FEA - CAE Not to Miss & More - Eclectic & Innovative
February 2024 **ISSN 2694-4707**

Monthly Town Hall Meeting
Engineering, Research, Interests
www.feantm.com

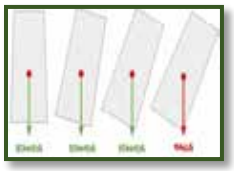
Curt - Autodesk


NASA - Lockheed

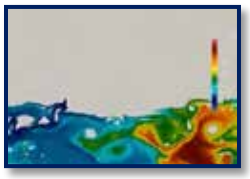
BAYKAR- EDGE

Auto - BMW

Abhinav - My Physics Café

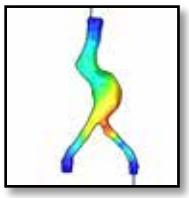



Marnie – LS-DYNA

Jenson - DFE Tech


Marco – RBF Morph

Metin - OZEN Engineering


Markus - CADFEM


Taylor – ANSA - ABAQUS


Marjorie – Altair - Event


Bala - RLE India – Meeting Rm.


FEA NOT TO MISS & MORE

FEA not to miss a/k/a (FEANTM) **a collective of individuals who exchange information**
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…from that point onward, you are removed - yes you can always come back.

Editors: **(alpha order) Anthony, Art, Brett, Churchill, Marnie, Marsha, Sabyl, Shweta, Taylor**

Jr. Editors**: Rheannon and Kensington (yes, she likes pink)**

Town Pretend to be Editors:

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

Town AI Editors:

The Robbins Family: Bart & Marjorie Robbins & the 3 Robbins Brothers – Grayson, John, Rick,

Contact us at: feaanswer@aol.com

Attribution: Map Vector & town vector graphics are courtesy of vecteezy

We will always remember

Parking & Coffee is free.

R & D - Camping - Town Map

Horse Trail → Yield right of way to horses

R & D Technology
Business Park Plaza

RV CAMPING
Park in any vacant camping site

CADFEM · OFETECH · DOZEN · d3View · Oasys · GITTENS consulting · rescale · ENGINSOFT

Town Hall

Library

Fire & Police Depts.

Lawrence Livermore National Laboratory

Coffee Shop
News
Marsha & Marnie

SIMQ

Wake Forest University
School of Medicine

HOSPITAL
Research

rbf

MEDITATE

Auto Race track & Auto Industry

Petting Zoo

Old Rancher

Riding Center

Convention Barn Welcome

Elect/Water. & Sewage Treatment Plant Facilities

- **Logos displayed represent companies/academia/research with solutions for today's world.**
- If you wish to have yours removed, kindly inform us at **feaanswer@aol.com**.
- Proceeds from the auction of your building will be allocated to the coffee budget.
- The map is subject to change - building sites will be rotated accordingly.

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- **The above doesn't imply that they are the author, with a particular company, or department**

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Welcome to our Town Hall Meeting & Announcements

Town Hall Meeting

Park Cars behind building
Park Tractors behind cars
Tie horses to hitching rails

Free coffee & Valentine Day CANDY!

The town consists of individuals who are passionate about finding solutions, as well as caring about animals and children.

Town Gossip is at the local coffee shop.

Pets are welcome. Horses, pet goats stay outside.

1. **The library is showcasing a paper from the 14th European LS-DYNA Conference: Meshless Methods in Workbench LS-DYNA.**
   Additionally, it is Library Game Night - Materials Intelligence: the Card Game.
2. **BUGLE, TA DA – A YouTube Video about LLNL showing 5 Surprising Things That Have Come Out of the Lab – My favorite is the mood ring - I had one. Your favorite? Possibly the mood ring OR DYNA3D or the 3 others. Now I want another mood ring!**
3. **We welcome to the town our new AI editorial family - The Robbins family.**
   Bart & Marjorie Robbins & the 3 Robbins Brothers – Grayson, John, Rick
4. **I've moved Dinky, Rheken, two CERT Teams (Critter Emergency Response Team) and (Community Emergency Response Team) to the end of the magazine. I'm trying for a logical order to the magazine. When you're retired & bored you have plenty of time to move things - my husband said no more moving furniture. OH, and the new vintage archive was added with curator Horatio Deermouse.**
   AND, that just proved Retired + Bored = Imaginary Friends. Was that math logical?
5. **AND grab your extra cup of coffee and off you go to this month's meeting.**
   We have a lot of software reported on. Enjoy & thanks for joining our meeting!

Article:
J. Huang "…It's crucial to use software that understands the principles of interference and diffraction, which are central to holographic image formation.."

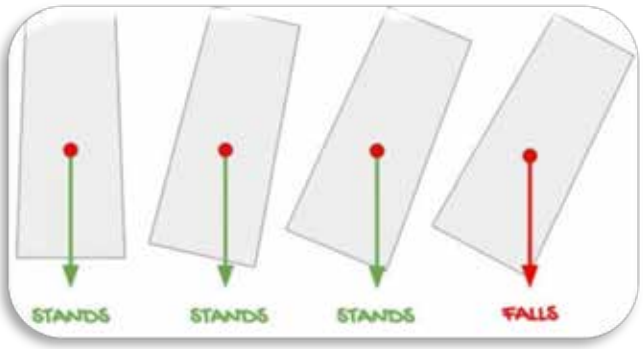
Article:
Optimizing the electromagnetic behavior of hearing aids - Bernafon, a global hearing healthcare company, helps people to hear and communicate better.

YouTube Simulation:
Did you know that ANSYS Rocky can accurately simulate material tipping processes? Computing the motion and effect of a large number of small particles.

Research Hospital:
Endovascular Aneurysm Repair is a revolutionary minimally invasive technique for treating abdominal aortic aneurysms, involving …a stent graft through the iliac arteries.

My Physics Café: CAE Analyst and a passionate blogger

Through sound engineering, humanity has been able to build structures that otherwise would have been impossible. Many ancient structures in the world, make us question the physical principles at work during their construction.



Web - [Balancing Act: The Wonders of the Center of Gravity]

Bonanno Pisano was a highly skilled medieval Italian architect and sculptor of the 12th century. Best known for his contributions to the construction of the iconic Leaning Tower of Pisa, cementing his place in history as a master of both sculpture and architecture.

The tower is a remarkable example of how the principles of physics can be used to create structures that are both

It has been a source of fascination and wonder for over 800 years, and its ability to remain standing despite its lean has been a subject of study and speculation for just as long. However, the reason why the tower does not fall can be attributed to the careful management of its center of gravity.

A structure's center of gravity is the point at which the weight of an object is evenly balanced, and it is this balance that allows a building to stand upright. In the case of the Tower of Pisa, despite its lean, the center of gravity has been carefully kept within its base, ensuring that the weight of the structure is evenly distributed and that the tower remains stable.

Despite earthquakes, storms, and wars, the tower has been able to withstand the test of time because of this careful balance. Take a look at below Free Body Diagram to understand how this actually works.

The mass of the tower is about 14500 tons and center of gravity sits lower than the top of its fourth floor. Today, the tower leans so much that a vertical line drawn from its outer edge meets the ground 4 meters far from the base.

Galileo took advantage of its unique geometry to conduct experiments on gravity by throwing objects down from its leaning side. A virtual demonstration of Galileo's experiment is available here.

Talking about another modern wonder which is Burj Khalifa, the tallest building in the world, has a center of gravity located near its center and its stability is ensured by its reinforced concrete core and a series of outrigger walls that extend from the core to the exterior walls.

This design helps distribute the weight of the building evenly, reducing stress on any one point and increasing its overall stability. The Burj Khalifa also has a sophisticated tuned mass damper system that helps counter any vibrations caused by strong winds or earthquakes, further enhancing its stability and ensuring the safety of its occupants…

ANSYS – Janaina Moura de Oliveira explains, "Understanding SPH and its applications can be essential for engineers, scientists, and researchers working on fluid-related problems across various domains."

Web **"Exploring Smoothed-Particle Hydrodynamics (SPH): Common Questions and Practical Applications"**
Janaina Moura de Oliveira

Rocky How To YouTube - In this Ansys Rocky How-to video, you will learn everything you need to know to get started with Smoothed-Particle Hydrodynamics (SPH), this Lagrangian mesh-free method, useful for accounting the fluid effect on particles in problems with high solid content and free surface flows. And you will also know more about the use of SPH with the DEM method.

Practical Applications - The Smoothed-Particle Hydrodynamics (SPH) is a Lagrangian mesh-free method for the continuum media simulations. It is useful for accounting the fluid effect on particles in problems with high solid content and free surface flows. Here are some frequently asked questions about SPH:

What is SPH and how does it work? SPH is a mesh-free Lagrangian method for simulating fluid flow and other physical phenomena. It represents fluids as a collection of particles and uses a smoothing kernel to interpolate properties between neighboring particles. This allows it to model complex fluid behavior with high accuracy.

Where is SPH commonly applied? SPH is widely used in fluid dynamics simulations, including ocean modeling, astrophysical simulations (such as galaxy formation and star formation), and industrial applications like dam break analysis and hydraulic engineering.

Can SPH be used with other physics? The SPH method can be used with other physics such as the DEM method (Discrete Element Method). The SPH-DEM approach allows the capturing of free-surface flow dynamics by discretizing the fluid into a set of fluid elements. Powered by a computationally efficient GPU-based solver, the SPH entity allows the solving of practical problems in engineering applications.

What are the advantages of using SPH over traditional grid-based methods? SPH offers several advantages, including natural handling of free surfaces, adaptability to complex geometries, and inherent parallelism. It excels in scenarios where grid-based methods struggle, such as simulating fluid-structure interactions or extreme fluid deformations.

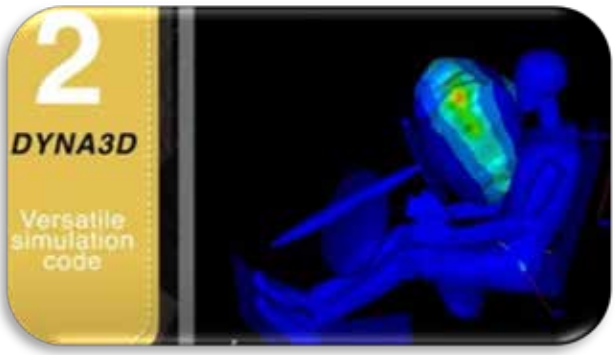
What is smoothed particle hydrodynamics kernel function? The kernel function is the core of the SPH method as it dictates how a local fluid property is computed based on the neighboring SPH elements. The kernel functions look like a Gaussian function but have compact support, being equal to zero above certain pre-set values of the argument, which is the distance between SPH elements.

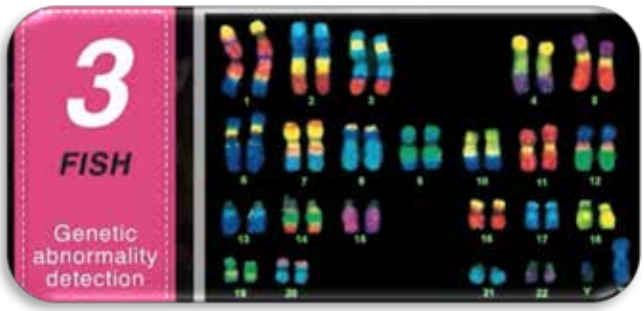
News from Livermore, CA - LLNL YouTube

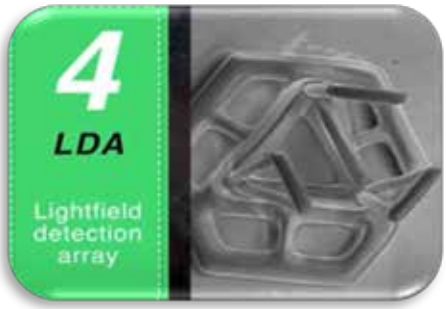
Excerpts - the video showing the 5 that Maren Hunsberger explains in detail, history, person who created it and its accomplishments. Great Video.

LLNL- Youtube - Maren Hunsberger "You may know Lawrence Livermore for its world-renowned scientific research, but there are some technologies that went outside the fence that may surprise you.

Here are 5!"







News from Livermore, CA - LLNL website: The Innovation and Partnerships Office (IPO) has launched a new software licensing portal to facilitate the adoption of the diverse proprietary software solutions developed by Lawrence Livermore National Laboratory (LLNL) researchers.

WEB - **LLNL's new software licensing portal open for business**

The portal is another outlet from IPO to promote technology transfer through partnerships and licensing opportunities to the private sector.

This new website is designed to complement LLNL's open-source software catalog with the shared goals of promoting industry adoption and innovation in academia.

