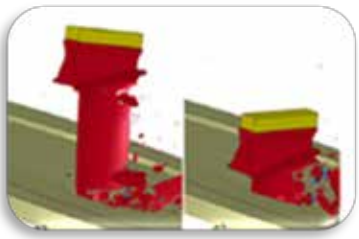
www.feantm.com Issue March 2022 ISSN 2694-4707

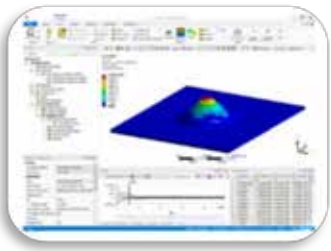
FEA Not To Miss Town

Software & Engineering Solutions
Town Hall Meeting, Blog & Gossip

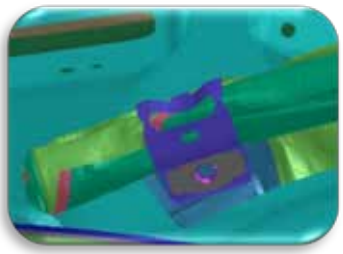
AEROSPACE - ITP Aero



ANSYS



AUTOMOTIVE - FORD

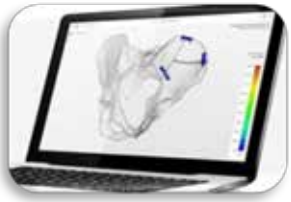


AUTOMOTIVE - GM

AUTOMOTIVE - Swivel Mount

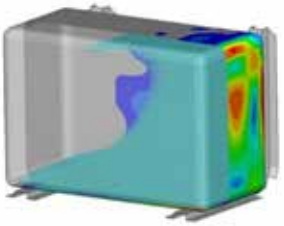
CADFEM

CADFEM Medical

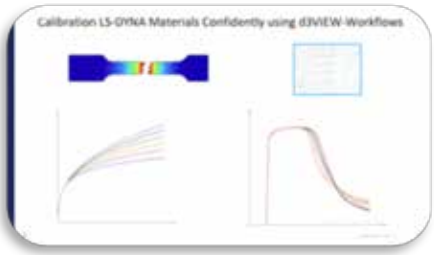


DYNAmore Germany

DYNAmore Nordic



D3View

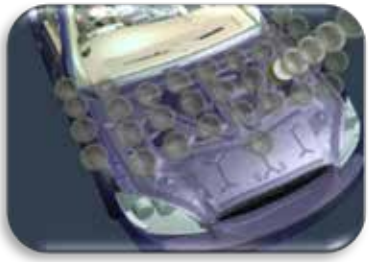


ENGINSOFT

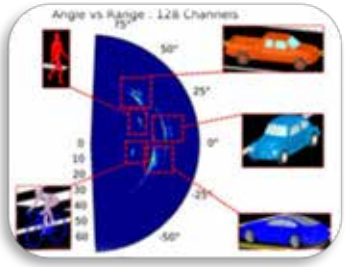
LEAP

MSC - Hexagon

OASYS



OZEN



Free publication & independently owned

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Editors: **(alpha order) Anthony, Art, Marnie, Marsha, Yanhua**

Town Pretend to be Editors

The Old Cattle Rancher - No one in town knows his name. You yell "Hey, Old Rancher."
The Old Retired Pilot - No one in town knows his name. You yell "Hey, Old Pilot."
The Old Retired Racer - No one in town knows his name. You yell "Hey, Old Racer."
They are all brothers - strange family

Contact us at feaanswer@aol.com

Map Vector & town graphics in our magazine are courtesy of vecteezy

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Thanks to Vecteezy for our **Map Vector/town and many of the graphics in our magazine**

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Goodbye, AND answers to the Old Pilot Quiz - Old Rancher Horse News

Monthly town hall meeting.
Serving - coffee & special treat:
from Gregory S., in Australia -
Kitkat-Dark With Southern Australian Orange

Our town comprises companies, engineers, scientists, mathematicians, universities, professors and students, consultants, and all individuals interested in software, hardware, and solutions.

Town secretary special hello wave: Andrea, Curt, Dan, Dixon, Eric, Jenson, Jitesh, Madhukar, Marc, Marko, Marta, Metin, Nanda, Parth, Pravin, Rashmiranjan, Sahil, Sahithyananda, Suraj, Stanley

The town proving ground has been renovated to a race track. Take home your tractors; we have denied tractor racing. We voted in a new editor/track manager, the Old Retired Racer. No one in town knows his name. You yell, "Hey, Old Racer." He's related to the old retired rancher & the old retired pilot. They are all brothers - a strange family. The first race scheduled for April is Drift Racing. We will hand out the history of Drift Racing before the race. Who knows what country drift racing started? WRONG - it was Japan! Why doesn't anyone believe me, and you're googling it?

As presiding town Supervisor, I call this meeting to order:
BANG - I again have to hit the desk with a horseshoe. Who borrowed my gavel?
1. The town secretary created ice cream stored in buckets. Rocky Road Dark Expresso Macadamia.
2. DEM is not Dark Expresso Macadamia - what was her thought? OH, an ice cream idea.
3. "Rocky" does not refer to the ice cream Rocky Road. Buckets mentioned were not for ice cream.
4. Raise your hand if you know the term DEM? Anyone? Can you google it?
5. Rocky DEM is software and NOT ice cream. We do thank the secretary for her creativity in flavors.
6. Donate the ice cream to the research hospital - she used their research budget to research flavors.

Rancher - Fatigue life prediction: complementing structural analysis with particle simulation

Our town information clerk confused the words "dam" vs. "damn "

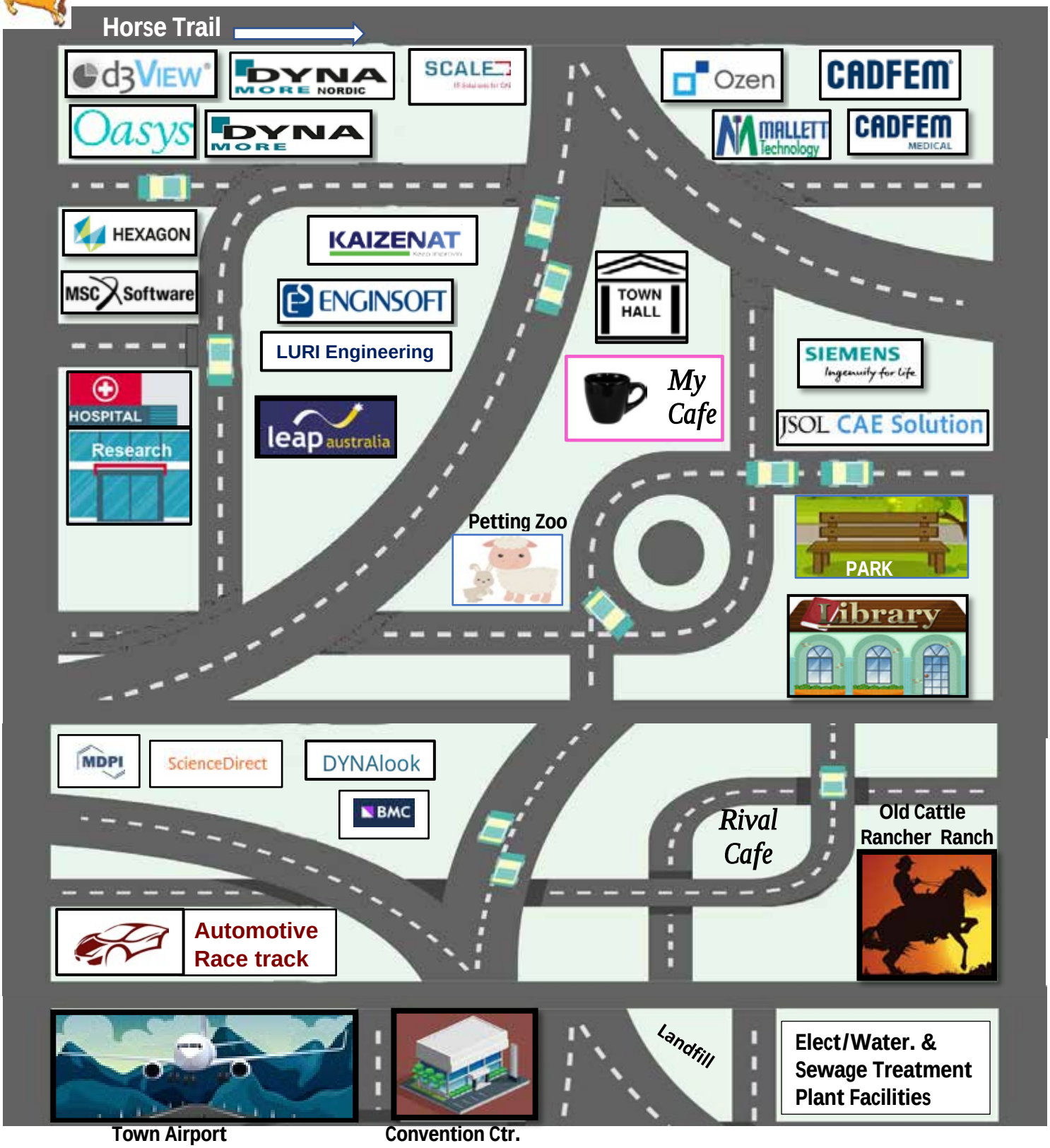
1. The voice mail from the building dept. asked, "Where is our *dam* break information?" Not *DAMN*
2. They want "dam *break* information!" We now have a list of 250 types of coffee break information.
3. Then the clerk left a note saying, "Here's your "damn" break information - next time, be polite!"
4. Please explain to the clerk that *dam break* and *damn* break are NOT the same.
   Dam means to hold back or confine—damn means to criticize or condemn as inferior.

Building Dept. Dam Break simulations

Our Town Secretary
1. She was advised for announcements over the intercom first to sound the announcement tone.
   Do not start announcements by yelling into the intercom, "YO, heads up and listen."
2. A DRONE flew into my office towing a banner that read:
   "YO heads up and listen - Secretary about to make an announcement."
3. She thought I said *drone* instead of *tone*. The old retired pilot programmed it! I fainted.
4. After the K-9 Unit dogs stop chasing the drone down the hall, please direct it to the town airport.

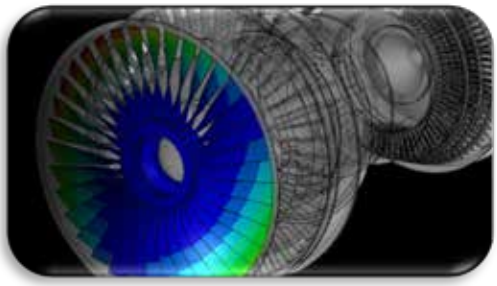
Town Airport - How to Quiet Drones With Acoustics Simulation

Town Map



* **The logos displayed, of content in our magazine, do not represent their endorsement.**
* **To be removed, please notify feaanswer@aol.com with the request.**
* **Your town lot will be auctioned, with the Town applying all proceeds to the coffee budget.**
* **The town map changes pending information, and rotational building rentals.**

Thank you, Curt Chan, Senior Product Marketing Manager, Ansys for assisting the FEA community. He works with students, start-ups and larger companies to embrace and get the most out of the new generation of simulation-led design products like Ansys Discovery



Ansys LS-DYNA Multiphysics Solver **Ansys LS-DYNA** is the industry-leading explicit simulation software used for applications like drop tests, impact and penetration, smashes and crashes, occupant safety, and more.

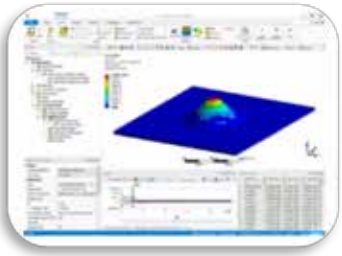
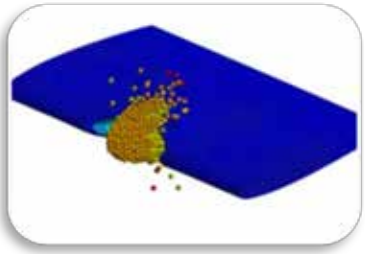
Simulate the Response of Materials to Short Periods of Severe Loading - Ansys LS-DYNA is the most used explicit simulation program in the world and is capable of simulating the response of materials to short periods of severe loading. Its many elements, contact formulations, material models and other controls can be used to simulate complex models with control over all the details of the problem.

Quick Specs

LS-DYNA delivers a diverse array of analyses with extremely fast and efficient parallelization.

- Impact Analysis
- Forming Solutions
- Euler, Lagrange, and ALE Formulations
- Non-linear Implicit Structural Analysis
- Crash Simulation and Analysis
- Electromagnetics
- Smoothed-Particle Hydrodynamics
- Non-linear Explicit Structural Analysis
- Failure Analysis
- Fluid-structure interaction
- Incompressible Fluid Dynamics
- Total Human Model for Safety (THUMS™)

What's New - Ansys LS-DYNA 2022 R1 features a wide variety of enhancements to the LS-DYNA solver, including integration of new LS-DYNA technologies with Ansys Mechanical and the ability to overcome hardware capacity limitations.

		
Exciting New Features in Ansys LS-DYNA - LS-DYNA solver continues to add exciting new features in many areas like Iso-geometric Analysis (IGA), advanced materials, Smooth Particle Galerkin (SPG) and complex multiphysics which can be used for battery-abuse modeling, electro-physiology and many more areas.	**Continued Integration of Ansys LS-DYNA with Ansys Mechanical** Continued integration of LS-DYNA technologies in Ansys Mechanical to run LS-DYNA simulations more efficiently with improvements in restart capabilities, such as change in boundary conditions support, and the modification of imposed displacements.	**High Performance Computing – ARM and Ansys Cloud Support** Ansys LS-DYNA continues to empower users to run large jobs and overcome hardware capacity limitations with high-performance computing ARM and Ansys Cloud support for LS-DYNA.

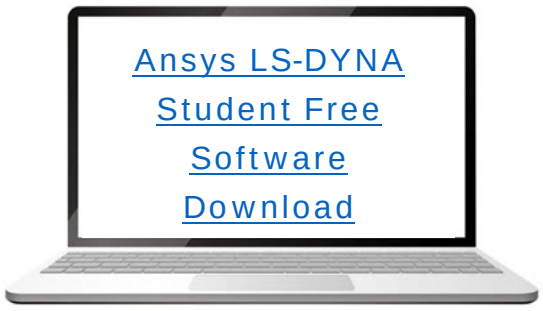
LS-DYNA CAPABILITIES - Vast array of capabilities to simulate extreme deformation problems

Engineers can tackle simulations involving material failure and look at how the failure progresses through a part or through a system. Models with large amounts of parts or surfaces interacting with each other are also easily handled, and the interactions and load passing between complex behaviors are modeled accurately. Using computers with higher numbers of CPU cores can drastically reduce solution times.

Key Features

LS-DYNA elements, contact formulations, material models and other controls can be used to simulate complex models with control over all the details of the problem.

- Implicit and Explicit Solvers
- Frequency Domain Analysis
- ICFD for Incompressible Fluid
- Electromagnetics Solver
- Multiphysics Solver
- Particle Methods
- Contact – Linear and Nonlinear
- Adaptive Remeshing
- Meshless – SPH and ALE
- Advanced CAE
- Supporting Tools



Ansys LS-DYNA Student offers free access to the world's most-utilized explicit simulation program, capable of simulating the response of materials to short periods of severe loading.

Students can work through simulations involving materials failure and look at how the failure progresses through a part or through a system. Applications include automotive, aerospace, incompressible fluids, compressible fluids and shock waves, electromagnetics and more.

Sudden Impact: Simulating MMA Head Shots - Using simulation, doctors can determine the magnitude and location of brain strains, enabling them to improve concussion treatment.

By applying an LS-DYNA simulation-based workflow, clinicians can obtain a player's acceleration level and convert that into strain levels across different parts of the brain.

Article - Read the article - Clinicians are unclear about how to measure the damage incurred by head impacts. Concussions diagnosed by magnetic resonance images (MRIs), computed tomography (CT) scans and blood tests often deliver inconclusive results.

Meshless analysis of a snapping and unsnapping action, using LS-DYNA

Branch
Plastic and rubber,
Automotive supplier Specialist field
Structural mechanics

Elkamet Kunststofftechnik GmbH

Meshless analysis of a snapping and unsnapping action, using LS-DYNA

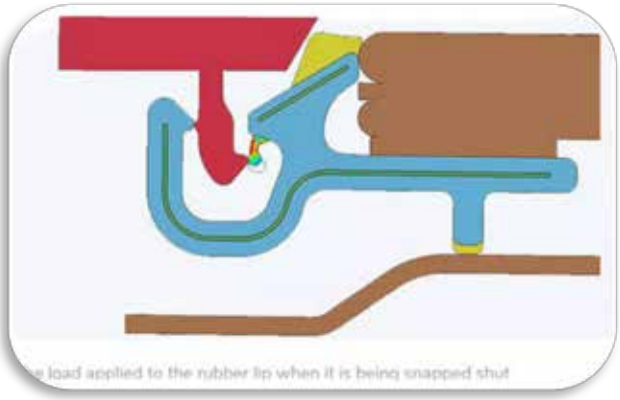
One of the products manufactured by **Elkamet Kunststofftechnik GmbH** for both the automobile industry and the lighting industry is extruded profiles made from polymer materials. CADFEM used simulation to assist with the decision-making process in relation to a variety of designs

Summary

Task - The requirement was to investigate and assess the way that different variants of a clip connection located between a car front windshield and a water reservoir behave in terms of snapping and unsnapping.	**Solution** - Due to the way the rubber lip became severely deformed during the operating sequence, a meshless method (the element-free Galerkin method) was used for the calculation performed within ANSYS LS-DYNA.	**Customer benefits -** Elkamet received substantive assistance in selecting the most suitable variant in terms of serviceability.

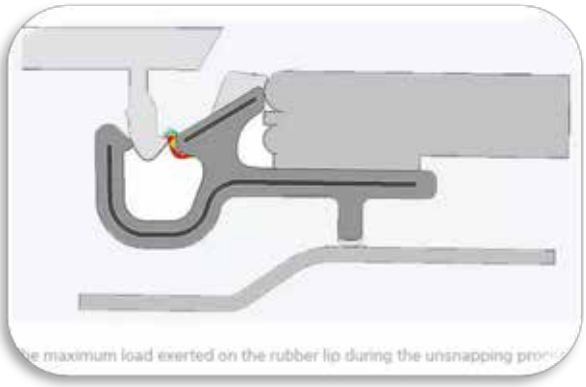
Task

One of the products manufactured by Elkamet Kunststofftechnik GmbH for both the automobile industry and the lighting industry is extruded profiles made from polymer materials. The analyses carried out involved investigation of a seal developed by Elkamet that was located between a car front windshield and a water reservoir, with the specific aim of investigating the snapping shut and unsnapping of a clip connection. It was essential that the forces to be applied be defined across a severely deformed rubber sealing lip.



