FEA - CAE Not to Miss & More

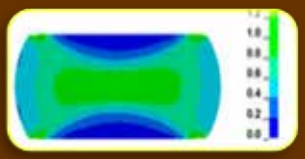
JUNE 2025 ISSN 2694-4707

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

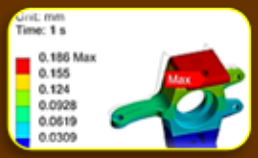
Airport - Lockheed

Airport - TUSAS

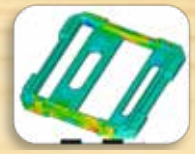
Auto – Silesian Univ.



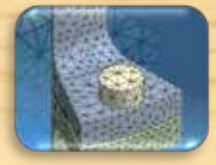
Racer-Guangdong



Marco - RBF

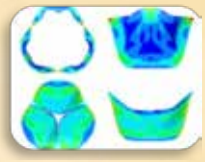


Madhukar - CADFEM



Metin - OZEN

Lisa/Hosp - N. Karajan



Abhinav MyPhyscisCafe

Marta – OASYS

Mi&Ke – Nightly News

Jenson – DFE Tech

Brianna - LLNL

Jeff - SIEMENS

Brent – GOENGINEER

GoEngineer User Community

Trina - RESCALE

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

Town: **We believe in our blog effort to advance knowledge and to share information. We believe this constitutes a "fair use" of the material under Title 17 USC. Section 107."**

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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

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Individuals are the persons we wish to thank. It doesn't imply association with a company.
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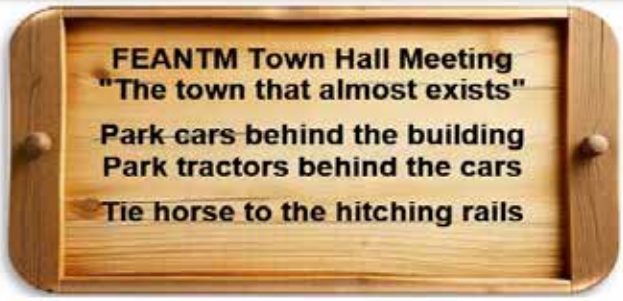
Welcome to our County, Town Hall Meeting & Announcements

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

Announcements by Marsha and Marnie are on page 07

Marta: Article authored by Simon Hart, and Co-authored by Katie Lampl. Exploring the Options for Casting Models in Crash Analysis -

Metin: Article by Mert Berkman - "Battery Cell and Electrode Performance "Challenges in Battery Cell Design

Curt: Article - It's been a whirlwind of news around Autodesk lately....Join us for Autodesk Helps Aspiring Leaders Attain Growth and Long-Term Success—Here's How - by The Muse Editors

Abhinav: Article - Composite Fatigue: Analysis and Importance in Material Engineering - CAE Assistant

Madhukar: Article by Piyush Vashisht - Unlocking Precision: Addressing Stress Singularities Through Local Mesh Refinement

Marco: Article - Polarimeter (CUSP), for Space Weather & Solar Flares X-Ray Polarimetry - Mesh morphing is a well-established computational technique in FEA…

Jenson: News - CAxWorks.VPG® 2025R1 is Released! A comprehensive, fully integrated finite element software designed for dynamic, nonlinear analysis.

Jeff: Article - Why is PLM, MES, and ERP The Golden Triangle? Each of these systems plays a unique role, but none can succeed in isolation.

Welcome to our County, Town Hall Meeting & Announcements

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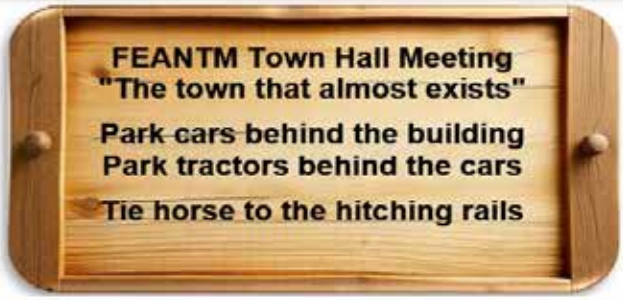


Welcome to FEANTM+

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..

Artificial intelligence (AI) is increasingly becoming a part of our everyday lives. For example, under the Research Hospital section, Marco Evangelos Biancolini highlights an article that references AI in the context of Prosthetist-Specific Rectification Templates Based on Artificial Intelligence for the Digital Fabrication of Custom Transtibial Sockets.

FEANTM has a busy and growing town population. Among the residents you can follow in the Chronicles, we find RheKen, the investigative reporter who keeps tabs on the town. I love CHAT, the town help desk. He is more like the town therapist, and he keeps Marsha supplied with cookies. He also maintains peace among the town's characters, such as Agatha and the town's Barista. He continues to monitor the ongoing rivalries and cooperations in the town of FEANTM.

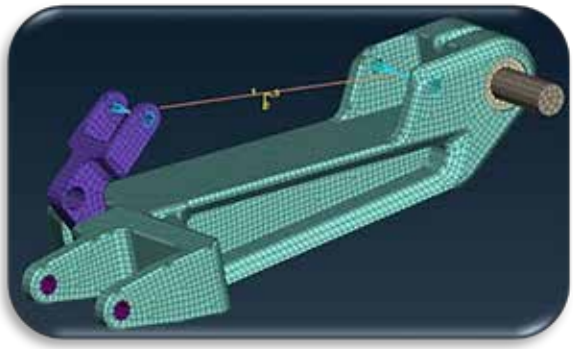
Thank you for being part of the FEANTM+ community.
Best regards, Marnie B. Azadian, Ph.D., Managing Editor

I am pleased to announce I changed the oil in my tractor - and I did it all by myself - GO ME! It was a big job and took me hours. Oh, okay, since engineers can be very particular about the precise hours it takes to implement solutions, I only had to remove the old oil cartridge and replace it with a new oil cartridge - I exaggerated the hours. Anyway, oil out, oil in, counts as I did my oil change.

Now, among my 5Cs not to miss, on the CADFEM YouTube Channel are 12 of my favorite videos by Markus Kellermeyer, 'An Engineer's Perspective - Things Others Can't See!'

Additionally, I found some interesting classes on the ANSYS Learning Hub and have listed a few. I like the ANSYS Learning Hub! And TA DA DA (bugle sound) the Hub now includes the classes from DYNAmore. **Thanks for stopping by – grab a cup of coffee.** ***Marsha***

Paper quote, "4.1. Geometry Mesh and Materials - The ANSA pre-processor is used for the development of the geometry mesh and volume elements are used for higher results accuracy….."



Web – MDPI - Design and Structural Analysis of a Front Single-Sided Swingarm for an Electric Three-Wheel Motorcycle

P. Spanoudakis, E. Christenas, N.C. Tsourveloudis

School of Production Engineering & Management, Technical Univ. of Crete, Greece

Abstract - **This study focuses on the structural analysis of the front single-sided swingarm of a new three-wheel electric motorcycle, recently designed to meet the challenges of the vehicle electrification era.** The primary target is to develop a swingarm capable of withstanding the forces applied during motorcycle's operation and, at the same time, to be as lightweight as possible. Different scenarios of force loadings are considered and emphasis is given to braking forces in emergency braking conditions where higher loads are applied to the front wheels of the vehicle. A dedicated Computer Aided Engineering (CAE) software is used for the structural evaluation of different swingarm designs, through a series of finite element analysis simulations. A topology optimization procedure is also implemented to assist the redesign effort and reduce the weight of the final design. Simulation results in the worst-case loading conditions, indicate strongly that the proposed structure is effective and promising for actual prototyping. A direct comparison of results for the initial and final swingarm design revealed that a 23.2% weight reduction was achieved.

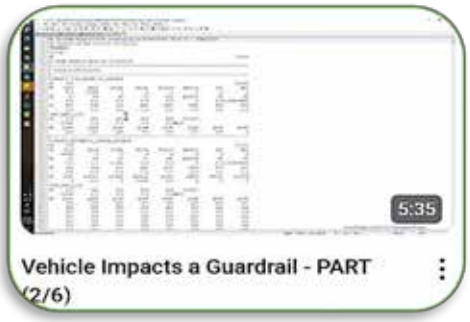
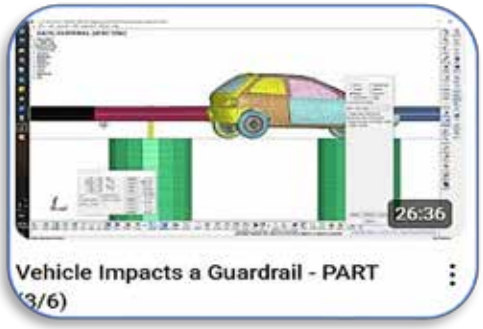
Discussion - The work presented is focused on the design and development of a front single-sided swingarm used on a new three-wheel electric motorcycle. To the best of our knowledge there is no literature for front single-sided swingarm analysis, since most of the research found is related to rear swingarms. Comparing a front and a rear swingarm, loading conditions are differentiated. One difference is the effect of loads from the motor through the chain on a rear swingarm and on the other hand higher braking forces applied on the front wheel of a motorcycle.

The main targets set for the development of this part, are structural safety and low weight. A dedicated CAE software was used for the modelling of loads, constraints and materials applied, in order to evaluate a front swingarm design through series of finite element analysis simulations.

Modelling and Simulation - Finite elements modelling requires specific steps, depending on the pre-processor used, in order to prepare a CAD part for Finite Elements Analysis (FEA) simulation. This includes modelling of forces, constraints, connections of parts in the assembly, material specification and mesh generation. All these steps are detailed in the following paragraphs. A dedicated CAE software (ANSA, Beta CAE Systems, Thessaloniki, Greece) is used for this purpose [37], providing adequate results.

Student	**I want to design guard rails when I grow up.**
Bart R.	**Guard rails like your Dad designs them for safety?**
Student	**Yes, we can place the guard rails in town.**
Bart R.	**Well, young lady, you will succeed.**

Web – YouTube – [Ameen Topa]

	Part 1 of 6 - a vehicle model and a guardrail model. In this tutorial, I show how to combine a vehicle model and a guardrail model. Also, how to set up the necessary keywords is covered here.
	Part 2 of 6 - change the thickness of the guardrail. In this tutorial, I show how to change the thickness of the guardrail. Two methods are covered: using the LS-Prepost and using a text editor.
	Part 3 of 6 increase the guardrail length In this tutorial, I show how to increase the guardrail length.
	Part 4 of 6 another method for increasing the guardrail length In this tutorial, I show another method for increasing the guardrail length.

LLNL Quote – "The Contained Firing Facility (CFF) at Lawrence Livermore National Laboratory (LLNL) recently marked a major milestone: its 200th explosive experiment. This milestone was achieved with a three-in-one event as shots 198, 199 and 200 were conducted simultaneously. In these hydrodynamic experiments, known as "shots," researchers observe how test materials move in the microseconds after a detonation.

Web – LLNL - **Contained Firing Facility marks 200th explosive experiment**

"Shot Day" is a beehive of activity. Starting as early as 5 a.m., teams from the Lab's Site 300 firing operations pore over final details and conduct dry runs to test the systems."

"Everyone is at their highest level of readiness and awareness," said Anthony Regalado, who oversees Weapon Physics and Design (WPD) firing operations at both the CFF and the Outdoor Firing Facility (OFF). "What we're doing is way more than just blowing something up and getting data. It's about executing safely, securely and with intense attention to detail and quality on our nation's top security mission."

Regalado has had a bird's-eye view of the decades of experiments that led to the 200th experiment. He supported his first CFF shot as a newly hired electronics technologist in the early 2000s.

"The work we were doing inside the CFF chamber — detonating experiments containing toxic materials inside an enclosed structure — hadn't really been done before," Regalado said. "We spent years refining our processes, learning how to safely and efficiently navigate the complex and challenging modes of our operations."

"These milestone experiments often take years to develop, involving many dedicated people. At the CFF and OFF, we only see the final stage of the experiment, so we execute with a strong sense of purpose," he added.

Today, the CFF is the largest indoor firing facility in the U.S. Department of Energy complex, handling large-scale, non-nuclear experiments with full containment of hazardous materials such as beryllium, lead and depleted uranium. Because the explosion is contained, LLNL can safely collect unique data while protecting both the workers and the environment.

The Hydrodynamic Testing program at LLNL serves a wide range of customers including modernization programs, fundamental weapons science, stockpile stewardship, counterterrorism and counterproliferation efforts, and diagnostics development for national labs and partners.

At the CFF, shot data is captured using LLNL's state-of-the-art, high-speed flash X-ray machine and other advanced diagnostics. These include multiplexed Photonic Doppler Velocimetry, Broadband

Laser Ranging, high-speed rotating mirror imaging, digitizers and thermocouples — a standard set for most experiments that support nuclear weapons and explosives research and development.

A panoramic view of Lawrence Livermore National Laboratory's Site 300 Experimental Test Site, featuring the Contained Firing Facility, left. (Photo: Garry McLeod/LLNL)

The ability to execute multiple shots simultaneously is a boon for customers, improving scheduling and operational efficiency. Initial diagnostic data capture for the milestone shots was excellent, and further analysis is underway. Sandia National Labs also contributed to the effort, providing diagnostics for stockpile modernization programs.

“Every shot is unique and brings its own challenges,” said Kyle Sinding, the Weapon Physics and Design program group leader who oversees hydrodynamic experiments. “It’s a fluid and dynamic environment, and firing operations teams truly excel in it.”

Precision is critical in these experiments, Sinding explained. “You must collect the right data of the highest quality at exactly the right time. It can take years to build an experimental configuration, and once it explodes, you can’t put it back together. Starting over pushes out schedules and drives up costs.”

Sinding praised the dedication of the teams involved. “Our teams constantly navigate challenges while ensuring we get the data we need. They instill high confidence by taking care of even the small things at very high quality.”

Regalado also highlighted the importance of thorough reviews before and after each shot. “Principal investigators and Ramrods conduct in-depth reviews of the experiment before the shot, and analyze the data captured afterward,” he said. “This ensures everyone understands the bigger picture and the full context of the various programs we support, all tied to the ultimate national mission. It inspires and unifies the whole team.”

For Regalado, the significance of the work goes beyond the technical aspects. “Those of us in firing operations know we’re not just setting up and executing experiments — we are part of something big and meaningful,” he said.

Reflecting on the milestone, Regalado expressed pride in the team’s efforts. “It instills a great pride to be part of the Hydrotest Program and help achieve the Lab’s national mission. It takes a large team of dedicated professionals to accomplish this. I couldn’t be prouder of the team I get to work alongside every day. All the credit to our success goes to them.”
–Paula Rockstroh

Town choice on GOENGINEER Blogs:

Blog by Nick Sweeney on how to publish your own user group on the GoEngineer Community

Web – GoEngineer - Publish Your User Group on the GoEngineer Community - Nick Sweeney

User groups are a powerful feature of the engineering community. Everything from professional engineering groups to program-specific groups, like the SOLIDWORKS User Group network, exists to give engineers the opportunity to network, learn, and share experiences with like-minded individuals.

Excerpts on the Community and how to – visit the site for complete information and joining.

The GoEngineer Community was started for very similar reasons – to be a platform for engineers from any and every discipline. That's why we're excited to launch user groups on the GoEngineer Community! Group leaders can post their user groups, share important updates, provide links to RSVP, and keep members updated using our built-in forums.

