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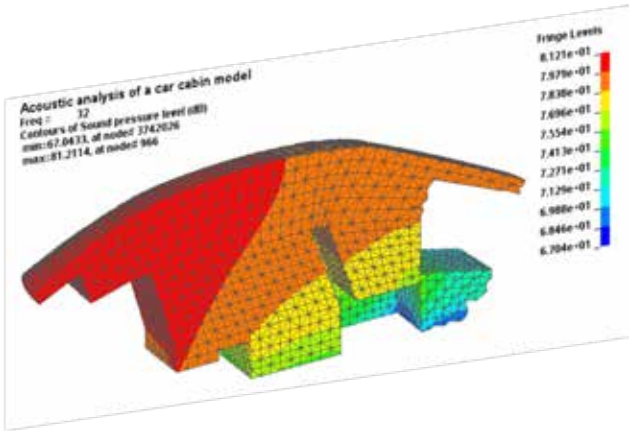
FEA Information Engineering Solutions

Volume 4, Issue 02, February 2015

Implicit LS-DYNA Part III



LS-DYNA China User's Conference

Soil Structure LS-DYNA

Dr. Peter Schmitt Executive Vice President, Sales & Operational Marketing of ESI Group

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

FEA Information Inc. Publishes:

FEA Information Engineering Solutions
FEA Information Engineering Journal
FEA Information China Engineering Solutions

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

FEA Information China Engineering Solutions

The first edition was published February 2012. It is published in Simplified and Traditional Chinese in pdf format.

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FEA Information Engineering Journal: ISSN #2167-1273

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Announcements

IMPLICIT Part 3 by By Yun Huang, LSTC

(part3 Presentation, contact huang@lstc.com - Subject line Part 3)

ABSTRACT SUBMISSION DEADLINE EXTENDED TO MARCH 6th

European LS-DYNA Conference - 10th European LS-DYNA Conference

June 15 - 17 2015, Würzburg, Germany

The deadline for abstract submission for the European LS-DYNA Conference will be extended to 6 March.

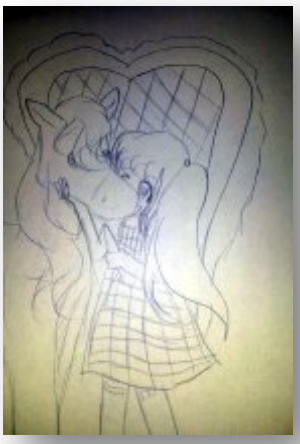
TopCrunch HPC Performance - Vendor/Submitter: ARD, Inc./CAE Team

Book - Finite element analysis of machining parameters in milling of Ti6AL4V Paperback by Moaz H. Ali (Author)

LSTC Classes – Michigan - Announcement by Aleta Hays – classes@lstc.com

Class Registration Form in pdf format – send in now!

- **March 3rd - ICFD_Day 1 : Introduction to CFD and CFD Applications**
- **March 4th ICFD_Day 2 : Focus on FSI and Heat Transfer**
- **March 5th Electromagnetism**
- **March 30th -31st NVH & Frequency Domain Analysis**
- **March 23rd Intro to LS-PrePost**
- **March 24th – 27th Intro to LS-DYNA**



Drawing by Ariane Kayvantash

"I love My Horse"

Ariane is the daughter of Agnes Bellini (a/k/a Kayvantash)

Acoustic solvers

(Implicit Part 3 by Yun Huang –
For part 1-2 contact huang@lstc.com – Subject Line "Part 1-2"

Acoustic analysis is very common in industry. The acoustic problems can range from vibro-acoustics, to acoustic radiation, reflection, and scattering, etc. Typical examples include NVH analysis of automotives, transmission loss analysis of mufflers, and acoustic design of auditoriums.

In LS-DYNA, both boundary element methods (BEM) and finite element methods (FEM) have been implemented to solve the acoustic problems in frequency domain:

- BEM (keyword: *FREQUENCY_DOMAIN_ACOUSTIC_BEM)
- FEM (keyword: *FREQUENCY_DOMAIN_ACOUSTIC_FEM)

This article provides a brief introduction of these acoustic solvers.

BEM Acoustics

The theory of BEM acoustics is based on Helmholtz integral equation. It is used for linear, homogeneous, steady state acoustic problems. It can be combined with transient dynamic solver or frequency domain vibration solver (*FREQUENCY_DOMAIN_SSD) of LS-DYNA to solve a vibro-acoustic problem (where the acoustic wave is excited by vibrating panels), or solve a pure acoustic problem with user-defined boundary conditions.

Several solution methods are provided under this category. They include

1. Rayleigh method
2. Kirchhoff method
3. Variational indirect BEM
4. Collocation BEM
5. Collocation BEM with Burton-Miller formulation for exterior problems.

Where, methods 1 and 2 are approximate methods and can provide a fast solution for some simple problems. Methods 3-5 require a frequency-dependent complex equation system to be set up and solved. Thus they are more expensive than methods 1 and 2 in terms of CPU and memory cost. On the other hand they can provide more accurate results and are more flexible than methods 1-2. All the methods have been extended to MPP (massive parallel processing) so that they can be used to solve large scale problems with a wide range of frequencies involved.

A list of options have been added to the keywords:

- ATV
- MATV
- HALF_SPACE
- PANEL_CONTRIBUTION

so that the BEM acoustic solver can work with ATV (acoustic transfer vector), MATV (modal acoustic transfer vector), and a reflecting boundary condition defined by half space, and can be used to perform acoustic panel contribution analysis.

The BEM acoustic solver can work with another keyword *FREQUENCY_DOMAIN_ACOUSTIC_INCIDENT_WAVE to solve acoustic scattering problems. It can also work with *BOUNDARY_ACOUSTIC_MAPPING to take care of the cases when the acoustic mesh and the structural mesh are not matching in a vibro-acoustic problem. It can also work with *FREQUENCY_DOMAIN_ACOUSTIC_SOUND_SPEED, so that it can use a frequency dependent complex sound speed in computation, to take into account the damping in the acoustic system.

For post-processing, the acoustic pressure and sound pressure level at user selected field points are saved in ASCII xyplot files: Press_Pa and Press_dB. A binary plot database D3ACS is provided to show the fringe plot of acoustic pressure and nodal velocity on the surface of the acoustic volume. For ATV analysis, a binary plot database D3ATV is provided to show the fringe plot of ATV vectors. D3ACS and D3ATV are defined by keyword *DATABASE_FREQUENCY_BINARY*_{OPTION}*.

For a sample problem, we consider a simplified engine model shown in Figure 1. The engine model is constrained to a table via the base nodes. Time harmonic nodal force is applied to the engine at the node A for the range of frequency 1000 – 3000 Hz, in y direction, as shown in Figure 1.

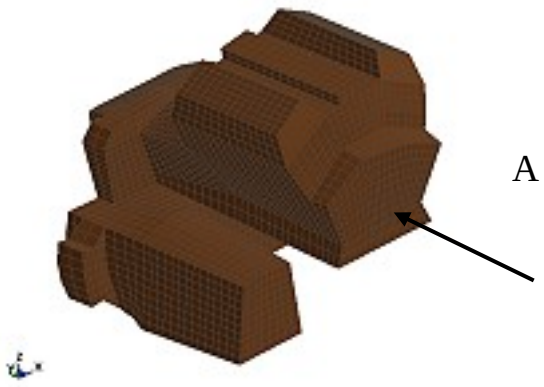


Figure 1. **A simplified engine model** subjected to time harmonic nodal force

The radiated noise is computed for pre-defined field points on a semi-sphere (radius 1 m) surrounding the engine model. The fringe plots of the acoustic pressure (real part) at the frequencies 1000 Hz and 2000 Hz are given in Figures 2 and 3.

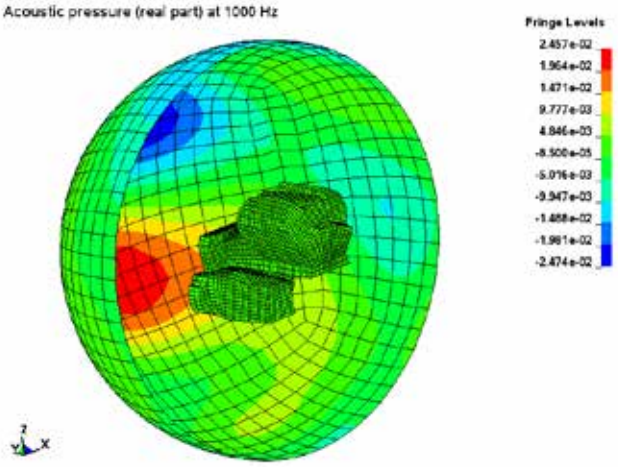


Figure 2. Acoustic pressure at 1000 Hz.

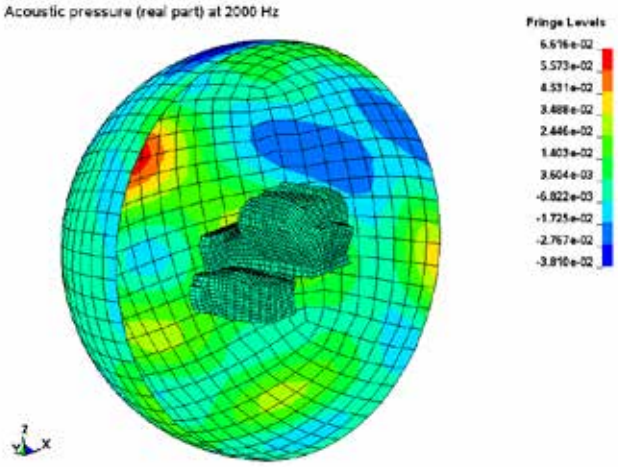


Figure 3. Acoustic pressure at 2000 Hz.

For another example, we study the noise within the passenger compartment of a car. The acoustic volume of the compartment is shown in Figure 4.

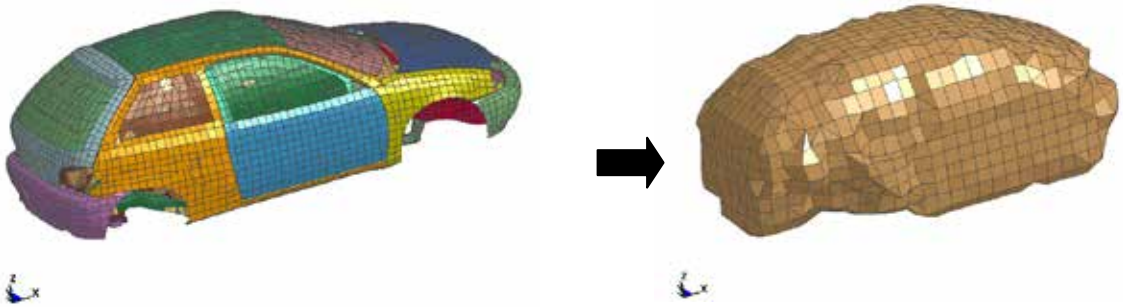


Figure 4. Acoustic volume of the passenger compartment

With the collocation BEM one can get the distribution of acoustic pressure (real part, imaginary part, or dB) as well as nodal normal velocity on the surface of the acoustic volume. Figure 5 shows the fringe plot of the acoustic pressure at the frequency 400 Hz.

