JULY
2005

fea INFORMATION

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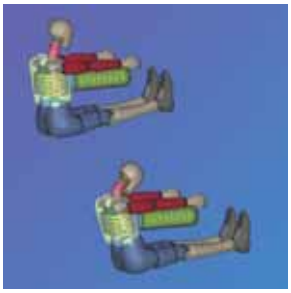

COVER STORY

ANSYS DESIGNSPACE HELPS LEADING ROBOTICS COMPANY REDUCE WEIGHT, SAVE TIME

HARDWARE SPOTLIGHT

CRAY: DEMONSTRATING BREAKTHROUGH PERFORMANCE FOR THE CRASH/EXPLICIT CODE LS-DYNA

HARDWARE SPOTLIGHT

PERFORMANCE AT THE SPEED OF LIFE HP SPECIAL EDITION L2000 NOTEBOOK

FEA Information Worldwide Participant's

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FEA Information Announcements

LSTC Users Conference:

LSTC is beginning to compile their 9th International LS-DYNA Users Conference 2006 Information on www.ls-dynaconferences.com.

Due to the outstanding turnout they had in 2004 the pricing for the conference and seminars will remain the same.

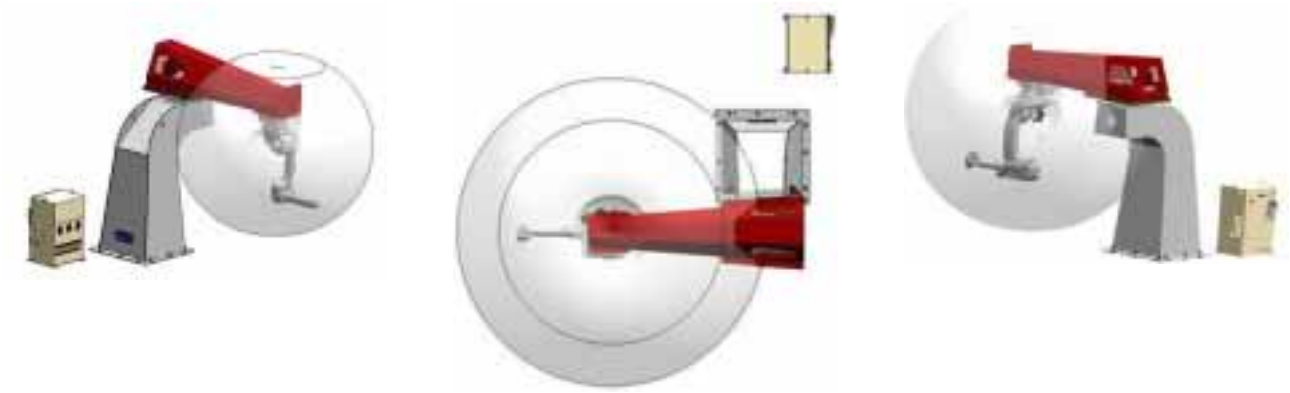
August 1st LSTC will have available the Sponsorship and Exhibitors Information. If you are interested in sponsoring an event or being an exhibitor contact vic@lstc.com

FEA Information New series:

LS-DYNA NEWS – Part 1. Each month, for those readers that have missed LS-DYNA conferences, we will be providing information directly from the Power Point slides at the conferences. We will begin this series with slides from Version 971 Developments.

Sincerely,
Trent Eggleston & Marsha Victory

ANSYS DesignSpace Helps Leading Robotics Company Reduce Weight, Save Time



Challenge:

To design the new MotoSweep O, a boom and riser system on which to mount a 6-axis robot, which would be able to service multiple vertical and/or horizontal machines from overhead, addressing installations in a linear, rotary, or facing configuration, with a rotating arm that would be able to reach all of the machines at once, while freeing up significant floor space

Solution:

Use ANSYS DesignSpace to reduce the boom's mass and increase the reach, efficiency, and maximum payload of the system

Benefits:

- Saved time and hand calculations
- Helped to eliminate trial-and-error
- Precluded the necessity for numerous prototypes for testing
- Reduced material cost
- Enabled engineers to create and analyze many different designs

Introduction

Motoman, Inc., founded in August of 1989, is the second-largest robotics company in the United States, as well as one of the fastest growing, with more than 17,000 robots installed in North America.

Motoman is the offspring of two powerful companies; Yaskawa Electric America (YEA), which manufactures numerical control products, inverters, and AC servo motors and drives, and Yaskawa Electric Corporation (YEC) of Japan, one of the world's largest manufacturers of industrial robots, with more than 85,000 installed worldwide.

Motoman's wide variety of robots is used in a broad range of applications, including material handling for machine tool load/unload, injection mold machine load/unload, arc and spot welding, and process applications, such as die spray, dispensing, and trimming. Motoman's

biggest customers are integrators and suppliers to the top auto manufacturing companies.

Challenge

Motoman's 6-axis robots have been used in conjunction with a boom, which is a swinging gallows arm mounted on a riser, to make a 7-axis robot that can be used from an overhead position. Recently, Gary Schutte, Senior Mechanical Engineer for Motoman, Inc., set out to replace Motoman's existing servo gallows system, which was made for overhead arc welding. His intention was to design a system that could also be used for material handling, in which the boom's mass would be reduced, and the overall payload would be increased. This improvement was meant to allow a robot larger than 280kg, the maximum for the present system, to be mounted on the boom, and more efficiently service single or multiple workstations, gaining access from the front or the top of the work cell.

Motoman's Product Development team of Ken Harbaugh, Senior Mechanical Engineer, Wade Hickle, Senior Electrical Project Engineer, Gary Schutte, Senior Mechanical Engineer, and George Sutton, Associate Chief Engineer, designed the new system. From this, they would also create a manually operated boom, and a fixed boom, to be mounted on a self-supporting overhead structure.

Another objective was to solve the problem that they were having with backlash in the main drive assembly of the boom. The backlash, which caused the boom to shake when the robot reached its program point, was increasing the robot's settling time, as well as MotoSweep O's cycle time. Therefore, they would have to develop a dampening system for the drive unit.

Solution

Schutte and his team used DesignSpace to create a boom with less mass, so that they could increase its reach and payload. DesignSpace also enabled them to reduce the base structure size, as well as the floor mounting requirements for the riser on their new product line.

The MotoSweep O allows a 550kg robot (UP50), which has an allowable working payload of 50kg, to be mounted 2 meters from the axis. That's double the payload and twice the mass of the 280kg robot (UP20), whose payload is only 20kg.

Motoman's team also was able to devise a dampening system to eliminate the backlash and increase the stiffness of the structure. An important element in this system was a friction roller that would be mounted to a top plate. It would have to be flexible, so as not to work against the main bearing. To see how it would react within the MotoSweep system, the team built a model of the main drive unit in DesignSpace.

Through hand calculations, they acquired its spring rate, then used the value they obtained to alter the material properties of the model to simulate the flexing that would occur. This analysis was used to determine the spring rate that would be necessary for the top plate. DesignSpace then helped them to find the exact thickness they would need for the plate to achieve the desired deflection. Now, although the main bearing is still taking most of the load, the roller is dampening the backlash and reducing the deflection of the boom.

