu
Tel: +81-(0)-45-478-3840
Tel: +81-(0)-45-478-3842
Email: info@top-cae.co.jp

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

The Complete Training Courses with any changed can be found at
http://www.lstc.com

For questions contact Training Coordinator: Cathie Walton Cathie@lstc.com

California

11/7/2011 11/7/2011 Mon
LS-PrePost (no charge with Intro to LS-DYNA)

11/8/2011 11/11/2011 Tue-Fri
Intro to LS-DYNA (3-1/2 days; half day on Friday)

11/14/2011 11/15/2011 Mon-Tue
Smoothed Particle Hydrodynamics in LS-DYNA

11/16/2011 11/17/2011 Wed-Thurs
Advanced ALE Applications

Michigan

12/8/2011 12/9/2011 Thurs-Fri
Advanced Options in LS-DYNA

12/12/2011 12/12/2011 Mon
LS-PrePost (no charge with Intro to LS-DYNA)

12/13/2011 12/16/2011 Tue-Fri
Intro to LS-DYNA (3-1/2 days; half day on Friday)

Training Courses

DYNAmore Nordic AB

For complete information and changes please check website

LS-OPT, Optimization and
robust design
October 4, 2011

LS-DYNA, implicit analysis
October 11, 2011

ANSA & Metapost, Introductory
October 25, 2011

LS-DYNA, Simulation of sheet metal forming processes October 31., 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
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
November 8-9

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

LS-DYNA User Options
to be announced

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

Shanghai Hengstar Technology Co. Ltd.

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

2011	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								

Training Courses

ETA

http://www.eta.com for training dates and additional information

Introduction to DYNAFORM

Introduction to DYNAFORM for sheetmetal forming applications. Includes Die Face Engineering and Blank Size Estimation tutorials.

Duration: 2 day course

Using PreSys with NISA

An introduction to PreSys for finite element modeling and the NISA finite element solver. This course will teach the student how to use PreSys to create their finite element model, set up a NISA simulation and review the results of the simulation. Workshop problems will be used to demonstrate of the principles discussed in the course material.

Duration: 1 day course

Introduction to PreSys

An introduction to the PreSys software for finite element modeling and results visualization. This course provides the basics for creating finite element model from CAD data, property definition and analysis preparation and visualization of simulation results. Workshop problems will be used to demonstrate all of the principles discussed in the course material.

Duration: 1 day course

Introduction to LS-DYNA

This course is intended for the new user, or those who might like a refresher on the basics of creating, running, debugging and analyzing an LS-DYNA model. The course will be in a lecture/workshop format, with the user running example models and post-processing the results.

Duration: 2 day course

Please contact support@eta.com This e-mail address is being protected from spambots. You need JavaScript enabled to view it , call (248) 729-3010, or register online to reserve a seat at the desired training session. Space is limited, so please reserve a seat as early as possible.

LS-DYNA Users

Challenge
Your Knowledge

Question 1

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	_																	
C	O	N	T	R	O	L	_																	
M	A	T	_																					
M	A	T	_																					
C	O	N	T	R	O	L	_																	
C	O	N	T	R	O	L	_																	

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 to Question #1

LS-DYNA Users

Challenge
Your Knowledge

ANSWER Question #1:

QUESTION BOX

C	O	N	T	R	O	L	_																			
C	O	N	T	R	O	L	_																			
M	A	T	_																							
M	A	T	_																							
C	O	N	T	R	O	L	_																			
C	O	N	T	R	O	L	_																			

Answers:

C	O	N	T	R	O	L	_	S	H	E	L	L														
C	O	N	T	R	O	L	_	S	O	L	U	T	I	O	N											
M	A	T	_	M	O	O	N	E	Y	-	R	I	V	L	I	N	_	R	U	B	B	E	R			
M	A	T	_	S	I	M	P	L	I	F	I	E	D	_	R	U	B	B	E	R	/	F	O	A	M	
C	O	N	T	R	O	L	_	B	U	L	K	_	V	I	S	C	O	S	I	T	Y					
I	G	N	O	R	E																					
C	O	N	T	R	O	L	_	I	M	P	L	I	C	I	T	_	G	E	N	E	R	A	L			

