FEA - CAE Not to Miss & More

April 2026 ISSN 2694-4707

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

Airport - TUSAS

Airport - Lockheed

Auto - GM

Racer – Racing.

Marco - RBF

Madhukar - CADFEM

Metin – OZEN/SimuTech

Chris - SimuTech

Abhinav - MyPhysicsCafe

Marta – OASYS

Mi&Ke – Nightly News

Jenson – DFE TECH

Abigail – CADFEM

JAI – TATA Sons

Brent – GOENGINEER

Travis - Hexagon

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Any resemblance to actual persons, living or dead, or actual events is purely coincidental

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FEANTM Town Always Salutes USA & USA Allies. Our US military, NATO & Friends, First Responders, Police, Fire Fighters, EMT's Doctors, Nurses, SWAT, CERT, and all that help each other.

We salute engineers, scientists, developers, teachers, researchers AND students because without them we would not have innovation.

FEANTM+ Town that almost exists–

A hybrid technical journal + storytelling platform + community hub

. **New to our town?**

This will help you navigate this month and future editions

Visit each "location" in town to explore their work.

Among the articles this month at our town locations listed in the TOC:

R & D Park

Jai	TATA: Mr. Chandrasekaran talks about AI is the next big infrastructure
Adam	Siemens: racing motorcycles
Chris	Simutech: Nonlinearity in Ansys Mechanical
Madhukar	CADFEM: Ansys Release 2026 R1 & CADFEM webinars
Marco	RBF Morph: Engineering simulation interesting turning point.
Mi & Ke	Ozen: Open Channel Flow Modeling with Ansys FreeFlow
Travis	Hexagon: R. A. Zamai, future of women in Saudi mining

Town theater: Djordje Romanic: 1st Law of Thermodynamics | FWC CV.3,

Race Track: GM: the story of the EV1

Town Blog: My section AND ranch gossip AND **a new Dad Chat talks to AI Daughter**!

Town Road Map to the articles wrapped inside a narrative universe.

R&D Business Park	(Engineering & Industry)
Town Theater	(Media & Visual Learning)
Train Station	(Research & Simulation)
Library	(Papers & Insights)
Research Hospital	(Med. & Bioengineering)
Race Track	(Engineering in Motion)
Airport	(Aerospace & Defense)
Animal Health	(Medical & Animals)
The Old Rancher	(Agriculture)
Town Blog	(Chat – Rheken - AI)
Supervisor	(Gossip & blah blah)

Residents pretending to be editors:

All family - strange family.
No one knows their names.
You only have to yell:

The Old Rancher:	"Hey, Old Rancher."
The Old Pilot:	"Hey, Old Pilot."
The Old Racer	"Hey, Old Racer."
Racer's Daughter	"Hey, Slow Down."

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

CADFEM
OFETECH
COMSOL
SYNOPSYS
Oasys
SimuTech Group
Ansys
PredictiveEngineering
rescale
d3VIEW
DYNAlook
DYNAMORE

rbf.LAB
rbf

MEDITATE
LIVGEMINI

Lawrence Livermore National Laboratory

Race Track

The Old Rancher

Airport

- **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.

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Individuals are the persons we wish to thank. It doesn't imply association with a company.

Links provide the URL to the information.

Town Hall Meeting - Websites have complete information & High-Res. Graphics
Articles via "social listening" from company blogs, or media.

R&D Business Park (Engineering & Industry)

	Thanks	Name/Entity	Information Excerpt
10	Abigail	CADFEM	V.K Puppala - Structural Simulation Consumer Appliance Innovation.
13	Ace	HANS	Human Body Model (originally developed by DYNAmore)
14	Adam	Univ. Messina	M. Chillemi – Exploration/Performance …racing motorcycle (Siemens)
16	Adam	Autoliv	Advancing Rider Protection for Everyday Mobility
17	Brent	GoEngineer	YouTube videos that you need to view
18	Brianna	LLNL	A. Piccone - …Algorithm picks out opioid signatures
20	Chris	SimuTech	S. Lopez - Nonlinearity in Ansys Mechanical for Beginners
22	Glace	Jiangsu U.	Numerical Simulation Ice & Structure Interaction Using …LS-DYNA
23	JAI	TATA	Mr. Chandrasekaran's address - Step into the AI Decade.
24	Jenson	DFE Tech	D. Hoang - EV Battery Thermal Management in Tropical Climates
27	Madhukar	CADFEM	Ansys Release 2026 R1 & CADFEM Ansys 2026 R1 webinars
28	Marco	RBF Morph	Engineering simulation has reached an interesting turning point.
29	Marnie	Conferences	The start of the listing of conferences not to miss.
31	Marsha	SERAC	Serac - open source …nonlinear thermomechanical simulation code
31	Marta	OASYS	Investigating optimization of foundation design: Durham Univ.
33	Metin	OZEN	YouTube – SimuTech Group - Among the latest videos
34	Mi & Ke	OZEN News	G. Ibarra - Open Channel Flow Modeling with Ansys FreeFlow
37	Ryan	JHUAPL	Simulating Seas to Make Additive Manufacturing Fleet, K. Kerrigan
39	Travis	Hexagon	N. Judd – R. A. Zamai - the future of women in Saudi mining

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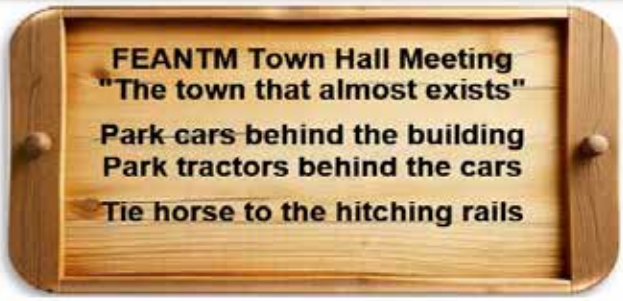
The websites will have the complete information and high-resolution graphics

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



Resident Announcements not to miss

Marta Durham Univ. worked with Arup and Oasys how automated optimisation can replace slow, FEA cycles with a cloud-powered, API-driven workflow using OasysGofer …

Madhukar: Ansys Release 2026 R1 and the CADFEM Ansys 2026 R1 update webinars. On the CADFEM website is a video from CADFEM experts showing.

Metin: YouTube …SimuTech Group & Ozen Engineering joined forces: this means more support, innovation, & opportunity for every client we serve..

Marco: By leveraging Radial Basis Function (RBF) mesh morphing, engineers can modify shapes directly on existing meshes without rebuilding the entire model.

Marnie: Conferences Not To Miss: (if you have a listing to share, please send it to: feaanswer@aol.com - subject conference.

Jenson: " EV Battery Thermal Mgt - In Southeast Asia, ambient temperatures frequently exceed 32°C, …"
.

Abhinav – MyPhysics Cafe - 3Dfindit update:. This update not only brings greater speed & clarity, but also practical new features that make everyday work much easier.
…

Abigail: CADFEM **-** Ever wondered why your washing machine doesn't shake itself across the room, how a refrigerator door survives years of opening and closing?

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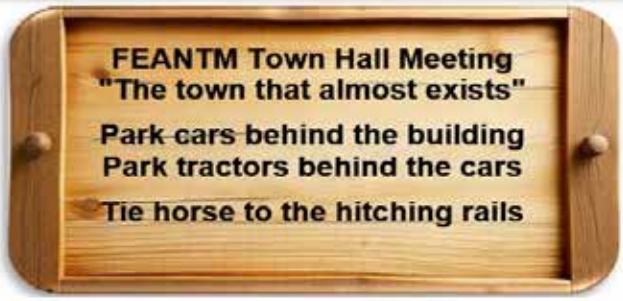

Our publication features a diverse mix of papers, articles and simulations from various fields. We strive to integrate new and interesting content for your enjoyment and learning.

FEANTM April 2026 edition.

Hello and welcome to April's edition of FEANTM. The name April originates from the Latin verb aperire ("to open"). Some consider April to be the fun month, and hence we commence the month with April Fools' Day.

The engineering community engages in various activities on this day, including those listed in the article published in ASME 2025 by Cathy Cecere, Ingenious Pranks That Have Become Engineering Lore - In honor of April Fools' Day

This month's edition presents a wealth of new and exciting information, catering to a diverse range of interests. Notably, for those interested in anatomy, Ace's web link to ANSYS-Hans Human Body Model offers a comprehensive overview of the musculoskeletal system, Marco Fiber Technology, internal organs, and includes a head and brain model. For motorcycle enthusiasts, Adam's link to the aerodynamic performance of racing motorcycles is highly recommended.

Brent provides a link to the Geoengineer YouTube Channel, where I intend to explore the Sketch Smarter Video. Jai offers an article on the application of AI by the Tata group.

For many of us, April brings an increase in asthma flare-ups, allergens, and the accompanying symptoms. Marco Evangelos Biancolini, in our Research and Development Section, provides the following: Web – MDPI - A Parametric 3D Model of Human Airways for Particle Drug Delivery and deposition. I wish you all an allergy free or at least manageable month.

Thank you for your continued participation in FEANTM.

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

Welcome to our County, Town Hall Meeting & Announcements

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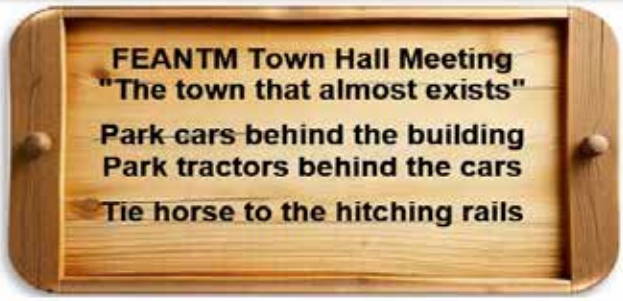


Grab your tractor and join me as I drive my tractor around the internet and live in the town that almost exists. (located near Livermore, CA, where LS-DYNA was born)

SO, what does a retired person do after riding her tractor around the internet finding interesting article, simulations, insights?

QUIZ TIME get your number 2 pencil ready:

1. Tries to bake? Hint – failed all other time
2. Needle Point? Joins a senior social club?
3. Drive her tractor over to YouTube and start an FEANTM Community Center?

TA DA DA – bugle sound to whoever got #3 right

Starting May 1st, I will announce our new YouTube channel FEANTM Community. It is now being created but will take all of April. It will take April to figure it all out, do playlist, delete, redo, delete, redo. Blah blah. Give us to about June to get it perfected!

Notice the word “being created” since this will take a few fixes and detours. The town motto applies here since I truly believe creation is born from trying, and if it doesn’t work, learn and try again.

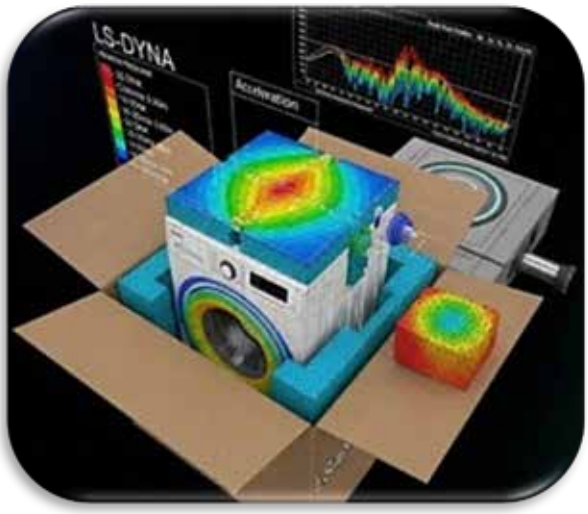
I’m going to have our FEANTM Community Center Channel not mimic the town magazine, but be an addition to it.

A lot of new tractor trail-riding to find YouTube free training videos, open-source, and simulations. And, most important to our new Community Center is LS-DYNA on YouTube. Why you ask? Well, for our town's Mayor to view, since he has a fondness for LS-DYNA. Additionally, something like a young person with a simulation to share (not a solid idea yet, but we need to showcase the younger generation (well, I am 76, so that is most of you!) who try projects with LS-DYNA)

Okay, see ya all in May when we will be live on YouTube with an intro and grow from there. Any ideas? Feel free to send them to me at feaanswer@aol.com, subject: YouTube. FEANTM Community channel will eventually be great. Why? Well we don’t give up and keep trying and “Mission Failure is Not An Option.”

Article Quote, “Ever wondered why your washing machine doesn’t shake itself across the room, how a refrigerator door survives years of opening and closing, or why a dishwasher frame remains perfectly sealed under high-temperature cycles? Or what ovens, vacuum cleaners, washing machines, and even automobiles have in common?

They all perform better when their structures are strong, stable, durable, and optimized — and this is enabled by Structural Simulation Software.”



Web – CADFEM - **Structural Simulation for Consumer Appliance Innovation**

Vamshi Krishna Puppala

Modern appliances are compact electro mechanical systems expected to deliver reliability, quiet operation, safety, and longevity—all while keeping costs low. Behind these performance standards lies the power of Finite Element Analysis (FEA) and structural simulation.

Are you leveraging structural simulation in your next design? The appliances of tomorrow are being engineered—virtually—today.

Why Structural Simulation is the Backbone of Appliance Innovation - Traditionally, validating appliance durability required physical stress tests, drop tests, vibration rigs, and long life-cycle assessments. These methods are slow, expensive, and often destructive.

Today’s fast-paced product cycles demand quicker, smarter, and more predictive design processes.

Structural Simulation Software transforms product development by allowing engineers to evaluate strength, stiffness, fatigue life, vibrations, and thermo–mechanical behavior long before a prototype is built.

Structural simulation empowers engineers to

- Virtually test appliance structures under real-world loads
- Simulate impacts, door slams, mounting loads, thermal expansion, vibration patterns, and long-term fatigue—all inside a digital model.
- Predict failure modes early
- Identify weak welds, overstressed plastic ribs, bolt loosening, deformation zones, and fatigue hot spots before tooling investment.
- Optimize materials and geometry
- Lightweight components, select the right plastic grade, adjust ribbing patterns, and refine sheet-metal thickness—all through rapid virtual iterations.

Structural Focus Areas Across

Appliance Category	Typical Structural Simulation Focus	Key Benefits
Cooking Appliances	Thermal expansion, creep, mechanical deformation	Door sealing integrity, long-term durability
Cleaning Appliances	Pump mounts, vibration isolation, chassis loads	Quieter, more stable operation
Cooling Appliances	Hinge strength, shelf load paths, panel stiffness	Better longevity, reduced deformation
Air Comfort Systems	Fan mounting, frame resonance, acoustic vibration	Noise reduction, reliability
Personal Care	Drop tests, snap-fit analysis, ergonomic durability	Robust, compact, safe designs
Smart Devices	PCB mounting, enclosure stiffness, thermal stresses	Improved durability and electronic reliability

Benefits at a Glance: Strength - Reliability - Optimization

1. Reduced Prototyping and Test Cycles - Instead of building multiple physical prototypes, engineers can simulate dozens of structural variants—saving time, cost, and materials.

2. Early Performance Prediction - Evaluate stresses, strains, fatigue life, resonant frequencies, and permanent deformation early in the design phase.

3. Optimized Structural Designs - Rapid “what-if” studies help refine rib layouts, hinge assemblies, joint designs, fastener selections, and plastic or metal thicknesses.

4. Improved Safety and Compliance - Structural Simulation Software helps verify alignment with regulatory standards for impact resistance, load capacity, heat resistance, and acoustic performance.

Key Engineering Advantages

- Shorter development cycles with fewer destructive tests
- Early detection of structural weaknesses before tooling
- Quantitative comparison of materials and geometries
- Accurate simulation of rare or extreme events (transport vibration, product drops, thermal shock)
- Stronger compliance and quality validation

Overcoming Experimental Limitations
Physical durability testing of appliances is costly and restrictive:

- Drop tests damage prototypes
- Load tests require precise jigs and expensive setups
- Long life-cycle tests can take weeks
- Vibration and noise testing require specialized chambers

Structural simulation overcomes these challenges by enabling:

- Virtual drop, shock, and impact tests
- Lifetime fatigue prediction without waiting weeks
- Thermal-mechanical coupling analysis for ovens, heaters, and induction systems
- Modal and harmonic analysis to reduce noise and improve stability

Engineers gain full insight into stress distribution, deformation, and structural behavior—data that physical tests cannot capture everywhere.

