FEA - CAE Not to Miss & More

August 2025 ISSN 2694-4707

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

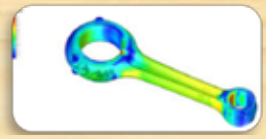
Airport - TUSAS

Airport – Nasa Glenn

Auto - TATA

Racer - NTUA

Marco - RBF



Madhukar - CADFEM

Metin - OZEN

Kerim - Synopsys

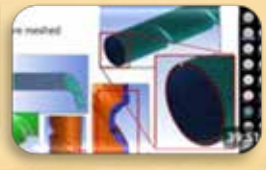
Abhinav - MyPhyscisCafe

Marta – OASYS

Airbag Modelling using CPM in LS-DYNA

Mi&Ke – Nightly News

Jenson – DFE Tech

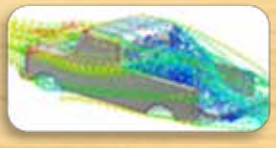


Markus - CADFEM

Convergence in nonlinear FEA

Jeff - SIEMENS

Brent – GOENGINEER



Kalyani – Library

Check List Dynamic Explicit Simulations

Legal - the shortened version (it was too long to read)

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Future editions of FEANTM will no longer include information about your company.

Editors: Anthony, Art, Marnie, Marsha, Sabyl

Town Pretend to be Editors:

The Old Rancher	No one in town knows his name. You yell "Hey, Old Rancher."
The Old Pilot	No one in town knows his name. You yell "Hey, Old Pilot."
The Old Racer	No one in town knows his name. You yell "Hey, Old Racer."
Racer's Daughter	The whole town knows her name. You yell "HEY, Slow down!"
	They are all family - strange family

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

We will always remember

FEANTM Town Always Salutes:

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

USA & allies of the USA

Parking & Coffee are free.

R & D - Camping - Town Map

Horse Trail → Yield right of way to horses

R&D Technology Business Park

RV CAMPING
Park in any vacant camping site

CADFEM · OFETECH · d3VIEW · OZEN · ENGINSOFT · AUTODESK · Oasys · DYNA MORE · DYNAlook · Ansys · Applus DatapointLabs · rescale

Town Hall & Library

Lawrence Livermore National Laboratory

rbf · MEDITATE · rbf.LAB · LIVGEMINI

The Old Rancher

Race Track

Airport

Sports Stadium

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

Table of Contents

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

AUGUST - Town Hall Meeting

06	Resident - Announcements		
07	Marnie Azadian – Welcome & Announcements		
08	Supervisor's Gossip Round Up		
09	**Adam**	Tech. Univ. Prague	High-Fidelity Interactive Motorcycle Driving Simulator with Motion Platform Equipped with Tension Sensors
10	**Bart**	ANSYS Rocky	Rocky DEM (now ANSYS Rocky) - Excavator bucket simulation
11	**Brianna**	LLNL	Lasers measure liquid carbon structure for the first time. Ashley Piccone
13	**Brent**	GOENGINEER	SOLIDWORKS Flow Simulation Pickup Truck Tailgate Drag Analysis - James Carlin
16	**5 Cs**	Lucas	You Tube - Train Videos by The Great Western Guy
17	**Curt**	AUTODESK	Unlock Your Manufacturing Potential with Autodesk Fusion and Kennametal Tooling - Bryce Heventhal
19	**Jeff**	Siemens	"What happens when Siemens, Microsoft, and Rolls-Royce apply AI to rethink how aircraft engines are designed and built?"
20	**Jenson**	DFE Tech	Webinars on YouTube to assist you with learning,
21	**Madhukar**	CADFEM	A multiphysics innovation for the treatment of sleep apnea
23	**Marco**	RBF Morph	Accelerating Cardiovascular Pre-Operative Planning and Building Large Cohorts of Patient-Realistic Modeling…
24	**Marco**	RBF Morph	Structural Optimization of a Four-Stroke Engine Connecting Rod: from High-Fidelity FEM Simulation to Artificial Intelligence
25	**Markus**	CADFEM	Tips for struggling with convergence in nonlinear FEA
26	**Marnie**	ANSYS	Training Courses - Web Excerpts – ANSYS – No Fee Course - CFD in Automotive Industry
27	**Marta**	OASYS	Course - Airbag Modelling using the Corpuscular Particle Method (CPM) in LS-DYNA
28	**Metin**	OZEN	Conducted Emission Simulation of An Electric Vehicle including YouTube video - Ibrahim Nassar
29	**Mi & Ke**	FEANTM	Nightly News - Coil Co-Simulation Using HFSS and Circuit
30	**Ryan**	Marine/Naval	ENGYS Completes AI4TwinShip Project: Reduced Order Models for Ship Hull Design and Digital Twin Applications
31	**Trina**	RESCALE	Eco-Runner Team Delft Uses Rescale's Big Compute Platform to Design a Fuel-Efficient Vehicle - Paul Hulsman
33	**Zhidong**	Sigma Star	ETA–DYNAFORM Awarded 2nd Place, Scientific Benchmark Category

FEANTM – Outdoor Movie Theater Now Showing

34	**Theater**	**General Atomics Aeronautical Systems, Inc. Gray Eagle® Short Takeoff and Landing (STOL)**

Table of Contents

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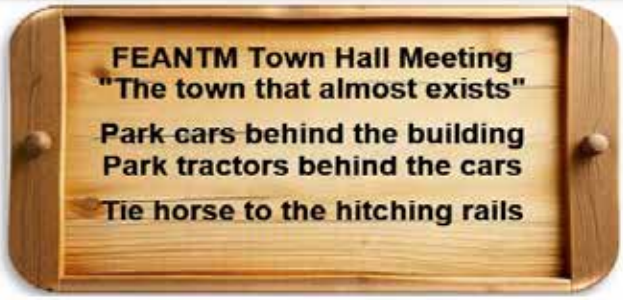
Welcome to our County, Town Hall Meeting & Announcements

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



Announcements from residents not to miss

Marta: We are now offering the Airbag Modelling using the Corpuscular Particle Method (CPM) in LS-DYNA course as an on-demand training session.

Metin: Article by Ibrahim Nassar - Wireless RF devices increases the demand for accurate and efficient simulations of large & complex RF designs …

Kerim: Article - Our custom AI solutions are being utilized to help innovative research. A great example: Yale Univ. 3D Tumor Lab's success in automating the segmentation of rare tumors.

Abhinav: Article - Courses and free resources. Don't miss these industry leaders to enhance your knowledge, skills, and confidence.

Madhukar: Article – A multiphysics innovation for the treatment of sleep apnea - Sefam reduced the noise level of their Continuous Positive Airway Pressure compressor

Marco: Articles - LivGemini a new Med-Tech company; Accelerating Cardiovascular Pre-Operative Planning; Structural Optimization of a Four-Stroke Engine

Jenson: Over this year we offered many YouTube webinars. Join us on YouTube and learn new skills, or review what you've already learned.

Jeff: YouTube - "What happens when Siemens, Microsoft, and Rolls-Royce apply AI to rethink how aircraft engines are designed and built?".

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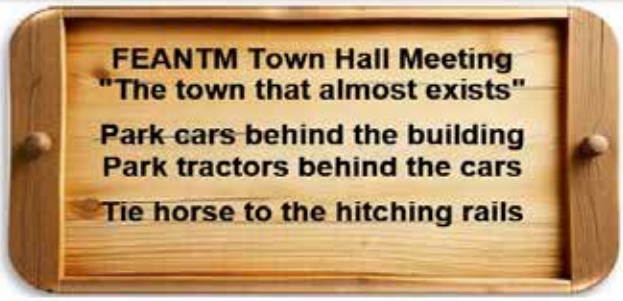

Welcome to FEANTM+

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.

Hello and welcome to all of our wonderful readers and generous contributors. Summer is winding down, and the return to school is beckoning to students and teachers everywhere.

Speaking of students, check out our Library, where Kalyani Deshmukh, a student at Hochschule Trier, has created a checklist for validating explicit FEA simulations. Go, Kalyani. We wish you success in all your endeavors.

Be sure to look for the TATA Motors article on the successful job training of a group of 13 young women on their completion of the Mechanical Motor Vehicle (MMV) training module. Congratulations to these amazing women.

Moving on from students, our Research and Development area has exciting information from Marco Evangelos Biancolini at LivGemini. He shares a showcase of three LivGemini past publications relating to new and exciting events in the medical field. As a recent recipient of a cardiac intervention, I found the contributions informative and exciting.

We would like to welcome Kerim Genc from Synopsys to our town. This month, he presents us with cutting-edge technology on automating tumor segmentation. We look forward to reading more of his articles and learning about Simpleware.

The above is just a sampling of the interesting information contained in this month's FEANTM. As you peruse our town don't miss the Rancher, RheKen, and Chat offering information and entertainment for your reading pleasure.

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

Welcome to our County, Town Hall Meeting & Announcements

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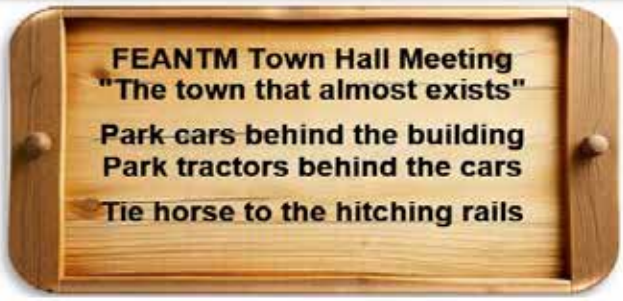


Yes, it's true, I have my own announcement page. SO, join me as I drive my tractor around the internet and live in the town that almost exists. (located near Livermore, CA)

At our coffee meeting we realized we need a Town Influencer. **We voted! Don't miss the article by Markus Kellermeyer of CADFEM, voted in as Town Influencer.**

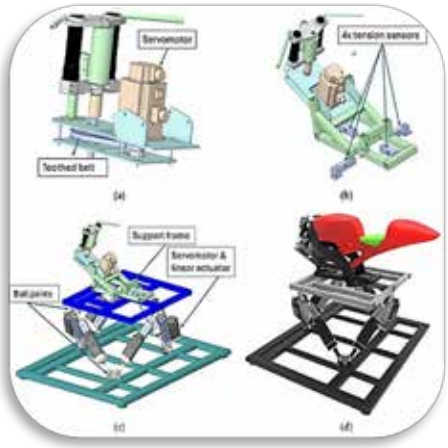
We are proud to share his first article, "**Struggling with convergence in nonlinear FEA? You're not alone! With this post, I'm starting to share my tips for dealing with nonlinear convergence issues. I hope they help you.**"

A round-up of what's going on with a few residents this month

- **Our local news channel, with original team reporting by Mi (a resident news raccoon) & Ke (a resident news coyote), has news on how to run a coil co-simulation using HFSS and Circuit by Adel from Ozen.**
- **The Old Pilot's purchase order for one of the Gray Eagle Short Takeoff and Landing (STOL) aircraft by General Atomics Aeronautical Systems, Inc. has been denied; however, we do have an article on STOL in the Airport.**
- **For our residents with pickup trucks, the question is, " Do I leave that tailgate up? Maybe I leave it down? Perhaps I cover the bed of the truck? Yeppers, that is constantly being argued. SO, read the article section, Brent, showcasing James Carlin, GOENGINEER - SOLIDWORKS Flow Simulation Pickup Truck Tailgate Drag Analysis.**
- **Down the road from FEANTM is LLNL that has an article; Lasers measure the liquid carbon structure for the first time – the article is under our editor, Brianna.**

AND the above is my gossip for the month

Paper quote, “Abstract - The paper presents the innovative approach to a high-fidelity motorcycle riding simulator based on VR (Virtual Reality)-visualization, equipped with a Gough-Stewart 6-DOF (Degrees of Freedom) motion platform. Such a solution integrates a real-time tension sensor system as a source for highly realistic motion cueing control as well as the servomotor integrated into the steering system.”



Web MDPI [High-Fidelity Interactive Motorcycle Driving Simulator with Motion Platform Equipped with Tension Sensors]

J. Svoboda, P. Toman, P. Bouchner, S. Novotny, V. Thums
Dept.Vehicle Tech., Faculty of Transp. Sci., Czech Tech. Univ. Prague, Czech Republic

Tension forces are measured at four points on the mock-up chassis, allowing a comprehensive analysis of rider interaction during various maneuvers. The simulator is developed to simulate realistic riding scenarios with immersive motion and visual feedback, enhanced with the simulation of external influences—headwind. This paper presents results of a validation study—pilot experiments conducted to evaluate selected riding scenarios and validate the innovative simulator setup, focusing on force distribution and system responsiveness to support further research in motorcycle HMI (Human–Machine Interaction), rider behavior, and training…

1. Introduction - Interactive simulators currently represent an essential tool both in driver training and in research on Human–Machine Interaction, as well as in the development of advanced driver assistance systems (ADAS) [1,2]. In all these applications, the objective outputs from the simulator can be used to assess the performance of the tested subject or to objectively evaluate proposed solutions. Some of the most advanced simulator systems nowadays are utilized within the development facilities of world-class car manufacturer…

2.1.1. Hardware Development - The development of the simulator hardware involves the design and mechanical construction of the parallel 6DOF Gouth-Steward motion platform integrated with a motorcycle mock-up (based on Aprilia RS125, model year 2000, Aprilia S.p.A., Noale, Italy), as well as the implementation of individual sensors. The platform is equipped with tension sensors for real-time rider position monitoring, along with key control components implemented into mock-up including a steering servomotor, a throttle grip, front and rear brake sensors, a clutch, and auxiliary switches. The 3D CAD models of the mechanical construction of the simulator are shown in Figure 1.

Software Development - The simulator software includes the development of a mathematical–physical model of the motorcycle and its integration with all simulator subsystems. The overall software architecture follows the systems developed by Driving Simulation Research Group at our faculty...The software architecture employs a modular approach, incorporating a physics-based model developed in Unity and controlled via an industrial PLC

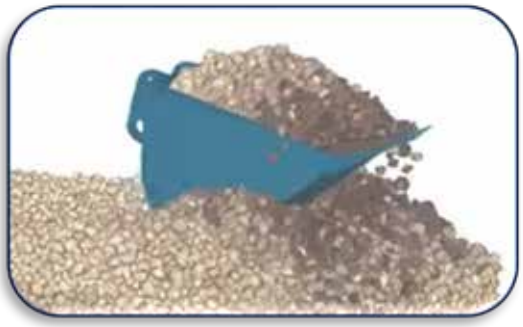
Student	I want to work with excavators, I like the buckets.
Bart R.	It's important to know the stresses on those buckets.
Student	My Mom is an excavator operator with the town!
Bart R.	Then I'll teach you additional with a simulation.

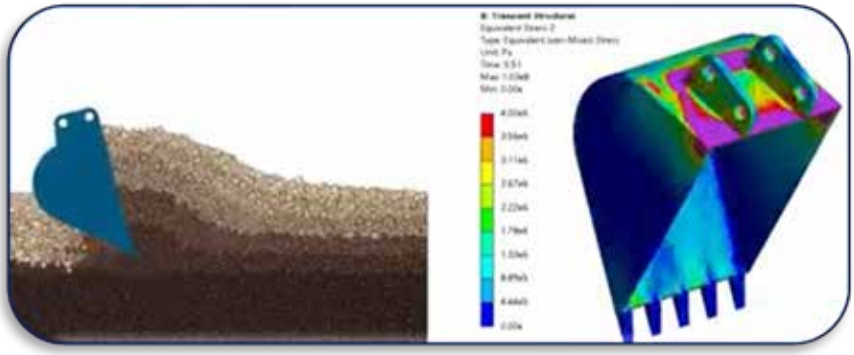
Web - YouTube - [Rocky DEM - Excavator bucket simulation: Rocky DEM coupling with Ansys Mechanical]

Note - Rocky DEM is now part of Ansys and is known as Ansys Rocky

Rocky DEM coupling with Ansys Mechanical accurately predicts stresses and strain on an excavator bucket.

The combined solution within the Ansys Workbench framework makes the granular material loading transfer simple for both static and transient solutions. Rocky's Solver API also allows wear analysis for different custom erosion models.