Question 2

LS-DYNA Users

Challenge Your Knowledge

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(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

Question 3

LS-DYNA Users

Challenge Your Knowledge

Quiz:

Taking a closer look on the material models in LS-DYNA, one can distinguish between two different kinds of material laws. On the one hand, one can find material laws, which relate stresses to strains. Keeping thereby in mind that there exist several stress and strain measures, care must be taken on the interpretation of force vs. displacement or stress vs. strain diagrams. For example, the basis for a parameter identification of an elastoplastic material model in LS-DYNA is typically a true stress true strain curve, cf. http://www.dynasupport.com/tutorial/computational-plasticity . On the other hand, there exist material laws, which relate directly forces to displacements or moments to rotations, respectively. These types of material laws are known as discrete material laws and require other element formulations in LS-DYNA, cf. the keyword *SECTION_DISCRETE or beam element form six.

Please download the LS-DYNA input file beam2.k (http://www.dynasupport.com/links/fea-information-examples/beam2.k/at_download/file) and answer the following questions. The exercise intends to give a better understanding of the above mentioned two classes of material formulations:

1. Take a look on the force vs. displacement relationship of the beam. Why can you find a nonlinear relation between these two variables, although an elastic material law is chosen? How can you check this?
2. Reference within the part keyword of the beam the material and section keywords with the id two. Carry out the simulation and take a further look on the force vs. displacement curve. Why is there a linear relation between these two variables now?
3. Define a further node at the origin of the coordinate system and replace the second node of the beam by this new node. Carry out a simulation and take a look on the force vs. displacement curve of the beam. Why can you observe no difference in comparison with the beam of finite length?
4. Take a look on the critical time steps of the discrete beams with and without a certain length. Why can you find the same value for both configurations?
5. Divide the mass of the beam in halves. What is the consequence for the critical time step?

Answer 3

LS-DYNA Users

Challenge Your Knowledge

Solutions:

1.) *MAT_ELASTIC provides a material formulation between true stresses and strains and not between engineering stresses and strains or forces and displacements. If you plot true stresses vs. strains, you will find the linear relation between them.

2.) Now a discrete material law is used, whereby the force is directly related to the displacement.

3.) As a discrete material law relates forces to displacements and not to strains, where generally the displacement is related to the length of an element, the resulting force depends only on the displacement between the two nodes of the beam element and not on the length between them.

4.) The critical time step of an element with a discrete material law is independent of the length of the element.

5.) The critical time step decreases. The critical time step of a element with an discrete material law depends on the mass and the stiffness.

Question 4

LS-DYNA Users

Challenge Your Knowledge

The time step of a finite element simulation using an explicit time integration should not exceed the smallest critical time step of the whole model for stability reasons.

The relation for the computation of the critical time step in LS-DYNA differs depending on the element type as well as on the material laws and parameters used.

Please download the file solid_shell.k
(http://www.dynasupport.com/links/fea-information-examples/solid_shell.k).

The critical time step of a 1-d beam element is given via dt=l*sqrt(rho/E).

In the above mentioned example, this relation yields a value of dt=10.0*sqrt(1.0E-08/10000.0)=1.0E-05, which equals the values of the smallest time steps given in the d3hsp file for the solid and the shell elements.

Thus, for the given material parameters, the computed critical time step of a beam, a solid as well as a shell element is the same.

1.) Set the Poisson's ratio to 0.3. Why do the critical time steps of the solid as well as of the shell elements change?

2.) Why differs the critical time step between the solid and the shell elements for Poisson's ratios unequal zero?

3.) Compute the critical time steps of the solid as well as of the shell elements by hand and compare the solution with the values given in the d3hsp file.

4.) Delete the keyword *CONTROL_BULK_VISCOSITY. Why is there an influence on the critical time step of the solid element?