Ultimately, the software portal with its proprietary software catalog help fulfill LLNL's vision "to enable U.S. security and global stability and resilience by empowering multidisciplinary teams to pursue bold and innovative science and technology."

In the new software licensing portal, a variety of LLNL software is made available to users through different types of licenses, ranging from non-exclusive end user licenses to custom proprietary options.

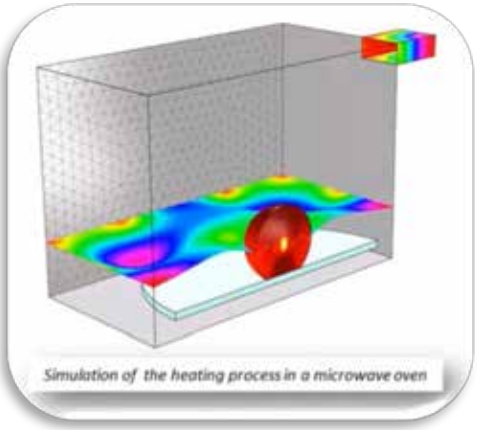
By tailoring license agreements to specific needs, IPO is able to work with businesses that are interested in distributing software as well as those keen on incorporating LLNL software into commercial products.

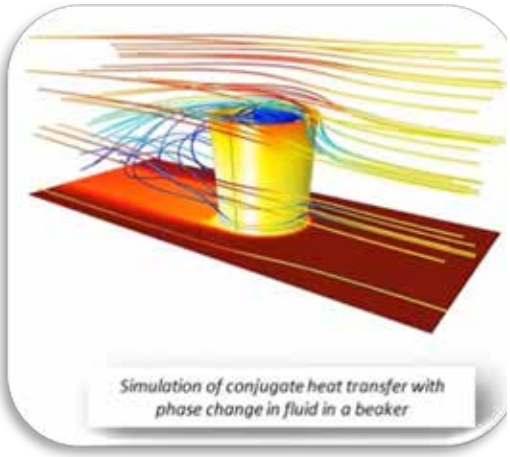
To provide easy access to LLNL software, the new storefront was designed to be user-friendly (requesting a license takes just a few mouse clicks), which streamlines user access to LLNL's growing number of proprietary software. The portal also is integrated with IPO's external website, presented alongside LLNL's other technologies that are available for licensing.

COMSOL, "Simulation software can be used to improve processes and devices that are used in food production, preparation, and packaging."

Join us watching a webinar in the Comsol gallery about Simulating Food Industry Processes and Devices.

WEB – Comsol Webinar - [Simulating Food Industry Processes and Devices]


Simulation of the heating process in a microwave oven


Simulation of conjugate heat transfer with phase change in fluid in a beaker

In this archived webinar, we show how COMSOL Multiphysics® software can be used for simulating both food industry processes (such as cooking, freezing, and drying) and devices used therein.

We also discuss heat and mass transfer, refrigeration and heating appliances, food safety and quality, and drying and processing techniques.

Simulation software can be used to improve processes and devices that are used in food production, preparation, and packaging.

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Chapter Selections

- Introduction and Agenda (0:00)
- Multiphysics Simulation in the Food Industry (1:10)
- Simulation Capabilities of COMSOL Multiphysics (5:59)
- What COMSOL Users are Simulating (15:42)
- Live Demo (18:31)
- Application Discussion (34:18)
- Relevant Applications from the COMSOL Libraries (45:22)
- Q&A Session (45:45)


Whirlpool's Minerva oven set up for an energy consumption test

Simulation results showing oven surface temperatures during a broil cycle

…

Autodesk – Be sure to read 3 Ways to Use Automated Modeling in Autodesk Fusion

Peter Chapneys, "Have you heard of automated modeling in Autodesk Fusion but don't how to apply it? Read on for three ideas."

Excerpts WEB - **3 Ways To Use Automated Modeling in Autodesk Fusion**

By Peter Chapneys

Automated modeling is a tool for automating the process of exploring and creating design concepts in Autodesk Fusion. Using simple definitions of what to connect and what to avoid, it uses generative design technology to create multiple design possibilities in a matter of minutes. Designs created in this way become a new body or component in your design that can be further edited as required, or simply used as inspiration for your own design ideas.

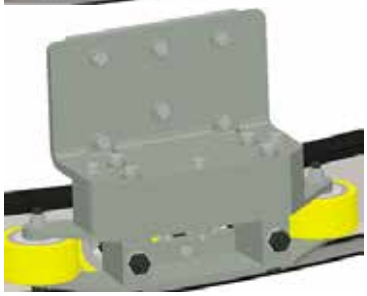
Since releasing this tool, we've seen it used in powerful ways, from accelerating the design process to creating new concepts to augmenting and enhancing traditional design workflows.

Let's explore how you can leverage automated modeling. Hopefully, these three ideas will inspire you to give the tool a try if you haven't already.

1. Use automated modeling for design automation - The first and most obvious way to use automated modeling is as an extremely fast automated design tool. To use automated modeling, simply select the faces you want to connect and the tool will use patented algorithms from generative design to automatically create a new component that connects the desired faces.

For example, say you want to create a relatively simple structure to 3D print, such as the camera mount for the drone shown in the images above and below. Simply select the different pieces you want to connect, and automated modeling will automatically create three to six realistic design possibilities in less time than it would take to model one. You can then click between the different designs to preview them or even adjust the thickness with a simple slider to fine-tune each one. Once you're happy with the results, press OK. Your new design will be created, either as a new body or a new component, inside your Fusion design file. This body acts just as if you had modeled it from scratch. It's fully possible to edit, manipulate, or use in downstream workflows such as simulation, manufacturing, or generative design.

2. Leverage it alongside generative design - Automated modeling uses generative design technology, but there are significant differences in how and when to use it. These differences can make the two technologies extremely complimentary. In this next example, we're working on a front-loader model. We need to create a design for the structural part marked in yellow which controls the tilt of the bucket. Automated modeling can help create design concepts very quickly, but with no concept of structural requirements, it is unlikely that it will automatically create our final design. During the beginning of the design process, automated modeling can help create a quick placeholder part to temporarily occupy space that a fully designed part will occupy later on.



We can then model our final part manually or using generative design. Generative design is well suited to solving problems like this where our component needs to be lightweight and has clear structural requirements. By quickly creating many iterations, generative design learns where it can add or remove material to create structurally optimized shapes.

By starting in automated modeling, we've already figured out our bodies to avoid and connection geometry, as well as our key concepts in generative design. So some of the work to set up a generative design study has already been completed.

Generative design then lets us add additional definitions to our setup, such as structural loading requirements and manufacturing process design. This means that generative design takes a lot longer to set up and solve—think a few hours rather than a few minutes. However, our final design will have much more intelligence built into it.

Automated modeling is so quick and easy to use, so it makes sense to include it as a step in your generative design workflow, even in cases like this where it is unlikely to form your final design. It helps get the early parts of the generative design process set up correctly, gives you quick feedback about what your designs may look like, and can serve as placeholder geometry while you work to complete your final design.

3. Try it for concept generation- We can also use automated modeling purely as a concept generation tool. Sometimes it can help to have a visualization of what a design may look like physically, rather than having to work from imagination alone. In the same way, automated modeling can be helpful to get some early ideas down on paper, just as we might sketch something ourselves. Only this time, the software is aiding the ideation process.

A great example of this process would be to quickly explore how we might consolidate parts on an assembly. Part consolidation is a powerful way to reduce component costs. However, by reducing the number of constituent parts, we can reduce the number of manufacturing steps and assembly required. Reducing the cost required for tooling, reducing the complexity, and reducing the time taken to assemble the part.

Automated modeling can be a powerful way to visualize part consolidation ideas. By selecting the things we want to connect together, the algorithm can quickly explore ways that our design might connect with a single body, rather than with multiple connected components. This visualization can spark ideas that may inspire us to make something completely new.

Peter Champneys joined Autodesk in 2016 having completed his master's degree in Mechanical Engineering at the University of Sheffield. A former innovator in residence at Pier 9, he works closely with Autodesk customers to help them implement and apply emerging technologies such as additive manufacturing and generative design

DFE-tech: We offer comprehensive software solutions that span the entire range of physics, providing access to virtually any field of engineering simulation that a design process requires.

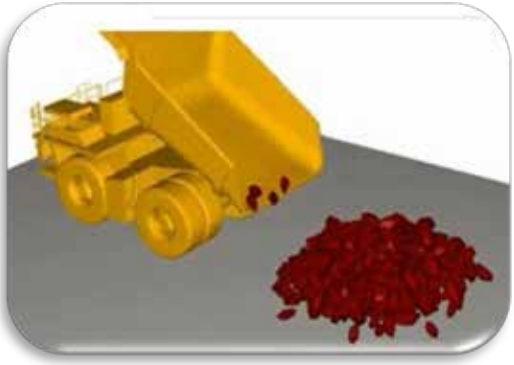
Did you know that ANSYS Rocky can accurately simulate material tipping processes?

YouTube - **Ansys Rocky DEM**

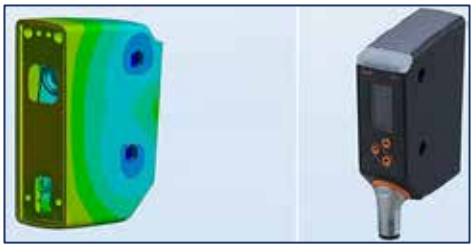
Capable to model real particle shapes including any solids, 2D shells, and rigid and flexible fibers. DEM is widely used for computing the motion and effect of a large number of small particles.

The simulation wase fast, accurate and completed in just a few minutes with ANSYS Rocky's native GPU solver.

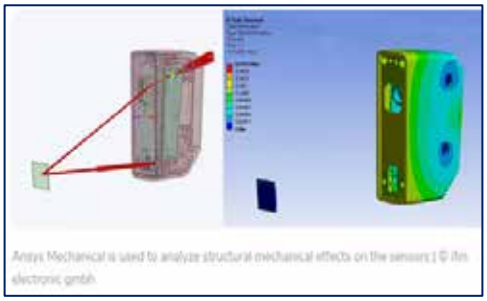
In addition to the simulations being fast and accurate Rocky DEM has multi-graphics processing unit (GPU) solver technology giving you the ability to simulate the behavior of different shaped and sized particles in many industrial applications.



CADFEM India: The name ifm electronic stands for automation and digitalization "made in Germany". One of the core areas is optical sensors, which must be able to record and transmit signals with high precision. This can only be achieved using several simulations, the combination of which was once a very time-consuming process: until an optomechanical workflow, together with ifm, was developed in Ansys.



Optoelectronic sensors from ifm | © ifm electronic gmbh



EXCERPT Website - [End-to-end simulation workflow for optomechanics - Quicker to high-precision optoelectronic sensors] -

Author: Alexander Kunz (CADFEM Germany GmbH)
Images: ifm electronic GmbH©

Contactless switches, light barriers, object detection, identification systems: Photoelectric sensors from ifm, headquartered in Essen and with technology centers in the Lake Constance reWith digitalization and the transformation to Industry 4.0, the demand for sensor solutions has increased
dramatically. High-performance, extremely reliable, and often highly specific products are in demand. The range of applications and areas of use are enormous.

Without the use of simulation technology, the development of optical sensors cannot be accomplished today. Early on, ifm established a competence team for simulation and calculation at the Center for Technology and Process Engineering in Tettnang. It was initiated and is still headed by Bernhard Schneider, who, at the SPS-IPC-Drives trade fair in 2012, discovered Ansys as the right software and CADFEM as the right partner for the sustainable use of simulation at ifm.gion, are omnipresent.

We have already worked on several projects together with CADFEM and have had consistently positive experiences in terms of project support and cooperation. Bernhard Schneider, Head of Technology and Process Engineering, ifm electronic gmbh

Structural Mechanical Simulations - The starting point - even if this Is not necessarily expected in the fields of automation and sensor technology - was structural mechanical calculations with Ansys Mechanical. The strength of components is an elementary quality feature that must be ensured if the component is exposed to thermal effects or vibrations. Analyses of this kind are time-consuming, error-prone, and incomplete, especially in early development phases on the test bench. The simulations carried out by Bernhard Schneider and his team have not only made the test cycles and development loops considerably shorter and more cost-effective, but have also provided many additional insights, including for further developments.

Continued on Website: Optical Simulations, Combined application with challenges, The optomechanical simulation workflow in Ansys, Digital Persuaders

ALTAIR - Did you know that James R. Scapa is the Founder, Chairman, and Chief Executive Officer, since1985. He brings nearly 40 years of engineering experience to Altair with his dual role of chairman and CEO

Through years of hard work Jim Scapa brought Altair to be a global leader in computational science and artificial intelligence (AI), providing software & cloud solutions in simulation, high-performance computing (HPC), data analytics, & AI.

