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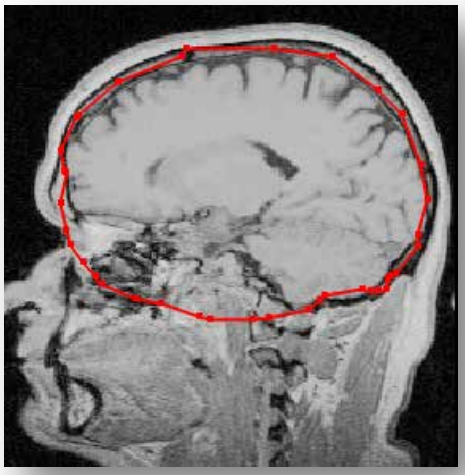

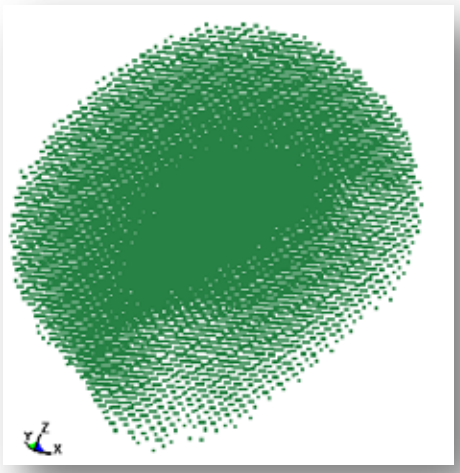

Mild Traumatic Brain Injury-Mitigating Football Helmet Design Evaluation

New Wildcat Debuts Aboard Illustrious

A Chevrolet Camaro that converts into the iconic Bumblebee

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:

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FEA Information China Engineering Solutions

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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
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Table of Contents

Announcements

Thanks to Suri Bala for taking on additional editorial responsibilities.
Suri Bala - Editor.
Sections: showcased products – showcased publications
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FEA Information Engineering Solutions
FEA Information Engineering Journal (FEAIEJ)

Showcased Published Book on Amazon

Mathematical and Numerical Methods for Partial Differential Equations: Applications for Engineering Sciences (Mathematical Engineering)
[Kindle Edition]
Joël Chaskalovic (Author)

Showcased Published Paper now available on www.dynalook.com

Mild Traumatic Brain Injury-Mitigating Football Helmet Design Evaluation
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Minoo Shah, B.S.(Mechanical) - *IDIADA Automotive Technology, Troy, MI.*

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

Employees and robots working directly together in production: Mercedes-Benz Cars receives international award for groundbreaking "Robot Farming" production concept

Left to right: Dr. Michael Zürn, Senior Manager Process Engineering Joining and Assembly Technology at Mercedes-Benz Cars, receives the 'IEEE Robotics and Automation Award for Product Innovation' from Dr. Raja Chatila, President Executive Committee IEEE Robotics & Automation Society.

- Markus Schäfer, Member of the Divisional Board of Mercedes-Benz Cars, Production and Supply Chain Management: "The award for the "Robot Farming" production concept affirms our position in progressive, revolutionary production technologies of tomorrow."
- Successful testing of applications involving light-duty robots for series production

Stuttgart/Hong Kong –Mercedes-Benz Cars has received an award for its groundbreaking "Robot Farming" production concept at the annual International Conference on Robotics and Automation (ICRA) in Hong Kong. "Robot Farming" stands for overcoming previously irreconcilable antitheses in production technology: The concept allows people and robots to work together directly in production, without a protective fence. In this interaction, the movements of the robot are directly influenced by the actions of the person. In this way, the person and the lightweight robot can carry out intricate assembly work together as part of an optimized production process. Mercedes-Benz Cars received the "IEEE Robotics and Automation Award for Product Innovation". Since 2010, the IEEE (Institute of Electrical and Electronics Engineers) has bestowed this award for new, innovative and commercially viable developments and products in the field of automation and robotics.

"The award for the "Robot Farming" production concept affirms our position in progressive, revolutionary production technologies of tomorrow," says Markus Schäfer, Member of the Divisional Board of Mercedes-Benz Cars, Production and Supply Chain Management. "We aim for premium cars and top quality.

These innovative technologies will bring us forward in automotive production in terms of quality and efficiency. At the same time, the robot facilitates the work of our employees by taking over tiring tasks.”

About “Robot Farming” at Mercedes-Benz Cars

Mercedes-Benz was the first automotive manufacturer to recognize the potential of the reactive light-duty robot, and successfully test it in series production in the course of pilot applications. This is based on a strategic partnership with the robot and machine engineering company KUKA AG from 2012. In operating tests, employees of both companies investigate procedures including screwing processes in vehicle assembly. In the adaptable production systems of the future, innovative new lightweight robots and employees will work together very closely without the robot replacing the person. Mercedes-Benz calls this holistic production system “Robot Farming”, which combines the cognitive and physical abilities of the person with the consistency, precision and stamina of the robot. Depending on the unit volumes and production scopes required, the employee can add one or more robots and assign them flexibly to various workstations, or even work with them in the same area without a protective fence. The robot can be positioned in a way that provides the best ergonomic support for the employee. For example, the light-duty robot can take on taxing duties like overhead work.

About the IEEE award

The IEEE (Institute of Electrical and Electronics Engineers) is the world's largest professional association of engineers in the fields of electronics and IT, with more than 395,000 members in over 160 countries. Its activities include organizing professional conferences, and it publishes a number of specialist journals.

- Ford China May sales reach 93,323 wholesales, up 32%; year-to-date sales reach 461,473 vehicles, up 39%;
- CAF passenger car May sales reach 67,454 wholesales, up 32%; year-to-date sales reach 330,771 vehicles, up 43%;
- JMC May vehicle sales reach 21,342 wholesales, up 25%; year-to-date sales reach 113,926 vehicles, up 21%;

SHANGHAI, China, June 6, 2014 - Ford China sales grew 32 percent in May with 93,323 wholesales sold compared to 70,449 wholesales in May 2013. Year-to-date sales were up 39 percent, with 461,473 wholesales sold compared to 332,308 wholesales sold in the first five months of 2013.

Passenger car sales for Ford China—which include imported cars—grew 35 percent in May with 71,981 vehicles sold compared to 53,392 in May 2013. Ford has sold 347,547 passenger cars so far in 2014, up 46 percent from 238,100 vehicles sold during the same period last year.

“Our sales are a direct reflection of our continued commitment to bring the best of Ford to China with a great lineup of Ford cars and utilities that offer high quality, great fuel efficiency, world class safety and smart technologies,” said John Lawler, Chairman and Chief Executive Officer, Ford Motor China. “We are honored that customers are increasingly deciding that Ford vehicles are the best choice to power their lives.”

Changan Ford Automobile (CAF), Ford's passenger car joint venture, sold 67,454 vehicles in May, up 32 percent from 51,008 sold during the same period last year. Year-to-date sales reached 330,771 vehicles, up 43 percent compared to the first five months of 2013.