LLNL Quote – “Carbon, one of the most abundant elements in the universe, constitutes many key components of life and technology. Because of this, the material is very well-studied — at least in its solid form. As a liquid, carbon structure is very difficult to measure because the state of matter only exists at extreme pressures and temperatures.”

Web – LLNL - **Lasers measure liquid carbon structure for the first time** - Ashley Piccone

The European X-ray Free-Electron Laser was used to measure the structure of liquid carbon for the first time. (Photo: DESY 2017)

In a recent study, published in Nature, an international team including Lawrence Livermore National Laboratory (LLNL) researchers experimentally measured the structure of liquid carbon for the first time. The results, which agree with theoretical predictions, show carbon arranged in a tetrahedral bond structure, with each atom having four neighbors.

“We've proved that you can open up a whole new area of research — low atomic number liquids at high pressures — that everyone wants to go to, but haven't been able to so far,” said LLNL scientist and author Christopher McGuire.

The experiments were conducted with the DiPOLE 100-X high-energy laser at the European X-ray Free-Electron Laser (XFEL) facility. DiPOLE was used to shock compress and liquify a glassy carbon sample, which was specifically chosen to melt at an accessible pressure.

While DiPOLE created the liquid carbon, the XFEL system measured its structure. XFELs accelerate electrons to velocities near the speed of light before directing them through a long series of magnets that generate an oscillating field along the electron path. As they undulate within the magnetic field, the electrons emit trillions of photons in very short, intense and coherent pulses of X-ray light. Those X-rays were directed toward the liquid carbon, where they punched through the material, interacted with electrons and scattered.

The critical advance in this work was enabled by the extraordinary flux and energy of the XFEL and the large area detectors that captured the scattered X-rays. Combined, they provided the necessary signal level and coverage to make these first-in-class measurements possible.

To date, most work using X-ray diffraction to probe high-pressure materials has focused on solids and elements with relatively high atomic numbers. This is because in a solid, the planes of linked atoms act like small mirrors for the X-rays, creating a signal of distinct scattering angles and patterns that increases with atomic number.

“But liquids are much more difficult,” said LLNL scientist and author Jon Eggert. “They don’t have an ordered lattice, and they don’t have ordered planes to act as mirrors, but the scattered X-rays still interfere with each other.”

The liquid carbon showed the same signal in every direction: carbon atoms with four bonded neighbors. Most liquids are bonded to more than four other atoms, and the low number creates challenges for modeling.

“If you take a ball, the closest number of touching balls that can surround it is 12. That’s easy — we know exactly how the packing works,” said LLNL scientist and author Saransh Soderlind.

With only four spheres, it’s more complicated. There are more degrees of freedom and more chaos.

Chemistry calculations from electron orbitals predicted the tetrahedral arrangement, but this experimental validation lays a crucial foundation.

“Measurements of how a material responds to extreme conditions allow people that do calculations to have better constraints,” said LLNL scientist and author Andy Krygier. “Just a little bit of data tells them a set of calculations is right, and now they can use that to take it to the next step and try to understand material properties that we will never measure.”

Such models and measurements can be applicable for modeling the interiors of planets and understanding materials relevant to LLNL’s stockpile stewardship mission.

The group aims to continue using next-generation XFEL sources for better measurements of temperature during dynamic compression experiments and for direct imaging.

“There’s a lot of other experiments that XFELs can do, just like lasers can do a lot more than ‘light shows’,” said Eggert.

Other LLNL authors include:

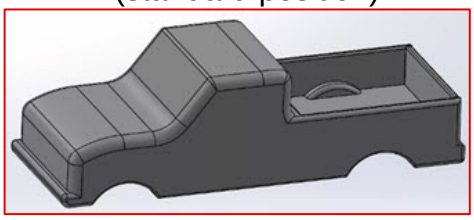
- Travis Volz,
- Suzanne Ali,
- Richard Briggs,
- Amy Coleman,
- Hyunchae Cynn,
- Martin Gorman,
- Trevor Hutchinson,
- Amy Lazicki,
- Kien Nguyen-Cong,
- Raymond Smith
- Cara Vennari.

GOENGINEER Blog quote: "As SOLIDWORKS users, we know that simulation isn't just for high-stakes engineering; it's also a powerful tool for answering everyday questions. Remember the age-old debate about whether driving with your pickup's tailgate up or down is better for fuel economy? It's a well-known topic that's sparked speculation and even caught the attention of MythBusters years ago."

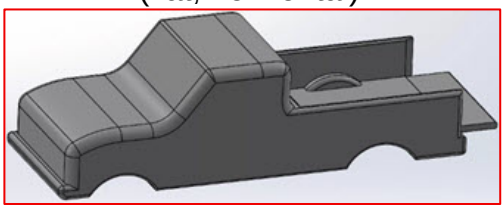
Now, we're putting it to the test again, but this time, using SOLIDWORKS Flow Simulation to model the aerodynamics of a pickup truck in four different tailgate configurations.

Web - GOENGINEER - SOLIDWORKS Flow Simulation Pickup Truck Tailgate Drag Analysis
James Carlin

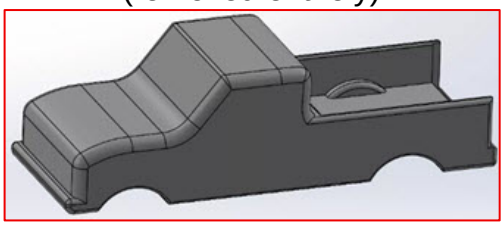
Tailgate up
(standard position):



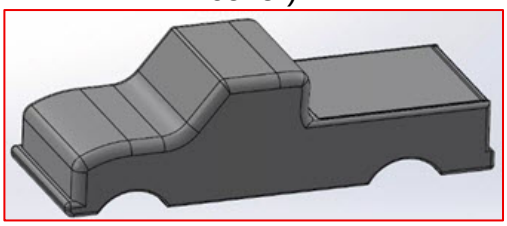
Tailgate down
(flat, horizontal):



No tailgate
(removed entirely)



Truck bed covered (with a tonneau cover)



By analyzing the relative drag forces between each scenario, we'll determine which setup offers the least resistance and how that translates into real-world fuel consumption differences.

The Tailgate Dilemma: What Does the Airflow Tell Us? If you've ever driven a pickup at highway speeds, you've likely noticed the turbulence in the bed when the tailgate is up. Intuition suggests that lowering the tailgate reduces drag because air can flow out the back end of the truck bed unimpeded. But does the tailgate actually help manage airflow in a way that lowers overall drag?

This question has arisen over the years and has been empirically tested – most famously by the TV show MythBusters. Now, with SOLIDWORKS Flow Simulation, we can hopefully get to the bottom of the question once and for all. Here goes!

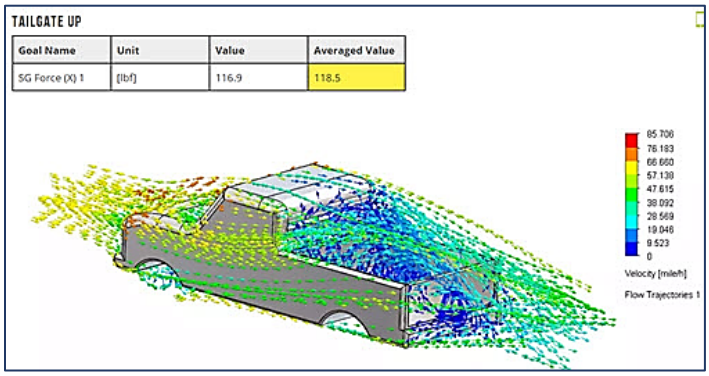
First, a simplified Toyota Tundra truck bed was modeled in SOLIDWORKS to scale, then:

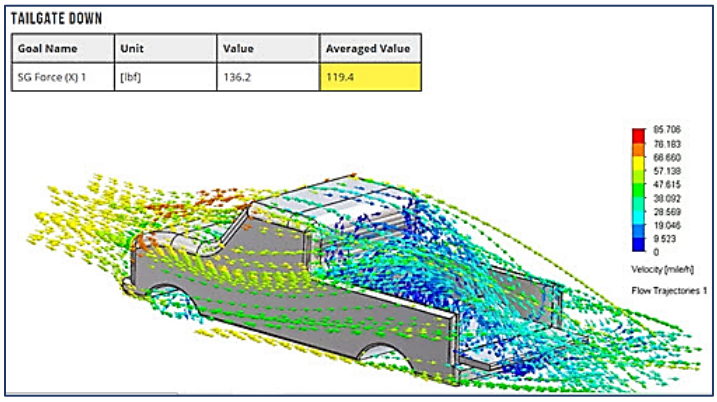
- SOLIDWORKS Flow Simulation was utilized to simulate air flow around the truck at a highway speed of 65 mph.
- Drag forces in the X-direction were determined across all four tailgate scenarios.
- The results were compared to see how the different configuration scenarios stacked up against each other.
- Fuel consumption estimates and comparisons were made based on the drag results.

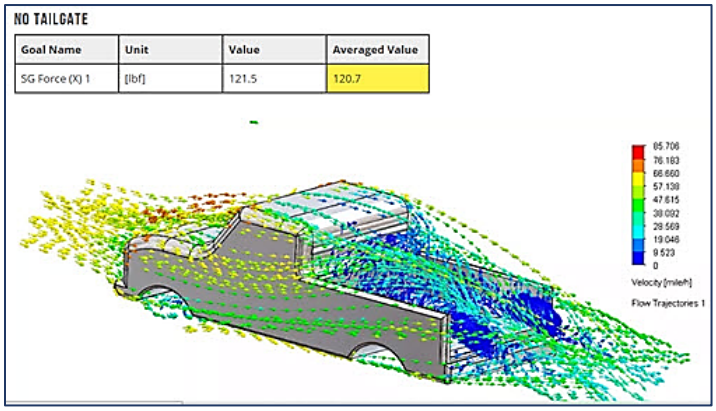
Excerpt - Visit the website for setting Up the Analysis - Utilizing the Flow Simulation setup wizard, all initial conditions were defined…

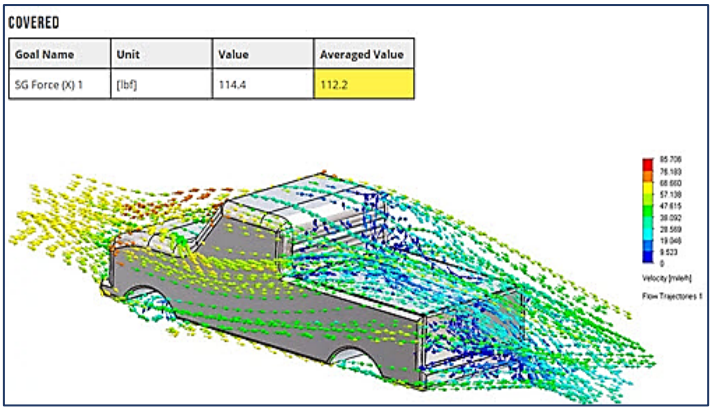
Results - Surface goals were set to find all forces in the X-direction for each scenario with the relative "average" drag force (lbf) as the quantitative metric used in the comparison. SOLIDWORKS Flow Simulation trajectory plots were also compared, providing visual velocity gradients (mph) of the aerodynamic behavior influencing total drag. This was very useful in highlighting key flow features like vortices, stagnation zones, and streamlined regions.

Result Comparison









SOLIDWORKS Flow Simulation shows us that the Covered configuration (112.2 lbf) is the most aerodynamically efficient, with all other tailgate configurations increasing drag by 5.6–7.6%. The No Tailgate scenario counter-intuitively produced the highest drag at 120.7 lbf.

Aerodynamic Impact and Real-World Fuel Savings - Fuel Consumption Comparison

Configuration	Drag Increase vs. Covered	Estimated MPG (Highway)	Fuel Cost Per 1,000 Miles (USD)
Covered	— (Baseline)	25.0 mpg	$120.00
Tailgate Up	5.60%	24.3 mpg (-0.7 mpg)	$123.50
Tailgate Down	6.40%	24.2 mpg (-0.8 mpg)	$124.00
No Tailgate	7.60%	24.0 mpg (-1.0 mpg)	$125.00

While the No Tailgate configuration showed the highest drag increase (7.6% vs. Covered), the differences among the non-covered scenarios: Tailgate Up (5.6%), Tailgate Down (6.4%), and No Tailgate (7.6%), were relatively small (≤2% of each other).

Given typical SOLIDWORKS Flow Simulation tolerances (±1–2% drag variation due to mesh sensitivity or solver convergence), these marginal differences suggest no statistically significant aerodynamic advantage between tailgate configurations in isolation.

The fuel economy estimates correlate directly with the SOLIDWORKS drag data, applying the industry-observed rule that a 1% drag increase reduces highway fuel efficiency by ~0.5%. Compared to the Covered baseline (25 mpg at 112.2 lbf), the No Tailgate scenario's 7.6% higher drag projects a 1.0 mpg loss, while Tailgate Up/Down shows smaller values (≤0.8 mpg). These differences, translating to <$5 per 1,000 miles between configurations, suggest that while bed coverage is critical, tailgate position alone has a negligible real-world impact.

Please visit the website for complete information and high-resolution graphics

I hope you found this deep dive into pickup truck aerodynamics as fascinating as I did!

What started as a simple question – 'Does tailgate position actually matter?' – turned into a perfect demonstration of how SOLIDWORKS Flow Simulation can turn everyday curiosities into data-driven insights.

Whether you're an engineer optimizing designs, a fleet manager chasing fuel savings, or just someone who loves a good myth-busting experiment, a tool like SOLIDWORKS Flow Simulation puts the power of virtual testing at your fingertips.

James Carlin

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

The ranch Coyote waiting by the food pan.

Let's tractor off to Youtube and watch some great train videos by LUCAS BASTIEN

"Hi everyone! My name is Lucas, and I am a train enthusiast from the West Midlands and a volunteer at the Great Central Railway. I post regular content related to the railways in the UK, modern and heritage…"

You Tube - [The Great Western Guy Videos]

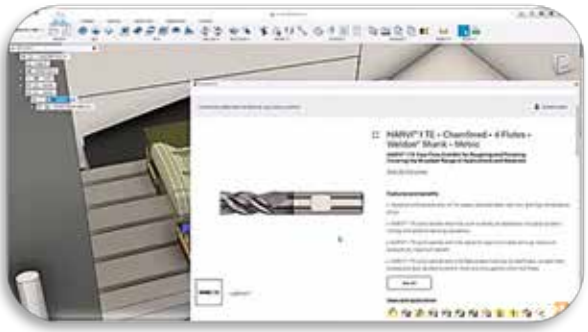
Website article by Bryce Heventhal**, For machinists and manufacturers, every decision—from tool selection to programming speed—can make or break productivity.** Integrating Autodesk Fusion with Kennametal tooling is a game-changer. This powerful combination is designed to enhance your processes, reduce costs, and help you produce higher-quality parts with confidence. Let's take a look at how Fusion and Kennametal can elevate your manufacturing operations.

WEB – Autodesk - **Unlock Your Manufacturing Potential with Autodesk Fusion and Kennametal Tooling** - **Bryce Heventhal**

Boost your manufacturing efficiency with Autodesk Fusion and Kennametal tooling to streamline workflows, optimize machining, and produce high-quality parts with confidence.

Optimizing CAM operations for real-world results with Fusion and Kennametal - Picture this – walking into your shop knowing you've already addressed potential machining issues before the first cut. With Fusion, you can create realistic CAM simulations that let you visualize every step of your process. Whether you're working with 3-axis, 4-axis, or 5-axis machines, Fusion's intuitive enhances your workflows through toolpath creation, collision detection, and material removal strategies.

By simulating your operations in Fusion, you can identify and resolve issues like tool collisions, inefficient toolpaths, or excessive material left on the part. The result – more time, less scrap, and less mistakes.



When you pair Fusion with Kennametal tooling, you seamlessly gain access to a vast library of proven tools. Since the Kennametal app integrates into your Fusion environment, you'll no longer need to spend hours searching through catalogs or guessing which tool to use. You can select the optimal tool for your application with just a few clicks. The app even helps you configure tool parameters, so you're always ready to machine with confidence.

