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LS-DYNA Metal Forming Developers

Xinhai Zhu

Li Zhang

Line-Die Simulation

Welcome to the June edition of FEA Information Engineering Journal and Website Resouce.

Our featured article:

A Novel Approach to Line-Die Simulation
Xinhai Zhu and Li Zhang

We have updated the section for LS-DYNA worldwide classes.

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Sincerely,

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Table of Contents

Line-Die Simulation - A Novel Approach © Copyright 2009,
Xinhai Zhu and Li Zhang (LSTC)
Editors: Metal Forming Simulation www.metalformingsimulation.com

Summary

Several new features have been implemented in LSDYNA® to streamline the line-die simulation process. With these new keywords, a complete line die simulation can be done with one job submission. In addition, the input set-up becomes much easier. Templates can be set up for various die processes and repeatedly used.

Introduction

A typical die line includes several individual processes, such as gravity loading, binder closing, draw-forming, trim/pierce and flanging operations. The final product quality depends on each of the above mentioned process. Accurate simulation of the entire line-die process provides tremendous values to die manufacturing industry.

Because of its complexity, line-die (also called multi-stage) forming simulation has been one of the challenging issues facing the CAE community. Although LSDYNA has long been applied in line die engineering under large scale production environment, simulation of the next process operation was somewhat always dependent on the outcome of the previous process. For example, trimming of a drawn panel needs to wait until a seed node on the blank has been generated (for adaptive mesh) and identified; empty tool travel exists between the processes; and proper constraints needed in springback simulation had to wait until the needed nodes were generated; Constraint locations for springback could not be specified exactly on the spot. FEA pre-processors need to be used in between to set up the next process simulation input decks. There has been a great demand to streamline the simulation of the entire process.

New Approach

Several new features have been implemented in LS-DYNA to address the foregoing difficulties. The following are the new keywords:

1) *CONTROL_FORMING_AUTOPOSITION_PARAMETER (short for *C_F_A_P for all later reference purpose),
2) *DEFINE_TRIM_SEED_POINT_COORDINATES,
3) *CONSTRAINED_COORDINATE,
4) *CONTROL_FORMING_TIPPING.

The new capabilities, together with the keywords *PARAMETER, *PARAMETER_EXPRESSION, and *CASE, allow a stamping engineer to define everything needed ahead of time and conduct a multi-stage simulation with one job submission.

The new keyword, *C_F_A_P, automatically calculates the tool and blank separation distances and saves the distances in corresponding variables which are initially defined in *PARAMETER. By referencing the variables which store the proper separation distances calculated, the blank and tools can be automatically moved with *PART_MOVE from their home position. In addition, using keyword *PARAMETER_EXPRESSION, all time related variables can be also calculated. These time related variables can be used for definition of keywords such as:

*CONTROL_TERMINATION,
*CONTROL_ADAPTIVE,
*CONTROL_TIMESTEP,
*DATABASE_xxxxxx,
*DATABASE_BINARY_D3PLOT,
*BOUNDARY_PRESCRIBED_MOTION_RIGID,
*DEFINE_CURVE, etc.

This concept can be viewed in Figure 1. The *C_F_A_P keyword is very versatile in handling various situations of die processes. For example, a specific binder travel distance can be specified for the draw process setup; extra punch support and under-support can also be defined; drawing and flanging in local coordinates are fully supported.

The second technology enabler is the trimming of stamping panel, which can now be handled with the definition of location coordinates using *DEFINE_TRIM_SEED_POINT_COORDINATES. Instead of defining a seed node (which had to be a part of the blank and is unknown in the beginning of the simulation), up to two sets of location coordinates can be defined to handle the double attached draw panels.

The third feature is the new keyword *CONSTRAINED_COORDINATE, which allows for the definition of constraints during springback based on location coordinates, rather than node IDs. Exact location coordinates now can be generated beforehand based on process specification from the stationary punch (or flaning post for flanging simulation) and used in the keyword.

*CONTROL_FORMING_TIPPING can now be used to tip and translate the panel between line dies. Typically there are some small amounts of rotations and/or translations between the line dies about orthogonal axes of the press, which can be handled by this new keyword now and it works well with *CASE.