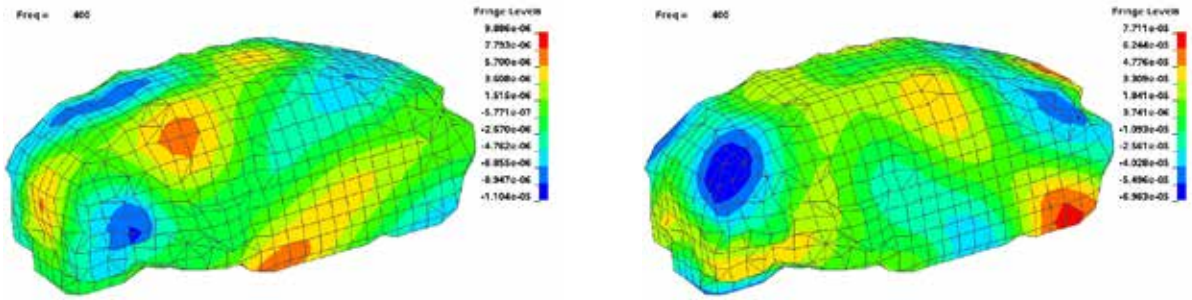
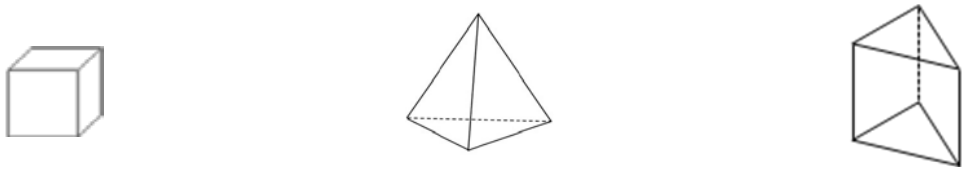


Figure 5. Surface acoustic pressure at 400 Hz (left: real part; right: imaginary part)

FEM Acoustics

As an alternative to the BEM acoustic solver, the FEM acoustic solver is more applicable to interior acoustic problems. Three types of elements are available, as shown in Figure 6 below:



Hexahedron Tetrahedron Pentahedron

Figure 6. Three types of acoustic elements

Similar to the BEM acoustic solver, the FEM acoustic solver is also used for linear, steady state acoustic problems. It can be combined with transient dynamic solver or frequency domain vibration solver (*FREQUENCY_DOMAIN_SSD) of LS-DYNA to solve a vibro-acoustic problem. It can also solve a pure acoustic problem with user specified boundary conditions (velocity, pressure, or acoustic impedance). The results are also saved in the ASCII xyplot files Press_Pa and Press_dB, and the binary plot database D3ACS, which are accessible by LS-PrePost$^{\text{Ò}}$.

(Implicit Part 3 by Yun Huang –
For part 1-2 contact huang@lstc.com – Subject Line “Part 1-2”

For the example shown in Figure 7, we consider a simplified auto compartment model. Velocity boundary condition is defined on the base panel, as shown in Figure 8. Due to the existence of seats and other structures in the compartment, the geometry of the interior cavity can be very complicated. So tetrahedron elements are used in this case.

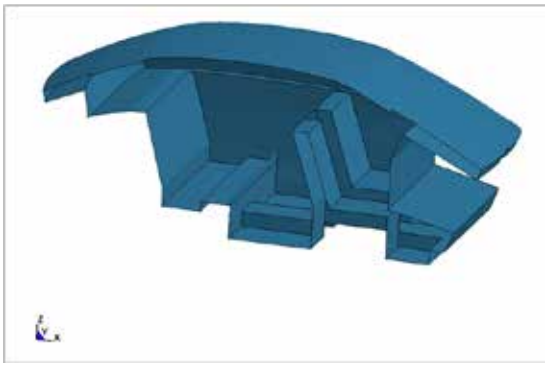


Figure 7. Internal acoustic volume

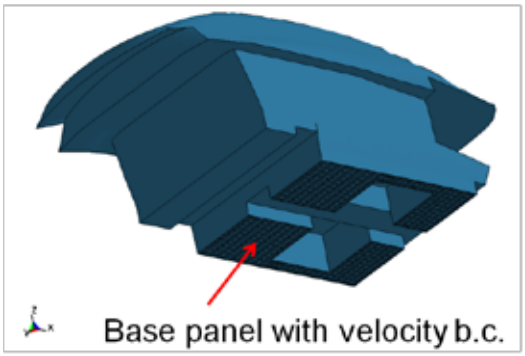


Figure 8. Velocity boundary condition

With the FEM acoustic solver, one can obtain the acoustic pressure distribution in the volume, for each excitation frequency.

The results (Sound Pressure Level, unit: dB) at frequency 32 Hz are given in Figure 9.

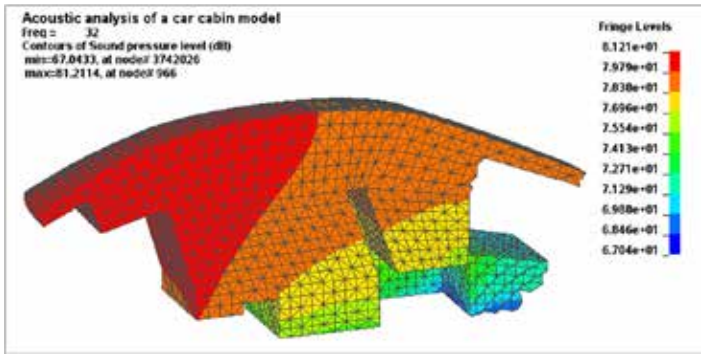


Figure 9. Sound Pressure Level distribution in the compartment

SURVEY

We are taking suggestions on the one day training/information classes below.

Please fill out below and fax to: Classes 925 449 2507, or pdf to vic@lstc.com

Please check your preferences

1 Day Training/Information Class	**Location MI**	**Location CA**	**On Line Webinar**
Easy Set Up - Metal Forming Applications			
Dummy Positioning – restraint systems and barriers			
Airbag Folding			
Roller Hemming			
THUMS Positioning			
Advanced Options LS-PrePost			
Simplified Blast Capabilities – (load-blast, enhanced_load_blast…)			
Debugging models			
Feel free to write SUGGESTIONS below for a one day training/information course on a capability in LS-DYNA you are interested in.			

Nov. 9th -11th , 2015 Shanghai, China

LSTC proudly announces
2nd China User's Conference

Shanghai, China
Nov 11 to 19, 2015

2015 2nd China LS-DYNA User's conference

The 2nd conference will echo the success of the well-participated 1st China User's Conference , 2013.

Accompanied by the rapid growth of CAE applications in China, LS-DYNA is highly recognized as one of the most widely used finite element analysis software by Chinese users. China is gaining momentum and recognition in Finite Element Analysis. In the past years, the continuing expansion of application areas has been gaining in automotive, die and mold, aerospace and aeronautics industries in China.

In China LS-DYNA is fast becoming the software of choice, by all engineering users, students, professors and consulting companies. It is recognized that LS-DYNA, LS-PREPOST, LS-OPT and the LSTC ATD and Barrier Models, developed by LSTC, are setting standards for the finite element simulation industry. At the conference LSTC software new features will be introduced and helpful techniques will be shared.

The conference will be attended by experienced users from different industries, LSTC technical support engineers and LSTC software developers. Additionally it will be attended by academic researchers, hardware vendors and software vendors.

With the popularity and attendance of the 1st conference and demand from users the conference will be held regularly. One of the goals is to serve as a convenient platform for people in this field to exchange their ideas, share their findings and explore new software functions.

The conference aims to prompt the interaction and communication between developers and end users.

Hosts:
Livermore Software Technology Corp.
Dalian Fukun Technology Development Corp.

Date: Nov. 9th -11th , 2015
Training: Nov. 12th -13th , 2015

Location:
InterContinental Shanghai Pudong,
Shanghai, China

The conference organizers wholeheartedly welcome your paper submission and attendance.

Paper submission:
Please send your one to two page abstract or full paper to chinaconf@lstc.com .

- Submission can be in Chinese or English.
- Submission of both Chinese and English versions are greatly appreciated but not mandatory.
- Include email address.

Abstract submission deadline:
Aug.10th , 2015
Notice of acceptance deadline:
Sept. 10th , 2015
Full paper submission deadline:
Oct. 10th , 2015
Conference website: http://www.lsdyna.cn
Contact us: chinaconf@lstc.com

In association with:
- ETA, Shanghai, China
- ARUP, Shanghai, China
- Hengstar Technology, Shanghai, China

Exhibitor Atrium Conference Area

2015

2nd China LS-DYNA Users' Conference

Nov. 9th-11th, 2015 Shanghai, China

Sponsorships - Exhibitor Booths

Reserve your participation at the 2nd China LS-DYNA Users' Conference.
Contact: chinaconf@lstc.com

Sponsorships include the exhibitor booth and sponsors will be highly visible through the conference date in both FEA Information Engineering Solutions and the Chinese Edition published in China.

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Reserve your Sponsorship and/or booth now in the Atrium - chinaconf@lstc.com

Fracture, Damage and Failure Using LS-DYNA - NEW COURSE OFFERING

This course will allow LS-DYNA users to model Fracture, Damage, and Failure. The different methodology to model failure and fracture in LS-DYNA will be presented and discussed. All formulation in LS-DYNA including Lagrangian, Eulerian, SPH, SPG, XFEM, EFG, and the DEM methods etc. will be discussed. Various examples will be presented.

Course Outline

- Chapter-1
  Introduction & Historical Review
  - Brittle Failure
  - Ductile Failure
- Chapter-2
  Fundamental Theoretical Concepts
  - Failure Theories
  - Damage Models
  - Fracture Mechanics
- Chapter-3
  Material Models with Failure & Damage
- Chapter-4
  Fracture & Computational Methods
- Chapter-5 Element Erosion; Advantages & Short Comings
- Chapter-6
  Current Capabilities to Model Failure & Damage
  - Lagrangian
  - Eulerian & ALE
  - SPH
  - SPG
  - XFEM
  - EFG
  - DEM
- Chapter-7
  Current Capabilities to Model Fracture
- Chapter-8
  Damage Verification Examples
- Chapter-9
  Fracture Verification Examples

- Chapter-10
  Other Capabilities
- Chapter-11
  Modeling Delamination and Debonding
  - Cohesive Elements
  - Tied Contact with Failure
- Chapter-12
  Summary and Concluding Remark
- Chapter-13
  References and Other Courses
- Chapter-Appendix-1
  - Failure Strain Versus Tri-axiality for Some Material (will not be discussed)
- Chapter-Appendix-2
  - Finite Element in Fracture Mechanics (will not be discussed)

Workshop

There will be several examples, which are designed to understand and reinforce the lectures and the concepts presented in the course.

