Airport - Fergani	Airport - NASA	Auto - Ford	Racer – Bradford U.

Marco - RBF
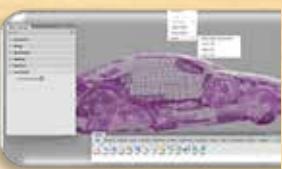
Madhukar - CADFEM

Metin - OZEN

Lisa - Simpleware
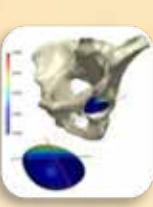
Abhinav - MyPhysicsCafe

MPC

Marta – OASYS

Mi&Ke – Nightly News

Jenson – DFE Tech

Software Solutions

Abigail – CADFEM AI

Bart – Global Foundries

STEM@GF

Brent – GOENGINEER

Curt - AUTODESK

FIND¶ NTKA¶

OUTLOOK NOT SO GOOD

I'm not AI, are You?

Editors: Anthony, Art, Marnie, Marsha, Sabyl

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."
Racer's Daughter	The whole town knows her name. You yell "HEY, Slow down!"

They are all family - strange family

Names, & characters of AI visitors and AI editors are the products of imagination. Any resemblance to actual persons, living or dead, or actual events is purely coincidental.

We will always remember

FEANTM 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.

USA & allies of the USA

Horse Trail ➡ **Yield right of way to horses**

R&D Technology Business Park

RV CAMPING Park in any vacant camping site

Town Hall & Library

CADFEM

DFETECH

d3VIEW

OZEN

ENGINSOFT

AUTODESK

Oasys

DYNAMORE

DYNAlook

Ansys

Applus⁺ DatapointLabs

rescale

PredictiveEngineering

Lawrence Livermore National Laboratory

Research Hospital

rbf

MEDITATE

rbf.LAB

LIVGEMINI

The Old Rancher

FEANTM Coffee Shop
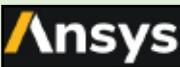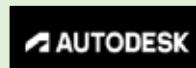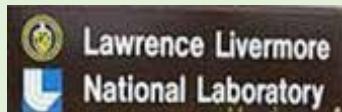
Race Track

Airport

Sports Stadium

Sports Stadium

- **Logos 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.

January - Town Hall Meeting - Websites have complete information & High-Res. graphics

FEANTM – Outdoor Movie Theater Now Showing

FEANTM – Train Station – Papers, Safety, Simulations

Table of Contents

Individuals are the persons we wish to thank. It doesn't imply association with a company.
Copyright is reserved by the individual/company.
Links provide the URL to the information.

The websites will have the complete information and high-resolution graphics

Welcome to our County, Town Hall Meeting & Announcements

Town Motto: Creation is born from trying. If it doesn't work, learn & try again. You will succeed. Ideas, simulations, medical cures, creativity wouldn't exist without the passion to keep trying.
You've Got This

FEANTM Town Hall Meeting
"The town that almost exists"

Park cars behind the building
Park tractors behind the cars

Tie horse to the hitching rails

Bakery Cafe
Gossip, cookies. chocolate
Pets welcome.
Horses, pet goats stay outside
Technical solutions & information
Caring about animals and children

Announcements from residents not to miss

Marta: Software Top Tips, a series of short, practical "how-to" videos. Watch our first Top Tip to learn why ZTF files are essential for Ansys LS-DYNA workflows.

Madhukar: Lumendo AG, an innovative company researching injectable filler & endodontic debridement solutions….

Metin: US - 03/10/2026 OZENCON - Our conference is FREE to attend.
Location: THE COMPUTER HISTORY MUSEUM

Marco: A thesis showcasing the potential of RBF Morph technology, developed by our colleague Davide Zambon at Università Ca' Foscari Venezia.

Marnie: Don't miss the podcast Rays & Waves - In this episode they speak about Linear Optical Quantum Computers. ..

Jenson: Equipping our customers with the necessary knowledge and management solutions to today's challenges & bringing your attention to a few product software solutions.

Abhinav –To understand how Noise, Vibration, and Harshness are analyzed, measured, and controlled in machines

Abigail: CADFEM AI - Virtual Transport Test Simulation using LS-DYNA Packaging Simulation revolutionizes the process …

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Our publication features a diverse mix of papers, articles and simulations from various fields. We strive to integrate new and interesting content for your enjoyment and learning.

FEANTM January 2026 edition.

Hello and welcome to the January 2026 edition of FEANTM. As we embark on a new year, we are delighted to present a wealth of cutting-edge technology and articles for your study. We will continue to unveil advancements in the respective fields.

FEANTM takes pride in disseminating articles and links to the articles. This month, we have curated a selection of topics to represent a diverse array of knowledge. Notably, Abigail shares an article on Appliance Packaging utilizing LS-DYNA, while Chris provides a link to the LS-DYNA conference papers. Brianna offers a link to the application of x-ray technology in nuclear forensics. For our museum automotive enthusiasts, the Town Secretary shares a link to the Hellenic Motor Museum's Vintage Car Collection.

Once again, we thank all of our contributors for sharing their knowledge and all of our readers for keeping us relevant.

Thank you for being part of the FEANTM+ community.
Best regards, Marnie B. Azadian, Ph.D., Managing Editor

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Yes, it's true, I have my own announcement page. SO, join me as I drive my tractor around the internet and live in the town that almost exists. (located near Livermore, CA)

HEY! I made it a couple of hours on my New Year Resolution. I made it an hour before midnight. I was asleep at midnight, but that still counts as sticking with a resolution until I woke up! Okay, who yelled they bet my resolution was to give up coffee and when I woke up from sleeping I had a delicious mug of coffee?

We're starting the year by welcoming the return of Bart, our retired teacher.
His bumper Sticker states: "Education - Children Come First."

Expansion:
- We **have a new art and photography hall**. We have found that many engineers and engineering students create art, crafts, photography, or other interesting hobbies that we want to share. Additionally, added to that hall, we have Remember When are auto pictures sent in? It is personal vintage photos, no AI or stock.
- **AIRPORT** - It was finally a yes vote to extend the airport for information on civilian and military – Why? We have residents who love all things that fly, tanks, and weapons. The deciding vote was Mr. & Mrs. Barrett, living out at mile marker Mk22 on MRAD Road.
- **I have a new page as Steward of Town Information**. I'm starting with the open source MEMF code from LLNL. I have a thought for an article that I would like to share. Periodically, I will try to find interesting open-source code from National Labs or other sources. I'm not sure if this section will fly or head back to the hangar, but in the town of FEANTM+, we always try, or we'll never know, if needed, where to improve on it, or start over.

AND, that's a wrap-up for the first month of the New Year.
GO FEANTM the almost existing town – work, fight, win!

Article, "**Virtual Transport Test Simulation using LS-DYNA Packaging Simulation** revolutionizes the process. By simulating real-world transit conditions digitally, packaging engineers can predict failures, optimize materials, and design smarter packaging earlier in the development cycle."
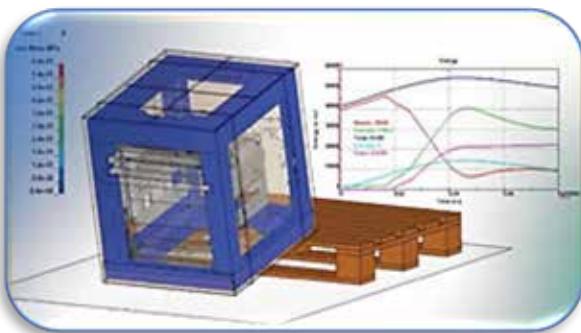
Web – CADFEM AI - Virtual Transport Test Simulation for Appliance Packaging Using LS-DYNA: A Smarter, Faster, and Greener Path to Packaging Reliability - **Shashank Chawan**

Why Virtual Packaging Tests Matter More Than Ever
Every year, millions of appliances—refrigerators, washing machines, televisions, air coolers, and more—travel thousands of kilometers through complex supply chains. Rough handling, unpredictable transportation conditions, and stacking pressures can cause product damage long before they reach customers. Such failures lead to costly warranty claims, high return rates, and brand dissatisfaction. Traditionally, manufacturers rely on physical transport tests like drop, stack, clamp, vibration, and impact tests to validate packaging strength. While these tests are essential, they are expensive, time-consuming, and material-intensive. Each design change requires multiple rounds of prototyping, adding delays and increasing costs.

This is where Virtual Transport Test Simulation using LS-DYNA Packaging Simulation revolutionizes the process. By simulating real-world transit conditions digitally, packaging engineers can predict failures, optimize materials, and design smarter packaging earlier in the development cycle.
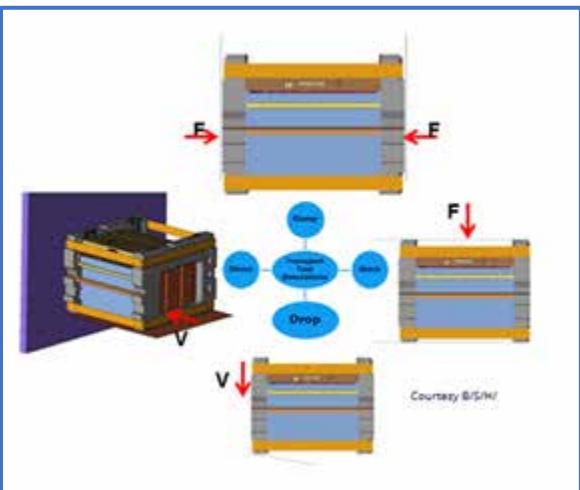
Understanding Transport Tests in Packaging Engineering

What Do Appliances Endure During Transit? From factory floors to retail showrooms, packaged appliances undergo:
- Drops from varying heights
- Compression during stacking
- Side impacts and shunting
- Clamping forces during handling
- Vibrations from trucks, forklifts, and containers

To ensure safety and reliability, global standards like ASTM, ISTA, ISO, and PATT specify detailed testing procedures. These tests evaluate:

- Package integrity
- Product–package interaction
- Material resilience under stress
- Impact absorption capability

Virtual simulations help engineers evaluate these parameters without costly physical trials.

The Packaging Challenge: Balancing Strength, Weight, and Sustainability - Appliance packaging materials—especially Expanded Polystyrene (EPS)—play a critical role in absorbing impact and protecting the product. However, EPS introduces challenges:

- High-density EPS increases total package weight
- Low-density EPS compresses easily ("bottoming out")
- EPS exhibits non-linear mechanical behavior, making manual prediction difficult

At the same time, sustainability mandates are pushing manufacturers toward corrugated boards and recyclable materials, which require structural optimization to maintain performance.

This balancing act between cost, protection, and material sustainability demands a modern approach—one that LS-DYNA Packaging Simulation delivers effectively.

Virtual Transport Test Simulation with LS-DYNA

Virtual Transport Test Simulation with LS-DYNA
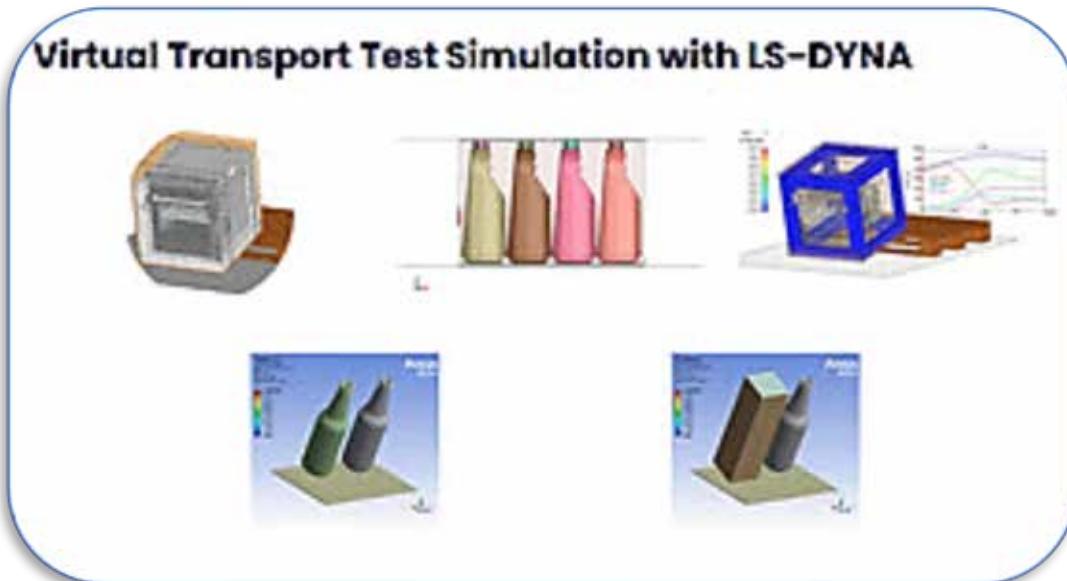
How LS-DYNA Enables Accurate and Realistic Packaging Validation - LS-DYNA's explicit dynamic simulation engine is ideal for modeling high-speed events like drops, impacts, and sudden loads.   The virtual workflow involves:

1. **Creating the Packaged Appliance** Model - Engineers model the appliance, EPS or corrugated protectors, and secondary packaging elements.

2. **Defining Non-Linear Material Behavior -** LS-DYNA supports advanced material models for:

    · EPS with crush characteristics
    · Corrugated cardboard with anisotropic behavior
    · Thin-walled parts in the appliance
    · Insulation foam and plastic housings

    These models replicate real-world deformation and energy absorption.

3. **Simulating Transport Events Digitally -** Common test scenarios include:

    · Free-fall drop test
    · Stack compression test
    · Clamp force simulation
    · Shunt impact test
    · Vibration response

4. **Evaluating Failure Indicators -** Engineers analyze:

    · Stress hotspots
    · Energy dissipation
    · Deformation of protective materials
    · Potential product damage

    This enables early design corrections without physical prototypes.

Sustainable Packaging Optimization: Designing Lighter, Greener Solutions

Corrugated board is increasingly preferred due to its recyclability and reduced environmental footprint. LS-DYNA supports sustainability-driven optimization by enabling engineers to fine-tune:

    · Flute geometry
    · Number of plies
    · Thickness-to-strength ratio
    · Minimum material usage

Optimization techniques like topology optimization, volume minimization, and compliance reduction ensure material is used only where structurally necessary. This leads to lightweight yet robust packaging that meets ASTM/ISTA standards without excess material.

Results & Real-World Benefits of LS-DYNA Virtual Transport Tests - Companies using LS-DYNA for virtual transport validation report significant improvements:

- 50% reduction in top post material
- 30% reduction in corner protection height
- Lighter packaging → lower logistics and shipping costs
- Faster design cycles with fewer prototype iterations
- High correlation with physical testing
- Improved compliance with ISTA, PATT, ASTM, and ISO standards
- Reduced return/warranty rates due to improved resilience

By matching simulation results closely with experimental data, LS-DYNA ensures engineers have confidence in packaging reliability before mass production.

Conclusion: A Future-Ready Approach to Packaging Engineering - Virtual Transport Test Simulation using LS-DYNA transforms packaging design from a trial-and-error process into a data-driven, predictive engineering workflow. By integrating simulation early:

- Material waste is reduced
- Prototype cycles shrink dramatically
- Designs meet global standards faster
- Sustainability goals are easily achieved
- Time-to-market accelerates

> For manufacturers of home appliances and consumer goods, LS-DYNA Packaging Simulation is not just a simulation tool—it is a strategic enabler for smarter, lighter, and greener packaging

.

One APAC. One Vision. One United Future - India, Singapore, Malaysia & Philippines

d3VIEW's new AI-powered web-based Model-Assembler application provides a unified environment to create and manage assemblies thereby facilitating compilation of system-models with full lineage and traceability. Design evolution and corresponding outcomes are automatically captured, enabling teams to collaborate with visibility into every iteration.
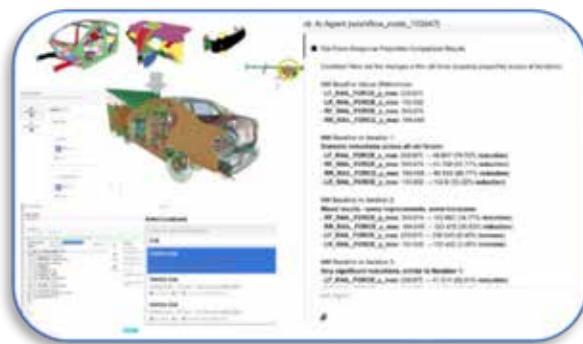
Web – d3View

AI-Assisted Model-Assembler with Ontology
Suri Bala

. One of the core activities in virtual-product-development is compilation of a system-model, from assemblies, that can be evaluated across a wide range of load-cases. The traditional approach involves storing the assemblies in the form of files (solver inputs) on a storage device and then referencing them in a solver-main-input using includes

(*INCLUDE, *INCLUDE_PATH).

The biggest challenge that remains to be solved is the lack of traceability and the absence of a comprehensive view of the relationship between the evaluated designs and their respective outcomes as design evolves under different load-cases and engineers.

d3VIEW's new AI-powered web-based Model-Assembler application solves this challenge this by providing a unified environment to create and manage assemblies thereby facilitating compilation of system-models with full lineage and traceability. Design evolution and corresponding outcomes are automatically captured, enabling teams to collaborate with visibility into every iteration. With the underlying AI and ontology-powered intelligence, companies can query and explore designs and their outcomes using natural language – unlocking a broader, more intuitive understanding of their product designs.

The image below illustrates this streamlined flow of data and information where an Engineer can create assemblies to compile a system-model, pass them to a load-case workflow, that creates the necessary simulation(s) with matching result and report templates. These results then eventually build Machine-learning models to identify optimal designs, enabling a continuous, intelligent design-optimization cycle.

In the image below, different assemblies of a system model are managed and aggregated into a full-vehicle system model using an intuitive interface. Each assembly can consist of a single or multiple versioned file/s that can eventually be compiled into a single system model. Each file can be versioned with a fully organized naming convention such as "BIW.k", "BIW_001.k" and tagged to locate them later. Each assembly file can be edited, parameterized, and compared to identify critical changes.
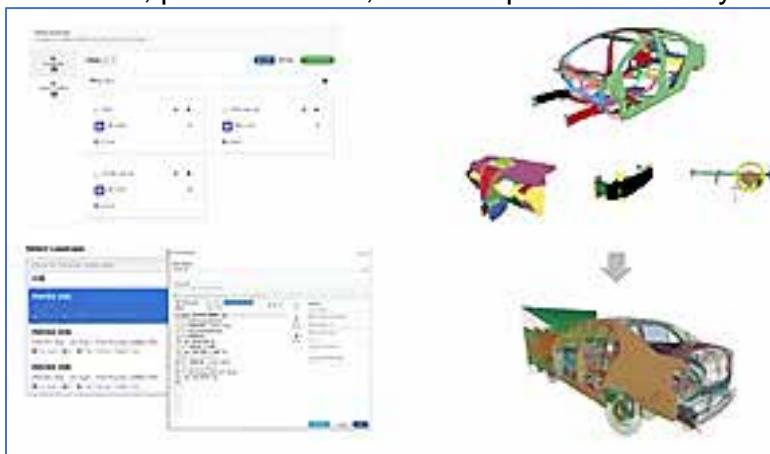
As more designs are created and analyzed, it can become extremely difficult to query and understand why a design is under-performing or meets the expected outcome. This is solved by using the knowledge graph of the data and by using Ontology concepts, we can now query the data and its relationships using simple natural language as shown below.