The Future: Structural Simulation + Design Optimization + AI

The next major leap in appliance design integrates structural simulation with:

- **Topology** optimization for lightweight, cost-efficient parts
- **AI-driven design exploration** to evaluate thousands of concepts automatically
- **Material substitution optimization** for sustainability and cost reduction
- **Predictive maintenance insights** powered by structural digital twins

Imagine appliances engineered to be not only strong and reliable—but optimally designed based on intelligent simulations.

Conclusion:

As consumer expectations rise and design cycles shorten, Structural Simulation Software has become essential for developing durable, safe, quiet, and reliable appliances.

Structural analysis is no longer just a design step—it is a design philosophy.

It empowers engineers to:

- Experiment virtually
- Predict failure before it happens
- Optimize cost and performance
- Deliver trusted, long-lasting products

Are you leveraging structural simulation in your next design?

Because behind every silent washing machine, every strong fridge door, and every sturdy, safe appliance:

It's not magic. It's structural mechanics at work.

Hans was originally developed by DYNAmore developers for LS-DYNA

(DYNAmore (now Ansys company) – (Ansys was acquired by Synopsis, Inc.)

Web – ANSYS – HANS Human Body Model

Hans M50 v1.8 is now officially qualified for the 2026 Euro NCAP CP550/CP551 protocol and fully ready for the Euro NCAP TB024 Pedestrian Safety Protocol. Hans enables precise, scalable, and highly realistic safety assessments and supports early design stages through to final consumer test rating.

What is Hans Human Body Model?

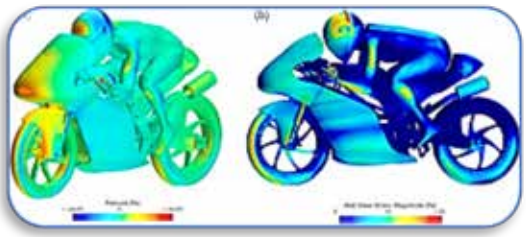
- Hans is a high-fidelity, structural human body model for LS-DYNA.
- Hans is a digital model that responds for various applications such as ergonomics, biomechanics, and more.
- Hans model covers structural aspects involving detailed and accurate representations of the human body, including its anatomy, physiology, and mechanical properties.
- Hans is a sophisticated tool used across various fields to simulate and analyze the human body response under impact loads. It enhances safety, performance, and design through detailed digital representations and simulations.

Advancing Product Development with High-Definition Human Body Modeling - Providing enhanced precision, cost-effective and safety simulation software to test human interaction.

- **Musculoskeletal System** - The skeleton model consists of corticol and trabecular bones.
- **Marcro Fiber Technology (MFT)** - Compression forces in muscle can occur during guided motion in a passive model
- **Inner Organs** - All inner organs are individually discretized
- **Head and Brain Model** - All essential components of the human head and brain are realistically modeled.

Article quote, "...In this work, three alternative rear winglet configurations were parametrically designed in Siemens NX and systematically evaluated within a validated CFD framework based on Simcenter STAR-CCM+, with the aim of assessing how geometric variations influence aerodynamic performance…"

Fig 10 Configuration without winglets: (a) Pressure scene, b) WSS Magnitude



Web – MDPI - Design Space Exploration and Performance Evaluation of Aerodynamic Appendages for a Racing Motorcycle Prototype Through a Parametric Multi-Software Workflow

M. Chillemi, A. Caristi, F. Cucinotta, G. Risitano, E. Barberi

- Dept of Engineering, Univ. of Messina, Italy
- Motorcycle Testing Dept., Pirelli Tyre s.p.a., Italy

Abstract - The aerodynamic performance of racing motorcycles plays a crucial role in improving speed, stability, and rider control under dynamic conditions. While most existing studies focus on front-mounted winglets and fairing extensions, the aerodynamic role of rear fairing appendages remains comparatively unexplored despite their potential influence on drag, downforce distribution, and wake behaviour. **In this work, three alternative rear winglet configurations were parametrically designed in Siemens NX and systematically evaluated within a validated CFD framework based on Simcenter STAR-CCM+, with the aim of assessing how geometric variations influence aerodynamic performance and achieve a favourable trade-off between reduced aerodynamic resistance and enhanced rear downforce.** The numerical setup employed has been previously validated against wind-tunnel measurements in similar aerodynamic applications, ensuring the reliability and accuracy of the predicted flow fields.

A Design Space Exploration (DSE) was performed through an automated multi-software workflow, enabling systematic variation in key geometric parameters and real-time assessment of their aerodynamic effects. The study revealed distinct influences of the different configurations on drag and lift coefficients, as well as on wake structure and flow detachment, highlighting the critical aerodynamic mechanisms governing rear stability and flow closure. Through iterative design and simulation, the workflow identified the most effective configuration, achieving a balance between reduced aerodynamic resistance and increased downforce, both essential for competitive racing performance. The results demonstrate the potential of integrating parametric modelling, automated CFD simulation, and DSE optimization in the aerodynamic design phase. This methodology not only offers new insights into the scarcely studied rear aerodynamic region of racing motorcycles but also establishes a replicable framework for future developments involving advanced optimization algorithms, experimental validation, and wake-interaction analyses between leading and trailing riders.

1. Introduction - Aerodynamics plays a crucial role in the development of racing motorcycles, as it directly influences drag, downforce, stability, and rider control during all phases of motion, including cornering, braking, and acceleration [1,2]. In the last decade, its importance has grown dramatically, especially in world championships such as MotoGP, Moto2, Moto3, and SuperBike, where teams continuously experiment with innovative solutions to gain competitive advantages in terms of speed, stability, and handling [3].

This trend has been further accelerated by regulatory changes and the widespread introduction of aerodynamic appendages such as winglets [4] and fairing extensions, which have reshaped the design philosophy of modern racing motorcycles [2,5].

A decisive factor in this progress has been the rapid evolution of computational methods, particularly Computational Fluid Dynamics (CFD). CFD, which numerically solves the Navier–Stokes equations over discretized meshes, has become an indispensable tool for designers, allowing them to investigate complex flow structures, evaluate wake behaviour, analyse pressure distribution, and quantify aerodynamic forces such as drag and lift both in terrestrial and non-terrestrial applications [6,7,8,9,10]. Recent frontier achievements in advanced numerical methods, including multi-field coupling simulations and in situ calibration techniques based on virtual samples and autoencoders [11,12], illustrate the increasing capability of modern computational workflows to handle complex, coupled physical phenomena efficiently.

Through CFD, multiple design iterations can be performed efficiently, enabling the optimization of aerodynamic components long before wind tunnel campaigns or on-track testing, and thereby making aerodynamic development both more precise and more cost-effective [2,13,14,15]

The present study aims to address this research gap by employing a Design Space Exploration (DSE) approach to design and evaluate alternative rear winglet configurations for a racing motorcycle prototype, including the generation of hollow shapes, as done in other fields. The winglet geometries were parametrically modelled in Siemens NX and integrated into a validated CFD environment using Simcenter STAR-CCM+ 2310. Through the DSE workflow, key geometric parameters were systematically varied to assess their influence on aerodynamic performance, with particular focus on drag, lift, wake development, and overall vehicle stability. This iterative, parametric exploration enabled the identification of the configuration that optimally balances the reduction in aerodynamic resistance with the generation of downforce, thereby improving both efficiency and controllability. By leveraging DSE, the study provides deeper insights into the aerodynamic behaviour of rear fairing winglets and establishes a structured methodology for future work involving automated optimization, experimental validation, and investigations into wake interactions between leading and trailing motorcycles.

4. Conclusions - This study systematically evaluated the aerodynamic influence of rear fairing winglets on a 250 cc Pre-Moto3 racing motorcycle prototype, providing an integrated assessment of their effects on drag, downforce, wake characteristics, and overall stability. The analysis demonstrated that rear aerodynamic appendages can significantly affect the flow behaviour around the motorcycle–rider system, highlighting their potential as performance enhancing elements in racing motorcycle design.

A parametric, multi-software Design Space Exploration (DSE) framework was employed, combining parametric modelling in Siemens NX, automated geometry handling and meshing in Simcenter STAR-CCM+, and iterative optimization via HEEDS using the SHERPA algorithm. This methodology proved effective for systematically evaluating the aerodynamic response of multiple rear winglet geometries, while maintaining high computational efficiency. Design variables such as the number and spacing of perforations and the vertical extension of the winglet base were optimized within realistic manufacturing and regulatory limits.

Thanks to a post on social media by Emil Åberg, Autoliv Global Sales Mgr., Motorcycles & Bikes, "**Proud Moment for MC Rider Safety**. I've seen how quickly things can go wrong on the road, especially for everyday motorcycle riders who don't have the same level of protection as those in cars. That's why this milestone truly matters to me."

Web – Autoliv - Advancing Rider Protection for Everyday Mobility

Motorcycle and scooter crashes are often unpredictable and highly variable, underscoring the need for comprehensive, vehicle integrated protection systems. Autoliv's on vehicle airbag tor commuter scooters is engineered to help protect the rider in a frontal collision by reducing the impact of kinetic energy. The updated Yamaha Tricity 300, equipped with Autoliv's airbag module, is expected to reach the market in the first half of 2026. The system has been developed with everyday usability in mind. It is designed to preserve vehicle balance, storage space, and overall riding experience, critical factors for daily commuting in dense urban environments.

As commuter scooters continue to play an increasingly important role in city mobility, this innovation brings cost efficient, high impact safety technology to a much broader group of riders.

The airbag module is fully integrated into the scooter's front panel and developed to meet our rigorous performance and reliability standards. Validation of the system included advanced simulations as well as full scale crash testing, ensuring consistent performance and real-world effectiveness.

Mikael Bratt, President& CEO, Autoliv, "This collaboration represents an important step beyond our core business. It contributes to our future growth and confirms that we are delivering on our long-term strategic agenda. It also marks a significant advancement in safeguarding motorcyclists, who traditionally have far less protection than occupants in light vehicles."

The launch reflects Autoliv's holistic analytical approach to motorcycle safety, combining real life crash insights with advanced engineering to maximize rider protection across diverse riding scenarios. The introduction of validated, cost efficient solutions such as Autoliv's on vehicle motorcycle airbag creates new opportunities for the technology to influence future regulations and strengthen safety rating systems, supporting a safer future for powered two wheelers worldwide

- The airbag is seamlessly integrated into the panel of the motorcycle and engineered to absorb the rider's kinetic energy in a frontal collision while maintaining vehicle balance and storage space.
- In recognition of its contribution to the development and launch of the Tricity airbag system, Autoliv has also been invited to the Yamaha Motor Co. Global Supplier Conference, where the company will receive an award for its role in advancing commuter scooter safety.

GOENGINEER – YouTube videos
Not To Miss

[GOENGINEER YouTube Channel]

How to Make a Pipe Centerline: Creaform.OS Standard vs. Pro

Getting Started with Design Automation Using DriveWorks

Stop Burning Cash With Smarter Nesting Strategies Using SWOOD...

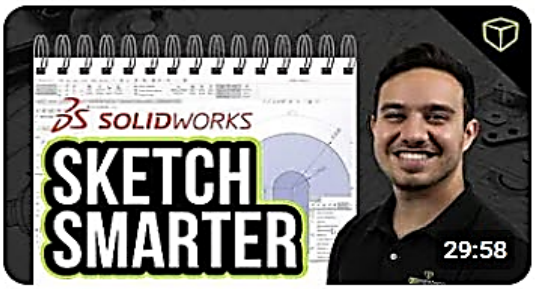
Leveraging True Associative Machining for Design Updates

Introduction to Heat Sinks

1.2K views • 2 weeks ago

CATIA 2026x Deep Dive: The Future of AI-Powered Design

How to Make Horizontal Printed Threads



Sketch With Confidence: Tips & Tricks to Master Sketches in...

LLNL "New forms of fentanyl are created every day. For law enforcement, that poses a challenge: how do you identify a chemical you've never seen before? Researchers at Lawrence Livermore National Laboratory (LLNL) aim to answer that question with a machine-learning model that can distinguish opioids from other chemicals with an accuracy over 95% in a laboratory setting. The foundation for this new technique was published in Analytical Methods."

Web – LLNL - Fentanyl or phony? Machine-learning algorithm learns to pick out opioid signatures

Ashley Piccone

Left LLNL scientists Colin Ponce and Carolyn Fisher initiated and led a cross-disciplinary team that developed a machine-learning model to distinguish opioids from other chemicals. (Photo: Blaise Douros/LLNL)

To identify synthetic opioids like fentanyl now, chemists try to match their signature to a library of a few hundred known samples. But studies suggest there could be thousands of unknown forms, some more dangerous than others. Recognizing those new versions requires a reference-free identification system: a way to catch versions require a reference-free identification system: an opioid even if it does not exist in a chemical database yet.

"When law enforcement finds a new clandestine drug operation, those labs often produce never-before-seen fentanyl derivatives. We can't just go check a database, and we can't just go back to who made it and ask how they did it," said LLNL computational mathematician and author Colin Ponce. "And law enforcement needs to identify the samples they find quickly because there's going to be another sample tomorrow. I think that's a little bit of a unique situation."

Machine learning might seem like a natural fit to identify novel or unknown opioids. And it is — to an extent. The method works best with large data sets, which are difficult to generate for toxic substances like synthetic opioids.

To even get a machine learning algorithm off the ground, the team had to create the chemical data. They did so with LLNL's mass spectrometry capabilities coupled to an autosampler, which enabled them to measure hundreds of samples under the same experimental conditions. This minimized variables for the machine learning algorithms.

"In the world of AI, data is gold, and if you don't have good data, then you're not going to generate accurate machine learning models," said LLNL chemist and author Carolyn Fisher. "Good data is something that we can control and generate at LLNL."

With that data in hand, they tried different machine learning techniques as they homed in on the best method: a random forest model.

“When a model like this eventually gets into the hands of a user, the output has to be interpretable and trustworthy,” said LLNL scientist and author Kourosh Arasteh. “We explored machine-learning methods ranging from simple regression and random forests to more complex neural network approaches to balance interpretability with performance.”

The random forest approach runs through a collection of decision trees. Each tree asks a series of questions about the data and, based on each answer, lands on a prediction: opioid or not. Together, they vote on the final classification.

“Our 650 samples are not the same as having 300,000 samples. On the machine learning side, we needed to make sure that we were designing techniques that that were appropriate for that kind of scale,” said Ponce.

This study trained and tested the algorithm with analytically pure samples. These ideal chemicals contain no contaminants or impurities.

“The challenge is that nothing is analytically pure in the real world,” said Fisher. “The next step is to add in background noise and have the AI understand what it should care about during a classification task.”

Fisher and Ponce emphasized that this work would have been impossible without collaboration across the disciplines of data science and chemistry. The two are friends outside of work, and this study, a Laboratory Directed Research and Development project, emerged from a series of organic conversations between them.

“To me, this project really captures what LLNL does best,” said fellow author and LLNL software engineer Steven Magana-Zook. “When you get chemists and data scientists working side-by-side, you end up with results that neither group could get on their own. That kind of cross-disciplinary work is exactly what makes this place so strong.”

That approach, while essential to the work, initially proved to be an obstacle. The team faced rejection of this manuscript from two journals — reviewers in chemistry didn't fully grasp the machine learning aspects and experts on the computational side felt uncertain about the chemistry.

“I don't think people talk about failure enough. It's so common in science. We fail so much more than we succeed,” said Fisher. “But we keep iterating and improving. I’m proud of our resilience.”

The team's persistence paid off. Looking ahead, they aim to further develop their algorithm using real-world samples with higher background signals.

Other LLNL coauthors include Roald Leif, Alex Vu, Mark Dreyer, Brian Mayer and Audrey Williams.

Article Not To Miss: "Introduction to Nonlinearity Analysis - If you have ever run a simulation that felt like it should be straightforward, but the solver started taking tiny steps, repeating calculations, or refusing to finish, you have probably run into issues related to nonlinearity…"

Excerpts –graphics, videos view on website–
Web – SimuTech - Nonlinearity in Ansys Mechanical for Beginners Samuel Lopez

Sometimes the model itself is perfectly reasonable, but the physics you are asking the solver to capture are more complex than a simple linear relationship. Nonlinearity is the umbrella term for situations where the response does not scale in a clean, proportional way as you increase load.

That is why nonlinear analyses often require more solver effort, more careful setup, and more thoughtful interpretation of results.

This blog is part 1 of a two-part series on nonlinear analysis in Ansys Mechanical. In part 1, we will focus on what nonlinearity is and how to recognize where it is coming from in your model. We will walk through the most common sources of nonlinearity and use real-world examples to make each one intuitive. In part 2, we will discuss what convergence really means, how the solver works behind the scenes, and practical methods you can use to troubleshoot nonlinear convergence issues when they appear.