Featuring great fuel-efficiency, safety, quality, and smart technologies, demand for both the Ford Mondeo and the Ford Focus continued to increase last month. Ford Mondeo nameplate sales were up 90 percent with 10,395 vehicles sold in May while Ford Focus nameplate sales reached 33,341 vehicles, up 22 percent compared to May 2013

Jiangling Motors Corporation (JMC), Ford's commercial vehicle investment in China, also continued to turn in steady growth, with sales rising 25 percent in May, selling 21,342 vehicles compared 17,057 sold in May 2013. JMC's year-to-date sales were up 21 percent with 113,926 vehicles sold, up from 94,208 in the first five months of 2013.

Late last month, Ford China launched its flagship Conservation and Environmental Grants China (CEGC) program, and Level Up!, its capacity-building program for green NGOs. This year, CEGC will be awarding RMB2 million in grants to better support domestic environmental efforts.

Since its establishment 14 years ago, CEGC has awarded the great work of 325 grassroots environmental leaders and groups in China. For more information, please visit www.fordgreen.com.cn.

# # #

Editor's note: All sales figures quoted are based on wholesale numbers.

New Wildcat Debuts Aboard Illustrious

The Navy's new helicopter has paid its first visit to HMS Illustrious – dropping in on the veteran carrier during a submarine hunting exercise off Cornwall. Wildcat, which will replace the long-serving Lynx on the front line from next year, touched down on Lusty in the middle of Exercise Deep Blue.

(Source: Royal Navy; issued June 17, 2014)

The Navy's newest helicopter paid its first visit to one of the grand old ladies of the Fleet when Wildcat landed aboard HMS Illustrious off the Cornish coast.

The state-of-the-art helicopter, based with 700W Naval Air Squadron, dropped in on the veteran assault ship as the latter took part in the biggest anti-submarine exercise the Royal Navy has run in decades, Deep Blue.

Nine Merlin Mk2 helicopters have joined Lusty for the three-week war game, which began off the Lizard peninsula before moving out into the grey wastes of the Western Approaches.

The Merlins are flying around the clock as they try to hunt down Dutch diesel and British nuclear boat in the eternal game of anti-submarine warfare cat and mouse.

To support the exercise, however, there are regular flights between Royal Naval Air Stations back in the UK – delivering personnel, supplies, stores and the like.

The Wildcat was making one such delivery – on deck for a matter of minutes to drop off a passenger and take on fuel.

The successor to the Lynx is in the middle of extensive trials before entering front-line service next year.

“On a busy flight deck operating Merlin and Sea King helicopters, the latest addition to the Fleet Air Arm looked right at home,” said Cdr Mike Ryan, Illustrious’ Commander Air.

“As someone who was closely involved with bringing Wildcat into service, it was both a great pleasure and privilege to welcome this highly impressive new helicopter on to Illustrious for the very first time.”

Wildcat will continue training and trials with 700W, based at RNAS Yeovilton in Somerset, until the end of July.

Then the squadron disbands and a new Wildcat squadron forms on August 1, 825 NAS, which will be the parent unit for training all air and ground crew working on the new helicopter, as well overseeing the flights which will operate from Royal Navy frigates and destroyers deployed around the globe.

Transformers: The Movies that Made Camaro a Star

– A Chevrolet Camaro that converts into the iconic Bumbleb

A look at the evolution of Bumblebee in the Transformers movie franchise

DETROIT – A Chevrolet Camaro that converts into the iconic Bumblebee returns to the big screen in Michael Bay's "Transformers: Age of Extinction" in theaters June 27.

"In all the Transformers films, Chevrolet vehicles get to play the heroes," said Tim Mahoney, chief marketing officer, Global Chevrolet. "These movies have helped us get our vehicles in front of a younger audience around the world."

This is the Camaro's fourth appearance in a Transformers film. The first three movies helped propel Camaro to sales leadership in its segment for the past four years.

"Being a part of the Transformers franchise is an incredible way to showcase the design work of which GM is capable," said Ed Welburn, vice president of GM Global Design. "The global series gets our cutting-edge designs in front of more potential customers than we could through traditional methods."

Transformers (2007) In the first film of the series, Bumblebee goes through arguably his biggest change. The car starts off as a hand-me-down 1977 second-generation Camaro. The car is anything but flashy, with rust and primer spots, its famous yellow paint covered in patina.

Bumblebee eventually converts into a fifth-generation Camaro. However, this was in July 2007, two years before the Camaro would go on sale, so Chevrolet had to build a one-off running concept for the movie.

The vehicle used body panels made from the same molds that were used for the 2006 Camaro Concept, which was on the auto show circuit the year before. The body was fit to a chassis of a Holden Monaro to make it capable of performing in the film.

Its starring role in Transformers helped cement the fifth-generation Camaro as one of the coolest cars to come on the market in the following years.

Transformers: Revenge of the Fallen (2009) and Transformers: Dark of the Moon (2011)

With Revenge of the Fallen coming out only a few months after the latest Camaro went on sale, the movie depicted a modified production version of the Camaro. The yellow Camaro sported the signature black rally stripes on the hood and trunk deck lid, a mailslot hood, and a custom front bumper.

For Dark of the Moon, Bumblebee was upgraded to the SS model with a subtle update to its color, sporting a more amber hue than the previous model's pure yellow. The vehicle sported darker wheels and a new paint scheme that included wider rally stripes and black side mirrors.

Transformers: Age of Extinction (2014) For the latest installment, Michael Bay asked the design team at GM to redesign Bumblebee to give him an updated look. With a specific focus on making him look more aggressive and muscular, the job was well suited to the North Hollywood Design Center.

The Center is just down the street from Paramount Pictures and as GM's advanced design center, pens some of the most forward-looking designs to wear a bowtie badge.

The team designed a vehicle specifically for the movie with a new fascia and bulked up sides to create a leaner, meaner Bumblebee, with design cues that could put it years into the future.

But one Transformer can't fight on his own, which is why the team was also tasked with designing an Allspark Green Tint Corvette Stingray to play Crosshairs and a Chevrolet Sonic rally car. Those vehicles will be joined by the Trax, which recently went on sale in China, and is set to go on sale in the U.S. early next year.

The movie makes extensive use of GM facilities as settings for the film. Scenes were filmed on Milford, Mich. Proving Ground, at the GM Design Center in Warren, Mich., including Welburn's office and the Lansing, Mich., Delta Township Assembly Plant.

For example, at the Warren Technical Center, the production brought 200 people and 50 semi-trailers and filmed with minimal disruption to the work going on during the day.

About Chevrolet

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 4.9 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.