Additional Courses Offered On-Line

- Advance Impact Using LS-DYNA
- Blast and Penetration In LS-DYNA
- Fluid Structure Interaction In LS-DYNA
- Implicit In LS-DYNA
- Material Models In LS-DYNA
- User Defined Material In LS-DYNA

Tutorials On the Website

- LS-PRE Tutorial
- LS-POST Tutorial
- Running LS-DYNA Tutorial

The Numerical Simulation Conference
33rd CADFEM Users' Meeting
June 24th and 26th, 2015.

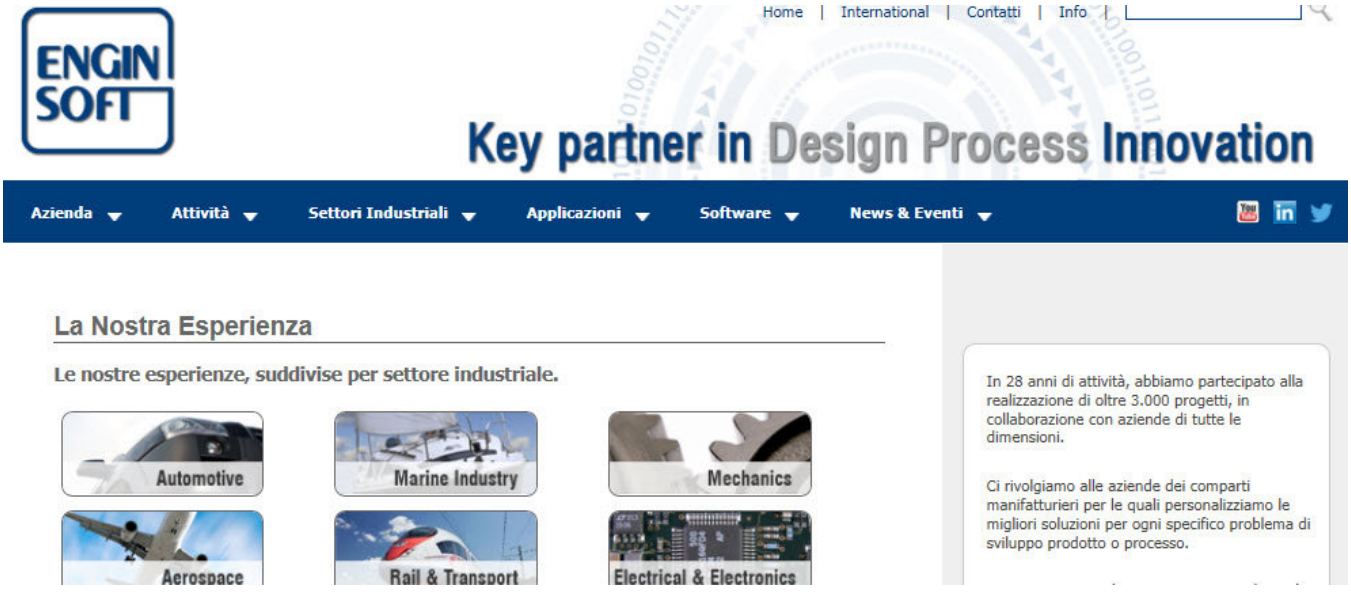
When it comes to numerical simulation in product development, the place to be is the city of Bremen, Germany.

CADFEM GmbH & ANSYS Germany GmbH would like to invite you to the Numerical Simulation Conference between June 24th and 26th, 2015. As a simulation expert, beginner or simply an interested party, you can experience the complete range of simulation technology as a tool for quality, innovation and time-saving in product developments of today and the future.

You can expect a packed and varied agenda at our ANSYS Conference & 33rd CADFEM Users' Meeting – from ANSYS, from CADFEM and from the world of simulation: Technology updates, contributions from users from various sectors and fields of simulation, as well as compact seminars on topical subjects. You can also look forward to the big CAE exhibition, the intensive exchange and dialog with like-minded people and as always an attractive supporting program. Let the conference inspire you to new ideas. Or why not inspire others by making your own contribution to one of the biggest conferences on numerical simulation in Europe. We would like to invite you to send us your papers on the named topics for Thursday, June 25th. If you register before February 2nd, 2015, you will profit from an early-bird discount of 10% either as a speaker or participant. We are looking forward to some great papers, curious trade visitors and exhibitors with some interesting special offers.

Find out everything you need to know about the event at www.usersmeeting.com/en

www.dynasplus.com



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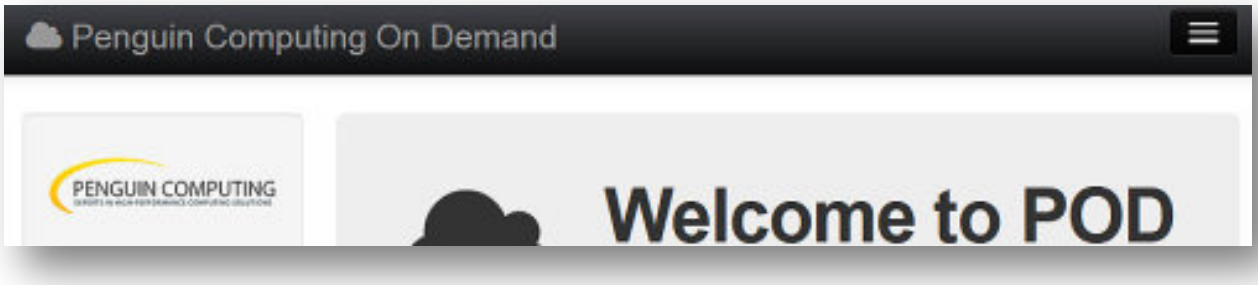
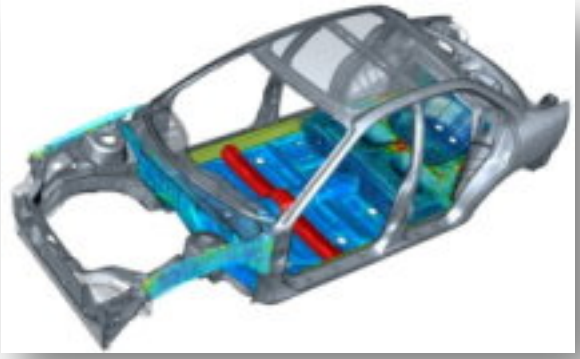


Penguin's On-Demand HPC Cloud **www.penguincomputing.com/**

BETA CAE ANSA & µETA v15.2.3 BETA CAE

www.beta-cae.gr/news/20150209_announcement_ansa_meta_v15.2.3.htm



BETA CAE System S.A. announces the release of v15.2.3 of ANSA / µETA pre- and post- processing suite.

This maintenance release focuses on the correction of identified problems and issues for ANSA and µETA.

Understanding the Software Release Schedule

The plan

We are committed in delivering improved and enhanced software releases, the soonest possible, in order to meet the requirement of our customers for the continuous improvement of their experience and work. Therefore, we are working in releasing new software versions with code corrections, new software features and enhancements, in regular, frequent intervals.

- A major software version is released every year.
- First point releases, such as v15.1.0, v15.2.0 and so on, with code corrections but also with additional software features and enhancements are released every three months.
- Second point releases, such as v15.2.1, v15.2.2, v15.2.3 mainly with code corrections only upon their parent first point release, are scheduled on a monthly basis.

Each software release is accompanied by a detailed description of the introduced corrections and/or additions so that our customers can decide whether it is critical to implement this release in their environment.

This release

This release of v15.2.3 implements enhancements and code corrections on v15.2.0 and v15.2.2.
Note that ANSA / µETA v15.2.1 had been revoked.

Known issues resolved in ANSA

GUI

The Feature selection toolbar issue, when saving and loading .xml files with labels activated, has been resolved.

Data Management

- Input: Plmxml files containing more than one top level items, might not be handled correctly.
- Multi-selected parts, when saved in DM, would be assigned the same version, if “Apply to all” was selected.

Mesh

Zone Cut: Gradual definition performance has been significantly enhanced. Applying ZoneCut, could affect neighboring frozen mesh. Applying Project in mode 'Create zones' could result in unexpected termination.

Volume mesh

- Volume mesh might not respect the Size Boxes' Growth Rate.
- Structured Mesh: Applying Rotate using an axis collinear to the extruded elements' edges, could result in unexpected termination.
- Tools Conv2Poly: The procedure exhibited excessive memory utilization.
- Improvements of TetraRapid implementation of growth rate for a wider range of values.

DECKs

- Opening a TABLE, with large number of points, exhibited significant delay.
- NASTRAN / SOL200: Algorithm selection was missing from the Simulate and DOE window.
- Abaqus / STEP: Contact variables: CNAREA, CLINELOAD, CDISPETOS, CSTRESSERI and CSTRESSETOS, were missing from the *CONTACT OUTPUT keyword's variables list.

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

Known issues resolved in µETA

Supported interfaces

- Abaqus 6.14 .odb files could not be read on MS-Windows workstations.
- ANSYS results on nodes of 1st order pyramid elements were incorrect.
- Column ASCII result labels might not be read correctly.
- Universal file results on nodes with assigned coordinate systems might be wrong.

Section Forces

Incorrect Section forces calculated on nodes with assigned coordinated systems.

2D Plot

- Unexpected termination could occur when plotting ASCII results from Nastran PLT files.
- Curves from specific HDF files could not be plotted.
- Displacement from coordinates curves from ERF1 files could not be plotted.

Report

Unexpected termination might occur when saving a PPTX report that contained slides with grouped shapes.

Compatibility and Supported Platforms

- ANSA files saved by all the first and second point releases of a major version are compatible to each other. New major versions can read files saved by previous ones but not vice versa.
- The .metadb files saved with µETA version 15.2.3 are compatible and can be opened by earlier versions of µETA.
- Support for 32-bit platform has been discontinued for all operating systems.

Download

Where to download from and What to download

Visit www.beta-cae.gr/news/20150209_announcement_ansa_meta_v15.2.3.htm

www.lstc.com/applications/soil_structure/ Ushnish Basu

Concrete dams, nuclear power plants, high-rise buildings and bridges vibration between structure and soil need to be modeled accurately

Large civil structures such as concrete dams, nuclear power plants, high-rise buildings and bridges are massive enough that their vibration due to earthquake excitation affects the motion of the soil or rock supporting them, which in turn further affects the motion of the structure itself. This interaction between the structure and the soil needs to be modelled accurately in order to design earthquake resistant structures and to correctly evaluate the earthquale safety of existing structures.

Historically, engineering analysis of such soil-structure interaction has had several impediments: (i) limited knowledge of the relevant earthquake faults and of the regional geological features required to fully characterize the incoming earthquake ground motion, (ii) lack of accurate earthquake input methods in existing analysis software, and (iii) inability to efficiently model the unbounded soil domain.