The MotoSweep O also has a higher rotational speed and an increased allowable payload over the old gallows system. In addition, its settling time has improved from a second and a half to less than

one second, and the application and process times have been reduced dramatically. The MotoSweep O has a velocity of 10.6 rpm and a rotation of plus or minus 180°. The standard MotoSweep O axis-to-robot base radial distance is 2000mm, while the floor-to-robot base height is 2595mm. The MotoSweep O UP20, available with ceiling and wall mounts, has an overall reach of 3.8 meters from the turning axis, while the UP50, available with the ceiling mount, has a reach of 4 meters.

The analysis of the MotoSweep O was done on an 800 MHz, 512K-ram system, with a 20 gig hard drive. Each run on the MotoSweep O took about 4 hours. The large and complex MotoSweep O could have been simplified to reduce the processing time, but the engineers wanted to test the capabilities of the software. Normally, Schutte runs ANSYS DesignSpace software on a 2.8 GHz dual processor, with 2 gig of ram, and an 80 gig hard drive.

Benefits

"Using DesignSpace saved time and hand calculations, and helped to eliminate trial-and-error," Schutte said. "We didn't have to keep building new structures, which reduced the cost of materials."

The MotoSweep O has the ability to service multiple vertical and/or horizontal machines, and the flexibility to address installations in a linear, rotary, or facing configuration. It can be used from overhead to service a group of machines, by rotating the arm so that the robot can have access to all of the machines at once. It also frees up a lot of floor space.

Schutte, who uses DesignSpace to help other departments at Motoman with custom robots and risers, says, "FEA plays a major role in Motoman's Product Development Group. It helps us to look at different designs we would not even have tried in the past, because of the expense and time restraints involved in prototyping new products. Now we can look at three or four different designs and determine which will be the most cost-effective. We can also incorporate more functions in the designs."

Motoman's engineers had used Cosmos FEA software for about five years, but switched to DesignSpace in 2002. Schutte says, "We changed from Cosmos to DesignSpace, because it is easier to use. It has the ability to solve complex assemblies, and provides better customer support. Cosmos doesn't support Solid Edge as much as it should. It also had trouble meshing components and solving the boom and base structures of the MotoSweep O, without making major changes to the designed model."

Other features in DesignSpace are easier to use as well. Schutte notes, "With the old system, it was kind of difficult to put the pictures into the reports generated by the software; but it's very easy to do with DesignSpace."

Released in January 2003, the MotoSweep O is the fastest rotary overhead robot transport, 2-meter boom, with a 50kg 6-axis robot payload available on the market.

Simply put, Schutte says, "DesignSpace adds value to standard robotic systems."

Demonstrating Breakthrough Performance for the Crash/Explicit Code LS-DYNA

The full white paper can be read at:

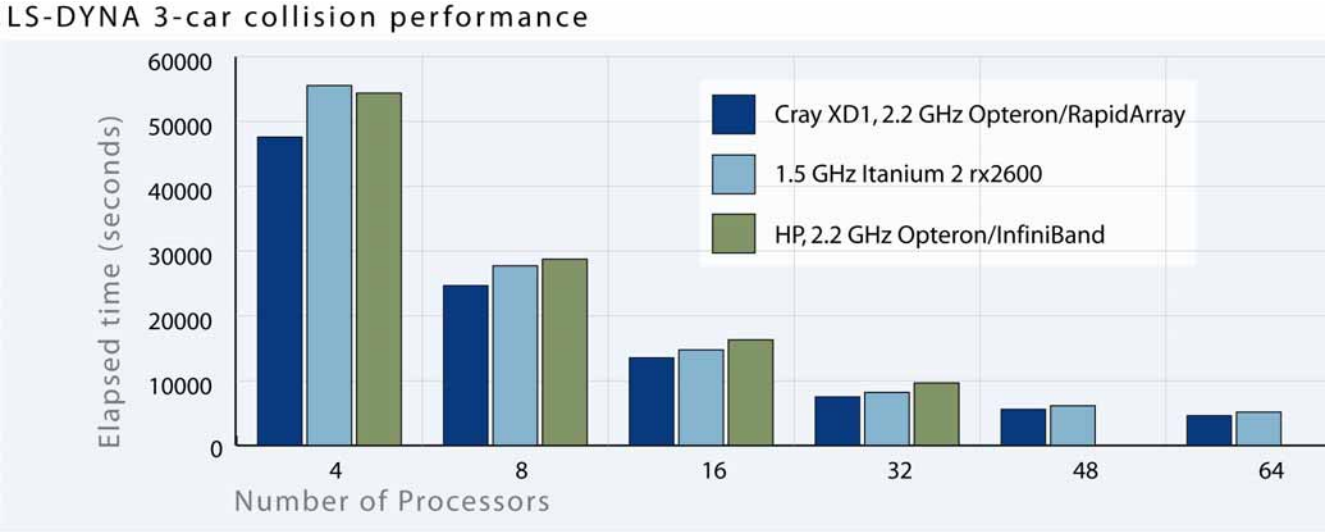
http://www.cray.com/forms/whitepaper_f.html

To assess the effectiveness of the Cray XD1 supercomputer for Crash/Explicit codes the paper presents benchmark results on LS-DYNA 3-car collision for three systems, as posted on www.topcrunch.org and analyzes the corresponding Cray XD1 results in further detail to understand the impact of Cray XD1 features.

LS-DYNA 3-Car Collision Benchmark

The 3-car collision benchmark has 794,780 elements and six contact interferences, and involves a simulation time of 150 milliseconds. For the runs on the Cray XD1 supercomputer, LS-DYNA version 970, revision 5434a was used. Figure 1 compares overall performance of LS-DYNA at various processor counts, on three systems, the Cray XD1 supercomputer, an Itanium 2 system and an Opteron/InfiniBand clusters. All of these results were posted by vendors to www.topcrunch.org. These results show that the Cray XD1 supercomputer consistently outperforms the other systems at each processor count. The Cray XD1 supercomputer (2.2 GHz AMD Opteron) is 29 percent faster than competing cluster systems with InfiniBand interconnect (2.2 GHz) and 9 percent faster than Itanium 2 with InfiniBand (1.5 GHz) at 32 processors.

The performance advantage is due to the Cray system's superior interconnect technology, its balanced architecture, and Cray HPC optimized Linux.



LS-DYNA mpp970, revision 5434a,3-car collision, simulation time: 150 ms,(Source: www.topcrunch.org, 11 February 2005)

Figure 1: LS-DYNA 3-car collision performance

Communication time on 3-Car

Figure 2 shows the percentage of the overall solution time spent in computation, synchronization and communication for the Cray XD1 supercomputer at various processor counts. On any system, the time spent in each function varies with the problem type (model size, types/number of contacts, elements etc.). In addition, each function has its own influences:

- Computation time: This is the portion of the time spent doing productive work. Maximizing computation time leads to high application efficiency on a system.
- Synchronization time: Depends on effective load balancing and increases as processors wait for other processors to reach application barriers. Thus, synchronization time may increase significantly as the number of processors increases.
- Communication time: Is a function of the bandwidth and latency of the system interconnect. High interconnect latencies result in increasing the percentage of time spent on communications, directly reducing the time spent on computation.