The Importance of Engineering Simulation for Innovation

Posted by: DE Guest in Simulate June 1, 2014

by Nicholas M. Veikos, CAE Associates

NickVeikosInnovation. We hear the word with increasing frequency in today's business environment. In the April 2014 issue of the Harvard Business Review (HBR Vol. 92, No. 4), the editors used Google's Ngram Viewer to track the frequency of a variety of familiar business terms used in books over the past century. Their premise was that language is a reflection of our culture, and the phrases used reflect our shifting priorities. In this study, the word "innovation" showed more than a five-fold increase in frequency of use over this period; much larger than either "management" or "leadership."

In the same issue of HBR, "innovation in response to customer requirements" was highlighted as one key way in which manufacturers in developed countries are competing successfully with those in emerging economies with much lower labor costs.

The U.S patent office received over 575,000 patent applications in 2012, more than six times the number received in 1962, and 60% more than in 2002. So, innovation is not only increasing, it is accelerating rapidly.

Enabling Innovation

There are many factors that enable innovation. A culture of creativity and flexibility is key, but so is the ability to quickly test new ideas and identify those that merit further development.

With the use of computer aided engineering (CAE) simulation, today's trials can be virtual. This approach can be orders of magnitude faster and cheaper than innovation by building one physical prototype after another. In our rapidly moving and competitive world, vetting new ideas and processes in a virtual environment provides significant advantages compared with traditional physical experiments. An engineer can dream up a new concept during a morning shower, flesh it out a bit more during the drive to work, simulate it by lunchtime to prove feasibility, and have a solid, defensible proposal on the manager's desk by 3 o'clock. With sufficient computer hardware, a hundred different variations of the original concept will be ready to review by morning. Someone taking the traditional physical testing approach would be lucky to have the paperwork requesting lab resources completed in this same timeframe.

Savings in time and cost are not the only advantages that simulation has to offer. Sometimes, innovation happens by accident. For example, making minor modifications during product testing or changing materials may yield huge performance benefits. The reasons for the improvement may not always be understood; testing is great for answering what happened, but not always so good for answering why it happened. You need a lot more testing for that — or you can simulate.

Because simulation can help engineers visualize the relevant parameters, it can provide insight and understanding not easily achievable by testing. New products that rely on multiple physics working together are the most complex to test and are those where simulation brings the most benefits. Simulation answers the "why" question, which is critical when filing for a patent or when deciding whether to further pursue a concept.

Simulate Early and Often

The pace of change is fast and getting faster with breakthrough technologies like additive manufacturing. Traditional manufacturing constraints will soon disappear, opening a new universe of potential designs for even everyday items.

With this increased pace comes increased risk. A company may be looking at dozens of innovative ideas. How does it decide which ones to proceed with? While the basis of this decision is multi-faceted, simulation can certainly help. One obvious way is to model the innovation to ensure that it can achieve the performance and benefits required for success. In addition, CAE simulation can help determine the manufacturing methods, tolerances and material requirements for a successful implementation, thereby helping to put a number on production cost and timeframe. Without simulating early on, it is difficult to rationally draw these conclusions before committing significant time and resources.

Like most things that have increased risk, there is also potential for increased reward. Businesses at the forefront of innovation who embrace simulation level the playing field as they compete with more established and conservative rivals.

Nicholas M. Veikos, Eng.Sc.D., is president of CAE Associates Inc. He has more than 30 years of experience in engineering analysis. Contact him via caeai.com or de-editors@deskeng.com.

Contact classes@lstc.com to reserve your place

Intro to LS-PrePost	MI	June 23	Monday
Intro to LS-DYNA	MI	June 24-27	Tue-Fri
Composite LS-DYNA	CA	June 30-July 1	Mon-Tue
Umat LS-DYNA	CA	July 2-3	Wed-Thur
Adv Impact & Options	MI	July 8-9	Tue-Wed
Contact LS-DYNA	MI	Aug 5-6	Tue-Wed
Composite LS-DYNA	MI	Aug 7-8	Thur-Fri
Intro to LS-PrePost	CA	August 4	Monday
Intro to LS-DYNA	CA	Aug 5-8	Tue-Fri
Blast in LS-DYNA	MI	Aug 12-13	Tue-Wed
Penetration in LS-DYNA	MI	Aug 14-15	Thur-Fri
Intro to LS-PrePost	MI	August 18	Monday
Intro to LS-DYNA	MI	Aug 19-22	Tue-Fri
Intro to LS-OPT	MI	Oct 28-31	Tue-Fri
NVH	CA	Nov 4-5	Tue-Wed
Intro to LS-PrePost	CA	November 10	Monday
Intro to LS-DYNA	CA	Nov 11-14	Tue-Fri
Adv Impact & Options	MI	Dec 11-12	Tue-Wed
Intro to LS-PrePost	MI	December 15	Monday
Intro to LS-DYNA	MI	Dec 16-19	Tue-Fri

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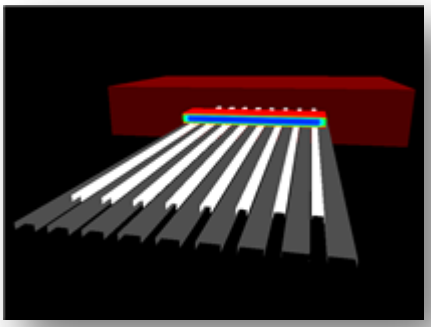
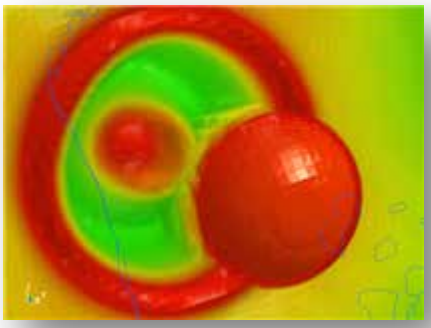


Walking Beam Furnace
No.398
Coupled Structural Thermal Analysis of Walking Beam Furnace

Keywords: Coupled Structural Thermal Analysis, View factor update



Shockwave toward a droplet
No.399
Propagating shockwave toward a droplet

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The LS-DYNA® Aerospace Working Group (AWG)

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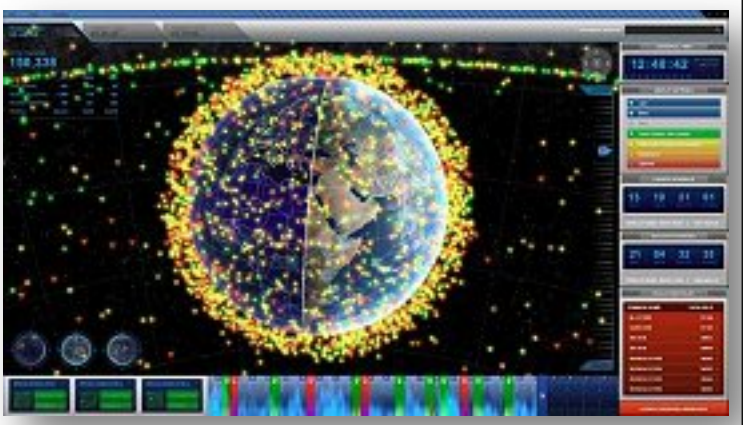

Air Force awards Lockheed Martin approximately $914 million contract to provide Space Fence radar system (excerpt – full article: www.lockheedmartin.com/us/news/features/2014/140602-mst-space-fence-an-out-of-this-world-feeling.html
Debris from space collisions. Spent rocket stages. Dead satellites. Numbered in the tens of thousands, these and other fast-moving "space junk" orbiting the earth can be lethal to spacecraft and satellites in their path.