.

LS-DYNA now has a novel method for soil-structure interaction analysis that applies the earthquake forces in an efficient and rational manner and models the unbounded domain accurately at low computational cost, given a free-field ground motion characterizing an earthquake. It uses the effective seismic input method to incorporate the earthquake forces into the soil-structure model, using only the free-field ground motion at the soil-structure interface, and not requiring any deconvolution down to depth unlike older methods of earthquake input. The unbounded domain is modeled using perfectly matched layers, which absorbs the outward-propagating waves almost perfectly with only a slight increase in cost from the classical Lysmer dashpot boundaries. These pages explain and demonstrate these techniques for seismic soil-structure interaction analysis in LS-DYNA

Marcia Swan swan@datapointlabs.com

/www.testpaks.com/Datapoint_v211.htm Volume 21.1

For complete articles and full graphics resolution

DatapointLabs Celebrates 20 Years of Putting Materials into Product Design

With grateful thanks for the support of our clients and partners, DatapointLabs marks the twentieth anniversary of our founding and the start of our third decade of providing the material properties required for new product development, CAE, and R&D.

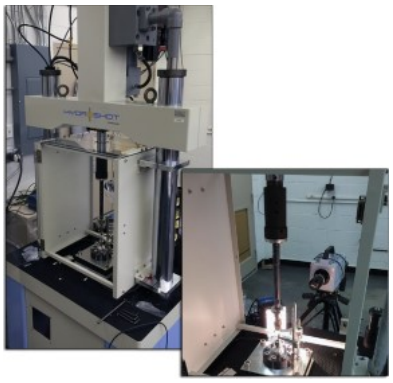
Through our first 20 years, we have continuously pushed boundaries to expand our capabilities—in testing technology and methods, as well as in the types of materials tested. We now serve a growing global clientele of more than 1200 companies in 35 countries. We partner with more than 20 software providers to support more than 30 codes with TestPaks® to provide load & go material properties and formatted material input cards for CAE and FEA. Our seasoned, expert technical team operates an ISO 17025 certified laboratory to test virtually any materials used in the products of today—and tomorrow.

Today, DatapointLabs and its affiliate, Matereality, together provide material properties testing and software for material data visualization, CAE parameter conversion, and materials information management for manufacturing enterprises.

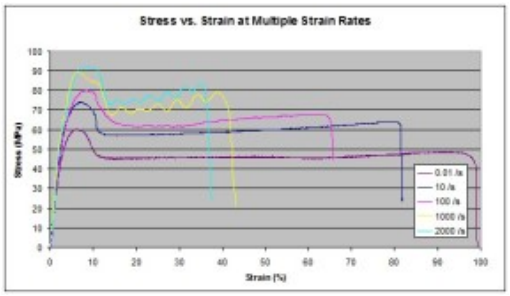
Very High Strain-Rate Tensile Testing Up to 1000 /s

In our 20th anniversary year, DatapointLabs is the first commercial laboratory in the US to offer dynamic tensile testing at speeds up to 20 m/s.

The company has just brought into service a new, high-speed tensile testing machine from Shimadzu. Dynamic properties are becoming extremely important as fundamental data for product design and R&D, particularly in the automotive, consumer products, electronic, and appliances industries, where product safety and reliability considerations are of paramount concern.



Coupled with the installation of a Photron SA5 camera, which is able to capture up to one million frames per second, DatapointLabs can now employ non-contact video extensometry to measure data at strain rates as high as 1000 /s.



The M-235 Very High Speed Tensile Stress-Strain test can be added to existing TestPaks® for rate dependent applications, such as Abaqus *Rate Dependent, Digimat MX Crash (EVP), LS-Dyna MAT24 and SAMP-1, and MSC.Dytran DYMAT24 models, and PAM-CRASH software (G-174, G-520, G-602, G-712, G-771, G-778, and G-871).

Hubert Lobo to Present at SPE Fellows Forum

DatapointLabs founder and SPE Fellow Hubert Lobo will talk about Challenges in the Modeling of Plastics in Computer Simulation at the Fundamentals in Plastics forum presented by SPE Fellows at ANTEC® Orlando 2015, which takes place on March 23-25, 2015 in conjunction with NPE 2015 in Orlando, FL.

Abstract: Finite-element analysis and injection-molding simulation are two technologies that are seeing widespread use today in the design of plastic components. Limitations exist in our ability to mathematically describe the complexity of polymer behavior to these software packages. Material models commonly used in finite-element analysis were not designed for plastics, making it difficult to correctly describe non-linear behavior and plasticity of these complex materials. Time-based viscoelastic phenomena further complicate analysis. Dealing with fiber fillers brings yet another layer of complexity. It is vital to the plastics engineer to comprehend these gaps in order to make good design decisions. Approaches to understanding and dealing with these challenges, including practical strategies for everyday use, will be discussed.

[Dr. Peter Schmitt is appointed Executive Vice President, Sales & Operational Marketing of ESI Group]

- 20 years of experience on the PLM software market
- Substantial expertise in sales strategies among industrial leaders
- International profile and in-depth knowledge of the Americas

Dr. Peter Schmitt is joining the ESI Group as Executive Vice President (EVP), Sales and Operational Marketing. In that role he will contribute to the Group's international distribution and Go-to-Market strategy. He will notably be responsible for implementing new marketing strategies whilst optimizing the business models for the Group's various innovative solutions and associated services. His expertise in terms of management and execution and proven track record in the field of technological solutions for major automotive and aeronautics enterprises, position him to contribute materially to the successful implementation of the ambitious development plans of ESI.

Alain de Rouvray, the ESI Group's Chairman and CEO, says: "We are delighted to welcome Dr. Peter Schmitt to our corporate management team to strengthen its commercial dimension. His substantial experience in implementing global sales and marketing strategies among major industrial players, his dual European and American culture, and his proven market knowledge represent solid assets that will enable ESI to further expand its current collaborations whilst deploying innovative solutions with proven value amongst new partners and new customers."

Peter Schmitt is a graduate of the Karlsruhe Technical University and he received a doctorate in manufacturing engineering from the University of Stuttgart. After spending 5 years at the Fraunhofer Institute in Stuttgart, he joined Delta Industrie Informatik GmbH as Vice President, Sales. After its acquisition by Dassault Systèmes in 2000, he became Managing Director of DELMIA GmbH and then Vice President, Marketing and Business Development with Dassault Systèmes Delmia and was later appointed Vice President, Sales Americas in Manufacturing Business segment of Dassault Systèmes

Peter Schmitt concludes: “I am eager to contribute to the development of ESI, which I see as the leader and visionary in the virtual prototyping market. The transformational nature of ESI solutions, together with the culture of technological innovation that strongly permeates the company rapidly convinced me to join. I am confident that my 20 years of experience, gained notably in the PLM market, equip me to contribute substantially to the execution of ESI’s ambitious and exciting plans".

ESI releases Virtual Seat Solution, a unique software solution dedicated to seat prototyping

Helping develop safe, lightweight and comfortable seats at first try-out

Presentations are now available to download
http://www.oasys-software.com/dyna/en/events/users_jan-15/users_jan-15.shtml

Oasys LS-DYNA UK Users' Meeting 2015: The twelfth in a series of update meetings for Oasys LS-DYNA Users was held at our office in Solihull on Thursday 22nd January 2015 - many thanks to all who attended.

The day brought together over 80 users of the Oasys and LS-DYNA software to obtain information on upcoming features of Oasys and LS-DYNA and to learn more about current and new applications.

Attendees enjoyed talks from Inaki Caldichoury of LSTC, Thomas Borrvall of DYNAmore Nordic, Christophe Bastien of Coventry University, as well as the Oasys Software Development team.

The event was followed by a complimentary meal at The Boot Inn in Lapworth kindly sponsored by OCSL.

Presentations - Presentations are now available to download; click on the relevant talk in the agenda below. For some presentations only a revised version is available.

Session 1
Introduction and General Update
Brian Walker, Arup

LS-DYNA for Incompressible CFD analysis (ICFD): Recent Developments, Application Areas, Validation and Roadmap
Inaki Caldichoury, LSTC

Session 2
Oasys PRIMER Update -
Gavin Newlands, Arup

Session 3
Capabilities for the Electromagnetics Solver (EM) and the Compressible Fluid Solver (CESE) in LS-DYNA
Inaki Caldichoury, LSTC

Oasys Post-Processing Update: D3PLOT, T/HIS & REPORTER
Roger Hollamby/Chris Archer, Arup

Session 4
Current Status of Subcycling and Multiscale Simulations in LS-DYNA
Thomas Borrvall, DYNAmore Nordic

Finite Element Human Computer Models in Vehicle Safety Applications
Christophe Bastien, Coventry Univ.

www.gompute.com/events/gum2014 May 5th – 6th, 2015

Gompute User Meeting is an event that gathers all aspects related to Simulation and Technical Computing.

Gompute User Meeting 2015

- Discover the latest simulation and HPC software developments.
- Learn about how the Gompute software delivers comprehensive HPC and where it is used.
- Meet experienced analysts.
- Learn about the state of the art on commercially available computing services.
- Meet colleagues active in the field of technical computing and simulation.
- Attend workshops on latest techniques in HPC and simulation tools.

At the 2015 Gompute User Meeting, Engineers, Scientific Users, Designers, contractors, Analysts, Academics, Managers and Executives will meet up to share best practices and tips from their simulation experience.

This convention of Comprehensive Technical Computing is free of charge for attendes, and here you can meet engineers and experts of several related fields in order to improve your engineering and simulation skills.

Topics:

- Simulation Tools,
- Simulation techniques,
- Computing hardware,
- Linux for High Performance Computing,
- HPC Cloud,
- Remote Visulization

Venue:

Elite Park Avenue Hotel
Kungsportsavenyen 36-38
Gothenburg, Sweden

www.topcrunch.org/

The TopCrunch project was initiated to track the aggregate performance trends of high performance computer systems and engineering software

Instead of using a synthetic benchmark, actual engineering software applications are used with real data and are run on high performance computer systems. The data are available for download in the form of data files for our current software suite. The results of the benchmarks are available as submitted, and may be searched by data, code name, and year

Submitted During February to TopCrunch

Vendor/Submitter ARD, Inc./CAE Team

Intel Core i7 5960X

Benchmark Problem: 3 Vehicle Collision

Computer/Interconnect	#Nodes x #Processors per Node x #Cores Per Processor = Total #CPU	Time (sec)
C5932256/Mellanox QDR IB	4 x 1 x 4 = **16**	3259
C5932256/Platform MPI 8.1.1	2 x 1 x 8 = **16**	3793
C5932256/Mellanox QDR IB	3 x 1 x 8 = **24**	2716
C5932256/Mellanox QDR IB	4 x 1 x 8 = **32**	2054

DYNAmore Swiss - Bernd Hochholdinger

DYNAmore Swiss in Zurich is founded by Dynamore (Germany) together with Bernd Hochholdinger.