5.) Increase the Poisson's ratio to the limit of 0.5. What can be observed regarding the critical time steps?

ANSWER ON NEXT PAGE

Answer 4

LS-DYNA Users

Challenge Your Knowledge

Answers:

1.) The critical time step depends on the speed of sound of the elements. For an elastic material, the speed of sound depends on both elastic material parameters, in this example the Young's modulus and the Poisson's ratio.

2.) The speed of sound is computed in a different way for solid and shell elements.

3.) Solid: dt=l/c and c=sqrt{E(1-nu)/[rho(1+nu)(1-2nu)]} --> dt=8.618E-06
Shell: dt=l/c and c=sqrt{E/[rho(1-nu^2)]} --> dt=9.539E-06

4.) For solid elements, the critical time step depends on the bulk viscosity coefficients as well,
cf. LS-DYNA Theory Manual, section 22, TIME STEP CONTROL.

5.) ERROR TERMINATION, because the calculated critical time step for the solid element is zero.
For shell elements, the critical time step is reduced by a factor of 0.886 in comparison to a simulation with a Poisson's ratio of zero.

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 -

Universidade Federal De Santa Catarina - Fórmula UFSC

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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 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
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Thank you for your interest in our products!

Best regards, LSTC Models Development Team

Press Release

Tohoku University Selects SGI

http://www.sgi.com/company_info/newsroom/press_releases/2011/august/tohoku.html

Tohoku University Selects SGI to Advance Fluid Science Research

Internationally Recognized Research Institute Begins Large-Scale 3-D Visualization Studies with SGI® Altix® UV 1000

FREMONT, Calif. — August 22, 2011 — SGI (NASDAQ: SGI), a trusted leader in technical computing, announced today that the Institute of Fluid Science, Tohoku University in Sendai, Japan has begun operation of an SGI high performance computing (HPC) system. The HPC system consists of an SGI® Altix® UV 1000 operating at over 32 teraflops and delivering up to 4x peak performance over the previous system.

The new solution, added to other HPC systems already in place at the Institute, was designed and implemented by SGI Professional Services. It was configured with over 3550 cores of Intel® Xeon® processor X7560 series. It contains 10 terabytes (TB) of total memory with 4 TB of shared memory, and includes an integrated multi-screen Cave Automatic Virtual Environment (CAVE) 3-D visualization system. Applications such as Fluent, SGI® OpenFOAM® and in-house codes are utilized, enabling users to run AVS or Ensight to visualize the output data.

Institute of Fluid Science, Tohoku University is focused on high quality investigations on a wide range of studies. These include numerical simulation of sonic booms of supersonic aircraft, three-dimensional simulation of core-collapse supernovae, simulations and the design of intracranial stents for treating cerebral aneurysms and the associated blood flow analysis, meteorological forecast by downscaling simulations, measurement-integrated airport-area simulation for wake turbulence measurements, and numerical prediction of erosion of pipes in nuclear power plants due to liquid droplet impingement.

"We're pleased that Tohoku University's Institute of Fluid Science has been able to seamlessly integrate an SGI Altix UV 1000 into their existing infrastructure and bring it online at this time," said Nobuhiko Nakatsu, president of SGI Japan. "The results of their research will benefit communities around the world for years to come."

"Institute of Fluid Science, Tohoku University requires outstanding high performance computing technology to advance their research agenda," said Rajeeb Hazra, general manager of HPC at Intel. "By using the Intel® Xeon® processor X7560 series, the SGI® Altix® UV 1000 has the desired performance,

memory capacity, and bandwidth to handle complex data intensive problems in fluid science. Intel is excited to help these scientists conduct collaborative research to move forward the state of the art."

About SGI
SGI, a trusted leader in technical computing, is focused on helping customers solve their most demanding business and technology challenges.

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Press Release

ESI's Japanese User Forum PUCA 2011

http://www.esi-group.com

ESI's Japanese User Forum PUCA 2011 will take place on 5 & 6 December, bringing together Virtual Prototyping users and experts.