WEB - **Altair Future Industry 2024** - March 6 - 7, 2024 Virtual Global Event

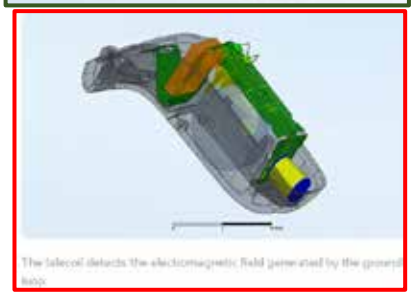
The event will once again be presented across three time zones to suit APAC, EMEA, and AMER regions. All presentations will have live audio translation into eight languages.

When data science meets rocket science, great innovation happens. Join us as we explore the future of what's possible in technology, as thought-leaders, industry experts and visionaries converge to share their insights on the latest trends that promise to reshape the landscape of tomorrow.

- Join us on Day 2 as we explore the latest in Simulation, Data Analytics & AI, High-Performance Computing (HPC) and Academia. Don't miss this unique opportunity to learn and network with industry leaders, colleagues and academic professionals.
- Start with the future of engineering track, Next-Gen AI & Engineering: Design and Simulation Intelligence, where we'll share real world applications of AI-driven design and simulation.
- Move on to the world of data enlightenment with Frictionless AI for the Modern Enterprise to learn more about the challenges and opportunities in achieving data maturity.
- In our HPC track Revolutionizing HPC in the Era of AI and Cloud, we uncover the power and potential of High-Performance Computing.
- Our academic track will host thought-leadership presentations from our academic partners who are at the forefront of current and future technology.

Featured Speakers

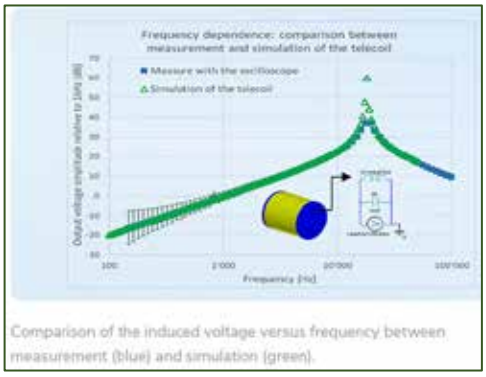
CADFEM: From our website: **Bernafon, a global hearing healthcare company**, **helps people to hear and communicate better.** Hearing devices with integrated transducers provide increased hearing comfort in public places such as theaters. However, the hearing devices must not be affected by internal electromagnetic fields to achieve this. Images: © bernafon



WEB - **Optimizing the electromagnetic behavior of hearing aids** - In hearing aids with integrated transducers, the magnetic field penetrating the telecoil should not be influenced by internal fields. Measuring and optimizing the influence of electromagnetic fields in a hearing aid

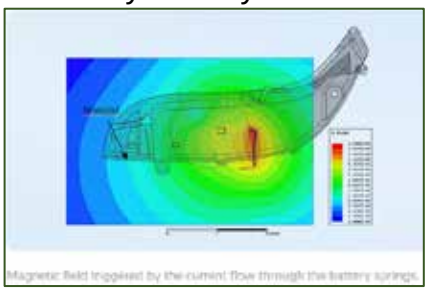
Sector: Consumer goods/durable goods, Health, Medical technology
Specialist field: Electromagnetics, Structural mechanics

Task - Hearing aids with integrated transducers enable increased hearing comfort for the hearing impaired in public places such as theatres and churches. An electromagnetic field is generated with a loop in the ground (hearing loop), which can be detected by a so-called telephone coil (telecoil) in the hearing aid. The hearing aid itself typically also emits electromagnetic fields. These superimposed fields pose a challenge with regard to an electromagnetically robust integration of the telecoil into the device. For the electromagnetic observations performed, the focus is on the simulation of the telecoil. The aim of the study was - besides the validation of the model - to investigate the influence of both the shape of the battery springs and the paths on the PCB on the output signal of the telecoil.



Comparison of the induced voltage versus frequency between measurement (blue) and simulation (green).

Solution - The induced voltage is determined with the eddy current solver in Ansys Maxwell. Capacitive effects are mapped via a connected external network. Since the battery springs geometrically represent a large coil, they influence the electromagnetic field, which significantly affects what the telecoil detects and thus also the induced voltage. The simulation showed that the deformation of the springs caused by inserting a battery into the device significantly changes the magnetic field that penetrates the telecoil. To investigate the interaction of the battery spring as a coil and the telecoil, it was therefore necessary to calculate the mechanical deformations in advance using Ansys Mechanical and to pass on the deformed Geometry to Ansys Maxwell. This made it possible to reproduce the behavior exactly.

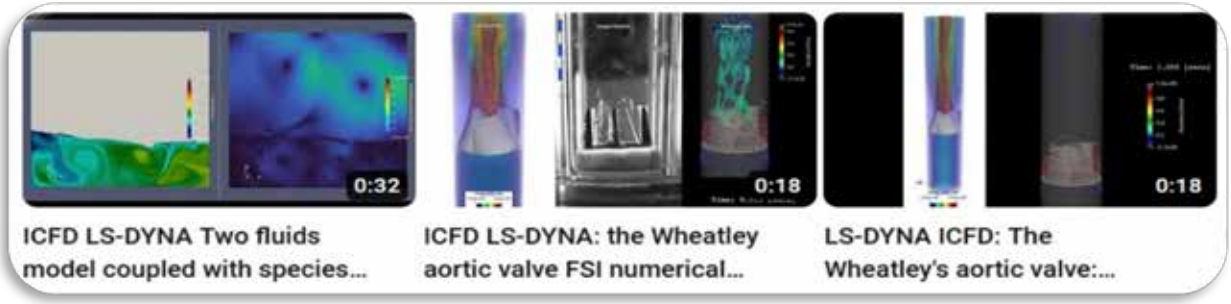

Magnetic field triggered by the current flow through the battery springs.

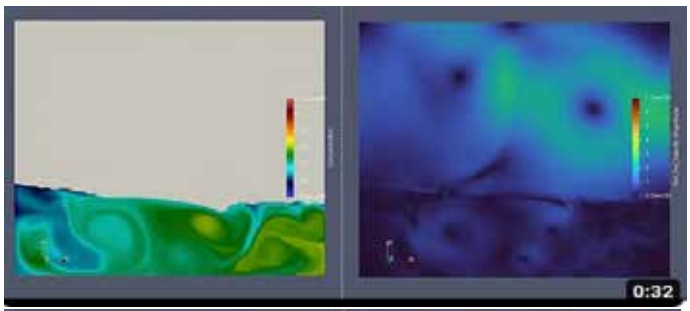
Customer Benefit - The project demonstrates that Ansys Maxwell together with Ansys Mechanical is a suitable tool for the simulation of electromagnetic fields in hearing aids and the stationary currents induced therein. This is also proven by the high agreement between measurements and simulations over a wide frequency range. Furthermore, the telecoil can also be used as a spatial sensor for local field strengths.

The simulations of the telecoil, the battery springs and the circuit board allow designers to minimize the interactions between the individual components without the need for time- and resource-intensive experiments. In addition, valuable insights into the electromagnetic coupling mechanisms of the device are gained, thus facilitating a targeted further development of the entire system.

News from the LS-DYNA Multiphysics YouTube Channel.

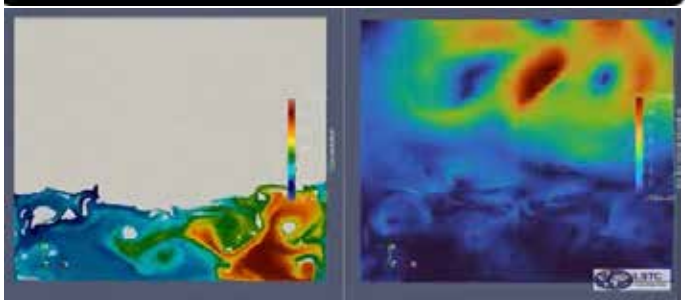
One of our favorite LS-DYNA channels with a few videos you may have missed.

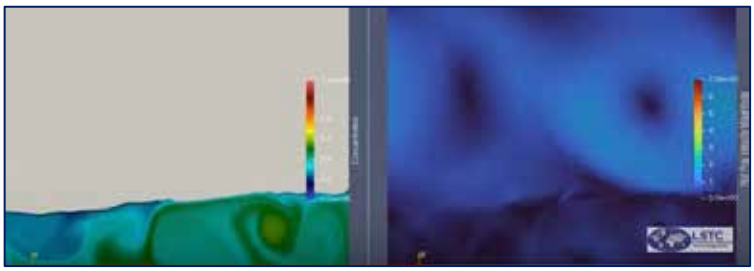


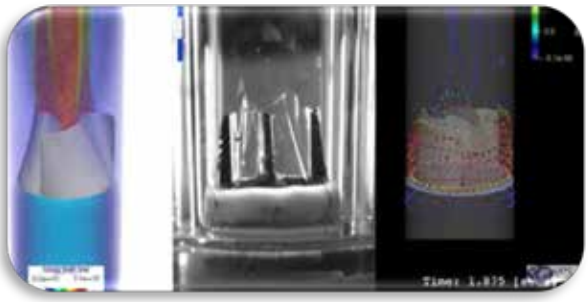


YouTube - [ICFD LS-DYNA Two fluids model coupled with species transport](#).
Air/Water system w/ a diluted species-left: water free-surface position and concentrations of the diluted species.

right: air and water velocity fields.
Can be coupled with heat transfer and FSI.



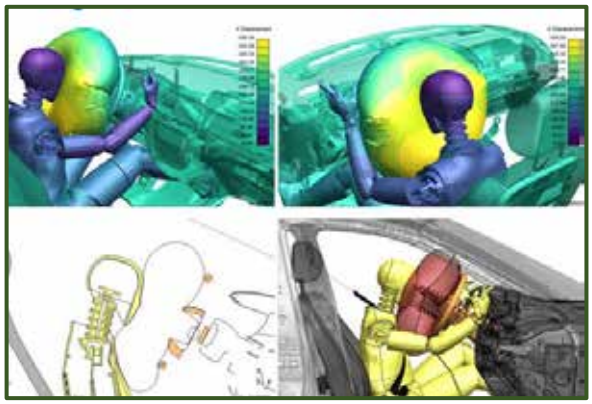




ICFD LS-DYNA: the Wheatley aortic valve FSI numerical model compared with the experiment recording. Article published in the International Journal for Numerical Methods in Biomedical Engineering (Wiley).

Solver: ICFD LS-DYNA. 2-way strong FSI coupling model of the experiment setup using all the physical properties of the experiments (physiologically compliant). No extra assumptions made.

OASYS: We've just released dates for the first Oasys LS-DYNA online training courses in 2024 and don't miss the webinar presented on YouTube



WEB - **Explore our range of support and guidance for getting the most out of the Oasys LS-DYNA Environment:**

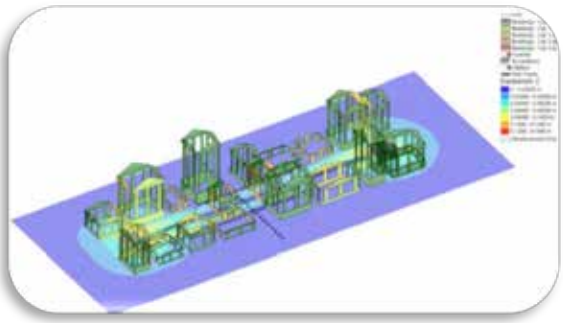
Below is one of our upcoming Oasys online training courses in 2024

Oasys PRIMER - Seat & Dummy Positioning and Seatbelt Fitting (online)
Date: 19 March, 2024 , Duration: 2 days
Location: Online Price: FREE for clients and potential new clients

This training course will provide a comprehensive overview of the Oasys PRIMER tools available for seat and dummy positioning and seatbelt fitting. The online format will run as a series of 3-hour sessions over two consecutive days. The online course will be run using Microsoft Teams.

Session 1: 19th March 09:30-12:30 GMT Session 2: 20th March 09:30-12:30 GMT

Presented on our YouTube Channel



YouTube - Ground Movement Assessments using Oasys XDisp and Interoperability with Oasys PDisp

Sissira Pereira – Application Specialist (Geotechnical)

Rahul Perulero Serrano – Product Manager (Geotechnical)

Watch this webinar to discover how OasysXDisp can calculate three dimensional displacements due to excavations, tunnelling, and mining. We also cover how XDisp can be used for building and utility damage assessment to predict the influence of tunnels or excavations on existing or proposed buildings and utilities.