Solution

The analysis of the snapping shut and unsnapping was carried out using LS_DYNA. Due to the way the rubber lip became severely deformed during the operating sequence, a meshless method (the element-free Galerkin method) was used for the calculation performed within ANSYS LS_DYNA. Meshless methods are numerical methods that use weighted nodes rather than finite elements for spatial discretization. Such methods are particularly employed in cases involving large deformations. The analysis facilitated determination of the forces required to snap and unsnap the cover on the water reservoir. The investigation involved the examination of three different geometric variants.

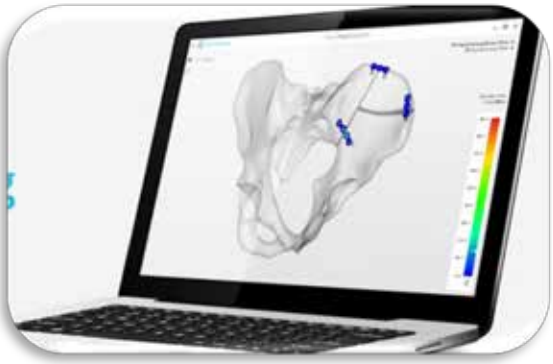


Customer Benefit

The results facilitated comparison of the forces that arose in snapping shut and unsnapping the three geometric variants investigated, thereby assisting the customer in selecting the most suitable variant in terms of serviceability.

Ralph Rauchheld - CAE Engineer - CADFEM

CONTACTS

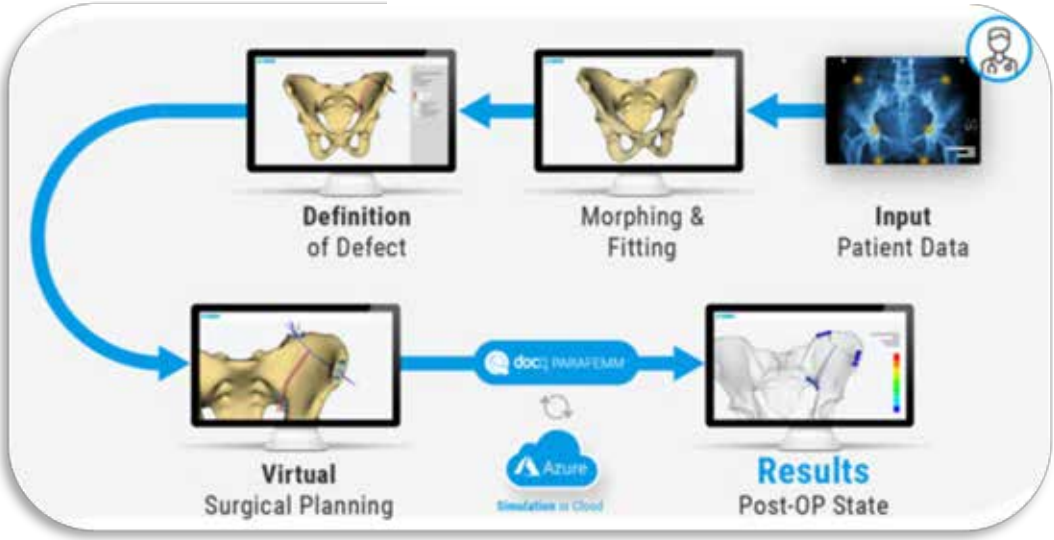


docq PARAFEMM - Improving treatment

Operative planning of multiple pelvic fractures

The goal of the project is to improve surgical planning for the treatment of multiple pelvic fractures. For this purpose, a patient-specific model based on a template will be created.

Parameters extracted from CT and RTG scans (measurements on the geometry) are used for the creation. For further treatment planning, an FEM simulation can be performed to evaluate the strength and to place the positioning of the implants and screw connections in an optimal way.



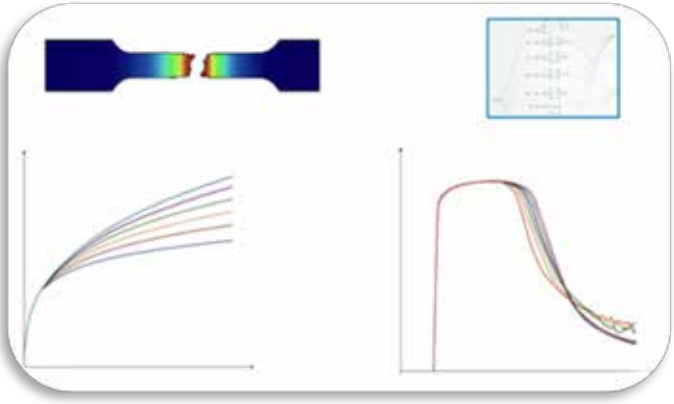
docq PARAFEMM at a glance

Target: Improve surgical planning for the treatment of multiple pelvic fractures

- Personalization of out of the box implants
- Simulation without complex model creation - Parametric models as input for biomechanical simulation
- Verified and validated parametric biomechanical simulation models
- State-of-the-art determination of biological material parameters from ex-vivo studies and material experiments.

Suri Bala
Founder and CEO at d3VIEW, Inc

"Material calibration in D3View allows you to derive material behaviors using material test data, configuring your model parameters with historical data, and maintain accuracy and standardization."



Calibrating LS-DYNA Materials Confidently using d3VIEW-Workflows

Calibrate Materials, Connections and Spotwelds Faster

Introducing Workflows for Material Calibration

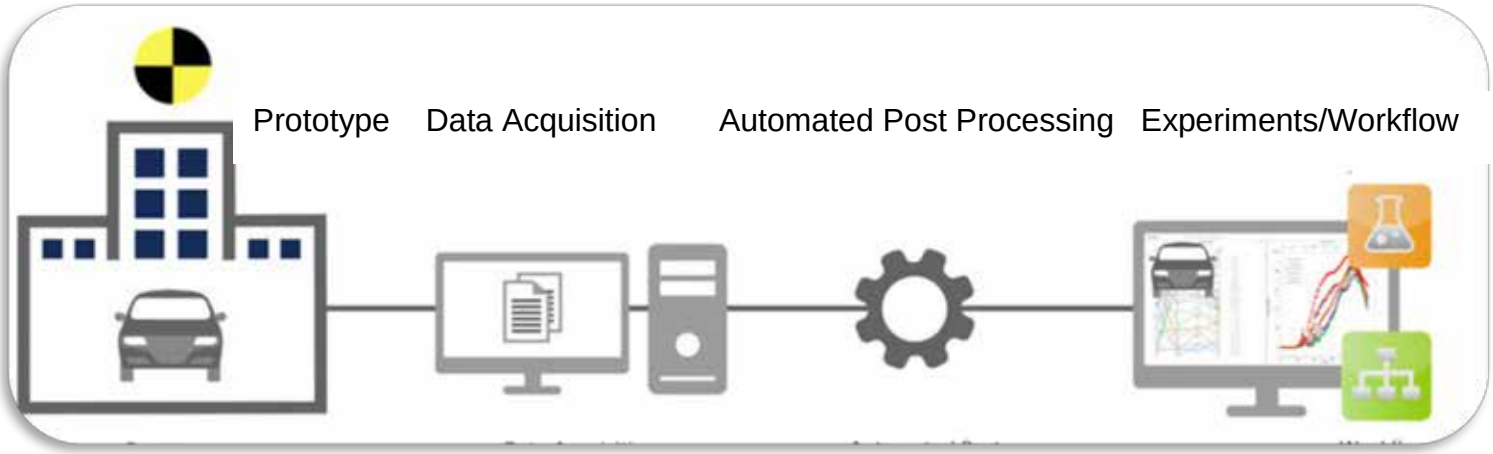
With D3View for LS-DYNA, and other software, the following material calibrations workflows are among the possibilities.

Test Data - The most time-consuming and error-prone activity for any material science or simulation engineer is Data import and processing from Labs.

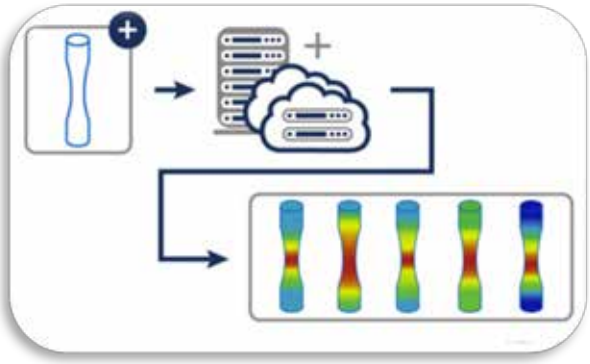
Import your Test Data using D3View

- You have the ability to import test data (curves and images) from Excel, CSV/TSV, or any Text Format.
- You have the ability to import multiple tests from a single ZIP file from well-known labs, including labs at The Ohio State University, University of Waterloo, Applus+DataPoint Labs.

- You have the ability to define custom rules and re-use them to automate the data import.



Run Simulations in house, or remotely from other locations:



- With d3VIEW's HPC app, run your simulations on-premise or in the cloud with minimal configuration.
- Perform single or several in parallel and track them as the solution is progressing.
- Automate Data-Extraction from Simulations and Compare with Tests
- With the Templates app, you can extract any data (time-history, image, movies) from simulations and compare them with tests to validate the results.

Clean and Transform Data functionality

With hundreds of material specific curve transformations, you can remove data that does not belong in your dataset and convert your data from one format or structure into another without scripting.

Our software development approach requires few, if any, programming skills to quickly build an application. This no code philosophy has resulted in data-transformations that finish faster and reliably to accelerate the generation of data for simulations.

Robust Specimen Library

Our library is continually updated with additional specimens for your use to run simulations quickly with zero-model-build-time. The library affords you many types to choose from:

- Use specimens of different mesh-lengths, sizes and standards with built-in instrumentation for force, displacement and any time-history data. The specimens are linked to the measured data to adjust scaling.
- View the specimens within the browser using our Peacock-3D application.

Full-field DIC Calibration

- **Simulations can be compared,** using zero-user-interaction, with DIC full-field using d3VIEW's patented technology.

Reporting and Analytics

- **D3View's Simlytiks app** generates standard calibration reports and analyze the data.

Store Calibrated Data, Share and Collaborate Globally

- **D3View's** Database app will store the calibrated data to create a repository of materials to compare and analyze.

The 16th German LS-DYNA Forum will take place from October 11-13, 2022 in Bamberg and online.

Important dates

- Call for Papers May 20, 2022
- Author notification Jun 03, 2022
- Submission extended abstract Sep 02, 2022

With approximately 100 technical presentations, keynotes from renowned speakers and an accompanying hardware and software exhibition, the forum is the main event dedicated to LS-DYNA in Central Europe.

Invitation We cordially invite all LS-DYNA users to the 16th German LS-DYNA Forum in Bamberg. Like last year it will be a hybrid event.
The forum will take place on October 11 and 12.
The online conference will take place on October 12 and 13.

Special feature of the forum: Presenters can present in English or in German.
New: You can optionally submit your abstract for the Ansys "Level-up 3.0" online conference. Simply click on the corresponding box when submitting.

We look forward to receiving numerous presentation submissions and registrations.

We hope to have aroused your interest and look forward to receiving numerous presentation submissions and registrations.

Bamberg's Old Town has been on the UNESCO World Heritage List since 1993. The city grew continuously around a medieval core and today has one of the largest unspoiled old town centers in Europe.

Schedule 2022

- Monday, 10 Oct. from 6 p.m.
  Get together in the exhibition and conference registration
- Tuesday, 11 Oct. from 8 a.m.
  Start of the conference
- Tuesday, 11 Oct. from 8 p.m.
  Gala Dinner
- Wednesday, 12 Oct. from 8:30 a.m.
  Second conference day
- Wednesday, 12 Oct.
  Day 1 Online Conference
- Thursday, 13 Oct.
  Day 2 Online Conference

Thank you Kathleen and Katherin, Uli, Dirk, for assisting the FEA community.

THUMS: New Extended DYNAmore Support Package

Based on the extensive experience, resulting from the long-lasting distribution and support services of the THUMS human body models, DYNAmore offers a support package, which covers the areas of model preprocessing, simulation/solver and postprocessing.

Extended DYNAmore support package

Can be individually adapted and might include the following points

Preprocessing -

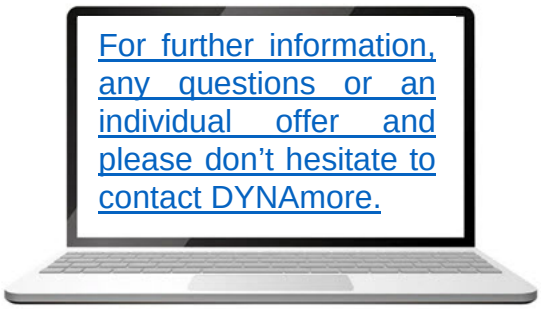
- support with model positioning, e.sg. using the Primer software approach
- implementation of special-purpose positioning scripts which can account for special data structures or formats and implementation into available process chains
- model instrumentation, e.g. definition of reference points, cutting planes, required for the result extraction

solver/simulation

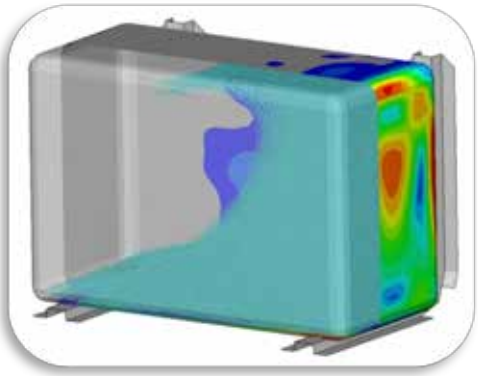
- model optimization and –debugging, incl. error search, model stabilization, etc.

postprocessing

- creation of templates for the evaluation of kinematical results
- support evaluation of relevant model-based injury criteria, e.g. the JSOL Injury Risk Visualization Tool or the implementation of special-purpose and adapted injury evaluation tools



Thank you, Rasmus and Daniel, for assisting the FEA community.



Sloshing analysis of a fuel tank

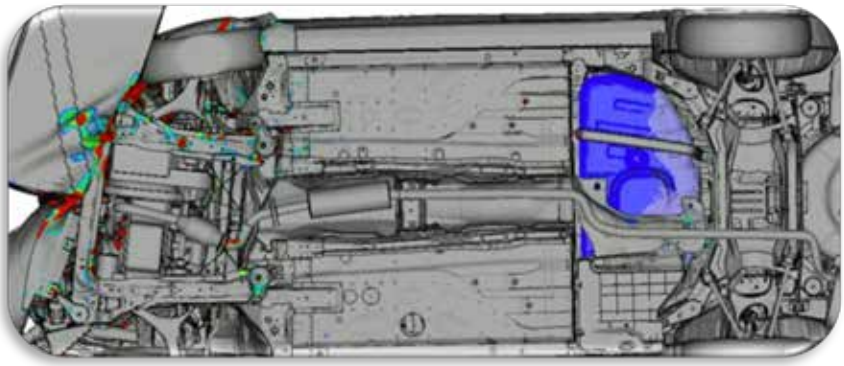
Case study: Using Multiphysics to simplify boundary conditions for a range of different simulation cases

Complex boundary conditions made intuitive - When dealing with complex systems it can be a challenge to create appropriate boundary conditions and loads. We demonstrate this here by looking at the calculation of stresses and deformations of a fuel tank containing sloshing fuel.

Creating boundary conditions and pressure loads on the tank that accurately represents the sloshing fuel can easily become a project within itself. To further add to the complexity, a product often undergoes several different evaluations within the organization that all need specific boundary conditions and loads, making the array of simulation models required large and complex.

A more straightforward way to capture complex boundary conditions, such as fluid sloshing, is to use the wide range of multiphysics capabilities within LS-DYNA.

In the case presented here, you can learn how adding and solving more advanced physics can make the work more intuitive, reduce complexity, and save time within the organization.



Product development enhancements - It is highly beneficial for product development to use simulations to minimize the need for expensive prototypes. In the simulation, it is easy to change things such as wall thickness, dimensions, and add reinforcements.

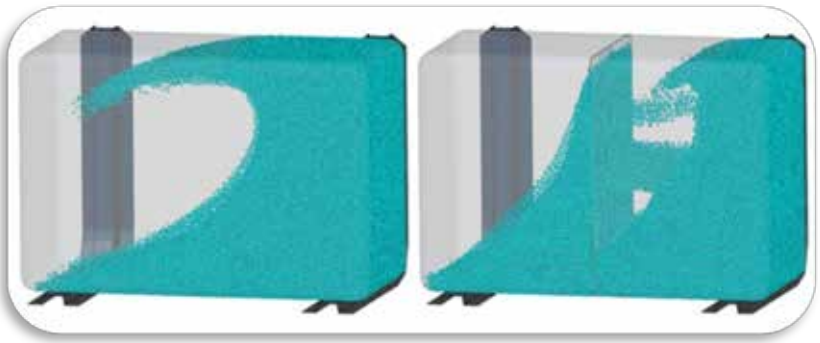
Traditionally, engineers need boundary conditions for the loading and evaluation of the component. In the fuel tank case, this could, for instance, be a maximum pressure obtained from testing a similar product. These loads gathered from testing might be reasonable to use when the design changes are small, but for a more substantial design change such as adding a baffle in the middle of the tank, the completely change in fluid and structure dynamics would make the loading based on the test data invalid.

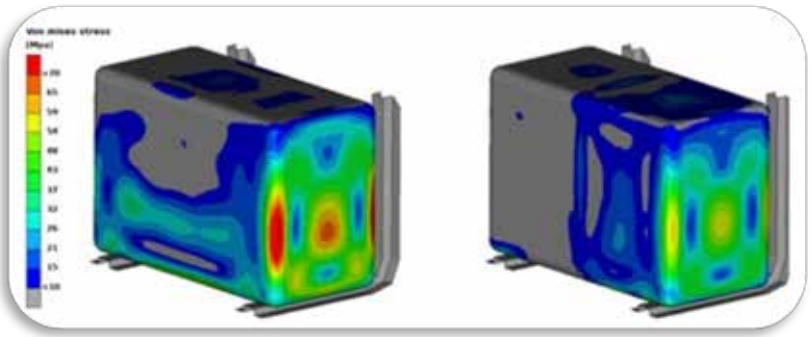
A more intuitive way to solve the problem is to model the fluid-structure interaction and use a global parameter such as the acceleration of the whole vehicle, which is not much affected by changes in the tank design. The vehicle acceleration is therefore a much more suitable boundary condition. The inquiry of vehicle accelerations is also more intuitive, as these can be sampled from existing products by testing or numerical simulation. There is also a higher chance that this data already exists within the organization.