Finally the keyword *CASE is used to link all the die process simulations together with one input deck. The latest capability of *CASE also allows for switching between double and single precision solvers for implicit and explicit calculations, respectively, in both LINUX/UNIX and WINDOWS environment.
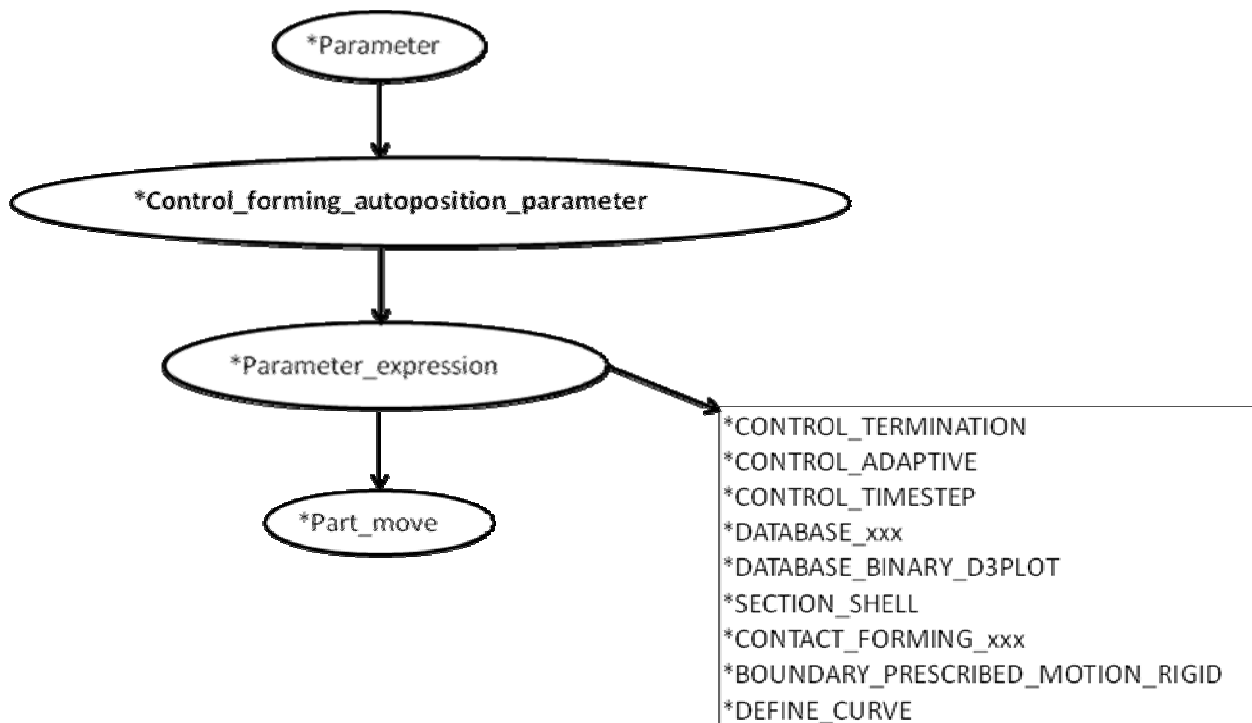

Figure 1. A new concept for sheet metal line die simulation

The new capabilities have gone through extensive testing and have proven to be very robust. As an example, NUMISHEET'02 fender (air draw) is used to illustrate the entire process simulation with a modified multi-flanging die process. As shown in Figure 2, in addition to the original flanging process along the hood line in a local coordinate system, two more flanging processes were added along the door line and wheel house. The entire simulation is run with one single input deck, which includes cases representing die processes shown. The final springback of the panel in the flanged areas are illustrated in Figure 3 (next page).
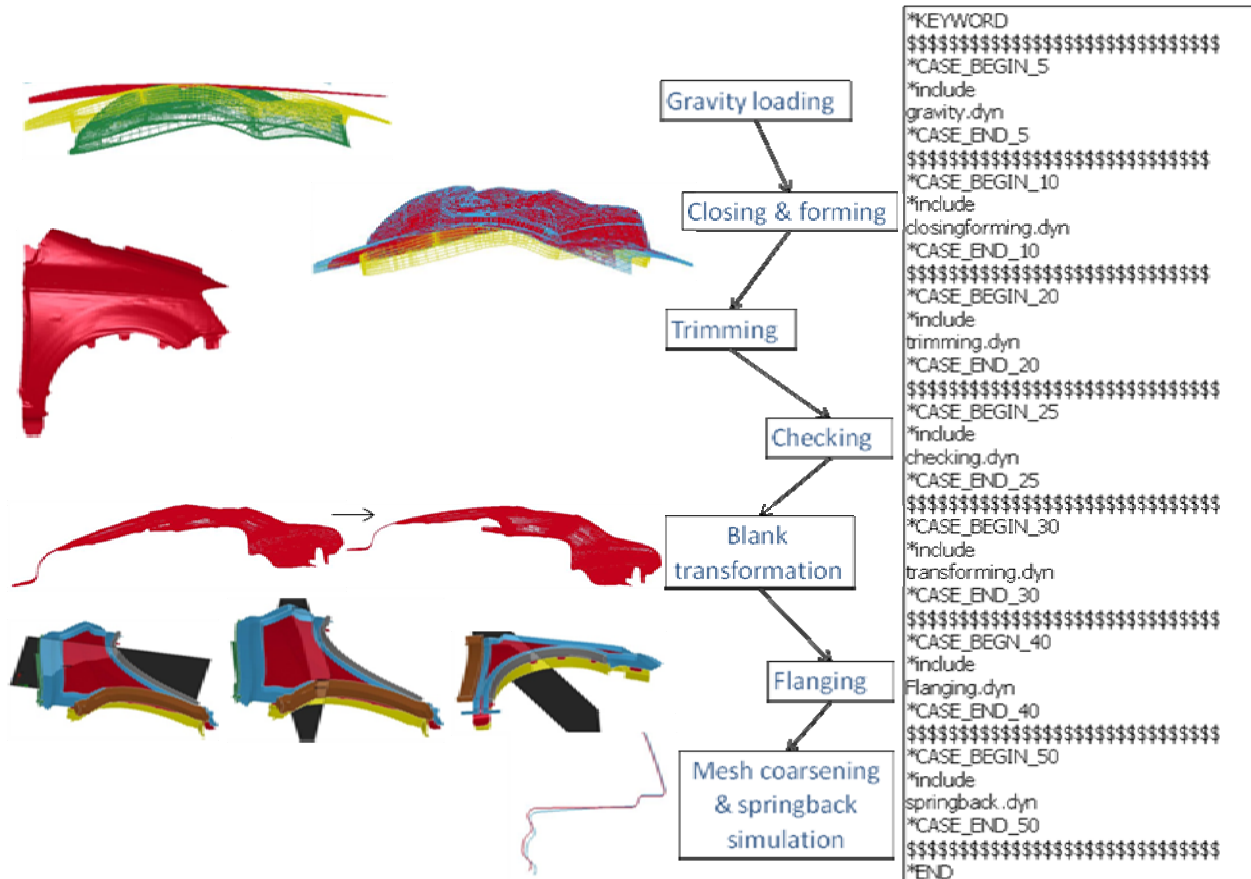
Figure 2. A typical sheet metal line die process simulation