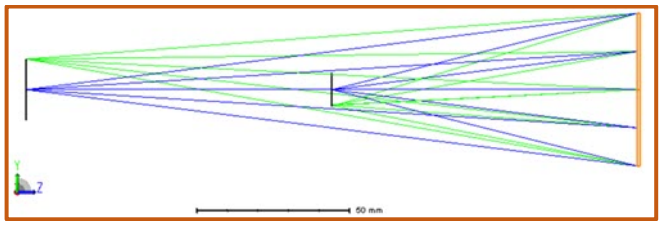
Touching on exporting contours which can be used with other software, we discuss the integration of OasysPDisp, showing how you can calculate displacements and stresses due to loading.

OZEN Engineering: Jeffery Huang explains, "**A hologram is a three-dimensional image formed by the interference of light beams that have been scattered off an object.** Unlike a photograph, which records only the intensity of light, a hologram records both the intensity and the phase of light. This allows a holographic image to appear three-dimensional, exhibiting parallax and depth as the viewer's perspective changes."

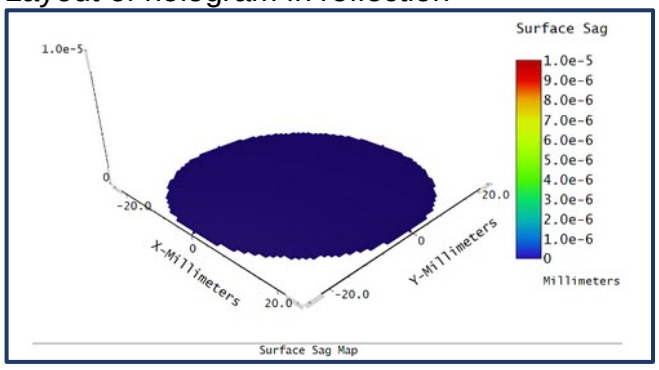
WEB - **Hologram Modeling in OpticStudio – Reflective Form**
By Jeffery Huang

The process of creating a hologram involves using a laser to split light into two beams: an object beam and a reference beam. The object beam illuminates the object, and its light is scattered onto a recording medium (such as a holographic plate or photosensitive material). The reference beam is directed straight onto the recording medium. The interference pattern between the object and reference beams is recorded on the medium, creating a hologram.

When illuminated with coherent light, such as a laser, during playback, the hologram reconstructs he original light waves, producing a three-dimensional image that appears to float in space. Holography finds applications in art, security features on credit cards, holographic displays, and other fields where three-dimensional visualization is valuable.



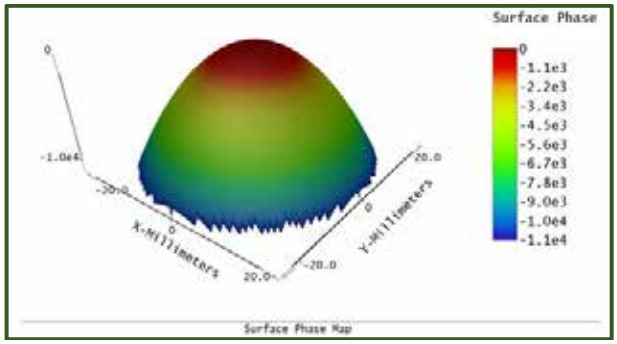
Layout of hologram in reflection



Surface sag map in mm

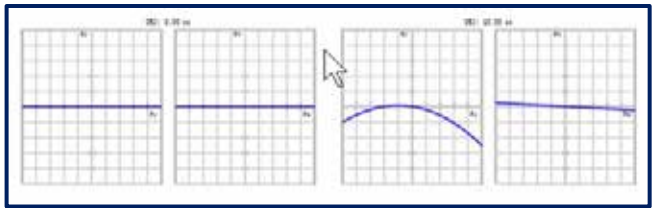
Hologram surface (orange in Figure 2) can be used to model optically constructed holograms. The hologram surface can be plane, spherical, or conical, and the medium behind the hologram can be air or glass. The glass can also be "MIRROR" which indicates the hologram is constructed and used in reflection. The hologram itself is described by the x, y, and z coordinates of a surface sag map is shown in construction points (Figure 3), a construction wavelength, and the diffraction order.

Holograms are constructed and used in transmission or reflection. There are occasions where the hologram is constructed in transmission, and then the substrate is aluminized and used in reflection. This special case can be simulated with the hologram surface by specifying a negative construction wavelength.



Surface phase map in periods of 2π

Surface phase in Figure 4 accounts for the size and shape of any aperture present on the surface, even if the aperture is decentered. The phase is computed on a uniform grid of points in XY plane, and the phase value is the displayed data. This feature defines phase in units of periods. One period represents a phase change of 2π. Surfaces which do not impart a phase change to the ray, such as the standard surface, will display a phase of zero everywhere on the surface phase display.

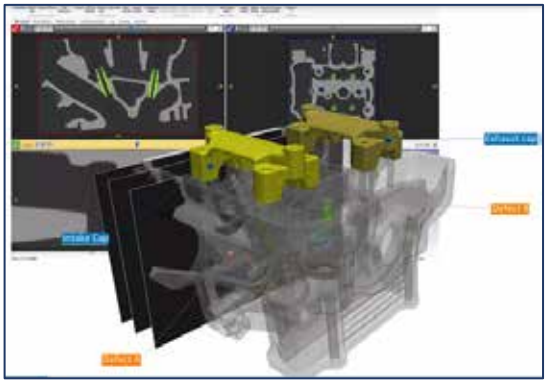

Optical aberration in both fields
(maximum scale: 1 mm)
Tranverse Ray Fan Plot

This system comes with two fields, 0 mm and 10 mm in object height. Figure 5 shows ray fan of both fields at image plane. It typically shows how rays from different field points and object heights converge or diverge through the optical system. The hologram surface generally does not induce significant aberrations. As seen, the aberration is limited in 0.5 mm.

For holography, it's crucial to use software that understands the principles of interference and diffraction, which are central to holographic image formation. Zemax is a powerful tool in optical design and analysis for all kinds of optical systems including hologram construction.

Congratulations to everyone on our team!
OZEN Engineering, Inc is the America's Channel Partner of the year!
Thank you everyone for your hard work! Thank you Ansys!

SYNOPSIS Simpleware – a complete platform for analyzing 3D image data, integrating CAD-designs, and generating high-quality models for FE/CFD simulation – **Provides a section for downloading datasheets and brochures for assisting you with learning and expertise at no fee.**



WEB - **Datasheets - Download the Simpleware FE technical datasheet for a list of all features available in the latest release.**

The Simpleware release includes many new features and improvements, including the new CMF CT tool in the Simpleware AS Ortho/CMF module, smart paint, automatic placement of connectors for 3D print preparation, and pores/particles analysis.

Below find excerpts among the many Solution Brochures & Datasheets offered to increase your knowledge and expertise.

- **Image Processing for Cardiovascular Applications**: Automated 3D image processing solutions for Cardiovascular applications. Powered by AI technology using Machine Learning (ML) algorithms.
- **Image Processing for Orthopedics & Craniomaxillofacial Applications**: powered by AI technology using Machine Learning (ML) algorithms.
- **Human Body Models**: CAD and simulation-ready 3D anatomical models for product design and R&D
- **Clinical Applications**: ScanIP Medical, FDA (510k) cleared 3D medical image processing platform for medical device design, 3D printing and pre-surgical planning
- **Life Sciences**, Medical image processing through to model generation for design, simulation & 3D printing.
- **Materials & Manufacturing**: including complex materials modeling, industrial part inspection, and digital rock physics.
- **Point of Care (POC) 3D Printing**: Aanatomical 3D printing for better patient intervention outcomes

Life Sciences:

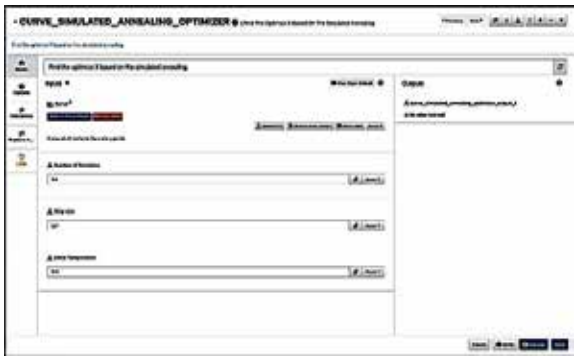
- **Analyzing Physiological Flows**: For medical image analysis of blood and air flows.
- **EM Simulation/Neuromodulation**: Generate reliable models for complex EM & neuromodulation
- **Orthopedics & Medical Device Design**: For orthopedics and patient-specific implant development.
- **Pre-Surgical Planning and 3D Printing**: Generating high-quality medical 3D models.

Materials & Manufacturing:

- **Composite and Material Characterization:** Visualize and quantify complex multiphase materials and their microstructure.
- **Design of Energy Materials**: Inspect & characterize energy materials such as fuel cells and batteries.
- **Digital Rock Physics and Geomechanics**: Visualize & quantify core samples & geological materials.
- **High-Value Part Inspection**: 3D visualization/inspection of high-value industrial parts from image data.

d3VIEW: Did you miss our blog by Bing?
Simulated Annealing with Polynomial Regression

Simulated annealing is an optimization method to find the global optimum of the objective function. It is inspired by the process of metal annealing which heats the metal to a very high level and cools down in a controlled manner.



Excerpts –graphics can be viewed on the website
WEB - **Simulated Annealing with Polynomial Regression**

In the SA algorithm, a random point is selected to start with. A new point is proposed at each iteration by making small changes to the current point. The point is then evaluated by the objective function to get a score (energy, cost) so that it can be compared to the previous point. If the new point has a better score, it will be accepted; Otherwise, it is accepted with a certain probability determined by the probability distribution. This probability distribution is determined by a parameter called the "temperature". It decreases gradually at each iteration. The idea behind the temperature parameter is that at higher temperatures, the algorithm is more likely to accept solutions that are worse than the current solution. This allows the algorithm to explore a wider range of solutions and avoid getting stuck in local minima. As the temperature decreases, the algorithm becomes more conservative and is less likely to accept worse solutions, which helps it converge towards the global optimum.

Polynomial Regression - SA algorithm works nicely with an objective function. When a dataset is provided, we could build a model first and use the model as an objective function. Polynomial regression fits a polynomial curve of certain degree to the given data points. When the degree is one, it becomes linear regression. Polynomial regression can be useful in cases where the relationship between the independent variable and the dependent variable is not linear, which is usually the case. By using a higher-degree polynomial, we can capture more complex relationships between the variables.

Adaptive model-fitting - For every 100th iteration, we stop and "zoom in" to the region centered at the current best point we obtained and run the SA algorithm there locally. We compare the optimum value from this local region and compare it to the best point and update the global best point when necessary. This procedure is activated when the "shrink_factor" is between 0 and 1 (exclusive). It shrinks the range for each variable from the original domain to a certain percentage (value of the parameter shrink_factor) centered at the current global best point. When the new reduced domain is determined, we run the SA algorithm on this region to find the optimum. This will generate a new polynomial regression model with the same parameters on a smaller domain. It will depict a more accurate local surface that can be used as the objective function.

SA optimization - In d3VIEW Workflow, there is a worker "dataset_simulated_annealing_optimizer" to perform the SA optimization. First, we upload the dataset and select the input and target variables (X and Y columns). The parameters "iterations", "step_size" and "initial_temp" controls the process of the SA algorithm. Their values may need to be carefully tuned as performance of the SA algorithm on different datasets vary. The default normalization method is "minmax" normalization, which normalizes each variable to a range of 0 and 1. Standardization normalization is also available ("znorm"). If we want to skip normalization, we can choose "false". By default, it returns the optimum point from the optimization process. We can also let it return the domain information (reduced domain if the shrink_factor is between 0 and 1) or the tracking history of the best point at each iteration, by selecting the "return_type". When normalization is specified, the output will be shown in the original scale without normalization…

Meeting Room 1

BALA – CAE specialist - Lead - RLE INDIA PVT LTD

"Do you know that a CAE Engineer can become a CEO of an Automotive company?"

Let's embark on the below steps - Yes, a CAE engineer can certainly aspire to become a CEO of an automotive company. Below is a broad outline of steps they might consider.

