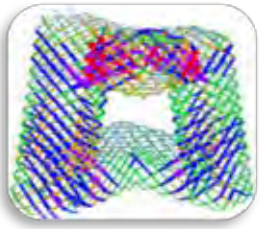
www.feantm.com Issue July 2021 ISSN 2694-4707

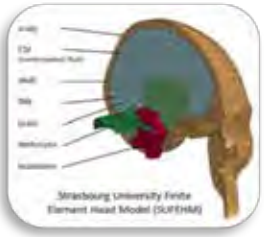
FEA Not To Miss Software
&
Engineering Solutions
Town Hall Meeting & Gossip

OASYS

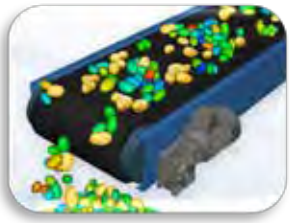


MSC.Software

DYNAmore



CADFEM



ALTAIR

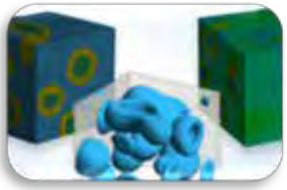
ANSYS

BETA CAE

OZEN

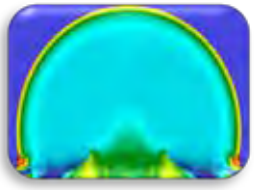
SIEMENS

JSOL



ESI-GROUP

LLNL



Cyclist - aerodynamics

Ballistic analysis - Kennedy

Automotive News

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 publication ISSN # 2694-4707.

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

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After that, going forward from the email's receipt, content (excluding that found on Twitter, Linkedin, Youtube, FaceBook and other social media) will not be included.

Contact us at: feaanswer@aol.com

Table of contents

Author and/or person using social media or company site

Town Library - Library for this month's reading awareness:
Due to length of the information, we have used excerpts and link to the paper/book

Table of contents

Author and/or person using social media or company site

Town equipment

Guest Annex Building & Exhibitor Hall

Town Announcements will be in this style box throughout the magazine.
We welcome you to our town and hope you enjoy your visit.

Town Hall Meeting & Announcements

The respective websites will have the larger graphics, with full resolution.

Monthly town hall meeting.
Serving - coffee & Baklava

Our town comprises companies, engineers, scientists, mathematicians, universities, professors and students, consultants, and all individuals interested in software, hardware, and solutions. Oh, and gossip at the local coffee shop, and your pets are welcome.

As presiding town Supervisor, I call this meeting to order:

- Voting took place last month on a Carousel picture to demonstrate revolving on the review area.
- Only I voted YES. The entire town plus guests voted NO.
- I then decided to ask for suggestions. The Old Cattle Rancher (No one knows his name. You yell, "HEY Old Cattle Rancher") filled the suggestion box with a picture of a Smith & Wesson "revolver." Someone, please explain to him the difference between "revolver" vs. "revolving."
- Katie, Sean, and Evan, please sit down and stop gossiping by the coffee.

The Town Library construction is complete. The library is now open and added to the map.
Welcome to this month's authors:

C. Then	**F. Malizia**	**C. Liebold**	**M. Biancolini**

The town secretary - She was pecked by a rooster in the kitchen. She has moved her office to the Annex Building - please send in your conference dates and/or events. feaanswer@aol.com subject Town Secretary.

Building department software - Where is the software?

1. Who bankrupted the building budget by purchasing 1,000 Etch-a-sketch pads?
2. Etch-a-sketch is not considered a building design software program.
3. We do thank you for the thought. Does anyone know what the thought was?
4. Read Building Design Software - **GSA Building is part of the Oasys General Structural Engineering suite.**

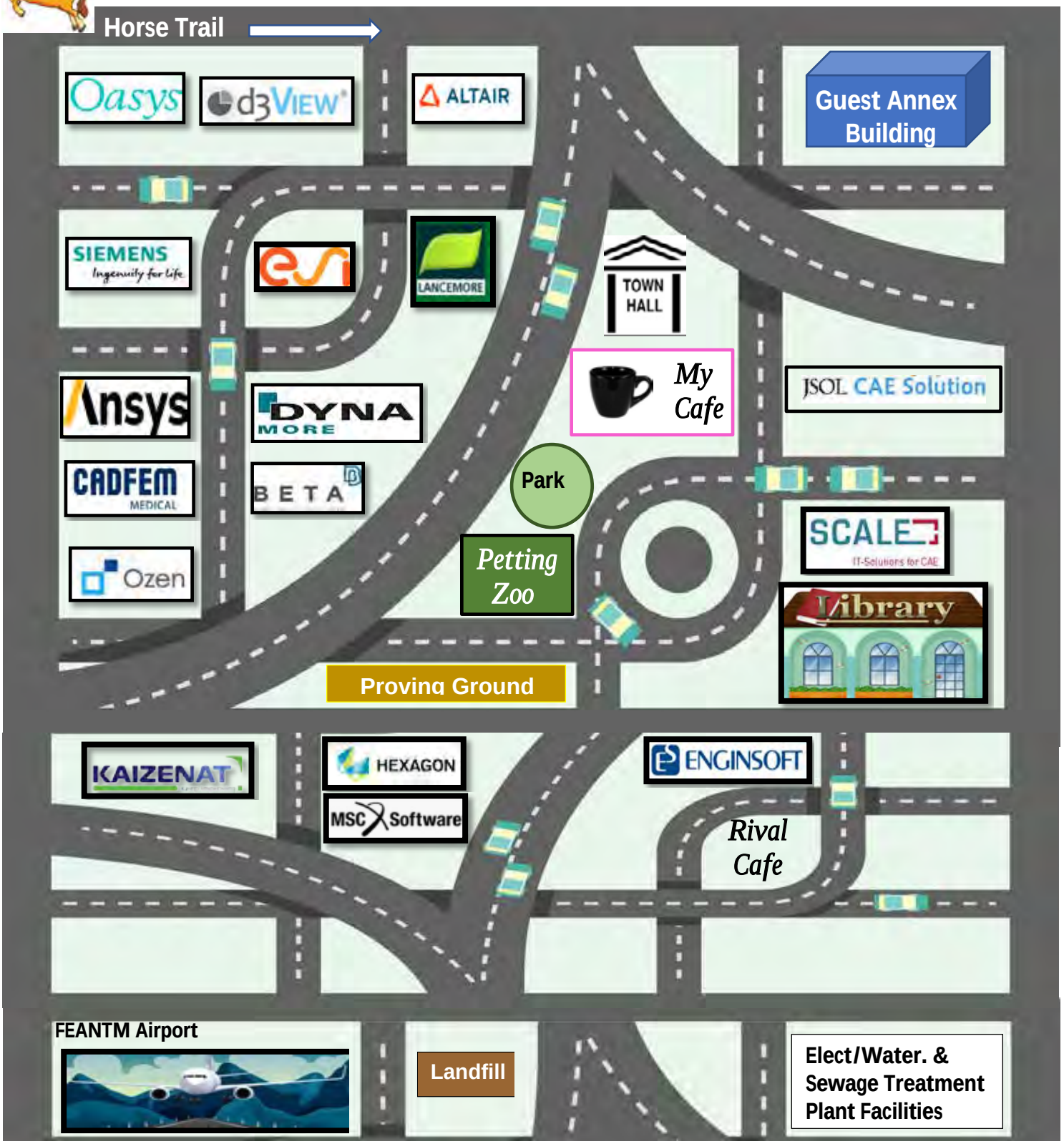
Town equipment - We are not using the coffee budget for a drone equipment department!

1. We appreciate suggestions, but the town data challenge was not the drone data challenge
2. In town equipment, see **DSTL** finished in the top four of the NATO Communications and Information Agency (NCI Agency) drone data challenge.

Question

1. Who owns the rooster crowing in the kitchen? Please take your rooster home.
2. It's chasing anyone who enters the kitchen for coffee. It is not a friendly rooster!
3. Until the owner is located, Julia will feed the rooster.

Town Map *



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

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

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

Main news story: There is still time to visit Oasys LS-DYNA Virtual Exhibition.

Virtual Update Meeting Entrance

And don't miss

The latest Oasys LS-DYNA newsletter

On line courses, tutorials are on our training page. July 07 Intro to Oasys PRIMER July 21 Intro to Oasys POST Sept 28 Intro to LS-DYNA)	**Webinars** - View The complete on line webinars Sept 29 Advanced seatbelt modelling in Oasys PRIMER: fully fabric seatbelts, child seats & more Oct 27 Oasys POST: User Defined Components Nov 25 Modelling FRP composites in LS-DYNA

Alasdair Parkes - 3D results on the web, for everyone! We've launched a brand new way of communicating engineering analysis. With D3PLOT Viewer you can:

- Explore in 3D with your team in meetings and design reviews
- Share animated 3D models with designers and suppliers
- Give your clients 3D project deliverables

Find out just how excited I am in the video - Head straight to our website for information and to play with the demos (no registration required).

Not To Miss on YouTube

Building Design Software — GSA Building

GSA Building is part of the Oasys General Structural Engineering suite and combines steel and concrete design, footfall, and soil-structure interaction analysis in the same building design software package. With this intuitive software, you can design structural models with skeletal frames and two-dimensional finite elements, enabling you to design and analyse even the most complex buildings.

GSA Building — Advanced building design software in one powerful package

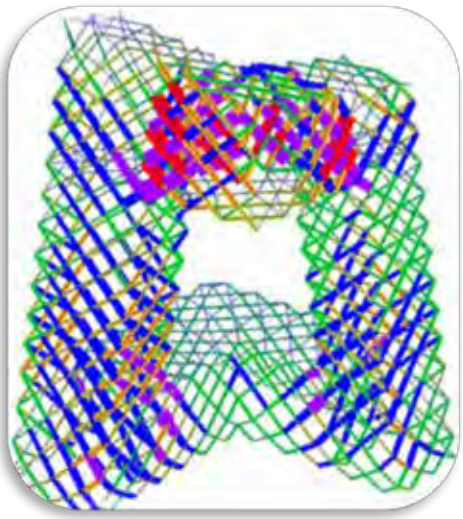
GSA Building is a structural analysis and design program. It gives engineers the tools they need to create any type of building.

With this intuitive software, engineers can design structural models with a full range of 1D, 2D and 3D elements. GSA Building also combines steel and concrete design to a range of international codes, footfall or human-induced vibration, and soil-structure interaction analysis in the same package. For seamless working, GSA Building integrates with Revit Structure and other BIM programs. Integration with BIM applications is a fundamental feature that encourages design coordination across teams.

GSA Building saves time and money by designing steel beams and slab reinforcement directly from the analysis results. It will also analyse how the structure interacts with the ground or predict the footfall vibration on irregular floors or staircases, whether they are concrete, steel, or composite.

How GSA Building Works

Input: Create structural finite element analysis models using CAD and BIM links, directly in the table or graphical views, or using your own scripts via the Application Programming Interface. Assign linear and nonlinear materials to a variety of element types, whether beams from catalogues, standard shapes, profiled slabs, or your own special requirements. Add static, dynamic, prestress, or thermal loads and analyze the effect.



Analysis and Design: GSA includes several solvers, including:

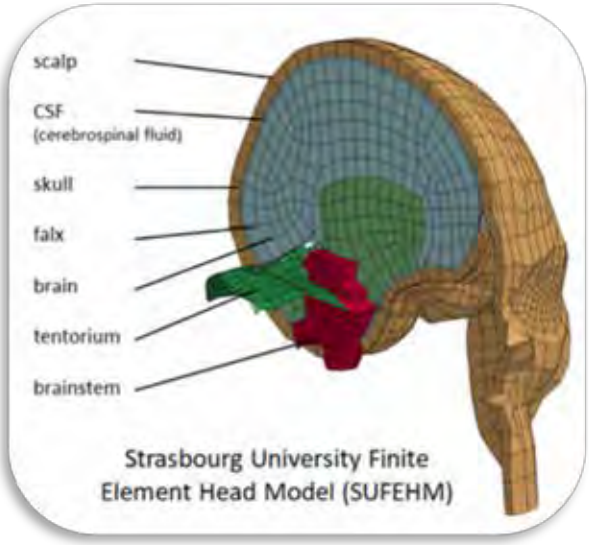
- steel member and concrete slab design
- footfall analysis for human induced vibration
- matrix-based stiffness method for static and p-delta analyses
- dynamic relaxation and explicit solvers for nonlinear static and dynamic problems
- eigenvector solvers for modal vibration and buckling analyses
- dynamic response analyses for seismic response spectrum or time history, harmonic and periodic vibrations, vibrations
- soil structure interaction for rafts and piled structures
- diagnostic analyses for resolving modelling problems

GSA will find the lightest, shallowest, cheapest, or most environmentally friendly steel beam section to carry the load, and work out the ideal quantity of reinforcement in your concrete slabs and walls.

Output: Output forces, moments, deformed geometry, and other results in graphical views, tables, and graphs. Export analysis models to LS-DYNA, model changes to Revit, or text and numbers to Office documents.

Key Features & Benefits

- Simulate advanced footfall analysis with accurate tools developed by engineers at the forefront of this technique
- Integration with Autodesk's Revit Structure and other advanced modelling software will ensure high integrity of model transfer and also accurate model coordination
- Raft analysis - Combine structural models with non-linear soil for foundation design
- Steel design - Design of steel beams, columns, and braces to international design codes



Among the models: SUFEHM Model

To assess a vehicle, tests are carried out under comparable conditions. For this purpose, accurately specified barrier and dummies are used as test devices. DYNAmore develops and distributes the FE models of these test devices.

The *Strasbourg University Finite Element Head Model* (SUFEHM) is actively developed at the Strasbourg University since 1997.

The *Strasbourg University Finite Element Head Model* (SUFEHM) is actively developed at the Strasbourg University since 1997. It represents a finite element model of the human head and can be used in real-world head impact conditions to evaluate the injury risk of the skull and the brain.

The geometry of the SUFEHM model was obtained from a scan of an adult human male skull. Its main anatomical features are the skull, falx, tentorium, subarachnoid or cerebrospinal fluid (CSF), scalp, cerebrum, cerebellum and brainstem. The finite element model consists of approx. 13,200 elements and has a total weight of 4.7kg.

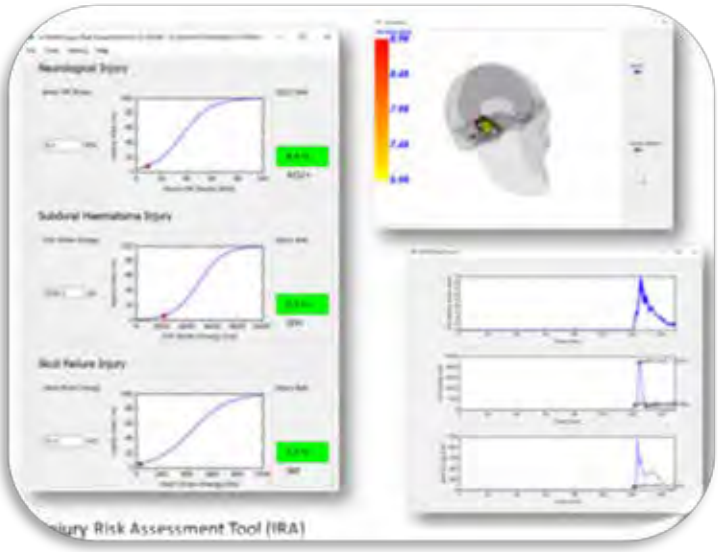
The validation of the SUFEHM model is based on the reconstruction of a total of 125 head impact scenarios, obtained from motorcyclist, American football and pedestrian accidents using the SUFEHM model in LS-DYNA simulations. In contrast to conventional statistical-based injury criteria, not only the translational acceleration of the head/brain was considered, but also the important rotational acceleration occurring during an impact situation.

This finally leads to model-based injury criteria and the SUFEHM model is able to predict three main injury probabilities

- skull fracture
- subdural hematoma (SDH)
- vascular injuries with bleeding between the brain and skull
- diffuse axonal injuries (DAI)
- neurological injuries like concussions, unconsciousness and coma.
- Separation into mild and severe levels according to coma duration (<24h for moderate, >24h for severe DAI)

The SUFEHM model can be used in stand-alone simulations, where the head model may be impacted against the vehicle structure to simulate a pedestrian impact scenario or impacted against the vehicle interior for occupant safety simulations. In this case, the acceleration curves obtained from a conventional human to vehicle simulation can be applied to the SUFEHM model to get a more detailed injury assessment of the human head in the specific impact situation.

Another approach may be to couple the SUFEHM model to human models like the THUMS. In this case, the SUFEHM model rather than the original model is used and the improved injury criteria of the SUFEHM model can be evaluated. This of course needs some modelling work, but already has been done by some customers.



The postprocessing, i.e. the evaluation of the injury probabilities is done using the Injury Risk Assessment (IRA) tool, also provided along with the SUFEHM model. The IRA tool extracts the injury relevant data from the LS-DYNA d3plot file database and calculates the probabilities for the three injury types (skull fracture, SDH and DAI). The resulting probabilities are visualized inside the IRA tool as depicted in Fig. [SUFEHM-IRA.png]. Additionally, the location of the maximum brain stress and the temporal development of the injury-relevant values can be visualized using the IRA tool.

References

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- Sahoo D., Deck C. and Willinger R. (2015): Axonal strain as brain injury predictor based on real world head trauma simulations. IRCOBI 2015
- Deck C. and Willinger R. (2009): Head injury prediction tool for protective systems optimization, 7th European LS-Dyna Conference, Salzburg 2009
- Deck C. et al (2008): Improved head injury criteria based on head FE model, International Journal of Crashworthiness, Vol 13, No 6, pp. 667-678

DYNAmore Nordic AB is a project partner in human modeling research!

Active human body models for virtual occupant response has entered its fifth stage

The SAFER A-HBM5 project follows on from four previous projects; A-HBM steps I-IV, from 2008 to today. This is state-of-the-art research on car occupant muscle responses and development of active human body models (HBM) and is part of a continuous line of research projects working in sequence towards the evolution of an even more advanced SAFER Human Body Model.

Within human body modelling, SAFER provides a competence platform for SAFER partners as well as a natural contact point for external cooperation. The growing activity in human body modelling has already placed SAFER amongst other well-known organisations, and the interest shown by other universities proves its high academic relevance globally. SAFER's HBM vision encompasses a scaleable, tuneable, human body model with omni-directional injury prediction capabilities, including high-g and low-g events. This means a virtual human substitute that can be used for predicting injury outcome in any impact situation/ direction, able to replicate a large population of people, standing as well as sitting, with humanlike kinematics in impacts as well as vehicle-manoeuvre events. The human body models, including the knowledge obtained in the pre-competitive joint research, are used by the industry in safety developments.

The development of SAFER's human body model and knowledge building in the field of biomechanics and human body protection continues through the start-up of the latest project Active human body models for virtual occupant response, step 5. The project aims to introduce a more advanced head controller, and to further refine the upper body control for prediction of humanlike response when transferring between upright, forward leaning and reclined postures. In addition, the first step in addressing population variability is taken, by modelling the average female in addition to average male model.

The project will be placed in SAFER's project portfolio for Human body protection. The project started in April and will continue until March 2023. FFI is the financier.

Project partners are
Volvo Cars, Autoliv, Chalmers and DYNAmore

Lotta Jakobsson, Volvo Cars is the project leader and Emma Larsson, Chalmers University of Technology, is the PhD student in the project.

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

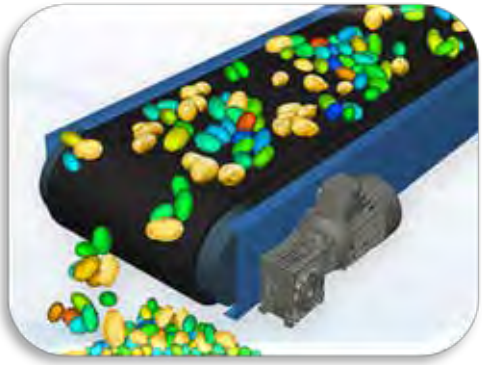
Comprehensive Customisation Options
Integration of any CAE Tools

- 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

CONTACT



Particle after particle precisely simulated with DEM

There are advantages to knowing the dynamics of solid elements during manufacturing process. The discrete element method (DEM) provides decisive answers.

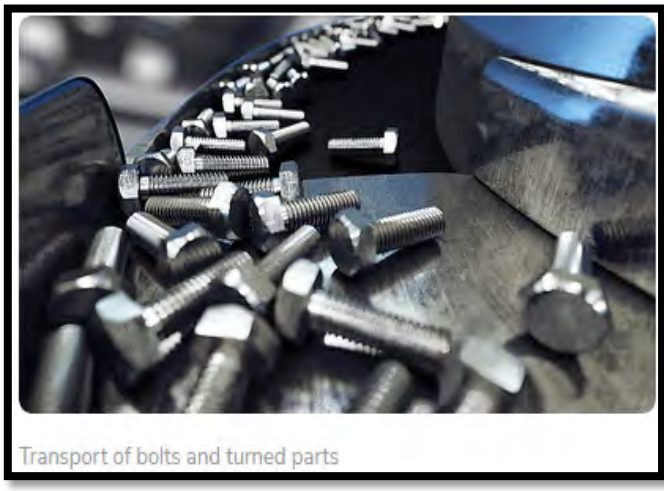
Discrete element method – separating the wheat from the chaff!

Simulation also drives innovation in process engineering. Equipment and processes can be optimized using particle simulation based on the discrete element method (DEM). The freedom to choose any solid and particle shapes and the use of GPU hardware technology open up completely new possibilities.

DEM for the manufacturing, pharmaceutical, food, and mining industries

Wide range of application options - DEM helps wherever particles, solids or entire components are moved and processed in mechanical process engineering. CADFEM offers its customers a compelling solution for simulating dynamic processes such as separating, sorting, aligning, filtering, screening, mixing, coating, drying, crushing, packaging or transportation.