In summary, the advantages of the new capabilities include:
1) Complete line die simulation can now be done with one job submission
2) Input deck becomes much easier to set up even for line die simulation involving multi-flanging simulation
3) Various templates are reusable for local modifications of die geometry within the same class of future parts

The complete input decks on this multi-flanging simulation of the above example can be found on www.metalformingsimulation.com.

Two other examples utilizing the latest capabilities are also posted in the NUMISHEET'02 fender (air draw) with one single flanging process and NUMISHEET'05 decklid inner (toggle draw) line die process simulation.

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Figure 3. Springback in line die process simulation
(final springback of the panel in the flanged areas)

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Simulation Drives Move to Virtual Prototyping

With the economy running on fumes, today's automakers are desperately trying to find some breathing room. Many best-in-class IT organizations find that by investing in cost-effective technology, they save money and increase ef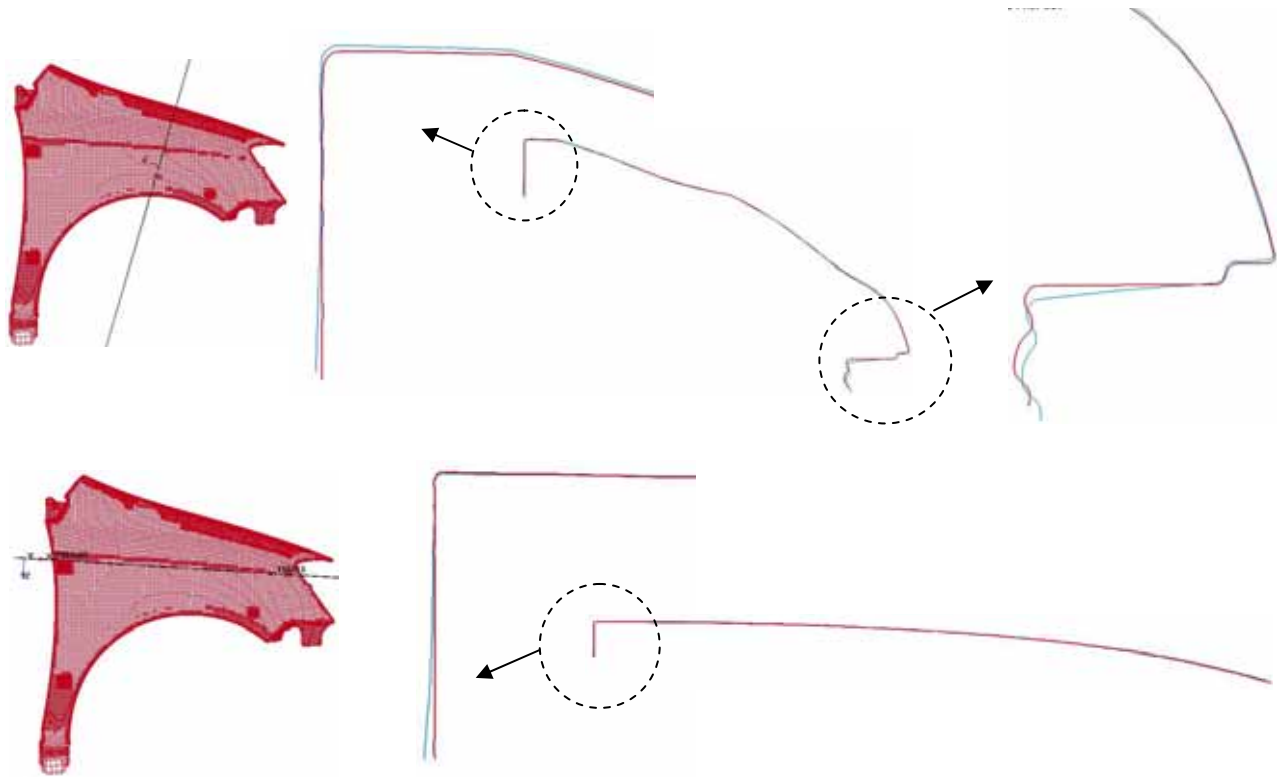ficiency. CAE simulations running on high performance blades are leading automotive companies through today's tough economic times and into a more competitive future.

