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FEA Information Engineering Solutions

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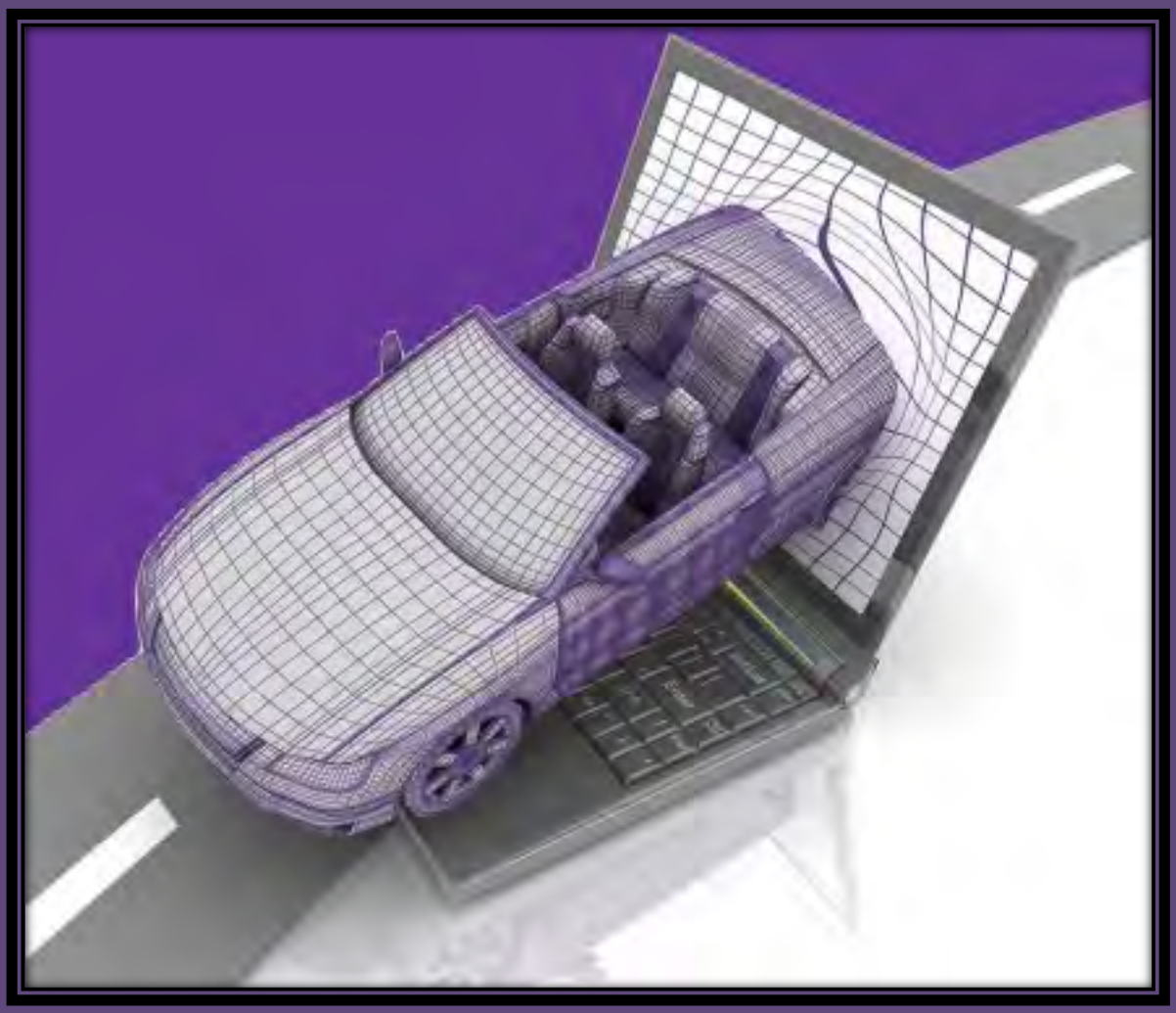

Inside This Issue:

FEA Information Inc. is a publishing company founded April 2000, incorporated in the State of California July 2000, and first published October 2000. The initial publication, FEA Information News continues today as FEA Information Engineering Solutions. The publication's aim and scope is to continue publishing technical solutions and information, for the engineering community.

FEA Information Inc. Publishes:

FEA Information Engineering Solutions

FEA Information Engineering Journal

FEA Information China Engineering Solutions

FEA Information Engineering Solutions:

A monthly publication in pdf format sent via e-mail, additionally archived on the website FEA Publications. www.feapublications.com

FEA Information China Engineering Solutions

The first edition was published February 2012. It is published in Simplified and Traditional Chinese in pdf format. Published : February, April, June, August, October, December. The China Solutions is archived on the website FEA Publications. www.feapublications.com

To sign up for the Traditional, or Simplified edition write to yanhua@feainformation.com

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Issues Now On Line	Volume 1 Issue 1 February 2012 Compilation	Volume 1 Issue 2 March 2012 Metal Forming	Volume 1 Issue 3 April 2012 FSI	Volume 1 Issue 4 May 2012 Aerospace	Volume 1 Issue 5 June 2012 Electromagnetics

Volume 1 Issue 6 July 2012 Blast & Impact	**Volume 1 Issue 7 August 2012 Constitutive Modeling**				

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www.jsol.co.jp/english/cae

www.lstc.com

www.oasys-software.com/dyna/en/

kaizenat.com

www.dfe-tech.com

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Thomas J. Vasko, PhD, PE

We would like to welcome Thomas J. Vasko, PhD, PE., as Managing Editor of FEA Information Engineering Journal (FEAIEJ). Professor Vasko works directly with Editor In Chief, Trent Eggleston. Additionally, Professor Vasko is the Editor of Aerospace Information www.aerospaceinformation.com

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DYNALOOK www.dynalook.com

Now updated with the papers from the 2012 International LS-DYNA Users Conference. Dynalook now has more than 1360 papers available from the last 7 International Conferences and the last 6 European conferences.

SOCIAL MEDIA

Addition - Oasys Software group on LinkedIn
Oasys LS-DYNA Environment Software

We welcome unsolicited topics, ideas, and articles. Publishing is at the sole discretion of FEA Information Inc.

A Perfect Balance in Speed and Accuracy - the eZ-Setup for Sheet Forming in LS-PrePost4.0®

Xinhai Zhu, QuanqingYan, Philip Ho, and Li Zhang, Livermore Software Technology Corp. (LSTC)

INTRODUCTION: LS-DYNA® is well known for its superior accuracy and unmatched capabilities in stamping simulation. On the other hand, it perhaps is lesser known, to some extent, for its fast speed. In a concerted effort to allow our users to take full advantage of the software, eZ-Setup GUI for metal forming was born. One very important feature within the eZ-Setup is the computing options for forming and for flanging simulation. Three default computing levels each for forming and flanging were incorporated in the GUI, with flexibility of providing experienced users to fine tune the parameters.

MAIN FEATURES: The eZ-Setup is accessible through the *Application* menu, as shown in Figure 1. Once a "Forming" process is selected, under "Control/Forming" (Figure 2), users are presented with three default computing options.

1. For early feasibility – With fast computing speed as the main focus, this level sets faster tool speeds (vcls=2000mm/s, vdraw=5000mm/s), smaller penalty (0.03), and few adaptive refinement level and size. Mass scaling is also set in accordance with the minimum adaptive size. Reduced integrated element type and fewer through-the- thickness integration points (NIP) are defaults. Relatively coarser adaptive frequency is used. "Lookforward" adaptive distance is set at 5(mm) for fewer elements generation. For inner panels which typically have high level of stiffness, users are advised to adjust to higher tool speeds.

2. For formability only – With the focus set on accuracy, default tool speeds remain the same. Reduced inertia effect calls for a smaller mass scaling. More adaptive levels and smaller element size are designed to capture the small features within the tool surfaces. There are no changes to the element type, NIP, and "lookforward' distance. Penalty stiffness factor is higher at 0.05 for better fit to the tool surface. Again, for certain inner panels, tool speeds can still be higher.

3. For springback – Forming settings are designed for springback calculation and compensation of stamping tools. The aim is to obtain stable and accurate stresses for residual stresses calculation. Tool speeds are much slower (vcls=1000mm/s, vdraw=2000mm/s). Tight penalty (0.1) is used for accurate tool surface representation. More adaptive levels are used with smaller element size. Mass scaling is set at the lowest (-3E-07). Fully integrated shells and 7 NIP are employed.

The "show" button allows users to view the individual parameter settings (Figure 3), modify, and save in each level. Additionally, an added level, "user-define", is also available for fully customized control.