It is a spin-off company of ETH Zurich. DYNAmore Swiss GmbH.

DYNAmore Swiss has now moved into its permanenet premises at TECHNOPARK® in Zurich and is a direct distributor of Livermore Software Technology Corporation.

DYNamore Swiss serves the Swiss market with technical support and sales of LS-DYNA, including at no additional fees; LS-PrePost, LS-TaSC and the LSTC ATD and Barrier Models..

In addition to the main stream applications of LS-DYNA in crash and metal forming, DYNamore Swiss is working with the high tech industries in Switzerland like the watch and clock industry, the medical industry and with railway and energy companies.

DYNAmore Swiss is also proud to assist renown Swiss Universities and research organizations to solve problems with LS-DYNA.

Please feel free to contact DYNAmore Swiss!

E-Mail: bh@dynamore.ch
Telephone: +41- 445157890

DYNAmore Swiss GmbH
Dr. Bernd Hochholdinger
Technoparkstrasse 1
CH-8005 Zürich

10th European LS-DYNA Conference

June 15 - 17 2015, Würzburg, Germany

We kindly invite all users of LS-DYNA, LS-OPT, LS-PrePost and LS-TaSC to take advantage of this fantastic opportunity to showcase their work. The Conference is your chance to talk with industry experts, catch up with colleagues and enjoy time exploring new ideas. In addition, attendees can meet with exhibitors to learn about the latest hardware and software trends, as well as additional services relating to the finite element solver LS-DYNA, the optimization codes LS-OPT and LS-TaSC, and the pre- and postprocessor LS-PrePost. Make sure that you will be part of the conference by submitting your abstract soon!

Conference website:
www.dynamore.de/ls-dyna2015-e
Abstract online submission:
www.dynamore.de/eu-ls-dyna-abstract-e
Flyer (pdf):
www.dynamore.de/c4p-ls-dyna2015-e

Abstract submission
Please submit an abstract (300 words) by
E-Mail to forum@dynamore.de or online at
http://www.dynamore.de/ls-dyna2015

Important dates

Abstract submission:	March 6th	2015
Final Paper Deadline	April 20th	2015

Contact and registration

DYNAmore GmbH
Industriestr. 2, D-70565 Stuttgart, Germany
Tel. +49 (0) 7 11 - 45 96 00 – 0
Fax. +49 (0) 7 11 - 45 96 00 – 29
E-Mail: forum@dynamore.de
http://www.dynamore.de/ls-dyna2015

Venue:

Würzburg is a beautiful historical city and a UNESCO World Cultural Heritage site, which is easily accessible from Frankfurt International Airport by train or by car. The Congress Centrum at the Maritim Hotel Würzburg is centrally located directly on the banks of the river Main, offering a splendid view of the Marienberg fortress. Visitors can comfortably explore the baroque inner city with its numerous sights by foot.

http://www.ec-e.pl/

EC Engineering Sp. z o.o. is one of the fastest developing design offices in Poland. It also has a status of a Research and Development Centre.

We employ over 150 well-trained engineers who participate in development of designs of the fastest trains in Germany, Italy and China, we also have engineers in Austria, Belgium, France, the Netherlands, Romania and Japan. Every year, we increase our expansion on foreign markets.

Thanks to long-term cooperation with the leading company in production of rail vehicles - Bombardier Transportation, we take part in designing a high-speed ZEFIRO train intended for the Chinese and Italian markets.

We have been the first Polish manufacturer of pantographs for over 20 years.

Recently, a heavy freight locomotive designed by our company appeared on the Polish railway tracks. According to its certification, it transports goods under the so called “supervised travels”. During tests, the locomotive presented excellent parameters, pulling the train weighing 4300 tons with ease.

Main departments of our company:

- Railways
- Aviation
- Automotive
- Software
- Production

ware sales in Poland: MSC.Software, Simufact, LS-Dyna, DynaForm, VI-Grade, LifeModeler

phone: + 48 12 341 89 41,
e-mail: software@ec-e.pl

Book FEA of machining parametersin milling of Ti6AL4V Paperback

Finite element analysis of machining parameters in milling of Ti6AL4V Paperback

by Moaz H. Ali (Author)

- Dr. Moaz H. Ali was born in Kerbela-Iraq on November 30, 1978.He received a BS in Mechanical Engineering from the Babylon University. He completed a master's degree in manufacturing processes & FEM from the University of Donetsk National Technical. He finished PHD at Universiti Tenaga Nasional (UNITEN). Now is a member of the University of Karbala.

Titanium alloys are considered as difficult metals to machine because of their properties such as corrosion resistant, lightweight, and high temperature. Titanium and its alloy have the highest strength to weight ratio. It has been recognized as an element (Symbol Ti, atomic number 22, atomic weight 47.9). Titanium alloys are applied extensively in aero-engines and especially in gas turbines, on account of their excellent combination of high specific strength, which is pointed out at high temperature, their exceptional resistance to corrosion, and their fracture resistant characteristics. Therefore, the main goal of metal cutting studies is to establish and develop a module that would enable us to predict cutting performance, such as cutting force, surface roughness, cutting temperature, and stress-strain analysis. This prediction can be estimated by using simulation software through modeling, analysis such as finite element method (FEM). Also, it optimizes the cutting process of titanium alloy by using response surface method (RSM)..

www.dynasupport.com/ **LS-DYNA Support**	Answers to basic and advanced questions that might occur while using LS-DYNA. New releases/ongoing developments.
www.dynalook.com/ **Papers**	Papers from LS-DYNA User Conferences with search option.
www.lsoptsupport.com/ **LS-OPT**	LS-OPT, developed by LSTC to interface with LS-DYNA
www.dummymodels.com/ **Dummy Models**	Detailed information on dummy models for LS-DYNA
www.topcrunch.org/ **Benchmarks**	Track the aggregate performance trends of high performance computer systems, with real data
www.dynaexamples.com/keyword-search **LS-DYNA Examples**	Examples for specific LS-DYNA keywords, with search option

BETA CAE Systems S.A. **www.beta-cae.gr**

BETA CAE Systems S.A.– ANSA

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

BETA CAE Systems S.A.– μETA

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

Solutions for:

Process Automation - Data Management – Meshing – Durability - Crash & Safety NVH - CFD - Thermal analysis - Optimization - Powertrain Products made of composite materials - Analysis Tools -

Maritime and Offshore Design - Aerospace engineering - Biomechanics

CRAY **www.cray.com**

Cray CS300-AC Cluster Supercomputer

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

The CS300-AC system features two new preconfigured ready-to-go solutions, the CS300 shared memory parallel and the CS300 large memory systems.

Cray CS300-LC Cluster Supercomputer

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

Cray XC30 Supercomputer Series

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

Cray Sonexion Scale-out Lustre Storage System

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

DatapointLabs **www.datapointlabs.com**

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

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

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

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

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

ETA – Engineering Technology Associates **www.eta.com**

etainfo@eta.com

Inventium Suite™

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

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

PreSys

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

VPG

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

DYNAFORM

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

ESI Group **www.esi-group.com**

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

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

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

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

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

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

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

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

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

Gompute on demand®/ Gridcore AB Sweden

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

Gompute is owned, developed and operated by Gridcore AB in Sweden. Founded in 2002, Gridcore is active in three areas: Systems Integration, Research & Development and HPC as a service.

Gridcore has wide experience of different industries and applications, developed a stable product portfolio to simplify an engineer/scientist's use of computers, and has established a large network of partners and collaborations, where we together solve the most demanding computing tasks for our customers. Gridcore has offices in Gothenburg (Sweden), Stuttgart (Germany), Durham NC (USA) and sales operations in The Netherlands and Norway.

The Gridcore developed E-Gompute software for internal HPC resources gives end users (the engineers) an easy-to-use and complete environment when using HPC resources in their daily work, and enables collaboration, advanced application integrations, remote pre/post, accounting/billing of multiple teams, license tracking, and more, accelerating our customers usage of virtual prototyping

.

JSOL Corporation **www.jsol.co.jp/english/cae/**

HYCRASH

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

JSTAMP/NV

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

JMAG

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

Livermore Software Technology Corp. **www.lstc.com**

LS-DYNA

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

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

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

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

LSTC Dummy Models:

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

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

Oasys Ltd. LS-DYNA Environment **www.oasys-software.com/dyna**

The Oasys Suite of software is exclusively written for LS-DYNA® and is used worldwide by many of the largest LS-DYNA® customers. The suite comprises of:

Oasys PRIMER

Key benefits:

- Pre-Processor created specifically for LS-DYNA®
- Compatible with the latest version of LS-DYNA®
- Maintains the integrity of data
- Over 6000 checks and warnings – many auto-fixable
- Specialist tools for occupant positioning, seatbelt fitting and seat squashing (including setting up pre-simulations)
- Many features for model modification, such as part replace
- Ability to position and depenetrate impactors at multiple locations and produce many input decks automatically (e.g. pedestrian impact, interior head impact)
- Contact penetration checking and fixing
- Connection feature for creation and management of connection entities.
- Support for Volume III keywords and large format/long labels
- Powerful scripting capabilities allowing the user to create custom features and processes

www.oasys-software.com/dyna

Oasys D3PLOT

Key benefits:

- Powerful 3D visualization post-processor created specifically for LS-DYNA®
- Fast, high quality graphics
- Easy, in-depth access to LS-DYNA® results
- Scripting capabilities allowing the user to speed up post-processing, as well as creating user defined data components

Oasys T/HIS

Key benefits:

- Graphical post-processor created specifically for LS-DYNA®
- Automatically reads all LS-DYNA® results
- Wide range of functions and injury criteria
- Easy handling of data from multiple models
- Scripting capabilities for fast post-processing

Oasys REPORTER

Key benefits:

- Automatic report generation tool created specifically for LS-DYNA®
- Automatically post-process and summarize multiple analyses
- Built-in report templates for easy automatic post-processing of many standard impact tests

Shanghai Hengstar

www.hengstar.com

Center of Excellence: Hengstar Technology is the first LS-DYNA training center of excellence in China. As part of its expanding commitment to helping CAE engineers in China, Hengstar Technology will continue to organize high level training courses, seminars, workshops, forums etc., and will also continue to support CAE events such as: China CAE Annual Conference; China Conference of Automotive Safety Technology; International Forum of Automotive Traffic Safety in China; LS-DYNA China users conference etc.

On Site Training: Hengstar Technology also provides customer customized training programs on-site at the company facility. Training is tailored for customer needs using LS-DYNA such as material test and input keyword preparing; CAE process automation with customized script program; Simulation result correlation with the test result; Special topics with new LS-DYNA features etc..

Distribution & Support: Hengstar distributes and supports LS-DYNA, LS-OPT, LS-Prepost, LS-TaSC, LSTC FEA Models; Hongsheng Lu, previously was directly employed by LSTC before opening his distributorship in China for LSTC software. Hongsheng visits LSTC often to keep update on the latest software features.