Figure 2 compares the percentage of time spent on each of these functions on the Cray XD1 system to time allocations on an Opteron/Myrinet cluster. It shows how performance is affected as more processors are used. Even on this benchmark test, which is less demanding on the system interconnect as the majority of the time is spent in computations, the performance on other systems starts degrading very rapidly, compared to the Cray XD1 system, which is optimized for compute/communicate intensive applications.

These figures illustrate that the Cray XD1 system achieves an impressive 70 percent efficiency on the 3-car benchmark, as compared to 50 percent for an Opteron/Myrinet cluster. These differences are magnified on the larger problems run in the real world.

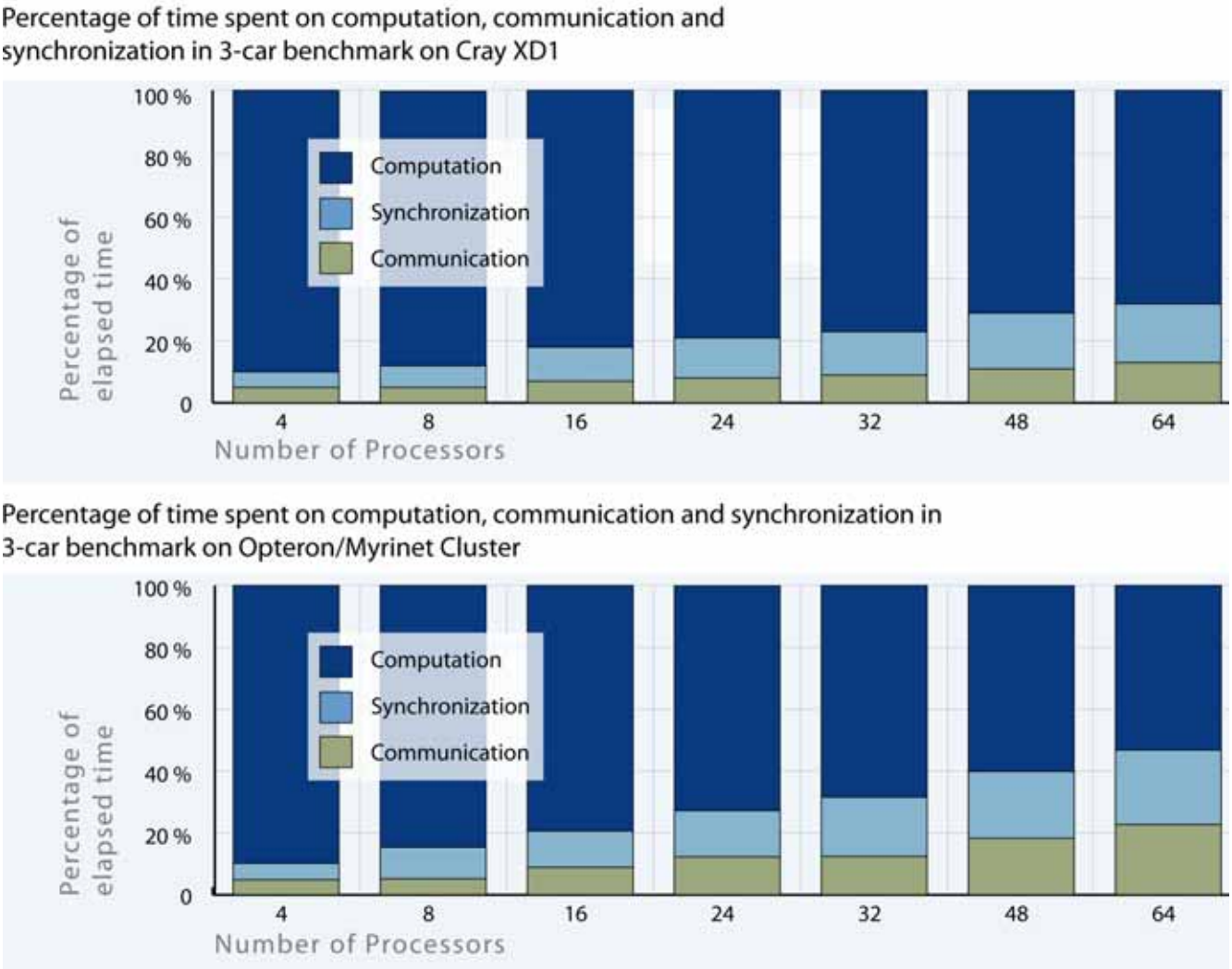


Figure 2: Percentage of time spent on computation, communication and synchronization in 3-car benchmark on the Cray XD1 supercomputer and Opteron/Myrinet cluster

Like most Crash codes, the LS-DYNA code involves significant amounts of inter-processor communications using MPI libraries. Inter-processor communications occur during various stages of a crash simulation and can soon become a bottleneck in overall performance, unless the interconnect technology offers low latency and high bandwidth. The Cray XD1 interconnect is the key to the exceptional performance, particularly at higher processor counts. The impact is evident in the portion of the overall time spent during the communication phase.

Figure 3 compares MPI communication times for the Cray XD1 supercomputer and an Opteron/Myrinet cluster. Note that the communication time on the Cray system was one third that of a Myrinet cluster at 16 processors and higher. The impact of the Cray XD1 interconnect's low latency is evident starting at four processors and becomes extremely compelling at 16 processors and above.