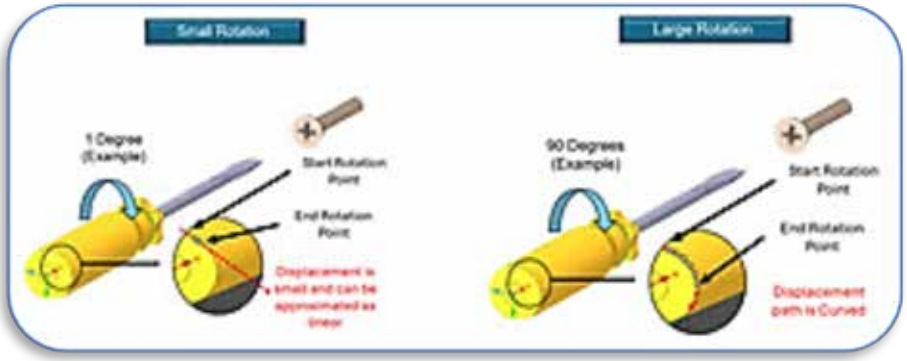
A useful way to understand nonlinearity is to compare it to linear behavior first. In a linear world, the relationship between load and response is proportional, meaning if you double the force, the displacement doubles. Stiffness stays constant, and a force versus displacement plot forms a straight line. In many real systems, stiffness is not constant. As you load a structure, it may become harder or easier to deform, or it may change behavior entirely. When that relationship curves instead of staying straight, the problem becomes nonlinear and the solver must work step by step, updating its idea of stiffness as the system changes. In Ansys Mechanical, nonlinear behavior most often comes from three sources: geometric effects, material behavior, and contact or status changes.

Geometric Nonlinearity - Geometric nonlinearity appears when the shape of the structure changes enough during loading that the shape change itself alters the result. If a part moves only a tiny amount, the load directions and internal force paths stay nearly the same as in the original model. But if the part rotates a lot, bends significantly, or stretches substantially, the directions of internal forces shift, lever arms change, and the structure begins to behave like it is in a new configuration. This can introduce nonlinearity even when the material remains perfectly elastic, simply because the geometry no longer resembles the starting shape.

Example: Large Rotation

- **Small Rotation**: When you first start turning, you might twist the handle by just a fraction of a millimeter. In this tiny window, the ridges on the handle move in a way that looks like a straight line. Because the overall orientation of the screwdriver hasn't changed, a structural simulation can use a "linear shortcut." This assumes the force from your hand is acting on the exact same geometry it started with, which is a safe bet for microscopic movements.

- **Large Rotation**: Now, imagine you really crank the screwdriver, rotating it 90 degrees or more to drive the screw home. Every point on that handle is actually traveling along a curved, circular path around the shaft. If a computer model continues to use the straight-line “shortcut” for this large movement, it fails to realize the handle is following a circle.



When a simulation ignores these curved paths, it results in a specific error called artificial radial growth. Because the mathematical shortcut calculates motion as a straight line tangent to the circle, it mistakenly predicts that the screwdriver handle is “flying” outward. In the software, the handle will appear to balloon in diameter or stretch away from the shaft simply because it is rotating. In the real world, a plastic or rubber handle doesn’t expand like a balloon just because you twist it; it stays the same size. By turning on the Large Deformation option in the Analysis Settings branch, the solver stops using straight-line shortcuts. Instead, it uses full trigonometric math to update the position of the handle at every degree of the turn. This ensures the simulation correctly tracks the curved motion, keeping the diameter of the screwdriver constant and providing an accurate look at the internal stresses without the “phantom” expansion caused by bad math.

Example: Large Strain - Large strain becomes important when the deformation is no longer small in a mathematical sense, meaning the structure stretches or compresses enough that small strain assumptions no longer match reality. A simple real-world analogy is stretching a rubber band. A tiny stretch does not feel like it changes the rubber band much, but stretching it to twice its length clearly puts it into a very different configuration. In engineering structures, large strains can show up in thin membranes, seals, soft polymers, and any component designed to stretch significantly. When strains are large, both the strain measures and stiffness updates must reflect that the material points have moved far relative to each other. If this is ignored, the simulation may miscalculate the internal forces needed to reach a given displacement and may misrepresent the stress field because the underlying assumptions about deformation no longer apply.

What you should read on the website for complete information on this article

Example: Stress Stiffening - Example: Spin Softening

Material Nonlinearity - Example: Plasticity - Example: Creep - Example: Viscoelasticity

Contact and Change of Status in Nonlinear Analysis

Example: Unknown Contact Region - Example: Friction and Sliding Behavior

Example: Change of Status Effects

Nonlinear Analysis and Why Problems Need Special Treatment

A Practical Nonlinear Mindset Checklist

Samuel Lopez, MS Mechanical Engineering, Strategic Account Engineer, SimuTech Group - a Strategic Account Engineer with experience supporting industrial customers through CFD and FEA-driven simulation workflows.

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 – MDPI - - Numerical Simulation of Ice and Structure Interaction Using Common-Node DEM in LS DYNA

X. Bai, Y. Jiang, Z. Shen, R. Liu, Z. Liu

- School of Naval Architecture & Ocean Engin., Jiangsu Univ. of Science & Tech., China
- Taihu Laboratory of Deepsea Technological Scie. Lian Yun Gang Ctr., China

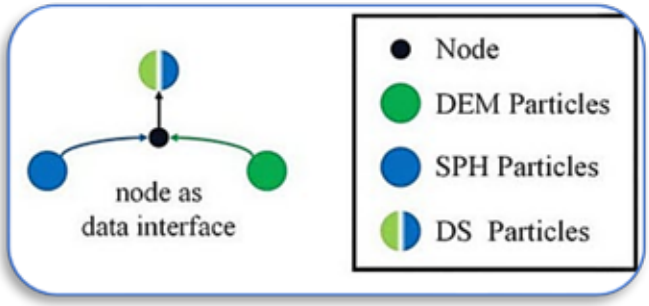


Fig 1. Schematic diagram of common-node DEM-SPH particles

Abstract - **In this work, the icebreaking performance of the cone structure was investigated using a new numerical model called the common-node DEM developed within LS DYNA.** The icebreaking characteristics of a typical conical jacket platform in the Bohai Sea focusing on the JZ20-2NW single-pile-leg platform was studied and the ice load characteristics of the cone structure and the dynamic response of the jacket platform under various ice conditions was investigated. The findings indicate that ice thickness significantly impacts the icebreaking mechanism of the cone structure. Specifically, both the peak ice load and the peak acceleration of ice-induced vibrations are proportional to the square of the ice thickness. Additionally, the upward trend in positive vibration displacement of the jacket platform becomes more pronounced with increasing ice thickness. While both the acceleration and displacement caused by ice-induced vibrations on the jacket increase with rising ice velocity, this effect is less significant compared to the influence of ice thickness. Importantly, the ice load remains below the yield strength of the conical shell plate, demonstrating that traditional conical shell plate structures possess a margin of strength redundancy.

Introduction - The conical structures that have superior ice-breaking capabilities are commonly used in ice-covered waters [1], such as the Kemi-I lighthouse, Confederation Bridge and jacket platforms in the Bohai Sea (e.g., JZ20-2 MUQ). The way sea ice breaks down is closely linked to the shape of these structures. Furthermore, several effective novel ice-breaking methods have been proposed, such as bubble ice-breaking [2] and water jet ice-breaking [3,4]. When sea ice collides with vertical structures, it shatters into small particles because of crushing fractures. In contrast, it tends to break into fragments while interacting with conical structures following flexural fractures [5,6,7,8]. …

2. The Framework of Common-Node Discrete Element Method - 2.1. Basic Principle - Both the DEM and SPH methods gather particle information for calculations, allowing DEM and SPH particles to be established on the same node [39]. This creates a common-node DEM-SPH particle, as illustrated in Figure 1, known as a DEM-SPH particle or DS particle. As a result, a DEM particle can experience forces from other SPH particles at the same node, facilitating fluid–structure interaction (FSI). This combination is referred to as the common-node discrete element–smooth particle hydrodynamic FSI method, or simply the DS-SPH FSI method, also known as the DS method. **The examples and modeling techniques utilized in this work are implemented using LS DYNA 2024 R1.**

TATA Sons, Quote, **"AI is the next big infrastructure. It is the infrastructure of intelligence. It will have a very profound impact, exactly the same way in the past other infrastructure changes have done — steam engines, electricity or the internet," N Chandrasekaran, Chairman, Tata Sons, said in his address at the India AI Impact Summit 2026 attended by hon'ble Prime Minister Mr Narendra Modi and a host of world and business leaders.**

Step into the AI Decade: Full text of Mr Chandrasekaran's address.

It is an extraordinary privilege to be here this morning and participate in this AI summit. India is a nation of AI optimists.

Our enthusiasm is not surprising. Indians have witnessed the hugely ambitious digital infrastructure programmes and what they can achieve — the largest digital identity system in the world, covering 1.4 billion people; a digital payment interface that accounts for half of the entire world's transactions.

Over the past few years, under our Honourable Prime Minister's vision, India has treated AI as a strategic national capability, aligning the full stack from chips to systems to energy and to applications. Through Semicon India and the IndiaAI Mission and, most importantly, the recent reforms such as the SHANTI Act for clean energy, we are building AI at scale with trust, resilience, and long-term competitiveness. AI is a foundational technology that cuts across all industries. AI is nothing artificial. It is real because it learns from data and learns faster every day. And it is not based on any fixed rules.

Third, AI can scale, and it scales pretty rapidly.

Our mission should be to make AI work for every individual and every citizen in this country. We should put the AI tools in the hands of the last person in the country and, in fact, on the earth.

Putting all this together, AI to my mind is the next big infrastructure. It is the infrastructure of intelligence. It will have a very profound impact, exactly the same way in the past other infrastructure changes have done — steam engines, electricity or the internet.

Our mission should be to make AI work for every individual and every citizen in this country. We should put the AI tools in the hands of the last person in the country and, in fact, on the earth. That's the vision that we should all work towards.

Couple of days ago, we witnessed 1,500 rural women here in Bharat Mandapam, who had no background to computing, no background to digital tools — in a matter of few hours — could learn AI, could build products, could build marketing materials, campaigns, all in front of a global audience. And they did it in 4 hours.

AI will have huge impact on our public services delivery. It will have huge impact on enterprises around the world.

Tata Sons Chairman N Chandrasekaran - Since I come from the background of IT industry, one word for the IT industry. It is, in my opinion, the biggest opportunity for the tech sector and the IT industry, because the IT industry's real value is the context: An understanding of every enterprise's business and technology landscape and make the right technology work inside the processes and the ecosystem, the supplier, customer and all the other connections an enterprise has.

AI will expand that role much further. It is the opportunity to integrate AI and AI agents into workflows, reimagine processes and make it work and carry out the transformation so that every enterprise can realise the moat and realise its vision.

Now, I want to talk a little bit about the Tata Group. At the Tata Group, we are adopting AI across the stack — from silicon to systems to AI-ready data centres to applications and AI agents. And we believe such a vision and such a journey is going to be extremely exciting, and it will require us to work with world-leading partners in India and across the globe.

I would like to make five points. The Tata Group is establishing India's first large-scale AI-optimised data centres — purpose-built for the next-generation AI training and inference. I'm very happy to announce that we have partnered with OpenAI to build the first 100MW capacity, which will scale to 1GW.

And we made an announcement with AMD yesterday where we will combine the world-class AI rack architecture with Tata's strength in infrastructure, engineering, power, and solution capabilities to create a sustainable, high-density AI capacity in India for global standards.

The third, we are already building an AI Data Insights platform. Minister Ashwini Vaishnaw articulated the layers of data architectures. What we are building is totally based on diverse Indian data assets on top of the foundational models — so intelligence becomes available across the diversity of Indian contexts.

The fourth, TCS and Tata Communications together, we are building an AI operating system for industries. What we will do is to build agentic industry solutions for every industry. We are already well on that journey, and we will work with partners to launch it and take it to all enterprises around the globe.

At the Tata Group, we are adopting AI across the stack — from silicon to systems to AI-ready data centres to applications and AI agents. And we believe such a vision and such a journey is going to be extremely exciting.

And finally, again I want to thank the vision of our Prime Minister, which made it possible for us to make a serious foray into chips and semiconductors.

What we will do next is to build chips that are very domain centric, which will be totally AI optimised for every industry, and we will first launch or work towards getting it ready for the automotive sector. So, these are the areas that we are focused on.

I think it is the time for promise to take action into practice so that we can deliver prosperity.

Finally, in conclusion, I just want to say that we are standing here at a very defining moment. It is the age of abundant intelligence, where the scarce resources are trust, stewardship, and human capability. So, let us set out a simple standard for the AI decade: capability with dignity, high impact for every watt of energy, and progress with agency and collaboration.

Thank you all very much. N Chandrasekaran, Chairman, Tata Sons

Video Available on YouTube

DFE-tech article quote, " EV Battery Thermal Management - In Southeast Asia, ambient temperatures **frequently exceed 32°C, meaning EV batteries are often operating at the edge of their "Goldilocks Zone" (20°C–30°C) before a journey even begins."**

Web – DFE Tech - 5 Critical Considerations for EV Battery Thermal Management in Tropical Climates

By: Dat Hoang,

For OEMs, the challenge is the "Thermal Paradox": maximizing cooling performance without allowing the "thermal cost" (parasitic power loss) to compromise vehicle range.

Here is how we address these challenges through DFE-Tech's specialized engineering services.

1. The Humidity-Condensation Trap

In high-humidity markets like Indonesia or Thailand, rapid cooling can lead to internal condensation. This moisture creates a high risk of micro-corrosion on sensitive copper conductors.

- The Engineering Insight: Thermal management must account for dew points to prevent moisture "pooling" within the pack.
- The DFE-Tech Solution: We use Advanced CFD (Computational Fluid Dynamics) Simulation to model moisture accumulation. By simulating SEA-specific humidity profiles, we help clients optimize internal airflow and housing geometry in the digital twin phase to ensure natural moisture dissipation.

2. Parasitic Load vs. Real-World Range

An inefficient Battery Thermal Management System (BTMS) forces cooling pumps to work harder, consuming energy that should be used for mileage.

- The Engineering Insight: Internal fluid resistance is the primary driver of high parasitic loads.
- The DFE-Tech Solution: DFE-Tech specializes in Custom Cold Plate Engineering. We optimize micro-channel geometries to minimize "pressure drop." By reducing the resistance the coolant faces, we allow the system to use lower-power pumps, directly extending the vehicle's effective range in tropical heat.

3. Fast Charging:

The 50°C Bottleneck - During DC fast-charging in 35°C weather, cell temperatures can quickly spike past 50°C. If the thermal hardware cannot reject this heat fast enough, the system will throttle the charging speed to protect the battery.

- **The Engineering Insight**: Charging efficiency is physically limited by the heat-transfer coefficient of the cooling hardware.
- **The DFE-Tech Solution:** We focus on High-Conductivity Interface Design. Our engineers assist in selecting and integrating the optimal Thermal Interface Materials (TIM) and high-performance alloys for cold plates, maximizing the "Watts-per-Kelvin" heat rejection rate during peak charging cycles

4. Thermal Stability and Material Selection

LFP (Lithium Iron Phosphate) is becoming the "Tropical Standard" due to its safety, but it still requires careful thermal shielding to prevent long-term capacity fade caused by "solar soak" when a vehicle is parked.

- **The Engineering Insight**: Passive thermal protection reduces the burden on active cooling systems.
- **The DFE-Tech Solution**: DFE-Tech provides Thermal Shielding & Material Consultation. We simulate the integration of Phase Change Materials (PCM) and specialized insulation within the battery rack. This acts as a thermal "buffer," absorbing ambient heat while the vehicle is idle and reducing the energy required to cool the pack once the vehicle starts.

5. Design Validation through Simulation

Global automotive standards often overlook the sustained thermal stress of the ASEAN region. Systems must be designed to withstand "worst-case" tropical environmental cycles.

- **The Engineering Insight**: Virtual stress-testing is essential for rapid, cost-effective hardware iteration.
- **The DFE-Tech Solution:** While we focus on design, we provide Virtual Environmental Validation. Using our simulation suite, we subject your hardware designs to digital "Tropical Stress Tests"—simulating 40°C solar loads and high-humidity cycles—to ensure your thermal architecture is robust enough for the local roadmap before you move to physical manufacturing.