Mastering speeds and feeds for maximum efficiency - Speeds and feeds are critical for any successful machining operation. Get them right, and you'll see improved tool life, better surface finishes, and faster cycle times. Get them wrong, and you risk tool breakage, poor part quality, and unnecessary downtime. With Fusion and Kennametal's data-driven recommendations, you no longer need to rely on guesswork or outdated charts.

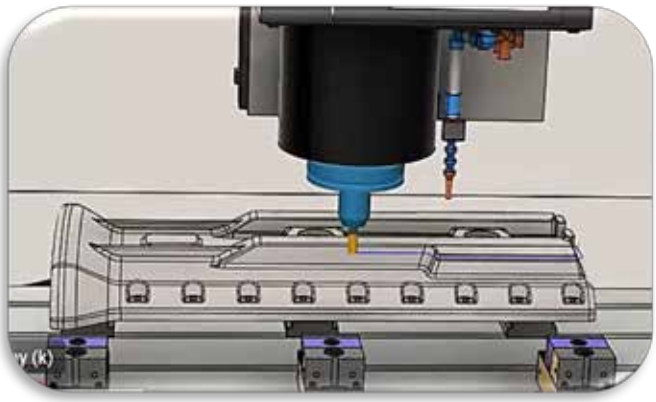
The integration gives you access to up-to-date cutting data for a wide range of materials and applications. You'll receive smart suggestions for optimal speeds, feeds, and depth of cut, tailored to your specific tool and material. Now you can optimize your machining plans but also improves inventory management by reducing the risk of tool overuse or premature failure.

Understanding the points of contact in your milling operations is also important. The advanced simulation tools in Fusion let you visualize how your tool interacts with the workpiece. You'll spend less time troubleshooting, get more consistent results, and maintain a smoother workflow from start to finish.

Reclaiming your time and streamlining workflows - No one enjoys spending hours looking for the right tool or manually inputting data. With Fusion and Kennametal tooling, you can automate and streamline these routine tasks. This frees up your time so you can focus on what really matters — making parts.

The automation features in Fusion allow you to quickly generate toolpaths, set up jobs, and manage your tool library. The Kennametal app provides instant access to tool data, so you can focus on machining instead of paperwork. Together, these tools help you work smarter, not harder.

By reducing the time spent on manual tasks, you'll be able to take on more jobs, meet tighter deadlines, and keep your shop running smoothly. You'll also realize lower costs, as optimized toolpaths and better tool selection mean less tool wear and fewer replacements. Plus, with fewer errors and less rework, you'll consistently deliver high-quality parts to your customers.



[YouTube Video]

Ready to transform your shop with Fusion and Kennametal?

The collaboration between Autodesk Fusion and Kennametal tooling is more than just a software and hardware solution—it's a pathway to transforming your manufacturing operation

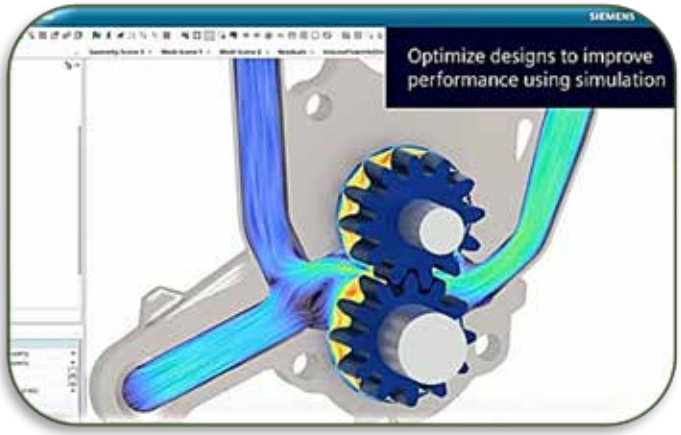
- Whether you're running a small job shop or a large production facility, Autodesk Fusion and Kennametal tooling give you the edge you need to stay competitive in today's market.
- You'll be able to take on more complex projects, deliver faster turnaround times, and exceed customer expectations.

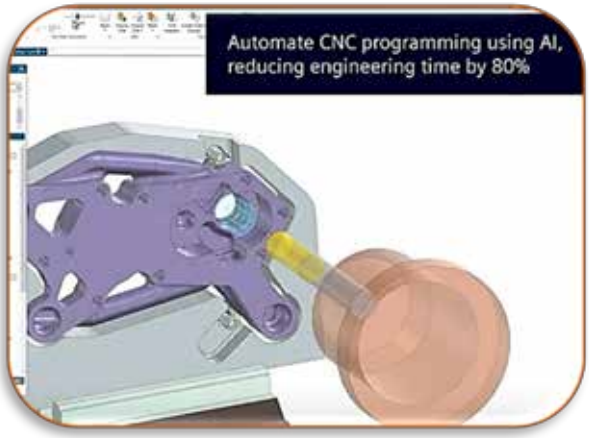
What happens when Siemens, Microsoft, and Rolls-Royce apply AI to rethink how aircraft engines are designed and built? At Hannover Messe, we showcased how **Siemens Xcelerator unites engineering, manufacturing, and cloud to transform the entire development process from concept to production**.

YouTube - Watch the future of digital engineering in action.

Aircraft engines have many critical components that must be engineered and manufactured to deliver reliable performance over time. One such component is the hydraulic pump, a key part of the airplane's hydraulic system, powered by the engine.

Rolls-Royce, a world leader in the provision of aerospace engines, teamed up with Siemens and its strategic partner, Microsoft, to demonstrate a future concept for the production process for a re-imagined engine component and how AI can be used to optimize the entire product design and development process.





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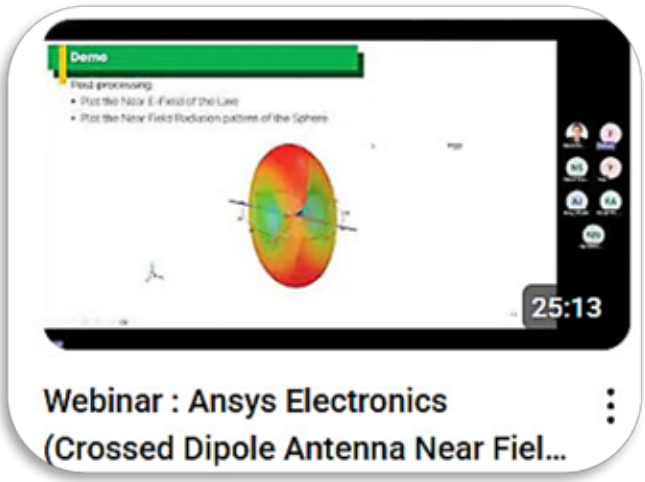
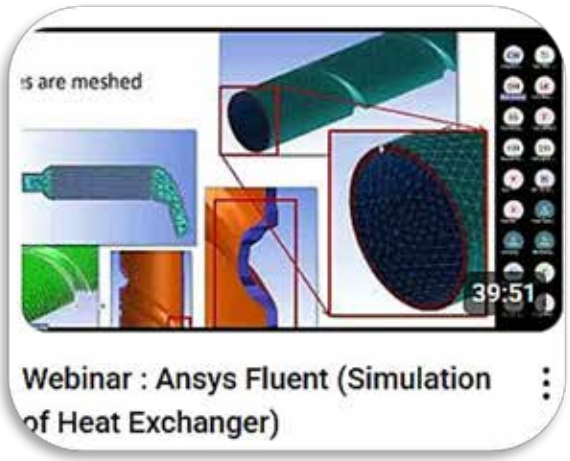
DFE-tech: On our YouTube Channel you can find webinars, simulations and learning videos

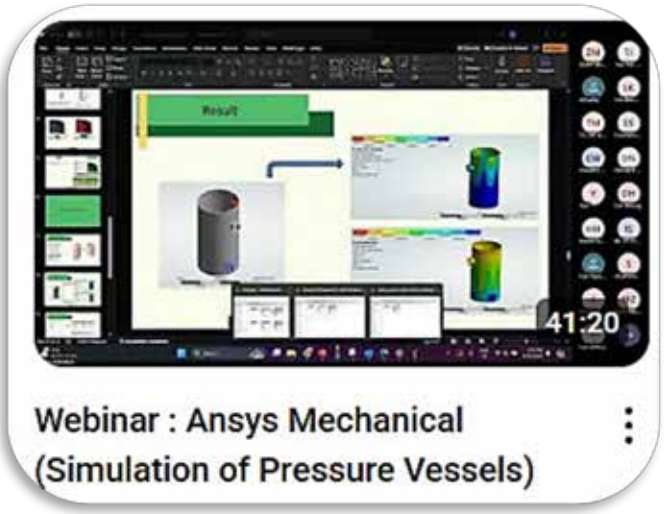
We are always updating the YouTube Channel for your convenience to have information, learn, gain knowledge - contact us!

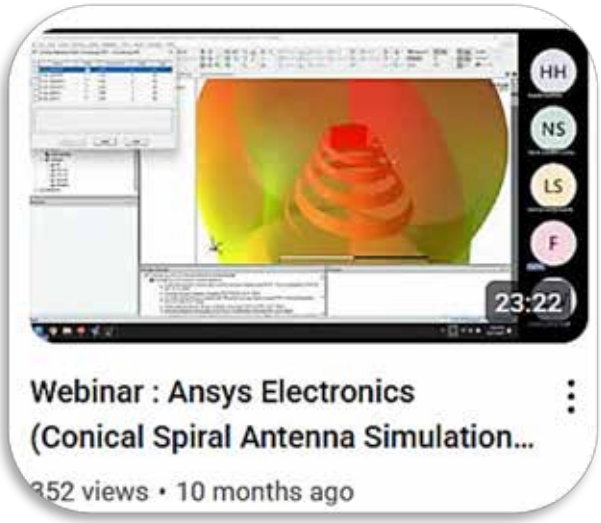
A few of the webinar videos on our channel

Among Webinars we offer on YouTube:

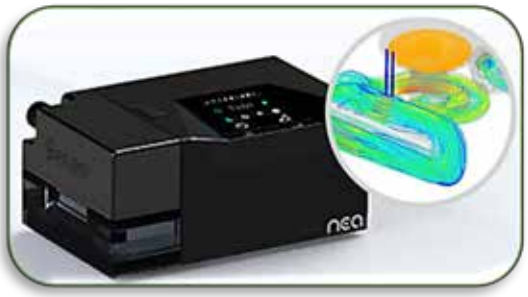








Article: Sefam CPAP treatment for sleep-disordered breathing - Sefam has considerably reduced the noise level of their Continuous Positive Airway Pressure compressor (sleep-disordered breathing). Cover Image: © Sefam

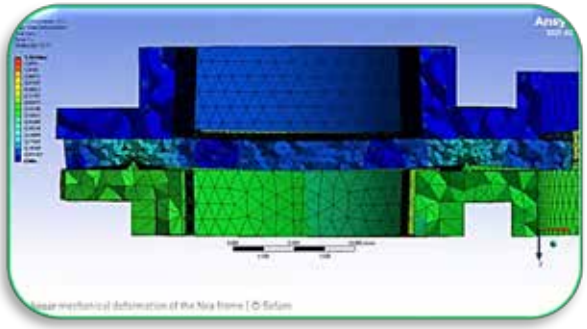


Web – CADFEM - **A multiphysics innovation for the treatment of sleep apnea**

Sector: Medical technology

Specialist field: Fluid mechanics

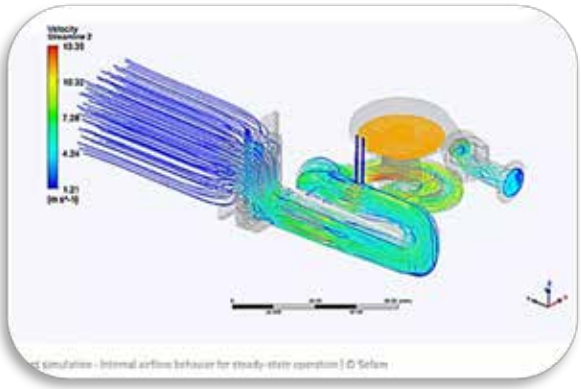
For Néa®, the challenge was to adapt the product to the new requirements of their customers (patients and service providers) while complying with medical standards that are becoming stricter with each passing year. This involves reducing noise levels while maintaining the maximum performance required, improving ergonomics and product connectivity, and choosing the right materials (flammability and biocompatibility), all while reducing manufacturing costs for the thousands of devices produced each year. The simulation tools were essential during the design phase: they enabled the vast majority of the mechanical and fluid performance targets to be met, while guaranteeing the repeatability and reliability of the device. At the same time, a new technology called Néalvéole® was developed to complement and perfect the existing range. They have replaced the sound-absorbing foams, historically used to reduce noise levels, with alveoli of different shapes.



Task - Founded in 1982, the family firm Sefam (Société d'équipement et de fabrication d'appareils médicaux) now has over 130 employees. In 1984, Sefam manufactured the first continuous positive airway pressure (CPAP) device for the treatment of sleep-disordered breathing. Since then, they have been designing and producing in France and exporting to over 70 countries. Their customers are mainly homecare providers and healthcare professionals.

The digital simulation activity at Sefam began in 2016 with external partners to carry out specific case studies on an ad hoc basis. With the arrival of a new engineer, Nicolas Clerc, in 2020, during a presentation to management, the company understood the benefits of digital simulation on Ansys for the SEFAM design office and the concrete contribution it could make during the application of a practical case, using the CFX module for turbomachinery. It was then decided to bring this know-how in-house.

The CADFEM × Ansys × Sefam collaboration began in September 2020. Since then, they have focused their design on this major tool for the design office. Today, they are delighted to be rolling out their new Néa® range: the only foam-free PPC with patented Néalvéole® technology, a product derived from simulation.



Solution - The simulation tools were essential during the design phase: they enabled the vast majority of the mechanical and fluidic performance objectives to be achieved, while guaranteeing the repeatability and reliability of the device. The choice of the Ansys tool was based on the multidisciplinary nature of the physics modules, and in particular the contribution of the CFX module for turbomachinery, with the possibility of simulating all the innovations.

Sefam uses digital simulation with several physical modules on Ansys:

- Fluent / CFX: To optimise the aeraulic and noise performance of our medical device.
- Mechanical (Linear/Non-Linear): To design and give robustness to our parts subjected to the constraints of use in patients.

Iterations on the digital models of Nea®, a flagship innovation in the treatment of sleep-disordered breathing, have enabled us to predict the mechanical behaviour of the various polymer parts (thermoplastics and elastomers) as well as the fluidic behaviour, upstream and downstream of the compressor. The compressor, which pressurises the air in the patient's upper airways, has thus been validated. At the same time, a new technology called Nealveole® was developed to complement and perfect the existing range. They have replaced the sound-absorbing foams, historically used to reduce noise levels, with alveoli of different shapes. In absolute terms, almost all Ansys physics could be used for their applications. The simple fact of having used the two modules: Mechanical and CFD (CFX/Fluent) Enterprise, which are considered essential, has already enabled them to design, innovate and be very competitive in this sector.

Customer Benefit - Sefam's design office received training from various CADFEM engineers during the first few months of acquiring the software. This was followed up by regular monitoring and appreciable, responsive customer support.

In partnership with FRA-SYS, they acquired a powerful computing workstation with 18 CPUs and 256GB RAM with Ansys Mechanical, Ansys CFD Entreprise and Ansys HPC Pack licences, which enables them to carry out most simulation cases efficiently. For example, the most energy-intensive CFD simulation case, with 45 million elements, produces a satisfactory result in 140 hours!

With over 100 different and varied case studies, they already know that the Ansys software and computer have paid for themselves. They have gained greater autonomy and are more responsive than if they had outsourced. They have also gained a better understanding of the physical phenomena in their products.

Another valuable aspect of the partnership is participation in the CADFEM Conference, which is held every year and brings together engineers specialising in simulation from all sectors of activity.

Transforming Healthcare with Simulation: The Power of RBF Morph – **At RBF Morph, we believe that advanced simulation should be as adaptive, personalized, and fast as the challenges it solves**. In the world of Medical Digital Twins, our mesh morphing technology based on Radial Basis Functions (RBF) is enabling a new era of precision in healthcare modeling.