Reap the benefits - When designing machines and equipment, engineers benefit decisively from being able to accurately predict the behavior of solids (particles) in process engineering. Shorter development cycles, affordable designs, long machine running times, lower maintenance costs, better product quality and, ultimately, happier customers are just some of the positives. Competitiveness is also boosted, while illustrative presentations make it easier to communicate project results. Systematically expand your expertise with realistic and advanced simulations.

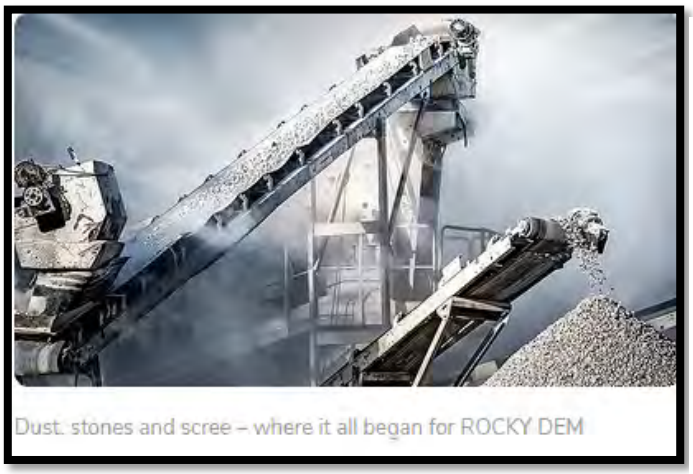


Transport of bolts and turned parts

Latest version of DEM simulation

The closeness to reality and computational speed are crucial to the successful use of particle simulation software. ROCKY DEM is setting a new standard in this regard. In addition to a library of standard shapes, almost any particle or solid shape can be scanned, while shell elements and even fibers with realistic material properties can be defined. Ideally, the simulation should be carried out using a software architecture with multi-GPU capabilities that can intelligently combine CPU and GPU performance (HPC technology). Even highly complex movements with millions of particles can thus be quickly simulated and all kinds of crushing processes modeled.

Furthermore, mechanical loading of solid elements and equipment wear and tear are predicted. Structure and fluid mechanics information can also be accessed by interfacing with Ansys Workbench, which incorporates FEA and CFD simulations. Never before has particle simulation been so simple, fast or precise as with ROCKY DEM.



Dust: stones and scree – where it all began for ROCKY DEM

CADFEM helps you attain your goals

DEM is increasingly used in the process industry and process engineering. We came across ROCKY DEM when researching the market for suitable systems. The software is developed by simulation specialist ESSS at its sites in Brazil and the US. Due to its versatility and precision, it offers considerable added value for the entire process industry, from A for automation to Z for zones. As one of the most experienced Ansys partners in Germany, we have been impressed by the capabilities and the seamless integration into the Ansys world.

Project planning is crucial to the successful use of DEM. We offer you the advice, training and support needed for efficient, fast use of DEM software, tailored to your requirements.

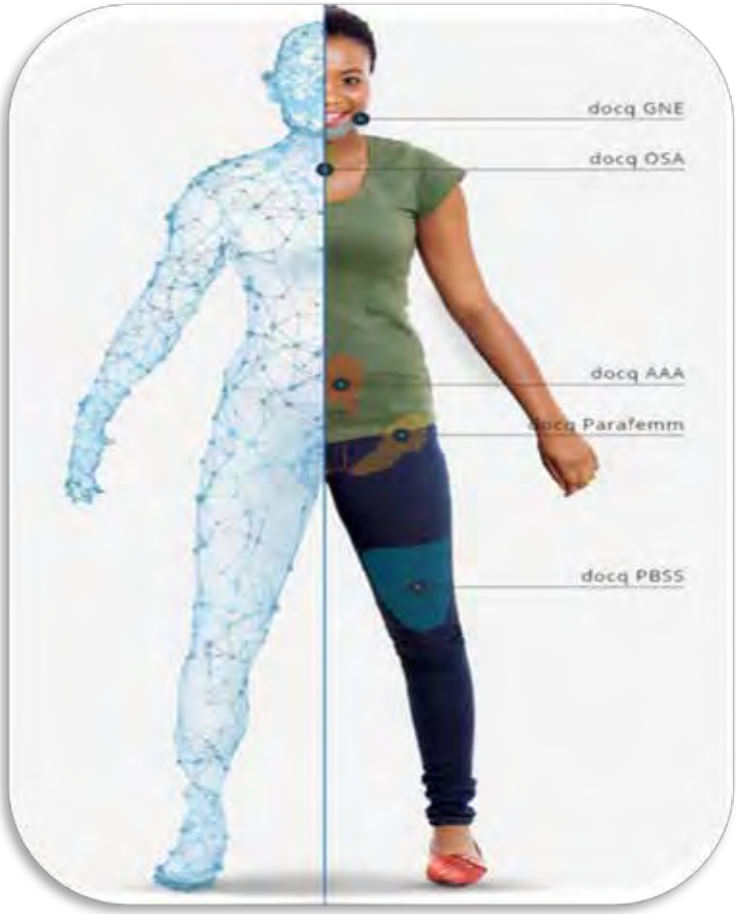
CADFEM Medical - CADFEM Medical is a certified simulation service provider and software manufacturer in the field of medicine and medical technology and is considered a pioneer of in silico medicine.

Virtual implant testing with simulation
docq VIT

Identification of appropriate **therapy for severe snoring**
docq OSA

Symmetry improvement through optimization of the cut
docq GNE

Predictive assessment of abdominal aortic aneurysms
docq AAA

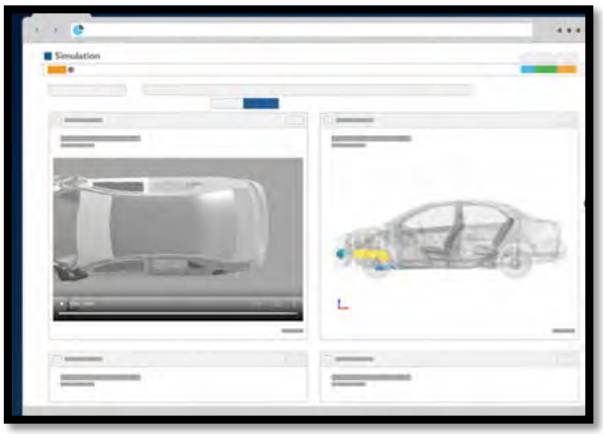


The digital twin
Our new website is live!

We are so grateful to everyone involved bringing our vision to life.

Patient-specific simulation technologies

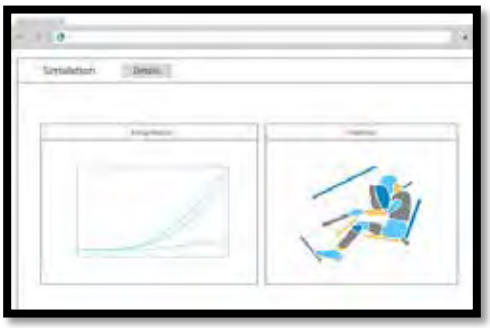
Learn more about how CADFEM Medical is using the digital twin in medicine and applying patient-specific simulation technologies to healthcare to improve therapies, enhance patients' well-being, identify diseases and increase product safety.



Simulations

A Comprehensive Application for Smooth Simulation Management

- Redefine the Way You Manage Your Simulations
- Our Simulations application infuses simulation data, information and visualizations into a comprehensive, interactive viewing window.
- While the simulations are solving, you can monitor them, interact with them using live preview and explore visualized critical information.
- You can perform DOEs, or run optimization using a single interface.



Simulation Details
View the details of your simulations in real-time.

- Visualize different elements of the running job such as energy balance, minimum time-step history and time remaining for completion.
- Simulation details also provides the ability to discover and eliminate any abnormalities before the simulation finishes.

HPC Jobs

Conveniently review specified HPC job configurations as well as submission history.

- Find information such as the submission node or the number of CPUs effortlessly, so you can compare and guide the submissions of new simulations.

Simulation Files - Readily manage and share your simulation files. You can add more files related to your simulation or use the built-in data viewer to deeply study them.

Simulation Responses

- Examine your simulation data outputs, overlay curve responses and, in accordance with our Peacock Application, view default animations.
- With extensive data extraction capabilities from templates, you can extract information from a variety of data formats using an intuitive web interface.

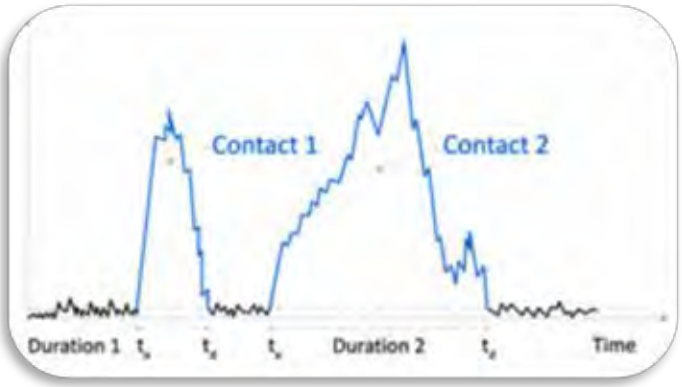
Additional Information visit d3View

D3VIEW blog by Elisa

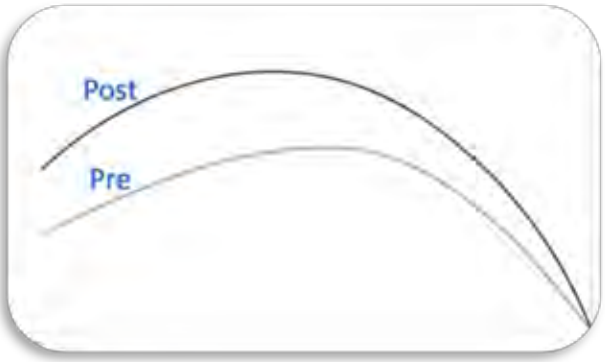
Excerpt from Crashworthiness Tools in d3VIEW - d3VIEW isn't just a general data mining and visualization platform. It caters to specific industries and concentrations, enhancing and accelerating product design. Crashworthiness, the pinnacle of vehicle safety and an important element in vehicle design, is no stranger to the platform. Featured below are some tools d3VIEW has specifically designed for crashworthiness.

Crash Workers - The Workflows application uses a plethora of workers to employ for complicated business tasks (over 900 if we're counting). Some are precisely coded for crash simulations with the most prominent as follows:

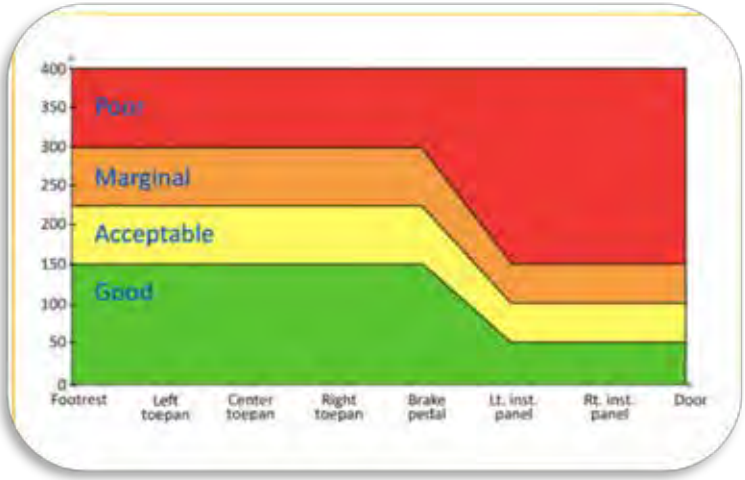
Contact Duration Curve Worker:
Returns all contact forces.



Pre and Post Crash Curve Worker:
Computes the pre-post crash using coordinates.



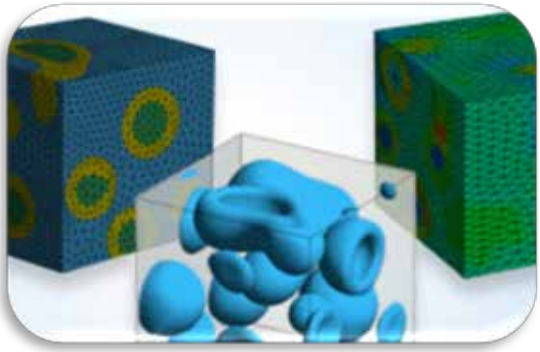
IIHS Intrusions Curve Worker:
Computes the IIHS intrusion based on the seat and the measuring points.



Additional Information is on the blog.
Come visit and learn about d3View's:

Crash Visualizers - The Simlytiks application has over 40 different basic and advanced visualizations for charting important data. The following visualizers are clearly created for crash testing analysis.

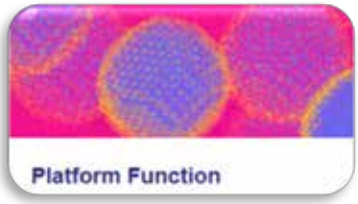
Crash Templates - The Templates application uses no-code or low-code data integration for extraction more information and deeper meaning from data. The subsequent crashworthiness templates are d3VIEW's most used and useful.



J-OCTA is useful at the forefront of material research and development

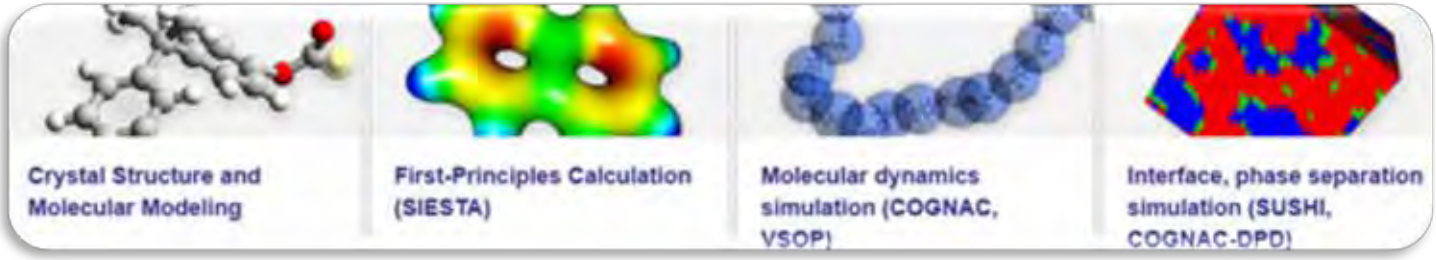
J-OCTA is a material property analysis software that predicts material properties from atomic scale to micrometer scale on a computer when developing a wide range of materials such as rubber, plastics, thin films, paints and electrolytes.

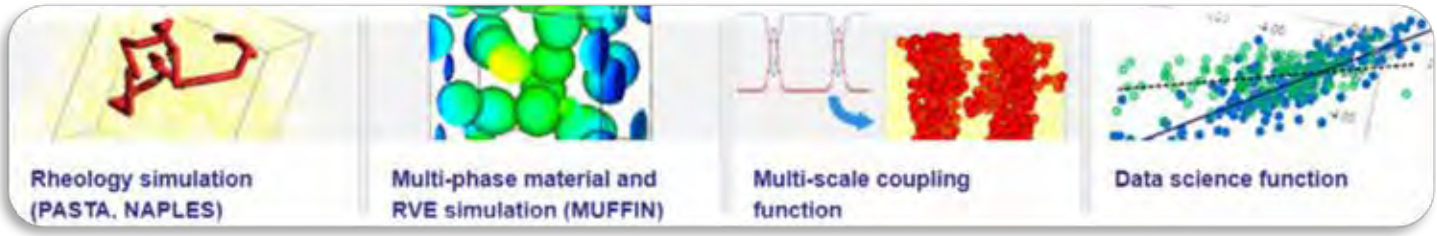
It can be used as a knowledge discovery tool to understand complicated phenomena and physical properties which could not be grasped only by experiment results. We will support state-of-the-art material design and material development by linking and operating simulators corresponding to each scale on a common platform.

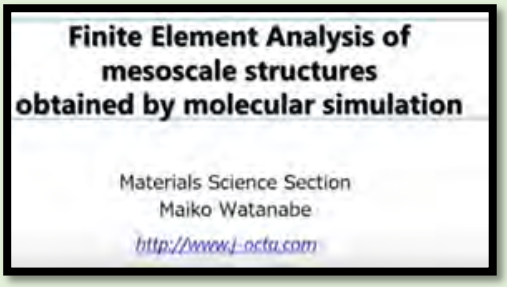


Please visit the website for videos, J-OCTA structure, student edition, and complete information

Main Functions - J-OCTA can be used to simulate







YouTube - [J-OCTA & DIGIMAT] Finite Element Analysis of mesoscale structures obtained by molecular simulation

Maiko Watanbe

A case study is presented where the dispersion structure of nanoparticles obtained using J-OCTA was passed to DIGIMAT to perform Finite Element Method calculations.

Motorizing the Bike You Love with Bimotal and Ansys Simulations

Author - Susan Coleman - Senior Marketing Manager, Academic and Startup Programs, Ansys

The Bimotal Elevate is a removable, lightweight and e-bike motor that mounts to your bike's disc brakes.

All your mountain biking friends are buying e-bikes, and, even though you are considering joining them, you have a problem: You like your current bike too much to trade it in. Your bike has just the right weight and feel, and you've been through a lot together. None of the e-bikes or retrofit kits available has the perfect combination of features.

Toby Ricco,
Founder and CEO of Bimotal

All your mountain biking friends are buying e-bikes, and, even though you are considering joining them, you have a problem: You like your current bike too much to trade it in. Your bike has just the right weight and feel, and you've been through a lot together. None of the e-bikes or retrofit kits available has the perfect combination of features.

Elevate is the brainchild of Toby Ricco, Founder and CEO of Bimotal, and "Motor Expert" (that's his official title) Chad Furey, an electrical engineer with a focus on motor design, who had worked together at Tesla a few years back. Jason Roesslein and Matt Rounds, also former colleagues of Ricco and Furey, joined the team in the summer of 2020. When Ricco mangled his knee in a skiing accident in 2018, he was worried that he might not be able to enjoy mountain biking again, because his knee lacked the power to push up some of the hills.

"I started looking for full e-bikes as well as e-bike retrofit systems and found that both were still super heavy, expensive and clunky," Ricco says. "I wanted a way to put a motor on a bike that was super light and something I could take on and off. So that's how the system and company was born."

Finding a Better Way to E-Bike - The knee took a long time to heal, which gave Ricco the space to look at e-bike design in a new way.

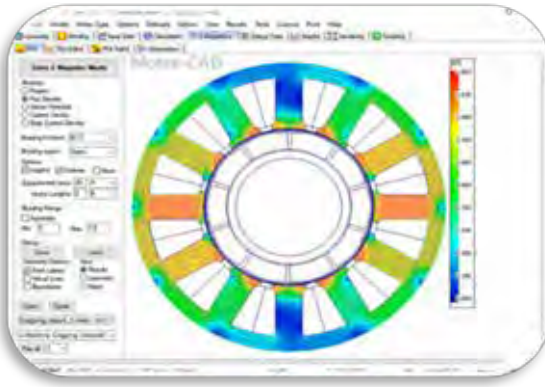
"It was literally me with an injured knee staring at my bike every evening after work for an hour," Ricco says. "I thought, 'There's got to be a better way.' And this went on for months … I just kept looking."

For reference, typical mid-drive e-bikes have the motor in the bottom bracket in front of the crankshaft where the pedals are located. For most speeds (anything above 5, maybe 8 mph), the motor is geared down to the user's cadence at the pedals and then geared back up through the bike chain and cogs mounted on the rear wheel hub. Thus, the motor is operating at a lower total motor-to-wheel gear ratio, which requires more motor torque and is inherently less efficient or heavier for the same power. Other common e-bikes are powered by hub motors which transfer torque directly to the wheel, usually with limited-to-no gear reduction, which again leads to a heavier motor for a given torque and efficiency at the wheel.

"I kept thinking, 'How can I get torque to the wheel?'" Ricco says. "And eventually it came to me: The brakes can take a lot of torque. A motor gearbox driving a wheel didn't exist in the e-bike world at that time, even though that's how every single electric powered car does it."

Having settled upon the basic idea, the challenge was making it simple. In Ricco's mind it had to be this easy: Fasten the Elevate motor to a bracket on the brake post mounts and start cycling.

Bimotal says the Elevate motor and battery can be removed in 20 seconds.



Making the E-Bike Idea Work Through Simulation

With the idea of the Elevate motor established, and Bimotal launched as a company in July 2019, the real work began. While Ricco worked on the motor mount design, quick connect system and gearing to drive through a bike's brake rotor, Furey got busy simulating every aspect of the battery-powered motor to make the Elevate system the lightest, quietest and most efficient, with the highest power density possible.

Bimotal uses a thermal model in Motor-CAD to understand the temperature rise in the motor under various operating conditions.

As a startup with very little funding, the design and engineering had to be done as economically as possible. "When you start looking around at simulation software and you ask Ansys if they have a better deal for startups, you quickly learn about the Ansys Startup Program," Furey says. "We were excited that we could use Ansys software at such a low price."

Soon Furey was using his own, well-established process of using MATLAB with custom scripts he wrote to automatically assess tens of thousands to a hundred thousand designs at a time, followed by Ansys Motor-CAD on the best candidates. This huge number of models piles up quickly with just a few tweaks to the design.

“I want to determine if the magnet should be this big or this big, or if the rotor should be this big or this big?” Furey says. “You take 10 magnet variations and 10 rotor variations and 10 thermal variations, and soon you're at 1,000 iterations. So, the thing in motor design is that with 100 parameters to adjust, the number of iterations just explodes.”

Using this brute force approach, Furey can quickly assess the fundamental viability of all these combinations, and then take a closer look at the 10 or 15 most viable candidates using Motor-CAD.

“I refine the good candidates and use Motor-CAD to make sure everything's lining up nicely,” Furey says.

