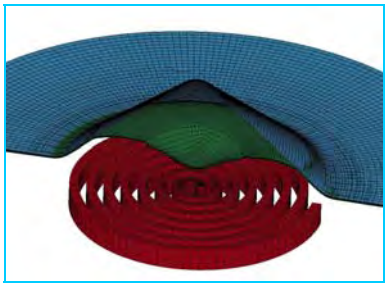
FEA Information http://www.feainformation.com

Engineering Journal and Website Resource

SEPTEMBER 2010

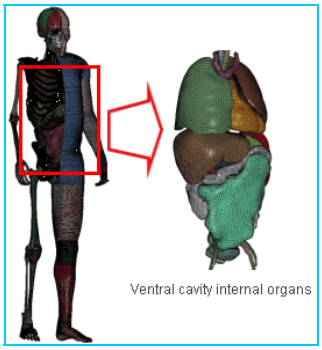
LS-DYNA – D3View - PACE F1 car - Brigham Young University



LS-DYNA Electromagnetic Solver

Heart Valve Simulation

SGI Cyclone™, LS-DYNA® and Takata A User Success Story



THUMS Version 4

TABLE OF CONTENTS

Announcements

In this issue don't miss:

SGI Cloud Computing Success Story:
SGI – TAKATA – LSTC

PACE F1 Car:
BYU - LS-DYNA –d3VIEW (white paper available)

LS-DYNA
Electromagnetism Module

LS-DYNA
Heart Valve Simulation

Toyota Motor Corp. & Toyota Central Lab:
THUMS

LS-DYNA Distributor Page Addition
PhilonNet Engineering Solutions

November 3-5th, I will be attending the CADFEM Users´ Meeting 2010. If you are attending please make sure to find me and say hello, and what you would like in the FEA Information News.

Sincerely, Marsha J. Victory,
President, FEA Information Inc

From engineering to horses - http://www.livermorehorses.com


A friend, Eliza, with (6-Hands) 24" tall Quincy


Eliza with (18-Hands) 71" tall Jack

FEA Information

Platinum Participants

OASYS Ltd: http://www.oasys-software.com/dyna/en/	**JSOL Corporation**: http://www.jsol.co.jp/english/cae	**HP**: http://www.hp.com/
ETA: http://www.eta.com	**INTEL**: http://www.intel.com	**ESI Group**: http://www.esi-group.com
BETA CAE Systems S.A.: http://www.beta-cae.com	**LSTC:** http://www.lstc.com	**SGI:** http://www.sgi.com
MICROSOFT http://www.microsoft.com		

Conference Paper Showcase

Paper available for download at: DYNALOOK

http://www.dynalook.com/

An Improved 3D Adaptive EFG Method for Forging and Extrusion Analysis with Thermal Coupling in LS-DYNA

C. T. Wu - Livermore Software Technology Corporation
Hongsheng Lu Shanghai Hengstar Technology Co. Ltd.

Abstract: The 3D adaptive EFG method using conventional moving least-square approximation or fast transformation method [1] has been successfully applied to metal forging and extrusion analysis thanks to its high accuracy in dealing with large material deformation [2] in LS-DYNA. Recently, a meshfree convex approximation [3-5] was developed to be an alternative in the large deformation analysis. However, its application to the adaptive method has not been investigated.

In this paper, an improved version of 3D adaptive EFG method with emphasizing on the modified maximum entropy approximation, whose approximation is non-negative and owns Korncker-Delta propriety at the boundary, is presented. The thermal effect in forging and extrusion problem is considered, and a scheme to interpolate the thermal state variables during the adaptive procedure is proposed

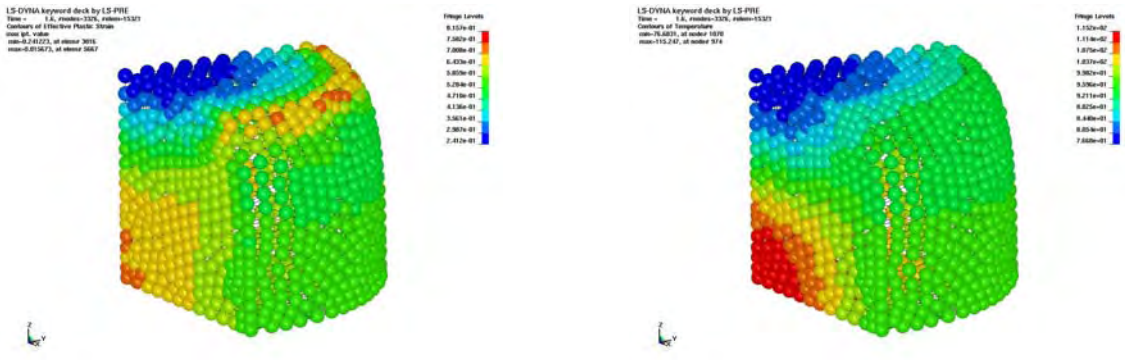


Figure 4: Final distribution of effective plastic strain and temperature

http://www.dynalook.com/international-conf-2010/MetalForming-5.pdf

Conference Paper Showcase

Paper available for download at: DYNALOOK

http://www.dynalook.com/

.

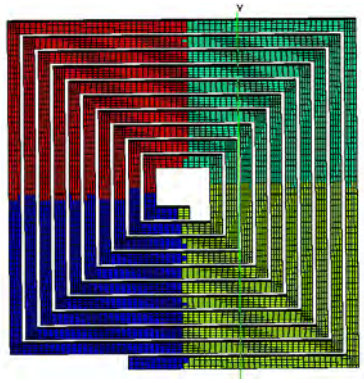
An MPP Version of the Electromagnetism Module in LS-DYNA® for 3D Coupled Mechanical-Thermal-Electromagnetic Simulations

P. L'Eplattenier, Livermore Software Technology Corporation
C. Ashcraft, Livermore Software Technology Corporation
I. Ulacia, Mondragon Goi Eskola Politeknikoa

Abstract: A new electromagnetism module is being developed in LS-DYNA for coupled mechanical/thermal/electromagnetic simulations. One of the main applications of this module is Electromagnetic Metal Forming (EMF). The electromagnetic fields are solved using a Finite Element Method (FEM) for the conductors coupled with a Boundary Element Method (BEM) for the surrounding air/insulators. Both methods use elements based on discrete differential forms for improved accuracy
.
Recently, a Massively Parallel Processing (MPP) version of the EM module was developed allowing sharing the CPU and memory between different processors and thus faster computations on larger problems. The implementation of the FEM and BEM in MPP will be presented. The EM module will then be illustrated on an actual EMF case. Experimental and numerical results will be compared and the speed-up of the MPP version will be studied.

Finally, a new contact capability for the electromagnetic fields will be presented and illustrated on a rail gun simulation.

Figure 1: Example of a domain partition of a BEM mesh into 4 processors



http://www.dynalook.com/international-conf-2010/MetalForming-6.pdf

Conference Paper Showcase

Paper available for download at: DYNALOOK

http://www.dynalook.com/

.

New Features in LS-DYNA® HYBRID Version

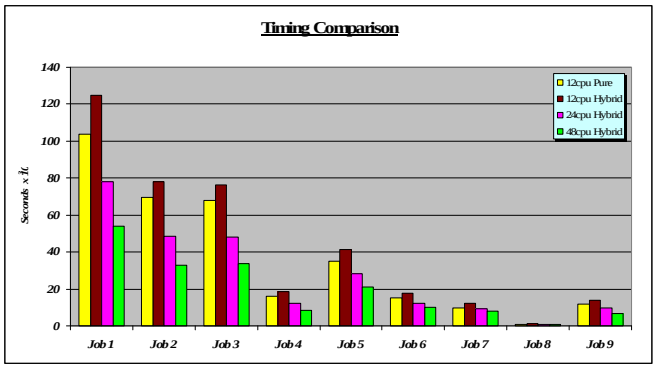
Satish Pathy, Livermore Software Technology Corporation
Jason Wang, Livermore Software Technology Corporation
Nick Meng, Intel Corporation, Software and Services Group

Abstract: Numerical noise arising from different MPP core counts compels users to fix the number of cores used by LS-DYNA® MPP e.g. during a vehicle development program. This fixed core count limits job turn-around time and flexibility in managing computing resources. In addition, using a large number of cores for calculations diminishes scalability with pure MPP.

LS-DYNA® HYBRID addresses these issues through the use of both MPI + OpenMP technology. LS-DYNA HYBRID is able to produce consistent numerical results when changing the number of OpenMP threads thereby reducing job turnaround time. In addition, LS-DYNA HYBRID can greatly reduce the number of processors involved in message passing and achieve much better scalability over large number of cores. Furthermore, for the implicit applications LS-DYNA HYBRID not only reduces the memory requirement per node but also decreases IO activity.

Currently, LSTC and Intel® teams are working together with a customer to evaluate LS-DYNA HYBRID code using a custom QA (Quality Assurance) suite. The consistency and performance will be discussed in this paper.