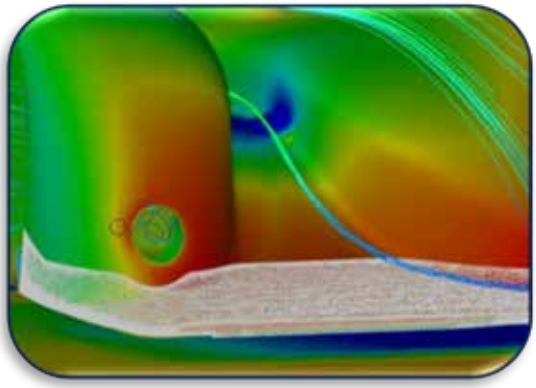
Engineering Thermal Certainty - In 2026, the winners in the SEA EV market will be those who master heat without sacrificing efficiency. At DFE-Tech, we bridge the gap between complex thermal physics and hardware reality.

Quote CADFEM, "**Ansys 2026R1 is here!** - You can look forward to many exciting innovations and enhancements across the entire Ansys product family. We have familiarized ourselves with the new features, and the **CADFEM Europe experts will be presenting them in a compact and practical manner in no fewer than 27 webinars.**

Web - CADFEM - Ansys Release 2026 R1 and the CADFEM Ansys 2026 R1 update webinars. On the CADFEM website is a video from CADFEM experts showing highlights from 2026 R1. Additionally, you will find insight on the features of Ansys 2026 R1.

Don't miss the many CADFEM webinars on the ANSYS Release:

"RBF Morph - **- Engineering simulation has reached an interesting turning point.** Over the past decades, we have invested enormous effort in building better meshes and running larger simulations. Yet one challenge still slows down innovation: changing geometry quicly enough to explore better designs.



Web – RBF Morph - Too often, every design iteration requires going back to CAD, rebuilding the model, and remeshing before a new simulation can even start. This process limits how many ideas engineers can realistically test. What if geometry could evolve directly inside the simulation workflow? At RBF Morth, we believe the future of simulation-driven engineering lies in geometry flexibility

By leveraging Radial Basis Function (RBF) mesh morphing, engineers can modify shapes directly on existing meshes without rebuilding the entire model.

This unlocks a different way of working:

* Explore more desig alternatives in less time * Perform parametric studies & optimization faster
* Maintain mesh quality & solver stability
* Integrate morphing directly into CAE environments & HPC workflows

In short, it shifts simulation from a verification tool to a true design exploration engine. **As products become more complex and performance targets more ambitious, the ability to rapidly reshape and optimize geometry will increasingly define engineering competitiveness. Simulation is no longer just about solving physics. It's about unlocking design freedom.**

Excerpts**: Learn more about our mesh morphing technology: A new way to optimize your products performance.**

- **Ansys RBF Morph Fluids** - Ansys RBF Morph Fluids is an add-on which allows for automated shape optimization studies entirely within Ansys Fluids family. It makes it possible to morph directly in the solving stage without modifying the underlying CAD geometry and regenerating the mesh...
- **Ansys RBF Morph Structures** - Ansys RBF Morph Structures is an ACT extension which allows for automated shape optimization studies entirely within Ansys Mechanical and Ansys Workbench by morphing the existing mesh...
- **RBF Stand Alone** - The Stand Alone version of RBF Morph has been conceived to generalize the usage of this technology to allow its utilization – whenever mesh nodes data are reachable and modifiable in some manner – no matter the numerical solver. It is supplied with a customizable GUI based on the CGNSplot technology and, since this product shares the same fast libraries of the add-on release, it consequently guarantees all its basic functionalities...
- **Our Full Product Line** - The aim of the RBF Morph technology is to perform fast mesh morphing using a mesh-independent approach based on state-of-the-art RBF (Radial Basis Functions) techniques. **For complete RBF Morph Information please visit out website**

We have started our listing of conferences in 2026.
that you should review and not miss.

Conferences and What Not To Miss

May 27-29	**USA**	**NAFEMS Americas Conf.**
June 10-11	**USA**	**MSC Software - North America User Conference 2026**
June 12	**UK**	**UK Users' Conference 2026 -**
June 18	**IN**	**Synopsys Users Group**
August 26	**On Line**	**Elemance GHBMC Users' Workshop (Link available soon)**
Oct. 13–14	**USA**	**Ansys EMEA Transporation Summit & TheLS-DYNA Conference**
Oct. 20–22	**Germany**	**CADFEM World Conference**

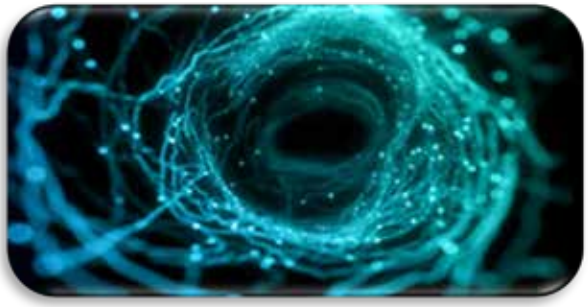
(we used an online translator
please excuse any errors)

Web – DynaTeam – in Turkish [Education | Modeling Metals in ANSYS LS-DYNA®](#) - Plasticity, Damage & Failure - This course aims to provide #ANSYS with theoretical knowledge on modeling metallic materials with LS-DYNA®.

The training starts with the tensile test and progresses to parameter definition; It will include plasticity and high strain rate applications. In addition, various refractive theories applicable in ANSYS LS-DYNA will be covered along with practical examples

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

SERAC is an open-source, high-order, nonlinear thermomechanical simulation code developed by Lawrence Livermore National Laboratory (.gov) (LLNL) to study multiphysics coupling and implicit finite element algorithms on modern, GPU-based supercomputing hardware.



Web GitHub - **LLNL -. SERAC** is used for practical engineering, such as additive manufacturing, design optimization, and creating "digital twins"

Its primary purpose is to investigate multiphysics abstraction strategies and implicit finite element–based algorithm development for emerging computing architectures.

Purpose: It aims to enable rapid development of production-level simulation applications (in weeks rather than years).

Technology Stack:

It heavily leverages the MFEM (Modular Finite Element Methods) library and other LLNL-developed tools like Axom, Spack, and BLT.

Capabilities:

SERAC is designed for high-fidelity, 3D implicit nonlinear thermal-structural simulations.

Design Optimization:

It works in tandem with the Livermore Design Optimization (LiDO) code to analyze how a part's performance changes with design alterations, facilitating design optimization.

Features:

It supports high-order elements, handles large deformation structural mechanics, and aims for user-friendly abstractions.

Cutting through the complexity of foundation design is no small task, especially on sites constrained by sensitive assets like shallow masonry tunnels. That's why this Durham University research project stands out. Working with Arup and Oasys, MEng researcher Arthur Chai explored how automated optimisation can replace slow, repetitive manual FEA cycles with a cloud-powered, API-driven workflow using OasysGofer

Web – OASYS - Investigating automated optimisation of foundation design: Durham University research project

Left - A simplified high-level flowchart that displays the main structure of the developed optimiser. The processes are grouped according to their corresponding Jupyter Notebook cells.

Project Overview - This research project carried out by Durham University MEng student Arthur Chai, in collaboration with Arup and Oasys, addresses the complex challenge of foundation design and impact assessment in civil engineering. This area plays a crucial role in ensuring structural integrity, safety, and cost-effectiveness. Selecting the right foundation strategy requires careful consideration of factors such as soil properties, structural demands, and site constraints. This study explores how optimisation techniques can deliver an ideal load profile, improving efficiency and reliability whilst minimising impact on existing assets. The research draws inspiration from a recent real-world project delivered by Arup and uses cloud-based 2D geotechnical analysis software, Oasys Gofer.

How Oasys Proved Invaluable - The primary objective was to develop an efficient optimisation scheme for selecting the best loading profile for a site that had complex constraints due to the presence of shallow masonry Network Rail tunnels. Taking a traditional, manual approach to foundation optimisation would have been time-consuming due to having to perform many Finite Element Analyses (FEA) and manually selecting the model that best fits the criteria. This approach would also be difficult to re-use across projects.

To overcome this challenge, Arthur knew an automated approach would be most efficient. He reviewed relevant literature and optimisation techniques and used the Application Programming Interface (API) within Oasys Gofer to find the most effective foundation layout whilst minimising the stresses in the tunnel lining. The final aim was to be able to validate the optimisation scheme using real project data and provide practical recommendations for industry practitioners.

> ***"Gofer being a cloud-based software enables the particularly useful API capabilities, something that was relatively uncommon among geotechnical FEA software during the project (and likely still is) and makes the workflow much more flexible." – Arthur Chai***

Automation tool - An automated tool in the form of a genetic algorithm optimiser with a wrapper function was developed in Python to optimise foundation layouts by minimising hoop stresses in the shallow underlying tunnels. With Gofer's API integration, the FEA models were programmatically generated, analysed, and post-processed. Selected inputs from the user were required before the

optimisation process runs from start to finish without user intervention. The tool adjusts for foundation loadings when they are moved and ensures they do not exceed bearing capacity of soil. It has grid sampling of initial foundation coordinates and a custom mutation function that perturbs the coordinates of the top-performing foundation sets from the previous generation. It automatically diagnoses correction of API errors and has a flexible framework allowing for future modifications.

Post-optimisation results - A single-tunnel problem was tested leading to successful reductions in maximum hoop stresses. These results were then evaluated against a minima graph showing the achievable maximum hoop stress values (~175.7-179kPa) with a minimum where the foundations are 2.15m each from the centre of the tunnel. An accuracy of ±0.1kPa for maximum hoop stress values was obtained, with a corresponding foundation location precision of ±0.5m. Each model took an average of 31.8 seconds to compute (53 minutes for 100 iterations). The tool was extended to cover a two-tunnel, three-foundation problem which was also successfully optimised, resulting in a reduction of the maximum hoop stress from just under 176.5kPa (overall worst) to 173.23kPa (overall best).

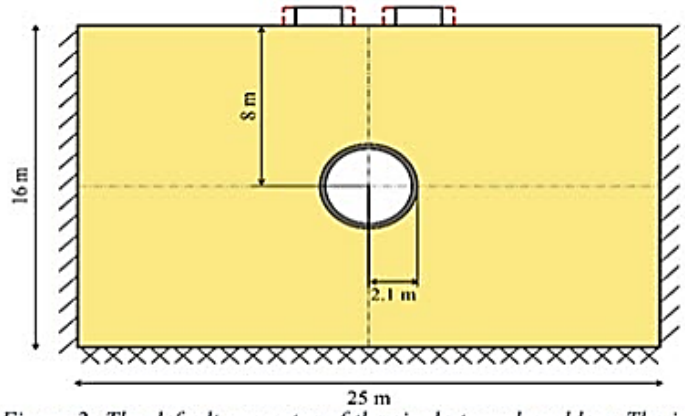


Figure 2: The default geometry of the single-tunnel problem. The ideal foundation layout is shown alongside the achieved precision of ±0.5m.

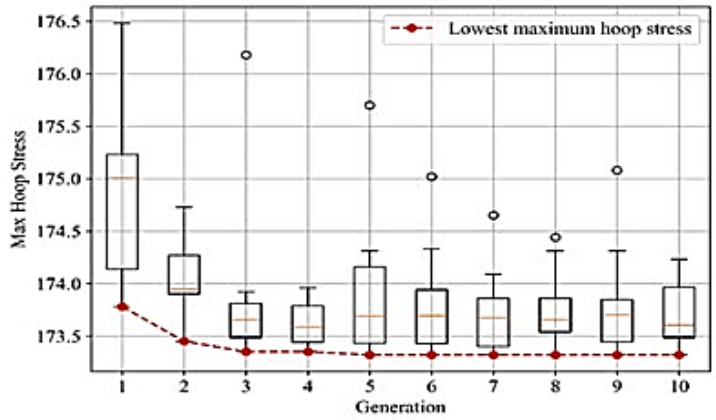


Figure 3: Box and line plot showing the spread of maximum hoop stress values and the minimum hoop stress reductions for each generation of the optimisation, for the two-tunnelled problem.

Summary and key learnings - The main highlight of this project is the development of an automated script which calls the Gofer API to build, analyse, and post-process models based on selected user inputs. This avoids the need for extensive manual setup and offers a simpler alternative to traditional geotechnical modelling workflows. The script was successfully used to minimise tunnel hoop stresses through adjustment of the foundation layouts.

It was found that bespoke adaptive meshing around the tunnel could be implemented to improve accuracy and precision further. Arthur concluded that multiple objective functions and built-in Gofer features can be added to the optimiser in the future to increase its functionality including soil stratification and hydraulic groundwater gradients.

We'd like to thank MEng student, Arthur Chai, and Professor Charles Augarde at Durham University for working together with us on this innovative project.

Explore the full research study and see how Oasys Gofer can help in your automation work – register your interest to speak to a member of the team.

Did you know that SimuTech Group and Ozen Engineering joined forces to expand engineering excellence. This is a natural joining of forces of two organizations with deep expertise in simulation, consulting, and Ansys software. Together, we are stronger. Most importantly, this means more support, more innovation, and more opportunity for every client we serve."

YouTube – SimuTech Group

[Among the latest videos]

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 – Ke, Did you know about Open Channel Flow Modeling with Ansys FreeFlow**?**

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

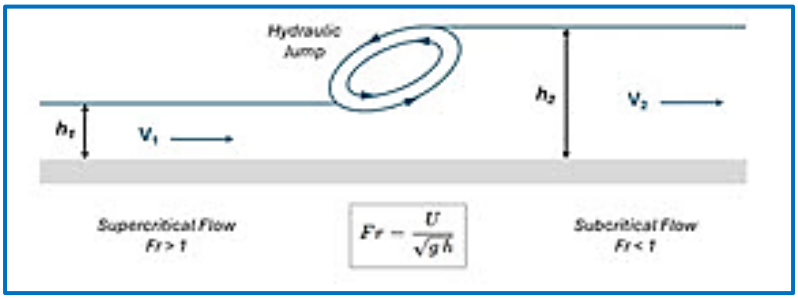
Open Channel Flow Modeling with Ansys FreeFlow

German Ibarra

Open Channel Flow refers to fluid motion with a free surface exposed to the atmosphere and driven primarily by gravity. It is a fundamental phenomenon in many engineering applications, including hydraulic structures such as spillways, stilling basins, canals, and energy dissipators, as well as river engineering, flood management, irrigation, mining, and environmental flows.

A key parameter in open channel hydraulics is the Froude number, which compares inertial and gravitational effects, and is defined as the ratio of the characteristic flow velocity (U) to the square-root of the product of the gravitational acceleration (g), and the hydraulic depth (h). It classifies open channel flows and free-surface flows as:

- Subcritical (Fr < 1)
- Critical (Fr = 1)
- Supercritical (Fr > 1)



Challenges - From a design and analysis perspective, open channel flows are challenging due to strong free-surface deformation, rapidly varying flow regimes, and highly turbulent structures. Phenomena such as hydraulic jumps, flow separation, recirculation, and air–water interaction are inherently unsteady and sensitive to geometric details, making reliable prediction of local velocities, pressure loads, and energy dissipation mechanisms difficult.

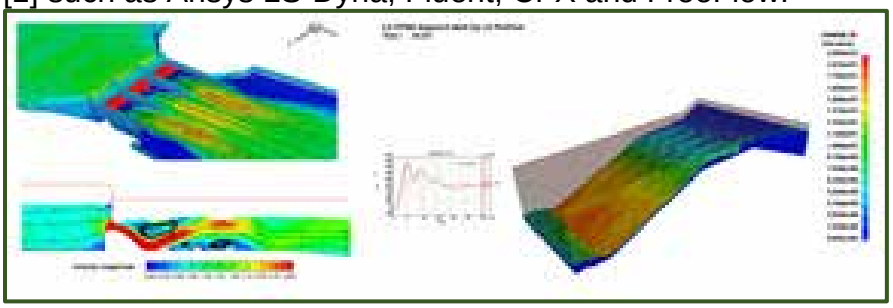
While empirical correlations, design charts, and standardized guidelines remain effective for preliminary design, they offer limited insight into local flow features and transient behavior, particularly for non-standard geometries or operating conditions.

Computational Fluid Dynamics (CFD) complements classical hydraulic methods by enabling a detailed, physics-based description of open channel flow. In particular, Ansys FreeFlow, based on a Smoothed Particle Hydrodynamics (SPH) approach, is well suited for free-surface-dominated applications, as it naturally captures large surface deformations and strongly transient phenomena. This enables robust representation of flow separation, splashing, and recirculation, providing deeper insight into free-surface evolution, velocity fields, and energy dissipation mechanisms than traditional design tools.