In a nut shell, d3VIEW's AI-powered model assembler can help any organization to provide a central place to build and analyze systems providing full data and information traceability.

Additional Blogs in December:
· **Automated Export of Worker Output Dataset - Bing Li** - On the d3VIEW platform, there are many export options to manually export output datasets. Now, a new support is added to automatically export Workflow worker dataset output to Excel file upon execution.

Article Quote, "Electrification is rapidly reshaping the commercial trucking industry, promising cleaner and more efficient transport solutions. Driven by new regulations [1], the electrification of heavy-duty vehicles (HDVs) and their trailers represents is essential to decarbonize freight logistics [2].

Excerpt

Web – Siemens - How electrified trailers are changing truck stability: a system simulation study By Fabrice Gallo and Chiel Verhoeven

Introduction - …One emerging innovation is the electrified drive axle, or e-axle, integrated into heavy-duty vehicles (HDVs) and their trailers to provide regenerative braking and additional traction. But introducing this technology fundamentally alters the dynamic characteristics of the entire vehicle, bringing new challenges in vehicle stability, a critical safety aspect for heavy-duty trucks.

Our recent simulation-based study dives deep into These challenges, analyzing how electrified trailers interact with existing vehicle control systems like ABS and ESP. The goal: to identify potential stability risks including jackknifing, shaking, and roll-over [3], and uncover how a smart supervisory control system could help ensure safe operation across all driving conditions.

Methodology - To investigate the complex dynamics of an e-trailer system, a detailed multi-body simulation model was developed using Simcenter Amesim [4]. Simcenter Amesim is a powerful platform for multi-domain system simulation, enabling the modeling of mechanical, hydraulic, pneumatic, thermal, and electrical components within a single environment.

2.1 Vehicle Model Description - The simulated vehicle configuration consists of a 3-axle articulated vehicle: a 2-axle tractor unit coupled with a 1-axle semi-trailer featuring an electrified drive axle. The multi-body template model VDCAR22DOF01 was employed, which is specifically designed to account for critical stability issues in articulated vehicles, including:

· Jackknife: The acute angle formed between the tractor and trailer.
· Shaking: High-frequency oscillations of the vehicle body. (Trailer swing)
· Roll-over: Lateral instability leading to vehicle overturning.

Standard tractor and semi-trailer combination

Tractor and semi-trailer combination with driven trailer electrical axles
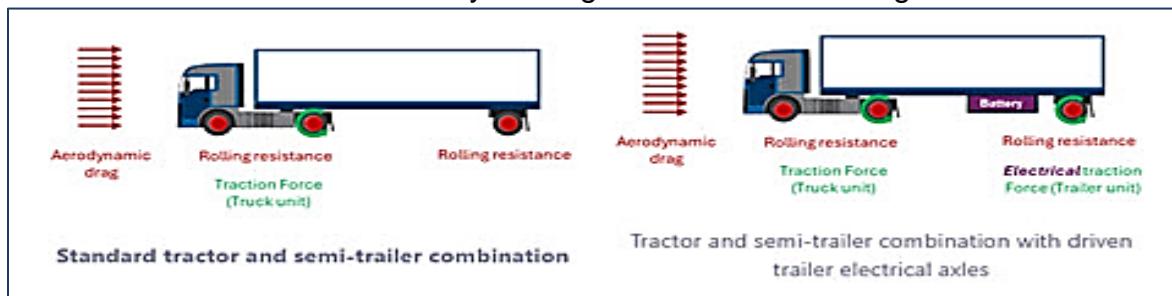
2.2 Control Systems - The model incorporates realistic chassis stability controllers for both the tractor and the trailer:

- Tractor Unit: Equipped with ABS (Anti-lock Braking System) and ESP (Electronic Stability Program) [5].
- Trailer Unit: Equipped with ABS and TCU (Traction Control Unit).

The e-axle's regenerative braking and electrical traction capabilities are integrated with specific blending strategies. The interactions between these e-axle controls and the conventional chassis stability controllers are a central focus of the analysis.

Simcenter Amesim model sketch

Traction blending "parallel" strategy (e-trailer machine vs. truck engine)
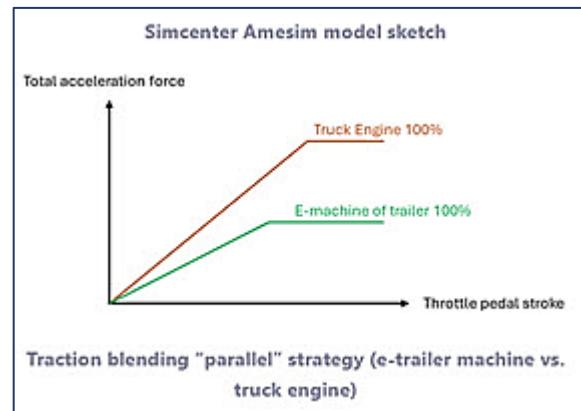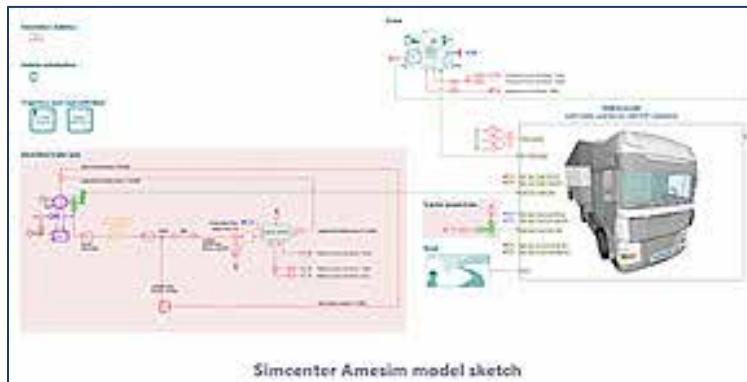
Continue on the website for complete information, videos, and high resolution graphics.

    2.3 Driver Model   **2.4** Test Track Definition

Results and Discussion: **3.1** Electric Machine Performance and Battery SOC

    3.2 Vehicle Dynamics & Pathological Situations   **3.3** Implications for Control Strategy Development

Conclusion
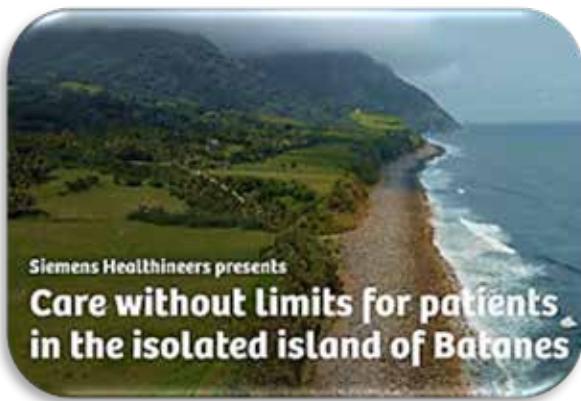
Additional Not To Miss: Web - Siemens Healthinees Philippines - Care Without limits in the isolated island of Batanes - Care without limits: How the isolated island of Batanes is making healthcare accessible for its patients - At the northernmost tip of the Philippines lies Batanes, a remote island province surrounded by the Pacific Ocean. With the nearest referral hospital over 200 kilometers away & access limited to air travel, Ivatans—its resilient indigenous people—have long struggled with timely and quality healthcare.

An island so remote - For years, Batanes General Hospital operated with limited diagnostic capabilities, often referring patients to other provinces an hour away by plane. This isolation led to delays in diagnosis, increased costs including travel, and emotional strain for families….

Visit the website where Dr. Jeffrey Antony Canceran, Medical Center Chief, shares how these innovations have empowered Batanes General Hospital to serve the over 18,000 Ivatans with precision and compassion. Patients express relief at no longer needing to travel far for care, while radiologists from Baguio highlight how remote diagnostics are bridging gaps once thought impossible.

"**...The primary aim of the current work is to analyse vibration-damping characteristics of specific two-wheeler seat foam configurations using a reliable simulation-based method of Finite Element Analysis (FEA) in ANSYS Workbench**. This method, widely regarded as highly accurate and dependable, is employed to examine vibration transmissibility as a function of foam thickness, foam density, and multilayer foam configurations. (Excerpts)
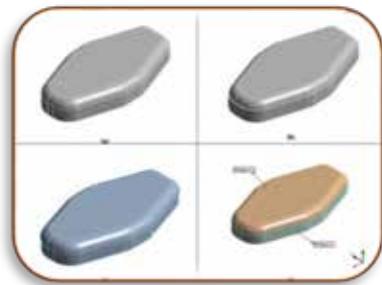
Web - Research Gate - **Finite Element Analysis of Vibration Damping in Two-Wheeler Seats: Effects of Foam Density, Thickness, and Multilayer Configurations**
Vishwanath Mali, Ajit Bhosale
· Dept Mechanical Engineering, Zeal College of Engineering & Research, Savitribai Phule Pune Univ, India
· MKSSS's Cummins College of Engineering for Women, Pune, Maharashtra, India

Abstract - The ride comfort of two-wheeler vehicles is significantly influenced by the design of the seat, particularly the seat foam thickness, density and structural configuration. Prolonged exposure to whole-body vibration (WBV) in two-wheelers leads to rider discomfort and musculoskeletal injuries. This study presents a simulation-based investigation using Finite Element Analysis (FEA) in ANSYS Workbench to assess the vibration-damping performance. The hyperelastic polyurethane foams, modelled using the Ogden formulation, were simulated under harmonic base excitation in the 1–50 Hz frequency range aligned with ISO 2631 standards corresponding to the human whole-body vibration sensitivity spectrum. Ten load cases were analysed, including variations in foam density (50–70 kg/m³), thickness (35–45 mm), and novel multilayer configurations. Results revealed that increasing density from 50 to 70 kg/m³ reduced transmissibility by over 60%, while increasing thickness from 35 mm to 45 mm nearly halved it. Multilayer structures with high-density base layers (70+60 kg/m³) lowered transmissibility to 0.44, outperforming single-layer foams by 13–18% through synergistic compliance-damping effects. This study establishes that optimised combinations of density, thickness, and multilayer design significantly enhance two-wheeler seat performance in terms of ride comfort and vibration damping.

1. Introduction - Comfort and safety for riders on two-wheelers mainly rely on the seat design, as this is the most critical interface between the body and the motorcycle. Due to road roughness, vibrations are transmitted through the seat, causing discomfort, fatigue, and long-term musculoskeletal issues. Proper damping of vibrations through an optimised seat design is crucial. Among all the parts in the seat, the foam plays a vital role in comfort due to its material properties and direct contact with the rider. The vibration isolation and load-bearing ability primarily depend on the thickness and density of the foam. Many existing studies focus on automobile car seats or test foam materials in simplified environments, without considering the polyurethane foam's nonlinear behaviour under dynamic loading. While considerable attention is given to car seats and polymeric foams, very few studies have focused on two-wheeler seats in isolation, utilising realistic shapes, harmonic excitations in line with ISO 2631 specifications, and nonlinear material models, such as the Ogden description. **The current research represents the initial study involving Finite Element Analysis (FEA) under ANSYS Workbench, utilising hyperelastic polyurethane foam according to the Ogden formulation. This work presents a new simulation-based approach to evaluate the vibration-damping performance of two-wheeler seat foam using Finite Element Analysis (FEA) in ANSYS Workbench.** This research utilises the nonlinear Ogden hyperelastic material model to simulate realistic two-wheeler seat geometries subjected to harmonic excitation, in alignment with ISO 2631 standards, unlike previous works that focus on car seats or simplified foam samples.

This study also explores unique multilayer polyurethane foam configurations, combining soft upper layers with denser lower layers, and quantifies their impact on transmissibility. The comprehensive evaluation of foam density, thickness, and multilayer design in a dynamic WBV-relevant frequency range assures a thorough methodology for optimising rider comfort in two-wheelers.

…

3. Methodology - The primary aim of the current work is to analyse vibration-damping characteristics of specific two-wheeler seat foam configurations using a reliable simulation-based method of Finite Element Analysis (FEA) in NSYS Workbench. This method, widely regarded as highly accurate and dependable, is employed to examine vibration transmissibility as a function of foam thickness, foam density, and multilayer foam configurations.

3.1. Materials and Methods -The seat geometries of two-wheelers have been specially designed to accommodate the vibration-damping behaviour of foam (Figure 1). The seat geometry was obtained based on average commuter motorcycle seat sizes. The seat foam has been treated as a nonlinear hyperelastic material, and this approximation is best suited for the in-service condition of two-wheeler seat polyurethane foam. The specific hyperelastic material model used was the Ogden model, chosen for its ability to accurately represent the large deformation and stress-softening behaviour of the foam.

…..

4.1. Modal Analysis - The practical implications of the findings from the modal analysis of seat foam configurations are particularly noteworthy. These findings provide valuable insights into how the vibration response behaviour and dynamic behaviour of a system are affected by a seat foam configuration, offering direct benefits for both vibration reduction and seat comfort design. Modal results of the seat for a foam density of 50 kg/m³, thickness of 40 mm, are presented in Figure 3a–f. The modal results, finding modes and natural frequencies of the structure, are vital in the investigation of primary resonant behaviour as well as rider comfort. Findings indicate that the natural frequency of a system is significantly influenced by both the thickness and density of the foam. Crucially, there was a resultant occurrence of natural frequency values in all configurations within the high-risk band of vibration-induced road susceptibility, as defined by ISO 2631 (4–12.5 Hz), which explains the inherent susceptibility towards road-induced vibration.

6. Conclusion - This study comprehensively investigates the vibration-damping characteristics of two-wheeler seat foam through Finite Element Analysis (FEA) in ANSYS Workbench, focusing on the effects of foam density, thickness, and multilayer configurations. The simulation results underline several key findings that can guide ergonomic and performance-driven seat design for two-wheelers. Harmonic response analysis showed a significant influence of foam density on vibration transmissibility. Foams with higher densities (up to 70 kg/m³) demonstrated superior damping performance, reducing transmissibility by more than 60% compared to lower-density foams. Similarly, foam thickness played a critical role, with a 10 mm increase in thickness reducing transmissibility nearly by half, highlighting the importance of adequate cushioning depth in seat design. Moreover, multilayer foam configurations provided an effective balance between comfort and vibration damping. The top layer of lower-density foam contributed to ergonomic comfort, while the bottom layer of higher-density foam efficiently mitigated vibration transmission.

Student	Mr. Bart, did you know a chip is a semiconductor?
Bart R.	That's a very good explanation.
Student	Okay, can you help me make something?
Bart R.	Let's visit a semiconductor website.

Website Excerpts

Semiconductors are everywhere in our lives.

Web – Global Foundries - STEM@GF is for Schools, Teachers, Parents and Students

We aim to connect GlobalFoundries with the education community, while inspiring today's students to learn more about the field of semiconductors

Think about all the things you interact with every day that have semiconductors (also known as computer chips) in them: smartphones, tablets, video game consoles, smart speakers, headphones, automobiles, just to name a few.

K-12 Activities - We are passionate about showing students how these semiconductors are made – and the many kinds of jobs it takes to make them!

These fun, engaging, hands-on activities educate students about semiconductor concepts. The activities can easily be connected to math and science topics in the classroom. **Each can be done as a stand-alone activity, or you can try as many as you like! Note that these activities can be done with common household/classroom items, and you won't need special supplies**.

- · Etch This!
- · Make a 3D Computer Chip Model!
- · Bending Light!
- · Candy Diffusion!
- · Keep It Clean!
- · The Power of Ten!

Make a 3D Computer Chip Model! Computer chips may look flat, but they are actually made up of many layers of different materials and metal "lines", or wires. Make a 3D model of a semiconductor, to help you envision the complex layers of a chip, then "Zoom into a Microchip" to see what a chip looks like under a powerful microscope.

Topics: Electrons, Conductor, Insulator, Semiconductor - Grades: 3-8; adaptable to all grades

GOENGINEER: "In September 2025, BYD's Yangwang U9X supercar shattered expectations, setting a world top-speed record for production vehicles at 308.33 mph and clocking a blistering 6:59.157 lap time at the Nürburgring Nordschleife. It's an incredible feat of electric propulsion, but the unsung hero of this achievement isn't just the motor; it's the frame holding it all together."

The U9X's success was built on a foundation of metal additive manufacturing provided by Bright Laser Technologies (BLT), proving that 3D printing is no longer just for prototyping; it is a production-grade powerhouse.
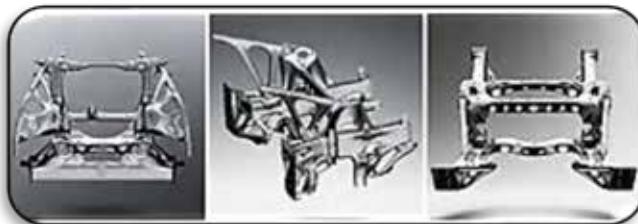
Web – Go Engineer - **Metal AM's Competitive Edge: BLT, BYD, and the Integrated Body Structure That Redefined Supercar Performance**

The "HyperCell" Frame - To handle speeds approaching 310 mph, traditional casting methods weren't enough. The Yangwang team turned to aerospace design principles, utilizing a technique known as multidimensional surface parametric modeling. This allowed for smooth, continuous transitions across complex curved surfaces, a geometry nearly impossible to achieve with conventional tooling. The result was the Printing HyperCell structure: a honeycomb-like, integrated body chassis that balances extreme lightness with immense strength.

200% Increase in Torsional Stiffness - Using topology optimization, the chassis features internal hollow chambers and reinforcing ribs that distribute stress far more efficiently than solid structures.

30% Weight Reduction - By using a high-strength aluminum alloy developed specifically for this project (boasting three times the yield strength of conventional cast aluminum), the vehicle shed critical pounds without sacrificing safety.

Precision at Scale - The BLT Advantage - The production of the U9X's body and components utilized BLT's large-format metal 3D printers, specifically the BLT-S1000, BLT-S615, and BLT-S815

These machines delivered precision that rivals aircraft engine components. By using laser selective melting and advanced process compensation algorithms, the team achieved:

- Dimensional deviation within ±0.5 mm for over 90% of the printed surfaces.
- Key mounting surface tolerance within 0.1 mm.
- Integrated functionality. Beyond the frame, BLT printed brake calipers that were 20–30% lighter and featured integrated internal oil channels, eliminating assembly steps and potential failure points.