Figure 1: Elapsed time of nine production QA models on 12 cores, 24 cores, and 48 cores. LS-DYNA MPPR4.2.1 and HYBIRD LS-DYNA R4.2.1 both are used. Scalability of HYBRID LS-DYNA is demonstrated



http://www.dynalook.com/international-conf-2010/ComputingTechnology-5.pdf

LS-DYNA crash-analysis model of the PACE F1 car, under the guidance of Dr. Greg Jensen, Brigham Young University

Link to the full article: http://www.lstc.com/pdf/a_pace_car.pdf

INTRODUCTION

Vehicle crash analysis has historically been the postmortem physical test that caused engineers and manufacturers to launch a flurry of product modifications and redesign, engineering change orders, and even the eventual demise of a car model. One need only think of the Ford Pinto or Chevy Corvair as examples of models that were designed, manufactured, and sold long before the automotive industry knew how unsafe some of their cars really were. In the early 60's a number of analysis codes were developed to assist engineering in the a priori investigation of designs to better predict when a given part or assembly would fail in real life. However little was done until the mid 70's when Dr. John O. Hallquist developed the first analysis code that attempted to analyze the impact between two bodies. This early DYNA has matured into a widely used crash analysis tool that today catches many design flaws long before the first prototype is ever realized. Today, the correct use of this tool is credited with saving millions in development costs, reducing untold numbers of vehicle recalls and ultimately saving un-numbered lives by empowering engineers with the ability to virtually crash their design until they arrive at an optimally safe survival cell for the occupants.

This report will focus on work done collaboratively by BYU Mechanical Engineering and LS-DYNA engineering creating a crash simulation on the Pace F1 race car. From February to April 2010, BYU students met with industry expert Suri Bala to create a best possible frontal impact simulation. Students worked on the model 6-10 hours a week with a one-hour coaching session from Suri each week. The results of this work are enlisted below with a detailed description of the methodology adopted, plan of action and finally, the progress that was made.

COLLABORATION TOOLS

As all interactions between BYU Mechanical Engineering students and LSTC engineer Suri Bala were done remotely, certain collaboration tools were very useful in organizing the projects work and results.

D3View

D3VIEW, an online collaboration tool for LS-DYNA projects, was used as a repository for all work done. Using D3VIEW made it easy for BYU students to share current progress on the model, information about the car, media (photographs and videos on the car) that abetted functioning of various components, and other questions easily with Suri Bala. The version control feature of D3VIEW was particularly useful in backing up and logging the progression of the car model. The milestone and tasks features were also useful in helping everyone working on the project, know specifically the tasks that needed to be completed by each student each week and also when weekly meetings would be held. Once the LS-DYNA simulation results were available, D3VIEW was used extensively to review model information, time-history plots and media files such as images and movies generated from D3PLOTs and BINOUTs files.

Cisco Webex

For review of the each week's work, and for instruction, Cisco Webex, an online desktop sharing application, was used to share desktops between BYU students and Suri Bala. This tool proved extremely useful in allowing Suri to review the student's work, and use other instructional material to teach the BYU students about LS-DYNA and the modeling process. Additionally, modifications could be made spontaneously which helped to quicken the overall process of model creation, as described below.

MODEL CREATION

Discretization Process

Creating a discretized model of the PACE car began with identifying the most basic structural components of the car and meshing them. Functionality of those basic structural components and how they connected with various other components was additionally important. For example, modeling the suspension required a detailed comprehension of its mechanics and dynamic movements, as discussed later in this section. The components which were first meshed include the front wing, nose cone, nose/wing connection pieces, structural bulkheads, and the monocoque body (See Appendix A for a detailed list of each part). The meshing process began by cleaning the part geometry in NX. Several features and geometrical constructions were inaccurate and inconsistent to the actual part produced: inconsistent in that they were either not the same as the actual component with regards to geometry or shape, or had CAD features that would not allow correct meshing. De-featuring the geometry and exporting it to a STEP file in NX was the next step. The STEP files were then imported into Hypermesh and meshed using a 2D shell mesh for the thinner/ hollow parts (nose cone, front wing, monocoque body) and a 3D solid tetramesh for the bulkier parts (bulkheads, nose/wing connection pieces). The mesh was then checked and refined in several iterations throughout the project to get rid of any misshapen elements. Mesh quality was an important part of obtaining accurate results – mesh element size and variables such as interior angle and

warpage were kept under control within a range of acceptable values. Staying within that range increased the accuracy and quality of the mesh which in turn produced more realistic results. Mesh quality is discussed in short below.

Subsequent to meshing the main structural components, we focused on adding more detailed components to the model. The wheel assemblies along with beam elements representing the suspension struts were similarly meshed and added to the assembly. We then meshed several of the suspension and steering components of the car keeping in mind which components would prove structurally effective (in the core sense and which would be addendums to the structure (provide structure but do not enhance structural integrity by much). As important as meshing these various components were, was the task of connecting the components as they were connected in the car and then modeling these connections for crash analysis. The accomplishment of this task was done using LS PrePost. The meshed geometry from Hypermesh was imported into LS PrePost as an LS DYNA keyword file and then saved as a keyword file within LS PrePost (Note: Some components were not meshed in Hypermesh but were directly imported into LS PrePost and meshed therein). Within LS PrePost nodes were created for the type of joint/feature connecting these components. These components and their motion were modeled using several different connection methods which will be discussed in the “Part to Part Connections” section of this report. The fixed and revolving brackets were meshed as 2D shell elements and their quality was checked within LS PrePost. The suspension was modeled by attaching spring elements to the revolving and fixed brackets through revolute joints, then connecting the small revolving bracket to the large fixed bracket and rigid strut element through additional revolute joints. These connections allow the modeled pieces to as closely as possible behave like the actual components which are installed on the car, but at the same time are not modeled only for the purpose of correct representation with the car. Because there is load transfer between these components and that they enable deflection (hence absorption), these connections were quintessential to accurate modeling.

Blog Showcase
CHINA

Learning New Cultures
A perspective on China

Author: Jeremie Brecheisen

Note: the blog is not owned, or operated by FEA Information Inc

About Jeremie: Securing China's only LPGA golf tournament on the 2010 schedule, he has gained some unique perspectives on international business in China

Jeremie, is currently working for an international consulting firm, as well as being an ardent admirer of China business and culture. Completing his International MBA with the University of Hawaii, in 2010, Jeremie spent an entire year studying and working in southern China. He had studied Modern US and Chinese History at BYU, where he received his Bachelor's Degree.

Jeremie's blog is focused on encouraging and initiating meaningful dialogue around greater cultural understanding of China and its people.

Posted on September 8, 2010 by Global China Blog - Biz, Culture, and Life
http://globalchina.wordpress.com/
Author: Jeremy Brecheisen

Mass Exercising – Try a new Culture on for Size

The Beijing Government is pushing mass exercising again to increase the health of the nation. Mao Ze Dong began mass exercising in the 1950s and many of my Chinese friends grew up doing such exercises in school.

http://online.wsj.com/video/beijing-suits-up-for-health-push/CACDB49C-F71D-4079-8CE8-8E1A8F3C95C7.html

While working at Kingold Group in China, we did mass exercises at 11am and again at 3pm. We did the same exercise everyday and eventually I was able to memorize it and do it without any aides, or the need to clumsily mimic others. My Chinese coworkers thought it was hilarious to watch me because I, of course, wasn't doing it with natural flow that most of them performed with. It was kind of like watching Jay Leno doing a hardcore rap song about rollin' through the rough part of town.

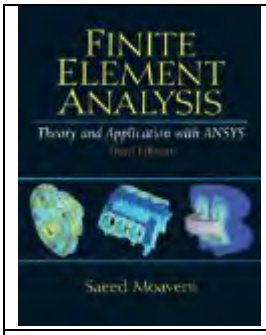
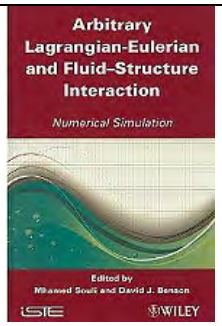
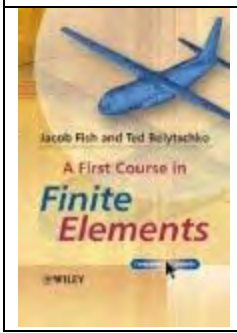
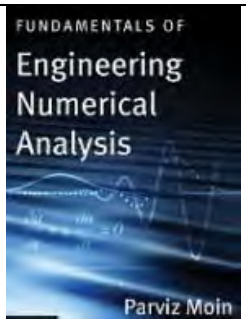
However, there was some camaraderie that I could feel and it was invigorating to get up in the afternoon and get my blood flowing. Some days I did feel like we were all being magically brainwashed as we moved in unison, but I don't see

how any existing technologies could be brainwashing me in those moments.

Overall, it was a very different cultural experience. I participated and was rewarded with greater trust, deeper friendships, moments of laughter, greater understanding of the benefits of Chinese culture, and I was able to skip the afternoon nodding off that typically happens after eating too large of a lunch.

I think we should be willing to participate in other people's culture. Try it out. That doesn't mean we have to try their religious ceremonies and worship other gods if we don't believe it is the right thing to do. It just means we can try on cultural opportunities for size. We will start to realize that a different culture offers benefits our culture may not offer. We realize that our way doesn't have to be the only right way. In fact, there might even be something better out there. And even if it turns out that such a cultural activity doesn't fit us at all, at least we can understand just a little bit more what it means to be Chinese or Russian or French.