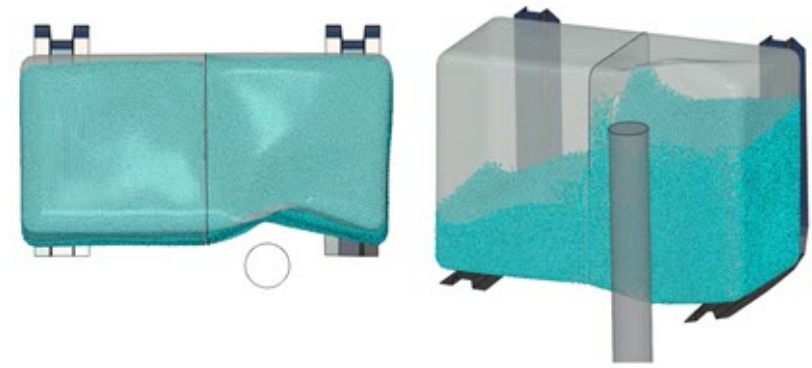
Videos can be viewed on the website case study

The following simulations were performed in LS-DYNA using a standard non-linear finite element model of the tank, coupled with a smoothed particle hydrodynamics (SPH) description of the fuel.

The fuel is discretized as SPH particles that are in full contact with the tank in a coupled fluid-structure interaction (FSI) model. The whole system is loaded using gravity and acceleration due to a sudden braking of the vehicle. One can see that the baffle clearly influences the dynamics of the fluid to a great extent and therefore also the pressure loading on the tank.







Looking at the stresses in the tank, one can see how much the change in dynamics affects the tank's structural integrity. The two design iterations were performed by only changing the tank's design, without having to come up with new boundary conditions. This facilitates rapid tests of new design ideas and continuous product improvements.

System development

Another great benefit to this method is that other departments can use the same model for system evaluations. The fuel tank could be included in a crash simulation to better understand its performance during such loads. It would also contribute to the overall system validity, as it provides a more accurate dynamic response. Below you can see a simulation where a pole hits the tank, testing the tank's integrity and the brackets that support it.

To learn more: Simulations have time and again proven to be a cost-effective product development tool that avoids costly tooling redesign. We have the software and knowledge required so that you may learn to perform these simulations yourself. We will guide you all the way, including training and support. To learn more, please contact one of our technical experts listed on this page.

The car used in this demonstration is a modified version of the publicly available Honda Accord model, provided by NHTSA

RecurDyn easily analyses the complex dynamics of a musical box - Analysis includes highly flexible bodies and extended contacts with their surfaces

Although this example is not about an industrial component, its dynamics are very complex, and its analysis requires special care.

A music box or musical box is an automatic musical instrument in a box that produces musical notes by using a set of pins placed on a revolving cylinder or disc to pluck the tuned teeth (or lamellae) of a steel comb.

The mechanism is powered by the elastic energy stored in a spiral spring, which is manually wound. The main drum also powers a micro fan through a gear train with a large transmission ratio. As the fan reaches high speed, the drag torque works as a brake to control the unwinding speed.

A virtual prototype of a music box must necessarily include highly flexible bodies and the extended contacts with their surfaces. This is a classic scenario that exploits the best features of RecurDyn software, such as the Full-Flex and the Geo-Contact technology.

In order to store the powering energy for the music box, a spiral spring is manually wound. In order to be reliable enough, the virtual model must reproduce both the large deformation of the structure and the contacts occurring along the entire body (self-contacts). These requirements make the model highly non-linear and, therefore, the classic approaches which would be used in multi-body tools for flexible body simulation are no longer applicable. Only RecurDyn allows the user to choose between two approaches for flexible body simulation: classic linear flexibility (Craig-Bampton theory) and proprietary non-linear flexibility. The first method is called Reduced Flex, while the second is called Full Flex. The power spring of the music box is clearly a component that could not be simulated without RecurDyn's efficient Full Flex technology.

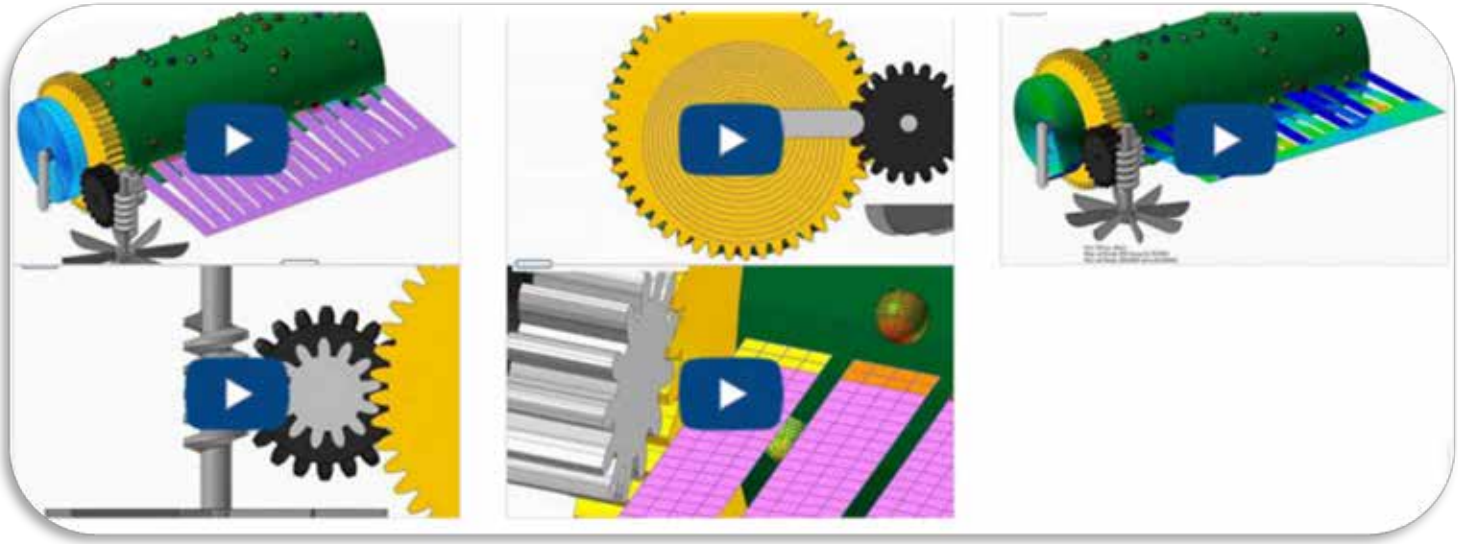
The steel comb features teeth of variable lengths, which, once plucked, vibrate and produce the notes. If one only considers the amplitude of the deformations, this component could be modelled as a Reduced Flex body. Since the teeth are plucked by small asperities located on the revolving cylinder, we need to set a number of contacts between the rigid cylinder and the steel comb.

For this reason, we again need to use RecurDyn's premium Full Flex technology which really has no limitations. Since full flex bodies use similar formulations to the standard Finite Elements, the results include both strains and stresses. RecurDyn allows the time evolution of the stress components per each node of the Full Flex body to be exported.

The revolving cylinder would reach very high-speed if it was not properly braked. The music box features a microscopic fan, powered by the drum, which provides sufficient drag torque. To make the fun rotate fast, a gear train returns a high transmission ratio between drum and fan. The train includes both a worm gear and toothed gears. All the gears are kept rigid, but very refined surface contacts are used to represent the interaction between the parts. Once again, RecurDyn's Geo-Contact technology allows one to control the surfacic tessellation, the numerical smoothing, and the organization of the nodes' domain so that the contacts perform efficiently.

The steel comb, which makes the music by vibrating, has to be modelled using the Full Flex approach. Indeed, we need to set at least one contact per each tooth, and this would not be permitted by linear approaches to flexibility. RecurDyn Implicit Alpha Solver handles this highly non-linear problems without hesitation. Even in the presence of abrupt changes, such as the one that occurs when the teeth are disengaged, the solver keeps going by simply adjusting the time step. Full Flex's numerical efficiency remains rather high because the solver is optimized for handling high-frequency dynamics.

Videos can be viewed on the website



2 Excerpts - please read the complete question and answers on the website

Luke Mosse, "Based on my experience, LS-DYNA is ideally suited for these blast & crash applications owing to the work that's been put into the code over many decades at LSTC (which was recently acquired by Ansys), as LS-DYNA was in fact originally developed for blast & projectile simulations."

Q&A with an Explicit Dynamics Simulation expert – using simulation to meet MIL standards for fatigue, crash and blast scenarios

We recently sat down for a (socially distanced) chat with **Luke Mosse, Specialist Applications Engineer at LEAP with 15 years experience in Explicit Dynamics simulations.** Our discussion aims to learn how explicit dynamics simulations are used to meet stringent MIL standards for fatigue, crash and blast scenarios.

Luke, you've worked on many complex projects involving crash, blast and fatigue simulations to help military vehicles meet MIL standards – first, can you provide some background to the MIL standards you typically work with?

A lot of MIL standard test were developed many years ago before fully transient simulation was readily available. They were often developed for equivalent static load cases; for example, instead of doing a blast simulation test, a simple 200 G (Gravity) static load test would be applied and considered to be the equivalent of a blast for the purpose of the Finite Element simulation. With recent advances in simulation solvers and available hardware, it is much easier to conduct an accurate simulation of a more realistic scenario – which both meets the current MIL standards and provides a better indication of the vehicle's survivability of a blast or predicted fatigue life under given scenarios. Many of our clients have experimental accelerometer data – they conduct blast tests during which they measure accelerations at various locations in the vehicle – and we apply those directly in our simulation. So, we don't have to actually simulate the blast, but can replicate the dynamic effects of the blast on all key components on the vehicle.

How is LS-DYNA suited to simulations being used to these MIL standards?

Based on my experience, LS-DYNA is ideally suited for these blast & crash applications owing to the work that's been put into the code over many decades at LSTC (which was recently acquired by Ansys), as LS-DYNA was in fact originally developed for blast & projectile simulations. For background, LS-Dyna is a highly dynamic, explicit-based finite element solver, with both a pure structural and a coupled Euler-Lagrange approach that allows you to simulate either just the structure or the blast-plus-structural response with coupling interaction between them. Also, with LS-DYNA having been developed heavily for automotive industry, it has the added benefit of having lots of in-built automotive-based features to model joints, airbags, seatbelts and dummy models – which were all developed for automotive originally, but can be easily applied to vehicles incorporating MIL spec specifications.

Visit our LS-DYNA page on the LEAP website

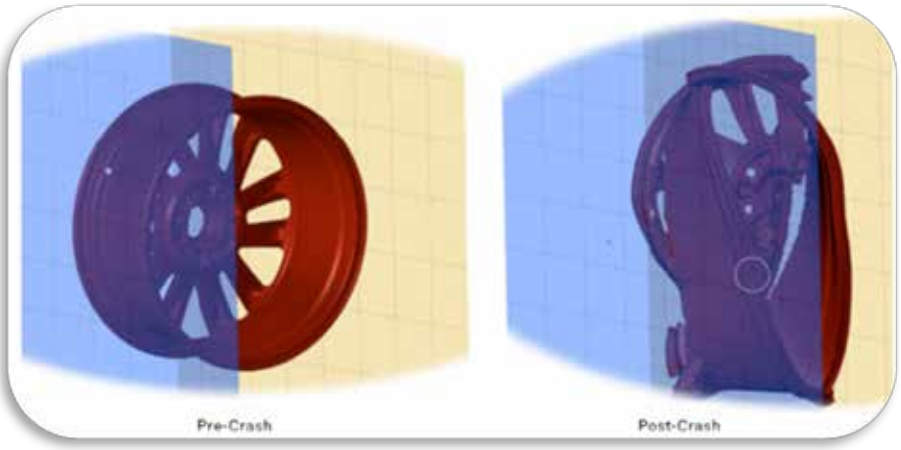
Excerpt from Case Study pdf

PDF - Dynamic load prediction of a wheel - Ford Motor Company, Michigan, USA

ODYSSEE CAE enables Ford to save 59 days of computational time studying a wheel's rotational radial load characteristics.

Ford Motor Company was established in the year 1903 and their aim is to help build a better world where every person is free to move and pursue their dreams. Ford is the oldest American car manufacturer and has 13.8% of the vehicle market share in the US.

Ford produces many cars, SUVs, and trucks in various price ranges under the brands of Ford and Lincoln. In 2020, Ford sold 4,187,000 vehicles worldwide and had a market share of 5.8% of all vehicles sold worldwide. Ford slogans over the years have included "Go Further", "Built Ford Tough", "Ford. Designed for Living. Engineered to Last.", and "Ford has a better idea". Ford designs their vehicles to be enjoyed by their customers for a long time. Ford is a multinational organization with globally geographical headquarters and the cooperate headquarters located in Dearborn, Michigan.



The FEM setup in the pre-crash and post-crash position of a wheel simulation where the blue side is the dynamic loading, and the yellow is the reactionary side.

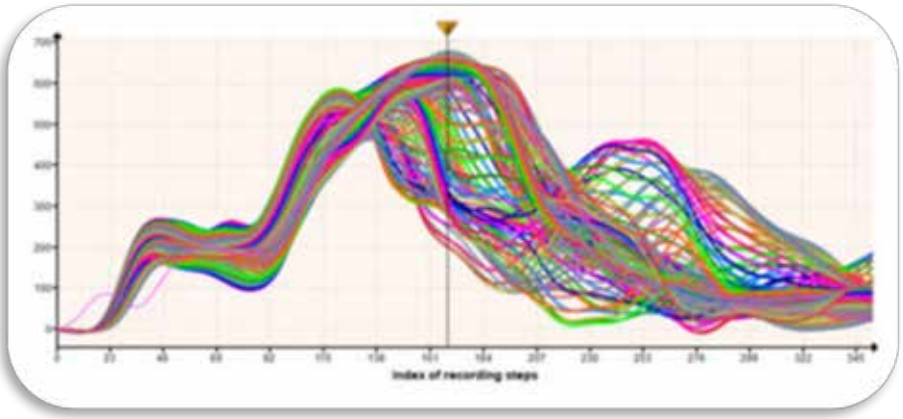


Fig 1: Load time history over the full 180° design space as predicted by ODYSSEE CAE. The dotted red curve represents the final validation curve achieved in a FEM simulation.

Challenge - Ford designs their vehicles with the slogans “Built Ford Tough” and “Go Further” in mind and delivers a quality vehicle to their customers. To ensure that they
have a car that is “Designed for Living. Engineered to Last”, Ford digitally tests their car parts including the wheel design. There have been new advancements in aluminium alloys and manufacturing process which opens new avenues for Ford’s wheel designers to explore. With the myriad of new options, the wheel designers can design functional and aesthetic wheel designs with new stylings and shapes to attract new customers and achieve performance requirements. Each of these new wheel design possibilities wouldneed to be tested to guarantee stringent quality andperformance requirements of Ford’s vehicle parts. The current method of testing the wheel designs digitally for the variation of loading along the wheel’s circumference when rotated and radially loaded takes approximately 9hrs per degree with finite element analysis (FEA). Can ODYSSEE CAE help Ford reduce the time needed to study the wheel’s dynamic load characteristics?

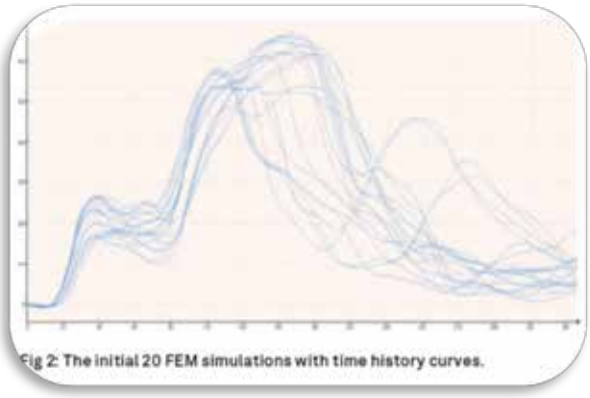


Fig 2: The initial 20 FEM simulations with time history curves.

Solution - “Ford has a Better Idea” with ODYSSEE CAE to reduce the computational time needed to fully study the new wheel designs while achieving results comparable to FEA. The current finite element method (FEM) analysis uses 1 million elements and advanced material models to preserve the detailed geometry and capture material fractures. While this FEM method yields high fidelity results, it is at the expense of high CPU usage and large time costs.

This is where ODYSSEE CAE helps, it used 20 FEM runs to learn the system’s characteristics. From learning the behaviours, ODYSSEE CAE was able to create an analytical solution that can predict the entire 180° analysis of the wheel’s behaviour. The reduced time and computational costs associated with this method of analyzing the wheel’s behaviour will allow Ford to study more wheel designs.

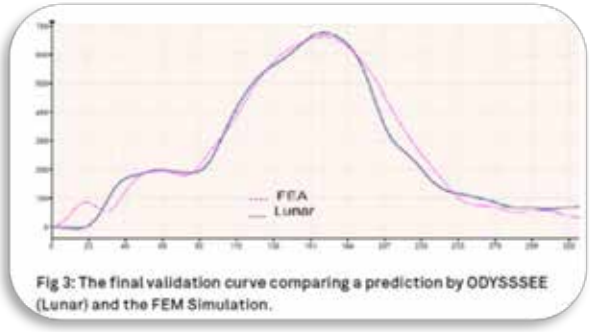


Fig 3: The final validation curve comparing a prediction by ODYSSSEE (Lunar) and the FEM Simulation.

Results - The “Built Ford Tough” slogan is a high-quality standard for vehicles that begins with the wheel design. The original FEM intensive analysis of the wheels is prohibitively computationally expensive with 9 hours per degree or 67 days for the full 180° analysis. ODYSSEE CAE reduces this time to less than 8 days for learning and to seconds to provide the full 180° analysis. Ford can analyse 8 new wheel designs in the same timeframe it used to analyse one.

This method provides results with an accuracy above 92% when compared to the FEM analysis for multiple wheel designs. ODYSSEE CAE helps Ford’s time “Go Further”.

Marta Kempa, MBA - Marketing Coordinator & Seppi
Oasys LS-DYNA
Oasys Software, Tutorials & Classes Not To Miss

Not To Miss on YouTube -

Oasys Suite
Developed specifically for LS-DYNA.

Oasys PRIMER - Prepare

The Oasys Suite is at the leading edge of pre and post-processing software and is used worldwide by many of the largest LS-DYNA customers.

Oasys PRIMER is the pre-processor designed to make preparation and modification of LS-DYNA models as quick and as simple as possible.

With support for every LS-DYNA keyword, you can read and write models with the confidence that no data will be lost or corrupted. The Oasys PRIMER user interface is designed specifically for LS-DYNA – with no compromises – giving you convenient access to a range of powerful pre-processing tools.

Model Setup

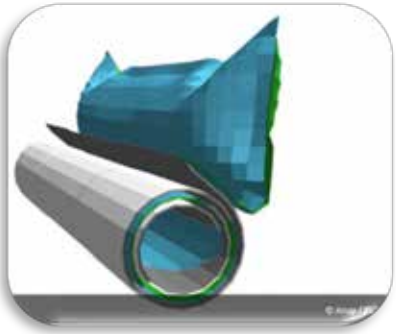
- Create and edit LS-DYNA entities using custom menus and a powerful keyword editing tool.
- Extensive connection tools including support for solid spotwelds, adhesive and bolted connections.
- Occupant modelling: simulation-based dummy positioning, seatbelt fitting, seat foam compression.
- Contact penetration detection and removal.
- Full support for INCLUDE and INCLUDE_TRANSFORM files with label range management and visualisation.