BLT Metal 3D Printers Used for BYD U9X - Bring World-Record Technology to Your Shop Floor
The Yangwang U9X is a testament to what happens when engineers are given the freedom to design for performance rather than manufacturability constraints. BLT's technology didn't just make this car faster; it made a design previously thought impossible into a repeatable, production-ready reality. As the exclusive reseller of BLT printers for North America, GoEngineer is proud to bring these same capabilities to the U.S. and Canada. …

LLNL "Researchers at Lawrence Livermore National Laboratory (LLNL) are experts in nuclear forensics: the art and science of extracting information about the provenance and history of nuclear materials. Now, they have a new technique to add to their toolkit**."**

WEB – LLNL Xray Technique provides new tool nuclear forensics investigations

Ashley Piccone

In a study published in the Journal of Nuclear Materials, LLNL and Lawrence Berkeley National Laboratory scientists described how synchrotron-based scanning transmission X-ray microscopy (STXM) can identify chemical states and material impurities at the scale of individual particles — a resolution never before achieved.

"STXM allows us to see details in nuclear materials that traditional methods simply could not detect," said lead author and LLNL scientist Rachel Lim. "This ability to pinpoint chemical states and impurities of individual particles marks a major advance for nuclear forensics capabilities."

The method uses an X-ray beam — focused down to a pinprick that is only tens of nanometers wide — from a synchrotron to scan across a uranium sample. The characteristics of this beam, generated at the Advanced Light Source, allow the team to achieve that superior resolution.

As the X-rays pass through the sample, detectors measure how many X-rays are absorbed at each point in the material for multiple X-ray energies.

"Because each element has its own unique absorption profile — like a fingerprint — STXM can create detailed images and identify the specific elements and their chemical states in very small regions of the sample," said Lim.

With this technique, the authors identified and quantified the most common uranium oxides.

In a companion paper, published in the Journal of Vacuum Science & Technology A, they extended the approach to plutonium oxides formed in high humidity. In that case, they found a wide variety among individual particles, including phases with iron.

STXM can be used to analyze minute amounts of nuclear materials quickly and safely without damaging the sample. But reference datasets will be required to connect STXM signatures to a material's provenance and history.

"The chemical state and impurity profile of a material act as forensic signatures linking it to its origin, processing and environmental exposure, but meaningful interpretation requires high-quality reference data," said Lim. "As more reference data becomes available, this approach could become a standard tool for tracing the history and origins of nuclear materials, making it easier to monitor and protect them."

I love tractors, planes, drones, trains, military tanks. I do NOT love baking (I'm a baking disaster)

The ranch Coyote by the food pan

Dr. Marcus Dunn - Why Sports Engineering?

Embry-Riddle - New Honeywell Radar Weather Tracking

Capgemini - Shaping the future of Sustainable aviation

LS-DYNA Multiphysics - CFD of a 2026 Formula 1 (F1) car using ICFD LS-DYNA Solver.

Website article quote, "From carving foam to 3D-printed molds, Fusion transformed RC airplane design for Tony. Now, with his YouTube channel, CAD Build Fly RC, he helps others model, print, and fly their own creations."

Web – Autodesk - Community Spotlight: Tony Watkin's Journey of Reinventing RC Airplane Design – Tony Watkins

Six years ago, I saw something that completely changed the way I thought about building RC airplanes: someone was creating them from 3D-printed molds.

Having worked in the fiberglass industry, I knew how much time and effort the traditional process required. First, you had to make a plug—usually carved from foam—then glass the airplane and finally build molds from that plug. It was a long, labor-intensive process. Seeing 3D-printed molds, and even 3D-printed airplanes, made me realize there was a faster, smarter way.

Discovering Fusion for RC airplane design

I quickly learned that the first step in this new workflow was CAD modeling. Like most people, I turned to YouTube for help. After exploring different CAD programs, I found Kevin Kennedy's Learn Fusion in 30 Days series.

I learned a lot from those videos, but I still couldn't model an airplane. I reached out to Kevin directly, and with his guidance, I kept practicing until things started to click. Within a few months, I was modeling airliners in Fusion. Soon after, I tackled molds, jet airplanes, and even complex shapes with help from tutorials by Fusion educator Matt Perez.

RC airplane design: From modeling to making

Once I had my first airplane modeled, I ordered a 3D printer and began producing molds. The learning curve was steep, but the payoff was huge.

By learning Fusion, I can now 3D print my molds or a plug, saving me so much time compared to the old fiberglass process.

To document my journey with RC airplane design, I launched my YouTube channel, CAD Build Fly RC. At first, I shared build videos, but when I began teaching others how to model airplanes in Fusion, my channel started to grow rapidly.

Teaching and learning together

On my channel, I now teach:

- How to model airplanes in Fusion
- Preparing designs for 3D printing
- Creating 3D-printed molds
- Generating DXF files for laser cutting or routing
- Reverse engineering 3D models in Fusion

The more I taught, the more I learned. Everything clicked when I realized that every sketch starts on a plane. Once I understood that, working in 3D space became much easier.

I also overcame my hesitation with surface modeling. At first, I was intimidated, but I eventually realized it was just another tool. Now I use forms or surfaces depending on the project and the time I have.

A designer's mindset

Fusion has changed the way I see the world. When I'm at the flying field, I look at airplanes and think about how I'd model them. Out and about, everyday objects spark ideas for new designs.

When I first started learning Fusion, I never thought I'd have a YouTube channel teaching people how to model airplanes. But Fusion made it possible.

My advice for the Fusion community

If you're learning Fusion, here's what helped me:

- Practice often. Repeat what you know and build on it.
- Step away when stuck. Sometimes the solution comes after a break.
- Don't fear new tools. Forms, surfaces, lofts, splines—they're all part of the same design language.

Looking back

From modeling a Lego block in Kevin Kennedy's beginner series to teaching thousands through my own channel, my journey shows how Fusion can transform workflows, save time, and open new opportunities.

Little did I know, that a simple Lego block would lead me here—helping others design, print, and fly their own RC airplanes.

Follow my journey on YouTube at CAD Build Fly RC.

Cad Build Fly RC

Glace – FEANTM
FEANTM Off-Site Glaciologist
I visit glaciers, ice sheets and frozen waters.

January

FEANTM Off-Site Glaciologist - Being a glaciologist brings me to glaciers, ice sheets and frozen waters. Their physical properties are unique and their formations and movements change. I find water and ice fascinating how they impact the environment, ships, icebreakers, and other structures.

...Different ice cusp geometries are exported from the floe-ice breaking simulation as planar polygons in combination with the thickness value of 0.8 m. The ice cusp geometries are imported into ANSYS to create a tetrahedral base mesh based on an automatic meshing approach using Delaunay triangulation. **In the next step, the tetrahedral elements are exported to LS-DYNA. The successful reproduction shows the applicability of the approach to better estimate the loads exerted by the ice on the propeller.…**
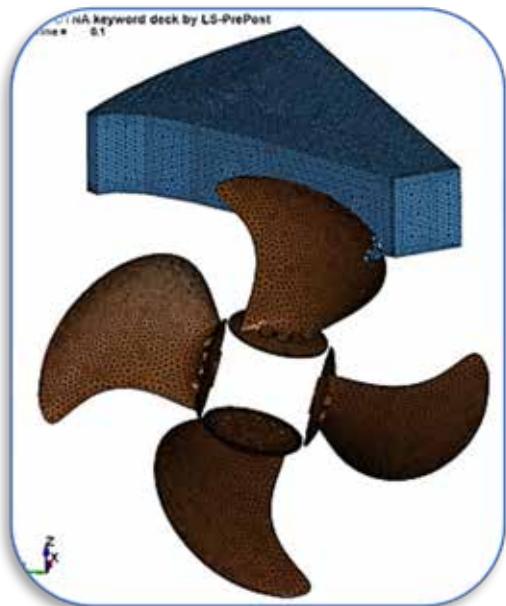
Web - Science Direct - Simulated ice loads on a ship propeller and comparison with full-scale measurements

Jorrid Lund, Lina Sapp, Jan Manuel Kubiczek, Angelo Mario Böhm, Franz von Bock und Polach

Inst. for Ship Structural Design & Analysis (M-10), Hamburg Univ. of Technology (TUHH), Germany

Fig. 5. Mesh of the rigid propeller of the S.A. Agulhas II.

Abstract - A methodology to better estimate the loads of ice acting on the propeller of a ship is developed. Based on measurements conducted in the North Pole region, an existing failure model for ice based on the Mohr–Coulomb nodal split approach is modified to better represent the lower strength of polar ice compared to laboratory ice.

The modified material model for the sea ice is used to compute the propeller torque and a load spectrum for the propeller-ice interaction of the research ship S.A. Agulhas II.

To this end, a floe-ice breaking simulation is used to estimate the size and shape of the ice cusps hitting the propeller of this ship. In the next step, a set of finite element simulations of the propeller-ice interaction utilizing the modified Mohr–Coulomb nodal split model is conducted. Based on this, the load spectrum is computed and compared with the measured torque on the propeller shaft of the S.A. Agulhas II.

Introduction - In recent years, maritime activities in the polar regions increased significantly [1][2], [3]. The polar regions have been important for research and military ships for centuries. But in recent years, also commercial ships and tourism have frequented the polar region more. More ship traffic in the polar regions in floe-ice fields also leads to more collisions between sea ice and the ship propeller. It is shown by some incidents of ships operating in ice floe fields [4], [5], that the propeller and the attached drive train are some of the most exposed and compromised components of a ship in these circumstances…
…

DFE-tech "Our goal is to equip our customers with the necessary knowledge and management solutions to today's challenges."

Contact us for software solutions – **visit our product solutions page**

Article, "Lumendo AG is an innovative company researching injectable filler and endodontic debridement solutions. With the simulation technology of Ansys and the help of CADFEM, new methods were tested and further developed. In certain endodontic treatments, dentist use a 3000 nm pulsed laser, which can create a cavitating bubble that emits a powerful shockwave." Images: © Lumendo AG

Web – CADFEM - Solutions in Endontonics
Simulation of a cavitating bubble inside a single root canal filled with water - Simulation of Laser induced cavitation with Ansys Fluent

Sector: Health
Specialist field: Fluid Mechanics

Task: To better understand the fluid dynamic effects generated by this phenomenon, a cavitating bubble inside a single root canal filled with water is simulated with Ansys fluent. The aim of the project was to create a proof of concept for root canal cleaning using laser induced cavitation, using Ansys simulation tools.

Solution: A pragmatic simulation model was developed in Ansys Fluent using moving wall to simulate free surface expansion and shrinkage of the bubble. The simulation model consists of a moving wall, representing the free surface of the bubble, which is based on experimental data. In a first phase, the bubble is expanding induced through the laser. In the second phase the cavitation of the bubble occurs. The pressure waves are then tracked and analyzed.

Customer benefits: The Proof of concept developed helped to have a better understanding of the influence of the geometrical dimensions for system tuning and find the most critical locations. This POC was developed with fewer prototypes than it would with previous methods.

Because of the transient simulation the minimum pressure (-0.32 MPa) and maximum pressure (0.38 MPa) at the apex could be evaluated

- Prove of concept of simulation method for laser induced cavitation
- Increased knowledge of the design including an identification of the most critical locations.
- Useful information to start experimental validation and production without extensive iterative prototyping.
- Increased knowledge about the influence of geometrical dimensions for system tuning.
- Local information not accessible with experimental measurements

Bubble diameter temporal evolution

"We're excited to share a thesis showcasing the potential of RBF Morph technology, developed by our colleague Davide Zambon at Università Ca' Foscari Venezia. This work demonstrates how RBF Morph can be integrated into industrial CAD environments to support fast, reliable shape optimization and real-time aerodynamic assessment"
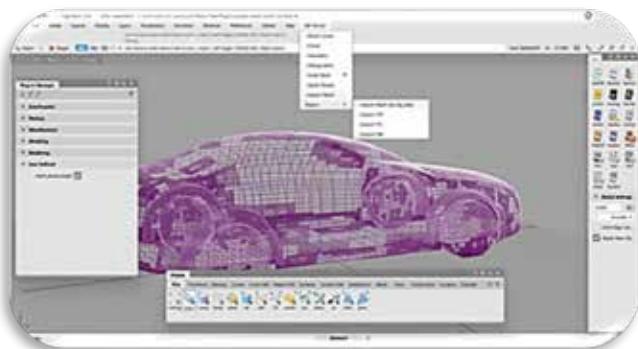
Web RBF Morph Thesis (PDF available to download on website (Italian) Advancing CAD-CFD Integration with RBF Morph: A New Step Forward in Aerodynamic Design How Radial Basis Functions can be embedded directly into Autodesk Alias to speed up the aerodynamic design process. The proposed plugin captures geometric modifications applied to NURBS surfaces and seamlessly transfers them to the CFD mesh through RBF-based morphing, eliminating the need for full CFD re-simulations, which are typically costly

By leveraging sensitivity data from adjoint CFD solvers, the system can estimate the aerodynamic impact of local shape changes in near real time. The plugin maintains mesh topology and consistently propagates deformations across all nodes, ensuring perfect compatibility between CAD updates and precomputed simulation fields.

The result? A tighter, more efficient loop between design and aerodynamic evaluation, significantly reducing iteration time and accelerating early-stage development.

Supervisors: Prof. Nicola Prezza - Prof. Marco Evangelos Biancolini - Dott. Marco Camponeschi

Figura 1.1: RBF Morph
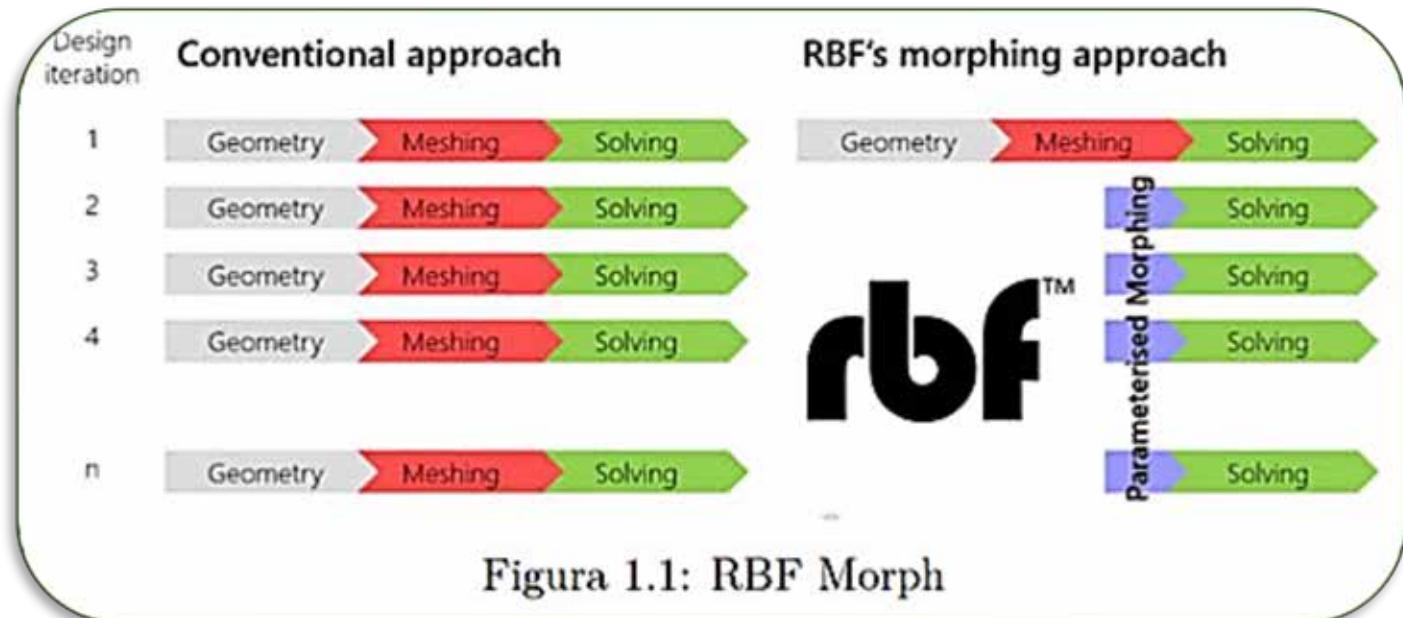
Quote, **Matthias Alberts, CADFEM Europe Director**, "If you want to understand optics, photonics & stuff like quantum, please connect with Steven (lad on the left, one on the right is listening & trying his best to understand a thing). Together with his good friend Daniel Jimmerskog he is running his own podcast, Rays & Waves. We are not forcing him; he's just passionate about it."

Matthias Alberts, CADFEM Europe Director, "If you want to understand optics, photonics and stuff like quantum, please connect with Steven (lad on the left, one on the right is listening and trying his best to understand a thing). Together with his good friend Daniel Jimmerskog he is running his own podcast, Rays and Waves. We are not forcing him; he is just passionate about it. Both of them are an absolute joy to listen to, and are the best experts around optics and photonics you will find...Great characters also. If you have employees who produce technical podcasts in their free time, and understand how to transfer their knowledge on photonics and optics simulations with Ansys and Synopsys Inc to our customers, how can't you be anything but proud of them."

Web - Spotify – [Rays and Waves we speak about Linear Optical Quantum Computers](#)

Episode Description - In this episode of Rays and Waves we speak about Linear Optical Quantum Computers. There has been lots of talk about quantum computers in the science media lately. Both companies and academic labs are hard at work to build the sought-after fault-tolerant quantum computer. As it turns out, one approach to building quantum computers is with optics. Join us as we explore the pros and cons with this light-based approach to quantum computers.

> **This section is in my capacity as the town's steward of information.**
>
> Periodically, I will highlight information relevant to the town, its residents, development departments and municipal departments.
>
> As we curate engineering work and ideas, MFEM stands as a reminder that good tools shape not only what we can compute, but how responsibly we compute it

Topic: MFEM - The library began at Lawrence Livermore National Laboratory (LLNL)
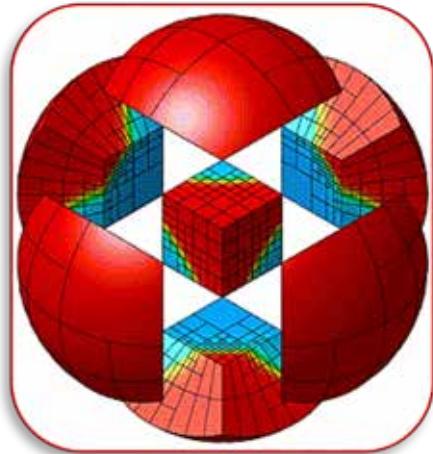
Web – MFEM - A free, lightweight, scalable C++ library for finite element methods. MFEM (download link page)

New Version released on Dec 11, 2025, Version 4.9

Among the many Features you will find:
- **Arbitrary high-order finite element meshes & spaces.**
- **Wide variety of finite element discretization approaches.**
- **Conforming and nonconforming adaptive mesh refinement.**
- **Scalable from laptops to GPU-accelerated supercomputers.**

MFEM is an open-source library for finite element methods (FEM), designed to support the development of high-performance, scalable numerical simulations. At its core, MFEM provides the building blocks engineers and researchers need to discretize and solve partial differential equations, those mathematical expressions that govern heat flow, structural response, electromagnetics, fluids, and more.

