

**FEA Information Engineering Solutions**  
**Volume 2, Issue 12, December 2013**



Cover: 2014 "LT-1" 6.2L V-8 VVT DI (LT1) for Chevrolet Corvette  
ANSA Model Checks for LS-DYNA  
KMUTT, ETA and DFETECH  
ESI Group Visual-Environment 9.0

**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](http://www.feapublications.com)

**FEA Information China Engineering Solutions**

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To sign up for the Traditional, or Simplified edition write to [yanhua@feainformation.com](mailto:yanhua@feainformation.com)

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## Platinum Participants



Participant Logo  
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## Announcements

### 11th Annual UK Oasys LS-DYNA Users' Meeting - Thursday 16th January 2014.

Location: Arup Campus, Solihull, UK

Website: [http://www.oasys-software.com/dyna/en/events/users\\_jan-14/users\\_jan-14.shtml](http://www.oasys-software.com/dyna/en/events/users_jan-14/users_jan-14.shtml)

### Employment Opportunity

Sr. Staff Mechanical Engineering - Predictive Engineering, Inc

Sincerely, Marsha Victory, Trent Eggleston - FEA Information Inc. USA edition



My miniature horse, Dusty, who is 24" tall has made a new friend. She is taller....

Bull decides to turn around during drive



Neighbor's cattle drive past our house

Neighbor's cattle drive past our house

## FEA Information Engineering Journal

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Showcasing: [www.feaiej.com](http://www.feaiej.com)

### **LS-OPT Parameters Identification on Concrete Sample Tests for an Impact Simulation on Concrete Slab**

Nicolas VAN DORSSELAER- DynaS+, Ivry-sur-Seine, France

Vincent LAPOUJADE - DynaS+, Ivry-sur-Seine, France

Georges NAHAS, Bertrand CIREE, François TARALLO, Jean-Mathieu RAMBACH

Institut de Radioprotection et de Sûreté Nucléaire, Fontenay-aux-roses, France

### **Using LS-OPT for Parameter Identification and MAT\_FABRIC with FORM=-14**

David Dubois, Ph. – Autoliv France

Jimmy Forsberg, Ph. D - DYNAmore Nordic AB

### **Multi-disciplinary Topology Optimization for Vehicle Bonnet Design**

David Salway - GRM Consulting Ltd

Dr Tayeb Zeguer - Jaguar Land Rover Ltd

### **Stochastic Simulation of Aircraft Fuselage Assembly Considering Manufacturing Uncertainties**

Dietmar C. Vogt, Sönke Klostermann

EADS Innovation Works, Germany



**Introduction**

One of the most important pre-processing tasks is to ensure the validity of a CAE model before submitting it to the solver for analysis. A good and rich suite of checks reduces engineering errors, increases the confidence in the simulation results, and minimizes the duration of a simulation cycle by eliminating multiple back and forths from the solver to the pre-processor. ANSA meets the demands of the industry by providing a complete library of checks.

**Checks Manager**

The Checks Manager is the main tool and manages all the various checks required for a specific model set-up. The user has the ability to create templates with all the needed checks and desired ranges for every type of analysis. Templates can be saved, re-used and shared. Some of the major LS-DYNA specific checks that are controlled by the Checks Manager are presented below.

with the rest of the team. This ensures that the model check process can be standardized.



The Checks Manager presents the results of the checks color-coded in groups of per type error based on the category of the error or warning. Tools are provided to automatically fix errors from within the Checks Manager interface.

### **Penetration Check**

Penetration detection and fixing is generally a time consuming task. ANSA provides a check that both detects and auto fixes penetrations. The check can be applied both on pure FE mesh and on mesh with the underlying geometry. Intersections and thickness penetrations are detected and listed. Auto-fix tools intelligently move the nodes away from each other without creating any local distortions.

### **Contacts Checks**

The contacts check functionality detects various possible errors of the contact definitions. These are:

- The validity of the SETs defined as master and slave in the contact. Empty sets, sets with free nodes, and nodes used only by segments are flagged by the tool.
  
- In case of TIED contacts, incorrect definition and definitions with prohibitive distances between the participating entities are detected. Automatic fixes are available to facilitate the correction of the model.
  
- Common entities on slave and master areas (SETs) of a contact are identified and listed.

Visibility functions can help the user to isolate and work with each identified error.

- Slave nodes of connection should always be attached to a master segment. The Check>Contacts function identifies the errors and previews them on the model.
  
- The most important contact check is the identification of contact thickness penetration. The tool identifies the violating areas per LS-DYNA requirements and presents them to the user. An automatic fix is available that fixes these penetrations fast and accurately.

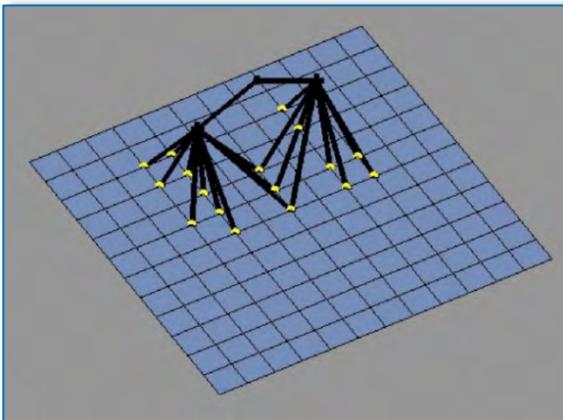
### **Connections Check**

ANSA provides the user with very advanced model assembly tools. Thus, powerful checks that validate the connectivity of the model are available. Some of these checks include:

- Areas that are not connected with the rest of the model can be identified.
  
- Spotwelds in contact with elements which have Nodal rigid Bodies attached are identified. The Automatic fix functionality can offset the contact of the respective spotwelds.
  
- Spotweld beam elements that deviate from the shell's normal by a user defined angle are identified.
  
- Spotweld beams with a length greater than a user defined value.

### Rigid Bodies

One of the most common checks for a crash model is the rigid body dependency check. ANSA's check identifies and fixes these errors. Any nodes belonging to two or more rigid parts, nodal rigid bodies, or constrained extra nodes are detected and listed. The Auto-fix functionality merges these entities to resolve the conflict. In addition Constraint Nodal Rigid Bodies that are not attached to a structural part can be identified. Similarly, when an SPC is defined on a rigid body is detected and previewed.