Hengstar also distributes and supports d3View; Genesis, Visual DOC, ELSDYNA; Visual-Crash Dyna, Visual-Process, Visual-Environment; EnkiBonnet; and DynaX & MadyX etc.

Consulting

As a consulting company, Hengstar focus on LS-DYNA applications such as crash and safety, durability, bird strike, stamping, forging, concrete structures, drop analysis, blast response, penetration etc with using LS-DYNA's advanced methods: FEA, ALE, SPH, EFG, DEM, ICFD, EM, CSEC..

Distribution/Consulting	US/Canada	Distribution/Consulting

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

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

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

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

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

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

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

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

Distribution/Consulting	Europe		Distribution/Consulting	
Italy	**EnginSoft SpA**		info@enginsoft.it	
	www.enginsoft.it			
	ANSYS	MAGMA	Flowmaster	FORGE
	CADfix	LS-DYNA	Dynaform	Sculptor
	ESAComp	AnyBody	FTI Software	
	AdvantEdge	Straus7	LMS Virtual.Lab	ModeFRONTIER
Russia	**STRELA**		info@dynarussia.com	
	LS-DYNA	LS-TaSC	LS-OPT	LS-PrePost
	LSTC Dummy Models		LSTC Barrier Models	
Sweden	**DYNAmore Nordic**		marcus.redhe@dynamore.se	
	www.dynamore.se		Oasys Suite	
	ANSA	µETA	LS-DYNA	LS-OPT
	LS-PrePost	LS-TaSC	FastFORM	DYNAform
	FormingSuite		LSTC Dummy Models	
			LSTC Barrier Models	
Sweden	**GOMPUTE**		info@gridcore.com	
	www.gridcore.se		www.gompute.com	
	LS-DYNA Cloud Service		Additional software	

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

Australia	**LEAP**			
	www.leapaust.com.au			
	ANSYS Mechanical	ANSYS CFD	ANSYS EKM	Recurdyn
	ANSYS	ANSYS HPC	FlowMaster	Ensigh
	DesignXplorer			
	LS DYNA	DYNAform	Moldex 3D	FE-Safe
China	**ETA – China**		lma@eta.com.cn	
	www.eta.com/cn			
	Inventium	VPG	DYNAFORM	NISA
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
			LSTC Barrier Models	LS-TaSC
China	**Oasys Ltd. China**		Stephen.zhao@arup.com	
	www.oasys-software.com/dyna			
	PRIMER D3PLOT	HYCRASH	T/HIS REPORTER	SHELL
	LS-DYNA	LS-OPT	LSTC Dummy Models	LS-PrePost
	DIGIMAT	FEMZIP	LSTC Barrier Models	LS-TaSC
China	**Shanghai Hengstar Technology**		info@hengstar.com	
	www.hengstar.com			
	LS-DYNA	LS-TaSC	LSTC Barrier Models	D3VIEW
	LS-PrePOST	LS-OPT	LSTC Dummy Models	
	Genesis	VisualDoc		ELSDYNA
	Visual-Crahs DYNA	Visual-Proeces		DynaX & MadyX
	Enki Bonnet	Visual Environement		

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

				LS-PrePost
				LS-TaSC

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

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

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

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

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

Taiwan **Flotrend** gary@flotrend.tw

www.flotrend.com.tw

LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
LSTC Dummy Models	LSTC Barrier Models	eta/VPG	FCM

Taiwan **APIC**

www.apic.com.tw

LS-DYNA	LS-OPT	LS-PrePost	LS-TaSC
LSTC Dummy Models	LSTC Barrier Models	eta/VPG	FCM

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

www.penguincomputing.com/services/hpc-cloud

Penguin HPC clusters are optimized for engineering workloads and offer:

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

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

https://pod.penguincomputing.com/

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

FEA, CFD and FDTD Modeling

- **LS-DYNA** / LS-PrePost LS-DYNA is an advanced general-purpose multiphysics simulation software package. Its core-competency lie in highly nonlinear transient dynamic finite element analysis (FEA) using explicit time integration. LS-PrePost is an advanced pre and post-processor that is delivered free with LS-DYNA.
- **OpenFoam:** OpenFOAM (Open source Field Operation And Manipulation) is a C++ toolbox for the development of customized numerical solvers, and pre-/post-processing utilities for the solution of continuum mechanics problems, including computational fluid dynamics (CFD).

- **ANSYS HFSS:** ANSYS HFSS software is the industry standard for simulating 3-D full-wave electromagnetic fields. Its gold-standard accuracy, advanced solver and compute technology have made it an essential tool for engineers designing high-frequency and high-speed electronic components.
- **ANSYS Fluent** ANSYS Fluent software contains the broad physical modeling capabilities needed to model flow, turbulence, heat transfer, and reactions for industrial applications.
- **Star-CD** and **Star-CCM+:** STAR-CCM+ is CD-adapco´s newest CFD software product. It uses the well established CFD solver technologies available in STAR-CD, and it employs a new client-server architecture and object oriented user interface to provide a highly integrated and powerful CFD analysis environment to users.
- **Convergent:** CONVERGE is a Computational Fluid Dynamics (CFD) code that completely eliminates the user time needed to generate a mesh through an innovative run-time mesh generation technique.
- **Lumerical:** Simulation tools that implement FDTD algorithms.

Cloud computing services
for
JSOL Corporation LS-DYNA users in Japan

JSOL Corporation is cooperating with chosen cloud computing services

JSOL Corporation, a Japanese LS-DYNA distributor for Japanese LS-DYNA customers.

LS-DYNA customers in industries / academia / consultancies are facing to the increase use of LS-DYNA more and more in recent years.

In calculations of optimization, robustness, statistical analysis, larger amount of LS-DYNA license in short term are required.

JSOL Corporation is cooperating with some cloud computing services for JSOL's LS-DYNA users and willing to provide large in short term license.

This service is offered to the customers by the additional price to existence on-premises license, which is relatively inexpensive than purchasing yearly license.

The following services are available

(only in Japanese).

HPC OnLine

NEC Solution Innovators, Ltd.
http://jpn.nec.com/manufacture/machinery/hpc_online/

Focus
Foundation for Computational Science
http://www.j-focus.or.jp

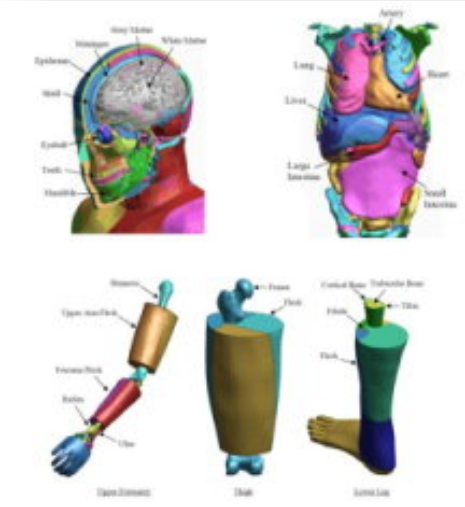
Platform Computation Cloud
CreDist.Inc.
http://www.credist.co.jp /

PLEXUS CAE
Information Services International-Dentsu, Ltd. (ISID) https://portal.plexusplm.com/plexus-cae/

SCSK Corporation
http://www.scsk.jp/product/keyword/keyword07.html

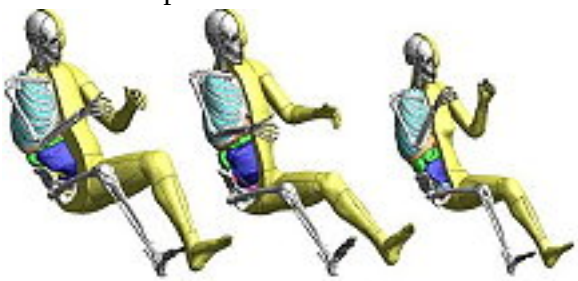
Contact; JSOL Corporation Engineering Technology Division cae-info@sci.jsol.co.jp

TOYOTA - Total Human Model for Safety – THUMS



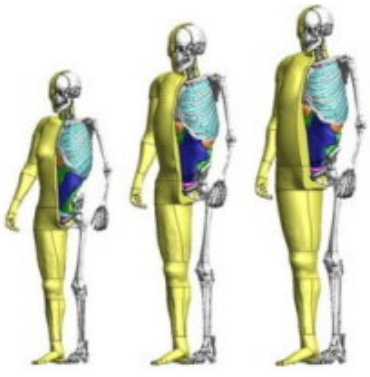
The Total Human Model for Safety, or THUMS®, is a joint development of Toyota Motor Corporation and Toyota Central R&D Labs. Unlike dummy models, which are simplified representation of humans, THUMS represents actual humans in detail, including the outer shape, but also bones, muscles, ligaments, tendons,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

Each of the different sized models is available as sitting model to represent vehicle occupants



AM95 AM50 AF05

and as standing model to represent pedestrians.



AF05 AM50 AM95

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

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

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

For information please contact:
THUMS@lstc.com

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

LSTC – Dummy Models

LSTC Crash Test Dummies (ATD)

Meeting the need of their LS-DYNA users for an affordable crash test dummy (ATD), LSTC offers the LSTC developed dummies at no cost to LS-DYNA users.

LSTC continues development on the LSTC Dummy models with the help and support of their customers. Some of the models are joint developments with their partners.

e-mail to: atds@lstc.com

Models completed and available (in at least an alpha version)

- Hybrid III Rigid-FE Adults
- Hybrid III 50th percentile FAST
- Hybrid III 5th percentile detailed
- Hybrid III 50th percentile detailed
- Hybrid III 50th percentile standing
- EuroSID 2
- EuroSID 2re
- SID-IIs Revision D
- USSID
- Free Motion Headform
- Pedestrian Legform Impactors

Models In Development

- Hybrid III 95th percentile detailed
- Hybrid III 3-year-old
- Hybrid II
- WorldSID 50th percentile
- THOR NT FAST
- Ejection Mitigation Headform

Planned Models

- FAA Hybrid III
- FAST version of THOR NT
- FAST version of EuroSID 2
- FAST version of EuroSID 2re
- Pedestrian Headforms
- Q-Series Child Dummies
- FLEX-PLI

LSTC – Barrier Models

Meeting the need of their LS-DYNA users for affordable barrier models, LSTC offers the LSTC developed barrier models at no cost to LS-DYNA users.

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

- ODB modeled with shell elements
- ODB modeled with solid elements
- ODB modeled with a combination of shell and solid elements

- MDB according to FMVSS 214 modeled with shell elements
- MDB according to FMVSS 214 modeled with solid elements
- MDB according to ECE R-95 modeled with shell elements
- AE-MDB modeled with shell elements

- IIHS MDB modeled with shell elements
- IIHS MDB modeled with solid elements
- RCAR bumper barrier

- RMDB modeled with shell and solid elements

e-mail to: atds@lstc.com.

 **FACEBOOK**

BETA CAE SYSTEMS SA CADFEM Cray Inc.