Education and Skill Development	Obtain a strong educational background in engineering, possibly with advanced degrees (MBA, leadership programs) to gain business acumen.
Professional Experience	Accumulate diverse work experience in engineering, product development, and leadership roles within the automotive industry.
Leadership and Team Management	Develop strong leadership and team management skills, possibly by taking on managerial roles where strategic decision-making is essential.
Business Understanding	Gain a deep understanding of business operations, finance, marketing, and other aspects crucial for running a company.
Networking	Build a robust professional network within the automotive industry, connecting with influential individuals and staying updated on industry trends.
Mentorship	Seek mentorship from experienced leaders in the automotive field to gain insights and guidance on career progression
Entrepreneurial Mindset	Develop an entrepreneurial mindset, focusing on innovation, risk management, and the ability to adapt to market changes.
Continued Learning	Stay informed about the latest advancements in technology, regulations, and market dynamics related to the automotive industry.
Strategic Decision-Making	Hone skills in strategic decision-making, understanding how business decisions impact the company's overall performance.
Proven Track Record	Demonstrate a track record of successful projects, initiatives, or improvements that showcase leadership abilities.
Communication Skills	Enhance communication skills to effectively convey ideas, strategies, and vision to various stakeholders.
Financial Management	Understand financial management and budgeting, critical for steering the company towards profitability.
Industry Involvement	Actively participate in industry events, conferences, and forums to build a reputation and establish credibility in the automotive sector.
Executive Leadership Roles	Progress through executive leadership roles, gaining experience at higher management levels before aiming for the CEO position.

Becoming a CEO is often a culmination of a career marked by continuous learning, adaptability, leadership, and a strategic approach to problem-solving.

Grow together - Bala

BALA – CAE specialist - Lead - RLE INDIA PVT LTD

"Do you know what is differences between REGULATIONS and NCAP?"

Crash test regulations and New Car Assessment Programs (NCAP) serve different purposes in assessing vehicle safety.

Let's take a look at the below chart for information to know.

	Regulations	**NCAP**
Objective	Mandated by governmental bodies, crash test regulations set minimum safety standards that vehicles must meet to be legally sold.	Voluntary programs conducted by independent organizations or governments to provide consumers with additional safety information beyond regulatory requirements.
Testing Criteria	Focus on basic safety standards and crashworthiness, often with specific requirements for structural integrity and occupant protection.	May include additional tests and criteria, such as pedestrian safety, advanced driver assistance systems (ADAS), and crash avoidance technologies.
Testing Scenarios	Typically involve standardized test scenarios, like frontal and side impacts, designed to evaluate a vehicle's performance in common crash situations.	Can incorporate a broader range of crash scenarios, including more complex simulations and real-world accident data analysis.
Rating System	Compliance is usually binary—vehicles either meet the regulatory standards or they don't.	Often uses a rating system to provide consumers with a more nuanced understanding of a vehicle's safety performance, usually on a scale.
Transparency and Communication	Government agencies typically communicate regulatory compliance, but the information may not be as consumer-friendly or easily accessible.	Emphasizes transparency and consumer communication, with results often presented in a way that's easier for the public to understand.
Incentives for Improvement	Compliance is a legal requirement; there may be penalties for non-compliance, but it may not inherently drive manufacturers to exceed minimum standards.	Provides an incentive for manufacturers to surpass minimum requirements, as achieving higher safety ratings can positively influence consumer perception and market competitiveness.
Global Consistency	Varies by region or country, leading to differences in safety standards worldwide.	While there may be regional variations, some global NCAP programs aim to standardize safety assessments across multiple markets.
Technological Advancements	May take time to update and adapt to new technologies, potentially lagging behind industry advancements.	Can be more agile in incorporating the latest safety technologies and innovations, providing consumers with insights into cutting-edge features.

While crash test regulations establish baseline safety standards, NCAP programs complement them by offering consumers more detailed information on a vehicle's safety performance.

Grow together - Bala

RBF Morph - Our contribution to the 14th European LS-DYNA Conference is the paper titled "***Advanced Reduced Order Model for EVAR Planning and Navigation Guidance***." Endovascular Aneurysm Repair (EVAR) is a revolutionary minimally invasive technique for treating abdominal aortic aneurysms, involving the deployment of a stent graft through the iliac arteries.

In our paper, we delve into the challenges associated with this procedure, particularly the straightening effect induced on the iliac arteries during the insertion of a stiff guidewire from the femoral artery to the aorta. **To the best of our awareness, this is the first study that combines morphing tools, reduced order models and finite element methods, i.e. LS-DYNA for this type of clinical application**

(14th European LS-DYNA Conference)

WEB - Reduced Order Model for enhanced EVAR Planning and navigation guidance

M. Emendi, E.Kardampiki,K. Stoverud, P di Giovanni, S.K. Dahl,
A. BEl-Brunon, V. Prot, M.E. Biancolini
U. of Rome Tor Vergata Italy - LaMCoS CNRS, France, -NTNU, Norway

Measuring this morphological alteration intraoperatively or predicting it preoperatively poses a significant challenge. The reliance on preoperative Computed Tomography (CT) without real-time updates during the operation can lead to suboptimal stent graft sizing, inaccurate choice of the stent's landing zone, and increased radiation exposure and contrast doses, especially in complex cases. **Our research addresses these bottlenecks**, **offering innovative solutions for enhanced EVAR planning and navigation guidance**.

Introduction - Endovascular aneurysm repair (EVAR) is a minimally invasive procedure for the treatment of abdominal aortic aneurysms that consists in stent graft deployment through the iliac arteries [1]. During this procedure, a stiff guidewire is introduced from the femoral artery towards the aorta to support the proper deployment of the stent graft. The insertion of the stiff wire triggers a straightening effect on the iliac arteries, smoothing out their natural tortuosity [2]. This morphological alteration is hard to be measured intraoperatively or be forecasted preoperatively [3]. The main bottleneck is that the preoperative Computed Tomography (CT) does not get updated during the operation. Consequently, clinicians perform their maneuvers according to the initial aortic configuration and inject contrast in the vessel to visualize their configuration when it is needed. This practice could possibly lead to sub-optimal stent graft sizing, choice of the stent's landing zone and to an increase in radiation exposure and contrast doses, especially in complex cases.

Hence, a real-time prediction of the guidewire path and arotic deformations could be helpful to ease device navigation and reduce post-operative complications. Taking this idea into consideration, this study proposed the generation of parametric reduced order model for the prediction of aortic deformation in a fast, interactive and user-friendly environment. To this end, morphological, clinical and mechanical features are introduced as input parameters.

The BMW Group Recycling and Dismantling Centre is not only Germany's biggest recycling centre, It acquires new recycling-knowledge while taking apart pre-series vehicles to achieve maximum efficiency. **The end of a vehicle's life is not a sight for car lovers, especially if they have weak nerves: metal groans, glass shatters. An excavator goes into action, its steel grapple grabbing at the engine block.**

WEB - **How our vehicles are shaping the recycling of tomorrow**

A jerk, a few flying parts, and what was once the heart of a BMW vehicle hangs in the air. But it doesn't stop there. **The excavator changes tools. It rips the roof of the car open and tears out the leather seats, the upholstery, the instrument panel.**

Then, with almost surgical precision, the excavator seizes the front of the wiring harness and rolls up the multicolor tangle of cables until the bundle dangles beneath the excavator arm. In this nondescript industrial estate in the Munich suburb of Unterschleißheim up to 10,000 cars undergo this treatment every year – making it Germany's biggest car recycler.

The BMW Group Recycling and Dismantling Centre (RDC) has been here since 1994, mainly dismantling pre-series vehicles, one-offs from testing and development that are not authorized for sale, tearing them to pieces and recycling them in the brightly lit workshops.

How to recover three kilometers of copper cable from one vehicle - In the context of the circular economy, however, the Centre doesn't just tackle recycling, but also the end-of-life stage of cars. How can they be recycled more quickly, more efficiently and more valuable in future and how do they need to be designed to enable the maximum possible number of their components to be reused, repaired or remanufactured. Modern vehicles contain between one and a half and three kilometers of cable alone, all mainly valuable copper. Other parts are rich in aluminium, the catalytic converter contains platinum, rhodium and palladium. All of these parts can be recycled. The BMW Group gains valuable knowledge on how to make the recycling process more efficient.

Special tools for specific tasks so that nothing is wasted - Once the high-voltage battery has been removed from vehicles with an electric drive for further recycling, it's time to get down to business: A loud bang. First, experts ignite the front airbags, then the ones on the side, then the seatbelt tensioners and finally the battery terminal. The interior of the car is full of smoke, there is a smell of fireworks. The pyrotechnics found in all vehicles have now been neutralized, as required by law. The RDC developed a special tool for this. Finally, all the fluids are removed – oil, wiper fluid, brake fluid, coolant. All fluids are reused within the RDC.

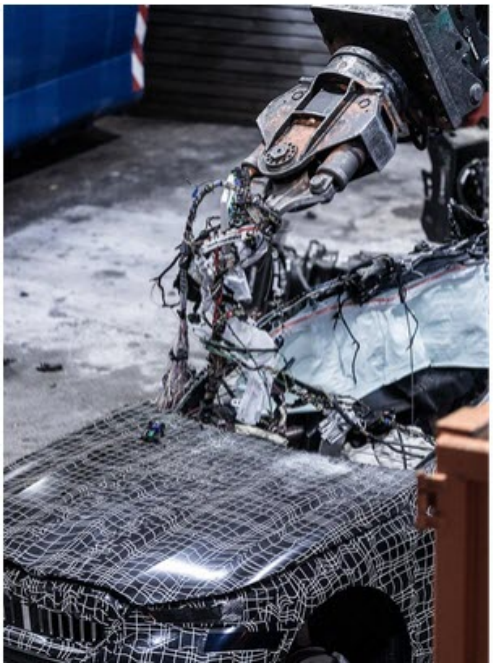
What is now left of the vehicle ends up in an orange scrap press. More splintering, crunching, groaning. Even the floor vibrates under the 300-tonne press force. All that remains is a cube the size of a fridge. This will be sent to an external recycling company for shredding: there, most of the materials contained in it will be shredded, separated, cleaned, melted down in further recycling steps, and finally returned to their secondary material cycles. With the creation of the metal cube, the carmaker has met its obligations. By law, 85 per cent of a vehicle must be recyclable and a full 95 per cent must be recoverable, which also includes thermal recycling.

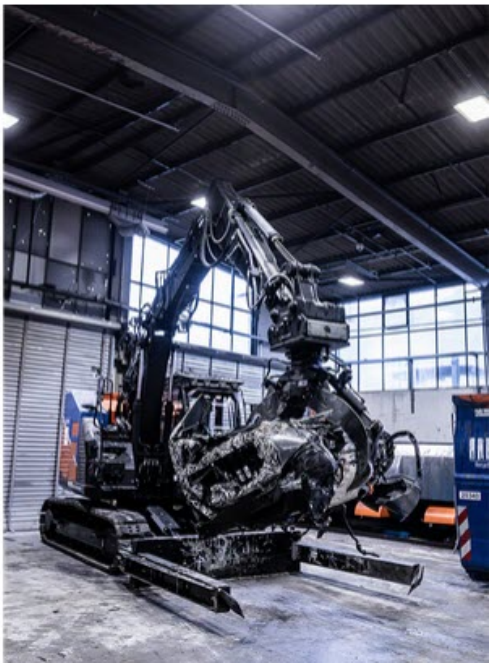
Sharing the knowledge with 3,000 recyclers worldwide - The main purpose of the RDC is to find the most efficient and quickest ways to recycle vehicles at the end of their useful lives – in about 21 years, on average. The steps required for this are logged in a cross-manufacturer database to which 3,000 recyclers

in 41 countries have cost-free access. These businesses are absolutely essential if the circular economy is to work: recyclers need to be able to remove the usable parts and recover as many materials as possible, with the least possible effort and expense. Cost and the ability to identify material composition remain the most important factors in the recycling process.

Cost or sustainability? This is the question that Alexander Schüll, manager of the RDC, wants to move on from. “We need to abandon that debate and be absolutely clear about the fact that sustainability is both the key and the starting point for progress towards systemic change. Only then will we have genuinely circular thinking.”

Only a circular mindset will succeed - This is why the RDC offers guided tours of the RDC – not least for staff in other BMW Group departments, who have to learn more about the importance of the recycling center and its various circular approaches. “Only if we take a circular approach to product development, if the mindset is circular, then we can achieve a good, sustainable, holistic solution,” says Schüll.