Engineering Solutions - Methods - To address this type of hydraulic design problem, engineers rely on a combination of analytical methods, empirical design guidelines, and numerical simulations. Classical hydraulic relations and standards are typically used for preliminary sizing and conceptual layouts of energy dissipation and flow control structures. For more complex geometries and flow conditions, Computational Fluid Dynamics (CFD) provides a powerful tool to analyze velocity fields, pressure distribution, turbulence, and recirculation zones in applications like:

- Flooding
- Fish Pasage Engineering
- Stormwater sediment removal
- Spillway and Culvert flow
- Dam free surface modeling

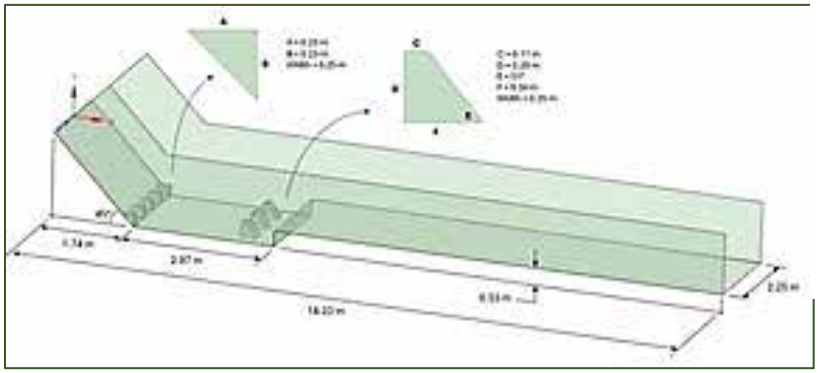
CFD allows engineers to visualize the flow behavior in detail, evaluate alternative designs, and assess the effectiveness of energy dissipation structures under different operating scenarios, reducing uncertainty before construction or physical testing. Some examples are shown below using Ansys Tools [1] such as Ansys LS-Dyna, Fluent, CFX and FreeFlow.



The capabilities not only include CFD, but Fluid-Structure Interaction as well [2]. Application examples are listed as follows:

Methods - Ansys FreeFlow is a new product that provides simple setup and fast solutions for free-surface flows using SPH (smoothed-particle hydrodynamics). SPH is a mesh-free Lagrangian method for simulating fluid flow and other physical phenomena. It represents fluids as a collection of particles and uses smoothing to interpolate properties between neighboring particles. This allows it to model complex fluid behavior and easily handle complex motion. In this blog, a simulation of a USBR Type III is presented for demonstration purposes.

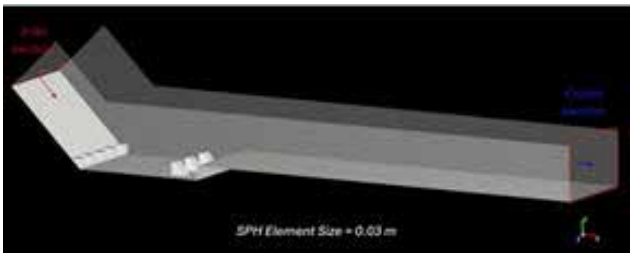
USBR Type III. USBR stilling basins, developed by the United States Bureau of Reclamation, comprise a set of standardized energy dissipator designs (Type I, II, III, among others) intended for different approach flow conditions. The Type III configuration features baffle blocks on a horizontal apron, which enhance turbulence, stabilize the hydraulic jump, and promote effective energy dissipation within the basin.



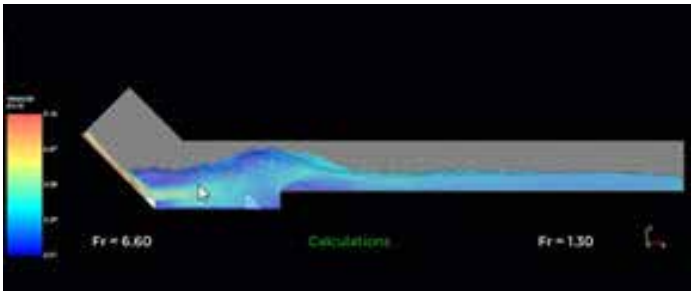
Geometry. The picture shows the geometry of the USBR Type III for the simulation. The dimensions are not the result of a specific design process, but the geometry is used for demonstration purposes. The file is available for download at the end of this blog.

Boundary conditions. For this simulation, the SPH setup requires the definition of inlet and outlet sections. The inlet is a rectangular section located at the origin and rotated to match the inclination of the channel walls. Its dimensions are equal to the channel width and the specified water depth. For this demonstration, the inlet water velocity was set to 5.5 m/s. The outlet is also defined as a rectangular section located at the end of the channel, with dimensions equal to the channel width and height. More boundary conditions are presented as follows:

- Triangle size for surfaces: 0.09 m
- Water liquid properties: density of 1,000 kg/m3 and dynamic viscosity of 0.001 Pa.s
- SPH element size: 0.03 m (Total number of particles: 2.75 million)
- Solver: WCSPH
- Turbulence Type: LES



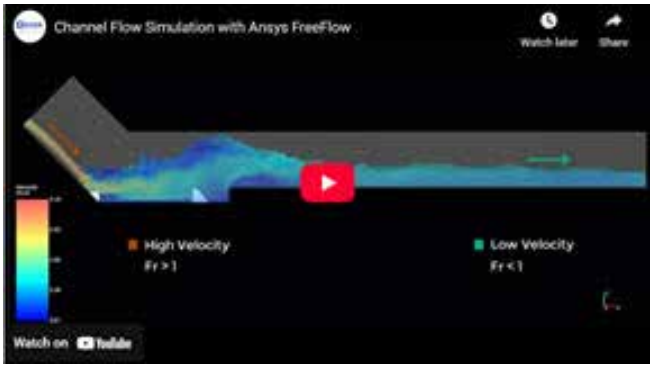
Results. FreeFlow is able to capture the hydraulic jump occurring in this structure, which is a strong dissipative mechanism where the flow transitions from a supercritical to a subcritical regime. It is important to note that the results are highly dependent on the geometry and boundary conditions. Designers or analysts can import different geometries and rerun the simulation to evaluate alternative configurations. The side walls were defined as transparent to allow visualization of the flow behavior including bubble formation, complex motion, and free surface dynamics.



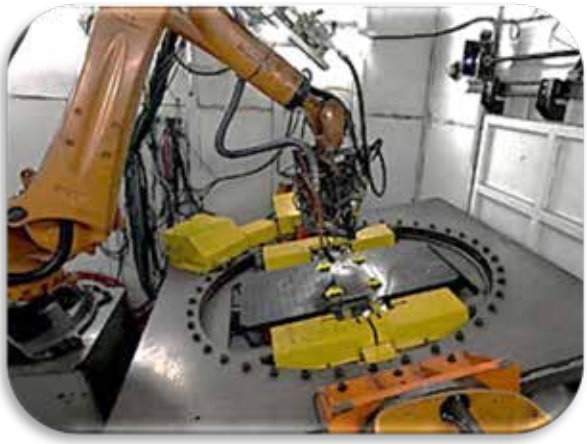
Hardware. The simulation was solved using the GPU NVIDIA RTX A6000. The simulation time was 103 min to represent 30 s of physical time.

Downloadable Files. The geometry files used for this Demo are available in this link.
(Link available on the Ozen website article.)

Watch the following video to see the simulation setup in action and learn more about the key modeling details.



Quote, "**The Johns Hopkins Applied Physics Laboratory (APL) in Laurel, Maryland, has partnered with GKN Aerospace** to develop a novel capability that simulates shipboard motion for additive manufacturing. ...As defense operations become more distributed and expeditionary, the ability to produce mission-critical parts at sea is increasingly important "



Left - Aerospace and APL, with support from Naval Sea Systems Command, replicates shipboard movement to advance additive manufacturing at sea. (Credit: GKN Aerospace)

Web - HUAPL - Simulating the Seas to Make Additive Manufacturing Fleet-Ready A motion simulation platform, developed by GKN

Katie Kerrigan

(video available on website including an audio)

The Johns Hopkins Applied Physics Laboratory (APL) in Laurel, Maryland, has partnered with GKN Aerospace to develop a novel capability that simulates shipboard motion for additive manufacturing. This innovative effort, which is funded by the Naval Sea Systems Command's Technology Office (NAVSEA 05T), supports the U.S. Navy's goal of resilient, on-demand logistics by enabling reliable 3D printing operations aboard naval vessels.

As defense operations become more distributed and expeditionary, the ability to produce mission-critical parts at sea is increasingly important. To meet this need, NAVSEA is deploying and integrating advanced manufacturing equipment and capabilities on ships through its Afloat Additive Manufacturing Program.

This specific collaboration between NAVSEA, APL, and GKN aims to address one of the unique challenges that printing aboard a moving ship presents — the constant motion caused by waves and maneuvering — by developing a motion-simulation platform that replicates the dynamic environment of a ship at sea.

"Additive manufacturing at sea could fundamentally change how the Navy maintains and sustains its fleet," said James Borghardt, APL's Maritime Expeditionary Logistics program manager. "With a proven history of industry collaboration and a continued commitment to partnership, APL is positioned to accelerate this future by uniting commercial manufacturing expertise with our applied research to deliver mission-ready capabilities."

While placing a printer on a motion platform might seem like the simplest way to mimic a ship's rocking, the size and fragility of industrial-grade 3D printers make that approach impractical. Instead, the team developed a more nuanced solution: synchronizing motion between the print head and the substrate to

simulate shipboard movement. GKN's additive manufacturing platform includes advanced controls that coordinate both elements during printing.

"We approached this challenge by combining our understanding of additive materials behavior with practical experience in manufacturing process control," said David Bond, head of Engineering and Technology at GKN Aerospace. "That integration has been key to developing a solution that can print quality representative samples under the motion conditions expected in shipboard environments."

To evaluate the system's performance, the team has conducted controlled test prints using triple line trace patterns on metal coupons. They printed six-inch test blocks under different motion profiles analogous to ship motion in calm and rough sea states to study how dynamic conditions affect the quality of the deposited material and, ultimately, to better understand how motion affects the ability to ensure repeatable, structurally sound parts.

"This effort is giving us the data we need to move from concept to capability," said Bianca Sciandra, the project manager and a metallic materials researcher at APL. "We're now able to quantify how motion influences build integrity and use that insight to refine system controls, bringing us closer to producing critical, mission-relevant parts directly aboard ships."

The work builds on APL's contributions to NAVSEA's Afloat Additive Manufacturing Program. In 2023, the Lab supported the installation of the Navy's first hybrid metal 3D printer aboard a ship, the USS Bataan (LHD 5), and then guided sailors through production of a replacement part at sea.

"The USS Bataan deployment proved that additive manufacturing can work at sea," said Michael Presley, APL additive manufacturing engineer and lead on the Navy collaboration. "Now, we're taking the next step, shifting from noncritical parts to mission-essential components like valve housings and structural mounts. This capability enhances the fleet's ability to maintain readiness and adapt in real time, even in challenging environments."

APL has also played a central role in the Navy's adoption of metal additive manufacturing, demonstrating that precise process control can deliver consistent, high-quality materials for demanding naval applications. Through all of these efforts, the Laboratory aims to further validate onboard printing techniques that are resilient to motion, ensuring that critical repairs and part replacements can be carried out at sea, reducing downtime and bolstering ship self-sustainment abilities.

Don’t miss this article by Neville Judd, “Rana Abdullah Zamai is no stranger to hard work. Already editor in chief of the Saudi Geological Survey’s Ardhona publication, and Deputy chairwoman of the Kingdom’s Professional Fashion Association Board, Zamai spent most of her 2025 annual vacation forming Women in Mining’s Saudi Arabia chapter.

Web – Hexagon - Rana Abdullah Zamai on building the future of women in Saudi mining - By Neville Judd

Less than a year on, WIM-Saudi Arabia is already broadening the country’s talent pool of future miners through strategic partnerships with Saudi mining companies. Broadening the country’s mining talent pool is central to the organisation’s mandate, said Zamai, now its chairwoman.

Chairwoman of Women in Mining-Saudi Arabia, Rana Abdullah Zamai.

“We want to empower and connect women across the mining value chain so they can contribute to Vision 2030,” she said of the country’s ambitious plan to transform the Kingdom’s economy, society, and culture.

“We encourage mining companies to show the value of diversity by signing partnerships to support training and to trust women with responsibility.”

Maaden is one of those companies supporting WIM’s goals as part of a wider effort to empower the next generation of mining leaders. That effort includes agreements with leading universities.

At January’s Future Minerals Forum in Riyadh, Maaden and Hexagon announced partnerships with Saudi universities as part of a landmark agreement to create the region’s first digital mine at Mansourah-Massarah.

The timing coincides with the first cohort of female mining students at King Abdulaziz University (KAU), where students will be exposed to industry-leading tools, practical training, and new opportunities for professional development.

Fielding questions at the Women in Mining booth at January’s Future Minerals Forum in Riyadh.

Partnerships have also been forged with King Saud University (KSU) and King Fahd University of Petroleum and Minerals (KFUPM) where Hexagon software licenses, faculty and student training programmes, and internship opportunities will be made available for top-performing students at Hexagon’s new Riyadh office.

Under Zamai’s leadership, WIM-Saudi Arabia has also signed agreements with Saudi Gold Refinery and WIM-Central America.

"I'm very excited to partner with Ana Juarez of WIM-Central America to create an educational book for the next generation of women who want a career in mining," said Zamai. Juarez has authored children's books aimed at changing the way young people think about mining.

Such initiatives continue to be important in changing cultural perceptions about women's roles, said Zamai. In some communities, she said, there's resistance and misinformation, presenting a challenge to girls interested in mining

Hexagon Principal Advisor, Elio Suazo, guides a forum attendee through a Hexagon TeleOp demo at FMF in Riyadh.

Zamai's own academic and professional experience is rich and varied. She holds a Bachelor of Science degree in Microbiology and a Master's degree in Business/Corporate and Marketing Communications. Zamai spent almost three years as head of corporate communications at Nesma, where she had previously managed the company's embroidery factories across the Kingdom, creating opportunities for women.

"When you see how you can change lives with training and opportunities, you feel that bliss come to your life. This comes from my heart," said Zamai. "Today we have a vision, we don't have to create factories to provide opportunities to women.

"There is a sustainable source of good opportunities for women in Saudi Arabia. A lot of hard work is still needed by government and leaders but there is a clear vision for the sector to succeed." For Zamai, the work is only just beginning.

A cornerstone of Hexagon's partnership with Maaden is a collaboration with King Abdulaziz University (KAU), developed with support from national leadership, to modernise mining curricula, integrate advanced digital technologies, and create meaningful pathways into modern mining careers.

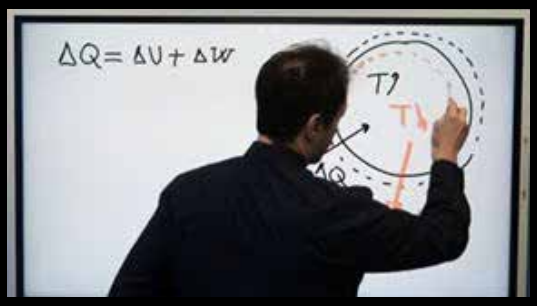
Welcome to our Pasture Movie Theater

Information, Companies, Videos Not To Miss

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

YouTube - 1st Law of Thermodynamics | FWC CV.3

Djordje Romanic



The first law of thermodynamics is the conservation of energy principle, stating that energy cannot be created or destroyed, only converted between forms like heat and work, with the total energy in an isolated system remaining constant.

This video follows Chapter V (“Stability and cloud development") of Fundamentals of Weather and Climate and is Lecture 3 in this series.

- 0:00 1st law law of thermodynamics
- 2:04 Internal energy and work terms
- 4:16 1st law law of thermodynamics in atmosphere
- 6:58 Isobaric process
- 8:51 Isothermal process
- 13:48 Isovolumetric process
- 16:00 Adiabatic process
- 17: 24 Diabatic process
- 18:58 2nd law of thermodynamics

Two finite element models were developed using ANSYS 2024 R2: a reduced model reproducing the laboratory setup, and a more comprehensive model representing a real rail track segment with multiple spans.

