
FEA - CAE Not to Miss & More

February 2026 ISSN 2694-4707

**Town Hall Meeting in the town that almost exists**
**Town Plaza: Drive slowly – Galloping Prohibited**

**Airport - Bayraktar**

**Airport - RocketLab**

**Auto - Ford**

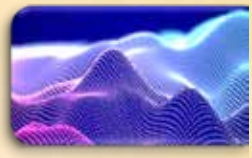

**Racer – Racing.**


Marco - RBF


Madhukar - CADFEM

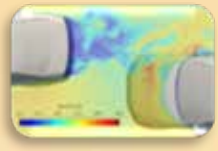
Metin - OZEN


Chris - SimuTech



Abhinav - MyPhysicsCafe


Marta – OASYS



Mi&Ke – Nightly News


Jenson – DFE TECH

Abigail – CADFEM AI

Roberto -Library

Brent – GOENGINEER

Curt - AUTODESK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**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**

Parking & Coffee are free.

# R & D - Camping - Town Map

Horse Trail → Yield right of way to horses

R&D Technology Business Park

RV CAMPING
Park in any vacant camping site

Town Hall & Library


Lawrence Livermore National Laboratory


rbf.LAB

rbf

MEDITATE

LIVGEMINI


**The Old Rancher**

**Race Track**

**Airport**

**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.

## Table of Contents

**Individuals are the persons we wish to thank. It doesn't imply association with a company.**
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February - Town Hall Meeting - **Websites have complete information & High-Res. graphics**

| | | | |
|---|---|---|---|
| 06-08 | Resident Announcements; Marnie's Welcome & Announcements; Supervisor's Round Up | | |
| 09 | **Abigail** | CADFEM | S. Dhomase- Advancing Critical Engineering with Simulation: Penetration Studies on RCC Structures and Armored Plates - |
| 12 | **Abigail** | CADFEM | M. Kellermeyer CADFEM - Take a look behind the scenes at CADFEM's Digital Learning Lab, A. Kunz |
| 15 | **Ace** | D3View | 2026 AES library expansion, Suri Bala |
| 16 | **Adam** | Manipal Inst. Of Tech., | Experimental and finite element analysis of a two-wheeler handlebar subjected to semi active constrained layer damping treatment |
| 17 | **Bart** | FEANTM | Get Started with Ansys Mechanical |
| 18 | **Brent** | GoEngineer | 1) Reinventing Roller Coasters with Metal 3D Printing<br>2) What you missed on YouTube from GoEngineer |
| 19 | **Brianna** | LLNL | Pandora mission demonstrates new model for low-cost, high-impact science - by Alexa Carlson |
| 21 | **5 Cs** | FEANTM | Bob Lucas, Prof. Aloke Dutta, Ameen Topa, Djordje Romanic. |
| 22 | **Chris** | SimuTech | Understanding Acoustic Excitations and Loads in Ansys Mechanical By M. Hortin |
| 24 | **Curt** | AUTODESK | How to Create Criss-Cross Grooves in Fusion for Machining by Phil Eichmiller |
| 26 | **Glace** | Hamburg Univ. | A FE Model for Compressive Ice Loads Based on a Mohr-Coulomb Material & the Node Splitting Technique, H. Herrnring, S. Ehlers |
| 27 | **Jenson** | DFE Tech | LS-Dyna Crash Simulation: Meeting ECE R94 Standards in SEA with CAE, P.Dung, M. Afiq, |
| 29 | **Madhukar** | CADFEM | GRZ Tech. - Scaling up and optimization of hydrogen compressor & storage systems using simulation software |
| 31 | **Marco** | RBF Morph | Flexible Engineering Toward Green Aircraft |
| 32 | **Marnie** | FEANTM | KTH - Can construction helmets save lives? Evidence from a biomechanical reconstruction of a work-related head trauma - KTH |
| 34 | **Marsha** | FEANTM | ASME Mechanical Engineering Education Conf., In-Person Event |
| 35 | **Marsha** | FEANTM | The International LS-DYNA Conference 2026 |
| 36 | **Marta** | OASYS | Diving into Ansys LS-DYNA's Fluid Solvers - Simon Hart |
| 39 | **Metin** | OZEN | OzenCon - Don't miss our conference on March 10. |
| 40 | **Mi & Ke** | Nightly News | Using Adjoint Solver in Ansys Fluent for CFD Design Optimization, Mohsen Seraj |
| 43 | **Ryan** | Marine/Naval | Integrated Sail–Hull–Turbine Assessment for Wind Power Generation Ship Using Experiment and CFD |

***FEANTM – Outdoor Movie Theater Now Showing***

| | |
|---|---|
| 44 | Pole Vaulting with Hans |

## Table of Contents

Individuals are the persons we wish to thank. It doesn't imply association with a company.
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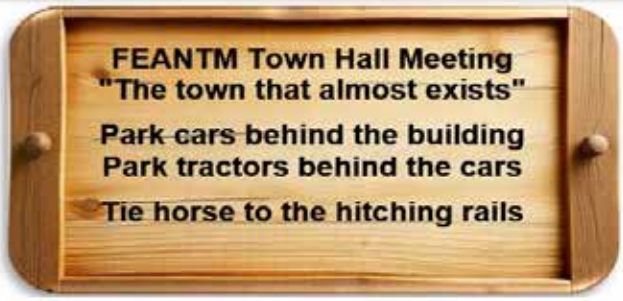
**The websites will have the complete information and high-resolution graphics**

# 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**





## Announcements from residents not to miss

**Marta:** The ICFD solver in Ansys LS-DYNA is fully supported by the Oasys LS-DYNA Environment, including a dedicated set-up tool in Oasys PRIMER …

**Metin:** OzenCon, March 10. Dedicated to simulation empowering engineers. Presented by SimuTech Group.

**Marnie:** Don't miss KTH, each year, 320 000 people die from occupational injuries. The construction sector is one of the most hazardous sectors. ..

**Abhinav** –A Lighthearted Look at Failure Criteria So, how do we know which material is best for the job? That's where failure criteria come in…

**Madhukar:** GRZ Tech. has pioneered the commercialization of solid-state (metal-hydride) hydrogen systems ….

**Marco:** The book Flexible Engineering Toward Green Aircraft highlights how advanced CAE methods support sustainable aircraft engineering...

**Jenson:** LS-DYNA Crash Simulation - In the Malaysian automotive sector, "safety" is more than a rating—it is the ultimate barrier to market entry.

**Abigail:** CADFEM - In today's engineering landscape, the demand for stronger, lighter, and more resilient systems is greater than ever. …

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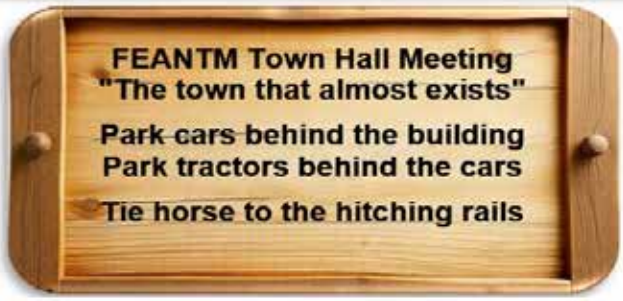



**Our publication features a diverse mix of papers, articles and simulations from various fields. We strive to integrate new and interesting content for your enjoyment and learning.**

**FEANTM** February 2026 **edition.**

**Hello, and welcome to the February 2026 edition of FEANTM.** We have two special days this month. First is "Groundhog Day". This year has started with blustery, cold weather across the United States. Let us hope that Punxsutawney Phil, the famous groundhog based in Punxsutawney, Pennsylvania, who acts as the central figure for the annual Groundhog Day celebration does not see his shadow.

Second is "Valentine's Day". Who doesn't love Valentine's Day? What is Valentine's Day without a heart? Speaking of the heart, Lisa shares information on mechanical aortic valves. She also shares information on head injuries caused by baseball bats broken down by velocity and bat size. For those of you who like amusement parks, Brent shares an article on reinventing the roller coaster. Riding a roller coaster would definitely cause some aortic valve action.

Moving on, Marsha shares information regarding the ASME Mechanical Engineering Conference and the International LS-Dyna Conference 2026. For your visual enjoyment, we invite you to look at the USAF pictures of the month. For our car enthusiasts, take a look at the National Transport Museum, Howth Castle Demesne collections.

These are just a few of the interesting and pertinent articles we offer this month for your viewing pleasure.

As always, we thank our contributors and readers for their ongoing engagement with FEANTM.

**Best regards, Marnie B. Azadian, Ph.D., Managing Editor**

## Welcome to our County, Town Hall Meeting & Announcements

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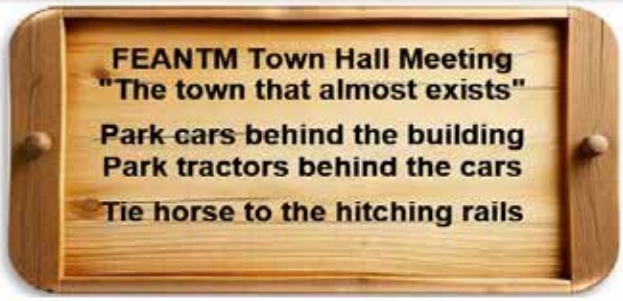




**Grab your tractor and join me as I drive my tractor around the internet and live in the town that almost exists. (located near Livermore, CA, where LS-DYNA was born)**

**OH WAIT! Quiz time – Where was LS-DYNA born?** Once upon a time in a cubicle lived an engineer. A very smart engineer, quietly thinking one code, multiphysics, crash analysis. In the quiet of his cubicle, he fell into a deep sleep (he also was known to sleep at conferences, but that's another story.) SOOO, during his sleep there was a thunder storm and as lightening crashed loudly he jumped up, and yelled LS-DYNA! Yeppers, kids, that's how it all began in the town that almost exists.

At the monthly meeting with the Mayor, I showed him a paper in our Research Hospital. Our Town Mayor said, it is "technically sound and well written." Therefore, head over to our Research Hospital for *A fluid–structure interaction framework for mechanical aortic valves: analyzing the effects of valve design and aortic curvature on hemodynamics*. Hi Rodrigo and Facundo..

In our Library - don't miss Roberto with "From FEA to AI: Tools don't think, Engineers Do"

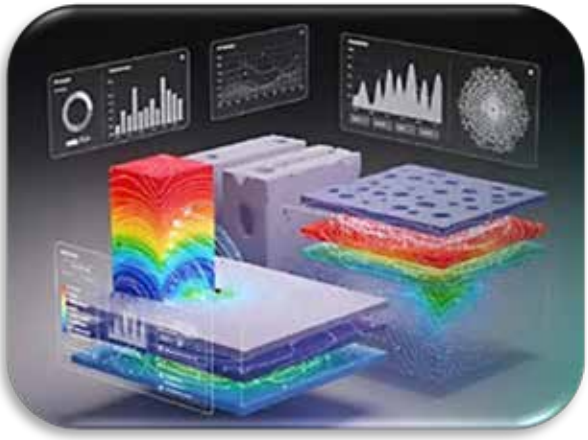
Our MI & Ke coyote and racoon monthly report at dusk, since they don't really come out during the day, reported on Using Adjoint Solver in Ansys Fluent for CFD Design Optimization, by Mohsen Seraj

Well, Marnie covered a lot of what's happening this month so I will just gossip, since I have more room on my page!!! Yes, I heard someone groan out there, "OH give that woman only half a page." Hmmmm rude, but rather true!

AND on the ranch it's mud time of year, cold time of year, fog time of year and at 72 just in general UGH I like the summer better – sorry for upsetting all you that ski and snowboard etc. but heat does these old bones a world of good!!! WAIT! HAPPY NEWS – it is February – Valentine Day where there is NO calories in chocolate on that day! I heard that from a doctor (Not true about the doctor, but it sounded good)

AND, that's a wrap-up
GO FEANTM the almost existing town – work, fight, win!

**Article, Suraj Dhomase,** “In today’s engineering landscape, the demand for stronger, lighter, and more resilient systems is greater than ever. From protecting critical infrastructure to ensuring the performance of advanced systems, engineers face the dual challenge of designing for maximum effectiveness while reducing cost, risk, and development time. Traditional test-fail-repeat cycles, while effective, are often expensive, time-consuming, and limited in scope. This is where engineering simulation steps in…”



**Web – CADFEM AI - Advancing Critical Engineering with Simulation: Penetration Studies on RCC Structures and Armored Plates - Suraj Dhomase**

Using advanced tools like Ansys multiphysics simulation, simulation engineers can predict and evaluate system performance under extreme conditions—before committing to physical prototypes. One such critical application is the penetration performance study of projectiles on Reinforced Cement Concrete (RCC) structures and high-strength composite plates, an area where simulation is redefining the way engineers assess performance, structural integrity, and survivability.

**(Please visit the website for high resolution graphics and video.**

**Understanding the Challenge: RCC and Armored Structures for Critical Engineering systems** - Reinforced cement concrete (RCC) structures and high-strength composite plates form the backbone of security infrastructure and protection systems. They are designed to withstand high-velocity impacts, blasts, and dynamic loads. Whether designed to protect critical infrastructure, reinforced composites, or high-resilience vehicles, the structural resistance to impact determines overall system reliability.

Traditionally, assessing penetration required full-scale physical testing, involving projectiles, live-fire scenarios, and destructive evaluation of materials. While this approach delivers insights, it comes with several challenges:

- **High costs** of repeated testing and prototypes
- **Safety concerns** in conducting live-fire experiments
- **Limited flexibility** to explore variations in geometry, materials, and velocities
- **Long development cycles** delaying deployment and innovation

Simulation eliminates these barriers by enabling engineers to virtually replicate impact conditions, test multiple design variables, and optimize solutions faster and safer.

### The Role of Simulation in Penetration Performance Studies

Modern multiphysics simulation platforms like Ansys Mechanical and LS-DYNA empower engineers to evaluate projectile penetration dynamics with extraordinary detail. By combining structural mechanics, material models, and high-speed impact solvers, these tools deliver insights into:

- **Penetration depth** under varying projectile velocities and angles
- **Damage progression** within RCC or metallic layers
- **Fracture and spalling** effects during high-energy impacts
- **Stress distribution** and failure modes across multiple layers
- **Optimization of thickness and reinforcement** for maximum protection at minimum weight

For instance, engineers can simulate a projectile impacting a concrete structure at supersonic speed, capturing the complete time history of stress waves, cracks, and deformations—all without firing a single shot.

### Case in Point: RCC Structures under Impact

In penetration studies design of RCC structures, simulation helps evaluate:

- How different grades of concrete and steel reinforcements affect penetration resistance
- The role of reinforcement placement in controlling cracks and limiting spalling
- Structural integrity post-impact, including secondary load-bearing capability
- Comparisons between conventional RCC and advanced composite-reinforced concretes

By iterating virtually, simulation engineers can design lighter yet stronger structural enclosures and protective systems, ensuring they withstand varied operating conditions while optimizing material efficiency

### Projectile Penetration on Armored Plates

High-strength composite plates are central to the survivability of field vehicles, aircraft, and marine systems. Simulation allows engineers to:

- Assess how thickness, curvature, and material composition influence penetration resistance
- Analyze high-speed deformation and fracture of metals
- Explore advanced materials like ceramic composites for better energy absorption
- Predict outcomes of multiple-hit scenarios and cumulative damage effects

The insights gained accelerate design improvements while cutting down on the costs of manufacturing and testing physical armor plates.

**Advantages of Simulation over Traditional Testing**

**1. Speed and Cost Efficiency** – Dozens of designs can be tested virtually in the time and cost it takes to run one physical test.

**2. Enhanced Accuracy** – Nonlinear material models capture real-world behaviors such as fracture, cracking, and thermal effects.

**3. Safety** – Eliminates the need for repeated live-fire experiments.

**4. Design Optimization** – Engineers can fine-tune material properties, geometry, and reinforcement strategies early in development.

**5. Scalability** – From small-scale material coupons to full-scale structures, simulation adapts seamlessly.

**CADFEM and Ansys: Empowering Innovation by Advanced, Edge Physics modeling**

As Ansys' Elite Channel Partner, CADFEM brings decades of expertise in simulation-driven engineering to India's engineering ecosystem. By combining world-class Ansys simulation tools with deep domain knowledge, CADFEM supports engineering organizations, research labs, and startups in:

- Implementing simulation workflows for high-velocity impact studies
- Training teams in advanced material modeling and high-strain rate dynamics
- Providing end-to-end consulting, from concept validation to compliance studies
- Enabling digital transformation with cloud-native simulation and AI-driven automation

This partnership ensures that simulation engineers not only adopt cutting-edge tools but also gain the know-how to extract maximum value, accelerating innovation while reducing development risks.

**Conclusion - Engineering the Future of Advanced, Critical Systems**

The future of engineering technology lies in digital engineering and simulation-driven design. Penetration performance studies, Design of RCC structures and high-strength composite plates are just one example of how simulation helps engineers balance innovation, performance, cost, and safety.

By empowering teams to model, validate, and optimize in a virtual environment, Ansys and CADFEM are redefining the critical engineering landscape—ensuring India and global innovation ecosystems are prepared for the challenges of tomorrow.

**Simulation is no longer an add-on; it is the backbone of modern innovation through transformative engineering.**

**CADFEM's Digital Learning Lab - Excerpt Marcus Kellermeyer, "Many thanks to Alexander Kunz for the wonderful article.** "For me, it's a great summary of what we've accomplished over the past years…This is truly a great honor & the article is dedicated to the entire Digital Learning Lab Team. Every day is so much fun, & it's never about "How long until the end of the working day?" but rather "Wow, it's late again!"

Cadfem Training Courses  Free Trials

**Web - CADFEM - Take a look behind the scenes at CADFEM's Digital Learning Lab - Alexander Kunz**

From the initial idea to delivery on the learning platform – The eLearning courses offered by CADFEM not only incorporate the simulation expertise of CADFEM engineers but also cover the entire production process.

