www.feantm.com Issue January 2021 ISSN 2694-4707

# FEA Not To Miss Software & Engineering Solutions

## News, Gossip & Blog

**DYNAmore**

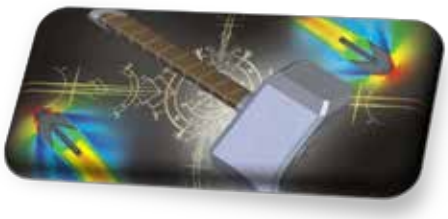
**Altair**

**OZEN**


**Rescale**


**Oasys**

**Siemens**



**MSC.Software**

**Art's Blog**


**Cadfem**

**ESI-Group**

**ANSYS**

**Fraunhofer**

**Collins**

**Hyundai**

**Origin of C**

# *FEA Not To Miss Profile*

**FEA not to miss a/k/a (FEANTM) comprises a group of interested parties sharing information. Information is presented on the website www.feantm.com and this pdf publication.**

**The FEANTM publication is no fee to receive.**

## Goal

**Our goal is to share information on companies with expertise and innovative products. Strengths that rely on smart work ethics in today's changing world.**

## Compensation

**FEANTM does NOT receive compensation from the companies whose products we showcase. FEANTM is independently owned. Companies and/or information included is at the sole discretion of FEA not to miss a/k/a FEANTM**

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**We believe in our effort to advance information on software products. We believe this constitutes a "fair use" of the material in accordance with Title 17 USC. Section 107."**

## Opt-Out

**Any company may opt-out at any time by writing to Marsha feaanswer@aol.com**
.
**After that, going forward from the email's receipt, the content will not include the company in any article.**

**Editors: (alpha order)**
**Anthony, Art, Marnie, Marsha, Yanhua**
**Contact us at: feaanswer@aol.com**

**FEA Not To Miss *Software & Engineering Solutions***
***& News, Gossip & Blog***
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# Table of contents





Author/person who brought the article to our attention, or posting the article on social media

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# Announcements

**First - The respective website for the article will have the larger graphics, with full resolution.**

**HAPPY New Year, get your favorite flavor of coffee and join us for engineering software, solutions, news, blogs, gossip, and new friends sharing information whose names are located in the TOC.**

## Among January Articles - Not To Miss

**Thor's Hammer with a little HEEDS-Ooomph!**
**By Boris Marovic**

**Repairing Bone Loss with Simulation-Generated, Patient-Specific Implants**
**By Tim Palucka -**

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## January Choice Video - YouTube



**Drone Project.** [Drone Making and final flight testing]

For the past few weeks, I've been working on this drone project for my kids. The final flight test is towards the end. For details, part list, design and step by step instructions drop email to uzzain.bharat@gmail

## For This Month











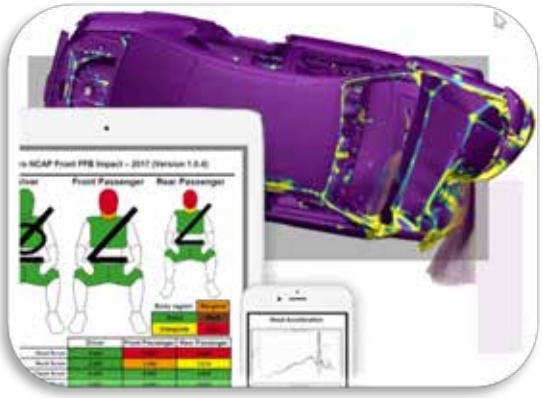



**Marta Kempa, MBA - Marketing Coordinator, Oasys LS-DYNA**
**&**
**Seppi**

**Oasys Software, Tutorials & Classes Not To Miss**

[Not To Miss on YouTube]





**Oasys REPORTER offers automatic report generation using numerous layout tools with the ability to auto-create images through embedded D3PLOT, T/HIS and FAST-TCF scripts.**

Generate your report for multiple simulations, extract key data points and combine into one document, complete with automatically collated summary tables, colour coding and company logos.

**Main Features**

- Fast and convenient post-processing of LS-DYNA results using templates and scripts.
- Can be used to produce reports automatically after an LS-DYNA analysis finishes.
- Using command files and scripts, Oasys REPORTER links with D3PLOT, PRIMER, T/HIS, and other programs, to create the images and graphs for your report.
- Compatible with scripts written in all major programming languages.
- Supports files from a mixed UNIX / PC system.
- Reports can be output in PDF, PowerPoint VBA, HTML and postscript formats.

**Standard Loadcase Templates**

- EuroNCAP – Frontal ODB & FFB
- EuroNCAP – Side MDB & Pole
- CNCAP – Frontal ODB
- EuroNCAP Pedestrian Head & Leg
- GTR Pedestrian Head
- IIHS ODB & SOB
- USNCAP – Front and Side

.For Complete technical information, sales, demo's visit **Oasys REPORTER**

**Author: Christian Frech** christian.frech@dynamore.de

**Save the date!**

**13th European LS-DYNA Conference**
**October 5-6, 2021, Ulm, Germany**

**Conference Website:**
**www.dynamore.de/en/conf2021**

**Invitation:** We very much hope for a normalization of the situation and that we will be able to welcome the LS-DYNA users personally at a conference again next fall. We kindly invite all users of LS-DYNA, LS-OPT, and LS-TaSC to the 13th European LS-DYNA Conference at October 5-6, 2021 in Ulm, Germany. As usually the conference will be a great opportunity to talk with industry experts, catch up with colleagues and enjoy time exploring new ideas. In addition, attendees can meet with exhibitors to learn about the latest hardware and software trends as well as additional services relating to the finite element solver LS-DYNA, the optimization codes LS-OPT and LS-TaSC, and the pre- and postprocessor LS-PrePost. Training courses and workshops will also take place in the week before, during and after the conference.

**Venue:** The Congress Centrum Ulm is located directly on the river Danube. The city is best known for its cathedral, the highest church tower in the world and for being the birthplace of Albert Einstein.

Ulm is located directly on the A7 and A8 motorways and can be easily reached from Stuttgart and Munich airports.

Address: Basteistraße 40 89073 Ulm
Telefon: +49 731 922990
Telefax: +49 731 9229930 www.ulm-messe.de

**Abstract submission**

Please submit your abstract (maximum length 2,500 characters)
by E-Mail to conf@dynamore.de or online at: www.dynamore.de/en/2021-abstract

**Important Dates**

| | | | |
|---|---|---|---|
| Abstract submission: | May 28, 2021 | Author notification: | July 9, 2021 |
| Paper submission: | September 3, 2021 | Conference date: | October 5-6, 2021 |

**Participant fees**

| | |
|---|---|
| Industry speaker: | 420 Euro |
| Academic speaker: | 360 Euro |
| Industry: | 640 Euro[1)] / 690 Euro |
| Academic: | 490 Euro[1)] / 540 Euro |

[1)] Registration before 30 June 2021. All plus VAT.

**Exhibiting and sponsoring**

Please request further information.

**Contact**

DYNAmore GmbH
Industriestr. 2, D-70565 Stuttgart, Germany
Tel. +49 (0) 7 11 - 45 96 00 - 0
E-Mail:conference@dynamore.de
www.dynamore.de/en/conf2021

**Conference Website: www.dynamore.de/en/conf2021**

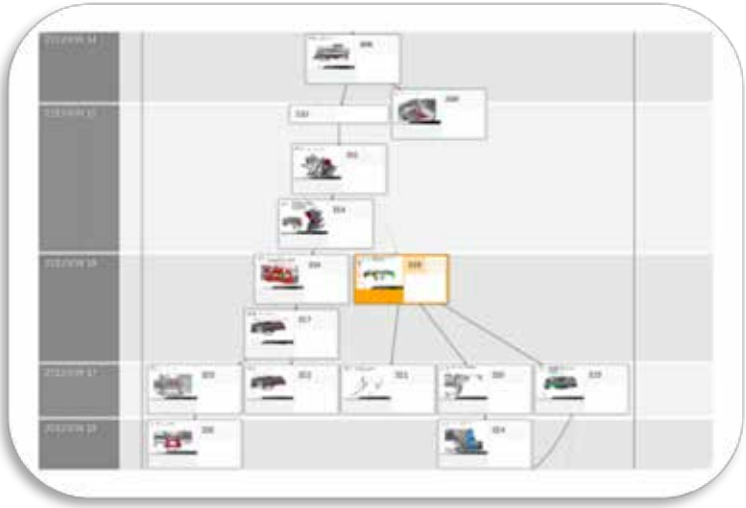

## LoCo - SCALE.model

Simulation Data Management
Modern Workbench for Simulation

- Simple handling of models
- Quick overview of model features
- Management of load cases
- Job submit and monitoring

Perfect Support for Teamwork and Remote Working

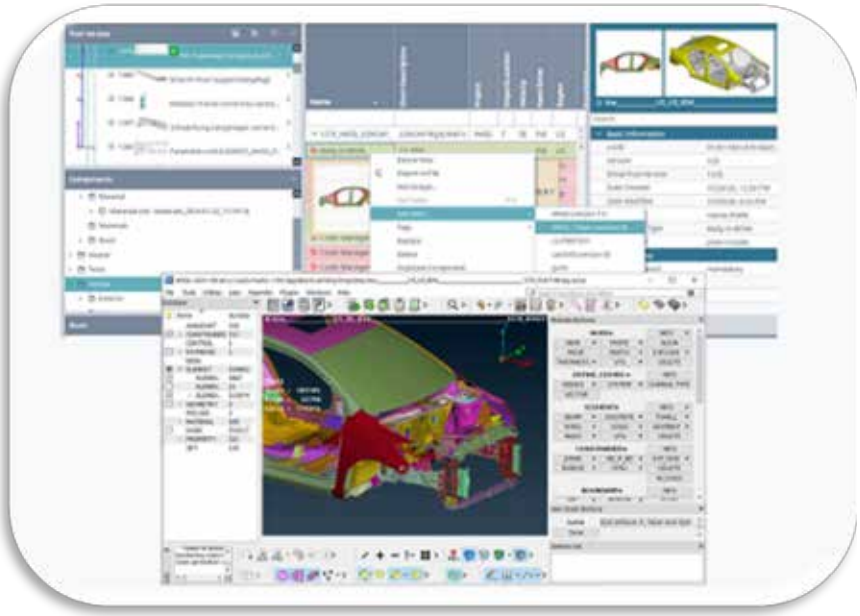
- Simple exchange of model data
- Access to shared model libraries
- Access-, roles and rights management
- Powerful data compression



**Version Management**

Complete documentation of the history of all
model data

- Each object has its own version history: nets, simulation models, scripts, parameters, runs etc.
- Each version is documented with comments, images, reports etc.
- Version trees show complete parent-child relationships of all objects
- Merge and diff. functionalities between versions
- Graphical representation of the version trees with zoom option and timeline
- Filter and search functions



**Comprehensive Customisation Options**

Integration of any CAE Tools

- Pre- and postprocessors such as ANSA, Hypermesh, Animator etc.
- Any ssolver such as Abaqus, Nastran, PAM-CRASH, LS-DYNA, Star-CCM+ etc.
- Text editors such as Notepad, gvim, Emacs etc.
- CAE software for quality checks such as Primer
- Optimization, robustness, DOE with LS-OPT, Optimus, optiSLang etc.

Scripts for Workflow Automation

- Integration of any existing or new scripts
- High Flexibility in the adaption of individual processes

**Visit LoCo - SCALE.model For Complete Information**

Due to the prevailing situation with Covid-19 all seminars are performed online (through WebEx), until further notice. Details for each seminar can be found at: DYNAmore Nordic Seminars

| 2021 Seminars - please check website for updates | Feb | March | April |
|---|---|---|---|
| Introduction to ICFD solver | | 9 | |
| Introduction to LS-DYNA | 2 | 2 | 13 |
| Introduction to ANSA & mETA | 16 | | |
| ANSA CFD meshing, intro course | 2 | | 27 |
| Non-Linear Implicit Analysis in LS-DYNA | | 23 | |
| NVH & Frequency Domain | | 16 | |
| Contacts in LS-DYNA (2 days) | | | 20 |
| LS-DYNA, Simulation of sheet metal forming processes | | 9 | |
| Digimat Material Model for Fiber Reinforced Plastics | | 2 | |

**FE-Model development - Employees of DYNAmore have for many years been developing Finite Element models of dummies in cooperation with the German automobile industry.**

At DYNAmore, we have been working with dummy model development for more than 15 years, including a longstanding collaboration with the German Automobile industry.

The cooperation is carried out with FAT (Sub-organization of VDA) and the PDB (Cooperation from Audi, BMW, Daimler, Porsche and VW). Further models for LST LCC are developed, as well as the available models developed in-house. Ten of the fifteen largest automobile companies have licensed our models.

Examples for the development are:

- ES-2 model with FAT (Project partners: AUDI, BMW, Autoliv, Daimler, JohnsonControls, Opel, Volkswagen.....)
- Similar to FAT: EuroSID-1, USSID, BioRID II Model
- WorldSID model with PDB (Project partner: Audi, BMW, Daimler, Porsche, Volkswagen)
- Simple ES-2 model in contract with LST LCC

***We support LS-DYNA, LS-OPT, ANSA and META users in Sweden, Norway, Denmark, Finland, Iceland, Estonia, Latvia and Lithuania. Our services include support, sales, development, process integration, training, and consulting.***

***DYNAmore Nordic Newsletter***

Dr. Markus Kellermeyer
Productmanager Learning on Demand, Professional Development at CADFEM

## [World of the Simulation Engineer -](#)

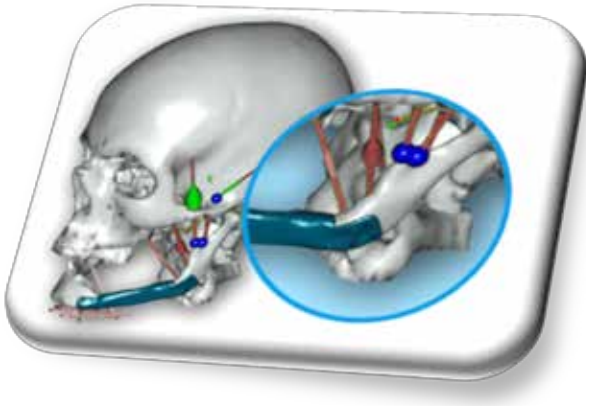
**Things others cannot see!**



## CADFEM Medical

CADFEM Medical is a certified simulation service provider and software manufacturer in the field of medicine and medical technology and is considered a pioneer of in silico medicine.