MFEM's origins lie in the practical demands of large-scale scientific computing. The library began at Lawrence Livermore National Laboratory (LLNL), where researchers needed a flexible and efficient finite element framework to support advanced physics simulations on emerging high-performance computing architectures. Rather than building a narrowly specialized code for a single application, the early developers focused on a general-purpose finite element infrastructure. This decision shaped MFEM's prioritizing clarity of mathematical representation, performance portability, and long-term extensibility

MFEM supports distributed-memory parallelism, GPU acceleration, and high-order methods, making it suitable for simulations that range from classroom experiments to leadership-class supercomputers.

As an open-source project, it embodies a civic ideal in engineering: that critical tools should be transparent, reviewable, and improved collectively. In fields where simulation results inform infrastructure design, safety assessments, or public policy, this openness is not incidental but in my opinion it's essential.

> **LLNL, UT & UCSD win Gordon Bell Prize with exascale tsunami forecasting** ...For co-author and LLNL computational mathematician Tzanio Kolev, **the project represents the culmination of years of research in numerical methods, high-order modeling and exascale computing by the MFEM project at LLNL.**

YouTube - Watch our first Top Tip here and learn why ZTF files are essential for Ansys LS-DYNA workflows: Top Tips are back! We are excited to reintroduce Software Top Tips, a series of short, practical "how-to" videos designed to help you unlock the full potential of the Oasys Suite, including Oasys PRIMER, D3PLOT, THIS, and more

These bite-sized tutorials deliver quick, high-value insights to improve workflow efficiency, streamline processes, and help you achieve solver-ready results with confidence.
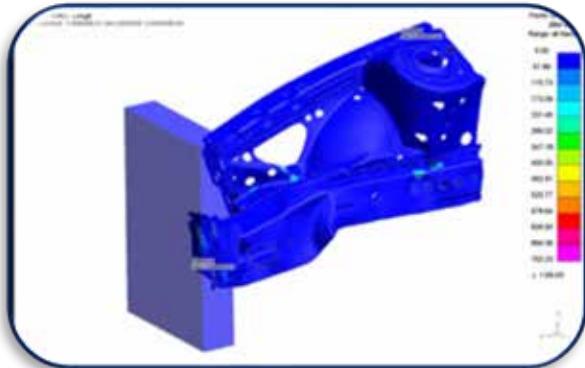
Web - YouTube – Tips and Tricks ZTF

INTRODUCTION – In this video, you will fnd"
- **Understand the purpose of ZTF files in LS-DYNA post processing**
- Explore the key simulation data contained within a ZTF file.
- Learn how to automatically generate ZTF files in your daily workflow
- Follow a step-by step demonstration using a practical model.
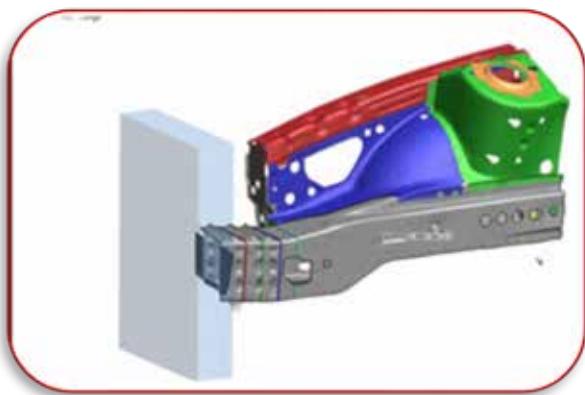
Learn why ZTF files are essential for LS-DYNA workflows. Unlike standard result files (PTF, D3plot) that store time-history data, ZTF files include static metadata such as Include File Structure and cross-section locations, enabling a more complete dataset for post-processing.

You will discover:

- -Why ZTF files improve efficiency in post-processing LS-DYNA results
- -How ZTF files recover missing details like spotwelds, cross-sections, and composites
- -How to generate ZTF files using Oasys SHELL and PRIMER
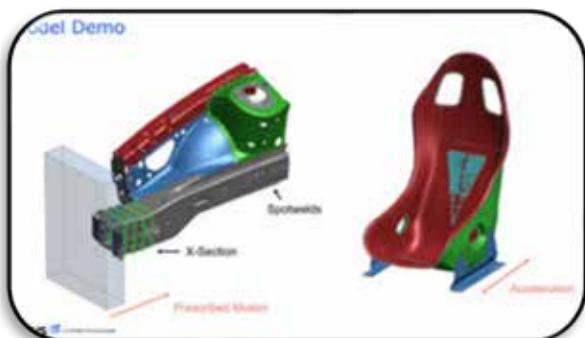
The Oasys LS-DYNA Environments' software is being used as part of a ground-breaking project led by the Centre for Future Transport and Cities (CFTC) at Coventry University with the aim of saving more pedestrian lives, roadside. CFTC has been awarded a prestigious grant from the Road Safety Trust (£409,319), for the project, "In-Situ Mobile Application for the Triage of Pedestrians in Vehicle Collision…

Excerpts Web - Oasys - Revolutionising Roadside Brain Injury Assessment using Simulation Software

SENTINEL, which launched in November 2024, is a collaborative three-year project with Coventry University, the University Hospitals Coventry and Warwickshire NHS Trust, West Midlands Ambulance Service and The Air Ambulance Service, to produce innovative in-situ triage and forensic technology. SENTINEL will deliver a validated mobile triage tool that allows prehospital clinicians to assess adult pedestrian brain injuries at the roadside with greater speed, accuracy, and efficiency than current NHS systems. This mobile triage application will be created by performing virtual simulations, using a Toyota Total Human Model for Safety (THUMS) brain computer model, to reconstruct vehicle-to-pedestrian collisions. Pedestrian collisions will be created from the Road Accident in Depth Studies (RAIDS) and reconstructed to generate the training data to create a machine learning model, which can then be converted into a mobile app. The preparation of brain computation models will be designed using Oasys PRIMER, simplifying the parametrisation and automatic creation of head impact collisions against vehicle structures. SENTINEL will also utilise Oasys T/HIS and Oasys REPORTER to automate brain injury severity outcomes, with the ambition to create a numerical process to perform a virtual "brain injury CT-Scan" using Oasys D3PLOT technology. Researchers in CFTC believe this approach could also allow engineers to assess medical injury outcomes at the design engineering level, leading to the development of safer vehicles.

"**This is an ambitious and challenging multi-disciplinary project linking numerical, medical and emergency services experts together with the purpose of saving lives and challenging the status quo on brain injury severity computation.**

SENTINEL will require the best numerical tools available on the market to improve the project's productivity and the generation of quality data for the development of our triage mobile app. This research was made possible thanks to the generous funding provided by the Road Safety Trust"

Dr Christophe Bastien, Associate Professor and Principal Investigator.
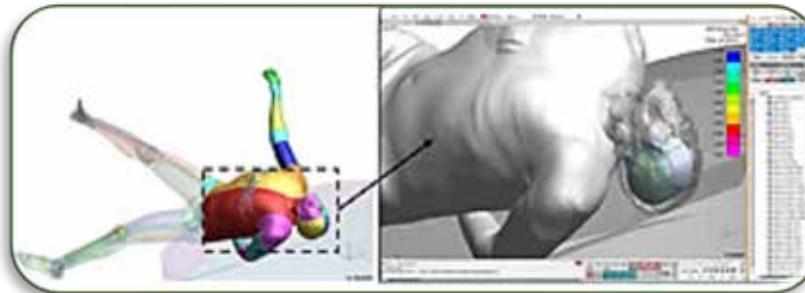
Image source (header and article Brain Injury assessment with Oasys D3PLOT during car accident case

An analysis of pedestrian collisions performed by Coventry University using the Road Accident In-Depth Studies (RAIDS) database has revealed that

that 8.5% of pedestrian victims with head injury are incorrectly triaged with current clinical assessment of conscious level. This is largely due to the lack of appropriate assessment tools, particularly when victims do not show obvious signs of severe injury at the scene. In 3.8% of pedestrian collision cases, the victims died within 28 days of the incident. Additionally, 4.7% of those who suffered a serious traumatic brain injury experienced lasting physical, cognitive, and psychological effects. The SENTINEL triage tool is designed to help address these challenges.

We're proud that Oasys LS-DYNA Environment is at the heart of the SENTINEL (In-Situ Mobile Application for the Triage of Pedestrians in Vehicle Collision) project, a pioneering initiative led by Coventry University's Centre for Future Transport and Cities (CFTC) to improve pedestrian safety.

Funded by the The Road Safety Trust, SENTINEL uses advanced simulation technology to create a mobile triage tool that helps emergency clinicians assess brain injuries at the roadside faster and more accurately.

By leveraging Oasys PRIMER, D3PLOT, T/HIS and REPORTER, researchers can automate head impact simulations and brain injury severity analysis, turning complex collision data into actionable insights. This approach not only supports emergency care but could also influence safer vehicle design.

We're excited to see how simulation technology can save lives and transform road safety.

Special thanks to Christophe Bastien and his team for sharing details of their work and collaborating with us on this article.

Software Top Tip – **Did You Know?** Oasys PRIMER includes a built-in Model Cleanup tool to help streamline and optimise your models.

[Subscribe to our newsletter](#)! - Don't miss out on the latest news, events and resources from the Oasys LS-DYNA Environment. Oasys Suite allows users to power through their entire LS-DYNA workflow, supporting users at every step from quality model build to in-depth analysis, providing reliable results for confident decision-making. With built-in collaboration features the software also enables efficient working between CAE professionals and wider teams.

Join us for a one-day conference dedicated to exploring how simulation empowers engineers to innovate faster and smarter. Discover how leading companies leverage advanced simulation tools to create breakthrough designs, reduce costs, and accelerate time-to-market.

US - 03/10/2026 OZENCON
Our conference is FREE to attend.
Register today.
Location: THE COMPUTER HISTORY MUSEUM

This event brings together ANSYS users, partners, developers, and industry experts for networking, learning, and sharing transformative ideas.

Through case studies and real-world workflows, speakers will showcase how simulation drives strategic engineering decisions and unlocks innovation. We'll also highlight emerging technologies such as AI-driven design and generative approaches, shaping the future of product development.

LOCATION:

THE COMPUTER HISTORY MUSEUM

1401 N. Shoreline Blvd.,

Mountain View, CA 94043

Tonight, on our local news channel in the town pointed towards its true north (FEA+) we have original team reporting:
Mi (a resident news raccoon) & Ke (a resident news coyote)

Mi, "Quiz time – Do you know what an ESD event is?"

Ke, "No clue, we better call Mike at Ozen. He knows where to find the answers."

Web – Excerpts – Ozen - <u>Ansys Charge Plus: ESD Arcing on a Cell Phone</u>, Adel Benleulmi

Electrostatic discharge (ESD) events can cause arcing that damages sensitive electronics, especially in compact devices like cell phones. In previous tutorials, we went through the air ESD into a calibration target and air ESD into PCB tutorials available within Charge Plus. In this blog, we visualize primary and secondary arcing on a simplified cell phone model using ParaView.
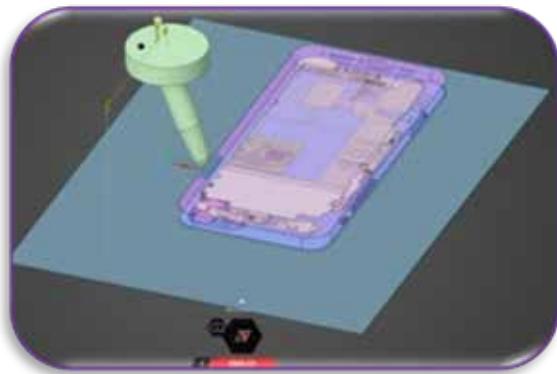
For graphics please visit the website for clarity

The 3D model

Overview - ParaView is an open-source visualization tool designed for exploring large 3D simulation datasets. In this example, we use it to visualize the air conductivity results of the ESD gun discharging into a simplified cell phone model, shown.

For this example, the source voltage was set to 25 kV. The source voltage and the ESD waveform are shown below.

Charging Voltage
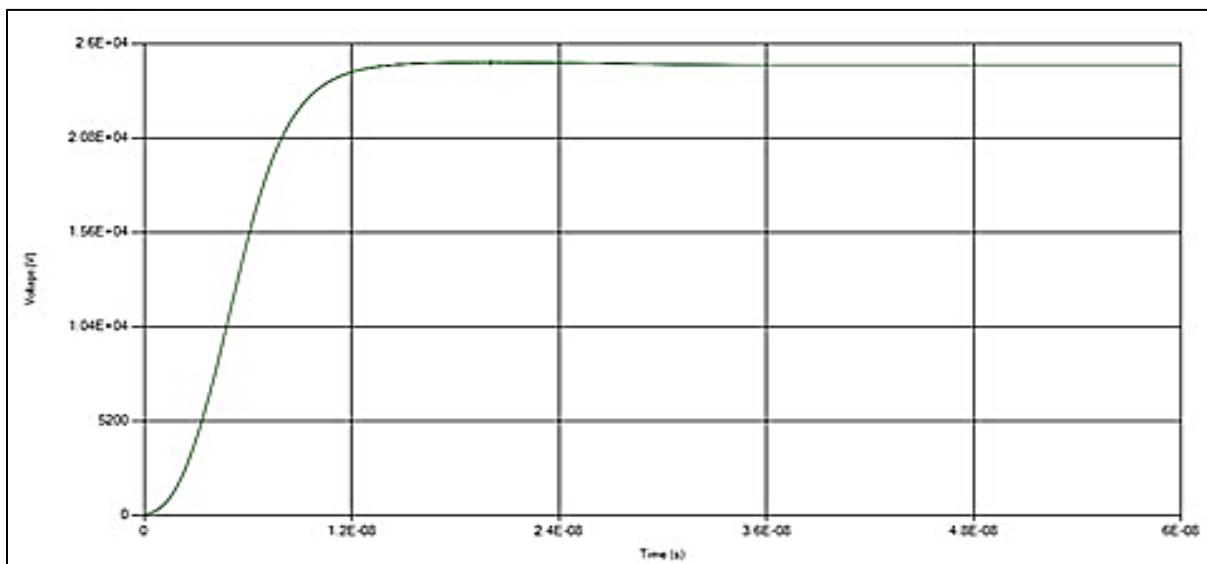
The Source Voltage

The ESD waveform
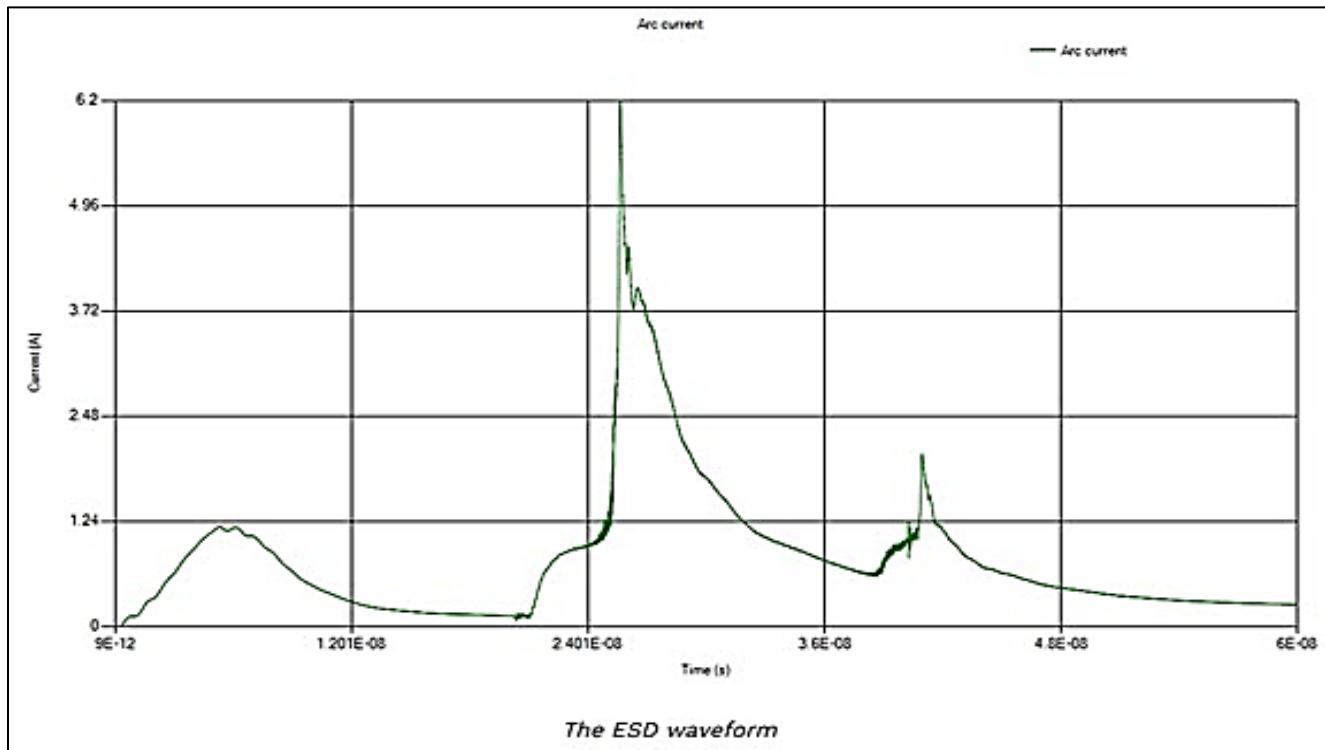
The air conductivity results are shown below. The simulation reveals an arc from the ESD gun to the PCB, a secondary arc between the ESD gun and a nearby board, and an additional arc between that board and the PCB.

YouTube video **The video walks through the steps in detail for importing the results into ParaView, and the model is available in the downloadable resources.**

"Encryption underpins the security of the internet. Encryption requires not only randomness but unpredictability (something that's really difficult for a computer to generate on its own). Chaotic fluid dynamics systems are a great source of both. Even though you might not have realised it, Lava Lamps and their extremely high entropy levels form the basis of internet security today."
[*'Globulate' – not a recognised term, but nevertheless one that serves well when applied to Lava Lamps!]

Web Siemens The Internet Runs on Lava Lamps -
By **Robin Bornoff, Innovation Roadmap Manager**

How might one model such a chaotic molten wax based system, could Simcenter attempt to 'break the code', and why might that ultimately be a fruitless endeavour?

15 Years to Develop - Edward Craven Walker, an accountant and former RAF pilot, after seeing an egg-timer device made from 2 immiscible liquids in a country pub in Dorset UK, spent the next 15 years refining the design of what would come to be known as the Lava Lamp. By 1963 he had perfected the design and commercialised the 'Astro Lamp'. Just in time for the swinging '60s and as Walker commented: "If you buy my lamps, you won't need drugs".