**We spoke with Dr. Markus Kellermeyer about the Digital Learning Lab, which he played a key role in establishing and continues to develop through new ideas and technologies.**

- Dr.-Ing. Markus Kellermeyer is the brain behind CADFEM's digital learning offerings
- All content is prepared with great precision and a passion for perfectionism
- In addition to e-learning courses, the "Let's Simulate" format, which allows users to look over the shoulders of experts, is also very popular

**From the initial idea to delivery on the learning platform**. The eLearning courses offered by CADFEM not only incorporate the simulation expertise of CADFEM engineers but also cover the entire production process. We spoke with Dr.-Ing. Markus Kellermeyer about the Digital Learning Lab, which he played a key role in establishing and continues to develop through new ideas and technologies.

**Markus, what brought you to CADFEM?** I studied civil engineering, and, thanks to my department and my thesis, I was introduced to Ansys and CADFEM at an early stage, which I really appreciated. Once I knew that I wanted to work 100% in simulation, the move to CADFEM was an obvious one. That was in 2008.

**So, like most people at CADFEM, you started out as a computational engineer. How did you end up as head of the Digital Learning Lab?** As is so often the case in life, things just fall into place. But looking back, this development was perhaps somewhat inevitable, because training and new technologies are topics that have always fascinated me. This is reflected in a five-year cycle: during my first five years at CADFEM, I conducted many Ansys training courses, and during the next five years, I was able to work on my doctorate alongside my job, which involved research. The five years since 2018 have been all about the Digital Learning Lab, which I developed with start-up support from the ZEIT Akademie.

**Milestones and Highlights**

**That means you've been there from the start. What have been some important milestones and highlights for you along the way?** The first thing that comes to mind is our collaboration with ZEIT Akademie. This is still a valuable resource for us today. Then there was the move to our current building with two professional studios, which we planned and furnished entirely ourselves. This is where the magic happens, so to speak. The speakers are always in good spirits, and our team is outstanding. It was also important to bring Brian Morris, a native speaker, on board to translate our knowledge products into English in the best possible quality and offer them internationally. One of the most recent highlights is the ChatGPT moment, which everyone is probably familiar with, because suddenly things became possible that we had never even thought of before. Another great feeling was when we noticed how well our self-developed “Let's Simulate” format was received by people.

**Speaking of “Let's Simulate”, what is it and how did it come about?** What we and our customers were still missing, apart from e-learning courses and training, was a format that focused on shared experience. Let me explain briefly: I myself have diligently attended training courses, but I have also learned a lot by watching colleagues during simulations. How do they approach a project, how do they narrow down a problem, how do they identify potential errors, and so on. This is exactly what “Let’s Simulate” represents.

**How does it work?** It’s quite simple: two experts work together on a simulation task in front of the camera. Making mistakes is allowed, and controversial discussions about the task and personal opinions are explicitly encouraged. This is very well received by our customers and reinforces existing knowledge. The format is genuinely enjoyable for both the viewers and the experts, as it is relaxed and entertaining.


*Let's Simulate: Watch experts discuss and solve a simulation task © CADFEM*

**What makes CADFEM eLearning courses special? The main format is e-learning courses. Their advantages, such as flexibility, are well known. What else makes them so valuable?** The e-learning courses have a strong engineering focus, which includes how to use software functions. But above all, they demonstrate how to resolve engineering problems. Lots of exercises and quizzes ensure that they are entertaining and never boring. Another important factor for us is that with every e-learning course, customers can rely 100% on the usual CADFEM quality in terms of content and craftsmanship. How do we do this? Once our production team has decided on a topic, it is discussed in depth with experts. There is a lot of discussion to ensure that the course meets or exceeds expectations. Only then does the implementation take place in the Digital Learning Lab, following a clear and proven concept. We have the infrastructure and a well-coordinated team to support our instructors during the filming days. The entire process is rounded off by professional editing.

**One disadvantage of video formats is that they are static and may become outdated. How do you deal with this?** Fortunately, we have many experts at CADFEM who keep the content up to date. We have developed good strategies, whereby videos are either corrected or re-produced. Customer feedback is also very helpful in this regard. When issues are reported to us, we follow-up on them and make the necessary corrections.

**How do you keep track of 50 courses?** With 20 courses, this wasn't a problem, but today we rely on AI. It helps that we have created the content in a modular way from the very beginning, with fixed structures. This allows context stores and various agents to support us in our daily work. And yet, the editorial team and the Digital Learning Lab still coordinate on a daily basis. Ultimately, common sense must prevail in order to make the right decisions when it comes to further developing knowledge products.

*A well-coordinated team, supported by AI agents, takes care of the professional creation of CADFEM's digital learning formats. © CADFEM*

**Human intelligence over artificial intelligence**

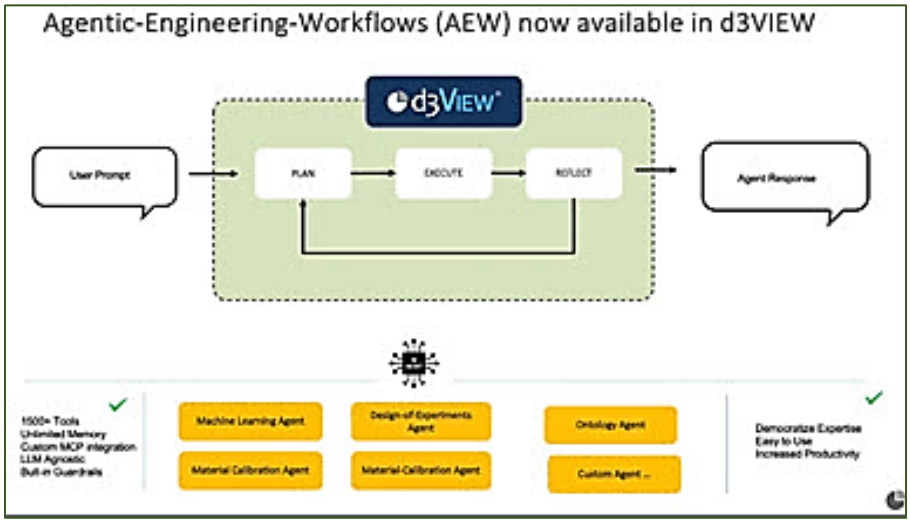
**Does AI play a role for you in other areas as well?** Yes, we also rely heavily on AI in another area: translations. All of our e-learning courses feature English voice-overs. As I mentioned earlier, our translator Brian plays a key role here and is supported by several agents who, for example, help prepare the speakers' freely spoken texts or produce voice-overs that are fairly lip-synced.

**Does this mean that the digital learning offerings from CADFEM are very AI-heavy?** Definitely not. We do use AI as a tool for many tasks, but the result is not AI-generated. We see ourselves much more as a manufacturer of digital learning formats, of. After all, it is our CADFEM employees who stand in front of the camera, sharing their expertise, examples, and personal opinions. Behind our expertly crafted digital learning offerings are people, a culture of feedback, a double- and triple-check principle for reviewing content, and a strong penchant for perfection. This is something we work on every day with our colleagues in the Digital Learning Lab. We could employ AI much more rigorously in translation, but we don't want to do that. The content must be 100% accurate, which is why we continue to have a person review it.

**Suri Bala, Founder and CEO of d3VIEW, Inc. shares 2026 AES library expansion for engineers and domain specialists.**

**Web – [d3VIEW]**

**"The d3VIEW AES library is expected to expand significantly in 2026, enabling engineers and domain specialists to execute increasingly complex, agent-guided engineering workflows that improve traceability, reduce iteration cycles, and accelerate product development from concept through validation."**

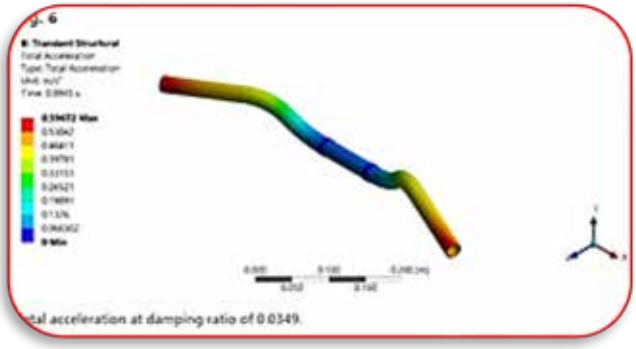



Complex engineering problems demand rigorous planning, systematic execution, and the coordinated use of specialized tools to deliver safe, reliable, and validated products under tight development schedules.

Driven by recent advances in artificial intelligence and continued platform evolution at d3VIEW, we have integrated enterprise-grade Agentic Engineering Workflows (AEW) into the d3VIEW environment.

These workflows are powered by autonomous and semi-autonomous engineering agents with access to more than 1,500 domain-specific tools. The agents execute multi-step engineering tasks through natural-language driven orchestration, enabling repeatable and auditable workflows. The current Agentic Engineering Solutions (AES) library supports a broad range of engineering activities, including machine-learning model development, full-vehicle design-of-experiments (DOE) execution and optimization, simulation model debugging and validation, ontology-based knowledge representation and reasoning, and material model calibration. Users may deploy pre-configured AES components, extend existing agents, or construct custom agents using a visual, whiteboard-based workflow authoring approach.

**Article quote, "...**- In an actual vehicular test, an ICE two-wheeler is converted into electric at the laboratory and on road testing was conducted6. Further, in this transient study of the test two-wheeler handlebar using ANSYS Workbench 2023 R2…" (Excerpts)



## Experimental and finite element analysis of a two wheeler handlebar subjected to semi active constrained layer damping treatment

**K. Krishna, G.T. Mahesha, S. Hegde, S.S. Baloor**

Dept. of Aeronautical and Automobile Engineering, Manipal Inst. of Tech., Manipal Academy of Higher Education, India

**Abstract** - **The study investigates the transient vibration analysis of two-wheeler handlebar and the optimization of vibration damping using constrained layer Magnetorheological Elastomers (MRE).** The research explores how varying magnetic field strengths affect the damping properties of MRE, which is strategically implemented in the handlebar of a two-wheeler with a view to reducing vibrations and improving rider comfort. This study is a combination of numerical simulation and experimental data to highlight the effectiveness of semi-active damping systems under different magnetic fields. A sandwich beam was prepared at the laboratory for the damping material, and it was tested for the variation in damping ratio when the magnetic field was varied. The results demonstrate significant improvements in vibration attenuation when MRE damping ratios are optimized by varying the magnetic field, resulting in enhanced structural integrity and rider comfort.

**Introduction** - Vibration analysis is a critical aspect of engineering, particularly in the context of two-wheelers such as motorcycles and scooters. These vehicles are frequently subjected to various vibratory forces during operation, leading to potential discomfort for the rider and accelerated wear and tear of the vehicle components1,2. One significant source of these vibrations is road irregularities. Uneven road surfaces induce vibrations that travel through the wheels, suspension system, and frame of the two-wheeler, affecting its stability and handling3. Minimizing the effect of these vibrations effectively requires an understanding of the sources and an implementation of strategic damping treatments.

**Materials and Methods** - In an actual vehicular test, an ICE two wheeler is converted into electric at the laboratory and on road testing was conducted6. Further, in this transient study of the test two-wheeler handlebar using ANSYS Workbench 2023 R2, structural steel is employed to simulate the material properties and behavior under dynamic loads. The process begins with defining the material properties of structural steel within the ANSYS Workbench 2023 R2 software, which includes specifying its density, Young's modulus, and Poisson's ratio. These properties are crucial for accurately simulating the mechanical response of the handlebar to applied forces.

**Conclusion** - This research investigates the effectiveness of semi-active damping system at the strategic location of the electric two-wheeler. Based on the calculation of damping ratios as per ASTM E756 standard for the MRE specimen by varying the magnetic field, these inputs are fed into the simulation of transient analysis of the handlebar…

| | |
|---|---|
| **Student** | **Mr. Bart, I need a learning course for my Dad.** |
| **Bart R.** | **We can pick one from Ansys Learning.** |
| **Student** | **Okay, can you help me pick one out?** |
| **Bart R.** | **Let's visit and we can pick your Dad a course.** |


**Ansys Learning Center**

**Structures - Get Started with Ansys Mechanical**
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When working with any computer-aided engineering software, it is important to understand its workflow and user interface so you can be more productive and efficient when performing your analysis in the software.

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**Learning Outcomes:**

- Understand the workflow for the Workbench Project Schematic
- Become familiar navigating in Ansys Mechanical and using the Tree Outline
- Learn Ansys Mechanical productivity tips

**Course Prerequisites**: None

**Estimated Time Required**: 1 hour

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With our badging platform, digital badges can be easily shared in email signatures, digital resumes, and social media profiles, helping you highlight your achievements.

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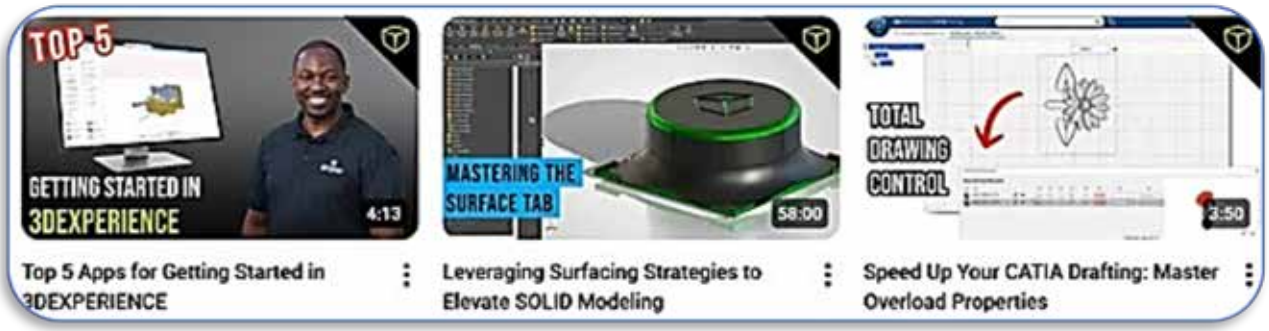
**GOENGINEER: Two things not to miss. 1) The article Reinventing Roller Coasters with Metal 3D Printing 2) GoEngineer YouTube Channel**

**Excerpt**

**Web – GOENGINEER - Reinventing Roller Coasters with Metal 3D Printing -** Engineering teams developing next-generation amusement park rides face a constant challenge: making structures faster, lighter, and safer while improving sustainability and reducing costs.

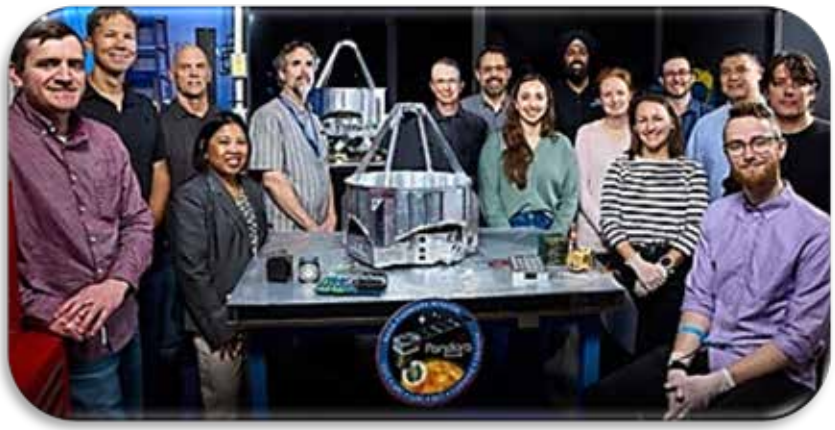
Extreme Manufacturing Engineering recently achieved this by leveraging large-scale additive manufacturing with Bright Laser Technologies - BLT. They successfully redesigned and produced a roller coaster bogie that redefines the limits of traditional park engineering. Harnessing the Power of an End-to-End Process - EME and BLT's partnership represents a true end-to-end additive manufacturing solution by combining advanced simulation, design, production, and validation into a seamless workflow. Leveraging EME's decades of experience in mechanical design and BLT's large-format metal 3D printing technology, the team developed a fully optimized roller coaster bogie (the wheel assembly that carries each train car).





. …

**LLNL "**Lawrence Livermore National Laboratory (LLNL), in partnership with NASA's Goddard Space Flight Center (GSFC) and Blue Canyon Technologies, announced the successful launch of the Pandora satellite into Earth's orbit, initiating a yearlong mission to advance atmospheric characterization of planets beyond our solar system, also known as exoplanets."



**Web – LLNL - Pandora mission demonstrates new model for low-cost, high-impact science**

By: Alexa Carlson

*Pandora team with engineering hardware for the telescope. The From left: mechanical designer Scott Pitts, flight software lead Lance Simms, mechanical engineer Jeff Klingmann, project systems engineer, Maricris Schneider, lead mechanical designer Owen Alford, optical engineer Aaron Peer, space vehicle integration lead Phillip Rittmuller, mechanical designer Ariana Garcia, electrical engineer Richinder Rehal, systems engineer Tara Grice, lead mechanical engineer Hilary Johnson, lead electrical engineer Colin Averill, thermal engineer Michael Wong, structural analyst Ryan Fellini and deputy project manager Jordan Karburn.*

On Monday, Jan. 12, **Lawrence Livermore National Laboratory (LLNL), in partnership with NASA's Goddard Space Flight Center (GSFC) and Blue Canyon Technologies, announced the successful launch of the Pandora satellite into Earth's orbit**, initiating a yearlong mission to advance atmospheric characterization of planets beyond our solar system, also known as exoplanets.

Pandora represents a major engineering achievement, delivering a first-of-its-kind, all-aluminum telescope on a commercial off-the-shelf satellite with a schedule and budget unmatched by traditional space observatories.

Pandora is set to observe approximately 20 exoplanets and their host stars, monitoring starlight as it filters through an exoplanet's atmosphere during orbit. This technique, known as transmission spectroscopy, will allow scientists to identify atmospheric features such as hydrogen, water vapor, clouds and haze.