Based on the studies on many stamping simulation of production intent processes, a brief summary is provided in Table 1, where CPU time on some typical parts are listed. Although the simulation results cannot be shown since they are proprietary, the forming results using the three levels are remarkably similar, except for areas of localized sharp features.

Figure 1. Activating the eZ-Setup

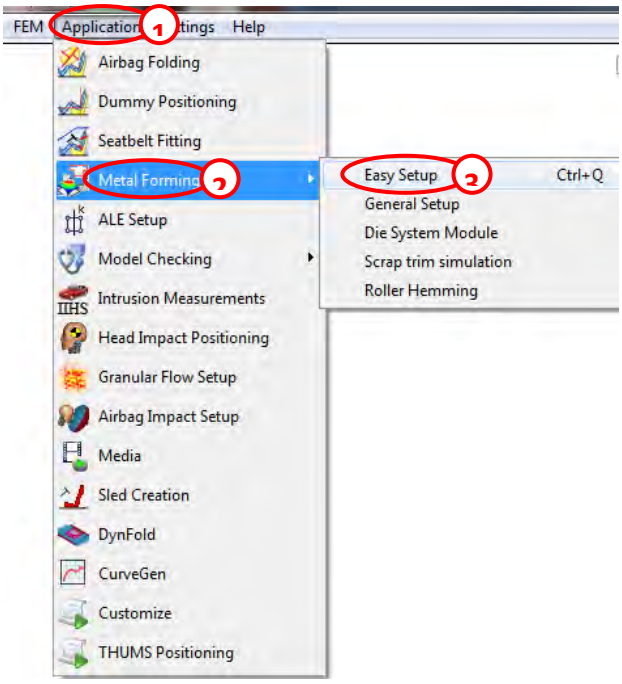


Figure 2. Three computing levels for balancing of speed and accuracy

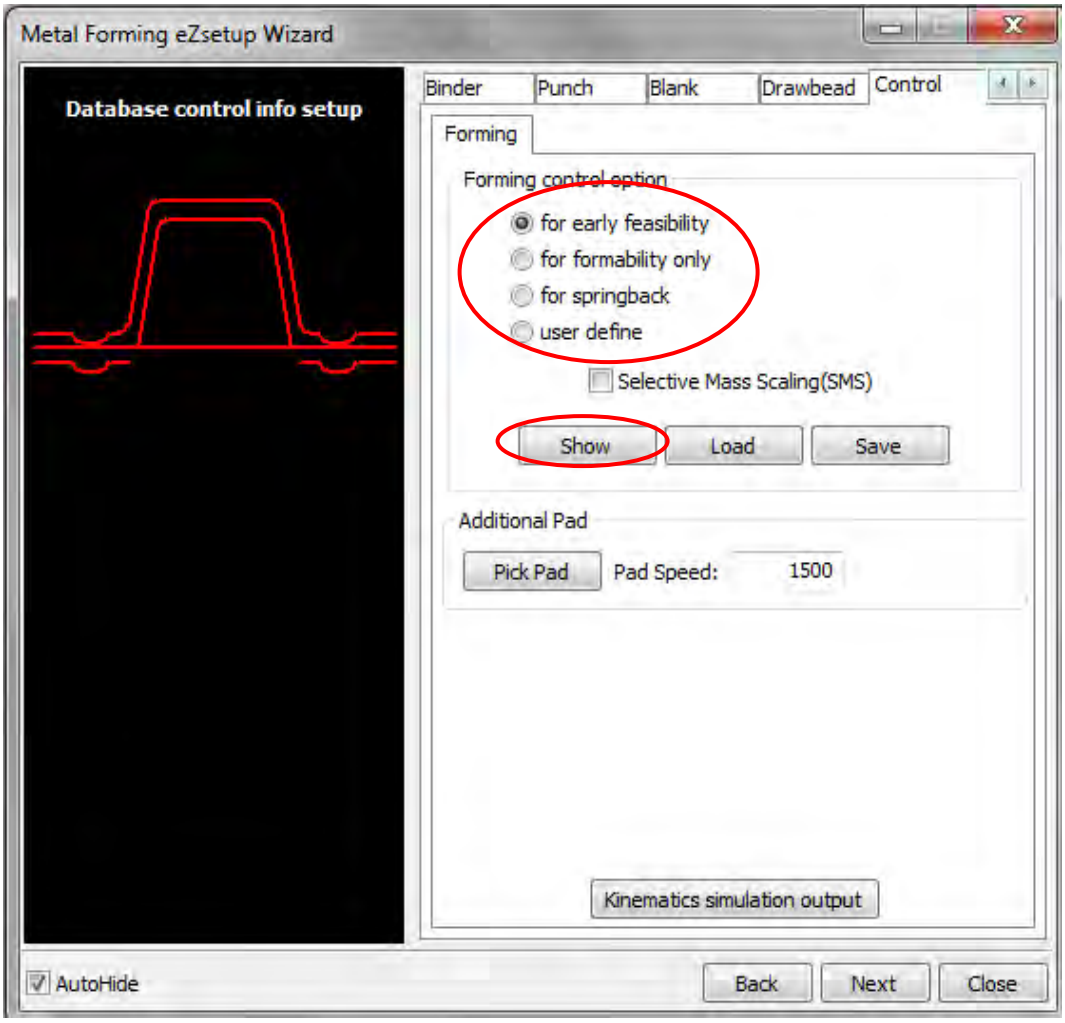


Figure 3. "Show" panel allows for changes to critical parameters

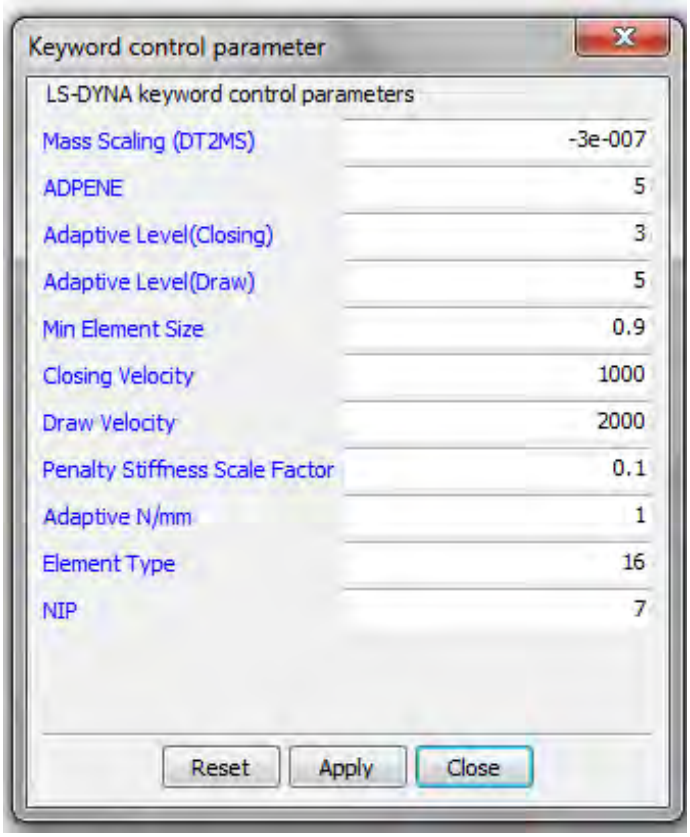
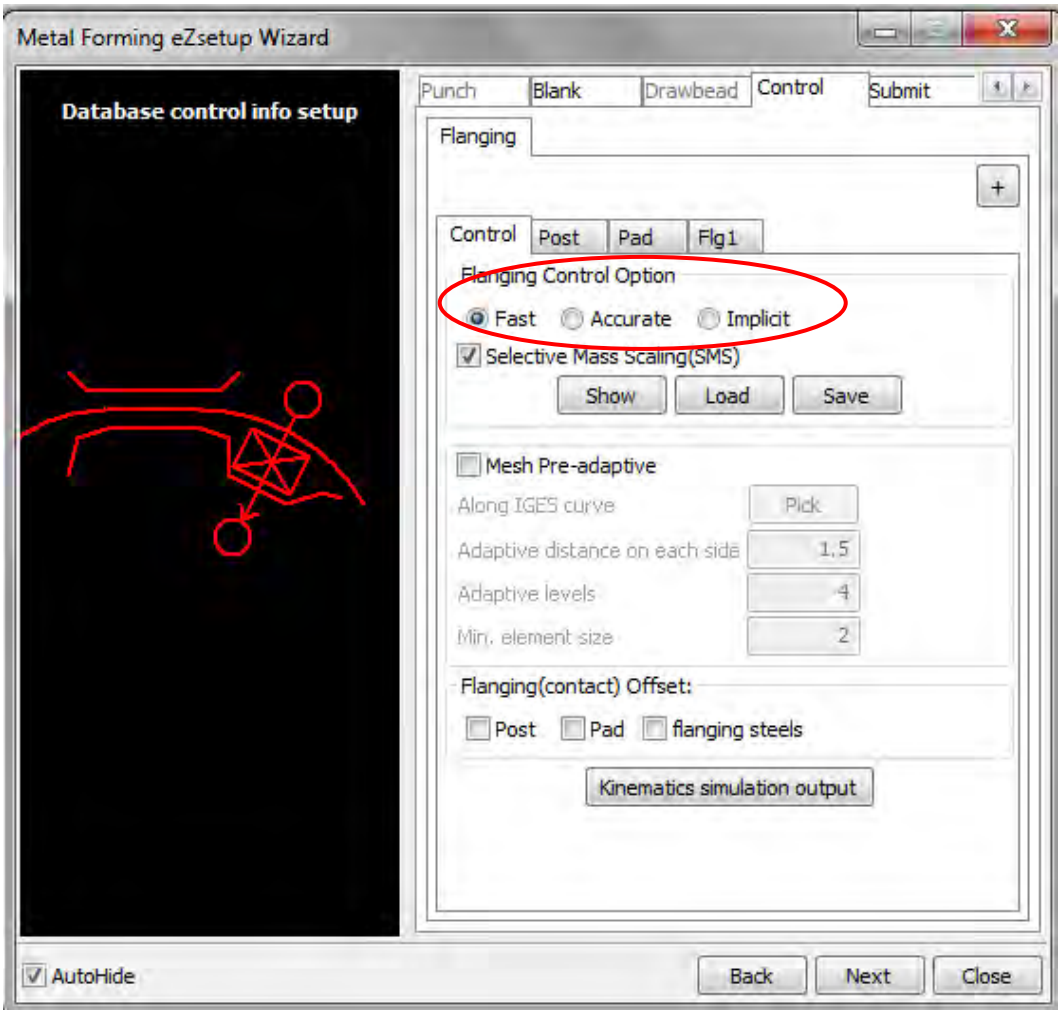