He uses a thermal model in Motor-CAD to get a good feel for the temperature rise in the motor under various operating conditions. The software generates efficiency maps that can help him determine the drive profile and the loss at key points in the motor’s design. Motor-CAD also helped with the decision to use surface permanent magnets or interior permanent magnets.

“Those are very simple things to try in Motor-CAD,” Furey says. “I can experiment to see ‘Hey, can I get the torque density up any higher?’"

Optimizing the System -
Ricco designed one of the smallest cam lever connector systems available, with a clamping power of 1,000 Newtons of force to make sure the Elevate package stays on the bike on rough rides. You can see how easy it is to connect the motor here.

In the end, even though the Elevate motor is a small system that you can hold in one hand, there was a lot of engineering to do. “It's a whole system optimization challenge,” Ricco says. “How much power do we really want? How much does a bike need? And then, basically, how much heat do we need to reject or can we reject? How small can we make the heat sink? How small can we make the motor and still have this really punchy system?"

Motor-CAD had a part to play in answering all these questions and more. The resulting Elevate motor weighs only two pounds and can generate up to 750 W of power. With the help of Ansys simulation, they stayed true to their motto, helping people to **“Keep Riding the Bike You Love.”** Bimotal will start delivering Elevate in the second quarter of 2021, after which they will focus on micro electric powertrain design bikes, scooters and other forms of last-mile transportation.

“In our mission to reduce barriers to car-free mobility, we are en route to becoming motor, gearbox, battery and electronics experts,” Ricco says. “The motor and gearbox optimizations are made faster and more efficient with the help of Ansys tools."

Product

Ansys Mechanical - Finite Element Analysis (FEA) Software for Structural Engineering

Ansys Mechanical is a best-in-class finite element solver with structural, thermal, acoustics, transient and nonlinear capabilities to improve your modeling.

Engineers Gain Answers Fast and With Confidence

Ansys Mechanical enables you to solve complex structural engineering problems and make better, faster design decisions. With the finite element analysis (FEA) solvers available in the suite, you can customize and automate solutions for your structural mechanics problems and parameterize them to analyze multiple design scenarios. Ansys Mechanical is a dynamic tool that has a complete range of analysis tools.

- Easy to Use, Multi-Purpose Tool
- Persistent, Dependable, Accurate Solver Technology
- Dynamic, Integrated Platform
- Powerful Nonlinear and Linear Solvers

Quick Specs

Ansys Mechanical offers a dynamic environment with a complete range of analysis tools, from preparing geometry for analysis to connecting additional physics for even greater fidelity. The intuitive and customizable user interface enables engineers of all levels to get answers fast and with confidence.

CAD Connected	Advanced Materials Modeling	Vibration	Coupled Field Technology
Automated Meshing Adaptivity (NLAD)	Explicit Analysis	Acoustics	Fast Parallel Solvers
Linear and Nonlinear Contact	Crack and Fracture Modeling	Structural Optimization	Fatigue Life Analysis

For capabilities and additional information visit ANSYS website

Electronic Design Automation (EDA)

Altair provides leaders in the electronics industry with electronic design automation (EDA) software to efficiently verify and evaluate their product designs. Our products significantly improve the design-to-manufacturing process, eliminate design iterations, and significantly reduce time-to-market. For printed circuit board (PCB) design, embedded systems development and smart product realization, we provide tools that address the challenges of ever-increasing performance and product complexity.

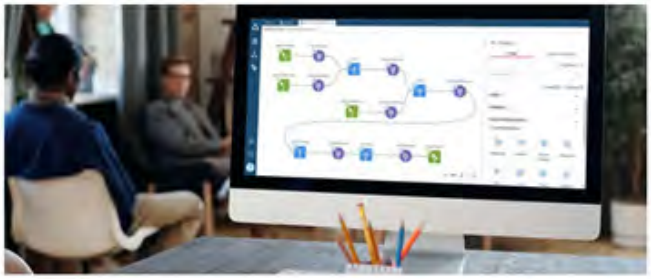
Integrated Software for PCB Design - Altair PollEx™ is the most comprehensive and integrated set of PCB design viewing, analysis, and verification tools for electrical, electronics, and manufacturing engineers. PollEx transfers data flawlessly between the industry's most popular ECAD and simulation tools and enables many of the world's major electronics corporations to quickly visualize and review PCB designs. Its checking tools detect issues early in the design to avoid product failures and simplify manufacture and assembly.

Visual Environment for Embedded Systems - Altair Embed® is a proven tool for model-based firmware development of embedded systems including motor control, IoT devices, and vision systems. With Embed, you can design, analyze, and simulate your embedded system using block diagrams and state charts, then automatically generate compact and optimized code to run on an extensive selection of microcontrollers from Texas Instruments™, STMicroelectronics®, Arduino®, Raspberry Pi™, and others. Hardware-in-the-Loop testing is fully supported using a high-speed bidirectional.

Optimize EDA Job Scheduling Trusted for semiconductor design and EDA, Altair Accelerator™ is the industry's fastest enterprise job scheduler — with scalable, event-driven architecture for highest throughput. Accelerator maximizes capacity utilization and can run millions of jobs per day with sub-millisecond latency for top performance. It provides scalable, small-footprint architecture and comprehensive policy management features with advanced license scheduling tracks, out-of-queue license usage, and dynamic license checkouts during a job's lifetime.communication link for data collection and real-time tuning.

NEWSROOM

Not to miss in the Altair Newsroom



Cloud-native Altair® SmartWorks™ Empowers Enterprises to Make Data-driven Decisions

Jim F. Anderson Joins Altair Board of Directors

Altair Announces Latest Release of Simulation Solutions

Altair Future.AI Global Event to Demonstrate How Artificial Intelligence and Analytics Accelerate Digital Transformation

Altair to Host Technology Conference and Showcase Simulation Solutions for Composites at JEC Composites Connect

Altair One Cloud Platform Delivers Most Advanced Environment for Collaborative, Data-driven Design and Development

ANSA Pre Processor

The advanced CAE pre-processing software for complete model build up

ANSA is an advanced multidisciplinary CAE pre-processing tool that provides all the necessary functionality for full-model build up, from CAD data to ready-to-run solver input file, in a single integrated environment.

ANSA is the users' preference due to its wide range of features and tools that meet their needs. The list of productive and versatile features is long and the alternative tasks and processes to be completed using them are countless.

Environment

All software features are accommodated in an integrated environment, with highly customisable GUI. The software is available for all contemporary popular operating systems in 32bit and 64bit architecture with multi-core CPU usage. The accelerated graphics, the rapid confirmations and function access, the GUI customization options, the model browser and lists handling, the filtering and modification operations, and the integrated search engine comprise a user friendly environment that ensures outstanding performance and productivity.

CAD data input & clean up

CAD definitions and model structure data in CATIA V4, CATIA V5, NX, Pro/ENGINEER and JT formats can be converted into ANSA files using the available translators. Moreover, custom interfaces to PDM or SDM systems, powered by scripting, bring product and model structure data into the heart of the software.

CAD geometry can be also read in from neutral file formats (iges, step, vda-fs), manipulated and healed by the proprietary powerful built-in geometry engine. A wide range of geometry healing functions, including those for the generation of neutral fibers, deliver geometry descriptions ready to be meshed.

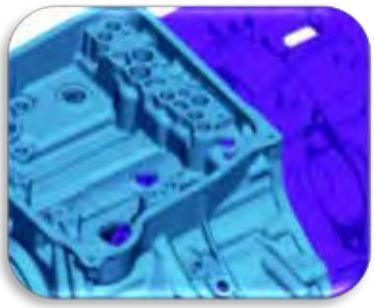
ANSA data management - ANSA Data Management (ANSA DM) is a centralized data management system, used to collect and store in a structured and hierarchical form all engineering data that are used during the development process of a vehicle simulation model. It assures the effective and efficient data handling throughout projects, by streamlining updated model data to engineering teams, allowing the easy sharing of common data and offering access to library items for the analysis dependent solution settings. The DM Browser, moreover, allows the browsing of the DM Root to identify the available CAD versions, study versions and representations for comparison and model update.

Model Comparison and update - An integrated tool that compares two models in order to identify differences in geometry, attributes, solver-specific definitions, as well as connections. User friendly navigation and identification features are provided while a complete or partial replacement can be performed, updating the model according to user directions.

Process Automation - Task Manager and scripting language provide a unique modeling solution for automated and effective applications.

Task Manager is an integrated workflow manager that includes all individual tasks of a simulation model development. The process template is built up by the CAE expert who sets the boundaries between distinct modeling actions and predetermines all modeling parameters that must be respected, leaving to the inexperienced user a minimum degree of interference and limited decision making.

The scripting language is an enhanced programming tool that boosts productivity providing the power to access data and perform custom operations in an automated way.



Meshing - The integrated Batch Meshing tool leads to controllable and effortless optimal results, for both shell and volume meshing. Following the versatile mesh area idealization, geometry can be meshed according to modeling requirements by cutting edge surface and volume meshing and wrapping algorithms.
A unique mesh generation environment is composed by:

- proprietary shell meshing algorithms
- high performance and quality volume meshing algorithms
- state-of-the-art boundary layers elements deployment
- Hexahedral dominant meshing
- Acoustic Cavity mesher and the straight forward Wrapping tool
- one-step mesh generation on automatically extracted middle surface
- numerous mesh handling functions.

Assembly - Powered with fully comprehensive parts and welding management tools, accommodates parts assembly, with alternative node-dependent or independent connections types, appropriate to various disciplines. Interfaces to numerous connections data file formats allow the completion of a single stage assembly. New concepts introduced, including model hierarchy input, multiple part instances handling, parts comparison-replacement and update as well as special joining type creation.

Different model variants or load cases can be compiled with available include files through one of ANSA's special tools. This enables the creation of particular model configuration even without loading the respective data.

Pre-processing decks - Pre-processing completion is achieved through the uniquely interoperable pre-processing decks for NASTRAN, LS-DYNA, PAMCRASH, RADIOSS, Abaqus/Standard, Abaqus/Explicit, PERMAS and ANSYS Structural, allowing direct model modification between solvers, including material synchronization. Numerous unique utilities facilitate laborious tasks such as the management of Includes Files, model sub-structuring, entity numbering control etc. ANSA is multidisciplinary by design, in order to simultaneously handle models for Crash, Durability, NVH analysis etc., supporting all entities required by the latest versions of solvers.

A compilation of CFD oriented features are accommodated into special CFD pre-processing decks that support the most popular codes, such as STAR-CD, CCM+, Fluent, OpenFOAM etc.

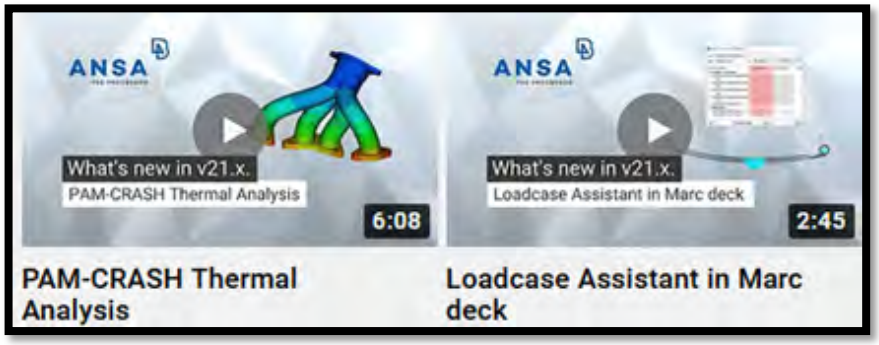
Analysis tools - Crash and safety modeling is assisted by user friendly features for impactors positioning, seatbelt fastening, positioning and articulation of crash test dummies and "headform" models for passenger and pedestrian safety simulation standard scenarios.

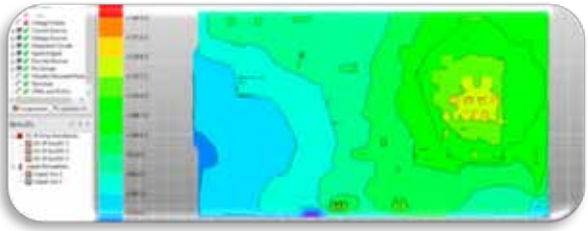
The fast and easy Kinematics tool solves sophisticated positioning problems, for seats, convertible roofs and other mechanisms…

Please visit the website for complete information on:

- **Model integrity checks**
- **Solution control**
- **Morphing**
- **Tools**
- **Optimization**
- **Benefits**

JULY Video - View at [BETA CAE Systems YouTube Video Channel]





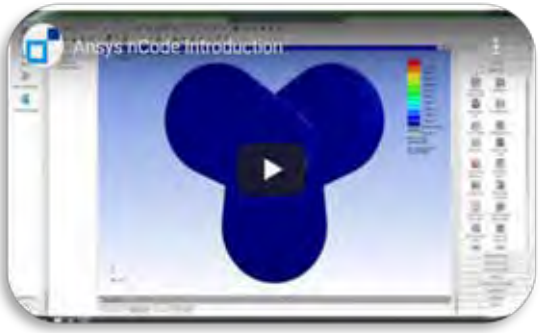
Using SIWave and IcePak for PCB Thermal Analysis - The ANSYS SIwave is a dedicated tool that allows users to import electrical CAD (ECAD) data to predict electrical behavior and performance from all major ECAD packages like Cadence, Zuken, and Altium Designer.

Ozen Blog - Introduction to ANSYS nCode

Ansys nCode DesignLife works with Ansys Mechanical and Ansys LS-DYNA to reliably evaluate fatigue life. Using the results of finite element analysis (FEA) from Ansys Mechanical and Ansys LS-DYNA, it accumulates damage from repetitive loading to determine a product's predicted life.

You can quickly evaluate the effects of different materials and alternative geometries for new designs, and then optimize them for the product's expected usage — long before the first prototype is built or expensive testing takes place.

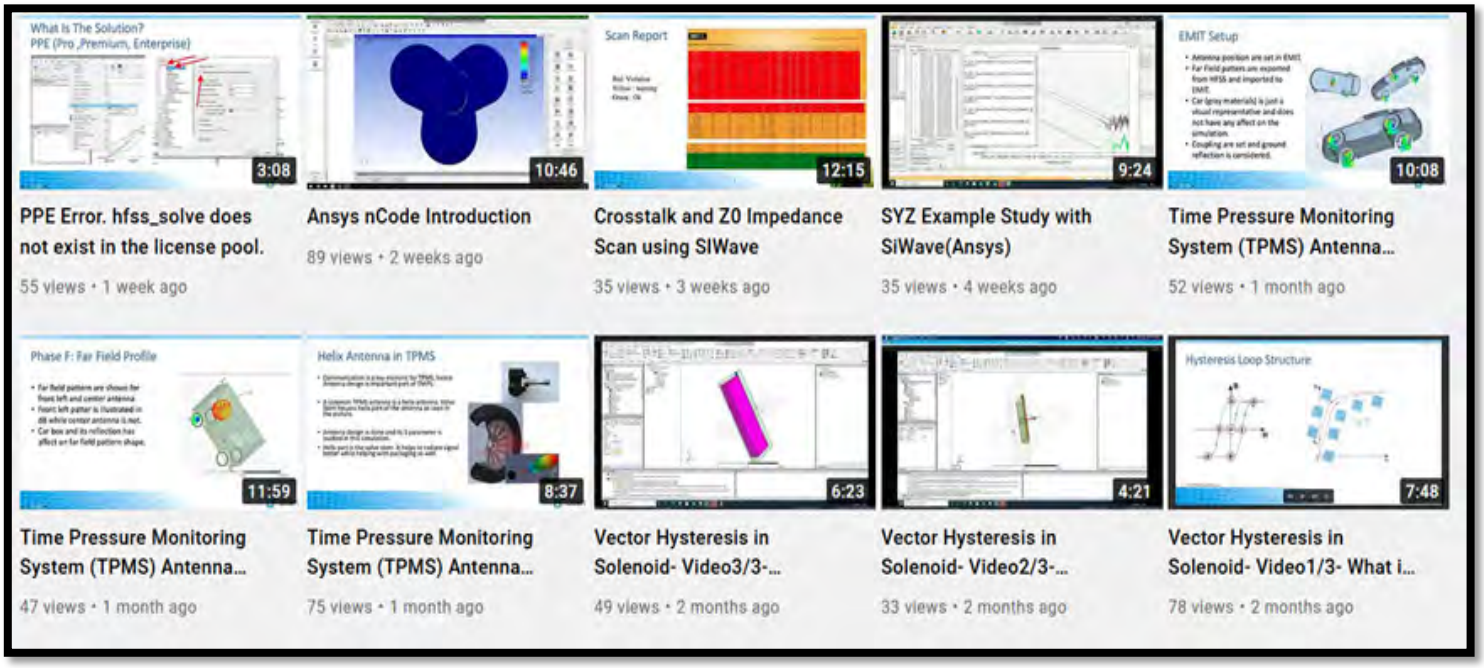
With a new interface on the Ansys Workbench, you can enjoy a customized workflow that integrates with other products while staying within a single interface. You also have the flexibility to access your nCode user interface directly from Ansys Workbench. The ease-of-use makes the power of nCode DesignLife even easier to realize.



Video can be played at YouTube

In the video, you will learn how to run a fatigue analysis in both the Ansys Workbench and nCode user interfaces.

July Videos - YOUTUBE



Ozen Engineering provides expert simulation consulting services in:

- Finite Element Analysis (FEA)
- Computational Fluid Dynamics (CFD)
- Electromagnetic (EM) Low/High Frequency
- ANSYS tools

Ozen Engineering is located in the heart of Silicon Valley and serves a variety of technology companies and industries. We pride ourselves on accuracy, deep experience, responsive customer service, and dependable delivery. With decades of experience under our belt we are the engineering simulation consultants of choice.

Please contact us to request a competitive quotation for consulting services. A senior engineer will contact you to discuss your project or schedule a time to meet with your team.

Unlocking the potential of hybrid multiphase CFD simulation - By David Mann

As I sit here writing this, I can see the sunset. It is now about as far North West as it gets before starting its long journey South. This heralds the arrival of summer. Even though this may be another abnormal year, it gets me thinking about what we might do.

My father-in-law owns a narrowboat. In previous years we have spent a week travelling along the UK's canal network at a snail's pace. The kids love operating the locks and picking fruit from the banks along the way. After a few days on the canal, a small village can feel like a metropolis when you finally arrive after knowing it was your target for several days. On such a holiday a few years ago, we visited the impressive Anderton Boat Lift in Cheshire.

The surrounding area, rich with salt deposits, offers a clue to the raison d'être for this cathedral of the canal. In the 1700s traders shipped salt by boat on the River Weaver to join the Mersey to the North. This was not ideal as many of the markets for the salt were to the South. In 1777 a new route opened with the Trent and Mersey canal passing close by. At one point the canal and the river almost touch, but there was a problem. The canal was around 50 ft (15m) above the river. As a result, for around 100 years salt had to be dragged up this steep incline between boats. This limited the growth of the industry.

It was not until 1875 that this problem was solved. The potential for much more rapid shipping was unlocked with the opening of the Anderton Boat Lift. Truly a marvel of Victorian engineering, it worked by hydraulically linking two caissons that counterbalance each. This allowed boats to be moved cheaply and quickly between the two waterways.

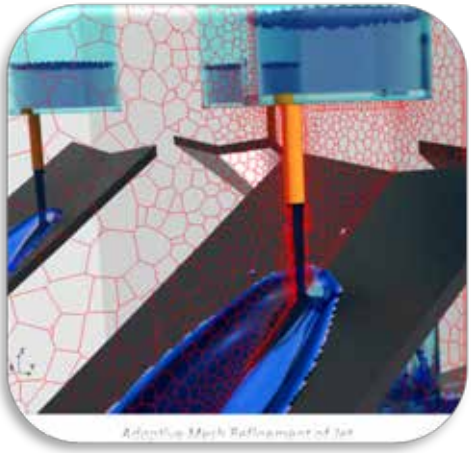
Ease of use and performance benefits - This innovation yielded not only massive performance improvements by reducing journey times, but also represented a significant ease of use improvement. It eliminated the need to transfer cargo across difficult terrain between boats. In the world of software development, new features like this are what we strive for. Such a feature awaits you in the upcoming June release of Simcenter STAR-CCM+ 2021.2.

Fluid Film compatibility with Adaptive Mesh Refinement (AMR).

Mesh that designs itself - Fluid Film is central to hybrid multiphase CFD simulation. This is the strategy where we use several multiphase models together to cover different scales efficiently. For many applications we use the Volume Of Fluid (VOF) model supported by Fluid Film and Lagrangian multiphase. Whilst VOF benefits from the existing Free Surface AMR model-based refinement, and Lagrangian is compatible, the previous incompatibility of Fluid Film with AMR meant that many hybrid multiphase CFD simulations could only be carried out on a static mesh resulting in large mesh counts.

To avoid simulations becoming prohibitively expensive, you could locally refine the mesh manually. But only if you know the approximate location of VOF flow features of interest such as jets a-priori. Even then this could be time consuming involving trial runs to get the refinement correct. With the arrival of Fluid Film compatibility with AMR, it is now possible to start with a coarse volume mesh and to let AMR do the work.

VOF to film transition is actually something we all observe on a daily basis. My children seem to be experts at ensuring a number of flow regime changes occur each time they pour a glass of water! Mopping up the puddles gave me some inspiration for the following simple example before moving on to something more complex. It clearly demonstrates the hybrid multiphase transitions and how AMR fits in.



A simple example of hybrid multiphase CFD - We start with a glass of water to which, inexplicably, we have added a tube. This causes flow to pour out in a jet. To this point we use VOF to represent the water. Next, the water impinges onto a folded plate causing it to spread out to a depth of less than 1mm. As our mesh is coarser than this, the hybrid VOF-Film phase interaction kicks in and the water transitions to a Fluid Film representation. The film then runs down the plate before stripping into Lagrangian droplets at the edge. These droplets then impinge on the side of the lower glass again forming Fluid Film. This finally transitions back to VOF as the water pools. Phew, a full cycle of models aimed to ensure maximum fidelity at minimum cost.