Comparison of the communication time for 3-car collision

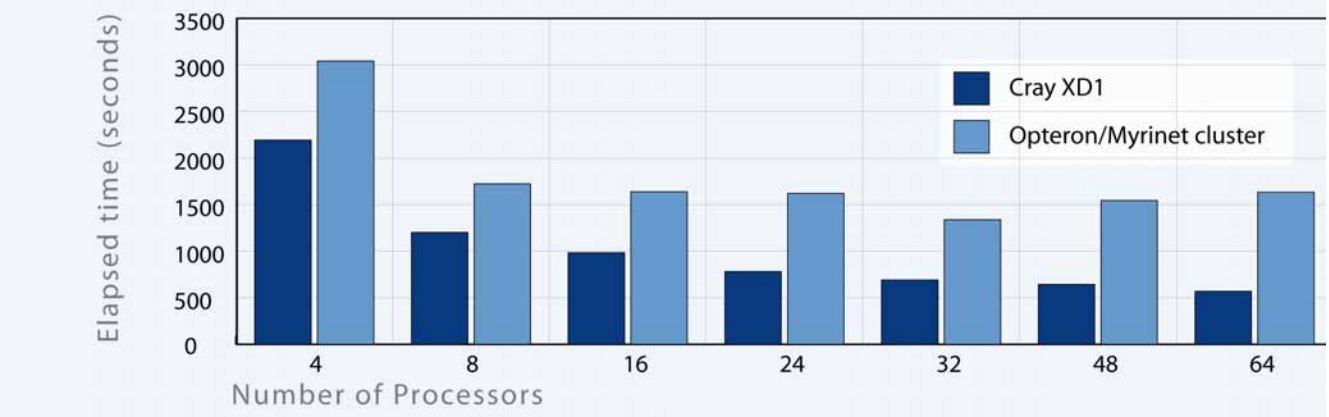
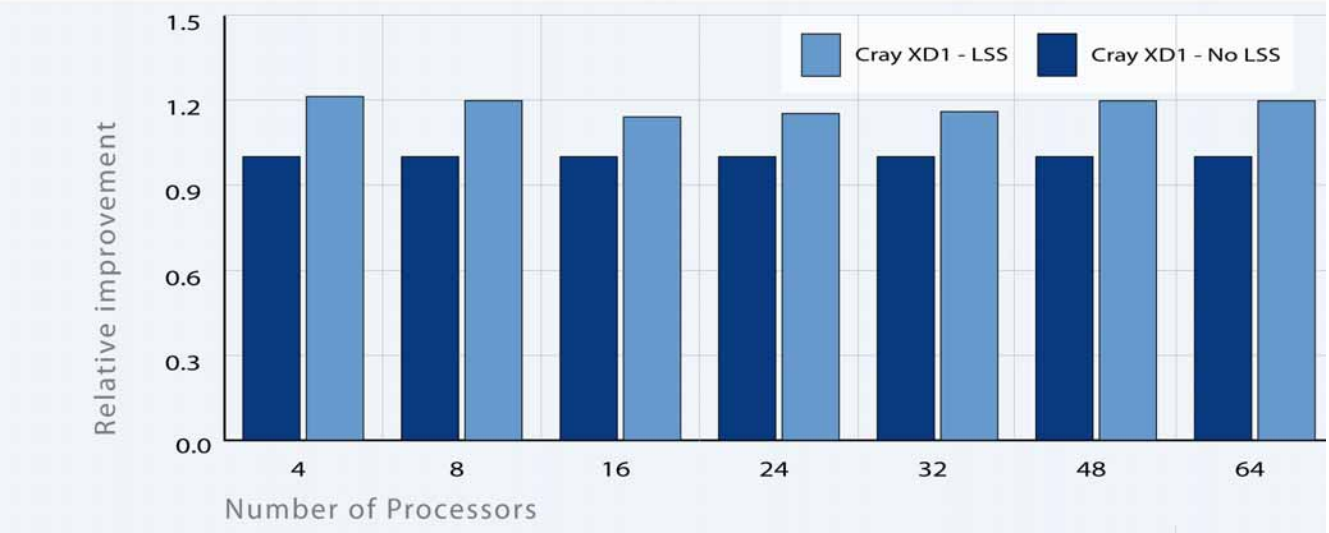


Figure 3: Comparison of the communication time for 3-car collision

Impact of the Linux Synchronized Scheduler on LS-DYNA

Additional performance gains can be attributed to the Linux synchronized scheduler (LSS) implemented on the Cray XD1 system. To ascertain and isolate the impact of the LSS on application performance, Cray benchmarked the performance of LS-DYNA at various processor counts, with and without LSS. The results are shown in Figure 4. A performance gain of 20 percent was observed. This performance gain is incremental to the performance gains delivered by the Cray XD1's RapidArray interconnect, and is not available on any other vendor's system.

Impact of LSS on LS-DYNA



As shown in Figure 2, the time spent in synchronization on the Cray XD1 supercomputer is consistently half that on the Myrinet cluster, at each processor count (4 through 64). This reduced synchronization time translates to an overall performance improvement of up to 20 percent in elapsed time for the 3-car crash model.

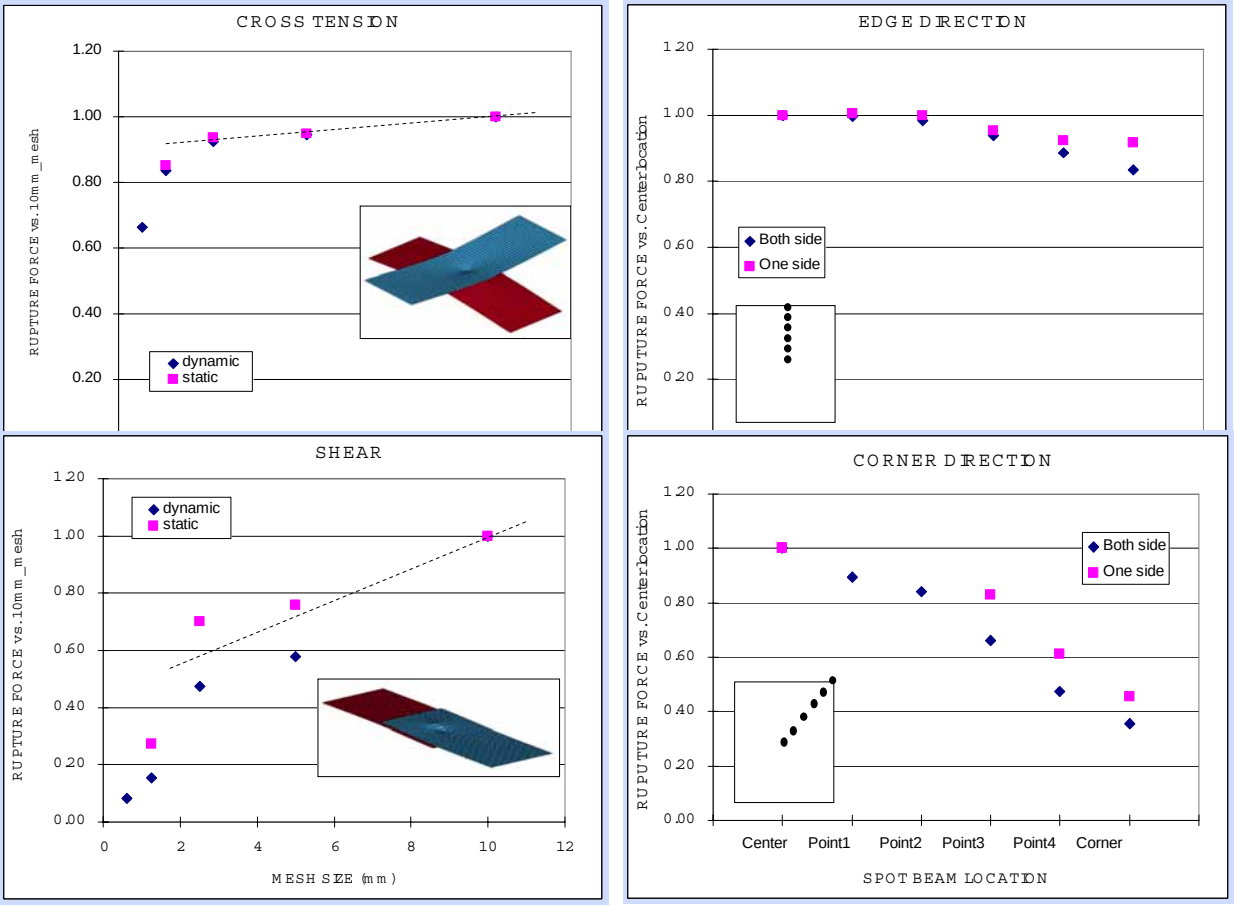
CRAY – LS-DYNA Bundle
http://www.cray.com/forms/ls-dyna.html