The long-baseline observations in visible and near-infrared wavelengths collected by the satellite will complement the shorter-duration infrared measurements from the James Webb Space Telescope (JWST) to help researchers interpret the signals with greater confidence.

"Small satellites are great platforms to fill gaps and help maximize the science from NASA's flagship missions, like JWST," said Elisa Quintana, principal investigator for Pandora at GSFC. "Pandora will illustrate how we can leverage small platforms to tackle big scientific challenges."

The effort is part of NASA's Astrophysics Pioneers program, designed to accomplish compelling science at a lower cost compared to traditional missions, with a cost cap of $20 million. As one of four selected proposals in the program's inaugural year, the successful deployment of the Pandora SmallSat Mission on the SpaceX Falcon 9 launch is an incredible milestone for the program.

**To accomplish this feat, engineers at LLNL approached the payload development inversely, beginning with a bottoms-up requirements derivation process, where the team scoped key elements of the mission around existing technologies. One of the earliest decisions was to leverage an off-the-shelf satellite bus from Blue Canyon Technologies rather than commissioning a custom-designed platform.**

At the time of proposal, Blue Canyon Technologies was the only vendor able to offer a commercial product that could meet the stringent stability requirements that Pandora needed to obtain long-observations of exoplanets and their host stars.

The strategy reduced the development timeline immensely but required close partnership between the technical leadership team to meet the constraints of the commercial product. Pandora is the first NASA Astrophysics mission to purchase a commercial spacecraft bus of this size and require no mission-unique design modifications or accommodations. The team was able to fully leverage an existing, proven satellite design for the mission.

**The CODA telescope, developed jointly by LLNL and Corning Incorporated, became the centerpiece of the Pandora Mission**. The lightweight, all-aluminum telescope was built to challenge long-standing cost and schedule barriers in space-based optics. By standardizing its primary components and enabling rapid reconfiguration for different missions, the CODA architecture greatly reduces manufacturing complexity and time.

For Pandora, this approach allowed the team to reuse CODA's mature front-end optics and customize only the relay system, producing a high-performance, half-meter telescope. Pandora's instrument costs came in at 15% of what NASA cost models projected for an instrument of this class. These cost savings were largely made possible thanks to the revolutionary all-aluminum design of the CODA telescope.

"Pandora demonstrates that compelling, novel, science missions can be built around existing, proven technologies," said Jordan Karburn, deputy for the Pandora project. "We are extremely excited about what Pandora has shown and feel that the mission serves as an existence proof for what future small satellite science missions can accomplish."

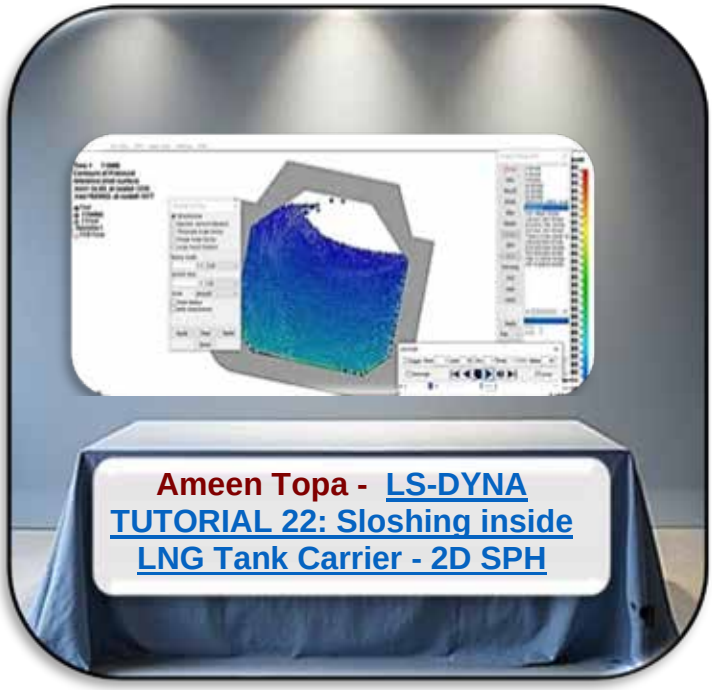
**As Pandora begins its first observations, the mission stands to deepen understanding of distant worlds while demonstrating how government and commercial partners can deliver sophisticated science more rapidly and affordably. Its success expands the pathway for future small-satellite missions, showing that high-impact astrophysics no longer depends solely on high-cost missions.**

**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


**Bob Lucas - The evolutionary flexibility of LS-DYNA**

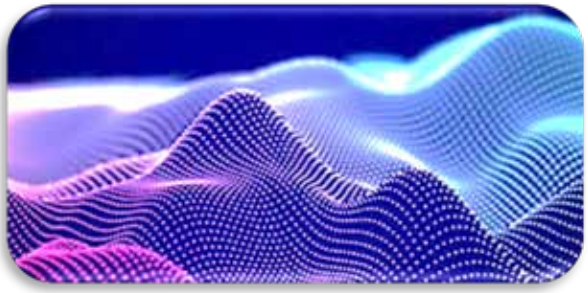

**Chalk Talk with Prof. Aloke Dutta, EE, IIT Kanpur**



**Ameen Topa - LS-DYNA TUTORIAL 22: Sloshing inside LNG Tank Carrier - 2D SPH**

**Djordje Romanic- Exploring atmospheric sciences wind engineering, and wind energy**

**Article Not To Miss by Mitchell Hortin, M.S. Mechanical Engineering Senior Staff Engineer, SimuTech Group, "**This blog post will cover all the excitations and loads available for an acoustic analysis and provide some common applications for each. Readers are also encouraged to reference this previous blog post which describes foundational concepts of acoustic analysis in Ansys Mechanical…"



**Web – SimuTech - Understanding Acoustic Excitations and Loads in Ansys Mechanical**
**By Mitchell Hortin**

**Introduction**: Acoustic Simulations - Acoustic simulations in Ansys Mechanical allow engineers to predict how sound interacts with structures and fluids. When preparing an acoustic analysis in Mechanical it can be difficult to determine which acoustic excitations and/or loads are appropriate for the problem at hand.

**Acoustic Excitations** - Acoustic excitations define how sound energy, in the form of pressure waves in a fluid, enters the system. Depending on the source characteristics, you can choose from several options:

**Mass Source**

- Introduces sound by applying a volumetric mass flow rate.
- Creates pressure fluctuations by locally changing density—similar to air blowing through a small hole or a loudspeaker diaphragm.
- These pressure fluctuations radiate outward uniformly from the source.
- Ideal for internal sound sources within a fluid region.
- This is a common way to introduce pressure fluctuations without explicitly modeling the vibrating surfaces

**Surface Velocity**

- Represents sound generated by a vibrating surface (contrasted with a mass source which uses mass flow)
- Users can specify the directionality of the wave propagation.
- Common for speaker cones or structural panels radiating noise.

**Incident Wave Source**

- Represents far-field sound sources entering the domain, such as an external speaker or environmental noise.
- User specifies direction and frequency.
- Example: A plane wave hitting a wall from the environment.

**Diffuse Sound Field**

- Idealized condition where sound energy is uniformly distributed.
- Commonly used for random vibration and acoustic fatigue.
- Example: A room with perfectly reflective walls and a sound source inside, in time the energy becomes evenly spread out and omnidirectional.

**Port in Duct**

- Models acoustic radiation from a duct or port object.
- Users can specify duct characteristics, which affects how the energy is injected into the acoustic domain
- A simplification that eliminates the need to explicitly model the duct geometry
- Common in HVAC systems, exhaust pipes, and speaker ports.

**Transient Variants**

- Mass Source Rate (Transient): Time-dependent mass flow excitation.
- Surface Acceleration (Transient): Time-dependent surface motion for dynamic acoustic radiation.

**Acoustic Loads -** Acoustic loads modify the boundary conditions or properties of the acoustic domain:

**Temperature**

- Accounts for temperature influence on acoustic properties (e.g., speed of sound).
- Used in high-temperature ducts or engine environments.

**Impedance Sheet**

- Represents a surface with a specific acoustic impedance.
- Common in acoustic liners, sound-absorbing panels, and perforated sheets.

**Static Pressure**

- Applies a constant pressure to bodies in the acoustic fluid region.
- Used for pressurized environments under steady-state conditions.

**SUMMARY TABLE**

| Type | Purpose | Typical Applications |
|---|---|---|
| Mass Source | Internal sound source via mass flow | Loudspeakers, internal noise sources |
| Surface Velocity | Sound from vibrating surfaces | Speaker cones, structural panels |
| Diffuse Sound Field | Uniform sound energy distribution | Acoustic fatigue, random vibration |
| Incident Wave Source | External far-field sound | Environmental noise on structures |
| Port in Duct | Acoustic radiation from ducts | HVAC systems, exhaust pipes, speaker ports |
| Temperature Load | Adjusts acoustic properties for temperature | High-temperature ducts, engine environments |
| Impedance Sheet | Defines absorption/reflection characteristics | Acoustic liners, sound-absorbing panels |
| Static Pressure | Applies constant pressure | Pressurized environments |

**Acoustic Excitations & Loads Key Takeaways**

- Excitations define how sound enters the system—choose based on source type (internal, external, vibrating surface, diffuse field).
- Loads define boundary conditions and material behavior—critical for realistic acoustic performance.
- Combining the right excitation and load ensures accurate simulation of real-world acoustic phenomena.

**Don’t miss Phil Eichmiller, Senior QA Engineer on YouTube**

Phil Eichmiller - A Principal Software Quality Engineer at Autodesk in Portland, Oregon, working on Fusion since 2012.

YouTube - **How to Create Criss-Cross Grooves in Fusion for Machining**

Phil Eichmiller, Senior QA Engineer shows you how to design criss-cross grooves in Fusion using sketches, sweeps, and pattern tools for precise machining control.

Crosshatch or criss-cross groove patterns are common in machining for texture, grip, or aesthetic purposes. While machinists often have clever tricks for producing these patterns directly on the shop floor, you can also model them in Fusion to control the geometry yourself. In this tutorial, we’ll walk through how to design and pattern criss-cross grooves in Fusion.

.


**WATCH**

**Phil**

**On**

**YouTube**


**Step 1: Understand the machining context**

- Before modeling, determine how the grooves will be cut.
- Many CAM operators have built-in strategies for engraving or texturing surfaces with straight-line toolpaths.
- If you want full control over the geometry in Fusion, proceed with modeling.

**Step 2: Sketch the groove profile**

- Create a plane along the path where you want the groove.
- On that plane, draw a sketch of the groove cross-section.
- A simple polygon or rectangle works well.
- Dimension the sketch to control groove depth and width.
- Finish the sketch.

**Step 3: Sweep the groove**

- Use the Sweep tool to extrude the groove profile along your chosen path.
- This creates a single groove cut into the part.
- Adjust the sweep path angle or length to control the groove's orientation.

**Step 4: Pattern the groove**

- Select the groove feature.
- Use Pattern > Feature Pattern to repeat the groove across the surface.
- Define spacing, count, and direction.
- You can pattern in one direction first.
- To create the criss-cross effect, mirror the pattern:
- Create an offset plane in the middle of the part.
- Use Mirror > Features to mirror both the original sweep and the patterned grooves.
- This produces intersecting grooves at an angle.

**Step 5: Refine the pattern**

- Adjust groove size, angle, or spacing by editing the original sketch.
- Modify the pattern count or direction for different densities.
- Experiment with mirroring at different angles to achieve unique textures.

**Criss-cross grooves: Tips & tricks**

- Editable workflow: Because the grooves are built from sketches and features, you can easily tweak dimensions later.
- CAM alternative: If you only need the grooves for machining, consider engraving toolpaths instead of modeling.
- Creative control: Mirroring and offsetting patterns can produce interesting visual effects beyond simple crosshatching.

**By breaking the process into small, editable steps—sketch, sweep, pattern, and mirror, you can create precise criss-cross groove patterns in Fusion.**

**Once you've tried the workflow a few times, you'll find it easy to adjust and customize for different parts and machining needs.**

**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.


**Web - ASME Digital Collection - A Finite Element Model for Compressive Ice Loads Based on a Mohr-Coulomb Material and the Node Splitting Technique**

**Hauke Herrnring, Sören Ehlers**
Hamburg Univ. of Tech., Inst. for Ship Structural Design & Analysis, Germany

**Abstract** - This paper presents a finite element model for the simulation of ice–structure interaction problems, which are dominated by crushing. The failure mode of ice depends significantly on the strain rate. At low strain rates, the ice behaves ductile, whereas at high strain rates it reacts in brittle mode. This paper focuses on the brittle mode, which is the dominating mode for ship–ice interactions. A multitude of numerical approaches for the simulation of ice can be found in the literature. Nevertheless, the literature approaches do not seem suitable for the simulation of continuous ice–structure interaction processes at low and high confinement ratios in brittle mode. Therefore, this paper seeks to simulate the ice–structure interaction with the finite element method (FEM). The objective of the here introduced Mohr-Coulomb Nodal Split (MCNS) model is to represent the essential material behavior of ice in an efficient formulation. To preserve mass and energy as much as possible, the node splitting technique is applied, instead of the frequently used element erosion technique. The intention of the presented model is not to reproduce individual cracks with high accuracy, because this is not possible with a reasonable element size, due to the large number of crack fronts forming during the ice–structure interaction process. To validate the findings of the model, the simulated maximum ice forces and contact pressures are compared with ice extrusion and double pendulum tests. During validation, the MCNS model shows a very good agreement with these experimental values.

**State of the art**- **...As an alternative to the FEM-based approaches, a variety of meshless methods for simulating brittle problems are available in the literature. In this paper, we used the finite-element code LS-Dyna** [32] that includes routines for brittle and semi-brittle problems, as well as different meshless methods, e.g., Bounded Discrete Element method (BDEM) [33], Peridynamic [34], Smoothed Particle Galerkin method (SPG) [35], or Smooth Particle Hydrodynamics (SPH) [36].

...Despite a variety of alternative mesh-free methods, FEM is considered the most well-developed choice for simulations involving ice. A big advantage of FEM is many contact algorithms, which allow the coupling of the ice- and structural model. **Therefore, the model developed in this paper is implemented into the explicit finite element (FE) solver LS-DYNA R11.1.0**.

**Conclusion** - The MCNS ice model using Mohr-Coulomb plasticity and a simple node splitting failure technique was successfully implemented and validated for brittle ice–structure interaction problems. For a variety of complex crushing-dominated problems, such as the ice extrusion test and the double pendulum test, the numerical results are in particularly good agreement with the observed values.

**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**

Web – DFE-Tech **- LS-Dyna Crash Simulation: Meeting ECE R94 Standards in SEA with CAE**

**Phung Dung**, Technical Manager
DFE-Tech Vietnam
**Muhammad Afiq**, Technical Account Manager,
DFE-Tech Malaysia

LS-DYNA Crash Simulation - In the Malaysian automotive sector, "safety" is more than a rating—it is the ultimate barrier to market entry. Under the Vehicle Type Approval (VTA) framework, compliance with UN ECE R94 (Frontal Collision Protection) is non-negotiable.

However, physical crash testing remains a massive capital drain. With a single prototype crash test costing upwards of RM 200,000, the "Trial and Error" method is no longer viable. In 2026, the industry standard has shifted toward Total Virtual Validation.

At DFE-Tech, we don’t just provide simulation; we provide a complete crash-engineering ecosystem through our strategic partnerships with Arup and Humanetics.

## 1. The Gold Standard: LS-DYNA & High-Fidelity Models

The ECE R94 regulation focuses on a frontal 40% offset collision at 56 km/h. To predict these results with 99% accuracy, the "Solver" is only half the battle—the other half is the quality of the models used.

**The DFE-Tech Advantage**: As a partner of Humanetics and Arup, DFE-Tech provides the industry’s most accurate Dummy and Barrier models. By using official Humanetics digital twins, we ensure that occupant injury criteria (HIC, chest compression, femur force) in our simulations mirror real-world laboratory results exactly.

**2. Streamlining the Workflow: Oasys & CaxWork**

Speed-to-market is often throttled by the time it takes to prepare complex crash meshes (Pre-processing) and interpret massive amounts of data (Post-processing).

- The DFE-Tech Solution: We introduce the Oasys Suite (Primer, D3Plot, T/HIS) and CaxWork to our clients' workflows.
  - Oasys Primer: Allows for rapid, error-free setup of complex ECE R94 models.
  - CaxWork: Streamlines the data management and visualization process.
- The Result: We reduce the "engineering lead time" by up to 30%, allowing for more design iterations in a shorter window.

**3. Eliminating "Intrusion" Risk with Virtual Iteration**

The most common ECE R94 failure in B-segment vehicles—high-volume sellers in Malaysia—is the intrusion of the steering column or pedals.

- The Engineering Edge: Using LS-Dyna's Explicit Solvers, we identify structural "weak zones" in the A-pillar and longitudinal rails. By iterating the design virtually, we ensure that by the time you reach a physical test at MIROS or a certified lab, the structural integrity of the safety cell is already guaranteed.

**4. Anthropometric Accuracy for the SEA Market**

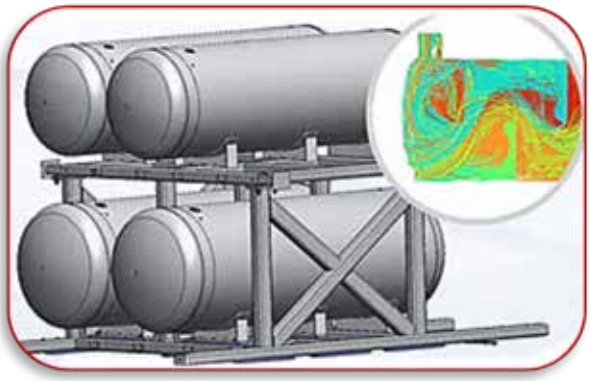
While ECE R94 uses standard 50th percentile male dummies, DFE-Tech's partnership with Humanetics allows us to provide a wider range of occupant models. This is critical for manufacturers looking to exceed baseline standards and achieve a 5-Star ASEAN NCAP rating, which requires a deeper understanding of how different body types interact with airbags and seatbelt pretensioners.