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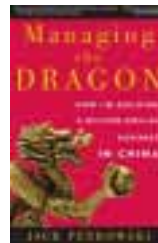
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The Seminar of LS-DYNA Technical Exchange

ETA- CHINA, Grace Su

The seminar was organized by ETA-CHINA and held in Beijing Oriental Garden Hotel on June 2nd, 2009. LSTC senior software engineer, Mr. Hao Chen presented The Analysis Function of LS-DYNA to the Aerospace & Defense institutes engineers.

At the seminar, Mr.Chen explained LS-DYNA's ALE role in the airbag's bufferring of impacts and explosions. After a brief introduction to general ALE theory and explanation of the FSI algorithm, Mr. Chen focused on ALE's capabilities and various applications; and the key aspects of building an ideal ALE/FSI model.

The seminar was considered a success by all participants, because it not only showed the power advantage of LS-DYNA in modeling analysis, but also provided an effective tool for complex problems in anlaysis.

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

Among the many technical aspects of LS-DYNA that Mr. Chen presents are:

- ALE Single and Multi Material Formulation
- Mesh Motion
- FSI Constraint and Penalty Formulation
- Pemeable Coupling – Porous Coupling – Projection Coupling
- ALE/FSI – MPP

July News will have presentation coverage of Fluid-Structure Interaction by Jason Wang and Hao Chen, Livermore Software Technology Corporation.

Review of the 7th European LS-DYNA Conference

The 7th European LS-DYNA Conference was held in Salzburg, Austria on May 14th - May 15th.

The conference was organized by DYNAmore GmbH and the European LS-DYNA distributors with headquarters located in:

- UK - Arup,
- France - Aloytech,
- Sweden - Engineering Research AB
- Russia - Strela
- US – LSTC development headquarters for LS-DYNA, LS-PrePost, LS-OPT, Dummy and Barrier models.

More than 330 participants, from 25 countries took the opportunity to learn the newest developments, trends, and applications of LS-DYNA. Over 140 technical presentations were given. These lectures, or presentations, were by experienced users and/or developers, from universities, research institutes and industry.

The accompanying hard- and software exhibition consisted of more than 30 companies providing software tools and services in the area of crash simulation, passenger safety and metal forming analysis.

Among the many components that made this European conference a success were:

- Comprehensive, information about LS-DYNA
- International knowledge exchange

- Technical discussions across country borders
- In depth plenary talks by respected experts in the field
- BMW, Daimler, Porsche and Jaguar Landrover, offered a comprehensive overview about the actual trends and challenges in crash and passenger safety simulation.
- Siemens AG offered an interesting lecture with applications from the railway industry
- Prof. Dr. Eberhardsteiner from Technical University Vienna presented an interesting lecture on the actual results in the area of wood.
- 6 parallel sessions with user talks from all application areas of LS-DYNA were scheduled.
- Lecturers from industry and science presented their latest experiences in crash and passenger safety simulation, pedestrian protection, airbag, new materials, optimization, metal forming, fluid structure interaction, optimization as well as complementary software tools in the area of data processing and data management.

Full Papers of almost all presentations can be downloaded now at
http://www.dynamore.de/conferences/past-conferences/eu7

Available in July will be information on The 11th International LS-DYNA User's conference to be held June 06 - 08th 2010, in the US at the Hyatt Regency Hotel, Dearborn Michigan.

eta/DYNAFORM

Expanded Die Analysis Solution Improves Efficiency

eta/DYNAFORM, now offers over 90 new and enhanced features in the latest release, version 5.7. While maintaining its status as the most cost-effective solution of its type, this version features the addition of the over 50 new steel and aluminum materials, an expanded Die Structural Analysis module, as well as a host of new and improved functions.
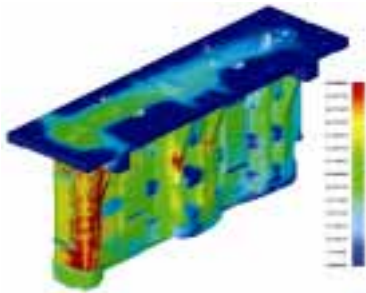
"DYNAFORM's expanded Die Structural Analysis (DSA) module which will surely help to increase manufacturing efficiency and productivity. Within DSA, a scrap shedding and removal function can help prevent line shutdown caused by the failure of scrap to exit the workstation," said ETA CEO, Abraham Keisoglou.

Also incorporated in the expanded DSA module is the ability to simulate the transfer of metal as it progresses through the manufacturing process and to predict interference between the work-piece and tools from simulated part deformation. Additionally, the module allows the user to simulate operational loads to analyze die structural integrity and generate FEA models of the structure.