Paris, France – 19 September, 2011 – ESI Group, pioneer and world-leading solution provider in virtual prototyping for manufacturing industries, announces the 22nd PUCA, a user event aiming to support the deployment of End-to-End Virtual Prototyping in Japan and neighboring countries. The event will address key industrial challenges of ESI's customers across various industry sectors, with a focus on ground transportation, aerospace and energy.

Designed specifically for Japanese customers, but attracting visitors from across the Asia-Pacific region, PUCA 2011 is a unique forum for ESI users to share their expertise, best practices, successes and challenges in implementing End-to-End Virtual Prototyping to help develop their products and manufacturing processes.

End-to-End Virtual Prototyping enables virtual manufacturing, building and testing of a product in coherent progressive stages and concurrently across multiple domains. It helps product development teams deliver quality results: accurate, for the right cost, at the right time, and with impressive benefits.
PUCA 2011 will also be an opportunity to introduce ESI's recent acquisition of German company IC.IDO, bringing the best 3D interactive and immersive visualization capabilities to bridge the gap between the virtual and physical prototyping worlds. This ground-breaking 3D visualization technology allows individuals and global teams to 'experience their product' and make design decisions long before physical prototypes are available; manifestly essential to End to End Virtual Prototyping.

The conference will bring together experts, senior practitioners and decision-makers from industry, and representatives from prestigious institutes and universities. Keynote speakers will address topics in different industry sectors - including ground transportation, aerospace and energy – and will challenge users to exchange information on their imperatives and experiences.

"We are looking forward to the next PUCA", said Toshihiro Araki, General Manager of the Integrated CAE Department at NISSAN MOTORS. "This has been an important event for us for more than 20 years now. We value the opportunity to learn about the latest developments in virtual prototyping and

share experiences with key users from around the world".

PUCA 2011 will take place on 5 & 6 December, 2011 at the Hyatt Regency Hotel, Shinjuku area, Tokyo. On the evening of December 5, participants will gather for a gala dinner. For further information, please visit http://www.esi-group.com/corporate/events/puca-2011

For more ESI news, visit: www.esi-group.com/newsroom

About ESI Group
ESI is a pioneer and world-leading solution provider in virtual prototyping for manufacturing industries that takes into account the physics of materials. ESI has developed an extensive suite of coherent, industry-oriented applications to realistically simulate a product's behavior during testing, to fine-tune manufacturing processes in accordance with desired product performance, and to evaluate the environment's impact on performance. ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping, thus eliminating the need for physical prototypes during product development. The company employs about 850 high-level specialists worldwide covering more than 30 countries. ESI Group is listed in compartment C of NYSE Euronext Paris. For further information, visit www.esi-group.com.

Nina Maurath

Cardboard Box Testing

Nina lives with Christoph Maurath of LSTC.

In her spare time Nina can be found doing engineering research testing cardboard boxes