### Check Free

The free nodes check identifies nodes that are referenced by only one entity (dependent free nodes) or not referenced by any entity (independent free nodes).

### Check Mesh

Multiple checks functionality that checks the quality of the mesh of the model is available. There are visual checks that show the violating elements color-coded per the violating criteria. Additional checks that identify negative volumes, trias on boundaries, or any opposite free edges are also available. Automatic fixes that use advanced meshing algorithms can reconstruct the mesh locally to create the best possible mesh quality

### Check Curves

Through the corresponding functionality engineers can identify whether there is any curve that has descending data on X or Y axis. Moreover, END DATA function will check if the END time of a curve agrees with the one set in the CONTROLS card. Also, the user can check the curve according to user defined time value.

### Model DATA Check

The Model Data check identifies whether an entity has not been defined properly. The cards of each LS-DYNA keyword are checked for any mistake and detected issues are listed and previewed to the user.

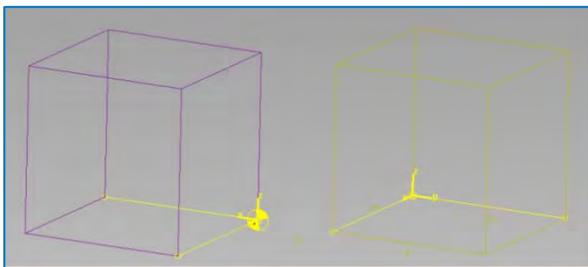
**Check DATABASE keywords**

DATABASE keywords related checks are also available.

For example, ANSA identifies situations where a DATABASE\_CROSS\_SECTION is defined but it does not cut through any elements, or when the user has forgotten to define a DATABASE\_SECFORC.

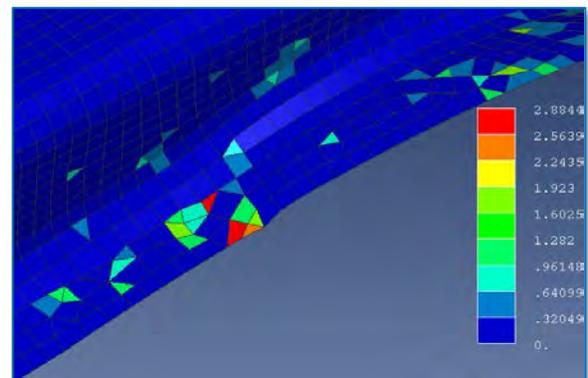


Accelerometer elements that do not reference to a DATABASE\_HISTORY are identified and presented to the user.



**Mass Checks**

The Massless check identifies grids with no mass. The massless nodes are listed and highlighted on the model. Mass Scale Ratio check functionality enables engineers to isolate areas that correspond to a specific range of added mass. The user has just to type the desired range and ANSA isolates and lists the corresponding areas. Moreover, fringe plot of the elements colored according to Additional or Scaled mass over Physical mass is available allowing for the identification of the elements that cause mass scaling.



**Check Joints**

Checking the validity of the Joints without the use of an advanced tool can be a very meticulous and time consuming task. ANSA checks the validity of all the joint definition of LS-DYNA.

Any problems such as, misalignments, wrong order, or node pairs are identified and auto fixes are available.

### **Live checks**

Every time a file is imported in ANSA there is a real time check for errors and warnings of the read data. The results of the check are presented in a window notifying the user accordingly. Additionally, ANSA performs certain checks every time a new entity is created. For example, ANSA will not allow the creation of a new SECTION card with negative thickness value.

### **User defined Checks**

There are cases where users have specific custom made tests that would like to run on their models. ANSA provides libraries of functions for the user to develop a Python Script. The scripts can interact with the checks manager in the same way as the hard coded checks do.

### **Conclusions**

Model checking is an important step of the crash model set up process. Successful checks accelerate model development by reducing errors and by reducing -if not eliminating- the multiple exchanges between the solver and the pre-processor. ANSA has a rich suite of checks with modern interface and provides the user with the ability to create his/her own custom checks.

### **For more information contact**

BETA CAE Systems S.A.

Email: [ansa@beta-cae.gr](mailto:ansa@beta-cae.gr)

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

Press Release December 11, 2013



King Mongkut’s University of Technology Thonburi (KMUTT), Engineering Technology Associates, Inc (ETA) based in Troy, Michigan, USA, and Dyna Forming Engineering & Technology Sdn. Bhd. (DFETECH) based in Shah Alam, Malaysia have reached an agreement to establish a relationship in terms of ‘Joint Technology Development’.

KMUTT, represented by Assoc. Prof. Dr. Bundit Fungtammasan, the KMUTT Vice President for Research, ETA, represented by Mr. Jenson Chen, and DFETECH, represented by Ms. Sirilak Menakanit, signed a memorandum of understanding (MOU) to be in effect for 5 years on 11 December 2013 in the presence of Ms. Noi Sims, Manager of Software Sales of Livermore Software Technology Corporation (LSTC) and Assoc. Prof. Purit Thanakijkasem of KMUTT as a witnesses.



On this occasion, DFETECH will provide annual academic licenses for LS-DYNA® at ‘KMUTT’ for 5 years while ETA has offered annual licenses of its flagship die system solution software DYNAFORM® (30 copies) and enterprise-level advanced CAE software ‘Invention Suite™’ (10 copies) installation at ‘KMUTT’ for 5 years without fees.

DYNAFORM® is an internationally recognized stamping CAE software specialized in Blank Size Engineering (BSE), Die Face Engineering (DFE), Formability Simulation (FS), Die System Analysis (DSA) and Optimization Platform (OP) with major applications in automotive, aerospace, electrical and electronic, and tool and die industries.

Inventium Suite™ is an enterprise-level CAE software solution. Inventium™ offers a streamlined product architecture provides users access to all of the suite's software tools.

LS-DYNA® is a general-purpose finite element program capable of simulating complex real world problems. It is widely utilized by the automobile, aerospace,

construction, military, manufacturing, and bioengineering industries.

The offered software and the relation with international partners like ETA and DFETECH are one of KMUTT's activities strengthening KMUTT's position as a leading research university on technical design and development in Thailand.