Several new and enhanced Pre and Post Processing features are also included in this newest release. Some examples include a new tonnage prediction function, the ability to free format input into the material library and an enhanced meshing tool which allows the user better control over small size parts.

DYNAFORM's quick and easy AutoSetup feature includes an enhanced function to edit single point constraints (SPCs), now supports tube symmetry for hydro-forming and also offers automatic calculation of adaptive frequency based on tool travel distance.

Development of the popular Blank Size Engineering (BSE) and Die Face Engineering (DFE) modules was also advanced. New functions include Quick Unfold, Batch BSE, Batch MSTEP, Sidestep, Double-Attach Tipping", Fillet Mesh, Double Fill", Die Trim and Addendum Control Profile.

About ETA and about Cranes Engineering can be found on their respective websites: www.eta.com or www.cranesengineering.com: Cranes Engineering is a leading provider of FEA (finite element analysis) solutions,

For information contact: Contact: Laura Abert - Email: labert@eta.com or sales@eta.com

Oasys
   LS-DYNA Environment

ARUP

nhance
   engineering solutions

Oasys LS-DYNA Indian Update Meeting 2009

The 2nd Oasys LS-DYNA Indian update meeting was successfully conducted in Pune, India on 22nd April 2009. Users of LS-DYNA from various industry segments and academic Institutions attended the update meeting, with the majority of users coming from OEMs, suppliers and consultancy companies from automotive industry. The event gave the right platform for users to gain updates on the cutting edge developments in the LS-DYNA and Oasys Software. Presentations of different LS-DYNA projects from Arup, Tata Motors and Mahindra & Mahindra were appreciated by the users.

LS-DYNA Training calendar for 3rd Quarter, 2009

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

Training	City	Date (year 2009)	Duration
LS-DYNA-Introductory Course	Hyderabad	July 14 to 15	2 Days
Automotive Crashworthiness using LS-DYNA	Pune	July 21 to 24	3½ Days
	Bangalore	August 04 to 07	
Airbag Modelling with LS-DYNA	Hyderabad	August 18	1 Day

The size of class is limited to 10 trainees only. Details of registration, cost etc can be found at: www.oasys-software.com/dyna/en/training/worldwide.shtml

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

Contact Details:

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

TOPCRUNCH.ORG
LS-DYNA Benchmarks Cray Inc./Cray CX Division

Vendor – Submitter Cray Inc./Cray CX Division
Submission Date: June 03, 2009

Computer/ Interconnect	Processor	#Nodes x #Processors per Node x #Cores Per Processor = Total #CPU	Time (Sec)	Benchmark Problem
CX1/IB DDR (mlx4_0/MT26418)	Intel® Xeon® X5570 2.93GHz (Turbo ON)	8 x 2 x 4 = **64**	16325	Car2car
CX1/IB DDR (mlx4_0/MT26418)	Intel® Xeon® X5570 2.93GHz (Turbo ON)	4 x 2 x 4 = **32**	29017	Car2car
CX1/IB DDR (mlx4_0/MT26418)	Intel® Xeon® X5570 2.93GHz (Turbo ON)	2 x 2 x 4 = **16**	54700	Car2car
CX1/IB DDR (mlx4_0/MT26418)	Intel® Xeon® X5570 2.93GHz (Turbo ON)	1 x 2 x 4 = **8**	105052	Car2car

Pre Post Processing Software

Livermore Software Technology Corp.

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

Engineering Technology Associates, Inc

FEMB Engineering Technology Associates' Finite Element Model Builder (FEMB) is a finite element pre- and post-processor for use with all major analysis codes and CAD Software.

JSOL Corporation

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

Oasys, Ltd

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.

BETA CAE Systems S.A.

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, a thriving innovative software with special features for the high performance and effortless 3D & 2D post-processing of LS-DYNA results.

Simpleware

Provides software solutions for robust, fast, and easy conversion of 3D images into high quality meshes which can be used for FEA, CFD, CAD, RP.

Participant LS-DYNA® Resource Page (alpha order)

Fully QA'd by Livermore Software Technology Corporation

SMP and MPP Hardware and OS

FUJITSU

FUJITSU Prime Power	SUN OS 5.8

HP

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

INTEL

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

NEC

NEX SX6	Super-UX

Participant LS-DYNA® Resource Page (alpha order)

Fully QA'd by Livermore Software Technology Corporation

MPP and Interconnect MPI

CRAY

	O/S	HPC Interconnect	MPI Software
CX1	Windows HPC Server 2008, Linux	InfiniB	MS MPI, HP MPI, Intel MPI
XT5	Linux	SeaStar2	Cary MPI
XT5M	Linux	SeaStar1	Cray MPI

FUJITSU

	O/S	HPC Interconnect	MPI Software
FUJITSU Prime Power	SUN OS 5.8		

HP

	O/S	HPC Interconnect	MPI Software
HP PA8000	HPUX		
HPIA64	HPUX		

continued next page

Participant LS-DYNA® Resource Page (alpha order)

Fully QA'd by Livermore Software Technology Corporation

INTEL

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

NEC

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

LS-DYNA® Resource Page - Participant Software

The following list are software programs interfacing to, or have the LS-DYNA solver embedded within their product. For complete information on the software products visit the corporate website.