To maximize the benefit, we need to ensure that the mesh is only fine where we really need VOF. For example, around the jet. We must also ensure we do not make the mesh unnecessarily fine in zones better represented by Film and Lagrangian. In our simple example, the position of these features is largely fixed, and we could design a mesh around this. However, that would require time and most likely a few attempts to get it right. We would still end up with more mesh than we needed. How much easier would it be if we could just start with a coarse mesh and use AMR to find these features? This is now possible with the compatibility of Fluid Film with AMR in Simcenter STAR-CCM+ 2021.2. The image below shows the mesh refinement around the jet.

This provides a truly hands-off approach to meshing for hybrid multiphase CFD simulation. To stop the refinement turning all the Fluid Film to VOF, the cells adjacent to the film are shielded. The minimum AMR cell size settings perform the same function for Lagrangian.

Now for something more industrial

To see the full benefit of this feature we need an industrial example, and whilst my drink transference device may not be marketable, we all use dishwashers daily.

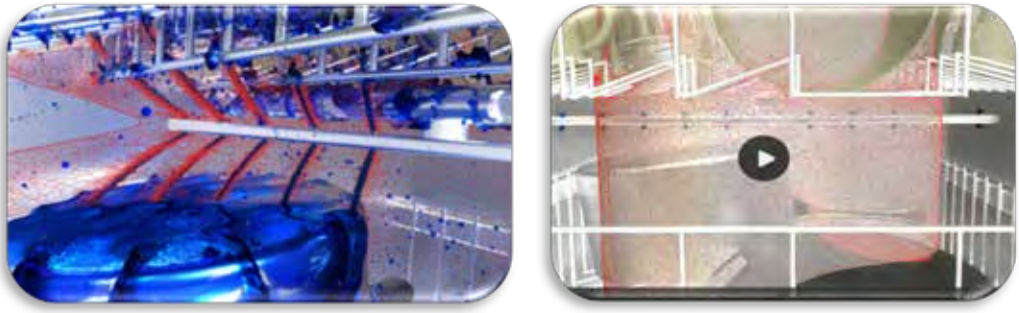
The dishwasher is a challenging application for simulation. It has jets of water spinning round and breaking up into droplets, splashing on surfaces and forming films. In such an example, we will need all the multiphase models in the example above. However, we also have the added complication of not knowing where the VOF regions will be a-priori.

We can carry out this simulation already in previous versions of Simcenter STAR-CCM+. But today we have to use a static mesh due to the lack of compatibility of Fluid Film with AMR. Our simulation is computationally expensive as we must use large areas of dense mesh where it is only needed temporarily.

Let's see this simulation in action…Visit the Website and scroll down the blog for all videos

Hybrid multiphase CFD in action in a dishwasher using AMR

What a complex flow field! We have been able to capture all the details of the flow using hybrid multiphase CFD.

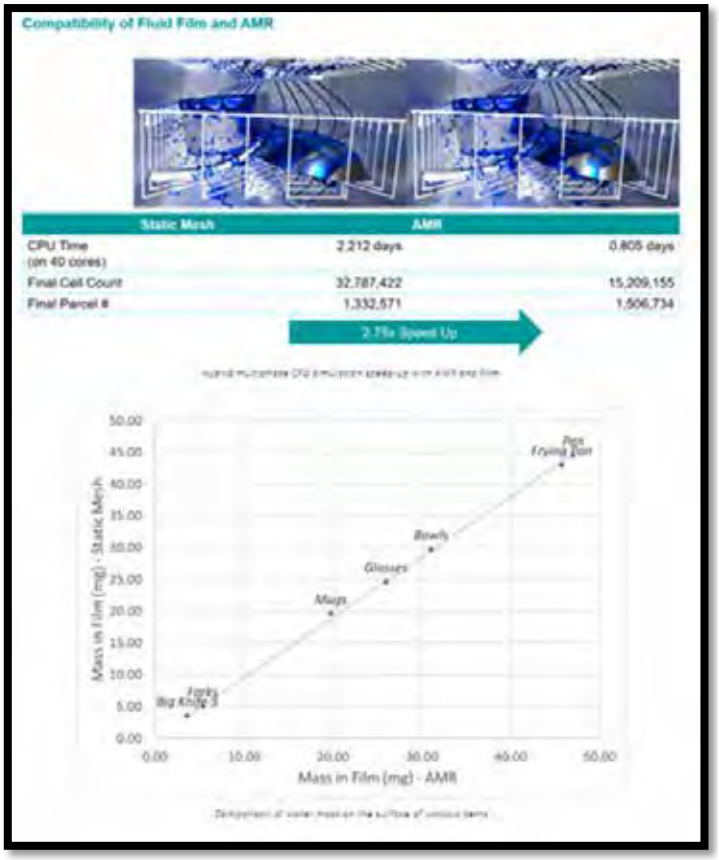


Adaptive Mesh Refinement (AMR) in use for the dishwasher example

Again, AMR can really help us here. We can see in the above animation and images that it allows us to use a coarse initial mesh whilst still capturing the details of the jets and their breakup, together with the film deposited on cups, glasses, and pans.

Hybrid multiphase CFD with AMR – Not just easier but faster too

So how much faster can we make this simulation by being able to use AMR? To find out, we ran this dishwasher example with a fine static volume mesh. We compared this to a run with a coarse volume mesh and AMR that has the same surface mesh. We setup the AMR refinement to give the same mesh size as the static mesh in areas with free surfaces. Take a look at the comparison of the results below:



The first thing to note is how similar the results of the two runs are. This gives great confidence in hybrid multiphase CFD simulation, that even with very different volume meshes the same results can be achieved. To complement this observation, the number of Lagrangian parcels is also very similar.

Now to the speed-up. The AMR simulation is 2.75 times faster than its static mesh counterpart. We have achieved this with a peak of less than half the mesh count of the static mesh.

AMR is a game changing technology that does for multiphase simulation what the Anderton Boat Lift did for salt transport. It unlocks the power of hybrid multiphase CFD simulation and enabling applications that you previously may have considered impossible. Get your hands on this and other exciting new features in the June release of Simcenter STAR-CCM+.

Keep tuned for some of the other great enhancements coming in this release.

-

Announcement on Social-Media by N. Johnson

Welcome to SIEMENS NX. New version now available for download!

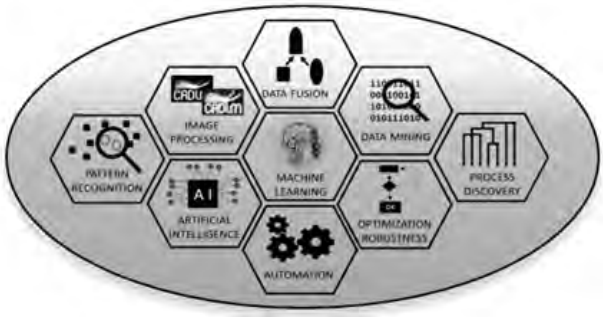
Discover Value Based Licensing, New NX Reporting, New NX Coatings, Visualizing the Digital Twin, Synchronous Modeling, Performance Optimized Structures, Multi-user Assembly Design, Model Based Definition and much more, such as:

NX Coatings - Expand the use of Model Based Information. NX Coatings is a new and fully integrated application that allows specification of coatings for product design.

Agnes BELLINI - ODYSSEE Global Head Business Development
Part of Hexagon Manufacturing Intelligence

ODYSSEE accelerates product design and development via real-time parametric simulations with optimization, machine learning and AI tools

ODYSSEE CAE - Access CAE design space exploration to broaden your horizons

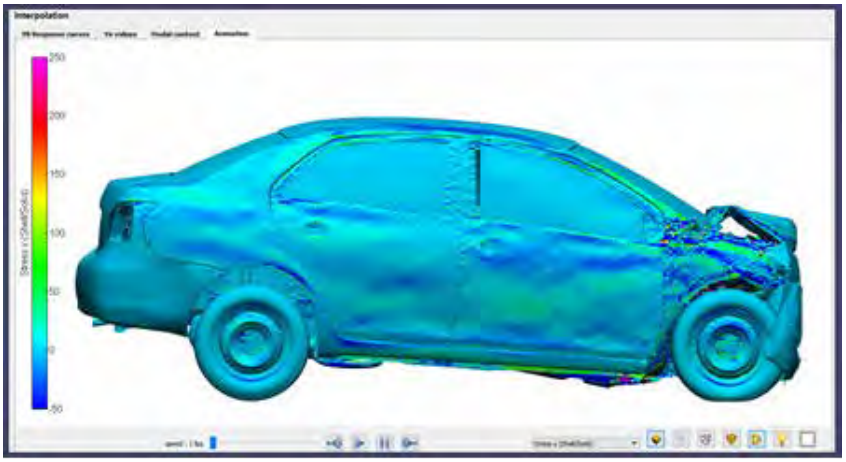


Overview

ODYSSEE CAE is a powerful portfolio of modules (Lunar, Quasar and Nova) from our partner Hexagon | MSC Software.

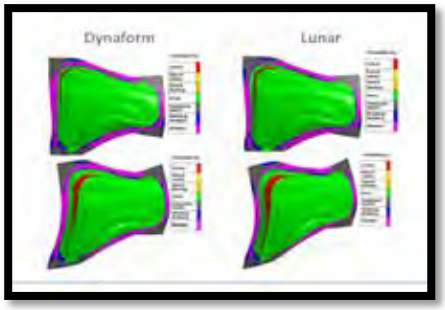
ODYSSEE CAE includes:

- ODYSSEE CAE includes:
- Machine Learning & AI
- Statistics, Data Mining, Data Fusion
- Optimization and Robustness
- Process Discovery
- Image Recognition and Compression

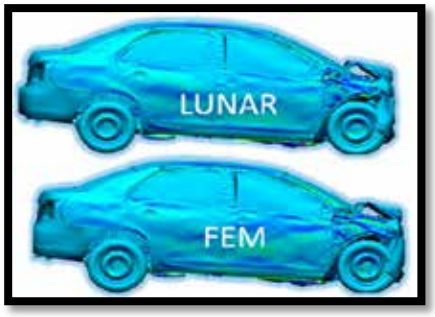


Intelligent DOE (Design of Experiment) * Adapted DOE tool * Improve an existing DOE tool * DOE can include simulation models, tests or the two	**Real-time computing** * Zero-computing effort for parametric studies and optimization * Corridor / Population generation	**Software and physics independent** * Works with Crash (LS-DYNA, RADIOSS, PAM-CRASH), Thermal, CFD, Acoustics (MSC Nastran, Marc, Adams, Cradle CFD, Actran)	**Automation/Parser** * Automatic post-preprocessing
Reduces CAE computing effort * Allows for a few, wisely selected sampling points * Adaptive learning that allows you to improve as you learn	**Precision & completeness** * Full time history output (not only scalars) * Physical domain decomposition and not fitting (it is NOT a Response Surface Method!)	**Can produce 3D animations** * No interpolations but reconstructions * Stress/displacement iso value reconstruction	

Real time simulation & optimization Safety
With courtesy of JSOL



Real time simulation & optimization Stamping
With courtesy of ETA



Real time simulation & optimization Stamping
Yaris model frontal crash

Simulation in Real Time

- With ODYSSEE CAE, you can manage the main steps of your project in real time with parametric design and optimization based on very few simulations
- Concept Design: Parametric Studies, Trial and error
- Detailed Modeling: Optimization, Model Fitting
- Validation: Reliability Studies, Robustness
- Co-simulation ODYSSEE/ LS-DYNA

The benefits of ODYSSEE will interest your entire organization:

- Engineering project managers
- VP Engineering
- CAE engineering departments
- Purchasing and procurement

We noticed this on social media thanks to Sarah Palfreyman.

Published in Engineering Reality Magazine - Volume XIII Summer 2020

50 years ago in 1971 - Nastran was released to the public for the first time by NASA's Office of Technology Utilization, and the MARC Analysis Research Corp was founded in the Netherlands.

Introducing our structures center of excellence

PDF - Delivering next generation structures simulation for smart manufacturing and sustainability

By Dr. Mahesh Kailasam, Head of Structures CoE, Hexagon, Design & Engineering

The following is Excerpts - The complete article is in Engineering Reality Summer 2021

This year marks two very special golden anniversaries for a couple of our flagship products, MSC Nastran and Marc. It was 50 years ago in 1971 that two separate events happened in the early days of the CAE industry - Nastran was released to the public for the first time by NASA's Office of Technology Utilisation, and the MARC Analysis Research Corp was founded in the Netherlands. Fast forward 46 years and MSC Software joined Hexagon's Manufacturing Intelligence Division in 2017 to forge a new and unique synergy between predictive design & engineering simulation software to market leading production software and metrology hardware. We have brought our rich 50yr history of CAE experience, expertise and innovation to the broader Hexagon group, a titan of Sensors & Software for Smart Manufacturing that has brands that have been in business for over 200 years! Our vision is to address the challenges of Autonomy, the Internet of Things, Big Data, AI and ML, Digital Twins, Digital Threads and deliver great CAE for smart manufacturing and sustainability solutions for the next 50 years.

…Excellence in structures simulation

Structures is both one of the oldest and newest of our centers of excellence and is the biggest segment of the CAE industry worldwide. It is the oldest, given the history of serving the Finite Element Analysis (FEA) community – the earliest discipline in CAE, but the newest in terms of leading the way to redefine a modern manufacturing business based on structures analysis.

…Reorganising, refocusing, and revitalising

What truly differentiates CAE portfolios in multi-physics these days is both the available physics and their coupling ultimately leading to high levels of real-world accuracy and the ability for companies to reliably replace physical testing with design & engineering simulation. The need to capture reality more accurately, to scale multi-physics collaborations, to embrace AI and machine learning while continuing to add complexity will continue to make demands on our people and software development processes.

...Before the CoEs there were many collaborations within MSC Software: MSC Nastran and Actran (for acoustic simulation) have already shared over 15 years of development, MSC Nastran and Adams (for multibody dynamics) share over 20 years of development activity. Reorganising, refocusing, and revitalising our Structures development team to be at the center of Hexagon's Design and Engineering solutions leverages 50yrs of our FEA solver technologies working in tightly chained or coupled co-simulation workflows. Multi-physics collaboration across multiple engineering disciplines and perspectives is accelerating now within our CoEs with coupled roles and responsibilities involving R&D, QA, Product Management, Product Marketing, and Business Development.

...If you think of all the engineering developments and effort behind such software collaborations and multiple CAE simulation engines with their different data structures and algorithms - millions of lines of code needing to exchange physics and information - architecting code to exchange physics is a unique strength of ours, with MSC Nastran being a longstanding pioneer in this area since the development of super elements or substructuring in the 1970s. We continue to develop our expertise in multi-physics collaborations, with the recent acquisition CADLM bringing modern AI and Machine Learning based perspectives to model-order-reduction, or the ability to exchange physics at different levels of fidelity between system level models and component level models.

Finally, we are also having our first ever global HxGN Live Design and Engineering Conference

Please submit an abstract and be a speaker at this vertical event and come and hear more about our unique multi-physics offerings and about Hexagon.

Dr. Mahesh Kailasam, SVP, Head of Structures Center of Excellence, Hexagon Design & Engineering

With over 20 years of experience in CAE, Dr. Kailasam is driving strategy, industry, and business development in Hexagon's Design and Engineering Business Unit (MSC Software) and is the leader of our Structures Center of Excellence.

ACE+ Suite

Build and Deliver Products at the Edge of Innovation with Advanced CFD and High-Fidelity Multi-Physics Simulations.

Whether pre-certifying the aero-thermal performance of new land or space vehicles, designing multiphase cooling systems for equipment – ranging from nuclear reactors to electric vehicle batteries – or engineer materials at the atomic level, squeezing a world of novel technologies into a single pixel, being at the peak of innovation is key.

While working with ever-shortening development cycles, the need to deliver products and processes of the highest quality with a concrete understanding of the product's behavior – as designed and throughout its lifecycle – is a challenge faced by every design engineer, manufacturer, and service provider in the world.

ACE+ Suite is an advanced CFD and high-fidelity Multiphysics simulation software package supporting the automotive, semiconductor, energy, microfluidics, and biotech industries, amongst others. With ACE+ Suite, engineers can virtually test the performance and behavior of their designs before they are manufactured, for the most extreme innovation requirements.

This tool offers the broadest range of physics disciplines including flow, heat transfer, stress/deformation, chemical kinetics, electrochemistry, biochemistry, electrostatics, electromagnetics, hypersonics, plasma and more – in any combination from a single environment.

ACE+ Suite also includes Design Space Exploration, Optimization and Reduced Order Model modules allowing you to fully understand and fine-tune designs.

Benefits Of ACE+ Suite

- Reduce/eliminate physical prototypes
- Minimize product development cycle time and cost
- Efficiently explore design space and understand the relative importance and relationship between different parameters
- Make physics-informed design/product support decisions
- Capture expert knowledge, customize, automate and democratize

Semiconductor Processing

The semiconductor sector is one of the fastest growing industry segments in the global economy today as more and more high-tech electronic devices are incorporated into products, ranging from cars to home appliances to military products.

ACE+ Suite provides the unique capacity to perform high fidelity, three-dimensional simulations of heat and mass transport with complex multi-step gas-phase and surface reactions for semiconductor applications. It supports design and optimizes equipment and processes like:

- Chemical and Physical Vapor Deposition (CVD/PVD), Etching, Epitaxy, Thermal Oxidation, Electrodeposition / Electroplating, Photolithography and Crystal Growth Processes
- Chip Processing
- Feature Scale Evolution
- Wafer Treatments
- Clean Room / Clean Equipment

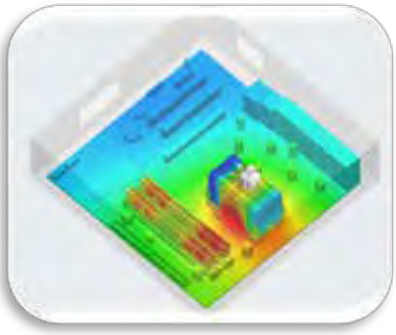
Plasma Applications

Products containing plasma represent one of the fastest growing product groups in the market today, with applications ranging from lighting to display panels to televisions. With a full line of software, R&D, and customized solutions for various plasma technologies, we make it easy for you to simulate the behavior of plasma accurately for a wide range of operating conditions. This includes semiconductor processing (ICP and CCP reactors), lighting, display panels, thermal plasmas (torches and arcs), and atmospheric plasma.

ACE+ Suite plasma solutions cover a wide range of applications including plasma-aided manufacturing, plasma display panels, plasma lighting, plasma in biomedical and plasma in environment.

Benefits:

- Model low temperature, nonequilibrium discharges
- Optimize plasma generation equipment
- Optimize plasma aided manufacturing processes
- Semiconductor fabrication for processing and manufacture
- Plasma display panels and lighting
- Plasma in biomedical and environmental applications



Electronics Cooling - For years, industries have been moving towards miniaturization of electronics – from cell phones to tablets and computers. The challenge becomes keeping these consumer devices at a temperature suitable for human use.

A complete CFD analysis solution for thermal management aids in the design of high-performance components and systems, while maintaining the lowest cost in the electronics industry.

.

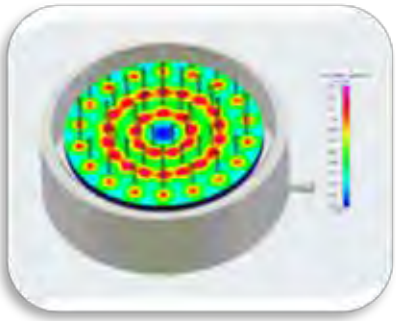
Benefits:

- Save time with an easy-to-use GUI: build, set, run
- Use CAD objects directly in simulation
- Import PCB and substrate data for better accuracy
- Rapidly evaluate effects of changes in design variables
- Design Space Exploration

ACE+ Suite includes state-of-the-art, multiple moving body capability for simulating the most complex aerospace problems including missile launch, maneuvering, and staging, as well as aircraft flight dynamics and store separation. These challenging applications become accessible by coupling a density-based, compressible Euler and Navier-Stokes flow solver with moving multi-body dynamics, generalized finite rate chemistry, and thermal non-equilibrium modules.

Benefits:

- State of the art numerical and physical models
- Supports all grid technologies including multi-block structured, polyhedral unstructured, Chimera/overset and adaptive Cartesian
- Works on all computer hardware/software systems. Designed for parallel computing

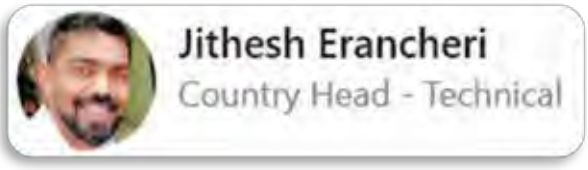


Design Exploration and Reduced Order Model

ACE+ Suite contains a built-in tool that allows you to effortlessly perform parametric analysis and optimization studies, while customizing and automating your specific design processes. Using its built-in GUIs and the Python script language, all users can easily create custom applications based on our CFD engineering analysis software.

Benefits:

- Standard wizards for parametric analysis (DOE) and optimization with geometric and simulation parameters, as well as boundary and volume conditions
- Single and Multi-Parameter Optimization
- Reduced Order Model
- Embedded Python interpreter, allowing creation of your own scripts and processes



Kaizenat Technologies Pvt Ltd

Kaizenat Blog

Buckling Analysis of Water Tower

Introduction - At first glance, it would be easy to assume that water towers exist to store water. But whether you're talking about a modest little water tower perched atop an apartment building within the city or a giant municipal water tower, water storage is not the primary function of the tower.

If water storage was the only goal, it would be significantly cheaper to build a reservoir.