Model Manipulation

- Quick access to part properties such as thickness and material.
- Mass balancing and assignment tools as well as mass calculation with mass-scaling effects.
- Part/assembly replace to update a model for design changes.
- Intelligent entity deletion with consideration for other dependent entities.
- Intelligent model merging with label clash resolution.

Model Validation

- Viewing of most LS-DYNA entity types allowing visual checking.
- Viewing of connections and relationships between entities (Cross-References and Attached).
- Contouring of material properties, timestep, mass scaling, etc.
- More than 7000 LS-DYNA specific checks with error tree view for easy identification and fixing of multiple instances of similar errors.
- Intelligent model comparison detailing differences and changes.

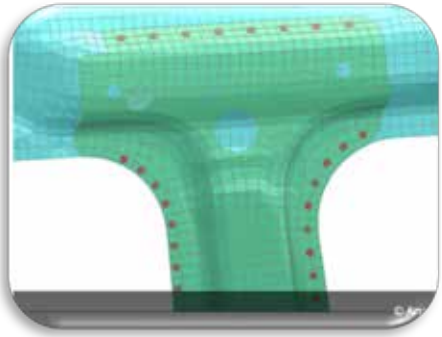


Airbag Folding:

Define the folding pattern for 2D and 3D airbags. Choose from a range of fold types such as thick, thin, tuck, spiral and scrunch. Distortion and penetration checking ensures the quality of the final folded airbag. Once created, the folding pattern data is stored in the keyword file to facilitate future modifications.

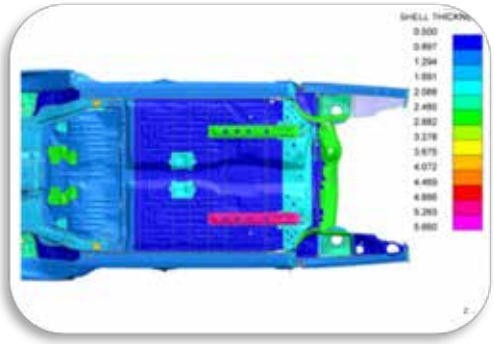
Barrier and pedestrian model set-up

Align crash barriers to test specifications and automate pedestrian impact setup with step-by-step tools.



Connection Definition

The Connections tool in Oasys PRIMER allows you to quickly and easily create welds, adhesive and bolted connections. You can import connections data from a spotweld file or directly from CAD, or create connections automatically using the geometry feature detection capability. Connection status can be reviewed in the Connection Table, where further modifications can be made. Once created, connections data are stored in the keyword file, allowing connections to be easily updated in the future or used with other models.

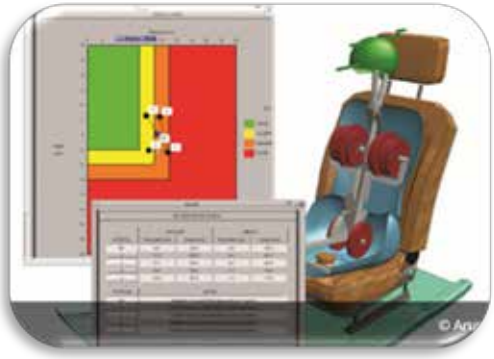


Model Checking

Oasys PRIMER has a large range of checking functions. In addition to the basic mesh quality checks, there are over 7000 LS-DYNA specific checks to help reduce the amount of time taken to get a new model up and running. The Check Window and Error Tree Viewer allows users to clearly see any errors within a model and quickly locate the items that are causing the errors. As well as pre-procesing checks, Oasys PRIMER is now able to scan the LS-DYNA output files. Entities with errors can be located on the model directly, making the task of debugging significantly easier.

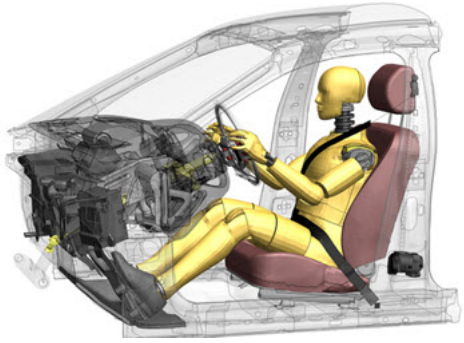
Include File Management

Oasys PRIMER fully supports INCLUDE and INCLUDE_TRANSFORM files, and also has advanced tools for managing include files and label ranges



Scripting

The JavaScript and Macro functions provide you with powerful tools for creating your own scripts and interfaces for model generation and editing.

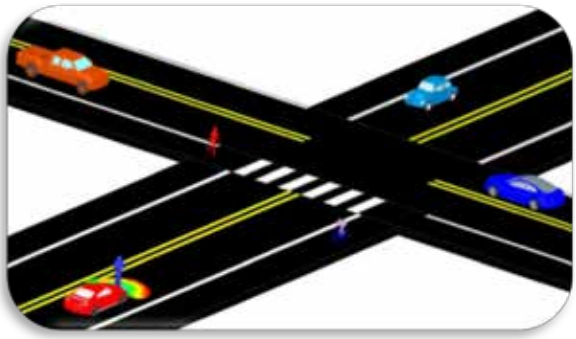


Occupant Modelling

Oasys PRIMER has a number of tools to help you set up and position occupant dummies within a model. These include:

- Dummy positioning
- Adjust seat positions with Mechanism
- Precompress seat foam
- Seatbelt fitting, including automatic refitting after dummy repositioning

Metin Ozen
Principal & CEO at Ozen Engineering, Inc. and Mallett Technology, Inc.



Ansys HFSS SBR+ 4 Fast Frequency Looping in HFSS SBR+ Speeds Up Range-Doppler Simulations

If you have a project involving a radar system, we can help you with the engineering and design by providing Ansys simulation software, training, and support as well as our consulting services. Contact Us

Ansys HFSS SBR+ **Figure 1:** HFSS SBR+ simulation of 128-channel 77 GHz radar module viewing a traffic intersection

The Range-Doppler setup within HFSS SBR+ provides a highly optimized simulation capability for radar systems used in modern automotive radar and aerospace applications. It simulates the response of a Range-Doppler radar system in a complex large-scale environment, such as an automotive radar viewing a traffic scenario or an airborne radar viewing objects on the ground. The results are presented as Range-Doppler colormap images and animations, with the simulation workflow contained entirely within the Ansys Electronics Desktop environment.

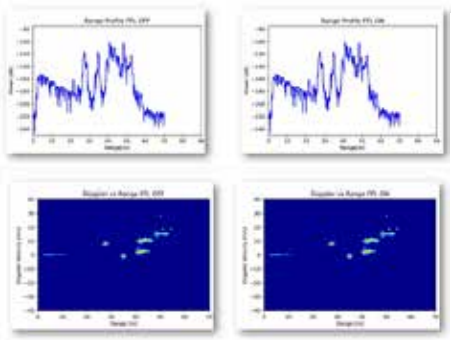
The SBR+ radar simulation is massively accelerated relative to conventional implementations using Ansys proprietary Accelerated Doppler Processing (ADP) technology. The ADP technique eliminates the need to separately solve hundreds of individual chirps in microscopic time-stepping of the dynamic scene. ADP also provides improved image quality by eliminating Doppler artifacts of the ray-tracing solution.

Radar modeling capabilities in HFSS SBR+ are continually increasing to enable more advanced and faster simulations. HFSS SBR+ uses a high-frequency ray-tracing method that efficiently computes scattering from electrically large geometries. ADP was originally introduced in 2019 R2 to perform fast radar scene simulations using Pulse-Doppler waveforms. In 2021 R1, the chirp-sequence FMCW waveform was added to model this popular radar signal type.

In 2022 R1, a powerful new capability named Fast Frequency Looping has been added to further reduce the runtime of Range-Doppler simulations. This innovative capability applies to both types of radar waveforms and can decrease simulation times by an additional order of magnitude. Fast frequency looping is applicable for waveforms having up to 10% relative bandwidth. Many radar designs meet this requirement on the signal bandwidth, such as those operating in the 24 GHz and 77 GHz frequency bands. Figure 1 shows an example Range-Doppler simulation of an automotive radar module entering a traffic intersection. The radar operates at 77 GHz and is composed of 8 transmitters and 16 receivers with a total of 128 channels. The scene includes three vehicles, a pedestrian, and a bicyclist moving towards or away from the four-way intersection.

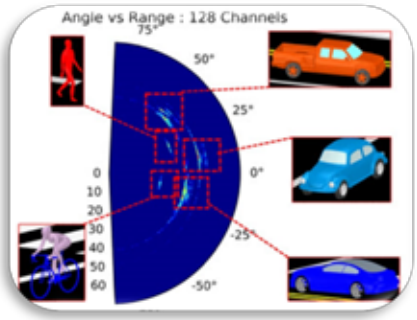
Ansys HFSS SBR+ 2 - Figure 2: Solution setup for 77 GHz Range-Doppler simulation with Fast Frequency Looping

The Range-Doppler solution setup window in HFSS SBR+ is shown in Figure 2. Range-Doppler radar systems operate by issuing a sequence of many pulses or chirps across a coherent processing interval (CPI). For this simulation, the waveform type is specified as Pulse-Doppler with range and velocity performance parameters entered to calculate the associated waveform and CPI parameter values. Note that the radar waveform bandwidth is approximately 1% of the center frequency. The new Fast Frequency Looping feature available in 2022 R1 is enabled by simply selecting the checkbox on the Options tab.



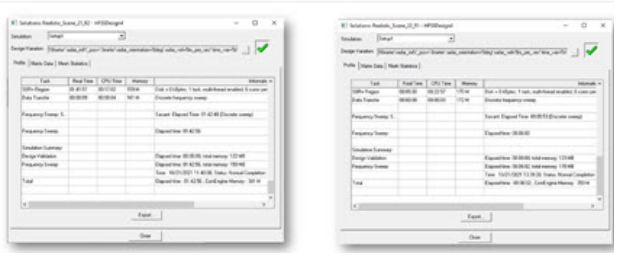
Ansys HFSS SBR+ 3a - Ansys HFSS SBR+ 3 - Figure 3: Range-Doppler simulation results with and without Fast Frequency Looping

The results of radar simulations with and without Fast Frequency Looping enabled are shown in Figure 3. The Fast Frequency Looping results are from HFSS SBR+ 2022 R1, while the results without Fast Frequency Looping are from HFSS SBR+ 2021 R2. No appreciable differences are discernable in the range profiles and Range-Doppler images, confirming that simulation results for the two cases are practically identical.



Ansys HFSS SBR+ 4 Figure 4: Simulated Range-Doppler target returns for the scenario in Figure 1

Figure 4 shows simulation results displayed as a hemispherical range-angle polar plot. This demonstrates how the multiple-input multiple-output (MIMO) radar can be used to determine direction of arrival. Each target object in the scene is identified at a unique location from the view of the radar module, with the vehicles producing larger reflected signals than the pedestrian and bicyclist.

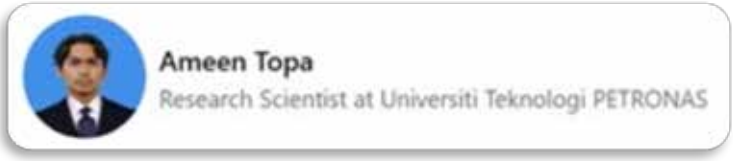


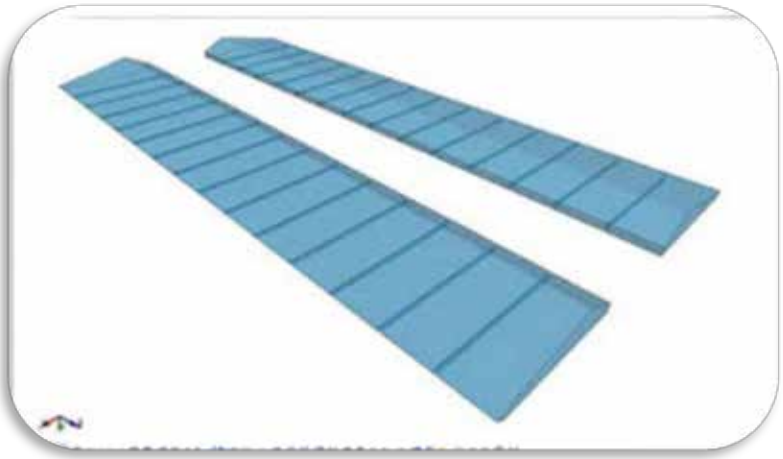
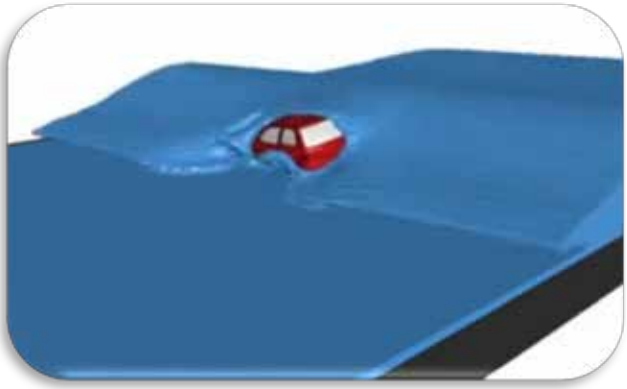
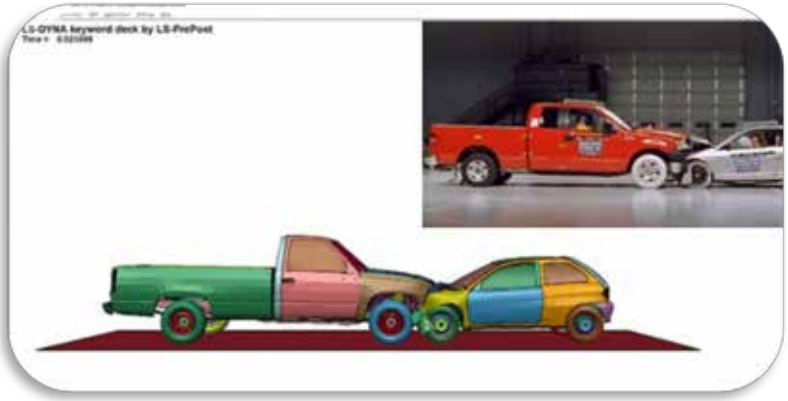
Finally, Figure 5 shows the solution profiles solved on a computer with 6 processor cores. Figure 5: Range-Doppler solution profiles with and without Fast Frequency Looping

This type of multiple-core configuration is representative of a modern laptop computer. The simulation without Fast Frequency Looping completed in 1 hour 43 minutes and used 159 MB of memory, while the simulation with Fast Frequency Looping completed in only 6 minutes and used a similar 170 MB of memory. In this case, the use of Fast Frequency Looping yielded a 17X faster runtime and produced the same simulation results. Upgrade to 2022 R1 to harness this powerful new capability for your Range-Doppler radar simulations!

Ameen Topa - Simulations

A crash simulation is a virtual recreation of a destructive crash test of a car or a highway guard rail system using a computer simulation in order to examine the level of safety.



	
[Side Impact: Taurus vs Neon]	[Car Spoiler: Solid Spoiler With Holes]
	
[Water Flood on Stationary Vehicle]	[Tutorial - LS-DYNA TUTORIAL 16: Car Collision - Hatchback vs Pickup Truck]

General Motors - LS-DYNA

Excerpt - 16th International LS-DYNA Conference, held June 10-11, 2020

General Motors has worked with LS DYNA® to improve performance issues of its vehicles in many areas of interests such as occupant safety, crash worthiness, structural durability and most recently, on water intrusion issues using SPH.

PDF - Driving Through Flooded Road

Bijoy Paul, Rachel Hysong, Babak Tehrani, Elizabeth Welch, John Davis, Amit Wavde
(General Motors)

Driving through flooded roads is always a challenge. Hydrostatic as well as hydrodynamic pressure can cause serious damage to the vehicle. Damage can adversely affect the performance of the vehicle in many ways. For example, high stress and strain can cause part failure, water ingestion into electrical components can lead to instant shutdown of the electrical system, corrosion, due to interaction with water can affect the performance and cosmetics of the vehicle. All of these can be costly fixes that are extremely dissatisfactory to our customers. General Motors has been designing and building state-of-the-art vehicles for more than a century.

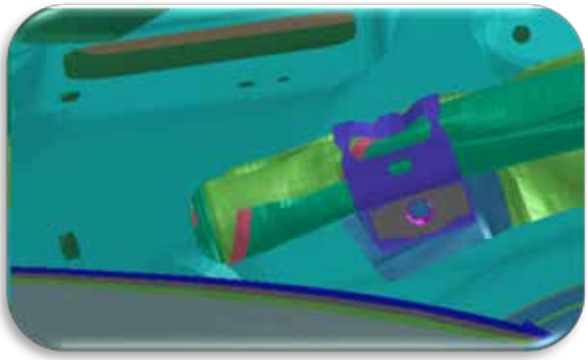
Safety, structural durability, part integrity, and performance are key features of every vehicle that General Motors produces. General Motors constantly invests in new technology and methods to improve quality, performance, and customer satisfaction. Smooth Particle Hydrodynamics (SPH) was developed in the late 70s. This mathematical advancement was transformed in the form of application in the recent past. The application has now been widely accepted by the CAE analysis community to study Fluid-structure-interface, water path analysis, and other hydrodynamic behavior, related to water and oil. General Motors has worked with LS DYNA® to improve performance issues of its vehicles in many areas of interests such as occupant safety, crash worthiness, structural durability and most recently, on water intrusion issues using SPH. This study involved structural durability analysis of a vehicle when driven on a flooded road. SPH particles were created to mimic the flooded road. A non-linear transient (crash) model was selected for the analysis. A node-to-surface contact was established between the SPH particles and vehicle. The vehicle was given an initial velocity of 30 km/hour, and the wheels were let to spin with the calculated rotational velocity.

The LS-DYNA simulation was run for 400 milliseconds and plastic strain outputs were measured. A physical test was scheduled. Strain gauges and strain rosettes were affixed at the areas where computer simulation results were measured and recorded. The physical test was then performed at the General Motors Milford Proving grounds. Analysis results were then compared with the physical test results. In conclusion, a good correlation was observed between CAE (SPH analysis) and test results. SPH analysis is computationally very intense. Therefore, steps are being discussed to shorten the total computational time.

FORD - LS-DYNA

Excerpt Paper - 16th International LS-DYNA Conference, held June 10-11, 2020

This work aims to englobe the tools and steps followed in order to obtain, within a short period of time, a LS-DYNA® CAE model of the airbag, capable of representing efficiently and accurately a deployment, which might be used in early stages of numerical analysis for areas such as Interior Trim integrity and safe interaction.