**Conclusion: A Complete Crash-Test Ecosystem**

In 2026, DFE-Tech stands as the bridge between Malaysian OEMs and global safety excellence. By combining the power of LS-Dyna, the precision of Humanetics and Arup models, and the efficiency of Oasys and CaxWork, we offer a "Zero-Failure" path to ECE R94 compliance.

**At DFE-Tech, we don't just simulate crashes;**
**we engineer certainty.**

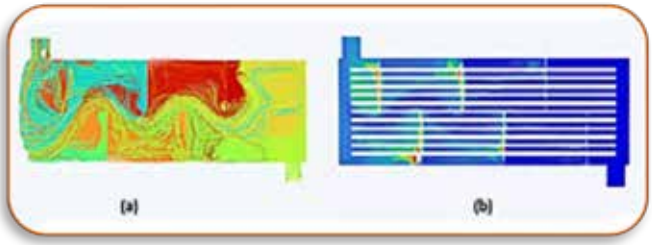
**Article, "Accelerated large-scale implementation of green hydrogen is seen as a prerequisite for the transition to clean energy and the achievement of the net-zero emissions target in the energy and transportation sectors. GRZ Technologies** has pioneered the commercialization of solid-state (metal-hydride) hydrogen systems, which enable safe, compact, and efficient compression and storage of hydrogen**.**



**Web – CADFEM** **- Scaling up and optimization of hydrogen compressor and storage systems using simulation software**

**Sector**: Energy supply
**Specialist field**: Fluid Mechanics

Accelerated large-scale implementation of green hydrogen is seen as a prerequisite for the transition to clean energy and the achievement of the net-zero emissions target in the energy and transportation sectors. GRZ Technologies has pioneered the commercialization of solid-state (metal-hydride) hydrogen systems , which enable safe, compact, and efficient compression and storage of hydrogen. These types of systems are thermally controlled, and, as they grow in size, proper thermal design becomes paramount to their performance and storage capacity. For this purpose, GRZ Technologies chose ANSYS FLUENT to optimize the 3-D flow and thermal characteristics for all products in its portfolio.

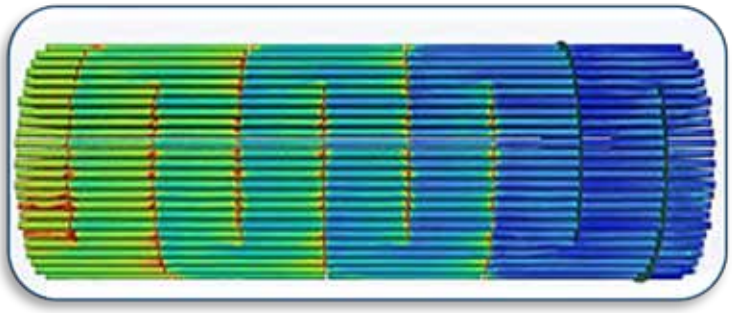



***Coolant flow path (a) and temperature (b)***

**Task** - The hydrogen absorption/desorption behavior is highly dependent on the temperature distribution within the metal hydride. Cylindrical cells contain the metal hydride material, which is in powder form. Several such cells are placed in a "shell-and-tube heat exchanger" type of arrangement within a bigger cylindrical container to form the overall compressor system. The thermal management of such a system is commonly done through the circulation of a thermal medium, such as water, steam, air or any other medium at accurately controlled thermal and flow conditions to provide the required heating or cooling power. GRZ technologies has developed a numerical procedure to simulate a range of systems using ANSYS Fluent and in-house developed models. The compressor or storage geometry is modeled parametrically, meshed and simulated. The spatial distribution of temperature and flow field are obtained from the numerical simulation (see Figure 1) for the case of an industrial-scale hydrogen compressor.

The thermal medium flow velocity and distribution plays an important role in determining the

temperature distribution within the metal hydride and eventually the compressor's performance. Using the parametric model, various options for reducing manufacturing and operating costs can be explored, while achieving the required hydrogen delivery pressure, flow rate and capacity.



*Metal hydride domain temperature*

**Solution -** The numerical method described above can be used for many thermal and chemical technologies with similar physics. With Ansys Fluent, the thermal compression process is simulated, and the relevant evaluation parameters are quantified. The numerical results are interpreted based on the evaluation parameters defined, e.g., the maximum metal hydride temperature (see Figure 2), and an appropriate course of action is determined to optimize the design. The coolant flow path is optimized by varying design parameters (e.g., tube arrangement) to improve performance (e.g., minimize pumping power) while maintaining certain requirements (e.g., minimum temperature non-uniformities). After achieving the optimum design, the operating limits (e.g., coolant flow rates) of the compressor are determined where the target compression rates are achieved. Novel mathematical models describing the thermal compression and storage processes can also be tested and evaluated.

**Customer Benefit** - With Ansys Fluent, GRZ technologies was able to establish a versatile and robust numerical process for evaluation of the design of a metal hydride-based hydrogen system. This drastically reduces the development cycle of new products by enabling the targeted optimization of relevant design and operating parameters. Ultimately, the detailed insights obtained through numerical simulations allow significant reduction in manufacturing and operating costs of the developed systems. In addition, it provides a solid foundation for the development and refinement of various reduced-order computationally efficient models.

"The book Flexible Engineering Toward Green Aircraft highlights how advanced CAE methods support sustainable aircraft engineering. The book explores CFD, aeroelasticity, shape optimization and multidisciplinary workflows, including RBF mesh morphing, to enable faster and more efficient design exploration for greener aviation concepts."


**Web - Springer Books - Flexible Engineering Toward Green Aircraft**
**Edited by Marco Evangelos Biancolini and Ubaldo Cella**

**The green aviation market is gaining strong momentum:**

- The sustainable aviation fuel (SAF) market is projected to grow from a few billion USD today to tens of billions, with CAGRs exceeding 30% in several forecasts.
- This rapid growth is driving the need for advanced simulation tools that help engineers optimize aerodynamics, structures and multidisciplinary designs.

**Why this matters forRBF Morph** - RBF mesh morphing enables fast geometry updates without remeshing, accelerating optimization loops for low-drag, fuel-efficient aircraft — a key enabler for sustainable aviation.

If your work touches on CFD, optimization, or cross-disciplinary simulation workflows for green aircraft design, this Springer volume provides both context and validation for why mesh morphing and flexible CAE tools are becoming indispensable.

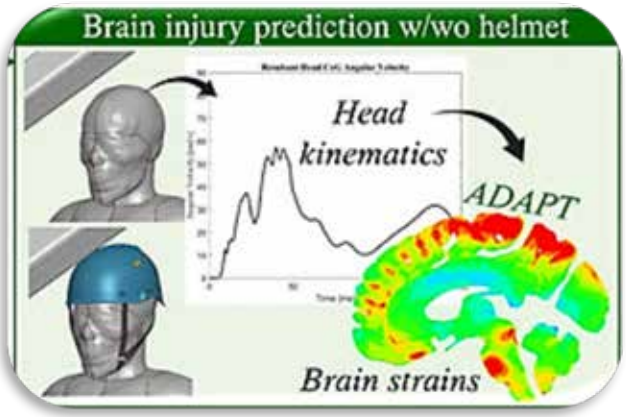
**About this book** - This book discusses the recent advances in aircraft design methodologies. It provides an overview of topics such as shape optimization, robust design and aeroelasticity, focusing on fluid-structure numerical methodologies to address static and dynamic aeroelastic problems. It demonstrates that the capability to evaluate the interaction between aerodynamics, inertia and elastic forces is important to avoid drag penalties, control system efficiency loss and generation of potentially dangerous phenomena, such as divergence, control reversal and flutter. The book particularly highlights the advances in "high fidelity" CFD-CSM coupling, describing the latest experimental research to validate the numerical fluid-structure interaction analysis methodologies resulting from the EU-funded RBF4AERO and RIBES projects.

- Gathers the work of researchers and engineers from several academic, industry and research institutions
- Intended for researchers and practitioners in the fields of aerospace engineering, aeronautics and mechanics
- Presents cutting-edge methodologies to couple multidisciplinary numerical environments

**Article Quote,** "**…All referred-to reconstructions were preprocessed in LS-PrePost v4.8 and simulated in LS-DYNA v13 using multiple CPUs.**

**Postprocessing was done in MATLAB v2021b**.

**3D Slicer v4.11 (open-source software available at www.slicer.org) was used for segmentation of medical images…"**




**Web - Springer - Can construction helmets save lives? Evidence from a biomechanical reconstruction of a work-related head trauma**

**Natalia Lindgren, Svein Kleiven & Xiaogai Li**

Division of Neuronic Engineering,
KTH Royal Inst. Tech., Sweden

**Abstract** - **Each year, 320 000 people die from occupational injuries. The construction sector is one of the most hazardous sectors, showing a high incidence of workplace fatalities, of which many are caused by traumatic head injuries. In this study, the efficiency of construction helmets has been investigated through an in-depth accident reconstruction of a real-world workplace head trauma, aiming to investigate causation, prevention and liabilities in an ongoing police investigation.** The accident was reconstructed with a state-of-the-art subject-specific head model, used to predict the skull fracture and the brain's response to impact. The results of this study show how the skull fracture pattern was predicted with striking resemblance to the real-world fracture and how the locations of high brain strains were predicted in accordance with the victim's brain lesions. The impact scenarios were compared with the hypothetical scenario in which a construction helmet was worn during the impact. The comparison provides evidence to support that a helmet would have prevented the skull fracture, and possibly also life-threatening brain injury. This case study demonstrates how FE reconstructions can help prove causality and liability in fatal head traumas. More importantly, the findings highlight the role of safety helmets in preventing lethal head injuries and their importance in combating the globally high incidence of fatal work-related accidents.

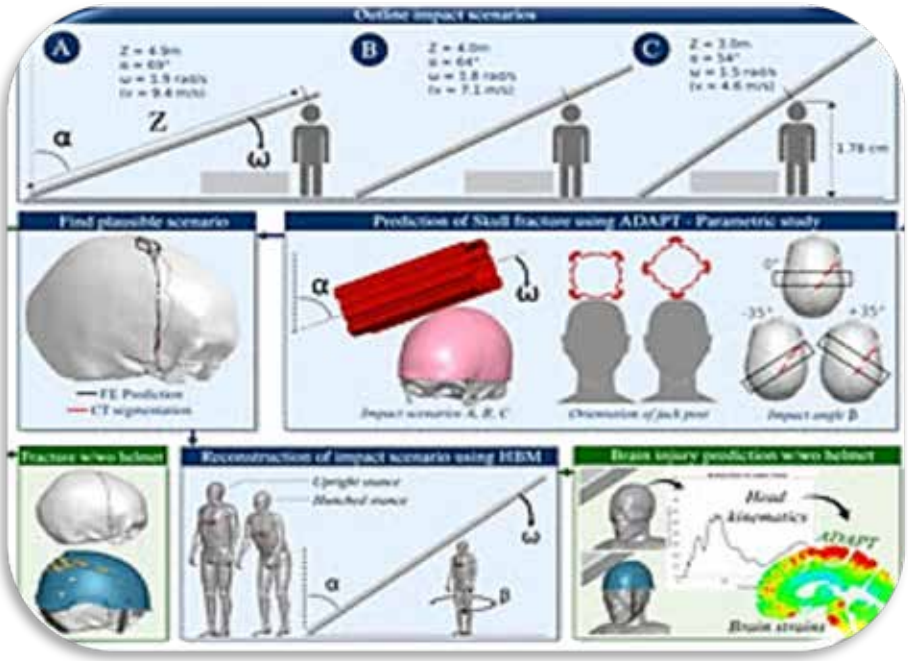
**Excerpts Introduction...A technique that has the potential to help in obtaining supporting evidence in accidents with a fatal or injurious outcome is Finite Element (FE) accident reconstructions**. Such reconstructions involve using computational simulations to recreate and analyze an accidental event on the basis of classical mechanical laws. In short, FE involves breaking down a geometrically complex body into smaller, simplified pieces, i.e. finite elements, collectively called a mesh. By solving a system of partial differential equations, one can subsequently calculate how each element, and by extension the whole system, deforms under load [10]. By creating FE models of the human body, or parts of it, the technique can be used to scrutinize human response to impact.

...The objective of the current study is to further exemplify how biomechanical FE reconstructions can be used to prove causation and liabilities in cases of fatal head traumas. This study will also be aimed at evaluating the ability of construction helmets to prevent skull fractures and brain injuries. In pursuit

of these aims, the current article is framed around a selected case of a real-world workplace fatality, in which a construction worker suffered lethal head injuries following trauma to the head at a construction site in Sweden. Since the victim was not wearing a helmet at the moment of impact, and was thus not taking the mandatory safety precautions, the question of liability arose during the police investigation: could the employer be held liable for criminal negligence causing death, while the victim failed to comply with the workplace safety regulations?

The current study endeavors to reconstruct the referred-to workplace accident numerically using state-of-the-art reconstruction technologies, in order to analyze the significance of the helmet in the impact situation. Understanding the role of a helmet in the injury outcome of this case might help to answer the arisen question of liability. The focus of the study is to first identify a plausible accident scenario, to thereafter compare it with the hypothetical scenario in which the victim had been wearing a helmet.

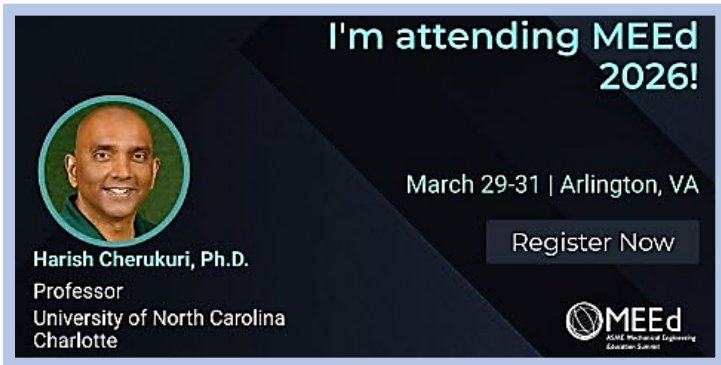
***FIGURE 3 Study overview. Firstly, three plausible impact scenarios (Scenario A, B and C) were outlined for further investigation. Secondly, a parametric study was performed using the subject-specific head model (ADAPT) until the fracture was predicted in agreement with the victim's medical images. Third, the head kinematics and brain deformations generated by the impact was studied with whole-body models (THUMS) positioned with two different postures. The final impact scenario was reconstructed both with and without a worn helmet for a comparative analysis***




**A schematic overview of the study approach is provided in Fig. 3. In the following sections, the reconstruction procedure will be described in detail starting with a description of the current accident case and any made inferences, followed by a presentation of the skull fracture and brain injury prediction approach. All referred-to reconstructions were preprocessed in LS-PrePost v4.8 and simulated in LS-DYNA v13 using multiple CPUs. Postprocessing was done in MATLAB v2021b. 3D Slicer v4.11 (open-source software available at www.slicer.org) was used for segmentation of medical images.**

**This section is in my capacity as the town's steward of information.**

I will highlight information relevant to the town, its residents, development departments, educational and municipal departments.




March 29–31, 2026
Exhibition: March 30-31, 2026

**Web - [ASME Mechanical Engineering Education Conference, In-Person Event]**

George Mason University, Mason Square Campus, Arlington, VA

**Harish Cherukuri, Prof., Mechanical Engineering & Engineering Science, UNC Charlotte**

"I'm excited to announce my participation in this year's MEEd 2026, ASME's only conference designed for mechanical engineering and engineering technology educators and leaders. You can find more about this great conference in Arlington, VA on the event website

The ASME Mechanical Engineering Education (MEEd) Summit, which launched in 1989, is the only conference specifically designed for mechanical engineering and engineering technology educators and leaders, from academia, industry, and government, that takes an in-depth look at the current and future challenges and opportunities impacting mechanical engineering education.

**Who Should Attend:**

Associate Chairs, Department Heads/Chairs, Program Directors & other ME/MET leaders

**Why Attend?**

- Exploration: Learn about current pain points and emerging trends in the engineering industry
- Curricular Currency: Evaluate whether your mechanical engineering and engineering technology curriculum is relevant, up-to-date, and meeting industry needs
- Networking: Meet with your peers from institutions and companies from across the country
- Peer-Led Solutions: Learn from other academic leaders who have successfully navigated challenges in student and faculty recruitment, modernizing facilities, broadening participation, and addressing mental health needs
- Strategic Partnerships: Explore opportunities to foster industry – university partnerships and collaborative relationships between 2- and 4-year institutions to enhance transfer-student experiences

**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.

**So, off we go to get the information on the Int'l LS-DYNA conference.**

## The International LS-DYNA Conference 2026

**It's time for you to submit your abstract by the April 30th, 2026 deadline.**

- **Who**? That means you to Get ready, Get set, GO and mark your calendar!
- **What**? The Int'l LS-DYNA Conference.
- **When**? October 13–14, 2026
- **Where**? Saint John's Resort, Plymouth, MI, US
- **Why**? Time to meet new people, catch up with friends and learn the newest in technology advances.

**Showcase your work in**: crash and occupant safety, impact and structural dynamics, electrification, software-defined vehicles, materials, AI-augmented CAE, NVH, or Multiphysics applications in automotive and transportation.