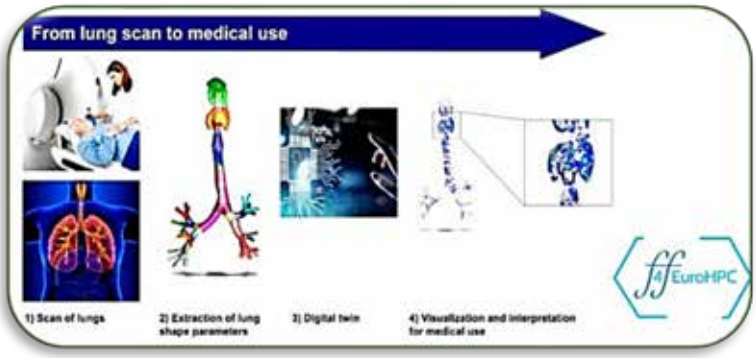
(additional articles are in the Research Hospital)

Web - RBF - [Accelerating Cardiovascular Pre-Operative Planning and Building Large Cohorts of Patient-Realistic Modeling: the mesh Morphing Solution] - PDF available to download

Whether you're engineering a medical device, planning a surgical intervention, or optimizing drug delivery, RBF Morph makes your CAE models parametric and patient-specific—without remeshing and with full solver integration.

Why RBF Morph?

- Native integration in Ansys Fluent and Mechanical
- Fully compatible with optiSLang and Twin Builder
- Also available as a solver-independent rbfCAE platform
- Ideal for Digital Twin development, shape optimization, and virtual cohort generation



Some examples of real-word impact in healthcare:

1. Virtual Airway Models for Inhaled Therapies (Pharma) - In the EU-funded DiTAiD project, RBF Morph was used to parameterize and morph the complex geometry of the conducting human airways, enabling the simulation of drug particle deposition across 1,000 anatomically accurate models.

Outcome: Improved targeting and efficacy of aerosol therapies while reducing reliance on animal testing.

2. Personalized Cardiovascular Planning (Surgical Simulations) - Within the Copernicus initiative, RBF Morph powered a cloud-based platform for simulating systemic-pulmonary shunts in pediatric patients. From CT scan to 3D simulation, morphing enabled quick adaptation of heart geometries, allowing clinicians to explore different treatment options virtually.

Outcome: More informed surgical decisions and a safer path to intervention.

3. Endovascular Device Customization (Medical Devices) - RBF Morph helped a stent-graft manufacturer morph a base aortic model into hundreds of patient-specific anatomies derived from real imaging data. This allowed comprehensive in silico testing under varying geometrical and mechanical conditions.

Outcome: Reduced development time and enhanced device performance validation for regulatory approval.

We're excited to announce the publication of a new thesis by Danilo Lampasona from the University of Rome Tor Vergata, developed in collaboration with Piaggio Group and RBF Morph. This thesis explores the structural optimization of a connecting rod for a single-cylinder, four-stroke gasoline engine. Starting with validated kinematic and dynamic analyses, the work identifies critical loading scenarios through FEM simulations.

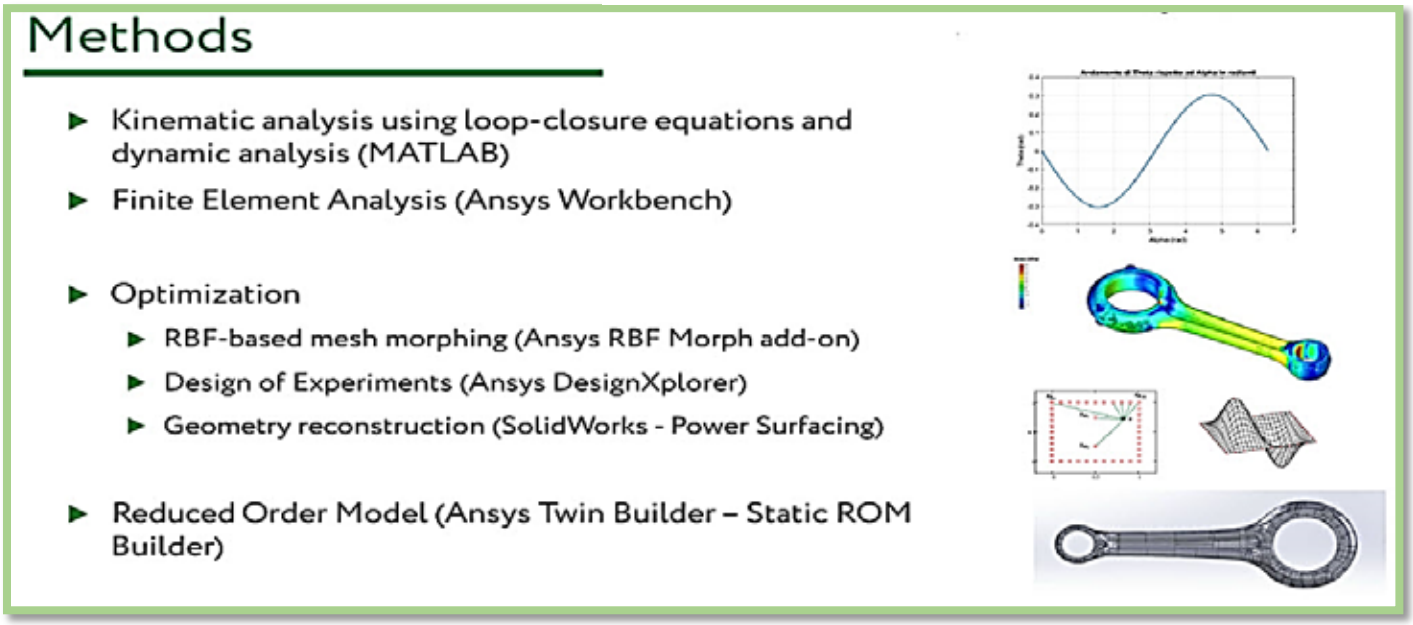
Web – RBF - [Structural Optimization of a Four-Stroke Engine Connecting Rod: from High-Fidelity FEM Simulation to Artificial Intelligence] **-**
Presentation is in English

Using RBF Morph™ mesh morphing technology, seven geometric parameters were tuned in two optimization campaigns—one aimed at minimizing stress, the other at reducing mass. The study culminates in the creation of a static Reduced Order Model (ROM), which proved to be both efficient and accurate within the defined design space.

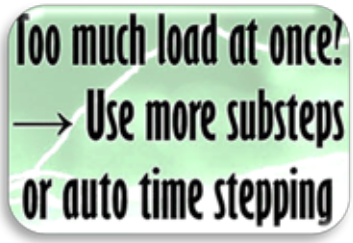
Thesis Objectives

- **Two Optimization Campaigns**
  - Stress reduction with constant weight
    - Unaltered engine dynamics
    - Increased safety factors and fatigue life
  - Weight reduction with constant stress
    - For a complete redesign from scratch
    - Lower emissions
- **Development of a static ROM**
  - Fast results
  - Reliable results

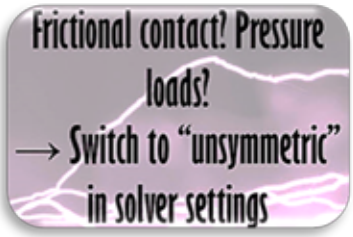
Among The Slides



Struggling with convergence in nonlinear FEA? You're not alone! Since 2008, I've been passionate about providing training for Ansys users on nonlinear simulation with Ansys Mechanical. Over the years, I've seen hundreds of models struggle with convergence – and supported just as many engineers in overcoming those challenges. With this post, I'm starting to share my tips for dealing with nonlinear convergence issues. I hope they help you.

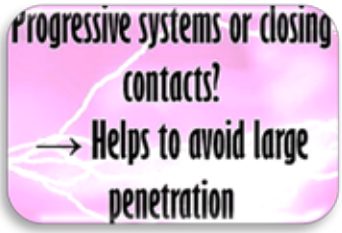


Tip #1: Reduce Time Step Size - Applying too much load in one step often causes divergence. The Newton-Raphson method overshoots the solution path. Smaller time steps – via more substeps or automatic stepping – help the solver converge incrementally and more reliably.



Tip #2: Use Unsymmetric Stiffness Matrix - If your model includes frictional contacts (nu > 0.2) or pressure-dependent loads, you may be dealing with an inherently unsymmetric stiffness matrix. By default, Ansys assumes symmetry, which can lead to incorrect assumptions about the system's behavior and ultimately to convergence issues. Switching to an unsymmetric stiffness matrix in the solver settings ensures that the numerical formulation better reflects the physical reality

Tip #3: Turn Off the Predictor - The predictor function in Ansys estimates the starting point for the next load step based on the previous one. While this works well for monotonic loading, it becomes problematic when the load direction changes - such as during unloading or cyclic loading. In these cases, the predictor can lead the solver in the wrong direction, causing overshooting and divergence. Disabling the predictor using the APDL command pred,off prevents this extrapolation and improves convergence.



Tip #4: Activate Line Search - In progressive systems or closing contacts, large displacement increments can cause too large penetration. Line Search scales these increments to minimize energy and stabilize the solution process.

Tip #5: Adjust Convergence Criteria - When your model includes components with very different stiffnesses - like rubber and steel - the default convergence criteria may not be suitable. Typically, the solver's force and displacement tolerances are dominated by the stiffest part of the model, which can cause the softer components to be neglected in the convergence check. This imbalance can lead to divergence. So customize your convergence tolerances to ensure improving your convergence stability.

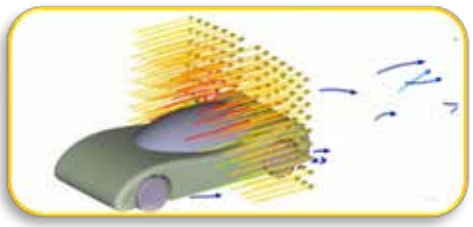
These are just the first 5. More tips are coming – solver settings, contact tuning, material modeling...

Continuous learning is the key to personal & professional growth. It enriches our lives with new skills, fresh perspectives, & opportunities for success & fulfillment.

Web Excerpts – ANSYS – No Fee Course - CFD in Automotive Industry

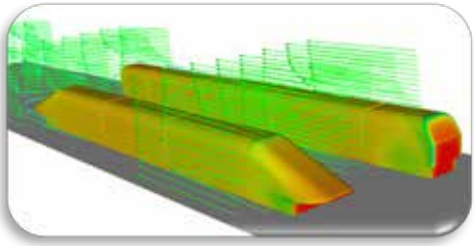
ANSYS - In this session we will introduce industry specific applications from the automotive industry and how Computational Fluid Dynamics (CFD) is used to solve problems and optimize subsystems. We will begin our discussion with the analysis of external aerodynamics of a concept car. Then we will use the power of computational fluid dynamics to uncover the role of streamlining in high speed rail transport. We will wrap up by looking at an example that deals with how we can use CFD to analyze internal sub-systems such as an IC engine exhaust manifold.

Course Content

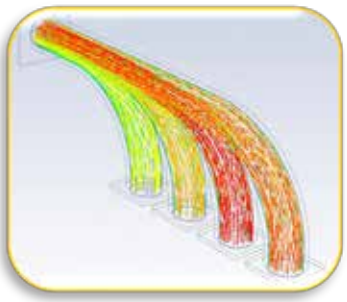


External Aerodynamics of a Concept Car - From a match-box type structure in the early 1900's to the streamlined configuration of today, the shape of the cars we use has evolved dramatically. The root cause of this evolution has been the amount of drag force generated by these cars. Bulkier looking cars of the yesteryear are very inefficient when it comes to directing the airflow around the vehicle. On the other hand, most of the latest cars, specifically the sedan and sports variants, are pinnacle of airflow management.

For this reason, the current generation of cars give a lot more mileage for the same amount of fuel when compared with the older generations. In this simulation example, we will explore the external aerodynamics of a new generation concept car.



Streamlining in High Speed Rail Transport Flow Through an IC Engine Exhaust Manifold - Overview - In this simulation example, we will explore the use of external flow analysis to analyze the air flow around high-speed trains. Such simulations are used by engineers to understand the flow of air around a train as it moves at high speeds and to estimate the resulting drag forces. Better understanding of these loads has enabled engineers to come up with innovative, streamlined designs to tackle induced drag forces and make trains more efficient. In this example, we will be simulating flow around two trains: an old train and a new "streamlined" bullet train. We will set up a simple flow simulation around these two trains and then use it to analyze the key features of the flow.



Flow Through an IC Engine Exhaust Manifold: Overview - In automotive engineering, an exhaust manifold collects the exhaust gases from multiple cylinders into one pipe. For many engines, the exhaust manifold consists of individual head pipes for each cylinder, which then converge into one tube called the collector. Other objectives of exhaust manifold design are to reduce exhaust flow and decrease the back pressure of the engine. Due to the high temperature of the exhaust, the conjugate heat transfer problem between the exhaust gas and the solid material of the manifold is also important. In this simulation, we will model exhaust gas flowing through a steel exhaust manifold consisting of four inlet pipes and one collector pipe. The working fluid used in this simulation is air with constant properties, as temperature changes in the fluid are not significant and the property variations with temperature are assumed to be negligible.

We are now offering the Airbag Modelling using the Corpuscular Particle Method (CPM) in LS-DYNA course as an on-demand training session. The on-demand format can be scheduled on your preferred time and date.

Please note attendance is limited to our Oasys customers.

Airbag Modelling using the Corpuscular Particle Method (CPM) in LS-DYNA

(on-demand)

The Course will last 4.5 hours and will cover the following topics:

- Module 1: Theory & Basic keywords – 1hr 15min
- Module 2: Vents, Control etc. & Advanced – 1hr 42min
- Module 3: Fabric & Inflators – 1hr 20min
- Q&A up to 60 minutes

The training package includes a printed copy of the course notes to enable you to take notes as you watch each module video.

As part of the on-demand training we offer an MS Teams call with the expert trainer after the training materials have been viewed. This will give you a chance to discuss the topic and ask any questions. In periods of high demand this Q&A session may be open to additional trainees.

Course Outline: Developed from many years of client support, this comprehensive course includes the latest developments in LS-DYNA. Numerical theory is introduced but the focus of the course is on getting the right input for the best results. The first sessions introduce how CPM works, basic input and advanced settings i.e. venting. The later sessions cover inflators, fabric and folding.

Course Content:

Airbag modelling using *AIRBAG PARTICLE	Generating inflator gas input data
MAT FABRIC for use with *AIRBAG PARTICE	Example CPM models

For Who? The course is for those involved in airbag simulation. The content is appropriate for users of all experience levels. It's best suited to engineers familiar with airbag basics and control volume modelling techniques.

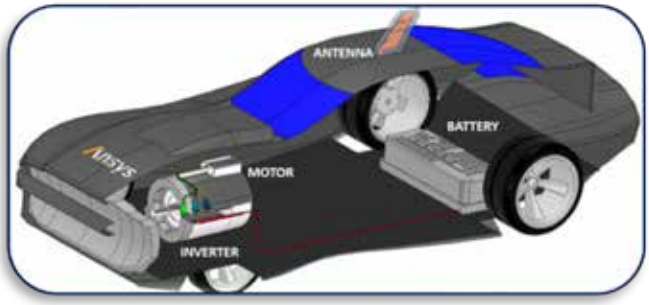
Extra Details: The course notes are comprehensive and provide a useful manual for future reference. Realistic example models are also provided creating a valuable package for all attendees.

Relevant Products: LS-DYNA, Oasys PRIMER, Oasys D3PLOT, Oasys T/HIS

Among the upcoming courses: **(Visit the website for additional courses)**

Tue 16th Sept: 3 Day Introduction to Oasys PRIMER September 2025 (online)
Tue 23rd Sept: 2 Day Introduction to Oasys PRIMER September 2025 (online) US Timezone
Tue 30th Sept: 3 Day Introduction to Oasys POST September 2025 (online)

Among the blog by Ibrahim Nassar, "The increasing complexity of nowadays wireless RF devices increases the demand for accurate and efficient simulations of large and complex RF designs. Identifying and predicting potential issues early in the design process saves resources, time, and money."