ETA – DYNAFORM

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

ETA – VPG

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

MSC.Software - MSC.Dytran LS-DYNA

Tightly-integrated solution that combines MSC.Dytran's advanced fluid-structure interaction capabilities with LS-DYNA's high-performance structural DMP within a common simulation environment. Innovative explicit nonlinear technology enables extreme, short-duration dynamic events to be simulated for a variety of industrial and commercial applications on UNIX, Linux, and Windows platforms.

MSC.Software - MSC.Nastran/SOL 700

The MSC.NastranTM Explicit Nonlinear product module (SOL 700) provides MSC.Nastran users the ability access the explicit nonlinear structural simulation capabilities of the MSC.Dytran LS-DYNA solver using the MSC.Nastran Bulk Data input format.

MSC.Nastran

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

MSC.Software – Gateway for LS-DYNA

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

Oasys software for LS-DYNA

Oasys software is custom-written for 100% compatibility with LS-DYNA. Oasys PRIMER offers model creation, editing and error removal, together with many specialist functions for rapid generation of error-free models. Oasys also offers post-processing software for in-depth analysis of results and automatic report generation.

ESI Group

Visual-CRASH For DYNA

Visual-Crash for 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.

APTEK

The MMCD is a graphics-based and menu-driven program that interfaces with the LS-DYNA library of material models and the LS-OPT optimization code. The core of the MMCD is the driver, which calculates the stress-strain behavior of material models driven by combinations of strain increments and stress boundary conditions, i.e. pure shear stress, and combinations of uniaxial, biaxial, and triaxial compression and tension. MMCD input and output is accessed via pre- and post-processors; graphical user interfaces (GUIs) for easily selecting the material
.

model parameters and load histories, and for plotting the output in both two (stress-strain curves) and three (yield surfaces) dimensions. The pre-processor, driver, and post-processor are combined into a web downloadable software package that operates seamlessly as a single code.

BETA CAE Systems – ANSA

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 – μETA

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

FEA Information Participants –
Company name takes you directly to Website

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

JSOL Corporation: Specializing in Research & Consulting; System Consulting, Frontier Business, System Integration and Science Consulting.

HP: Leading provider of high performance computing solutions for CAE, including workstations, servers, blades and storage..

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

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

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

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

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

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

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

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

Voltaire: Voltaire is a leading provider of scale-out computing fabrics for data centers, high performance computing and cloud environments. Voltaire's InfiniBand-based solutions help software applications run simulations and product-design analysis faster.

CRAY: A global leader in supercomputing, Cray provides innovative systems that enable scientists and engineers in government, industry and academia to meet both existing and future computational challenges

LS-DYNA® Software Distributors

Alphabetical order by Country

Australia	**Leading Engineering Analysis Providers**
Canada	**Metal Forming Analysis Corporation**
China	**Arup**
China	**ETA China**
France	**Alyotech**
France	**AS+**
Germany	**CAD-FEM**
Germany	**DYNAmore**
India	**Oasys, Ltd.**
India	**EASi Engineering**
India	**CADFEM Engineering Services India**
Italy	**DYNAmore**
Italy	**ENGINSOFT**
Japan	**JSOL Corporation**
Japan	**ITOCHU Techno-Solutions Corporation**
Japan	**Fujitsu**
Korea	**Theme Engineering**
Korea	**Kostech**
Netherlands	**Infinite Simulation Systems BV**
Russia	**State Unitary Enterprise - STRELA**
Sweden	**Engineering Research AB**
Taiwan	**Flotrend Corporation**
USA	**Engineering Technology Associates, Inc.**
USA	**Dynamax**
USA	**Livermore Software Technology Corp.**
UK	**ARUP**

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USA	Dr. Ted Belytschko	Northwestern University
USA	Dr. David Benson	University of California – San Diego
USA	Dr. Bhavin V. Mehta	Ohio University
USA	Dr. Taylan Altan	The Ohio State U – ERC/NSM
USA	Dr. Ala Tabiei	University of Cincinnati
USA	Prof. John D. Reid	University of Nebraska
USA	Professor Thomas Vasko	Connecticut State University

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

LS-DYNA Support Site	FEA Informationwebsites
LS-DYNA Examples (more than 100 Examples)	LS-DYNA Conference Site
TopCrunch – Benchmarks	LS-DYNA Publications to Download On Line
LS-DYNA Publications	LSTC LS-PrePost Tutorials
CADFEM GmbH Portal	LS-OPT Support Site
LS-DYNA Distributors	LS-DYNA Consulting
D3 VIEW - Tracking Developments in LS-DYNA®	

LS-DYNA® and Related Courses LSTC & Worldwide 2009

Advanced - Impact Analysis	$950	MI June 23-26
Advanced Options	$750	CA Sept 07-08, MI Dec 10-11,
ALE/Eulerian & Fluid/Structure Interaction	$750	CA July 15 - 17
Blast & Penetration	$1,250 minimum 15 students	MI Oct. 22-23
Composite Materials	$750	
Concrete and Geomaterial Modeling (min 3 students)	$1,000	CA Sept. 24-25
Contact	$750	MI Sept 10-11,
Implicit	$750	June 29 - 30 MI Sept 21-22
Introduction to LS-DYNA LS-PrePost is no fee and held the day prior to dates shown	$750	CA Aug 04-07 CA Nov 10-13 MI Sept 15-18 MI Dec 15-18
Introduction to LS-OPT	$750	CA Nov 3-6
Material Modeling Using User Defined Options	$750	CA July 01-02
MESH Free Methods (SPH and EFG)	$750	CA Dec 08-11

Please check with the listed Company for accuracy of dates/courses.