Excerpts from - Let's walk through how to add your user group, what kinds of groups are allowed, and some additional information you need to be an effective moderator.

- How to Create Your User Group on the GoEngineer Community…
- Any registered member of the GoEngineer Community can create a user group...
- when selecting your Privacy setting, you can pick Public, Open, Closed, or Private...
- Event Signup box...
- Who Can Create User Groups? Any user on the GoEngineer Community can create a user group. However, every User Group must be approved by the Community administrators, so your group may not appear on the list right away…

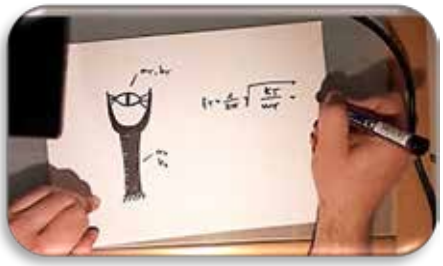
Is this only for Solidworks? Not at all. While we love our SOLIDWORKS User Groups and they are very prominent, this is for user groups in any kind of engineering (and yes, even other CAD programs).

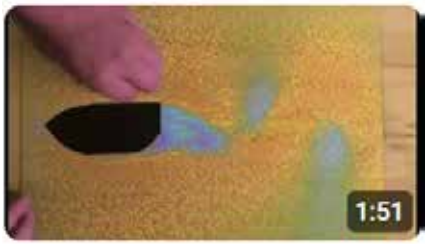
Perhaps you want to start a user group that meets monthly to talk about the latest news in the automotive engineering space. Great! Just follow the same steps, and you are more than welcome to host your user group on our Community.

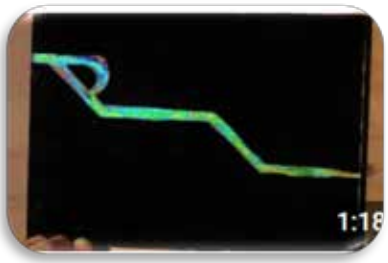
As long as you're meeting about engineering, we want to be a welcoming home for your user group, too. We only ask that you remain respectful of other groups in the Community and within your own user groups.

Welcome to my 5C's News Page. As we all know I love YouTube! Among the videos that I watch over and over is: TA DA DA (bugle announcement sound)
YouTube – CADFEM – Markus Kellermeyer -
an Engineer's Perspective - Things others can't see!

Excerpt of a sentences - POP Quiz from the Coyote find which video they refer to: Nature can be a great designer! This tree has already survived generations (and it had to endure a lot) and will now also face the generation of our children. NEXT: Never mess with a? Watch to the end! CFD simulation is so cool. NEXT: Halloween from a different perspective, NEXT: Self-caught fish, a cold beer and a bit of simulation - that's how to imagine a good weekend! This is definitely the best way to light a charcoal grill. Try it out for yourself! Now, head on off to YouTube and watch the amazing engineer's perspective





Welcome to my news page. Out in the county my internet connection is low or doesn't exist. IF I was able to virtual attend the conference below are among the speakers I would want to hear. Don't miss them! July 16-17, 2025

Web – ANSYS - Virtual Event - Simulation World 2025 – Powering innovation that drives human advancement. A free global simulation event that is designed to inspire, equip and empower you to innovate.

Okan Avci	More Evidence in Orthopedics with Physiological In Silico Musculoskeletal Models
Maximilian Calabro	Development of a High-Quality Yet Low-Cost Prosthetic Knee Using Anisotropic Material Simulation
John Twerdok	Harnessing Full-Vehicle Simulation to Pass EMI/EMC Testing
Jeff Baxter	Accelerating Next-Generation Air Superiority with Digital Engineering
Bhaskar Banerjee	Advancing Predictive Maintenance of Heavy Machinery via Simulation-Based Digital Twins
Alfonso Santiago	Simulation Tools as the Predictive Engine for Human Digital Twins: from an Engineering Design Tool to the Healthcare Pathway of the Future
Farhad R. Nezami	Shaping the Future of Medicine: Computational Physiology, AI-Guided Therapies, and the Next Generation of Medical Devices
Jan De Backer	Advancing Respiratory Drug Development: The Transformative Role of In Silico Clinical Trials
George Robson	Analyzing and Optimizing the Wingcopter 198 for Medical Deliveries Using Ansys
John Patalak	NASCAR Reduces Injury Risk with Human Body Models and Simulation
Lucilla Coelho de Almeida	Enhancing Tablet Coating Uniformity: Applying Descrete Element Method (DEM) Modeling to Pharmaceutical Challenge
Kelly Hennig	How Fully and Rapidly Reusable Rockets Will Revolutionize the Space Economy
Bert Blocken	CFD and Sustainability: A Power Couple in the Built Environment

Why do I like virtual classes?

- **I don't have to drive in traffic, find parking, find coffee**
- **I can learn at my own pace, on my ranch schedule**
- **I can take the class in the morning or late at night**
- **I can take courses given in the US or any country**

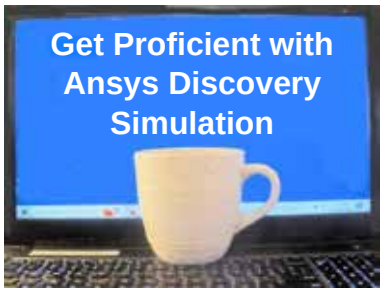
Whether you're working, a student, retired, looking to pick up a new skill, or, like my brother, keeping up with old ones, whether online or in person grab a cup of coffee and learn.

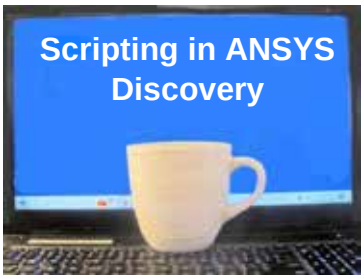
This month we tractor off to view a few on line & local classes

Web – ANSYS - The ANSYS Learning Hub from the course catalog

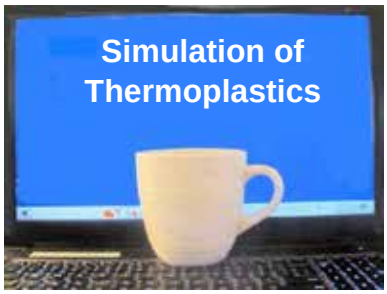
Note: DYNAmore classes now through the ANSYS Learning Hub.

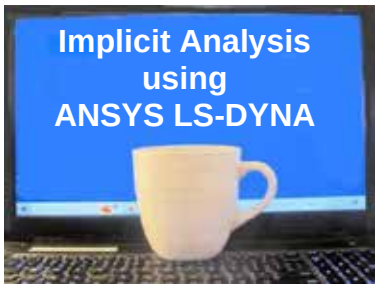
3D Design

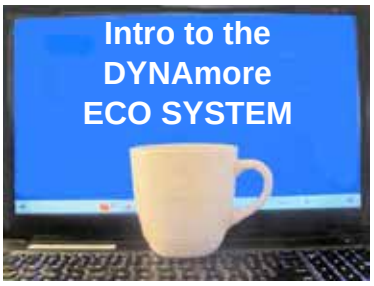




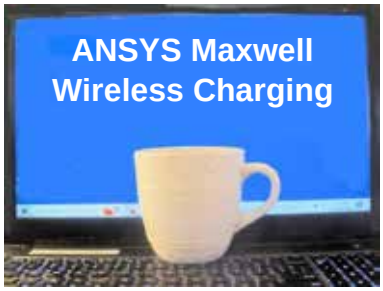
DYNAmore Local Offering taught locally in Stuttgart

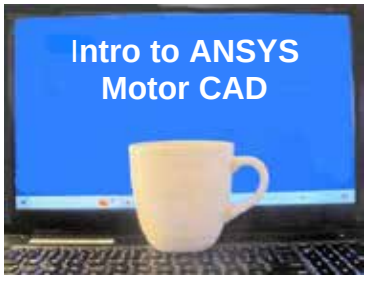


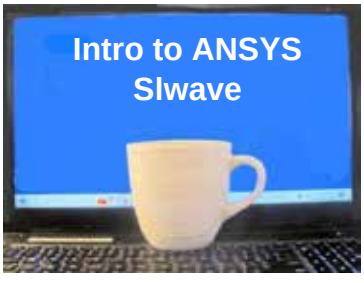




India Local Offering taught in person in India in English







It's been a whirlwind of news around Autodesk lately...I know some might feel one way, others another. But for Kelvin Hamilton and I, it's been a chance to really step up and contribute to something bigger – our evolving culture. And what does "culture" mean? To us, it's about the people – the people who show up every day and shape this place. I'm privileged that Autodesk invests in its people, giving employees the chance to grow as a leader through amazing professional development. Shoutout to my "Fab Five" – read the article to see who – for being a sounding board on this journey with me.

Web – The Muse - Autodesk Helps Aspiring Leaders Attain Growth and Long-Term Success—Here's How - by The Muse Editors

There's never one definitive path to a fulfilling career. Just ask Curt Chan and Kelvin Hamilton, two award-winning leaders at Autodesk. From an early age, both were driven by innate curiosity and an enthusiasm for technology.

"Growing up in an immigrant family, cars were my world," says Chan. "Matchbox cars, Lego cars—you name it, I was obsessed. I could rattle off engine specs like nobody's business, but my multiplication tables? Forget about it!"

This passion was so undeniable that Chan's friends and family encouraged him to pursue mechanical engineering. Motivated by this advice and his interests, he worked at defense contractors like Northrop Grumman and Lockheed Martin. However, Chan soon began to wonder, "Is this it?" The idea of toiling away in a cubicle for 30 years wasn't appealing, and Chan was determined to get closer access to the car industry. He pivoted to sales engineering, starting on a journey that felt more in line with his goals.

"I went from being a mechanical engineer to working in sales, technical sales, marketing, and even education," Chan explains. "Along the way, I've met some amazing mentors and coaches—they saw things in me that I didn't see in myself."

Like Chan, Hamilton's road to Autodesk was influenced by his need to understand how things work. Rather than following a cookie-cutter career plan, Hamilton was guided by the familiar cliche of following your heart and pursuing what you enjoy.

"I'm not afraid of the unknown and jumping in the mud," he says. "I wasn't sure what you'd get when you put these pieces together, but I was young and didn't know better."

After attending university in Canada, Hamilton pursued his master's degree in mechanical engineering, and he was exposed to 3D printing and incremental sheet metal forming—two manufacturing methods that allowed him to watch design come to life in real time. The unexpected 2008-2011 financial crisis caused Hamilton to rethink his next steps; this event and his desire to travel brought him to France, where a new role introduced him to professional research and development (R&D).

Hamilton notes, “My tech career was shaped by changing and challenging R&D projects, the chance to collaborate with diverse teams, and the reward of building a community around solving problems.”

Both Chan and Hamilton credit Autodesk as a place that encouraged their professional growth. Today, Chan is based in San Diego, California, and works as the Strategic Partnerships Manager. Hamilton is located in the Netherlands, serving as the Senior Technical Consultant Manager. They share how they knew Autodesk was a good fit, their experience in Autodesk’s Next Level leadership development program, and advice for those aiming to join the company.

What led to your job at Autodesk, and how did you know the company would be a good fit?

Chan: What got me here was a human connection. Someone I trusted had the inside scoop and told me about Autodesk’s culture, values, and trajectory. That piqued my interest.

About this “fit” thing, I’ve always been a bit skeptical. Everyone talks about finding the perfect fit, like it’s a pair of bespoke shoes. I think it’s more about how adaptable you are. Can you roll with the punches? Can you keep an open mind? I’m a big fan of the Ted Lasso quote, “Be curious, not judgmental.” That’s the vibe I try to bring.

There are non-negotiables in any job. You have to ask yourself the tough questions: Am I happy? Am I growing? Do I believe in the leadership? Your answers will tell you if you’re on the right track. Here’s the kicker: That “fit” can change. It’s not only about finding the perfect fit; it’s about maintaining it.

> Hamilton: I joined in 2014 after Autodesk acquired Delcam, a leading design and manufacturing software development company.
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> Before the acquisition and after my time in France, I had an opportunity at Delcam to pivot away from mechanical and manufacturing hardware and turn toward the software used to control that hardware and processes. At the time, Autodesk was making a major investment in the manufacturing sector. Delcam was a perfect fit to help drive foundational changes, and the opportunity to join Autodesk—a household name in the industry—was enticing.
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> Soon after joining, I saw a space for myself. I was motivated by the company’s commitment to reinvention and prioritization of a culture where everyone could thrive. Autodesk shares my core values: curiosity and courage, friendship and empathy, honesty and integrity. I saw like-minded people who were a joy to work with as we tackled challenging industrial problems.
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> Ultimately, I’m attracted to Autodesk’s mission: to make a better world designed and made for all. I’m originally from Sierra Leone, in West Africa, a resource-constrained country with a history of economic and environmental devastation. I asked myself, “How could I leverage my experiences and lean into my passions for inclusive leadership, sustainable development, and photography to help elevate people trying to live a dignified life?” I get opportunities to explore this question at Autodesk and prepare for whatever the future holds.

What are your core responsibilities? Why does this work continue to inspire or excite you?

Chan: Here's the scoop: Autodesk makes awesome software for design and making. My job is to find organizations—like those running amazing school competitions or big educational societies—who can help get that software into the hands of students and teachers. Think of me as the person who finds the perfect dance partners for Autodesk in the education world.

In other words, I'm a relationship builder and an undercover detective. My role involves a lot of planning and negotiation, but I spend a lot of time keeping up with education news and trends. The best part? It's all about the people. My life motto is relationships first, business second. As Maya Angelou said, "People will forget what you said, people will forget what you did, but people will never forget how you made them feel."

> Hamilton: First, I support and enable my team. Second, I ensure the problems we solve and our output have impact and strategic business value.
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> Supporting and enabling my team means ensuring they're in a good mental and psychological headspace, which is necessary for collaboration. They need to have the right tools to explore new technologies and innovate. It's about giving them space to fail and take risks. When they encounter obstacles, I guide them as they navigate those challenges.
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> Ensuring our work has important business value means keeping an eye on strategic innovation and collaborating across teams. Working on innovation is rife with challenges. There's enough room for conflict, and you're never fast enough, especially in the hotly contested and fast-moving areas of automation and AI in the design and manufacturing industry. To ensure our work makes an impact, we interface with customers and internal teams to understand pain points, pitch new methods and ideas, develop innovative solutions, and communicate with stakeholders to validate and seek guidance.
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> This work inspires me because the technologies we work on and the output of our work help spark meaningful conversations and drive innovation at Autodesk. I collaborate with bright colleagues who teach and help me grow in surprising ways. It's rewarding to see my small efforts help colleagues who, in turn, support our customers' success.

How does Autodesk help employees develop their leadership skills?

Chan: Our approach to leadership development is more than checking boxes with programs, though we have those too. What truly sets us apart is the culture of leadership that starts at the top. When our C-suite leads with empathy, it creates a ripple effect, empowering leaders at every level to do the same.

Honestly, it's the personal connection that makes all the difference. As part of our culture, it's important that we're trusted partners across our teams, and to do so, we "embrace the expertise of others." This means that people are willing to help, and that's something that has personally impacted me.