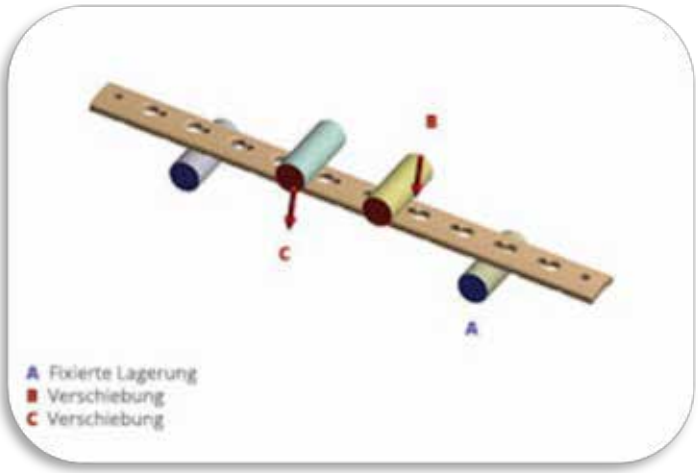
### Simulation in medical device development



Simulation in medical technology is used in classical product development, e.g. to simulate tests required for implant approval (ASTM and ISO standards) before the actual test. The structural-mechanical simulation can be used to identify possible weak points in advance or to determine worst-case scenarios (variants/sizes). In addition, based on evaluated calculation methods, automation processes, e.g. for strength calculations of patient-specific implants, can be further developed.

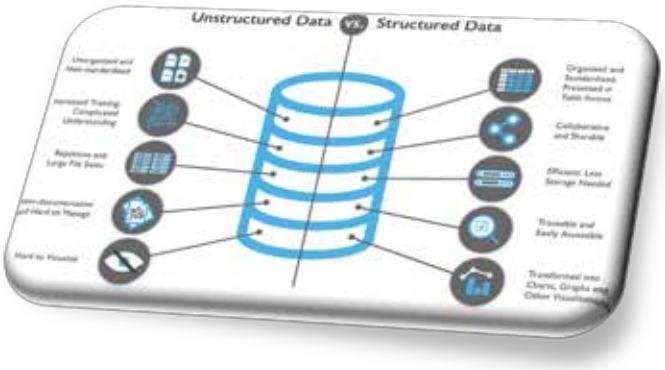
### Jaw replacement implants

To treat jaws after tumor resections is a big challenge. Patient-specific implants are often used for this purpose. Due to very different loading cases and a disproportionately high effort for mechanical testing, these implants are designed purely on the basis of experience. With the finite element method it is possible to carry out a simulation with realistic muscle forces from AnyBody with little effort. This makes it possible to realistically reproduce the loads on the implant, to objectively design the patient-specific implants for these loads and to improve the safety of the implants.


**ISO/ASTM - Virtual standardized implant testing**

With numerical simulation, implant tests can be virtually mapped within product development in a short period of time, thus greatly shortening development cycles. In the virtual lifetime test, several different concept geometries and their combinations can be cost-effectively tested and optimized for their functionality.

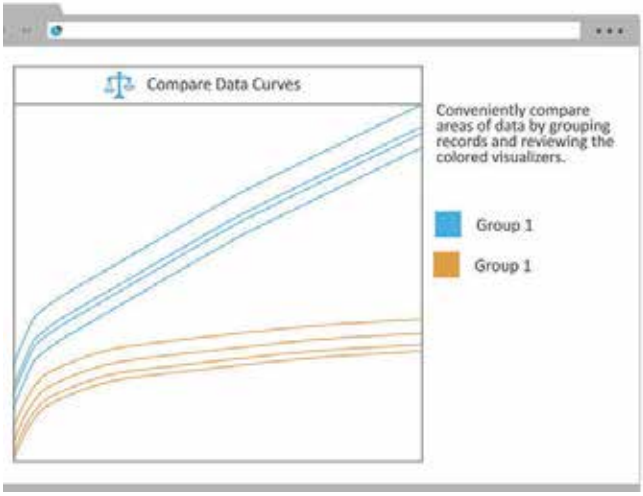



**Scientific Databases**

[Store and Manage All Your Data in One Place]

**Our Databases application provides an effective solution for organizing and storing large amounts of data.**

- Databases' centralized data management system eases sharing between multiple users, while the integration of interactive visualizers powerfully support productive decision-making.
- Structure Your Data
- Structuring your data through Databases takes away the hassle of organizing it yourself.
- Plus, structured data is easier to comprehend, track, is much more collaborative and sharable, takes up less storage and can be transformed into visualizations instantly.




**Databases Through Workflows**

- Productively manage your Databases by utilizing its integration with our Workflows application.
- Employ our Database workers to create LS-DYNA Material Databases and add a plethora of data records efficiently.

**Database Tools**

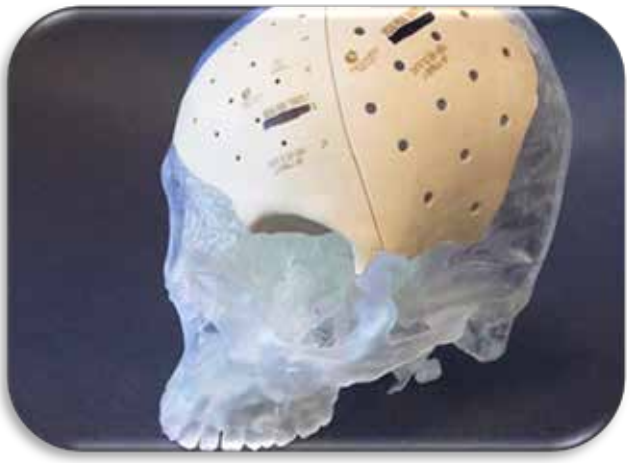
- Store scientific data formats such as curves, images, movies and tables.
- Keep bad data away using built-in sanitize and clean up procedures.
- Using advanced filter and search capabilities, find the the data you want quickly.

**Database Comparisons and Statistics**

- Compare and visualize your data with just a few clicks.
- Group important data together and utilize view templates to make comparing your structured data quick yet insightful.
- Review a summary of your data with built-in visualized statistics.

Curt Chan • Don't' Miss Below Blog Post by Tim Palucka

Engineer | Technologist | Marketer



**Tim Palucka - Repairing Bone Loss with Simulation-Generated, Patient-Specific Implants**

When a person loses bone structure due to an accident or a disease, it's important for a surgeon to be able to reconstruct the lost bone as quickly as possible. Until recently, the surgeon might have a few titanium or plastic implants in different sizes to choose from, and they had to make them work, even if the sizing was not ideal. In the case of mechanical joints like the lower mandible (jaw), a good fit determines the functionality and quality of life of the patient.

**Repairing Bone Loss with Simulation-Generated, Patient-Specific Implants**

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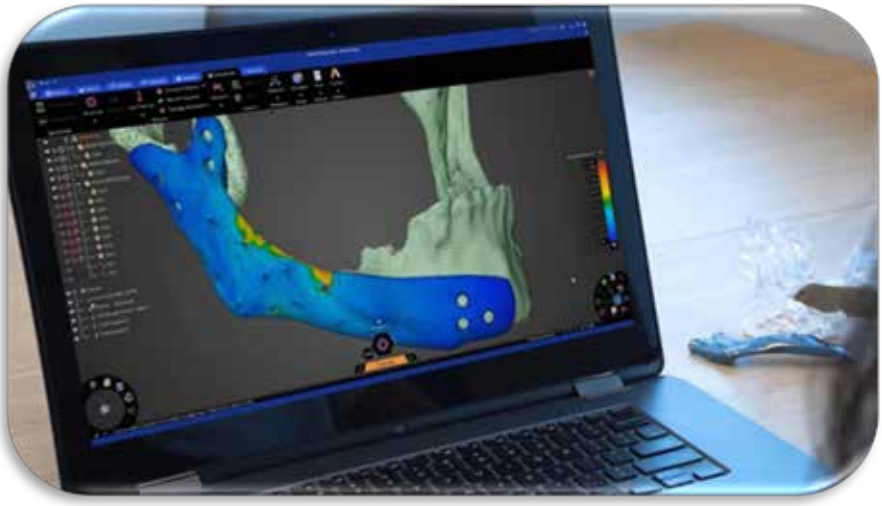
Now Techfit Digital Surgery of Daytona Beach, Florida, has developed a patient-specific way of 3D-printing medical devices using computerized tomography (CT) and magnetic resonance imaging (MRI) scans of the patient to determine the perfect geometry for each implant. They use Ansys Discovery 3D design software to quickly develop the implant's optimal design. Then they manufacture the implants, mostly using metal or plastic additive manufacturing, and deliver them for surgery within 10 working days.

"With Discovery, we know that our digital models will behave anatomically and mechanically like the patient will," says Mauricio Toro, cofounder and CEO of Techfit. "It allows us to do very rapid iterations and improve the surgical product and surgical outcome."

**A 3 Step Process for 3D Printing Medical Devices**

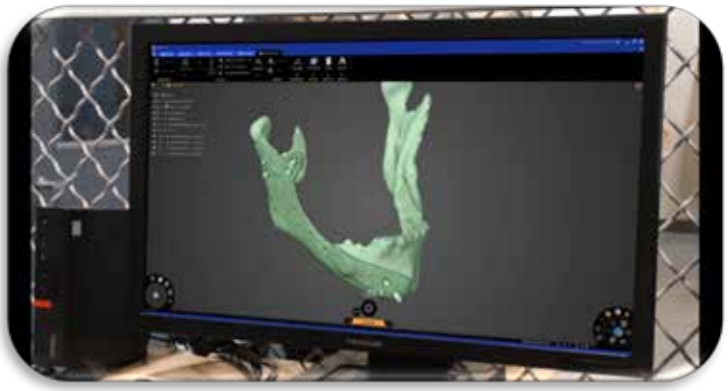
**1. Acquiring Data**

The first step in the surgical implantation process is to acquire data, which involves obtaining CT and MRI scans of the affected area. These scans are the starting geometry for the design. But as every engineer knows, geometries have to be cleaned up and modified before they can be useful.



Toro's first big challenge was to find software that could input the STL file created from the scans and enable him to edit the geometry. He started using Ansys SpaceClaim first, with good results. But then along came Ansys Discovery.

**Download a free trial of Ansys Discovery 3D design software.**



"Ansys Discovery is a perfect match because it can process the STL files, which not every CAD package can handle, and mesh the geometry and make alterations in near real-time," Toro says. "Discovery's mechanical solver turns out a design within hours as opposed to days or weeks, which we don't have because a patient is waiting for that implant."

**2. Co-creation and Validation**

This second step in the process starts with the physician. Toro and his team meet with the surgeon to learn about his or her needs for a particular patient. They often take Discovery along with them for these meetings to show the surgeon their preliminary design based on the scans and make modifications from there.

"Especially if I have a case where I'm uncertain about the mechanical behavior of the bone or the implant, in a meeting with the surgeon I can start tweaking the model using Discovery," Toro says. He explains that any implant design is always a compromise between the space you have and the implant's mechanical properties. In many non-biological applications, you can just add more material to increase the factor of safety. But when you are implanting something in a human body, your packaging requirements are very strict.

"So, being able to perform simulations live with the surgeon and interact with them in a very fast feedback loop to understand where the sweet spot lies between mechanical performance and packaging is key to providing the best results achievable," he says.

Toro finds this rapid feedback loop to be of critical importance.

“The saying goes that ‘practice makes perfect,’” he says. “But without a good feedback loop you can actually practice the wrong thing and become very good at doing something wrong. That’s why we’d rather say ’iteration makes perfection.’”

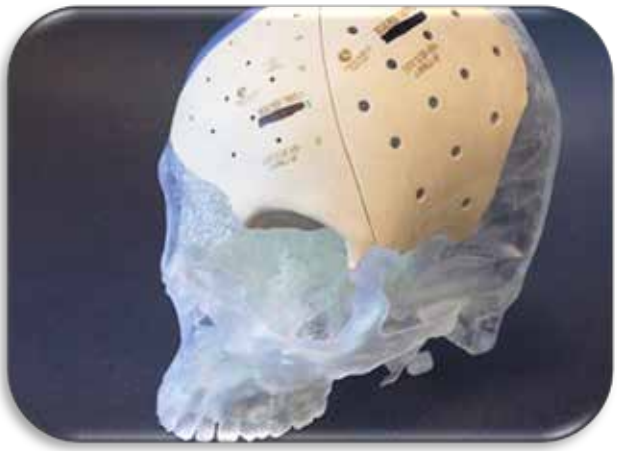
**3. Manufacturing**

Techfit currently manufactures all of its implants at company headquarters in Daytona Beach. They have all the standard machine tools needed for conventional manufacturing, along with additive manufacturing capabilities for more exotic implant shapes. Titanium alloys are most commonly used for metal implants. Plastic implants use PEEK for load-bearing applications and ultrahigh molecular weight polyethylene for tribological surfaces like joint replacements, where friction and wear can be a concern. Each implant is delivered with a mechanical validation analysis report so the surgeon has the utmost confidence in the surgical outcome.

Techfit also publishes papers in medical journals, presents results at conferences and even holds its own digital surgery conference annually.

“Custom surgery is actually a new field so it's not only a matter of making the implants but also a matter of evangelizing and ensuring adoption of the technologies,” Toro says. “Our goal is to make custom treatments the new standard for every patient around the world.”

**Ansys simulation will continue to play a major role in achieving this goal.**

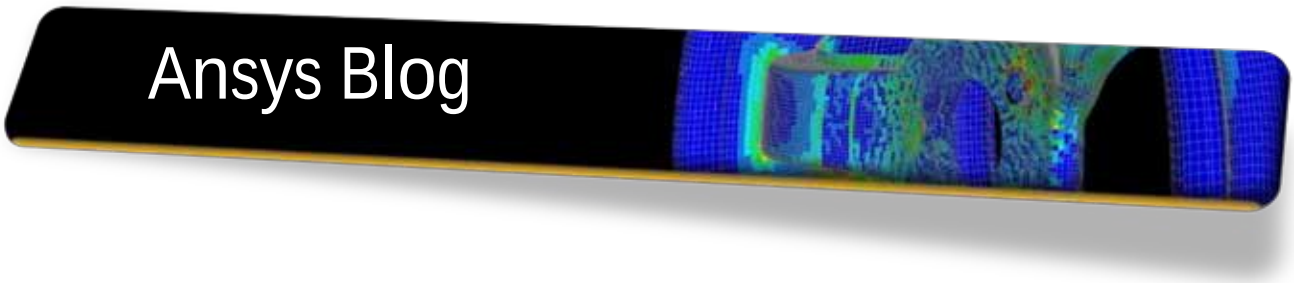


“Having Ansys Discovery in our workflow allows us to validate our products faster, helps people get their surgeries faster and helps them recover faster,” Toro says. “O ne of the most rewarding things is you can actually see people's lives get better every time.”