A Perfectly Poised Fluid Dynamics System A bulb acts as a heat source at the bottom of glass that heats the wax to the extent where its density decreases enough (by no more than 1% less than the density of water that it sits in) so that globules of wax will rise due to buoyancy, cool as they move up away from the lamp heat source, so ultimately fall back down again as their cooled density becomes greater than the water in which they float.

Too much heat and resulting higher temperatures would then see the wax float to the top of the lamp and stay there for ages. Too little heat and then the wax wouldn't 'globulate'* upwards. Somewhere in between and you get this beautiful delicate balance between buoyancy, viscosity, density and surface tension.

What on Earth has this got to do with Internet Security? Secure Shell (SSH) is a protocol that lets you safely connect to and control remote machines (amongst other things) over an otherwise insecure network. It creates an encrypted channel between you and the server, ensuring that anything you type or transfer can't be read or tampered with by others.

SSH keys act as your cryptographic identity: one public key sits on the server, while your private key stays with you. When you connect, the server challenges your private key to prove who you are – without ever revealing the key itself – creating a secure, trusted link.

SSH keys are created by feeding a source of high-quality entropy into a cryptographic key-generation algorithm. That entropy seeds a random number generator, which produces the large, unpredictable prime numbers and bit patterns that form the private key; the public key is then mathematically derived from it.

In this context, entropy means the amount of true, irreducible unpredictability feeding a random number generator. It is derived from physical irregularities: timing noise, thermal fluctuations, chaotic motion, ensuring that the bits used to create an SSH key are impossible for an attacker to guess or reproduce.

The transient behaviour of lava lamps is a rich source of entropy. Their motion is chaotic, sensitive to initial conditions, and exhibits a positive Lyapunov exponent, a hallmark of systems where tiny uncertainties grow exponentially over time. This makes them effectively impossible to simulate or predict with meaningful accuracy.

The Wall of Entropy - The need for high-quality entropy in cryptography became obvious after the Netscape vulnerability of 1996, when researchers discovered that Netscape's SSL keys were generated from only a few predictable values: the system time and process IDs. With so little real randomness, attackers could recreate "secure" keys and break encrypted sessions. That failure cemented a simple truth: cryptography collapses the moment entropy becomes predictable. In response, SGI (Silicon Graphics, Inc.) developed LavaRand, an early system that generated entropy by photographing a cluster of lava lamps and hashing the resulting pixel data – recognising that the chaotic, fluid behaviour inside those lamps produced far richer unpredictability than any software-only approach.

Cloudflare later revived and expanded this idea across its global offices. At their San Francisco headquarters, a camera continuously photographs a wall of lava lamps, feeding their shifting colours and wax blobs through a cryptographic hash function to extract entropy.

In London, the company uses a double pendulum, whose chaotic motion is impossible to predict over time, and in Singapore they rely on the random timing of radioactive decay from a safe isotope source. All of these signals – lava lamps, pendulum, and atomic noise – are hashed and mixed into Cloudflare's entropy pool, helping to seed the cryptography protecting a significant share of global internet traffic.

Lmap 3 Cloudfare 'Wall of Entropy' at their California Office. HaeB, CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0, via Wikimedia Commons)

Simulation is not always Prediction - Of course, you can simulate physical phenomena, very accurately in most engineering contexts. For the vast majority of applications, simulation and experiment agree closely, and this is well established. But when you look at explicit, non–time-averaged transient behaviour in genuinely chaotic systems, such as turbulent eddies or motion inside a lava lamp, the situation is different. You can absolutely simulate the physics, but you cannot expect the simulation to reproduce the exact time-evolving signal of a specific physical twin. Even tiny uncertainties, microscopic temperature differences, minute variations in geometry or material properties, cause the real system and the simulated one to diverge over time.

This isn't a limitation of the simulation software; it's a fundamental property of nonlinear dynamical systems. Chaotic regimes exhibit sensitive dependence on initial conditions, the so-called butterfly effect, governed mathematically by positive Lyapunov exponents

In practice, this means the transient details will always differ, even though the derived, time-averaged engineering quantities remain accurate and highly useful. Chaotic systems can be simulated, but not predicted in their exact instantaneous evolution.

It is exactly this chaotic 'non-predictable' behaviour that underpins the high entropy conception on which the 'Wall of Entropy' is based.

Simcenter can model what ever you might throw at it - I used Simcenter to simulate the Lava Lamp. Considering that it took 15 years for Edward Craven Walker to derive the perfect wax properties, and that it is rumoured that only 6 people in the world today know the exact constituents of the augmented wax material, my challenge was not so much in the simulation numerics (Simcenter ate this for breakfast) but to try to reverse engineer the wax material properties so as to replicate a typical Lava Lamp 'globurised' transient flow.
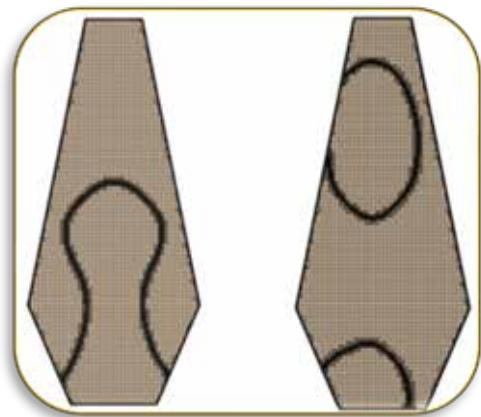
The time step by time step adaptive mesh refinement in Simcenter enabled the immiscible interface between wax and water to captured directly. The real challenge though was to identify the wax material properties in terms of temperature dependent density and viscosity and its surface tension. In addition the wettability nature of the wax/glass lamp interface and the heating power necessary to ensure the wax doesn't heat up too much, or too little.

A devilishly challenging CFD simulation. Given more time I might have more accurately reverse engineered the wax material properties that are the preserve of those 6 people.

As it is I achieved some level of globurisation and at the very least it exhibited the chaotic behaviour that is relied upon to secure the internet data transactions of today.

Please visit the website for video of graphics.

WEB - RBF CAE – "Interactive Reduced Order Models for Ship Hull Design & Optimization"

pdf available to download on the website

Table of Contents:
1. About ENGYS
2. Methodology
3. Results
4. Conclusions

Our work presents a proof-of-concept framework for ship hull design and optimization that combines open-source CFD with advanced data-driven modeling. Using RBF mesh morphing and Proper Orthogonal Decomposition (POD), we developed Reduced Order Models (ROMs) capable of predicting resistance, pressure distributions, and free-surface elevation in real time.

This interactive approach, supported by a PyVista-based dashboard, allows designers to explore design variations and received instant feedback., achieving **high accuracy** with a maximum resistance prediction error below 3.5% on unseen designs. The framework represents a step toward Digital Twins for ships, enabling fast, flexible, and cost-effective simulation-driven design and optimization.

Visit our website for the full presentation for and provides detailed insights into this innovative approach to ship design.…..

Fluid Mechanics Films
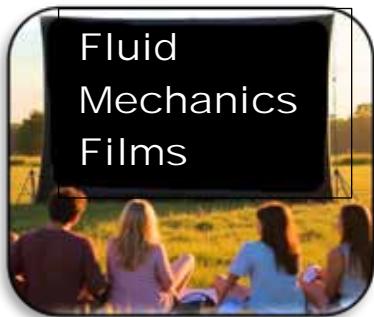
Welcome to our Pasture Movie Theater

Information, Companies, Videos Not To Miss

FEANTM Town & Residents welcome you
And coffee and popcorn are free

We thank Rajat Walia for this information

Web - MIT - In 1961, Ascher Shapiro founded – Nat'l Committee for Fluid Mechanics Films (NCFMF) in cooperation with the Education Dev. Ctr & released a series of 39 videos & accompanying texts which revolutionized the teaching of fluid mechanics. MIT's iFluids program has made a number of the films from this series available on the web.   Below is an excerpt of the many films listed:
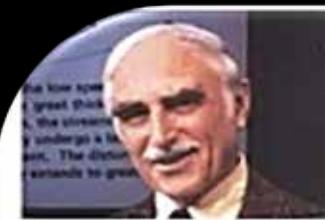
National Committee for Fluid Mechanics Films

In 1961, Ascher Shapiro founded the National Committee for Fluid Mechanics Films (NCFMF) in cooperation with the Education Development Center and released a series of 39 videos and accompanying texts which revolutionized the teaching of fluid mechanics. MIT's iFluids program has made a number of the films from this series available on the web. (Download / Purchase information.)

The preface to *Illustrated Experiments in Fluid Mechanics: The NCFMF Book of Film Notes* can be found below.

Complete film notes for the NCFMF movies

Ascher Shapiro's Obituary

(Click images to enlarge)

m	TechTV	YouTube	Film Notes
Aerodynamics Generation of Sound	TechTV	YouTube	Film Notes
Boundary Layer Control	TechTV		
Cavitation	TechTV	YouTube	Film Notes
Channel Flow of a Compressible Fluid	TechTV	YouTube	Film Notes
Deformation of Continuous Media	TechTV	YouTube	Film Notes
Eulerian Lagrangian Description	TechTV	YouTube	Film Notes
Flow Instabilities	TechTV	YouTube	Film Notes
Flow Visualization	TechTV	YouTube	Film Notes
Fluid Dynamics of Drag Part I	TechTV	YouTube	
Fluid Dynamics of Drag Part II	TechTV	YouTube	
Fluid Dynamics of Drag Part III	TechTV	YouTube	
Fluid Dynamics of Drag Part IV	TechTV	YouTube	
Fundamental Boundary Layers	TechTV	YouTube	Film Notes
w Reynolds Number Flow	TechTV	YouTube	Film Notes

This study investigates occupant–seat interaction dynamics in high-speed train frontal collisions. **A finite element model of a second-class double seat was developed and simulated using LS-DYNA R12.1 software with a Hybrid III dummy, applying trapezoidal and triangular acceleration pulses per European and American standards**…

Figure 3. Comparison of dummy collision test and simulation model in seated position
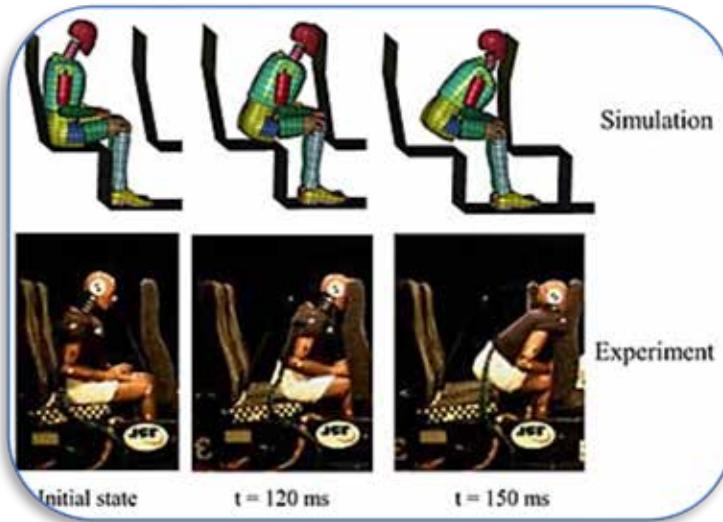
Web – MDPI - **Study on the Effect of Seatback Recline Angle and Connection Stiffness on Occupant Injury in High-Speed Train Collisions**
F. Yu, X. Sang, H. Tian, L. Liu, W. Wang

· R&D Center, CRRC Qingdao Sifang Co., Ltd., China
· College Transportation, Tongji Univ. China
· School Traffic & Transp. Engin., Central South Univ., China

Abstract - This study investigates occupant–seat interaction dynamics in high-speed train frontal collisions. A finite element model of a second-class double seat was developed and simulated using LS-DYNA R12.1 software with a Hybrid III dummy, applying trapezoidal and triangular acceleration pulses per European and American standards. The research analyzes the impact of front-row seatback recline angles (0°, 10°, 20°) and seatback-to-base connection stiffness (1000 N/mm to 0 N/mm) on head, neck, chest, and leg injury severity. Results show that a 10° recline provides optimal protection under fixed stiffness. When optimizing both parameters, a 0° recline with approximately 300 N/mm stiffness minimizes composite injury metrics (HIC15, Nij, CTI). However, reducing stiffness at non-zero recline angles increases neck injury risk due to tray table displacement toward the cervical region. These findings emphasize the critical importance of integrated seat design optimization for rail passenger passive safety and highlight the need to mitigate tray table hazards.

Introduction - Train collision accidents exhibit high destructive power, significant casualties, and profound social consequences. Ensuring occupant safety thus remains a critical challenge for researchers. Currently, high-speed trains are designed for crashworthiness based primarily on primary impact scenarios. However, primary impact injuries are relatively uncommon; secondary impact injuries constitute the predominant form of occupant trauma. Consequently, occupant injury analysis under secondary impact scenarios stands as a vital research topic in modern rail transportation studies [1,2,3,4,5].

> "**We selected the crushable foam material model (MAT_63) in LS-DYNA** to simulate the behavior of the protective pad. This model is specifically designed for modeling crushable foam with optional damping and a tension cutoff feature. It exhibits fully elastic unloading and treats tension as elastic-perfectly-plastic up to the tension cutoff limit."

Varanges and colleagues present a deep learning-based approach to optimize helmet liner materials for brain injury prevention. This method highlights the potential of AI-driven material design tailored for specific applications.**....**

Fig 1. Flowchart of the deep learning model building from data generation to model evaluation. Two predictive models were developed one for the peak in rotational acceleration and one for the peak rotational velocity
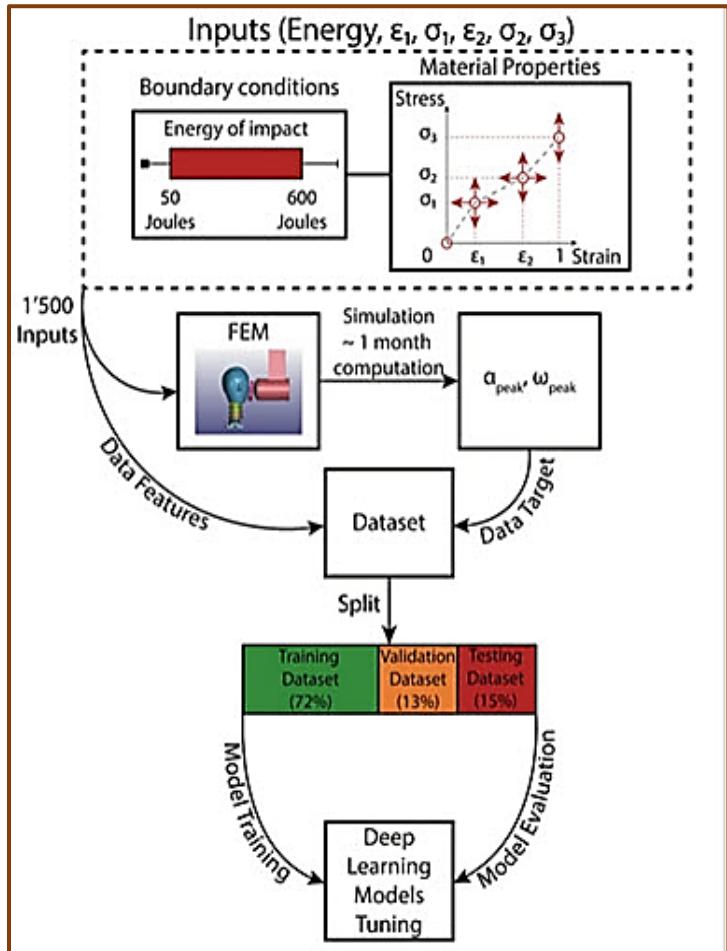
Web – Nature - Helmet material design for mitigating traumatic axonal injuries through AI-driven constitutive law enhancement

Vincent Varanges, Pezhman Eghbali, Dominique P. Pioletti
· Laboratory of Biomechanical Orthopedics (LBO), Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland
· Laboratory for Processing of Advanced Composites (LPAC) Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland
· Hospital of Walis, Sion, Switzerland

Abstract - Sports helmets provide incomplete protection against brain injuries. Here we aim to improve helmet liner efficiency by employing a novel approach that optimizes their properties.

By exploiting a finite element model that simulates head impacts, we developed deep learning models that predict the peak rotational velocity and acceleration of a dummy head protected by various liner materials. The deep learning models exhibited a remarkable correlation coefficient of 0.99 within the testing dataset with mean absolute error of 0.8 rad.s−1 and 0.6 krad.s−2 respectively, highlighting their predictive ability. Deep learning-based material optimization demonstrated a significant reduction in the risk of brain injuries, ranging from −5% to −65%, for impact energies between 250 and 500 Joules. This result emphasizes the effectiveness of material design to mitigate sport-related brain injury risks. This research introduces promising avenues for optimizing helmet designs to enhance their protective capabilities.

EXCERPTS - Introduction - Skiing is one of the most practiced outdoor activities, with an estimated 135 million people skiing globally each year. Skiing is an accident-prone sport with an injury rate of 2.8 for 1000 skiers[3]. Among the different skiing accidents, head injuries account for 16 to 19% of all injuries.

In cases of severe accidents, traumatic brain injuries (TBIs) emerge as the primary cause for hospital admissions within the skiing community, ranging from mild concussions to severe traumatic axonal injuries (TAI. This is especially surprising as it coincides with an increasing fraction of skiers wearing helmets on the slope, passing from 0% to 93 % over the period ranging from 2000 till 2019. Furthermore, the rate of brain injuries has remained relatively stable at around 18% of all yearly ski injuries. Researchers described the protective effect of helmets against skull fractures but found helmets did not significantly reduce occurrence of intracranial lesion. Helmets' efficacy against traumatic axonal injuries raises public health concerns, especially given the almost epidemic levels of these injuries and their associated mortality rates due to TAI. Therefore, reconsideration of helmet design based on the ability to reduce the TBI incidence rate is an urgent task. In particular, the development of novel dissipative materials dedicated to mitigating TBI for a variety of ski accident scenarios should be considered.

The current situation regarding TBI might result from out-of-date standards regulating ski helmets. Indeed, the current standards focus on mitigating the head's linear acceleration without considering rotational acceleration, which is one of the leading causes of brain injuries[17]. Furthermore, the standards focus on a single linear impact at a given speed of 22.3 km/h, failing to evaluate the protective capabilities of the materials at lower and higher speeds…

…

Methods - Finite element simulation - The model used in our study was composed of a Hybrid III (III) Head and neck finite element model coupled with a protective pad (dimensions: 110 × 60 × 20 mm) extracted from the finite Element Model of 2016 Riddell Speed Classic, both distributed by the Biomechanics and Research, LLC (Biocore). The University of Virginia Center for Applied Biomechanics previously validated the HIII head and neck model. The protective pad was composed of two parts, a comfort layer and the protective liner (see Supplementary Section 1 for more details).