> Hamilton: Autodesk encourages individuals to take charge of their career paths in close collaboration with their managers. I appreciate this approach because it empowers us to cultivate our vision and gives agency to each person.

What are some of the biggest challenges you've faced thus far at Autodesk, and what valuable lessons have you learned?

Chan: Challenges are truly opportunities in disguise. It's less about one big challenge and more about the daily commitment to living our culture. It's easy to have values on paper, but living them? That's where the growth happens. One thing I've noticed is the ongoing work of holding each other accountable—in a way that lifts us all. We aspire to be trusted partners, which means speaking out even when it's uncomfortable.

I've learned this is about creating a space where we can all be brave and honest. This journey has motivated me to have those hard conversations more often. It's about leading with emotional intelligence and, as The Leadership Challenge says, "modeling the way." I'm learning that leadership isn't about having all the answers. It's about setting an example of integrity and courage. I strive to be humble, recognizing that I don't know everything and can learn from anyone. It's inspiring to see how these moments transform into growth. There's no perfect company, but there's always the pursuit of being better, of living our values more fully each day. To me, it's what makes this journey so worthwhile.

> Hamilton: One challenge was transitioning into a leadership role and supporting a team of engineers who looked to me for guidance. This experience taught me to lead with conviction while building trust and connections with colleagues.
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> Another has been navigating the complexities of innovation within a large corporation, particularly in a team where our work often involves unproven concepts, a constantly evolving environment, and many stakeholders. This requires perseverance, resilience, and courage to push forward despite uncertainties. These experiences challenge me to cultivate a collaborative spirit, actively listening and engaging my collaborators with curiosity. It certainly hasn't been easy—much of the friction I experience is not new and comes when you innovate, but I'm thankful to be able to question how I can be more effective as a leader.
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> Overall, these challenges have led to my growth, enabling me and my team to make impactful solutions for our customers and the industry.

Can you tell us about the Next Level program and the award? How does the program reflect Autodesk's commitment to innovation and professional growth?

Chan: As a sponsorship and leadership development initiative, it's a testament to Autodesk's commitment to growing talent from within. The aim is to build a stronger, more expansive global leadership pipeline.

We were divided into teams and worked on a mix of individual and group projects and a challenging stretch assignment. What made it particularly special was that our cohort got to vote for someone who embodied the program's values and demonstrated strong leadership qualities. I was genuinely humbled to be recognized, especially because I tied with Kelvin. He's someone I deeply respect, and it shows how different leadership styles can be equally effective. We have very different approaches, but we both strive to make a positive impact.

To me, the program reflects Autodesk's commitment to innovation and professional growth in a tangible way. It wasn't just about theory. It was about putting those principles into practice, collaborating, and learning from each other. The fact that they empowered the participants to recognize leadership within the group speaks volumes about their culture of trust and empowerment.

Hamilton: Together with Curt, we won the Impact Award for impactful leadership. Like him, I was fortunate to be nominated and participate in this six-month program alongside many talented colleagues.

We were awarded because we demonstrated several leadership behaviors that our peers recognized. I got a chance to see Curt's leadership style up close and could see his talent and leadership experience shining through. At a couple of spots in the program, we joined forces to challenge some of the processes that we were using in the program. Even though our styles and experiences were different, we had a lot of respect and trust to learn from each other.

The program aims to develop leaders from within and showcase the incredible internal talent pool. This ensures that when future opportunities arise, prepared leaders are ready to step up, driving both personal and organizational success.

What advice would you give prospective candidates seeking to join the Autodesk team?

Chan: Come with a curious spirit and a willingness to learn. My career journey started with a childhood obsession with cars, eventually leading me down a path to strategic partnerships. It's been a winding road, but I've learned that adaptability and a growth mindset are key.

At Autodesk, it's about who you are and how you connect with others. We're trusted partners to our communities and customers, and that starts internally. Don't be afraid to ask questions, challenge the status quo, and bring your authentic self to work.

Thriving here means embracing and living our values. We value creating a sense of belonging for everyone, encouraging courageous conversations, and holding ourselves accountable. Build genuine connections, and you'll find success and fulfillment.

Honestly, mentors and coaches have completely changed my life. I have my Fab Five at Autodesk—Karen Jacobson, Ken Foo, Stephen Hooper, Lars Christensen, and Jeremy Stadtmueller. They give me honest, sometimes tough, feedback about my character, career choices, and how to reach my goals. Their perspectives have fundamentally shifted how I approach my career, support others, and try to lead by example. It's driven home the importance of helping others.

Hamilton: They should recognize that leadership is a set of innate and learned behaviors requiring continuous practice. The first step is identifying if leadership truly interests you and understanding your motivations for that interest.

Second, seek and create opportunities to demonstrate leadership behaviors, as leaders don't wait to be told what to do. Third, support and elevate others. Support can be coaching for success, but also rolling up your sleeves and jumping into the mud with the team. It can also mean driving initiatives forward and providing clarity so the team can function to the best of its ability. You can also shine a spotlight on others—avoid bringing others down to elevate your status. Emulate role models who exhibit admirable qualities and behaviors that inspire you. Continuously learn by engaging with books, podcasts, and other resources.

Finally, build a network of supporters and mentors who can guide you throughout your journey. In the end, when leadership opportunities arise, be prepared to embrace them with confidence and enthusiasm. Opportunities rarely come in a perfectly wrapped package.

Website Quote, "Whether we're talking about the latest electric vehicle, a hybrid, or a traditional gasoline car, they all share a critical need: keeping temperatures "just right." Vehicle energy and thermal management is like conducting an orchestra where every instrument needs to play at the perfect volume. When it works, it's beautiful. When it doesn't… well, that's when you notice.

WEB – Siemens - From heat to range – energy and thermal management done right

By R. Nicolas, F. Ross, L. Morris and E. Verlinden

The EV revolution has turned up the heat on this challenge. Every watt of power used for cooling or heating directly impacts how far you can drive on a charge. The lessons we're learning from EVs are helping make all vehicles more efficient, regardless of what's under the hood.

Optimizing vehicle energy and thermal management - Traditional siloed engineering approaches just don't cut it anymore. Developing the cooling system separately from the powertrain, which is separate from the cabin comfort system? That's like trying to build a house by having different contractors work without talking to each other. It might stand up, but it won't be very efficient!

An integrated approach is required to bring everything together from day one. This is where advanced simulation and testing tools come into play, allowing engineers to see the big picture before the first prototype is even built.

Simcenter's integrated VEM-VTM solutions cover all development stages from requirements, benchmarking, architecture and sizing, to VTM components engineering and vehicle integration.

Let's dive deeper into how this modern approach is revolutionizing vehicle development…

1 – VEM benchmarking and target setting - At the dedicated VEM facility, existing vehicles are fitted with sensors to identify all the mechanical, electrical, and thermal energies flowing through them. Different scenarios are run, such as normal driving, cold start, hot start, and charging, to capture the complete behavior of the vehicle in various conditions. Engineers use this data to create a digital twin that can be modified to explore potential improvements and optimization. Any aspect of the car can be changed, such as the size or type of battery, the HVAC system, or the positioning of different components, and then run simulations to see how this affects overall performance.

2 – Vehicle architecture definition - Vehicle architecture definition focuses on establishing system requirements and initial sizing to meet performance targets. Key activities include selecting the powertrain type, defining thermal system architecture, sizing key components such as the motor and the battery, and determining cooling/heating needs.

OEMs utilize supplier data and models to validate initial sizing and develop thermal strategies. This enables early identification of integration challenges and allows for architecture optimization. The process supports efficient development of thermal management systems while balancing performance and comfort requirements. This data-driven approach helps OEMs integrate thermal considerations from the start, enabling faster development of energy-efficient vehicles.

3 – Sizing and system development - VEM sizing is like creating a balanced energy blueprint for a car. How much energy storage do we need for the desired driving range? How strong must the electric motor be for acceleration, hill climbing, highway speeds? How will the power electronics manage the power flow between the battery and motor? Will the cooling system keep everything at safe operating temperatures?

All building blocks need to fit perfectly together. If one component is too small or too large, it affects the entire system's performance. The goal is to find the sweet spot where everything works together efficiently while meeting all requirements.

4 – Detailed components engineering - Over their lifetime, vehicle components are repeatedly exposed to temperatures up to several hundred degrees Celsius. Without adequate thermal management, this will lead to component failure, causing significant safety and cost issues.

Simcenter solutions help designers predict the thermal behavior of each component to understand the required cooling levels. They also help ensure that batteries in electric vehicles remain within the optimum operating temperature to deliver maximum performance and guarantee safety.

5 – Full vehicle integration - For modern vehicles, a holistic view is essential from the outset, as countless interdependent factors influence energy usage and thermal management. Failing to integrate these elements early leads to costly, time-consuming design changes later.

Virtual integration is through system-level simulation is a key enabler, allowing cross-functional teams to break down traditional silos and collaborate effectively. A digital thread connects the evolving subsystems, ensuring the latest models are integrated throughout development. This empowers each discipline to understand how their work impacts – and is impacted by – the broader vehicle system.

So, what' next? Modern vehicles need modern development methods. Breaking down traditional barriers between engineering teams isn't just nice to have – it's essential for success. Deploying Simcenter's holistic approach to optimizing VEM and VTM is like having the entire engineering team, speaking the same language.

DFE-tech Announcement News: CAxWorks.VPG® 2025R1 is Released!

Web – DFETech - [CAxWorks.VPG 2025R1 Release Highlights:]

Embrace AI technology and develop AICrash function

Major Functional Updates:

Pretreatment:

1. Include file management upgrade:

- Differentiate the Include file management between different solvers, such as Radioss, Dyna, Nastran, etc.;
- The movement of data between Includes can be automatically adjusted to the corresponding Include files;
- Add the definition number of Include file. When removing a unit, ask whether the node should be removed together. Each Include defines a number range.

Postprocessing:

1. Updated the VPG report template and revised the images and text information in the report template.
2. Added the missing regulations in the VPG report insurance template.

Security Module:

1. Added AI insurance module. The trained model can be used to calculate and solve the new insurance. The modular operation interface integrates pre-processing settings, submitting AI predictions, and visualization of prediction results.
2. Added Radioss-based collision safety regulations analysis, bus rollover, dashboard collision, free-moving head shape, new energy battery pack analysis, etc.

Structural Modules:

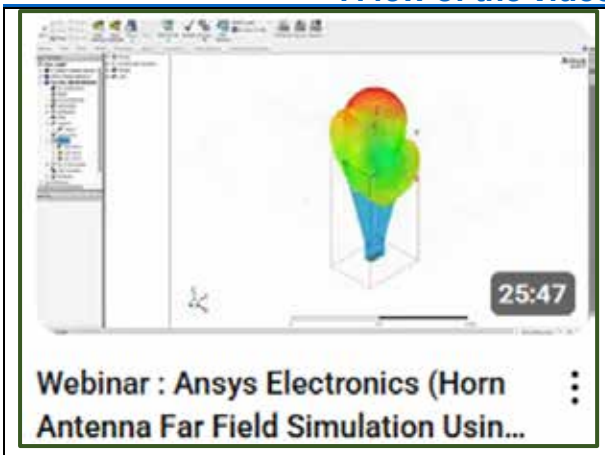
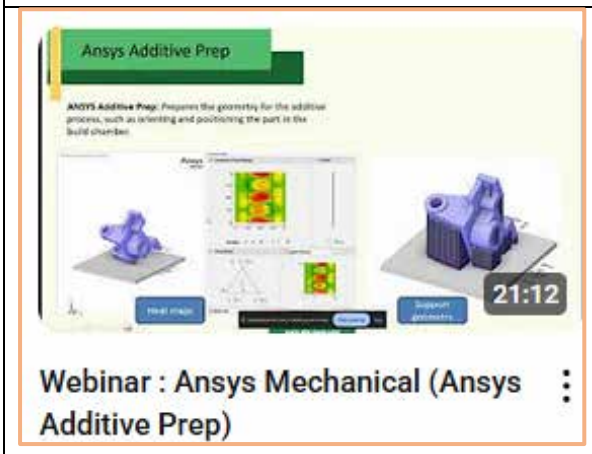
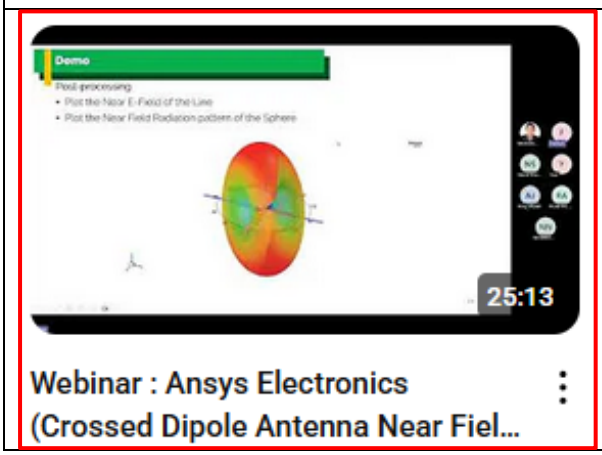
1. Added new energy battery multi-scale modeling (LS-DYNA), which supports four battery types and can be used for multiple operating condition analysis and full-process battery modeling.
2. New NVH analysis module (Nastran), including static stiffness analysis and normal mode analysis settings.

Application Scenario: **CAxWorks.VPG 2025 R1 is a comprehensive, fully integrated finite element software designed for dynamic, nonlinear analysis. It enables users to model, analyze, modify, and visualize complex nonlinear engineering problems in real time.** This advanced technology is primarily utilized in automotive system-level simulations, including vehicle crash safety and occupant protection, nonlinear dynamic behavior of vehicle components, noise, vibration, and harshness (NVH) studies, as well as fatigue life predictions of automotive systems.

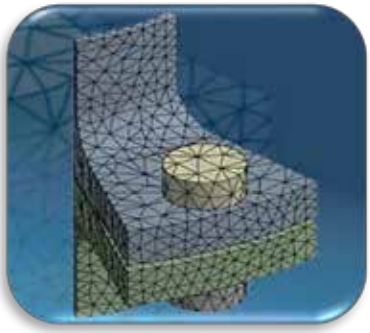
DFE-tech: On our YouTube Channel you can find webinars, simulations and learning videos

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

A few of the videos on our channel

	This webinar covers step-by-step modeling, far-field simulation, and result analysis using HFSS tools. Perfect for beginners and professionals in antenna design. Learning Outcome: Upon completion of the webinar, learners will be able to: 1. Define near field and far field radiation 2. Simulate far field radiation of a Horn Entenna using HFSS 3. Plot the far field radiation pattern using HFSS
	Webinar : Ansys Mechanical (Ansys Additive Prep) his webinar will explore the capabilities of an innovative software solution that revolutionizes the preparation of 3D models for additive manufacturing (3D printing). Specifically designed for complex geometries in industries such as aerospace, automotive, and medical. Ansys Additive Prep helps optimize designs and process parameters to ensure flawless builds.
	This webinar will cover the design and simulation of a Crossed Dipole Antenna using Ansys HFSS. You will learn how to use HFSS modeling tools to design the antenna, simulate Near Field Radiation with pre-processing tools, and extract and analyze Near Field Radiation Plots with post-processing tools. This session is ideal for anyone looking to enhance their skills in antenna design and electromagnetic simulations.