**Download a free trial of Ansys Discovery 3D design software.**

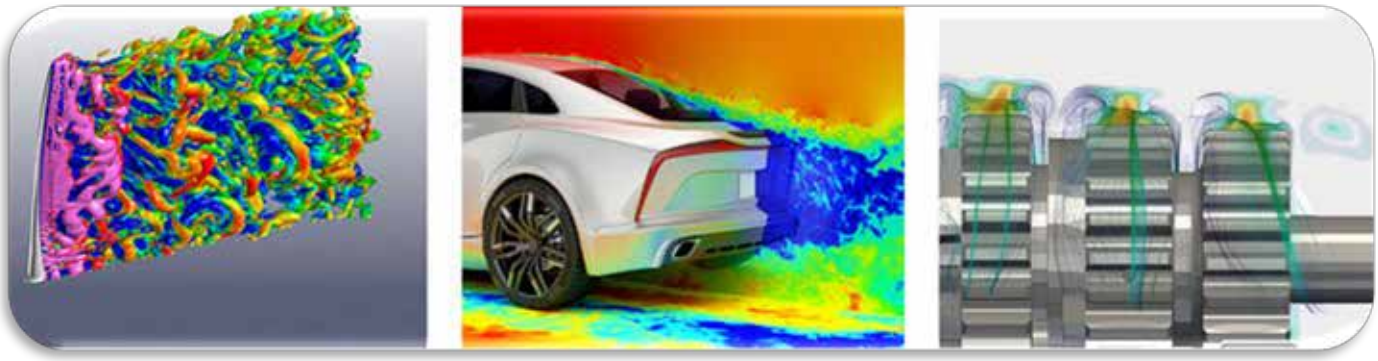
**Author: Tim Palucka**

**About the Author: Tim Palucka Is a senior marketing writer at Ansys, senior editor of Ansys Advantage magazine and coordinator of the Ansys 2020 Hall of Fame. He has a B.S. in chemistry and M.S. in materials science and engineering from the University of Pittsburgh.**



Fluids and Thermal - Whether you're an analyst performing advanced computational fluid dynamics (CFD) modeling or a design engineer who quickly needs to understand fluid or thermal effects on a design proposal, Altair offers a complete line of tools to support your project.

From detailed component analysis to full systems performance, Altair provides a range of scalable solvers and robust pre- and post-processing software for CFD.



General Purpose CFD
Altair AcuSolve™

External Aerodynamics
Altair ultraFluidX™

Particle-based Fluid Dynamics
Altair nanoFluidX™

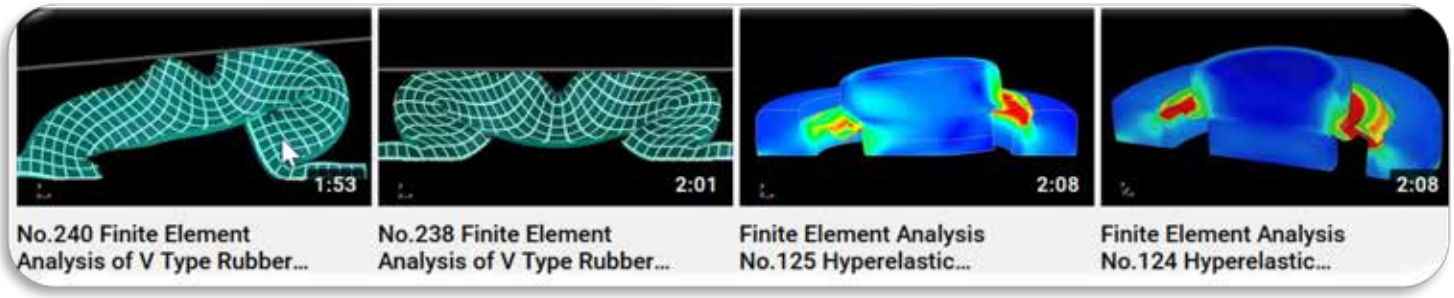
Discrete Element Modeling

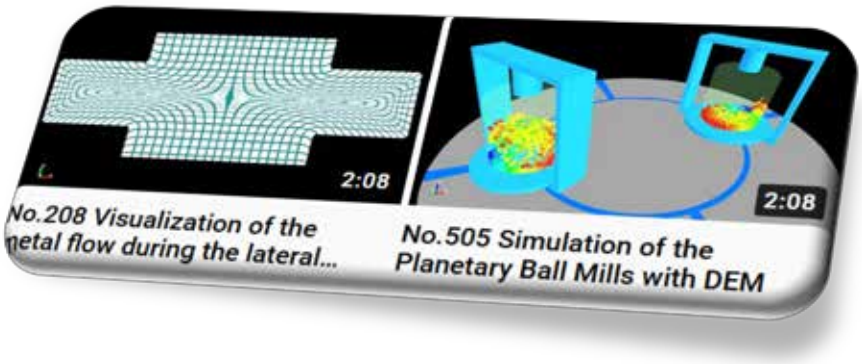
Altair EDEM™

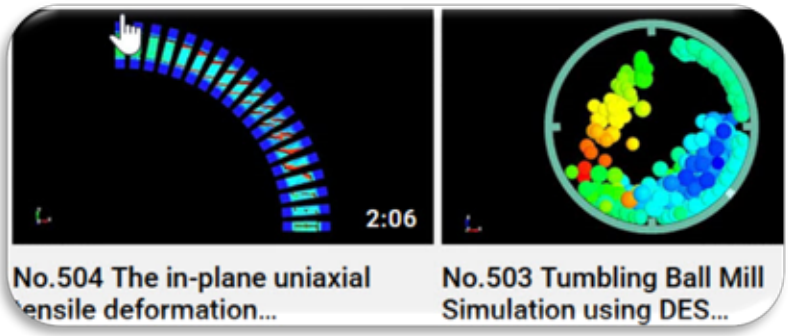
Flow, Heat Transfer,
& Combustion
GE's Flow Simulator

Multi-disciplinary
Design Exploration
Altair HyperStudy™

## YouTube - LANCEMORE



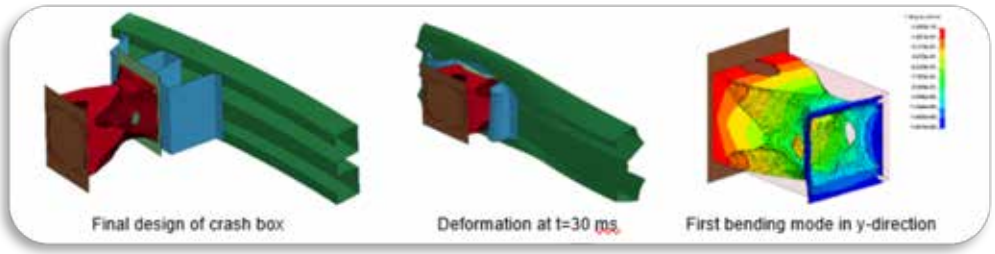

PDF - Quadcopter -Wing Collision Simulation

A complete solution for Aerospace crash simulations pre- and post-processingCrash simulationsare relativecomplex processes,considering all requiredsteps, from model import and simplification, mesh generation, material description, to boundary conditions, contacts and initial conditions setup. Starting from a detailed CAD model, BETA CAE Systems provides all the necessary tools for Aerospace crash simulations pre-and post-processing.

## Not To Miss on YouTube Channel




**BETA CAE Systems YouTube Video Channel**




**LS-TaSC is for the topology and shape optimization of large non-linear problems, involving dynamic loads and contact conditions.**

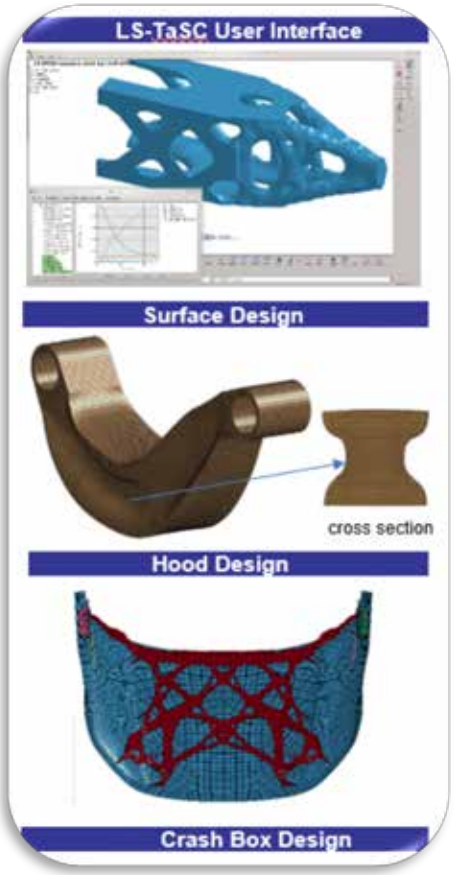
**The focus is on multidisciplinary topology optimization considering a combination of impact, statics, and NVH load cases. The methodology is specifically developed for huge models and requires no special treatment for nonlinearities such as contact.**

**Methodologies**

- Solid / Void Schemes: SIMP, True Mechanics
- Analytical and/or Numerical Design Sensitivity Analysis
- Optimality Criteria for Dynamic Problems
- Projected Sub-gradient Design Optimization Method
- Design Contribution Estimation

**Integration**

- With LS-DYNA – No special treatment for nonlinearities such as contact
- With LS-PrePost – Results visualization and model editing
- With LS-OPT – LS-OPT can drive LS-TaSC for complex design schemes




**For Information, product, demo, contact your local LS-DYNA Distributor**

**General Capabilities**

- Solid design using 1st-order hexahedrons, pentahedra, and tetrahedral elements
- Shell design using 1st-order quadrilateral and triangular elements
- Global constraints using the multi-point scheme and surrogate models
- Multiple load cases such as impact, statics, and NVH load cases with/out element deletion
- Occupant safety features such as global variables and responses
- Models with more than 10 million elements
- Geometry definitions such as multiple parts, extrusion, symmetry, edge smoothing, one or two sided casting


**Stephen Anchong Liu**

Twin Builder provides unmatched capabilities for system level design and validation. Twin Builder includes all of the capabilities that were part of the ANSYS Simplorer.

## YouTube Videos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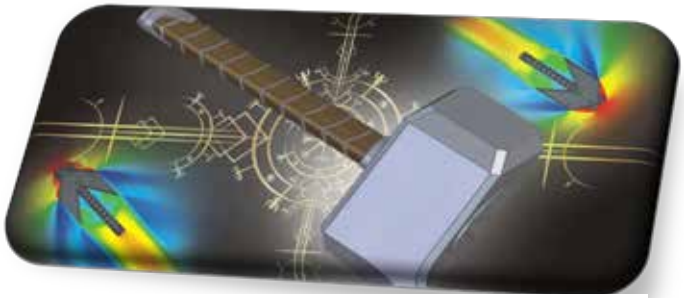


The mighty Mjölnir - Thor's Hammer

## Thor's Hammer with a little HEEDS-Ooomph!

**By Boris Marovic**

Have you ever wondered what Thor's hammer would look like if an Engineer and not two dwarfs designed it? No? Well please join me for a deep dive into the aerodynamics of Thor's hammer.

I would first like to point out that I'm neither team Marvel nor DC comics. For many there are strong loyalties for one or the other, for me it is more about the movies and if they are good or not. However, I have to say that there are some characters I like more. But in anticipation of Stan Lee's birthday on 28th December, I would like to take a look at one of my favorite characters.

I always found the Nordic legends interesting and therefore, seeing a company creating comics and movies out of the stories is a nice way to see how it would play out if it were real. One thing I always found fascinating with all the mythical and somewhat magical devices they have, having a hammer as a weapon is somewhat medieval-like. Considering a hammer doesn't really have the best aerodynamics, yet this one behaves more like a boomerang? Also, how Thor is flying with it despite it being a big, super-heavy lump and yet still a light material (depending on your worthiness). I found I needed to look to see if an engineer could actually improve the design of the hammer.

**What's the KPI of Thor's Hammer Mjölnir**

In order to improve the hammer, we need to have a look what it is meant to do. Now according to Skáldskaparmál (poetic language), it is said that Loki challenged two dwarfs (Brokk and Sindre) to make a hammer and bet his head that they cannot create something as nice as the sons of Ivald (Ivaldesønnene). According to the book "The Younger Edda", the hammer would always reach his target and hit it as hard as the bearer wanted. When Mjölnir is thrown, it would never miss or fly so far it would not find its way back to the wielder. It would also be small enough that it could fit into a coat or pocket.

Unfortunately, we cannot make it shrink. We could make it foldable, but that would cause issues with it being rigid enough when smashing it into something and not folding in on itself. We could compare it with some heat seeking or laser guided missile to make it always hit its target, but I wanted to have a closer look at the flying and smashing performance of Mjölnir.

It would need to have enough *oomph* and therefore enough volume with its hammer head, but also be aerodynamic enough to fly far and fast enough. I was also wondering how fast it should be able to fly.

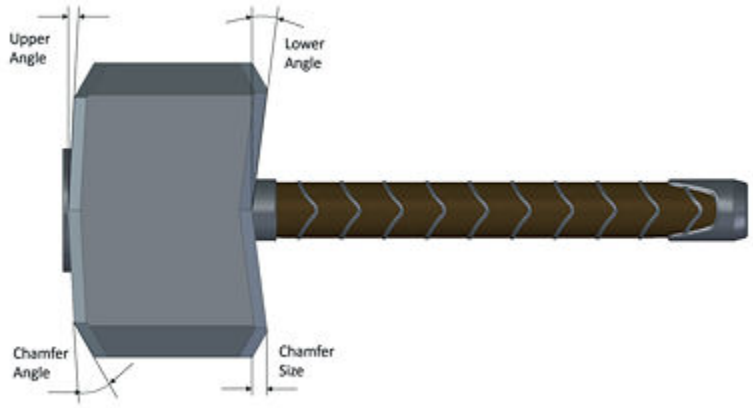
After doing some online research, I found this website in which you can find 15 Things You NEVER Knew About Thor's Hammer. One of them refers to the speed at which Mjölnir can fly, 770 mph (1,239 km/h), so roughly about the speed of sound at sea level and 20°C. The article states it is twice the

speed of sound, but I guess the author was not an engineer and not hot on his math

It also says that it is lower than the speed of light – dah – It's about 0.00000115% the speed of light. So pretty much lower than the speed of light I would say (sounding geeky now?).

As you can see, it is not easy with a magical or mythical design to get the right product requirements from your customer. But let's start from the current design. Judging from the size of Thor's hand in the movie I derived the size of Mjölnir for the basic design. For the aerodynamics and the *oomph* the shape of the head and volume would be most important.

With that, I created the hammer head with two angles which can make the hammer head look either more like a pickaxe or like a two sided broad-axe from its side profile. I also added the chamfer angle and size that goes around the hammer heads smashing faces. These 4 parameters impact the aerodynamics as well as the volume.




The parameters of Thor's Hammer.