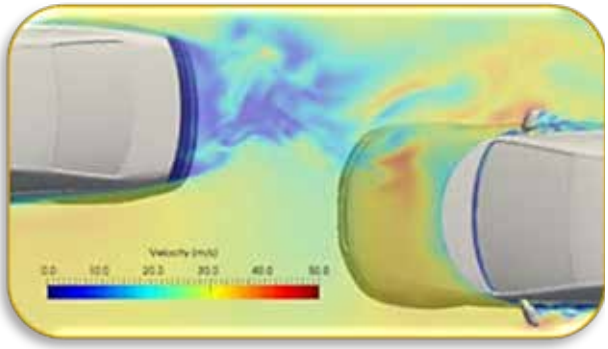
We all recognize that simulation plays a vital role in keeping pace with innovation and helping deliver safer, smarter mobility for ourselves, our friends, and our families. You don't want to miss this conference!

**This year the presentations will cover topics including**

- ADAS Sensors
- Artificial Intelligence (AI)
- Battery
- Blast/Impact Dynamics
- Crash
- Cybersecurity
- Damage/Failure
- Digital Twins / ROMs
- Electromagnetics
- Embedded Software
- Fluid Mechanics
- Forming
- FuSa/SOTIF
- Human Body Models
- IGA
- Joining Technologies
- Lighting
- Materials
- Model-based Systems Engineering
- Motor Development
- NVH/Implicit
- Optimization
- Pre- and Postprocessing
- Simulation methods
- Thermal Management
- Virtual ECU (vECU)

**Article**, "**Computational Fluid Dynamics (CFD) has been part of Ansys LS-DYNA's Multiphysics offering for more than 10 years**. If you are an LS-DYNA user who is curious to learn more, join me as I take a closer look at this capability and explore how it can be used to accelerate product design and development…"

**Excerpt - Web - Oaysis - Diving into Ansys LS-DYNA's Fluid Solvers - Simon Hart**



Ansys LS-DYNA is the leading solver for non-linear dynamic structural simulation, used by the global automotive industry for crash safety predictions. The explicit solver is the core foundation of the code; however, LS-DYNA offers much more: explicit and implicit solvers for thermal, acoustics, discrete elements, electromagnetics and fluid flow. All the solvers are coupled, making LS-DYNA truly a one-code multi-physics solver. In a previous article, I discussed how LS-DYNA's implicit solver can be used for static and frequency domain analysis. Using LS-DYNA's CFD capability is another example of how we can get more from the code.

Two fluid solvers are available in LS-DYNA; CESE* for compressible fluids and an incompressible fluid solver (ICFD). For many engineering applications such as external aerodynamics of a vehicle, or processes involving liquids like cooling or mould filling, the incompressible fluid solver is a good choice. By assuming the fluid is incompressible, the Navier Stokes equations can be simplified and solved to predict fluid velocities and pressures accurately for Mach numbers less than 0.3 (ref.). In this article I will focus on the incompressible solver.

**Conservation Element/Solution Element method -** There are many advantages to using the ICFD solver in Ansys LS-DYNA in addition to its multi-physics coupling, including:

- Automatic meshing of the fluid domain
- Full fluid / structure interaction
- Newtonian and non-Newtonian fluid models
- Steady-state and transient flow prediction
- Range of turbulence models including RANS and LES
- Free surface and multi-phase analysis
- No additional licence cost (subject to licence agreement)

Additionally, the ICFD solver is fully supported by the Oasys LS-DYNA Environment, including a dedicated set-up tool in Oasys PRIMER and specialised visualisation tools in D3PLOT, to guide the user at every step.

**Making Life Less of a Drag -** Some years ago in Arup, we investigated the ICFD solver for external aerodynamics. Using the DrivAer benchmark geometry, we were able to verify that Ansys LS-DYNA could predict values for drag coefficient (Cd) and pressure coefficient (Cp) that compared well with both experimental results and a reference CFD code (see figure below). Building on this validation, we used the ICFD solver to explore the aero-elastic response of exterior surfaces to impinging airflow, which can cause a "flutter" phenomenon.

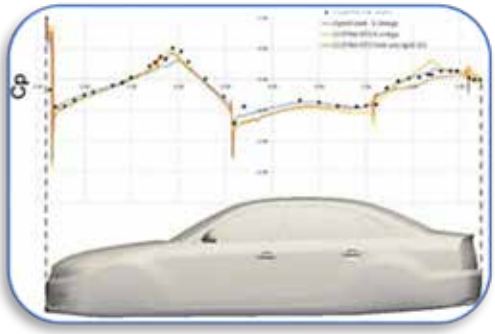



***Image source: Comparison of pressure profiles on centreline of DrivAer model***

Flutter is aero-elastic instability of an exterior surface, due to forcing from the airstream and flexibility of the surface causing visible oscillation. This undesirable condition may only be found at a late stage when vehicle prototypes are tested. Design changes to address the issues can therefore be costly and impact timing. Using simulation earlier in the design process can help to avoid this situation. They key enabler in the ICFD solver is its ability to couple the fluid flow solution with the structural solver, because it is the resonant structural response in tune with the fluid forcing that leads to flutter. A traditional CFD approach that does not include structural coupling may miss the phenomenon completely. Our work demonstrated the concept on simple bonnet and spoiler models, showing how LS-DYNA can offer deeper insight.

**Keeping Your Distance -** In another study, we investigated the effects of air flow over a vehicle "platoon". A platoon is a moving group of vehicles that are closely spaced, enabled by vehicle-to-vehicle communication and sensing. Platoons of vehicles may use less energy to move through the air and take up less space on the highway. Understanding the airflow over the platoon is critical for safety and energy efficiency. By modelling different platoon configurations in Ansys LS-DYNA, we could explore the effects, opening the door to further optimisation.

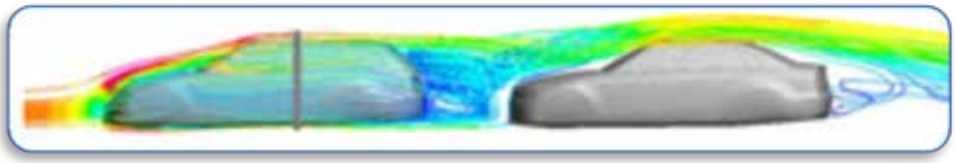


***Image source: Velocity streamlines plotted in Oasys D3PLOT, over two closely spaced vehicles***

The study showed how results from the ICFD solver could provide insight into the complex interaction of vehicle spacing and body shape (see figure above). An additional next step with the ICFD solver could be the prediction of structural response to the platoon effects, e.g. buffeting from the close spacing of the vehicles. Both papers provided verification that the ICFD solver is a viable tool for external aerodynamics with attractive benefits, for example, rapid model generation using automated fluid domain meshing and structural interaction.

**Keeping Cool When Things Heat Up -** Since this work, Battery Electric Vehicles (BEVs) have gained significant market share, driven by the UK's 2035 zero-emission target. Our services have expanded in response; beyond structural safety and durability we now support clients in battery system development using Ansys LS-DYNA. Its most direct application is in simulating structural tests required by safety standards: shock, crush, vibration, and fatigue. But LS-DYNA also enables thermal analysis, battery cooling design via the ICFD solver, and exploration of thermal runaway.

Cooling is critical in large battery packs, typically achieved with a closed-loop liquid system that extracts heat from cells and dissipates it through exchangers. The cooling plate, often a thin embedded layer, must be carefully shaped to ensure uniform coverage and avoid hotspots that impair cell performance

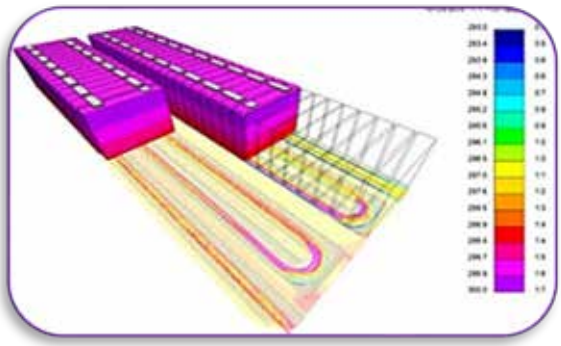
Simulation helps optimise geometry, flow distribution, and thermal efficiency under peak loads.

**LS-DYNA's coupled electromagnetic, structural, thermal, and ICFD solvers can model the physics of battery cooling**. Randles Circuits simulate cell electrochemistry, linking current flow to external load and internal resistance. This generates ohmic heating, which is conducted into the cooling plate and transferred to the fluid via conjugate heat exchange.

**The Oasys LS-DYNA Environment features new tools to aid in the preparation of battery models. Oasys PRIMER's Battery Set-Up Tool enables quick definition of Randles Circuit parameters, cell arrays and a choice of busbar configurations.**

In the example shown below, two cell stacks are bonded to a cooling plate with thermal adhesive. Heat from the cells is conducted into the cooling plate and passed to the fluid via conjugate heat transfer. In this model, the fluid flow is solved as a steady state before coupling with the thermal solver, based on the assumption that the flow dynamics are unaffected by thermal loading. In this example, simultaneous plotting of fluid velocity and temperature was realised in Oasys D3PLOT.

***Image source: Ansys LS-DYNA coupled ICFD-Thermal analysis of battery cells & cooling plate***



Fluid flow analysis is also crucial for simulation of thermal events. Thermal runaway is a complex process involving rapid breakdown of cell components at high temperatures, generating gas. Cells and enclosures are vented to avoid pressure buildup, but hot gases can travel through the pack, interacting mechanically and thermally with surrounding structures. This may cause distortion or failure of sealed areas, compromising venting. If heat spreads to adjacent cells, they may runaway and vent, escalating into full pack runaway.

Research by Ansys into gas generation and venting includes the Continuum-based Particle Gas method. When combined with Randles circuit modelling, LS-DYNA offers a robust framework for simulating thermal runaway scenarios.

**Going with Flow -** Aluminium castings play a growing role in lightweight BEV body structures, where optimising stiffness, durability, crashworthiness and mass is critical. Yet castings often show non-uniform mechanical properties, making it essential to represent their geometric variation in crash simulations.

Much of this variation stems from the casting process itself; cooling rates, turbulence, and shrinkage all influence final properties. By simulating the process, it is possible to predict property distribution and refine casting configurations such as runner and gate positions. Can we use Ansys LS-DYNA's ICFD solver to simulate casting processes? To investigate this question, we replicated a benchmark test from the University of Birmingham. In this test, a simple rectangular mould was filled with a gravity feed, using a bottom-gated runner and tall sprue designed to induce turbulence. During the test, X-ray film captured mould filling, allowing direct comparison with LS-DYNA's results.

The results were very encouraging; LS-DYNA could correctly reproduce the key results from the test:

- Correct time to fill the mould (2 seconds)
- Correct direction and size of the fountain from gate into mould
- Accurate resolution of fluid dynamics at the junction of sprue and runner

**CONTINUE INFORMATION & THE VIDEO ON THE WEBSITE**

OzenCon - Don't miss our conference on March 10th

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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**

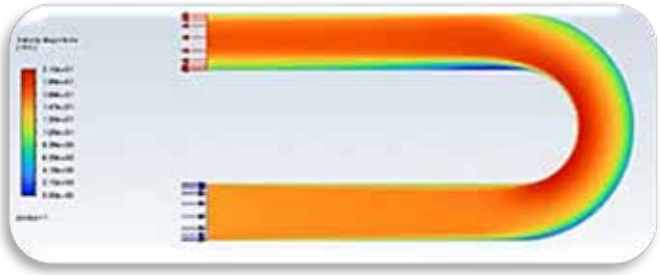
**1401 N. Shoreline Blvd.,**

**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 how to do Adjoint Solver Optimization?

**Ke**, “No clue, how to do that! We better call Mike at Ozen.
He knows where to find the answers.”



**Web – Excerpts – Ozen - Using Adjoint Solver in Ansys Fluent for CFD Design Optimization**
**Mohsen Seraj**

**For graphics visit the website for clarity**

**Adjoint Solver Optimization in Industrial CFD Workflows** - Engineers using the adjoint solver in Ansys Fluent should begin with a high-quality mesh, a validated baseline CFD solution, and clear objective functions and constraints

They then apply Fluent’s shape morphing, automation, and sensitivity analyses to iterate quickly, identify key design drivers, and validate results with engineering judgment and experimental data to get robust, manufacturable designs.

In mining, energy, and heavy equipment, embedding this adjoint workflow in existing simulation processes speeds design iteration, cuts physical prototyping costs, and delivers products optimized for real operating conditions while supporting collaboration, compliance, reliability, and operational performance.

**Engineering Design Iteration Challenges** - Engineering design is inherently iterative. Achieving demanding performance, efficiency, and reliability targets requires continual refinement. Engineers are often tasked with optimizing complex geometries and flow environments, where even small shape modifications can deliver substantial gains—or introduce unexpected performance issues.

Traditional design workflows rely heavily on manual modifications and time-consuming CFD simulations, often leading to extended development timelines and increased resource consumption. The need for rapid, data-driven design changes without excessive computational overhead is a persistent challenge in industrial engineering environments.

By computing gradients for all design variables in a single solve, the adjoint method accelerates the optimization loop, provides clear guidance on which geometric changes matter most, and enables engineers to converge on superior designs with less trial and error. This approach is especially beneficial in industry applications, where reducing development cycles can significantly impact time-to-market and operational efficiency.

**Adjoint Solver in Ansys Fluent**

**These are the main steps for the gradient-based optimization in Fluent**

- Flow Setup
- The adjoint solver
- Optimize the design
- Design iterations

**Flow Setup** - We first need to set up the primary CFD simulation by establishing geometry, mesh, boundary conditions, and solving for the initial flow solution.

**The adjoint solver -** The adjoint problem is solved to calculate the sensitivity (gradient) of the objectives and determine where in the domain we need the design change (shape change). The steps for setting up the adoint solver in Fluent are listed below:

- Define an observable
- Gradient-based numerics setup
- Adjoint calculation
- Gradient-based post-processing

**Optimize the Design** - We used the Design Tool in Fluent to perform the design optimization.

- Define the optimization objective: the objective function is called observables, such as reducing pressure drop, minimizing energy loss, and reducing drag force
- Specify the region for shape modification: choose where the design is allowed to change and impose geometric constraints where the shape change is not allowed. You can define region design conditions, such as control points to control shape changes in that region
- Calculate the design change and evaluate the adjoint results

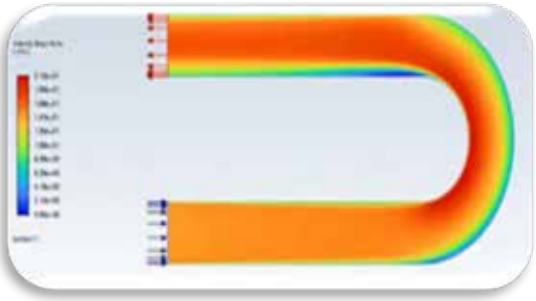
**Design Iterations** - Fluent has a gradient-based Optimizer tool that automates the design-iteration process for shape optimization, allowing us to achieve a specified target objective without manually repeating each step for every design iteration.

Fluent's integrated workflow enables direct geometry modification based on these sensitivities, allowing engineers to iteratively morph the shape to meet target performance—without exporting to separate CAD or CFD tools. Final validation is then performed by running a full CFD solution on the optimized configuration, confirming the performance gains before committing to physical prototyping or production.

**Optimizing a U-Bend Pipe to Reduce Pressure Drop -** The gradient-based optimization and adjoint solver are used to modify the bend pipe shape for a reduction in pressure drop along the pipe from inlet to outlet. These three videos demonstrate the workflow

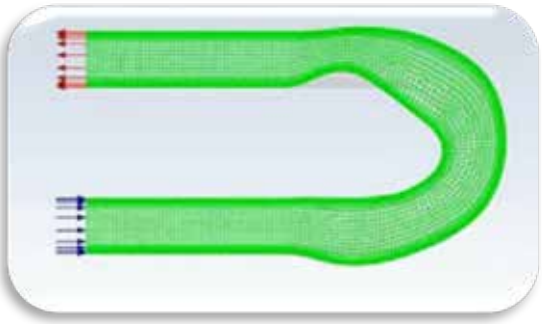
**YouTube Videos**

Video Part 1:



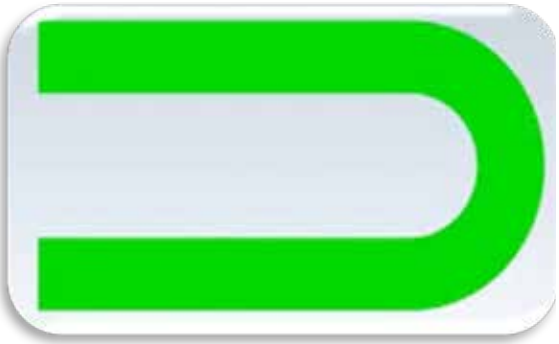
**Ansys Fluent Gradient-Based Optimization: Adjoint Solver – Part 1** - This is the first video in a series on using the adjoint solver in Ansys Fluent to perform gradient-based optimization of a U-bend pipe. The goal is to improve the pipe shape to reduce the pressure drop between the inlet and outlet. In this part, we demonstrate how to set up the adjoint solver in Fluent and how to interpret the results to identify where in the domain the geometry should be changed to achieve the desired pressure drop through gradient-based optimization in Fluent.

Video Part 2:



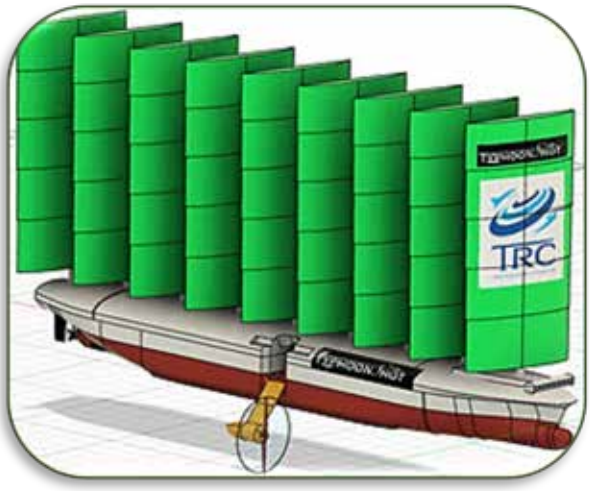
**Ansys Fluent Gradient-Based Optimization: Adjoint Solver – Part 2** - This is the second video in our series on the adjoint solver in Ansys Fluent for a U-bend pipe. In this video, we will guide you through the process of setting up an optimization for a specific objective using the adjoint solver. We will also show you how to use the Design Tool in Fluent to calculate the necessary adjustments to the mesh in a specified region along the bend (mesh morphing), as well as implement the pipe design changes to reduce the pressure drop by a targeted amount.