LS-DYNA Courses Worldwide Listings

If you have any courses, that you want listed in the FEA News please send:

Arup - The Arup Campus
   Blythe Gate
   Blythe Valley Park
   Solihull, B90 8AE
   United Kingdom
   dyna.sales@arup.com

COURSES BY OASYS – UK

Course Name	Date
Oasys PRIMER - Automatic Assembly of Multiple Crash Cases	15th June 2009 (half day)
Oasys PRIMER – Spotwelds & Connections	15th June 2009 (half day)
Oasys LS-DYNA Environment Automotive Crash Modelling	23rd – 25th June 2009
Oasys PRIMER & Oasys D3PLOT – JavaScripting	29th June 2009
Optimization with LS-OPT (introductory)	7th & 8th July 2009
Stochastic Analysis with LS-OPT (advanced)	9th July 2009
Fluid/Structure Interaction in LS-DYNA	14th & 15th September 2009
Using the Implicit Capabilities of LS-DYNA	*(October 2009)*

CADFEM India

   Plot # 48, Park View Enclave
   Old Bowenpally, Hyderabad-11
   Tel +91 40 64543579
   E-Mail info@cadfem.in

CADFEM India - India

Course Name	Date
Introduction to LS-DYNA	June 25 & July 16
Contact Simulation	July 23
Material Modeling	July 24

AS+ FRANCE

Vincent LAPOUJADE –
Tel: +33 (0)5 61 44 54 98 / Fax: +33 (0)5 61 44 74 88
E-mail : v.lapoujade@asplus.fr
5, avenue Didier Daurat - 31 400 TOULOUSE - www.asplus.fr

Paul Du Bois LS-DYNA Course

Course	Country	Company	Date
Material modelling in LS-DYNA (Plasticity, Damage, Failure)	France	AS+	22 sept (22-23)
Polymeric Material Modelling in LS-DYNA	France	AS+	24 sept (24-25)

Additional 2009 training:

Course	Country	Date
Composite	France	TBC (end of September, beginning of October)
Introduction to LS-DYNA – Explicit solver	France	13 oct (13-15)
Introduction to LS-DYNA Implicit	France	17 nov (17)
Advanced LS-DYNA Implicit	France	18 nov (18)
LS-DYNA SPH	France	24 nov (24-25)
LS-DYNA ALE / FSI	France	2 dec (2-3)
Unified introduction to LS-DYNA – Explicit & Implicit Solver	France	7 dec (7-10)

"3rd ANSA & μETA International Conference"
This is an excerpt: For full conference information visit:
http://www.beta-cae.gr/3rd_conference_announcement.htm

Being consistent to our biannual appointment and celebrating the 10 years since the establishment of BETA CAE Systems S.A., it is our pleasure to invite you to participate in the **"3rd ANSA & μETA International Conference"** to be held on September 9-11, 2009, in Porto Carras Grand Resort Hotel, Halkidiki, Greece.

…The conference will be of interest to decision makers, strategy & methodology planners, simulation experts, applications users and researchers at the forefront of the CAE simulation for various disciplines, coming from OEMs and suppliers from a wide spectrum of industrial sectors, specially from, but not limited to, the:

- automotive,
- motorsports,
- railway,
- aerospace,
- shipbuilding/offshore,
- electronics,
- energy,
- heavy machinery,
- medical/biomechanics,
- chemical processes and
- academic
- power tools,

A wide range of topics on various simulation application fields and disciplines will be covered, including:

- CAE strategy & process planning,
- Process automation,
- Product & Simulation Data Management (PDM / SDM),
- Durability,
- Crash & Rollover,
- Occupant & Pedestrian Safety,
- Dynamics,
- Noise, Vibration & Harshness,

- Computational Fluid Dynamics (CFD),
- Optimization,
- Composite materials modeling,
- Climate control,
- Engine technology,
- Heat transfer,
- Simulation results assessment, etc

Registration includes coffee breaks, dinner on September 8th, and meals on September 9th, 10th and 11th, 2009.

Return the registration form by fax or email no later than June 30, 2009, to: Mrs. Photini Paraskevopoulou

BETA CAE Systems S.A.
tel: +30-2392-021914
fax: +30-2392-021828
email: congress@beta-cae.gr

Abstracts submission:
 Final manuscripts submission:
 June 20, 2009

Registration until: June 30, 2009

Event: September 9 - 11, 2009

ICCT09 1st International Conference on Concrete

Tabriz, IRAN

The 1st International conference on concrete technologies serve the interchange of knowledge and experience in the field of concrete technologies among different research groups connected with this material and coming from all over the world.