These threats will be combatted by the U.S. Air Force's Space Fence program, which today was awarded to Lockheed Martin under a five-year $914.7 million contract to build an advanced ground-based radar system on the Kwajelein Atoll to improve the way we identify and track objects in space. Utilizing a powerful, new ground-based radar, Space Fence will enhance the way the U.S. detects, tracks, measures and catalogs orbiting objects and space debris with improved accuracy, better timeliness and increased surveillance coverage.

Lockheed Martin will deliver up to two advanced S-band phased array radars for the Space Fence program. The Space Fence radar system will greatly improve Space Situational Awareness of the existing Space Surveillance Network.

"Space-based technologies enable daily conveniences such as weather forecasting, banking, global communications and GPS navigation, yet everyday these critical services are being threatened by hundreds of thousands of objects orbiting Earth," said Dale Bennett, executive vice president of Lockheed Martin's Mission Systems and Training business. "Space Fence will locate and track these objects with more precision than ever before to help the Air Force transform space situational awareness from being reactive to predictive."

The system's design incorporates a scalable, solid-state S-band radar with a higher wavelength …

May

06 MIPS Helmets – New Generation
09 JSOL - HYCRASH
10 Comet Solutions, Inc - Automotive Focus
12 BETA CAE Systems S.A. ANSA & µETA v14.2.
14 LSTC - DES Discrete Element Sphere
15 Cray - Cray to Install Tiered Adaptive Storage Solution at the North German Supercomputing Alliance (HLRN)
17 MSC Software - The Jury Has Spoken
18 Penguin - POD (Penguin Computing on Demand
19 AEROSPACE X-29 research aircraft

March FEA Information Engineering Solutions

06 AEROSPACE X-29 research aircraft
08 BMW i8 Delivery in June
10 OASYS Software HPM / HRMD Positioning Tool
11 SEID KORIĆ New World Record in Parallel Scaling
13 CAE Associates Aerodynamic Analysis of an Airbrake System
14 Predictive Engineering Respirator Modeling
15 Gompute User Meeting
16 FORD Analyzing NASA's Robonaut 2
18 GM New Modular Ecotec Engines
20 DYNAmore Call For Papers
22 DYNAmore Free LS-DYNA Information Day

BETA CAE Systems S.A. **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 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 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.

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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.

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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.

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

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 www.mfac.com			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	eta/VPG	
	eta/DYNAFORM	INVENTIUM/PreSys		
United States	**CAE Associates Inc.** info@caeai.com www.caeai.com			
	ANSYS Products	CivilFem	Consulting ANSYS Consulting LS-DYNA	
United States	**DYNAMAX** sales@dynamax-inc.com www.dynamax-inc.com			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models		LSTC Barrier Models	

United States	**ESI-Group N.A** www.esi-group.com			
	QuikCAST	SYSWELD	PAM-RTM	PAM-CEM
	VA One	CFD-ACE+	ProCAST	Visual-Process
	VisualDSS	Weld Planner	Visual-Environment	IC.IDO
United States	**Engineering Technology Associates – ETA** www.eta.com		etainfo@eta.com	
	INVENTIUM/PreSy	NISA	VPG	LS-DYNA
	LS-OPT	DYNAform		
United States	**Gompute** www.gompute.com		info@gompute.com	
	LS-DYNA Cloud Service		Additional software	
	Additional Services			
United States	**Comet Solutions** Comet Software		steve.brown@cometsolutions.com	

United States	**Livermore Software Technology Corp**		sales@lstc.com	
	LSTC www.lstc.com			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	TOYOTA THUMS	

United States	**Predictive Engineering** www.predictiveengineering.com		george.laird@predictiveengineering.com	
	FEMAP	NX Nastran	LS-DYNA	LS-OPT
	LS-PrePost	LS-TaSC	LSTC Dummy Models	
			LSTC Barrier Models	

France	**DynaS+**		v.lapoujade@dynasplus.com	
	www.dynasplus.com		Oasys Suite	
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	DYNAFORM	VPG	MEDINA	
	LSTC Dummy Models		LSTC Barrier Models	

Germany	**CADFEM GmbH**		lsdyna@cadfem.de
	www.cadfem.de		
	ANSYS	LS-DYNA	optiSLang
	ESAComp	AnyBody	
	FTI FormingSuite		

Germany	**DYNAmore GmbH**		uli.franz@dynamore.de	
	www.dynamore.de			
	PRIMER	LS-DYNA	FTSS	VisualDoc
	LS-OPT	LS-PrePost	LS-TaSC	DYNAFORM
	Primer	FEMZIP	GENESIS	Oasys Suite
	TOYOTA THUMS		LSTC Dummy & Barrier Models	

The Netherlands	**Infinite Simulation Systems B.V**		j.mathijssen@infinite.nl	
	www.infinite.nl			
	ANSYS Products	CivilFem	CFX	Fluent
	LS-DYNA	LS-PrePost	LS-OPT	LS-TaSC

Italy	**EnginSoft SpA**		info@enginsoft.it	
	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@dynarussia.com	
	LS-DYNA	LS-TaSC	LS-OPT	LS-PrePost
	LSTC Dummy Models		LSTC Barrier Models	
Sweden	**DYNAmore Nordic**		marcus.redhe@dynamore.se	
	www.dynamore.se		Oasys Suite	
	ANSA	µETA	LS-DYNA	LS-OPT
	LS-PrePost	LS-TaSC	FastFORM	DYNAform
	FormingSuite		LSTC Dummy Models	
			LSTC Barrier Models	
Sweden	**GOMPUTE**		info@gridcore.com	
	www.gridcore.se		www.gompute.com	
	LS-DYNA Cloud Service		Additional software	

Switzerland	**DYNAmoreSwiss GmbH**		info@dynamore.ch	
	www.dynamore.ch			
	LS-DYNA		LS-OPT	LS-PrePost
	LS-TaSC		LSTC Dummy Models	
			LSTC Barrier Models	
UK	**Ove Arup & Partners**		dyna.sales@arup.com	
	www.oasys-software.com/dyna		TOYOTA THUMS	
	LS-DYNA		LS-OPT	LS-PrePost
	LS-TaSC	PRIMER	D3PLOT	T/HIS
	REPORTER	SHELL	FEMZIP	HYCRASH
	DIGIMAT	Simpleware	LSTC Dummy Models	
			LSTC Barrier Models	