Pdf - Side Curtain Airbag Folding Methodology

Pablo Alberto Rodríguez Calzada,
Hector Hernández Hernández,
Alejandro García Pérez,
Carlos Gómez González
(Ford Motor Company)

In recent years, CAE simulations have been substantially improved as a result of the growing need to achieve full vehicle developments in a shorter time span while also attending the demand of cost reduction in such developments. One of the most critical components regarding the passive safety systems of a vehicle is the Side Curtain Airbag, therefore the necessity to involve this critical component in an agile product development process becomes compulsory. Consequently, when the validation using numerical methods of such component is performed, a full deployment of the airbag is needed to be evaluated and analyzed, having as a key objective the monitoring of its dynamic behavior caused by the effect of interacting with nearby components. In view of the foregoing, the folding process of the airbag plays a key factor in its whole operation. This study describes a hybrid methodology to fold a Side Curtain Airbag by means of a geometrical and simulation-based routine, which can be defined entirely on LS-PrePost®, using the embedded tools in the occupant safety applications.

This work aims to englobe the tools and steps followed in order to obtain, within a short period of time, a LS-DYNA® CAE model of the airbag, capable of representing efficiently and accurately a deployment, which might be used in early stages of numerical analysis for areas such as Interior Trim integrity and safe interaction. Using this CAE methodology, a new scope of problem-solving techniques originates. Applying the novel approach described in the preceding paragraph, a folding scenario could be useful to control the dynamics of the airbag in order to achieve a faster deployment in a certain zone, to avoid an undesired interaction with the interior trim of the vehicle, or to simply evaluate the aperture time of the system overall.

All this adds up to a feasible cost reduction alternative to the most common techniques that involve modifying and adapting geometries including supplementary components, that impact directly in the prime cost of a vehicle.

ANSYS - Red Bull Racing

Red Bull Racing's Use of Ansys Simulation Paves the Way to Track Success ©ANSYS

With Ansys LS-DYNA, engineers can test impacts using virtual models and collect even more data than is available from physical crash testing.

"By Integrating Ansys' technology into our design processes, our team iterates aerodynamics designs much faster, giving us the edge against our competition on the track."
Matt Cadieux. CIO/Red Bull Racing.

-

Introduction - Since 2008, as part of an Innovation Partnership with Ansys, Red Bull Racing has been using Ansys simulation technology across a range of critical application areas. The focus of the partnership has grown from an initial focus on aerodynamics simulation to solving cooling problems, managing and optimizing materials usage and IP, and ensuring the vehicle is designed to protect the driver in the event of a crash.

Challenges - Formula 1 engineers must balance a multitude of competing design objectives for various track conditions. So, the engineers must perform their multidisciplinary design optimization studies not just once – but for every single race – often just 7 days apart. Not only do they need highly accurate design tools that give them the ability to deliver a race-winning advantage within the rules, but they also need the speed to do this between races.

Engineering Solution - The Aerodynamics Team have made Ansys Fluent Meshing their pre-processing tool of choice for generating models and creating computational meshes, and they have chosen Ansys Fluent CFD as the core component in their virtual wind tunnel. The Red Bull Racing team also uses Fluent to develop the cooling circuit and cooling capability of the car, related to the Power Unit (PU). Ansys Granta MI materials information management software is used to keep a comprehensive, single source of truth for all material information available to the team. **With Ansys LS-DYNA, engineers can test impacts using virtual models and collect even more data than is available from physical crash testing.**

Benefits

- Confidence in Fluent to set up an aerodynamics simulation and let it run without having to monitor it, freeing up time for other key tasks.
- Designing a cooling system to maximize the power unit's performance within the regulations, with virtual simulation reducing the need for on-track testing and providing the ability to run more iterations in a shorter period to optimize the cooling parameters.
- Having one source of truth for all materials properties with Granta MI removes the risk of team members accessing out-of-date information and human error.
- Improving the simulation of crash testing with LS-DYNA reduces the amount of physical testing required, saving time and investment while ensuring cars meet the crucial safety regulations of the sport

Swivel Mount

Swivel Mount - Always pointing in the direction that the car is sliding [Visit our website for complete information]

Designed for drifters, By a drifter. Troy, a Mechanical Design Engineer, started drifting his 1993 325i BMW in the fall of 2017 in the New England area. [Drifting is a driving technique where the driver intentionally oversteers, with loss of traction, while maintaining control and driving the car through the entirety of a corner.]

The action camera swivel mount was designed to point in the direction of travel and not in the direction that the front of the car is pointed. We believe that high-quality mounts can and should be made for a price that everyone from grassroots to Formula Drift drivers can afford.

Swerve & Swivel

Compare the top view of a camera mounted in a solid position always facing the front of the car, to the bottom view of our Swivel Mount. Always pointing in the direction that your car is sliding

Designed by Troy - He started recording videos on his GoPro from the car's roof or the inside of the cockpit. This proved unsatisfactory due to the static positioning of the camera.

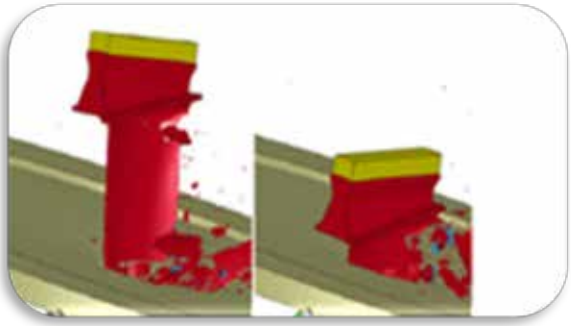
Troy knew he had to change the design. He started designing, 3D printing, and prototyping a new design that would swivel with the car as it went sideways. With his engineering background and love of the sport, he developed Swivel Mount - The future is now Swerve & Swivel.

My main goal was to come up with a design that was easy to mount on a car, recorded smooth footage, and most importantly could be affordable for my drifting buddies at the track. After 2 years of designing, testing, and redesigning, I finally figured it out.

My passion for design and drifting collided to produce The Swivel Mount.

Excerpt Paper 13th European LS-DYNA Conference, held October 5-7, 2021

The results of these tests are validated with LS-Dyna analysis, providing a reliable tool for predicting the containment capability of the casings and the out of balance progression in a blade off event. This will allow to assess the containment capability of future designs without the need of large and very costly test campaigns or service experience.



Inconel 713 and TiAl turbine blade impact test validation with LS-Dyna, including Inconel 718 casing and failure models

Kevin Manzanera, Izei Catalina
ITP Aero, Industria de Turbo Propulsores, S.A.U. Zamudio, Spain

Motivated by the necessity of validating new materials for future turbines, a set of Blade Crush Tests have been performed with Inconel 713 blades, TiAl blades, Inconel 718 casing material and steel plates. The objective of these tests is to study separately the deformation of a blade during a containment event (configuration 1 tests), and the damage of the casing caused by the impact of different blades (configuration 2 tests).

The results of these tests are validated with LS-Dyna analysis, providing a reliable tool for predicting the containment capability of the casings and the out of balance progression in a blade off event. This will allow to assess the containment capability of future designs without the need of large and very costly test campaigns or service experience.

The results and analysis validation obtained from configuration 1 tests are representative of the initial impact sequence of a containment event with Inconel 713 and TiAl blades. Inconel 713 blades will bend after tip contact with the casing and the shroud is likely to break. TiAl blade will shatter after tip contact with the casing and cracks will propagate through the aerofoil. Configuration 2 does not fully represent the damage and impact sequence expected in a containment event. The damage observed in these tests is likely to be higher than the expected on a containment event. Cracks observed in the plates correlate well with the analyses. This suggests that a containment analysis would also correlate well with a real containment event, even though the impact sequence is slightly different.

The work presented in this paper shows the capability of ITP Aero to perform impact rig tests that represent the initial containment impact conditions. This will allow to test and compare the impact behaviour of different blade and casing materials in containment like conditions.

LS-DYNA analyses show very good correlation of the impact sequence and the damage in Inconel 713 and TiAl blades in both configurations.

The quiz was left in the suggestion box by The Old Retired Pilot. No one in town knows his name. You yell, "HEY, Old Pilot." We are sending it out to the residents and guests.

The Old Retired Pilot and the Town Secretary are arguing about shooting stars. The secretary wanted a telescope to watch shooting stars and the Pilot wanted a vintage shooting star! They are still arguing in the hall which shooting star should use the budget. The budget belongs to the K-9 unit. Perhaps they should adopt a dog named Star.

Quiz - can you name the Manufacturer, and which picture is NOT is not the same as the others?

Additionally, "D" is an extra credit question!

A hint for "D" - Think President.

(The answers are at the bottom of the Goodbye page)

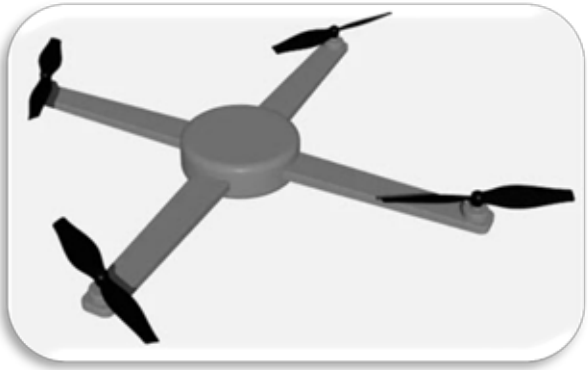
A_____

B_____

C_____

D_____

EXCERPT - full article is on the website



[How to Quiet Drones With Acoustics Simulation] - **Frank Kelecy**

What's that buzzing? As drones gain momentum in the commercial space, the noise they make has become more of an issue. Companies are investigating the use of drones for package delivery, military reconnaissance, emergency services, environmental monitoring, media coverage and much more. As drone use increases in urban and suburban areas, engineers are turning to simulation to analyze and reduce the noise they create.

A quadcopter drone model that was developed as a demonstration case.

Drone noise is affected by many factors, including:

- Motor size and mounting
- Propeller diameter, shape and rotational speed
- Drone body shape
- Operating environment

Ansys has developed a streamlined solution to predict both the unsteady flow field generated by a drone in flight and the aerodynamically generated noise from the rotating propellers by combining the power of computational fluid dynamics (CFD) simulation and advanced acoustic analysis techniques.

In the latest Ansys software release, 2021 R1, we have introduced a new acoustics workflow that couples Ansys Fluent CFD simulations to Ansys VRXPERIENCE Sound, which enables engineers to use advanced acoustics analysis techniques to analyze the acoustic pressure signals computed by CFD.

VRXPERIENCE Sound capabilities include:

- Generation of sound files (.wav) based on CFD-generated sound pressure signals, which allows you to listen to the simulated sounds.
- Built-in calculation of psychoacoustics indicators, with a complete report on such metrics as loudness, tonality, sharpness and articulation index.
- The ability to employ acoustic transfer functions, which allow you to translate a pressure signal computed at one location to see the acoustic indicators at another location.

EXCERPT - full article is on the website

Setting up the CFD Simulation for Aeroacoustics

Figure - The quadcopter drone model shown in the figure was developed as a demonstration case.

Each propeller revolves in a sliding mesh zone at a fixed rotational speed, with the rotation directions set up based on the counter-rotating orientation seen in most quadcopter drones. For this analysis, it was assumed that the drone was in hover mode 10 meters above an observer.

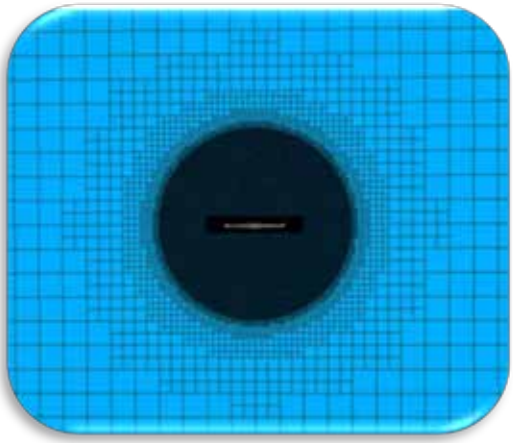


Figure - A 16-million cell mesh generated in Ansys Fluent with bodies of influence to accurately capture drone noise.

The drone geometry was brought into Fluent Meshing to generate a 16-million cell Mosaic enabled poly-hexcore mesh with bodies of influence used to refine regions close to the body and propellers. These refinement regions helped to increase the resolution of the unsteady flow field in the vicinity of the propeller, motor and motor mounts.

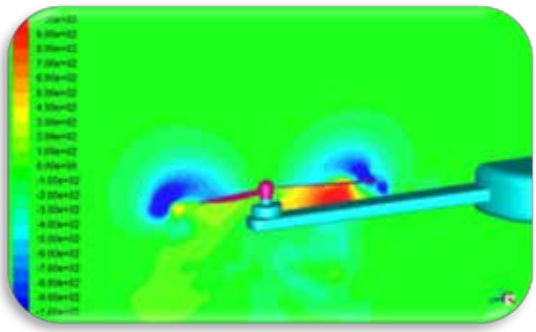


Figure - Instantaneous static pressure simulation showing a large pressure pulse resulting in a noise signature.

A transient CFD simulation was set up as a compressible, unsteady, turbulent flow in Fluent. Turbulence was modeled using a hybrid LES/RANS model to capture the fine scale flow field structures in the vicinity of the rotating propellers. As shown in the figure below, interaction of the propeller with the drone structure and motor mounts generates pressure “pulses,” which are one of the main contributors of noise generation from the drone.

Article continues on website

Viper sunset

An F-16 Viper assigned to the 8th Fighter Squadron lands after completing routine training at Holloman Air Force Base, N.M., Feb. 7, 2022. Holloman AFB is the Air Force's premier training base for F-16 and MQ-9 Reaper aircrew. (U.S. Air Force photo by Jessica Sanchez-Chen)

Cope North Falcons

Three U.S. Air Force F-16 Fighting Falcons assigned to the 14th Fighter Squadron, Misawa Air Base, Japan, fly over the Pacific Ocean during exercise Cope North 22, Feb. 10, 2022. Cope North is a trilateral exercise bringing American, Australian and Japanese forces together to test capabilities, enhance readiness skills and improve interoperability. (U.S. Air Force photo by Tech. Sgt. Matthew Lotz)

Lightning II enroute - A U.S. Air Force F-35A Lightning II assigned to the 356th Fighter Squadron, Eielson Air Force Base, Alaska, flies alongside of a U.S. Air Force KC-46A Pegasus assigned to the 77th Aerial Refueling Squadron, Seymour Johnson AFB, N.C., over the Pacific Ocean while enroute to the Singapore Airshow 2022, Feb. 11, 2022. The Singapore Airshow is the largest defense exhibition and biennial international trade show in the Pacific, attracting thousands of participants from 50 countries. The U.S. military is participating in the event by providing aerial demonstrations and static aircraft to demonstrate commitment and enhance partnerships with Singapore. (U.S. Air Force photo by Master Sgt. Richard P. Ebensberger)

Thanks to Jan Hertwig, CEO at CADFEM Medical, for bringing this to the attention of our Research Hospital

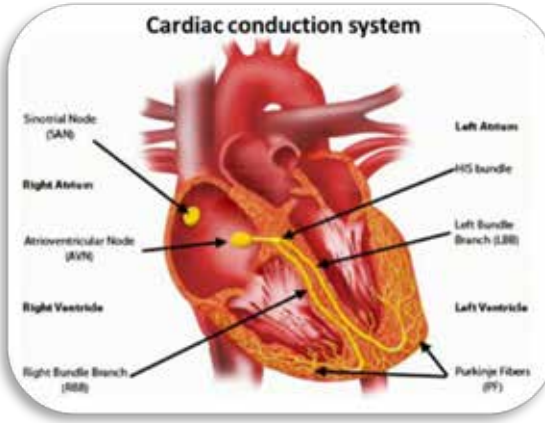
KLS Martin Group - **IPS Implants® Mandible Reconstruction**

Jaw defects due to trauma, tumors, infections, or extreme atrophy affect the quality of life of patients - both physiologically and psychologically. Approximately 20% of all IPS® cases are IPS Implants® Mandible Reconstruction cases. Resection of a tumor in the mandible and subsequent reconstruction with autogenous bone is a very demanding operation. It requires a 1:1 transfer of the donor site to the mandible to obtain a perfectly fitting bone graft. Therefore, custom fabrication using computer-based planning is one of the best and most precise ways.

Thanks to a wide range of planning options, bone thickness, implants including screw positions and the postoperative situation can be simulated in detail. The consideration of the vascular supply and the planning of the resulting vascular pedicle is decisive for the success of the transplantation…For you, this means maximum mobility, flexibility, and functionality…

Jan Hertwig - CEO CADFEM Medical

Your contact for all questions regarding CADFEM Medical.



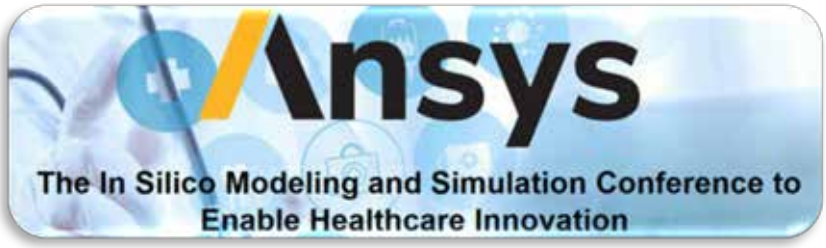
Cardiac Electrophysiology Using LS-DYNA®

P. L'Eplattenier, I. Caldishoury, F. Del Pin, R. Paz,
A. Nagy, D. Benson, Livermore Software, LLC

Heart disease is among the leading causes of death in the Western world; hence, a deeper understanding of cardiac functioning will provide important insights for engineers and clinicians in treating cardiac pathologies. However, the heart also offers a significant set of unique challenges due to its extraordinary complexity. In this respect, some recent efforts have been made to be able to model the multiphysics of the heart using LS-DYNA.

The model starts with electrophysiology (EP) which simulates the propagation of the cell transmembrane potential in the heart. This electrical potential triggers the onset of cardiac muscle contraction, which then results in the pumping of the blood to the various organs in the body. The EP/mechanical model can be coupled with a Fluid Structure Interaction (FSI) model to study the clinically relevant blood flow parameters as well as valves or cardiac devices. This paper concentrates on the EP part of the model…

Thanks to Marcus Reis, ESSS brought to our attention Tom Smithyman, ANSYS - social media post.



[Join SimCare and Discover How to Further Patient Care and Safety with Medical Innovation]

29 - 30 March, 2022 | Online Event

With a patient's well-being and even life at stake, product failure in Healthcare is not an option. The adoption of computer models and simulation – also known as the "in silico approach" – is encouraged by FDA and other regulatory authorities to accelerate the approval process, but many companies are still unsure of how to adopt and deploy this technology.

SimCare, a virtual conference presented by Ansys will bring together Medical Device and Pharmaceutical industry experts to share their experiences applying computer modelling & simulation (CM&S) throughout the development and regulatory process to drastically reduce the time to market and boost medical innovation without compromising with patient safety.