The conference is organized by The Iranian National Retrofiting Center, Tabriz, Iran and will be organized in close contact with the Chair of Structural Design at Dresden Univesity of Technology.

Sponsorship for the conference is Peshahvar Technical University Pakistan.

The conference venue is the Petroshimi Cultural Complex, located in Tabriz, Iran. Among the many conference topics are:

- High Performance Concrete
- Concrete in Fire
- Sustainability and Durability
- Concrete Construction in Architecture
- Analytical Models and Computer Simulation
- Ductile Fibre Reinforced Cementitious Composites
- Rehabilitation and Retrofitting of Concrete Structures
- Assessment, Monitoring and Environmental Aspect
- Concrete Materials and Chemical Admixtures
- Standard And Specifications
-

Excerpt from Conference Format…

The official language of the conference is English and all papers must be submitted in English. However, the presentations are possible to be in the Persian language.

The special topics will be grouped in parallel sessions to attract specialists and interested persons in neighboring fields.

There will be invited and welcome papers from all countries. The conference also will attract local attendees to participate and present papers and give an insight into the current level of the concrete in Iran.

Office Contact Locations:
Asia: Tabriz Iran
            asia@icct.ir
Europe: Dresden, Germany
            Europe@icct.ir

A short course taught by: Thomas J. R. Hughes and Ted Belytschko
August 17-August 21, 2009 Austin TX

 Learn the methods and the basics of nonlinear finite elements from two international experts in the field and get up to date on the latest research in finite elements. Some of the topics are:

Nonlinear constitutive equations
*   Time integration
*   Element Technology
*   Multiscale analysis
*   Isogeometric methods
*   Finite elements in fluids
*   XFEM and level sets
*   Meshfree methods
*   Plates and shells
*   Fluid-structure interaction

The course starts with a review of the basics of nonlinear finite element analysis, constitutive equations, element design and selection, and solvers. It then progresses to state-of-the-art methods, including current topics such as the extended finite element method, isogeometric methods, multiscale methods and mesh free methods. Important concepts are clearly explained so that students can obtain a thorough grounding in and overview of nonlinear finite element analysis.
Registrants will receive three books as part of their registration fee:

T Belytschko, WK Liu and B Moran:
    Nonlinear Finite Elements for Continua
    and Structures
J Simo and TJR Hughes:
    Computational Inelasticity
TJR Hughes:
    The Finite Element Method

Contact Information: If you have any questions regarding this course, please send us an e-mail at   info@feshortcourse.com   -   If you have any questions regarding registration for this course, please send us an e-mail at :   registration@feshortcourse.com

For more details see   **FE Short Course**

Available for Purchase From Amazon.com
TJR Hughes   -   **The Finite Element Method**
T. Belytschko, WK Liu, B Moran - **Nonlinear Finite Elements for Continua and Structures**

J Simo and TJR Hughes -   *Computational Inelasticity*

EnginSoft Int'l Conference and ANSYS Italian Conference 2009

1-2 October, Bergamo – Italy

The EnginSoft International Conference 2009 will feature CAE Technologies for Industry. Leading experts from around the world will highlight CAE applications in automotive, aerospace, energy, marine, oil&gas, consumer goods, environment, biomedicine and other.

The Call for Papers is now open, please visit the conference website:

http://meeting2009.enginsoft.it

Follow the sound of innovation - Get inspired about CAE

Software that will be presented through application cases and in product update sessions include:

- ANSYS
- ANSYS CFX
- ANSYS FLUENT
- ANSYS ICEM CFD
- modeFRONTIER
- LS-DYNA
- FLOWMASTER
- MAGMASOFT -
- FORGE
- FTI
- THIRD WAVE SYSTEM
- ESACOMP ...

ANSYS Conference & 27th CADFEM Users Meeting

November 18 - 20, 2009
Leipzig, Germany

Register now and receive the early-birds discount!
Whether you apply as a lecturer or participant – your early registration by June 30th, 2009 will help us plan the event – and we consider this worthy of a 10 % early-birds discount.
You are not risking anything as you can cancel, free-of-charge, until October 30, 2009 and replacement participants can be appointed at any time.

For Complete Details Visit
www.usersmeeting.com

Conferences & Events

07/16-19 USA	**10th US National Congress on Computational Mechanics**
09/09-11 Greece	**3rd ANSA & μETA Int'l Conf**
10/01-02 Italy	**Enginsoft International Conference 2009**
11/14/-20 USA	**SC2009**
11/ 18-20	ANSYS Conference & 27th CADFEM Users Meeting

2010 USA: June 6th-8th - Hosted by Livermore Software Technology Corp.
The 11th International LS-DYNA® Users Conference
The Hyatt Regency, Dearborn

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Direct Link to the information sign up page.

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ETA   **Panasas**

Tutorials and Workshops
Tutorials and Workshop Page   Oasys LS-DYNA Environment