**DFETECH the direct distributor of LSTC for LS-DYNA, LS-PrePost, LS-TaSC, LSTC ATD and Barrier Models**

**Thailand, Malaysia and Singapore.**

[For Complete PDF Version for ESI releases Visual-Environment 9.0.](#)



## ESI releases Visual-Environment 9.0, the latest version of its multi-domain simulation platform

**Enhanced performance, complete support for Casting and Electromagnetic applications, and introducing new CAE domains including CFD with OpenFOAM® and Composites**

Paris, France – December 17, 2013 – ESI Group, pioneer and world-leading solution provider in Virtual Prototyping for manufacturing industries, announces the launch of Visual-Environment 9.0. ESI's multi-domain simulation platform hosts most of ESI's Virtual Prototyping solutions, and is open to third party technologies. ESI's platform enables industrial users to automate all their Computer-Aided Engineering (CAE) processes from Computer-Aided Design (CAD), through pre- and post-processing, modeling, simulation and visualization, to reporting in any CAE domain; all in a unified environment.

Connecting ESI solutions while supporting third party applications, Visual-Environment 9.0 is the obvious choice to support the simulation of the manufacture and assembly of existing and future products, and to enable concurrent engineering and optimization across multiple domains including Crash, Safety, NVH, Energy, Heat Treatment, Flow,

Electromagnetics, CFD and more. It helps industrial organizations to maximize their use of CAE in order to achieve greater productivity in their engineering processes and supports their quest for innovation.

*“Visual-Environment’s wide range of functionalities across different solvers, implemented for pre- and post-processing applications, turn this software solution into an efficient and valuable tool within the development process of restraint systems and its components at TAKATA,”* says Axel Heym, Manager Numerical Simulation Global Engineering, TAKATA AG, Germany.

Current platform users will welcome the significant performance improvements in display that Visual-Environment 9.0 exhibits: the operational speed for viewing and manipulating models is increased manifold, especially for huge models (exceeding 10 million elements).

The new version comes with a local database that can automatically synchronize with local servers, and work along VisualDSS, ESI's Decision Support System for managing simulation content and to increase workflow efficiency and productivity.

Other improvements in Visual-Environment 9.0 include Visual-Cast, the first complete release of ESI's user environment dedicated to pre/post processing, meshing, modeling, set-up and handling for ESI's ProCAST.

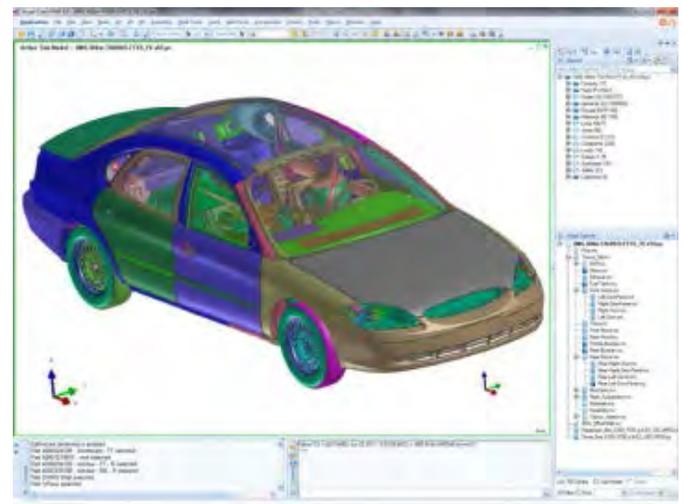
Adding to the existing environment supporting ESI's CEM Solutions for simulating electromagnetic compatibility, Visual-Environment 9.0 now also supports advanced electromagnetic scattering, antenna placement and RADAR signature analysis. It now offers a fully-integrated environment for all CEM needs.

Keeping up to date with the growth of ESI's solution portfolio, Visual-Environment 9.0 now introduces new CAE domains, launching Visual-CFD for simulating Computational Fluid Dynamics (CFD) with the widely used open source code OpenFOAM®. This new

dedicated OpenFOAM® environment has been conceived to bring the benefits of this open source code to industrial purposes.

With the ambition to fully integrate ESI's complete Composites Simulation Suite, Visual-Environment 9.0 also supports the analysis of complex manufacturing-induced shape distortion in composite materials.

The release also provides a first integration seat comfort evaluation, as featured in ESI's dedicated end-to-end solution, Virtual Seat Solution



**Image: Visual-Environment 9.0, ESI's Multi-domain simulation platform**

Several months ago ESI launched their customer portal, myESI, to provide users with direct access to materials, information and useful tips & tricks. Today, Visual-Environment users can connect to the myESI portal to download the latest User Manuals, register for trainings across the globe, and access technical notes delivered by the ESI technical team.

For more info about Visual-Environment, please visit <http://www.esi-group.com/visual-environment>

For more news or information about ESI solutions, please visit [www.esi-group.com](http://www.esi-group.com)

### **About ESI Group**

ESI is a pioneer and world-leading provider in Virtual Prototyping that takes into account the physics of materials. ESI boasts a unique know-how in Virtual Product Engineering, based on an integrated suite of coherent, industry-oriented applications. Addressing

manufacturing industries, Virtual Product Engineering aims to replace physical prototypes by realistically simulating a product's behavior during testing, to fine-tune fabrication and assembly processes in accordance with desired product performance, and to evaluate the impact on product use under normal or accidental conditions. ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping. These solutions are delivered using the latest technologies, including immersive Virtual Reality, to bring products to life in 3D; helping customers make the right decisions throughout product development. The company employs about 1000 high-level specialists worldwide covering more than 40 countries. ESI Group is listed in compartment C of NYSE Euronext Paris.

Connect with ESI on Twitter, Facebook, and YouTube

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Céline Gallerne - T: +33 (0)1 41 73 58 46

## Chevrolet Corvette 2014 "LT-1" 6.2L V-8 VVT DI (LT1) for Chevrolet Corvette



### 2014 "LT-1" 6.2L V-8 VVT DI (LT1) for Chevrolet Corvette

The award winning 6.2L LT1 V8 Small Block engine for the 2014 Corvette Stingray features direct injection, continuously variable valve timing and Active Fuel Management (cylinder deactivation). With the performance exhaust system the all-new engine produces an SAE certified 460 horsepower. Other variants of the new Small Block are also available in the Chevrolet Silverado and GMC Sierra pickup trucks.

### Chevrolet Powers Way to Pair of Engine Honors WardsAuto recognizes Corvette and Cruze engines among 10 Best in industry

DETROIT – The all-new, high-tech Small Block 6.2L V8 powering the 2014 Corvette Stingray and the 2.0L turbo diesel for the 2014 Chevrolet Cruze are among Ward's 10 Best Engines.