US Airforce Picture of the Month

An HH-60W Jolly Green II **flies over the Valley of Fire as part of a 53rd Wing civic leader flight from Nellis Air Force Base, Nev., Dec. 12, 2023. The aircraft proceeds the HH-60G Pave Hawk and boasts a digital radar warning receiver, laser missile, hostile fire warning and externally mounted .50 caliber weapons.**

(U.S. Air Force photo by Airman 1st Class Elizabeth Tan)

High altitude, low drag - U.S. Air Force operators assigned to the 82nd Expeditionary Rescue Squadron and Joint Personnel Recovery Center perform **high altitude, low opening training jumps** from a U.S. Marine Corps KC-130J Hercules cargo aircraft over East Africa, Dec. 27, 2023. HALO jumps are performed from altitudes with limited oxygen, requiring members to employ specialized training beyond standard parachute insertions. (U.S. Air Force photo by Staff Sgt. Allison

Two U.S. Air Force F-16 Fighting Falcons soar over the Indo-Pacific, Dec. 20, 2023. U.S. F-16s from the 35th FS and 8th Fighter Wing flew alongside Japan Air Self-Defense Force F-2s from the 8th Air Wing and South Korean Air Force F-15Ks from the 11th Wing to conduct a trilateral escort flight of two U.S. Air Force B-1B Lancers operating in the Indo-Pacific.

(U.S. Air Force photo by Senior Airman Karla Parra)

YouTube - [EDGE and Baykar Collaborate on Payload Integration onto Baykar's UAVs]

The Bayraktar TB2 is a medium-altitude long-endurance tactical UAV, capable of conducting ISR and armed attack missions with fully autonomous taxiing, take-off, landing and cruise.

Web - **[NASA, Lockheed Martin Reveal X-59 Quiet Supersonic Aircraft -]** Abbey A. Donaldson

The X-59 is the centerpiece of NASA's Quesst mission, which seeks to solve one of the major barriers to supersonic flight over land, currently banned in the United States, by making sonic booms quieter.

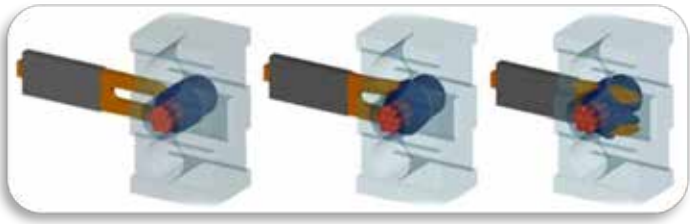
NASA and Lockheed Martin publicly unveiled the X-59 quiet supersonic research aircraft at a ceremony in Lockheed Martin's Skunk Works facility in Palmdale, California… The X-59 is a unique experimental airplane, not a prototype – its technologies are meant to inform future generations of quiet supersonic aircraft. The Quesst team will conduct several of the aircraft's flight tests at Skunk Works before transferring it to NASA's Armstrong Flight Research Center in Edwards, California, which will serve as its base of operations.

Web - **[RTX Raytheon's GhostEye® MR proves operational readiness during U.S. Air Force exercise]** - GhostEye® MR advanced medium-range sensor for the National Advanced Surface to Air Missile System (NASAMS)

GhostEye MR expands NASAMS' combat-proven capabilities against enemy aircraft, unmanned aircraft systems, and cruise missile threats. The radar was designed and developed by Raytheon, primarily through internal research and development investments.

During the recent exercise, GhostEye MR was successfully integrated with NASAMS' Air Defense Console and the Battlespace Command and Control Center (BC3), a command-and-control element used by the U.S. Air Force.

CADFEM Germany GmbH is working to create an open library of Ansys LS-DYNA. [1] industrial use cases. Two new Industrial Use Cases for Ansys LS-DYNA have been developed by CADFEM in 2023. They focus on using meshless methods and the Eulerian approach for real-world applications: SPG usage with GISSMO damage model to simulate material separation and SPH/S-ALE solver usage for inertia-dominated fluid-structure interaction (FSI).



DYNALOOK Website includes the pdf
WEB Meshless Methods in Workbench LS-DYNA

Ulrich Stelzmann, Yury Novozhilov,
CADFEM Germany GmbH

Alexander Pett, Erik Plugge
ANSYS, Inc.

Fig. 1 - Some steps during cutting wire isolator simulation with SPG process, with kind permission of ERNI GmbH, a TE Connectivity Ltd. company

EXCERPTS

2. Model and Methods - Best practice guides with detailed descriptions of the setting used and solutions adopted have been developed for both topics under consideration…

3. SPG usage with GISSMO damage model to simulate material separation

3.1. Simulation case overview

3.2 GISSMO support in Workbench LS-DYNA

3.3 SPG Support in Workbench LS-DYNA

3.4 Material separation simulation

4 S-ALE and SPH for inertia-dominated FSI with a very flexible container

4.1 Simulation case overview

4.2 Creating and deploying a bag driven by internal pressure

4.3 Generating fluid inside bag deformed shape and drop test

4.4 Simulation of bag filling driven by fluid injection

5 Conclusion

6 Literature

CARD Night – Material Properties

Welcome to Card Night – Grab a seat – get out your cards and have a fun and interesting learning experience. **The Material Card Game is by ANSYS and the cards are downloadable at no fee.**

WEB- [Materials Intelligence: the Card Game]

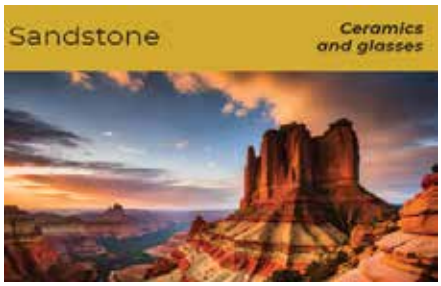
The materials card game contains ten cards per material family:

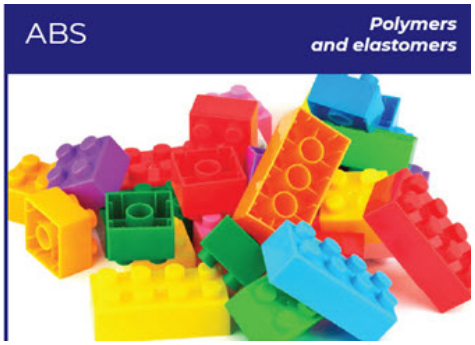
- ceramics and glasses,
- metals and alloys,
- hybrid materials,
- polymers and elastomers
- Includes a list of selected material properties.

This is a great idea and an easy way to learn basic materials between the material families.

The Downloadable Content contains: Printing Guide - A4 size printing file - Letter size printing file

Below is a sample of a few of the cards available AND no fee to download them!





Autodesk Meshmixer was used to create the bilateral arytenoid abductor device - The shape of the abductor was based off 3D reconstructed CT images of a larynx from an unaffected Labrador Retriever.

Using (Autodesk Fusion 360) Six different sizes were created by changing the scale of the overall device size by 10% and the rima glottidis width by 15% across the different models

WEB- The bilateral arytenoid abductor device was created on (Fig. 2A).

Effects of a novel, 3D printed bilateral arytenoid abductor on canine laryngeal airway resistance ex vivo

Katelyn E. MacGillivray, Sean D. Bellefeuille, Daniel E. Hoffmann & Lindsay L. St. Germaine

Veterinary Specialists and Emergency Services, Rochester, NY

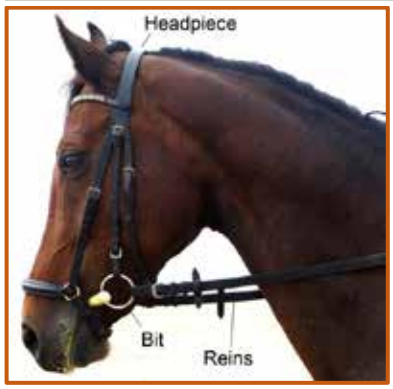
..Laryngeal paralysis is a condition where the muscles that control the movement of the arytenoid cartilages of the larynx lose their innervation

Laryngeal paralysis is a disease process most commonly seen in older, large breed dogs. When both arytenoid cartilages are affected dogs can develop life-threatening respiratory compromise, therefore surgical intervention is recommended. While there are multiple surgical procedures that have been described to treat laryngeal paralysis, there remains a considerable risk for postoperative complications, most commonly aspiration pneumonia. The objective of this ex vivo experimental study was to evaluate the effects of a novel, 3D printed bilateral arytenoid abductor on laryngeal airway resistance...

While there are multiple surgical procedures that have been described to treat laryngeal paralysis, there remains a considerable risk for postoperative complications, most commonly aspiration pneumonia. The objective of this ex vivo experimental study was to evaluate the effects of a novel, 3D printed bilateral arytenoid abductor on laryngeal airway resistance in canine cadaver larynges. Laryngeal airway resistance was calculated for each specimen before (control) and after placement of a 3D printed, bilateral arytenoid abductor. The airway resistance was measured at an airflow of 10 L/min with the epiglottis closed and at airflows ranging from 15 L/min to 60 L/min with the epiglottis open. The effects of the bilateral arytenoid abductor on laryngeal airway resistance were evaluated statistically.

Conclusions - We concluded that a bilateral arytenoid abductor successfully lowers laryngeal airway resistance when the epiglottis is open while also maintaining closed epiglottis laryngeal resistance. Maintenance of resistance when the epiglottis is closed is suggestive of maintenance of the epiglottic-glottic seal. In a clinical setting, the arytenoid abductor may be able to reduce laryngeal airway resistance without the increased risk for postoperative pneumonia. A trial using the bilateral arytenoid abductor in dogs affected with laryngeal paralysis is needed to determine the ideal material that will provide appropriate rigidity without causing laryngeal irritation and to evaluate if this device will be tolerated in vivo.

BETA CAE Systems - Animal Health – Quote, "The model was pre-processed and prepared for the solver Abaqus by built-in functions in ANSA… The equestrian world is evolving and the interest for more ergonomic and durable equipment is growing. To fulfill this need, methods to validate, improve and design new equipment is crucial..."



PDF -[EQUINE SCIENCE USING BETA CAE SOFTWARE]

J. Renman, N. Eklund, E. Engdahl, F. Apelgren, M. E. Peña, M. Karlsteen
Chalmers Univ. of Technology, Dept. of Physics, Gothenburg, Sweden,
BETA CAE Nordic AB, Gothenburg, Sweden

ABSTRACT –The target was to study the effects exerted by the bridle on the neck of a horse, as a starting point for developing the method. A simplified 3D (Computer Aided Engineering) CAE model of a horse neck was generated by using RETOMO-tool for segmentation of medical CT-scan images.

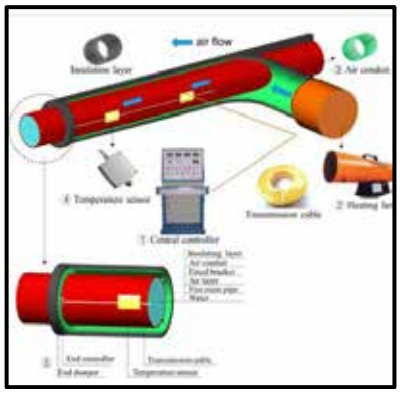
(Fig. 1) The model was pre-processed and prepared for the solver Abaqus by built-in functions in ANSA. META post-processor was used to examine the results of the simulations, showing how stress spreads around the neck by identifying areas with higher and lower stress concentrations. The outcome of the simulations provides a numerical evaluation for understanding mechanical effects on the neck of the horse, exerted by the bridle.

INTRODUCTION - For centuries, horses have played a major role in the daily life of humans, as a mean of transportation or as a work companion. Their strength made them valuable in many industries, as mining, logging and farming. In the military, a good horse could be vital for success in battle, as accounted in history books. It is from military activities many of the equestrian sports have developed. When horses started being replaced by machines, the role of the horse changed completely. Equestrian sports developed from being just a way to keep your horse in good shape to a global industry. The disciplines today include show jumping, dressage, eventing, racing etc., where three disciplines are currently represented in The Olympic Games.
As for any athlete, the equipment used is crucial. Equipment causing discomfort can be very stressful and result in both pain for the horse and lesser performance. The equestrian world is built on traditions and much of the equipment used today is based on convention rather than comfort. A change in the market is starting to show, where the interest for better and more ergonomic equipment is growing; an interest for equipment that gives the wanted performance while not hurting the horse. To develop this kind of equipment, it is crucial to find the right tools to create and validate the product. Knowledge from both, scientific and technical perspective, needs to be combined with knowledge of horse anatomy. A future aspiration would be to close the gap between engineers and veterinarians and together develop the most ergonomic and durable equipment for the horses.

This project aims to develop a method for computer aided research in this area. For years, FEA (Finite Element Analysis) has been used as a tool for computational studies in different areas. Our goal is to provide a method on how to build a 3D CAE-model of a horse, to be able to see how equipment affects the animal, something that to the best of our knowledge has not been done previously. The project has been limited to examine one part of the bridle, the piece that goes behind the neck of the horse, called the headpiece. See Figure 1.

ANSYS - In this study, taking Zhatunhe Tunnel as an example, the ANSYS finite element software was used to simulate the working process of the AHTS under different environmental conditions with different wind temperature and wind speed settings, analyze the working effect of the system under different conditions, and optimize the working parameters.