Australia	**LEAP**			
	www.leapaust.com.au			
	ANSYS Mechanical	ANSYS CFD	ANSYS EKM	Recurdyn
	ANSYS DesignXplorer	ANSYS HPC	FlowMaster	Ensigh
	LS DYNA	DYNAform	Moldex 3D	FE-Safe
China	**ETA – China**		lma@eta.com.cn	
	www.eta.com/cn			
	Inventium	VPG	DYNAFORM	NISA
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
			LSTC Barrier Models	LS-TaSC
China	**Oasys Ltd. China**		Stephen.zhao@arup.com	
	www.oasys-software.com/dyna			
	PRIMER D3PLOT	HYCRASH	T/HIS REPORTER	SHELL
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
	DIGIMAT	FEMZIP	LSTC Barrier Models	LS-TaSC
China	**Shanghai Hengstar Technology**		info@hengstar.com	
	www.hengstar.com			
	LS-DYNA	LS-TaSC	LSTC Barrier Models	
	LS-DYNA Courses	LS-OPT	LSTC Dummy Models	LS-PrePost

India	**Oasys Ltd. India**		lavendra.singh@arup.com	
	www.oasys-software.com/dyna			
	PRIMER	D3PLOT	T/HIS	
			LS-OPT	LSTC Dummy Models	LS-PrePost
			LS-DYNA	LSTC Barrier Models	LS-TaSC

India	**CADFEM Eng. Svce**		info@cadfem.in	
	www.cadfem.in			
	ANSYS	VPS	ESAComp	optiSLang
	LS-DYNA	LS-OPT	LS-PrePost	

India	**Kaizenat Technologies Pvt. Ltd**		support@kaizenat.com	
	http://kaizenat.com /			
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
	Complete LS-DYNA suite of products		LSTC Barrier Models	LS-TaSC

Japan	**CTC**	LS-dyna@ctc-g.co.jp		
	www.engineering-eye.com			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	CmWAVE	
Japan	**JSOL**			
	www.jsol.co.jp/english/cae		Oasys Suite	
	JSTAMP	HYCRASH	JMAG	
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	TOYOTA THUMS	
Japan	**FUJITSU**			
	http://jp.fujitsu.com/solutions/hpc/app/lsdyna			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	CLOUD Services	
Japan	**LANCEMORE**	info@lancemore.jp		
	www.lancemore.jp/index_en.html			
	Consulting			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models		
Japan	**Terrabyte**	**English:**		
	www.terrabyte.co.jp	www.terrabyte.co.jp/english/index.htm		
	Consulting			
	LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
	LSTC Dummy Models	LSTC Barrier Models	AnyBody	

Korea	**THEME**	wschung@kornet.com		
	www.lsdyna.co.kr		Oasys Suite	
	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

Gompute

www.gompute.com

Penguin Computing

www.penguincomputing.com/services/hpc-cloud

Training Classes Germany CADFEM GmbH Training Classes

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

Training Classes Germany DYNAmore Training Classes

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

Training Classes United States LSTC Training Classes

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

Training Classes Sweden DYNAmore Nordic Training Classes

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

Training Classes France DynAS+ Training Classes

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

Training Classes	Thailand	Training Classes

Complete Courses offered can be found at: **http://www.dfe-tech.com/training.html**

Training Classes	United States ETA	Training Classes

The Complete Courses Offered Can Be Found At: www.eta.com etainfo@eta.com

Training Classes	United States CAE Associates	Training Classes

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

Training Classes	France Alyotech Technologies	Training Classes

For course location visit www.alyotech.fr

Training Classes	UK ARUP	Training Classes

For course location visit www.oasys-software.com/dyna/en/training

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Run your LS-DYNA simulations and pay for what you use on a turn-key environment

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- Other simulation applications also ready to use
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For more information please visit: www.gompute.com

Price for computing-core/hour (CCH). Licenses and account set up are not included. Pricing valid only for universities, academic centers and research institutes. The following are trademarks or registered trademarks of Livermore Software Technology Corporation in the United States and/or other countries: LS-DYNA, LS-OPT, LS-PrePost, LS-TaSC. Gompute is owned and operated by Gridcore AB, 2012 All rights reserved.

POD (Penguin Computing on Demand) offers software including LSTC's LS-DYNA

www.penguincomputing.com/services/hpc-cloud

Penguin HPC clusters are optimized for engineering workloads and offer:

- Instant access to an HPC Cloud Cluster
- High performance InfiniBand bare-metal compute
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- No charges for network transfers
- Cost-effective, pay-per-use billing model
- Secure environment for private data
- Detailed billing reports for user groups and projects

Self Registration Portal – featuring rich--documentation, wiki, FAQ, pricing and more.

https://pod.penguincomputing.com/

POD Software Applications and Libraries (visit site for complete listing)

FEA, CFD and FDTD Modeling

- **LS-DYNA** / LS-PrePost LS-DYNA is an advanced general-purpose multiphysics simulation software package. Its core-competency lie in highly nonlinear transient dynamic finite element analysis (FEA) using explicit time integration. LS-PrePost is an advanced pre and post-processor that is delivered free with LS-DYNA.
- **OpenFoam:** OpenFOAM (Open source Field Operation And Manipulation) is a C++ toolbox for the development of customized numerical solvers, and pre-/post-processing utilities for the solution of continuum mechanics problems, including computational fluid dynamics (CFD).
- **ANSYS HFSS:** ANSYS HFSS software is the industry standard for simulating 3-D full-wave electromagnetic fields. Its gold-standard accuracy, advanced solver and compute technology have made it an essential tool for engineers designing high-frequency and high-speed electronic components.
- **ANSYS Fluent** ANSYS Fluent software contains the broad physical modeling capabilities needed to model flow, turbulence, heat transfer, and reactions for industrial applications.
- **Star-CD** and **Star-CCM+:** STAR-CCM+ is CD-adapco´s newest CFD software product. It uses the well established CFD solver technologies available in STAR-CD, and it employs a new client-server architecture and object oriented user interface to provide a highly integrated and powerful CFD analysis environment to users.
- **Convergent:** CONVERGE is a Computational Fluid Dynamics (CFD) code that completely eliminates the user time needed to generate a mesh through an innovative run-time mesh generation technique.
- **Lumerical:** Simulation tools that implement FDTD algorithms.

For the complete list of ATD Models developed and/or offered by DYNAmore visit
http://www.dynamore.de/en/products/models/side

PDB WorldSID-50

DYNAmore has developed a model of the WorldSID 50%. The model is validated with material, component and sled tests. The model was developed with a consortium of the German OEMs (PDB: Audi, BMW, Daimler, Porsche, and VW). The methods applied are the same as in the previous projects with the FAT for the ES-2, ES-2re, USSID, and BIORID model. The table below provides some general information about the release 2.0.1 of the WorldSID 50th percentile male model:

FTSS SID-IIs Model

The dummy represents a small female body and is used in an IIHS side impact load case, in the FMVSS214 and the US-NCAP load cases. The table below provides some general information about the release 3.1a of the SID-IIs model. A version for Build Level C (BLC) and Level D (BLD) is available.