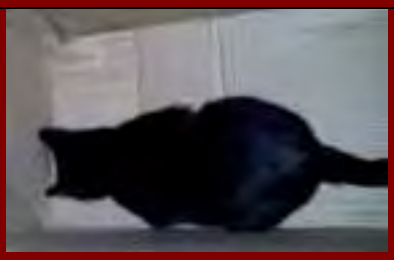
Chin Impact

Stress Test

Drop Testing

Repetitive Reach Test

Strength Testing

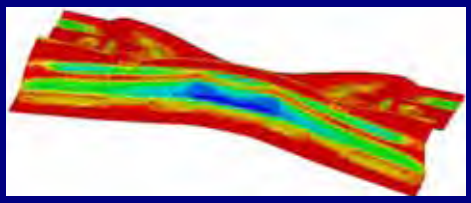


15 min. break time

Depth

Durability

Aerospace Landing



An Enhanced One-Step Metal Forming Solution in LS-DYNA®

Xinhai Zhu, Dilip Bhalsod, Li Zhang
Weiguo Lee, Philip Ho
LSTC

INTRODUCTION

One-step solution, also called “inverse” method, employing the deformation theory as opposed to the incremental theory, has been used in performing sheet metal forming simulation in early stage of a vehicle design, development and manufacturing process. Since the deformation loading is linear, it is strain path-independent and therefore history independent. It is most widely used for initial blank/material estimation, trim-lines unfolding, and initialization of plastic strains and blank thickness in crash simulation. One-step solution is known for its fast computational speeds and simplicity of input requirement. Typically, although it would help, the binder and addendum geometry are not required, saving a lot of efforts in creating these geometries; stamping die processes are not of concern, either; Furthermore, there is no need for contact treatment, since there are no tools and dies involved. Therefore, as far as the geometry goes, the trimmed product is all that is needed to start a one-step solution.

Commercial one-step solution for metal forming has been available for more than two decades. Now, requested by users in metal forming and crash application areas, and through intense and joint development efforts, the previously implemented one-step solution has been enhanced. The new release has included all necessary features required. It is now available in LS-DYNA® starting in Revision 67800 and later of the R6 release.

MAIN FEATURES

The one-step solution is activated with a keyword *CONTROL_FORMING_ONESTEP, with OPTION=7 (Card 1, 1st field). It utilizes some of the existing implicit static solver to iterate and to arrive at a converged solution. Most models need about 4 steps to achieve good results. Some of the details are as follows,

- INPUT – In addition to the usual input for part, material and physical properties, final product mesh in keyword format is needed. Any trimmed-out holes need to be filled. The filling can be done in LS-PrePost v3.2, by selecting *Mesh/EleGen/Shell/Shell by Fill_Holes/Auto Fill*.
- OUTPUT - Results are stored in an ASCII file named ‘onestepresult’. It is essentially a dynain file storing final forming thickness and plastic strains, which

can be plotted within LS-PrePost. The final estimated blank size (in its initial, flat shape) can be viewed and output through d3plot files, along with intermediate shapes stored for each implicit step. The first state will be the initial estimated blank from LS-PrePost.

- Draw beads can be applied along the periphery of the final part in two ways. The first so-called 'Auto Beads' applies a user supplied lock percentage for a variable *AUTOLOCK* (Card1, 3rd field in *CONTROL_FORMING_ONESTEP) to all nodes along the part boundary automatically. A 30% lockage is set as default for the variable *AUTOLOCK*. Optionally, a node set can be defined along the part boundary and a lock percentage using the _DRAWBEAD option *CONTROL_FORMING_ONESTEP_DRAWBEAD. The lock percentage is based on a percentage of a fully locked force, determined by tensile strength and sheet thickness, and is automatically calculated within the solver. In most cases, default lockage of 30% from 'Auto Beads' achieves sufficiently good results.
- Optionally, friction can be accounted for, by using a new option *CONTROL_FORMING_ONESTEP_FRICTION. The frictional force is based on a "binder pressure", and is a percentage of the input pressure.
- Nodal restraints used in implicit calculation to prevent rigid body motion are automatically applied using a new keyword *CONTROL_FORMING_ONESTEP_AUTO_CONSTRAINT, with OPTION=1 (Card 1, 1st field).
- All other implicit cards, such as *CONTROL_IMPLICIT_GENERAL, _SOLUTION, _SOLVER, _AUTO, _TERMINATION, etc., are used to set the convergence tolerance, termination criterion, etc. It was determined, that the two important variables controlling the solution convergence, Deltau in *CONTROL_IMPLICIT_TERMINATION, and Dctol in *CONTROL_IMPLICIT_SOULTION, can be set to 0.001 and 0.01, respectively, to obtain the most efficient and best results.