WardsAuto reviewed 44 engines from 16 automakers in this year's competition, which looked at power, fuel efficiency, new technology, refinement and compared it with data for similar engines.

“At GM – our goal is to design, build and sell the world's best powertrains – this recognition from the experts at WardsAuto provides two additional proof points that we are on the right track,” said Steve Kiefer, vice president, Global Powertrain.

“The fifth generation Small Block V-8 in the new Stingray, is an iconic brand in itself, and

our new 2.0L Turbo Diesel engine in the Chevy Cruze is redefining the market with outstanding performance, strong low end torque, low emissions and segment-leading highway fuel economy – a real winner.”

LT1 6.2L V8 Small Block technology, power, efficiency

“The arrival of a completely re-engineered Small Block engine family is truly momentous,” says Tom Murphy, executive editor of WardsAuto World magazine. “The critics can say what they want about the relevance of pushrod engines, but how can more than a hundred million buyers of small-block engines since 1955 be wrong? The new Corvette couldn't exist without this magnificent V-8.”

## Chevrolet Corvette 2014 "LT-1" 6.2L V-8 VVT DI (LT1) for Chevrolet Corvette

The all-new LT1 Small Block technologies contribute to making the new Corvette the quickest, most powerful and most fuel-efficient standard Corvette ever. The engine delivers an SAE-certified 460 horsepower helping propel the car to a 0-60 time in 3.8 seconds while offering 29 EPA estimated mpg highway.

The all-new engine is the most significant redesign in the Small Block's nearly 60-year history. The LT1, part of the new Gen 5 family of Small Block engines, combines several advanced technologies – direct injection, Active Fuel Management, or cylinder deactivation, and continuously variable valve timing – to support an advanced combustion system.

Direct injection is new to the engine architecture and is a primary contributor to greater combustion efficiency by ensuring a more complete burn of the fuel in the air-fuel mixture. This is achieved by precisely controlling the mixture motion and fuel injection spray pattern. Direct injection also keeps the combustion chamber cooler, which allows for a higher compression ratio.

Increased power and efficiency result from more than 10 million hours of computational analysis including computational fluid dynamics, to make the most of the combustion system, the direct injection fuel system, active fuel management and variable valve timing systems that support it. The combustion system itself benefited from 6 million hours of dedicated CPU analysis time.

Other variants of the Gen 5 Small Block include the 4.3L V6, 5.3L and 6.2L V8 truck engines offered in the all-new Chevrolet Silverado and GMC Sierra pickups. The LT1 is manufactured in Tonawanda, N.Y., which is also home to last year's WardsAuto 10 Best engine winner – the 2.0L turbocharged four-cylinder engine used in the Cadillac ATS.

2.0L Turbo Diesel winning design, global expertise

“The Chevy Cruze diesel is everything you want it to be: astonishingly efficient, whisper-quiet on the highway and shockingly fun to drive,” says Drew Winter, editor-in-chief of WardsAuto World magazine.

## Chevrolet Corvette 2014 "LT-1" 6.2L V-8 VVT DI (LT1) for Chevrolet Corvette

The 2.0L turbo-diesel delivers an SAE-certified 151 horsepower (113 kW) and 264 lb-ft of torque (358 Nm). Notable is the engine's high torque level of 250 lb-ft (339Nm) from 1750 - 3000 rpm. The rich torque provides for a sustained feeling of power on demand at almost all speeds – particularly when passing or entering a freeway onramp.

The 2014 Cruze Turbo Diesel engine delivers a segment leading EPA-estimated 46 MPG on the highway and range of 717 highway miles on one tank of fuel, based on fuel tank capacity and EPA estimates – your range may be less. That is better than any non-hybrid passenger car in America. The engine has an overboost feature capable of increasing torque to an estimated 280 lb-ft (380 Nm), for stronger acceleration periods of about 10 seconds.

Cruze's 2.0L turbo-diesel is based on a proven architecture used in European models.

Collaborating with Italian and German engineering groups, GM's diesel experts in the United States adapted the engine to accommodate more stringent diesel emission standards, diagnostics and a wider range of driving conditions – including colder and hotter climates and higher altitudes – for the United States and Canada. The engine is manufactured in Kaiserslautern, Germany and also used in the Opel Astra, Cascada, Insignia and Zafira Tourer.

Founded in 1911 in Detroit, Chevrolet is now one of the world's largest car brands, doing business in more than 140 countries and selling more than 4.5 million cars and trucks a year. Chevrolet provides customers with fuel-efficient vehicles that feature spirited performance, expressive design, and high quality. More information on Chevrolet models can be found at [www.chevrolet.com](http://www.chevrolet.com).



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## Sr. Staff Mechanical Engineering

**Position Description: Sr. Staff Mechanical Engineer with MSME or Ph.D.**

We are looking for a mechanical engineer with a broad background in numerical theory and its application toward solving engineering problems using FEA. Since we are a consultancy, you'll need top-notch communication skills and be able to manage your own projects and generate "near-net-shape" engineering reports.

Predictive Engineering: Our clients turn to us to solve their most difficult analysis challenges. We are the go-to FEA experts for quickly solving difficult problems in a collaborative manner. We have a nationwide reputation for providing accurate analyses across broad industrial sectors from medical, aerospace, marine, automotive, chemical, mining and general consumer products. Along with this consultancy side, we sell, support and providing training classes on Femap, NX Nastran, NX CAE and LS-DYNA.

### Required Qualifications:

- MSME
- 3+ year experience as an engineering consultant or 5+ years as an engineering analyst
- Demonstrative communication skills via engineering reports, presentations or sales activities
- U.S. Citizenship or permanent resident

Ideal Candidate: MSME or Ph.D. with three years of experience within an engineering consultancy. Comfortable writing high-quality engineering prose for proposals and reports. Since much of our work is presented at the senior engineer and VP level, one should be able to effectively communicate analysis results while being intelligently critiqued. Since our work is constantly changing, you should be comfortable with independently researching solutions and developing analysis checks to verify your assumptions. The outcome of your work often has a huge financial impact and the margin for error rarely exists.