Reading Reference Library Available From Amazon

	Finite Element Analysis Theory and Application with ANSYS (3rd Edition)		Arbitrary Langrangian-Eulerian and Fluid Structure Interaction.
	A First Course in Finite Elements		Engineering Numerical Analysis

D3View
Suri Bala

D3View
Available Through LSTC

Demo licenses are now available for D3View, developed by Suri Bala

White Paper Presentation:

d3VIEW – Collaboration Software For Virtual Product Development

You can experience D3VIEW in three different ways.

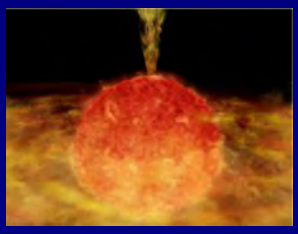
- **Simulation Data Collector**
  This has the least impact to the existing processes but provides a unparalleled alternative to NAS storage
- **Simulation Data Storage**
  This would be manual storage of selective simulations for viewing comparison and quality checks
- **HPC Front End**
  This would be central gateway to interface with HPC systems

d3VIEW used by the BYU team to model the PACE F1 Race Car

"With the complicated and intricate nature of creating a crash-worthy model of the PACE F1 race car, d3VIEW was a perfect solution to keep our team organized. With d3VIEW we were easily able to share images, videos, and most importantly the LS-DYNA key files. The simulation features made it very easy to visualize the simulation we had created. Overall d3View is a great collaboration tool saved our team valuable time in the management of our project"

Rob Moncur - BYU

For Pricing, Demo license, Availability, or Training:
Contact: sales@lstc.com



Artist concept of BP Piscium, a more evolved version of our Sun.

Chandra Finds Evidence for Stellar Cannibalism

Illustration credit: CXC/M. Weiss

http://www.nasa.gov/mission_pages/chandra/news/10-118.html

Evidence that a star has recently engulfed a companion star or a giant planet has been found using NASA's Chandra X-ray Observatory. The likely existence of such a "cannibal" star provides new insight into how stars and the planets around them may interact as they age.

The star in question, known as BP Piscium (BP Psc), appears to be a more evolved version of our Sun, but with a dusty and gaseous disk surrounding it. A pair of jets several light years long blasting out of the system in opposite directions has also been seen in optical data. While the disk and jets are characteristics of a very young star, several clues -- including the new results from Chandra -- suggest that BP Psc is not what it originally appeared to be.

Instead, astronomers have suggested that BP Psc is an old star in its so-called red giant phase. And, rather than being hallmarks of its youth, the disk and jets are, in fact, remnants of a recent and catastrophic interaction whereby a nearby star or giant planet was consumed by BP Psc.

When stars like the Sun begin to run of nuclear fuel, they expand and shed their outer layers. Our Sun, for example, is expected to swell so that it nearly reaches or possibly engulfs Earth, as it becomes a red giant star.

"It appears that BP Psc represents a star-eat-star Universe, or maybe a star-eat-planet one," said Joel Kastner of the Rochester Institute of Technology, who led the Chandra study. "Either way, it just shows it's not always friendly out there."

Several pieces of information have led astronomers to rethink how old BP Psc might be. First, BP Psc is not located near any star-forming cloud, and there are no other known young stars in its immediate vicinity. Secondly, in common with most elderly stars, its atmosphere contains only a small amount of lithium. Thirdly, its surface gravity appears to be too weak for a young star and instead matches up with one of an old red giant.

Chandra adds to this story. Young, low-mass stars are brighter than most other stars in X-rays, and so X-ray observations can be used as a sign of how old a star may be. Chandra does detect X-rays from BP Psc, but at a rate that is too low to be from a young star. Instead, the X-ray emission rate measured for BP Psc is consistent with that of rapidly rotating giant stars.

The spectrum of the X-ray emission -- that is how the amount of X-rays changes with wavelength -- is consistent with flares occurring on the surface of the star, or with interactions between the star and the disk surrounding it. The magnetic activity of the star itself might be generated by a dynamo caused by its rapid rotation. This rapid rotation can be caused by the engulfment process.

"It seems that BP Psc has been energized by its meal," said co-author Rodolfo (Rudy) Montez Jr., also from the Rochester Institute of Technology.

The star's surface is obscured throughout the visible and near-infrared bands, so the Chandra observation represents the first detection at any wavelength of BP Psc itself.

"BP Psc shows us that stars like our Sun may live quietly for billions of years," said co-author David Rodriguez from UCLA, "but when they go, they just might take a star or planet or two with them."

Although any close-in planets were presumably devastated when BP Psc turned into a giant star, a second round of planet formation might be occurring in the surrounding disk, hundreds of millions of years after the first round. A new paper using observations with the Spitzer Space Telescope has reported possible evidence for a giant planet in the disk surrounding BP Psc. This might be a newly formed planet or one that was part of the original planetary system.

"Exactly how stars might engulf other stars or planets is a hot topic in astrophysics today," said Kastner. "We have many important details that we still need to work out, so objects like BP Psc are really exciting to find."

These results appeared in The Astrophysical Journal Letters. Other co-authors on the study were Nicolas Grosso of the University of Strasbourg, Ben Zuckerman from UCLA, Marshall Perrin from the Space Telescope Science Institute, Thierry Forveille of the Grenoble Astrophysics Laboratory in France and James Graham from University of California, Berkeley.

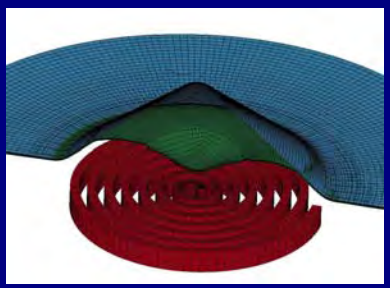
NASA's Marshall Space Flight Center in Huntsville, Ala., manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory controls Chandra's science and flight operations from Cambridge, Mass.

More information, including images and other multimedia, can be found at:

http://chandra.harvard.edu

Janet Anderson, 256-544-6162
NASA Marshall Space Flight Center, Ala.
Janet.L.Anderson@nasa.gov

Megan Watzke 617-496-7998
Chandra X-ray Center, Cambridge, Mass.
m.watzke@cfa.harvard.edu



Brief On

The Electromagnetism Module

In LS-DYNA

Author: Pierre L'eplattenier pierre@lstc.com

The Electromagnetism module allows performing Coupled mechanical/thermal/electromagnetic simulations:

- Introduction of electrical currents in solid conductors
- These currents generate magnetic fields, electric fields, as well as induced currents.
- The magnetic fields coupled with the currents generate Lorentz forces on the conductors.
- The forces induce motion and deformation of the conductors.
- This motion has an effect on the fields and the currents.
- The currents generate Joule heating in the conductors, changing the temperature, and thus some electromagnetic (as well as mechanical) properties (conductivity for example).
-

One application of the module: Magnetic Metal Forming:

- A conducting coil induces electrical currents in the workpiece.
- This creates an electromagnetic force pushing the workpiece against the die.
- It is a high velocity forming process:
  - The forming limits can be significantly increased (80%).
  - The springback is reduced.
  - The wrinkling is reduced.
  - Shock hardening of the material.
  - The amount of energy can be tightly controlled.
  - High reproducibility.
  - No contact between the coil and the workpiece (one sided die+no friction)

Additional Applications:

- Magnetic metal cutting
- Magnetic metal cutting.
- Magnetic metal welding (impact welding).
- High magnetic pressure generation
- Magnetic metal cutting.
- Magnetic metal welding (impact welding).
- High magnetic pressure generation.
- Computation of the stresses/deformations in coils.

Additional Recently:

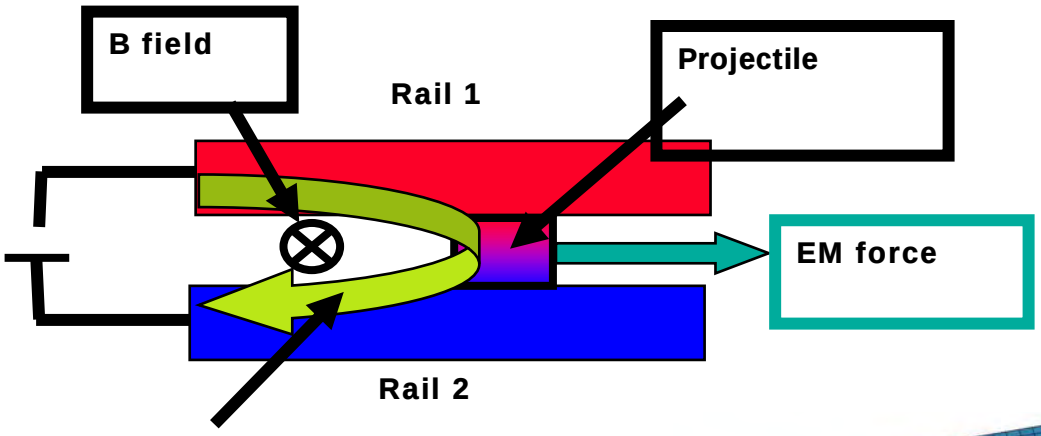
- MPP version of the EM module allows sharing memory and CPU between processors, hence faster computations on larger cases.
- Induced heating (Joule effect).
- Resistive heating.
- Electromagnetic contact capability: rail-gun.