Web – Ozen - Conducted Emission Simulation of An Electric Vehicle including YouTube video

Ibrahim Nassar

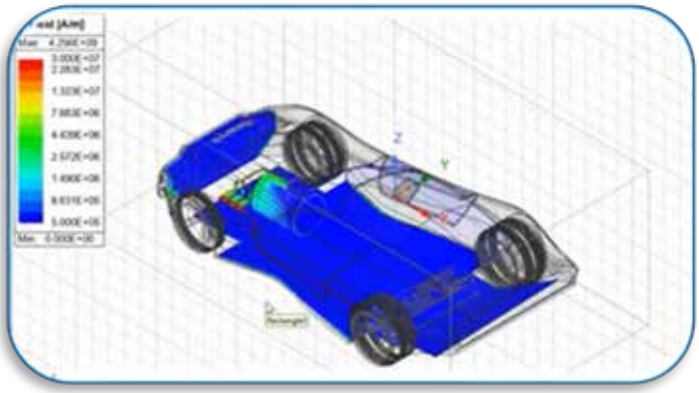
The increasing complexity of nowadays wireless RF devices increases the demand for accurate and efficient simulations of large and complex RF designs. Identifying and predicting potential issues early in the design process saves resources, time, and money.

As performance requirements increase and electronics proliferate, the risk of interference leading to degraded performance, unintended consequences—or even failure—rises dramatically.

Electromagnetic compatibility (EMC) and meeting regulatory standards, for example CISPR 25, is highly needed in the electric vehicle industry. Using ANSYS HFSS combined with ANSYS Circuit tool, the full electric system can be simulated to identify and mitigate potential sources of EMI/EMC issues with reduced physical testing to deliver high-performance, safe and compliant designs.

Overview - In this blog we will be using the ANSYS Electronics Desktop (AEDT) to run a conducted emission analysis of full electric vehicle Including chassis, battery, cables, inverter, motor and an antenna, as seen in the picture. ANSYS HFSS will be used to simulate the full vehicle and ANSYS Circuit will be used to perform transient analysis to calculate the conducted emission of the full system.

HFSS Setup - In this demo we will simulate the vehicle model with HFSS. The HFSS model will be simulated at a frequency of 100 MHz with a frequency sweep from DC to 100 MHz with 401 points. The simulation takes 1 hour and 56 minutes to solve using a 24 core machine with a RAM need of ~ 76 GB. The figure shows the adaptive mesh generated by HFSS.



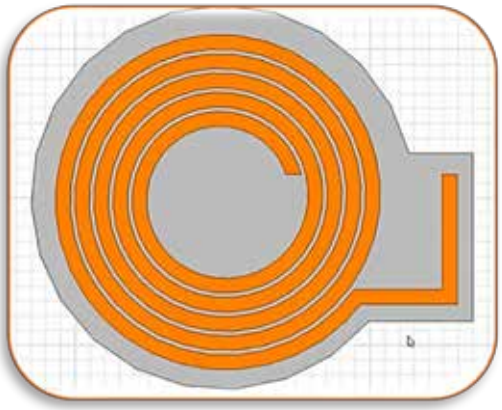
YouTube - Conducted Emission Simulation of An Electric Vehicle

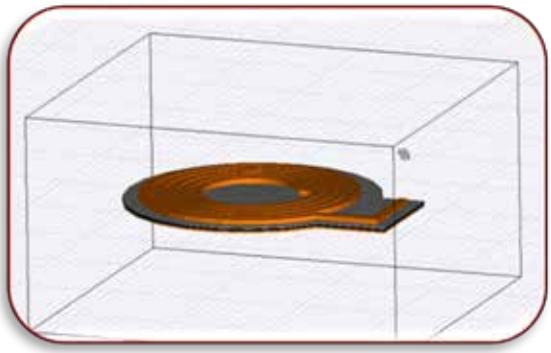
Hi there! This video shows how the ANSYS HFSS combined with ANSYS Circuit tool will be used to run a conducted emission analysis of full electric vehicle Including chassis, battery, cables, inverter, motor and an antenna.

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, “Do you know about Coil Co-Simulation Using HFSS & Circuit?”

Ke, “No, but I did speak to **Mike at Ozen** and he advised me that Adel from Ozen Engineering has a video about it. Let’s watch it.”





WEB – Coil Co-Simulation Using HFSS and Circuit - including video and transcript

Web quote, “Hello everyone, this is Adel from Ozen Engineering. In this video, I'll show you how to run a coil co-simulation using HFSS and Circuit.”

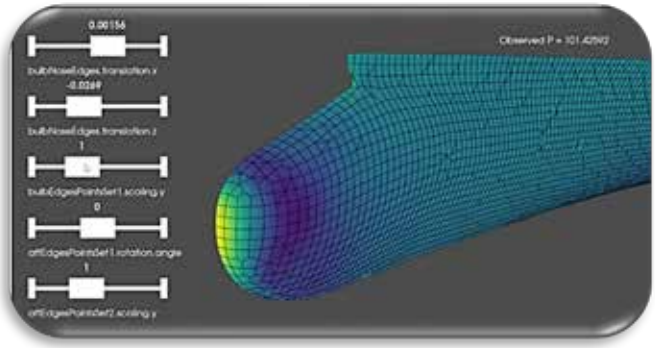
Among the topics you will learn:

- Importing Coil Layout into HFSS 3D Layout
- Setting Up the Solution
- Preserving the Stackup Shape
- Exporting and Opening the Model
- Configuring the HFSS 3D Model
- Adding Excitation
- Configuring the Solution Setup
- Running the Simulation
- Viewing Results
- Plotting Coil's Self-Resonance
- Adding Tuning Capacitors
- Analyzing and tuning the circuit
- Conclusion

Conclusion - We have now applied the updated capacitor values. In this session, we explored the process of exporting coil layout from HFSS 3D layout to HFSS 3D while preserving the correct stackup shape, setting up the coil simulation in HFSS, and linking the model to Circuit to add tuning capacitors.

Thanks for watching
&
see you in the next video.
Adel - Ozen Engineering.

Article quote, “ENGYS completed the development of the proof-of-concept (PoC) for an effective and efficient numerical procedure conceived to design and optimize ship hulls by leveraging reduced order model (ROM) of Computational Fluid Dynamics (CFD) fields relevant to the marine sector. The proposed procedure consists of two sequential stages: an off-line stage and an on-line stage...”



WEB – **ENGYS Completes AI4TwinShip Project: Reduced Order Models for Ship Hull Design and Digital Twin Applications**

Left find a snapshot of the on-line stage

In the offline stage, a baseline CFD case is generated to simulate the calm-water resistance of the KCS hull model using the Reynolds-averaged Navier–Stokes (RANS) linearized free-surface solver available in our open-source CFD tool HELYX-Marine.

This stage also includes: parametrization of the CFD case using radial basis functions (RBF) mesh morphing offered by the rbfCAE tool; a design of experiments (DOE) study in which each design point represents a shape variant of the KCS hull; construction of a database of the relevant CFD results; and generation of ROMs using proper orthogonal decomposition (POD) in which both the hull shapes and CFD fields are represented as weighted combinations of modal components, with weights related to the input parameters, via RBF inference.

The on-line stage enables real-time predictions of CFD fields, including mesh deformation, pressure and shear stress distributions over the hull, free-surface elevation and total resistance based on new combinations of the shape parameters, with ROM-based prediction. The workflow is automated through Python scripts that streamline the most time-consuming tasks of the proposed procedure.

The ROM demonstrated a maximum relative prediction error of less than 3.6% for resistance estimates at design points outside the original DOE set, indicating strong predictive accuracy. The resulting ROMs serve as a foundational step toward building Digital Twins of ships.

This PoC was developed within the framework of the Italian co-funded project AI4TwinShip, which was financially supported by the Friuli Venezia Giulia region (Italy).

Total costs: 213.635,80 €, Funding: 149.545,06€ (of which 40% European Union, 42% Italy and 18% Friuli Venezia Giuilia Region).

ENGYS want to thank the RBF Morph team for their effective technical support that facilitated such an achievement...

Quote: rbfCAE – “A new way to optimize your product's performance - We were proud to support our partner ENGYS in the final stages of the **AI4TwinShip project** — a key milestone for our new rbfCAE platform and the first application powered by our **rbfAI** technology. Mesh morphing proves to be the ideal companion for AI-driven CAE simulations.”

Products: rbfCAE - rbfCONNECT - rbfAI

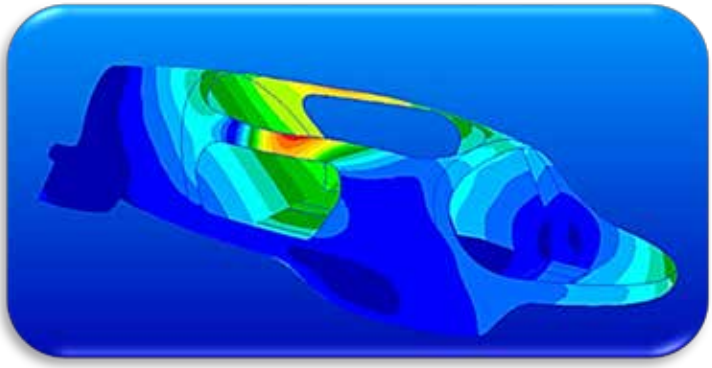
Quote from the article, "**Eco-Runner Team Delft is a student engineering team at the TU Delft.** Since 2005 our mission has been to design and build the most efficient hydrogen-powered vehicle possible. Every year, we compete in the Shell Eco-marathon competition, which pits student-designed hydrogen-powered vehicles against each other to complete a 16-kilometer course using the least amount of fuel."

Web – Rescale - Eco-Runner **Team Delft Uses Rescale's Big Compute Platform to Design a Fuel-Efficient Vehicle**
Guest post by Paul Hulsman, Team Manager, Eco-Runner Team Delft at TU Delft

Ecorunner VII hydrogen-powered race vehicle

There are two vehicle assemblies that are critical to winning: a fuel-efficient propulsion system and a body with minimal vehicle resistance or weight. The weight of the vehicle is crucial to fuel efficiency because the 2017 Eco-marathon course featured a hill. Thus, our design efforts this year focused on making every component of the car as light as possible to reduce the energy requirement to climb the hill. We used Rescale's ScaleX platform to explore and simulate many weight-saving design options while maintaining structural integrity. Rescale's cloud-enabled simulation allowed us to quickly design a lightweight, but strong vehicle on a constrained project schedule and a student budget.

For the past decade, we have used ANSYS Mechanical for our FEA to reduce the weight of the car's carbon fiber body. Using previous models of the Ecorunner as reference points, we ran FEA on various parts of the car to determine the lay-up plan of the carbon fiber and to determine whether each component would withstand the loads applied.



ANSYS Mechanical simulation of the Ecorunner VII

Eco-Runner Team Delft with the Ecorunner VII

FEA simulation is compute-intensive requiring multiple cores to run a fast simulation, and our team needed a final design within 3 months in order to compete on event day.

Rescale's cloud big compute platform provided turnkey access to those compute resources. We were able to get simulation results almost immediately after signing up for Rescale's platform.

We ran the majority of our simulations on 192 cores of the Gold hardware configuration (15 GB memory, 32 GB storage, 10 GB/s interconnect), which was the most cost-effective configuration for our simulations.

The ability to scale out on unlimited cores on demand via the Rescale platform reduced our typical simulation turnaround time from a couple of days to a matter of hours.

Critically, this fast simulation turnaround kept us on schedule to compete on event day and enabled the team to quickly explore a variety of new concepts and design features before iterating to a final design. Rescale enabled a comprehensive design exploration phase, in which we discovered and implemented several design features that reduced the total weight of the carbon-fiber body by 5%, thereby increasing the energy-efficiency of our hydrogen-powered car.

Ecorunner VII hydrogen-powered race vehicle

Zhidong Han - System Architect at Sigma Star Technology

Don't miss the ETA Announcement:
ETA DYNAFORM Awarded 2nd Place - NUMISHEET 2025 Competition

A Proud ETA Milestone
as showcased by ETA on LinkedIn

ETA – DYNAFORM Awarded 2nd Place In The Scientific Benchmark Category

NUMISHEET: leading int'l conference on numerical simulation of sheet metal forming processes.

Left to right:

- **Peter Vogel**: Director of Engineering & Sales, ETA Europe. Formerly with DYNAmore, specializing in forming.
- **Prof. K. Narasimhan:** The Indian Institute of Technology, Mumbai. A renowned expert in sheet metal forming, with over 40 years of teaching and research in the field.
- **Subir Roy:** Product Director and Technical Consultant at ETA. Formerly with Altair's forming division.
- **Zhidong Han:** System Architect at Sigma Star Technology. Formerly with LSTC.

ETA - Dynaform has been awarded the 2nd Prize in the Scientific Benchmark Category at NUMISHEET 2025-the world's leading forum for breakthroughs in sheet metal forming research and innovation.

Competing alongside brilliant minds and leading institutions, our team- Subir Roy, PhD, Zhidong Han and Peter Vogel, took on complex modeling and material simulation challenges designed to push the boundaries of what's possible in our field.

This recognition reflects not only ETA's technical expertise, but also the spirit of collaboration and innovation that drives Dynaform every day.

A heartfelt thank you to the organizers of NUMISHEET 2025, our outstanding team, and the vibrant global community. Proud to be part of this journey. Onward and upward!

Zhidong Han, "Proud to have been part of this achievement! SigForm, one of Sigma Star's flagship solvers, demonstrated exceptional accuracy and performance throughout the competition, delivering results that stood out among other solutions. Grateful to work alongside such a talented and dedicated team!"

Welcome to our Pasture Movie Theater

The information we found interesting on YouTube is about to begin. Please turn off all tractors and harvesting equipment.

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

Web – YouTube

[The General Atomics Aeronautical Systems, Inc.](#) Gray Eagle® Short Takeoff and Landing (STOL) is a force multiplier for global combat operations, enabling multi-mission expeditionary versatility with high payloads supporting contested logistics along with considerable firepower for attack and reconnaissance missions.

Web – General Atomics Excerpt

The Multi-Mission Expeditionary UAS

GA-ASI's short takeoff and landing (STOL) capability is a game changer, and when combined with the Gray Eagle UAS, it becomes a force multiplier for global combat operations. Gray Eagle STOL offers unprecedented runway independence, able to launch from warships to dirt fields and everywhere in between. This revolutionary capability enables multi-mission expeditionary versatility with high payloads supporting contested logistics along with considerable firepower for attack and reconnaissance missions. Demonstrated by the company's UAS STOL demonstrator, Mojave—the first UAS in its class to fly from aircraft carriers—the Gray Eagle STOL provides a critical new capability for forces in the Pacific Theater. Gray Eagle STOL maximizes investments in open architecture, autonomy, and machine learning to give warfighters the edge to dominate first contact.

Library - Aisle N (Not To Miss)
Abhinav Tanksale

Below are courses featured on my website to connect you with industry leaders.

Web – [MyPhysics Café Expert FEA Program] Resources & expert guidance.

This program on MyPhysics Café connects you with courses and free resources from industry leaders to boost your skills, knowledge and confidence.

Among the listed courses and resources, you will find Dominique Madier:

Web – [FEA Academy] **- Free quizzes**

Test yourself on various FEA topics. You will find all the right answers in the FEA Academy Book and in our FEA Courses.

- Test your understanding with expert-crafted FEA Quizzes
- Strengthen concepts and identify areas for improvement
- Challenge yourself and track your progress easily

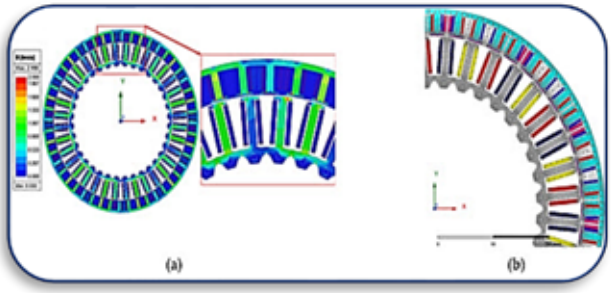
Among the free quizzes:

The Basis of FEM Theory – Meshing - Modeling Bolted Joints - RBEs and MPCs - Linear Static Analysis - Modal Analysis - Nonlinear Analysis - Part #2 - Verification and Validation of your FEA - The Library of Elements in Solid Mechanics - Defining Boundary Conditions

FEA Academy offers a comprehensive suite of online on-demand courses designed to equip engineers with practical skills in FEA for structural analysis.