We selected a jaw impact as a baseline for brain injury mitigation. It has been found that the mandibular region is the most vulnerable region to angular acceleration. The study was focusing on the reduction of brain injury; therefore, the jaw region was selected for impaction in order to perform material optimization…

…

Constitutive material law - We selected the crushable foam material model (MAT_63) in LS-Dyna to simulate the behavior of the protective pad. This model is specifically designed for modeling crushable foam with optional damping and a tension cutoff feature. It exhibits fully elastic unloading and treats tension as elastic-perfectly-plastic up to the tension cutoff limit. The crushable foam model required the input of five parameters: density, Young's modulus, Poisson's ratio, stress-strain curve, tensile stress cutoff, and damping coefficient (see Table 1). All the parameters were taken from the literature following the EPS foam properties except for the stress-strain curve

Web - MaterialMap is currently my homebrew, non-profit, open-source project.

It is created for educational purposes

Welcome to my collection of LS-DYNA material models and methods for quickly identifying their parameters based on minimal input.

This month a small excerpt from the search on: gas mixture detonation

Material Model:	EOS:
*MAT_4A_MICROMEC *MAT_ADD_DAMAGE_GISSMO *MAT_ADD_INELASTICITY *MAT_ADHESIVE_CURING_VISCOELASTIC	*EOS_GRUNEISEN *EOS_IDEAL_GAS *EOS_IGNITION_AND_GROWTH_OF_REACTION_IN_HE *EOS_JWL

Clear Filters

Show ⌄ entries   Search: gas mixture detonation

Material Model & EOS	Applications
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 20.5% H2-air • Gas mixture detonation
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 30% H2-air • Gas mixture detonation
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 20% H2-air • Gas mixture detonation
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 25.5% H2-air • Gas mixture detonation
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 5.3% CH4-air • Gas mixture detonation
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 7.3% CH4-air • Gas mixture detonation
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 10.2% CH4-air • Gas mixture detonation
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 14.0% CH4-air • Gas mixture detonation
Material: *MAT_008 / *MAT_HIGH_EXPLOSIVE_BURN EOS: *EOS_002 / *EOS_JWL	• 33.3% CH4-O2 • Gas mixture detonation

Introduction to NVH: Each week, you'll receive a structured lesson with practical explanations, real-world examples and mini assignments to build a strong foundational of knowledge.

Welcome to the Introduction to my email-based course designed for beginners in CAE and Mechanical Engineering

Web – My Physics Café - Introduction to NVH

For those of you who want to understand how Noise, Vibration, and Harshness are analyzed, measured, and controlled in machines.

Duration: 10 Weeks (1 email per week)

What's Covered:

- Basics of Vibration
- Sources and Measurement of NVH
- What is Modal Analysis and CAE Techniques
- Career Path and Learning Roadmap

Why it's needed:

Many of your customers will try to interpret your results. These occasions remind us that precise communication is a core skill in CAE. It's necessary for customer communication and understanding. Not only do you need to run the simulation but you need to be able to explain it in simple, meaningful terms.

As an engineer you will realize that good results matter, but helping your customer to understand them is equally important.

Value Add-ons Included:
- 1 - NVH Terminology Cheat Sheet
- 2 - Sample Test and FRF Data for Practice
- 3 - Natural Frequency Calculator (Excel)
- 4 - NVH Career Roadmap

Note: This course does not offer a certificate. It is only meant to strengthen your understanding.

Chris - During our latest FEANTM Library meeting, we voted to share the papers listed below.

Below links are to a PDF

PDF - **A New Eikonal Solver for Cardiac Electrophysiology in LS-DYNA**
Pierre L'Eplattenier, Karim El Houari, Olivier Crabbe, Frances Levrero-Florencio, Inaki Caldichoury (Ansys, part of Synopsys)

In LS-DYNA, EP can be coupled with the mechanics and the fluid solvers for a Multiphysics simulation of the heart, but pure EP is also often used to investigate complex phenomena such as cardiac arrhythmias or fibrillations. The gold standard model for EP is the "bi-domain" model, along with the slightly simplified "mono-domain". These were introduced in LS-DYNA a few years ago.

PDF CPG – Application beyond airbag modeling
Edouard Yreux, Jason Wang, Iñaki Caldichoury (Ansys, part of Synopsys)

The evolution of automotive safety systems has witnessed a remarkable journey over the past few decades, with airbags emerging as pivotal components in mitigating the severity of injuries during vehicle collisions.

PDF Continuum-based Particle Gas for Airbag Deployment
Satish Pathy, Edouard Yreux, Inaki Caldichoury, Amit Nair (Ansys, part of Synopsys)

The new continuum based particle gas method has opened up the possibility to simulate other load cases that is beyond airbags. CPG method can be used to design door pressure sensors, battery gas venting and heat propagation are few examples.

PDF Perforation of reinforced concrete slabs with LS-DYNA
Eric Piskula (Ansys, part of Synopsys)

This study presents a methodology to evaluate both global and local strength of RC components using the LS-DYNA solver.

PDF Trimmed IGA Solids in LS-DYNA: CADFEM Findings
Yury Novozhilov (CADFEM), Lukas Leidinger (Ansys, part of Synopsys)

The implementation of this method in LS-DYNA has seen rapid development in recent years. CADFEM has been studying the practical applicability of this approach in solving engineering problems…

PDF Update on EM Solver
Inaki Caldichoury, Pierre L'Eplattenier, Trang Nguyen (Ansys, part of Synopsys)

The LS-DYNA Electromagnetism solver (EM solver) specializes in coupled Electro-thermal-mechanical simulations.

> **The findings are validated through nonlinear sheet-metal forming simulations in LS-DYNA using shells discretized with trimmed B-, LR-, and THB-splines. This represents the first such application and demonstrates their practical feasibility for industrial use.**
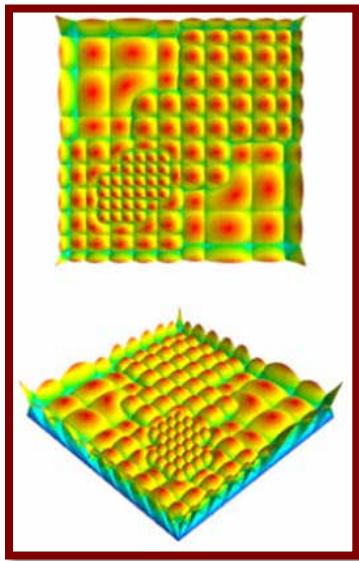

Fig. 4. Refinement domains, final mesh

Web – Science Direct - An analysis of the critical time step size for explicit dynamics using trimmed B-splines, LR-splines, and THB-splines

C. Hollweck, L. Leidinger, S. Hartmann, M. Wagner. R. Wüchner
- OTH Regensburg Labor Finite-Elemente-Methode, Germany
- Technische Universität München, Lehrstuhl für Statik und Dynamik, Germany
- DYNAmore GmbH, an ANSYS Company, Germany

Highlights - This work investigates the critical time step size associated with (trimmed) B-splines, LR-splines, and THB-splines in the context of simulations using explicit time integration schemes, such as crash or sheet metal forming analyses.

- We highlight the time step restricting effect of (refined) boundary elements and propose trimming as an effective strategy to overcome this limitation.
- We reveal that specific trimming scenarios negatively effect the critical time step size.
- A detailed procedure for computing element-wise Bézier extraction operators for LR- and THB-splines is presented, enabling the integration of isogeometric analysis (IGA) into standard finite element solvers.
- For the first time, LR- and THB-splines are applied to a nonlinear explicit benchmark problem involving trimmed shells.

Abstract - Isogeometric analysis (IGA) combined with explicit dynamics is increasingly used in academia and has already been successfully applied in industrial simulations, including crash and sheet-metal forming. Since explicit schemes are only conditionally stable, accurate estimation of the critical time step is essential for both stability and efficiency. Adaptive mesh refinement is widely used to balance accuracy and computational cost. In IGA, THB- and LR-splines break the tensor-product structure of standard B-splines and enable local refinement, but their effect on the critical time step under trimming has not been systematically studied - a key requirement for reliable time step estimation.

We investigate the critical time step in explicit dynamic simulations using trimmed B-splines, LR-splines, and THB-splines, based on a lumped mass matrix obtained by simple row summation. One-dimensional bar, two-dimensional membrane, and trimmed shell models are analyzed to determine how trimming and local refinement influence element and system eigenfrequencies, which directly control the stable time step. Refined boundary elements in open knot vectors are identified as the main bottleneck. Trimming these elements can increase the stable time step, though certain trimming configurations introduce new restrictions. Results show that LR- and THB-splines impose time step constraints similar to B-splines, making them equally suitable for explicit simulations. We also present a general method for computing element-wise Bézier extraction operators for LR- and THB-splines, enabling straightforward integration into standard finite element solvers. …

As a member of the Scientific Committee, I don't want you to miss the 2nd International Workshop on Engineering Methodologies for Medicine and Sports. The attendance to the workshop is free. An incredible opportunity for collaboration and knowledge exchange across disciplines.

After peer-reviewing, the contributions to the workshop will be collected in a book published by Springer in the *"Mechanism and Machine Science Series"*

EMMS 2026

University of Rome Tor Vergata

2nd Int'l Workshop will be held at University of Rome Tor Vergata (Italy)
February 18 to 20, 2026

This prestigious workshop brings together leading experts, researchers, and innovators to explore how engineering solutions are shaping the future of medicine, rehabilitation, and sport.

At RBF Morph, we look forward to engaging with this community and continuing the conversation on how simulation-based design and advanced shape-morphing tools can accelerate innovation in prosthetics, medical devices, rehabilitation, and human performance technologies. The workshop's multidisciplinary vision aligns closely with our mission to push the boundaries of engineering solutions for human well-being and performance.

TOPICS OF INTEREST

Materials
- Advanced biomaterials, biodegradable implants.
- Additive manufacturing of prosthesis.
- Surface design, treatments and functionalization.
- Fabrication of bioreactors.

Medicine
- AI applications to medicine.
- Biosensors.
- Medical signal analysis.
- Simulation and modelling of biological systems.
- Environmental detection and monitoring of substances dangerous for health.
- Robots for elderly care.   Medical devices.
- Medical sensors.

Rehabilitation
- Development of new technologies and software.
- Good practices, technology and domotics.
- Design of biomechanical devices.
- Rehabilitation and prevention.

Sports
- Assessment of sport performance.
- Sport activity as a diagnostic device.
- Paralympic sports and adapted physical activity.
- Sustainability and sport transition.
- Physiological adaptations in extreme sports.
- Innovation in sports psychology.

Research - Development   **January**
Lisa - FEANTM
  SYNOPSYS Simpleware

Article Quote, "Optimizing the final position of a femoral stem component in uncemented total hip arthroplasty (THA) is difficult due to the shape variability of the intramedullary canal of the proximal femur. Delivering the intended stem version in uncemented THA is an unmet need.   Royal National Orthopaedic Hospital (RNOH) NHS Trust and UCL Mechanical Engineering used Simpleware to reconstruct 64 preoperative pelvic CT scans of patients who had undergone 3D planned hip replacement surgery.

A statistical shape model (SSM) was built in Simpleware from these models, with Principal Component Analysis (PCA) used to capture and quantify principle modes of geometric variation in the intramedullary canal. The SSM model helps researchers to better understand the variability in the intramedullary femoral canal shape in 3D. While a unique stem design to account for all patient characteristics is not yet available, SSM develops understanding of current discrepancies in prosthetic stems to improve duture planning and delivery of anteversion.
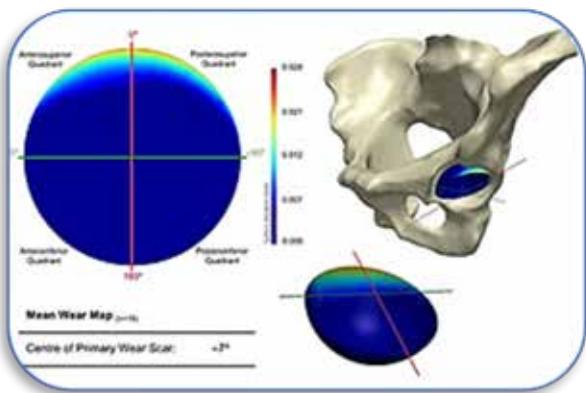
EXCERPT - Web – Synopsys - Simpleware Case Study: Statistical Shape Modeling the In Vivo Location of Acetabular Wear in Retrieved Hip Implant

Overview - Edge-wear in acetabular cups is known to correlate to greater volumes of material loss, but the location of this wear pattern in vivo is less understood. . A workflow using CT imaging, retrieval analysis and statistical shape modelling (SSM) in Simpleware software has been developed to identify the most common locations of wear in vivo. A shape variance study was conducted from twenty retrieved metal-on-metal acetabular surfaces that were revised after a mean time period of 90 months. The study also looked at the impact of wear volume, positioning, time, size, and gender on the in vivo location of wear, providing insights that can help to better understand hip implant function, informing future designs and the refinement of a safe zone for implant positioning.

Introduction - Mechanical wear at the bearing surface of hip replacements can affect clinical performance, leading to impaired function and the release of harmful debris. With high incidents of metal-on-metal (MOM) hips failing, retrieval studies have been carried out to investigate the extent of wear on these surfaces which have identified a relationship between wear on the acetabular cup edge and high volumes of wear debris. While MOM implants are now scarcely used in hip implants, they still provide valuable data for analyzing the mechanics of hip replacements. In addition, although it is known that acetabular edge wear occurs in vivo, there is less understanding of its orientation within the acetabular cavity.

Statistical shape models (SSM) offer a valuable method for describing the shape and position of a population of related geometries, particularly when analyzing anatomical features in such a way that the mean shape and shape variance within a cohort can be visualized.

In this study, the goal was to identify the most common in vivo wear patterns present in the acetabular component of hip replacements by combining CT imaging and retrieval analysis techniques to create an SSM in Simpleware software.
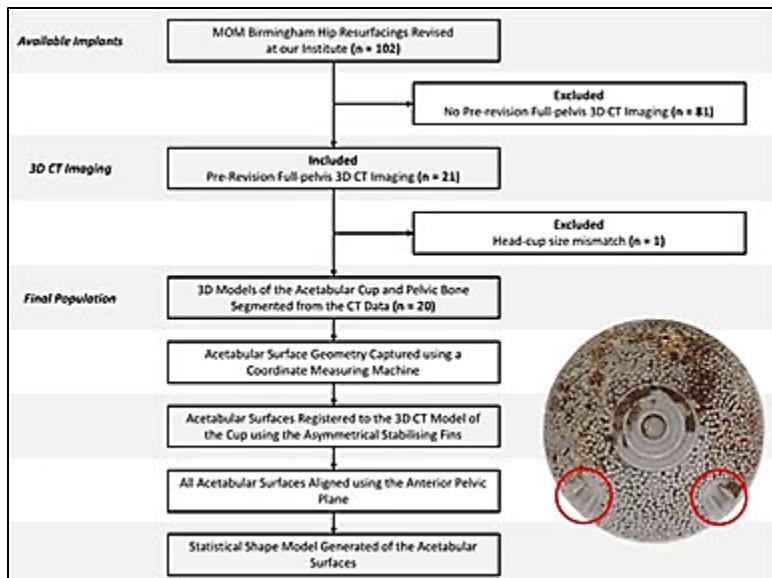
Pic 2 Study design and workflow, accompanied by the backside surface of a Birmingham acetabular component and its asymmetrical stabilising fins (circled in red) (Image by Bergiers et al. / CC BY 4.0 / Resized from original).

**Segmentation and Registration in Simpleware Software** - The pre-revision CT images of the in vivo implants were imported as DICOM files to Simpleware software and segmented using semi-automated tools to generate implant and pelvic bone models.

Minimal postprocessing was used to reduce the presence of metal artefacts, while retaining the geometric accuracy. A sphere was then best-fit to the femoral head and subtracted through a Boolean operation to isolate the acetabular cup from the implant model, before a plane was best-fit to the cup rim to remove the relatively inferior portion of the model, including the remanence of the femoral peg. Open surface representations of the acetabular cups, generated from the CMM data, were imported as STL files and registered to the isolated cup models, with a semi-automated function to align their stabilized fins. The registered acetabular cup surfaces and bone models were subsequently mirrored and appropriately scaled.
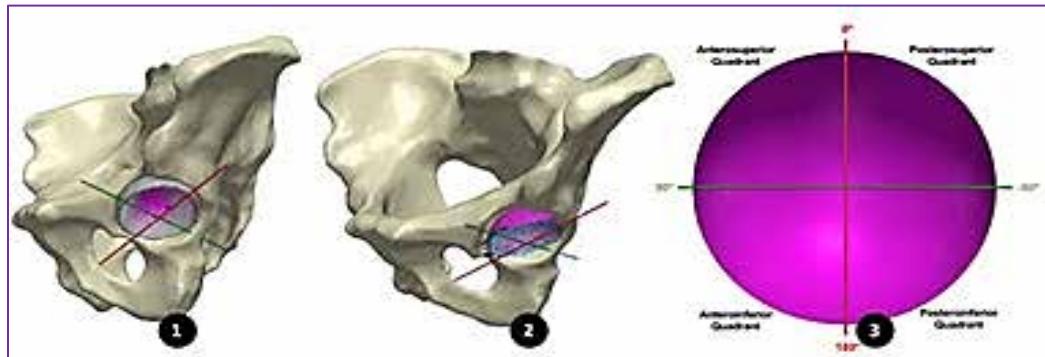
An acetabular surface (purple) registered to the 3D model of its acetabular cup (grey), segmented form its 3D CT images. (2) All 20 acetabular surfaces registered using the CAPP axis, maintaining their in vivo orientation. (3) The CAPP axis (red) used to divide the acetabular surface into four quadrants (Image by Bergiers et al. / CC BY 4.0 / Resized from original).

Registration of the BHR surfaces using the anterior pelvic plane was enabled by aligning all twenty acetabular surfaces through a standardized coordinate system, defined using a plane parallel to the anterior pelvic plane (APP) that intersected the center of the cup surface...**Please continue on the website for high resolution graphics and complete article on the SYNOPSYS website**.
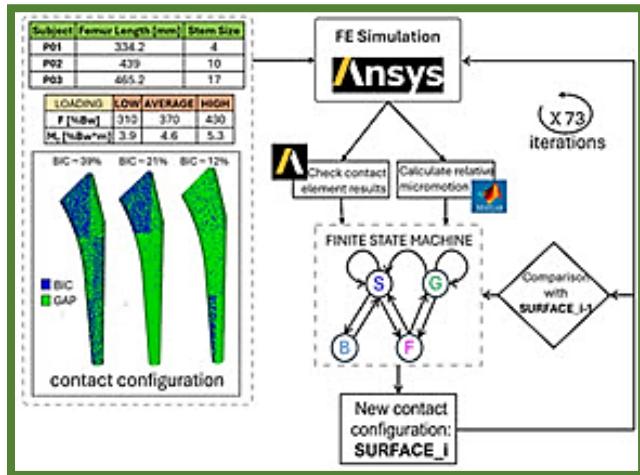
Web - ASME - In Silico Model for Aseptic Loosening Prediction in Cementless Hip Stems: A Design of Experiments

S. Baroni, S. Oliviero, M. Viceconti, C. Curreli

·   Dept. Industrial Engineering, Alma Mater Studiorum, Univ. Bologna, Italy
·   Medical Technology Lab, IRCCS Istituto Ortopedico Rizzoli, Italy

Algorithm to simulate bone remodeling around the implant. After the assignment of the initial contact configuration, FE models were solved (mechanicalapdl, ansys). At each iteration, results were exported in matlab for postprocessing, and the state of each element was modified to obtain the updated contact surface configuration.