LS-DYNA NEWS – Part 1
Version 971 Developments

*CONTROL_spotweld_beam

- Spotweld failure is sensitive to the:
  - location of the spotweld on the contact segment
  - physical size of the segment
- This new control card provides a means of scaling the failure force resultants to compensate for these sensitivities.
- Scale factors are introduced: ST, for tensile load sensitivity on mesh size; SS, for shear load sensitivity on mesh size; and, SO, for the location sensitivity. These scale factors are determined from user defined loads such as those shown below and are used in the equation for the failure calculation below:

$$\left(\frac{s_T s_O \sigma_{rr}}{\sigma_{rr}^F\left(\dot{\varepsilon}_{eff}\right)}\right)^2 + \left(\frac{s_S s_O \tau}{\tau^F\left(\dot{\varepsilon}_{eff}\right)}\right)^2 - 1 = 0$$



*Define_set_adaptive

- Sets adaptive refinement level by element or part set ID
- Minimum element size is specified in addition to the adaptive level

*Include_path

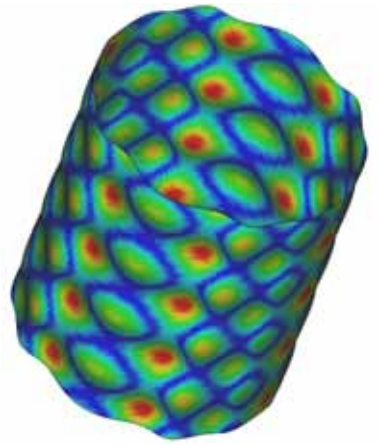
- The “path” option defines a directory where the include files can be found.
- Multiple *Include_path” definitions may be given
  1. When a file name is specified the local directory is searched first
  2. If the file is not found in the local directory then all directories specified in the *Include_path definitions are searched until the file is found

*Parameter_expression

- Define numerical values of parameter names referenced throughout the input file.
- Like the *PARAMETER keyword, but allows for general algebraic expressions, not simply fixed values.
- Available functions: *sin, cos, tan, csc, sec, ctn, asin, acos, atan, atan2, sinh, cosh, tanh, asinh, acosh, atanh, min, max, sqrt, mod, abs, sign, int, aint, nint, anint, float, exp, log, log10, float*
- General arithmetic expressions involving +, -, *, /, and **

*Perturbation

- *PERTURBATION_SHELL_THICKNESS
- *PERTURBATION_NODE
- Defined using:
  1. Sine series expansion
  2. Scaled displacements/modes



Monte Carlo radiative heat transfer

- Available for the calculation of exchange factors for heat transfer analysis.
  1. Arbitrarily complex geometries
  2. Arbitrary number of material properties
  3. Arbitrary number of energy (wavelength) bands
  4. Mixed specular and weighted diffuse material model
- Emission capabilities
  1. Directional emission based upon material properties
  2. Weighted diffuse emission
  3. Collimated (beam) emission
- Guaranteed to converge
- Simulates rarefied molecular gas dynamics
- Runs on single processor during input phase

*Part_composite

- Provides a simplified method of defining a composite material model for shell elements
- Eliminates the need for user defined integration rules
- For each integration points the user defines:
  - Material ID-not part ID's.,
  - Thickness
  - Material angle referenced to local shell coordinate system.
- Integration point data is given sequentially starting with the bottom
- Number of integration points is determined by the total number of entries
- The total thickness of the composite shell is the sum of the integration point thickness
- With *PART_COMPOSITE, the keywords
  *SECTION_SHELL and *INTEGRATION_ SHELL, are unnecessary.

*Case

- Provides a way of running multiple load cases sequentially in a single run
- Within each case, the input parameters, which include loads, boundary conditions, control cards, contact definitions, initial conditions, etc. can change.
- Results from a previous case can be used during initialization
- Each case creates unique filenames for all results files by appending the prefix "*IDn*." To the default name where n is the case ID for the active case.

*Constrained_spline

- A cubic spline interpolation element
  - Displacements and slopes are matched at endpoints
    - Based on beam theory
    - Widely used in NASTRAN
  - Provides a way of connecting regions of different mesh density
  - Works explicitly and implicitly

  - Implemented for NASTRAN compatibility
  - A linear capability

*Control_implicit_inertia_relief

- New feature for implicit computations to allow analyses of models with rigid body modes, e.g., aircraft in flight
- Computes the rigid body modes and uses these rigid modes to constrain the motion
- Works for linear statics, both single and multi-step
- Input requires threshold eigenvalue for identifying the rigid body modes. Default=0.001hz

*Define_curve_function

- Can be referenced just like any other curve
- Arbitrary analytic expressions of any complexity
  - Read in as ASCII FORTRAN expression
- Can reference other curves, either tabulated or analytic
  - For complete generality, a dependency tree is created so curves can reference curves that reference curves, etc.
- Examples of analytic expressions:
  - 42.5*sin(time*pi/20.)
  - Max(LC10,sqrt(LC122*5.))
    - LC10 and LC122 are load curve ID's
- Expressions can be functions of time, displacements, velocities, etc.

End of July News on LS-DYNA:

Future News:

- **Continuation of Developments in LS-DYNA**
- **LS-PrePost**
- **LS-OPT**

Performance at the Speed of Life

The HP Special Edition L2000 Notebook PC featuring AMD Turion™ 64 mobile technology

"Excerpt from the article By Susan Twombly" full article can be read at www.hp.com/hpinfo/newsroom/feature_stories/2005/05livestrong.html

Lance Armstrong using the new HP Special Edition L2000 Notebook PC featuring AMD Turion™ 64 mobile technology.

The HP Special Edition L2000 Notebook PC enables you to perform beyond your expectations with the powerful future-ready computing and enhanced virus protection of AMD Turion™ 64 mobile technology.

Jun. 2005 -- Building on a strong tradition of innovation and community involvement, HP and AMD have joined forces to introduce the HP Special Edition L2000 Notebook PC featuring AMD Turion™ 64 mobile technology to support the Lance Armstrong Foundation (LAF). The LAF provides the practical tools and information that people with cancer need to live strong. Now the power of advanced mobile computing technology delivers the power to help others.

A large part of living strong means empowering cancer patients and their families with information to help them face challenges and changes head-on. In fact, when diagnosed with cancer in 1996, Lance used technology to arm himself with as much information as possible about his testicular cancer diagnosis.

And that's where HP and AMD enter the scene. Providing the highest-speed, broadest-range wireless modem available and optimized for outstanding mobile performance, the HP Special Edition L2000 notebook PC enables Internet access where service is available. This one-of-a-kind notebook sports a unique design that bears the LIVESTRONG™ message and a reproduction of Lance's autograph.

For every special edition notebook PC purchased, the LAF will receive $50 to fund its public health, advocacy, research and education initiatives for people living with cancer. Further, HP and AMD are inviting PC buyers to join the battle against cancer by matching or exceeding that amount. The two companies have also donated notebooks for use in LAF-funded cancer survivorship centers and community grantees.