**"Simulating" My Mjölnir Throw**

Although I'm not sure if I would be worthy enough to lift it, let alone throw it like Thor, I am, however, lucky enough to be worthy of wielding Simcenter FLOEFD. Creating the model in Solid Edge was fun and it looks nice. Now setting up the hammer to fly at 770 mph and creating a HEEDS optimization study embedded in Simcenter FLOEFD is as easy for me (and for every design engineer) as throwing the hammer is for Thor.

Using the 4 parameters,

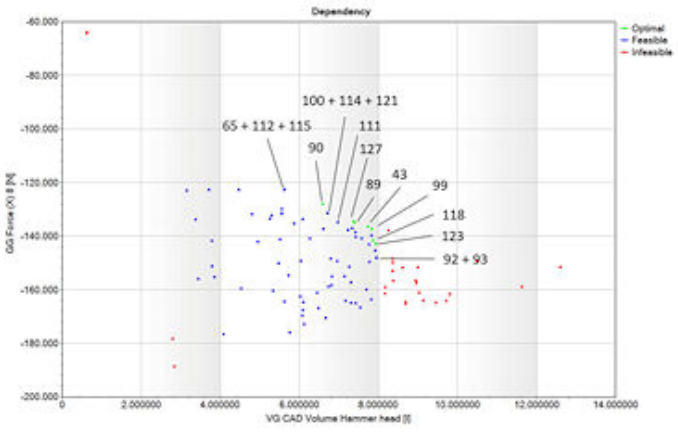
- I defined the maximum angles for the upper and lower head angle from -60° to +60° in 10° steps and
- the chamfer size from 0 to 30mm in 5mm steps and
- its angle from 10° to 70° in 10° steps.
- I set the output parameter to be the volume of the hammerhead to be maximized (for the *oomph*) but not bigger than 8 or smaller than 3 liters and
- the drag force to be minimized (or maximized as the force would point into the negative coordinate direction).

I assumed that Thor would have enough strength to throw it hard enough or hit with the hammer hard enough and since it is a weapon, it should more hit than fly. So the weighting of the two criteria was chosen to be 1.5 for the volume and 1 for the drag force.

The only thing left was the selection of enough cores of my Laptop and simultaneous runs (3) and the total number of calculations (128) and then to just click on “Run” and let Simcenter FLOEFD do all the rest (meshing, solving and repeat) for each design variant the embedded HEEDS algorithm comes up with.

**OMG, what will it be?** It took 2 days for the solver to run through 128 design variants and try to find the optimum cases that fit the criteria. The 16 Pareto front optimal points are shown in the graph below and some look blue (feasible) but they are a cluster of multiple similar ones and when zooming in you can see the separate ones. However, the values would be so close, that the difference is too little to make a big impact on the criteria.

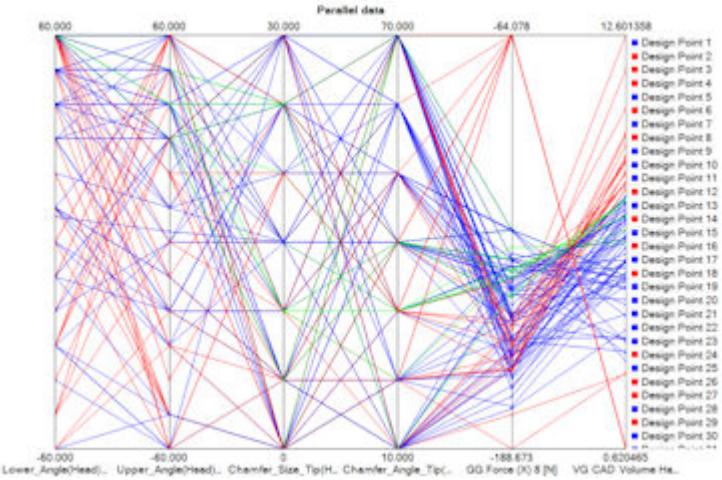
By the way, I was running a 2D slice of the model with solution adaptive refinement to represent the shock front better. So the forces are for that slice but since the design change mostly impacted this cross section, the results are a good indicator of the designs suitability for Thor’s requirements.




Result parameter plot showing the optimal design points

.

Looking at the parallel coordinate plot closer I was able to see that strangely the lower angle on the grip side of the hammer had all optimal points at 60° (pointing backward, toward the grip) – all of them. I would have figured the upper angle of course, as it will be more aerodynamic, but the lower angle was surprising.

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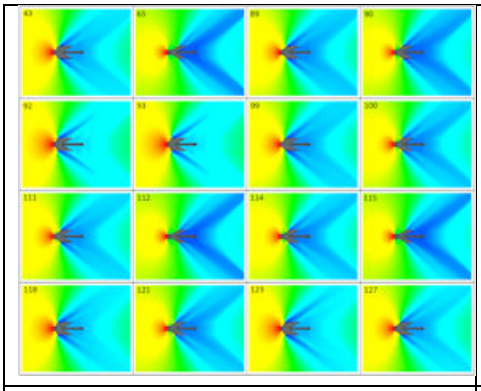
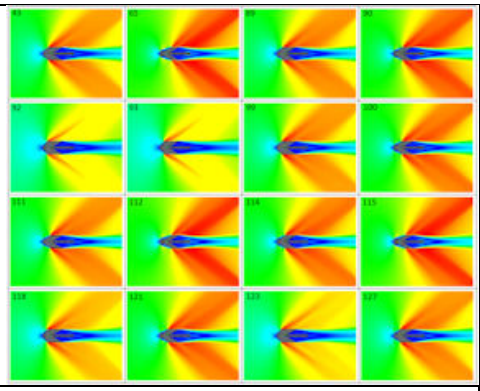
The upper angle optimal points were all between 30° and 60°, so also pointing back towards the grip. Whereas the chamfer angle and size were all over the range in the optimal designs and had therefore probably little impact on the results

The parallel coordinate plot of all design variants.

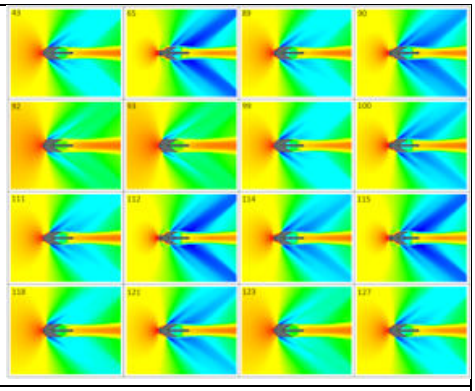
And finally let's have a look at the pressure, velocity and temperature plots. Every plot has its own range for the parameters. Most interesting is the temperature as the most extreme temperatures are +93°C and -104°C for the max and min. Yes, Thor better be heatproof.



The 16 optimal designs showing the pressure field.



The 16 optimal designs showing the velocity field.

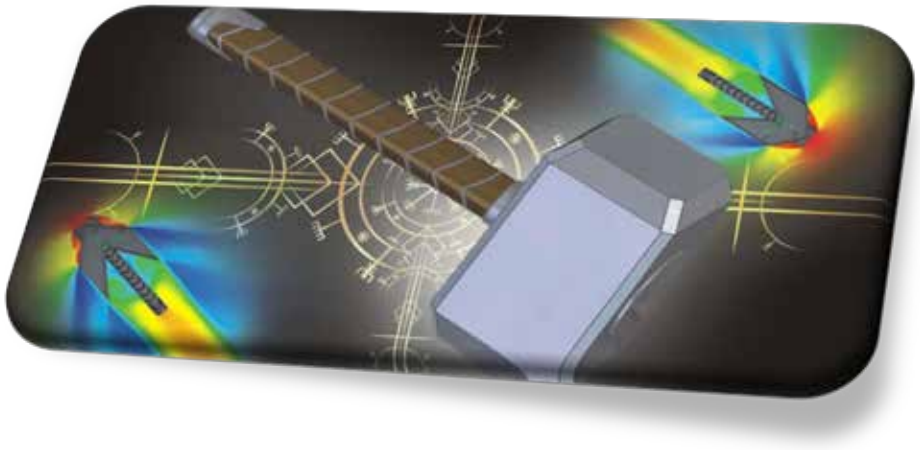


The 16 optimal designs showing the temperature field.

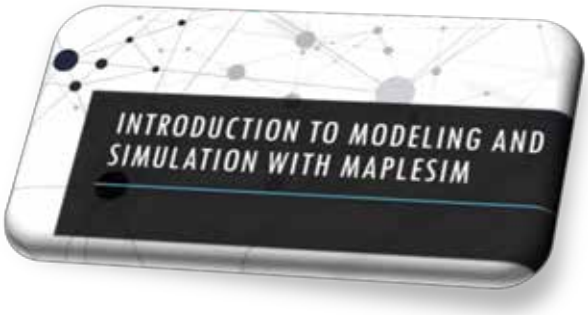
**Be the Hammer, not the Nail**

Now with all the funky designs, the optimum might be some arrow pointy shape, but at the end of the day, I like the original hammer design the most.

And if you look at Thor's fighting style you could imagine that his view is:
"If the only tool you have is a hammer, you tend to see every problem as a nail."

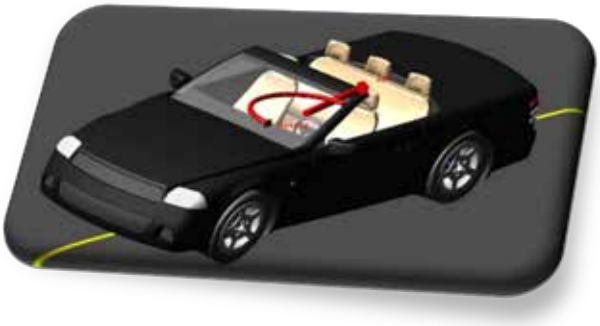


**Boris Marovic "Have a great birthday Stan, may you be enjoying a large horn of mead in Valhalla, and great work with Thor's hammer!"**




High Fidelity Modeling of Hybrid Electric Vehicle Dynamics using Adams and MapleSim

In this webinar, we present a co-simulation between Adams and Maplesim from Maplesoft for Hybrid Electric Vehicle modeling. The vehicle model is simulated in Adams and the hybrid electric powertrain is simulated in Maplesim.



Real Dynamics for Vehicle Design and Testing With Adams Car vertical products, engineering teams can quickly build and test functional virtual prototypes of complete vehicles and vehicle subsystems. Working in the Adams vehicle vertical environment, automotive engineering teams can exercise their vehicle designs under various road conditions, performing the same tests they normally run in a test lab or on a test track, but in a fraction of time.

- Analysis of suspension, steering and full-vehicle maneuvers
- Easy integration of control systems into vehicle models
- Creation or import of component geometry in wireframe or 3D solids
- Extensive library of joints and constraints to define part connectivity
- Model refinement with part flexibility, automatic control systems, joint friction and slip, hydraulic and pneumatic actuators, and parametric design relationships
- Comprehensive linear and nonlinear results for complex, large-motion designs
- Comprehensive and easy to use contact capabilities supporting 2D and 3D contact between any combination of modal flexible bodies and rigid body geometry

Adams Car was instrumental to tune all subsystems at their best before any real prototype was available… Testing several configurations on the virtual prototype required a matter of hours; doing the same on the real prototype would have been impossible" - Dr. Peter Tutzer, Bugatti

**Vertical Solutions:** Adams Car - Adams Car Ride - Adams Car Truck - Adams Driveline - Adams SmartDriver - Adams Tire - Adams Chassis

I was 8 years old in 1954. I'm sure at 8 years old I didn't volunteer for a series of 3 shots for the Salk polio vaccine. Frantic American parents -- looking for anything that could beat back the horror of polio -- offered up more than 1.8 million children to serve as test subjects.

I remember standing in line in the school gym with my class. There were cots lined up for anyone that felt faint after getting the shot. The scent of alcohol was overwhelming, but you didn't want to show weakness in front of your peers, so cots remained empty.


The payback was getting a neat pin and of course not getting polio. Polio was eradicated in the US.

https://www.historyofvaccines.org/content/massive-polio-vaccine-trial-begins-us

As the year 2020 comes to an end, the tallied numbers by every country in the world show that the Covid-19 death rate is much greater than that of a seasonal Flu. The total deaths due to Covid-19 in the state of New York as of December 11, 2020 is 35,420. This is more than the total deaths, 34,200, due to seasonal Flu in the entire U.S. population during the 2018-2019 influenza season. Covid-19 is real and dangerous. I will get the Covid-19 vaccine when my turn comes up and be part of the solution in eradicating Covid-19.

**Surprising Mask Math** - To stop the spread of COVID-19, we need to keep the virus effective reproduction rate, Rt, beneath 1. When this happens, on average, a contagious person will infect less than one person, and the epidemic will grind to a halt. So how many people need to wear a 50% effective mask to stop the spread of COVID-19? This interactive essay lets you predict then answer to this question (https://aatishb.com/maskmath/).


[Sensatek Designs On-blade Gas Turbine Sensors with Rescale]

See why Sensatek Propulsion Technologies uses the Rescale platform to run simulations for their on-blade gas turbine sensors, and what that means for the future of real-time turbine health monitoring.


[Aerion Runs Supersonic Jet Simulations on Rescale's Big Compute Platform]

Aerion Supersonic is one of the companies that runs simulations on Rescale's cloud HPC platform. This is their story.

Andrea Gittens
Innovation & Discovery Marketing Manager bei ESI Group

Driver's vision is a very well-known topic, but do you know about simulating the performance and vision of sensor systems?

Virtually Integrate Perception Sensors to Verify and Validate Vehicle Intelligence Software

Manufacturers are continually improving autonomous vehicles with the goal of safely reaching Level 2 autonomy. To achieve that level of safety, departments within OEMs and Tier 1 suppliers who are responsible for evaluating the performance of their sensing software and sensors integrated into the vehicle, must measure how the sensing and intelligence would operate in every required driving situation. But how do they achieve that without having to drive billions of miles of open road tests?

Optimizing safety requires that sensors be integrated into the vehicle. In turn, artificial intelligence (AI) software relies on these sensors for information related to object detection & tracking, path planning, and driving tasks. When sensors lack performance, the phenomena initiates a trickledown effect, ultimately impacting AI performance. Hence the necessity for suppliers of complete assistance systems to simulate sensors with a high level of fidelity, and to run virtual test drives that are highly realistic.

For many, NCAP for Safety Assist is a major selling point and sets performance requirements for the vehicle intelligence systems – this includes sensing performance requirements. Unfortunately, with each new NCAP update, tests increase in number and complexity, requiring tens or even hundreds of driven tests. This makes preparation for NCAP more costly for OEMs and Tier 1 suppliers.

These challenges only scratch the surface of why Virtual Prototyping is indispensable.

ESI PROSIVIC simulation software offers repeatable tests, access to high-value, real-life driving situations, and full control over simulations, all with zero real prototypes. Additionally, you gain flexibility and scalability for testing, shorter iteration cycles during development, and increased confidence in safety assessments.