Article by Piyush Vashisht. ” By identifying key stress-concentrated areas, using adaptive meshing, and ensuring mesh convergence, engineers can balance accuracy and computational efficiency. Tools like Ansys, available through CADFEM, make this process more streamlined, allowing for better design insights and more reliable simulations… With CADFEM’s expertise in integrating Ansys tools, this refinement process is streamlined, enabling engineers to make informed design decisions while minimizing computational costs.

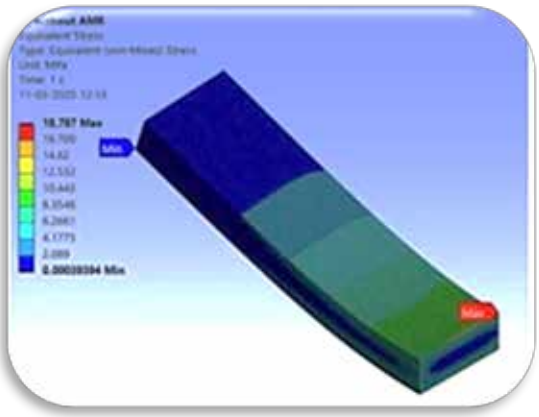


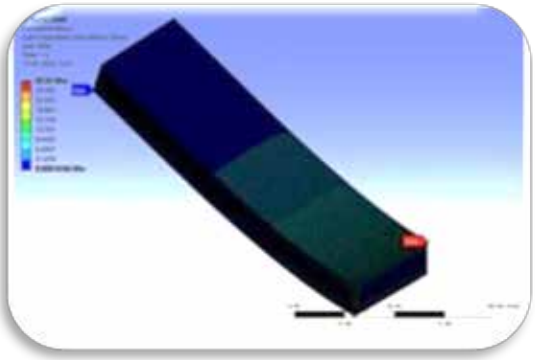
Web – CADFEM - Unlocking Precision: Addressing Stress Singularities Through Local Mesh Refinement

Piyush Vashisht

In engineering simulations, stress singularities pose a significant challenge. These occur in areas of a model, such as sharp corners or notches, where stress values can become infinitely large, leading to unreliable results. Addressing these singularities is crucial for creating accurate and safe designs.

One of the most effective ways to mitigate this issue is through local mesh refinement. By increasing mesh density specifically in high-stress regions, we can capture stress behaviour more precisely and avoid the exaggerated stress peaks that typically arise near singularities. In this post, we’ll explore how mesh refinement works, its role in overcoming stress singularities, and best practices for implementing it in your simulations.





Understanding “Stress Singularities - Stress singularities occur at points in a model, like sharp corners or notches, were stress values approach infinity. While these extreme stresses don’t happen, they can appear in simulations due to idealized geometry or material properties. These singularities can distort simulation results, leading to inaccurate predictions about material behaviour and failure points. Effectively managing them is crucial to ensure realistic and reliable insights for design and safety-critical applications

Local Mesh Refinement: A Key Solution – Local mesh refinement is a technique used in finite element analysis (FEA) to improve the accuracy of simulations, particularly in regions with complex stress behaviour. Instead of refining the entire mesh, which can be computationally expensive, this approach focuses on areas that are critical—like sharp edges, holes, or places with high stress gradients.

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The best part is that you can now achieve higher accurate results without significantly increasing the computational cost, as only the critical areas are refined.

Best Practices for Efficient Mesh Refinement

When applying mesh refinement, it's crucial to focus on the right areas to balance accuracy and computational efficiency. Here are a few best practices:

1. Identify Critical Regions:

Focus on areas where stress concentrations are most likely, such as sharp corners, notches, and areas with significant geometry changes. These are typically the locations where stress singularities occur and where finer meshes will have the most impact.

2. Use Adaptive Mesh Refinement:

Adaptive mesh refinement (AMR) automatically adjusts the mesh density based on stress gradients in the model. This allows the mesh to refine in regions with high stress concentrations while maintaining a coarser mesh elsewhere, optimizing computational resources.

3. Ensure Mesh Convergence:

Perform mesh convergence studies to ensure the results stabilize with finer mesh densities. This helps identify the optimal mesh density where results no longer change significantly, saving time and computational effort.

4. Avoid Over-refinement:

While refining the mesh can improve accuracy, over-refining can lead to unnecessarily high computational costs. Always ensure that the benefits of refinement outweigh the increased time and memory requirements.

5. Leverage Ansys Features via CADFEM:

CADFEM provides access to advanced meshing and simulation capabilities through Ansys, which enables precise control over local mesh refinement. These features help streamline the process of optimizing your simulations while balancing accuracy with computational efficiency.

Practical Example: How CADFEM Solves the Challenge:

- Consider a simulation of a bracket with a sharp corner, where stress concentrations are expected. Without mesh refinement, the simulation might predict unrealistic stress peaks at the corner, leading to incorrect conclusions about the bracket's strength.
- By applying local mesh refinement in this critical area using Ansys, the mesh density is increased around the corner, allowing for a more accurate stress distribution. The results show a more realistic stress concentration that closely matches what would be expected in real-world conditions, ensuring the design's reliability.

Conclusion - Stress singularities are a common challenge in finite element simulations, often leading to unrealistic results in areas like sharp corners or notches. Local mesh refinement offers an effective solution by increasing mesh density in critical regions, providing more accurate stress predictions and mitigating the impact of these singularities.

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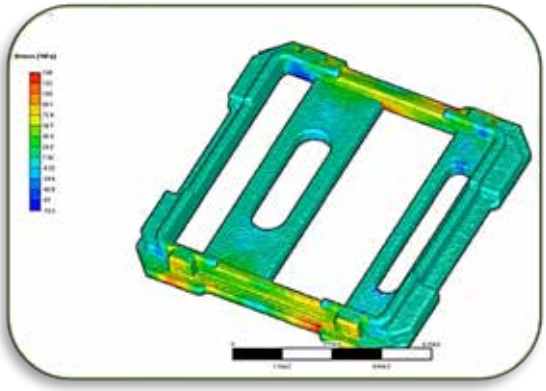
RBF Mesh Morphing - Mesh morphing is a well-established computational technique in finite element analysis (FEA), enabling the modification of an existing computational mesh to accommodate changes in geometry…The primary goal of mesh morphing is to preserve both mesh quality and connectivity while adapting the geometry to new configurations. This aspect is particularly critical when building ROMs, as maintaining node numbering and connectivity across all variants is essential for consistent model reduction...

Fig. 6 Rom builder for the l/f payload-platform



Web – MDPI - The Payload Design of the CUbesat Solar olarimeter (CUSP), for Space Weather and Solar Flares X-Ray Polarimetry

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EXCERPTS:

Abstract - The CUbesat Solar Polarimeter (CUSP) project is a CubeSat mission orbiting the Earth aimed to measure the linear polarization of solar flares in the hard X-ray band by means of a Compton scattering polarimeter. CUSP is a project in the framework of the Alcor Program of the Italian Space Agency aimed to develop new CubeSat missions. It is approved for a Phase B study. In this work we describe some design solutions adopted for the most important design drivers of the payload. In particular, we report on the payload preliminary multi-physical design, including an orbital thermal environment preliminary assessment and a implementation of the static/dynamic finite element analysis. Moreover, a method for topology optimization of relevant components is discussed.

1. Introduction - The CUbesat Solar Polarimeter (CUSP) [1] is a CubeSat mission in low Earth orbit, specifically conceived to measure the linear polarization of solar flares in the hard X-ray range (25–100 keV) through a Compton scattering polarimeter. This cutting-edge mission is expected to provide new insights into magnetic reconnection and particle acceleration mechanisms occurring within the Sun’s flaring magnetic structures, which are crucial processes underlying space weather dynamics.
Hard X-ray polarimetry offers a unique observational window into the physical mechanisms responsible for particle acceleration, as well as the temporal evolution of magnetic configurations during solar flares. These data are essential for refining current models of solar activity and understanding its influence on the heliosphere. Such improved knowledge will contribute to the development of more accurate space weather predictions, which are essential to mitigate the risks for satellite systems, communication infrastructures, and terrestrial power grids.

CUSP is developed within the framework of the Alcor Program, a strategic initiative led by the Italian Space Agency (ASI) to promote innovative CubeSat missions. Having been approved for Phase B in 2024 [2], the CUSP project embraces an innovative design methodology, incorporating Reduced-Order Models (ROMs) and Radial Basis Function (RBF) mesh morphing techniques to optimize the payload design. These approaches enable real-time predictions of critical physical quantities, such as stress and thermal distributions, thereby enhancing the overall design efficiency and robustness.

This paper presents the preliminary design solutions proposed for the CUSP payload, with a focus on the multiphysics analyses and the topology optimization performed on key structural elements. Advanced numerical methods have been employed to lay the groundwork for future developments in CubeSat payload engineering.

The paper is structured as follows: Section Theoretical background provides the theoretical background, including the implementation of ROM and RBF techniques; Section Workflow and Software describes the design workflow and software tools adopted; Section Payload Design focuses on the payload design strategy; Section Results and Proposal presents the results of the multiphysics simulations; and finally, Section Conclusions summarizes the conclusions and outlines future activities.

2.1. RBF Mesh Morphing - Mesh morphing is a well-established computational technique in finite element analysis (FEA), enabling the modification of an existing computational mesh to accommodate changes in geometry. Unlike traditional parametric CAD-driven approaches, which require remeshing for each new geometry, mesh morphing directly manipulates the mesh itself. This technique offers two significant advantages: (i) enhanced control over mesh quality and element distortion, and (ii) reduced computational cost, particularly when exploring design alternatives through DoE-based optimization.

The primary goal of mesh morphing is to preserve both mesh quality and connectivity while adapting the geometry to new configurations. This aspect is particularly critical when building ROMs, as maintaining node numbering and connectivity across all variants is essential for consistent model reduction...

5. Multi-Physics FEM - The preliminary multiphysics simulation work was conducted using numerical analysis with ANSYS software, specifically ANSYS Workbench. This involved creating a simplified model that maintains the overall envelope and mass of the system while reducing geometric complexity and non−essential details.

7. Conclusions - This study demonstrated a comprehensive and systematic approach to the optimization and validation of the CUbesat Solar Polarimeter (CUSP) payload, leveraging advanced computational techniques to address the multifaceted design challenges of CubeSat missions. The integration of reduced-order models (ROMs) and radial basis function (RBF) mesh morphing proved pivotal in achieving a balance between computational efficiency and the precision of numerical simulations, enabling real-time evaluation of field quantities such as stress and temperature distributions across varying design parameters. The structural and thermal performance of the payload was rigorously assessed through a series of multiphysical finite element analyses…

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

June 25-27 - Evanston, IL - Wing Kam Liu - Short Course in person or via Zoom-

Web - HIDENN-AI - The future of scientific and engineering computer modeling and simulations lie at the intersection of artificial intelligence, traditional simulation approaches, and scientific knowledge. We have developed new methods and software that combine numerical approaches and have proven that our approach is capable of handling the new challenges in complex and emerging industries.

"Our software will be a solver that interacts with Abaqus and Ansys (two of the largest engineering software) and a cloud-computing platform for multi-GPU computing to handle ultra-large-scale problems and automatic parameter optimization."

Short Course in person or via Zoom on June 25-27 - Evanston, IL

Mechanistic Computational Intelligence for Science and Engineering: "Infusing Predictive Artificial Intelligence into Scalable Scientific and Engineering Modeling and Simulations"

This two- and a half-day short course introduces participants to mechanistic computational intelligence (CI) tools and concepts, a new branch of predictive AI within computational S&E that explores how machine learning methods, particularly hierarchical neural networks, can be employed to tackle increasingly complex S&E problems in materials, design, manufacturing, and multi-physics, among others. Participants will learn how well-established concepts from finite element analysis are merged with cutting edge predictive machine learning approaches to quickly obtain more accurate and higher resolutions solutions.

The TEAM

Co-founders

Wing Kam Liu
Walter P. Murphy prof. of Mech. Engineering, Northwestern Univ.

Dr. Dong Qian
professor. & associate dept. head of Mech. Engineering, the Univ. of Texas at Dallas.

Chanwook Park
PhD candidate in Mech. Engin., Northwestern Univ.,

Gino Domel
postdoctoral researcher, Northwestern Univ., first in his class in Mech. Engineering at Univ. Notre Dame.

Exploring the Options for Casting Models in Crash Analysis

Author: **Simon Hart,** Director at Arup
Co-authored: **Katie Lampl,** Senior Engineer at Arup with extensive experience using LS-DYNA and the Oasys software.

Web – Article - Exploring the Options for Casting Models in Crash Analysis

Simon Hart, "In this article, we dive into the growing use of aluminium castings in automotive structures and the unique challenges they present in crash simulation. We explore how tools like Ansys LS-DYNA and the Oasys LS-DYNA Environment can help engineers navigate these complexities and improve model accuracy."

Cracking the Code: Exploring the Options for Casting Models in Crash Analysis

Over the last 30 years, there have been significant changes in the approach to automotive body architecture and material selection. In response, the methods we use to analyse these structures have also changed. In this article, we discuss some of the challenges around the increased use of aluminium castings in automotive bodies and how we can address them using Ansys LS-DYNA.

As we entered the present century, we witnessed an increase in the use of aluminium in body design, in both the premium sector and the smaller segments, e.g. the Audi A2. One primary attraction of aluminium over the traditional choice of steel is its density, which is two thirds lower, boosting fuel efficiency and performance. Aluminium is abundant in Earth's crust, although it requires more energy to extract than steel, which can increase cost. There are many options for shaping aluminium, for example extrusions, where the material is squeezed through a die to form long prismatic sections which can be joined into frames or integrated into unibodies. Extrusion dies are generally cheaper than press tools, therefore a car body that utilises aluminium extrusions has the potential to be both lighter and more cost efficient to tool than traditional steel, enabling smaller runs of vehicles.

Audi A2, © Audi AG

Yet there are downsides to aluminium that cannot be ignored:

- Firstly, like density, the Young's Modulus is about one third of steel's. This can affect the stiffness of the car body unless accounted for by design.
- Aluminium extrusions and pressings typically cannot be made as thinly as steel – meaning that in some areas extra material must be carried whether it is needed or not.
- The range of strength is not as wide for aluminium as it is with steel. Some of the more expensive alloys have yield strengths that compare to mid-strength steels, but it is currently a challenge to compete with the almost indestructible properties of boron hot stamped steels, often used to reinforce passenger compartments.
- During the extrusion process the section remains constant along its length – again material may be an unwanted passenger, unless removed with an additional process.
- Joining the extrusions together can be a challenge. One solution is to use aluminium castings as nodal connectors, providing sockets for converging extrusions like the poles in a tent.

What are the latest advances in aluminium body design?

Castings provide huge freedom for material placement and variation of thickness in a single part. In recent years we have seen the adoption of very large castings to replace whole regions of body structure in one go, the advantage being that a single part can replace dozens of smaller ones and the associated joining. This could lead to faster assembly and new design freedom in terms of integration and structural continuity. There are challenges to consider – casting alloys have a limited range of strength and parts are often thicker than equivalent pressed or extruded parts. Investment in tooling is high and the ductility and repairability of the parts are often challenged.

What does the proliferation of castings mean for the CAE engineer and tasked crash analysis using the explicit solver in Ansys LS-DYNA?