- **Conference Day One: Medical Devices - Conference Day Two: Pharmaceuticals**

REGISTER

Meet Your SimCare Speakers - 2022

KOLLIDE -[Tackling Challenges in the National Football League with Simulation]

With an increasing number of concussions among players in the National Football League (NFL) and a growing concern to prevent head injuries, the organization launched the NFL Helmet Challenge to create helmets better equipped to sustain impact from varying angles. **Rising to the task, a Canadian-based group of innovators formed KOLLIDE to meet this challenge head on by using Ansys' industry-leading simulation solutions with the biggest assist from Ansys LS-DYNA.**

Figure 1. The KOLLIDE football helmet features an innovative system that uses 95 pads to enhance shock absorption and better withstand impact. (video can be viewed on website)

The trusted explicit solver did not disappoint. KOLLIDE secured a spot as one of the NFL's top three awardees for their helmet's innovative and protective system, which employs 95 pads and an underlying supportive 3D-printed matrix structure. With $550,000 in grant funding to advance their prototype, KOLLIDE is headed into overtime with plans to further upgrade the helmet and scale the manufacturing process.

The Kickoff - Intrigued by the challenge, Kupol, an advanced manufacturing company, gathered fellow local innovators from startups and niche companies to work together toward a solution in collaboration with the École de technologie supérieure (ÉTS), a decades-old engineering school in Montreal.

Together with Kupol, KOLLIDE's lineup includes industrial design firm Tactix, simulation company Numalogics, and software firm Shapeshift 3D.

KOLLIDE took up the challenge in November 2020, with a one-year-deadline and 12 people who could not meet in person for 10 months due to the pandemic, adding another challenge in itself.

Given the in-person meeting limitations, coupled with budget restrictions for prototyping, the team went digital, turning to virtual design and testing. Implementing simulation as a collaboration tool not only united the team despite member location, but it was critical to saving development time and costs.

Additionally, the NFL provided four open-source finite element (FE) models of helmets with associated impact test methods and equipment.

"The bench test for testing the helmets is an expensive piece of equipment," says **Franck Le Naveaux**, a research coordinator for KOLLIDE at Numalogics. **"Testing virtually with Ansys LS-DYNA is helpful to improve our speed and reduce costs related to prototyping."**

For nearly 10 years, Numalogics has worked with Ansys and the SimuTech Group, an Ansys Elite Channel Partner. Until now, Numalogics experts relied mainly on implicit modeling to simulate medical devices and their interaction with the human body, however, to simulate helmet impacts, explicit modeling was required. Nine meters per second — the highest impact speed in the NFL's helmet testing protocol — may be slower than typical simulations that use LS-DYNA, but it's much faster than what a surgeon does with his hands. Prior to the challenge, Numalogics experts had the most experience using Ansys Workbench for more static, or structural simulations.

But with the speed of impact and composition of the prototype itself, they knew there was only one explicit solver for the job.

"Materials used in the helmet are fairly complex materials" says David Benoit, Biomechanical Simulation R&D Specialist at Numalogics. "Being able to simulate materials that are highly non-linear, viscoelastic and strain rate dependent was a challenge. Ansys LS-DYNA already had all of those profiles."

Figure 2. The KOLLIDE Helmet is comprised of 95 shock-absorbent pads.

Making a Play with Simulation - A different modeling approach was needed to find the optimal trade-off between model accuracy and solving time to iterate quickly. The team strategized on how to represent the lattice structures best, trying to understand how to model each wall of the structures.

Although the predictive results of the simulation by faithfully representing the lattice microstructure of the pads were promising, too much computing resources were required to simulate the whole helmet.

As a solution, they homogenized the lattice models to use less computing resources. Still, with 400,000 elements to analyze at the start, KOLLIDE's simulation journey was certainly not express. Ultimately, each type of simulated impact ran in about three hours on 16 cores. The simulations were performed at three different speeds to demonstrate diverse impacts.

KOLLIDE approached the helmet as a system comprised of two main parts: the liner and the shell, setting the facemask aside for last. And simulation played a role in each part of the system, allowing the team to test multiple types of liners and shell features, while mitigating risks of late design failure.

"Because the helmet is a system, you cannot optimize a single component without affecting the behavior of the whole helmet" says Benoit. "I don't see us being able to provide a fully optimized helmet for the challenge without simulation."

One of the KOLLIDE helmet's most essential features is its unique liner comprised of networks of lattice-filled, 3D printed structures. These networks absorb a large amount of energy and enable the pads to have flexibility and movement, relative to each other, which boost shock absorption depending on the direction of impact. Additionally, the group experimented with different printing techniques and materials to consider how lattice structures behave and sustain multiple types of impact at different temperatures.

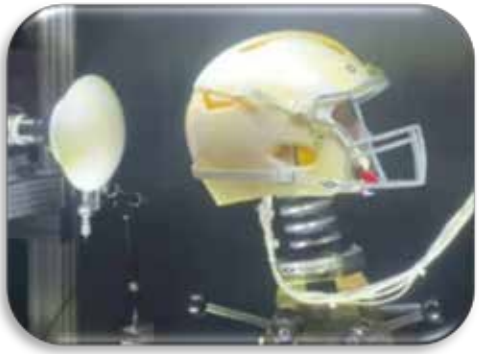


Figure 3. Ansys LS-DYNA and 3D printing reduced physical prototyping costs and accelerated product development.

The final pads were printed using fused deposition modeling (FDM). For the shell, KOLLIDE tested different compounds to find the best material for sustaining impact before opting for a soft shell to better distribute impact onto the underlining inner padding. **The rigidity of the pads and shell were calibrated using Ansys LS-OPT, a design optimization tool built into LS-DYNA, allowing to develop a fully automatized optimization workflow.** In another success, the finished pads are able to shear and mitigate rotational acceleration which has been found to be the most potentially damaging type of acceleration for the brain.

As a last step, the team created the facemask, which was less of a redesign and more of a fit adjustment to the new liner and shell.

Moving the Chains: What's Next? KOLLIDE's final product looks like a regular helmet but holds advanced features that highlight its lattice structure, such as its customizable fit. There are 95 shock-absorbent pads mounted on a sling in suspension with the shell — an area where simulation helped to improve energy distribution.

"This project would not at all have been possible without using simulation, given the fast timeframe. We would have submitted a helmet, but not a good one," says **Franck Le Naveaux,** a research coordinator for KOLLIDE at Numalogics. "Also, with designers working with computer-aided design (CAD) software, bringing concepts to us and testing them, simulation was critical to an efficient workflow."

Though no team met the NFL's goal, KOLLIDE scored just above the desired rank. The helmet's promise was so impressive that the team was selected with two other finalists to receive funding to advance their prototypes.

KOLLIDE is gearing up to do just that, focused on exploring new concepts and scaling 3D printing to produce an upgraded helmet at a faster pace to meet the HPS goal. In accordance with the grant, the NFL will follow KOLLIDE's progress for a year. The teams have six months to submit a new prototype, then another six months to produce an advanced final product.

Rocky DEM

Fatigue life prediction: complementing structural analysis with particle simulation

To better understand fatigue and equipment life, Bobcat developers combined DEM and FEA simulations to account for particle loading.

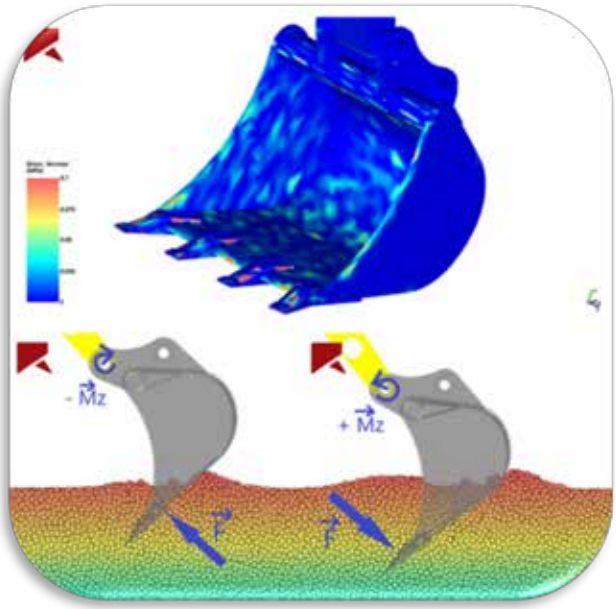
Identifying how particle interaction contributes to stress loads: a Bobcat's case study

Chances are you know that a Bobcat machine. Despite its small size, is the "go-to" job-site workhorse. Its namesake company is a global leader in developing compact equipment that serves the construction, agriculture, landscaping, and grounds-maintenance industries. The Bobcat corporation, part of the Doosan Group, offers quality products that empower people to do more and has built its reputation on performance and dependability.

Bobcat products' steel structures are especially important to ensure robustness and extend equipment life. Like many R&D teams around the world, Bobcat engineers apply mechanical FEA to predict how a part or machine system behaves under given conditions, which helps to identify weak spots and areas of tension. We're interested in interpreting these simulation results not just as they relate to stresses from certain loads, but also how these repeated actions affect equipment life.

The mechanical analyses are carried out using an envelope of load cases. We leverage FEA tools to reliably predict and analyze the extreme conditions that a product encounters — and though these analyses are good for assessing mechanical properties, they are not proficient in the assessing the life of the product under different operating conditions. That is why we also perform fatigue analysis.

In addition, for our application the loading changes depending on our machine type and application including for example what type of material the customer is working with. We wanted to design a set of simulation capabilities that brings all pieces of this puzzle together, so we considered a scenario that included loading and used a compact excavator as a case study. Typically, excavators dig into the ground, coming into contact with different types of soils. Unlike the fatigue that road vehicles sustain, excavators' most-damaging loads don't come from extreme dynamics. Excavator fatigue generally comes from contact with the environment, specifically, what the excavator is digging. When broken down to its basics, dirt comprises individual particles that interact with each other as well as with the surfaces of the tools the particles come in contact with, exhibiting forces of repulsion, bonding, and friction. We expected that Rocky Discrete Element Modeling (DEM) tools would be highly useful for this study.



Left Pic: Particle action on excavator bucket under normal stress.

With our eventual goal to optimize equipment life, our DEM investigations didn't intend to replace FEA. Instead, they planned to add different types of results to the mix, giving us another piece of the whole picture. We were not trying to build more precision on top of what we were already doing; instead, we were looking at the same thing from different points of view.

The study, that involved expertise from SVS FEM and resulted in a student's proof-of-concept master thesis, created two computational models, one in Rocky DEM and a FEA investigation inside Ansys Mechanical.

Discrete element modeling identified the effects of soil harvesting on the excavator's components, with an outcome that included forces and moments of the excavator's joints and the time that these occurred. The input parameters were found in literature (based on Bobcat's intellectual property restrictions) that dealt with soil-ripper wear.

Chances are you know that a Bobcat machine. Despite its small size, is the "go-to" job-site workhorse. Its namesake company is a global leader in developing compact equipment that serves the construction, agriculture, landscaping, and grounds-maintenance industries. The Bobcat corporation, part of the Doosan Group, offers quality products that empower people to do more and has built its reputation on performance and dependability.

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The physics of the bucket digging into dirt particles. When forces acting on the bucket's outer side prevail, torque is negative (left); when forces acting are more prominent on the bucket's inner side, torque is positive (right).

Coupled mechanical–DEM simulation represents excavator shaft stresses at any time during soil harvesting: von Mises stresses (left) and time instant (right).

The DEM results would then be applied in Ansys Mechanical as an external load to the excavator's joints, assessing elasticity and fatigue strength. The structural model used simplified geometry for the excavator arm and a more-detailed geometry model of the analyzed joint. All parts would be connected by rotational bonds, representing joints. Motion was defined by entering angular acceleration values into the joints. Simulation showed that the most significant results related to force and moment of the joint near the excavator bucket.

Were the results what we expected? Since this was a proof-of-concept, and not part of our usual development work, we did not know what to expect, especially since we wanted to compare the results with real-life Bobcat data. But the study results show that using Rocky DEM is a plausible solution to us, and it might deliver results in the range that we expect. We were able to set actual digging conditions and soil properties to determine how stress changes impact equipment life estimations. And by using Rocky, we became more convinced that we can achieve accurate results.

Our quick 15-minute sessions will keep you up-to-date about the latest in computational simulation using Discrete Element Modeling (DEM)

The Rocky in Action webinar series offers a realistic overview of simulation workflow, and showcases how easily Rocky enables DEM simulation and solves real engineering problems, in sessions presented by specialists in simulation and CAE applications.

Jaroslav Stanek

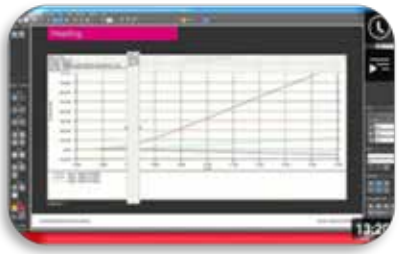
Advanced Simulations & Reliability Engineering Manager at Doosan Bobcat

Jaroslav Stanek is an Engineering Manager for Simulation and Reliability atBobcat EMEA (Europe, Middle East and Africa), and Senior Consultant & Partner at Diribet. Bobcat EMEA's headquarters are located in the Czech Republic, as part of the Doosan Bobcat family, a global leader in construction equipment, power and water solutions, engines, and engineering, proudly serving customers and communities for more than a century.

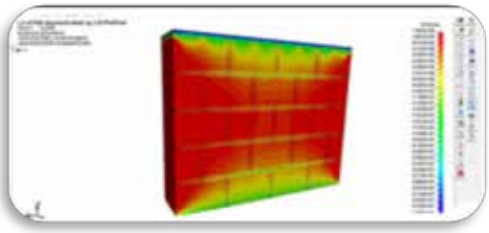
02/28/2021 - Quincy and Rhiannon running and jumping - Quincy loves to jump over things so it was a nice day. I hate to jump over things so it's great Rhiannon runs with him.	02/21/2021 - Our old man Shane sleeps most of the days now - he will be 30 in April. BUT still loves to eat and walk around slowly so all is good.
	
02/14/2022 Night vision camera - Yes, that is our owl that now sits on the roof - it was totally dark when I took the picture and I'm not used to my new night vision camera to get clear pictures, BUT it is the owl.	02/07/2022 Nicole and Kensington: Mom, miniature horse, Kensington time.
	

Tutorials

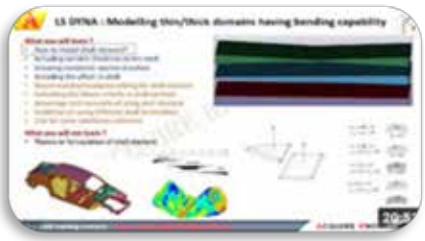
Silvia Mandel (DYNAmore GmbH) - LS-PrePost: News, Tips and Tricks



Oaysis - Top Tip: using and creating Oasys REPORTER variables in Oasys THIS

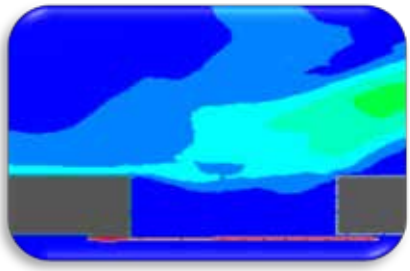


A. Topa - Vertical Load on Masonry Wall: Keyword Manager

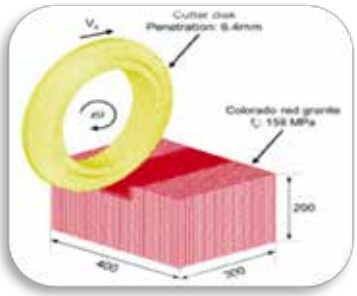


Acquire knowledge - Part 1 LS DYNA : Modelling thin/thick domains having bending capability

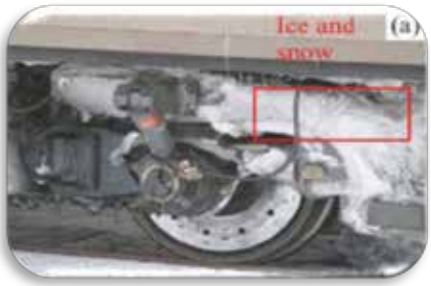
Papers



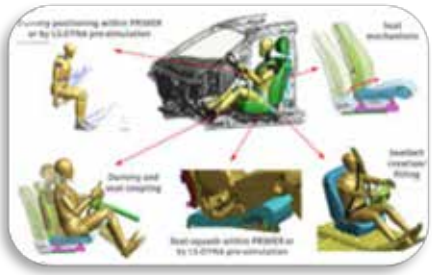
P. Wang - New Development of the Gap Closure Feature in LS-DYNA ICFD



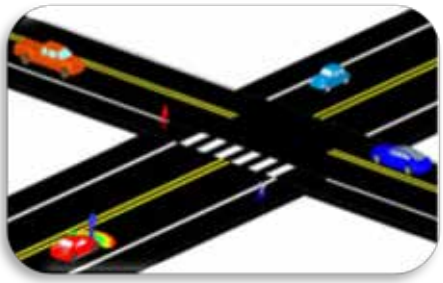
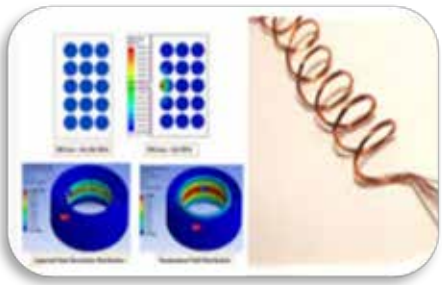
R. Nasouri - Numerical Simulation of Rock-Cutting Mechanism of Tunnel Boring Machine

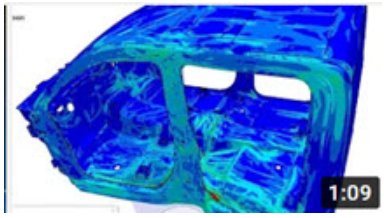


M.Vinot - Simulation…high velocity impact of railway ballast on thermoplastic train underbody structures



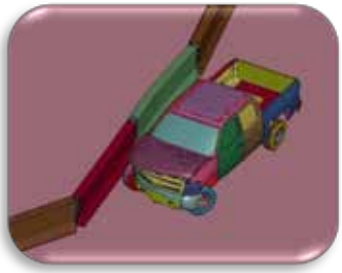
G. Mohamed, G. Newlands (Arup) - Human Body Model Positioning using Oasys PRIMER

	02/28 - **EDR Medeso** Blog- Kollide Tackling Challenges in the National Football League with Simulation - with the biggest assist from Ansys LS-DYNA.
	02/21 - - **Troy - Swivel Mount** Designed for drifters, by a drifter. Points in the direction of travel and not in the direction that the front of the car is pointed.
	02/14 - **OZEN** - Fast Frequency Looping in HFSS SBR+ Speeds Up Range-Doppler Simulations
	02/07 - **Marius Rosu - ANSYS -** All Wound Up: New Litz Wire Modeling and Loss Prediction in Ansys Maxwell



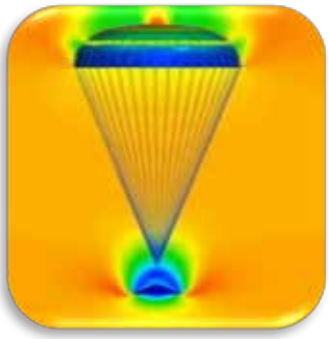
02/28- I think my coffee cups may spill during a side impact since that is a sideways slosh. BUT you are not suppose to drink and drive, OR text message! Now that you have hard my lecture, let's head over and view the side impact.