Besides simulating vehicle dynamics and traffic situations for decision-making, function performance analysis requires specific simulations of the quality of the sensing data.

PROSIVIC assists with the preparation and execution of such simulations with a straightforward workflow. Users can design their own scenarios using built-in or imported data and create scenario variants of interest for the necessary parametric studies. The sensor hardware characteristics, the mounting settings, and the host vehicle attributes can be modeled. The PROSIVIC platform is open and connects to other simulation tools necessary to simulate certain subsystems (such as sensor fusion or situation analysis, vehicle control, or behavior models). For each evaluation, the data to be monitored and recorded can be adjusted to facilitate results diagnostic as post-processing. Finally, the simulations can be run in a manual or automated way.

**Benefits of ESI PROSIVIC**

- Work with the GUI or use scripting (such as python) allowing for more flexibility to scale from studying specific use cases to preparing extensive performance verification
- Access to high-fidelity sensor models complemented by rich virtual scene content that come with all the required physics for sensor simulations
- Ease integration through co-simulation with the user's environments using protocols and standards such as OMG DDS and FMI
- Make crucial design decisions about sensor choice, positioning, and configuration early in the system development cycle
- Verify & validate the development of intelligence software on a continuous basis
    - Enhance system performance by assessing nominal to critical environment conditions for vehicle sensing
    - Reduce the amount of testing, improving the quality of early deliveries to customers
    - Explore technical possibilities from future systems in a fully virtual environment

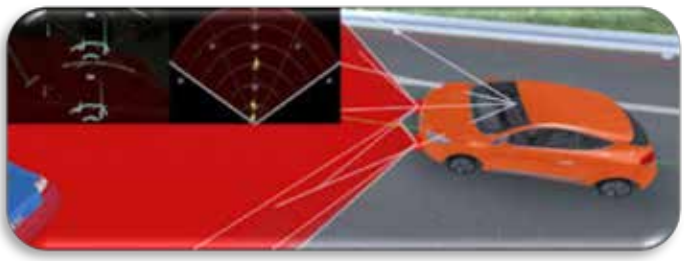
**Virtual Test Data Creation with High-Fidelity Sensing Simulation**

ESI PROSIVIC sensor models cover the entire range of hardware equipment available on the market through parametrization. Connected to the user's sensing processing software, they deliver high-fidelity simulation of sensing data. The parametric approach – for the scene, the behavior of road users, the weather, and sky conditions – provides the freedom to go from common case simulation to the corner cases, which are most challenging for individual sensors.

**Key Benefits**

- Configurable models of camera, radar, and lidar: 24-77GHz radar, optical camera, and near-infrared laser models
- Access scene libraries with object physics properties for sensors
- Obtain data to measure the in-vehicle performance of the sensing, in operational conditions, and before data from physical tests
- Gather reliable comparison data to benchmark different possible sensing options
- The virtual databases of scenarios improve testing flexibility towards sensing requirement changes during projects and reduces costs of future projects
- Run early, high-fidelity simulations and refine the performance KPIs for the sensing system

Easy Integration of Sensing into Existing Simulation Toolchains

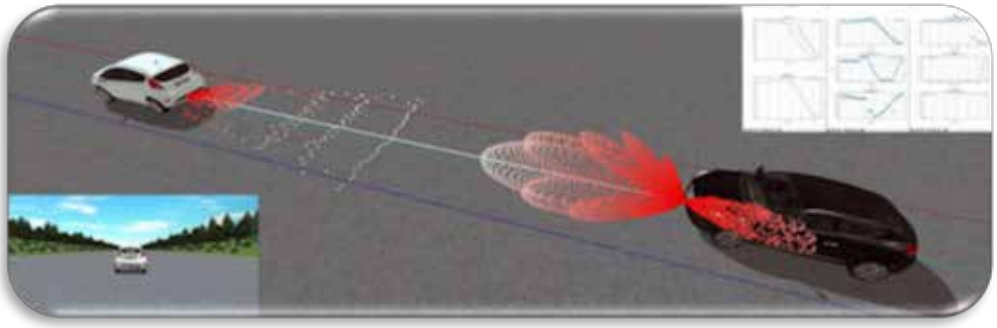


Interfacing is usually perceived as complex and time-consuming – but with PROSIVIC it is as simple as ever. We specifically designed it so that it integrates easily into any software toolchain.

PROSIVIC can exchange simulation data – including sensor outputs and the dynamic ground truth from the virtual scenarios – for processing from any other software. It also supports actuation feedback on PROSIVIC dynamic vehicles which enables closed-loop simulation. Additionally, it integrates with test automation processes involving scripting and remote execution control.

**Key Benefits:**

- Reuse existing simulation infrastructure and tools used by other departments; no toolchain migration necessary
- Gain access to sample interface components from other popular software providers
- Extend API independent of a tool vendor to connect new software. Gain access to source code, tutorials, and examples
- Co-simulation with other simulation tools is easy and straightforward, reducing extra simulation costs
- Integrate PROSIVIC with an automation flow using the remote-control API



Virtual Verification for Preparation of Function Assessment EURO NCAP Testing

PROSIVIC is committed to delivering the highest possible sensor modeling fidelity, which is necessary to prepare for virtual certification. Virtually create assessment tests and measure the sensing performance of the test conditions. The tool flexibility gives you full control over test conditions, such as variants of standardized test conditions or even custom proving ground tests – all decided by the user. After real test runs are carried out, data from real test logs are used to reproduce actual vehicle motions and simplify the understanding of system failures in real test campaigns.

**Key Benefits**

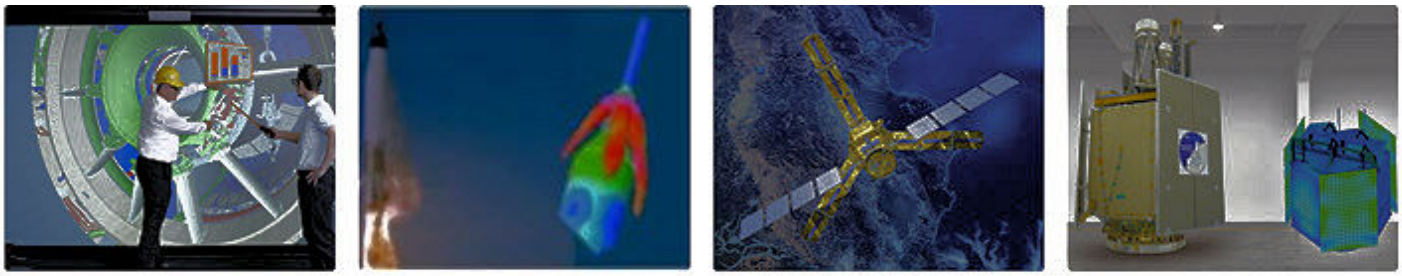
- Obtain high-fidelity test data (sensing and diagnostic information) with the correct sensors, before the prototype vehicle and equipment hardware have been developed and tested
- Measure the difference between sensing architecture choices (Ex. current vs. new generation of sensors on a vehicle)
- Improve confidence and communication on functionality performance by extending the test scenarios and conditions to cover your own set of proving ground tests
- Reduce the needed number of real tests and the costs related to them
- Capitalize on virtual test databases related to certification across vehicle programs, keeping the knowledge in-house and improving company expertise with difficult situations
- Share virtual databases between development function actors, improving consistency of performance comparisons and trust throughout the testing process


## MBSE Framework for Space Missions

Design and manufacturing, launch pad and recovery and reuse, this series offers solutions to the many challenges that the space industry faces.

WHO SHOULD PARTICIPATE?

This series, held in English, is designed for engineers and scientists from industry and research centers who wish to improve their knowledge and efficiency in virtual prototyping software and services.



SPACE WEBINAR 1
Aerospace Stamping and Metal Forming issues and how suppliers are succeeding
**Date: Jan 26th - 10:00am**

SPACE WEBINAR 2
Aerodynamics, fluid dynamics, and how the vibration affects the human and machine
**Date: Feb 2nd - 10:00am**

SPACE WEBINAR 3
MBSE Framework for Space Missions
**Date: Feb 9th - 10:00am CET**

SPACE WEBINAR 4
Efficiently predict and avoid damaging structural vibrations with fast modal extraction
**Date: Feb 16th - 10:00am**

## A new electronic module safeguards self-driving vehicles against the total failure of onboard electrical systems -

**Research News / 12/01, 2020**

**© Fraunhofer IZM/Volker Mai - Developed by Fraunhofer researchers and partners, this new electronic module safeguards emergency operation in autonomous**

Autonomous electric vehicles draw power from two sources: a high-voltage battery and, additionally, a conventional 12-volt battery that supplies the vehicle when idling or in high-load situations while driving. Safety-critical systems such as brakes and steering can therefore be connected to two sources of power. But what happens when one of these has a fault – a short circuit, for example? In order to safeguard against total failure and thereby a potentially dangerous situation, researchers from the Fraunhofer Institute for Reliability and Microintegration IZM have joined with partners on the HiBord project to develop an electronic disconnect device that is able to isolate any such faults in vehicle electrical systems. This module has already been successfully tested in a BMW i3.

In an optimistic assessment, the German motoring organization ADAC predicts that by 2050 as many as 70 percent of all new vehicles will feature technology that frees drivers to devote themselves to other tasks while driving on the highway. Yet critics are concerned by a number of unresolved questions. Will an automatic system remain reliable in the event of an emergency, and what happens if it breaks down due to the propagation of a short circuit?

In today’s electrical system architectures for automated and fully automated vehicles, it is standard practice that areas affected by a fault are isolated by means of an overload protection system. This setup means that the affected component is shut down completely in the event of a fault. For automated and fully automated vehicles, such an approach is only viable provided there is redundancy for all components and the onboard electrical system; i.e., they are present in duplicate. Yet this is expensive and also increases weight and consumes space, particularly in the case of the onboard electrical system. In the HiBord project, researchers from Fraunhofer IZM teamed up with partners from industry and the Fraunhofer Institute for Integrated Systems and Device Technology IISB to develop a disconnect device that shuts off faulty components in the onboard electrical system while still safeguarding the supply of power to safety-critical components. This guarantees safe driving without the need to install a duplicate onboard electrical system.

**Adequate time to convey passengers to safety**

Although it sounds like an economy measure, this approach actually represents a significant improvement in terms of safety for autonomous driving. As Phillip Arnold, research associate at Fraunhofer IZM, explains: “In conventional systems, any undervoltage while on the road can trigger a sudden and uncontrolled failure of the entire onboard electronics – including the braking and steering systems. This presents an unacceptable risk, particularly when traveling at high speeds. But with our new module, part of the onboard electrical system continues to function as before, so that a fully automated vehicle would still have enough time to convey passengers to safety – onto the emergency lane of the freeway, for example, or a parking lot.”

In the field of power electronics, engineers use so-called MOSFETs – field-effect transistors – to switch or block large electric currents. Equipped with 16 of these MOSFET switches, the newly developed disconnect device is capable of switching up to 180 amperes of current. If this threshold value is exceeded – in the event of a short circuit, for example – the electrical switch opens and thereby shuts off the power. Moreover, given that the MOSFET switches are capable of handling up to 300 amperes and therefore operate well below their maximum permissible load, they have a significantly longer lifetime than conventional solutions.

**Sixty times faster than conventional fuse systems**

In tests where researchers intentionally triggered short circuits, results showed that the module is capable of reliably isolating a current of up to 700 amperes without there being any propagation of the initial short circuit. There are also clear advantages over conventional systems in terms of switching speeds. While a conventional fuse takes some 20 milliseconds to trip, the disconnect device detects a fault within 10 microseconds and only requires a further 300 microseconds before tripping. This makes it more than 60 times faster than current fuse systems.

The module has already been successfully tested in an electrically powered BMW i3 demonstrator vehicle and is designed in such a way that it can, in principal, be used in any electric vehicle. By protecting against a complete failure following sudden problems with the onboard electrical system, this new development marks a groundbreaking step towards safe and reliable autonomous driving.


**Excerpt - The full article can be read**
**A damn stupid thing to do"—the origins of C**
**Today, C may be a lingua franca among programmers.**
**This is its (abridged) history.**

**Richard Jensen -**

In one form or another, C has influenced the shape of almost every programming language developed since the 1980s. Some languages like C++, C#, and objective C are intended to be direct successors to the language, while other languages have merely adopted and adapted C's syntax. A programmer conversant in Java, PHP, Ruby, Python or Perl will have little difficulty understanding simple C programs, and in that sense, C may be thought of almost as a lingua franca among programmers.

But C did not emerge fully formed out of thin air as some programming monolith. The story of C begins in England, with a colleague of Alan Turing and a program that played checkers.
God Save the King

Christopher Strachey was known as the "person who wrote perfect programs," as noted in a long profile from the journal, Annals of the History of Computing. It was a reputation he acquired at the Manchester University Computing Center in 1951. Strachey ended up there, working on the school's Ferranti Mark I computer through an old King's College, Cambridge, connection, Alan Turing.

Strachey was born in 1916 into a well-connected British family—his uncle, Lytton Strachey, was a founding member of the Bloomsbury Group, while his father, Oliver Strachey, was instrumental in Allied code-breaking activities during both World Wars.

That Strachey ended up being an acknowledged expert in programming and computer science would have come as something of a surprise to his public school and Cambridge University instructors. Strachey had always displayed a talent for the sciences but rarely applied himself.

If he had hopes for a career in academic research, they were dealt a serious blow by an unremarkable performance in his final exams. Instead, Strachey spent World War II working for a British electronics firm and became a schoolteacher afterward, eventually landing at Harrow, one of the most prestigious public schools in London.

In 1951 Strachey had his first chance to work with computers when he was introduced to Mike Woodger at Britain's National Physical Laboratory. After spending a day of his Christmas vacation getting acquainted with the lab's Pilot ACE, he spent his free time at Harrow figuring out how to teach the computer to play checkers. As Martin Campbell-Kelly, a colleague of Strachey in his later years, put it, "anyone with more experience or less confidence would have settled for a table of squares."

This first effort didn't come to fruition; the Pilot ACE simply didn't have the storage capacity required to play checkers, but it did illustrate an aspect of Strachey's interest that would prove instrumental in the development of the languages that led to C. At a time when computers were valued chiefly for their ability to quickly solve equations, Strachey was more interested in their ability to perform logical tasks (as he'd later confirm during the 1952 Association for Computing Machinery meeting).

Later that spring he found out about the Ferranti Mark I computer that had been installed at Manchester University, where Alan Turing was assistant director of the computer lab. Turing had written the programmer's handbook, and Strachey knew him just well enough from their time together at Cambridge to ask him for a copy of the manual.