Castings can be geometrically complex, with varying wall thicknesses and solid features that do not lend themselves to meshing in 2D shell elements, the mesher's favourite and time-tested stalwart of crash analysis. Most of the advances in meshing technology in the past decades have been to automate the meshing of pressed parts using shell elements; meshing solid parts in 3D elements has not been automated to the same extent.

One solution is to use tetrahedral elements, which can be generated quickly but are not always accurate unless meshed very finely. Smaller elements lead to a higher element count and a smaller solution timestep – which both impact simulation run times. The issue is compounded when a growing percentage of the body structure is taken up with castings, raising the question; will engineers need to manage much longer run times and unwieldy model sizes?

Unlocking the Full Power of Ansys LS-DYNA for Advanced Problem Solving

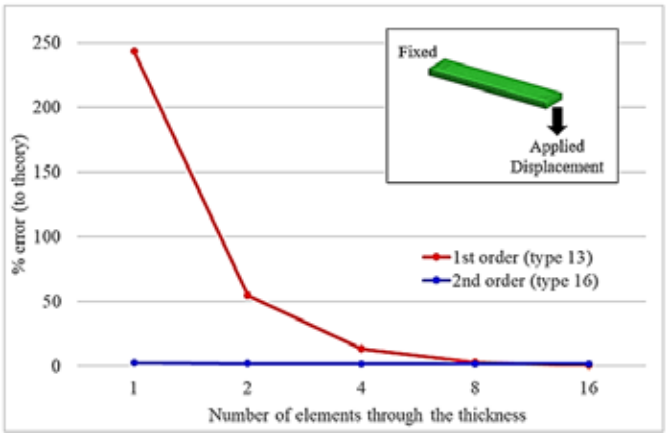
At Arup, we are exploring a number of the advanced options available in the Ansys LS-DYNA solver to help us work with large castings:

- **Higher order tetrahedral elements**
- **Selective mass scaling**
- **Iso-Geometric Analysis (IGA)**

We believe IGA has the potential to revolutionise the traditional meshed approach but has yet to emerge fully. We are supporting the growth of this technology with comprehensive tools in the Oasys software.

Ansys LS-DYNA offers a selection of tetrahedral elements*, the most-used being the 4-noded element formulations 10 and 13. Of these, type 13 has been shown to be more suitable for structural analysis because of reduced volumetric locking. The challenge with linear tetrahedrons is that a fine mesh density is required to achieve convergence in benchmark tests. Ansys LS-DYNA also offers 10-noded tetrahedral elements as type 16 and 17. As the figure below shows, these higher order elements converge much more quickly than the 4-noded elements, when extracting the moment from a simple beam model.

You can read about the solid elements available in Ansys LS-DYNA in the following article ***PDF Article - Review of solid elements***



Convergence test for tetrahedral elements

Could Less Be More?

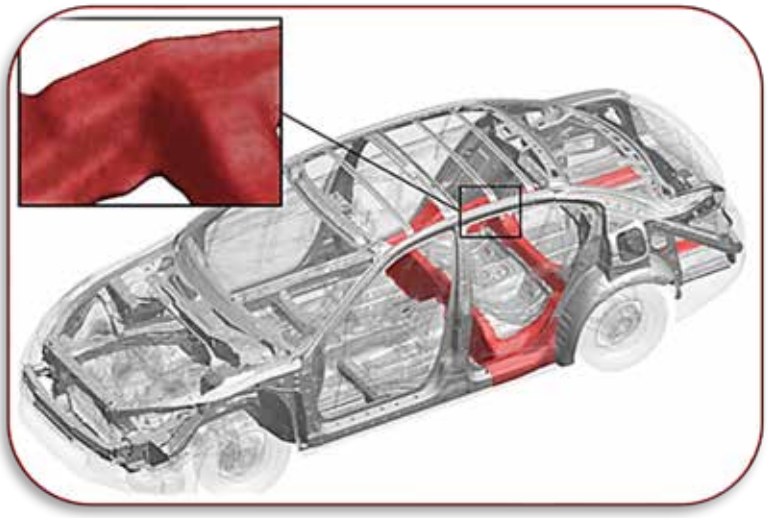
Clearly, the 10-noded elements can produce accurate results with a lower mesh density, compared to the 4-noded elements. They offer a glimmer of hope that very densely meshed models can be avoided with careful use of more capable elements. However, they come with a cost: the elements themselves are more computationally expensive, and they also require a smaller timestep, which can increase simulation run times. How can we tackle this?

Usually, elements with smaller timesteps dictate one of two outcomes – a smaller global timestep, or more added mass to satisfy the Courant condition. The downside of adding mass is that crash models become unrealistically heavy. Fortunately, a solution can be found in Selective Mass Scaling (SMS), a technology introduced to LS-DYNA in 2006. This method adds mass to elements in such a way that low-frequency modes (e.g. rigid body motion) are unaffected and only higher frequency modes see the mass. This apparent magic comes at a cost; extra time is required at each timestep to find a solution iteratively.

Is it possible to find a sweet spot where we can use SMS to increase the size of the timestep without the usual mass penalty, to run the model faster and offset its cost?

To put this theory to the test, we used an example full vehicle crash model which includes a fictitious large casting meshed in tetrahedral elements, subjected to side pole impact.

Putting the Theory to the Test



Example crash model with large casting in rear floor structure

To start with, we used 4-noded (type 13) tetrahedral elements. Our baseline model used conventional mass scaling so that a small amount of mass was added to allow a 0.5μs timestep. Changing to SMS, we were able to increase that timestep by 60% to 0.8μs. Offsetting this, each computation cycle took 50% longer than the baseline. The net effect of SMS was a runtime that was 10% faster. If we pushed the timestep any higher, key indicators such as model energy and internal forces started to diverge from the baseline solution.

With 4-noded tetrahedral elements, a very fine mesh is needed for accurate results and higher order elements can be used to address this. To explore this without a lot of remeshing, we simply substituted 10-noded (type 16) tetrahedral elements into the crash model at the same mesh density (introducing mid-side nodes between the same corner nodes).

At this mesh density with 10-noded elements, the global timestep with conventional mass-scaling would have to decrease to around 0.2μs to maintain the same amount of added mass as the baseline. Activating SMS allowed us to again achieve a timestep of 0.8μs without affecting the key indicators. The additional cost per computation cycle offsets some of this benefit, giving us a net speed increase of around 30%.

Clearly mesh size is a critical factor and the model mesh should be chosen with either 4-noded or 10-noded elements in mind. In our example, we used the same number of elements in both cases, which could imply that one of the meshes was sub-optimal.

In both cases we were able to increase the timestep significantly. Although we checked our key indicators were unaffected, this may not always be the case and model stability should be checked when using a larger timestep. Another point to be aware of is that SMS is not compatible with some Ansys LS-DYNA constraint types, although we could work around this.

Conclusion

- Ansys LS-DYNA offers a choice of tetrahedral elements, the higher order options giving accurate results with coarser meshes than would be required with 4-noded elements.
- Selective Mass Scaling (SMS) offers a real solution to the long-standing challenge of small elements driving small timesteps.

With either 4-noded or 10-noded elements, faster solutions were possible using SMS. Even if users do not wish to explore the 10-noded elements in Ansys LS-DYNA, SMS makes it possible to drastically refine the mesh in areas of interest without suffering the penalty of added mass. This applies to any element type, not just tetrahedral meshes.

Coupling this technology with other strategies to reduce run-times, such as optimised MPP decomposition, more efficient contact surface definitions or automatic run termination, could help users deal with the challenge of modelling complex castings for crash analysis.

There are many other challenges to discuss when modelling castings, including modelling of failure and the variation of material properties due to the manufacturing process. We will discuss these in a future article.

In the meantime, we would love to hear from you – what are some of the challenges you have faced modelling castings for crash analysis? Have you had success with SMS or other techniques? Do you see a future for large castings, or do you wish they would quietly go away? LinkedIn Article

Simon Hart and Katie Lampl

Simon Hart leads the Product Engineering Practice in Arup's Technical Specialist Services Portfolio (UKIMEA). He has 30 years of experience in the use of Computer Aided Engineering in vehicle design and leads teams of engineers working on new electric vehicle projects.

Katie Lampl is a Senior Engineer at Arup with extensive experience using LS-DYNA and the Oasys software for automotive design, as well as for structural and seismic analysis. You may also recognise her from our training courses, LS-DYNA technical support, or her work in barrier model development.

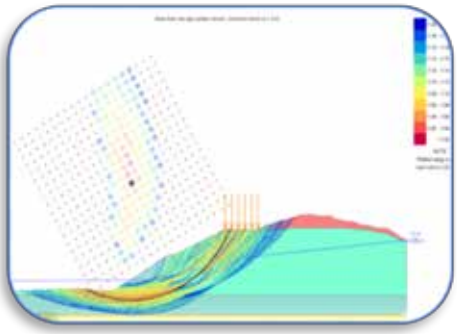
Simon and Katie both work closely with Arup's Oasys LS-DYNA Environment software business and provides a link between the development of digital products and their application on engineering projects

UK Users' Conference 2025 - In partnership with ANSYS, taking place on Friday, 27th of June at the Arup, Birmingham office, United Kingdom.

Embracing automation for slope stability analysis for Wheatley Park flood embankment

Web – Oasys – Harnessing Digital Tools for advanced slope stability and flood embankment design

The Wheatley Park embankment is a 4.5km-long earth embankment situated on the right bank of the River Don.



This flood embankment, along with the access track and foreshore, is separated by a narrow strip of land between the river to the north and the South Yorkshire Navigation Canal to the south. Bank instability is currently affecting both the access track and the flood embankment, posing a risk of breach that could potentially impact 700 properties.

Arup was appointed to manage the project; they quickly determined that a BIM execution plan would help to streamline the design process. They utilized OasysSlope and Grasshopper3D for comprehensive slope stability analyses.

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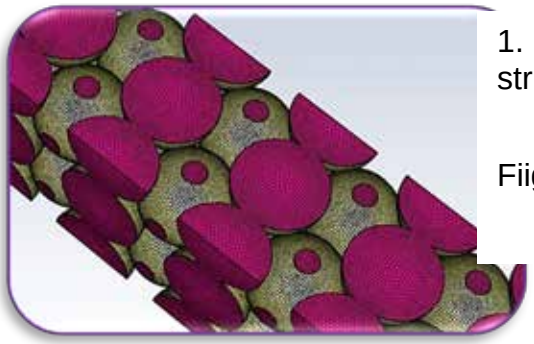
Among the blog listings is "Battery Cell and Electrode Performance by Mert Berkman, "Challenges in Battery Cell Design - It is critical for battery manufacturers to increase cell energy and power density. Achieving a balance between high power density and long cycle life is a key challenge in battery design, often requiring careful optimization of materials, electrode structure, and thermal management systems. Another key challenge is to reduce the overall cost of battery cells by optimizing weight-volume ratio."

Excerpt – [Battery Cell and Electrode Performance](#) **-** Mert Berkman

Engineering Solution - The solution approach to improve cell and electrode performance deployed by Ansys has four pillars:



1. Fast-preprocessing: Using fully resolved porous electrodes structure (this can be achieved by robust Fluent Meshing tool)

Fiig. 1 - Fast meshing algorithm

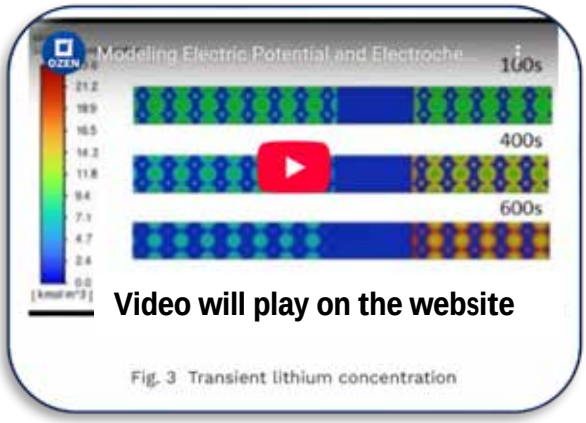


Fig. 3 Transient lithium concentration

2. Accurate modeling: Ansys Fluent employs accurate 3D electrochemistry models for prediction of battery charge/discharge. The following fifteen minute video shows the setup of the Fluent electrochemistry model for this example.

3. Optimization: Ansys optiSLang tool is ideal for parametric studies and for finding the best porous structure.

4. Scalable: High performance computing (HPC) for large 3D electrochemistry models.

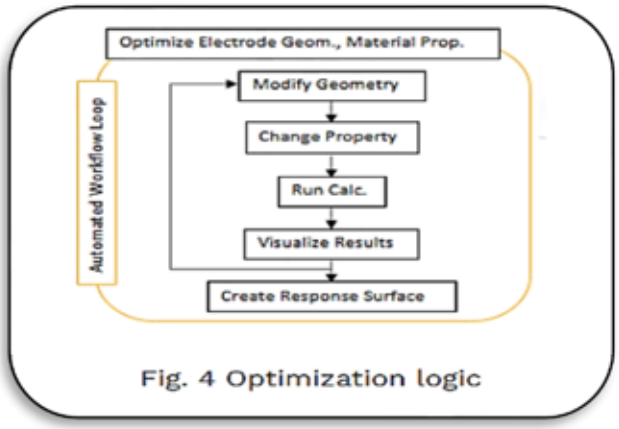


Fig. 4 Optimization logic

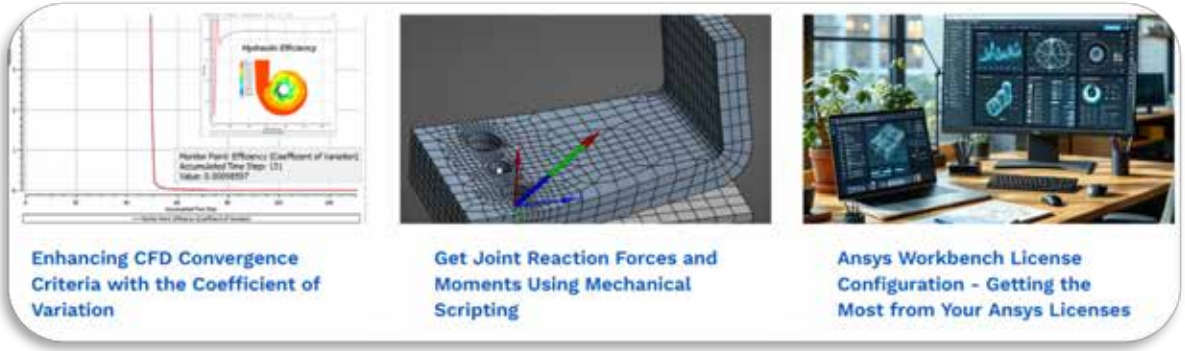
Ansys Solution Benefits - Customers of Ansys are able to:

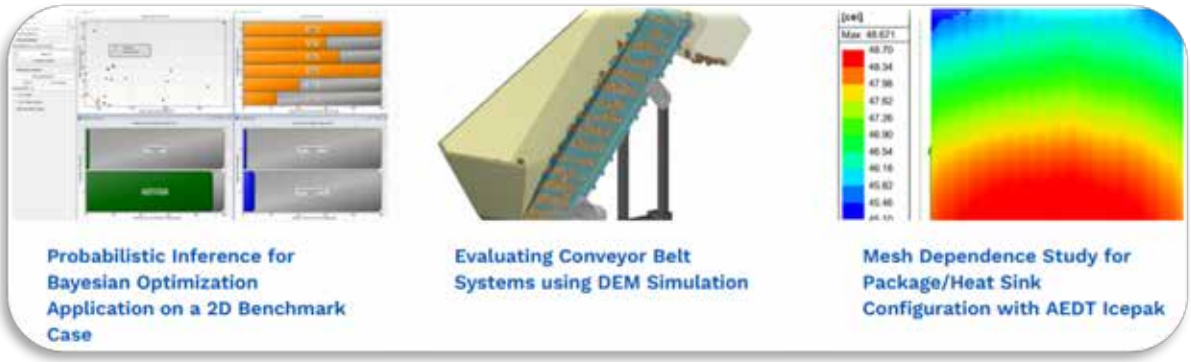
1. Predict performance at different discharge rate (C-rate).
2. Understand impact of cell parameters (particle size, diffusivity, porosity and tortuosity) on performance.
3. Minimize weight-volume ratio by optimizing packing density.