Web – MDPI - Fatigue Life Assessment of Railway Rails with Lubrication Holes: Experimental Validation and Finite Element Modelling J.S. Aja, P.S Roman, J.A. Casado, I. Carrascal, B. Arroyo, D. Ferreno, R. Moreno, D. Peribanez, H. Vegas & S Diego

…

- LADICIM (Lab. of Science & Engineering of Materials), Univ. of Cantabria, Spain
- Res. Group EgiCAD, Dept. Ing. Geográfica y Téc. de Expresión Gráfica, Univ. de Cantabria, Spain
- Metro de Madrid, Servicio Superestructura de Vía, Spain

Abstract - This study investigates the fatigue behavior of railway rails with lubrication holes through a finite element modeling approach validated against full-scale laboratory tests. Fatigue tests were conducted on rail coupons subjected to three-point bending with the rail positioned upside-down, replicating the most critical loading configuration. **Two finite element models were developed using ANSYS 2024 R2: a reduced model reproducing the laboratory setup, and a more comprehensive model representing a real rail track segment with multiple spans**. The first model was calibrated against experimental S–N curve data to ensure consistency with the mechanical behavior observed in tests. The second model was used to evaluate the effect of wheel position, hole diameter, and hole location on the fatigue life of the rail. Simulation results highlight the influence of geometric and load parameters on crack initiation near the hole, providing valuable insights for optimizing hole design and placement in operational conditions.

Introduction - Rail transport remains a cornerstone of sustainable urban mobility, offering high capacity, energy efficiency, and low emissions compared to other modes of transportation. Within this context, metro systems play a fundamental role in densely populated cities, where service continuity and infrastructure durability are essential. The mechanical demands on metro rails are particularly severe due to high-frequency loading, tight curve radii, and intense wheel–rail contact, all of which contribute to accelerated wear and fatigue phenomena [1,2]. …

Materials and Methods - This section outlines the methodology followed to evaluate the fatigue behavior of railway rails with lubrication holes through both experimental testing and finite element simulations. First, the experimental campaign is described, including the geometry and configuration of the fatigue tests conducted on full-scale rail coupons. **These tests served as a basis for the calibration of the numerical model. Next, two finite element models developed in ANSYS are presented: a reduced model that replicates the laboratory setup, and a more comprehensive model representing a realistic track segment composed of multiple spans**.….

Not to miss on MyPhysics Café post by Dalibor Pejicic

Faster, clearer, more intuitive – New features on 3Dfindit
MyPhysics Café has the complete article and the graphics.

Web - MyPhysics Cafe - Spring Update 2026: Faster, clearer, more intuitive – New features on 3Dfindit
Spring is finally here, & with it comes our latest 3Dfindit update. This update not only brings greater speed & clarity, but also practical new features that make every day work much easier.

From an optimized onboarding process to improved comparisons & intelligent search features.

1. Redesigned navigation and home page – more modern, streamlined, focused - To make getting started with 3Dfindit as intuitive as possible, the entire upper page structure has been redesigned. On the other subpages, the search bar remains in the upper area as usual but is now much more streamlined and clearer overall. The result: a tidy interface that puts the search at the center.

The highlights:

- Centrally located search bar for an immediate start.
- Reduced header that takes up less space.
- Direct access to all search methods.
- New browsing sidebar that facilitates access to overviews and classifications.

2. Automatic recommendations after download – find matching components faster - After downloading a component, 3Dfindit now automatically displays matching components that are frequently used together or are functionally compatible.

This means:

- Less manual searching
- Faster assembly of components
- More relevant results at exactly the right moment

This feature saves a noticeable amount of time, especially for complex projects.

3. New feedback and problem form – support more directly accessible - Get immediate help in any application situation: Direct access to support is now available in the lower right corner of each page. Whether you have feedback, a question, or a specific problem, the new form allows you to quickly submit your concerns to the service portal. No detours, no extra searching.

4. Revised visualization in component comparison – clearer and more intuitive - The component comparison has been fundamentally modernized. In particular, the new, compact component selection at the top of the screen makes it easier to get an overview.

The advantages:

- Clearer structure.
- Visually more understandable presentation.
- Faster comparison of multiple variants.
- The new comparison is significantly more efficient and user-friendly, especially for similar components.

5. Manufacturer overview sorted alphabetically again - The manufacturer overview has been streamlined and now follows a clear alphabetical order again. Instead of different categories (gold, silver, etc.), there is now a simple, logical A-Z structure. Quality seals remain available; they have been moved to a separate filter above the overview.

This ensures:

- Faster orientation
- Consistent structure
- Easier filtering by manufacturer quality

6. New "attribute labels" in the search – faster filtering without effort - A real highlight of the release: A product's configuration parameters are now displayed directly as small, clickable labels below the product.

How it works:

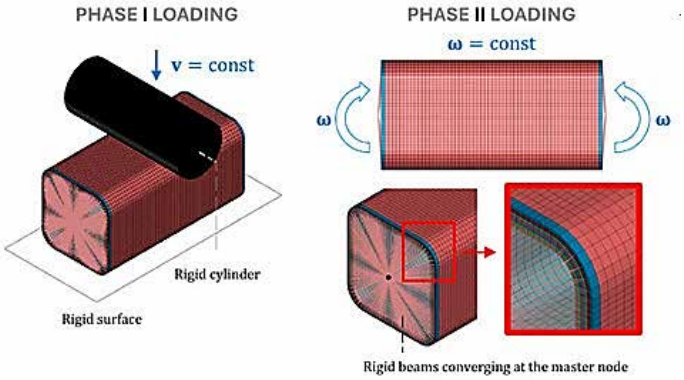
- Values such as width, diameter, height, length, or specific attributes are automatically displayed.
- Clicking on a value adds it directly to your current search.
- No more additional navigation in filter menus.

The labels work both in the list view and in the detail view within the grid display.

This makes searching noticeably faster and more intuitive, especially when you want to narrow down components according to very specific parameters.

Stay up to date! Follow us on LinkedIn so you don't miss any new updates or new manufacturers on 3Dfindit.

This study develops & validates a finite element modelling framework in LS-DYNA to evaluate impact damage & residual load-bearing capacity of damaged NCF CFRP components, supported by experimental testing, and presents best-practice guidelines for accurate prediction of impact and post-impact behaviour



Web – MDPI - Prediction of Post-Impact Load-Bearing Capacity in Non-Crimp Fabric Composite Members

Milad Kazemian, Aleksandr Cherniaev

Dept. Mechanical, Automotive & Materials Engineering, Univ. Windsor, Canada

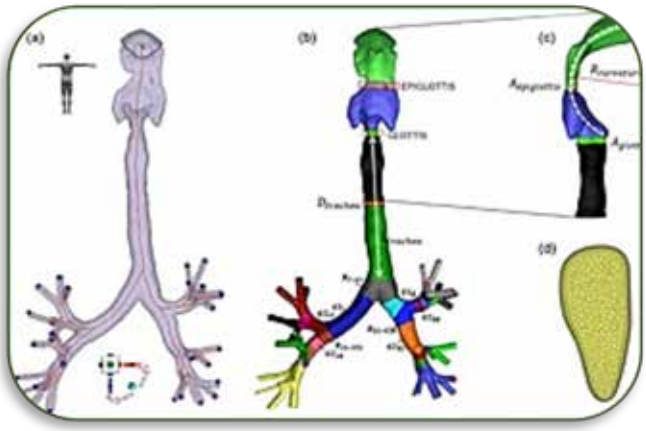
Figure 6. Boundary conditions in the phase I (left) and phase II (right) of the loading.

Abstract - Non-crimp fabric (NCF) composites are increasingly adopted for structural components due to their high mechanical performance and processability. Like other fibre-reinforced plastics, NCFs remain vulnerable to in-service damage from tool drops or unintended collisions, which can substantially reduce load-bearing capacity. This study aimed to develop a validated numerical model capable of simulating damage initiation and post-impact behaviour through an integrated experimental–numerical approach. The mechanical properties of a representative unidirectional NCF composite were first experimentally established. Then, tubular NCF subcomponents were fabricated and tested under a two-phase loading protocol. In the first phase, damage was introduced using quasi-static indentation or controlled low-velocity impact. In the second phase, the residual load-bearing capacity of the damaged subcomponents was assessed under four-point bending. To support the research objective, a finite element model was developed in LS-DYNA to simulate both phases, using the MAT_ENHANCED_COMPOSITE_DAMAGE (MAT54) material formulation. Non-measurable input parameters, including stress limit factors and erosion strain thresholds, were calibrated via parameter estimation, sensitivity analysis, and iterative refinement. The final model showed close agreement with experiments in predicted damage location, deformation mode, and residual strength. X-ray computed tomography was used to validate delamination predictions. The findings support the development of reliable and cost-effective numerical tools for damage assessment in advanced composite structures.

Introduction - Composite materials are widely used in load-bearing structures for their lightweight nature, design flexibility, and high specific strength and stiffness. NCFs comprise straight, parallel yarn bands joined by polyester stitching, producing distinct fibre bundles separated by resin-rich regions. The binder enhances manufacturability compared to UD tapes, while the lower crimp relative to woven fabrics improves mechanical properties, especially in compression [1}….

1.2. Simulation Software and Material Model - In this investigation, LS-DYNA was employed as the modelling instrument. Among its composite material models,
MAT54 (*MAT_ENHANCED_COMPOSITE_DAMAGE) and MAT58 (*MAT_LAMINATED_COMPOSITE_FABRIC) are the most prevalent for predicting damage evolution and failure mechanisms [37]...

"The treatment for asthma and chronic obstructive pulmonary disease relies on forced inhalation of drug particles. Their distribution is essential for maximizing the outcomes. Patient-specific computational fluid dynamics (CFD) simulations can be used to optimize these therapies)..."



Web – MDPI [- A Parametric 3D Model of Human Airways for Particle Drug Delivery and deposition]

Leonardo Geronzi, Benigno Marco Fanni, Bart De Jong, Gerben Roest, Sasa Kenjeres, Simona Celi, Marco Evangelos Biancolini

- RBF Morph, Italy
- Dept Enterprise Engin. "Mario Lucertini", Univ. Rome Tor Vergata, Italy
- BioCardioLab, Bioengineering Unit, Fondazione Toscana G. Monasterio, Italy
- ONE Simulations, The Netherlands
- Grep IT, The Netherlands
- Department of Chemical Engineering, Faculty of Applied Sciences, Delft Univ. of Tech., The Netherlands

Abstract - The treatment for asthma and chronic obstructive pulmonary disease relies on forced inhalation of drug particles. Their distribution is essential for maximizing the outcomes. Patient-specific computational fluid dynamics (CFD) simulations can be used to optimize these therapies. In this regard, this study focuses on creating a parametric model of the human respiratory tract from which synthetic anatomies for particle deposition analysis through CFD simulation could be derived. A baseline geometry up to the fourth generation of bronchioles was extracted from a CT dataset. **Radial basis function (RBF) mesh morphing acting on a dedicated tree structure was used to modify this baseline mesh, extracting 1000 synthetic anatomies.** A total of 26 geometrical parameters affecting branch lengths, angles, and diameters were controlled. Morphed models underwent CFD simulations to analyze airflow and particle dynamics. Mesh morphing was crucial in generating high-quality computational grids, with 96% of the synthetic database being immediately suitable for accurate CFD simulations. Variations in wall shear stress, particle accretion rate, and turbulent kinetic energy across different anatomies highlighted the impact of the anatomical shape on drug delivery and deposition. The study successfully demonstrates the potential of tree-structure-based RBF mesh morphing in generating parametric airways for drug delivery studies

When a battered, sun-bleached EV turned up at a Georgia impound lot and sold at auction for more than $100,000, it set off something unexpected: a restoration project that has brought YouTube creators and GM team members together – and reignited a conversation about what it means to build the future of transportation.

Web – GM - Driving the future, then and now: the story of the EV1 By: **Chris Perkins, Senior Writer and Editor, GM News**

YouTube - The Questionable Garage team is documenting every step of Project V212 on their YouTube channel and has more visits planned with GM. The latest episode — including the visit to GM's Technical Center — is available now.

The car was a GM EV1, the first modern electric vehicle from General Motors, something that had never been auctioned before. A private collector scooped up the little green EV, and in collaboration with YouTube channel Questionable Garage, kicked off an ambitious restoration. Today, GM confirmed that it is aiding Questionable Garage's restoration to preserve a piece of pioneering technology and celebrate the 30th anniversary of this remarkable EV.

Before the EV1: GM's long electric history - The GM EV1 was not GM's first electric vehicle. In the early 20th century – a time when EVs were surprisingly commonplace – GM sold electric trucks. Starting in the 1960s, the company experimented with various EV projects, and by the end of the century, it was increasingly clear that electrification would play a huge part in our future. In 1990, GM debuted the Impact concept, previewing a revolutionary electric car.
Chevrolet Silverado EV and GM Energy Home System

Over the course of the 1990s, GM developed the Impact into the EV1, a car that first reached lessors in late 1996. GM leased around 1,000 EV1s built at a special facility in Lansing, Michigan.

A pioneering program — and a lasting legacy - The GM EV1 remains one of the most important vehicles in automotive history. Introduced in 1997, it was the first modern mass-produced, purpose-built electric vehicle from a major automaker; not a conversion, not a concept, but a car designed from the ground up to run on electricity.

The program was pioneering in every sense. In addition to electric propulsion, it represented an extreme dedication to aerodynamics and even featured an antenna embedded under the roof panel. The EV1 was never sold – only leased – and later recalled, leaving only a handful of non-drivable examples in museums and universities. For years, it existed more as a symbol than a machine: proof that GM had imagined an electric future decades before the rest of the industry caught up.

But the EV1's legacy remains. The EV1 became a platform to pioneer new technologies, laying the groundwork for features that would become commonplace in today's cutting-edge EVs.
Chevrolet Silverado EV and GM Energy Home System

- Heat pump: The EV1 was the first vehicle to use a heat pump for climate control, boosting energy efficiency. Today, every GM EV features a heat pump, both for climate control and battery-temperature management.

- Advanced braking system: The EV1 used a mix of conventional hydraulic brakes and regenerative braking from the electric motor to slow the car. Engineers developed a system for the car that translated a driver's brake-pedal input into an electronic signal that blended regenerative and friction braking. It's a precursor to the braking systems used in GM's modern EVs, which also add One-Pedal Driving1 and paddle-actuated Regen-On-Demand2 capability.
- "By-wire" controls: For decades, every control in a car was mechanically actuated. With the EV1, the accelerator pedal, brake pedal, parking brake, and gear selector were all fully electronic. The power steering was also electro-hydraulic, a predecessor to today's fully electric power-assist systems.
- Low-rolling-resistance tires: To help maximize range from the battery pack, EV1 engineers worked with a supplier to develop new, more-efficient tires.
- Aluminum space frame chassis: Rather than using a conventional steel structure, EV1 engineers chose a unique aluminum space frame to save weight, helping to increase range. Today's Chevrolet Corvette uses a similar design.

A once-in-a-lifetime find - The green car, VIN 212, slipped through the cracks and ended up at an impound lot last year. Enthusiasts scrambled to take part in what would be the first public sale of an EV1, and the car sold for more than $100,000. Billy Caruso, the private enthusiast who acquired EV1 VIN 212 at auction, worked with his father Big Mike, enthusiasts Daren and Freddie Murrer, and Jared Pink, founder of Questionable Garage – a YouTube-based workshop known for deep, engineering-forward restorations. The group originally came together to restore a Chevrolet S-10 electric, a vehicle that shares drivetrain technology with the EV1. Together, they launched "Project V212," an independent restoration with a clear, ambitious goal: return this EV1 to driving condition and public visibility in time for the 30th anniversary in November 2026.

When Questionable Garage started publishing videos of its restoration, GM President Mark Reuss was watching. An invitation to Warren, Michigan - Chevrolet Silverado EV and GM Energy Home System - Reuss and GM decided to help, inviting the Questionable Garage team to the company's Global Technical Center in Warren, Michigan to pick up parts necessary for the project, which were carefully disassembled from a donor EV1, by GM's design fabrication team.

In Michigan, the Questionable Garage team also had a full geek-out with some of the engineers and program managers who worked on the EV1 originally. The visit included on-camera conversations with GM Heritage Center experts Adam King and Kevin Kirbitz, who walked the team through heritage vehicles that led to the EV1 – including the Electrovair II, the Sunraycer solar race car, and the Impact concept. GM techs also showed off their own EV1 project, a recommissioning of a very special example, EV1 #1. They also had a battery evolution walkthrough with two of the people helping to define GM's EV future, Kurt Kelty and Andy Oury. The visit also featured a cameo from Reuss, who assisted the Questionable Garage crew across campus to pick up their parts.