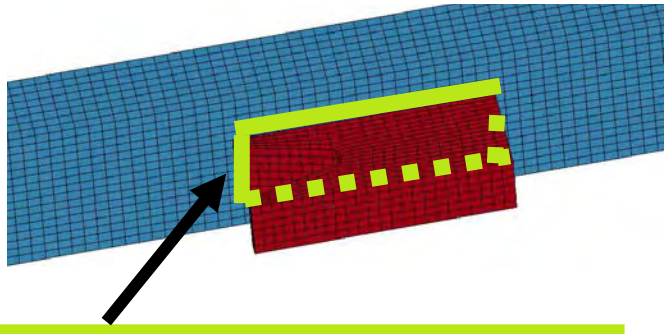
Rail Gun:

A railgun is an electrical gun that accelerates a conductive projectile along a pair of metal rails

The projectile is in contact with the two rails and a current passes through the projectile. This current interacts with the strong magnetic fields generated by the rails and this accelerates the projectile.

AVI 614Bfield AVI 614Current

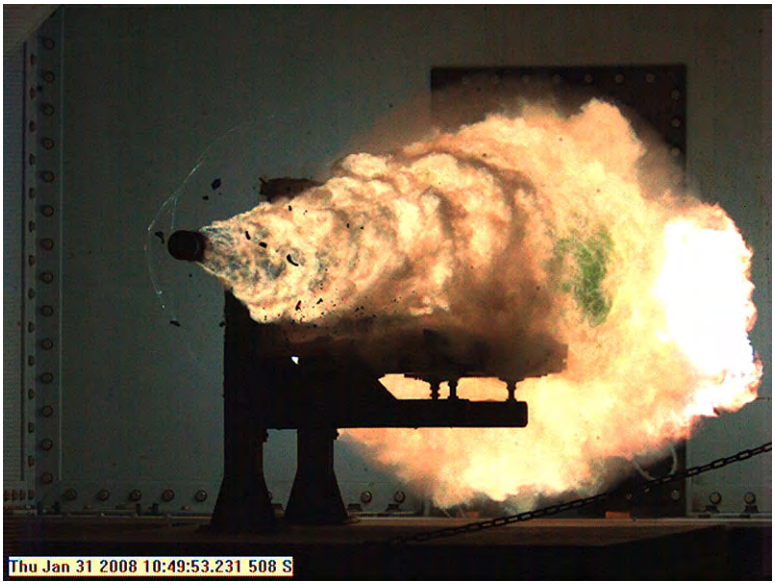




Sliding contact between the rails and the projectile

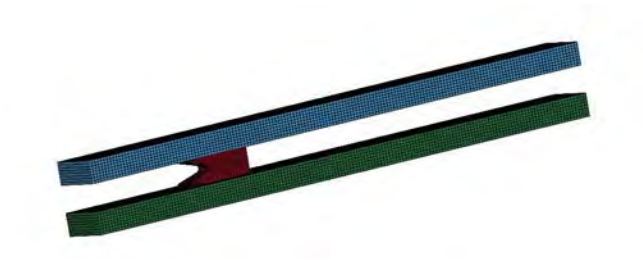
Rail Gun Simulation (3D)

The rail gun simulation can be viewed at: (**I need to put it on line)**

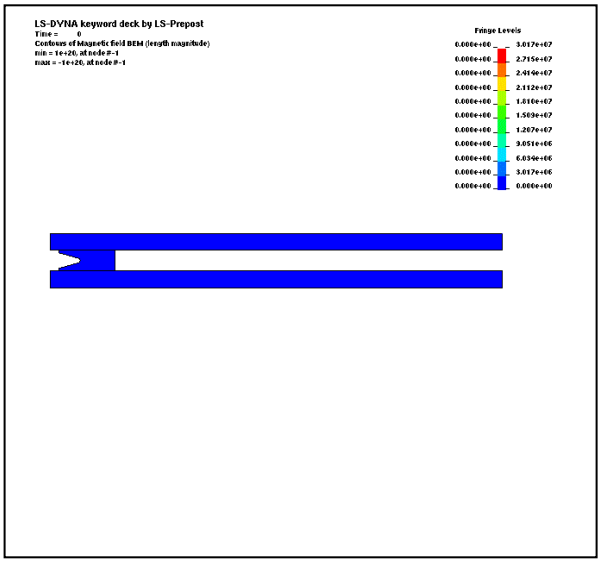


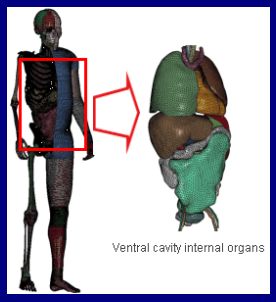
52,000 nodes - 43,000 solid elements

Current Density



B Field





THUMS

Total HUman Model for Safety

TMC and Toyota Central R&D Labs have developed the human models, to understand injuries sustained by the human body. THUMS allows highly detailed analysis of bone fractures, severed ligaments, etc. by simulating many characteristics of the human body—ranging from the shape of the body to its skeletal structure and skin.

THUMS History:

1997:
TMC began developing THUMS in cooperation with Toyota Central R&D Labs., Inc.

2000:
Version 1, was completed and commercially launched

2004:
Version 2, which added a face and bones to the model.

2006:
Version 3, added a precise model of the brain

2010:
Version 4, detailed models of the internal organs in addition to the skin, bones and brain of the previous model. Allows detailed analysis of injuries to bones, skin and now also to internal organs.

Development Version 4:

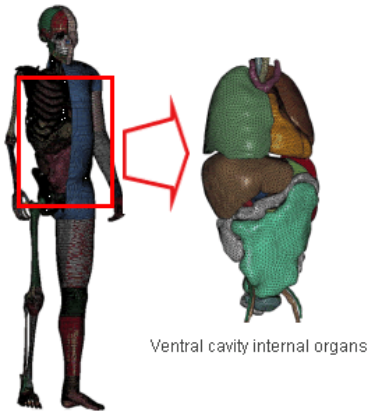
The utilization of a CT Scanner (computed tomography scanner), enables Toyota to make accurate and detailed measurements, of the human body's internal structure.

Version 4 Features:

Among the many features:

- Approximately 14 times more information then its predecessors.
- Brings a high accuracy and visual analysis.
- Precise models of various internal organs
- Position of the organs
- Relationship between the organs
- Simulate effects that cannot be measured with a crash-test dummy

Version 4 Adult Male:



THUMS Version 4, of an adult male of average build, adds detailed models of internal organs to the previous version's models of bones and the brain, enabling analysis of injuries to a wider range of internal organs. Internal organs are particularly vulnerable during collisions, with injuries to them accounting for approximately half of all sustained during automobile collisions.

Version 4 for internal injury analysis shows greater detail how the torso and internal organs are damaged during collisions. For the development of Version 4 TMC included collaboration with outside research institutes including universities.

Future Developments:

- Continued use of THUMS for analyzing internal injuries resulting from automobile collisions,
- Applying the results to developing and improving safety devices such as:
    - seatbelts
    - airbags.
- Add models of a small female
- Add models of a large male
- Enable simulation of a wider range of accident situations

FEA Information
AVI / Video Showcase

Heart Valve Simulation
Incompressible CFD Solver in LS-DYNA®
Incompressible CFD (ICFD) solver

Author: Facundo Del Pin, LSTC - fdelpin@lstc.com

Incompressible flows cover a vast number of engineering problems ranging from car aerodynamics to arterial flows and parachute simulation.

LS-DYNA offers users two options to do CFD depending upon the kind of problem they face. The CESE solver is highly accurate CFD solver for compressible fluids. The ALE solver supports both compressible and incompressible therefore making it the choice for highly transient problems.

Additionally to improve productivity of the solver and to satisfy customer demands for high performance computing all the features of the solver were implemented in parallel. A feature of development is the parallel CFD solver can be coupled to the parallel solid mechanics solver to do parallel FSI. In the same way the coupling may be done in parallel with the thermal solver to do conjugate heat transfer.

With the newly developed features being released, future developments in planning, as well as those listed above, LS-DYNA's CFD's solver remains the code that raises the bar for other software.

Among the many features of the Incompressible CFD (ICFD) solver in LS-DYNA is its ability to couple with any solid model to perform Fluid-Structure interaction (FSI) analysis using implicit or explicit formulation.

Highly non-linear behavior is supported by using automatic re-meshing strategies to maintain element quality within acceptable limits. In this work we will introduce the additional features for conjugate heat transfer, turbulence model, biphasic flow, some new feature in terms of mesh generation like boundary layer meshing and MPP

FEA Information AVI – Video Library

http://www.feainformation.com/avilib/60a-1.wmv

SGI Cyclone™, LS-DYNA® and Takata A User Success Story

Submitted by: Tony DeVarco
SGI Cyclone Program Manager
tdevarco@sgi.com
tel: 510-933-5124

Organizations that rely on HPC resources are increasingly investigating cloud computing as a solution that offers additional computing capacity and flexibility. Clouds reduce or eliminate altogether the need to make incremental long-term, often costly hardware and infrastructure investments. To date, cloud solutions have been primarily focused on running important business applications like CRM, ERP, HR, email and other database programs not technical and engineering applications.