FAT EuroSID Model

The dummy is used in the legal authorization in South Korea, Australia, China and India. The

FAT ES-2 and ES-2re Dummy Model

The dummy is used in US-NCAP- and Euro-NCAP side impact assessment, the ES-2re will be used in the new FMVSS214. The dummy is also used for the legal authorization in Europe, Japan and the United States. The table below provides some general information about the release v5.01 of FAT ES-2 model. The version v5.01 of the ES-2re, a variation of the ES-2 for the authorization and the evaluation in the United States, is also available with a comparable number of entities.

table below provides some general information about the actual release 3.6 of the model.

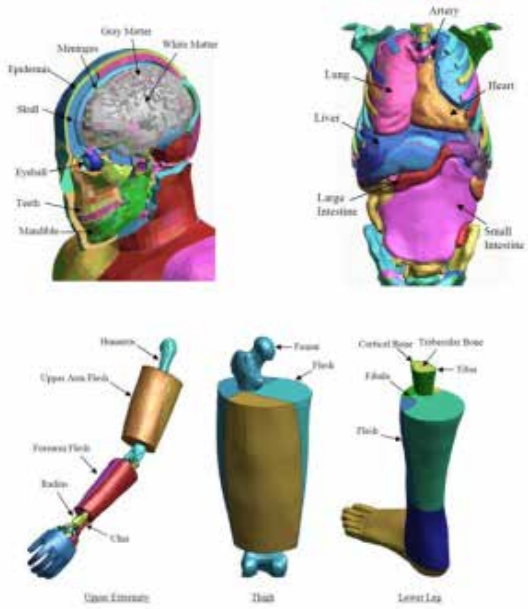
FAT US-SID and SIDHIII Model

The latest model of the FAT US-SID is version v5.0. The dummy is used in the subsiding FMVSS214 regulation and in the SINCAP load case. The modified version, the SIDHIII v5.1 is used in lateral impact to a pole. For both dummies a detailed model is available. The table below provides some general information about the actual multiple validated model of the US-SID.

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.

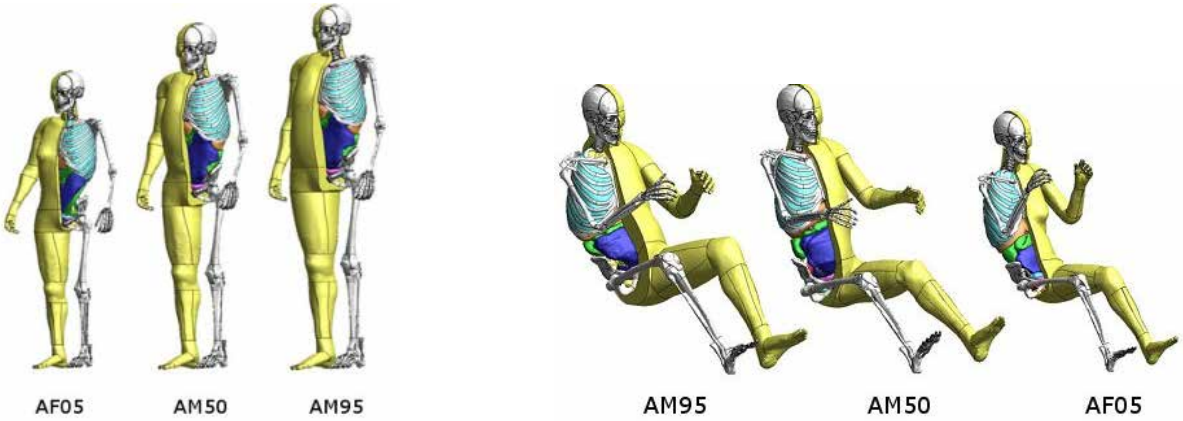


THUMS is limited to civilian use and may under no circumstances be used in military applications.

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 .



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

Owned and Operated by Dr. Al Tabiei

www.LSDYNA-ONLINE.com using GO TO MEETING.

- **Course Notes with Class, or by separate purchase**
- **Tutorials and Movies can be purchased**
- **Workshops - Tutorials - YouTube Videos**

  www.youtube.com/user/LSDYNATV/videos

Courses are easy to sign up forand attend with simple steps:

- Register and pay for the training.
- You will receive the course notes few days prior to the class date in PDF format.
- You will be sent the "go-to-meeting "invitation 2 days before the course date.
- You login to go to meeting few minutes before the class time.
- The class starts and you attend the interactive lectures.

Customer Location

Courses can be presented at the customer location. We offer several preset courses similar to the ones on line and/or we can custom design courses for your engineering needs.

For courses at your location preset, or special customization contact:

courses@lsdyna-online.com

Course Titles

- Material Models in LS-DYNA (new course)
- Intro LS-DYNALS-DYNA
- ImplicitFluid Structure Interaction in LS-DYNA
- Advance Fluid Structure Interaction in LS-DYNA
- Blast using LS-DYNA
- Penetration using LS-DYNA
- Composite Materials in LS-DYNA
- Contact in LS-DYNALS-DYNA
- DummiesAdvance Impact Simulations Using LS-DYNA
- Material Modeling Using User Defined Material
- Intro LS-PREPOST
- Advance LS-PREPOST
- Multi-Physics LS-DYNA

Dr. Al Tabiei has been a consultant on the use of LS-DYNA for more than 20 years to more than 60 companies.

He has been teaching different courses on LS-DYNA for more than 18 years nationally and internationally.

His primary work focus is in the area of multi-physics simulations, crash simulation, impact simulation, and material model development for isotropic and composite materials..

Len Schwer

http://www.duboisschwertraining.com/future

Paul Du Bois and I are pleased to announce or 2014 schedule of classes to be presented in Troy Michigan and hosted by our ETA partners (www.eta.com)

A registration form with the class price list is available on our web page.
http://www.duboisschwertraining.com/classes/Registration%20Details%20Troy%20MI

Completed registration forms are required prior to 13 May 2014 to establish class size. Class size minimum is four attendees. Once a class is confirmed, an invoice with payment instructions will be emailed.

2014 Schedule of Classes

DYNAmore, Stuttgart, Germany

9-10 October 2014 - Concrete and Geomaterial Modeling (Len)
13-14 October 2014 - Blast Modeling with LS-DYNA
15-16 October 2014 - Penetration Modeling with LS-DYNA

ARUP, Solihull, United Kingdom

20-21 October 2014 - Concrete and Geomaterial Modeling (Len)
20-21 October 2014 - Polymer Modeling (Paul)
22 October 2014 - Explosives Modeling for Engineers

testpaks.com is the side of DatapointLabs focused on the material modeling needs of the CAE (Computer-Aided Engineering) community.