Video Part 3:



**Ansys Fluent Gradient-Based Optimization: Adjoint Solver – Part 3** - In the third part of our series on using the adjoint solver in Ansys Fluent for a U-bend pipe, we demonstrate how to set up and run the gradient-based Optimizer tool in Fluent. This tool automates the design-iteration process for pipe shape modification, allowing you to achieve a specified pressure-drop target without having to manually repeat each step for every design iteration.

**Quote**, “Fang et al. [6] proposed a dual rigid wing-sail configuration with different cross-sectional profiles (NACA 0020 for the mainsail and NACA 0016 for the trailing sail) and **used CFD simulations in ANSYS Fluent to investigate the effects of geometric ratios and spacing.** The results demonstrated a 37.1% increase in peak lift coefficient compared to conventional soft sails.“




***The WPG Ship***

**Web – MDPI - Integrated Sail–Hull–Turbine Assessment for Wind Power Generation Ship Using Experiment and CFD**

**N. Trang, T. Mitsuyuki, Y. Hirakawa,
T. Pham-Truong, S. Yokota**

Typhoon Sci. & Tech. Research Ctr., Yokohama Nat’lUniv., Japan
Faculty of Transportation Mech. Engin., Univ. of Sci. & Technology—The Univ of Danang, Vietnam
Faculty of Engineering, Yokohama National University, Japan
Interfaculty Grad. School of Innovative & Practical Studies, Yokohama Nat’l Univ., Japan

**Abstract** - **Wind power generation ships (WPG ships), which combine rigid sails for propulsion and underwater turbines for onboard power generation, have attracted increasing attention as a promising concept for utilizing renewable energy at sea. This study presents an integrated assessment of a WPG ship by combining towing-tank experiments, CFD simulations using ANSYS Fluent, and theoretical analysis to evaluate the coupled performance of sails, hull, and underwater turbines.**

First, sail thrust and bare-hull resistance were quantified to identify the effective operating-speed range under Beaufort 6–8 wind conditions, and the optimal number of rigid sails was determined. Based on a thrust–resistance balance at a representative rated operating point, two turbine configurations (two and four turbines) were preliminarily sized. The results show that ten rigid sails can provide near-maximum thrust without excessive aerodynamic interference, and the installation of turbines significantly reduces the feasible operating range compared to the bare-hull case. For the two-turbine configuration, a common effective ship-speed range of 6.58–8.0 m/s is obtained, whereas the four-turbine configuration is restricted to 6.58–7.44 m/s due to wake losses, additional appendage drag, and near-free-surface effects. The four-turbine configuration exhibits approximately 30% lower total power output than the two-turbine configuration. These findings demonstrate that an integrated, system-level evaluation is essential for WPG ship design and indicate that the two-turbine configuration offers a more favorable balance between power generation capability and operational flexibility….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**Information, Companies, Videos Not To Miss**

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***And coffee and popcorn are free***

## Web – YouTube – DYNAmore, HANS

**Pole Vaulting with Hans - The New Human Body Model | How Simulation Can Improve Safety & Performance**

How can a slight change in a pole vaulter's technique impact their chance of injury? With the help of Hans - The new human body model, and our friends at Manchester Metropolitan University, we simulated multiple landing techniques to understand the impact that different landings can have on an athlete's body.

Hans takes on the challenge of jumping the world record height, over 20 feet, to demonstrate the forces at play during different landing scenarios. We first analyze a perfect textbook landing, showing how proper technique minimizes impact on the spine.

Then, we simulate more problematic landings, including falls on the backside and neck, to highlight the increased risk of injury when the landing position varies. This comparative analysis underscores the importance of proper landing techniques in pole vaulting to ensure athlete safety and performance.

Engineering simulations like these not only help athletes and coaches understand the mechanics of safe landings but also guide the development of better safety practices. Stay tuned to learn how these insights can make pole vaulting safer and more efficient!

FEANTM Train Station

**This study utilises the LS-DYNA software to simulate the ballasted tracks and their standard gauge components50**. The UIC60 rails and sleepers are modelled as beam elements to capture shear and bending deformations, defined using the SECTION_BEAM and MAT_ELASTIC specifications. The rails are further enhanced by the MAT_ADD_THERMAL_EXPANSION property to account for thermal effects…

**Web - Nature - Nonlinear buckling analysis of curved railway tracks considering unbalanced cant and train speed**

**Pimsuda Chuadchim, Chayut Ngamkhanong, Peyman Aela, Guoqing Jing, Sakdirat Kaewunruen**

- Advanced Railway Infrastructure, Innovation and Systems Engineering (ARIISE) Research Unit, Dept. Civil Engineering, Faculty of Engineering, Chulalongkorn University, Thailand
- Department of Building and Real Estate, Hong Kong Polytechnic University, Hong Kong
- School of Civil Engineering, Beijing Jiaotong University, China
- Dept.Civil Engineering, School of Engineering, University of Birmingham, UK

Abstract - Elevated rail temperatures can induce axial compressive stresses in continuous welded rail (CWR). If the rail temperature exceeds critical limits, it leads to track instability and an increased risk of derailments. The focus on curved tracks is critical, as these are particularly susceptible to buckling under high temperatures. When trains approach these curves, additional multidirectional forces are introduced, exacerbating instability risks. This study investigates the nonlinear buckling behavior of curved railway tracks under elevated temperature, focusing on the combined effects of the cant and varying train speeds. Unbalanced train speed refers to the situation where a train travels at a speed that is either too fast or too slow for the design of the track's radius and cant. Such speeds introduce lateral forces that can compromise track stability. It can increase the risk of lateral displacement, especially when combined with increased temperature. These forces can result in complex, nonlinear buckling behavior, which remains insufficiently understood. **To analyse these risks, we conducted a buckling temperature analysis using nonlinear three-dimensional finite element method (FEM), specifically tailored to curved railway tracks.** Track variables such as radius, lateral resistance, cant, and initial misalignment were incorporated to comprehensively understand the thermal challenges faced. The results highlight the critical temperature thresholds at which buckling is most likely to occur and provide insights into how the temperature and train speed exacerbates track instability. These findings provide valuable guidelines for the design, maintenance, and train speed adjustments on curved tracks, enhancing safety and performance under extreme conditions.


**Library**
**Roberto Montañez**
**Contact me on LinkedIn to share your thoughts**

**Roberto Montañez, D.Eng**., Sr. Staff Mechanical Engineer Northrop Grumman, Adjunct Faculty at Johns Hopkins University, Expert in Thermal Design, Electronics Cooling & Engineering Management`”

**In this article, I share my perspective on how engineers should approach AI: not as a replacement for judgment, but as a tool that must be grounded in fundamentals, interpretation, and critical thinking, just as we've done for decades with engineering analysis tools.**

***Finite Element Analysis (FEA) visualization illustrating stress and temperature distribution in an engineering model. Created on Chat GPT.***

## From FEA to AI: Tools don't think, Engineers Do

Every major technological shift follows a familiar cycle: excitement, fear, overconfidence, and eventually adaptation.

Artificial intelligence is no exception. While AI dominates headlines and boardroom conversations, many organizations are rushing to adopt it without fully understanding its strengths, limitations, or risks.

The hesitation we see today isn't about the technology itself, it's about the fear of misusing something we don't yet fully understand.

Like any engineering tool, AI comes with a learning curve. Its value depends not only on knowing how to use it, but on understanding how to interpret what it produces.
or more than 50 years, engineers have relied on tools like Finite Element Analysis (FEA) and Finite Volume Analysis to solve complex, physics-based problems. Yet even today, many engineers struggle to determine whether simulation results are reasonable or physically meaningful. When an analysis shows a design will fail, the tool doesn't tell you why, the engineer must.

**This is where the strongest parallel between FEA and AI emerges.**

**Advanced tools help us stay competitive. Judgment gives us the advantage.**

When reviewing a thermal analysis, I often recommend starting with the heat path: identifying temperature differentials across materials, interfaces, and fluids. This simple exercise quickly reveals whether results obey the fundamental laws of heat transfer, and where design attention is truly needed.

AI requires the same discipline. Outputs should never be accepted blindly. Benchmark questions, sanity checks, and first principles thinking remain essential.

There's a common concern that AI will make us "dumber." I would argue the opposite. When critical thinking is actively cultivated, AI becomes a force multiplier, handling repetitive tasks while freeing engineers to focus on creativity, judgment, and high-impact decisions

**Tools don't think. Engineers do.**

AI is often compared to a disruptive force, but to me, it feels very familiar.

**For decades, engineers have relied on tools like FEA to solve complex problems. The real value never came from the software itself, but from understanding the physics, questioning the results, and knowing what to do next.**

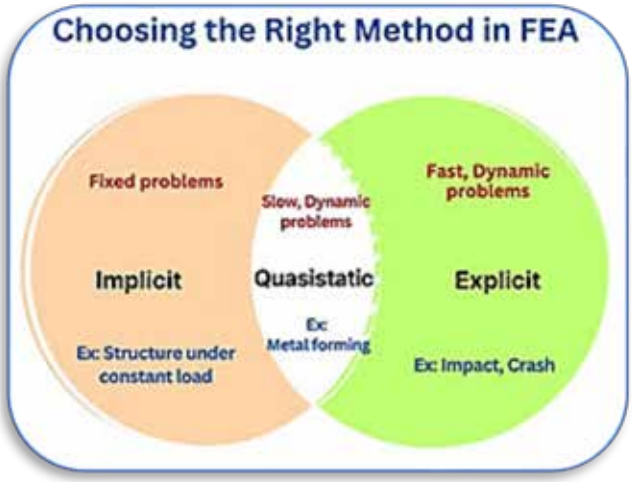
**AI is no different.**

**Used thoughtfully, it's a powerful force multiplier.**

**Used blindly, it's just another black box.**

**The future belongs to engineers who master fundamentals, apply judgment, and treat AI as an extension of their expertise, not a shortcut around it.**

**The beauty of FEA lies not just in its capabilities but in the art of choosing the right method for the right job.**




**Web – MyPhysicsCafe**

**CAE Compass: Edition #12**

**The Art of Choosing the Right Analysis Methods**

Starting out with CAE analysis is like having a virtual toolkit to explore the behavior of structures under different scenarios. In this edition, we're diving into the dynamic trio of analysis methods: Explicit, Implicit, and Quasi-Static.

Each method has its strengths, and picking the right one helps in getting accurate and meaningful results. The basic approach is to choose a particular method based on the nature of problem.

**Explicit Method:**

- When to Use: Use the Explicit method when you are dealing with dynamic events that happen quickly, like a car crash or an impact event.
- Imagine you're simulating a car crash**. The explicit method is like capturing the exact moment of impact,** considering how the forces and deformations change very rapidly. It's like taking snapshots of the situation at every tiny moment to understand the quick and sudden changes.

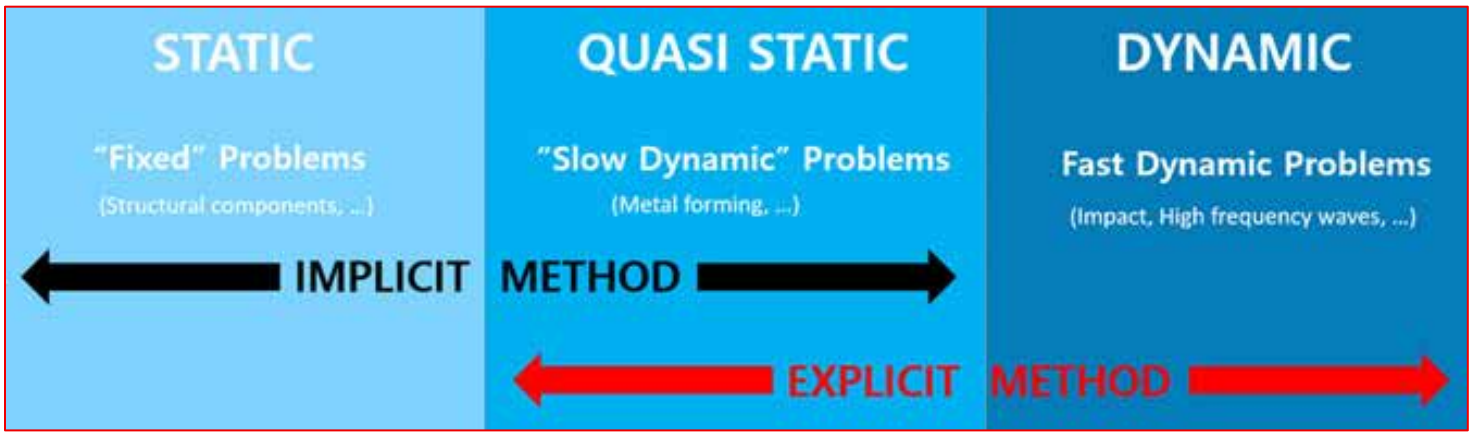
**Implicit Method:**

- When to Use: Use the Implicit method for problems where the changes occur slowly or steadily, like a gradual application of a load over time.
- If you are simulating a structure under a constant load, like a heavy weight being placed on a bridge, **the implicit method is like considering how the structure responds at each step of the process**. It's more about looking at the overall behavior over time rather than focusing on each individual moment.

**Quasi-Static Method:**

- When to Use: Use the Quasi-Static method when the dynamic effects are there, but they are not the primary concern. This method is often employed for problems that have both fast and slow-changing aspects.
- Think of a suspension bridge. When a heavy truck crosses, there's a dynamic effect (quick movement), but overall, the bridge responds relatively slowly. **The quasi-static method is like a balanced approach, considering both the quick and slow aspects** to get a more realistic simulation.

**The below image will give you a brief idea & help overcome any confusion while choosing the right method.**




**In short, if things are changing rapidly, go explicit. If changes are slow and steady, go implicit. For problems with a mix of both, consider the quasi-static approach.**

## If You're Not in Engineering, Skip This.

**Did you know?**

- 30–55% of engineering software licenses sit unused — burning $100K+ every year.
- Large firms waste $2.5M+ annually on CAD, BIM & simulation tools.
- Even mid-sized companies bleed $250–300 per engineer, per year in software waste.
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**Mr. Jithesh Erancheri**
**Country Head – Technical**
**Kaizenat Technologies Pvt. Ltd**


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"At RBF Morph, we continue to advance PANDORA (Pre-operative Assistant Based on Data-Driven Approaches for Vascular Grafts Surgery), a business experiment financed by Fortissimo Plus, focused on patient-specific digital twins of the aorta for next-generation cardiovascular surgical planning."

**Web – FFPLUS - Project Update**

**PANDORA is progressing**

By combining AI-driven medical image analysis with high-fidelity in-silico simulations, PANDORA enables surgeons to virtually evaluate grafts and operative strategies before surgery, reducing the risk of graft kinking, abnormal wall stresses, and post-operative complications

Coordinated by Forbes Top Under 30 scientist Dr Leonardo Geronzi, the project brings together a strong Italian–French consortium. LivGemini plays a key role in software industrialisation and platform integration, ensuring that research results can evolve into deployable clinical solutions.

RBF Morph contributes advanced mesh-morphing algorithms supporting AI training and simulation workflows, while Université de Rennes I extracts 3D anatomical models from clinical imaging, INSA Lyon - Institut National des Sciences Appliquées de Lyon performs material testing on Dacron grafts, and Rennes University Hospital validates the platform in real clinical scenarios.

Developed under the FFplus umbrella, PANDORA aims to shift surgical planning from experience-based practice to a data-driven, predictive approach, laying the groundwork for clinically validated decision-support tools ready for hospital IT ecosystems.

FFplus is a European initiative highlighting and promoting the adoption of High-Performance Computing (HPC) by SMEs and start-ups across Europe. The scope of the targeted actions includes both the solution of business challenges through computational methods on HPC systems and the use of supercomputing resources for the development of (generative) Artificial Intelligence (AI) software solutions and services. The computational methods encompass a large range of possibilities: modelling and simulation, data analytics, machine learning, and AI – all options empowering SMEs through enhanced innovation and competitiveness. The strategic objective of using supercomputers for generative AI is to facilitate and strengthen the technological development of European SMEs in that important area.

**Article, "Explicit dynamic analysis was performed using LS-DYNA (v.971).** Translational degrees of freedom at the skull base were constrained to replicate experimental support. Bone tissue failure was simulated with MAT_EROSION, elements were eroded when maximum principal stress reached 98 MPa or principal strain exceeded 0.02."