The primary function of water towers is to pressurize water for distribution. Elevating the water high above the pipes that distribute it throughout the surrounding building or community ensures that hydrostatic pressure, driven by gravity, forces the water down and through the system
FEA.

A variety of materials can be used to construct a typical water tower; steel and reinforced or pre-stressed concrete are most often used (with wood, fiberglass, or brick also in use), incorporating an interior coating to protect the water from any effects from the lining material.

Very high volumes and flow rates are needed when fighting fires. With a water tower present, pumps can be sized for average demand, not peak demand; the water tower can provide water pressure during the day and pumps will refill the water tower when demands are lower.
Architects and builders have taken varied approaches to incorporating water towers into the design of their buildings. On many large commercial buildings, water towers are completely hidden behind an extension of the facade of the building.

Eigenvalue Buckling Analysis

An Eigenvalue Buckling analysis predicts the theoretical buckling strength of an ideal elastic structure. The imperfections and nonlinearities prevent most real-world structures from achieving their theoretical elastic buckling strength. Therefore, an Eigenvalue Buckling analysis often yields quick but non-conservative results.

A more accurate approach to predicting instability is to perform a nonlinear buckling analysis. This involves a static structural analysis with large deflection effects turned on.

A gradually increasing load is applied in this analysis to seek the load level at which your structure becomes unstable. Using the nonlinear technique, your model can include features such as initial imperfections, plastic behaviour, gaps, and large-deflection response.

Eigenvalue Buckling in ANSYS Mechanical

In Mechanical, an Eigenvalue Buckling analysis is a linear analysis and therefore cannot account for nonlinearities. It employs the Linear Perturbation Analysis procedure of MAPDL. This procedure requires a pre-loaded environment from which it draws solution data for use in the Eigenvalue Buckling analysis.

An Eigenvalue Buckling analysis must be linked to (proceeded by) a Static Structural Analysis. This static analysis can be either linear or nonlinear and the linear perturbation procedure refers to it as the "base analysis" (as either linear or nonlinear).

A structure can have an infinite number of buckling load factors. Each load factor is associated with a different instability pattern. Typically, the lowest load factor is of interest.

Based upon how you apply loads to a structure, load factors can either be positive or negative. The application sorts load factors from the most negative values to the most positive values.

The minimum buckling load factor may correspond to the smallest eigenvalue in absolute value.

Buckling mode shapes do not represent actual displacements but help you to visualize how a part or an assembly deforms when buckling.

The procedure that the MAPDL solver uses to evaluate buckling load factors is dependent upon whether the pre-stressed Eigenvalue Buckling analysis is linear-based (linear pre-stress analysis) or nonlinear-based (nonlinear pre-stress analysis).

Conclusion

For a linear upstream Static Structural Analysis, you can define loading conditions only in the upstream analysis.

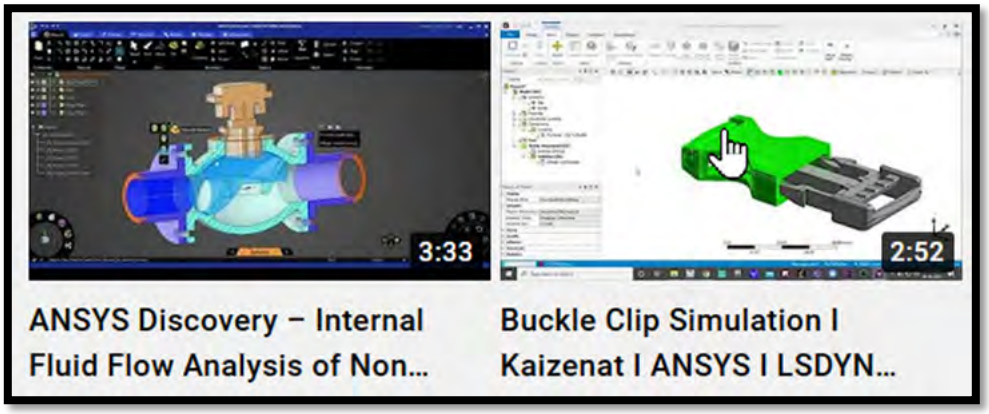
The results calculated by the Eigenvalue Buckling analysis are buckling load factors that scale all of the loads applied in the Static Structural analysis.

Thus for example if you applied a 10 N compressive load on a structure in the static analysis and if the Eigenvalue Buckling analysis calculates a load factor of 1500, then the predicted buckling load is 1500x10 = 15000 N. Because of this it is typical to apply unit loads in the static analysis that precedes the buckling analysis.

The buckling load factor is to be applied to all the loads used in the static analysis.

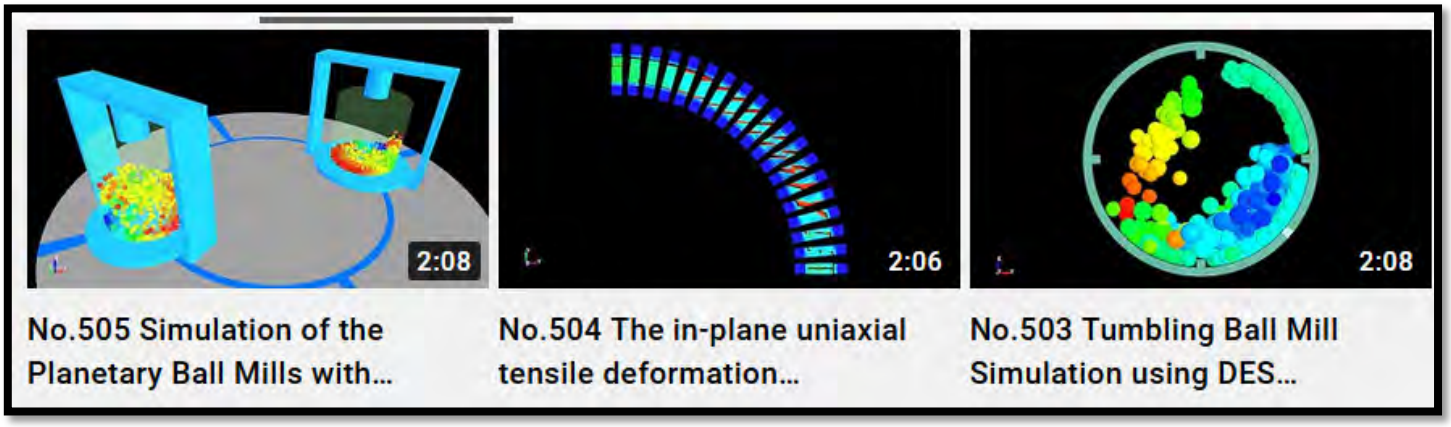
July Videos

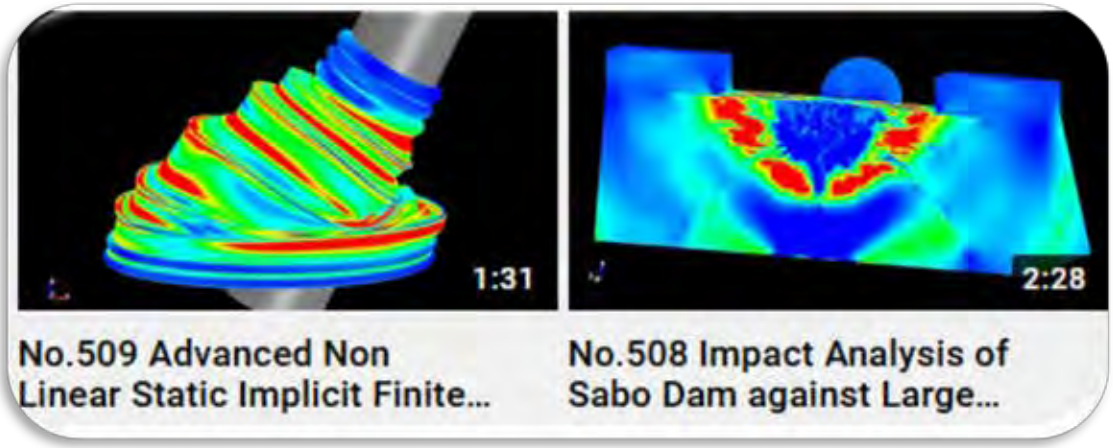
- Kaizenat Support YouTube



July Videos

YouTube - LANCEMORE





EnginSoft Expertise is Case Studies - The Corporate site is at EnginSoft

For this month our editors have chosen the following two case studies.

Excerpts:

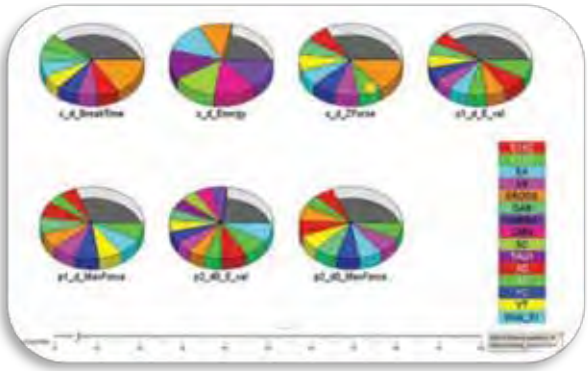
Gravity Die Casting of Motorcycle Components

A permanent mold casting study of the mold design and mold-casting process of an aluminum alloy single-sided-swing-arm

ABSTRACT - The advent of the Naked Motorcycle has changed the way we look at motorcycle parts. In addition to being of excellent quality, reliable, efficient and cost-effective, they now also need to be aesthetically pleasing because they are mostly visible to the naked eye.

This is a permanent mold casting study of the mold design and mold-casting process of an aluminum alloy single-sided-swing-arm developed through the collaboration of EnginSoft, experts in Computer Aided Engineering (CAE) simulation and GFT Battistini, experts in modeling and production of molds on behalf of a major European motorcycle manufacturer.

LS-DYNA & modeFRONTIER for Material Model Calibration at Automobili Lamborghini



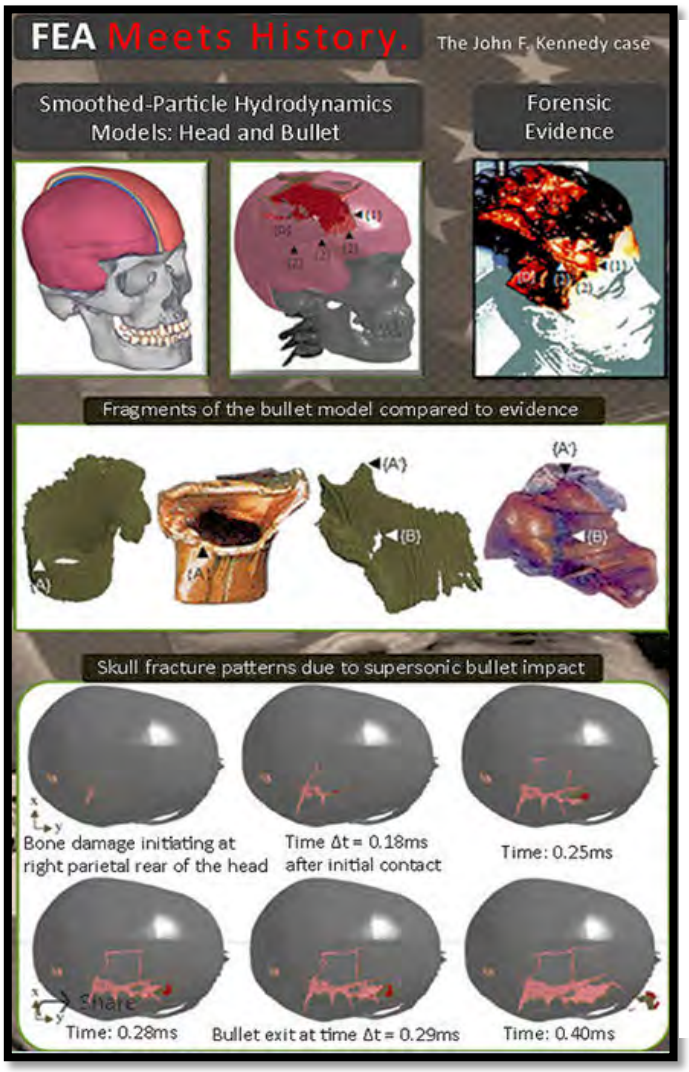
The main challenge is to reproduce their structural behavior by developing suitable numerical models

ABSTRACT - CFRP composites have been used in Automobili Lamborghini since 1983. Today, the main challenge is to reproduce their structural behavior by developing suitable numerical models whose set-up requires just simple experimental tests.

Automobili Lamborghini and EnginSoft started a collaboration to perfect sophisticated manufacturing applications and FE technical support with the aim to provide such numerical models. While the engineers relied on modeFRONTIER's capabilities, the procedure has been to calibrate the constitutive parameters of LS-DYNA's advanced material models, and to use them for prediction, design optimization and robustness analysis. In this way, the amount of expensive experimental tests could be reduced. This approach also allows better understanding of the influence of physical and geometrical variables on the composite dynamic structural response or, respectively, to obtain improved solutions for industrial case studies.

Dr. Christophe Then
Center of Biomedical Engineering

Computational ballistic analysis of the cranial shot to John F. Kennedy



Computational ballistic analysis of the cranial shot to John F. Kennedy

C. Then
Center of Biomedical Engineering CBME, Frankfurt/M., Germany

K. Nelson
Department of Vascular and Endovascular Surgery, Goethe University Hospital Frankfurt/M., Germany

T.J. Vogl,
1. Department of Diagnostic and Interventional Radiology, Goethe University Hospital, Frankfurt/M., Germany
2. Center of Biomedical Engineering CBME, Frankfurt/M., Germany

K.E. Roth
Center of Orthopedic and Trauma Surgery, Johannes Gutenberg University, Mainz, Germany

Abstract

Almost 60 years after the assassination of John F. Kennedy in 1963 the majority of Americans are still reluctant to believe the official reports of commissions from 1964 and again in 1976 that determined the direction of the shot resulting in the fatal head injury. Long-withheld, confidential government files released in 2017 reignited the controversy.

Computational ballistic analysis of the cranial shot to John F. Kennedy

The present investigation computationally simulated projectile-skull impacts from the direction specified in official reports and from three other directions. Detailed geometric models of the human head and ammunition, as well as known parameters from the assassination site served as the supportive base for analysis. Constitutive mathematical models for the impact of projectile material with skull tissues at supersonic speed were employed to analyze bone and bullet fragmentation mechanics.

Simulated fracture characteristics of the bone and the bullet were compared with photographic and X-ray evidence. The most likely origin of the fatal shot was determined based on the degree of corresponding deformation and fragmentation between simulation and documented evidence. Computational corroboration could be established as physically consistent with high-speed impact from the rear, as established by the official commissions. Simulations of three other speculative shot origins did not correspond to the documented evidence.

EXCERPT - Introduction

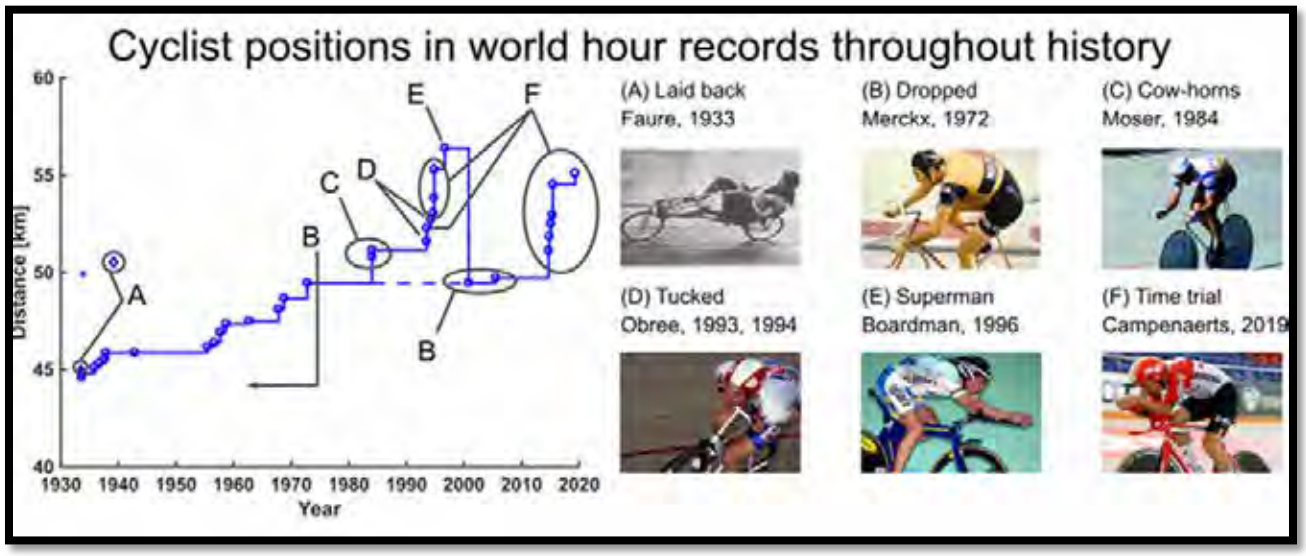
The President's Commission on the Assassination of President Kennedy, unofficially the Warren Commission, released its final report in 1964 and attributed the assassination of President John F. Kennedy (JFK) to three shots fired from a single marksman behind the presidential limousine with two bullets striking the president from the rear. While the first shot missed, the second shot caused a neck wound to Kennedy. The third and fatal shot hit Kennedy in the head

Controversy concerning the commission report arose due to a physician in the overall disarray describing the neck wound from the second shot as a bullet entrance from the front throat [2-5]. Considerable doubt regarding the shot direction was further raised by the testimony of over 40 eye witnesses, including treating doctors, who unanimously reported a large wound in the right back of Kennedy’s head [5-9], contradicting the official version of a large wound in the temple region of the right frontal bone [6]. Further contradiction was added by the film from a civilian bystander [10], known as the Zapruder Film, showing the president’s head snapping violently backward upon impact with the third shot. Intuitive interpretation of this backward movement led to a lay verdict that the projectile must have come from the front.

Download or read the paper on the website

Computational ballistic analysis of the cranial shot to John F. Kennedy

Cyclist aerodynamics through time: Better, faster, stronger



Cyclist aerodynamics through time: Better, faster, stronger

***Fabio Malizia *Bert Blocken**

*Building Physics and Sustainable Design, Dept. of Civil Engineering, KU Leuven, Kasteelpark Arenberg 40 - bus 447, 3001, Leuven, Belgium

*Unit Building Physics and Services, Dept. of the Built Environment, Eindhoven University of Technology, P.O. box 513, 5600 MB, Eindhoven, the Netherlands

The aim of the present paper is to provide a comprehensive review of the history and state-of-the-art in cycling aerodynamics focused on the aerodynamics of professional cyclists as influenced by their position on the bicycle, wearable components such as helmets and skinsuits and the presence of nearby cyclists or vehicles. The paper will indicate how, through the course of time, field tests, wind tunnel tests (WT) and computational fluid dynamics (CFD) simulations have made cyclists and their performances better, faster and stronger.

Highlights

- Comprehensive review of cyclist aerodynamics throughout history.
- Linked to historical evolution of the world hour record.
- Focus on aerodynamics of single cyclist and his/her wearable components.
- Focus on aerodynamic interaction between cyclists and other cyclists and vehicles.
- Providing future perspectives for research and development.

Cyclist aerodynamics through time: Better, faster, stronger

Abstract

The last decades have seen an increasing interest in cycling aerodynamics, with the design of more aerodynamic bicycles and wearable equipment such as helmets and skinsuits and the development and application of new cyclist positions. Moreover, a better understanding of the flow topology around a cyclist and of the aerodynamic interaction between cyclists and other cyclists and nearby vehicles has been gained. However, some knowledge – albeit mainly empirical – of the impact of aerodynamics on cycling performance was already known in late 1800s and early 1900s; as shown by the design of recumbent bicycles and aerodynamic fairings, the adoption of dropped cyclist positions and the organization of drafting races. The goal of this paper is to demonstrate the evolution of aerodynamic knowledge in cycling from the early days to the most recent state-of-the-art to efficiently drive future studies. Therefore, this paper provides a comprehensive review of the history and state-of-the-art in cyclist aerodynamics, focused on three aspects: (i) cycling flow topology and the wind influence; (ii) the aerodynamics of a single cyclist and his/her wearable components; and (iii) the aerodynamic interaction between a cyclist and other cyclists or nearby vehicles. Finally, some future perspectives about cyclist aerodynamics are provided.

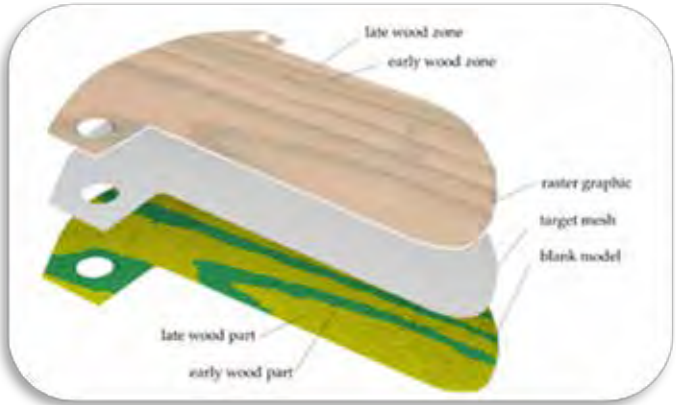
1. Introduction

Cycling races are sometimes won by time differences of fractions of a second or a few centimeter. For instance, Primož Roglič won the 2019 Tirreno-Adriatico, a seven-day race, with only 0.31 s advantage to Adam Yates. Kristina Vogel won the gold medal in the track cycling sprint competition of the Rio 2016 Olympic Games with only 0.016 s and 0.004 s ahead of Becky James, in race 1 and 2, respectively. LeMond won the 1989 Tour De France in 87h38′35″, only 8 s ahead of Fignon. LeMond gained the yellow jersey after the last stage, an individual time trial (TT), riding 58 s faster than Fignon. LeMond realized this endeavor aided by several aerodynamic features: a bicycle with airfoil shaped tubing, a Lycra skinsuit, aero-bars, an aerodynamic helmet, an aero water bottle and a disc rear wheel, whereas Fignon used a standard bicycle, an unzipped jersey, no helmet, cow-horn handlebars and front and rear disc wheels (Kyle, 1989). Kyle (1989) stated that the mere use of an aerodynamic helmet would have reduced the final time of Fignon by about 22 s, enough to win the 1989 Tour de France.