It's a win/win situation for all: exceptional mobile performance for you, $50 for LAF programs and a reliable, secure and affordable way for survivors to

communicate and connect with the information they need to live strong.

Incredible ATI graphics and audio. Experience cinema-quality graphics through integrated video processing and motion compensation acceleration with ATI RADEON® XPRESS 200M, providing up to 128MB user-configurable UMA VRAM. Enjoy exceptional Altec Lansing audio with included yellow stereo ear buds.

Broadest-range Wi-Fi. Maintain a high-speed wireless connection up to 50 percent farther away from the access point than competing technologies. The integrated 54g™ 802.11b/g WLAN with 125HSM/SpeedBooster™ and Broad-Range™ support make it all possible.

Long-lasting. Get extended battery life with AMD PowerNow™ technology. Double your battery life4 with the optional 12-cell Lithium Ion battery accessory.

Aerodynamic. Go the distance with this 1.2" thin and light-weight notebook PC — just 5.35 pounds.

Peak performance. Keep your notebook running at peak performance with award-winning HP support. Receive 24/7/365 toll-free support by phone during the warranty period and free online support for as long as you own the PC.

http://www.hp.com/hpinfo/newsroom/feature_stories/2005/05livestrong.html

LSTC Michigan Classes

LSTC Michigan Classes:
Jane Hallquist,
Training Coordinator
LSTC California
(jane@lstc.com)
Jane: 925-449-2500

Michigan Location:
1740 W. Big Beaver Rd.
Suite 100 , Troy , MI 48084
voice: 248-649-4728;
fax: 248-649-6328
www.lstc.com

Our training room in our Troy, Michigan Office, has 12 student Pentium 4 machines running Linux and PCwindows. Each course is a combination of lecture and hands-on practice with example files. Lunch is provided on site, with the opportunity to chat informally with the instructor and other students.

With the success of our first classes held in Michigan I have scheduled the following classes at that location:

Aug 15 to Aug 17
CONTACT in LS-DYNA

Aug 29 to Sept 1
INTRODUCTION TO LS-DYNA

Sept 19 to Sept 20
ADV. CRASH & IMPACT SIMULATION

Oct 19 to Oct 21
IMPLICIT & SPRINGBACK

Additional courses will be offered soon.

Please let me know of your interest in particular topics; customized curriculum is available upon request.

Jane Hallquist
jane@lstc.com

TOP CRUNCH NEWS

Dr. David Benson – www.topcrunch.org

Benchmark Details Uploaded June 30th

1. Computer System: Pentium 4
   - **a. Vendor: Dell**
   - b. CPU Inerconnects: Information Not Provided
   - c. MPI Library: Information Not Provided
   - d. Processor: P4 - 2.4GHz
   - e. Number of nodes: 1
   - **f. Processors/Nodes: 1**
   - g. #Nodes x #Processors per Node = 1 (*Total CPU*)
   - h. Operating System: Windows 2000

2. Code Version: LS-DYNA
3. Code Version Number: 970_s_5434
4. Benchmark problem: neon_refined
5. **Wall clock time: 25996**
6. RAM per CPU: 2048
7. RAM Bus Speed: Information Not Provided
8. Benchmark Run in Single or Double Precision: Single
9. Benchmark Run SMP or MPP: SMP
10. System Dedicated/Shared: Dedicated
11. Location: San Diego, CA
12. Submitted by: Dustin Boesch
13. Submitter Organization: Dell

German LS-DYNA Forum

DYNAmore invites you to the upcoming German LS-DYNA Forum

October, 20th-21st

Bamberg, Germany

The conference languages will be German and English. The German OEMs (DaimlerChrysler (Mercedes), Opel, Porsche, AUDI, BMW, and Volkswagen) will contribute 17 presentations on their current applications with LS-DYNA and LS-OPT.
Furthermore, many well-known suppliers and engineering service companies will present papers.

Keynotes will be given by:

- Dr. J. Hallquist (LSTC),
- Prof. P. Haupt (University Kassel),
- Prof. Schumacher (Hamburg University of Applied Sciences),
- P. Du Bois (Consultant),
- Dr. S. Frik (Opel),
- G. Scholpp (Siemens Restraint Systems),
- Dr. M. Wagner (BMW),
- Dr. S. Glaser (BASF).

In total, approximately 80 presentations will be held. The papers cover topics as Crash, Metal Forming, Modeling of Spot-Welds and Bonding, Material Modeling, Passive Safety, Optimization, Robustness, and New Application of LS-DYNA. Additionally, various presentations will be held on computer systems, and software related to LS-DYNA. The event is accompanied by an extended exhibition.

We kindly encourage attending the conference.

A detailed agenda is available at:

www.dynamore.de/af05

The conference is in the center of the marvelous City of Bamberg. The City of Bamberg is awarded by UNESCO as World Heritage and can be reached easily via railway from the Airports of Munich, Frankfurt and Stuttgart.

Among the many papers being presented by FEA Participants (alpha order) are:

- **AMD**: AMD's Multi Core Technology in LS-DYNA Projects
- **ARUP**: The Use of an Oasys PRIMER Model Management Database During Accelerated Vehicle Development Programs such as the 1805 Ford GT 6b - 63
- **Benson**: Professor D. Benson: A Simplified Rubber Model with Damage

- **CRAY**: Cray XD1 – Extreme Performance with LS-DYNA through the RapidArray Network Technology

- **DYNAmore**: Development of BioRID 2 Dummy model
- **ETA**: New Features of eta/DYNAFORM
- **Fujitsu Siemens**: Schlusselfertige Cluster-Losungen fur LS-DYNA mit Dienstleistungs-Angeboten
- **HP**: Overview on HPs Unified Cluster Portofolio
- **Intel**: Meeting The Needs of High Performance Computing – Move to 64 bit Architecture
- **LSTC**: Robustness Features in LS-OPT Version 3.0
- **LSTC**: Optimization Features in LS-OPT Version 3.0
- **LSTC**: Recent LS-PrePost Developments for Model Setup in Metal Forming
- **LSTC**: Recent Developments in LS-DYNA
- **MSC**: Virtual Product Development; Processes and Methods for Crash Applications
- **NEC**: Skalierung von LS-DYNA auf modernen Interconnect Architekturen
- **Schwer Consulting**: *MAT_CONCRETE_DAMAGE Release III – New Features and Capabilities
- **SGI**: SGI Update zu LS-DYNA

Among the many Exhibitions by FEA Participants (alpha order) are:

- Arup
- AMD
- Cray Inc.
- DYNAmore GmbH
- Fujitsu Systems Europe
- HP GmbH
- Intel GmbH
- MSC.Software GmbH
- SGI GmbH

Details of registration and a detailed agenda at:

www.dynamore.de

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LSTC Distribution Channel - July

FEA Participants for LS-DYNA Sales – Support – Training – Benchmark

Korea

KOSTECH
www.kostech.co.kr

Kostech provides Total Solutions for all your CAE, CAD/PDM, e-Business, and System related needs.