LURI Engineering Pole Side Crash Impact Protection - Cabin Truck



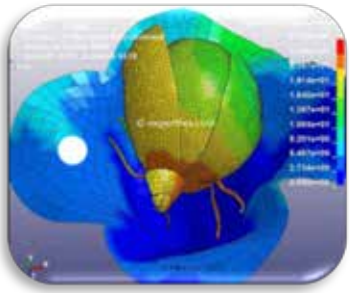
02/21- My new hobby is drifting - HA! I bet you thought I meant I go from hobby to hobby? Nope - you need to visit the Guest Section! Now let's drift on over to YouTube for an LS-DYNA crash

Saferoads' crash test with LS-Dyna FEA



02/14 - Happy Valentine Day - there are no calories in any chocolate on this day! It is a calorie free day! And we are dropping candie by parachute! That drops out all the calories on the way down.

LS-DYNA ICFD/FSI: 3D Porous Parachute FSI Modeling.



02/07 - Today we are rescuing lady bugs! Love Lady bugs on flowers.

SO that said, we will have Bug coffee? Lady Coffee? WHO yelled, "UGH!" Okay let's go to Youtube with Coffee and name it what you want it to be called.

ExpertFea - LS-DYNA FINITE ELEMENT ANALYSIS - Lady bug landing abruptly on a flower

My Virtual Travel Outing

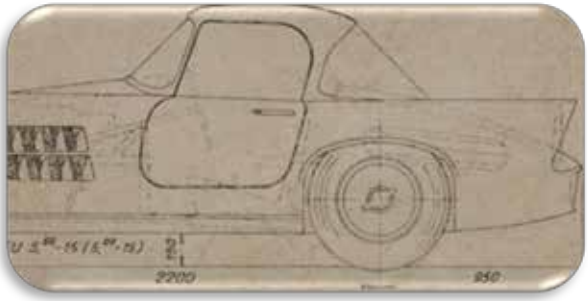
Thank you for joining me on my visit to this month's museum. I visit a new museum every month.

Thank you Christina Theuerkauf, for liking a post by Thomas Schaefer, CEO at ŠKODA AUTO a.s.

Thomas Schaefer "Only two examples of the ŠKODA 1100 OHC Coupé were built in 1959, and these were used in endurance circuit races. The Coupés were then sold to private customers in the mid-60s. Unfortunately, both cars were later involved in accidents and were 'gutted'."

SKODA Story Board - ŠKODA 1100 OHC

YouTube ŠKODA 1100 OHC COUPÉ: Back on track



Thomas Schaefer "It's amazing what the team at our ŠKODA Museum restoration workshop has come up with!

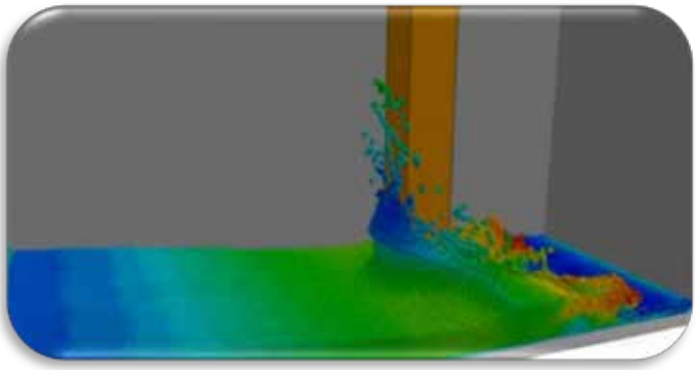
Seven years ago, the workshop team decided to reconstruct the 1100 OHC Coupé and reassemble at least one of them.

A tricky puzzle: The original engine, a four-cylinder in-line naturally aspirated engine, was on display at the vocational school in Mladá Boleslav for the last 50 years. The rear axle with its integrated gearbox was in storage at the National Technical Museum in Prague. And the chassis frame was cut into three parts, but we still managed to get it. The goal, of course, was to obtain as many original parts as possible.

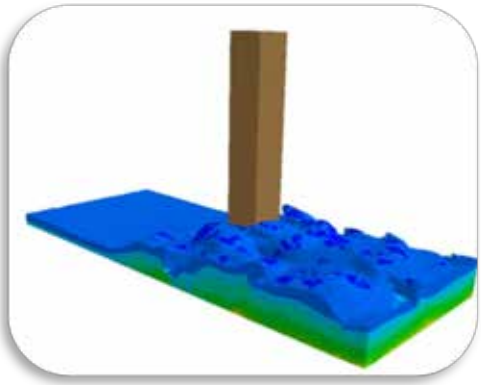
With the help of old technical drawings and photographs, the workshop team painstakingly restored the ŠKODA OHC Coupé. Some parts such as the radiator and the fuel tank were made from scratch. Fortunately, many of the other parts came from other ŠKODA models in the original version of the vehicle – the outer door handles, for example, came from the ŠKODA 1200 Saloon, and the steering wheel was from the ŠKODA POPULAR. Thousands of hours of work resulted in a fully roadworthy car.

It's wonderful, isn't it? A big thank you to everyone who helped bring this vibrant part of our over 120-year ŠKODA Motorsport history back to life!"

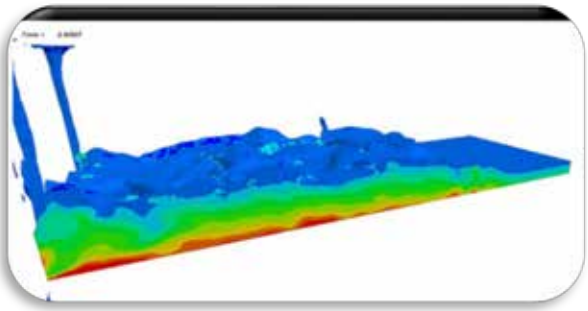
A dam failure or dam burst is a catastrophic type of failure characterized by the sudden, rapid, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release



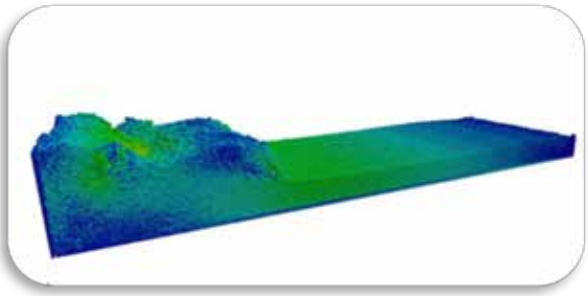
LS-DYNA SPH: Dam break and wave impact on rigid column
Test problem using the SPH solver in LS-DYNA.



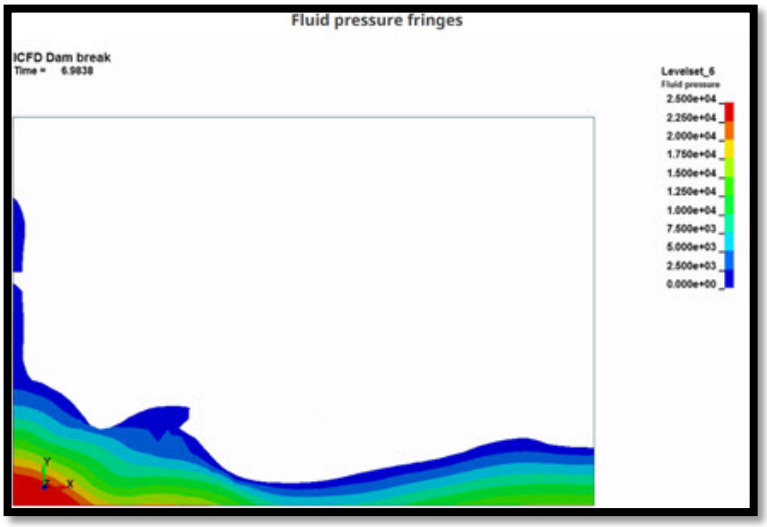
LS-DYNA CFD: Dam break and impact on rigid column
Test problem using the ICFD solver in LS-DYNA.



LS-DYNA CFD : Dam break and impact on square shape
Test Problem using the ICFD solver in LS-DYNA



LS-DYNA SPH: Dam break and impact on square shape
Test Problem using the SPH solver in LS-DYNA

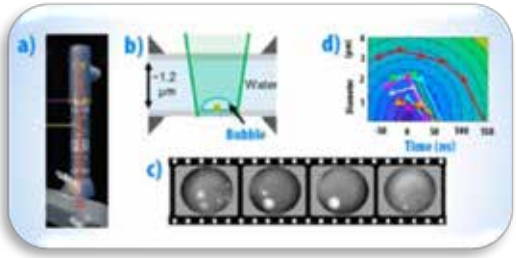


LS-DYNA Examples - Basics : Dam break - This LS-DYNA simulation shows a simple free surface example using the ICFD solver. A column of water collapses under the load of gravity. In order to set up such a problem, the domain must be divided in two ICFD_PART_VOLs, one for the fluid, one for the vacuum. For the automatic volume mesher to recognize the initial interface, the keyword MESH_INTERF must be used. Gravity load is applied through the use of LOAD_BODY keyword. Since the solver is implicit, no ramp up is needed.

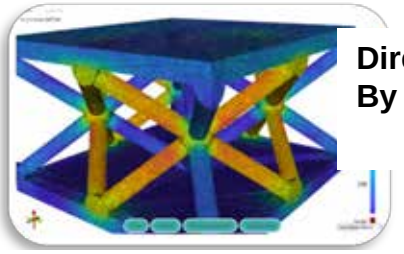
Welcome to our Convention Center exhibit hall & Coffee Cafe. Coffee, of course vanilla, hazelnut, and other flavors are courtesy of our favorite coffee shop (not the rival coffee shop).

Poster Board area is on the internet, news, or Social Media Posts Not To Miss

Interview with Erke Wang CADFEM Managing Director
What makes Ansys 2022 R1 stand out - The latest version of the Ansys program family was released at the beginning of February. CADFEM specialists have already tried out the new features and further developments. We talked to Erke Wang, Managing Director at CADFEM GmbH, about what makes Ansys 2022 R1 special, what customers have in CADFEM and where the simulation journey is heading.



Taking a look at tiny bubbles - Anne M Stark -
LLNL researchers combined a unique
a) Dynamic Transmission Electron Microscope with
b) a liquid cell to produce the first ever
c) time resolved images of
d) nanoscale bubble dynamics.



DirectFEM - ReveaL's secret: non-watertight geometry is for free!
By Nina Korshunova

Applus+IDIADA **performs a Driver Visual Distraction Characterization (DVDC) study for Toyota**

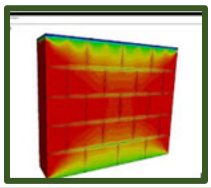
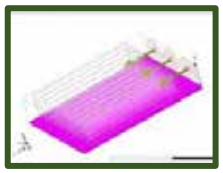
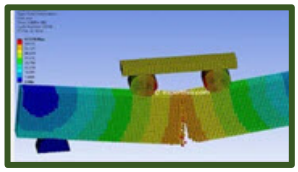
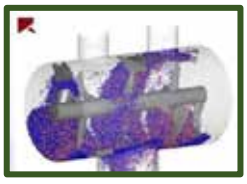
The experiment brought together 120+ naïve drivers, the largest number of participants ever gathered in a dynamic driving simulator for a test on the characterization of drivers' visual distraction patterns. The Driver Visual Distraction Characterization (DVDC) experiment, conducted in collaboration with Toyota Motor Europe, investigated and assessed driver visual attention associated with road traffic accidents and near-misses.

CONVENTION CENTER
YouTube Booths

March

Current videos
from our booth visit:
Feb 26th

Free Coffee for
visiting our exhibitors

Ameen Topa			Kaizenat
LURI ENG			Oasys LS-DYNA
LEAP Australia	Optimisation		ANSYS
Expert FEA			DYNAmore
BETA CAE			Ozen Engineering
MEETING ROOM			CADFEM

CADFEM India

Are you aware of just how much potential simulation harbors?

Using simulation for more efficient development work and a faster development process – for greater product innovation and improved product quality. Discover what simulation can do for your company too.

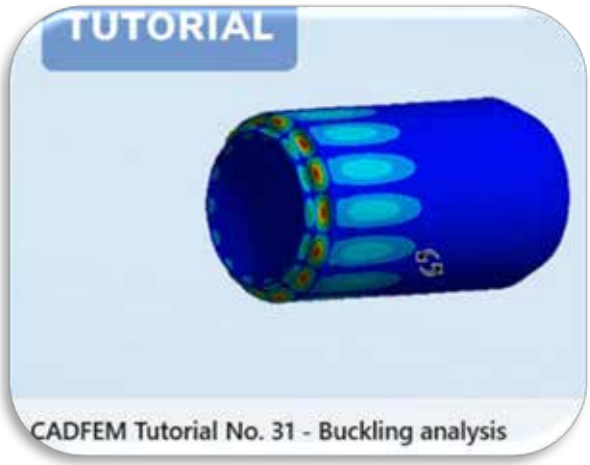
That's why simulation pays off

Simulation isn't an end in itself. Simulation's full potential for a company is revealed when viewed from three perspectives. First, from the point of view of the designer or development engineer using the software in their everyday work. This gives rise to significant benefits for the development process as a whole. Entrepreneurs and product managers, meanwhile, see the added value that simulation has to offer above all else in the company's higher product quality, quicker product availability and increasing innovative strength.

Introduction of simulation in your company

We would be delighted to advise and guide you through how to efficiently introduce simulation software and processes according to **our tried-and-tested four-step model.**

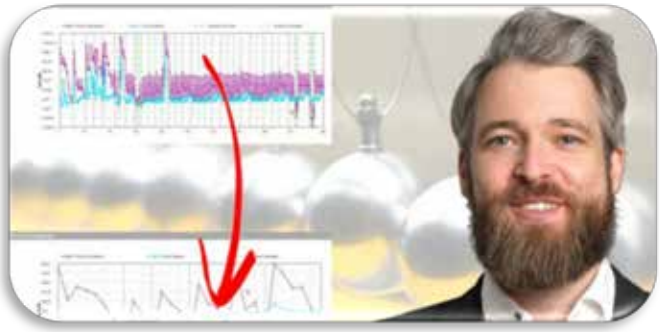
Potential and goals	Status Analysis and Solution Plan	Evaluation and Implementation	Productive use and expansion
Step 1 - Systematic determination of the potential benefits through our 3-perspective model and the identification of a pilot project.	**Step 2** - Determining the status quo as a basis for tailor-made solutions.	**Step 3** - Technical evaluation of the solution creates decision-making certainty	**Step 4 -** Productive use with continuous technical evolution.



CADFEM Tutorial #31 Buckling Analyses

In this tutorial, We would like to show you how buckling analyses can be carried out with Ansys.

Also, We will look at linear and non-linear buckling and how imperfections can be taken into account in the buckling analysis.



"Contact modeling with Ansys"

Additionally in the English language.

The lecturer is Alexander Nolte

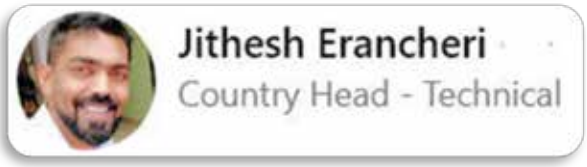
Dr.Markus Kellermeyer, "I'm sure that the first module, which anyone can watch for free, will bring a lot of understanding.

Take a look at it: Request a free eLearning module:

Test the first module for 30 days and start your eLearning journey!"

Dr.Markus Kellermeyer, "In my very first weeks at CADFEM, one of the main focus was to get familiar with contact calculation with Ansys. There was one situation that I remember very well. I sat for almost 1h together with Erke Wang in front of a force convergence diagram, which was constantly updating during the calculation. Erke was interpreting all kinds of things into the diagram. It seemed to me like in the movie the Matrix (who knows the movie will know what I mean). Anyone can become a Neo.

Now, 14 years later, I am happy that we can provide the CADFEM eLearning training for the "Contact modeling with Ansys" also in English language. The lecturer is Alexander Nolte, it takes 3 days and it is one of our bestsellers. Thanks, Brian Morris, for the great voice-over!"



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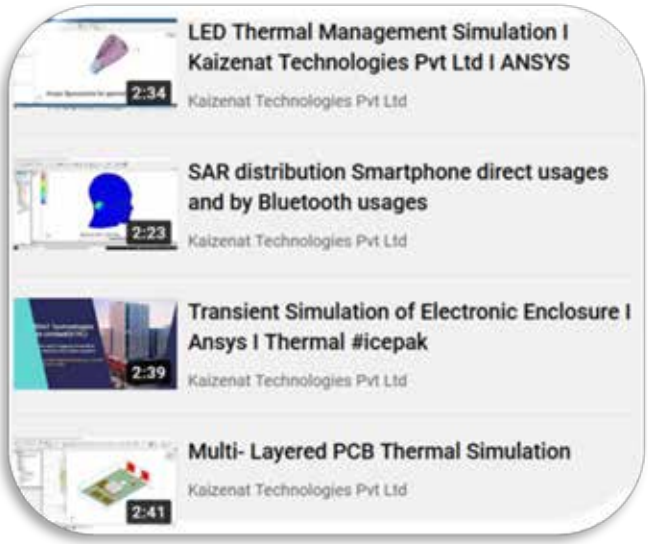
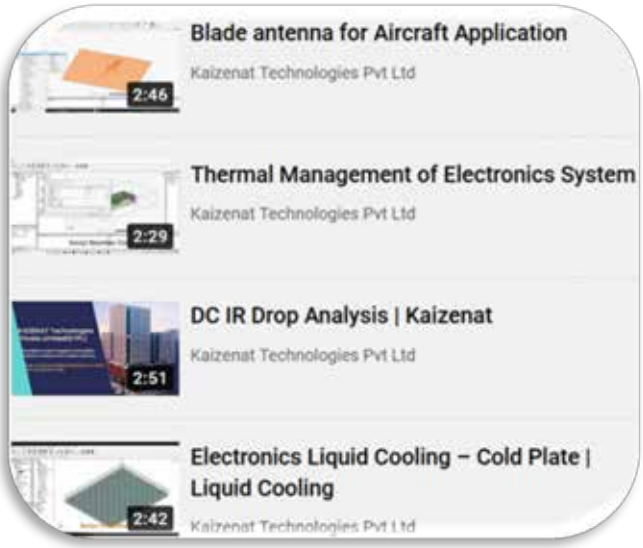
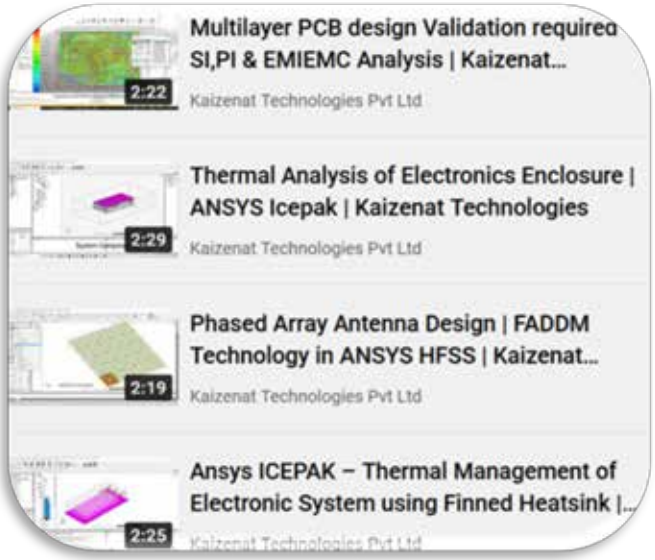
[Electronics Simulations. Enjoy your learning videos.](#)

Our Simulation experts work on different recent trends High-Frequency applications using ANSYS HFSS, ANSYS SIwave and Low-Frequency applications using Icepak, Maxwell & Motor-CAD. Electromechanical field simulation helps you design innovative electrical and electronic products faster and more cost-effectively.