Table 1. CPU time for the 3 computing levels for typical auto body panels.

	Advance Feasibility	For Formability Only	For Springback
Half door outer #1 single – / (Blank elements)	SMP 4 min. /(38900)	SMP 22 min. /(141000)	SMP 5 hrs. /(449000)
Half door outer #2 single / (Blank elements)	SMP 14 min. /(42730)	MPP 19 min. /(143730)	MPP 5hrs 10min /(488730)
Hood inner half / (Blank elements)	MPP 15 min. (101060)	MPP 40 min. (367560)	MPP(24CPUs) 9hrs 7min (1.2 million)
Body side aperture / (Blank elements)	SMP 2hr 37min. (674800)	MPP 6hr 24min (2.24 million)	N/A
Fender outer / (Blank elements)	SMP 29 min. (48150)	SMP 60 min. (145850)	MPP(24CPUs) 5hr. 17min (575750)
Roof outer full / (Blank elements)	MPP(24CPUs) 37min. (196750)	MPP(24CPUs) 1hr. 11min (621660)	MPP(48CPUs) 17hr. 14min (2.15 million)

(Note: all SMP results are run in 8 CPUs, and all MPP results are run in 16 CPUs, unless otherwise noted)

Figure 4. Computing levels for flanging simulation



In the flanging process, there are also three computing levels to be selected, as shown in Figure 4. One of the levels is used for simulating flanging action in implicit static to reduce the inertia effect, especially in free-flanging case. Some of our users call this level as a 'high stiffness', or 'rigid' option, since dynamic responses of the unsupported area of the flanges are absent appearing to be more rigid.

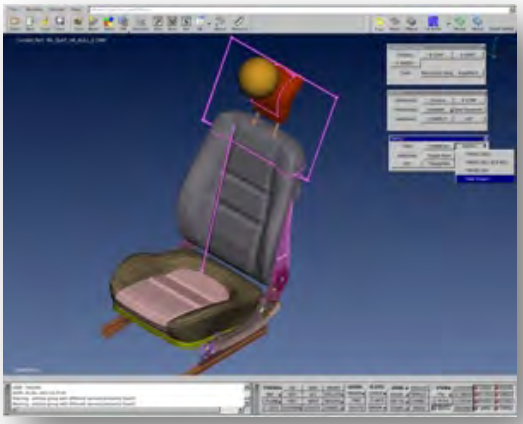
The fully QA'd LS-PrePost4.0 is available for downloading in the link below:
ftp://ftp.lstc.com/outgoing/lsprepost/4.0/metalforming

DISCUSSION/CONCLUSION

Using the computing level 1 'for early feasibilty', most of stamping simulations can be done in minutes, without sacrificing overall accuracy. It is noted that the three computing levels are still set in relatively conservative terms to account for all scenarios of vast majorities of problems from OEMs to smaller-scaled tool and die shops. The simulation still can be run faster, in terms of tool speeds, for example, in cases of structure/underbody parts and all closure inners with higher stiffness. It is also noted that double precision (DP) solvers, required for all implicit calculation such as gravity, springback and implicit flanging, takes longer CPU times if used for explicit forming, typically handled with single precision (SP) solvers. Since *CASE is used to link all the process simulation together, it is beneficial to switch to the appropriate precision solvers in the full process simulation using the 'appfile' and 'subfile' to further maximize the CPU performance.

For information contact info@lstc.com

http://www.beta-cae.gr/news/20120731_announcement_ansa_v13.2.3.htm



BETA CAE Systems S.A. announces the release of ANSA v13.2.3 with enhancements and known problems resolved

The official software release is comprised by the latest ansa_v13.2.3 files that reside in the server dated July 19th, 2012 and ansa_cad_v13.2.3 files dated July 22nd, 2012.

Enhancements

- CAD data Translators: significant performance improvement.
- Connection Manager: enhanced searching options and capabilities for the automatic identification and assignment of connectivity info for Bolt connections.
- Higher accuracy of automatic nodal distribution for CFD mesh.
- Volume mesh layers can grow from very sharp trailing edges.
- CGNS Input supports latest libraries.
- Results Mapper: New options for Laminate mapping.
- Safety: New Seat Impact Testing Tool to set up seat impact test load cases. Automatically calculates and creates the test zones per the ECER17, ECER21, FMVSS201 and FMVSS202A regulations and locates the testing device to the Target Points.
- NVH Console: Save / Load of Connectors, Loads and Assemblies.
- New Check to detect quad elements with two free opposite edges.
- Enhancements in LS-DYNA Checks for DB CROSS SECTIONS and DB HISTORIES.
- OpenFOAM Pressures now accept negative values.
- Fluent Output: the volumes are now written-out as different properties with a relevant name.
- SC/TETRA Input: the entities of Closed Volumes are matched to Volumes and the Volumetric Regions to SETs.
- MORPH: node based sensitivities can be plotted. and more...

Known issues resolved

- Polygon selection method applied directly the active function (e.g. Delete), without confirmation.
- Save Visible As did not always save the visible entities.
- Lists: When fields were multiplied by a number (e.g. $*0.9) the result was a number with too many digits.
- Improper conversion of “RBE3-HEXA-RBE3” and “Abaqus Fasteners” into Connection points.
- Connections Manager: using Focus functions (e.g. OR, NOT, etc.) during the preview mode of the “Mesh Reconstruction” could lead to unexpected termination.
- Mesh dependent connection representations (e.g. RBE2, SPIDER2, etc.) on linked faces were not properly created.
- “Bolt on Solid” connection representation was not using the mid-nodes.
- “FEMFAT Spot” connection representation: the named materials MAT151 and MAT152 were not being created for center and zones respectively.
- “RBE3” connections representation of Spot weld Line could cause NASTRAN dependency errors.
- Batch Mesh Parameters: The option for 2nd order elements was not being saved in the .ansa_mpar file.
- FACEs created by the OFFSET[Link] for absolute values of distance, were being moved to wrong direction .
- MESH GEN STL generated improper mesh on cylindrical or highly curved Faces.
- ELEMENTs SPLIT, when applied using nodes selection, was not locally remeshing the attached volume.
- Volume LAYERS: the last layer occasionally was not connected to the macro areas.
- Volume TRANSLATE: when modifying the "Distance" through the List, the Vector was changed instead.
- Volume CNV2POLY might create "left-handed", concave elements.
- VRML Output was not exporting the line elements.