ESI Group

 **TWITTER**

BETA CAE SYSTEMS SA Cray Inc. ESI Group

ETA CADFEM

 **LINKEDIN**

BETA CAE SYSTEMS SA CADFEM Cray Inc.

DYNAmore Nordic ETA Oasys

 **NEWS FEEDS** ETA:

YOUTUBE

YOUTUBE Channel	WebSite URL
BETA CAE SYSTEMS SA	www.beta-cae.gr
CADFEM	www.cadfem.de
Cray Inc.	www.cray.com
ESI Group	www.esi-group.com
ETA	www.eta.com
Lancemore	www.lancemore.jp/index_en.html

For information contact lsdynacourses@aol.com

www.lsdyna-online.com/

contact lsdynacourses@aol.com

TRAINING SCHEDULE

March 3-4
Composites In LS-DYNA

March 5-6
Contact In LS-DYNA

March 12-13
Advance Impact Using LS-DYNA

March 19-20
Fracture, Damage, & Failure In LS-DYNA

Kaizenat is glad to announce 2015 schedule of LS-DYNA classes presented in Bangalore and Pune.

The details about the trainings offered are given below

LS-DYNA Training Schedule	
Topic	**Date**
LS-DYNA Software Training	**Mar 11-13**
Material Modelling Advanced Training	**Mar 19-20**
LS-DYNA Software Training	**Apr 15-17**
Advanced Crash Analysis	**Apr 23-24**
LS-DYNA Software Training	**May 13-15**
Airbag Deployment Application	**May 21-22**
LS-DYNA Software Training	**Jun 10-12**
Advanced Material Forming Analysis	**Jun 18-19**

Information & Agenda:

Classes generally start at 9:30 a.m. and end at 5:00 p.m. Access to computer for workshop exercises and lunch each day are included with the registration. For details on agenda please Click Here and to register for the training please Click Here. For any queries/clarification please contact us @ support@kaizenat.com

March 3 Michigan
ICFD_Day 1 : Introduction to CFD and CFD Applications

March 4 Michigan
ICFD_Day 2 : Focus on FSI and Heat Transfer

March 5 Michigan
Electromagnetism

March 23 Michigan
Intro to LS-PrePost

March 24-27 Michigan
Intro to LS-DYNA

March 30-31 Michigan
NVH & Frequency Domain Analysis in LS-DYNA

Germany	**CADFEM GmbH**	www.cadfem.de
Germany	**DYNAmore**	www.dynamore.de/en
US	**LSTC**	www.lstc.com
US	**ETA**	www.eta.com
US	**Cae Associates**	www.caeai.com
Sweden	**DYNAMORE Nordic**	www.dynamore.se
France	**DynAS+**	www.dynasplus.com
Thailand	**DFE-Tech**	www.dfe-tech.com/training.html
UK	**ARUP**	www.oasys-software.com/dyna/en/training

Mercedes-Benz renowned "iF Product Design Award 2015" Mercedes-Benz

No less than four models and two one-off vehicle studies from Mercedes-Benz have won the internationally renowned "iF Product Design Award 2015".

A top-class jury awarded prizes to the Mercedes-Benz S-Class Coupé, the AMG GT, the Mercedes-Benz V-Class as well as the smart fortwo for their outstanding designs. In the Professional Concepts/Mobility category meanwhile, the Mercedes-Benz Future Truck 2025 and the Mercedes-Benz AMG Vision Gran Turismo picked up the coveted Design Award.

For decades the "iF Product Design Award" has ranked as one of the world's most important design awards and represents the seal of approval for outstanding design. This year, some 53 design experts from 20 different countries selected their favourites from among more than 4500 contributions. The jury met to make its decision from 20 to 22 January 2015 in Hamburg. The iF Design Award night, held in honour of the award winners, is scheduled to take place on 27 February in Munich.

In the Automobiles category, four models from Mercedes-Benz picked up an "iF Product Design Award 2015":

.

- With the V-Class Mercedes-Benz has redefined the MPV. At first glance the V-Class is unmistakably a member of the Mercedes-Benz passenger car family and creates an emotional highlight in its segment. With the powerful front end, sculptured V-shaped bonnet and progressively designed headlamps, it is a self-confident statement of modern luxury and embodies the Mercedes-Benz design philosophy of sensual purity in striking fashion. The V-Class combines room for up to eight people and exemplary functionality with the high-class appeal, comfort, efficient driving pleasure and safety that distinguish automobiles bearing the three-pointed star.

- With the new Mercedes-AMG GT, the sports car and performance brand of Mercedes-Benz is moving into a new, top-class segment for the company. The Mercedes-AMG GT has everything one would expect from an authentic sports car – from the characteristic styling with breathtaking proportions, powerfully shaped areas and flowing lines, through to thoroughbred motorsport technology and optimum weight distribution.

• The revolution is entering the next phase – the smart fortwo has undergone improvements in virtually all areas and is markedly more comfortable. The third generation of the smart fortwo features a clear, purist appearance and has been very progressively enhanced. With its typical attributes such as the silhouette with ultra-short overhangs, the clear lines and surfaces and the likeable smart face, it has remained unmistakably smart: fresh, modern and self-assured

• A confidently stylish presence, exclusive appointments and refined sportiness – the S-Class Coupé from Mercedes-Benz combines the classic proportions of a large, sporty coupé with modern luxury and pioneering technology. The sensuous flowing silhouette with clear, progressive design idiom expresses the Mercedes-Benz philosophy of sensual purity with pithy precision. As a world premiere, the breathtaking two-door coupé can be optionally equipped with the MAGIC BODY CONTROL suspension system with curve inclination function.

In the Professional Concepts/Mobility category there were two award winners:

• The Mercedes-Benz Future Truck 2025 with Highway Pilot, which drives autonomously up to 80 km/h, was presented by Daimler Trucks in July 2014. Inside and out, this truck symbolises the great leap from classic truck to autonomous transport vehicle of the future – the conventional truck cab is superseded by innovative forms and the lighting system. The exceptional design of the Mercedes-Benz Future Truck 2025 study combines functionality, efficiency and emotion to exciting effect and represents much more than just a distant vision: the truck is set to hit the roads in ten years and many of its technological components are already available and ready for use.

• With the Mercedes-AMG Vision Gran Turismo, the Stuttgart-based premium brand presented its visionary concept for a super sports car. Mercedes-Benz designers developed the super sports car with hallmark Mercedes gullwing doors for the new PlayStation® 3 racing game Gran Turismo® 6. The design of this concept car demonstrates to extreme effect the perfect symbiosis between emotional, sensuous contours and intelligently presented high-tech. As a 1:1-scale model, the Mercedes-AMG Vision Gran Turismo celebrated its world premiere at the opening of the new Mercedes-Benz Research & Development Center in Sunnyvale, California.

Feb 19, 2015 | Dearborn, Mich.

FORD AND PETTY'S GARAGE TEAM UP TO BUILD LIMITED-EDITION MUSTANG GT

- Ford dealerships to offer 143 limited-edition Petty's Garage-tuned Mustang GTs; a Stage 1 version and an even more exclusive Stage 2 version will be available
- All Petty's Garage Mustang GTs feature Ford Racing/Roush supercharger boosting output to 627 horsepower*, as well as unique exterior and interior treatments including Richard Petty's signature on the dashboard
- AC/DC's Brian Johnson ordered the first Petty's Garage Stage 2 Mustang GT – the rock 'n' roll legend's first-ever domestic vehicle purchase

DEARBORN, Mich., Feb. 19, 2015 – Ford Motor Company and Petty's Garage are teaming up to build a new 627-horsepower* Mustang GT – a limited-edition fastback inspired by the popular Petty's Garage Mustang GT on display at last year's SEMA show in Las Vegas.

"We received a tremendous amount of positive feedback about our Petty's Garage Mustang GT displayed at the SEMA show," said Jeff Whaley, Petty's Garage COO. "With so much interest, we began to explore the possibility of building a limited run of the Petty's Garage Mustang GT."

Two versions of the Petty's Garage Mustang GT will be built this year; the Stage 1 version will be limited to 100 units, while the even more exclusive Stage 2 version will total 43 units.

Stage 1 Petty's Garage Mustang GT will feature a host of custom modifications – both visual tweaks and under the hood. A Petty's Garage fascia at the front imparts a unique look, while a reworked rear fascia features a center-exit exhaust and prominently showcased race-inspired spoiler. Inside, custom embroidered head restraints, floor mats and Richard Petty's own signature on the dashboard set this Mustang GT apart from the rest.

A Ford Racing/Roush supercharger, cold air intake, custom engine calibration and MagnaFlow exhaust system are fitted to Mustang GT's 5.0-liter engine, boosting output to 627 horsepower. Power is delivered to the road by custom 20-inch Petty's Garage HRE FlowForm wheels shod with Continental tires.

Stage 1 Mustang GT can be ordered in any color, with all unique bodywork painted to match in-house at Petty's Garage.

Along with the features found on the Stage 1 car, the Stage 2 version includes a Petty's Garage Wilwood big brake upgrade and a complete Petty's Garage custom two-tone paint job. Stage 2 Mustang GT will ride on Petty's Garage HRE three-piece forged-aluminum wheels.

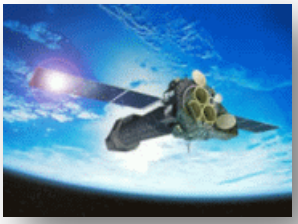
Of the 43 Petty's Garage Stage 2 Mustang GTs planned, only 42 remain, as rock 'n' roll legend Brian Johnson has an order in for the first car. "This Mustang has just taken my breath away," said Johnson, lead singer for AC/DC. "It really is one of the best cars I've ever driven. I didn't have an American car, but I do now!"

Paint fit for 'The King'

The Petty's Garage Stage 2 Mustang GT's custom two-tone paint job is identical to the 2014 SEMA show car. Using crushed-and-tumbled glass combined with iconic Petty Blue paint, Petty's Garage has created a one-of-a-kind color for the lower half of the car. A custom tri-coat pearlescent blend of Ford Tuxedo Black complements Petty Blue for the upper half. "The King's" legendary No. 43 is expertly ghosted into the paint on the fastback Mustang GT's hood and C-pillar.

The Petty's Garage Stage 1 car carries an MSRP of $62,210, while the Stage 2 car comes in at $92,210. Orders for this limited-edition Mustang GT can be placed at any Ford dealership on a first-come, first-served basis.

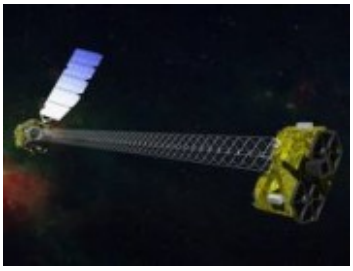
*Powertrain modifications are covered by a Ford Racing/Roush Performance parts limited warranty; Petty's Garage components and installation carry a 36-month, 36,000-mile warranty from Petty's Garage.