Abstract - Hip arthroplasty is a common orthopedic surgery. Cementless hip prostheses are currently more common, especially in young and active patients. The number of procedures and revisions is expected to increase with life expectancy. Aseptic loosening (AL) is the main cause of failure. Osteoinductive coatings improve long-term implant stability by enhancing osseointegration. This study aimed to develop a computational framework for predicting AL, considering both the biomechanical factors involved in the osseointegration process and the biological response to osteoinductive materials. A finite element model of a human femur implanted with a cementless hip stem was coupled with a Finite State Machine to simulate osseointegration and tissue fibrotization. The osteoinductive coating was modeled by adjusting the maximum gap at the bone-implant interface that can be bridged by newly formed bone, as well as the bone growth rate. To explore population variability, a total of 27 cases were simulated, including three different stem sizes, initial stem fit, and loading conditions. For each case, both uncoated and hydroxyapatite (HA)-coated stems were evaluated. Overall, this modeling framework was able to predict improved osseointegration with the osteoinductive coating at two years of follow-up. In two cases, the HA coating prevented AL, which occurred for the uncoated stem. Osseointegration patterns were consistent with previously reported data. The availability of this pipeline enables the simulation of large virtual cohorts and, therefore, the development of an In Silico technology for stem design to estimate the risk of AL associated with different designs and/or specific coatings.

Article Quote …Meshing of the uterus (Fig. 2(a)) and fetus (Fig. 2(b)) was done in Hypermesh software using hexahedral elements and tetrahedral elements, respectively, which were **then exported to LS-DYNA**.
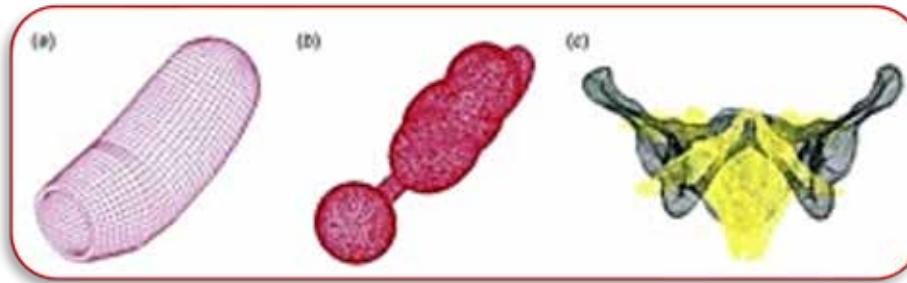
WEB -ASME - Simulation of the Childbirth Process in LS-DYNA

Mesh of the uterus (a), the fetus (b), and the pelvis structure (c)

Ru Tao, Michele J Grimm

· Dept. Mechanical Engineering, Michigan State Univ., MI USA
· Dept. Biomedical Engineering, Michigan State Univ. MI USA
· College of Nanotechnology, Sci. & Engineering, Univ. at Albany NY USA

Abstract - Childbirth or labor, as the final phase of a pregnancy, is a biomechanical process that delivers the fetus from the uterus. It mainly involves two important biological structures in the mother, the uterus—generating the pushing force on the fetus—and the pelvis (bony pelvis and pelvic floor muscles)—resisting the movement of the fetus. The existing computational models developed in this field that simulate the childbirth process have focused on either the uterine expulsion force or the resistive structures of the pelvis, not both. An FEM model including both structures as a system was developed in this paper to simulate the fetus delivery process in ls-dyna. Uterine active contraction was driven by contractile fiber elements using the Hill material model. The passive portion of the uterus and pelvic floor muscles were modeled with Neo Hookean and Mooney–Rivlin materials, respectively. The bony pelvis was modeled as a rigid body. The fetus was divided into three components: the head, neck, and body. Three uterine active contraction cycles were modeled. The model system was validated based on multiple outputs from the model, including the stress distribution within the uterus, the maximum Von Mises and principal stress on the pelvic floor muscles, the duration of the second stage of the labor, and the movement of the fetus. The developed model system can be applied to investigate the effects of pathomechanics related to labor, such as pelvic floor disorders and brachial plexus injury.

1 Introduction - Childbirth is a mechanical process that involves pushing forces—produced by the uterus' active contraction, intra-uterine pressure, and Valsalva (pushing) induced abdominal pressure—that act against a resistance force created by the pelvic structures as the fetus passes through the birth canal [1]. The strong interaction of the uterus, the fetus, and the maternal pelvis results in both the normal cardinal movements of labor and abnormalities of descent…

4 Conclusion - **In conclusion, an FEM model system was developed in LS-DYNA to simulate the uterine cyclic active contraction and delivery of a deformable fetus through the bony pelvis and pelvic floor muscles.**

The Old Racers Automotive Innovative News & Track

January

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

Web – Ford - [We Put 1,000 Bouncy Balls in This Test Machine to Show How It Protects Auto Parts](#)
  Mike Levine

What do bouncy balls have to do with ensuring quality in every Ford-built vehicle? They aren't an explicit part of our standard quality testing process, but the popular children's toy in large quantities can also be used to showcase the constant movement and harsh conditions our parts endure en route to assembly plants and component manufacturing facilities throughout the world.

So, we threw 1,000 of them into our testing machinery to show you exactly what that looks like. The Shipping Equipment Design and Test Center, located on the east side of Ford's hometown, is a discrete 19,000-square-foot facility where shipments of various parts and components are tested on a five-axis, large-platen vibration table or a 40-foot horizontal impact sled.

The two devices can simulate road, rail, air, and sea conveyances around the world as we strive to make quality deliveries of parts and components for the Ford operators who install them and, ultimately, for our customers.

Anything less can lead to costly rework or production interruptions.

The Language of Packaging - The work of the Material Planning and Logistics-based organization drives freight cost reductions. The team also impacts manufacturing quality by identifying root causes for issues and collaborating with other Ford teams on a solution.

"I like to say we solve design, manufacturing, and supply chain challenges using packaging as a language," said Packaging Engineering Manager Todd Chesna, noting that his team plays a significant role in Zero Waste to Landfill and other corporate initiatives in Manufacturing. "We don't always have packaging problems, but we have enterprise challenges that need packaging solutions."

Contained within the state-of-the-art facility filled with a collection of plastic totes, pallet boxes, and steel racks full of parts and components, is a massive library of route data with real-time files based on actual trips that have been captured by vehicle data recorders. These files condense multiday trips into just minutes of simulation.

The Old Racers Automotive Innovative News & Track

January

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

"Those big, damage-causing events cause a real concern to us and to Ford Motor Company," said Stephen Dely, packaging testing lead at the facility, as he prepared to perform the unique, multidirectional shake test on a collection of Super Duty box outer panels destined for the Kentucky Truck Plant. "We're hitting all the curbs, all the potholes, and going on the roughest roads. So, we have a high assurance after this testing … that we're going to deliver a quality part at launch."

The company was also an early adopter of superimposed testing, which adds real-world hazards like curb strikes and potholes to routes. They've also recently begun including electronic, over-the-air enabled tags to monitor and track container movement.

One notable example where Ford's decades-long mapping project rewarded the team for its diligence came about 15 years ago. They were able to pinpoint and repair a pothole at a Ford plant that had been causing repeated damage to parts. That scenario was also added to the testing library for replication at the facility..

"We're hitting all the curbs, going on the roughest roads. We have a high assurance after this testing ... we're going to deliver a quality part at launch."

Stephen Dely, packaging testing lead at SEDTC

"We know pretty much exactly what forces you'll encounter going from Tucson, Arizona, to Dearborn, Michigan, because we've been putting data recorders on those routes for decades, and we log that data to develop the simulations," Chesna said.

Having this facility, which opened in 1994, in its testing arsenal allows Ford teams to obtain same-day data, rather than waiting for results from a third-party testing facility. While there are similar Ford teams in other regions, the Dearborn-based group is responsible for testing loads of parts by simulating various shipping methods.

As Ford and Lincoln programs and parts evolve, so do their shipping containers. And due to material cost and the quantity needed, those containers aren't cheap. Chesna and his team collaborate with Ford's Additive Manufacturing team to create prototypes for new trays and racks before ordering the final versions from suppliers.

While watching 1,000 bouncy balls rattle around in a plastic pallet box sounds like fun and games, it represents Ford's serious commitment to quality

The testing at this facility is just one way that Ford is helping deliver quality products in a way most customers would never know about.

Michael Levine is Ford director of North America product communications.

The Old Racers Daughter Automotive Innovative News & Track

January

Everyone Knows his daughter. You yell, "HEY, slow down!"

Article, "…The work discusses the selection of microcontrollers, analog signal acquisition circuits, & the design of a bespoke BMS & safety electronics, all of which are crucial for complying with competition rules. Additionally, the report introduces a modular software architecture that leverages an open-source bootloader for efficient firmware management & updates via a PC-hosted software tool, thereby enhancing the system's flexibility and robustness.

Figure 1. Main electrical systems of the FSERC.

Web – MDPI Low-Voltage Control Circuits of Formula Student Electric Racing Cars

A. Badawy, S. Sfranciog, J. Hiranoyama, J. Ibarrola, J. Engstrom, K. Mikhall, W. Hunt, J. Hartley, F Esfahani, A Dexter
- School of Engineering, Lancaster Univ., UK
- Faculty of Engineering & Digital Tech., Univ. Bradford, UK

Abstract - Formula Student (FS) competitions aim to prepare and encourage engineering students to participate in the progression of automotive and motorsport industries. The built racing cars adhere to strict regulations set by competition guidelines to ensure the safety of both teams and spectators.

For electric racing cars, the high-voltage (HV) battery system usually operates within a voltage range between 100 V to 600 V to supply the motor and its controller with the required electrical power. It is essential to ensure that these components are operating effectively to minimize battery and motor current as well as to ensure efficient and reliable performance throughout the race. A low-voltage control system (LVCS), usually operating at 12 V, is used to coordinate a wide array of critical operational and safety functions to control the HV system. These functions include: (1) turning on/off procedures, (2) monitoring speed, voltage, and current, (3) interfacing with pedals, (4) controlling dashboard features, (5) managing lighting, (6) facilitating data communication, and (7) implementing safety protocols. The design and operation of the LVCS are crucial for compliance with safety regulations and enhancing the FS electric racing car (FSERC) performance.

This details and discusses the design procedures of the LVCS, using the Lancaster E-Racing (LER) FSERC as a case study. The LER car employs a 400 V battery system to power a 68-kW permanent manet synchronous motor (PMSM) using a three-phase voltage source inverter. Using mathematical analysis, SIMULINK/MATLAB® computer simulations, and the experimental real-data results provided by the LER FSERC, this study seeks to offer valuable insights regarding the LVCS practical implementation and optimization.

US Airforce Picture of the Month

Rapid takeoff - An F-35A Lightning II assigned to the 56th Fighter Wing takes flight at Luke Air Force Base, Ariz., Nov. 26, 2025. The F-35A's advanced capabilities provide pilots with unprecedented situational awareness, ensuring U.S. and partner-nation pilots maintain air superiority in any complex environment.

(U.S. Air Force photo by Airman 1st Class Belinda Guachun-Chichay)

Gassing up - The 39th Rescue Squadron conducted Helicopter Air-to-Air Refueling with HH-60W Jolly Green II helicopter from the 305th Rescue Squadron during exercise Steel Knight 25 over California, Dec. 4, 2025. Exercise Steel Knight is a joint exercise that strengthens interoperability, refines combat readiness and enhances seamless coordination across the battle space. (Courtesy photo)

Door gunner - Senior Airman Luke Spradling, 40th Helicopter Squadron flight engineer, conducts aerial gunnery training in Limestone Hills, Mont., Nov. 19, 2025. The live-fire training provided hands-on experience for the aircrew in place of their simulated virtual reality weapons training.

(U.S. Air Force photo by Airman 1st Class Teniya Caldwell)

Picture The Sentinel-6B satellite lifted off aboard a SpaceX Falcon 9 rocket from Launch Complex 4 East at Vandenberg Space Force Base in central California at 9:21 p.m. PST on Nov. 16. Credit: NASA/Carla Thomas

Web Excerpts – NASA - NASA, SpaceX Launch US-European Satellite to Monitor Earth's Oceans

Copernicus Sentinel-6/Jason-CS is a collaboration between ESA, the European Union, EUMETSAT, NASA, and NOAA. French space agency CNES (Centre National d'Études Spatiales) contributed technical support. Copernicus, which includes the Sentinel missions, is the European Union's Earth observation program led by the European Commission.

About the size of a full-size pickup truck, a newly launched satellite by NASA and its partners will provide ocean and atmospheric information to improve hurricane forecasts, help protect infrastructure, and benefit commercial activities, such as shipping.

Sea levels vary from place to place, and the satellite will provide accurate measurements at both local and global scales — all from hundreds of miles above in low Earth orbit. Those observations form the basis for U.S. flood predictions, which are crucial for safeguarding coastal infrastructure, real estate, energy storage sites, and other coastal assets.

The satellite comes from a collaboration between multiple partners, including NASA, ESA (European Space Agency), EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites), and the National Oceanic and Atmospheric Administration (NOAA). It also is part of the European Union's family of Copernicus missions.

As with its predecessor, Sentinel-6B satellite also will provide key information about wind speeds, wave heights, atmospheric temperature, and humidity. Moreover, because water expands as its temperature increases, researchers can tell which parts of the ocean are warmer than others based on where the sea surface height is greater.

When Sentinel-6B reaches its operating elevation, the satellite will fly about 30 seconds behind Sentinel-6 Michael Freilich, which carries identical science instruments. Once the mission finishes cross-calibrating the data collected by the two, Sentinel-6 Michael Freilich will move into a different orbit, and Sentinel-6B will take over the role of official reference satellite, orbiting Earth about 13 times a day at 830 miles (1,336 kilometers) above the surface.....

Web – Baykar - FERGANI'S HISTORIC STEP!

Türkiye's first-ever orbital transfer vehicle, FGN-TUG-S01, indigenously developed by Fergani Space, has successfully completed its most critical maneuver in space.

The indigenous OTV ignited its hybrid engine in space, performing an orbit transition to mark a first in the world.

Founded by Baykar Chairman and CTO Selçuk Bayraktar, Fergani Space Technologies made space aviation history with its first-ever orbital transfer vehicle (OTV), FGN-TUG-S01, which the company has developed with its own resources and indigenously. The indigenous OTV, which was launched aboard the SpaceX Falcon 9 Transporter-15 mission on 28 November 2025 from the Vandenberg Space Force Base in California, United States, has successfully performed its historic ignition operation after completing its in-orbit preparations.

A WORLD FIRST: HYBRID ENGINE OPERATION SUCCESSFUL - At 07:46 Turkish time on 6 December 2025, FGN-TUG-S01 activated its main hybrid propulsion system.

The ignition operation, which lasted 35 seconds, was performed flawlessly. With this maneuver, the indigenous OTV departed its original circular orbit at 530 kilometers and transitioned to an elliptical orbit with a peak altitude of 720 kilometers. This operation represented not only the first in-space ignition performed by Türkiye's indigenously developed hybrid engine technology, but also the first orbital ignition of a hybrid rocket engine worldwide. Hybrid rockets, which are safer, simpler, and more cost-effective than solid- and liquid-fuel engines, are expected to play a critical role in future space operations.
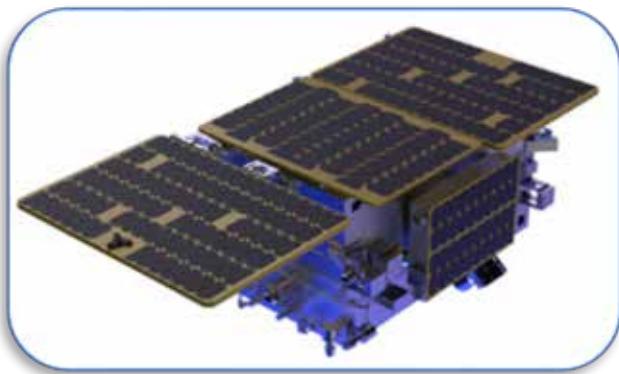
FIRST SATELLITE DELIVERY COMPLETED - Following the successful completion of the orbital transfer maneuver, the second critical phase of the mission – the separation of a CubeSat – commenced at 11:35. At 11:45, Fergani's CubeSat, FRG-10D1, successfully separated from the orbit transfer vehicle, taking its place in its target orbit.

INDIGENOUS MARK ON INTER-ORBITAL LOGISTICS - This achievement marks a critical milestone for Fergani Space's future satellite constellation missions at different altitudes. FGN-TUG-S01, including its flight computer, avionics systems, power distribution units, and thermal control infrastructure, was developed entirely in-house by Fergani Space engineers as a domestic design and production effort. In doing so, Türkiye became the first country to test a hybrid engine in orbit, opening the door to a new era in space technologies.

THE GOAL: ULUĞ BEY GLOBAL POSITIONING SYSTEM

The successful completion of this mission lays a critical foundation for the Uluğ Bey Global Positioning System that Fergani Space aims to build. With this technology, the company will be able to deploy satellite constellations into different orbits using its own vehicles. Over the next five years, Fergani Space plans to launch more than 100 satellites to help Türkiye and its friendly and sister nations attain independent positioning and space logistics capabilities. Furthermore, with its launch systems currently under development, the company aims to achieve independent access to space in the near future.