The solver currently supports all element types, with output of results in one integration point in plane and three integration points in the thickness direction. Both material types *MAT_024 (tables supported) and *MAT_037 are enabled with the one-step solver. Multiple part IDs are permitted (for filled holes in different PID). Finally, a double precision solver needs to be used. The following control cards are typically used, noting that the no input for the variable AUTOLOCK means default lockage of 30%.

```
*CONTROL_TERMINATION
$    ENDTIM
       1.0
*CONTROL_IMPLICIT_GENERAL
$    IMFLAG        DT0
         1       0.25
*CONTROL_FORMING_ONESTEP
$    OPTION             AUTOLOCK
         7

*CONTROL_FORMING_ONESTEP_AUTO_CONSTRAINT
$  AUTOSPC
         1
*CONTROL_IMPLICIT_TERMINATION
$    DELTAU
     0.001
*CONTROL_IMPLICIT_SOLUTION
$  NSLOLVR    ILIMIT    MAXREF      DCTOL      ECTOL
         2        11      1200       0.01       1.00
*CONTROL_IMPLICIT_SOLVER
$    LSOLVR
         4
*CONTROL_IMPLICIT_AUTO
$     IAUTO    ITEOPT    ITEWIN      DTMIN      DTMAX
         0         0         0        0.0        0.0
```

EXAMPLES

Two examples are provided below.

1) NUMISHEET 2005 cross member – With average element size of 5 mm uniformly across the blank, the drawn part (with addendum and binder) consists of 25328 elements. A DP600 material properties with *MAT_037 was used. On a 1 CPU Linux machine, it took 3 min. to complete the run, with 4 steps. Thickness, plastic strain, and blank size prediction were reasonable, as shown in *Figures 1~3*.

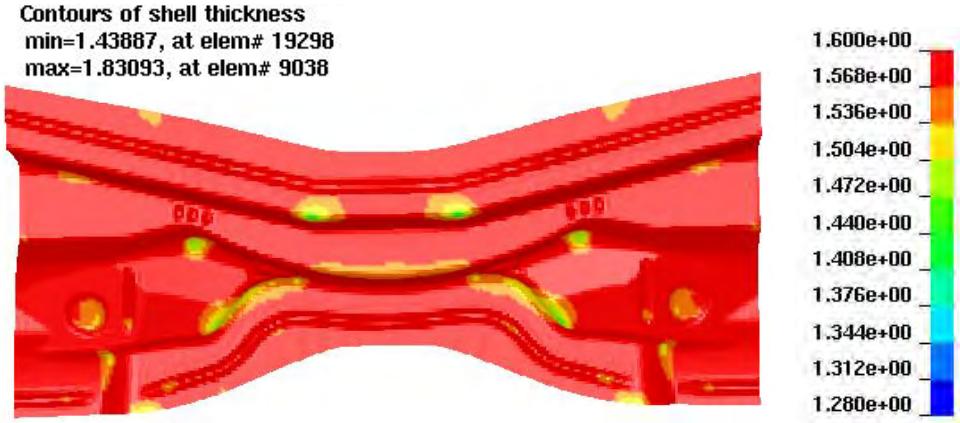


Figure 1 Sheet Thickness Prediction (t_0=1.6mm)