Here is a list of traits that would ensure success in this position:

- Inquisitive and engaging communicative style that facilitates client interactions
- Dedicated to getting the right answer beyond any logical argument
- Ability to quickly learn new analysis techniques from linear dynamics (PSD) to fluid structure interaction (SPH/DEM/ALE)
- Interested in learning and being challenged by a non-stop diversity of analysis projects
- Wants to be part of a team that is setting the bar for high-end analysis solutions

#### **Sr. Staff Position Description:**

- Ability to manage small projects (<\$50k) in an entrepreneurial manner. This implies: (i) in-depth examination of the project's goals and deliverables with full client involvement, (ii) execution of the analysis work with attention to detail and modeling efficiency, (iii) exceeding the client's expectations for delivery and quality, (iv) maintaining a follow-on relationship to ensure that the project work was correctly implemented and had a successful outcome, and (v) you take intense pride in your work.

- On-site engineering work (outside of Portland) is expected to be no more than five weeks a year.
- A keen sense of artistic balance in report and document preparation. All great engineers are artists but not all great artists are engineers.

**Salary:** Competitive salary with reviews every twelve months. Outstanding work will be compensated commensurately.

**How to Apply:** Send us a brief cover letter with an example of your engineering prose and your current resume. We would also appreciate seeing an example of your engineering project work in graphical format. Please be kind to us and keep your submittal as brief as possible. One can send their submittal electronically via our website email link under

#### **About Us/Careers:**

<http://www.predictiveengineering.com/Solutions/about/careers.html>

Predictive Engineering, Inc. is an equal opportunity employee and we encourage all races and creeds to apply for this position. We would welcome members from outside the standard U.S. ethnic groups. We promote bike commuting and advocate healthy lifestyles. Predictive offers a 401k pension plan with a matching contribution along with full health care benefits.

**Explicit, Nonlinear, Large Deformation Analysis for Structural Mechanics  
LS-DYNA® Training – Jan 27-30, 2014 Portland, Oregon By Predictive Engineering**

**Included:** Course manual, notes and workshop video files will be provided on a flash drive for post-class refresher training. One lunch and one social event are provided to encourage class interaction with fellow users. Course provides certification of 32 hours of professional continuing education credits.

**Registration:** Early registration is encouraged since space is limited to 18 students and it is expected that the class will fill. To register please send email to:

**Cost:** \$2380/student. Students may attend the Analysis for Structural Mechanics training (four days) or the full week with the addition of DEM/CFD/FSI training on the fifth day for an additional \$575/student.

[Training@PredictiveEngineering.com](mailto:Training@PredictiveEngineering.com) Attn: George Laird, Ph.D., P.E.

### Engineering Short Course

This week-long course is directed toward the engineering professional simulating highly nonlinear, transient dynamic problems involving large deformations and contact between multiple bodies. What this means in more layman terms is that we will provide a realistic foundation toward the practical usage of LS-DYNA, taught by practicing engineers for engineers.

The course is fast paced and follows a workshop format with theory, practice and Q&A sessions.

#### Course Outline

##### Day 1: Theoretical Foundation

- I. Implicit versus Explicit
- II. Explicit Time Step Significance / Mass Scaling (Workshop)
- III. Meshing for Explicit Success (Workshop)
- IV. Explicit Element Technology (Workshop)

##### Day 2: LSPP & Material Modeling

- I. LS-PrePost Philosophy (Workshop)
- II. Material Modeling: Metals, Elastomers, Foams (Workshop)
- III. Equation of State (EOS)
- IV. Material Failure & Fracture (Workshop)
- V. Rigid Bodies (Workshop)

##### Day 3: Contact & Load Initialization

- I. Contact Theory & Application (Workshop)
- II. Edge-to-Edge Contact & Other Pathologies (Workshop)
- III. Tied-Contact: Mesh Transitions, Gluing, Welding (Workshop)
- IV. Negative Sliding Interface Energy (Workshop)
- V. Implicit-to-Explicit Switching: Load Initialization (Workshop)

##### Day 4: Drop Test, Damping & Bird Strike (SPH)

- I. Dynamic Relaxation for Bolt Preload (Workshop)
- II. Damping (Workshop)
- III. Drop Test Simulation (Workshop)
- IV. Smoothed Particle Hydrodynamics (Workshop)
- V. Bird Strike / Ballistic Impact (Workshop)

**Day 5: Multiphysics with LS-DYNA (DEM/CFD/FSI)**  
Optional fifth day of discrete element modeling, CFD & fluid structure interaction with thermal effects.

### About Predictive Engineering

Based in Portland, Oregon, Predictive has 15+ years of experience with LS-DYNA consulting, services and training. References available at our website:

[www.PredictiveEngineering.com](http://www.PredictiveEngineering.com)



- smart becomes the first European importer to bring an all-electric vehicle to the Chinese market
- Following on from Europe, the USA, Canada and Japan, the electric smart reaches its 14th market with its launch in China
- With a market share of around 40 percent, the smart fortwo electric drive is the frontrunner in Germany

The new smart fortwo electric drive is now available to buy from dealerships in China. The smart brand celebrated this market launch at the Guangzhou Motor Show, where the all-electric city runabout was presented to the Chinese public.

Dr Annette Winkler, Head of smart: "Our smart electric drive was one of the first all-electric cars and is the clear market leader in Germany. We are now bringing this successful vehicle to China, and are the first European manufacturer to launch an all-electric car on this market. Offering powerful driving pleasure with zero local emissions, the smart electric drive is perfectly suited to China's big cities."

With this market introduction in China smart is further extending its leading position in the urban mobility sector. The new generation smart electric drive has been available in Europe, the USA, Canada and Japan since

production began in 2012. In Germany the electric smart quickly became the number one battery-powered electric vehicle, securing a market share of around 40 percent. Roughly 93 percent of customers would recommend the smart electric drive.

### **Urban mobility without any local emissions**

Emission-free motoring with an extra dose of driving pleasure – this can only be the smart electric drive. And it's all down to its powerful drive technology: thanks to the 55 kW electric motor, delivering 130 Newton metres of torque, the car is impressively quick off the lights and goes from 0 to 60 km/h in 4.8 seconds. Plus, with a top speed of 125 km/h, the two-seater doesn't have to shy away from urban expressways. A lithium-ion battery with 17.6 kWh provides enough energy to cover a range of 145 kilometres.