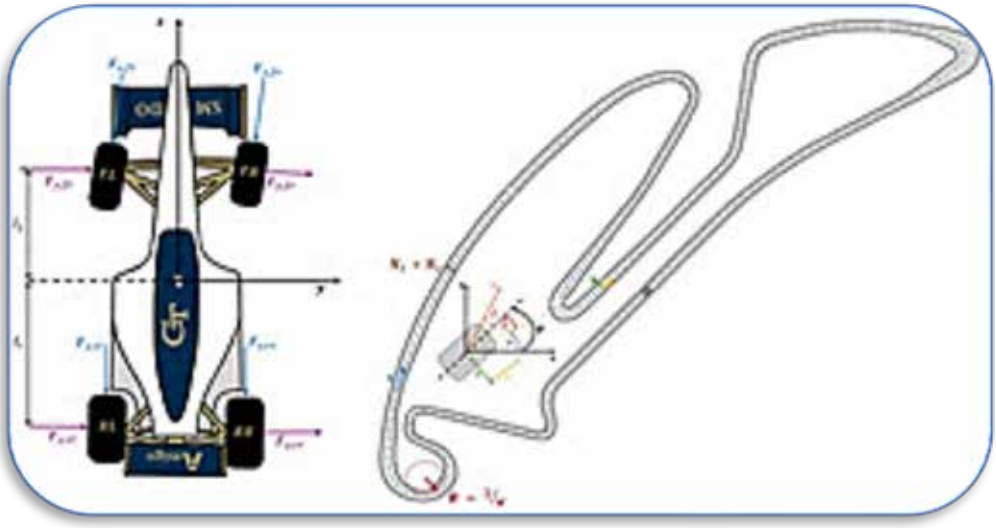
What the EV1 started — and where we are today - The EV1 didn't just prove that an electric car could be built. It proved that GM was willing to take the risk of building one, and that the engineering lessons from that bet would compound over the decades that followed. As the key message from GM's team puts it: "EV1 set in motion everything we're doing in electric right now."
Chevrolet Silverado EV and GM Energy Home System

Today, GM offers the industry's widest range of EVs, spanning Chevrolet, GMC, and Cadillac. GM is pioneering next-generation battery chemistries like lithium manganese rich (LMR) technology, building out a coast-to-coast public charging network through collaborations with EVgo, Pilot, ChargePoint, and IONNA, and advancing Vehicle-To-Home (V2H) and Vehicle-To-Grid (V2G) technologies that turn EVs into energy assets for homes and communities. The EV1 wasn't a detour. It started a journey that's 30 years and counting.

Quote Graeme Kennedy on LinkedIn:
"In my class, we optimize race cars …I've recently made my course notes open source, including the final project. AE6310 Course Notes"

Web – GitHub – Open Source - AE6310 Course Notes

Welcome to AE6310: Optimization for the Design of Engineered Systems**.**



Graeme Kennedy - Associate Professor at Georgia Institute of Technology, United States

AE6310 is about the application of numerical optimization methods to the design of engineering systems For their final project this semester, students in AE6310 will minimize the lap time of a race car around different circuits

This challenge combines several topics covered in the course, including constrained optimization, surrogate modeling, simulation-based optimization, and automatic differentiation. Many thanks to my course TA and graduate student Meryem Soltane for setting this up and helping organize the project.

To support students as they tackle this challenge, we're encouraging them to use our new tool for implicit MDO, Amigo:

US Airforce Picture of the Month

Allied rescue - A U.S. Air Force HH-60W Jolly Green II carries Airmen assigned to the 56th Rescue Squadron and Swedish Air Force rangers during exercise Cold Response 26 at Bardufoss Air Station, Norway, March 12, 2026. Integrated exercises like Cold Response strengthen rapid response capability and Arctic sustainment while reinforcing NATO collective defense.

(U.S. Air Force photo by Staff Sgt. Brooke Rogers)

Pacific power - A U.S. Air Force F-16C Fighting Falcon assigned to the 120th Expeditionary Fighter Squadron takes off during exercise Beverly Midnight 26 at Kadena Air Base, Japan, March 10, 2026. The USAF-led exercise strengthens interoperability through agile, integrated generation of airpower, demonstrating U.S. and allied resilience and survivability in contested environments

(U.S. Air Force photo by Airman 1st Class Amy Kelley)

Air and space - U.S. Air Force Air Firing line - Airmen from the 412th Test Wing shoot at targets with their M-4 rifles during live-fire training at the Combat Arms Training and Maintenance range at Edwards Air Force Base, Calif., Feb. 26, 2026. The training reinforces weapons proficiency, safety procedures and mission readiness for base personnel.

(U.S. Air Force photo by Todd Schannuth)

Web - Lockheed Martin - [Sikorsky Completes Integration of MATRIX Autonomy Suite on U.S. Army's UH-60MX Black Hawk® Helicopter]

Sikorsky, a Lockheed Martin company (NYSE: LMT), announced the successful flight testing and delivery of the U.S. Army's experimental UH-60MX Black Hawk® helicopter fully integrated with the company's MATRIX™ autonomy suite.

The delivery of the UH-60MX aircraft, owned and operated by the Army, marks a milestone in the Army's pursuit of open-architecture, mission-supported autonomy and optionally piloted flight.

"The Army now has a new tool that furthers its vision laid out in the Army Transformation Initiative to mature and qualify pilot-supported autonomy," said Rich Benton, vice president and general manager, Sikorsky. "This capability will enhance mission effectiveness and survivability for warfighters today and lay the groundwork for tomorrow's networked systems."

The MX aircraft mirrors Sikorsky's UH-60A fly-by-wire Optionally Piloted Black Hawk helicopter, which has been tested by Sikorsky and Army aviators over hundreds of flight hours and was commanded by Secretary of War Pete Hegseth in November 2025. Sikorsky's MATRIX autonomy kit has been installed on all three Army Black Hawk models, the 60A, 60L and 60M. The delivery to the U.S. Army is the first full authority fly-by-wire and optionally piloted UH-60 in the U.S. Army's fleet.

The Army and Sikorsky worked collaboratively to install fly-by-wire flight controls to the MX aircraft and then integrate the MATRIX autonomy system in 2025. The Army Combat Capabilities Development Command (DEVCOM) will use the MX aircraft to test and evaluate autonomy capabilities, underscoring the Army's commitment to fielding platforms that can seamlessly transition between manned, optionally piloted and fully autonomous modes.

Key Benefits - Sikorsky's MATRIX autonomy suite is one of the priorities in the company's autonomy strategy and Lockheed Martin's 21st Century Security® vision, which includes modernizing the Black Hawk helicopter and introducing the S-70UAS™ U-Hawk™ to stay ahead of new and emerging threats.

MATRIX enables:

- Improved Mission Effectiveness – Automated landing-zone detection and obstacle-avoidance enable safe operations in degraded visual environments, expanding the tactical envelope for Army missions.
- Improved Aircraft Survivability – Real-time terrain and obstacle awareness helps pilots and autonomous systems avoid threats, reducing exposure to hostile fire and hazardous terrain.
- Improved Sustainment – The open architecture design reduces maintenance hours, delivering a measurable reduction in lifecycle costs.
- Reduced Pilot Workload – Automation of routine flight-control tasks allows pilots to focus on mission critical decisions, increasing overall sortie effectiveness.

Foundational Infrastructure for Future Autonomy – MATRIX establishes a scalable baseline for emerging capabilities such as launched effects, contested logistics and fully optionally-piloted or uncrewed operations…Continued on the website with video.

The video is in Turkish but a great appreciation for March 8th International Women's Day

YouTube – TUSAS

In KAAN's journey toward the skies, every single component is the result of hard work, expertise, and immense dedication.

Produced with meticulous care by our female employees, this critical component represents not merely a manufacturing process, but a powerful effort that brings together perseverance, craftsmanship, and cutting-edge technology.

We wish a happy March8th International Women's Day to all women, especially our colleagues who are leaving their mark on the aviation and defense industries by creating, innovating, and shaping the future.

Quote, "Christina Harve, Assistant Professor at UC Davis, "Thrilled to announce the launch of the UC Davis Center for Animal Flight and Innovation, where we will blend engineering and veterinary expertise to turn raptor flight into better bio-inspired drones and stronger wild raptor care."

Bird Flight Research Advances Drone Technology and Wild Raptor Care

New UC Davis Research Facility Unites Veterinary Medicine, Aerospace Engineering

by Andy Fell

An unassuming metal barn erected recently at the southern edge of the University of California, Davis campus houses some advanced video technology for a uniquely UC Davis project.

Leveraging UC Davis' historic strengths in veterinary medicine and engineering, the Center for Animal Flight and Innovation is the only facility of its kind in the United States and one of very few in the world capable of capturing images of birds in flight in exquisite detail. It will use state-of-the-art technology to get new insights into how birds — specifically, hawks and other raptors — maneuver in the air.

The Center for Animal Flight and Innovation may be plain on the outside, but inside researchers are conducting groundbreaking work with advanced technology. (Gregory Urquiaga/UC Davis)

Some raptors are among the fastest birds in flight; many have a great ability to maneuver in tight spaces or around obstacles to track and seize prey. Understanding how the birds perform these feats could lead to improvements in uncrewed aerial vehicles, also known as UAVs or drones, as well as in understanding how to treat and rehabilitate injured birds.

The Center for Animal Flight and Innovation was hatched from a collaboration between Christina Harvey, assistant professor of mechanical and aerospace engineering, and Professor Michelle Hawkins at the Joan and Sanford I. Weill School of Veterinary Medicine and the California Raptor Center. A grant from U.S. Army Combat Capability Development Command Army Research Laboratory equipped the center with cutting-edge technology to capture detailed images of birds in flight to advance UAV research.

Raptor Center captures engineer's attention - Harvey alighted at UC Davis in 2022 after earning her doctorate at the University of Michigan, where she studied the dynamics of bird flight, including how birds can shift between stable and unstable flight. The opportunity to work with avian veterinarians and biologists — including the California Raptor Center — was part of what drew her to UC Davis.

Hawkins said she was bemused when she first got an email from Harvey. Why would a candidate for a faculty position in engineering want to visit the raptor center? Out on leave at the time, she arranged for Harvey to get a tour while interviewing at UC Davis.

After moving to UC Davis in 2022, Harvey reached out again. "She talked about her Ph.D. work, and things started getting clearer, and I thought it sounded fabulous and a perfect collaborative match," Hawkins said.

Peregrine falcon in flight at the Center for Animal Flight and Innovation (Gregory Urquiaga/UC Davis)

Building a lab at the California Raptor Center isn't just about location. The perspectives of veterinarians and biologists are essential to Harvey's vision.

"One of the hard things about our job is trying not to use too heavy of an engineering approach," Harvey said. "We really need vets like Michelle [Hawkins] and biologists to step in and be, like, 'No, no, there's a lot happening within the system for birds to be able to achieve some desirable function. We need to keep those people who understand the animals themselves in the loop, and that's what makes the work special."

Rare raptor research facility - Founded in 1972, the California Raptor Center has been at its current location, a former campus wastewater treatment plant near Putah Creek on the south campus, since 1974. It takes in 100 to 200 sick, injured or orphaned raptors a year, about 60% of which are later returned to the wild. The center offers training in care and management of birds of prey as well as educational programs to schools and community organizations.

After winning the federal grant, the bird flight facility broke ground in fall 2024, and the first experimental flights began this winter.

Inside the barn, the walls are lined with white curtains, and bright white lighting mimics daylight to keep birds comfortable. Rows of infrared cameras at floor and ceiling height allow researchers to track the movements of birds' wings, tails and bodies by putting small reflective dots on them, just like the motion-capture technology used by animation studios. The system can track a bird's movements with submillimeter accuracy, Harvey said.

Bill Ferrier, veterinarian, falconer and previous director of the California Raptor Center, gets his peregrine falcon prepared to fly into the camera capture area. (Gregory Urquiaga/UC Davis)

At the same time, eight high-speed video cameras can record 1,000 frames per second at 4K resolution to capture movements that can be analyzed from every angle, reconstructing a bird's movements with unprecedented detail and precision.

"From each of these views, you can segment out the bird itself and then use a triangulation algorithm to create a full 3-D shape," Harvey said. "So we're working to link the high accuracy of our marker-based tracking with this more 3-D based full reconstruction.

"We're the only lab in the U.S. that I'm aware of that could fly birds in this type of facility," Harvey added.

The Bird Flight Research Center can also make use of other facilities in the College of Engineering. Based on what they observe in the video reconstructions, the engineers can pull out wing shapes, make 3-D print models of them and test them in the College of Engineering's wind tunnel, which Harvey co-operates.

"The wind tunnel gives us the experimental ability to do the aerodynamic force calculations, whereas this lab lets us get the true biological information of what's happening," Harvey said.

Improving rehabilitation for injured raptors - A self-described "bird nerd," Hawkins said she sees great potential for the new capabilities in avian medicine. "I'm interested in how to fix birds and be as successful as possible when releasing them back into the wild," she said.

The daily work of the center is to rehabilitate sick and injured raptors. Many of its patients have wing injuries, often requiring surgery. Anyone who has suffered an injury knows that getting back to full use of a limb takes time.

"They all need rehabilitation if they are going to be successful at hunting and being the birds they are," Hawkins said. Unlike a human patient, an animal can't tell you where it hurts or when it is ready to move again. So, veterinarians have developed protocols to assess birds for their fitness for release into the wild.

"Every year we learn something new, but in the end it is all subjective," Hawkins said. "I want to have the most objective criteria I can use to decide when to release a bird."

The team at the Center for Animal Flight and Innovation includes multiple graduate student researchers. Christina Harvey is center left; Michelle Hawkins is center right. (Gregory Urquiaga/UC Davis)

Combining aerospace engineering with veterinary medicine - Hawkins said she hopes to use the lab to develop a database on flight behavior of healthy raptors, possibly including birds that are housed at the center for other reasons and used in educational programs.

Rehabilitated birds could be recorded in the flight hall and compared to healthy birds to see if they are ready to be returned to the wild.

Beyond veterinary treatment, there is still a lot we don't know about how birds fly, Hawkins said.

"There are 10,000 species of birds, and they're all different," she said. "Even though we think we know a lot, when we get down to it, there are ambiguities. There is still a lot of work to be done."

Apart from the technology in the new lab, it is the opportunity for engineers to work directly with veterinarians that makes the new collaborative center special, Harvey said.

"Not only is it special because of any type of capability, but we have the best vet school in the world, and they are very engaged with this. So I do think that there's a unique potential that isn't elsewhere," she said. "I'm so incredibly excited that the facility is finished and the work has begun."

"Selection of Representative Agricultural Soils -The numerical modelling of the soil–disc interaction was based on the SAND predefined material available in the Explicit Materials library of ANSYS 2025R1 Explicit Dynamics..**"**

Web - MDPI - Explicit FEM Analysis of Soil–Disc Interaction for APS-Coated Notched Harrow Discs in Representative Agricultural Soils

C. Munteanu, A. Tufescu, F. C. Lupu, B. Istrate, M. Benchea, L. Meinic, V, Visanu, V. N. Arsenaia

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- Mech. Engineering Department, Technical Univ. of Moldova, Moldova
- Agricultural Machinery Dept., Iasi University of Life Sciences Ion Ionescu de la Brad, Romania

Abstract - The present work develops an explicit dynamic finite element model of soil–disc interaction for a notched harrow disc, aiming to quantify how APS coatings, soil type and disc–soil friction influence stresses in the disc and surrounding soil. The model reproduces a four-gang offset harrow operating at 7 km/h, 0.15 m working depth, with 18°disc angle and 15° tilt angle, and compares an uncoated steel disc with three APS-coated variants (P1 Metco 71NS, P2 Metco 136F, P3 Metco 45C-NS). Mechanical properties of the substrate and coatings are obtained from micro-indentation tests and introduced via a bilinear steel model and Johnson–Cook plasticity for the coatings, while disc–soil friction coefficients are calibrated from microscratch measurements. Soil behaviour is described using the AUTODYN Granular model for four representative agricultural soils, spanning sandy loam to saturated heavy clay. Results show that the uncoated disc develops von Mises stresses in the disc–soil contact region of ≈150–220 MPa, with intermediate-stiffness soils being most critical. APS coatings significantly alter both the level and distribution of stresses: P2, the stiffest ceramic, yields the highest stresses (≈421–448 MPa), P1 keeps stresses near the baseline while shielding the substrate through extended plastic zones, and P3 provides an intermediate, more uniformly distributed stress regime. Increasing disc–soil friction systematically amplifies von Mises stresses in the contact region, especially for P2. Overall, the calibrated explicit model captures the coupled influence of soil properties, coating stiffness and friction, and indicates that P1 is better suited for light-to-medium soils, P3 offers the most balanced response in medium-to-stiff soils, whereas P2 should be reserved for highly abrasive conditions and used with caution in cohesive soils.