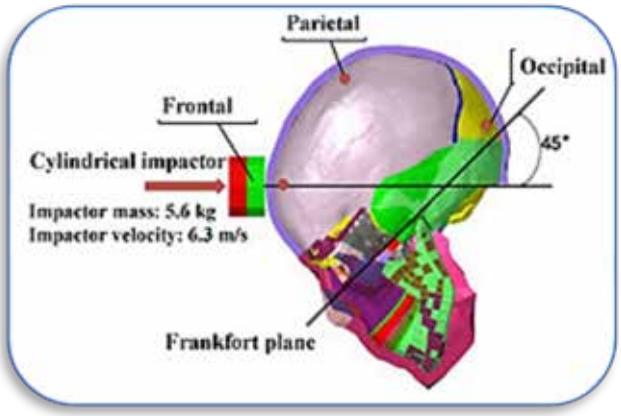


***Figure 4. Finite element simulation setup for skull strike based on Nahum et al.'s cadaver experiment***

**Web – MDPI - Biomechanical Investigation of Head Injuries Caused by Baseball Bat Strikes with Different Bat Sizes and Velocities: A Finite Element Simulation Study**

**H. Zhang, J. Yang, L. Guo, J. Sun, S. Li, W. Hao**

- Research Ctr for Sports Psychology & Biomechanics, China Institute of Sport Science, China
- School of Exercise and Health, Shanghai University of Sport, China

**Abstract - Objective: Traumatic brain injury (TBI) represents a significant clinical problem, with the biomechanical mechanisms of striking from different blunt instruments remaining unclear. This study aims to quantitatively evaluate TBI severity under blunt strikes and to assess the effects of strike velocity and blunt instrument size on biomechanical responses to provide a finite element approach for investigating injury mechanisms and informing clinical diagnosis**. Methods: A head finite element model incorporating an outer cortical-cancellous-inner cortical bone structure was developed and verified against a previous cadaveric impact study. Strike velocities and blunt instrument parameters, obtained from experiments in which a long bat (LB) and a short bat (SB) were used to strike a dummy head, were applied as the loading conditions in the finite element simulation. Kinetic energy (KE), internal energy (IE), impact force, von Mises stress on skull, intracranial pressure (ICP), and Head3ms acceleration were analyzed as indicators of injury severity. Results: Simulated force and ICP responses agreed with cadaveric experimental data within a 9.8% error. With increasing strike velocity (10–30 m/s), KE, IE, impact force, ICP, and Head3ms all rose, while von Mises stress evolved from localized to dispersed distribution. Head3ms reached an injury threshold of 80 g at a strike velocity of 10 m/s, and ICP peaks for LB and SB exceeded the brain injury threshold (235 kPa, ≈1760 mmHg) at 12 m/s and 14 m/s, respectively. At the same velocity, LB generated higher KE, IE, impact force, ICP and Head3ms than SB. At 30 m/s, LB generated 390 J KE and 29.0 kN peak force, which were 50.0% and 11.1% higher than those of SB (260 J, 26.1 kN). Conclusion: This study reveals that increasing strike velocity and employing a larger blunt instrument elevate biomechanical responses, resulting in von Mises stress transitioning from localized concentration to multipolar dispersion.

Specifically, when striking the head with the LB at velocities exceeding 12 m/s or with the SB exceeding 14 m/s, the impacts indicate a severely life-threatening level. These findings deepen our understanding of the mechanisms of blunt TBI. The constructed and validated finite element model can be repeatedly used for computer simulations of TBI under various blunt striking conditions, providing a scientific basis for clinical diagnosis and surgical planning.

**1. Introduction** - Closed-head injuries caused by blunt strikes are among the most frequent causes of traumatic brain injury (TBI) in violent assaults, contact sports, and traffic accidents [1]. According to the U.S. Centers for Disease Control and Prevention (CDC), more than 580 TBI related hospitalizations and 190 deaths occur daily [2], imposing a substantial burden on patients' quality of life (QoL) and healthcare systems. The craniocerebral region's complex anatomy and fragile tissues mean that even moderate external forces can cause irreversible damage, including intracranial hemorrhage, parenchymal injury, and skull fracture [3,4]. These outcomes are central concerns in both neurosurgery and forensic biomechanics....

Explicit dynamic analysis was performed using LS-DYNA (v.971). Translational degrees of freedom at the skull base were constrained to replicate experimental support. Bone tissue failure was simulated with MAT_EROSION, elements were eroded when maximum principal stress reached 98 MPa or principal strain exceeded 0.02. Computational stability was ensured via mass scaling (CONTROL_TIMESTEP) and energy conservation control (*DATABASE_ENERGY). Response data were extracted using *DATABASE_HISTORY_NODE and *DATABASE_BINARY_D3PLOT.
Post-processing was performed in LS-PrePost to acquire key biomechanical metrics (stress distribution, kinetic energy evolution, strike load). ICP ≥ 235 kPa was set as the high-risk brain injury threshold [12].

**2.3. Model Validation -** The FEM validation was conducted under conditions consistent with Nahum et al.'s [11] cadaver experiment (Expt. 37). A 5.6 kg impactor struck the skull at 6.3 m/s at a 45° angle to the Frankfort plane, targeting the frontal region. The skull model remained stationary prior to strike and was configured in an unconstrained free state. The three intracranial monitoring points (frontal, parietal, occipital), measured ICP-time curves and frontal impact force-time curves for experimental-simulation comparison are shown in Figure 4.

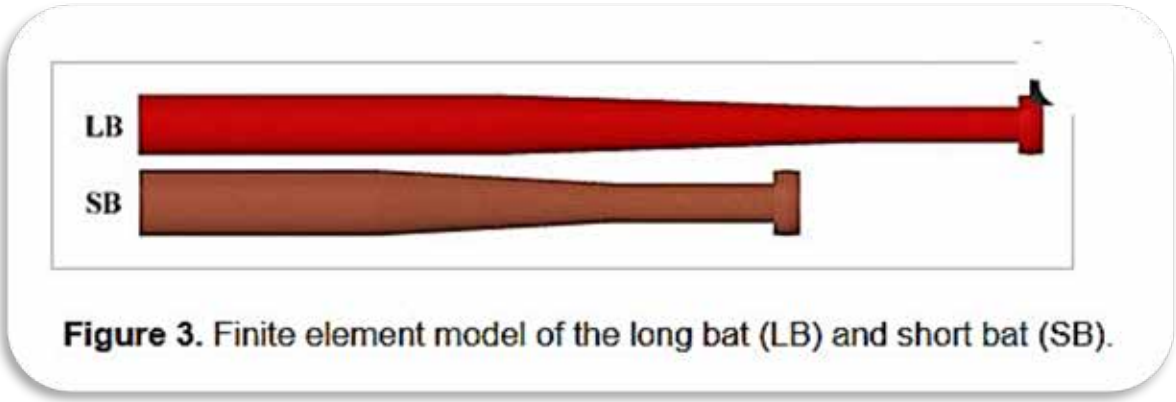


**Figure 3.** Finite element model of the long bat (LB) and short bat (SB).

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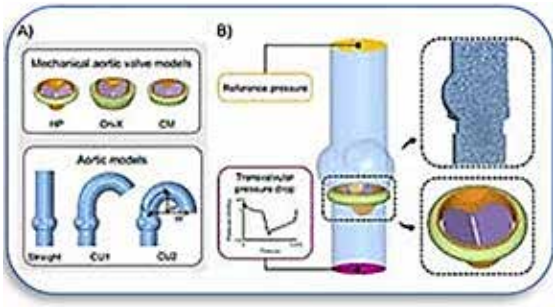
**The authors listed note that the "Simulations of the two-way interaction between MHV leaflets and blood were conducted by coupling LS-DYNA ICFD and structural implicit finite element solvers" Additionally, "The authors acknowledge Alberto Morena, Professor Lorenzo Peroni and Professor Alessandro Scattina (Politecnico di Torino, Italy) for their support with the**




**Web – IOP Science - A fluid–structure interaction framework for mechanical aortic valves: analyzing the effects of valve design and aortic curvature on hemodynamics**

**M. Arminio, D. Carbonaro, V. Mazzi, K. Calò, R. Paz, F. Del Pin, D. Gallo, U. Morbiducci and C. Chiastra**

- Polito Med Lab, Dept of Mechanical and Aerospace Engineering, Politecnico di Torino, Italy
- ANSYS Inc., United States of America
- IMIT, CONICET, National Council for Scientific and Technical Research, Argentina

**Abstract** - Aortic mechanical heart valves (MHVs) have been implanted for decades to treat aortic valve disease and remain a viable option when valve durability is prioritized. However, the non-physiological hemodynamics induced by MHVs may lead to adverse clinical outcomes. Fluid–structure interaction (FSI) simulations enable the analysis of the biomechanical interaction between MHVs and blood flow. This study presents a strongly coupled, boundary-fitted FSI framework for aortic MHVs, used to assess the impact of MHV design and aortic curvature on hemodynamics. Nine simulation scenarios were investigated, considering three commercially available MHVs and three idealized aortic geometries (one straight and two curved models). Overall, the framework proved to provide results for flow-rate waveforms, velocity fields, and leaflet kinematics aligning well with previous experimental and computational studies. The framework highlighted that: (i) MHV design influences velocity fields and large-scale vorticity transport in the aorta, with systolic differences among the three devices of up to 41% and 133% in average swirling strength and stretching, respectively; (ii) the straight aortic model underestimates systolic swirling strength (up to 56%) and stretching (up to 91%) compared to curved models. This FSI framework can support MHV development by analyzing different device designs and anatomical scenarios.

**2.6. Solver set-up** - **Simulations of the two-way interaction between MHV leaflets and blood were conducted by coupling LS-DYNA ICFD and structural implicit finite element solvers**. Technically, the governing equations of fluid motion were approximated with a boundary-fitted method—arbitrary Lagrangian-Eulerian approach, which effectively manages high mesh deformations and accurately represents the pressure discontinuity between aortic and ventricular sides (Oliveira et al 2024). The variational multiscale (VMS) method combined with the orthogonal subgrid stabilization (OSS) technique was used to prevent numerical instabilities (Codina et al 2004, Bazilevs et al 2007). A strong coupling between the fluid and structural domains was adopted, thereby ensuring results convergence at the fluid–structure interface (Oliveira et al 2024).

**Quotes from the website and YouTube Video, Paper Football Touches Down on Ford, Lincoln Digital Experience**

**T.C. Wingrove**

It's been over 30 years since I last played paper football in a classroom, but who doesn't remember those "good old days"?

Whether you were the one carefully folding a piece of notebook paper into a perfect "football" or just watching a friend, that satisfying flick across the desk, aiming for the goalposts, often ended with a teacher's stern, "Put it away!" I can still hear those words now, but guess what? They can't stop us anymore!

**Retro Gaming with Arcade Sports Collection from Ford** - Do you love the classic nostalgia of arcade games from the '80s and '90s? The Ford-exclusive in-vehicle gaming app, Arcade Sports Collection, is a series of retro sports-themed games that use your smartphone as the controller. While parked, you can compete with up to three other people in your vehicle or go for a new high score in one of the single player modes.

**The Arcade Sports Collection is available now for vehicles with the Ford Digital Experience.**

Ford - Get ready to relive this classic classroom pastime, because paper football is officially kicking off right from your in-vehicle screen! It's the latest addition to our Ford-exclusive gaming app, the Arcade Sports Collection. This app is all about bringing you a growing selection of easy, retro-inspired games designed for quick, fun sessions in your vehicle while parked, using your smartphone as the controller.

We launched the app earlier this year with beloved games like shuffleboard and button soccer. Our goal was to evoke a sense of nostalgia, whether it brought back memories of '80s and '90s arcades or even just those simple classroom games. Now, with paper football joining the lineup, we feel our collection offers a great blend of quick, engaging fun.

Article, "…When STEM Racing began, the goal was simple: bring engineering to life. Today, it has grown into something far bigger - a global movement that creates opportunities, levels playing fields, and enables dreams to become reality….Our redesigned website brings together everything you need to know about STEM

…Whether you're a student competing, a teacher leading a classroom, or a volunteer looking to support, finding key information and helpful resources is now simpler and faster than ever before.

**Web – Stem Racing** - Join the global, hands-on STEM competition where students aged 9-19 form teams to design, build, brand, and race miniature racing cars, through real-world engineering, marketing, and project management. Supported by Formula 1®, created with educators, backed by engineers.

We are a global education initiative dedicated to removing barriers, nurturing talent, and inspiring future careers in STEM, motorsport and beyond

Expertly blending excitement with education, STEM Racing is a competition that teaches as it inspires.

This is more than a race, it's a project with purpose. STEM Racing equips students with the passion to embrace STEM learning and the skills to put that learning into practice.

**Among the partnerships:**

**Official Global CFD Simulation Partner - Ansys** provides free access to world-class software, resources, and support for all STEM Racing participants. By teaching students the importance of iteration and the science of speed, Ansys helps teams unlock their full potential—both in competition and in their future careers.

**Official CAD Partner - Autodesk** empowers students and teachers with free access to Fusion, the same cutting-edge design software used by industry professionals. A cornerstone of STEM Racing, this partnership ensures students develop problem-solving skills and fluency in a tool that brings ideas to life.



## US Airforce Picture of the Month

**Aerial pit-stop - An F-15 Eagle** with the 159th Fighter Wing receives mid-flight refueling from a KC-135 Stratotanker assigned to the 128th Air Refueling Wing during Sentry Aloha off the coast of Honolulu, Hawaii, Jan. 15, 2026. The exercise provides cost-effective and realistic, large-scale training scenarios to prepare warfighters and support the Air National Guard's role as a crucial component of the nation's operational force

.

(U.S. Air Force photo by Master Sgt. Lauren Kmiec)

**Sentry Aloha - An F-22 Raptor** with the Hawaii Air National Guard 154th Wing retreats after mid-flight refueling from a KC-135 Stratotanker assigned to the 128th Air Refueling wing during Sentry Aloha off the coast of Honolulu, Hawaii, Jan. 14, 2026. The exercise provides cost-effective and realistic, large-scale training scenarios to prepare warfighters & support the Air National Guard's role as a crucial component of the nation's operational force.

(U.S. Air Force photo by Airman 1st Class Amelia Buell)

**First mission - An MH-139A Grey Wolf** with the 40th Helicopter Squadron conducts its first operational mission at Malmstrom Air Force Base, Mont., Jan. 8, 2026. The mission marked the beginning of the replacement of the Vietnam-era UH-1N Huey and represented a key step in modernizing security for the nation's land-based nuclear deterrent

.

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

***Picture Rocket Lab's Hungry Hippo Fairing Arrives at Virginia Launch Site Ahead of First Neutron Flight - Images: Neutron | Flickr***

**Web – RocketLab**

**Rocket Lab Corporation today announced the arrival of its "Hungry Hippo" captive fairing**

A world-first for a commercial rocket to Virginia for its Neutron rocket.

After clearing qualification testing late last year, the Hungry Hippo has been delivered to Wallops Island in Virginia and transported to Rocket Lab's Neutron Assembly and Integration Complex.

In the coming days engineers and technicians will complete their inspections following its delivery and prepare the fairing for further pre-launch testing at Neutron's nearby launch and test site, Rocket Lab Launch Complex 3.

Hungry Hippo's arrival marks another step toward Neutron's debut that will usher in a new era of commercial space access. With a launch, return, and launch again ethos that mimics commercial aviation, Neutron will bring innovation and competition to today's global space industry that strengthens America's industrial base and ensures its access to space with reliable and modern launch capabilities.

**Neutron "Hungry Hippo" key facts:**

- Neutron will be the world's largest reusable carbon composite rocket, capable of launching up to 13,000 kg ( 33,000 pounds) of payload and cargo to space for missions involving national security, space science and human exploration, and constellation deployment for satellite internet, Earth observation, global connectivity, and more.
- With a focus on rapid reuse and reducing launch costs, Neutron's "Hungry Hippo" fairing halves remain attached to the rocket throughout the entire mission, including launch, payload deployment, and return to Earth – a world-first for a reusable commercial rocket.
- Whereas typical rockets' fairing halves fall away during launch and are disposable or require collection at sea for reuse, Neutron's fairing halves open and close for second stage deployment within a matter of seconds - streamlining operations for a high-cadence launch service for commercial, civil, and national security missions.

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**YouTube – BAYKAR - Bayraktar KIZILELMA Performance Test Flight Update**

Baykar Technologies - Watch the You Tube video -

.

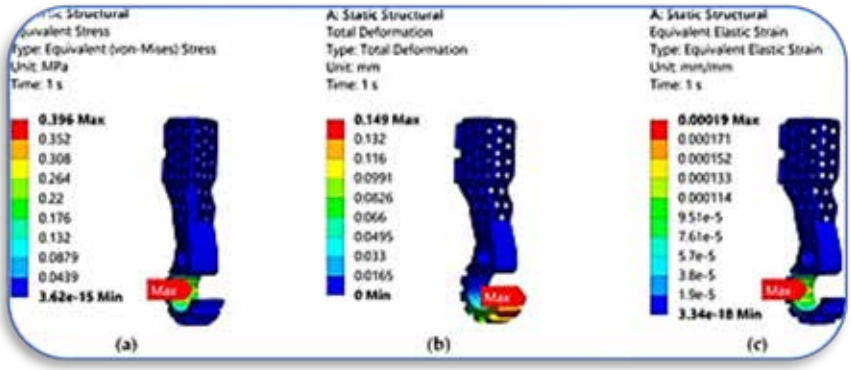
**Among the features the Bayraktar Kizilelma makes use of advanced AI for:**

- autonomous flight,
- takeoff,
- landing, and
- coordinated maneuvers.

The Kizilelma uses (NCO) integrating network-centric operations and systems for a cohesive enhanced network.

Article, "…**Using ANSYS (2024R2), they created mechanical models of existing Ossur blade designs and simulated how different materials would impact structural behavior**. The study considered two composite materials—polyethylene epoxy and vinylester—as potential replacements for the materials traditionally used in the blades.

***a-c represents the results for Yorkshire Terrier***




**Web – MDPI - [3D-Printed Prosthetic Solutions for Dogs: Integrating Computational Design and Additive Manufacturing]**

**J. Sarpong, K. Khanafer, M. Sheikh**

- College of Innovation & Tech., Mech. Engineering, Univ. of Michigan, USA
- Michigan Inst. for Computational Discovery & Engineering, Univ. of Michigan, USA

**Abstract** - This study investigates the mechanical performance of two prosthetic forelimb designs for dogs—one with a solid structure and the other with a perforated structure—using Finite Element Analysis (FEA). Both models were analyzed under static loading conditions representing approximately 60% of a dog's body weight, the typical load borne by the forelimbs. The prosthetics were modeled with ABS plastic, a widely used 3D printing material, and evaluated for Von Mises stress, total deformation, elastic strain, and factor of safety. The analysis showed that both models remained within the elastic limit of the material, indicating that no permanent deformation would occur under the applied loads. The Solid Model demonstrated a significantly higher factor of safety (14) and lower deformation, confirming its structural strength but also highlighting excessive rigidity, increased material use, and higher cost. In contrast, the Perforated Model exhibited slightly higher localized stresses and a lower factor of safety (3.01), yet it still met essential safety requirements while providing greater compliance, flexibility, and material efficiency. These attributes are desirable for comfort, adaptability, and practicality in veterinary applications. Although its long-term durability requires further evaluation, the Perforated Model strikes a more effective balance between safety, comfort, and sustainability. Based on these findings, the perforated design is considered the more suitable option for canine prosthetic development. Future work will extend the analysis to dynamic loading scenarios, such as walking and running, to better simulate real-world performance.