The electric smart is European through and through: the battery is produced by Deutsche ACCUmotive (a Daimler joint venture with Evonik), the electric motor comes from EM-motive (a Daimler joint venture with Bosch) and the vehicle itself is manufactured in the Hambach smart factory in France.

smart is now represented in 46 markets worldwide with the brand most recently introduced in Russia. Alongside Germany and

Italy, China is one of the main sales markets for smart, with sales there increasing by 43.8 percent in 2012. As the world's largest automotive market today already, China will also play a pivotal role in boosting market penetration of alternative drive systems thanks to the supportive environment created by the Chinese Government. Experts expect that China could become the world's largest market for these vehicles as well.

32<sup>nd</sup> CADFEM USERS' MEETING 2014 - June 4 – 6, 2014; NCC Ost, Nuremberg, Germany  
 For Full Information please visit the website - [www.usersmeeting.com](http://www.usersmeeting.com)



### The Numerical Simulation Conference

Further Training · Software News · Users Reports ·  
 Compact Seminars · Exhibition

[www.usersmeeting.com](http://www.usersmeeting.com)

**Language:** Lectures can be held in English or German.

Documents for presentation should be – if at all possible – in English.

Please submit the title of your lecture in the language in which you will hold it.

**Lecture submission and deadlines:** Duration of lecture should be 25 minutes.

Please submit by January 31st, 2014:

- Title of lecture
- Short summary stating subject and contents and the software used (at least 2000 signs)
- technical information
- The field/industry you are working in
- By February 14th, 2014: you will receive information about acceptance.
- by March 14th, 2014: you will receive information about session/time of your lecture.
- by May 16st, 2014: please provide us with your lecture and a short CV.

For templates and further information on lecture submission please refer to:

ACUM2014-Presenters [1.5 MB].

Submissions can be sent in:

- using the fax form: Registration -
- online at: Registration - email to: [acum2014@cadfem.de](mailto:acum2014@cadfem.de)

**Remuneration:** Please visit the website for information.

**Publication:** By submitting your lecture you agree to your presentation being published in the conference media and used by CADFEM and ANSYS for marketing purposes after the conference.

If you do not agree to this, please let us know.

**Registration for lecturers:** You must register for the conference even if you are a lecturer.

If you have chosen a free day of participation as remuneration for your user report, the respective day (presumably Thursday, June 5th, 2014) will not be charged.

**ACUM Best Paper Award:** A committee is going to award in each discipline (Structural Mechanics, Fluid Dynamics, Electronic-Mechanics and Systems & Multi-physics) the best presentation. Only papers submitted on time can be considered. Winners will receive a terrific surprise.

The main language is German. However, lectures in English are welcome! If you plan to attend, please note that selected sessions and workshops will be held entirely in English and the slides in all sessions will mostly be in English



The training classes are held at our Bangalore and Pune locations

Details about the trainings offered are given below

LS-DYNA Basic Training

Jan 8-10

LS-DYNA Implicit Training

Jan 16-17

LS-DYNA Basic Training

Jan 22-24

LS-DYNA Basic Training

Feb 12-14

Contact Modelling Advanced Training

Feb 20-21

LS- DYNA Basic Training

Feb 26-28

LS- DYNA Basic Training

Mar 12-14

Material Modelling Advanced Training

Mar 20-21

LS- DYNA Basic Training

Mar 26-28

LS- DYNA Basic Training

Apr 9-11

Advanced Crash Analysis

Apr 17-18

LS- DYNA Basic Training

Apr 23-25

LS- DYNA Basic Training

May 7-9

Airbag Deployment Application

May 15-16

LS- DYNA Basic Training

May 21-23

LS- DYNA Basic Training

Jun 11-13

Advanced Material Forming Analysis

Jun 19-20

LS- DYNA Basic Training

Jun 25-27

### [Information and Agenda](#)

Classes generally start at 9:30 a.m. and end at 5:00 p.m. Access to computer for workshop exercises and lunch each day are included with the registration. For any queries/clarification please contact us @ [support@kaizenat.com](mailto:support@kaizenat.com)

**The LS-DYNA® Aerospace Working Group (AWG)**

<http://awg.lstc.com>

The LS-DYNA® Aerospace Working Group (AWG) is a partnership of federal agencies, corporations, and universities working together to develop and publish aerospace test cases and modeling guidelines for finite element analyses

with LS-DYNA®. The actions of the AWG serve to support the use, development, and reliability of LS-DYNA® for aerospace numerical analyses.

**November FEA Information Engineering Solutions**

- 06 FEAIEJ China Conference Edition
- 07 Oasys- 11th Annual UK Oasys LS-DYNA Users' Meeting
- 08 BETA CAE ANSA &  $\mu$ ETA pre- & post-processing suite
- 12 CADFEM GmbH USERS' MEETING
- 13 Mercedes-Benz to return to China in 2014 DTM season
- 15 CRAY - University of Tsukuba - Cray® CS300™ cluster supercomputer
- 17 FORD Buffalo, New York, Stamping Plant
- 19 BSE-in-NX Version 2

**October 2013 FEA Information Engineering Solutions**

- 07 Comet Solutions Space-Borne EO Sensors
- 12 1st China LS-DYNA Users' Conference Review
- 14 LSTC AE-MDB Model
- 15 Kaizenat D3View in India
- 16 2014 Toyota Prius Hybrid Category
- 21 Cray Cluster Supercomputer at Mississippi
- 24 ESI Group Acquisition of CyDesign Labs. Inc.
- 28 Ford Focus Extends Streak - Best-Selling Vehicle Nameplate Worldwide
- 30 Chevrolet Previews Performance-Oriented SEMA Concepts
- 35 TopCrunch.org Cray Inc.

**September 2013 FEA Information Engineering Solutions**

- 07 Ford Motor Company 2014 Mustang
- 10 ANSA &  $\mu$ ETA North American Open Meeting
- 12 Japan's Railway Technical Research Institute Puts Multiple Cray Supercomputers Into Production
- 14 Call For papers LS-DYNA® Conference
- 15 Website Showcase

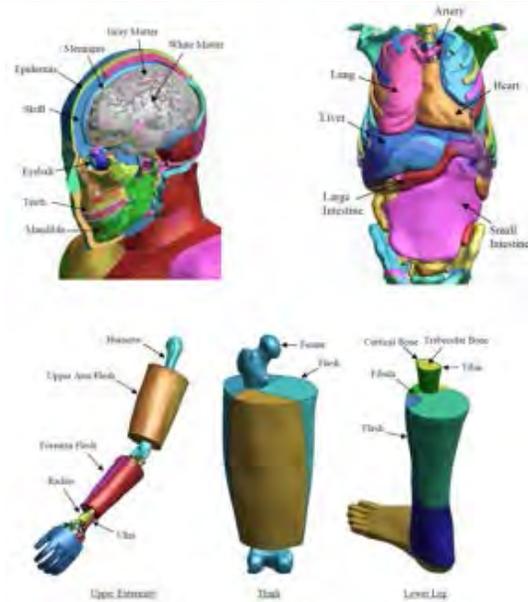
# Total Human Model for Safety - THUMS

## LSTC is the US distributor for THUMS

### About

The Total Human Model for Safety, or THUMS®, is a joint development of Toyota Motor Corporation and Toyota Central R&D Labs. Unlike dummy models, which are simplified representation of humans, THUMS represents actual humans in detail, including the outer shape, but also bones, muscles, ligaments, tendons, and internal organs. Therefore, THUMS can be used in automotive crash simulations to identify safety problems and find their solutions.