Aerodynamic drag is indeed the major resistive force in cycling, up to 90% when the cyclist is traveling on a level road at speeds of about 40 km/h and beyond (Grappe et al., 1997; Kyle and Burke, 1984). The cyclist body and wearable components, like helmets and skinsuits, are responsible for 64%–82% of the total drag (Barry et al., 2012; Defraeye et al., 2010a; Kyle and Burke, 1984; Nonweiler, 1956), depending on the cyclist body size and shape and the cyclist position on the bicycle. The remaining drag is caused by the bicycle, which includes the frame, the wheels, the handlebar and other small components.

Download or read the paper on the website
[Cyclist aerodynamics through time: Better, faster, stronger]

Numerical Simulation of the Forming Process of Veneer Laminates



Schematic view of the generation of digital twins of the blank samples by the gray scale mapping scheme.

Numerical Simulation of the Forming Process of Veneer Laminates

David Zerbst, Sebastian Clauß
Mercedes Benz AG, Research & Development, 71063 Sindelfingen, Germany
Christian Liebold
DYNAmore GmbH, 70565 Stuttgart, Germany
Thomas Gereke, Chokri Cherif
Institute of Textile Machinery and High Performance Material Tech. (ITM), Faculty of Mechanical Science and Engineering, Tech. Univ. Dresden, 01062 Dresden, Germany

Abstract

In automotive manufacturing, laminated veneer sheets are formed to have 3D geometries for the production of trim parts with wood surfaces. Nowadays, investigation of the formability requires extensive tests with prototype tools, due to the brittle, anisotropic and inhomogeneous material behaviors. The present paper provides numerical methods for the simulation of the forming process of veneers with non-woven backings. Therefore, a conventional forming process of an interior trim part surface is carried out experimentally and numerically, using veneer samples with different individual textures originating from the characteristic growth ring structure. Gray scale images of these samples are mapped to finite element models to account for the wood-specific structure. The forming simulation process comprises two steps, where a gravity simulation depicts the initial position of the blank sheets and the closing of the tool induces the material deformation. The virtual forming of the digital twins accurately reproduces the wrinkling behavior observed in experimental studies. Based on the proposed methods, the design process of manufacturing wood trim parts based on tedious prototype tooling can be replaced by a fully virtual forming process taking into account the individual growth-related properties of the veneer structure.

1. Introduction

Decorative automotive interior trim parts with wood surfaces are conventionally realized with thin veneer sheets, non-woven backings and plastic supporting structures. A forming process gives the 3D shape of the veneer laminate surface material. The forming behavior depends on the grain orientation, the material moisture content and the environmental temperature due to the heated forming tools. Additionally, local deformation, fracture and wrinkling varies with the type of the used veneer, e.g., burled or sliced veneer. Nowadays, the development of a stable forming process for series manufacturing is carried out with time- and cost-intensive tests with prototype tools.

Numerical Simulation of the Forming Process of Veneer Laminates

A feasible trim part geometry and suitable process parameters are derived in trial-and-error forming tests. Thus, the focus of the present and previous contributions [1,2] is the development and validation of a numerical methodology that replaces experimental trials.

Numerical Simulation of the Forming Process of Veneer Laminates

The numerical simulation of the forming process requires adequate material modelling of the veneer laminate. In Ormarsson and Sandberg's work [3], a numerical analysis of the forming process of birch wood veneer layers into a curved chair seat was carried out. The study contributes to the understanding of the influence of heat, pressure and fiber orientation on distortion and shape stability of the furniture structure. Opposed to the more homogeneous wood species of birch wood, experimental analysis of ash wood veneer laminates of Zerbst et al. [2] showed that the local deformation and fracture behavior of the material strongly depend on the periodic inhomogeneity caused by early wood (EW) and late wood (LW) zones in the veneer. In early wood, wide vessels and thin cell walls cause lower stiffness and strength compared to late wood. These structural differences contribute significantly to the variability of the material properties [4,5,6,7,8].

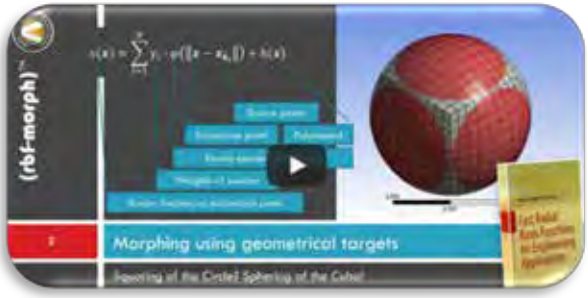
Stochastic modelling approaches depicting the uncertainty of wood material mechanics are presented in references [9,10,11,12]. However, the design of the veneer laminate forming process requires discrete consideration of the structural differences of early and late wood in areas of large deformation as the range of veneers with different textures and properties are used for trim part surfaces. A modelling approach based on the extended finite element method with repetitive early and late wood unit cells was presented in Lukacevic et al.'s work [13] in order to depict local material fracture. Different sources deal with the prediction of the effective strength of timber, considering the influence of knots and fiber deviations in finite element analysis, with the mapping of surface laser scans [14,15,16,17]. A mapping scheme was developed in Zerbst et al.'s work [1] to capture the geometric arrangement of early and late wood over a veneer sheet due to the veneer manufacturing process, e.g., slicing or rotary cut technology. Thereby, the color differences of early and late wood, as a result of significant differences in density, were used for the mapping of the two zones from gray scale images to a finite element mesh. Stochastic numerical analyses of tensile tests showed very good agreement of the distributions of strength and ultimate strain compared to experimentally obtained data and validated the approach. These results promised to capture the variation of material fracture for the suggested procedure.

In this work, the before-mentioned modelling approach is applied to establish a virtual forming process in order to speed up and optimize the development of wood surfaces for automotive trim parts. Therefore, blank sheets of ash wood veneer laminate with different textures are analyzed experimentally and numerically with finite element models, created with the gray scale mapping procedure. The objective is to provide a preprocessing chain in combination with a two-step forming simulation that completes the virtual design of the forming process of veneer laminate surfaces.

Download or read the paper on the website

Numerical Simulation of the Forming Process of Veneer Laminates

Squaring of the Circle? Sphering the Cube!



[YouTube - Squaring of the Circle? Sphering the Cube!]

One of the very first example of how RBF Morph mesh morphing can be guided by geometrical targets. A regular hexa mesh of a cube is transformed into a spherical one.

[Fast Radial Basis Functions for Engineering Applications Edition]

by Marco Evangelos Biancolini (Author)

This book presents the first “How To” guide to the use of radial basis functions (RBF). It provides a clear vision of their potential, an overview of ready-for-use computational tools and precise guidelines to implement new engineering applications of RBF.

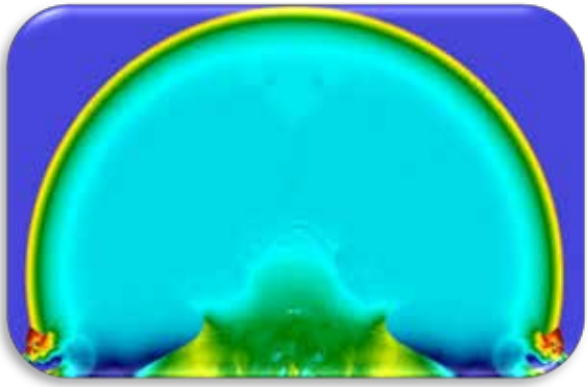
Radial basis functions (RBF) are a mathematical tool mature enough for useful engineering applications. Their mathematical foundation is well established and the tool has proven to be effective in many fields, as the mathematical framework can be adapted in several ways.

A candidate application can be faced considering the features of RBF: multidimensional space (including 2D and 3D), numerous radial functions available, global and compact support, interpolation/regression.

This great flexibility makes RBF attractive – and their great potential has only been partially discovered. This is because of the difficulty in taking a first step toward RBF as they are not commonly part of engineers’ cultural background, but also due to the numerical complexity of RBF problems that scales up very quickly with the number of RBF centers. Fast RBF algorithms are available to alleviate this and high-performance computing (HPC) can provide further aid. Nevertheless, a consolidated tradition in using RBF in engineering applications is still missing and the beginner can be confused by the literature, which in many cases is presented with language and symbolisms familiar to mathematicians but which can be cryptic for engineers.

The book is divided in two main sections. The first covers the foundations of RBF, the tools available for their quick implementation and guidelines for facing new challenges; the second part is a collection of practical RBF applications in engineering, covering several topics, including response surface interpolation in n-dimensional spaces, mapping of magnetic loads, mapping of pressure loads, up-scaling of flow fields, stress/strain analysis by experimental displacement fields, implicit surfaces, mesh to cad deformation, mesh morphing for crack propagation in 3D, ice and snow accretion using computational fluid dynamics (CFD) data, shape optimization for external aerodynamics, and use of adjoint data for surface sculpting. For each application, the complete path is clearly and consistently exposed using the systematic approach defined in the first section.

CADFEM	DYNAMORE GmbH	ANSYS
Oasys LS-DYNA Env.	BETA CAE Systems	Ozen Engineering
LS-DYNA Multiphysics	Kaizenat	Luri Engineering
Ameen Topa	Mallet Technology	Rescale
Predictive Engineering	Siemens	Condo Unit For Rent Inquire - Building Manager



Lawrence Livermore team looks at nuclear weapon effects for near-surface detonations - Michael Padilla

A paper in the Proceedings A of the Royal Society Publishing highlights findings by a Lawrence Livermore National Laboratory team on how nuclear weapon blasts close to the Earth's surface create complications in their effects and apparent yields. The work is featured on the front cover of the publication.

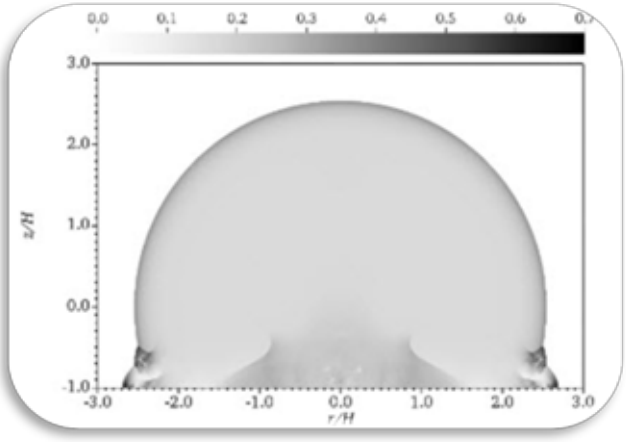
A Lawrence Livermore National Laboratory (LLNL) team has taken a closer look at how nuclear weapon blasts close to the Earth's surface create complications in their effects and apparent yields. Attempts to correlate data from events with low heights of burst revealed a need to improve the theoretical treatment of strong blast waves rebounding from hard surfaces.

This led to an extension of the fundamental theory of strong shocks in the atmosphere, which was first developed by G.I. Taylor in the 1940s. The work represents an improvement to the Lab team's basic understanding of nuclear weapon effects for near-surface detonations. The results indicate that the shock wave produced by a nuclear detonation continues to follow a fundamental scaling law when reflected from a surface, which enables the team to more accurately predict the damage a detonation will produce in a variety of situations, including urban environments.

The findings, featured in Proceedings A of the Royal Society Publishing, are authored by Andy Cook, Joe Bauer and Greg Spriggs. The work, "The Reflection of a Blast Wave by a Very Intense Explosion," also is highlighted on the cover of the publication.

The paper demonstrates that the geometric similarity of Taylor's blast wave persists beyond reflection from an ideal surface. Upon impacting the surface, the spherical symmetry of the blast wave is lost but its cylindrical symmetry endures. The preservation of axisymmetry, geometric similarity and planar symmetry in the presence of a mirror-like surface causes all flow solutions to collapse when scaled by the height of burst (HOB) and the shock arrival time at the surface. The scaled blast volume for any yield, HOB and ambient air density follows a single universal trajectory for all scaled time, both before and after reflection.

The team used the Miranda code and the Ruby supercomputer to compare theory against numerical simulations, and verified that Miranda reproduces Taylor's similarity solution for a strong blast wave in an ideal atmosphere.



This graphic displays the nondimensional pressure from two different simulations, one at a height of burst of 10 meters and the other at a height of burst of 1 kilometer.

Simulation 1 YouTube

Simulation 2 YouTube

“Before gathering data and collecting results, we performed convergence studies by refining the grid until the answer did not change,” Cook said. “Then we performed a series of simulations at the converged resolution for different nuclear yields, heights of burst and ambient air densities. We found that the scaled blast volume in each case fell onto the same nondimensional curve. The simulations covered scales from a few millimeters to several kilometers. The largest simulations utilized 3,136 processors and ran for a week.”

The Strategic Consequence Assessment (SCA) air blast team uses the Miranda code to simulate nuclear blasts in non-ideal environments. “Non-ideal air blast” refers to anything more complicated than the Nevada desert, for example, blasts over mountainous terrain or over water or in the presence of rain or snow. These environments change the blast wave in operationally significant ways, which need to be characterized through accurate simulations. High-fidelity blast simulations enable weapons designers to assess the effectiveness of particular designs for specific scenarios.

The team said that understanding nuclear weapon blasts close to the Earth’s surface is important to the nation.

“Having the capability to accurately predict the damage of a high-yield device in a wide array of cases, urban settings in particular, is of paramount interest to our national security,” Spriggs said. “This information enables us to pre-compute damage and guide emergency response personnel in the event that the United States is attacked or in case of a catastrophic accident, such as the recent Beirut explosion.”

The research spawned from decades of data collected by the “Film Scanning and Re-analysis Project,” hosted by the Lab’s Design Physics Division within the Weapons and Complex Integration Directorate at LLNL, with Spriggs serving as principal investigator. The work also has been supported by the LLNL’s Laboratory Directed Research and Development Program and by the National Nuclear Security Administration’s Mission Effectiveness Program.

“The more we know about the effects of nuclear detonations in different environments, the better prepared we will be to respond,” Spriggs said. “These new results lay the foundation for a more accurate and complete theory for nuclear blasts interacting with the environment. Numerous other effects, gleaned from the old atmospheric test films, have yet to be explained.”

BMW Group is a founding member of the Quantum Technology and Application Consortium (QUTAC).

We are taking over a vital role in the Quantum Technology and Application Consortium. The industry consortium was founded today and will strive to ensure early adaptation and application of quantum technology in the industry.

CEO Oliver Zipse: "Quantumcomputing is one of the most promising future technologies and can revolutionize application fields from materials research to automated driving. Germany and Europe need a strong quantum computing ecosystem to be at the cutting edge of technology and remain globally competitive. With QUTAC, we are laying the foundation for a successful ecosystem that will allow us to make the most of the great potential of quantum computing."

Berlin/Munich. Ten leading German corporations are jointly founding the Quantum Technology and Application Consortium (QUTAC). The goal of the newly founded consortium is to further develop the existing fundamentals of quantum computing into usable industrial applications.

Oliver Zipse, Chairman of the Board of Management of BMW AG: "Quantum computing is one of the most promising future technologies and can revolutionize application fields from materials research to automated driving. Germany and Europe need a strong quantum computing ecosystem to be at the cutting edge of technology and remain globally competitive. With QUTAC, we are laying the foundation for a successful ecosystem that will allow us to make the most of the great potential of quantum computing."

Specifically, QUTAC will help bring industry-relevant applications to market for the technology, chemical and pharmaceutical, insurance, and automotive industries. This is intended to create the basis for a successful industrialization of quantum computing in Germany and Europe. At the time of its founding, the consortium includes BASF, BMW Group, Boehringer Ingelheim, Bosch, Infineon, Merck, Munich Re, SAP, Siemens, and Volkswagen.

Foundation stone for a commercially successful quantum computing ecosystem.

In the Stimulus and Future Package, the German Government has given a big boost to the development of Quantum Computers. Working together with companies and start-ups we will identify, develop, trial, and share applications. There are many highly interesting areas, e.g., in logistics, transport, chemicals and the financial sector. So, I am delighted that QUTAC has brought so many leading companies together to help Germany move forward in this key sector", says Peter Altmaier, Federal Minister for Economic Affairs and Energy, emphasizing the importance of this alliance.

Anja Karliczek, Federal Minister of Education and Research, also welcomes the establishment of QUTAC: "Germany and Europe must become leaders in quantum technology and then stay at the top. What we want is technological sovereignty. To achieve this, we must rely on our strengths. These are our top researchers with their excellent ideas on the one hand and our strong industry on the other hand. Both must cooperate in an optimal way. Then we will achieve the best results. We are therefore funding companies and cutting-edge research under the quantum technologies framework programme."

The participating companies consider an economically strong and resilient quantum computing ecosystem in Germany and Europe to be crucial to promote successful industrialization and digital sovereignty in this field. QUTAC's vision is to drive such a quantum computing ecosystem.

Jointly advancing the European quantum technology economy.

QUTAC sees itself as a platform for action. The consortium promotes applications for the commercial use of this technology that are needed in the member companies. In doing so, they create industrial demand: The membership includes a broad cross-section of the German economy – thus the applications that are identified, developed, and tested within the consortium are trendsetting for entire industries. Through its orientation, QUTAC occupies an important position in the existing landscape of quantum technology-related institutions.

The current circle of ten members allows for a pragmatic exchange and rapid decision-making in order to develop practical solutions in the short and medium term. The results are intended to benefit all participants in the ecosystem. In its position paper, QUTAC sets specific steps: First, the need for quantum computing in the German economy is to be identified in order to create the basis for a cross-industry application portfolio. Currently, possible applications are being identified and their potential for industrial implementation is being evaluated. These reference applications will be jointly implemented and further developed beyond the boundaries of the consortium.

The results are published on the central platform at www.qutac.de .

About QUTAC. In the Quantum Technology and Application Consortium (QUTAC), some of the largest German groups from business and industry have joined forces to raise quantum computing to the level of large-scale industrial application.

The founding members of QUTAC include BASF, BMW Group, Boehringer Ingelheim, Bosch, Infineon, Merck, Munich Re, SAP, Siemens, and Volkswagen. Within the framework of various development projects, the members are decisively driving forward the first practical applications in the field of quantum computing in their respective industries and also across sectors. The aim of the consortium is to identify, develop, test, and share applications for quantum computing and to identify funding needs.

Marsha - Today, my husband asked, "Are there any museums open?"
That translates to "What's on TV today?"
(How would I know what's on the TV when he never lets me use the TV remote!)
SO, I decided we should go on an adventure.
That translates to "What's on the Internet today?"
SO, I took him on a virtual tour of the Henry Ford Museum and found him a magazine!
Plus handed him a cup of coffee! Has anyone noticed I'm multi-tasking?

The Henry Ford Magazine January-May 2020

The Driven To Win Issue

Virtual Tour of the Henry Ford Museum

The quiz was left in the suggestion box by The Old Cattle Rancher. No one in town knows his name. You yell, "HEY, old cattle rancher." Former military and he hangs out reading Wikipedia, and filling up the town suggestion box.

We don't have time for quizzes. We are mailing it to you, the town residents.

Quiz - remember those? Get your #2 pencil to answer - remember those?

Name Below and the Manufacturer (The answers are at the bottom of the Goodbye page)

1

2

3

4. EXTRA CREDIT QUESTION

A C-17 Globemaster III assigned to Joint Base Charleston deploys flares as part of a training event over the Atlantic Ocean in a military operating area outside Charleston, S.C., June 5, 2021. The C-17 is capable of rapidly and strategically delivering troops and all types of cargo to MOAs or forward-operating bases in deployment areas.

The C-17 can perform tactical airlift and airdrop missions as well as transport litters and ambulatory patients during aeromedical evacuations. (U.S. Air Force photo by Tech. Sgt. Chris Hibben)

Pegasus fuels Poseidon's Rage

U.S. Air Force F-15E Strike Eagles assigned to the 48th Fighter Wing participate in exercise Poseidon's Rage over the Aegean Sea, June 7, 2021.

Key objectives in the exercise focused on an increase in proficiency with employing inert and live munitions, helping to underscore U.S. commitment to the European region in direct support of the National Defense Strategy. (U.S. Air Force photo by Staff Sgt. Rachel Maxwell)

U.S. Air Force, French and Royal Air Force fighter aircraft participate in formation flight

A U.S. Air Force F-35A Lightning II, two Dassault Rafales and a Royal Air Force Eurofighter Typhoon fly in formation over France, May 19, 2021. The flight was a part of exercise Atlantic Trident 21, a joint, multinational exercise involving service members from the U.S., France and the U.K

Atlantic Trident is aimed at enhancing fourth and fifth-generation integration, combat readiness and fighting capabilities, through conducting complex air operations in a contested multinational joint force environment. (U.S. Air Force photo by Staff Sgt. Alexander Cook)

This equipment meeting is about drones. The suggestion box was filled with drone pictures. We appreciate the suggestion but it is not in the town budget. Suggested by the old retired pilot. No one in town knows his name. You yell, "HEY, old retired pilot." Former military and he hangs out at the town airport.

DSTL finished in the top four of the NATO Communications and Information Agency (NCI Agency) drone data challenge, which saw teams develop solutions to detect, track and identify small unmanned aircraft systems.

Agency announces winners of drone data challenge - The NATO Communications and Information Agency (NCI Agency) is proud to announce the winners of its challenge focused on Unmanned Aerial Systems (UAS) data.

The NCI Agency ran the challenge between February and May 2021, as a part of hosting the International Conference on Military Communications and Information Systems, or ICMCIS. This year's ICMCIS focused on the application of artificial intelligence and machine learning to the areas of military situational awareness and decision making.