So when SGI began to design our HPC cloud solution we were razor focused on the need to offer our customers the scientific and engineering applications that they currently use to drive innovation and create new products. SGI Cyclone presently offers end users a selection of over 20 technical open source and 3rd party ISV applications including LS-DYNA.

In February, when we launched the Cyclone offering, we made available two service models for our customers: Software as a Service (SaaS) and Infrastructure as a Service (IaaS). LSTC was one of the first ISV's to sign up for the SGI Cyclone SaaS offering allowing our joint customers to purchase from SGI additional licenses to run their LS-DYNA simulations in Cyclone on demand.

"LSTC and SGI have had a long history of working together. It was natural that we would partner together to deliver LS-DYNA, as a software service in the cloud, said John O. Hallquist, President, LSTC. SGI offers a team of technical application engineering experts, who for years have supported the optimization and benchmarking of our software on their supercomputing hardware architectures."

"When our customer Takata approached us with an urgent need to quickly run 100's of simulations under a very tight deadline we urged them to get in touch with the Cyclone team at SGI" said Marsha Victory, Administrator Global Sales.

Takata Corporation:

Established: 1933

Business:

Manufacture and sale of motor vehicle seat belts, airbags, steering wheels, electronic modules, interior trim, industrial textiles and child restraint systems.

Employees:

31,154 as of March 2010

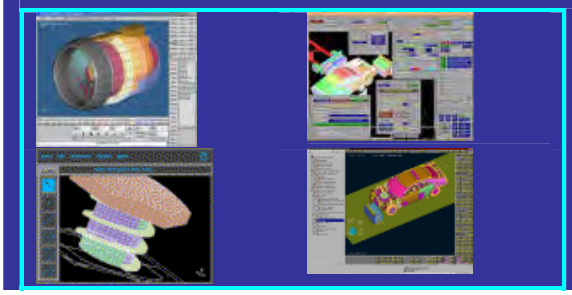
Worldwide plants:

45 plants in 16 countries as of March 2010

When Takata contacted SGI it was the Thursday before the 4th of July holiday weekend. They had 100's of simulations that typically ran for 4 hours on 4 cores each. We asked when they needed to have their results back and were told by Tuesday July 5th! In consultation with a SGI LS-DYNA applications expert we jointly came to the conclusion that by deploying a 512 core SGI® Altix® ICE integrated blade cluster we could execute on the project in less than 48 hours. In order to expedite the process we had the customer upload their files into Cyclone and had our LS-DYNA application engineer set up the batch scheduling and launch the jobs. Starting Friday night, the simulations ran for the next 31 hours and were made available for the customer to download back to their office on Monday July 4th ahead of their deadline.

"From the moment we started talking with the SGI Cyclone team I felt confident that we were going to hit our deadline goal, said Dan Long, Program Manager, Takata, We were assigned a technical and account manager who walked us through the process, quickly got us a Statement of Work that outlined the pricing terms and service level agreement and were asked which LS-DYNA version we currently used in house so they could have the exact version ready to go on the SGI Altix ICE system. Our experience with the SGI Cyclone team was one of technical competence and efficiency. In fact, we were so pleased with their service we have returned to use Cyclone several times since our early July project."

SGI's experience with Takata has brought home the fact that it takes more than just fast computers and storage to run a successful HPC cloud service. It also takes passionate account management and deep technical application expertise to provide our customers with the true value they are looking for. This has got us thinking that there is an even higher value service model we can offer our LS-DYNA customers via Cyclone and that is what we are calling Expertise as a Service (EaaS). So if you are looking for a quick and efficient computing environment to run your LS-DYNA simulations please give us a call or send us an email. We look forward to the opportunity to work with you as a trusted partner.



Pre-Processing

Post Processing

Model Editing

A preprocessor is a program that processes its input data to produce output. This data is then used as input to another program.

BETA CAE Systems S.A.

http://www.beta-cae.gr/

Provides complete CAE pre- and post-processing solutions. ANSA, the world wide standard pre-processor and full product modeler for LS-DYNA, with integrated Data Management and Task Automation. μETA, with special features for the high performance an effortless 3D & 2D post-processing of LS-DYNA results.

Engineering Technology Associates, Inc.

http://www.inventiumsuite.com

PreSys is an advanced Pre/Post Processor. PreSys is a full-featured, core solution that can be used on its own or with a variety of available add-on applications. The system offers advanced automeshing tools to provide the highest quality mesh with little CAD data preparation. It also features a scripting interface and model explorer feature for in-depth data navigation.

Oasys, Ltd

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

Oasys Primer is a model editor for preparation of LS-DYNA input decks. - Oasys D3Plot is a 3D visualization package for post-processing LS-DYNA analyses using OpenGL® (SGI) graphics.

JSOL Corporation

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

JVISION is a general purpose pre-post processor for FEM software. Designed to prepare data for, as well as support, various types of analyses, and to facilitate the display of the subsequent results.

Livermore Software Technology Corporation

http://www.lstc.com

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

LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT
LS-PrePost
LSTC Dummy & Barrier Models

Alpha Order by Country

Australia	Leading Eng. Analysis Providers - LEAP http://www.leapaust.com.au/ info@leapaust.com.au
Canada	Metal Forming Analysis Corp - MFAC http://www.mfac.com/ galb@mfac.com
China	ETA China http://www.eta.com.cn/ lma@eta.com.cn
China	OASYS Ltd. (software house of Arup) http://www.oasys-software.com/dyna/en stephen.zhao@arup.com
France	ALYOTECH TECH. http://www.alyotech.fr nima.edjtemai@alyotech.fr
France	ALLIANCE SVCE. PLUS - AS+ http://www.asplus.fr/ls-dyna v.lapoujade@asplus.fr
Germany	CADFEM http://www.cadfem.de/en lsdyna@cadfem.de
Germany	DYNAmore http://www.dynamore.de/ uli.franz@dynamore.de
Greece	PhilonNet Engineering Solutions http://www.philonnet.gr stavroula.stefanatou@philonnet.gr

LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT
LS-PrePost
LSTC Dummy & Barrier Models

India	OASYS Ltd. (software house of Arup) http://www.oasys-software.com/dyna/en lavendra.singh@arup.com
India	EASi Engineering http://www.easi.com/ rvenkate@easi.com
India	CADFEM Eng. Svce India http://www.cadfem.in/ info@cadfem.in
Italy	EnginSoft SpA http://www.enginsoft.it/ info@enginsoft.it
Japan	JSOL Corporation http://www.jsol.co.jp/english/cae cae-info@sci.jsol.co.jp
Japan	ITOCHU Techno-Solutions Corp. http://www.engineering-eye.com/ ls-dyna@ctc-g.co.jp
Japan	FUJITSU http://jp.fujitsu.com\solutions\hpc\app\lsdyna\

LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT
LS-PrePost
LSTC Dummy & Barrier Models

Korea	Theme Engineering http://www.lsdyna.co.kr/ wschung@kornet.com
Korea	Korea Simulation Technologies http://www.kostech.co.kr young@kostech.co.kr
Netherlands	Infinite Simulation Systems, BV http://www.infinite.nl/ j.mathijssen@infinite.nl
Sweden	Engineering Research AB http://www.erab.se/ sales@erab.se
Taiwan	Flotrend Corporation http://www.flotrend.com.tw/ gary@flotrend.tw
Russia	State Unitary Enterprise –STRELA info@ls-dynarussia.com

LS-DYNA Distributors

LS-DYNA is delivered with
LS-OPT
LS-PrePost
LSTC Dummy & Barrier Models

United Kingdom	OVE ARUP & PARTNERS http://www.oasys-software.com/dyna/en/ dyna.sales@arup.com
USA	Livermore Software Tech. Corp. - LSTC http://www.lstc.com/ sales@lstc.com
USA	Engineering Tech. Assc. Inc. – ETA http://www.eta.com/ sales@eta.com
USA	DYNAMAX http://www.dynamax-inc.com/ sales@dynamax-inc.com

Finite Element Analysis

North America

Consultants
&
Engineering Services

FEA Consultants use a wide range of software simulation programs. Their expertise using specific programs for their customers offers the ability for controlling the modeling and analysis of structures, systems, products and many other applications. Consultants and Engineering Services are used by government, homeland security, court trials, and a number of industries needing to have outside sources for expertise in FEA

http://www.fea-consulting.com

North America

Located: Texas **KBEC** **Khan Bui** (512) 363-2739	**Located: Connecticut** **CAE Associates** **http://www.caeai.com** (203) 758-2914
Located: Oregon **Predictive Engineering** **http://predictiveengineering.com** George Laird (800) 345-4671	**Located: California** **Schwer Engineering** **http://schwer.net** Len Schwer (707) 837-0559
	Located: Ohio **AEG Product Engineering Svce.** http://engineering-group.com support@enginering-group.com

Software & Hardware Alliances

Software Solutions
SMP / MPP Hardware & OS
MPP & Interconnect MPI

ETA – DYNAFORM & VPG

http://www.eta.com

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

ETA – VPG

http://www.eta.com

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

OASYS software for LS-DYNA

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

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

Software & Hardware Alliances

Software Solutions
SMP / MPP Hardware & OS
MPP & Interconnect MPI

ESI Group Visual-CRASH For DYNA

http://www.esi-group.com

Visual-Crash for LS-DYNA helps engineers perform crash and safety simulations in the smoothest and fastest possible way by offering an intuitive windows-based graphical interface with customizable toolbars and complete session support. Being integrated in ESI Group's Open VTOS, an open collaborative multi-disciplinary engineering framework, Visual-Crash for DYNA allows users to focus and rely on high quality digital models from start to finish. Leveraging this state of the art environment, Visual Viewer, visualization and plotting solution, helps analyze LS-DYNA results within a single user interface.