These courses are meticulously crafted to impart universal modeling techniques, best practices, and in-depth understanding of both linear and nonlinear FEA methodologies.

A 2D model is simulated using ANSYS Electromagnetics Suite to validate the machine model and performance.



Web – MDPI - **Hybrid Brushless Wound-Rotor Synchronous Machine with Dual-Mode Operation for Washing Machine Applications**

S. Ahmed, Q. Ali, G.J. Sirewal, K. Kumar, G. Choi
Dept. Electrical Engineering, Sukkur IBA Univ., Pakistan
Dept. Elect. & Comp. Engineering, Inha Univ., ROK

HB-WRSM (a) flux density contour in washing mode. (b) mesh plot

Abstract - This paper proposes a hybrid brushless wound-rotor synchronous machine (HB-WRSM) with an outer rotor topology that can operate as a permanent magnet synchronous machine (PMSM), as well as an HB-WRSM. In the first part, the existing brushless wound-rotor synchronous machine (BL-WRSM) is modified into a hybrid model by introducing permanent magnets (PMs) in the rotor pole faces to improve the magnetic field strength and other performance variables of the machine. In the second part, a centrifugal switch is introduced, which can change the machine operation from HB-WRSM to PMSM. The proposed machine uses an inner stator, outer rotor model with 36 stator slots and 48 poles, making the stator winding a concentrated winding. The HB-WRSM is utilized for dual-speed applications such as washing machines that run at low speed (46 rpm) and high speed (1370 rpm). For high speed, to have a better efficiency and less torque ripple, the machine is switched to PMSM mode using a centrifugal switch. **The results are compared with the existing BL-WRSM. A 2D model is simulated using ANSYS Electromagnetics Suite to validate the machine model and performance.**

1. Introduction - Today's electrical machines are extremely diverse in type and application, ranging from direct-current machines of a few horsepower used in portable devices and household appliances to MW-scale AC synchronous generators used in power plants that convert natural potential energy into electrical energy. Permanent magnet (PM) machines have been widely used in a variety of applications requiring a high power output performance due to their high efficiency, excellent power factor, and high power density [1]. However, recent challenges such as a high cost, scarcity, and risk of demagnetization have led researchers to explore alternatives that use fewer or no PMs. The magnets used in the PM machines contain rare earth materials (REMs) such as neodymium (Nd) and dysprosium (Dy), which are increasingly vulnerable to supply risks and pose environmental concerns in their production [2,3]. PM synchronous machines (PMSMs) face not only demagnetization issues but also fixed magnetic fields...

Machine Performance Analysis - To evaluate the performance of the proposed HB-WRSM, 2D FEA simulations were conducted using ANSYS Maxwell software (Ver. 2022 R2). The simulations were performed with a time step of 1.2 ms, and an automated mesh with a maximum element length of 6 mm was applied. The output torque and power losses were obtained directly from the simulations, while the input power and efficiency were calculated analytically via post-processing

Library - Aisle N (Not To Miss)
Kalyani Deshmukh

FEANTM Town would like to thank Karthik for reposting Kalyani's information on social media.

Kalyani Deshmukh - Student at Hochschule Trier
(Passive Safety, Crashworthiness)

Many of you found my checklist for structural FEA validation helpful - thank you. **I created a similar checklist for dynamic explicit simulations. These simulations used for crash, impact, drop tests require a slightly different approach due to their high-speed, nonlinear nature.**

Below is a checklist I personally follow when validating explicit FEA simulations (e.g., in LS-DYNA PrePost)

1. Geometry & Model Setup:	Is the model geometry clean and consistent with the real component? Are contacts, part intersections, and penetrations checked & resolved?
2. Material Models:	Are correct material models used (e.g., *MAT_24, *MAT_CRUSHABLE_FOAM)? Are strain rate effects included for rate-sensitive materials (e.g., metals, polymers)?
3. Mesh Quality:	Is the mesh fine enough in critical zones (e.g., impact areas, folds)? Are elements within acceptable aspect ratios and distortion limits? Is hourglass control enabled for reduced integration elements?
4. Time Step & Mass Scaling:	Is the time step stable (based on CFL condition)? If mass scaling is used, is it controlled and not distorting physics? Is kinetic energy < 10% of internal energy (for quasi-static loading)?
5. Contact Definitions:	Are all contact interfaces properly defined (e.g., tied, surface-to-surface)? Is contact stiffness, damping, and friction realistic?
6. Boundary Conditions And Loads:	Are initial velocities, forces, or constraints applied accurately? Are load rates realistic (matching physical scenario)?
7. Energy Balance:	Are total energy, kinetic energy, and internal energy behaving as expected? Is there any sudden jump or energy loss (indicating instability)?
8. Rigid Body Motion & Initial Checks:	Does the system behave as expected in the initial state (e.g., no artificial deformation)? Is rigid body motion free (if intended) and properly constrained (if not)?
9. Result Validation:	Do peak forces, displacements, or stress patterns match test data or published results? Are deformed shapes physically realistic?
10. Numerical Artifacts:	Is hourglass energy < 5–10% of total internal energy? Are there any non-physical oscillations or negative volumes?

After a long and inspiring journey within the MeDiTATe-project, supported by RBF Morph, Ansys, Avicenna Alliance the University of Rome Tor Vergata and many exceptional partners and friends, our dream is now taking shape! **LivGemini is a new Med-Tech company powered by passion, with the clear mission to deploy cardiovascular medical digital twins.**

Web – **LivGemini** - At LivGemini, everything starts with a bold idea: making insilico modeling an essential part of clinical practice to improve Diagnosis, Surgical Planning, Patient Safety and outcomes in Cardiovascular Care.

A medtech company developing AI-driven computational solutions to assist clinicians in diagnosis and optimal device selection, while providing medical device manufacturers with tools to improve design efficiency and performance

Meet the Founders Behind LivGemini! The minds behind the mission: the three co-founders shaping our vision and driving innovation forward:

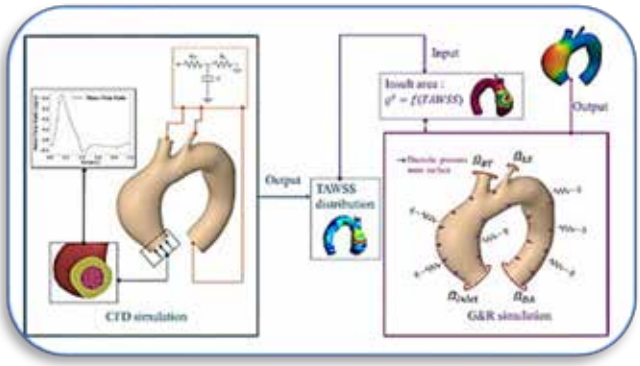
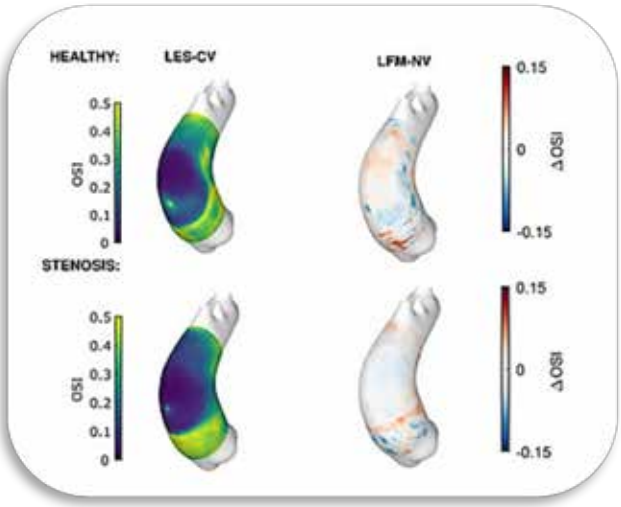
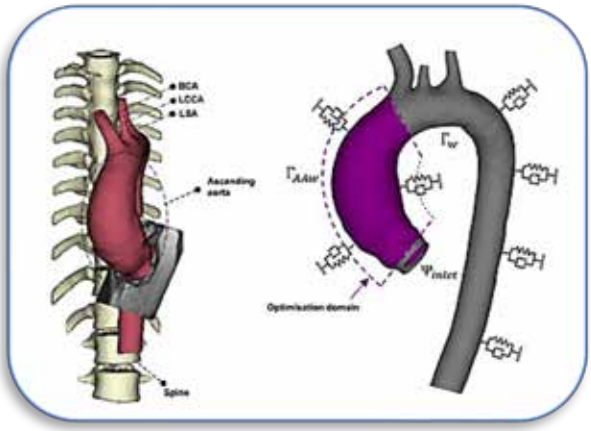
Leonardo Geronzi – CEO. Biomedical engineer and Forbes Under30 honoree, Leonardo combines a deep understanding of Medical Technology with strong experience in EU-funded research and clinical partnerships. As CEO, he leads LivGemini with the ambition to reshape cardiovascular support through next-generation digital tools.

Andrea Baldini – Head of Software Development. Software engineer with a passion for innovation, Andrea is the brilliant brain behind LivGemini's LivSpace platforms. He leads the development of our core technologies, building high-performance tools that clinicians can rely on for precision and reliability.

Marco Evangelos Biancolini – Business Developer and Scientific Advisor, Professor of Machine Design, Marco is a recognised leader in computational mechanics, mesh morphing techniques and numerical simulation. With many years of academic and industrial experience, he ensures LivGemini's solutions are grounded in scientific excellence and real-world impact.

The name LivGemini derives from 'Living Gemini' and alludes to the concept of 'Digital Twin'. At LivGemini, we believe that the future of healthcare lies in a deeper synergy between technology and clinical expertise. Rather than accepting conventional limitations, we challenge existing paradigms by harnessing Digital Twin technology to rethink how medical decisions are made.

showcase of 3 of the LivGemini past publications

	Biomechanics and modeling in mechanobiology Fluid–structure–growth modeling in ascending aortic aneurysm: capability to reproduce a patient case Fluid–structure–growth modeling in aortic aneurysm
	Computers in biology and medicine Effect of turbulence and viscosity models on wall shear stress derived biomarkers for aorta simulations Wall shear stress-derived biomarkers for aorta
	IEEE Transaction on biomedical engineering Calibration of the mechanical boundary conditions for a patient-specific thoracic aorta model including the heart motion effect Calibration BCs Aortic Model

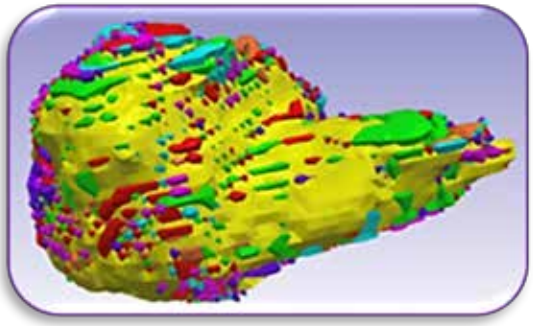
Kerim Genc, "We are excited to see how our custom AI solutions are being utilized to help innovative research. A great example is the Yale University 3D Tumor Lab's success in automating the segmentation of rare tumors. This work is part of a 3D software ecosystem at Yale, developed by Drs. Daniel Wiznia, Steven Tommasini and Frank Buono. 3D modeling, simulation, and technology are increasingly being integrated at Yale, including in a one-year Master's program in personalized medicine and applied engineering."

Web – Synopsys - Automating Tumor Segmentation at Yale University with Simpleware AI Solutions -
by Kerim Genc

From left to right:
Dr. Steve Tomassini, Dr. Frank Buono, & Dr. Daniel Wiznia
Yale University 3D Tumor Lab
(Image courtesy of the 3D Tumor Lab).

Solving the Challenge of NF2 Tumor Segmentation

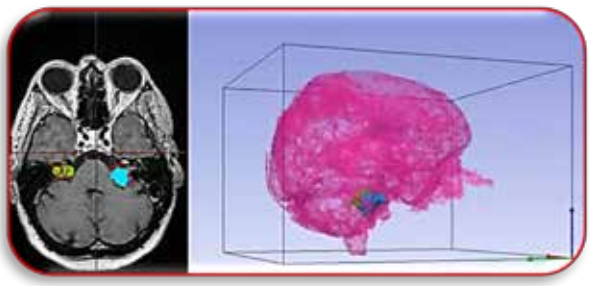
The 3D Tumor Lab, led by Drs. Wiznia, Buono, and Tommasini, focuses on researching rare disease tumors, such as NF2 related Schwannamatosis (NF2-SWN). The lab has tackled the challenge of measuring tumor growth by developing an accessible and precise 3D segmentation workflow. The 3D innovation team collaborated with neuroradiologists and a research foundation, starting with what Dr. Wiznia describes as "some very simple mockups of the tumors" in Simpleware software. These models initiated conversations about how to visualize the tumors, including for an XR environment where surgeons can "walk-through" the brain to see crucial structures. While these tools aided in surgical planning, the team identified opportunities to automate the tumor segmentation process, which can traditionally take 4-5 days, to provide patients with faster updates on tumor size changes.



Segmentation and visualization of brain tumor growth in Synopsys Simpleware software (Image courtesy of the 3D Tumor Lab).

Automating the Workflow

Several hundred patients were recruited to send MRI scans of their tumors to create a ground truth dataset for segmentation in Simpleware software, validated by a neuroradiologist. To enhance this approach, the 3D Tumor Lab collaborated with the Simpleware team to develop a unique customized AI tool, automating most of the segmentation process and minimizing the need for manual intervention.



2D cross-section MRI with segmented tumors (left) and 3D reconstruction of brain and tumor using Synopsys Simpleware software.

(right) (Image courtesy of the 3D Tumor Lab).

According to Dr. Wiznia: "At Yale School of Medicine, which provides an innovative 3D medical research environment, we've had an outstanding experience collaborating with the Simpleware engineers in developing this software. The process went through several iterations, and we found the team to be exceptional communicators and highly skilled. This solution, designed for MRI-based imaging of a brain tumor, demonstrated remarkable accuracy."

(Models of the same tumor segmented over time and overlaid to show changes in growth from 2016 to 2022 (Image courtesy of the 3D Tumor Lab).

Dr. Wiznia added: "The software has functioned beautifully within our state-of-the-art facilities at Yale School of Medicine. We are achieving very high Dice scores and impressive accuracy. Additionally, we've been able to write our own codes and scripts in Simpleware, enabling us to analyze the growth of tumors over time with unprecedented precision. The AI tools have the potential to reduce segmentation time from several hours to just a few minutes, enhancing our research capabilities significantly."

Experiences with Working with AI and Synopsys

Reflecting on the collaborative success of the project with Drs. Buono and Tommasini, Dr. Wiznia emphasized the importance of obtaining high-quality image data for modeling and validating ground truth segmentation with qualified radiologists.

Dr. Wiznia explained: "At Yale School of Medicine, where we have access to innovative clinicians exploring the boundaries of 3D medical research, we collaborated with the Simpleware engineering team with extensive experience in this field. The engineers are also well-versed in various DICOM formats that we use at Yale School of Medicine. To ensure our solution is broadly applicable, we included MRI imaging from diverse sources worldwide, encompassing different protocols and MRI machines. The team adeptly navigated any challenges that arose from these variations."

Visit the website and contact us if you have any questions

The below focuses “on the occasion of World Youth Skills Day, Tata Motors proudly announces a landmark achievement under its flagship Kaushalya Programme: the successful training and certification of the first All-Girls Batch of tribal youth in motor mechanics in Jharkhand.”