The challenge tested participants' use of the latest tracking, data fusion and machine learning techniques to detect, track and identify small unmanned aircraft systems (UAS). Participants in the challenge fused together several sources of data provided by the Agency to track the drones. The challenge focuses on Class I Unmanned Aircraft Systems (UAS), which includes systems with a mass lower than 150 kg. Hobby drones are a typical example of Class I UAS.

The competition was run on Kaggle, a popular platform for artificial intelligence and machine learning challenges.

"It was really impressive to see the great interest shown by the participants in the challenge. This was the first challenge organized by the Agency using Kaggle, in a public domain where data science enthusiasts and research groups equally compete on diverse topics relevant for our society today," said Dr Michael Street, Head of Innovation and Data Science at the NCI Agency.

After evaluating the submissions by comparing the test set with the ground truth data, the top four submissions were asked to share their approach and techniques in more depth with a wider community during the special session on C-UAS and Radio Frequency technologies at ICMCIS.

The top four teams were:

- **Centre For Research and Technology Hellas (CERTH)** Information Technologies Institute (ITI) Virtual and Augmented Reality Lab (VARlab) Team: The CERTH ITI VARlab Team proposed a tracker based on machine learning technologies, which is something new in the tracking domain. Although the team has not specifically addressed data association, track management or fusion of data from multiple sensors, aspects their solution scored relatively high.
- **Defence Science & Technology Laboratory (Dstl)**: The Dstl team used well-studied tracking and data fusion techniques available under the open source project known as Stone Soup. They fused all data from two radar sensors and two RF direction finders and solved specific challenges such as data association, track filtering and track management. The Dstl jupyter notebook posted on Kaggle is a great example of how the C-UAS tracking and data fusion problem can be solved.
- **CERTH ITI Visual Computing Lab Team**: The CERTH ITI Visual Computing Lab team used a mix of well-known techniques such as the Hungarian algorithm to solve the data association problem and a machine learning solution for the filtering part.
- **Horizon Lab:** The Horizon team proposed an innovative solution based on machine learning, and although with less focus on challenges such as data association, track management or data fusion; their solution scored relatively high in the Mean Root Square Error (MRSE) parameter used in the ranking.

"The teams achieved very good results using classical tracking and data fusion techniques, as well as new machine learning approaches applied to solve the problem," said Dr Cristian Coman, Principal Scientist at the NCI Agency. "The NCI Agency will continue to periodically challenge researchers and technology enthusiasts with practical security challenges, linked to realistic datasets."

This challenge is part of a larger research and development effort at the NCI Agency aiming at developing effective remote sensing technologies suitable for detecting, tracking and identifying Class I UASs. The data released for this challenge was recorded in 2020 during a measurement campaign at the Dutch Ministry of Defence's Counter-UAS Nucleus, in the Netherlands…

Watch this YouTube video for more information about our work with unmanned systems.

NCI Agency scientists are researching how to counter threats posed by small drones. Watch this video to learn more about their work. The scientists were interviewed in 2020 during a measurement campaign at the Dutch Ministry of Defence's Counter-UAS Nucleus in the Netherlands. During the measurement campaign, the scientists flew different models of drones to gather data. That data can be used to train algorithms to better detect drone signals. The effort was sponsored by NATO through its Defence Against Terrorism Programme of Work.

Xitadel has a new look

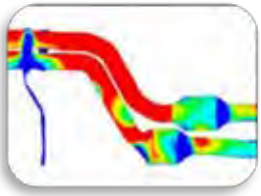
Pushing the Frontiers of Simulation

Xitadel is a vision driven company that will help you achieve your Product Development objectives with NexGen Simulation technology. We incorporate the latest advances in Lightweight materials, Optimization techniques and Multiphysics. We push the frontiers of simulation with the latest technological advances in Process Automation, AI/ML, IoT, Digital Twin and Data Analytics.

XIPA - Pioneering Technology Innovation - XIPA (Xitadel Intelligent Process Automation, a pioneering CAE technology powered by ML. This Blue Ocean Technology transforms the traditional onerous task of building complex models to a "button-push" implementation.

It achieves an unprecedented level or productivity in the Automation of the Model-Build process. It's very simple Graphical User Interface allows for meshing and modeling with just a push of a few buttons.

Two of the many upcoming webinars



July 29th -

Speaker - Pradeep Ramu, Product Specialist - TAITherm

New Muffler Capabilities to Maximize Your Exhaust System -

August 11th

Speaker - Sreejeesh Mammily, Product Specialist - SIMULIA

Modelling Rubber & Viscoelasticity for Automotive Applications

Art's Blog

My Razor Died!

"Oh-No! My Schick adjustable injector safety razor has died. The plastic dial that adjusts the blade exposure stripped its gears."

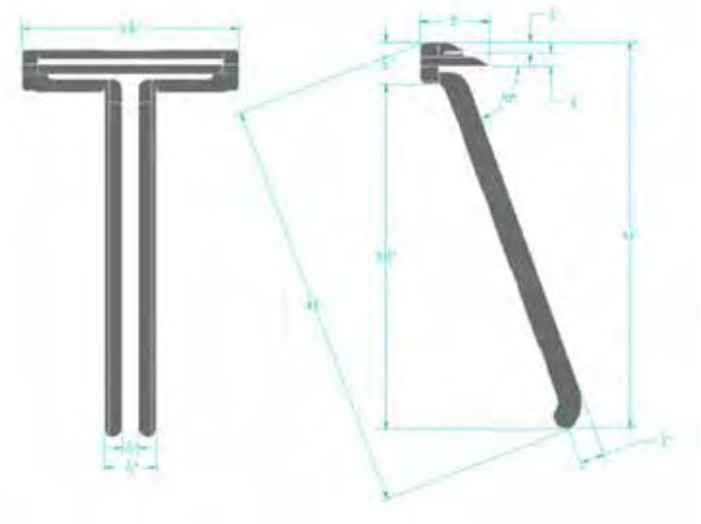
This razor has served me well over the last 40+ years. It has traveled all over the world and only once was I stopped at airport security. I didn't want to throw my trusty razor in the garbage can just because the young security guard had no idea what it was. It only had 1 blade like a box cutter and not 3 to 5 blades like new disposable razors. I asked, "can I give you the blade and keep the razor?" The confused guard agreed. I handed him the stainless steel, polymer coated, special operations cutting weapon and passed through the checkpoint.

Now the big decision. Do I purchase a new single blade razor or an electric razor? First stop is Amazon. There I find an "Amazon Choice" 5-blade Gillette Fusion or a "Best Seller" 3-blade Gillette Sensor. I was left wondering what happened to the old standby single edge razor? I moved on to searching electric razors. This search turns up the Braun series 5, 7, and 9. Sort of like buying a BMW 3, 5, or 7 series car.

I decided to stay with what I'm used to, a single edge safety razor, and start a Google search. This turns up brands I know (e.g., Gillette, Wilkinson Sword, Merkur) and a plethora of brands I never heard of (e.g., Qshave, RazoRock, Jungle Culture). I eventually found 3 of interest, all new kick starter brands.

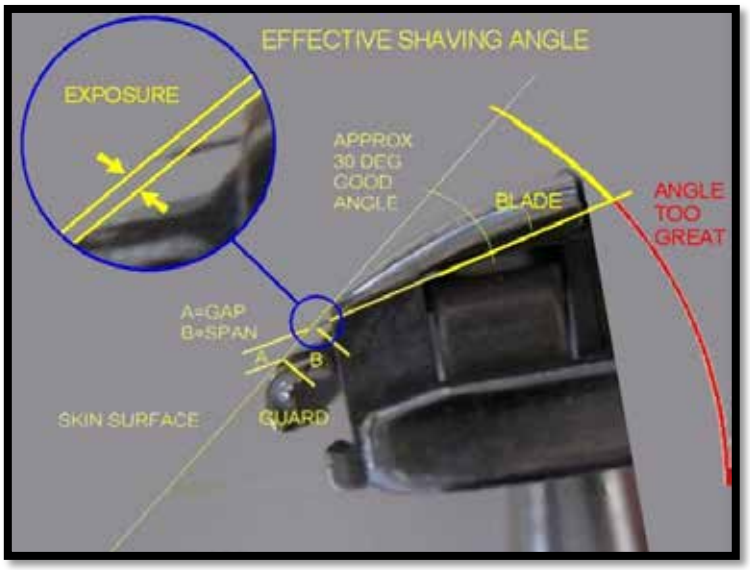
1. The Single Edge 2.0	https://supply.co/products/the-single-edge-razor
2. One Blade:	https://www.onebladeshave.com
3. Occam's Razor:	https://www.kickstarter.com/projects/628200436/occams-razor-simplify-your-shaving-by-the-blades-g

"I down selected to Occam's Razor because of the hidden meaning in their company name (the simplest explanation is usually the best one) and they present a dimensional drawing of their razor which appeals to my engineering inner self."



Two things are apparent in the left view. I like the 2 large horizontal gaps which will allow shaving cream and hair to easily pass through and keep the cutting edge clean. However, I'm not sure I like the large width (39 mm) of the shaving head. This will take some time getting used to since it is 11mm longer than my old Schick safety razor. The reason for the large head is to insert Feather Artist Club Razor Blades which are the best on the planet. More about blades later.

Now my engineering curiosity kicked in. What are the critical parameters in razor design? These include blade gap, blade span, blade exposure, blade angle, guard span, cap span, and shaving angle. The correct combination will maximize hair removal and minimize skin irritation.

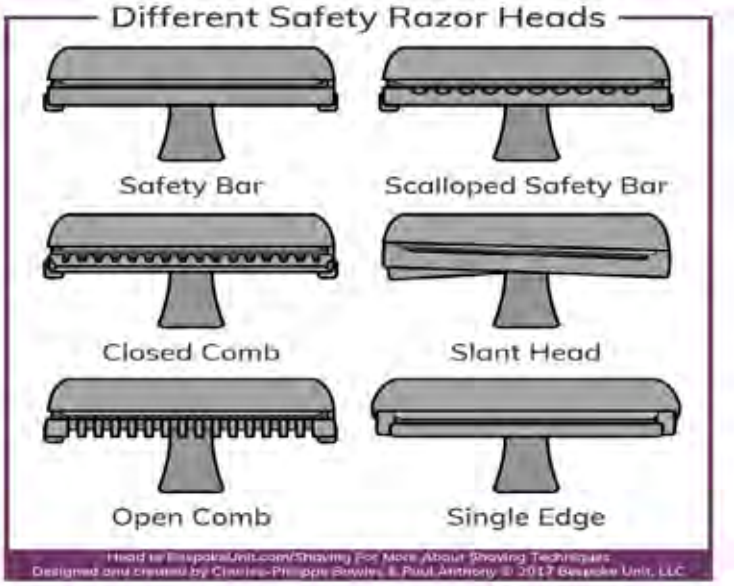


Aggressiveness of a safety razor can be thought of as the degree to which a blade is exposed to the face and beard. Aggressive razors have a large blade gap. A large blade gap leads to quick hair removal, but since more of the blade is exposed to the skin, there is greater risk of nicks and cuts.

"I can sense the blade cutting my beard when I dial in a large blade gap on my Schick. I also end up with a razor burn on my neck."

The web site (https://www.executive-shaving.co.uk/double-edge-razor-blade-gap-explained) presents a table of popular razors and their blade gap. Some of the entries are duplicated in the following table.

Model	Blade gap
Gillette Slim – Setting 1	0.38mm
Gillette Slim – Setting 3	0.43mm
Merkur 34C	0.50mm
Feather AS-D2	0.74mm



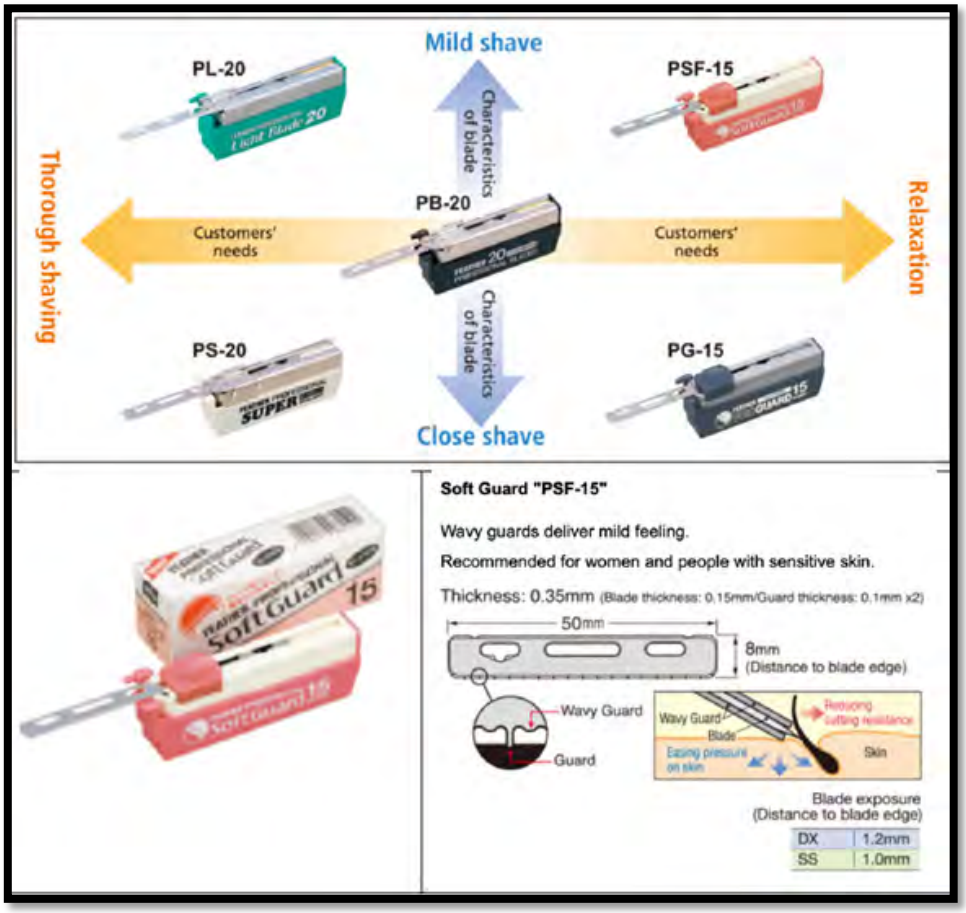
This gets further complicated if you consider safety bar design. The safety bar sits just below the razor blade. This ensures that the blade is properly guarded to avoid accidental cuts and nicks. However, the way these are designed will change the type of shave you experience. Flat edges tend to be gentler when the blade meets the skin while combed guards will be more aggressive.

And last but not least is the choice of razor blade. This turned out to be as difficult as choosing a razor. While all blades follow a standard design to fit into safety razors, what differentiates the blades is their sharpness. Some blades are sharper than others. Sharper blades will slice through stubble more easily, but when paired with an aggressive razor, can cause irritation for those with sensitive skin. This web site ranks several blades according to sharpness and recommends use from advanced shavers to beginners.

https://www.beardandblade.com.au/blogs/academy/choosing-a-double-edge-blade-for-your-safety-razor

Amazon offers a sample pack consisting of 2 individual blades from 15 different brands to help with your decision.

Now back to my choice of Occam's Razor. This razor is designed for Feather Artist Club Blades (https://www.feather.co.jp/en/bh_Products/professional.html) . These blades are inserted into straight razors used by barbers and hair salon stylists. I decided to start with the Soft Guard blade as I develop technique in using my new razor.



The optimum razor comes down to individual preference because we each have a different beard (soft hair to coarse hair), skin sensitivity, and shaving technique.

"I hope your current razor lasts for many years because choosing a new razor and blade combination is a bit overwhelming."

RBF Morph

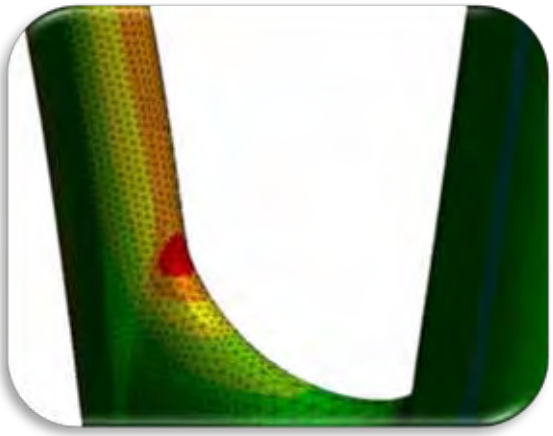
Case Study on Page 18 published the ENGINSOFT pdf format Newsletter

A natural remedy for hot-spot stresses

Using advanced mesh morphing to seamlessly perform bio-inspired structural shape optimization.

Excerpt

This paper demonstrates how the biological growth method, studied by Mattheck in the 1990s, can be easily implemented for structural shape optimization finite element method (FEM) analyses using advanced radial basis functions (RBF) mesh morphing. We use the same mechanism observed in tree trunks: hot spots of higher stresses promote material growth as well as reducing the stress itself thanks to the added thickness. Mesh morphing is a key enabler in adapting the desired shape, calculated over the surface of the finite element analysis (FEA) mesh, to the entire solid domain. According to the same principle, material can be also removed allowing for lighter structures. We first explain the method by studying a tree trunk and then through a variety of successfully addressed structural optimization challenges



Video - How a tree trunk reacts to stresses

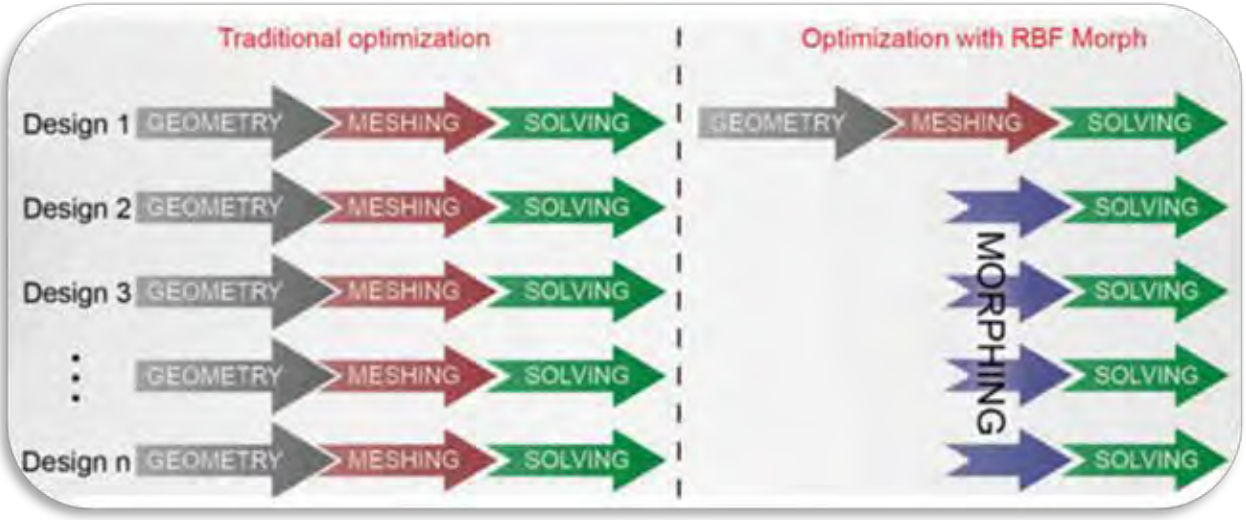
Learn how nature can reacts to stresses by adding new materials.

The biological growth method here explained can be used to optimize the shape of structural components as well.

RBF Morph

Website - RBF Morph is a unique mesh-morphing technology that combines a very accurate control of the geometrical parameters with an extremely fast mesh deformation, fully integrated in the solving process. Our mission is the development and broad application of simulation technology to synthesize and optimize designs, processes and decisions for our clients that need better performances in less time.

RBF Morph technology - The aim of the RBF Morph technology is to perform fast mesh morphing using a mesh-independent approach based on state-of-the-art RBF (Radial Basis Functions) techniques.



The use of such Technology allows the CFD user to perform shape modifications compatible with the mesh topology, directly in the solving stage, by just adding one single command line in the input file.

The most important specifications are:

- mesh-independent solution -
- parallel morphing of the grid
- large size models (many millions of cells) must be morphed in a reasonably short time
- management of every kind of mesh element type (tetrahedral, hexahedral, polyhedral, prismatic, hexcore, non-conformal interfaces, etc.)
- support of the CAD re-design of the morphed surfaces

The final goal is to perform parametric studies of component shapes and positions typical of the fluid-dynamic design, like:

- design developments
- multi-configuration studies
- sensitivity studies
- Design of Experiment (DOE)
- optimization

Visit the website for complete information

We noticed this on a Social Media . Post by Jack Chessa, Chair of Mechanical Engineering at The University of Texas El Paso

(Jack F. Chessa, has been appointed as the University's delegate to the USRA.)

Photo: JR Hernandez / UTEP

UTEP Selected to Influential Group of Universities Dedicated to the Advancement of Space-Related Research - By UC Staff

The University of Texas at El Paso has joined the ranks of the Universities Space Research Association (USRA), a nonprofit corporation comprised of 114 universities that have demonstrated a commitment to the advancement of space-related science, technology and engineering. Several space and aerospace-related initiatives buoyed the UTEP's application for membership in the USRA. Those included the Technology Research and Innovation Acceleration Park in Fabens, TX (pictured above), part of UTEP's Aerospace Center (cSETR).

EL PASO, Texas — The University of Texas at El Paso has joined the ranks of the Universities Space Research Association (USRA), a nonprofit corporation comprised of 114 universities that have demonstrated a commitment to the advancement of space-related science, technology and engineering. The California Institute of Technology, the Massachusetts Institute of Technology and the University of Chicago are also among the association's member institutions.