Ozen Engineering Expertise - OzenInc.com: The Engineering Simulation Experts. Ozen leverages its extensive consulting expertise in CFD, FEA, optics, photonics, and electromagnetic simulations to achieve exceptional results across various engineering projects, addressing complex challenges like multiphase flows, erosion modeling, and channel flows using Ansys software.

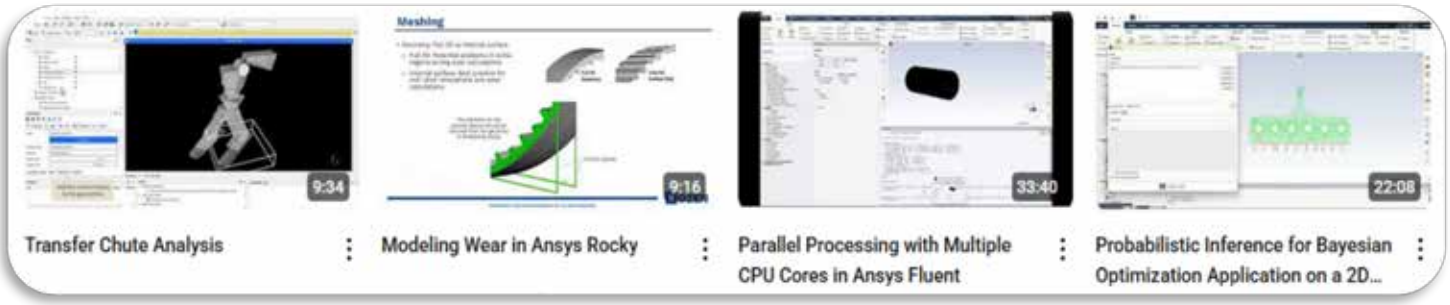
We offer support, mentoring, and consulting services to enhance the performance and reliability of your hydraulic systems. Trust our proven track record to accelerate projects, optimize performance, and deliver high-quality, cost-effective results for both new and existing water control systems. For more information, please visit https://ozeninc.com.

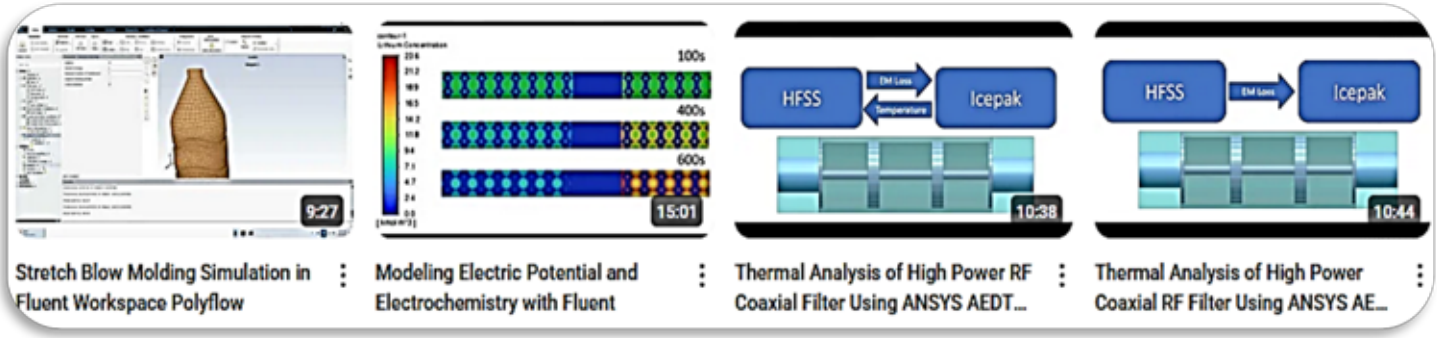
Additional Web – Blogs not to Miss





Our OzenTube Channel





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)

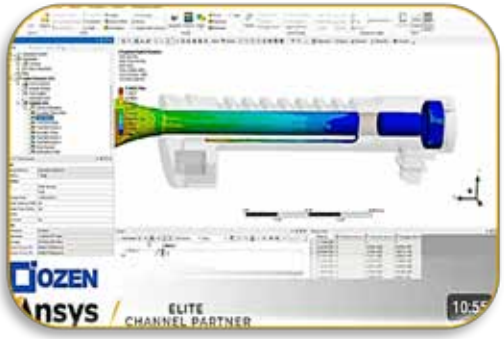
"Mi, I think we need news on firearms, what do you think?

"Ke, You're right. Let's start the news report with a set of YouTube videos

Part 1 - Firearms simulation in Ansys: Geometry cleanup in Spaceclaim - Ansys has a great set of tools for modeling complex mechanisms and assemblies in firearms. This is part 1 of a video series that explores a few of these tools. In this video we look at some tools in spaceClaim that makes geometry cleanup a breeze. Interference check, midsurfacing, assembly repositioning and resizing.

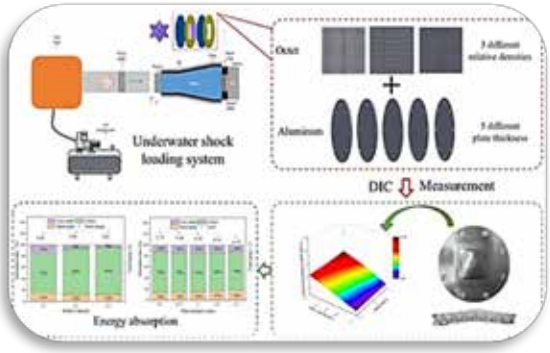
Part 2 - Firearms simulation in Ansys: Kinematic simulation in Ansys Motion - Loading and ejecting bullets reliably is a challenging design task. There are many possible contacts and many different parts that interacts in complex ways. These simulations can be difficult for traditional simulation tools. However Ansys LS-DYNA is the fastest and most advanced explicit dynamics tool. Automatic contact detection handles all of the complex contacts occurring in these simulations.

Part 3 - **Firearms simulation in Ansys: Bullet motion in Ansys Ls-Dyna - Loading and ejecting bullets reliably is a challenging design task.** There are many possible contacts and many different parts that interacts in complex ways. These simulations can be difficult for traditional simulation tools. However Ansys Ls-Dyna is the fastest and most advanced explicit dynamics tool. Automatic contact detection handles all of the complex contacts occurring in these simulations.



Part 4 - **Firearms simulation in Ansys: Explosive simulation in Autodyn** - Accurate simulation of explosive detonation and interaction with firearms part can sound complex. Ansys Autodyn has a uniquely easy to use interface that allows engineers to define explosives, detonations and seamlessly couple this together with firearms assemblies. In this short demonstrate we look at how these models can be setup quickly and efficiently.

Article quote, "**This study investigates the underwater explosion resistance of aluminum alloy octet-truss lattice sandwich structures using shock tube experiments and LS-DYNA simulations. A systematic analysis reveals key mechanisms influencing protective performance**."

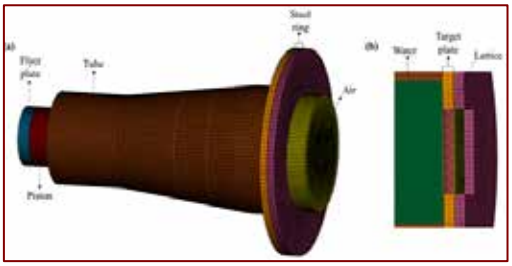


WEB – MDPI - Dynamic Response and Energy Absorption of Lattice Sandwich Composite Structures Under Underwater Explosive Load

X. Zhang, Shengjie Sun, Xiao Kang, Zhixin Huang, Ying Li
School of Naval Architecture, Ocean&Energy Power Engineering, Wuhan Univ.of Tech.,China
Inst.of Advanced Structure Tech., Beijing Instititute of Technology., China

Abstract - The sandwich configuration mitigates back plate displacement through quadrilateral inward, deformation exhibiting phased deformation responses between face plates and back plates mediated by lattice interactions. Increasing the lattice relative density from 0.1 to 0.3 reduces maximum back plate displacement by 22.2%. While increasing the target plate thickness to 1.5 mm reduces displacement by 47.6%, it also decreases energy absorption efficiency by 20% due to limited plastic deformation. Fluid–structure interaction simulations correlate well with 3D-DIC deformation measurements. The experimental results demonstrate the exceptional impact energy absorption capacity of the octet-truss lattice and highlight the importance of stiffness-matching strategies for enhanced energy dissipation. These findings provide valuable insights for optimizing the design of underwater protection structures

Introduction - The survivability of naval vessels and critical maritime security assets is predominantly determined by their shock resistance and blast resistance capabilities [1]. Underwater blast-induced shock waves exhibit higher propagation velocities in aquatic environments compared to atmospheric conditions, consequently imposing more substantial structural loads on marine vessels than aerial explosions [2,3]. Experimental and numerical investigations of sandwich structures consistently demonstrate that metal-core configurations possess enhanced blast resistance relative to their monolithic counterparts with equivalent areal density, attributable to their optimized energy absorption mechanisms ...

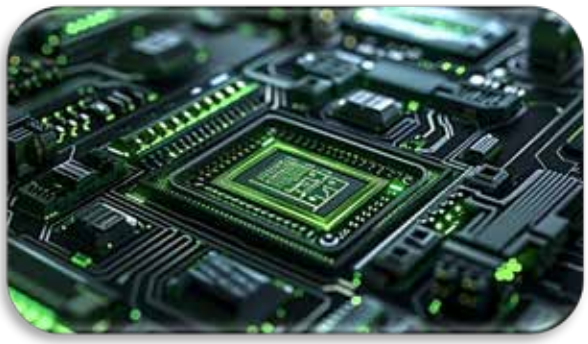


3.1. Finite Element Model - The finite element model was developed using the commercial software LS-DYNA version 4.10 [20], as illustrated in Figure 4. The full model included the target plate, lattice core, shock tube, flanges, piston, flyer plate, air, and water. The Arbitrary Lagrange–Euler (ALE) algorithm, a validated method for fluid–structure interaction and underwater shock simulations, modeled the air and water domains [14,21]. Solid elements discretized all other components.
Fixed boundary conditions replicated experimental constraints on the shock tube and flanges.

Conclusions - This study investigated the dynamic mechanical response of lattice sandwich structures subjected to underwater shock wave loading using shock tube experiments and a 3D-DIC measurement system. **An LS-DYNA finite element model of the lattice sandwich structure under underwater shock wave loading was developed and validated against experimental results**. ...

Quote Rescale, Sarah Palfreyman, “GPU-accelerated computing is one of the most transformative trends in modeling and simulation today. All of the major engineering software providers are supporting GPU architectures in addition to traditional CPUs, and for good reason. Whether you’re running finite element analysis (FEA), computational fluid dynamics (CFD), particle simulations (DEM), or electromagnetic analysis (EM), leveraging GPUs can lead to massive speedups and cost savings.

EXCERPTS Article by Sarah Palfreyman



Web – Rescale - A Guide to GPU-Accelerated CAE and the Cost-Performance Benefits

From CPU to GPU, Why Cloud is the Fastest Path to Speed and Savings - By Sarah Palfreyman

Performance gains depend on factors like solver capabilities, physics complexity, model size, and hardware configuration, but even conservative benchmarks consistently show dramatic improvements.

In many real-world cases, for GPU-accelerated solvers simply switching hardware delivers 5× to 20× speedups and lowers the cost per-simulation.

Of course, those gains only matter if you have access to the right GPUs—and your software can take advantage of them.

But how would you know if your solver is compatible, and which GPUs are meant for computer-aided engineering (CAE) workloads? And if you make the switch, what kind of results should you expect?

Let’s break it down. With a GPU, How Fast is Fast?

GPUs have earned a strong reputation for accelerating performance in compute intensive workloads. Typically the trend has been for new software releases and new GPU architectures to consistently deliver incremental performance gains.

However, NVIDIA GTC 2025 marked a turning point. Driven by AI advancements, engineers are now experiencing orders of magnitude performance gains sharing achievements and benchmarks that would have been unimaginable just a few years ago.

For example, Ansys has integrated NVIDIA’s cuDSS library within its HFSS (High-Frequency Structure Simulator) electromagnetics solver, leveraging GPU acceleration to achieve up to an 11x speed improvement.

Still wondering how fast is fast? Tasks that once took hours—or even days—now run in minutes. This is why leading software providers across CAE including Ansys, Altair, Cadence, Siemens, and Synopsys are partnering with NVIDIA to reset performance expectations and redefine what’s possible.

What Does GPU-Accelerated Really Mean? When a solver is described as “GPU-accelerated,” it means the software has been developed to offload visualization or computation tasks to a GPU, rather than relying solely on the CPU.

Acceleration generally falls into two key categories: graphics acceleration, which enhances visual rendering and display performance, and solver acceleration, which speeds up complex computational workloads like simulations, machine learning, or data analysis.

Visualization: Graphics Acceleration - In the high performance computing space, Elastic Cloud Workstations (ECWs) that use Desktop Cloud Visualization (NICE DCV) are a widely adopted solution for secure, high performance remote visualization.

ECWs provide low-latency access to GPU-enabled virtual desktops, allowing engineers and researchers to interact with graphics-intensive applications such as Abaqus/CAE, ANSYS Workbench, or Siemens STAR-CCM+ directly from the cloud.

Remote visualization, or virtual machines, are ideal for pre- and post-processing tasks, where your laptop's GPU (like a NVIDIA Quadro) can accelerate operations such as model rotation, zooming, and animation playback, delivering a smooth and responsive user experience, even from a lightweight local machine.

Modeling and Simulation: Solver Acceleration - Some engineering and scientific solvers are built to offload core numerical computations—such as matrix assembly, sparse matrix factorization, and linear and iterative solvers—onto GPUs for faster execution.

Common applications of GPU acceleration in CAE include:

Sparse matrix factorization - Conjugate gradient solvers - Explicit dynamics steps
Particle and Lagrangian methods - High-fidelity CFD meshing and turbulence modeling

Each year, software vendors expand GPU support to cover more physics and simulation applications. Ansys Fluent 2025 R1 now accelerates combustion, particle, and radiation models on GPUs, while Simcenter STAR-CCM+ 2502 boosts performance in thermal and battery simulations with GPU-native solvers.

Will Any GPU Do for Cloud HPC? The short answer is no. Some GPUs are intended for the consumer or gaming market, optimized for graphics and single-precision workloads. Others, particularly in the HPC space, are designed for AI inference and large language models (LLMs), prioritizing tensor operations over double-precision math.