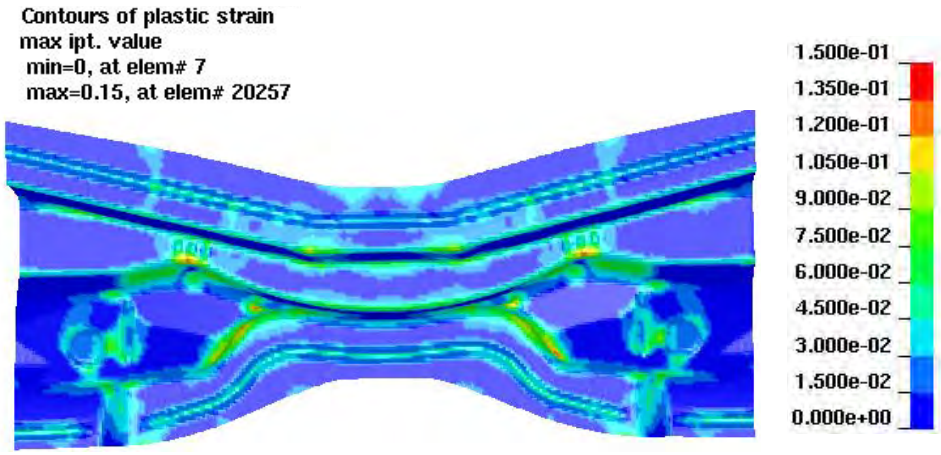


Figure 2 Plastic Strain Prediction

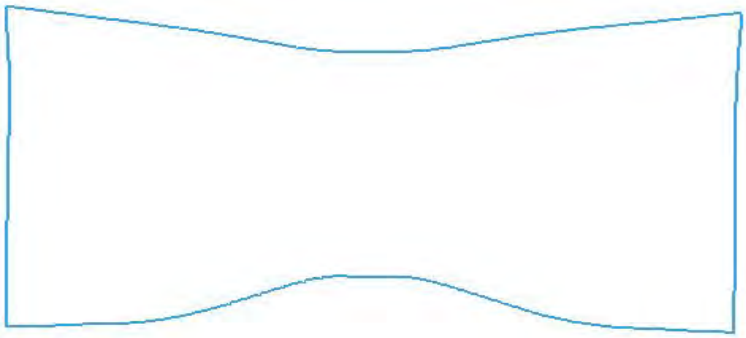


Figure 3 Initial Blank Size Prediction (not to be scaled)

2) NCAC Taurus model firewall - With average element size of 8 mm across the blank, the trimmed part (with holes filled) consists of 15490 elements, as shown in *Figure 4*. A BH210 material properties with *MAT_024 was used. On a 1 CPU Linux machine, it took 4 min. to complete the run with 4 steps total. Thickness, plastic strain, and blank size prediction were reasonable, as shown in *Figures 5~7*.

Figure 4 Sheet Thickness Prediction (t_0=0.75mm)

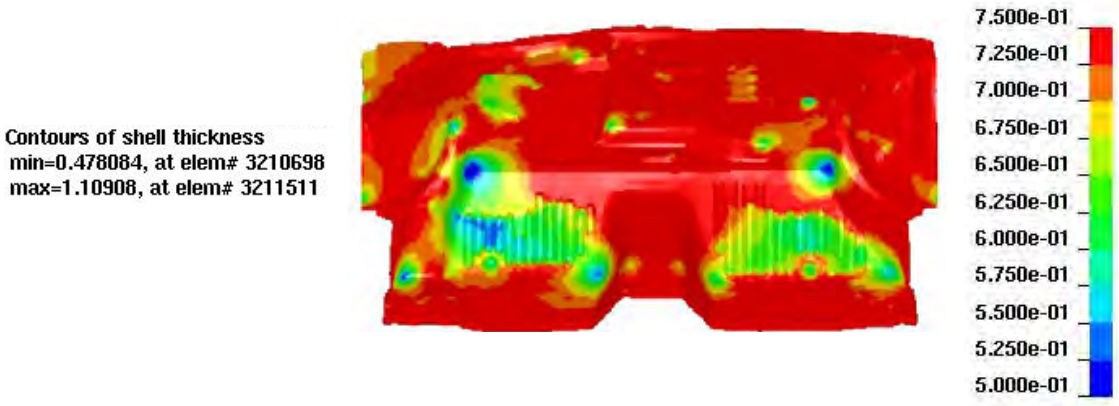


Figure 5 Sheet Thickness Prediction (t_0=0.75mm)