USRA's current members formally admitted UTEP into the Association on May 17, 2021. Several space- and aerospace-related initiatives buoyed the University's application for membership in the USRA. Those included the Aerospace Center, also known as cSETR, which conducts research using computational modeling of heat flow, fluid flow and structural analysis to create test hardware and experimental facilities in space propulsion, small satellite design and combustion in the energy sector. The substantial number of recent UTEP doctoral graduates and current students in space- and aerospace-related fields, as well as the high number of courses available in these areas at UTEP, were also important components of the University's bid.

"This designation from the USRA is an important recognition of the transformative work that members of the UTEP faculty and staff are doing in the fields of space and aerospace research," said Roberto Osegueda, Ph.D., UTEP vice president for research. "From innovations in unmanned aerial vehicles to the creation of new ways to use natural resources in environments such as the moon, these projects aim to revolutionize not only their respective fields, but also the local community through the creation of new industries where our students can apply their talents."

We noticed this on a Social Media . Post by Jack Chessa, Chair of Mechanical Engineering at The University of Texas El Paso

Jack F. Chessa, Ph.D., chair of the department of mechanical engineering in UTEP's College of Engineering, has been appointed as the University's delegate to the USRA.

The eligibility criteria for USRA membership includes demonstrated significant contributions in space or aerospace research fields by faculty, and a substantial commitment to courses of study and dissertation research leading to the doctorate in one or more related fields.

"We are very pleased to welcome UTEP as a member," said Dr. Jeffrey A. Isaacson, USRA's President and CEO. "Its expertise broadens our collective strength in space-related science and technology, worldwide. We look forward to UTEP's active engagement with, and contributions to, our association."

UTEP's stature as a national center of expertise in space and aerospace research is poised for continued growth thanks to significant initiatives that are still taking shape. Those include a new Bachelor of Science in Aerospace and Aeronautical Engineering that was approved by The University of Texas System Board of Regents in early May, and the creation of the Center for Advanced Manufacturing and Aerospace, for which the Regents allocated $70 million in late 2019.

About The University of Texas at El Paso

The University of Texas at El Paso is America's leading Hispanic-serving university. Located at the westernmost tip of Texas, where three states and two countries converge along the Rio Grande, 94% of our nearly 25,000 students are minorities, and half are the first in their families to go to college. UTEP offers 166 bachelor's, master's and doctoral degree programs at the only open-access, top tier research university in America.

About USRA

Founded in 1969, under the auspices of the National Academy of Sciences at the request of the U.S. Government, the Universities Space Research Association (USRA) is a nonprofit corporation chartered to advance space-related science, technology and engineering. USRA operates scientific institutes and facilities, and conducts other major research and educational programs, under Federal funding. USRA engages the university community and employs in-house scientific leadership, innovative research and development, and project management expertise. More information about USRA is available at www.usra.edu.

Month	Start Date	Organized by	Conference - Symposium - Event
September	28th	Magna Powertrain	Electrification & All-Wheel Drive Congress - EAWD'21
September	29th	ARAI	Symposium on International Automotive Technology 2021
October	5th	DYNAmore	13th European LS-DYNA Conference 2021
October	19th	Carhs	Automotive CAE Grand Challenge
October	19th	ESI Goup	9th OpenFoam Conference 2021
November	17th	EnginSoft	37th Int'l CAE Conference and Exhibition - EnginSoft

13th European
LS-DYNA Conference 2021

37th Int'l CAE Conference
and Exhibition

Welcome to our town annex building exhibit hall. Coffee, of course vanilla, hazelnut, and other flavors are courtesy of our favorite coffee shop (not the rival coffee shop).

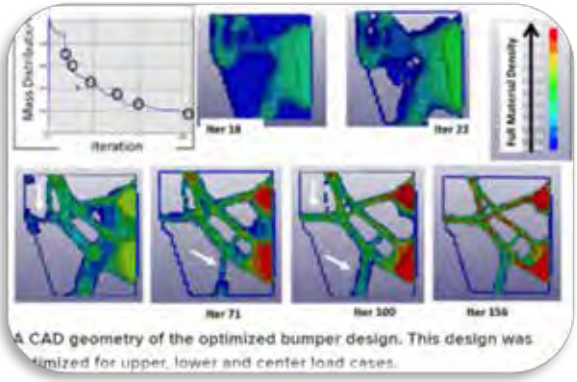
[Faurecia in Conversation, episode 1: active noise control solutions in the automotive industry]

In this first episode of Faurecia in Conversation, our podcast where we give the floor to our experts and meet the people changing the field of mobility, we speak to Jean-François Rondeau, General Manager of Faurecia Creo Dynamics.

Applus+ IDIADA [How 3D modelling decisions can influence the thermal performance predictions within a vehicle cabin environment]

Charalampos (Babis) Tsimis

"I got the chance to showcase the R&D our CFD team, and particularly my good colleague Paul Marston, was working on in the last few months on the topic. The focus of the work is to validate the CFD methodology (developed with Simcenter STAR-CCM+) against experimental climatic chamber results, and doing so while minimizing the amount of parameter tuning typically used in these type of simulations. I hope you enjoy it and learn something from it."



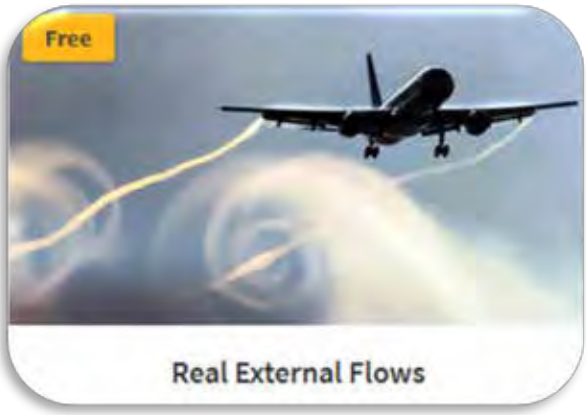
Optimization and CAE Automation - SIMCenter employs optimization techniques to automate and enhance the use of CAE tools. These numerical techniques allow engineers to deliver the best possible designs with exceptional performance in areas like weight, efficiency and manufacturability.

A CAD geometry of the optimized bumper design. This design was optimized for upper, lower and center load

The purpose of a vehicle's bumper system is to prevent damage to expensive and vital components in a low-speed collision. A heavy, strong bumper system increases fuel consumption and emissions, but a lighter, weaker bumper system might not provide adequate protection. Researchers used topology optimization to design a bumper that was stronger than the original design, but without adding weight.

These courses were in our suggestion box (listed as airport/plane interest) by The Old Retired Pilot - no one knows his name. You yell, "HEY, old retired pilot."
He hangs out at our town airport. (His brother is The Old Cattle Rancher - very strange family)

Fluids Engineering Courses - ANSYS



06/26/2021 - I SO hate lizard time of year. WHY? Because they attract the snakes - where there is lizard food there is rattle snakes. AND the lizard just has to want to live by the house in the garden.

Well, he did look at the camera for his photo so I guess he can stay.

06/21/2021 - There is always the one individual that sees a different perspective.

06/13/2021 - Well, below is the skunk, but he is early. He eats about 9:00 p.m. Tonight it still was light out and as soon as I put the food down, he was walking toward it -

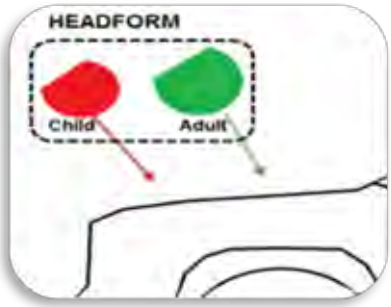
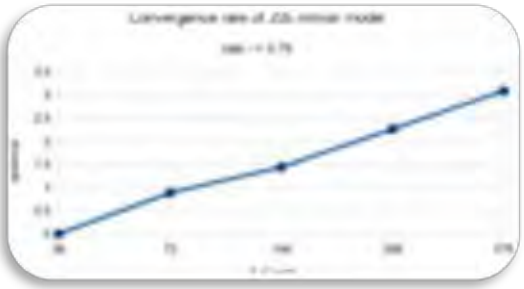
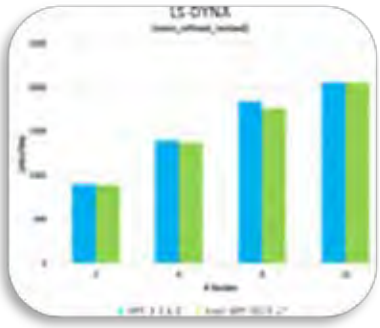
Odd, I am not afraid to slowly walk past the bobcat or the coyote but the little skunk? NO WAY!

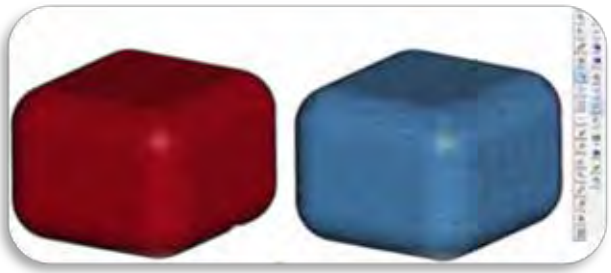
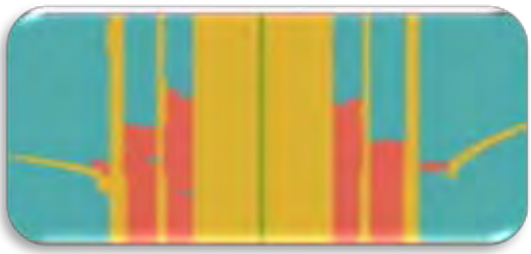
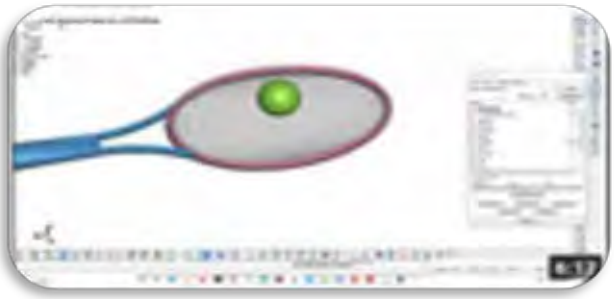
06/07/2021 - I accidently killed a snake.

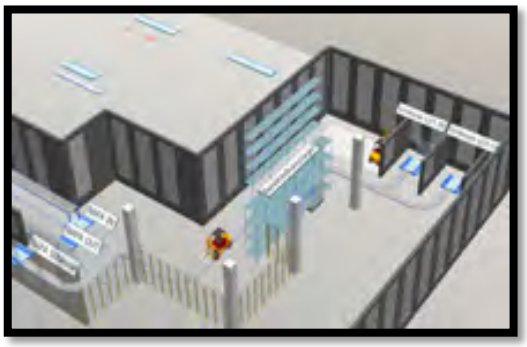
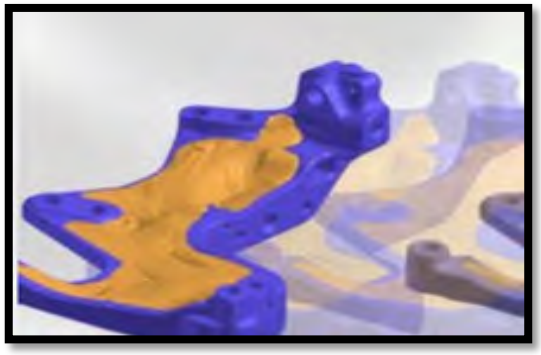
It was by my mailbox when I went to get the mail, and a close proximity to my leg (yes, I do wear snake chaps)

It coiled and rattled its tail. I honestly couldn't figure fast enough if it was a rattle snake or Gopher snake, so it kind of died.

My crow flew right over. I thought he wanted to make sure I was okay - NOPE - he wanted lunch! He cawed "Hey, Mom, I'll take care of this for you, you go inside your house and have coffee." Then he just grabbed it and flew off with it. Someone mentioned he is a Raven not a crow. I am not sure what he is other than a bossy bird!

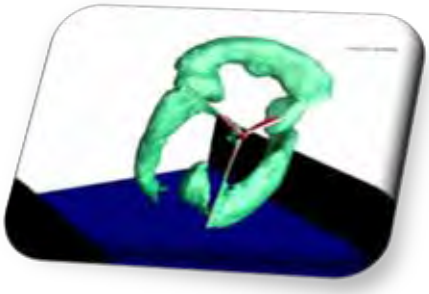
Y. Leost - An Engineering Approach of an X-Ray Car Crash Under Reverse Small Overlap Configuration	**M. Parab** - Pedestrian Head Impact, Automated Post Simulation Results Aggregation, Visualization and Analysis Using d3view
	
L. Rovira - Introducing Arup-Cellbond MDPB Shell Model	**H. Chen** - Structured ALE Solver with Large Models
	
O. Maor - The Effect of InfiniBand and In-Network Computing on LS-DYNA®	**P. Calzada** - Side Curtain Airbag Folding Methodology
	

M. Helbig - DYNAmore GmbH - Introduction to Material Characterization	Kaizenat - ANSYS Discovery – Internal Fluid Flow Analysis of Non-Return Valve
	
Ameen Topa - Box with Round Edges (Tetra Elements vs Hex Elements)	BETA CAE - From CT scan data to simulation results
	
Kaizenat - Tennis racquet pre-tension by LS-DYNA	
	

M. Rouman - **Siemens** - Leveraging simulation to advance pharmaceutical manufacturing	**ESI** - Virtual Prototyping predicts exterior noise levels for launchpad acoustics
	
EnginSoft - Aviospace: The Italian Aerospace & Defense Company | Interview with Eng. Giovanni Gambacciani	G. Deppe - **MSCSoftware** - Generative Design insights: A game changer for product development and industrial 3D printing
	
ESI - Dream up Your Most Innovative Lightweight Designs with Topology Optimization	**ANSYS** - R. Harwood - Achieving the Digital Mission Engineering Competitive Advantage: 5 Key Capabilities
	

06/28/2021 - My coffee shop has won the Coffee Challenge, in my own mind. And, we all know I loved the Lego Challenge. YES, you are right, we are heading over with our coffee to watch the Lego Challenge!

The Lego Challenge



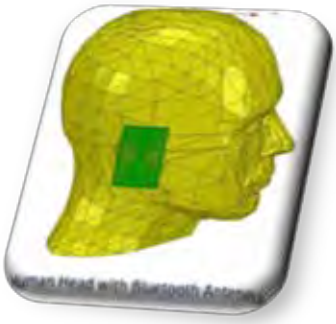
06/21/2021 - As we all know, I live in California, AND we have wind turbines - SO we are naming this week's coffee Windtubine with a dash of chocolate.LS-DYNA Multiphysics Channel

Wind turbine (HAWT) simulation

06/13/2021 - This video is essential to me since my snake chaps have these buckles! So buckle up your snake chaps and take your coffee, and we will head for YouTube (Okay, only I will buckle my snake chaps)

Kaizenat - **Buckle Clip Simulation I Kaizenat** - ANSYS - LSDYNA - CADLM

Buckles are fastening devices that are used to tie two ends of a belt, strap, etc. to keep them secure.



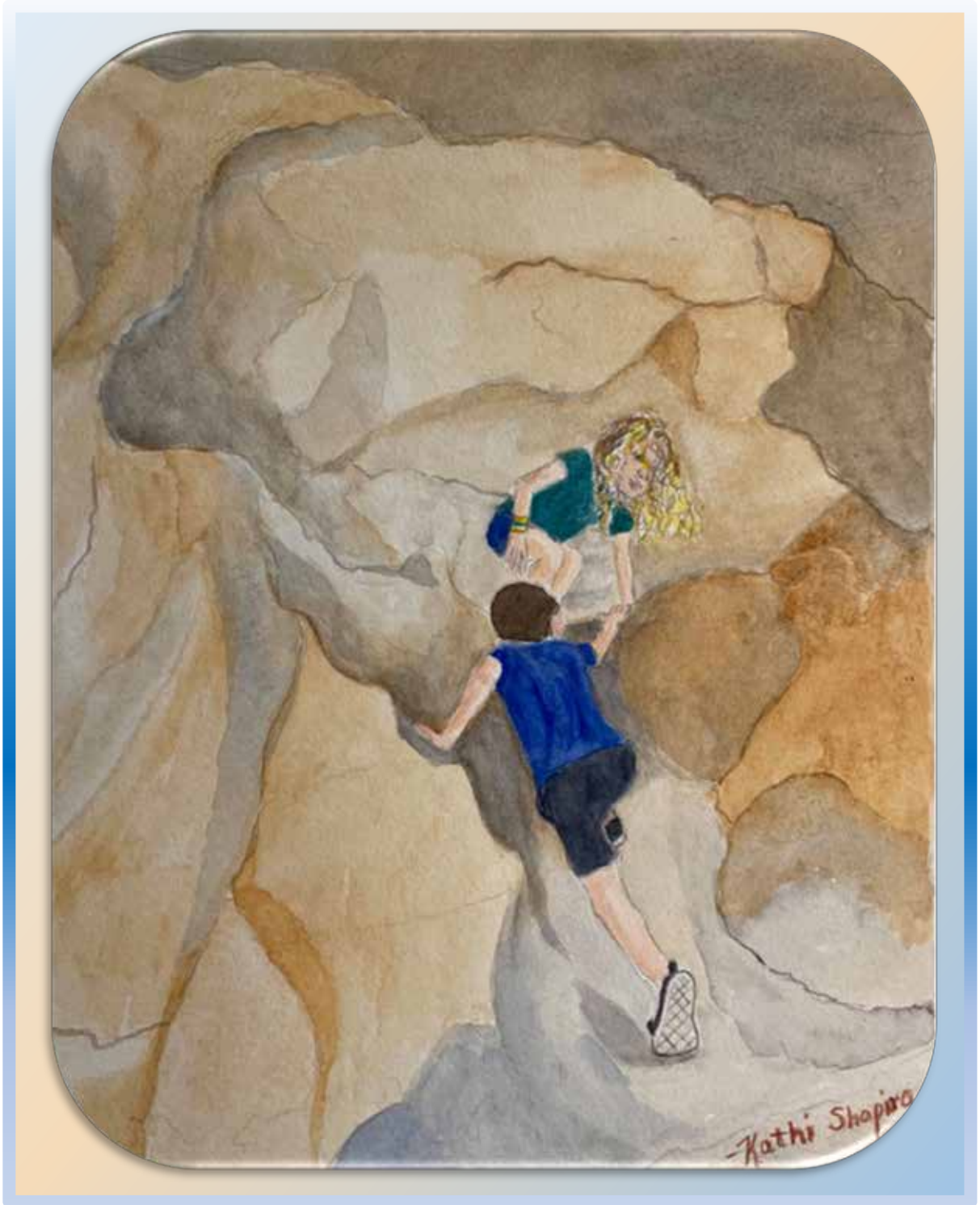
06/07/2021 - The good news is that my coffee does not have a SAR value (may have a high caffeine value). We will head on over to YouTube with our no SAR value coffee to find out about that cellphone you are using. I prefer to drink coffee than speak on my cell phone. Now I have a reason - it may be safer.

Kaizenat - **SAR distribution Smartphone direct usages and by Bluetooth usages**

K. Shapiro

Children climbing a cave near the ocean.

"Exploring an Ocean Cave"

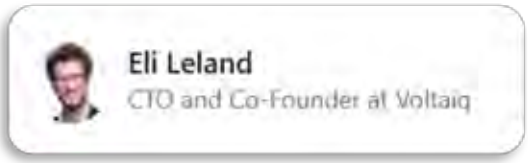


Review - Did you miss this?

July

EnginSoft

Taking stock: the evolution of simulation around the world pre- and post- Covid-19.



Voltaiq - Batteries Are Complicated - Eli Leland

This week we launched a new Medium publication "Batteries Are Complicated"

Video - CADFEM Learning

Now in English - CADFEM eLearning goes international with Brian Morris.

Now you can hear the training/seminars in English but you can still change it to hear the original German voice.

your platform for simulation training for engineers by engineers

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PIA Porsche Inter Auto - JerusalemaDanceChallenge

On the road to better times, together.

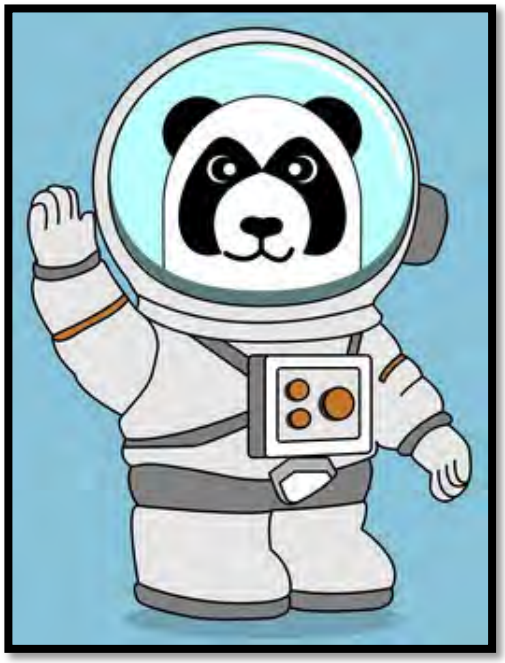
Goodbye - Come Back Soon

You are now leaving
Our Town
FEA Not To Miss
(Population - Virtual)

Please come back

Real estate available

Goodbye and Come Back Soon
Feel free to send a picture



Picture chosen and sent to our town by Laura. It's from the free "waving" pictures at Vecteezy.

Graphics Courtesy of Vecteezy

QUIZ ANSWERS -

Credit for answers: questions 1-3 doughnuts - question 4 you are served Coffee!!!!

1. Air Force R-99A - National origin Brazil Manufacturer Embraer
2. IA-63 in flight - National origin Argentina - Manufacturer FAdeA
3. North American P-51 Mustang - National origin - USA - Manufacturer - North American Aviation
4. Hawk - National origin - California, USA - Manufacturer - Mom and Dad Hawk