With widespread use of modern materials there is the growing need to understand material behavior for the proper utilization of virtual product development tools. testpaks.com is the first web site to feed the "material" needs of the CAE (computer aided engineering) user. It seeks to concentrate the current knowledge base of materials modeling for virtual product design, drawing from the extensive experience of DatapointLabs materials specialists, CAE vendors, and expert users. testpaks.com is important in view of the widespread difficulty experienced by the CAE community and the subsequent limitations it places upon the use of CAE products.

As CAE use has evolved in the past decade, DatapointLabs products for CAE, TestPaks®, have offered CAE users with the most convenient way to get material data inputs specific to their material and simulation programs. For good material models, it is important that the testing and modeling be done by people who understand material behavior, as well as CAE programs. To better understand the needs of CAE, DatapointLabs maintains an active and extensive Alliance Program with all major CAE vendors, and has been serving its client base with not just material data, but "ready-to-load" models that can be exported in digital format as CAE-input decks via MaterealityDDS.

testpaks.com is info-mercial in nature. While it serves as a convenient online catalog for purchase of material testing for CAE, it also serves as a place for CAE community to submit content, opinions and experiences on the modeling of materials. We actively solicit this input and post it subject to review. We have in-house facilities to take relevant papers, presentations, web-links and movies and make them ready for the web. These facilities are at your disposal and you can work interactively with our team to get the desired interconnectivity and results.\

The new online job market is designed for CAE-engineers from industry, research & development and education. The portal has been initially developed in cooperation with the German NAFEMS Online-Magazine, the magazine for numerical simulation methods and related fields (FEM, CFD, MBS, VR, etc.).

In order to provide this service also to the international engineering community we now offer this service in English language.

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www.dynamore.de/forum2014-e

DYNAmore invites you to attend 13th LS-DYNA Forum which will take place from 6 - 8 October in Bamberg, Germany. This year, the conference is extended by half a day with the successful Developer Forum, which will take place before the main two-day User Forum.

You are warmly welcome to participate at the event as well as to actively contribute to the conference agenda by submitting an abstract. In your presentation you may report about your experience with LS-DYNA or LS-OPT as well as exchange your knowledge and discuss your problems with other users.

Additionally, there will be selected keynote lectures of renowned speakers from industry and universities. Software developers from LSTC and DYNAmore will present the latest features in LS-DYNA and the associated new application possibilities. In the accompanying exhibition, numerous hardware and software manufacturers will offer an insight into the latest news and trends around LS-DYNA.

Moreover, we are pleased to offer you several English spoken seminars in the week before, during and after the Forum, which will be either held by LS-DYNA developers or experienced consulting engineers

Presentation topics are:
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- aerospace,
- mechanical engineering,
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- Meshless Methods in LS-DYNA - EFG
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October 27-28, Turin – Italy

Your opportunity
to be part of the future!

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This year's Conference will take place in Turin, Northern Italy. The program will feature multiple parallel sessions on a variety of industrial verticals including: Aerospace & Defence, Automotive and Transportation, Naval, Oil & Gas and Energy, Processing and Production, Consumer goods, and more. The International CAE Conference is also an annual appointment for dedicated users' meetings on specific and emerging technologies.

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In the frame of the International CAE Conference, the 3rd edition of the "Poster Award" will be presented. The Award honours the most outstanding and innovative research work by students and researchers in the year 2014.

For further information about the conference, to submit a presentation and/or become an exhibitor and sponsor, please contact :

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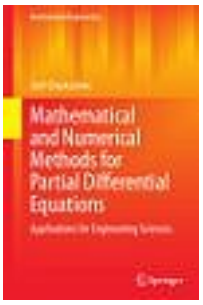

Mathematical and Numerical Methods for Partial Differential Equations: Applications for Engineering Sciences (Mathematical Engineering)
[Kindle Edition]
Joël Chaskalovic (Author)

Publication Date: May 16, 2014

This self-tutorial offers a concise yet thorough introduction into the mathematical analysis of approximation methods for partial differential equation. A particular emphasis is put on finite element methods. The unique approach first summarizes and outlines the finite-element mathematics in general and then in the second and major part, formulates problem examples that clearly demonstrate the techniques of functional analysis via numerous and diverse exercises. The solutions of the problems are given directly afterwards. Using this approach, the author motivates and encourages the reader to actively acquire the knowledge of finite- element methods instead of passively absorbing the material as in most standard textbooks. This English edition is based on the Finite Element Methods for Engineering Sciences by Joel Chaskalovic.

AUTHORS
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The Finite Element Method for Fluid Dynamics, Seventh Edition

Book Description
Publication Date: November 28, 2013 | ISBN-10: 1856176355 | ISBN-13: 978-1856176354 | Edition: 7

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Book Description
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Excerpt of: Mild Traumatic Brain Injury-Mitigating Football Helmet Design Evaluation

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ABSTRACT

Concussion, as known as mild Traumatic Brain Injury (mTBI), is the most common sport-related head injury. Football is the most common sport with higher concussions in USA. Helmet is the equipment being used in mitigation of mTBI. There are numerous designs of helmets which meet the requirements of sport regulation committee. In this paper, a football helmet is evaluated using numerical methods. The brain and the tissues in human head are modelled using continuum Smoothed Particle Hydrodynamics (SPH). The brain tissues are generated by segmentation from human brain MRI data. The LSTC dummy is used to represent the football players. The brain tissue is fitted in the cavity of the dummy headform. Two different impact scenarios are simulated in this study. The results for these impact conditions are presented.

INTRODUCTION

Concussion, as known as mild Traumatic Brain Injury (mTBI), is the most common sport-related head injury. Centers for Disease Control (CDC) estimates reveal 1.6 million to 3.8 million concussions occur each year in USA. Football is the most common sport with higher concussion risk due to the nature of the sport. A professional football player will receive an estimated 900 to 1500 blows to the head during a season. Impact speed of a football player tackling a stationary player is around 25mph. The topic of concussions and the effect that they have on the human brain are being increasingly scrutinized by media, political personnel and research community.

Tremendous amount of research studies have been conducted by medical, defense and academic communities in understanding the etiology of concussion, treatment protocols and mitigation strategies by designing better equipment.

Helmets are being developed and marketed in order to mitigate the mTBI. These helmets meet the requirements of the existing standards by National Operating Committee on Standards for Athletic Equipment (NOCSAE) [1]. Helmet testing to assess the impact performance is documented in Reference[2]. Impact test comparison of 20th and 21st century American football helmets is provides by

Bartsch, et al[3]. The helmet designs vary widely. The designs are based upon simple inner foam padding, energy absorbing adapting head protection system, multi-directional protective systems, use of shear-thickening fluid layers, etc. The effects of pad composition, geometry and material stiffness were studied by Moss et al.[4]. Viano, et al studied the effect of mouthguards on head responses and mandible forces in football helmet impacts[5].