Known issues resolved
(continued)

- Merging of ansa files was not respecting the attribute "Freeze ID=Yes" of Nodes and Elements, which were erroneously renumbered.
- LAMINATE: the Layers with 2nd order elements were not read-in..
- Results Mapper might be calculating wrong pressures when operating on results imported from a *.csv file.
- D.INFO was reporting incorrect results for NASTRAN Aspect Ratio criterion.
- KINEMATICS: “Primitive Inplane” Joints were being converted to "Planar" during output.
- NASTRAN: the ID-offset was leading to 10-digits PIDs and MIDs during merging many files.
- Abaqus Input: *FLUID BEHAVIOR fields of DEPENDENCY and POLYNOMIAL were not read in correctly.
- Abaqus Input: the MATERIAL SOFTENING option was being switched from TABULAR to EXPONENTIAL.
- Creation of Abaqus GASKET elements, based on 2nd order shell elements, might be leading to unexpected termination.
- LS-DYNA Input: the fields IDOF2 and TWGHTX2 of the imported CONTRAINED_INTERPOLATION were not being updated.
- LS- DYNA Input: KRBODY entities were massing from LSTC dummy if the properties were offset.
- RADIOSS Input: the renumbering of the /SH3N and /SHELL that had the same IDs, was not being updated in the GROUP accordingly.
- STAR-CD Output: Polyhedral elements might not be exported correctly.
- MORPH PARAMS: the Box-in-Box morphing parameter was not applied if the recorded history state was not selected explicitly for APPLY.
- MORPH PNT2CURV was not operating properly when local coordinate systems were used.
- DIRECT MORPHING OFFSET was not moving the mid-nodes. and more...

For more details about the new software features, enhancements and corrections please, refer to the Release Notes document.

Compatibility

ANSA files saved by version 13.2.3 can be opened by v13.2.0 but not by older versions.

Documentation
Release Notes

For more details about the new software features, enhancements and corrections please, refer to the "ansa_v13.2.3_release_notes" pdf document, that can be downloaded separately. This can be also reached by the "Help>Ansa documentation index" accessed by top menu bar within ANSA.

Updated documentation

- LS-DYNA tutorial: Sled Test Set-up.
- Basic Assembly: Spotwelds and Seamlines for Shell Meshed parts connection.

Scripts collection

A number of scripts that extend the software features are being made available with each software release.

Notable new scripts with this release:

- SeatDepenetrationDyna: automatically creates an LS-DYNA load case for Dummy-Seat depenetration.
- UpdatePamcrashComposites: updates any PAMCRASH composite properties in order to have the same number of PLYs as their Materials.
- PostRealize_RigidPatchBolt: post realization function for the creation of CONSTRAINED_RIGID_BODIES at bolt connections that have been realized with HEAD=TRIAS and BODY=JOINT R. The function deletes the joint and the extra nodes that are created by the realization.

Download

Where to download from

Customers who are served directly by BETA CAE Systems SA. may download the new software, examples and documentation from their account in our server. They can access their account through the user login link at our web site http://www.beta-cae.gr
Contact us if you miss your account details. The [Public] link will give you access to the public downloads area.

Customers who are served by a local business agent should contact the local support channel for software distribution details.

What to download

For the installation of the software on each platform type the following are needed:

1. the .tar file with the respective platform name (e.g. Linux etc.), or the respective .zip file for Windows and
2. the "common" .tar or .zip file
3. the "tutorials and examples" .tar or .zip file

Previous software releases can be found in the sub-directory called "old".

August 23, 2012

The Trendsetting Post-Processor for FEM Analysis Animation tool for handling extremely large finite element models.

Animator4 is a post-processor for a wide range of finite element analysis (FEA) applications.

Animator4, Version 1.4.8 released - the new Animator4 to public.
This release includes mainly bugfixes in the old 1.4.X series.

Overview about main release points:

- Fixed view coupling for cross section moving by mouse
- Reactivated option all for "fun fba del"
- Fixed crash adding multiple curves with different dimensions to a curve view and axis should be generated
- title of table not properly added to table, if read from eva dbs and page is > 1
- wri ppx: Objects pinned in A4 are now exported unpinned to PowerPoint. Rationale: there is no way to interactively unpin them in PowerPoint 2007 or 2010
- reduced redraw amount during view resize from command / session file
- Dyna3d d3plot: v. Mises stress for composites
- Nastran: fixed reading ?les larger than 10GB

For further details and a complete list of new features, improvements and bugfixes please visit the website http://gns-mbh.com

Animator4

The program is based on almost 20 years of experience in project work for the automotive industry and its predecessor Animator3. Started in the early '90s, earlier versions of the program were exclusively developed for the automobile manufacturers VOLKSWAGEN and AUDI.

- Animator4 is the perfect animation tool for handling extremely large finite element models.
- Animator4 makes efficient use of system resources.
- Animator4 offers constantly extended functionality to easily and carefully verify and validate the results of even the most complex calculations.
- Curves of nodal and element time history data can be plotted while running the animation simply by picking them with the mouse.
- A curve calculator allows for the analysis and/or manipulation of time history curves: It can be used to carry out mathematical operations on time history curves as well as complex safety analysis to calculate HIC curves or neck injury criteria.
- Models can be animated using a variety of different rendering modes. The excellent animated graphics allow the efficient presentation of simulation results to designers or product managers.
- Cross section views can be animated, and cross sections of the undeformed geometry can be compared to any deformed state.
- Different stereoscopic 3D options are available, allowing the use of all the above features with stereoscopic 3D animation.

Training

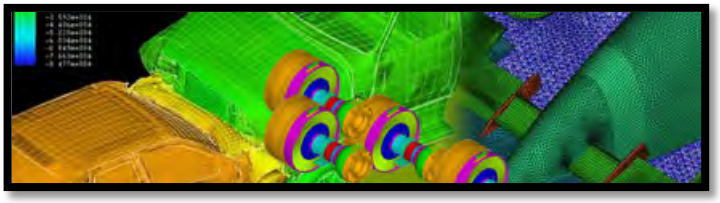
Trying to integrate Animator4 in your workflow?

GNS is now offering training for beginners and experienced users in FEM post-processing with Animator4.

We come to your office, showing you the tips and tricks of working with Animator4.

For more information contact training(at)gns-mbh.com

CAE Associates Begins ANSYS e-Learning Series



http://www.caeai.com/engineering-analysis-news.php?news=CAE+Associates+Begins+ANSYS+e-Learning+Series&newsID=68

Drawing on 30+ years of providing Engineering Advantage to our ANSYS community, members of our technical staff have developed a series of 30 minute online webinars.

Goal

Help our customers get the most of their software investment through:

- Focused content based on usability.
- Feedback generated topics, applicable to you.
- Live software demonstrations.
- Presentations developed by our senior engineers that, like you, use ANSYS daily to solve real-world engineering problems.

Fee -There is no charge to attend.

The Series

The "ANSYS e-Learning" series starts with the four sessions listed below.

1. Parametric Modeling Best Practices - View Recording
2. CAD Cleanup - View Recording
3. Meshing Part I - 3D Solids - August 28th
4. Meshing Part II - Shells & Beams - September 11th

Future Topics

Will be determined by your feedback, so please let us know what you would like to see.

These webinars, developed by CAE Associates' technical staff, are designed to supplement our training classes and assume basic familiarity with the ANSYS software.

PE Credit

Attendees are eligible for one PE credit per session.

1579 Straits Turnpike / Suite 2B / Middlebury, CT 06762 / Phone: (203) 758-2914

Location: Manchester Central Convention Complex, Manchester, UK

Welcome Reception and Social Event:
Sunday 2nd June 2013

Conference:
Monday 3rd and Tuesday 4th June 2013

Gala Dinner:
Monday 3rd June 2013

Arup are pleased to announce that the 9th European LS-DYNA Users' Conference will be held at Manchester Central Convention Complex, UK on 3rd and 4th June 2013.

Manchester is situated in the centre of the UK with one of the world's best connected international airports and efficient road and rail links. The event will give those in academia and industry a chance to present their work to colleagues and to catch up on the latest developments in the software. Attendees can also meet with exhibitors to find out more about hardware, software and services relating to LS-DYNA.

On the evening of Monday 3rd June the Gala Dinner will take place at the Museum of Science and Industry, just a short walk from the conference venue. The museum brings to life innovation and invention from science and industry through the ages even offering rides on 'Planet', a reproduction steam locomotive!