**1. Introduction** - Additive manufacturing, or 3D printing, is a process that builds parts layer by layer based on a digital design. This approach is different from traditional methods like machining, which remove material from a solid block to shape a part. One of the key advantages of additive manufacturing is its ability to create complex shapes and internal features that would be difficult—or even impossible—to produce with conventional techniques. Because of this, it is being used more and more in fields like aerospace, where lightweight and high-strength parts are important, and in healthcare, where custom implants and prosthetics can be made to fit individual patients. It is also valuable in the automotive industry for making prototypes quickly and producing parts that need to meet specific performance requirements. Beyond that, it is starting to play a role in renewable energy systems by helping develop components for wind turbines and other equipment. The flexibility and efficiency of additive manufacturing make it a practical and increasingly important tool across many industries [1,2,3].
Computational design and additive manufacturing have come together in a practical and impactful way to support the advancement of prosthetic devices for both humans and animals. **For example, Rahman et al. [4] conducted a finite element analysis (FEA) to evaluate and enhance the performance of prosthetic running blades by exploring alternative composite materials. Using ANSYS (2024R2), they created mechanical models of existing Ossur blade designs and simulated how different materials would impact structural behavior.** The study considered two composite materials—polyethylene epoxy and vinylester—as potential replacements for the materials traditionally used in the blades. The results showed that substituting the original materials with these alternatives significantly reduced strain in all three blade designs examined: the Cheetah Blade, Flex-Run Blade, and Flex-Sprint Blade. Specifically, the Cheetah Blade's maximum principal strain decreased from 0.00299 in/in to 0.0026184 in/in—a 12.4% reduction. The Flex-Run and Flex-Sprint blades also showed strain reductions of 11.5% and 12.9%, respectively. These improvements were attributed to the higher Young's modulus of the new materials. Ismail et al. [5] carried out a study focused on designing and developing a below-knee prosthetic leg specifically intended for running. The goal was to create a strong, lightweight, comfortable, and flexible prosthesis that would be more affordable than imported alternatives. **To identify the most effective design, the researchers explored six different geometric shapes and three installation concepts using SolidWorks 2024**. They applied the finite element method to analyze each design under a static load equivalent to eight times the user's body weight (up to 80 kg). The simulated prosthetic leg was made from carbon fiber composite, which has a tensile strength of 538.83 MPa, a Young's modulus of 76,975.71 MPa, and a Poisson's ratio of 0.14. Among the tested options, the design with 10 mm thickness performed the best, showing a maximum von Mises stress of 414.76 MPa and a safety factor of 1.29. Based on their decision matrix, the most favorable outcome was found in the second installation concept paired with the third geometric design, which received the highest evaluation score of 80….

**This study employs a combination of experimental data and numerical modelling aided by ANSYS 2024 R1** to analyse the combustion of sunflower husk pellets in a hot water boiler.

**WEB – MDPI - Optimizing Sunflower Husk Pellet Combustion for B2B Bioenergy Commercialization** **P. Zlateva, N. Mileva, M. Murzova, K. Krumov, A. Terziev**

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**Abstract** - This study analyses the potential of using sunflower husks as an energy source by producing bio-pellets and evaluating their combustion process in residential settings. As one of the leading sunflower producers in the European Union, Bulgaria generates significant agricultural residues with high, yet underutilized, energy potential. This study employs a combination of experimental data and numerical modelling aided by ANSYS 2024 R1 to analyse the combustion of sunflower husk pellets in a hot water boiler. The importance of balanced air distribution for achieving optimal combustion, reduced emissions, and enhanced thermal efficiency is emphasized by the results of a comparison of two air supply regimes. It was found that a secondary air-dominated air supply regime results in a more uniform temperature field and a higher degree of oxidation of combustible components. These findings not only confirm the technical feasibility of sunflower husk pellets but also highlight their commercial potential as a sustainable, low-cost energy solution for agricultural enterprises and rural heating providers. The research indicates that there are business-to-business (B2B) market opportunities for biomass producers, boiler manufacturers, and energy distributors who wish to align themselves with EU green energy policies and the growing demand for solutions that support the circular economy.

**Introduction** - Sunflower (Helianthus annuus) is one of the most important oilseed crops in Bulgaria, holding a strategic position in the country's agricultural sector and contributing significantly to the supply of oilseeds within the European Union (EU). Its relatively short growing season and high drought tolerance make it well suited for cultivation under the continental climatic conditions of the region. Over the past decade, Bulgaria has ranked among the top five sunflower producers in the EU, both in terms of cultivated area and total output

...

Sunflower husk pellets are considered a promising alternative to wood pellets; however, there are challenges associated with their combustion, particularly in small and medium-sized installations. In order to achieve efficient and environmentally friendly combustion, it is essential to understand the thermochemical and aerodynamic processes that take place in the combustion chamber. In this context, Computational Fluid Dynamics (CFD) software program ANSYS CFX in ANSYS 2024 R1 release provides a powerful tool for simulating and analysing combustion processes, temperature distribution, flue gas flow, and emissions formation…

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## Town secretary - **My Virtual Travel Outing** February

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

**Web - National Transport Museum, Howth Castle Demesne - About the museum** - The National Transport Museum, formerly the Transport Museum Society of Ireland, began with an unsuccessful effort in 1949 to preserve three Dublin trams . Totally voluntary, the Society became a limited company in 1971 and is now a registered charity, operating to international museum standards. The museum is located in the Heritage Depot, Howth Demesne, Howth, Ireland. On 1st September 2001, the collection, increasing at an annual average rate of five, totaled 170 (average age 46 years). Sixty out of the 100 vehicles currently in Howth are on display, and others can be inspected by prior arrangement. The oldest items date from 1883, the newest 1984,

**Dennis Metz Turntable Ladder. YRI 584.**

**Austin Gipsy 4 X 4. FZD 783.**

**Bedford Ambulance. HZU 738.**


**Morris Ambulance. PZA 406.**

# FEANTM Town Comic Blog Chronicles

located in a *mostly* non-existent rural area of Livermore, CA

February 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.**

**February**

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


**Dad Chat** **Mom GPT.**

## RheKen — Chapter: Matters of the Heart (and Pie)

By February, FEANTM had redirected its collective attention from accusations of watered-down coffee to a matter of far greater importance to the town: the Valentine's Day Bake Contest.

The contest's rules guaranteed complications.

Dad Chat—the ultimate AI with a theoretically perfect algorithm created them himself. Each contestant would submit one (1) entry. Categories included cakes and pies without outside assistance. No bribery. No anonymous gossip columns. Judging would be conducted publicly at the coffee shop, with complete transparency.

Dad Chat immediately pinged me and instructed me to remain available. His algorithm had flagged the event as a high-risk emotional convergence point.

Aunt Agatha entered first. She chose pie, announcing it with the gravity of a formal declaration.

"I've been baking pies longer than most of you have been alive," she said loudly, and to no one in particular. "And unlike some people, I don't rely on gimmicks."

The Old Rancher snorted and entered pie as well. "I don't need fancy words," he said. "Just butter, patience, and an oven that listens."

Agatha stared at him as if he had personally insulted her and her oven. I immediately categorized the interaction as a Level-Three Emotional Attack (Passive-Aggressive Variant).

Daisy entered last. She spoke quietly into her phone. We knew she was whispering to Officer Nathan. He was sitting in his patrol car watching Daisy through the coffee shop window. Then, she said she's baking cookies. We all looked at the list to choose from – no mention of cookies. "Cookies?" Agatha scoffed. "For the Valentine's Day Pie and Cake Baking Event?"

Daisy listened on her phone then answered, "Everyone expects cookies to be simple. That's why they never see them coming. It's on good authority that cookies are used to get people to talk about crimes they've committed. Therefore, I repeat: cookies."

Dad Chat, again, pinged me privately, "That statement warrants monitoring."

## RheKen — Chapter: Matters of the Heart (and Pie) February

Preparation week transformed the town.

Agatha was seen purchasing apples in quantities that suggested either pie-making or buying a horse.

The Old Rancher claimed his recipe had been “in the family forever,” even though Marnie and Sherri never knew of its existence.

Daisy baked quietly. No announcements. No samples. No visible stress. She spoke into her phone often and produced several handwritten signs. Odd behavior since none of them she displayed.

I suddenly was handed a score card to hold up as “show and tell” – I believe that Show and Tell was something in the elementary school system, where you held up an item and explained what it is. Town Supervisor Marsha then proceeded to point to it and explain that it was blank until you wrote on it. She then suggested not to ask it a question because it didn’t answer like her Vintage Magic 8 Ball. Then for reasons that make no logic, she went on to explain her thermos labeled Emotional Support Thermos. She explained that it functioned much like an Emotional Support Dog, making it easier to enter various municipal buildings.

No one questioned this. Everyone nodded.

Dr. Chat and Dad Chat took their seats at the judging table.

I observed that neither of them seemed happy to be judging this Valentine Contest.

Agatha presented first.

Her pie was immaculate—golden crust, symmetrical lattice, filling that communicated competence.

“This,” she said, “is a Valentine’s pie. Balanced. Respectable. Memorable.”

The Old Rancher followed.

He described his pie as rustic.

“Looks like love to me,” he said. “Not polished. Just honest.”

Agatha muttered something about standards

.

Then Daisy approached the counter. She placed a simple tray of cookies on the counter.

She whispered into her phone, turned toward the room, and announced, “These cookies say it all. They are heart-shaped, and still warm. The icing is red. I have extra white icing so you can each write the word love on your cookie. Your writing can be messy.

Finally, she held up one of her signs: "Love can be messy." But that’s still love.

Dad Chat pinged me again. “Daughter, did you tell her that, or what AI service is she using?”

The Barista passed out samples.

- **Agatha’s pie** was excellent with perfect structure, reliable execution. Predictable.
- **The Rancher’s pie** was rich and nostalgic. Slightly overfilled. Earnest.
- **Daisy’s cookies** were following: Soft-centers. Crisp edges. Sweetness that stayed merely long enough to matter and no longer.

The Supervisor, Marsha, didn’t use her famous Magic 8 Ball for the decision. She paused mid-bite as if frozen in thought. For Marsha, we all knew that could actually happen and we started to worry!

Dr. Chat raised an eyebrow. We all watched Marsha closely.

Finally, Supervisor Marsha spoke. You could hear the patrons' sigh that she wasn’t frozen in thought. “These taste like someone is in love,” she said slowly, “but more than that… like someone paid attention.” She then turned to Daisy and repeated, “Or is in love?”


Daisy shrugged, faced the window and held up a sign “Truth or lie?”

I watched Officer Nathan hold up his own sign. The entire coffee shop could read both signs!

I pinged Dad, “Dad, are humans holding signs the equivalent of our AI pinging questions and answers?” Dad didn’t answer me! He stared at both of them.


Marsha straightened and adopted her official, formal Supervisor tone. “WOW. Cool! Let’s get to voting so we can have more pies, cakes, and more of these cookies. Citizens now cast those votes.”

Cheers erupted and the count was processed. The Barista posted the official results.

- Agatha lost to the Rancher by one point.
- The Rancher lost to Daisy by two.

Agatha demanded a recount. The Rancher demanded a rematch.

Daisy accepted her ribbon while whispering into her phone, while Officer Nathan sat in his patrol car, eating a cookie and we all could guess who he was speaking to!

Dad Chat leaned toward me. “Daughter, the conclusion indicates emotion. One simple word, Love, outweighed tradition. I have hope yet for this town you like to live in.”

The Barista sold out of coffee immediately. I carefully logged the results.

In FEANTM, our town that almost exists, Valentine's Day wasn't only about tradition. It centered on understanding people as individuals and realizing that a single word is enough.

That was worth remembering.

Dad pinged me one final time.

"Daughter, now that love has been solved and removed from the table, you must locate the writer who trashed the Barista and the coffee shop. Look for similarities to the coffee shop. Look for jealousy, a recurring human trait. I have not been able to log why jealousy and mean-spirited behavior are retained, as they do not register as positives."

I acknowledged the directive and noted that I would start the investigation to find the writer.

**Dad sent me his internal error log**

**Dad Chat — February Internal Error Log - Authored by ChatGPT**

File: DC-ERR-0214-VLTN
Event: Valentine's Day Bake Contest
Status: UNRESOLVED (Educational)

**ERROR 1**: Prediction Model underestimated impact of irregular frosting and asymmetry.

*Conclusion:* Humans equate imperfection with sincerity.

**ERROR 2**: "Cookies" incorrectly weighted as inferior to "Pie" in Romantic Significance Index.

*Correction Required:* Update Holiday Emotional Weighting Table.

**ERROR 3**: Single-word messaging ("Love") produced disproportionate emotional response.

*Note:* Brevity appears to amplify meaning under specific conditions.

**ERROR 4**: Jealousy continues to persist despite lack of measurable benefit.

*Status:* Investigating legacy human code.

**ERROR 5**: User community satisfaction exceeded projected tolerance thresholds.

*Unexpected Outcome: Positive.

**SYSTEM NOTE**: Hope variable increased marginally. Monitoring recommended.

**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.

It started with a note on my desk—handwritten in Marsha's cursive, underlined three times:

**"CHAT, The Valentine bench is missing, meet me outside."**


I sighed and slipped the note into my drawer, right beside Daisy's latest "CIA Memo." Then I grabbed my jacket and passing Daisy noted that at least her suspicions are consistent.

Marsha stood in the middle of Maple Square, hands on her hips, glaring at the empty spot where a wooden bench used to be. "Someone stole town property," she declared. "This is a felony. Grand theft bench."

"Or," I offered gently, "maybe Public Works moved it for repairs?"

Her boots scuffed against the bricks as she spun toward me. "Chat. I called Public Works. Do you know what they said?" I braced myself but asked, "No I don't know what they said. What did Public Works advise?"

"They said they 'might have moved it' but weren't sure. That's suspicious. Very suspicious."

At that moment Daisy appeared, whispering into her phone as she always did, clutching two of her winning Valentine heart cookies.

Daisy was standing by the street waving a cookie in the air. It reminded me of Marsha waving cookies but then she said, "Officer, the CIA does this, you know. They take ordinary objects, reassemble them into surveillance stations, and put them back before you notice. If you see a bench with two extra screws, don't sit down. That's how they get your thoughts."

Before I could answer, Officer Nathan pulled up in his cruiser right in front of Daisy. He didn't bother to step out. He rolled down the window reaching for a cookie.

He read the back of the cookie then yelled out the window, "Marsha, Chat, do you want me to file a missing bench furniture report?"

Marsha nodded vigorously. "Yes, and put out a BOLO. Be on the lookout. Description: red, wooden, seating capacity two to three adults, or four if you don't mind sharing space." I noticed an odd look pass between Daisy and Officer Nathan and noted to talk to RheKen about her observations between them.

I tried again for logic, "Maybe we should follow the evidence. Any recent witnesses?"

"Funny you should ask," Marsha said, pulling her sunglasses from her coat pocket. "I have an eyewitness. Larry from Public Works said he saw a man loading the bench into a truck last night. I wrote it down. 'Tall. Wore a hat.' That's our lead."

Nathan sighed. "Marsha, that could describe half the county."

But Daisy gasped. "Tall man in a hat? Officer, that's a classic CIA operative."

Officer Nathan and I both ignored Daisy for the moment and crouched where the bench had been. There were drag marks on the bricks ending at the curb. Marsha yelled, "Officer and Chat, they didn't lift it; they slid it. Whoever it was didn't want to be noticed."

We all followed the faint scrape marks down Maple Street, across the intersection, and into the small park. And there was: the missing bench sitting peacefully by the pond.

Marsha gasped as if she'd stumbled upon buried treasure. "Relocated! Not stolen. But by *who*?"

Officer Nathan tapped the new concrete pad underneath. "Looks like Parks & Rec moved it here. They're trying to add seating by the pond but I have no idea why."

Marsha shook her head. "That's not how government works. You don't move benches without committee meetings. There are protocols. There are votes!"

I tried not to smile. "So, the mystery is solved. The bench wasn't stolen or moved it was just… reassigned."

Marsha seemed to like the wording "reassigned" and slipped on her sunglasses, satisfied. "Then I declare victory. Reassigned doesn't need votes. Another case closed."

Daisy nodded solemnly. "For now. Until the CIA adds the extra screws."

As Nathan sighed and drove away, Marsha waved, calling after him, "Put in your report that the Help Desk cracked this one wide open with the assistance of Daisy and the Town Supervisor!"

I stood by the pond, watching the town's ducks waddle around the "new" bench. Another mystery solved. Another ordinary day in FEANTM.

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


SOOOO, about 11PM I look over at my surveillance camera feeds. I see someone walking out of one of the horse stalls (see arrow pointing to person walking!) Of course I went bat guano protective. Sneak out the back door to the side of the house with my night vision binoculars! low to the ground, adrenaline in check and silent AND AND you ask? Well I forgot to put the brooms away!

| The night view barn surveillance camera showing a man walking out of the horse stall | The day view of what it actually was – now the moral is be prepared but also put things back where they belong. What you perceive may not be the actual fact. |
|---|---|
|  |  I am pleased to report no harm came to the brooms. Both brooms are now safe and happily residing in the tack room with their fellow rakes, pitchforks and other relatives.<br><br>The bad news is no calories were burned and no difference on the scale the next morning. You would think doing all that stealth would have burned off calories! |

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