Externally applied foam is also used in football helmets for impact reduction [6].

The numerical analysis of the human head models using the finite element technique is being used extensively for the past few decades. A literature review of the finite element human head models which are used in the medical and engineering fields is given by Samaka et al. [7]. Patient specific finite element head models are generated by Johnson Ho [8] based on Magnetic Resonance Imaging (MRI) scans. A multiscale computational estimation of axonal damage under inertial loading of the head was investigated by Wright et al.[9] using two dimensional finite element models of the head constructed from detailed MRI and Diffusion Tensor Imaging (DTI).

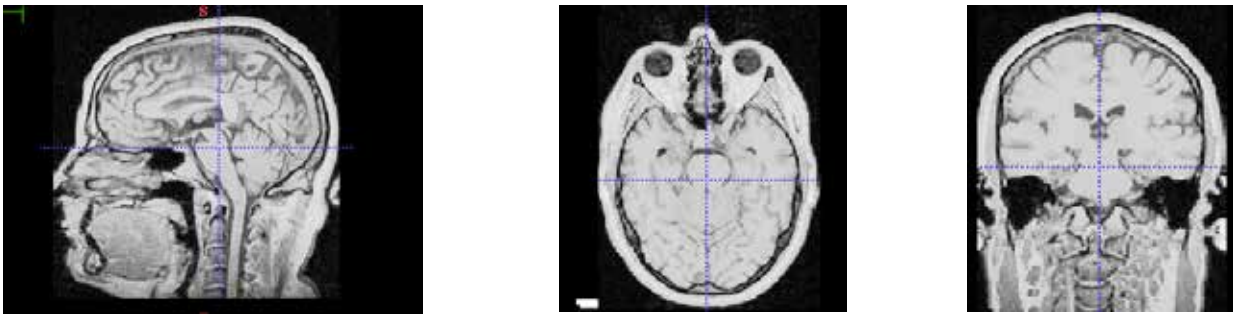
Full-scale anthropomorphic test devices (ATD) that simulates dimensions and weight of the human body are being used in automotive crash testing and occupant protection modeling. The finite element model of ATD for impact analysis is available from Livermore Software Technology Corporation (LSTC).

The brain that basically floats inside the skull is surrounded by cerebral spinal fluid. The head is subjected to linear acceleration and or a rotational acceleration during an impact or a blow. During the linear impact, the brain strikes the inner skull in acceleration and then hits the opposite side of the skull in deceleration and in the rotational acceleration scenario, the brain tissues are subjected to shear due to rotation of the head. In either case, the delicate neural pathways in the brain can become damaged, causing neurological disturbances.

In this study, a generic helmet with foam padding is used in design evaluation for mitigation of brain injury. The brain geometry is developed from MRI image using segmentation technique. The brain is modeled using continuum SPH technique. The player is represented by H3 LSTC 50th percentile dummy.

METHODS

BRAIN MODELING: A brain section is shown in Figure 1.



Sagittal Anterior Coronal

Figure 1. Brain Sectional Views

3D view of the brain tissue is obtained by segmentation of the MRI image using ITK-SNAP [10] program. The SPH model of the whole brain is shown in Fig. 2.

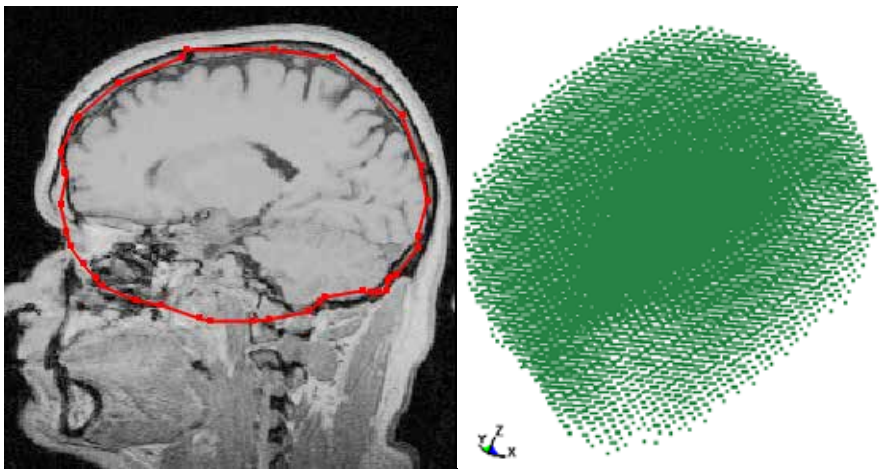


Fig.2 MRI image and approximated SPH mesh.

The material model for approximated brain is assumed as viscoelastic material and the constants used in the analyses are:-

Density = 1100 kg/m^3, Bulk Modulus = 500 MPa, G0 = 2.0MPa, Gi=1Mpa and Beta = 700/sec.

HELMET MODEL: A generic helmet model is shown in Fig. 3.

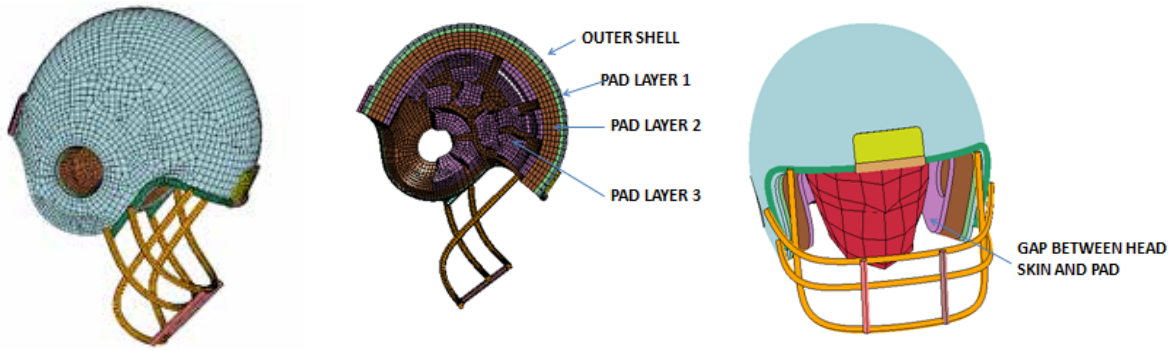


Fig. 3 Helmet Model and Energy Absorbing Pads.

The outer shell is modeled as plastic_kinematic material with Density=1200 kg/m^3, Young's modulus = 1.50GPa, Yield Stress = 80MPa and Tangent Modulus =1.5 MPa.

The energy absorbing pads are modeled as low density EPP foam with varying densities, Distribution of the foam is unsymmetrical and symmetric as shown in Fig 3. The symmetric foam model has some gaps between the skin and the foam pad as shown in the figure 3.

The complete paper

Mild Traumatic Brain Injury-Mitigating Football Helmet Design Evaluation

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