In this channel we offer to address or solve the RF problem using ANSYS HFSS, ANSYS SIwave (Antenna, Array, RCS, Radar simulations for Range Doppler and Angle of Arrival, FSS, Radome, SI, PI, EMI, EMC, RF Interference, RFIC MMIC, etc.) and Thermal Management of Electronics (Chip, Package, PCB, System) as well Design and Simulation of Electromechanical Systems (Motors, Actuators. Transformers, Busbars, Magnetic Sensors etc.)



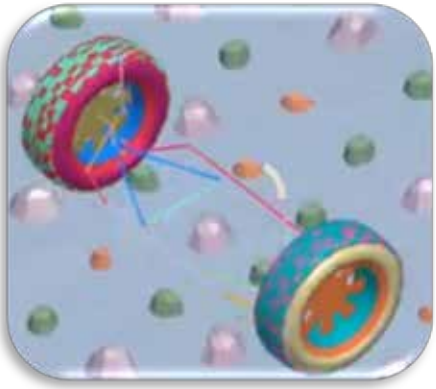


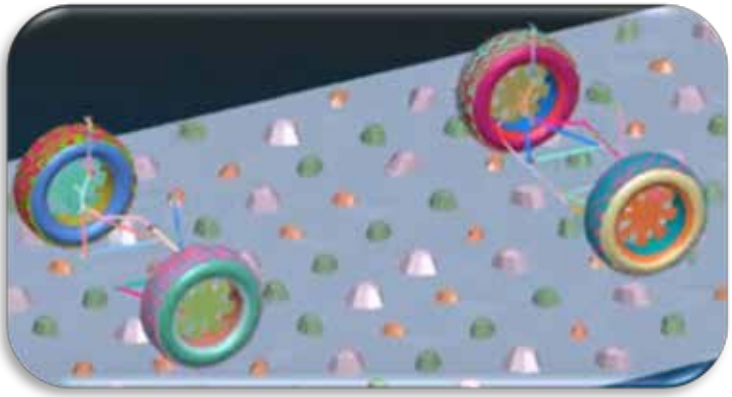


Fabian Leonov S. López - CAE Engineering Manager/COO
LURI Engineering México Automotive/ Structural Analysis FEA
Ask if you are interested in learning more- leonov.lopez@luriengineering.com.mx

LURI Engineering VPG Tire, Suspension and Virtual Proving Ground for Road Load Simulation

The Structure module under VPG is the finite element tool customized and developed for users in the auto industry, including the sub modules such as, Road, Tire, Suspension and so on.





The town welcomes a future engineer, doctor, Olympian, cattle rancher, pilot, did we say rancher and pilot? We need to add Cowboy!

Amauri Tadeo born - Jan 22nd - The town gives happy congratulations to:
Dad **Fabian Leonov S. Lopez**, AND Mom **Zeltzin Coria** (Mom did all the work)

The Engineering of a perfect yawn, before falling asleep held by Mom
He was too sleepy to start a simulation video of the yawn - wait a few years!




We will have 125 classes in Germany (including Swiss and France) and 36 in Sweden.
Many of them are available online and in English.

March

07, 28	LS-DYNA Compact: Intro to LS-PrePost	S. Mandel
08	ALE and FSI	M. Souli, J. Lacambre
10	Welding & Heat Treatment with DynaWeld & LS-DYNA	M. Souli, J. Xu, J. Lacambre
10	Implicit Analysis using LS-DYNA	T. Erhart, P. Glay, C. Schmied
10	Smoothed Particle Hydrodynamics	
15, 23	Intro. to LS-DYNA	Dynamore staff
14, 21	Intro. to LS-PrePost	S. Mandel, P. Glay
09, 28, 30	LS-DYNA Compact: Intro to LS-DYNA	Dynamore staff
17	LS-DYNA Compact: Damage and Failure	F. Andrade
18	Support days Occupant Safety	
18	Intro to contact definitions in LS-DYNA	T. Graf, P. Glay, J. Lacambre
21	Material Failure	F. Andrade, A. Haufe, M. Feucht
21	LS-DYNA Compact: Electromagnetism in LS-DYNA	I. Çaldichoury
23	LS-DYNA Compact: Resistive Heating and Battery Modeling	I. Çaldichoury
24	CPM Airbag Modeling	S. Stahlschmidt, S. Mattern
28	Polymers/Elastomers	S. Kolling
25	Introduction to contact definitions in LS-DYNA	T. Graf, P. Glay, J. Lacambre
26	LS-DYNA Compact: Intro to Draping Simulation with LS-DYNA	T. Klöppel, C. Liebold
28	LS-DYNA Compact: Introduction to Simulation Data and Process Management in LoCo	
30	ICFD Incompressible Fluid Solver	I. Çaldichoury

Contact

Maik Schenke

Paul Du Bois and Suri Bala

Crash Analysis Course in Gothenburg, Don't miss out.

This advanced course applies to engineers with experience in:

- the application of explicit programs, or who bring along experience from the field of dynamic & nonlinear calculation with implicit programs.

The aim of the course

- Particularly the aim of the course is to show how to perform an accurate and reliable crashworthiness simulation by thorough modeling and further understanding of the procedure.
- To show how to perform a crashworthiness simulation in the automobile industry using LS-DYNA.
- The presented methods are transferable to other kinds of crashworthiness simulations (rail-vehicles, components of vehicles, airplanes, vans, etc.).

Expected participants

- New fellow employees from the department of crash simulation of a car manufacturer
- New fellow employees of suppliers in the automobile industry (suppliers of components, engineering companies),
- Users in related industrial sectors.

Advantages and disadvantages of different kinds of modeling to become aware of:

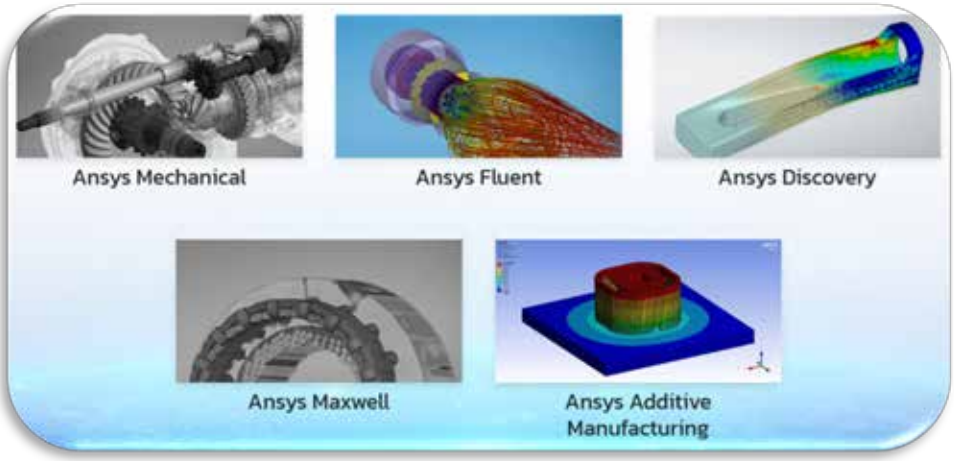
- Each crashworthiness simulation is a compromise between profitability and accuracy.
- At the moment there is no kind of a guideline for modeling and calculating crash.
- Therefore, the user has to be aware of the procedures depending on the purpose of the simulation.

Course Content:

- Introduction to crash simulation using LS-DYNA, history, possibilities, technical limits, accuracy and reliability problems, future developments
- Modeling techniques for parts of car bodies: mesh-outlay, element quality, flanges and weld spots, contacts, etc.
- Modeling techniques for components consisting of other materials than steel: the motion of motor, tires, bolts, rubber buffer, etc.
- Selection and description of suitable material models in crashworthiness simulation for soft foams (chair cushions), EA-Foams, rubber, etc.
- Modeling of dummies with a determination of material parameters
- Airbag simulation, reference geometries, folded airbags
- Modeling of barriers under extreme deformation
- User subroutines
- Quality control of models as well as analysis and evaluation of the results

Dyna Forming Engineering & Technology DFETECH

DFETECH is an engineering firm established since 2005 to provide advanced engineering solutions to industries ranging from automotive and aerospace to electronics, consumer products, civil engineering and defense. Our expertise includes CAE, modern stamping engineering, dimensional engineering and variation prediction.



Among the products we offer to our customers.

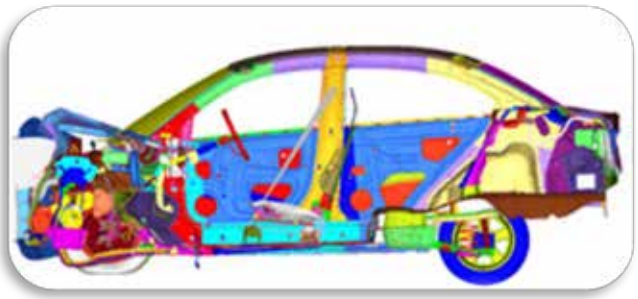
Ansys products Next-Gen Pervasive Engineering Simulation.

Additionally, we offer **DFETECH CONSULTING**

Accelerate your journey to success - "Our goal is to equip our customers with the necessary knowledge and management solutions to today's challenges."

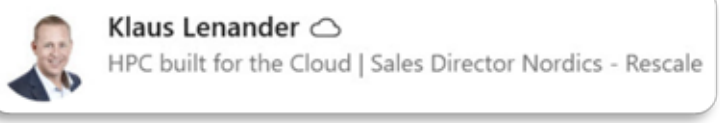
Sheet Stamping Engineering

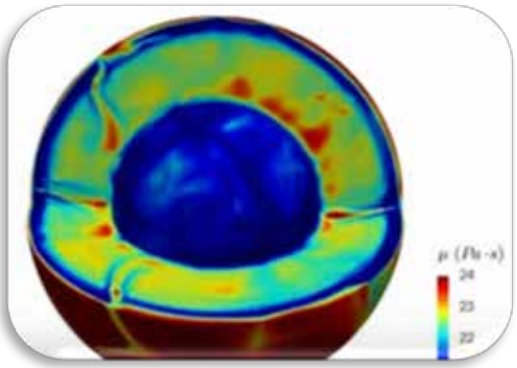
- Draw Die Development and Simulation
- Design of Progressive and Transfer Dies
- Die Structure Designs and Analysis
- Die Process Design
- Blank Size Estimation and Cost Analysis
- Spring back Estimation and Compensation
- Tubular Bending and Hydroforming
- Formability Engineering Analysis

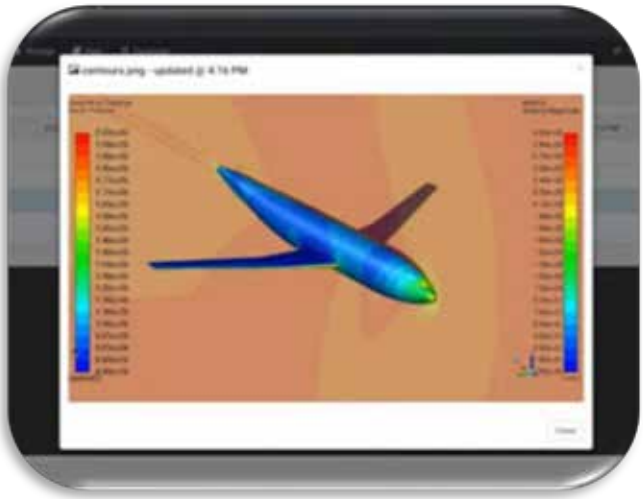


Advanced CAE Analysis

- Vehicle Crashworthiness Analysis
- Pedestrian Safety Analysis
- Vehicle Dynamic Analysis
- Vehicle NVH (Noise, Vibration and Harshness) Analysis
- Durability Analysis
- Drop Test
- Shock and Vibration Analysis
- Analysis of Building Structure





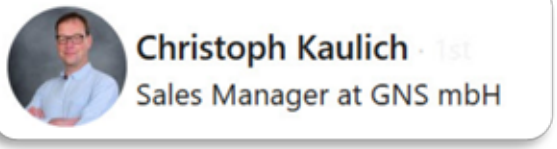


Rescale is High Performance Computing built for the cloud.

YouTube - See how Rescale provides an easy solution for engineers, scientists, and IT/HPC leaders, in their pursuit of fast and world-changing innovation.

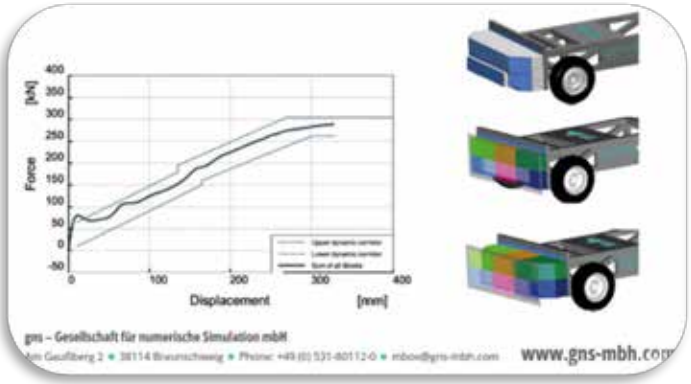
Featuring engineers and leadership from Sensatek, Exponent, and Liberty University.

Rescale is high performance computing built for the cloud, to empower engineers while giving IT security and control. From supersonic jets to personalized medicine, industry leaders are bringing new product innovations to market with unprecedented speed and efficiency with Rescale, a cloud platform delivering intelligent full-stack automation and performance optimization. IT leaders use Rescale to deliver HPC-as-a-Service with a secure control plane to deliver any application, on any architecture, at any scale on their cloud of choice.



Excerpt from pdf - GNS now offers its customers innovative solutions in the field of LS-DYNA finite element models

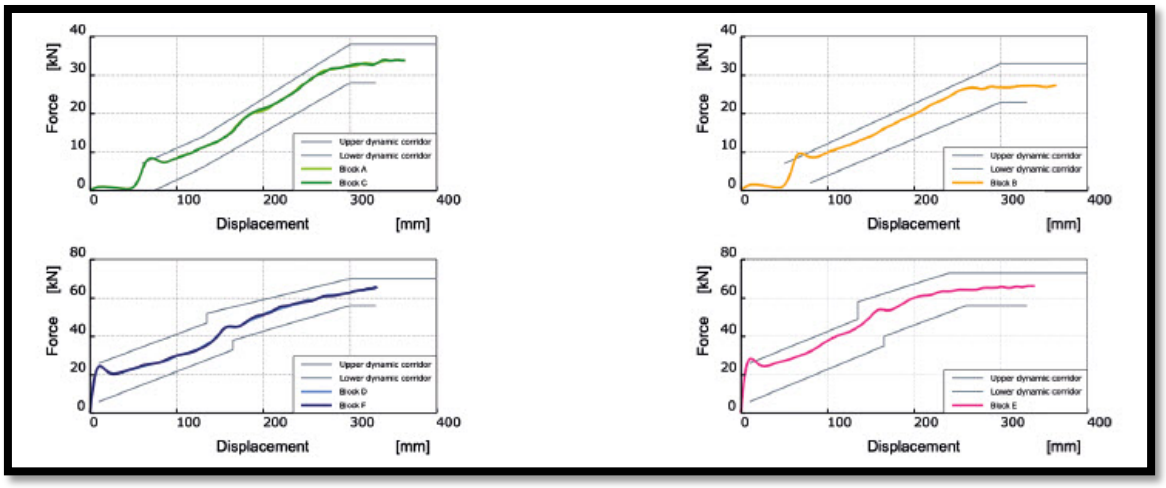
GNS AE-MDB MODEL - To meet the requirements of higher vehicle weights and new body shapes, the side crash barriers are also constantly being further developed by the NCAPs. Together with the far side load case, for example, the AE-MDB. This model follows the latest developments of the hardware barrier.



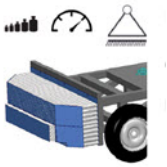
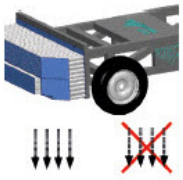
PDF GNS AE-MDB barrier model according to the latest AE-MDB specification

- Adjusted block stiff nesses with prescribed performance corridors
- Two versions are available, considering enabled or disabled gravity in your simulation.
- **Model mass, velocity and boundary condition is adjustable by LS-DYNA *PARAMETER**

Barrier model vs. load cell wall



Basic Features

				
Easily Adjustable By setting *PARAMETER GNS_MASS, GNS_XVELO, GNS_FIX, the barrier model integrates perfectly in your simulation	**Adhesive -** Adhesive beams, gluing honeycomb to cladding sheets are able to fail under according load.	**Pressure Air Wheels -** Trolley wheels with tires of pressure air, getting model motion closer to reality	**Sophisticated -** The barrier model was calibrated using several hardware tests with vehicle like lateral structures as impact bodies in different positions.	**Gravity -** Two versions of the GNS AE-MDB barrier model are available, considering enabled or disabled gravity in your simulation.

Graphics Courtesy of Vecteezy

Goodbye and Come Back Soon

QUIZ Credit - Correct Answers A-C - you are served chocolate ice cream!
Correct Answer D you are served candy bars!!! Love those!

A. Lockheed F-80B Shooting Star **B. Lockheed T-33 Shooting Star**
C. Lockheed F-104B Starfighter **D. McDonnell Douglas VC-9C Presidential Transport**

Our Town Salutes our US military and the military of friends of the US.

Our town stands with Ukraine.

Old Rancher Horse News: It's wrong when a rogue horse takes over a pasture. They will never equal, be, or have the respect of the Lead Horse.

The pasture is a Lead Horse's territory, his pasture, his herd and his foals. A Lead Horse is fair, honorable. It may take time but the pasture always returns to the Lead Horse, honor & freedom. The rogue horse is shut down.