BETA CAE Systems S.A.– ANSA

http://www.beta-cae.gr

Is an advanced multidisciplinary CAE pre-processing tool that provides all the necessary functionality for full-model build up, from CAD data to ready-to-run solver input file, in a single integrated environment. ANSA is a full product modeler for LS-DYNA, with integrated Data Management and Process Automation. ANSA can also be directly coupled with LS-OPT of LSTC to provide an integrated solution in the field of optimization.

BETA CAE Systems S.A.– μETA

http://www.beta-cae.gr

Is a multi-purpose post-processor meeting diverging needs from various CAE disciplines. It owes its success to its impressive performance, innovative features and capabilities of interaction between animations, plots, videos, reports and other objects. It offers extensive support and handling of LS-DYNA 2D and 3D results, including those compressed with SCAI's FEMZIP software

FEA Participants

SMP & MPP Hardware & OS

For LS-DYNA®

http://www.hpcservers.com

CRAY XD1	Linux
HP PA-8X00	HP-UX 11.11 and above
HP IA-64	HP-UX 11.22 and above
HP Opteron	Linux CP4000/XC
INTEL IA32	Linux, Windows
INTEL IA64	Linux
INTEL Xeon	Linux Windows 64 bit
SGI Mips	IRIX 6.5 X
SGI IA64	SUSE 9 w/Propack 4 RedHat w/Propack 3

FEA Participants

MPP and Interconnect and MPI

For LS-DYNA®

http://www.hpcservers.com

Vendor	O/S	HPC Interconnect	MPI Software
CRAY XD1	Linux		
HP PA8000	HPUX		
HPIA64	HPUX		
INTEL IA32	Linux, Windows	InfiniBand (Voltaire), MyriCom	Open MPI, MPICH, HP MPI, SCALI
INTEL IA64	Linux		Open MPI, MPICH, HP MPI
INTEL Xeon	Linux x86-64 Windows 64	InfiniBand (Topspin, Voltaire), MyriCom, PathScale InfiniPath	Open MPI, MPICH, HP MPI, INTEL ICR, SCALI
SGI Mips	IRIX 6.5 X	NUMAlink	MPT
SGI IA64	SUSE 9 w/Propack4 RedHat w/Propack 3	NUMAlink, InfiniBand (Voltaire)	MPT, Intel MPI, MPICH

Crash Test Dummy Models

Anthropomorphic Test Devices
Crashest Devices
Websites / Information

FEA Information

http://www.ls-dynadummymodels.com

LSTC's Models

http://www.lstc.com/models/

Arup Cellbond Barrier Models

http://www.oasys-software.com/dyna/en/fe-models/barrier.shtml

Arup Pedestrian Impactor Models

http://www.oasys-software.com/dyna/en/fe-models/pedestrian.shtml

Arup RCAR Barrier Model

http://www.oasys-software.com/dyna/en/fe-models/rcar.shtml

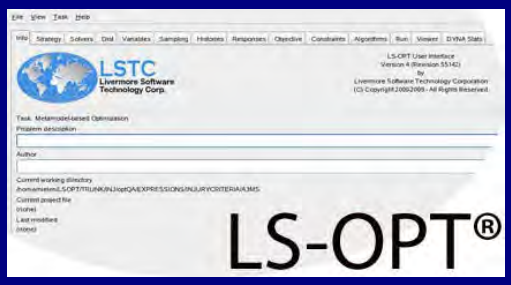
DYNAMore Models for

http://www.dummymodels.com

LS-DYNA Dummy Mailing List

sarba@lstc.com

SUPPORT SITES FOR LS-DYNA



The Official LS-OPT Support site

http://www.lsoptsupport.com

LS-OPT User's Group on Google

A new LS-OPT User Group has been established. The intention of this group is to support LS-OPT users and to provide useful information according to LS-OPT. In addition, the user group provides the possibility to get in contact with other users and to share experience on the application of LS-OPT.

In order to subscribe to the group, please use the following (external) link:
https://www.google.com/accounts/ServiceLogin?service=groups2&passive=1209600&continue=http://groups.google.com/group/lsopt_user_group&followup=http://groups.google.com/group/lsopt_user_group

The Official LS-OPT Support site
[http://www.lsoptsupport.com] is jointly monitored by DYNAmore GmbH (Germany) and LSTC (US)

The LS-OPT support site was jointly developed to keep you updated with current information. During January 2010 the site will be updated with

"Getting Started"
A first place to stop for new users to view the LS-OPTui and the basic procedures of optimization with LS-OPT.

How To's
A collection of information and examples for several tasks with LS-OPT

Documents
A collection of documents related to LS-OPT, Optimization and Stochastics

Examples
This Section demonstrates LS-OPT capabilities by means of a series of examples

Glossary
Alpha order to view definitions such as Anova, Bias error, Iteration and other technical terms.

Downloads
Downloads specific to LS-OPT

FAQ's
Questions related to Optimization, Robustness and Reliability Analysis
Answers are posted on the LS-OPT Support Site
http://www.lsoptsupport.com/faqs

News
Latest news relation to, or about LS-OPT

9th German LS-DYNA User Forum

12th – 13th October, 2010,

Bamberg, Germany

DYNAmore invites to the German LS-DYNA Forum, 12 - 13 October 2010 in Bamberg/Germany.

Approximately 80 papers from users and developers, including keynote presentations from:

- Prof. M. Kaliske (TU Dresden),
- S. Frik (Opel),
- H. Klamser (Porsche),
- K. Wiegand (Daimler),
- C. Lemaitre (Faurecia),
- T. Zeguer (Jaguar Cars),
- P. Du Bois (Consultant)
- J. O. Hallquist (LSTC)

Special emphasis will be on fibre reinforced plastics and advanced occupant analysis, along with the contributions from the main applications crash and sheet metal forming.

The majority of presenters will use English slides and some of the presentations will be held in English language. If requested, se-lected presentations will be translated simultaneously.

The detailed agenda is available at
www.dynamore.de/forum2010e

Online registration at
www.dynamore.de/forum2010e/registration

Additionally, we offer three pre and post conference seminars, held in English language:

Corpuscular Method - Simulate Airbag Unfolding,
by Dr. J. Wang (LSTC),
October 11 in Stuttgart
http://www.dynamore.de/seminars/passive-safety/cpm-airbag

ALE and Fluid-Structure Interaction in LS-DYNA
by Prof. M. Souli
(LSTC/University of Lille),
October 14-15 in Bamberg,
http://www.dynamore.de/seminars/new-methods/ale

Blast Modelling with LS-DYNA – Protective Structures, Vehicles, Security Threats
by Paul Du Bois (Consultant)
Dr. Len Schwer (SE&CS),
October 14-15 in Bamberg
http://www.dynamore.de/seminars/defence/blast

2010 EnginSoft International Conference
CAE Technologies for Industry
and
ANSYS Italian Conference

21-22 October 2010,
Fiera Montichiari, Brescia - Italy

For more than 20 years, the EnginSoft International Conference on "CAE Technologies for Industry" has been the reference event for the VP community in Italy, offering unique insights into: current and future values of software technologies, background trends, outstanding achievements, groundbreaking scientific developments and the visions of those who realize advancements.

The accompanying exhibition will see the world's leading CAE and VP solution providers showcasing products and services covering all aspects of the technologies and their successful implementation.

Delegates and exhibitors use the exhibition as an international networking forum to gain new insights, share experiences and find new business opportunities.

The 2010 EnginSoft International Conference also offers:

- a think tank bringing together executives from industry, research, academia and technology providers
- a panel of simulation-based engineering and science experts and technology experts
- an informal environment for delegates, technology providers, managers and experts to meet and share experiences, address key industry issues and challenges, and explore new business opportunities

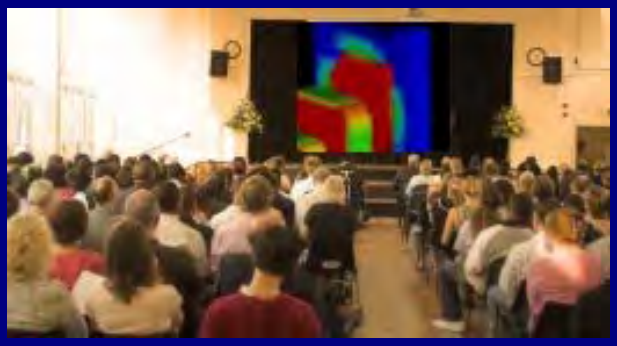
…in a word: the ideal occasion to discuss today's limitless applications of "simulation based engineering and sciences" in the true sense of the conference motto: "Believe in innovation: simulate the world"

The annual conference takes place concurrently with the ANSYS Italian Users' Meeting.