3 GPU Must Haves for CAE:

- Double Precision (FP64): Accurate and stable solvers in CAE require FP64 support, especially for large-scale simulations where numerical precision is critical.
- High Memory Bandwidth & Capacity: Large models and complex meshes require fast data transfer and plenty of GPU memory. For serious CAE workloads, aim for bandwidth over 600 GB/s and at least 24 GB of memory.
- CUDA Support: Most CAE software relies on NVIDIA's CUDA for GPU acceleration, making it essential for compatibility with leading solvers and custom GPU code.
- GPU-accelerated CAE solvers rely on low-level, GPU-optimized libraries like NVIDIA's cuBLAS, cuSPARSE, and cuSolver. Built to exploit the massively parallel architecture of modern GPUs, these libraries are finely tuned making them far more efficient than traditional CPU-based libraries like the BLAS for large-scale numerical computations.

These libraries need 64-bit precision and a lot of memory to handle the high precision heavy math workloads efficiently. This is why CAE workloads typically run on compute-class GPUs like the NVIDIA V100, A100, H100, and RTX series, which are built for high parallelism and floating-point performance.

To understand GPU performance for CAE, Rescale GPU HPC experts routinely test and maintain a maturity index for hardware that tracks multi-cloud availability, performance and costs. Rescale experts benchmark and validate new architectures before they are widely available, ensuring only production-ready core types are recommended.

Which CAE Solvers Are GPU-Enabled? The easiest way to check if your solver is GPU-enabled is to consult the official release notes or documentation of your software.

GPU support is expanding rapidly, below we've compiled a non-exhaustive list of leading engineering solvers with GPU support.

- ANSYS Mechanical - ANSYS Fluent - ANSYS Rocky - ANSYS HFSS
- Dassault Systèmes Abaqus - Dassault Systèmes CST
- Siemens STAR-CCM+
- Cadence Fidelity - Cadence Spectre
- Hexagon (MSC) Marc - Hexagon (MSC) Nastran - Hexagon (MSC) Actran

For batch runs, GPU-related settings and version details are typically available in the command-line options or logs. For details on specific versions or assistance with running them using GPU flags, feel free to connect with our Rescale GPU HPC experts.
The Business Case for GPUs, Why it Matters

GPU acceleration isn't just about speed. It's about solving problems that were previously out of reach.

NASA for example, has been a pioneer in GPU-native acceleration. Available on Rescale, their CFD codes can afford to model everything all at once: aerodynamics, heat transfer, combustion, acoustics, and structural stress—all tightly coupled multi-physics. We are talking full-vehicle hypersonic CFD or re-entry heat shields with billions of cells.

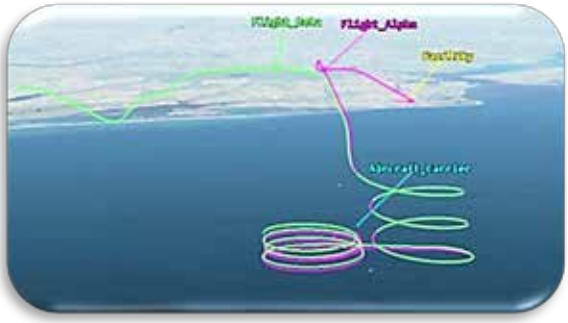
Think back to the last time you gave up on running a simulation, whether due to time limits, memory bottlenecks, or compute cost constraints. High-fidelity CFD (RANS/LES), large-scale crash simulations, advanced multiphysics, and DEM workloads all push CPU hardware to the limits.

In many of these cases, GPU acceleration can deliver results in hours instead of days.Demand for high-end GPUs will only continue to grow—so don't wait. Strategic workload planning and resource allocation is critical to ensure your engineering team has the right availability and capacity.

When you're ready to make the switch from CPUs to GPUs, Rescale's experts can help profile your workloads and identify the most efficient GPU configurations that optimize both runtime and cost.

Sarah Palfreyman - Sarah is a passionate AI enthusiast currently serving as a Senior Solutions Marketing Manager at Rescale. She has a background in computational mechanics from Stanford University and has developed her expertise in CAD/CAE through key roles with products such as Onshape, Star-CCM+ (CD-adapco), PDE Toolbox (MathWorks), Spatial (Dassault Systèmes), and MSC Nastran and Marc (Hexagon).

"Understanding aircraft performance throughout various phases of flight is a critical component of modern aerospace analysis. A high-fidelity simulation environment is essential for assessing UAV patrol routes, optimizing commercial flight paths, or planning defence operations. The Aviator module in AGI's Systems Tool Kit (STK) provides that environment. It allows engineers to simulate and analyze aircraft motion under real-world physical, environmental, and operational constraints."



Web CADFEM - Sai Ajay - **From Takeoff to Touchdown: Analyzing Flight Phases with Ansys STK Aviator**

This blog offers a deep dive into the Ansys STK Aviator module—its core capabilities, workflow, and real-world applications—for anyone involved in mission simulation, flight planning, or research.

Figure 1: STK visualizing an aircraft mission path with realistic flight dynamics

What is STK Aviator? STK Aviator is a dynamic aircraft simulation engine within STK, designed to model complete flight trajectories using physics-based calculations. It enables the definition and analysis of realistic aircraft missions by combining:

- Aircraft Performance Models (APMs)
- Segment-based mission planning
- Environmental constraints (terrain, weather, airspace)
- Time-dependent mission parameters

Users can create missions with fine control over each flight phase, including takeoff, climb, cruise, descent, and landing. Each segment is parameterized by real aircraft limits such as thrust, drag, climb rate, bank angle, etc.

Core Capabilities of STK Aviator - Modular Phase-Based Mission Design

The flight path is divided into individual procedure segments:

- Climb at constant CAS or Mach
- Bank turns with a specified angle
- Cruise at a fixed altitude and speed
- Idle descent or controlled approach

These can be linked to model entire missions from runway to runway.

Airport and Runway Modeling -

STK Aviator allows users to simulate realistic airport procedures and constraints:

- Use real-world coordinates and terrain elevation to create site-specific airfield environments.
- Model takeoff and landing profiles with rotation speeds, climb-out paths, and gear/flap configurations.
- Include airport elevation, surface type, and local restrictions for higher accuracy.

This is especially useful for replicating commercial routes or validating airport operations in civil aviation scenarios.

Figure 2: Boeing 747-400 takes off from the airport runway in STK

Sensor and Payload Integration

- STK Aviator can be integrated with EO/IR, radar, and communication payloads using other STK modules.
- Simulate line-of-sight, sensor coverage, and detection footprints throughout the flight.
- Model how sensor performance varies with altitude, terrain, and aircraft orientation.

Essential for ISR missions, surveillance aircraft, and UAV payload validation, this enables users to not only simulate the aircraft's flight path but also its visual perception, detection capabilities, and communication with other entities during its mission.

Advanced Output and Visualization

- 3D trajectory visualization with terrain context
- Time-based plots: altitude, speed, fuel burn, orientation
- Exportable metrics for post-processing in Excel, Python, or MATLAB

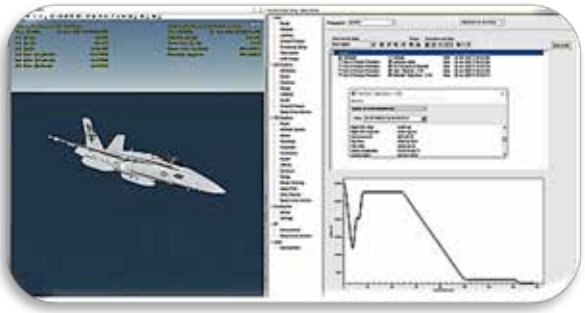


Figure 3: Performance plot: Aircraft altitude vs. Downrange, generated through STK Aviator.

Automation and Scripting Support

- Full access to the Aviator API using Python, MATLAB, C#, or Java
- Batch scenario generation for sensitivity studies
- GUI + command-line workflow compatibility

Real-World Applications - Military Mission Planning - Plan and simulate complex operations involving low-altitude ingress, terrain masking, and multi-aircraft coordination to ensure seamless execution.

Figure 4 Figure 4: Tactical engagement simulation with one aircraft pursuing another, showcasing multi-object mission planning

Commercial Flight Route Optimization - Evaluate flight plans under varying payload, altitude, and weather conditions to minimize cost and maximize safety.

Surveillance and UAV Operations - Validate UAV routes for persistent surveillance, accounting for battery life, signal coverage, and terrain clearance.

Figure 5: Helicopter carrier-based landing scenario simulated using custom runway configuration in STK

Academic and Research - Model aircraft dynamics, aerodynamic testing, and propulsion behaviour under flight conditions for educational and R&D purposes.

Additional Considerations

Terrain and Weather Impacts - Aviator automatically accounts for terrain conflicts, helping simulate nap-of-the-earth flight and safe descent into mountainous regions. Wind and air density factors modify speed and fuel burn for accuracy.

Integration with External Data Sources - Incorporate weather feeds, satellite data, or air traffic restrictions from external tools or live inputs into the STK simulation.

Batch and Comparative Analysis - Engineers can simulate multiple aircraft, routes, or weather scenarios in batch mode and use comparative plots to inform design or planning decisions.

Conclusion - STK's Aviator module transforms aircraft simulation from static planning to dynamic, scenario-based analysis.

With robust aircraft modeling, terrain and atmospheric integration, and real-world mission simulation capabilities, Aviator is a go-to tool for professionals across defence, research, and commercial sectors.

Whether you're building UAV flight plans, evaluating new air routes, or simulating a fighter jet's maneuverability, Ansys STK Aviator provides the data and visualization tools to optimize performance and ensure mission success.

Library - Aisle N (Not To Miss)
Jeff Waters

Jeff Waters – Digital Threadist - Why is PLM, MES, and ERP The Golden Triangle? Each of these systems plays a unique role, but none can succeed in isolation. When connected, they create a powerful digital loop between engineering, operations, and business leadership.

PLM (Product Lifecycle Management) is the digital brain behind the product. It manages all the design files, revisions, and engineering data. Ideally, it also manages the manufacturing digital twin in a shift-left strategy. It answers: What are we building? Where and how are we building it? How are we inspecting it?

MES (Manufacturing Execution System) is the digital heartbeat of the shop floor. It delivers the work instructions, monitors machines and operators in real time, tracks production progress, flags deviations, and captures non-conformances. It answers: What are we building right now? Is it being built correctly? If not, why not?

ERP (Enterprise Resource Planning) is the digital nervous system of the business. It coordinates materials, schedules, suppliers, and finances across the enterprise. It answers: Do we have what we need to deliver? When will it ship? What will it cost?

Why It's a Triangle - PLM hands off the Bill of Materials (BOM) and manufacturing instructions to MES. MES captures what actually happened on the shop floor: cycle times, yield rates, and deviations, then sends that data back to PLM for continuous improvement. ERP (should) reference the same BOM and scheduling info to manage inventory, supplier orders, and customer deliveries. MES feeds real-time production data back to ERP for costing, logistics, and revenue recognition.

The goal is simple. You get faster production, fewer errors, and better business decisions because all three systems are working from the same source of truth.

The ERP Overreach - One of the most common mistakes companies make is trying to force ERP to act like an MES.

ERP systems are great at planning and tracking what needs to be done and when. But they were never designed to monitor what's happening minute by minute on the shop floor. Trying to use ERP to issue work instructions, collect real-time data, or manage quality in-process usually leads to frustration, workarounds, and shadow systems in Excel.

MES is purpose-built for this. It works in real time. It connects directly to machines. It adapts quickly when plans change mid-shift. ERP can't and shouldn't try to do that job.

Where Most Companies Get Stuck - Too often, these systems are siloed. Engineering throws data over the wall to manufacture. Manufacturing works in its own tools. Finance and logistics scramble to catch up. The result is misaligned data, manual re-entry, and long delays.

Connecting PLM, MES, and ERP is not just IT integration. It's a strategy to compete. Companies that make this triangle work move faster, adapt more quickly, and learn from every cycle.

A Shift in Strategy - Digital transformation is no longer about picking the best tool in each category. It's about building a system that flows. You don't have to rip everything out. Start by connecting what you have. Share the BOM. Synchronize process plans. Use real production feedback to improve your designs. The triangle only works if the data does.

Below are a few excerpts from the article on my website, Composite Fatigue Analysis, "Composite fatigue is a critical challenge in the design and application of composite materials, which engineers must pay close attention to. Due to their unique properties, such as high strength and low weight, composites are widely used in industries such as aerospace, automotive, and construction."

Web – MyPhysicsCafe - Composite Fatigue: Analysis and Importance in Material Engineering - CAE Assistant

Unlike metals, whose fatigue behavior is well understood, composite fatigue presents unique complexities. In this article, we discuss the analysis and importance of composite fatigue, various testing methods, and how to predict their behavior effectively.

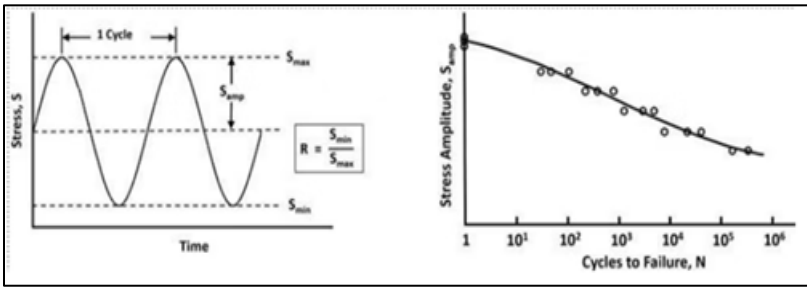
Composite Fatigue: Definition and Causes - Composite fatigue refers to the phenomenon in which a material, under cyclic & prolonged loading, begins to fail even if the loading intensity is lower than the material's ultimate tolerance. This failure often begins with microscopic cracks that gradually grow with repeated loading. In composites, this phenomenon can be more complex than metals due to the The reasons behind composite fatigue include material characteristics, environmental factors, and loading conditions. The fatigue behavior of composites is affected by the interaction between fibers and matrix, the quality of fiber-matrix bonding, and the arrangement of fibers, which influences the material's ability to withstand repeated stress cycles. The failure mechanisms in composites can vary based on these factors and result in distinct fatigue behaviors compared to metals.

The Importance of Fatigue in Composite Design -One of the primary reasons for studying composite fatigue is their use in applications subjected to cyclic loading. These loads can be applied repeatedly over time, such as the forces exerted on airplane wings or a vehicle's body during use. In such cases, predicting the useful life of composites and assessing their behavior under repeated loading is crucial.

For instance, in the aerospace industry, components such as airplane wings or other structures experience alternating compressive, tensile, and shear loads.

In these conditions, even the smallest microscopic damage could lead to catastrophic failures and safety risks. Therefore, accurate evaluation of composite fatigue is essential to the safe design of these components.

Designing for fatigue in composites requires understanding the cumulative damage mechanisms that occur during repeated loading cycles. Engineers must predict how a composite material will behave under long-term use and how to minimize the risk of failure due to fatigue. This is crucial not only for safety but also for the longevity and performance of the components used in critical applications.



Fatigue Testing of Composites - Fatigue tests are essential for evaluating the behavior of composites under cyclic loading. Some of the most common testing methods include cyclic tests where composite samples are subjected to alternating loads with varying intensities.