Germany

DYNAmore
www.dynamore.de

DYNA*more* is dedicated to support and distribute LS-DYNA and related software products for crash analysis, metal forming, optimization and much more!

Italy

Altair
www.altairtorino.it

Altair Engineering è una multinazionale statunitense presente sul mercato da quasi un ventennio nel settore della progettazione e della sperimentazione virtuale. In Italia ha il suo quartier generale dal 1994 nella prima cintura di Torino e due sedi operative a Lecce e Milano, aperte rispettivamente nel 2000 e nel 2001

Turkey

FIGES
www.figes.com.tr

FIGES Ltd is a Computer Aided Engineering(CAE) company dealing with numerical simulation of mechanical systems and control. FIGES is providing sales, technical support, training, project and consulting services on this field.

USA

ETA
www.eta.com

Engineering Technology Associates, Inc. (ETA) is a software development and engineering company specializing in automotive CAE applications worldwide. ETA's mission is to be the leading global supplier of CAE software, services, training and technology solutions.

EVENTS

October 05-08, 2005
TCN CAE 2005 International Conference on CAE and Computational Technologies for Industry
Italy – (Numerica)

August 12, 2005
Altair India – 3rd South Asia LS-DYNA User Conference, Bangalore, India

October 20-21, 2005
German-LS-DYNA Forum
(DYNAmore)
Bamberg, Germany

November 09-11, 2005
23rd CADFEM Users' Meeting – Int'l Congress on FEM Tech. W/ANSYS CFX & ICEM CFD Conference,
Bonn, Germany

November 25, 2005
Korean Users Conferece – LS-DYNA (THEME)

November 29-30, 2005
Japanese Users Conference (Nagoya) LS-DYNA (JRI)

June 2006
LS-DYNA
9th International LS-DYNA Users Conference – Deerborn, MI
(LSTC)

LS-DYNA Resource Page

Interface - Hardware - OS And General Information

LS-DYNA General Information- www.lstc.com sales@lstc.com
Now available – Training at LSTC Michigan Office

Version: 970

Classes:
www.lstc.com classes

30-day demonstration licenses available – no fee

Sales
sales@lstc.com

Participant Hardware and OS that run LS-DYNA (alpha order)

All Hardware and OS listed have been fully QA'd by Livermore Software Technology Corporation

AMD Opteron Linux	HP PA8000 HPUX	INTEL IA32 Linux, Windows	SGI Mips IRIX6.5
CRAY XD1 Linux	HPIA64 HPUX or Linux	INTEL IA64 Linux	SGI IA64/Linux Altix/Prism
FUJITSU Prime Power SUN OS 5.8	HP Alpha True 64	INTEL Xeon EMT64 Linux	
FUJITSU VPP Unix System V	IBM Power 4/5 AIX 5.1	NEC SX6 Super-UX	

LS-DYNA Resource Page
Participant Software Interfacing or Embedding LS-DYNA

Each software program can interface to all, or a very specific and limited segment of the other software program. The following list are software programs interfacing to or having the LS-DYNA solver embedded within their product. For complete information on the software products visit the corporate website.

ANSYS - ANSYS/LS-DYNA
www.ansys.com/products/environment.asp

ANSYS/LS-DYNA - Built upon the successful ANSYS interface, ANSYS/LS-DYNA is an integrated pre and postprocessor for the worlds most respected explicit dynamics solver, LS-DYNA. The combination makes it possible to solve combined explicit/implicit simulations in a very efficient manner, as well as perform extensive coupled simulations in Robust Design by using mature structural, thermal, electromagnetic and CFD technologies.

AI*Environment: A high end pre and post processor for LS-DYNA, AI*Environment is a powerful tool for advanced modeling of complex structures found in automotive, aerospace, electronic and medical fields. Solid, Shell, Beam, Fluid and Electromagnetic meshing and mesh editing tools are included under a single interface, making AI*Environement highly capable, yet easy to use for advanced modeling needs.

ETA – DYNAFORM
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.

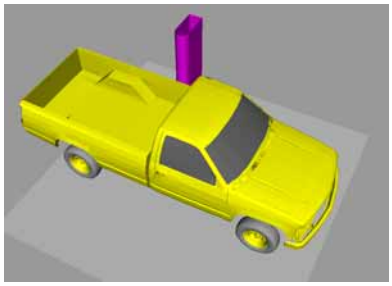
ETA – VPG
www.eta.com

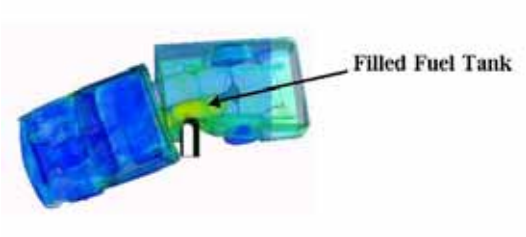
Streamlined CAE software package provides an event-based simulation solution of nonlinear, dynamic problems. eta/VPG's single software package overcomes the limitations of existing CAE analysis methods. It is designed to analyze the behavior of mechanical and structural systems as simple as linkages,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

MSC.Software
“MSC.Dytran LS-DYNA”
www.msc.software.com

Tightly-integrated solution that combines MSC.Dytran's advanced fluid-structure interaction capabilities with LS-DYNA's high-performance structural DMP within a common simulation environment. Innovative explicit nonlinear technology enables extreme, short-duration dynamic events to be simulated for a variety of industrial and commercial applications on UNIX, Linux, and Windows platforms. Joint solution can also be used in conjunction with a full suite of Virtual Product Development tools via a flexible,

cost-effective MSC.MasterKey License System.





Side Impact With Fuel Oil Inside

MSC.Software - MSC.Nastran / SOL 700

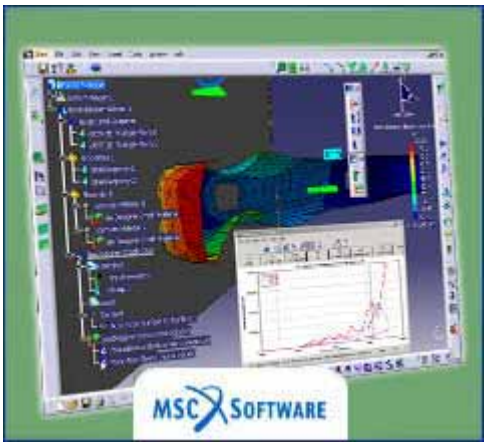
The MSC.Nastran™ Explicit Nonlinear product module (SOL 700) provides MSC.Nastran users the ability access the explicit nonlinear structural simulation capabilities of the MSC.Dytran LS-DYNA solver using the MSC.Nastran Bulk Data input format. This product module offers unprecedented capabilities to analyze a variety of problems involving short duration, highly dynamic events with severe geometric and material nonlinearities.