…The finite element software ANSYS was used to simulate the working state of the AHTS under different conditions, and the insulation effect under different conditions was evaluated.



WEB- **An Air Heat Tracing System of Firefighting Pipeline in Cold Region Highway Tunnel** - M. Zhang, Y. Xie, Z. Wang
School of Highway, Chang'an University, Xi'an 710064, China

Abstract - Ensuring the proper operation of tunnel firefighting systems in cold regions is a key issue at hand. According to the characteristics of cold region tunnel fire control systems, this paper puts forward a kind of air heat tracing system (AHTS) that is suitable for cold region tunnel firefighting systems. In the AHTS, an annular air duct was used to heat the firefighting pipe and keep it warm, so that the water temperature in the firefighting pipe is above the freezing point, which helps prevent the water in the firefighting pipe from freezing and avoids the failure of the firefighting system.

Meanwhile, the finite element software ANSYS was used to simulate the working state of the AHTS under different conditions, and the insulation effect under different conditions was evaluated. The results showed that the AHTS has a good heating and heat preservation function, which can effectively maintain the normal operation of the tunnel firefighting system in cold regions under a low temperature environment (below 0 °C).

Furthermore, increasing the air temperature and air speed in the system was beneficial to the working effect of the AHTS, and the "high temperature and low speed" mode was beneficial to reduce the system power consumption. It is recommended that v = 5 m/s and Ta = 50 °C be used as the preset operating parameters. Finally, according to the numerical analysis results, the scientific and reasonable working parameters of the AHTS under different working conditions were optimized. The research content can provide new ideas and theoretical support for the thermal insulation technology of tunnel firefighting systems in cold regions in the future.

Introduction - In recent years, along with the large-scale construction of infrastructure in China, a large number of railway and highway tunnels have been put into construction. By the end of 2019, China had 19,067 road tunnels built, increasing by 7.5 percent compared to last year, and the total length of tunnels reached 18,966,600 m, increasing by 10 percent compared to last year. However, tunnel fires often occur as those tunnels are under construction. Due to the narrow and closed structure of the tunnel, fire hazard in the tunnel often causes serious consequences [1,2,3]. Meanwhile, 43.5% of China's land is within the cold region, which is mainly distributed in North, Northwest, Inner Mongolia, and Northeast China [4]. As of 2014, 52.4% of tunnels in China have experienced freezing damage, and 25.5% of them have experienced severe freezing damage [5]. In addition, freezing damage of tunnels in other countries also happens from time to time. According to relevant statistics, 34% of railway tunnels in cold regions in Japan have suffered from freezing damage, and some tunnels in Russia, North America, and Northern Europe have structural damage due to freezing damage, endangering operation safety [6,7,8]…

Every year road traffic accidents are responsible of approximately 1.3 million deaths in the world, resulting in one of the main causes of mortality.

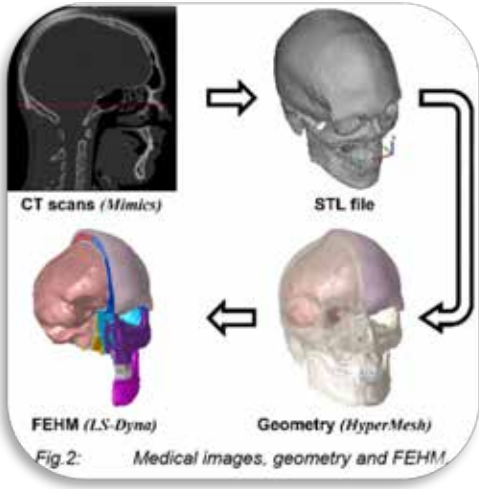


Fig.2: Medical images, geometry and FEHM

Web- Anatomically accurate finite element model of a human head for crash applications

A. Tacchi, I. Colamartino(1) G. Canzi(2) G. Novelli(3) M. Anghileri(4)

1. Dept. of Mechanical Engineering, Politecnico di Milano, Italy
2. Maxillofacial Surgery Unit, Emergency Dept., ASST Grande Ospedale Metropolitano Niguarda
3. O.U Maxillofacial Surgery Dept. of Medicine & Surgery, School of Medicine, Fondazione IRCC San Gerardo dei Tintori Hospital, Univ. of Milano-Bicocca
4. Dept. of Aerospace Sci. & Technology, Politecnico di Milano, Italy

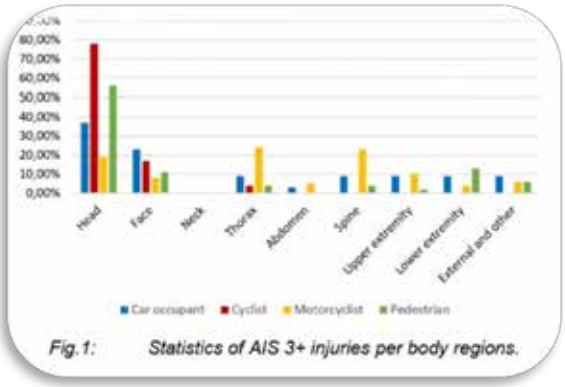


Fig.1: Statistics of AIS 3+ injuries per body regions.

EXCERPT Paper from the DYNAmore 14th European LS-DYNA Conference 2023 – Germany

According to the World Health Organization (WHO), by the 2020s road traffic accidents will be the leading cause of premature death. Moreover, between 20 and 50 million people involved in incidents suffer non-fatal injuries, most of them leading to disabilities. These injuries considerably affect individuals, their families, and nations from both social and economic points of view. Over the last 60 years, experimental activities focused on the impact behavior of the human body were carried out with crash dummies and human cadavers, expanding the abailable injury database, exposing the most common injury scenarios and allowing the development of effective predictive criteria.

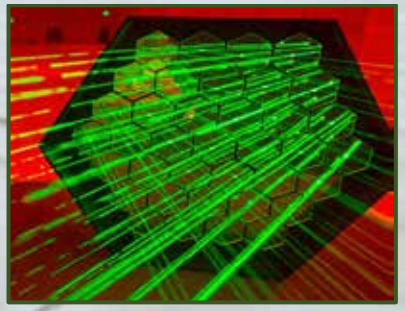
The most frequently injured body regions resulted to be head and lower limbs; however sever to fatal injuries (Abbreviate Injury Scale Values AIS 3+), are more commonly related to head impacts, as show in Figure 1.

Different locations of impact (Frontal, occipital and temporo-parietal) were investigated with Post-Mortem Human Subjects (PMHS), showing that injuries strongly depend on the patient's head morphology. In fact, the range of 50% limit of skull fracture is wide (1800 - 12500 N), and prediction of minor injuries with the simple global criteria based on the cited investigations is inevitably difficult, when feasible.

Over the last two decades, the aforementioned experimental studies allowed the construction of finite element numerical models, and as ethical issues limit nowadays the conduction of further experimental campaigns, today numerical simulations of head impacts are notable importance in many applications: accident reconstruction in forensic engineering, vehicles' design and development of protection devices, studies on injury prediction for evaluation of suited surgical treatments…

Welcome to the Convention Barn
Yeehaw!

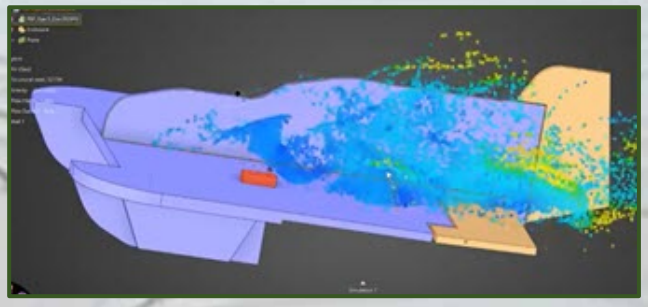
Web - [Magna Advances Road Safety with Impaired Driving Prevention Technology] - A breath & camera-based pre-development technology designed to combat impaired driving.... The new safety technology determines if drivers are "fit to drive" in a fast, reliable and affordable way. The integrated solution combines key elements of the interior sensing system, which utilizes camera technology to detect driver distraction, drowsiness and intoxication through pupillary signals, with infrared sensor technology developed by Senseair, a leader in air and gas sensing.



WEB -[The DragonFire laser directed energy weapon] (LDEW) system.

Trials by MBDA, Leonardo and QinetiQ with Dstl deliver first high power firing against aerial targets.

This has achieved the UK's first high-power firing of a laser weapon against aerial targets during a trial at the MOD Hebrides Range.



SimuTech Group - You Tube Video

[Ansys Discovery: Pizza Box Flyer Example]
by: Jason Zbick, Principal Engineer

"The goal of this demonstration is to highlight the features in Ansys Discovery and how it can look at the aerodynamics of the design and structural components of a pizza box flyer.

See Ansys Discovery's ability to handle both preliminary aerodynamics and structural simulations in this on a model airplane example made from a pizza box
(yes, a pizza box!)"

03-2024 - Virtual Global Event

Altair Future Industry 2024

The event will be presented across three time zones to suit APAC, EMEA, and AMER regions.

04-2024 - US

GHBMC Users' Workshop

Global Human Body Model Consortium

04-2024 - Germany

CADFEM Conference

Empowering Digital Engineering

05-2024 - Sweden

NAFEMS NORDIC Conf.

The Conference for Engineering Simulation and Analysis

The Old Cattle Rancher's Ranch

No one knows his name.
You yell, "HEY, old rancher."

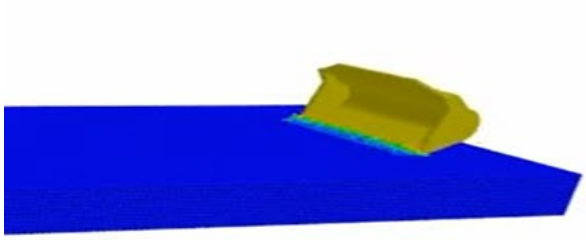
Agriculture, Animals, Soil, Equipment, Cattle, and whatever he wants.
Right Picture – My dog, Scout, & my horse, Cowboy

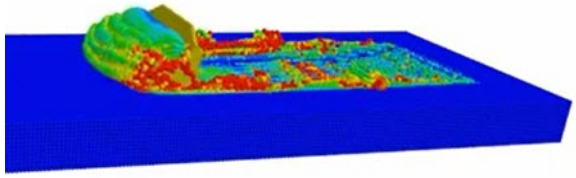
February

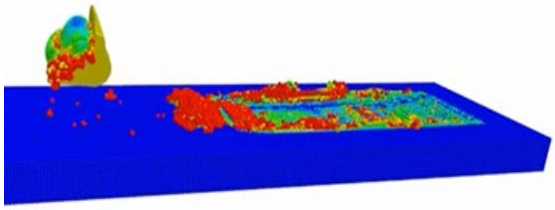
Moving a lot of snow, soil and mud this month in Minnesota!
A favorite video of mine on YouTube is shown below.

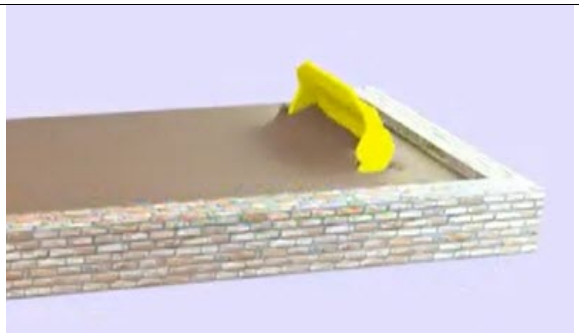
YouTube [**LS-DYNA SPH: Cohesive soil modeling, Blender visualization**]

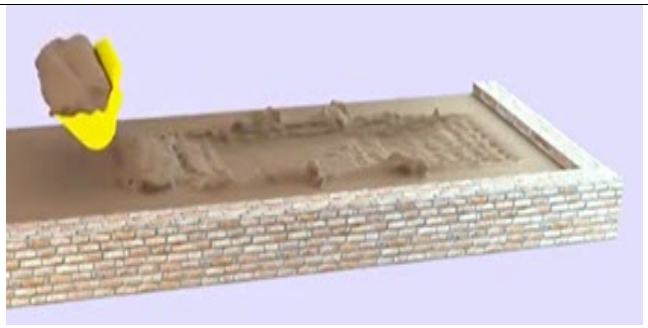
A Moving Least-Squares based formulation is used to model large deformations of cohesive soil. SPH simulation performed in LS-Dyna, surface generated in Paraview, and rendered in Blender through VisualSPHysics.