Important dates:

Registration Opens: end of September 2012
Abstract Deadline: end of December 2012
Papers Deadline: end of April 2013

If you would like to attend, present, exhibit or sponsor, please visit our conference website at: http://arup.cvent.com/euroconference.

We look forward to welcoming you to the event!

Seminar of LS-DYNA in HPC/MPP

The Seminar of LS-DYNA in HPC/MPP was held in Shanghai Jianguo Hotel on Aug. 9th-10th. by ETA-China.

More than 40 engineers attended this seminar; these engineers are from the main auto manufacturers in China, such as SAIC, Shanghai Haima, FAW Haima, Jiangling Motors, Benteler Automotive etc.

ETA-China invited Dr. Jason Wang, a senior engineer of LSTC (Livermore Software Technology Corporation) as the keynote speaker. Dr. Wang's presentation covered LS-DYNA MPP development history, scalability, effect of decomposition to scalability, the Hybrid version, effect of hardware configuration to MPP, and parameter settings for MPP job administration; In addition, Dr. Wang also made presentation for recent development on SPH, ALE, Particle Gas, Discrete Element, and Integrated Multi-physics Solvers. After the presentation, an interactive communication between Dr. Wang and the attendees.

An introduction about LS-OPT application in Automotive was also given to the attendees, covering the general introduction about LS-OPT, its basic theory and interface introduction, also two application examples on Multi-Objective optimization and Multidisciplinary Optimization.

There are many technique achievements during this seminar. To satisfy different requirements in technique from customers, ETA-China will hold seminars and trainings on different topics together with LSTC irregularly.

For information: www.eta.com.cn

Mr. Nandhagopal joins Kaizenat

Mr. Nandhagopal joins Kaizenat in the position of Application Engineer with our Technical support team.

Kaizenat now has four staff memebers dedicated to our technical team. In addition we have two non-technical staff members managing the operational requirements of LS-DYNA support. With our expansion we will be hosting dedicated training sessions on LS-DYNA, LS-PrePost, LS-Opt, LS-TaSC, to keep customers highly satisfied and knowledeble on the latest software features.

The Following is the list of our current team:

1. Head-Customer Support
   - 12 years of LS-DYNA support from 15 years of experience
   - Supported ~150 LS-DYNA customers in India
   - Support experience of countries like USA, Malaysia, Singapore & Thailand

2. Domain Expert
   - 13 years of LS-DYNA experience from 16 of experience
   - 4 years of product development in Engineering Research Center (ERC) at OEM
   - 8 years of Product development & validation from leading CAE service provider

3. Manager-LS-DYNA Support
   - 9 years of total experience
   - 8 years of LS-DYNA support experience
   - 1 year of design experience

4. Application Engineer
   - 3 year of total experience
   - 2 year of CAE

Have LS-DYNA queries? Please write to support@kaizenat.com

For full details visit www.kaizenat.com

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Getting Started With LS-DYNA - Course Notes - By Morten Rikard Jensen, Ph.D.

This book is a basic introduction to the non-linear explicit Finite Element program LS-DYNA®. The book is practical oriented and developed for first time users. Selected options are presented based on what is most often applied by users, as experienced by the author through handling customer support at LSTC for over a decade.

The book explains how to start LS-DYNA®, the input necessary to run models and shows some of the most often used commands. It also describes the manuals for LS-DYNA® and the notation therein, which makes it easier to understand the manuals when looking for features that should be applied to a model. The book describes some of the features in LSPrePost®, both for pre and post-processing. Throughout the book is shown how the format for the option is in the keyword deck but it is also shown how to specify it in LS-PrePost®'s Keyword Manager and how the entity can be created in LS-PrePost®, if relevant. This approach integrates the use of LS-PrePost® and LSDYNA ®, which helps first time uses to get started with LS-DYNA®.

The book is a collection of slides that have been re-edited and improved for printing. They are based on a getting started class to LS-DYNA®, which is a two days class that is taught on-site for LSTC's customers. The class has been developed by Morten Rikard Jensen, Ph.D, from LSTC's support team.

It is the hope of the author that the reader will be able to:

- Understand the flow of a LS-DYNA® simulation and get an overview of the process involved
- Start LS-DYNA® using both Windows Manager and Linux Shell
- Build a small model in LS-PrePost®
- Add and edit keywords in
- LS-PrePost®
- Understand the structure of the Keyword User's Manual
- Select a material model
- Specify contact, boundary conditions and loading etc.
- Post process results using
- LS-PrePost®

The book is divided into 18 different chapters covering main areas of using LS-DYNA®. These pages are taken directly from the print file, therefore showing the cut lines. Throughout the notes, exercises are listed to emphasize specific options. The exercise sheets, the input files and the answer sheets are on the CD located in the back of the book. Additional exercises and corresponding answer sheets can also be found on the CD. The exercises are

constructed as tutorials so they can be used for self study, which also is the reason for having exercise sheets and answer sheets.

A total of 27 exercises are included on the CD.

About the Author

Dr. Morten Rikard Jensen graduated from Aalborg University, Denmark in 1995 with a master degree in Manufacturing Engineering and he obtained his Ph.D. in Mechanical Engineering at the same University in 1999 (part time at Linköping University). His main area has been experimental work on sheet metal forming, especially determination of tool wear and investigation of the hydromechanical deep drawing process. Besides experimental work Dr. Jensen has worked extensively with the Finite Element code LS-DYNA® since 1994.

Dr. Jensen has published 10 papers in international journals, more than 15 papers in International conferences and about 25 additional papers.

Dr. Jensen is Technical Support Manager at Livermore Software Technology Corporation, which he joined in 2001. He supports customers in the use of the Finite Element code LSDYNA ® and the pre/post processor LS-PrePost®. Dr. Jensen's work covers all main areas of the LS-DYNA® code, e.g. crash simulation, metal forming, bullet penetration etc.

To contact the author: write to info@lstc.com subject Line – Author, Morten Jensen

To Order Contact: aleta@lstc.com

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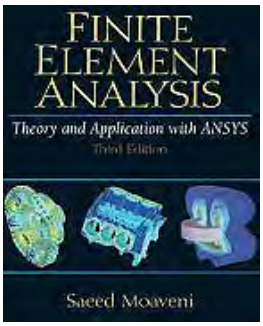

Finite Element Analysis Theory and Application with ANSYS (3rd Edition)

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Practical Stress Analysis with Finite Element

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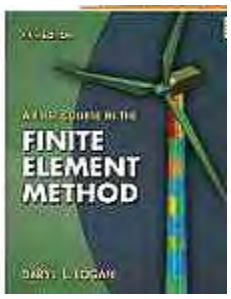
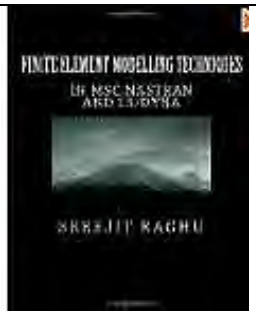


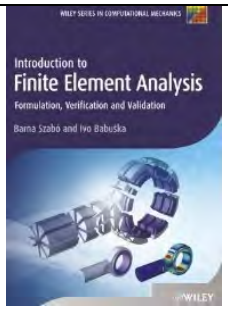
A First Course in the Finite Element Method

Daryl L. Logan



Finite Element Modelling Techniques in MSC.NASTRAN and LS/DYNA

Sreejit Raghu



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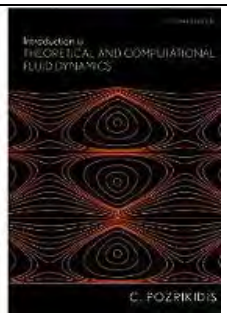

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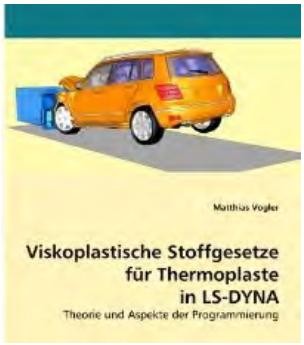

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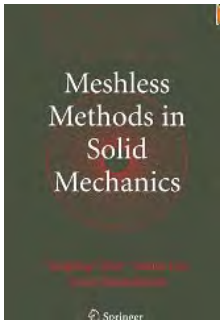

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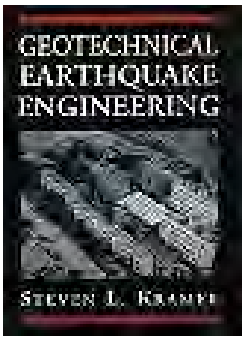

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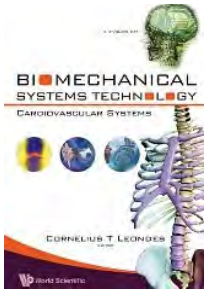

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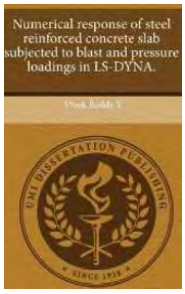

Numerical response of steel reinforced concrete slab subjected to blast and pressure loadings in LS-DYNA.