THUMS is limited to civilian use and may under no circumstances be used in military applications.

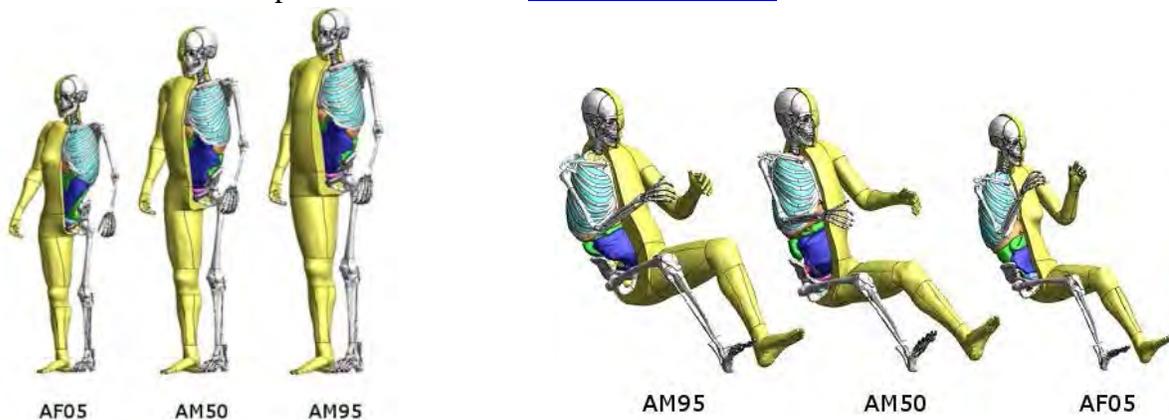


**Model Details:** Each of the different sized models is available as sitting model to represent vehicle occupants and as standing model to represent pedestrians.

The internal organs were modeled based on high resolution CT-scans.

**LSTC is the US distributor for THUMS.** Commercial and academic licenses are available.

For more information please contact us at [THUMS@lstc.com](mailto:THUMS@lstc.com).



THUMS®, is a registered trademark of Toyota Central R&D Labs.

**BETA CAE Systems S.A.**

[www.beta-cae.gr](http://www.beta-cae.gr)

**BETA CAE Systems S.A.– 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 or 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**[www.cray.com](http://www.cray.com)**Cray CS300-AC Cluster Supercomputer**

§ The Cray CS300-AC cluster supercomputer features an air-cooled architecture based on blade server or rackmount server building block platforms. The system is built for capacity and data-intensive workloads. It delivers turnkey high performance computing with a broad range of flexible system configuration options.

§ The CS300-AC system features two new preconfigured [ready-to-go solutions](#), the CS300 shared memory parallel and the CS300 large memory systems.

**Cray CS300-LC Cluster Supercomputer**

§ The Cray CS300-LC cluster solution features a direct liquid-cooled architecture using warm water heat exchangers instead of chillers. It delivers a turnkey, energy-efficient solution that reduces datacenter power and cooling operation costs for faster

ROI while addressing capacity and data-intensive workloads.

**Cray XC30 Supercomputer Series**

§ The Cray XC30 family delivers on Cray's commitment to an adaptive supercomputing architecture that provides both extreme scalability and sustained performance. The flexibility of the Cray XC30 platform ensures that users can configure the exact machine to meet their specific requirements today, and also remain confident they can upgrade and enhance their system to address the demands of the future.

**Cray Sonexion Scale-out Lustre Storage System**

§ Brought to you by Cray, the world's leading experts in parallel storage solutions for HPC and the technical enterprise, the Cray Sonexion is a fully integrated, modular and compact scale-out storage system for Lustre.

**DatapointLabs**[www.datapointlabs.com](http://www.datapointlabs.com)

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 company 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**  
[etainfo@eta.com](mailto:etainfo@eta.com)

[www.eta.com](http://www.eta.com)

### **Invention Suite™**

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

Invention'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**

Invention'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](http://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](http://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.

**Compute on demand®/ Gridcore AB Sweden**

[www.gompute.com](http://www.gompute.com)      [www.gridcore.se](http://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/](http://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](http://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](http://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](http://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.

Hongsheng travels to LSTC often to keep current on the latest software features and support to continue to grow Hengstar as a CAE consulting group.

**Comet Solutions**

[www.cometsolutions.com](http://www.cometsolutions.com)

Comet enables rapid and robust design space exploration from concept discovery and selection through concept validation using a model-based engineering approach. We empower our customers to discover an array of possible design concepts, evaluate which ones are feasible, then select the best.

Comet software is a tool-open, extensible, vendor-neutral performance engineering

workspace that lets engineers and engineering project teams readily carry out multi-fidelity, multi-physics modeling and simulation.

In the Comet workspace, companies can better leverage all of their simulation assets – “best practices” expertise, COTS as well as in-house engineering tools, and product performance data.