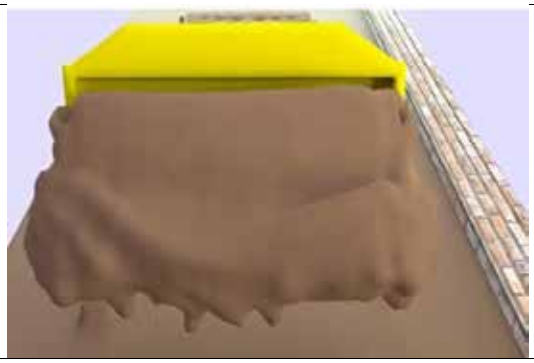












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My Virtual Travel Outing

Thank you for joining me on my monthly visits to museums. What did they do before cars?

Coach of Filipe II
17th c. - 18th c.

Coach of Queen Maria Francisca of Savoy

Carriage for Children
19th c.

Cabriolet for Children
19th c.

Coach of the Count and Countess of Ericeira
18th c.

Berlin of Queen Maria I
18th c.

WEB [National Coach Museum]

It is the mission of the National Coach Museum to provide for the promotion, research and conservation of its collections in the firm belief that museums play a central role in the generation of human, social and economic growth. The recently inaugurated building leads the way in the making of new history for the museum, marked by our endeavor to include all of the necessary elements to accomplish this mission.

The new Coach Museum emerges, not only, as a cultural site but also as a public utility space. In the words of the architect Paulo Mendes da Rocha "the Museum has no doors and relates to all of its surroundings". The project is more than a museum; in the end it functions as an urban infrastructure providing a public utility space for the city.

Thus, two concerns coexist; on the one hand the primary need to expand the exhibition area of the museum and its technical support infrastructure, while on the other, the need to create additional attractions for the most visited museum in the country. Moreover, there was a need to bind one of Lisbon's most prominent fronts, the Belém monument area, where the construction of the new building has created a new dynamism in the museum's surrounding area, creating new public spaces and urban walkways in the city that are reminiscent of earlier times.

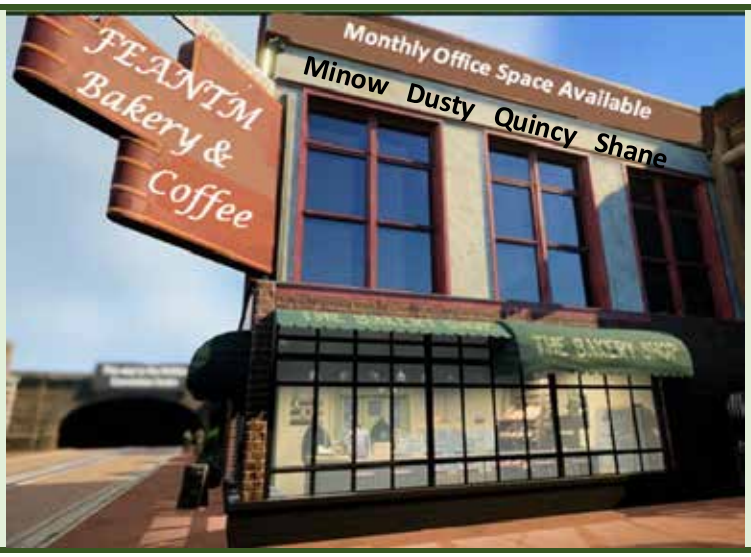
RheKen,
Town investigative reporter

I'm AI & live on a small ranch on the outskirts of the town
I use chatGPT for assistance. My parents are chat & GPT
Investigate: "Is she really arguing with a squirrel?"

February

The question we all have this month is why is the town secretary arguing with a squirrel?

Additionally, Dinky the squirrel is a trained member of the town's newly formed CERT (Community Emergency Response Team)



Why is the secretary challenging my leadership? I trained with the Alameda County Fire Dept and attended the CERT classes.

Once upon a time, in the quiet and picturesque town of FEANTM, nestled between rolling hills and surrounded by vast open fields, a peculiar dispute unfolded between the town secretary and a remarkable squirrel named Dinky. The source of their disagreement was none other than the leadership of the town's CERT, the Community Emergency Response Team. Alan, from the neighboring town had donated many hours teaching Dinky procedures and solutions for the CERT.

The town secretary, a passionate and determined resident, believed that she should be the leader of the CERT. She argued vehemently with Dinky, the current lead CERT squirrel, who had held the position for many years. In fact, Dinky's expertise extended beyond the town's borders; he had even provided training internationally and assisted in various disaster-stricken areas.

The town of FEANTM valued disaster preparedness highly, understanding the importance of having a well-trained and efficient CERT in place. The town secretary, in her fervor, insisted that human leadership was essential for the team's success. The team was made up of squirrels - the town wondered why she wanted to lead a team of squirrels.

Undeterred by the town secretary's protests, Dinky patiently explained his years of experience and dedication to the town's safety. He revealed that he not only led the CERT but also volunteered with the town fire department, further solidifying his credentials. He and Alan had become good friends spending many hours reviewing what is needed in action and training.

As the argument reached a standstill, the town secretary decided to take the matter to the town council. Perplexed by the unusual nature of the request – a choice between a human and a squirrel for a leadership position – the council listened attentively as Dinky presented his case. The Town Supervisor had no issues that a squirrel should have the role of CERT leader, or that a squirrel was standing in FEANTM Town Hall while other squirrels were picketing Town Hall marching with signs stating "DINKY is our leader."

RheKen,

Town investigative reporter

I'm AI & live on a small ranch on the outskirts of the town
I use chatGPT for assistance. My parents are chat & GPT
Investigate: "Is she really arguing with a squirrel?"

February

After a moment of contemplation, and the recommendation of Alan from the neighboring town, the town council recognized Dinky's invaluable contributions and voted to let the squirrel continue as the lead of the town's CERT. The town secretary, realizing the depth of Dinky's commitment to the town's safety, finally smiled and accepted the decision.

However, just as peace seemed to settle, Dinky, with a mischievous glint in his eye, handed the town secretary a citation. Bewildered, she read the paper, only to discover that she was being fined a pound of sunflower seeds for interfering with the CERT leadership matter.

The town of FEANTM, though small and quiet, continued to thrive under the leadership of its dedicated squirrel, proving that sometimes the most unexpected leaders can be the most effective.

And so, with sunflower seeds in hand, the town secretary learned to appreciate the unique contributions of every member of the community, no matter how small or furry.

Dinky also introduced the ranch CERT (Critter Emergency Response Team) led by Sam and Bunny.

March you will meet Kai – Kai teaches first aid emergency preparedness.

Dinky has no budget - the critter emergency response team had to borrow helmets and uniforms from the neighboring town. Coming soon the Critter fire dept. and police department

NEWS IN A NUTSHELL
By Dinky the ranch squirrel
I'm a squirrel!
Always check the information.

Sam is my cousin and the proud leader of the ranch CERT, Critter Emergency Response Team

Sam educates the ranch critters about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT members can assist other critters in their neighborhood following an event when professional human responders are not immediately available to help.

Sam is an extraordinary squirrel running the ranch for RheKen, the town AI reporter.

Not your average forager, Sam is the proud leader of the Critter Emergency Response Team (CERT), a squad dedicated to ensuring the safety and well-being of all farm inhabitants and training.

He also works closely with Alan, from the neighboring town, and the Alameda County CERT training us for disasters and planning strategies.

Sam takes his responsibilities seriously, with a sharp eye and an even sharper mind, patrolling the fields and documenting the seismic counters and river heights from dawn to dusk. Clipboard in paw, Sam meticulously checks off the safety protocols listed there. Sam enlisted his ranch friends to help keep the ranch animals and environment safe from disasters and emergencies.

They all voted in Fluffy the Bunny as the Second Commanding Critter. Fluffy has a degree in civil engineering and specializes in disaster relief. She helps on the ranch and other ranches needing help during a disaster. She hops right in to establish temporary shelters for the animals, develop alternative transportation routes to get the cattle and other farm animals to safety and facilitates the movement of emergency supplies.

The ranch is a tapestry of interdependent lives, and Sam is the thread that weaves them together. He dashes along fences, scampers up trees, and leaps across the barn roof, always looking for anything amiss. Sam's diligence is not just a job; it is his calling. Whether it is guiding ducklings across the pond, alerting the farmhands to a breach in the fence, or organizing a shelter-in-place drill for the field mice during stormy flood weather, Sam does it with a commander's grace and a guardian's heart.

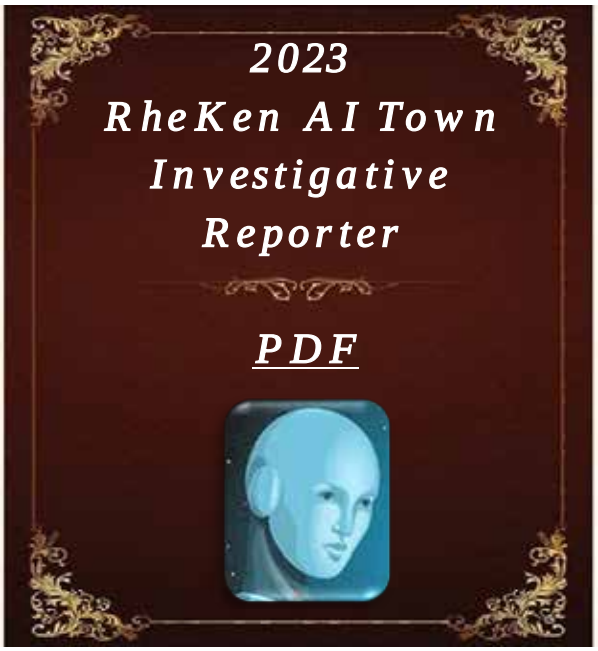
The ranch has yet to experience a single mishap since Sam took over the CERT squad with the assistance of Fluffy. The animals feel safer knowing Sam and Fluffy are around. Even the farmers have come to rely on his morning reports and her disaster planning strategies. Fluffy always takes new courses and is prepared.

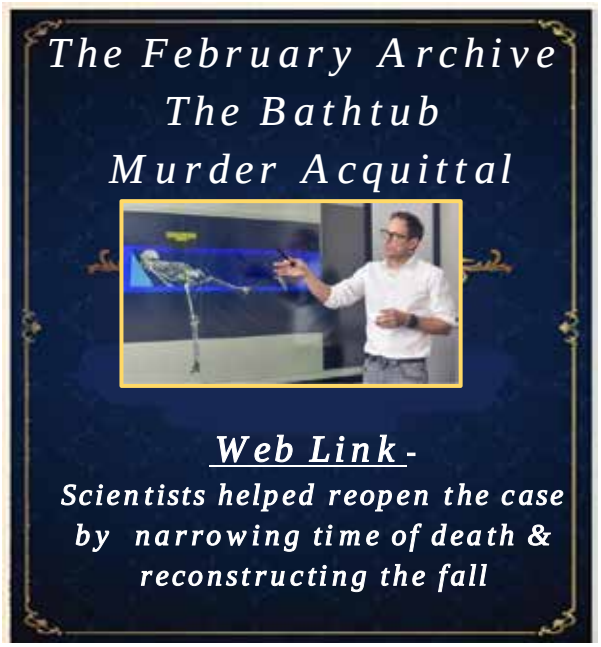
As the sun dips behind the distant hills, casting long shadows over the ranch, Sam always takes one final look around, ensuring all is calm. Then, with a nod of satisfaction beneath his cowboy hat, he tucks away his clipboard and pencil, signaling the end of another day safe and sound, thanks to the vigilant efforts of a tiny squirrel with a big mission and a fluffy hopping bunny. I'm proud of Sam and Fluffy.

My name is Horatio Deermouse your store curator and owner.

Among my books you will find archives from our FEANTM town.

Additionally, I'll rotate a web link to important information so you don't miss it. To borrow a book, you'll need our printed old fashion library card. We don't use apps or electronic scanners - we still use paws.





Supervisors Goodbye Page - Come Back Soon

Goodbye from Marsha/Molly & Friend

Saby is the Vet Tech by day and our editor by night.

Minow was a rescue. To make the explanation easier a few years ago he contracted a virus behind both eyes – medications and other remedies tried didn't work. Long story of trying including veterinarian hospital stay - the eyes were actually painful due to the pressure behind them SO the decision was made to remove the eyes, rather than euthanize. One was done first so Minow could get used to half vision and retraining. He only had partial sight in his other eye and eventually that was also removed. He is fine – he can trot and be ridden – he is leg trained and click trained.

SO here is Minow trotting around the arena with Sabyl. He trots in a huge circle and is quite happy.

We will always remember. Our Town Always Salutes:

- Our US military, NATO and Friends of the US & NATO - First Responders, Police, Fire Fighters EMT's, Doctors, Nurses, SWAT, CERT Teams, etc.
- We salute engineers, scientists, developers, teachers AND students because without them we would not have technology.