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

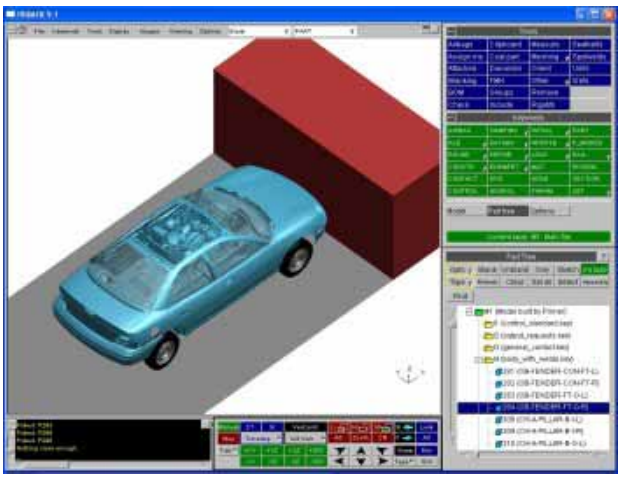
The MSC.Nastran Sol 700 will be released in November 2005. Beta release is available now !

MSC.Software – Gateway for LS-DYNA

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



Gateway products provide CATIA V5 users with the ability to directly interface with their existing corporate simulation resources, and exchange and archive associated simulation data.



Oasys software for LS-DYNA
www.arup.com/dyna

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

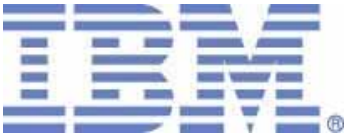
LS-DYNA Events
INDIA 08/12 (Altair India) **3rd South Asia LS-DYNA User Conference,**
Italy 10/05-10/06 (Numerica) **(Numerica)** **TCN CAE 2005 International Conference on CAE and Computational Technologies for Industry -** workshops focusing on LS-DYNA
Germany - 10/20-10/21 (DYNAmore) **German LS-DYNA Forum**
Germany - 11/09-11/11 (CADFEM) **Int'l Congress on FEM Tech.. workshops focusing on LS-DYNA**
Korea 11/25/05 (THEME) **Korean LS-DYNA Users Conference**
Japan 11/29-30/05 (JRI) **Japanese LS-DYNA Users Conference (Nagoya)**
US 06/06 (LSTC) **9th International LS-DYNA Users Conference**

Hardware & Computing and Communication Products

www.amd.com

www.fujitsu.com

www.hp.com



www-1.ibm.com/servers/deepcomputing

www.intel.com

www.nec.com

www.sgi.com

www.cray.com

Software Distributors

Alphabetical order by Country

Australia	**Leading Engineering Analysis Providers** www.leapaust.com.au
Canada	**Metal Forming Analysis Corporation** www.mfac.com
China	**ANSYS China** www.ansys.cn
China	**MSC. Software – China** www.mscsoftware.com.cn
Germany	**CAD-FEM** www.cadfem.de
Germany	**Dyna*More*** www.dynamore.de
India	**GissETA** www.gisseta.com
India	**Altair Engineering India** www.altair-india.com
Italy	**Altair Engineering Italy** www.altairtorino.it
Italy	**Numerica SRL** www.numerica-srl.it
Japan	**Fujitsu Limited** www.fujitsu.com
Japan	**The Japan Research Institute** www.jri.co.jp
Japan	**CRC Solutions Corp.** www.engineering-eye.com
Korea	**Korean Simulation Technologies** www.kostech.co.kr
Korea	**Theme Engineering** www.lsdyna.co.kr

Software Distributors (cont.)

Alphabetical order by Country

Netherlands	**Infinite Simulation Systems B.V** www.infinite.nl
Russia	**Strela, LLC** www.ls-dynarussia.com
Sweden	**Engineering Research AB** www.erab.se
Taiwan	**Flotrend** www.flotrend.com.tw
Turkey	**FIGES** www.figes.com.tr
USA	**Altair Western Region** www.altair.com
USA	**Engineering Technology Associates** www.eta.com
USA	**Dynamax** www.dynamax-inc.com
USA	**Livermore Software Technology Corp.** www.lstc.com
USA	**ANSYS Inc.** www.ansys.com
UK	**Oasys, LTD** www.arup.com/dyna/

Consulting and Engineering Services

Alphabetical Order By Country

Australia Manly, NSW www.leapaust.com.au	**Leading Engineering Analysis Providers** Greg Horner info@leapaust.com.au 02 8966 7888
Canada Kingston, Ontario www.mfac.com	**Metal Forming Analysis Corporation** Chris Galbraith galb@mfac.com (613) 547-5395
India Bangalore www.altair-india.com	**Altair Engineering India** Nelson Dias info-in@altair.com 91 (0)80 2658-8540
Italy Torino www.altairtorino.it	**Altair Engineering Italy** sales@altairtorino.it
Italy Firenze www.numerica-srl.it	**Numerica SRL** info@numerica-srl.it 39 055 432010
UK Solihull, West Midlands www.arup.com	**ARUP** Brian Walker brian.walker@arup.com 44 (0) 121 213 3317
USA Irvine, CA www.altair.com	**Altair Engineering Inc. Western Region** Harold Thomas info-ca@altair.com
USA Windsor, CA www.schwer.net/SECS	**SE&CS** Len Schwer len@schwer.net (707) 837-0559

Educational & Contributing Participants

Alphabetical Order By Country

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Italy	Professor Gennaro Monacelli	Prode – Elasis & Univ. of Napoli, Frederico II
Russia	Dr. Alexey I. Borovkov	St. Petersburg State Tech. University
USA	Dr. Ted Belytschko	Northwestern University
USA	Dr. David Benson	University of California – San Diego
USA	Dr. Bhavin V. Mehta	Ohio University
USA	Dr. Taylan Altan	The Ohio State U – ERC/NSM
USA	Dr. Ala Tabiei	University of Cincinnati
USA	Tony Taylor	Irvin Aerospace Inc.

Informational Websites

The LSTC LS-DYNA Support site
www.dynasupport.com

FEA Informationwebsites	www.feainformation.com
TopCrunch – Benchmarks	www.topcrunch.org
LS-DYNA Examples (more than 100 Examples)	www.dynaexamples.com
LS-DYNA Conference Site	www.ls-dynaconferences.com
LS-DYNA Publications to Download On Line	www.dynalook.com
LS-DYNA Publications	www.feapublications.com
LS-DYNA CADFEM Portal	www.lsdyna-portal.com.

Archived News Page

June 2005

June 06, 2005

SGI: New Silicon Graphics Prism Deskside

ETA/VPG

Gisseta: Distributor – India

Flotrend: Distributor – Flotrend

Kostech: Distributor - Korea

June 13th

JRI: Japanese User Conference, November 29-30

Oasys: Oasys Primer pre processor

DYNAmore: Distributor – Germany

Altair: Distributor – Italy

FIGES: Distributor - Turkey

June 20th

HP: HP9000 server family

INTEL: **Intel® Extended Memory 64 Technology**

Numerica: Distributor – Italy

CAD-FEM GmbH: Distributor – Germany

INFINITE: Distributor – Netherlands

LEAP: Distributor - Australia

June 27th

AMD: AMD Technology

Fujitsu: PRIMEPOWER 2500

MFAC: Distributor – Canada

ERAB: Distributor – Sweden

Dynamax: Distributor – USA

THEME: Distributor - Korea