In July 1951, Strachey had a chance to visit Manchester and discuss his checkers program with Turing in person. Suitably impressed, Turing suggested that, as a first step, he write a program that would enable the Ferranti Mark I to simulate itself. A simulator would allow programmers to see, step by step, how the computer would execute a program. Such a 'trace' program would highlight places where the program caused bottlenecks or ran inefficiently. At a time when both computer memory and processor cycles cost a fortune, this was an important aspect of programming.

The trace program Strachey wrote included over a thousand instructions—at the time it was the longest program that had ever been written for the Ferranti Mark I. Strachey had it up and running after pulling an all-nighter, and when the program terminated, it played "God Save the King" on the computer's speaker, according to Campbell-Kelly.

This accomplishment, by an amateur, caught the attention of Lord Halsbury, managing director of the National Research and Development Corporation, who soon recruited Strachey to spearhead the government's efforts to promote practical applications of the rapid developments in computer science taking place at British universities.

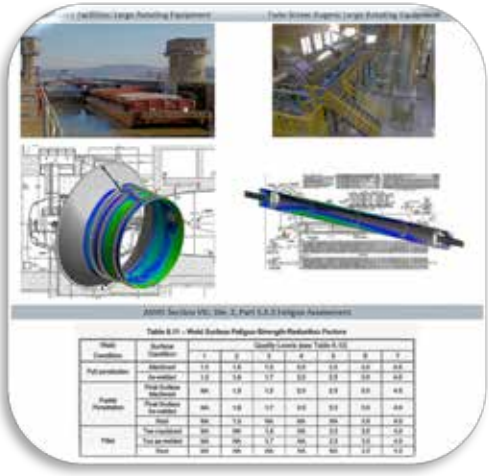
It was in this capacity that he found out about a project at Cambridge being undertaken by a trio of programmers named David.

Excerpt - The full article can be read A damn stupid thing to do"—the origins of C
Today, C may be a lingua franca among programmers. This is its (abridged) history.


**George Laird's blog - Fatigue Analysis: ASME Section VIII, Division 2, Part 5.5 Protection Against Failure from Cyclic Loading**

**Even with an academic and experimental background in fatigue analysis, it is daunting to provide a hard, no-nonsense life-cycle prediction.**

It becomes especially daunting when your fatigue prediction can cost or save your client millions of dollars. Plus, there are tons of computer programs that promise "instant fatigue nirvana" at the press of a button; which leads one to ask: "What is a poor engineer supposed to do?" Over the years, we have learned that there are three critical components to a quality fatigue analysis: i.) accurate FEA stress results, ii.) accurate FEA stress results and iii.) accurate FEA stress results. Okay, sad, old, real-estate joke about location, location, and location; but let us just imagine that your stress numbers are good, then what? Fatigue analysis is all about the protection of structures and systems against failure from cyclic loading.

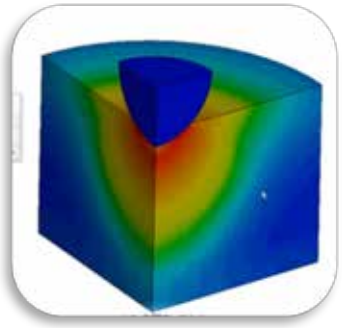


This is where the ASME Boiler & Pressure Vessel Code (BPVC) provides a tried and true standard that, if your stress numbers are good, then you can be assured that your fatigue prediction will be conservative. Besides providing robust fatigue curves, the Code provides explicit guidance on how to treat welds based on type, inspection and surface quality. For example, if the weld is completely un-inspected and un-finished, then it earns a fatigue-strength-reduction factor or 4x, which means your FEA stress numbers are multiplied by 4x prior to the calculation of fatigue cycles per the ASME curve.

In contrast, if a full penetration weld is ground to smooth profile and then fully-inspected (volumetric and surface examinations) , then the fatigue-strength-reduction factor is 1x. The ASME code makes clear that it is not saying that the weld material is as good as the base material, but merely that the ASME fatigue curves are still accurate. The ASME fatigue method was recently used to confirm cyclic fatigue damage and to guide subsequent design revisions. From an engineer's perspective, it was a very satisfying journey since the Code provided clear guidance on how to treat welded and non-welded sections. The projects have been completed and now we wait to see what happens. Nothing is perfect and one never truly knows with fatigue, but at least following the ASME "Protection Against Failure from Cyclic Loading" we are not flying alone.

Ameen Topa •
Research Scientist at Universiti Teknologi PETRONAS

This video is answering the frequently asked questions I get regarding post processing with LSPP.



## YouTube Tutorial by Ameen Topa

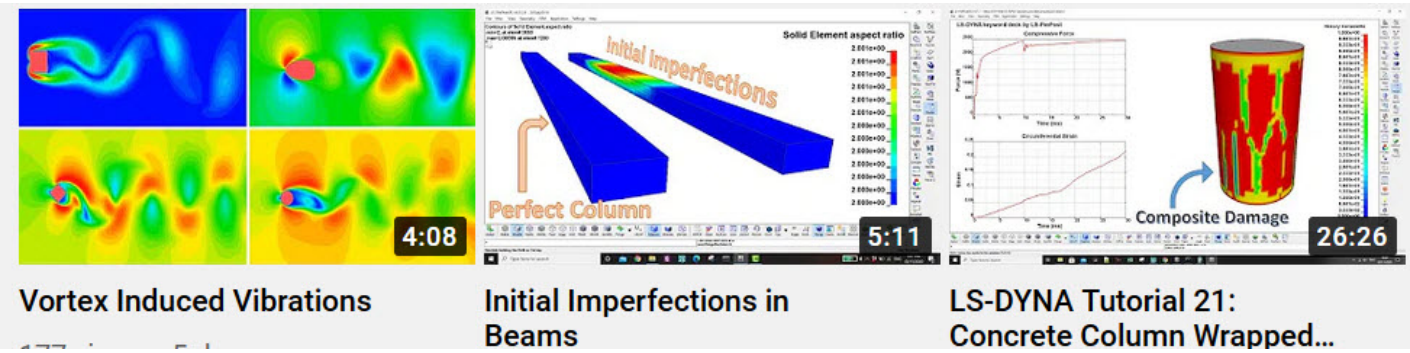
**Post Processing Tutorial (with LS-Prepost)**

In this video, I discuss few things that I am being asked frequently.

Things in this video that I cover might also be covered in a previous video, so here is the list of things that I mention in this video:

- How to control the states when animating the results
- How to display the Fringe components, and control their range
- How to extract the data using History option, and ASCII option
- What is the difference in the results from History and ASCII?
- How to use Cross Option to plot Force vs Displacement/Stress vs Strain curves
- How to show the velocity vectors?
- How to plot a the results (stress, strain, displacement) along a path, with the help of excel

**Do Not Miss the additional tutorials and videos, such as:**

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- a curious person looking to find out how machine learning works and maybe build something new

**Book's features**

- concise and to the point — the book can be read during a week. During that week, you will learn almost everything the modern machine learning has to offer. The author and other practitioners have spent years learning these concepts.
- companion wiki — the book has a continuously updated wiki that extends some book chapters with additional information: Q&A, code snippets, further reading, tools, and other relevant resources.
- flexible price and formats — choose from a variety of formats and price options: Kindle, hardcover, paperback, EPUB, PDF. If you buy an EPUB or a PDF, you decide the price you pay!
- read first, buy later — download book chapters for free, read them and share with your friends and colleagues. Only if you liked the book or found it useful in your work, study or business, then buy it.

**Andriy Burkov -** Hey! My name is Andriy. I'm a dad of two and a machine learning expert based in Quebec City, Canada. Nine years ago, I got a Ph.D. in Artificial Intelligence, and for the last seven years, I've been leading a team of machine learning developers at Gartner. My specialty is natural language processing. My team works on building state-of-the-art multilingual text extraction and normalization systems for production, using both shallow and deep learning technologies.

Marc Font
CAE Passive Safety Engineer en Applus+ IDIADA

## IDIADA' s Virtual Proving Ground: a whole new range of testing possibilities

The integration of IDIADA Spain Virtual Proving Ground (ISVPG) with testing and simulation software has strengthened virtual development and validation activities by offering new virtual scenarios for various applications such as comfort/durability simulations, driving simulator activities and ADAS & Autonomous Driving system development.

ISVPG supports development activities by having the most important surfaces of Applus IDIADA's proving ground in Spain scanned in high resolution.

Description: ISVPG reproduces all the macroscopic unevenness and irregularities of the real surfaces, supporting correlation activities by using an adequate representation of the road inputs. It also helps to gain confidence in simulation and enhances the potential of virtual development of components, control systems and full vehicles. These virtual roads can be used from very early stages of the vehicle development process in order to identify and solve further problems. This saves the financial and time costs associated with on-road/track test sessions & design process.

**Applications:**

The continuous development of hardware allows the rapid increase of use cases for the virtual representation of IDIADA Proving Ground. Additionally, more data-centred approaches to engineering are only possible if simulation is in the hub of the development process.

The virtual data is available in several industry standard formats as well as it being possible to build them into customized formats.

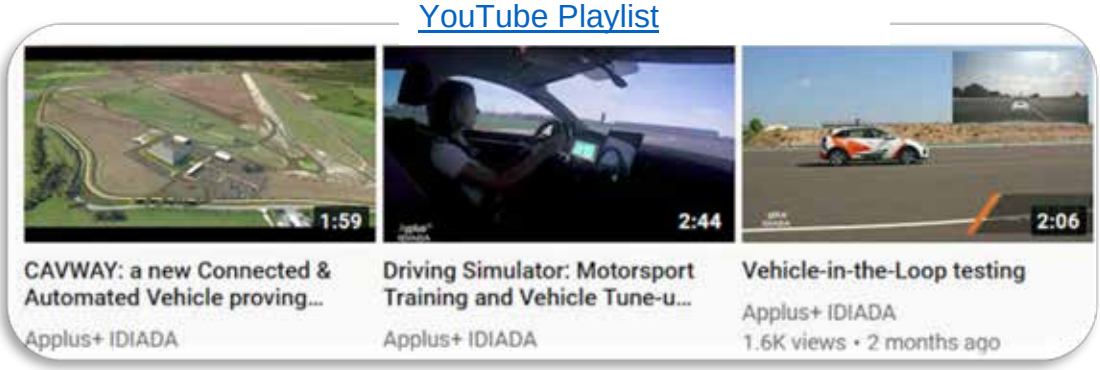
In the end, the general idea is to allow all potential users of the proving ground to test virtually on the same surfaces by its integration into the major simulation software solutions.

The main applications as well as the usual required formats for each one are listed below by sequential order of development:

- Comfort and Ride analysis using 3D mesh representation of the roads such as 3D encrypted CRG format within MSC. ADAMS/Car (and also RGR format for any cosin compatible application) or Road Surface as rFpro TerrainServer model and VI-grade offline format.
- Active system development and test planning.
- Integration into driver-in-the-loop (DIL real-time systems) using proprietary driving simulator formats representing the complete 3D environment, including the road surface, such as 3D Environment for main Driving Simulator software from rFpro and VI-grade.
- ADAS, autonomous driving system development and validation using High-Definition maps introducing the logics of driving, main road geometries, intersections, etc. such as Opendrive format. If other relevant information is needed, other formats and track characteristics such as signalling or environment information can also be obtained upon request under standard or customized formats.
- Tire development by using very detailed representation of small road sections, such as micro-structural information up to 60 micrometres as contact patch trajectories.

**Conclusion:** Since 2012, Applus IDIADA has been developing the applications of the data of virtual the Proving Ground. At the same time, our customers have had the opportunity to get access to the data to complement most of the tests performed at the PG. There is still a lot to discover regarding newer applications, such as tire simulations and how to get better integration in the ADAS and CAV related projects.

YouTube Playlist




## Hyundai Motor Group to Lead Charge into Electric Era with Dedicated EV Platform 'E-GMP'

- Hyundai Motor Group reveals E-GMP, its first dedicated BEV platform, for next-generation BEV line-up
- BEVs based on E-GMP can provide range over 500km on a full charge (WLTP) and be charged up to 80% within 18 minutes through high-speed charging
- High performance model based on E-GMP will accelerate from zero to 100kph in less than 3.5 seconds, with top speed of 260kph
- Components optimize driving dynamics and safety, and maximize cabin space
- Integrated Power Electric system includes world's first multi-charging (400V/800V) and bi-directional power conversion function
- Platform modularization and standardization enable rapid and flexible development depending on customer needs
- Hyundai Motor Group plans to introduce 23 BEV models and sell 1 million BEV units worldwide by 2025

SEOUL, December 1, 2020 — Hyundai Motor Group has unveiled its new Electric-Global Modular Platform (E-GMP), a dedicated battery electric vehicle (BEV) platform. Revealed online today during an 'E-GMP Digital Discovery' event, the platform will serve as the core technology for Hyundai Motor Group's next-generation BEV line-up.

The event was broadcasted through the Group's official YouTube channel and Channel Hyundai, an online global content platform.
From 2021, the E-GMP will underpin a range of dedicated new BEVs, including Hyundai Motor Company's IONIQ 5; Kia Motors Corporation's first dedicated BEV to be revealed in 2021; and a series of other models.

Designed exclusively for BEVs, E-GMP provides various advantages compared to the Group's existing platforms, which have each been engineered predominantly to accommodate internal combustion engines. Benefits include increased development flexibility, powerful driving performance, increased driving range, strengthened safety features, and more interior space for occupants and luggage.

“Today our front-wheel driven Hyundai and Kia BEVs are already among the most efficient ones in their segments,” said Albert Biermann, President and Head of R&D Division for Hyundai Motor Group. “With our rear-wheel driven based E-GMP, we are extending our technological leadership into segments where customers demand excellent driving dynamics and outstanding efficiency.”
“E-GMP is the culmination of years of research and development and brings together our most cutting-edge technologies. Our BEV line-up will evolve and be strengthened by this innovative new platform,” said Fayez Abdul Rahman, Senior Vice President of Vehicle Architecture Development Center for Hyundai Motor Group.

**Maximizing development flexibility through modularization and standardization**

E-GMP reduces complexity through modularization and standardization, allowing rapid and flexible development of products which can be used across most vehicle segments, such as sedans, SUVs and CUVs. Moreover, flexible development can satisfy various customer needs for vehicle performance. Among these, a high performance model will accelerate from zero to 100kph in less than 3.5 seconds and achieve a maximum speed of 260km/h.

E-GMP will be highly effective in expanding the Group’s EV leadership position as it will enable the company to enlarge its EV line-up over a relatively short period through modularization and standardization.

**Designed for Driving Performance, Safety and Maximized Space**

E-GMP is engineered to offer improved cornering performance and driving stability at high speed. This is due to optimal weight distribution between front and rear, a design which enables a low center of gravity thanks to its low-mounted battery pack, and the adoption of electric motors located in the space previously occupied by an engine.