ESA's XMM-Newton Telescope observed the low-energy portion of the X-ray light spectrum emitted by PDS 456.
Image Credit:
ESA

NASA's Nuclear Spectroscopic Telescope Array (NuSTAR) and ESA's (European Space Agency) XMM-Newton telescope are showing that fierce winds from a supermassive black hole blow outward in all directions -- a phenomenon that had been suspected, but difficult to prove until now.

This discovery has given astronomers their first opportunity to measure the strength of these ultra-fast winds and prove they are powerful enough to inhibit the host galaxy's ability to make new stars.



NASA's NuSTAR telescope, launched in June 2012, observed the high-energy portion of the X-ray light spectrum emitted by the supermassive blackhole dubbed PDS 456.

Image Credit:
NASA

"We know black holes in the centers of galaxies can feed on matter, and this process can produce winds. This is thought to regulate the growth of the galaxies," said Fiona Harrison of the California Institute of Technology (Caltech) in Pasadena, California. Harrison is the principal investigator of NuSTAR and a co-author on a new paper about these results appearing in the journal Science. "Knowing the speed, shape and size of the winds, we can now figure out how powerful they are."

Supermassive black holes blast matter into their host galaxies, with X-ray-emitting winds traveling at up to one-third the speed of light. In the new study, astronomers determined PDS 456, an extremely bright black hole known as a quasar more than 2 billion light-years away, sustains winds that carry more energy every second than is emitted by more than a trillion suns.

"Now we know quasar winds significantly contribute to mass loss in a galaxy, driving out its supply of gas, which is fuel for star formation," said the study's lead author Emanuele Nardini of Keele University in England.

NuSTAR and XMM-Newton simultaneously observed PDS 456 on five separate occasions in 2013 and 2014. The space telescopes complement each other by observing different parts of the X-ray light spectrum: XMM-Newton views low-energy and NuSTAR views high-energy.

Previous XMM-Newton observations had identified black hole winds blowing toward us, but could not determine whether the winds also blew in all directions. XMM-Newton had detected iron atoms, which are carried by the winds along with other matter, only directly in front of the black hole, where they block X-rays. Combining higher-energy X-ray data from NuSTAR with observations from XMM-Newton, scientists were able to find signatures of iron scattered from the sides, proving the winds emanate from the black hole not in a beam, but in a nearly spherical fashion.

"This is a great example of the synergy between XMM-Newton and NuSTAR," said Norbert Schartel, XMM-Newton project scientist at ESA. "The complementarity of these two X-ray observatories is enabling us to unveil previously hidden details about the powerful side of the universe."

With the shape and extent of the winds known, the researchers could then determine the strength of the winds and the degree to which they can inhibit the formation of new stars.

Astronomers think supermassive black holes and their home galaxies evolve together and regulate each other's growth. Evidence for this comes in part from observations of the central bulges of galaxies -- the more massive the central bulge, the larger the supermassive black hole.

This latest report demonstrates a supermassive black hole and its high-speed winds greatly affect the host galaxy. As the black hole bulks up in size, its winds push vast amounts of matter outward through the galaxy, which ultimately stops new stars from forming.

Because PDS 456 is relatively close, by cosmic standards, it is bright and can be studied in detail. This black hole gives astronomers a unique look into a distant era of our universe, around 10 billion years ago, when supermassive black holes and their raging winds were more common and possibly shaped galaxies as we see them today.

"For an astronomer, studying PDS 456 is like a paleontologist being given a living dinosaur to study," said study co-author Daniel Stern of NASA's Jet Propulsion Laboratory (JPL) in Pasadena. "We are able to investigate the physics of these important systems with a level of detail not possible for those found at more typical distances, during the 'Age of Quasars.'"

NuSTAR is a Small Explorer mission led by Caltech and managed by JPL for NASA's Science Mission Directorate in Washington.

Winter Testing Season at Ram Truck

February 20, 2015 , Auburn Hills, Mich. - Piles of snow and below-zero temperatures in Houghton, Mich., Bemidji, Minn., and other hostile winter areas are the cue for Ram Engineering to suit up and run severe cold weather and plow testing.

Every year, the dedicated truck engineering teams take advantage of the naturally reoccurring elements to reproduce the harsh environments some customers and operators experience. Although the conditions are far from humanly comfortable, those folks running a “Cold Trip” could not ask for a finer setting.

“Only a small percentage of Ram truck owners will subject their truck or van to the harshest winter conditions, but for those who do our durability testing procedures instill confidence,” said Mike Cairns, Director of Ram Truck Engineering. “When it’s minus 20 outside and I walk up to my Ram Truck on a morning of a Michigan winter, I have a sense of self-reliance and assurance that my truck will start, warm up quickly and run well because I know that we have tested and verified our trucks to perform in these harsh environments. We want every Ram customer to feel that way."

The Cold Trip - Ram Engineering conducts a multitude of lab tests at the company’s Technical Center in Michigan and full vehicle tests at the company’s two major proving grounds in Arizona and Michigan. The purpose of the Cold Trip is to run real world operational tests in extreme environments. The Cold Trip serves as the engineering team’s final validation, assuring all Ram trucks are fully capable and the components will withstand the harshest environments in the United States and Canada. Being based in Michigan offers a naturally cold environment for testing but the northern region amplifies the experience. Houghton, Mich., not only provides below zero temps, it also is home to a testing facility dedicated to the winter bloom. The team also travels to Bemidji, Minn., to experience extreme cold, where the trucks soak in frigid below-zero temps for extended periods of time.

Slush test - When deicer is spread on the road in temperatures around 28 degrees Fahrenehit, slush can collect. Because slush is water during an in-between state of liquid and solid it can shift either way, but when the sun goes down and temperatures drop, solid has the advantage. Slush does not drip off the undercarriage. It hangs on, filling gaps and covering components. During a hard freeze, anything covered in slush becomes encased in ice -- fuel lines, diesel exhaust fluid tanks, engine oil pan, brakes, etc. Ram engineers run trucks through 12-inch-deep slush and immediately park the truck overnight in a refrigeration facility set at minus 20 degrees. The truck is then inspected top to bottom to assure components and systems are functioning properly. Ram trucks feature dedicated systems to protect areas of potential vulnerability. For example, the diesel exhaust fluid (DEF) tank is allowed to freeze in such conditions. The tank and lines are made of materials to allow a hard freeze without breaking. An independent heating system keeps just enough DEF above freezing temperatures to allow engine start up while meeting tailpipe emissions. Another example is the location of vent lines. Water can freeze, clogging vent lines for the axles, transmission and transfer case. Windows must continue to roll up and down. More importantly, windshield wipers and defrost mechanisms must function.

Arctic blast - Anyone who has walked across a windy parking lot in low temperature conditions knows the effects. Imagine that force at higher wind speeds and even lower temps while delivering a healthy dose of snow and ice. That's exactly what Ram executes during the arctic blast test. Ram engineers create a convoy of trucks and drive in-line for hours on end, switching positions in the order. The leader pulls a "drag" or rake to kick up ice and snow. This test addresses performance of windshield wipers, lighting, defrost and systems related to the engine.

Snow ingestion can be particularly bad in such conditions. Similar to driving though a sandstorm, snow can pack the truck's air filter and air box, limiting the truck's "breathing" capabilities. If the intake system is compromised it will dramatically reduce engine performance. It is important to place the engine's air intake in a location that avoids an over exuberance of snow ingestion. Alternatively, areas such as Arizona in the summer can create a need for the air intake to be present at the front of the truck for maximum flow of cooler air. The industry-exclusive Ram Active Air intake system addresses both scenarios. When the intake system senses extreme heat it draws cooler air from the front of the vehicle – a function that also engages at high altitudes for superior throttle response in low-oxygen environments. When conditions are wet from snow, ice or water fording, the system pulls air from an under-hood inlet, clear from snow packing and water.

Moving white stuff

Each season, Ram engineers plow more than 10,000 tons of snow to validate every system and ensure reliable operation. Moving a large amount of snow is paramount to a plow operator, which is why more than 80 percent of commercial and private plow trucks are ¾-ton or greater. Although the Ram 2500 and 3500 are very popular for such duties, Ram also sells a large number of Chassis Cab trucks for snow removal. Ram 2500 and 3500 are available with a Snow Chief Package, which includes:

- Upgraded cooling system
- Higher-amp alternator
- Anti-spin differential
- More robust front suspension
- Plow lighting interface eliminates the need for a lighting harness and enables plow lights to override the headlights upon plow installation
- Transfer case skid plates
- Auxiliary switches to operate the plow
- Clearance lamps
- OWL 18" tires

All Chassis Cab trucks come standard with heavy duty cooling, auxiliary switches, limited slip rear axle, clearance lamps and 3500 (optional on/off road 4x4 tires) and 4500/5500 (rear traction tires on 4x4).

Ram Chassis Cab 3500 4x4 is available with a Snow Plow Prep Package, which includes:

- Higher-amp alternator
- Transfer case skid plate

Ram Chassis Cab 4500 and 5500 4x4 and 4x2 are available with a Snow Plow Prep Package, which includes:

- Higher-amp alternator
- Transfer case skid plate
- Heavy Duty front suspension group

The front Gross Axle Weight Rating (GAWR) is the dictating specification for how much weight can be attached to the front of the truck. Front GAWR is the maximum allowable weight on the front two tires of the truck, including added equipment (winch, PTO, plow, rack, etc.). Plow operators balance plow size with truck weight, traction and power. Ram 4500 and 5500 Chassis Cabs are rated for up to 7,000 pounds of front GAWR on 6.4-liter gas engine-equipped models and up to 7,250 pounds GAWR on 6.7-liter Cummins Turbo Diesel models, allowing for the largest plow in the segment.

Before you can use a piece of equipment on your truck, it needs to be installed. Ram Truck has benefitted from a long-standing relationship with truck equipment manufacturers. Our pickups, vans and chassis cab trucks are known for upfitter friendliness.

Not every plow is brand new and there are a variety of plows available. Ram engineering tests trucks with new and “experienced” plows — some with minor damage, V-plows and straight plows, to assure a range of use and equipment is covered.

Operating at maximum front GAWR is a sure way to push the trucks. The largest possible plows are used, matched with each truck’s capability. Plow truck operators often take multiple passes in a small area, pushing forward and reversing out, only to make another push. The engineering team has logged a staggering amount of plow miles pushing snow and nearly an equal amount in reverse. That type of use can be punishing for a transmission and Ram has included the actions in the durability schedule.

Additional weight (about 500 pounds) is mounted over the rear axle, in the bed, to help maintain rear tire traction and counter the hanging weight of the plow on the front of the truck. This also presents an opportunity to test tires in low-traction environments. Heavy Duty trucks normally carry tire pressures upward of 70 psi, which isn’t always helpful when trying to gain traction while pushing mounds of snow.

Ram Truck cold weather testing video:
https://www.youtube.com/watch?v=G6Z2jL85f3Q