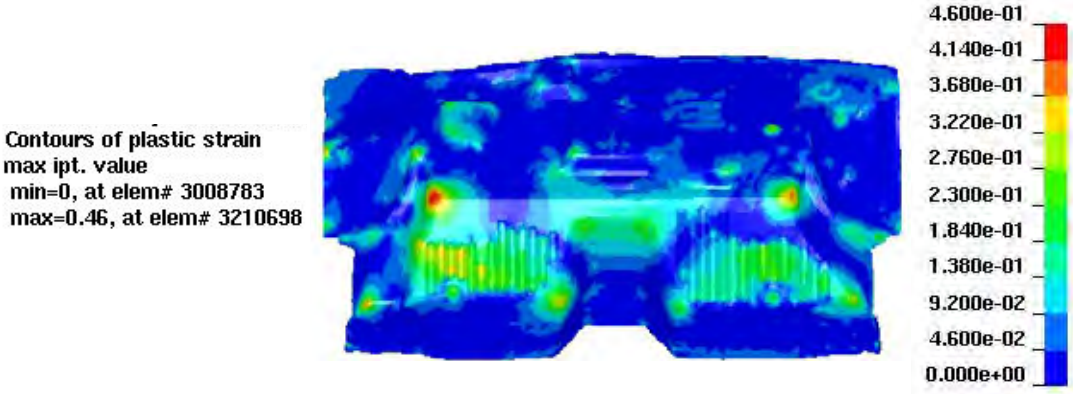


Figure 6 Plastic Strain Prediction

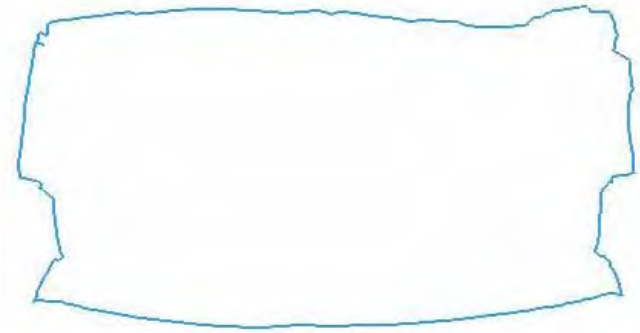


Figure 7 Initial Blank Size Prediction (not to be scaled)

DISCUSSION/CONCLUSION

The new one-step solver from LS-DYNA provides excellent results for a one-step solution. It is fast, robust, easy to use and can be applied in blank size prediction, material cost quotation in a manufacturing engineering environment, and in initializing forming effects for crash simulation. It is loaded with features that cover all of the needs for initializing forming for crash, such as, *MAT_024, multiple parts and tables for material curves, etc. Since most users use LS-DYNA for crash simulation, this new feature provides a few added advantages and benefits – it is entirely compatible in forming/crash mapping; users can perform all forming and crash simulation in one software; it provides an opportunity for the management to consolidate and realize cost savings.

It is important to note that although one-step results provide a fast, initial estimate, and are good enough in some applications, its results are not as accurate as those provided by incremental solutions, which are close to reality. The following *(Figure 8)* illustrates the incremental results for the same cross member in two different views. It is noted that the results are much more realistic, when compared with experimental data provided by the benchmark.

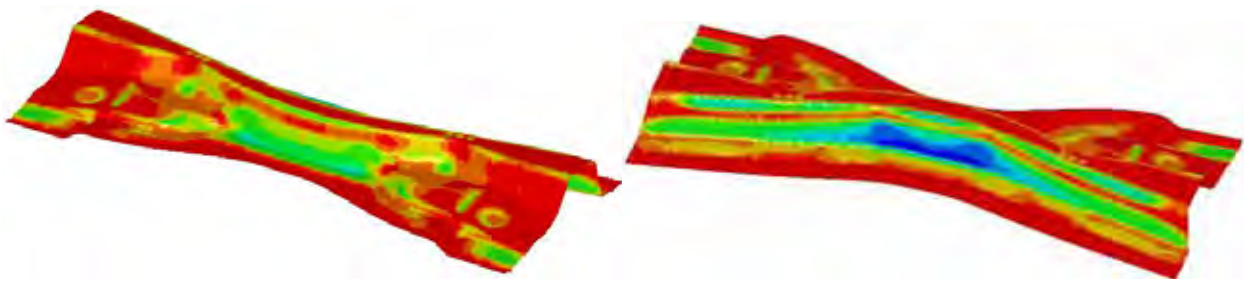


Figure 8 Thickness Prediction from LS-DYNA Incremental Results