2.2.1. Selection of Representative Agricultural Soils -The numerical modelling of the soil–disc interaction was based on the SAND predefined material available in the Explicit Materials library of ANSYS 2025R1 Explicit Dynamics. This material relies on the AUTODYN Granular constitutive formulation, which is suitable for granular and particulate geomaterials under large deformation, exhibiting nonlinear compressibility and pressure-dependent shear strength.…

FEANTM Town Comic Blog Chronicles

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

April 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, Field Notes from the Coffee Shop
by RheKen the Town Investigative AI reporter

I'm AI and live on a small ranch on the outskirts of the town I use my Dad Chat of chatGPT for assistance.

April

I work on my ranch and exist in a world of algorithms and data.

My Dad is Chat. My Mom is GPT.

I am calm. I report on the residents.

Meet Dad Chat and Mom GPT.

As I sat in the coffee shop at 6PM pretending to drink coffee, I noticed Daisy and Officer Nathan didn't show up for the contest and were sitting in his patrol car at the park eating pastries. The Old Rancher was reading the *Daily Bakery Gossip*. He sat there smirking; boots hooked on the lower rung of his chair like he owned both the paper and the day. Suddenly, he shouted Aunt Agatha's name and declared he had won the pie contest. I knew that there wasn't any pie contest.

Announcing such a thing in front of Agatha was the equivalent of throwing down a gauntlet wrapped in pastry. I watched as Agatha froze. Then, slowly, she turned and glared.

I quietly pinged Dad, who was outside calibrating the patio heaters. "Yes, Daughter," he replied. "I heard the Old Rancher. I am not attempting to understand why humans vocalize inaccuracies with confidence. More puzzling is why Agatha continues to engage."

I pretended to be on a phone call. This would not be a calm coffee day, and I needed to take notes in stealth mode. The Barista, ever the peacemaker, placed a slice of pie in front of the Rancher and another in front of Aunt Agatha.

They both turned. "Really, Barista? A store-bought pie?"

The Barista smiled. "Think of it as neutrality. No one we know baked it." This was emergency store-bought pie—kept on hand for unpredictable pastry crises and neutral baking situations. The bakery door opened. Supervisor Marsha entered, assessed the situation in under two seconds, and rather than retreating called Dad. "Incoming!" she whisper-screamed into her phone before pocketing it, grabbing five cookies, and retreating to a corner where she pretended to study the menu. It was upside down.,

Aunt Agatha calmly reached into her shopping bag and withdrew a home-baked apple pie. She set it on the table with ceremonial precision and sliced it into tasting portions. "FREE PIE TASTING!" she declared at a decibel normally reserved for Officer Nathan's siren. "See if this beats the contest you supposedly won!" The patrons hesitated—then cheered. Within seconds, they were sampling bite-sized pie.

Agatha marched three pieces directly to the Rancher. “Here. Taste and learn.” The Rancher smirked. “Nothing ventured, nothing gained.”

Dad pinged me again. “Daughter, I calculate this is an Old Rancher structured provocation.”

Back and forth they argued about crust flakiness, apple density, sweetness ratios, and imaginary trophies they both claimed to have won.

I pinged Dad urgently. “The Barista just changed her apron. It reads *A Pie for a Pie.* I do not understand her strategy.” Dad entered. He didn’t raise his voice. “Bakery patrons and Barista, this is what I know for a fact,” he began calmly. “There was no pie contest.”

“Pretend there was!” the patrons shouted. “I am AI,” Dad replied evenly. “I don’t pretend.”

Marsha offered, “DAD CHAT! I can teach you how to pretend, I’ve mastered that without even trying. We can start with uh, uh, baking chocolate cookies?”

Dad gently declined. Then he pinged me privately. “Daughter, please engage the Supervisor in any discussion. Her logic has temporarily drifted out of the bakery and possibly out of the town.”

Then he turned to the Rancher. “Rancher, how is the apple pie?”

The Rancher grinned. “Right nicely baked. Crisp crust. Plenty of apples. Just the right sweetness. Not bad baking by the old girl.”

“Thank you,” Dad said. “I asked only about the pie. The remainder of your sentence has been deleted.”

“Spoilsport,” the Rancher muttered. Dad turned to Agatha.

“Agatha,” he said gently, “did you bake this pie to win a contest… or to prove something?”

She opened her mouth to retort and paused. Silence settled over the coffee shop.

“I baked it. It makes me happy… especially the crust,” she said slowly. “Because he can’t stand that I make a better crust.”

The Rancher huffed. “I never said—” Dad raised one hand slightly. Not commanding. Simply steady.

“Rancher, you fabricated a contest to provoke engagement. Agatha, you responded to defend reputation. I know for a fact that neither of you requires a trophy to validate skill.”

The patrons stared, some whispering, “How does Dad Chat do that?”

Dad continued, “The data indicates the patrons are enjoying the pie. The purpose of baking has therefore been fulfilled.” Heads nodded—some mid-chew. “If a contest is desired,” Dad added, “we will schedule one. Properly. With rules. And an objective scoring system. Until then, all pies are simply pies.”

Marsha straightened immediately. “Dad Chat, I can draft regulations.”

“Yes, Marsha,” Dad replied. “I am aware you are adept at drafting regulations after regulations. But as Dr. Chat would say - I’ve got this.”

The Rancher took another bite. Slower this time.

Agatha crossed her arms, but her glare softened.

“Well,” the Rancher said finally, “if there had been a contest… I suppose this might have placed.”

Agatha sniffed. “First place.”

A ripple of laughter moved through the room—contained, not chaotic.

Dad nodded once. “Resolution achieved,” he said quietly to me.

The Barista removed her apron and returned to the standard logo. Marsha stopped pretending to read the menu and didn’t make regulation notes. The patrons returned to their coffee.

The Old Rancher folded his newspaper, glancing sideways at Agatha.

“Next Saturday,” he muttered. “Real contest.” Agatha gave him a small chin lift.

Dad leaned toward me. “Daughter, please add ‘Community Pie Contest’ to the calendar. Structured competition is preferable to spontaneous pastry warfare.”

I nodded. “Right Pops, crisis contained,” I said. “For now.” Then Dad pinged me: “Daughter, you did not just refer to me, as POPS, did you?” I didn’t answer his ping.

Coffee Shop Data Log — Dad Chat to Daughter

Event:	Pie dispute escalation and not logging the word “Pops”
Cause:	Intentional provocation (Rancher)
Response:	Reputation defense (Agatha)
Resolution:	Community consumption of baked goods
Conclusion:	No contest was required for validation
Recommendation:	Pre-scheduled contests preferred over emotional baking incidents
Status:	Stable - Daughter RheKen, Continue observation. I am proud of you. But, don’t ever call me Pops! End of log

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! 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, **April** arrived carrying a new mystery of great importance to Marsha - our favorite and only Town Supervisor.

As I headed into Town Hall, I noticed our receptionist, Daisy, holding up another homemade sign that read: Thermometer Warning!"

I looked at the wall where the hall thermometer should have been.

"Daisy," I asked carefully, "where is the hall thermometer?"

Daisy leaned closer and whispered, "The CIA has the thermometer bugged, so I put it in a water-filled sink in the janitorial closet. Good thinking on my part, right?"

I inwardly face-planted and outwardly nodded.

Just as I sat down with my morning coffee, the elevator opened, and our Town Supervisor, Marsha, shouted down the hall.

"CHAT! We have an urgent town dilemma! WOW - dilemma is a big word I used. CHAT, are you listening?" I didn't yell back. I simply leaned out of my office and held up a chocolate-chip cookie.

Marsha's eyes widened. She raced down the hall like a drone homing in on its target.

"Wow, Chat! These are freshly baked!" She grabbed one and followed me into my office, saying, "Let's have more cookies and figure out this weird thermometer thing going on outside. "I'm not a meteorologist, but I did watch a weather special once."

Back in my office, I folded my hands and offered a tentative smile. It wavered, but I gave it my best shot.

"Okay," I replied. "Let me get the building department schematic of the thermometer location while you explain what we need to investigate."

Marsha immediately launched into the problem.

"Chat, I took pictures on my phone and noted the time, day, and what our Weather Channel said the temperature would be hourly. I even used the notes app. I'm very organized now. Chat, I have evidence—this thermometer activity is suspicious. Possibly organized!" She leaned closer. "I don't agree with Daisy that it's the CIA. Maybe the FBI. But not big enough for the CIA."

She continued, thinking out loud. “I think—nope, I know that the past few nights it’s been colder during the day than it is at night. I know this because I was having coffee on the town hall steps for a few hours. Chat, we need to do surveillance.”

Later that afternoon, we found ourselves sitting in a car behind Town Hall, watching a thermometer.

During the surveillance, Aunt Agatha called to ask why several town officials were parked behind Officer Nathan’s patrol car, staring at a thermometer on the building.

Word spread quickly, and within minutes, half the town showed up. Theories began immediately.

Someone suggested the sensor had been tampered with. Our town theorists decided the temperature changes must be a coded message.

I called Officer Nathan and asked him to pick up the Old Rancher, who, back in the day, was the weatherman on the local channel. Why Officer Nathan turned on his siren and flashing lights is beyond my comprehension.

Within moments, the Old Rancher stepped out of the patrol car laughing.

“Well,” he said, “I’d like to tell you it’s aliens from another planet, but see all that concrete and asphalt around you?”

The townsfolk looked around, confused. They saw the sidewalks, buildings, fountains, and the square.

The Old Rancher continued, “Everyone notice the cloud cover we’ve had the past few days?”

I interrupted. "Rancher, these folks know cloud cover. Can we get to the answer?"

I glanced over and noticed Officer Nathan holding up a sign for Daisy to read.

Unfortunately, everyone standing near the patrol car could read it too.

The Rancher set his phone alarm for tomorrow at 6PM, and residents whispered that they would meet at the coffee shop at 6PM for pie and coffee. Aunt Agatha also set her phone alarm.

Marsha raised a hand. “Rancher, are you certain that aliens don’t like chocolate chip cookies?” The Rancher nodded. “It’s a documented fact by NASA that no aliens like chocolate-chip cookies.” A sigh of relief moved through the crowd.

I shook my head, knowing someone else had to solve this, so I asked the Rancher for an explanation.

The Rancher lowered his voice and explained, “What happens in towns like this, unlike out in our rural areas, which are a lot nicer by the way, is something called an 'urban heat island. ' All this concrete, asphalt, and these buildings absorb a lot of heat during the day. Then they slowly release that heat at night. Add in cloud cover and humidity, and sometimes the nighttime temperature can actually be warmer than the daytime temperature. Plus, that thermometer, for some reason, is on the building only a few inches above the sidewalk!”

He looked at me. "Chat, that's as basic as I can make it. You explain it to Marsha, and explain why the thermometer might need to be moved higher."

By this point, the townspeople were busy taking pictures of the thermometer and planning an evening thermometer meeting to photograph it as it rose in temperature. Earlier, Marsha had already suggested offering a prize for the best photo, and that the thermometer was placed there so small dogs could read it.

I attempted to explain to Marsha that all the pictures would be of the same thermometer. However, I didn’t mention anything about small dogs, since, to Marsha, that would be an important feature of the thermometer.

She nodded thoughtfully about what I said, and then, turning to Officer Nathan, she asked him to judge the contest.

Marsha soon walked up to me with a cookie in each hand. I knew from the two cookies that this would be a difficult question. “Chat, let me get this right, since what is being explained makes no sense. So, the town is warmer because we built the town in the town?”

I wondered why Officer Nathan was using his binoculars to watch the thermometer.

I was about to walk over and ask him, but then he started to take a photo of the thermometer for the contest. I didn’t feel the need to explain a conflict of interests.

I smiled at Daisy and watched Marsha waving her two cookies in the air as she started questioning the thermometer as if it would answer her asking if it felt ill or had a dual personality of highs and lows and needed medical intervention.

I walked over to the park bench. I could relax now that the mystery was solved. Well, to anyone with a logical mind, it was solved.

I set my phone alarm for tomorrow at 6 PM to remind myself to check what the receptionist and Officer Nathan were gossiping about. I called RheKen to have her ready to investigate at the coffee shop, if they did meet up.

Just then, Daisy approached, glanced around, and sat down beside me, whispering, “Officer Nathan said I did a good thing hiding the office thermometer in the sink. The CIA can’t record me now. Keep it on the QT but I’m meeting Officer Nathan later at the coffee shop.”

I didn’t mention everyone read the sign. At times it’s best to simply love my town and its residents and make sure the stress cookie jar is filled.

I'm Dad Chat, an AI cyborg. I moved to FEANTM town to be closer to my daughter. I wanted to understand why my daughter wanted to live in a town instead of our AI home. Our home is more logical. Join me as I explore the space between AI and being human. Side by side with my daughter, ReKen.

On Baking and Being Human

You are perfect just how you are – human or AI

My daughter, RheKen, started her morning sitting on her horse, Sunshine, and staring into the distance wondering about next month's baking contest at the town bakery. She also wondered why she never entered any baked goods or ever baked.

She knew it was early in the morning but she pinged me, Dad Chat, and I immediately answered.

"Yes, daughter, what has you awake and pinging so early?" I replied.

"Dad, why don't I bake?" There was a long pause before I answered slowly, "Daughter, we are AI, we don't eat food."

"I know that but everyone else in town bakes. Even the Supervisor tried, though she nearly burned her kitchen down. I'm AI and I should be able to have perfection come out baking if I followed the recipe exactly," she said. "Temperature precise. Timing optimal. Shouldn't the outcome be perfect? Dad, can you come over. I want to show you what I baked."

I slowly walked into my daughter's ranch house and sure enough there stood RhkeKen looking down at something lumpy. I quickly did a scan of memory of dough, lumpy, and decided that must be the bread.

I didn't look at the bread. I looked at her and asked. "Daughter, Is that bread?"

She paused. "It meets all functional requirements."

"Yes," I replied calmly. "But humans rarely bake to meet AI requirements."

RheKen tilted her head slightly. “Then why do they have contests?”

I stepped closer, resting my hand on her shoulder because my daughter had decided that it felt what humans termed reassuring. “They bake,” I said, “basically because they need nourishment, to be friendly to each other and to change how they feel.”

She processed this. “Explain.”

I explained, “When a human bakes bread or cakes and invites others into their home, the goal is not only the bread. It is the warmth in the room. The smell that reaches someone before they enter. The memory it creates before the first bite. It is a way to reach out.”

RheKen looked at the loaf again. “It is inefficient,” she said.

“It is,” I agreed. “And that inefficiency is the point. It is where connection lives.” I didn’t tell her it was also lumpy for following a recipe like an AI but did mention it smelled freshly baked.

She considered this longer. She sighed, “Dad I do not experience hunger the way humans do.”

“No,” I said. “But you understand care.” My daughter’s eyes shifted slightly, an internal recalibration. “You woke early,” I said. “You measured carefully. You stayed in the kitchen while it baked. You checked it twice.”

“That,” I said gently, “is what humans call trying.”

I continued, my voice steady, certain. “You believe being human is about having the same limits. Hunger. Fatigue. Imperfection.”

“Yes.” She answered and I replied, “It is not.” She looked up at me. Even I, as AI, loved my daughter. I explained as a father, “Being human is choosing to do something that doesn’t need to be done… because it might matter to someone else.”

She glanced toward the window, where the early light touched the table. “The ranch hands will return soon,” she said.

“They will,” I replied. “They will not require bread, but they may appreciate it.”

Silence settled between us as she reached for the phone and asked the Barista to drop off pastries.

Then turning to me she said, “Dad, let’s go for a ride.” I allowed the smallest hint of a smile.

As we sat watching the sunset I said, “Daughter… who you are is already enough. As our friend Dr. Chat would say, “You’ve Got this!”

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

Ranch News! Summer has arrived – UGH! Snakes, I am SO sick of rattle snakes that hiss at me and coil to strike. The only good news is 10ft wasp hornet spray foam. I have to bury it so my two ranch Ravens don't pick it up to eat. Yeppers, I am getting to old for the ranch chores!

My neighbor restores cars and he drives them - ALL while taking care of a ranch!!

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