The conference program highlights applications in automotive, aerospace, energy, marine, oil & gas, consumer goods, environment, biomedicine and others and presents the use of the following software:
ANSYS - ANSYS CFX - ANSYS FLUENT - ANSYS ICEM CFD - modeFRONTIER - ANSOFT - -FLOWMASTER - MAGMASOFT - FORGE - FTI - THIRD WAVE SYSTEM

LSTC's LS-DYNA®

Submit a talk, attend the conference, visit the exhibition and/or be an exhibitor: www.caeconference.com



ERAB

The Nordic LS-DYNA Users' Forum

Sponsored by Microsoft

Engineering Research organizes the Nordic LS-DYNA Users' Forum biannually.

http://www.erab.se/?page+conf_registration

Nordic LS-DYNA Users' Forum: FREE of CHARGE,

About

The Nordic LS-DYNA Users' Forum will be held at Fars Hatt , Gothenburg, on October 14 2010.
The forum brings together LS-DYNA users, researchers and developers to discuss LS-DYNA developments and its applications in simulations of complex mechanical problems. Developers from LSTC will participate to inform about the latest developments in LS-DYNA, LS-PrePostand LS-OPT. Specially invited speakers will talk about how LS-DYNA simulations contribute to their companies and products. We expect 200 attendees from the Nordic countries and Baltic states.

Training and Seminars

In close connection to the forum, we are pleased to offer the following training classes and seminars in Gothenburg.

•LS-DYNA Introductory course

Date: Monday October 11 - Wednesday October 13.

•ANSA and mETA Introduction
Date: Thusday October 12 - Wednesday October 13.

TRAINING COURSES

Send listings to
agiac99@aol.com

For changes for accuracy please see the company websites.

France – AS+ www.asplus.fr

October - December

-

UK - Oasys

http://www.oasys-software.com/dyna/en/training/

Oasys PRIMER –
An Introduction 1 FREE 27th Sep 2010

LS-DYNA Introductory Course
25th-27th Oct 2010

For further information or to enrol on any of the courses listed below please contact:
Katherine Groves
0121 213 3399 at
katherine.groves@arup.com .

TRAINING COURSES
DYNAmore

Send listings to
agiac99@aol.com

For Full Course List and Dated: http://www.dynamore.de/seminars/infodays

DYNAstart - Getting Started with LS-DYNA

Traboch, Austria, Nov 03, 2010
Stuttgart, Nov 10, 2010
Stuttgart, Dec 14, 2010

Possibilities of Computational Fluid Dynamics (CFD) with LS-DYNA

Stuttgart, Sep 30, 2010

LS-DYNA Application in Civil Engineering

Stuttgart, Oct 05, 2010

Capabilities of LS-DYNA/Implicit

Stuttgart, Oct 20, 2010

Support Day

Stuttgart, Oct 22, 2010
Stuttgart, Dec 17, 2010

Simulation of Drop Tests with LS-DYNA

Stuttgart, Oct 28, 2010

Introduction to Forming Simulation using LS-DYNA and ETA/DYNAFORM

Stuttgart, Nov 09, 2010

Visual-Crash DYNA - Environment for LS-DYNA

Stuttgart, Nov 24, 2010

Dynamic Material Characterisation using 4A Impetus

Stuttgart, Dec 01, 2010

Occupant Safety Support Day

Stuttgart, Dec 06, 2010

Current LS-DYNA Trends and Delevopments for Forming Simulations

Stuttgart, Dec 09, 2010

TRAINING COURSES

LSTC

Send listings to
agiac99@aol.com

LSTC Course Coordinator: Cathie Walton
Cathie@lstc.com (248) 649-4728 x221

Course	Location	Start Date	End Date
LS-PrePost *new date* (no charge w/ Intro to LS-DYNA)	CA	11/15/2010	11/15/2010
Intro to LS-DYNA *new dates* (3.5 days; 1/2 day Friday)	CA	11/16/2010	11/19/2010
LS-OPT *new dates* (3-1/2 days; half day on Friday)	CA	11/30/2010	12/3/2010
Advanced Options in LS-DYNA	CA	12/9/2010	12/10/2010
LS-PrePost (no charge with Intro to LS-DYNA)	MI	12/13/2010	12/13/2010
Intro to LS-DYNA (3-1/2 days; half day on Friday)	MI	12/14/2010	12/17/2010

Isogeometric Analysis 2011

www.ices.utexas.edu/iga

January 13-15, 2011, Austin Texas

Integrating Design and Analysis

Dr. David Benson

dbenson@ucsd.edu

Contact: Ruth Hengst - e-mail ruthusacm@ices.utexas.edu

Geometry is the foundation of analysis yet modern methods of computational geometry have until recently had very little impact on analysis. The reason may be that Finite Element Analysis (FEA), as we know it today, was developed in the 1950's and 1960's, before the advent and widespread use of Computer Aided Geometric Design (CAGD), which occurred in the 1970's and 1980's. The CAGD – FEA interface gives rise to many problems.

Perhaps the most significant of all is the problem of translating CAGD files into analysis-suitable FEA geometry and meshing, reputed to take 80% of overall analysis time for complex engineering designs. The approximate, polynomial-based geometry of FEA also creates difficulties in modeling sliding contact, flows about aerodynamic shapes, buckling of thin shells, etc. It would seem that it is time to look at more powerful descriptions of geometry to provide a new and more efficient basis for analysis. An attempt to address these issues and improve on FEA has led to the introduction and development of Isogeometric Analysis, in which a single geometric representation is utilized for design and analysis. Among the approaches that have been proposed, those that have demonstrated the most potential so far are Subdivision Surfaces, NURBS, and T-Splines. NURBS are the industry standard for CAGD systems used in engineering design. NURBS-based isogeometric analysis has already been applied to fluids, structures, fluid-structure interaction, phase-field modeling, electromagnetics, shape and topology optimization, material modeling (e.g., implicit gradient damage models), discrete and diffuse modeling of crack propagation, etc. T-Splines, which are a generalization of NURBS that allow efficient local refinement while maintaining higher-order continuity and exact geometry, have recently attracted increasing attention. The purpose of this workshop is to bring together experts in geometry and analysis interested in the development of the new generation of analysis procedures based on modern methods of computational geometry. The workshop will focus on:

- Analysis-suitable geometry
- Mathematics of isogeometric methods
- New isogeometric analysis technologies
- Applications
- Implementation and software
- History of CAGD and FEA

BETA CAE Systems SA

Twitter
Events to Visit BETA CAE

From the BETA CAE Systems SA News In Brief pdf.
http://www.beta-cae.gr/news/20100624_news_in_brief.pdf

BETA CAE Systems SA launches a Twitter account

Follow@betacae on Twitter to be updated on the latest news about our products, services and events. http://twitter.com/betacae

4th ANSA & µETA International Conference,
June 1-3, 2011, Makedonia Palace, Thessaloniki, Greece

NAFEMS Nordic Regional Summit 2010: Trends and Future Needs in Engineering Simulation,
October 26–27, 2010, Gothenburg, Sweden organized by NAFEMS

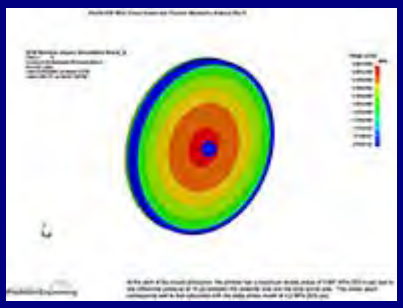
German LS-DYNA User Forum
October 12-13, 2010, Bamberg, Germany organized by DYNAmore GmbH

LS-DYNA Nordic Users' Forum,
October 14, 2010, Kungälv (Gothenburg), Sweden organized by Engineering Research Nordic AB

8th MIRA International Vehicle Aerodynamics Conference
October 13-14, 2010, Grove, United Kingdom organized by MIRA

Open Source CFD International Conference 2010,
November 4-5, 2010, Munich, Germany organized by ICON

SIMVEC - Berechnung und Simulation im Fahrzeugbau,
November 16-17, 2010, Baden-Baden, Germany organized by VDI



Consultant Showcase

Predictive Engineering

http://www.predictiveengineering.com

Impact and Fracture Mechanics Assessment of a Fused Silica Window

http://www.predictiveengineering.com/consulting/projects/lsdyna/fused_silica/index.html

Full Graphics can be viewed on the website of Predictive Engineering

Objective:

Determine the survival probability of a fused silica window subjected to a large particle impact event within a hypersonic wind tunnel using numerical methods (LS-DYNA) and fracture mechanics theories for brittle solids. If damage is predicted, provide an assessment of the windows' service life under repetitive pressure cycling of 14 psi.

Modeling Assumptions and Details:

A finite element (FE) solid model of a 18" diameter, 1.5" thick disk was constructed based on information provided by the engineering team at Arnolds AFB (see Appendix). The FE model idealized a fused silica window that was potted into a steel frame using Ultracal 60 cement. The window is subjected to a differential pressure of 14 psi during hypersonic wind tunnel operation. This pressure tends to bow the window outward into the wind tunnel (internal side).