Vivek Reddy

Formulas for Mechanical and Structural Shock and Impact

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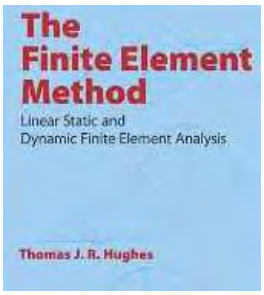

The Finite Element Method

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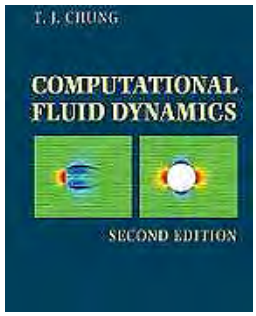

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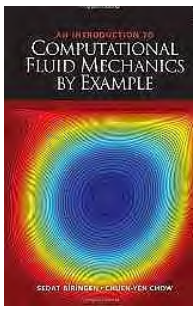

An Introduction to Computational Fluid Mechanics by Example

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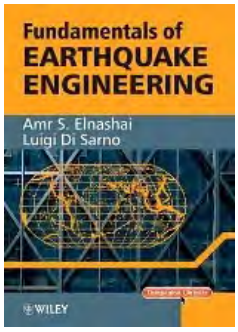

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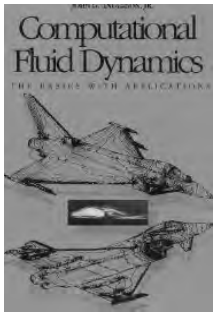

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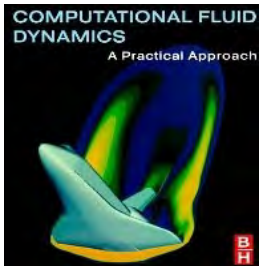

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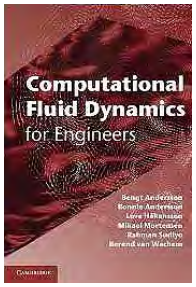

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Is an advanced multidisciplinary CAE pre-processing tool that provides all the necessary functionality for full-model build up, from CAD data to ready-to-run solver input file, in a single integrated environment. ANSA is a full product modeler for 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

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

CRAY

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The Cray XK6 supercomputer combines Cray's proven Gemini interconnect, AMD's leading multi-core scalar processors and NVIDIA's powerful many-core GPU processors to create a true, productive hybrid supercomputer

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Cray also offers custom and third-party storage and data management solutions

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Testing over 1000 materials per year for a wide range of physical properties, DatapointLabs is a center of excellence providing global support to industries engaged in new product development and R&D.

The compary meets the material property needs of CAE/FEA analysts, with a specialized product line, TestPaks®, which allow CAE analysts to easily order material testing for the calibration of over 100 different material models.

DatapointLabs maintains a world-class testing facility with expertise in physical properties of plastics, rubber, food, ceramics, and metals.

Core competencies include mechanical, thermal and flow properties of materials with a focus on precision properties for use in product development and R&D.

Engineering Design Data including material model calibrations for CAE Research Support Services, your personal expert testing laboratory Lab Facilities gives you a glimpse of our extensive test facilities Test Catalog gets you instant quotes for over 200 physical properties.

ETA – Engineering Technology Associates www.eta.com

Inventium Suite™

Inventium Suite™ is an enterprise-level CAE software solution, enabling concept to product. Inventium's first set of tools will be released soon, in the form of an advanced Pre & Post processor, called PreSys.

Inventium's unified and streamlined product architecture will provide users access to all of the suite's software tools. By design, its products will offer a high performance modeling and post-processing system, while providing a robust path for the integration of new tools and third party applications.

PreSys

Inventium's core FE modeling toolset. It is the successor to ETA's VPG/PrePost and FEMB products. PreSys offers an easy to use interface, with drop-down menus and toolbars, increased graphics speed and detailed graphics capabilities. These types of capabilities are combined with powerful, robust and accurate modeling functions.

VPG

Advanced systems analysis package. VPG delivers a unique set of tools which allow engineers to create and visualize, through its modules--structure, safety, drop test, and blast analyses.

DYNAFORM

Complete Die System Simulation Solution. The most accurate die analysis solution available today. Its formability simulation creates a "virtual tryout", predicting forming problems such as cracking, wrinkling, thinning and spring-back before any physical tooling is produced

ESI Group

www.esi-group.com

Visual-Environment: Visual-Environment is an integrated suite of solutions which operate either concurrently or standalone within a common environment. It aims at delivering an open collaborative engineering framework. As such, it is constantly evolving to address various disciplines and available solvers.

Visual-Crash is a dedicated environment for crash simulation: It helps engineers get their job done in the smoothest and fastest possible way by offering an intuitive windows-based graphical interface with customizable toolbars and complete session support.

For LS-DYNA users, Visual-Crash DYNA allows to focus and rely on high quality digital models, from start to finish as it addresses the coupling with competitive finite element or rigid body based software. This very open and versatile environment simplifies the work of CAE engineers across the enterprise by facilitating collaboration and data sharing.

Further tools are integrated in Visual-Environment enhancing CAE engineers work tasks most efficiently.

Visual-Mesh generates 1D, 2D and 3D elements for any kind of simulation.
Visual-Mesh provides automatic and guided surfaces clean up, application specific mesh generation and intuitive post mesh editing features..

Visual-Viewer is a complete, productive and innovative post-processing environment for CAE applications.

Visual-Viewer delivers a dedicated plotting and animation control solution. It offers a multi page, multi plot environment, allowing to group data into pages and plots. It is designed with a Windows GUI based on an intuitive and sleek user interface.

Visual-Process Executive is an advanced CAE environment for process customization and automation.

VisualDSS is an End-to-End Decision Support System for CAE. Manufacturers widely resort to Simulation-Based Design to gain a competitive edge in product development.

GNS - Gesellschaft für Numerische Simulation mbH www.gns-mbh.com

Animator4

A general finite element post-processor and holds a leading position in its field. Animator4 is used worldwide by almost all automotive companies, a great number of aerospace companies, and within the chemical industry.

Generator2.

A specialized pre-processor for crashworthiness applications and has become very successful in the field of passenger safety and pedestrian protection. It is mainly used as a positioning tool for finite element component models by a great number of automobile companies throughout the world.

Indeed

An easy-to-use, highly accurate virtual manufacturing software that specializes in the simulation of sheet metal forming processes. Indeed is part of the GNS software suite and works concurrently with all other GNS software products.

OpenForm

A pre- and post-processor independently of a particular finite element forming simulation package. The software is extremely easy to handle and can be used as was designed to enable those who are not finite element experts to carry out multi-stage forming simulations with even complex multi purpose finite element codes.

Gompute on demand®/ Gridcore AB Sweden

www.gompute.com **www.gridcore.se**

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) an 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

.

JSOL Corporation

www.jsol.co.jp/english/cae/

HYCRASH

Easy-to-use one step solver, for Stamping-Crash Coupled Analysis. HYCRASH only requires the panels' geometry to calculate manufacturing process effect, geometry of die are not necessary. Additionally, as this is target to usage of crash/strength analysis, even forming analysis data is not needed. If only crash/strength analysis data exists and panel ids is defined. HYCRASH extract panels to calculate it's strain, thickness, and map them to the original data.

JSTAMP/NV

As an integrated press forming simulation system for virtual tool shop the JSTAMP/NV meets the various industrial needs from the areas of automobile, electronics, iron and steel, etc. The JSTAMP/NV gives satisfaction to engineers, reliability to products, and robustness to tool shop via the advanced technology of the JSOL Corporation.

JMAG

JMAG uses the latest techniques to accurately model complex geometries, material properties, and thermal and structural phenomena associated with electromagnetic fields. With its excellent analysis capabilities, JMAG assists your manufacturing process

Livermore Software Technology Corp. www.lstc.com

LS-DYNA

A general-purpose finite element program capable of simulating complex real world problems. It is used by the automobile, aerospace, construction, military, manufacturing, and bioengineering industries. LS-DYNA is optimized for shared and distributed memory Unix, Linux, and Windows based, platforms, and it is fully QA'd by LSTC. The code's origins lie in highly nonlinear, transient dynamic finite element analysis using explicit time integration.