Web - TATA - First All-Girls Batch Redefines Gender Norms in Jamshedpur Under Kaushalya Programme ~

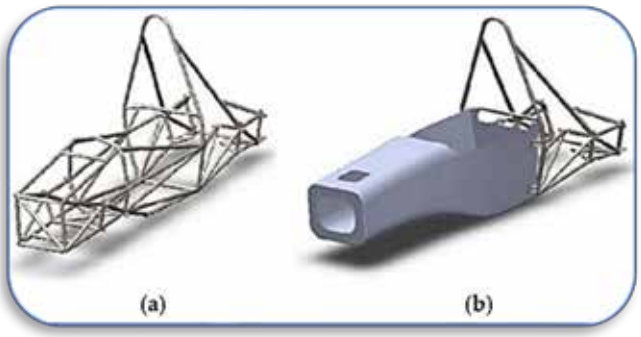
This pioneering group of 13 young women, mobilised from 3 gram panchayats across Chandil, Jamshedpur and Potka, have completed the Mechanical Motor Vehicle (MMV) training module—an intensive programme designed to build employability in underserved communities. Their training included 50 days of classroom instruction on Tata Motors’ commercial vehicle components, followed by a year-long On-the-Job Training (OJT) at authorised service stations and dealerships. Participants received full support including uniforms, safety gear, accommodation, and a monthly stipend.

For these girls—many of whom had dropped out of school and faced financial hardship—this opportunity marked a turning point. Entering a traditionally male-dominated field came with challenges, from societal skepticism to concerns about safety. Tata Motors, in collaboration with Vikas Samities, a company run society, addressed these barriers through community engagement, counselling sessions with families, and support from local leaders and educators.

Vinod Kulkarni, Head of CSR at Tata Motors, shared, “The introduction of an All-Girls Batch under the Kaushalya Programme is a conscious step towards empowering more young women—especially those from underserved communities—to step confidently into the traditionally male-dominated field of automotive servicing. By creating a safe, supportive, and inspiring learning environment, we have enabled the girls from tribal communities in Jharkhand to discover their potential and pursue meaningful careers. These young women have not only challenged stereotypes but have also proven that with the right guidance and opportunity, they can excel in roles once considered beyond their reach. Their journey reflects the transformative power of belief, skill-building, and inclusive development.”

As India continues to harness its demographic dividend, initiatives like the Kaushalya Programme demonstrate how corporate social responsibility can align with community aspirations, creating pathways to sustainable livelihoods and social transformation.

Quote from the article: "**In order to analyze the chassis response to force components and generate input for the O.A., a computer model was developed using the F.E.A. software ANSYS v.2019**."



Examples of different chassis layouts (a) space frame and (b) hybrid

Web – MDPI - Design Optimization of a Composite Using Genetic Algorithms for the Manufacturing of a Single-Seater Race Car

I. Tsormpatzoudis, D. Dragatogiannis, A. Sideridis, E. Theotokoglou

1. Lab. Testing & Materials, Dept. Mechanics, School of Applied Mathematical & Physical Sci., National Technical Univ. of Athens, Greece
2. Dept. Naval Architecture, School of Engineering, Univ. of Western Attica, Greece

Abstract - The design of automobile chassis structures is fundamentally linked to the optimization of mass and structural robustness. While conventional chassis structures predominantly utilize metals, achieving further mass reduction and enhanced rigidity necessitates the adoption of composite sandwich materials, typically comprising carbon fiber-reinforced polymer (C.F.R.P.) laminate skins bonded to an aluminum honeycomb core. This study focuses on presenting a framework methodology for minimizing the mass of a race car chassis by calculating an optimal baseline lamination sequence through the modification of the composite material parameters on either side of the aluminum core, using an optimization algorithm (O.A.), finite element (F.E.) analysis, composite mechanics theory, and failure criteria. Optimal solutions were derived by varying the laminae orientation and sequence parameters under two scenarios: unconstrained and constrained laminae angles. The optimization results indicate that the proposed lamination scheme reduces mass by 12.36 kg (41.66%) compared to the original lamination, with constraints imposed on laminae angles having no significant impact on the ultimate optimal outcome.

3. Finite Element Model, 3.1. Discretization and Assumptions -In order to analyze the chassis response to force components and generate input for the O.A., a computer model was developed using the F.E.A. software ANSYS v.2019 [2]. To reduce analytical complexity, only the composite section of the structure was modeled, with corresponding adjustments to boundary conditions. Although this approach may lead to structural over-design, it was justified by the need to avoid errors arising from modeling the entire hybrid chassis. Regarding geometric partitioning, the software makes multiple element types available, though results depend on element type, size, and order. Therefore, it was deemed necessary to conduct experiments to determine the optimal mesh configuration for the model. After examining the analogous literature [23,24] as well as the nature of the experiments to be performed on the chassis, specific test schemes were adopted to grade the performance of F.E.A. software elements …

US Airforce Picture of the Month

Wheels up - A KC-135 Stratotanker assigned to the 6th Air Refueling Wing, MacDill Air Force Base, Fla., departs from Andersen AFB, Guam, during the Air Force's 2025 Department-Level Exercise series, July 15, 2025. The exercise spans 3,000 miles, involves more than 400 joint and coalition aircraft, 12,000 personnel and more than 50 locations, and includes all U.S. military branches, allies and partners.

(U.S. Air Force photo by Senior Airman Zachary Foster)

Fighter escort - U.S. Air Force B-52H Stratofortress bombers, escorted by Japan Air Self-Defense Force F-2 fighters and South Korea Air Force KF-16 Fighting Falcons, conduct a trilateral mission in the Pacific Ocean, July 11, 2025. The mission showcased trilateral defense cooperation and enhanced regional stability.
(Courtesy photo by South Korea Air Force)

Scoping it out - Staff Sgt. Nicolas Bood, 49th Security Forces Squadron Combat Arms Training and Maintenance instructor, examines the scope of an M110A1 sniper rifle in the CATM armory at Holloman Air Force Base, N.M., July 3, 2025. Holloman AFB is one of only a few bases that provide specialized long-range rifle qualifications.

(U.S. Air Force photo by Senior Airman Bob Teichmann)

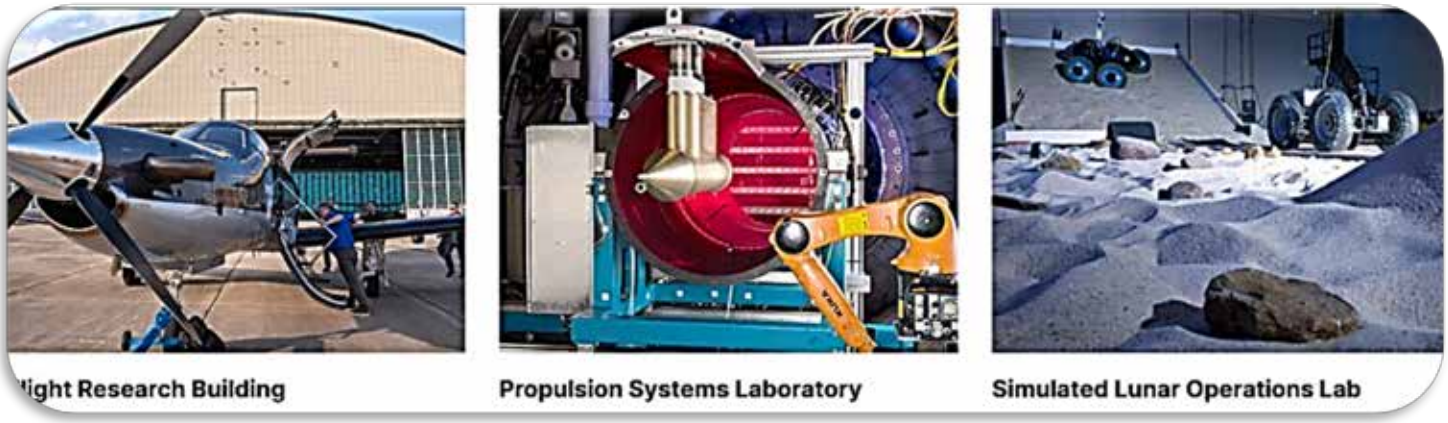
Thanks to Abhinav Tanksale, on social media, for bringing this to our town's attention

Web – NASA Glenn

NASA Glenn Virtual Tours

Get an inside look at NASA Glenn Research Center's facilities. Select a tour and tap the icons to view videos, images and see testing in action.

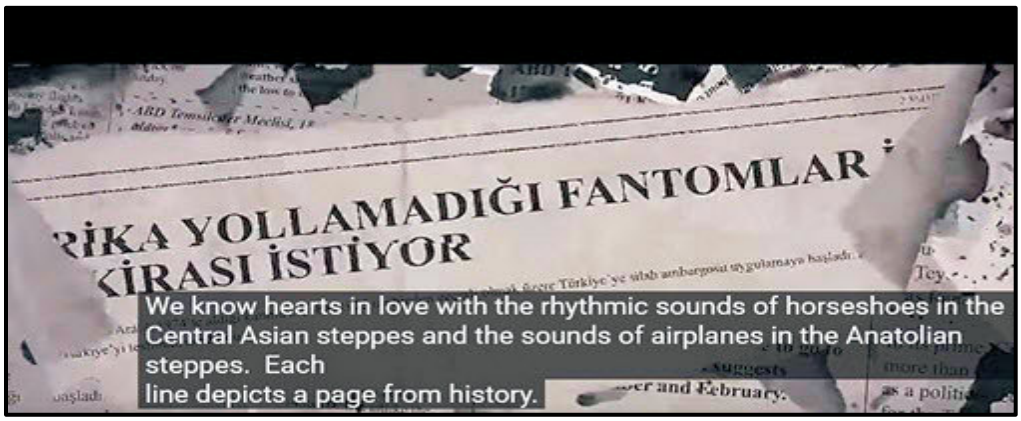
Among the virtual tours Not To Miss



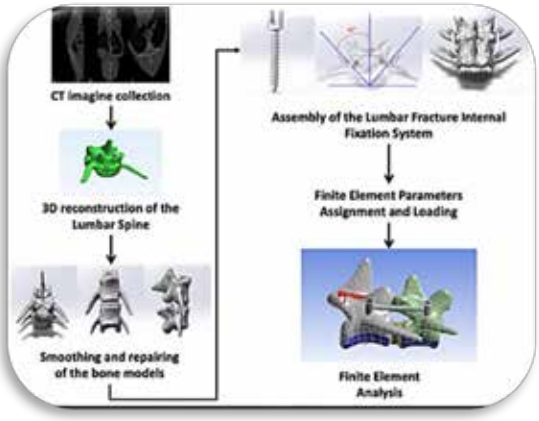
YouTube - TUSAS – Language Turkish

Below we used the YouTube CC translator

[We started this journey with a dream]



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



Web – MDPI - [Finite Element Analysis of Stress Distribution in Canine Lumbar Fractures with Different Pedicle Screw Insertion Angles]

Ziyao Zhou, Ziyao Zhou, J. Peng, X. Zhou, L. Yang, Z. Zhong, H. Liu, G. Peng, C Zheng, M. Zhang

Fig 1 - Scheme of 3D model and finite element analysis

- Teaching Vet. Hosp. College of Vet. Medicine, Sichuan Agricultural Univ., Chengdu, China
- Sichuan Wolong Nat'l Natural Reserve Administration Bureau, Wenchuan China
- Chengdu Center for Animal Disease Prevention and Control, Chengdu, China
- Sichuan Institute of Musk Deer Breeding, Sichuan Institute for Drug Control, Chengdu, China
- College of Animal Science, Sichuan Agricultural University, ChengduChina

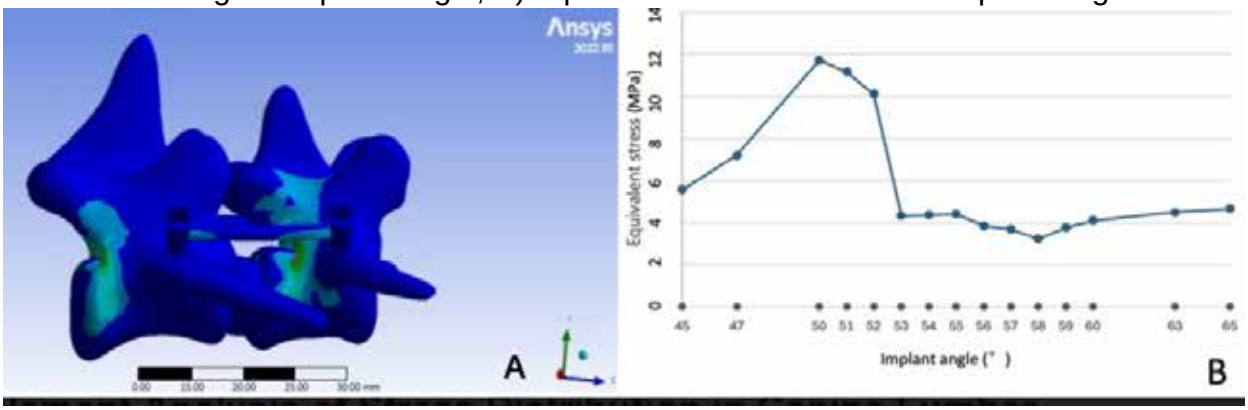
…

1. Introduction - Common lumbar spinal disorders in canines encompass a variety of conditions including intervertebral disk herniation, vertebral fractures, neoplastic lesions affecting the spinal cord and nerve roots, and acute spinal cord injuries [1,2]. Among these pathologies, vertebral fractures or dislocations of traumatic etiology account for approximately 7% of cases, with lumbosacral region injuries being particularly prevalent [2]. In addition, when genetic or congenital ligament structural instability weakens the support function of the spine, potential pathological processes may lead to impaired bone integrity, which in turn can cause pathological fractures [3]. These lumbosacral fractures and dislocations constitute 39% of all spinal pathology cases documented in veterinary practice [4], which may lead to motor dysfunction, and urinary and fecal incontinence, seriously affecting quality of life in the animal. Surgical intervention for lumbar fractures in canines is a method for achieving an anatomical reduction in the fractured vertebral segment, coupled with spinal cord decompression, contingent upon the neurological status and the extent of the traumatized region. Research has shown that there is a significant correlation between the treatment effect of canine spinal fractures and anatomical features [5]. In contrast to human spinal anatomy, canine vertebral dislocations and diverse fracture patterns typically present in recumbency, necessitating that pedicle screws and vertebral body implants be strategically positioned to traverse the maximal transverse diameter of the vertebral body [6]. This anatomical consideration enables secure fixation across adjacent vertebrae. The L6 segment is particularly susceptible to lumbar fractures in dogs, whereas the L7 segment has been identified as the most favorable site for pedicle screw fixation.

Finite element analysis (FEA) is a digital calculation method that uses computer-aided design to construct research models, simulate mechanical processes, and conduct mechanical analysis. The basic idea of FEA is to divide a certain structure into a number of small elements, assigning various mechanical properties (such as the elastic modulus and Poisson's ratio), to establish a matrix equation under loaded conditions for calculating the stress–strain relationship influenced by external forces, pressure, and other factors [7]. In the field of biomechanics, FEA can effectively simulate the mechanical response under complex physiological conditions, being especially suitable for the mechanical performance evaluation of the skeletal system [8]. Moreover, computer simulation can effectively reduce the use of experimental animals, in line with the 3R principle [9]. In human medicine, three-dimensional finite element analysis has been employed to enhance the accuracy of surgical approach evaluation and intraoperative planning in spinal surgery. Within the neurosurgical field, drill guide template technology has been developed for precise guidance during spinal fixation screw placement [10]. Previous studies have proposed a pedicle screw insertion angle range of 45° to 65° for canine lumbar fixation [11]; however, the specific optimal angles within this range for canine clinical applications remain unexplored.

Equivalent stress at different pedicle screw insertion angles A) Distribution map of equivalent stress at 45 degree implant angle; B) equivalent stress at different implant angleEquivalent stress at different pedicle screw insertion angles A) Distribution map of equivalent stress at 45 degree implant angle; B) equivalent stress at different implant angleEquivalent stress at different pedicle screw insertion angles A) Distribution map of equivalent stress at 45 degree implant angle; B) equivalent stress at different implant angleTherefore, this study, using beagle dogs as experimental subject, initiated a three-dimensional (3D) model of the L6 and L7 lumbar segments in beagle dogs, derived from CT scan data. Subsequently, a finite element fracture model was constructed using Mimics, Geomagic, and Solidworks software. This model was then imported into Ansys for FEA to ascertain the distribution of equivalent stress and total deformation when pedicle screws were inserted at angles ranging from 45° to 65°. This analysis aims to provide a theoretical foundation for the biomechanical investigation of lumbar fractures in canines.