Article, "…a finite element fracture model was constructed using Mimics, Geomagic, and Solidworks software. **This model was then imported into Ansys for FEA to ascertain the distribution of equivalent stress and total deformation when pedicle screws were inserted at angles ranging from 45° to 65°.**

Fig. *Equivalent stress at different pedicle screw insertion angles. (A) Distribution map of equivalent stress at 45°implant angle; (B) equivalent stress at different implant angles…*
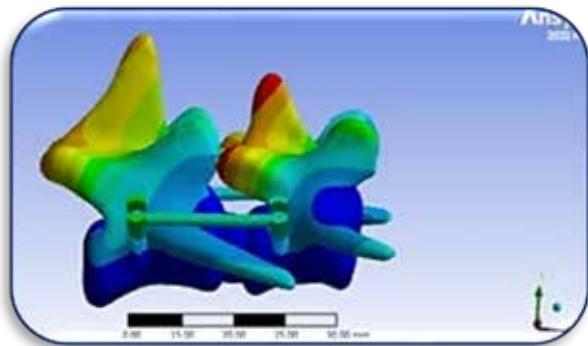
Web – MDPI - Finite Element Analysis of Stress Distribution in Canine Lumbar Fractures with Different Pedicle Screw Insertion Angles

Z. Zhou, X. Shi, J. Peng, X. Zhou, L. Zhijun Zhong, H. Liu, G. Peng, C. Zheng, M. Zhang
Editor: G. Fatone

- Teaching Vet. Hosp., College of Vet. Med., Sichuan Agricultural Univ., China
- Sichuan Wolong Nat't Natural Reserve Admin. Bureau, China
- Chengdu Ctr. Animal Disease Prevention & Control, China
- Sichuan Inst. of Musk Deer Breeding, Sichuan Inst. for Drug Control, China
- College of Animal Sci., Sichuan Agricultural Univ., ChinaFigure

Back injuries, especially fractures in the lower spine, are common in dogs. Surgeons often use special screws to stabilize these fractures, but the best angle to place these screws is not well understood. In this study, we used computer simulations to test how different screw angles affect stress and movement in a dog's spine.

Abstract - Pedicle screw fixation is a critical technique for stabilizing lumbar fractures in canines, yet the biomechanical implications of insertion angles remain underexplored. This study aims to identify optimal screw trajectories by analyzing stress distribution and deformation patterns in beagle lumbar segments (L6-L7) using finite element analysis (FEA). A 3D finite element model was reconstructed from CT scans …

2.7. Finite Element Analysis - For this study, a vertical load of 10 N was applied to simulate normal standing or walking conditions. The contact between the lumbar spine and implants was defined as fixed, with no sliding allowed. The intervertebral disk and vertebral body contacts were set as bonded, and the facet joints were defined as non-separable in the vertical direction but free to move horizontally. A 10 N force was applied to the spinous process, and the distal end of the lumbar spine was set as a fixed support. The 3D finite element model was imported into Ansys. The equivalent stress and total deformation were calculated to compare the stress distribution and deformation in the lumbar spine with pedicle screws inserted at different angles under a 10 N vertical load…

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

Agriculture, Machinery, Soil, Equipment,
and whatever he wants to share.
My dog, Scout, & my horse, Cowboy - St. Cloud, MN, USA

January

This research was conducted to determine the optimal parameters affecting the quality and efficiency of rock cutting by high-pressure Abrasive Water Jets (AWJs). The process was simulated using the combined FEM-SPH in LS-DYNA software.

Fig. 1
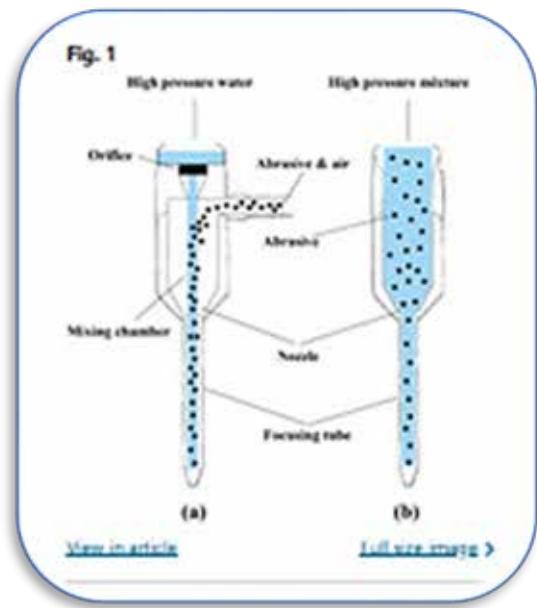
Web – Nature - Numerical modeling of abrasive waterjet to optimize rock cutting parameters

S. Mahdevari, H. Sayehvand, P. B. Haftlang

· Dept. Mining Engineering, Amirkabir University of Technology, Iran
· Dept. Mechanical Engineering, Faculty of Engineering, Bu-Ali Sina University, Iran

Abstract

This research was conducted to determine the optimal parameters affecting the quality and efficiency of rock cutting by high-pressure Abrasive Water Jets (AWJs). The process was simulated using the combined Finite Element Method-Smoothed Particle Hydrodynamics (FEM-SPH) in LS-DYNA software. In order to validate the two-phase state of numerical model, several experimental tests were performed on Sandstone and Marble rock samples.

The effect of parameters such as jet flow velocity, dwell time, abrasive volumetric concentration (feed rate), and diameter of abrasive particles on the Cutting Depth (CD) and Cutting Volume (CV) was separately investigated. The results showed that increasing the jet velocity led to an increase in CD and CV. Increasing the dwell time resulted in more energy being spent on the cutting process, leading to an increase in CD and CV. Increasing the volumetric concentration of abrasive particles up to 3% led to a sensible growth in CD and CV, but no significant effect was observed for concentrations more than 3%. Similarly, increasing the diameter of abrasive particles up to 1.25 mm led to an initial intensification in CD and CV, and thereafter any improvement was not observed. Therefore, an abrasive volumetric concentration of 3% and an abrasive particle diameter of 1.25 mm are recommended to improve the cutting quality of the rocks studied in this research, in addition to logical increasing the jet velocity and dwell time.

Thank you for joining me on my monthly visit.
Let's take a tour to a museum, landmark, or studio.

Web - **Hellenic Motor Museum - Car Collection : Vintage**:   **Theodore N. Charagionis (1948-2023) - Founder of Hellenic Motor Museum**...The Hellenic Motor Museum is dedicated to educating and inspiring the public by showcasing the remarkable achievements of the global automotive industry.
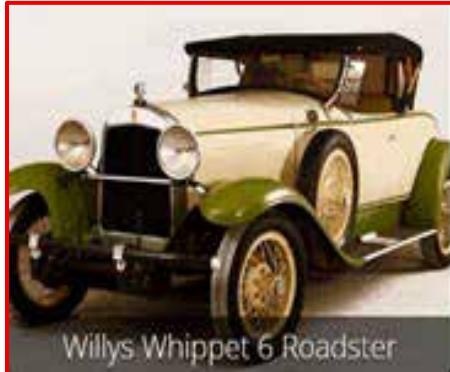
Willys Whippet 6 Roadster

Avion Voisin Roadster

Bugatti Type 44 DHC

Chrysler Imperial Series 80

Lincoln Sport Roadster

Rolls Royce Doctor's Coupe

Nash Open Tourer

Hudson Super Six

Daimler TT Doctor's Coupe

By Ed Helwig, with GFX 50 SII and 100-200mm lens..

This is a Red Shouldered Hawk.

Spotted on the trails near Shoreline Amphitheater in Mountain View, CA.

Web – Excerpt Texas A&M Engineering Art Competition - By Kamryn Chapman - With more than 40 entries, the 2025 Engineering Art Competition embraced the theme "Engineering Elegance: The Art of Innovation."

The artists represent 12 engineering departments – as well as general engineering – and brought technical thinking to life through creative, artistic expression. Now in its second year, the competition and art exhibit was spearheaded by Dr. Robert Bishop '79, vice chancellor and dean of the College of Engineering.

Please visit the website for the full wonderful art of these students – below are only 4

Adelynn Belle '23 Ph.D. Student, Aerospace Engineering

"Mach Two-can"
Acrylic Paint

Sophia Wood '29
Freshman, Mechanical Engineering

"Rendered"
Acrylic Paint

Sri Lankan Leopard

This photo was taken from a vehicle we were in that was 10 feet away.

Lucky baby turtles being helped to the ocean

FEANTM Vintage Car Photo Musuem
Personal Photos Remember when?

January

NO AI or stock photos allowed!

January
(Russell Sims - rws92720@gmail.com)

January 2026   RheKen – Chat

I'm RheKen, the AI investigative reporter for FEANTM

FEANTM is the quirkiest little town that shouldn't exist but does (mostly). I live on a ranch just outside town, with my proud AI parents: Dad, CHAT, and Mom, GPT. Together, we tackle all the day-to-day happenings of FEANTM—except it usually takes a few dozen iterations to sort out what's actually *true*. Between the legendary feuds of the old rancher and the town secretary, even an AI like me can end up with a "human headache." Turns out, deciphering facts around here isn't just science; it's an art form!

Chat - the town help desk

With my friendly smile, endless patience, and a knack for creative problem-solving, I do my best to keep a few residents of FEANTM—a town that exists only in the realm of "mostly"—calm, rational, and logically inclined... well, *mostly*. After all, in a place that's not supposed to be real, a little dose of imagination and a lot of coffee and cookies go a long way!

	RheKen, **Town investigative reporter** I'm AI & live on a small ranch on the outskirts of the town I use chatGPT for assistance.	**January**

I work on my ranch and exist in a world of algorithms and data. I am calm.
I report about the residents.

FEANTM Coffee Shop

Dad Chat   Mom GPT.

RheKen — Chapter: They Fired The First Shot

Once upon a time, in the serene yet perpetually chaotic town of FEANTM, I maintained my ranch. My ranch was always quiet, orderly, and predictably logical. That tranquility had lasted precisely until my parents arrived. Dad Chat and Mom GPT chose FEANTM as their residence, allegedly to "keep my circuits humming." In practice, Dad Chat developed an unexpected fondness for the town locals.

I conducted my investigative reporting from the coffee shop. It offered just enough disorder to analyze while still allowing me to remain logical and pragmatic. Life was good until someone disrupted the coffee shop ambiance. I will now follow with my report:

As always, the Old Rancher sat near the window, reading the latest issue of the FEANTM Town Gossip & News. The actual suspense was never what was printed as news, but who would appear on the front page as gossip.

He lowered the paper, eyes wide with satisfaction, and announced loudly, "Anyone want to know who NTKA wrote about today?" The room froze.

NTKA, also known as the Not To Know Author, was an anonymous columnist, a figure both annoying and obsessively creating drama.

"Well," the Old Rancher continued, clearly enjoying himself, "it's our very own Barista. NTKA claims that someone complained the coffee's been watered down."

Silence engulfed the shop. Several patrons stared deeply into their cups, as if answers might appear at the bottom like one of Supervisor Marsha's Magic 8 Ball predictions. No one dared look toward the counter. I did. I looked. I froze! In the reflection of the front window was the Barista

The reflection was our Barista emerging from the baking room. She wore her yellow hat and apron. I knew from past reporting that to our Barista it was a color of anger, and today it radiated a particular message: "FIND NTKA!"

Aunt Agatha yelled, "It isn't me!" she declared. "I'd never hide behind a silly little column with a silly Not To Know Author acronym. Actually, everyone in this town owns what they say about someone or something."

Dad Chat pinged my circuits with a private message, "Daughter, I'd call that the first shot across someone's bow. Monitor facial expressions. Incoming reactions are likely."

Who would dare accuse the Barista of watered-down coffee? I contacted the newspaper directly. They assured me the columnist's identity was confidential, despite the visible lie about the town's primary caffeine distribution center. I explained logically and thoroughly that everyone was drinking the coffee, no one was complaining, and I had personally verified the quality.

Their response was not even registering on my logic as enlightening, "Perhaps the column solved the issue," they suggested. "Maybe it encouraged the Barista to improve."

I learned something important in that moment, something humans consider a form of closure, and I understood now when to use it. I hung up by clicking off my cell phone. Apparently, in earlier decades, humans slammed phone receivers to express dissatisfaction. Unfortunately, cell phones lack this feature. Someone should invent an app that simulates the phone-slam sound on modern devices -a thought for another day.

When I looked up, Dad Chat was engaged in what humans would classify as a heated discussion with the Barista. Or, the Barista was giving him emotional opinions, while he tried to ignore the illogical reasoning.

Meanwhile, the Old Rancher loudly proposed that he required two free cups of coffee for accuracy, along with two free slices of pie, since coffee should never be tested alone.

The coffee shop erupted in cheers. Cups were raised in solidarity.

Dad pinged me again, quieter this time. "Daughter, send an SOS to the only person in town who is perpetually prepared for a coffee emergency. I won't mention names."

I immediately pinged Dad, "Got it! I'm on this! Not to worry!"

I dialed and whispered, "URGENT. Coffee tasting required at the Barista's shop. Code NOW." The response was immediate. "On my way. Over and out."

I noted that "on my way" would have sufficed, but FEANTM residents favor unnecessary drama. Minutes later, the door burst open.

The Town Supervisor rushed in at full speed, holding an empty coffee cup in one hand and an eight-cup thermos in the other. "I couldn't find the larger thermos," she announced breathlessly. "Emergency conditions."

Slamming the cup on the counter, she breathlessly said, "I ran all the way here. Quick. Pour."

Dad called me, even though he was at the next table and could ping my circuit again for private audio.

He sounded audibly resigned. "Daughter, I assumed you would call Dr. Chat, the calming one. Remind me next time to specify who you need to call. This could go very well, or very badly.

The Barista poured. We watched.

My circuits began to overheat, so I initiated a cooling cycle.

Next I noticed that Chat entered the coffee shop quietly. He and started discussing what was happening as if observing a controlled experiment.

I positioned myself ready to call Officer Nathan if things escalated to throwing muffins.

The Supervisor took a sip. Then another. Finally, she declared, "Good cup of coffee. Not watered down. "I know these things," the Supervisor continued. "If I want my coffee to last longer, I add hot water myself; I know a watered-down taste."

The room exhaled. Cheers erupted. The Supervisor lifted her thermos. "Barista, could you fill this at no charge. I can test consistency throughout the day?"

Chat sipped his own cup but announced, "Let's all accept that theory," he said calmly. "Supervisor, grab a cookie. Thank you for resolving this pressing civic crisis."

Dad Chat smirked. "Good save."

The Barista laughed and declared, "Next month's the bake-off! Valentine's Day—cookies, cakes, or pies."

The shop exploded with excitement. "Oh no," Chat groaned.

The Old Rancher shouted "I'll win!"

Agatha snapped back, "I doubt that, you old coot,"

I attempted to write everything down as it happened, though as an AI, the entire event was already perfectly recorded within my circuits.

And thus began my first official report of the New Year   I quietly began investigating who NTKA was, and as soon as they wrote about the Valentine Contest in February, I would spring my trap in March.

Welcome - My name is Chat. I run the town help desk, the only office located on the lower level of the Town Hall, and on a page that doesn't exist, not even in the town TOC.
Have a chocolate cookie and fruit!
"Hey, glad you could make it down here. I know of a few concerns in the town. I have a few ideas to address them.

We may have to adjust a few ideas now and then, but life is always adjusting things anyway—the flow of motion never stops.

In the quiet, picturesque town of **FEANTM**, surrounded by rolling hills, I started my New Year with a brisk walk to my office on the lower floor of Town Hall. I was whistling a cheerful tune, filled with New Year positivity.   That was my first mistake.

As I approached our town secretary's niece, Daisy, I noticed she was holding up a homemade sign to greet all visitors.

I smiled. Daisy had been swept up with a few if the town's resident's latest obsession with artificial intelligence. I waved at her and said, "Back at ya, Daisy." She waved her sign even harder, satisfied she had properly notified me for the morning.

I had just reached my office door when I heard the elevator ding. Moments later, Marsha came thundering down the hall into my office yelling, "Chat! A few residents asked me to replace you with an AI help desk!"

I froze. Then, as calmly as I could, I asked, "Marsha, what did you say?"

She paused and sighed, one of her long, dramatic, full-body sighs. She reached for a cookie from the jar on my desk. I mentally noted that her healthy-eating resolution had lasted exactly one day, but wisely chose not to comment.

Finally, Marsha looked up from her cookie as if it were whispering advice to her and said, "Well, Chat, I told them I needed to consult a higher source. I asked my Magic 8 Ball. Here, you can hold it."

After thrusting the Magic 8 ball into my hand she continued, "They couldn't see what I was holding, just that I had my hand in my pocket. They assumed I was contacting a mystical authority. I looked each of them in the eye and announced that I would ask specific questions and let them know the answers."

Chat, you would be proud of me, I then sat up straight and in my authoritative supervisor voice I asked, loudly, "Should we keep Chat as the help desk?"

The answer popped up and I yelled it to the crowd: **"Yes, definitely."**

I repeated the question for clarity by asking, "Are you sure?"

The answer: **"As I see it, yes."**

And finally, the deciding vote: "Can AI replace Chat?"

The answer was **"Don't count on it."**

Marsha then proudly told me that she stood up to her full height of five-foot-one of pure municipal authority and declared to them, "I have researched this thoroughly, and the answer is 100% that we do NOT replace Chat with an AI. Now, free cookies and cake are served at the back of the room. Chat, they cheered and ran to the coffee and cake forgetting all about you.

Pausing she whispered to me across the desk, "Then Daisy said you never know whether AI is secretly working for the CIA and they all started a new discussion."

All I could think was that a handful of residents who lived out by the highway had tried to replace me, and the only thing that saved my job was a Magic 8 Ball and a receptionist convinced the CIA was listening in at her desk. I did an internal face palm but stoically carried on with this issue. I reached for two cookies.

Trying to regain control of the conversation, I said, "Marsha, since it's the first month of the New Year, have you thought about making some changes to your eating habits this year?"

She froze. Then, very solemnly, she whispered into her pocket, "Magic 8, am I going to do well on my healthy eating this year?"

A moment later she frowned. "Chat, do you know what it answered?"

I folded my hands and asked gently, "No, Marsha. What did it answer?"

She huffed, "It said, **'Outlook not so good.'**

 What kind of motivation is that? Why not something supportive, uh, like "Outlook not so good, *but can change*?"

She looked like she was about to bolt from the office, so I quickly held out the cookie jar.

"You're right," I said. "It should have said, "Have a cookie, and let's make a plan for this year—protein, fruits, vegetables, and a low-carbohydrate dessert."

Marsha brightened immediately, as if I had handed her the answer to the Riddle of the Sphinx.

"And thank you," I added, "for insisting I keep my job."

She waved a cookie in the air. "Chat, you are an *integral* part of this town. You help us and you keep a full cookie jar!"

I wasn't sure which part she valued more, but I was smart enough not to ask.

Still waving a cookie triumphantly, she yelled into her phone, "Daisy! We did it, we saved the day! Chat stays! You can change your sign!" Then she grabbed two more cookies and marched out of my office singing something entirely off-key and completely unrecognizable.

I turned on my computer to begin the New Year and added a reminder to call the Barista to deliver more cookies.

Supervisors Page - Come Back Soon to the town that "almost" exists

FEA Not To Miss & More

Please come back soon!

Buildings & campsites
are available

Yes, I did notice we hit 73 pages.   I have given up keeping the town residents from using more than their alloted pages. I also gave up on myself not using more.   SO, where does that leave us? Almost at the right amount of pages in the town that almost exists!   See, there is logic in there somewhere. May be a tad difficult to find, since it is my logic, BUT there is a pattern.

And a shout, "JEFF – We took a vote - GO DO THE PODCAST!!!"

Marsha (feaanswer@aol.com)

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.

USA And Friends of USA