It is hypothesized that there exists a potential, during a specific wind tunnel test, for large particle debris (Pyroceram) to impact the window at high velocities (12.27 ft/s tangential and 10.18 ft/s normal to the window). A nominal particle size was determined (see Appendix) and idealized as a sphere with a diameter of 42.90 mm.

Mechanical property data for fused silica and Pyroceram 9606 is presented in the Appendix. It should also be noted that the mechanical properties for fused silica are similar at 25 and 176C. Data for Pyroceram 9606 at 176 C was not available but is believed to follow a similar trend as that for fused silica.

The analysis approach consists of model validation, impact simulation and interpretation of the results using fracture mechanics for brittle solids. Auxiliary static stress models are also used to provide additional substantiation of the fracture mechanics predictions. The FE model was built using Femap v10.02 and statically analyzed using NX Nastran v6.1. The transient dynamic impact analyses were performed using

LS-DYNA v971 R4.2 for the Win64 platform.

Summary:

(i) Determine stress state in the fused silica window during and subsequent to the impact event using LS-DYNA. A LS-DYNA model was constructed of the impact event using two simulated particle sizes (42.90 mm (nominal size) and 12.7 mm). Stresses were calculated during and subsequent to the impact event. Impact stresses were found to be highly localized and the overall stress state of the window remains unchanged during and following impact. This result indicates that the particle can hit anywhere on the window and have approximately the same impact response (i.e., impact force on window and stress state within the window). Since fracture is dominantly initiated by tensile stresses, the following key results were determined: (a) the steady-state tensile stress in the window is ~4.0 MPa (580 psi); (b) the nominal particle created a peak tensile stress of ~17 MPa (2,466 psi) and the smaller particle created a peak tensile stress of ~6.3 MPa (910 psi).

(ii) Evaluate the window for its toughness or resistance to impact damage based on standard fracture mechanics principles.
Results from the LS-DYNA model show impact forces of 9,400 N (2,113 lbf) for the nominal particle size (42.90 mm diameter) and 1,060 N (238.3 lbf) for the smaller particle of 12.7 mm. Crack formation on the surface of the window is a function of impact force and sharpness of the contacting particle. A conservative approach was chosen for this analysis where the particle was assumed to be spherical and therefore presents a smooth contacting surface against the window. This allows a direct correlation with experimental fracture mechanics work conducted on fused silica where a spherical indenter having a diameter of12.7 mm was pressed against a fused silica plate. In this experimental work, small surface cracks were noted at loads greater than 600 N (134.9 lbf). Since the smaller spherical particle is shown to cause surface cracking on the window, fracture mechanics principles would then predict that for sharper particles the probability of surface cracking is even greater. Moreover, as the particles become larger (42.90 mm), the probability of crack formation would likewise scale. This allows one to conclusively state that if particles between the sizes of 12.7 to 42.90 mm impact the fused silica window at the stated velocities, surface cracking will appear on the window.

(iii) Provide an engineering assessment of the probability of the window surviving the impact event and if damaged, the largest flaw it could withstand and maintain its structural integrity A detailed FEA contact model of the sphere/window system was created to determine the contact stresses due to the particle debris impact.
The load for this model was the maximum contact force of 9,400 N (2,113 lbf). Stress results from this model were then used to drive the fracture mechanics calculations. In this work, it was argued that a crack of 5.7 mm (0.226”) deep would form during the impact event. Given a fused silica fracture toughness of 0.75 Mpa*m^0.5, calculations show that the window is able to withstand this flaw size and remain stable. That is, the catastrophic flaw size

for the window under a differential pressure of 14 psi is 8.4 mm (0.331”). Therefore, the window should not fail during impact from Pyroceram debris.

The probability of window failure during the impact event is based on engineering judgment since no direct calculations exist. In this work, the worst possible particle configuration was assumed, that is, spherical. This assumption provides the absolute maximum impact force. From this analysis, the impact event was predicted to create a 5.74 mm deep crack. However, the propagation of this crack into the window for catastrophic failure is driven by the windows’ steady-state tensile stress field due to the differential pressure load and is decoupled from the impact event. Hence, if the particle hits away from the center of the window (i.e., outer radial impact), .

the impact induced crack will be more stable (lower tensile stress in the window) and less likely to cause failure of the window. Overall, given the conservative nature of this analysis and that the particle would have to hit near the center of the window, the probability of the window failing in a catastrophic manner is highly unlikely.

Long term stability of the window is difficult to predict since fused silica (glass) will tend to weaken due to moisture exposure. If the wind tunnel remains a dry environment then the impact induced crack should remain stable and not propagate during wind tunnel pressure cycling. It should be noted that the tolerable crack size is 8.4 mm (0.331”) and visual inspection should be able to detect a crack that is larger than 1/4 of an inch

Distributor Case Study

LEAP - Australia

LEAP Update Newsletter: http://www.leapaust.com.au/news/newsevents.htm

The LEAP Australia newsletter aims to keep LEAP clients informed about the latest happenings in the world of CAE and CAD, and includes the latest information about current products and services as well as any important changes.

LEAP Case Study: Transfer Point Retrofit by Haald Engineering

http://www.leapaust.com.au/about/casestudy/EDEM_Haald-Bucket-Reclaimer.pdf
Read the full article for the Solutions and Benefits

EDEM_Haald-Bucket-Reclaimer.pdf Haald Engineering is a specialized mechanical design consulting firm—and innovator in the design and development of equipment for mining, transport, sugar, energy, defence, and agriculture sectors. Haald has extensive turnkey experience in the construction of materials handling and processing facilities.

Haald uses EDEM virtual prototypes to streamline the design process. With EDEM virtual performance testing Haald has a proven tool for troubleshooting.

Challenge:

A troublesome transfer point on a 10m-diameter bucket-wheel reclaimer had recurring issues with blockage, spillage and wear. The unit was rated to have a throughput of 4500 metric tons/hour. Flow problems had resulted in throughput closer to 4000 metric tons/hour. Haald needed to pinpoint flow issues and test various design options. Design changes needed to:

- remedy the causes of blockage
- reduce spillage
- reduce component wear
- improve reliability

Press Release

Intel

Intel Details 2011 Processor Features, Offers Stunning Visuals Built-in

http://newsroom.intel.com/community/intel_newsroom/blog/2010/09/13/intel-details-2011-processor-features-offers-stunning-visuals-built-in

SAN FRANCISCO, Sept. 13, 2010 - Intel Corporation revealed today several significant design features for the company's 2011 2nd Generation Intel® Core™ processor family at the Intel Developer Forum. The new and enhanced features will further extend Intel's chip performance and battery life leadership, and add a number of visually related features built right into the chips.

Codenamed "Sandy Bridge," the chips will be based on Intel's first new "visibly smart" microarchitecture produced on the company's cutting-edge manufacturing factories, or "fabs," at 32-nanometer (nm is a billionth of a meter) process technology with second-generation high-k metal gate transistors.

"The way people and businesses are using computers is evolving at an explosive rate, fueling demand for an even more powerful and visually appealing experience," said Dadi Perlmutter, executive vice president and general manager of the Intel Architecture Group. "Our upcoming 2nd Generation Intel Core processor family represents the biggest advance in computing performance and capabilities over any previous generation. In addition to offering these features inside Intel-based laptops, we plan to scale these advances across our server data center and embedded computing product portfolio."

The processor family will include a new "ring" architecture that allows the built-in processor graphics engine to share resources such as cache, or a memory reservoir, with the processor's core to increase a device's computing and graphics performance while maintaining energy efficiency.

The 2nd Generation Intel Core processor also includes an enhanced version of Intel® Turbo Boost Technology. This feature automatically shifts or reallocates processor cores and processor graphics resources to accelerate performance, tailoring a workload to give users an immediate performance boost when needed.

Laptops and PCs powered by the 2nd Generation Intel Core processor family are expected to be available early next year.

New Visual Experience - Visibly Smart

Intel's new processor graphics delivers enhanced visual features focused on the areas where most users are computing today: HD video, 3-D, mainstream gaming, multi-tasking and online socializing and multimedia.

To obtain and view video faster, Perlmutter demonstrated hardware accelerated video editing using the architecture's dedicated silicon for media processing, which allows users to quickly convert video to other formats.

The 2011 chips also come with Intel Advanced Vector Extensions (AVX). AVX delivers improved performance, rich functionality and the ability to better manage, rearrange and sort data. A new 256-bit instruction set accelerates floating point intensive applications such as digital photo editing and content creation.

Intel also demonstrated a dual processor, next-generation Intel® Xeon® processor server running Vidyo* video conferencing software that utilizes the 32 threads available on the system, and takes advantage of the AES New Instructions set (AESNI). Next-generation Xeon™ processors for 2 socket servers and workstations run 8 cores and 16 threads per processor and are on schedule for production in the second half of 2011.

For more information on the Intel Developer Forum 2010, visit the press kit at www.intel.com/newsroom/idf

About Intel: Intel (NASDAQ: INTC) is a world leader in computing innovation. The company designs and builds the essential technologies that serve as the foundation for the world's computing devices. Additional information about Intel is available at newsroom.intel.com and blogs.intel.com.