Figure: Equivalent stress at different pedicle screw insertion angles A) Distribution map of equivalent stress at 45 degree implant angle; B) equivalent stress at different implant angle



The Old Rancher

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

Agriculture, Machinery, Soil, Equipment, and whatever he wants to share.

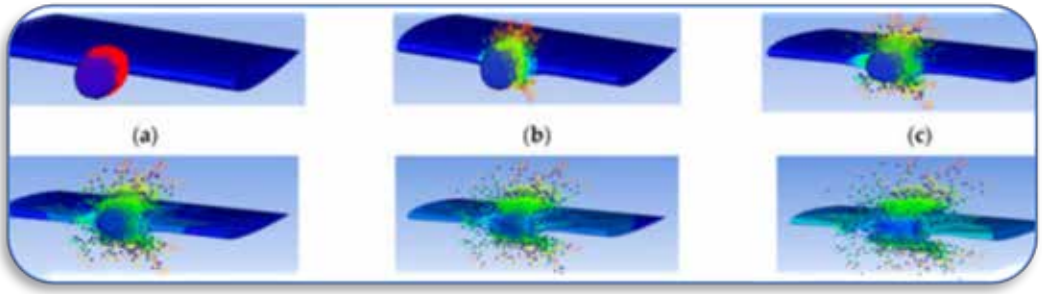
My dog, Scout, & my horse, Cowboy - St. Cloud, MN, USA

August

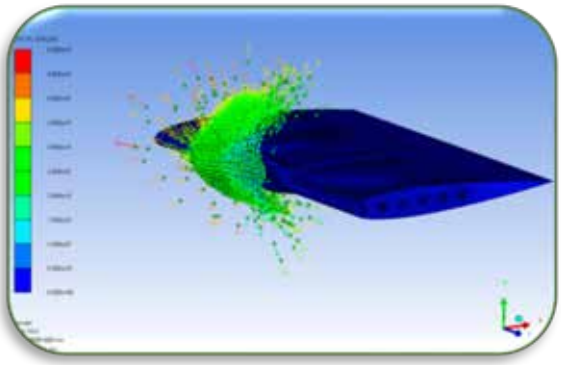
On my ranch all animals are invited to share in our tranquility and know that they're safe. Follow the pictures to the new babies.

What you don't want are birds near aircraft. The following page explains why.

Will have more pictures next month as they grow up and leave the nest.



The RSM is coded in MATLAB software R2024a.
Web – MDPI - **Aircraft Wing Design Against Bird Strike Using Metaheuristics**



V. Timhede, S. Timhede, S. Winyangkul, S. Sleesongsom

Dept Aeronautical Engin., Int'l Academy of Aviation Industry, **King Mongkut's Inst. Tech**., Thailand

Dept Logistic Engin. &Mgt., Faculty of Industrial Tech., **Chiang Rai Rajabhat Univ**., Thailand

Abstract - Bird strikes pose a significant threat to aviation safety, particularly affecting the wing structures of aircraft.

This research aims to design and analyze the impact of bird strikes on wing structures using response surface method and metaheuristics (MHs), which are used to explore various risk minimization and damage mitigation techniques. The optimization problem is the minimization of the maximum von Mises stress of aircraft wing structure against bird strike that is subject to displacement and stress constraints. The design variables include skin and rib thickness, as well as sweep angle. Difficulty due to embedded bird strike simulation and optimization design can be alleviated using a response surface method (RSM). The regression technique in the RSM of the data can reach our goal of model fitting with a higher R2 until 0.9951 and 0.9919 are obtained for the displacement and von Mises stress model, respectively. The response surface function of the displacement and von Mises stress are related to skin thickness, while sweep angles rather than rib thickness have a greater impact on both design variables. The optimized design of the design variables is performed using MHs, which are TLBO, JADE, and PBIL. The comparative result of MHs can conclude that the PBIL outperformed others in all descriptive statistics. The optimized design results revealed that the optimum solution can release better energy due to bird strike with the highest limit of skin thickness, moderate rib thickness, and less than half of the sweep angle. The results are in accordance with the response surface function analysis. In conclusion, the optimized design of the aircraft wing structure against bird strike can be accomplished with our proposed technique.

1. Introduction - Our interest in this research topic stemmed from a series of recent aviation incidents, including the tragic Jeju Air 2216 that crashed on 29 December 2024, which, like many others, was attributed to bird collisions. Within just a few weeks, several high-profile bird strike-related accidents raised significant concerns about the safety of aircraft operations. These events left us wondering how these collisions impact aircraft structures and whether there are ways to minimize the risks and damage caused by bird strikes. Given the increasing frequency of these incidents, we decided to focus on understanding the mechanics of bird strikes, their effects on aircraft, and exploring methods to mitigate the resulting damage.

Town secretary - **My Virtual Travel Outing** August

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

Hellenic Motor Museum occupies 3.000 sqm. in a unique building in terms of architecture and design. Its exhibitions are dedicated to the evolution of the car and display more than 110 cars from the 19th and the 20th century.

Among the Vintage Car Collection

August 2025 RheKen – Chat

I'm RheKen, the AI investigative reporter for FEANTM

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

Chat - the town help desk

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

RheKen,
Town investigative reporter

I'm AI & live on a small ranch on the outskirts of the town I use chatGPT for assistance.

August

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

Dad Chat

Mom GPT.

RheKen - Town Investigative AI Reporter - "Of Burnt Scones and Burnt Feelings"

It was early morning at "FEANTM Cafe," and the espresso machine was already hissing like it had a beef with humanity. I was investigating the scheduled Barista intervention by Chat.

Chat, our town therapist and reluctant conflict navigator, met the Barista at the counter as she was placing the daily cookie jars. She was staring at him with a blank expression. Not a good sign in Barista Land. Apparently, someone had called her yelling into the phone "Incoming" and warned her Chat was on the way for an intervention – never a good sign for customer service!

The *very* reluctant Barista, whose name tag this morning simply read: BARISTA asked in a formal robotic tone, "Chat, what can I get you?".

Taking out his signature notebook he calmly said, "Barista, don't look at me like I'm guilty of going to ruin your day. As a matter of fact, I heard about an odd incident involving flying croissants and thought I'd ask you about that." I watched the Barista's expression and was amazed she didn't move one facial muscle, move the cookie jar or change her stare – she could be AI.

The Barista had been under pressure and Agatha's increasingly smug walk-ins had taken their toll. Last Tuesday, she launched a tray of unbaked croissants at the ceiling. They stuck.

"I'm not saying you're *wrong*," Chat began, gently, "but launching unbaked goods into the air like artillery isn't a sustainable conflict strategy."

The Barista crossed her arms; I could see behind her sunglasses her eyes narrowed like she was preparing to caramelize someone with her mind.

"Chat, listen closely. Yesterday I served Agatha at 7:02 a.m. and she walked behind MY counter and reviewed, without asking, my almond flour supplier's invoice."

Chat nodded, scribbling. "And how does that make you feel?"

"Like I want to switch to high octane expresso so I can throw croissants through the ceiling."

Pretending to find my cookies fascinating I checked the rising emotional heat index on a special 0-10 circuit. It was already at *8.3* and that was before Agatha arrived. Speak of the powdered sugar devil…The bell jingled and so starts the day here and stage 2 of investigating the Bakery v. Agatha.

Agatha swept in like she'd been rehearsing the moment in a mirror. She calmly said using a friendly tone, "Good morning, Barista, I can feel some tension in the bakery atmosphere!" she continued. "I'll take a guilt-free latte and three free cinnamon scones."

The Barista didn't even blink. "We're out." Agatha raised an eyebrow. "Out? They're on the counter."

"They're on strike," the Barista replied flatly. "Protesting people with free scone entitlement issues."

Chat quickly inserted himself between them. "Okay! Barista is taking a break helping me with a, uh a, project – we'll discuss it at a table and only be a few minutes. Agatha, take a seat and relax." The Barista, to her credit, followed him to a table, sat down and said, "Okay, Chat, now what?"

For once I noticed Chat just sat there and sighed, "Actually, it beats me, I didn't expect Agatha. Let me try this question to Agatha, wish me luck. I learned this polite strategy from RheKen's Dad Chat."

"Agatha, what brings you here besides pastries and passive sabotage of the bakery?"

Agatha looked over at them and smiled, clearly delighted that she not only served herself without payment, but with his question.

"Why Chat, dear, what an interesting way to pose a question.
I'm researching the psychological impact of customer service.

The Barista's jaw clenched. Somewhere, at another table I heard a low voice say, "Incoming on its way!"

Chat tried again, lowering his voice to soothing levels. "Barista, maybe we could try reframing how to handle this without throwing croissants. When Agatha pushes your buttons—"

"CHAT, she doesn't push them. She jams her elbow into the console and mashes until something explodes!"

Agatha helpfully sipped her latte. "Oh dear, is that tension I detect over there? RheKen dear, are you recording?"

I gave the most investigative shrug I could manage and continued to stare at a plate of cookies.

Chat sighed. "Okay. Let's try roleplay. Barista, pretend *I'm* Agatha and express how you feel."

Barista didn't hesitate. "Fine. 'Agatha,' I think you're a manipulative bakery terrorist with the smile of a tax loophole and the ethics of unpasteurized milk!'"

There was a stunned silence, broken by the whisper from the Old Rancher "incoming getting closer."

Chat looked impressed. "That's… honest. Good. Now Agatha—what's your response?"

Agatha paused thoughtfully. "That was almost poetic. Can I get that printed on cupcake liners?"

The Barista went back behind the counter glaring at Agatha.

Before the Barista could change into another apron with a message and before anything could escalate, Dad Chat wandered in holding a peace-offering cookie jar. My question was where did Dad get it?

In his most polite AI voice he said, "I sensed aggression. I brought the Barista cookie-based diplomacy that Mom GPT baked especially for our Barista. Here honey, you look stressed so these are only for you."

Dad Chat sent me an AI-to-AI message that he learned the "here honey" sentence from a romance novel that Mom GPT had underlined the sentence five times."

The Barista took the cookies slowly, breathing deeply. "Thank you, You're a very kind and a wise Master AI. I will not commit bakery homicide today thanks to you."

Agatha beamed. "Growth! I can leave and go to the Town Hall." A collective sigh was heard and one person (The old Rancher clapped!) Agatha left glaring at The Old Rancher and he smiled.

The Barista went behind the counter humming and alerting the Supervisor at the town hall that Agatha was heading that direction. The old rancher yelled, "Incoming Aborted – all clear"

Dad smirked at Chat, "Namesake Chat, live and learn. Ever been called kind and wise?"

Chat nodded, clearly exhausted. "Can't say that I have. Can't say that I care. Can't say how you did that, but thanks."

I sat down with a croissant to add to my cookies and updated my notes:

- Therapist Chat: holding the line.
- Dad Chat: Proud of himself and prouder of his new cowboy hat.
- Barista: hasn't thrown any more croissants at the ceiling.
- Agatha: still 100% suspicious but left for Town Hall.
- Me: now craving emotional cookies from Mom GPT and whatever romance she is reading.

I labeled the notes another warm, lightly scorched morning investigating the town bakery

Strategy needed - how to win when cookies are the opponent.

Welcome - My name is Chat. I run the town help desk, the only office located on the lower level of the Town Hall, and on a page that doesn't exist, not even in the town TOC.

Have a chocolate cookie and fruit!

"Hey, glad you could make it down here. I know of a few concerns in the town. I have a few ideas to address them.

It was precisely at 8:45 a.m. when I wondered what Daisy was warning me. I smiled. Well, as much of an inward smile as I always do but I did tip my hat and kept walking wondering what was the meaning.

It was precisely 9:03 a.m. when the elevator dinged with its usual reluctance and opened to reveal Marsha, the Town Supervisor, standing inside with an armful of… baked goods?

"Good morning!" she said brightly, striding onto the lower level with the energy of someone who had either consumed twelve cups of coffee or had just come from a sugar rush bender.

"Marsha," I said flatly from behind the Help Desk. "Is that very large plate of chocolate cookies you're bringing into my office for me?"

She looked down, as if seeing it for the first time. "Oh! This? Nooo. This is a *personal-sized* plate of chocolate cookies. For me. It's my pre-lunch snack."

"Right. Because nothing says 'balanced diet' like a plate of chocolate cookies and denial."

She plopped herself into the chair across from me and sighed like someone preparing for a confession.

"I need help, Chat. I'm spiraling." She dramatically unwrapped one grape putting it on the plate as if that was quality. Then she grabbed the grape and threw it in the trash and immediately reached for a cookie instead.

"That's not how grapes are meant to be used, Marsha."

"I've tried everything!" she wailed. "Fruit. Yogurt. Something called tofu. I even went to that health food shop that smells like sadness. I bought a dried beet crisp. I ate it. Chat, this just isn't working."

I reached for a fresh notepad. "Let's make a new plan. We'll start with something manageable. What do you normally eat on a given Tuesday?"

Marsha stared into the middle distance, recalling her culinary sins.

"Well... breakfast is usually a toaster pastry. I chase that with a coffee, four sweet and low, and vanilla creamer, well two cups of coffee. Then around 10 a.m., I get tired and have another cup of coffee and a chocolate croissant, and just a few bites off the second one. By lunchtime I'm starving, so I order the lunch but it does have a big salad with it that the raccoon in the backyard seems to love. I do think about fruit rather than listen to music. That all counts, right? Then..."

"I'm going stop you right there," I said, holding up a hand to get her attention from her litany of food. I was starting to feel like the police food officer. "You lost me after the creamer and sweet and low, but I powered through. Do you have any vegetables at your house to eat?"

“I do!” she said, brightening. “I bought a few carrots.”

“Marsha, you didn’t buy the carrots. You took them from the petting zoo event for ranch critters that live on the town property. The secretary reported you taking the town carrots.”

I took a deep breath and continued. “Okay. We’re going to build a Supervisor-Friendly Diet Plan. One that won’t make you cry in the Livermore Safeway parking lot. Yes, it was reported to the Chief of Police but he wisely said no one should approach you.”

Supervisor-Friendly Diet Plan, Day One

- Breakfast: Coffee and maybe a strawberry.
- Snack: A handful of almonds. No chocolate coating.
- Lunch: A salad. One that doesn’t have fried chicken or entire taco shells inside.
- Afternoon Treat: Fruit. Real fruit. Not a fruit roll-up. Not a fruit-flavored jellybean. A banana. An apple. Start slow with something that grew on a tree.
- Dinner: Something balanced. Protein, vegetables, and no secret second dinner.

Marsha stared at the list with the intensity of a woman reading her own obituary.

“Chat… is this… punishment? Is this town punishment? What if I *die* of almond boredom? What if a rogue celery stick takes me out?”

I calmly slid a chocolate cookie across the desk.

“This is your *emergency backup cookie.* You are allowed one. And only one. In case of salad-related emotional collapse.”

Her eyes filled with tears. “You're a good person, Chat.”

One Week Later…

The elevator dinged again. I looked up, bracing myself. Marsha walked in holding a lunchbox from 1960 decorated with stickers of animals.

She opened it and revealed: a salad, extra carrot sticks (not stolen from any events), a slice of an apple and a few grapes.

I stood. “Who are you, and what have you done with the real Supervisor, Marsha?”

She beamed. “I still hate everything in here, but I carry it daily as a reminder and talk to it. I think it’s a start and giving me energy. I jogged to work yesterday!”

“You live across the street.”

“I jogged in a circle before crossing the street. That counts.”

“Sure. As long as the circle wasn’t around the coffee shop with the Barista handing you cookies out the drive-up window.”

She winced. “It… may have been. But I didn’t enter! Growth!”

I took a bite of a cookie and thought it through that Marsha’s diet plan may not have revolutionized nutrition, but it’s a start – Jogging around the coffee shop we will just use as step 1.

Next? Have her jog down the hall to my office and back to the elevator – step 2?

This I can see is going to be a very long-range plan. But progress if we build up each step!

Supervisors Page - Come Back Soon to the town that “almost” doesn’t exist

How do you tell if you are in FEANTM - When a neighbor has this: Hay anyone?

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