The high-speed electric motor raises the driving performance of E-GMP vehicles. A five-link rear suspension system, which is typically used for mid and large sized vehicle segments, and the world’s first integrated drive axle (IDA), which combines wheel bearings with the drive shaft to transmit power to the wheels, enhance ride comfort and handling stability.

The platform secures battery safety through a battery support structure made of ultra-high strength steel. Hot-stamped steel components surround this structure for additional rigidity. Collision energy can be absorbed efficiently thanks to energy-absorbent sections of the body and chassis, effective energy load paths, and a central section of the battery pack tightly bound to the vehicle body.

Moreover, by strengthening the structure of the load support section, located in front of the dashboard, engineers have been able to minimize collision energy to the power electric system and battery. The A-pillar's load distribution structure also prevents deformation of the passenger cell.

E-GMP maximizes interior space through its long wheelbase, short front and rear overhangs and slim cockpit module. With the battery pack mounted beneath the floor, the E-GMP creates a flat floor for the cabin. This provides more legroom for passengers, while enabling various arrangements for the front and rear seats.

The battery pack itself – mounted between the front and rear wheel axles – will be the most power-dense system that Hyundai Motor Group has ever created. This is partly thanks to its enhanced cooling performance, a result of a new separate cooling block structure which helps make the battery pack more compact. With energy density enhanced by around 10% compared to existing EV battery technology, the battery packs are lighter, can be mounted lower in the body, and liberate more cabin space.

**Efficient and Powerful Electrification System**

The E-GMP's compact new power electric (PE) system consists of a powerful motor, EV transmission and inverter. These three components are integrated into a single compact module. This ensures powerful performance by raising the motor's maximum speed by up to 70 percent compared to existing motors. The high-speed motor is smaller than other motors while providing comparable performance, and it gives efficiencies in both space and weight.

Additionally, a standardized battery system can be tuned to offer performance appropriate for a specific vehicle segment, to maximize driving range, or to meet various customer needs.

The motor is controlled by the inverter power module, which adopts silicon carbide (SiC) semiconductors. This motor can enhance system efficiency by around 2~3 percent, which means the vehicle can be driven for approximately 5 percent longer on the same battery energy.

E-GMP relies on the rear wheel for propulsion. Customers will be able to choose between rear-wheel and all-wheel drive configurations; models with the latter can be equipped with an additional motor. The all-wheel drive system includes an EV transmission disconnector, which can control the connection between the additional motor and front wheels, and switch between two-wheel and all-wheel drive modes to enhance efficiency by offering the ideal level of power or performance for current driving conditions.

All vehicles developed with the E-GMP platform use a standardized single type of battery module. This module is composed of pouch-type standard cells and can be packed in different quantities as required for each vehicle.

**Multi (800V and 400V) and Bi-Directional Charging System**

Most existing EVs and the fast-charging infrastructure provide 50kWh~150kWh charging for EVs equipped with a 400V system; however, the development of 800V infrastructure, with up to 350kWh charging, will gradually enable even more fast-charging.

In line with this trend, Hyundai Motor Group has invested in IONITY, Europe's leading high-power charging network, as a strategic partner and shareholder. IONITY operates 298 high-power charging (HPC) stations – using a charging capacity of up to 350 kWh – along highways in European countries. The company plans to increase this number to 400 HPC stations by 2022, including 53 currently under construction.

E-GMP offers 800V charging capability as standard and enables 400V charging, without the need for additional components or adapters. The multi-charging system is a world's first patented technology which operates the motor and the inverter to boost 400V to 800V for stable charging compatibility.

A BEV based on E-GMP is capable of a maximum range of over 500km with a fully charged battery, according to the Worldwide Harmonized Light-duty vehicle Procedure (WLTP). Moreover, it can high-speed charge up to 80 percent in just 18 minutes and can add up to 100km of driving range in just five minutes.

Unlike previous BEVs, which only accept one-way charging, the E-GMP's charging system is more flexible. The E-GMP's newly developed Integrated Charging Control Unit (ICCU) represents an upgrade from existing On-Board Chargers (OBC), which typically only allow electricity to flow in a single direction from an external power source. The ICCU enables a new vehicle-to-load (V2L) function, which can additionally discharge energy from the vehicle battery without additional components. This enables BEV based on the E-GMP to operate other electric machinery (110 / 220V) anywhere. The system can even be used to charge another EV.

The new V2L function can supply up to 3.5kW of power and operate a mid-sized air conditioner unit and a 55-inch television for up to 24 hours.

**E-GMP to underpin future EV sales growth worldwide**

Hyundai Motor Group has put in considerable effort to prepare for the era of electrification. Kia Motors Corporation launched its first mass-produced BEV in 2011, the Ray EV, in Korea, with the Soul EV sold in global markets from 2014. The Group completed the introduction of a mass production system for all electrified vehicles in 2015, including those with HEV, PHEV, BEV, and FCEV.

The E-GMP will underpin Hyundai Motor Group's plans to introduce a total of 23 BEV models including 11 dedicated BEV models, and sell more than 1 million BEVs worldwide by 2025. As part of its BEV vision, Hyundai Motor Company launched its dedicated 'IONIQ' BEV brand in August 2020, which includes three dedicated BEV models, the IONIQ 5,6 and 7 by 2024. This currently covers various vehicle segments.

Kia is also undergoing a transformation for the era of electrification, based on its 'Plan S' mid-to-long term strategy. In September, Kia announced plans to increase the share of BEV sales volumes as a proportion of total sales to 20 percent by 2025. The company also recently published an early image of seven dedicated BEV models to be released sequentially by 2027.


**Sarah Widmann- In operation for ten years: the Mercedes-Benz driving simulator: Virtual journey into the future: simulated with the latest test tools**

Stuttgart/Sindelfingen. 10th anniversary at the Mercedes-Benz driving simulation centre: ten years ago, the most modern moving-base driving simulator of its time commenced operation in the Mercedes-Benz Technology Centre (MTC) in Sindelfingen. With its 360° screen, fast electric drive and a twelve metre long rail for transverse and longitudinal movements, it continues to be one of the most capable facilities in the automobile industry. It allows highly dynamic driving manoeuvres such as lane-changes to be realistically simulated. The driving simulator also plays an important role on the way to autonomous driving. Some of the testing and verification work for the DRIVE PILOT in the new S-Class took place there. The experts in Sindelfingen are also working on the simulator of tomorrow: In the compact XR (Extended Reality) driving simulator developed in-house, the interior functions of future vehicles can be tested flexibly with the help of digital smartglasses.

"Mercedes-Benz has been systematically working towards digitisation in its development and testing for many years. But never before has simulation been as important as now, when it comes to conditionally automated driving," says Dr. Michael Hafner, Head of Automated Driving at Mercedes-Benz. "A major part of the testing and verification work for the DRIVE PILOT took place in the dynamic driving simulator." It is expected that from the second half of 2021 the S-Class will be able to drive in conditionally automated mode in situations where traffic density is high or in tailbacks on suitable motorway sections in Germany.

During the virtual testing of automated vehicles, the simulator quickly and efficiently allows many scenarios to be enacted that do not occur in real tests, or not often enough, because they are so infrequent. Moreover, with no physical danger, the safety developers are able to provoke situations in which the driver needs to take over control very quickly. They use the simulator to observe and assess the interaction of the driver, and e.g. measure his/her reaction time.

Hafner: "The best possible development results are obtained from an intelligent combination of modern simulation methods and intensive practical tests. Several million test kilometres in road traffic continue to be an indispensable part of development work. Simulation cannot completely replace real testing, it remains an elementary tool for the development and approval of safety-related systems."

Numerous simulations are carried out at Mercedes-Benz during the development and testing of new vehicles. "Digital prototypes" of a vehicle created with the help of high-performance computers make it possible to test a new model completely in many driving situations, before the real vehicle even exists. As a result, the actual prototypes attain a higher maturity level more quickly, allowing even more detailed testing.

**The future: on the road in the cockpit of future vehicles with digital smartglasses**

The next stage in simulator technology is also being tested in the conceptual phase in Sindelfingen: together with their colleagues in the Virtual Reality Centre (VRC), the driving simulator experts at Mercedes-Benz have developed and designed a new XR driving simulator. This is where the real and virtual surroundings blend even more closely than before, hence the designation Extended Reality.

Only very few controls physically exist in this simulator: along with the driver's seat, these are the steering wheel with touch controls, the pedal cluster and the Start switch. The respective specialist departments supply CAD data sets, UI and function models which are converted into the appropriate software by the simulation experts. This makes the driving simulation centre a "digital vehicle workshop". The XR driving simulator is the ideal addition to conventional simulators based on the cockpit of a real vehicle. Especially in a very early development stage when there is yet no hardware, the vehicle can already be digitally experienced on the road, in real time, in the XR driving simulator.

To this end, the tester only needs to take a seat and put on the smartglasses. The new simulator allows various interior functions such as display and control concepts or lighting scenarios to be staged in a still early development phase.

For the first time it is also possible to simulate parking situations under laboratory conditions. The level of realism is very high: for example, the view reflected by the exterior and rear-view mirrors changes with the viewing angle. The tester's eye direction is tracked by the smartglasses, and the mirror image adapted accordingly. The vehicle's surroundings with other vehicles or pedestrians are also simulated very realistically.

**The present: 10 years of the moving-base driving simulator in Sindelfingen**

In October 2010 Mercedes-Benz officially opened the moving-base driving simulator in the company's Technology Centre in Sindelfingen. With its 360° screen, fast electric power system and the twelve-metre long rail for transverse or longitudinal movements, depending on the test setup, the moving-base simulator at Mercedes-Benz is among the most capable in the entire automobile industry.

The real car in the virtual world is a randomly chosen vehicle cab in which the tester takes a seat in the simulator cell. This can be electronically reprogrammed to simulate the behaviour of every current and future Mercedes model. The simulator cell is a hexapod mounted on six moveable supports. As well as the vehicle cab, this contains the projection screen on which road traffic is portrayed realistically with moving pedestrians, oncoming traffic and houses.

The vehicle controls are linked to the computerised controls of the driving simulator by data lines. When the test driver moves the steering wheel or accelerates, these responses are registered by the computer and have the same effects as in real traffic. The scenery shown constantly changes, and the moving base simulates the car's attitude versus the road surface, e.g. pitching when the driver brakes. The computer calculates the vehicle's behaviour over 1000 times per second, and sends the corresponding commands to the electrics. It can move the system by up to twelve metres in a transverse direction, at a speed of up to ten metres per second (36 km/h).

In the driving simulation centre, driving tests are carried out in a virtual world. The focus is on the driver and the subjective driving impression. Both external test subjects and specialists are allowed behind the wheel:

- During sessions with test subjects, the emphasis is on studies to verify the concepts for driving assistance systems and on UI (user interface) testing. This includes user-friendliness and UX concepts (UX = user experience), voice control systems and the assessment of engine sound.
- During tests by experts, dynamic handling studies are conducted with cars, trucks and buses. These make it possible to experience overall vehicle systems, although they are still in the development phase. As "drivers-in-the-loop", experts can interactively and subjectively experience new suspension systems and functions in the driving simulator. This allows the dynamic properties of a prototype (e.g. handling stability, agility or ride comfort) to be assessed under identical conditions on a reproducible basis.

Numerous other simulators are used in addition to the moving-base driving simulator. With a ride simulator it is possible to carry out subjective assessments of the performance of digital prototypes driving on uneven roads, for example. To this end, the Mercedes specialists feed the simulator with the surface data of real-life test stretches and the necessary suspension and functional data relating to vehicle models. The driver and front passenger can sit in the two seats on the test rig to carry out purely digital yet realistic test drives. This is because the vehicle seats, which are mounted on a hexapod with electric supports, move as prescribed by the digital prototypes.

**Fixed-base simulators** do not have a hydraulically or electrically powered motion system, and the vehicle cab is fixed to the floor. Thanks to single or multi-channel projection and the sound systems conveying driving noises, the traffic scenario is nevertheless so realistic that the driver becomes immersed in the virtual world and behaves as if in real-life road traffic. The driving assistance systems are tested in different traffic situations here. Development work is also carried out on interior noise by reference to measured and synthetic noise, and with the aid of expert panels and customer studies.

A realistic impression of active safety systems already installed in production vehicles is provided by the simulator for assistance systems. A virtual test drive becomes an impressive active safety experience when the occupants of the simulator interactively, rapidly and directly experience the current assistance systems in different scenarios at the touch of a button.

**History: more than three decades of expertise in the field of driving simulation**

The first driving simulator of the former Daimler-Benz AG was developed completely in-house, and went into operation in Berlin in 1985. There are a number of safety innovations whose development was given its first impulse by this driving simulator: For example, the engineers found that while most test subjects operate the brake pedal rapidly, they do not do it with enough force – thereby sacrificing valuable braking distance. This finding led to the development of Brake Assist (BAS), which recognises this and automatically makes the full braking force available. Brake Assist has long been standard equipment in all Mercedes-Benz models.

## B-52 bomber preparing to fly into 2050

**Collins Aerospace has supplied the B-52's engine system components since the 1950s**

When the United States Air Force (USAF) launched its legendary Boeing-built B-52 bomber in the 1950s, it's likely no one envisioned that the aircraft would still be flying today – nor that the USAF would decide to continue its operations until at least the 2050s. But that's the current plan for the 76 B-52H aircraft still in operation, the most recent of which were built in the 1960s.

The B-52 Stratofortress – a long-range, subsonic, jet-powered strategic bomber – has played a key role in deterring enemy aggression from the Cold War and Vietnam War to Desert Storm and the global war on terror. Now as the current fleet surpasses 50 years of service, the USAF recently decided to re-engine the B-52 as part of the Commercial Engine Replacement Program (CERP). Doing so will outfit these legendary aircraft with commercial off-the-shelf, in-production jet engines that will:

- extend the life of the aircraft
- reduce maintenance
- boost fuel efficiency
- increase range
- improve diagnostic equipment and
- reduce greenhouse gas emissions.

Not a bad birthday present for this tireless warbird.

Collins Aerospace has been part of the B-52 since the first version took flight in the 1950s. Rohr Aircraft Corporation, one of Collins' heritage companies, produced parts of the plane's propulsion system for what was then Boeing's cutting-edge new bomber: the B-52. As the B-52 advanced from the first "A" model to the current "H" model that started flying in the 1960s,

Collins Aerospace expanded its manufacturing innovations to modify the original parts to accommodate increased electrical power generation and engine thrust. Over the years, the company supplied not just the nacelles and struts, but also the fuel pod tanks and aft fuselage structure.