**Canada**      **Metal Forming Analysis Corp MFAC**      [galb@mfac.com](mailto:galb@mfac.com)

[www.mfac.com](http://www.mfac.com)

LS-DYNA                      LS-OPT                      LS-PrePost      LS-TaSC  
 LSTC Dummy Models      LSTC Barrier Models      eta/VPG  
 eta/DYNAFORM              INVENTIUM/PreSys

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**United States**      **CAE Associates Inc.**      [info@caeai.com](mailto:info@caeai.com)  
[www.caeai.com](http://www.caeai.com)

ANSYS Products              CivilFem              Consulting ANSYS  
 Consulting LS-DYNA

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**United States**      **DYNAMAX**      [sales@dynamax-inc.com](mailto:sales@dynamax-inc.com)  
[www.dynamax-inc.com](http://www.dynamax-inc.com)

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

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**United  
States**

**ESI-Group N.A**

[www.esi-group.com](http://www.esi-group.com)

QuikCAST

SYSWELD

PAM-RTM

PAM-CEM

VA One

CFD-ACE+

ProCAST  
Process

Visual-

VisualDSS

Weld Planner

Visual-Environment

IC.IDO

**United  
States**

**Engineering Technology Associates – ETA**

[etainfo@eta.com](mailto:etainfo@eta.com)

[www.eta.com](http://www.eta.com)

INVENTIUM/PreSy

NISA

VPG

LS-DYNA

LS-OPT

DYNAform

**United  
States**

**Gompute**

[info@gompute.com](mailto:info@gompute.com)

[www.gompute.com](http://www.gompute.com)

LS-DYNA Cloud Service

Additional software

Additional Services

**United  
States**

**Comet Solutions**

[steve.brown@cometsolutions.com](mailto:steve.brown@cometsolutions.com)

Comet Software

United  
States

**Livermore Software Technology Corp**

[sales@lstc.com](mailto:sales@lstc.com)

LSTC [www.lstc.com](http://www.lstc.com)

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

LSTC Dummy Models

LSTC Barrier Models

TOYOTA THUMS

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United  
States

**Predictive Engineering**

[george.laird@predictiveengineering.com](mailto:george.laird@predictiveengineering.com)

[www.predictiveengineering.com](http://www.predictiveengineering.com)

FEMAP

NX Nastran

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

LSTC Dummy Models

LSTC Barrier Models

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**France****DynaS+**[v.lapoujade@dynasplus.com](mailto:v.lapoujade@dynasplus.com)[www.dynasplus.com](http://www.dynasplus.com)

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

DYNAFORM

VPG

MEDINA

LSTC Dummy Models

LSTC Barrier Models

**Germany****CADFEM GmbH**[lsdyna@cadfem.de](mailto:lsdyna@cadfem.de)[www.cadfem.de](http://www.cadfem.de)

ANSYS

LS-DYNA

optiSLang

ESAComp

AnyBody

FTI FormingSuite

Germany

**DYNAmore GmbH**[uli.franz@dynamore.de](mailto:uli.franz@dynamore.de)[www.dynamore.de](http://www.dynamore.de)

PRIMER	LS-DYNA	FTSS	VisualDoc
LS-OPT	LS-PrePost	LS-TaSC	DYNAFORM
Primer	FEMZIP	GENESIS	
TOYOTA THUMS		LSTC Dummy & Barrier Models	

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Germany

**GNS**[mbox@gns-mbh.com](mailto:mbox@gns-mbh.com)[www.gns-mbh.com](http://www.gns-mbh.com)

Animator	Generator	Indeed	OpenForm
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The  
Netherlands**Infinite Simulation Systems B.V**[j.mathijssen@infinite.nl](mailto:j.mathijssen@infinite.nl)[www.infinite.nl](http://www.infinite.nl)

ANSYS Products	CivilFem	CFX	Fluent
LS-DYNA	LS-PrePost	LS-OPT	LS-TaSC

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**Italy****EnginSoft SpA**[info@enginsoft.it](mailto:info@enginsoft.it)[www.enginsoft.it](http://www.enginsoft.it)

ANSYS

MAGMA

Flowmaster

FORGE

CADfix

LS-DYNA

Dynaform

Sculptor

ESAComp

AnyBody

FTI Software

AdvantEdge

Straus7

LMS Virtual.Lab

ModeFRONTIER

**Russia****STRELA**[info@dynamore.com](mailto:info@dynamore.com)

LS-DYNA

LS-TaSC

LS-OPT

LS-PrePost

LSTC Dummy Models

LSTC Barrier Models

**Sweden****DYNAmore Nordic**[marcus.redhe@dynamore.se](mailto:marcus.redhe@dynamore.se)[www.dynamore.se](http://www.dynamore.se)

ANSA

μETA

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

FastFORM

DYNAform

FormingSuite

LSTC Dummy Models

LSTC Barrier Models

**Sweden****GOMPUTE**[info@gridcore.com](mailto:info@gridcore.com)[www.gridcore.se](http://www.gridcore.se)[www.gompute.com](http://www.gompute.com)

LS-DYNA Cloud Service

Additional software

## Switzerland

DYNAmoreSwiss GmbH

[info@dynamore.ch](mailto:info@dynamore.ch)[www.dynamore.ch](http://www.dynamore.ch)

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

LSTC Dummy Models

LSTC Barrier Models

## UK

Ove Arup &amp; Partners

[dyna.sales@arup.com](mailto:dyna.sales@arup.com)[www.oasys-software.com/dyna](http://www.oasys-software.com/dyna)

LS-DYNA

LS-OPT

LS-PrePost

LS-TaSC

PRIMER

D3PLOT

T/HIS

REPORTER

SHELL

FEMZIP

HYCRASH

DIGIMAT

Simpleware

LSTC Dummy Models

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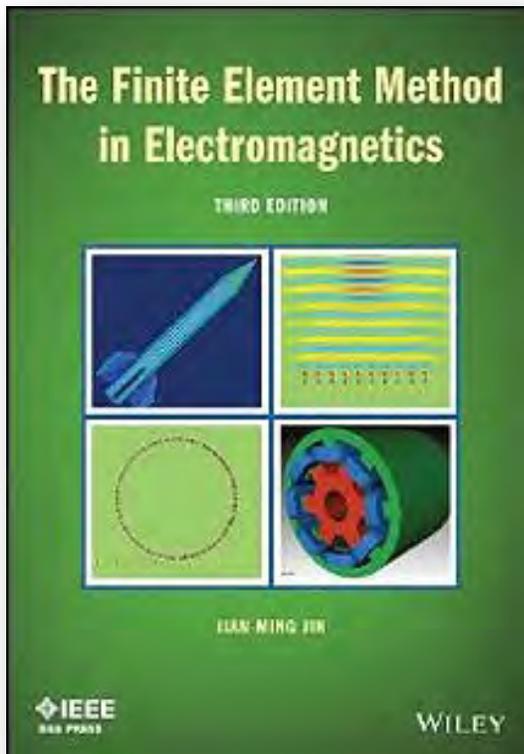
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