LS-PrePost

An advanced pre and post-processor that is delivered free with LS-DYNA. The user interface is designed to be both efficient and intuitive. LS-PrePost runs on Windows, Linux, and Macs utilizing OpenGL graphics to achieve fast rendering and XY plotting.

LS-OPT

LS-OPT is a standalone Design Optimization and Probabilistic Analysis package with an interface to LS-DYNA. The graphical preprocessor LS-OPTui facilitates definition of the design input and the creation of a command file while the postprocessor provides output such as approximation accuracy, optimization convergence, tradeoff curves, anthill plots and the relative importance of design variables.

LS-TaSC

A Topology and Shape Computation tool. Developed for engineering analysts who need to optimize structures, LS-TaSC works with both the implicit and explicit solvers of LS-DYNA. LS-TaSC handles topology optimization of large non-linear problems, involving dynamic loads and contact conditions.

LSTC Dummy Models

Anthropomorphic Test Devices (ATDs), as known as "crash test dummies", are life-size mannequins equipped with sensors that measure forces, moments, displacements, and accelerations.

LSTC Barrier Models

LSTC offers several Offset Deformable Barrier (ODB) and Movable Deformable Barrier (MDB) model

Oasys, Ltd

www.oasys-software.com/dyna

Oasys LS-DYNA® Environment

The Oasys Suite of software, exclusively written for LS-DYNA®, is at the leading edge of the market and is used worldwide by many of the largest LS-DYNA® customers.

Oasys PRIMER is a model preparation tool that is fully compatible with the latest version of LS-DYNA®, eliminating the risk of data loss or corruption when a file is manipulated, no matter what operations are performed on it:

Key benefits:

- Maintains data integrity
- Finds and fixes model errors (currently over 5000 checks)
- Specialist tools for dummy positioning, seatbelt fitting, mechanisms, interior head impact etc.
- Connection manager for spotwelds, bolts, adhesive etc.
- Intelligent editing, deletion and merging of data
- Customisable with macros and JavaScript.

Oasys D3PLOT is a powerful 3D visualization package for post-processing LS-DYNA® analyses

Key benefits:

- Fast, high quality graphics
- Easy, in-depth access to all LS-DYNA® results.
- User defined data components
- Customisable with JavaScript.

Oasys T/HIS is an X-Y graph plotting package for LS-DYNA®

Key benefits:

1. Automatically reads all LS-DYNA® results.
2. Wide range of functions and injury criteria.
3. Easy handling of data from multiple models
4. Scriptable for automatic post-processing

Oasys REPORTER is an automatic report generation tool, for use with LS-DYNA®. which allows fast automatic report creation for analyses.

Shanghai Hengstar

www.hengstar.com

Center of Excellence

Hengstar Technology is the first LS-DYNA training center of excellence in China. As part of its expanding commitment to helping CAE Engineers, Hengstar Technology will continue to organize high level training courses and seminars in 2012.

The lectures/training are taught by senior engineers and experts mainly from LSTC, Carhs, OEMs, and other consulting groups.

On Site Training

Hengstar also provides customer customized training programs on-site at the company facility. Training is tailored for company needs using LS-DYNA or the additional software products by LSTC.

Distribution & Support

Hengstar Distributes and supports LS-DYNA, LS-OPT, LS-PrePost, LS-TaSC. Hongsheng Lu, previously was directly employed by LSTC before opening his distributorship in China for LSTC software. He travels to LSTC often to keep current on the latest software features and support to continue to grow Hengstar as a CAE consulting group.

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LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
LSTC Dummy Models	LSTC Barrier Models	CLOUD Services	

Korea	**THEME**	wschung@kornet.com		
	www.lsdyna.co.kr			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	Planets
	eta/DYNAFORM	FormingSuite	Simblow	TrueGRID
	JSTAMP/NV	Scan IP	Scan FE	Scan CAD
	FEMZIP			

Korea	**KOSTECH**	young@kostech.co.kr		
	www.kostech.co.kr			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	FCM
	eta/DYNAFORM	DIGIMAT	Simuform	Simpack
	AxStream	TrueGrid	FEMZIP	

Taiwan	**Flotrend**	gary@flotrend.tw		
	www.flotrend.com.tw			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	FCM

Taiwan	**APIC**			
	www.apic.com.tw			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	FCM

Germany	Gridcore www.gridcore.se
Sweden	Gridcore www.gridcore.se
United States	Gompute www.gompute.com

The Complete Courses Offered Can Be Found At: www.cadfem.de

Please check the site for accuracy and changes. Among the many course offered:

Introduction to explicit structural mechanics with ANSYS-LS-DYNA and LSTC's LS-DYNA

09/05/12
11/06/12 12/19/12

Material Modeling with LS-DYNA
10/16/12

Contact modeling with LS-DYNA
11/06/12

Modeling joints with LS-DYNA
10/12/12

Crash simulation with LS-DYNA
09/25/12

Introduction to simulation with Diffpack
11/06/12

Working efficiently with Diffpack in ANSYS Workbench
11/07/12

Introduction to simulation of joint- and muscle-forces with AnyBody
09/19/12

Efficient coupling of AnyBody with ANSYS Workbench
09/21/12

Additional Courses are offered – please check the website for upcoming dates for: FTI Forming Suite - DIGIMAT DIFFPACK and others.

Individual Training: Take advantage of the expertise of our specialists and get to know how simulation processes in your company can be arranged in an optimal way.

The Complete Courses Offered Can Be Found At: www.dynamore.de/en

Intro LS-DYNA
09/20/12 10/15/12 10/30/12 12/10/12

Contact Definitions
10/18/12

Plasticity
10/24/12

Users Interfaces
11/19/12

Crash Analysis
12/04/12

Spot Welds
09/27/12

eta/DYNAFORM
09/17/12

ALE
10/11/12

Meshless Methods
10/11/12

The Complete Courses Offered Can Be Found At: www.lstc.com

Please check the site for accuracy and changes. Among the many course offering are the following:

NVH & Frequency Domain Analysis with LS-DYNA CA
October 9-10, 2012 Tues-Wed

Introduction to LS-OPT MI
November 6-9, 2012

Introduction to LS-PrePost (no charge) CA
November 12, 2012

Introduction to LS-DYNA CA
November 13-16, 2012

Introduction to LS-PrePost (no charge) MI
December 10, 2012

Introduction to LS-DYNA MI
December 11-14, 2012

Advanced Options in LS-DYNA MI
December 17-18, 2012

The Complete Courses Offered Can Be Found At: www.dynamore.se

Please check the site for accuracy and changes. Among the many course offering are the following:

LS-PrePost 3, introduction
September 3

LS-PrePost 3, introduction
November 26

LS-DYNA, introductory course September 4

LS-DYNA, introductory course November 27

LS-OPT, optimization and robust design September 18

LS-DYNA, implicit analysis
October 2

ANSA & Metapost, introductory course
October 9

Contacts in LS-DYNA
October 12

LS-DYNA, simulation of sheet metal forming processes
October 16

LS-DYNA, advanced training class in impact analysis
November 20

The complete Training Courses offered can be found at www.dynasplus.com

Please check the site for accuracy and changes.

LS-DYNA Introduction Explicit Solver
10-12/09

LS-DYNA Introduction Implicit Solver
24/09

LS-DYNA Unified Introduction Implicit & Explicit Solver
16-19/01, 18-21/06 & 12-15/11

LS-OPT & LS-TaSC Introduction
24-25/10

Switch to LS-DYNA
10-11/10

Switch from Ls-PrePost 2.X to 3.X
4/04 & 26/09 & 28/11

LS-DYNA Advanced Implicit Solver
25/09
-material modeling
14-15/12

LS-DYNA ALE / FSI
22-23/10

LS-DYNA SPH
21-22/05 & 8-9/10

LS-PrePost 3.0 – Advanced meshing capabilities
5/04 & 27/09 & 29/11

LS-DYNA User Options
23-24/05

LS-DYNA – Plasticity, Damage & Failure – By Paul DU BOIS
26-27/11
(date may be changed in Q1)

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

LS-DYNA – Geo

Users LS-DYNA Days

Alyotech will be hosting two Users Days this year. These events will focus on the recent evolutions of LS-DYNA and related products from LSTC and will feature talks both about novel functions and real-world applications.

Two sessions will be held: the first one will take place in Toulouse on September 20th while the second one will be held in Antony on November 8th.