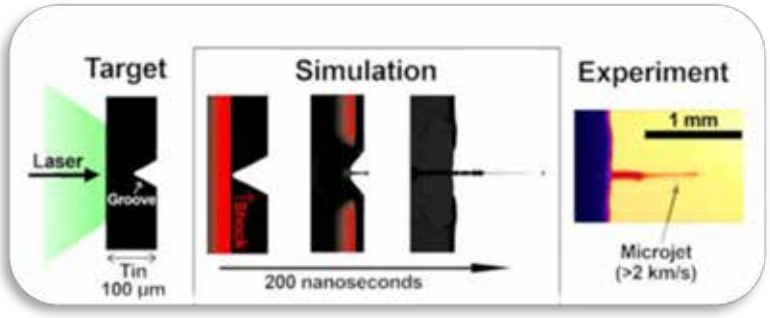
"We've been on every B-52 variant to date, producing 5,952 nacelles and 2,976 struts over the years," said Marc Duvall, president, Aerostructures, Collins Aerospace. "We understand nacelles and how to efficiently and accurately manufacture them to the Boeing and Air Force standards and schedules. And beyond manufacturing, Collins has the service and repair network to keep these components flying as the B-52 mission extends toward its centennial celebration."

It's critical to the USAF that its suppliers provide the safest and most capable components available. Collins Aerospace's proven designs and on-time delivery rates have demonstrated maximum fleet readiness for not only military aircraft, but also commercial and business jet aviation.

"We believe we have more experience in complex, highly engineered nacelle structures for aircraft than anyone else in the business. We've now been manufacturing these types of components for 80 years," Duvall said. "More than 50 different programs are supported by our team, and our products have been certified with the rest of the aircraft on 18 new programs over the last 10 years. We're proud that so many customers continue to place their trust in us."

In recent years, Collins Aerospace was a supplier in two other major USAF re-engine programs: the Lockheed C-5 and Boeing KC-135. The company provided the new C-5M with struts for the replacement engine along with inlets, fan cowls and core cowls for the nacelle that were adapted from an existing program. For the Boeing KC-135, the company provided inlets and fan cowls for approximately 425 aircraft.

"The B-52 has a 70-year track record of dependability and performance since it first started flying in the 1950s, and our propulsion components have been on every aircraft for every flight-hour," said Duvall. "We've been with the USAF on the B-52 since the beginning and we have a unique combination of technology and experience to support this platform in the next chapter of its iconic mission."




Anne M. Stark - Microjets are faster than a speeding bullet

In experiments performed by the MERIT project, lasers shock microscopic tin samples and create microjets that travel at several kilometers per second. Simulations are critical to understand the dynamics of jet formation.

When a shock wave travels through material and reaches a free surface, chunks of material can break away and fly off at high speeds. If there are any defects on the surface, the shock forms microjets that travel faster than a speeding bullet.

Understanding how these microjets form and how they interact with material help to improve spacecraft shielding and understanding a planetary impact.

Lawrence Livermore National Laboratory (LLNL) scientists produced hydrodynamic simulations of laser-driven microjetting from micron-scale grooves on a tin surface. From these simulations, they were able to see microjet formation across a range of shock strengths, from drives that leave the target solid after release to drives that induce shock melting in the target.

When a metal sample is subjected to dynamic pressure from an impact, an explosion or irradiation by a high-power laser, a shock wave can develop near the loaded side and propagate into the sample. When the shock interacts with the sample's free surface, it accelerates the surface and may cause localized material failure. As the shock wave interacts with surface defects (such as pits, bumps, voids, grooves or scratches), material can be ejected as clouds of small particles, or thin, directed jets at velocities significantly faster than the free surface.

Simulations are critical in studying microjets as they travel 1-10 kilometers per second (km/s), whereas a bullet travels about 0.3 km/s.

"The tin was designed with micron-scale grooves in the surface so we can generate microjets, studying how they propagate and interact," said LLNL physicist Kyle Mackay, lead author of a paper appearing in and chosen as an editor's pick in the Journal of Applied Physics

.The research is part of the Metal Eject Recollection Interaction and Transport (MERIT) project at LLNL.

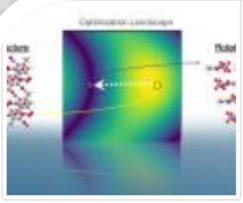
The team found that jet formation can be classified into three regimes: a low-energy regime where material strength affects jet formation; a moderate-energy regime dominated by the changing phase of tin material; and a high-energy regime where results are insensitive to the material model and jet formation is described by idealized steady-jet theory. Mackay said transitioning between these regimes can increase the mass of the jet by 10 times.

“It’s no surprise that the harder you smack something, the more things come off of it,” said LLNL physicist Alison Saunders, a co-author of the paper and lead on the MERIT project. “But there is a lot of subtlety involved in understanding the materials physics that leads to such a relationship, and for a material like tin, which undergoes many phase transitions under shock loading, the relationship is far from linear.”

Livermore scientists Fady Najjar, Suzanne Ali, Jon Eggert, Tommor Haxhimali, Brandon Morgan, Hye-Sook Park, Yuan Ping and Camelia Stan, as well as researchers from the Laboratory for Laser Energetics at University of Rochester, contributed to the project.

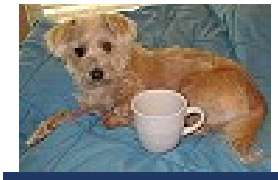
The research is funded by the Laboratory Directed Research and Development program.

Additional article of interest on their website:



**Molecular crystal structures pack it in**

Dec. 23, 2020- Whether organic chemists are working on developing new molecular energetics or creating new blockbuster drugs in the pharmaceutical industry, each is searching how to optimize the chemical structure of a molecule to attain desired target properties. Part of that optimization includes a molecular crystal’s packing motif, a perceived pattern in how molecules orient relative to one...





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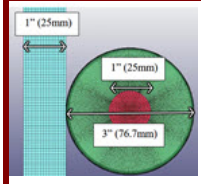
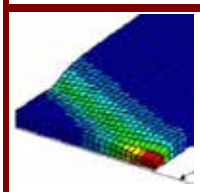
|   | 12-14 J. Puryear - Wear Analysis of Machinery Componentsin Buildings |
|  | 12-07 J. Johnsen - Calibration and Application of GISSMO and *MAT_258 for Simulations Using Large Shell Elements |
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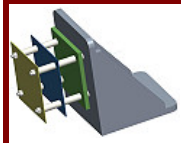
|  | 11-09 - **T. Legaud** - Use of Prepreg Carbon and Aluminum in Satellite Shielding Submitted to High Velocity Impacts |
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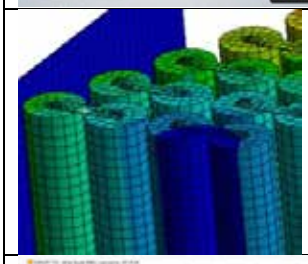
|  | 12/21 - **A. Remmel** - Ozen Engineering - How to model the Battery Pack impact and submodeling using ANSYS Workbench LS-DYNA |
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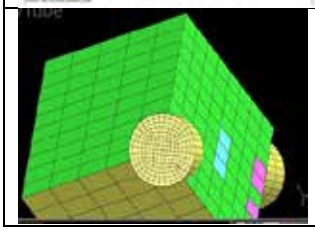
|  | 12/07 - **OAYSIS** - Oasys PRIMER - Mesh modifications tools - meshing tools built into the latest release. |

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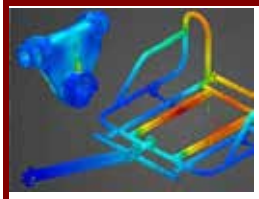
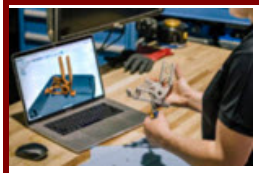
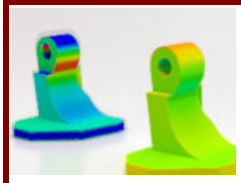
|  | 12/21/2020 - **Curt Chan** - article by **T. Palucka** - AdvenChair Rolls Boldly Into Adventure With Off-Road Wheelchair Design |
|  | 12/14/2020 - **E. Engle** - 10 Fusion 360 Classes From Autodesk University You Can Watch Right Now |
|  | 12/07/2020 - MSC.Software - Simulation enables mass-production Additive Manufacturing |
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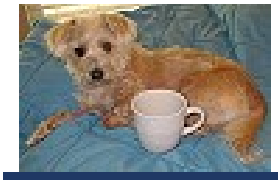
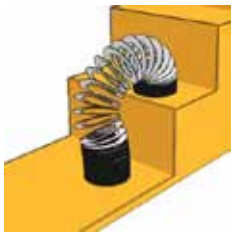




12/28/2020 We are ending the year with two of my older favorites. IF you look at the Hybrid 3 crash dummy - he didn't FALL! Look at his back - see that pole? He was struck by someone behind him. He was walking to the kitchen to boil water in the kettle, and was murdered! Did they want to steal the kettle? (AND to answer who just yelled, "Is Marsha drinking alcohol?" "NO, I'm not drunk, I'm only drinking coffee without alcohol of any kind!)

Hybrid 3 Crash Test Dummy Falling downstairs

Electric Kettle simulation using LS-Dyna



12/21/2020 Last week we had coffee and studied pin ball machines. This week we have our coffee and sit at the stairs watching our Xmas Slinky! After YouTube to watch the slinky video I'm heading to Amazon and see if they sell them! This week we will have a new Xmas Slinky Coffee, of course with chocolate.

Lancemore Japan - LS-DYNA Slinky walks down stairs

12/14/2020 Who asked for a pinball machine for Xmas? If you didn't then you should. And if you did then below will be of interest if you want to be like the song Pinball Wizard. Old old song!

Self-controlling pinball simulation using LS-DYNA - in this neat pinball simulation by DYNAmore Nordic, prescribed motions are applied to the flippers as the ball, modelled with a Discrete Element Sphere, comes into contact with some segments above the respective flipper.

12/07/2020 I did try to find an FEA simulation on how to make me follow through on my 2021 New Year Resolution I am thinking to do - NONE!

I am thinking of bottling my to go coffee so we need to watch bottle caps!

LS-DYNA simulation of a LS-TaSC optimized bottle opener in action.

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12/28/2020 - Well I thought Shane would want a new friend. I know it has only been a week since he lost his pal so I am letting the mini's visit him. Have I mentioned yet that wasn't a great idea? I'm trying to explain to them that we are family and although sad that we all stick together. Shane tried to bite Quincy who then bit Shane on the nose. Dusty just wanted to find food and ignored it all! I will try again next week for a happy horse family picture.

12/21/2020 Well Happy Holiday from us and I guess our Raven who likes to sit on the top of the barn waiting for his cat food. Also, he is a tad picky about cat food! Loves his friskies sea food - I did put out dry cat food beef flavor and he didn't eat it! Now, that was weird - he picked them up and then just dropped them and hopped away. SO, I went out and dumped it and put in the friskies sea food flavor dry food and he ate that! I did give him my lecture on if someone is offering you free food do not spit it out!

12/14/2020 - No posting this week. We had to euthanize our 24 year old horse Hero - the black horse on the right playing tug of war with our palomino Shane (28). Yes, we did all we could but could not get him to surgery and the severity of his pain was to much. Will post next week since life goes on as evidenced by my friend, Cathy Cerro, who brought over her 3 new puppies to give me puppy kisses! Sad day but puppy kisses from wiggling little pups have to make you smile.

12/07/2020 - Yes, I am late feeding and they are all sitting on the roundpen waiting. I think they brought their relatvies again since it gets more and more each week.



11/09/2020 -I created a pdf explaining how I got rid of tumbleweeds. It was too many pictures to post. I have to find a better way - Bagging them will take hours. I don't see tumbleweed bagging as a hobby. Next week I'm going to dry them out and crush them into tiny twigs! PDF - KILL TUMBLEWEEDS!

11/02/2020 - Below is Dad Bobcat -Mom is orange and the two kid bobcats still act silly (in earlier posts) Now, keeping in mind I try to teach them "my space, your space" he is walking past my back porch. He has never jumped up on it. It is difficult to relax with my Molly on the porch with Dad Bobcat walking past the porch! Don clapped his hands and yelled at Bobcat, "Go away!" Bobcat just looked like he said, "Sorry, didn't see you." And, he slowly turned and walked back up into the pasture and then past the porch. NOW, if I yelled that to the bobcat? Bobcat would give me a look like "OH, go drink coffee!" I'd stand and put Molly in the house. I would then glare at him MY SPACE! He would just keep walking like "yeah yeah, your space, I understand. See you later."

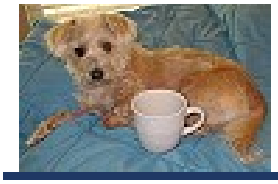
10/26/2020 - Now, keep in mind Tiki on the blue blanket is sleeping on the floor. He has to be safe. Tiki is missing one eye, the other is 90% blind, and he doesn't hear.  Yes, it makes it difficult, BUT he has learned to follow carpet runners, so he finds his way.  I was hoping Molly would be friendlier to him since he is blind. He does try to follow her. Molly then jumps up on something and watches him! YES, I lectured her on being nice to him - She looked at me with an expression as if saying, "WHATEVER! NOT GOING TO HAPPEN!"

10/26/2020 - Now, keep in mind Tiki on the blue blanket is sleeping on the floor. He has to be safe. Tiki is missing one eye, the other is 90% blind, and he doesn't hear.  Yes, it makes it difficult, BUT he has learned to follow carpet runners, so he finds his way.  I was hoping Molly (on the pink blanket) would be friendlier to him since he's now blind. He does try to follow her but Molly jumps up on something and watches him! YES, I lectured her on being nice to him - She looked at me with an expression as if saying, "NOT GOING TO HAPPEN!"

10/19/2020 - The below picture is my favorite time - right before sunset. An hour before sunset, I always take my last cup of coffee (yes, it is decaf) and ride my tractor around the ranch. I also feed the horses their dinner. Muck out three paddocks just to do it - it's nice tonight and not hot. Then I watch as the sun goes down, AND then I hear my ferals, "Mom, go inside the house, it's our time." Oh, WAIT - I also hear my neighbor's rooster crowing! WHAT! He crows in the mornings, in the afternoon, and now at sunset? I have to google and ask why a rooster does more than only announce the sun is coming up.

10/12/2020 - My space is NO space! Now, let's see - my tractor is the small green tractor. Don's is the large orange tractor. I love my tractor because it is small enough for me to handle. Now, I go outside and my tractor is not in its place. I walk down to the barn (since obviously I can't ride my tractor) AND for once it is not my ferals lousing up my space, their space. NOPE it is DON!!! Using my tractor!

10/05/2020 - Gotta love my boys! I am out here in the heat, smoke in the air, mucking out their horse shit! Are they helping? Are they standing here saying, "Mom, we love you, thanks for shoveling horse shit in this horrible weather" Nope - they took off to graze as I opened the gate





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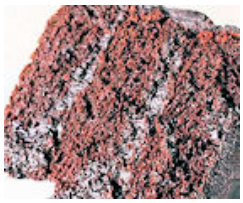
|  | Marsha Chocolate Cake - YouTube |
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