Each session will start with lectures from Alyotech and presentations of studies from LS-DYNA users in the morning. The afternoon will then be devoted to discussions between users on selected topics of interest.

Don’t hesitate to contact us at support.ls-dyna@alyotech.fr

Engineering Technology Associates
The Complete Courses Offered Can Be Found At: www.eta.com

Please check the site for accuracy and changes.
Among the many course offering are the following:

Introduction to LS-DYNA

Sept 18 - 19

Introduction to DYNAFORM

Sept 04 - 05

Intro to PreSYS

Sept 11

The Complete Courses Offered Can Be Found At: www.caeai.com

Please check the site for accuracy and changes. Among the many course ffering are the following:

ANSYS Training, CFD and FEA Consultants Serving CT, NJ, NY, MA, NH , VT

Sep 10, 2012
1 day ANSYS DesignModeler / Middlebury, CT $ 600.00

Sep 11, 2012
2 days Introduction to ANSYS Mechanical (Workbench) / Middlebury, CT $ 1 200.00

Sep 18, 2012
1 day Finite Element Analysis Fundamentals / Middlebury, CT $ 600.00

Oct 15, 2012
1 day ANSYS DesignModeler / Middlebury, CT $ 600.00

Oct 16, 2012
1 day ANSYS Workbench Meshing for CFD / Middlebury, CT $ 600.00

Oct 17, 2012
2 days Introduction to CFX / Middlebury, CT

The Complete Courses Offered Can Be Found at http://www.hengstar.com

2012	2	3	4	5	6	7	8	9	10	11	12
An Introduction to LS-DYNA(High Level)											
Concrete & Geomaterial Modeling with LS-DYNA											
Pedestrian Safety and Bonnet Design with LS-DYNA											
Crashworthiness Theory and Technology											
LS-DYNA MPP, Airbag Simulation with LS-DYNA											
Introduction of LS-OPT which is Based on LS-DYNA											
Passive Safety and Restraint Systems Design											
Crashworthiness Simulation with LS-DYNA											
Passive Safety Simulation with LS-DYNA											
Crashworthy Car Body Development - Design, Simulation and Optimization											

For course location visit www.alyotech.fr

LS-DYNA Introduction
- Sept 10-12
- Oct 01-03
- Nov 12-14
- Dec 03-05

LS-DYNA Thermal
- Sept 13-14

LS-DYNA Implicit
- Sept 17-19
- Nov 19-21

LS-PrePost – Meshing
- Sept 27
- Nov 26

LS-PrePost – New Interface
- Sept 28
- Nov 27

LS-OPT Introduction
- Dec 10-11

LS-TaSC – Topology Optimization
- Dec 12

October 09, 2012
www.dynamore.de/en/training/conferences/upcoming/ls-dyna-forum-2012/ls-dyna-update-forum-2011

German LS-DYNA Forum 2012 LS-DYNA Forum, 9 - 10 October 2012, Ulm, Germany

On the 9th and 10th October 2012, our 11th LS-DYNA Forum will be taking place at the Maritim Hotel in Ulm, Germany. We cordially invite you not only to attend the event but submit a paper. In your presentation, you can talk about your experiences with LS-DYNA or LS-OPT and you can discuss and exchange these experiences with other users.

User presentations will form the core of the event. General lectures given by renowned speakers are also planned as well as talks on the latest LS-DYNA und LS-OPT .

Comprehensive information all about

LS-DYNA software can be obtained from the accompanying exhibition.

The Forum will be accompanied by seminars which will be held during the week of the conference on the subjects of CPM Airbag OoP, ALE and fluid-structure inter-action, meshless methods and on concrete and geomaterial modeling.

Your presentation: You are cordially invited to contribute towards the program plan by submitting a paper. Contributions from the various areas of application of LS-DYNA/LS-OPT are planned

To Submit your papers: Please send us the title, authors and a short summary (approx. 300 words).

Dates:
Submission of two-page summary for proceedings: 7th Sept. 2012

Location: Maritim Hotel Ulm
Basteistraße 40, 89073 Ulm

Registration and contact
DYNAmore GmbH
Tel. +49 (0) 7 11 - 45 96 00 - 0
Fax +49 (0) 7 11 - 45 96 00 - 29
E-Mail: forum@dynamore.de
www.dynamore.de/forum12

International CAE Conference 2012

22-23 October, Pacengo - Lazise (Verona) – Italy

Special Guest and Speaker
Professor Parviz Moin

Numerical analysis technologies are more and more present in the industrial world. They are absolutely essential to the product and process innovation at each level and in every industrial sector.

The International CAE Conference is hosted annually by EnginSoft, it presents the state-of-the-art of CAE in diverse industries. Significant user testimonials will prove how such technologies help increase product efficiency and ROI. This annual appointment is a major, an efficient platform for designers, analysts, IT managers, engineers, professors, researchers, associations and students involved or interested in virtual simulation tools.

The accompanying exhibition traditionally offers a networking platform, where CAE technology solution providers offer their knowledge, advice and expertise to the participants. A special section of the exhibition area will be dedicated to members of associations and scientific bodies, the technical press as well as to hardware vendors who provide the necessary know-how to implement machines and components to perform today's more and more complex analyses.

For more information on the Program and to register online, please visit: www.CAEconference.com

October 24-26, 2012 Location: Kassel Germany

Environmental protection and economic aspects make electric mobility one of the great challenges of the coming years. Step-by-step it will replace traditional forms of mobility in everyday life. Therefore, a number of projects have been defined in so-called ‘model regions’ in order to better understand and optimize this process.

For a better understanding of electric mobility and its optimization, simulation specialist ANSYS has extended its portfolio with a set of simulation applications that can serve as models in the development and implementation of innovative drive concepts. Structural and fluid mechanics and electromagnetic simulation models of the individual components are modeled in a consistent environment both individually and interacting, considering the drive as a complete multi-physical system – Engineering the System!

The ANSYS Conference & the 30th CADFEM Users’ Meeting focus on the many simulation options in electric mobility and several other current application fields where structural mechanics, fluid mechanics and electro magnetics issues are important.

CADFEM GmbH and ANSYS Germany GmbH cordially invite you to join the conference

We look forward to your participation

The CADFEM & ANSYS Germany Team

 **FACEBOOK**

BETA CAE SYSTEMS SA
http://www.facebook.com/pages/BETA-CAE-Systems-SA/193472524006194

Cray Inc.
http://www.facebook.com/crayinc

ESI Group
http://www.esi-group.com/corporate/facebook/

 **TWITTER**

BETA CAE SYSTEMS SA
http://twitter.com/betacae

Cray Inc.
http://www.twitter.com/cray_inc

ESI Group
http://twitter.com/ESIgroup

ETA
http://twitter.com/ETA_Inc

LINKEDIN

BETA CAE SYSTEMS SA

http://www.linkedin.com/company/beta-cae-systems-s.a.?trk=fc_badg

Cray Inc.

http://www.linkedin.com/company/4936

ETA

http://www.linkedin.com/groupRegistration?gid=1960361

Oasys

http://www.linkedin.com/groups/Oasys-LSDYNA-Environment-Software-4429580?gid=4429580&trk=hb_side_g

YOUTUBE

BETA CAE SYSTEMS SA

http://www.youtube.com/user/betacae

Cray Inc.

http://www.youtube.com/user/crayvideo

ESI Group

http://www.youtube.com/ESIgroup

ETA

http://www.youtube.com/user/etainfo1

NEWS FEEDS

http://www.eta.com/index.php/eta-news?format=feed&type=rss

Solutions and Products

- Structural Analysis
- Fluid Dynamics
- Nuclear Analysis & IT
- Seismic Analysis
- Ultrasonic / Electromagnetic Wave
- Material Design
- Disaster Simulation
- Impact and Safety Analysis
- Automation·Optimization
- Geology & Geophysics
- Ground Analysis
- Simulation
- CAD/GIS
- New Energy Solution
- Weather Solution

ITOCHU Techno-Solutions Corporation (CTC)
www.engineering-eye.com/en/index.html

Our wide-ranging solutions lineup covers all phases of the IT life cycle, spanning front-line backbone system development led by the Contact Center and portals, open systems large-scale platform configuration, and outsourcing services utilizing the Data Center. Optimal solutions are then selected from this diverse portfolio.

Consulting

Industry-specific solutions

IT Solutions

Support services

Rooted in the core principle of "Challenging Tomorrow's Changes," we at CTC constantly work to create a clearly defined mission based on a foundation of rock-solid values in order to fulfill our vision.