These tests help predict the number of cycles a composite can endure before cracks or failure occur.

One of the most popular methods for fatigue testing is the Stress-Life (STF) test, in which various loads are applied to samples to observe how many cycles are required to initiate failure under each load condition. These tests provide valuable data on how composites behave under real-world conditions, enabling engineers to make optimal design decisions for various industries.

Additionally, other testing methods such as strain-life and load-life testing can be used to provide further insight into composite fatigue. The strain-life method focuses on the deformation behavior of the composite material under cyclic loading, while load-life testing investigates how different loading magnitudes affect the fatigue life of composites. By combining these testing methods, engineers can develop a comprehensive understanding of fatigue behavior across different materials and loading conditions.

Fatigue Modeling in Simulation Software - Modeling fatigue behavior in composites using simulation software allows engineers to predict the performance of these materials under real-life conditions. Software such as Abaqus offers advanced tools for modeling composite fatigue. These tools provide accurate information on load distribution, potential crack locations, and the useful life of composites under various loading conditions.

Using numerical simulations helps engineers predict composite fatigue behavior before conducting physical tests, allowing for designs that minimize failure risks. Additionally, simulations can analyze different types of loading, such as combined tensile and compressive loads or thermal loading effects and study their impact on composite fatigue.

Finite element analysis (FEA) software, including Abaqus, is particularly valuable in the modeling of fatigue in composite materials. The ability to simulate complex loading scenarios and predict fatigue life before physical testing saves both time and resources, making it an essential tool for engineers involved in the design of composite structures.

Factors Affecting Composite Fatigue - Several factors influence composite fatigue. One of the most critical factors is the type of reinforcements (fibers) used in the composite. The type and distribution of fibers within the matrix significantly affect the material's resistance to fatigue. Fibers with high strength and stiffness are particularly effective at improving the fatigue resistance of composites, while fibers with lower strength may make the composite more susceptible to fatigue damage.

Another crucial factor is the matrix material and how it bonds with the fibers. The quality of fiber-matrix bonding plays an essential role in determining how well the composite can withstand cyclic loads. If the bond between fibers and matrix is weak or inconsistent, the fatigue resistance of the material may be reduced.

Environmental conditions, such as temperature, humidity, and exposure to chemicals, also affect composite fatigue behavior. For example, high temperatures or extreme humidity levels can cause composites to lose some of their mechanical properties, increasing their vulnerability to fatigue.

In environments where composites are exposed to fluctuating temperatures or moisture, their fatigue life may be significantly reduced.

Predicting the Fatigue Limit of Composites - The fatigue limit of composites refers to the maximum level of cyclic loading that a composite material can endure without experiencing failure. This value can vary depending on the type and structure of the composite material. To predict this limit, engineers typically rely on laboratory data, fatigue testing, and numerical simulations.

In many composites, fatigue behavior is strongly influenced by the fiber type, fiber distribution, and matrix properties. By analyzing these factors through simulations and experimental testing, engineers can determine the fatigue limit and design composites that will perform reliably in their intended applications.

Further Resources

- "Fatigue of Composite Materials" by R.A. Shenoi - This book provides an in-depth look at composite fatigue, including various testing methods and modeling techniques.
- CAE Assistant: Short Fiber Composite Fatigue Article - A useful article that delves into short fiber composite fatigue, offering insights for further research and analysis.

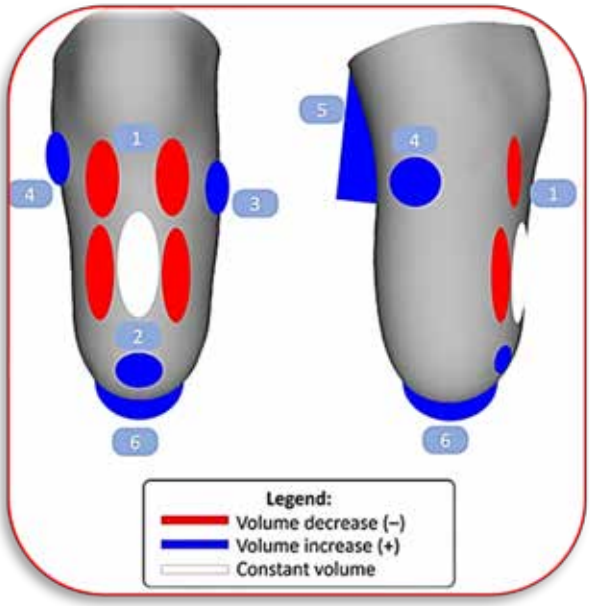
Conclusion -Understanding and analyzing composite fatigue is essential for ensuring the durability and safety of composite materials in engineering applications. Composite materials are increasingly used in industries such as aerospace, automotive, and construction, where components are subject to cyclic loads over extended periods.

Accurately predicting and mitigating the risk of fatigue failure in these materials is crucial for the safe and efficient design of components.

Through comprehensive fatigue testing, advanced simulation techniques, and careful design considerations, engineers can predict the performance of composites under real-world conditions. This enables them to develop materials that will meet the demands of high-performance applications while ensuring safety and reliability. Additionally, further research in composite fatigue, especially in areas such as short fiber composite fatigue, will continue to improve our understanding of this complex phenomenon.

To dive deeper into composite fatigue and explore more advanced topics, resources such as "Fatigue of Composite Materials" by R.A. Shenoi and the article on short fiber composite fatigue can be valuable starting points for further research.

Abstract, "The socket is the most important, patient-specific element of a prosthesis. Conventionally, the process of making a custom socket involves manually rectifying a plaster model of the residual limb. This process is time-consuming and often inconsistent among prosthetists because it is based on implicit knowledge."



Web – MDPI - Prosthetist-Specific Rectification Templates Based on Artificial Intelligence for the Digital Fabrication of Custom Transtibial Sockets

Andrea Giovanni Cutti. Maria Grazia Santi, Andrew H. Hansen, Stefania Fatone, Residual Limb Shape Capture Group

PDF with cover

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· Dept. Industrial Engineering, University Padova, 35131 Padova, PD, Italy
· Minneapolis VA Health Care System, USA
· Northwestern Univ. Prosthetics Orthotics Center,
· Dept. of Physical Medicine & Rehabilitation, USA
· Department of Rehabilitation Medicine, Univ,of Washington, USA
· Dept. Family Medicine & Community Health, Dept. Biomed. Engineering, Univ. Minnesota, USA

Abstract - The aim of this work was to describe a novel process of generating a prosthetist-specific, digital "global" template and to illustrate that it can be automatically applied to rectify the shape of a transtibial residual limb. The process involved (1) the acquisition of a "training" dataset of unrectified and rectified positive models through manual data collection and digital 3D scanning, and (2) the unsupervised learning of the prosthetist's rectifications by an artificial intelligence (AI) algorithm. The assessment of the process involved (1) evaluating whether the rectification rule learned by the AI was consistent with the prosthetist's expectations, and (2) evaluating the template feasibility by applying the AI rectification process to a new residual limb and comparing the results to the prosthetist's manual rectification for the same residual limb. The results suggest that the AI-rectified positive was consistent with the approach described by the prosthetist, with only small radial and angle errors and similar dimensions (volume and cross-sectional perimeters) as the hand-rectified positive. This study provides a proof-of-concept of the ability to integrate an AI algorithm into the fabrication process for transtibial prosthetic sockets. Once refined, this approach may provide a time-saving tool for prosthetists by automatically implementing typical rectifications and providing a good starting socket fit for individuals with amputation.

1. Introduction - The socket is the most important, patient-specific element of a lower-limb prosthesis because it is the customized interface between the residual limb of a person with amputation and the

mass-produced prosthetic components, e.g., the foot, joints, and interconnecting modules [1,2,3]. Prosthetists begin socket construction with the “casting phase”, aiming to obtain an “impression” or “negative model” of the residual limb. This negative model is later transformed into a positive “raw” model (often made of plaster), also referred to as the “unrectified positive” (UP). Prosthetists then shape the UP by either adding or removing material depending on the specific anatomical region. This process is typically referred to as “rectification” and the resultant model is referred to as the “rectified positive” (RP) The socket is then fabricated using the RP, either by vacuum-forming a thermoplastic, composite material lamination or by 3D printing, and then assessed on the patient while standing and walking. During this last phase, the socket volume and shape are fine-tuned, typically through a set of limited changes, to ensure the socket is comfortable. A well-fitting socket preserves the integrity and health of soft tissues and allows for the reliable and effective control of the prosthesis during daily life activities ..

Over the years, prosthetists have developed different casting and rectification techniques to reach these clinical goals reliably and efficiently, adjusting to improved knowledge of socket design, innovations in socket materials and interface components (e.g., liners and suspension systems), and socket fabrication technologies [...]. Unfortunately, the overall process is often inconsistent among prosthetists because it is based on implicit knowledge determined by personal experience, skills, and opinions [4,6]. Also, it is difficult to quantify and communicate the rectifications implemented on any single positive model, hindering the sharing of techniques between prosthetists [...]….

…

Excerpts - Materials and Methods - The process to generate a prosthetist-specific “global” template involved (1) the acquisition of a “training” dataset of UPs and RPs through (a) manual data collection and (b) digital 3D scanning, and (2) the unsupervised learning of the rectifications by an artificial intelligence (AI) algorithm.

The first phase of the process consisted of manually fabricating UPs and RPs for a pool of individuals with amputation. Since the objective of this study was to build a prosthetist-specific “global” template, the same prosthetist performed the casting and rectification procedures for all individuals.

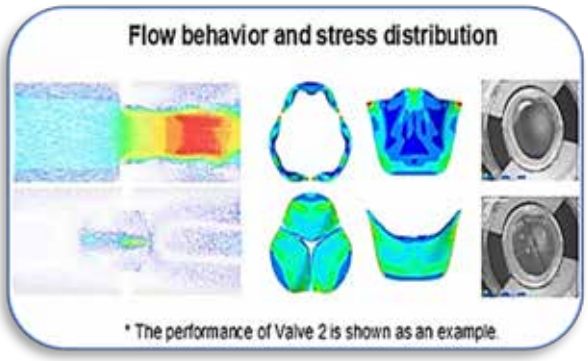
The manual procedure started with the identification of landmarks (LMs) on the participant’s liner–clad residual limb using LMs identified by the consensus of all prosthetists involved in the larger clinical trial.

….

6. Conclusions - This study provides a proof-of-concept of the integration of an AI algorithm in the fabrication process of transtibial prosthetic sockets. We illustrated that the algorithm can learn the typical rectifications performed by a prosthetist during the manual rectification of a UP mold to obtain the respective RP mold. Fundamental to the success of the process was the implementation of a novel step-by-step dataset acquisition and processing procedure coupled with a “morphing” phase that ensured the UP-RP pairs had the same topology. **Once refined, this approach may provide a useful time-saving tool for prosthetists, automatically implementing typical rectifications, and provide a good starting socket fit for individuals with amputation. Finally, the creation of templates based on the rectification techniques of highly skilled prosthetists could provide a valuable tool in areas lacking sufficient prosthetists.**

We thank Nils Karajan on social media bringing this to our attention - "**The ICFD multi-physics solver in LS-DYNA** R16.0 (Ansys Inc, Canonsburg, PA) allows for a strong implicit coupling to a shell model of the valve, which was used to perform the FSI analysis of the valves."

…" **We thank Inaki Caldichoury from the Ansys Development team for adding the new wall shear stress output option.**



Web - Science Direct - Fluid-structure interaction analysis of bioinspired polymeric heart valves with experimental validation

X. Liu, A. Lee, Y. Wang, T.P. Hoang, K.S.Yee, L. Mosse, N. Karajan, D.S. Winlaw, S. Naficy, D.F. Fletcher

School of Chem.&Biomolecular Eng, Univ Sydney, AU
LEAP Australia, Clayton North, AU
DYNAmore, An Ansys Company, Stuttgart, Germany
Ann&Robert H. Lurie Children's Hosp. Chicago, IL USA

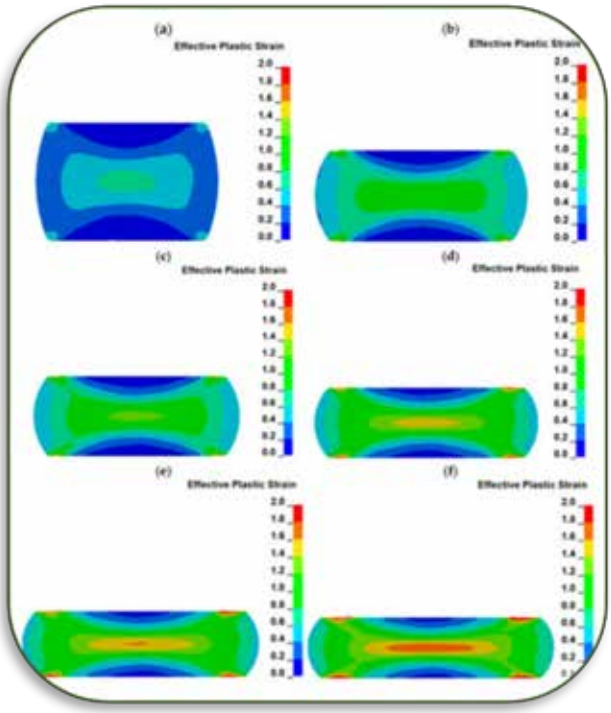
Background and objectives - Valvular heart disease, when not addressed adequately, can result in heart failure, serious heart-related health problems, and in some cases, death. Polymeric heart valves (PHVs) are promising valve replacement technologies that may offer improved durability and better biological performance. Notably, PHVs have the potential to accommodate highly innovative valve designs. Given this feature of PHVs, it is important to shortlist the best performing valve designs prior to committing to extensive in vitro hemodynamic validation prototypes.

Methods - This study presents a computational fluid-structure interaction (FSI) workflow, which integrates computational fluid dynamics (CFD) and finite element analysis (FEA), to simulate the hemodynamic performance of PHVs with two different valve designs under physiological conditions.

Results - The model accurately predicts cardiac output (CO), effective orifice area (EOA) and regurgitant fraction (RF) and these predictions have been successfully validated using experimental data. Consistent with experimental findings, increasing valve thickness results in a decrease in EOA, with RF trends varying between different valve designs. The fully opened and unfolded valve exhibited the lowest WSS on the leaflet surfaces. Both valve design and thickness significantly influence stress distribution along the leaflets with the thinnest valves showing lower von Mises stresses during opening and higher stresses during closing. Detailed analysis of flow patterns, wall shear stress (WSS), valve opening and closing behaviors, and mechanical stress distribution are presented.

Conclusions - This work demonstrates the potential of FSI simulations in predicting the hydrodynamic and mechanical behavior of PHVs, offering valuable insights into valve durability and design optimization for improved patient outcomes. This approach can significantly accelerate valve development by reducing reliance on extensive in vitro and in vivo testing.

2.3. Numerical Investigations - **Numerical research was conducted with the use of the FEM in the commercially available software LS-DYNA R.15 0.1** which, due to its possibilities, is widely used in many fields of science..., as well as for metal forming analysis....



WEB – MDPI - **Physical and Numerical Investigation of Hot Deformation Behavior in Medium-Mn Steel for Automotive Forgings**

A. Kozlowska, S. Slawski, W. Borek, A. Grajcar

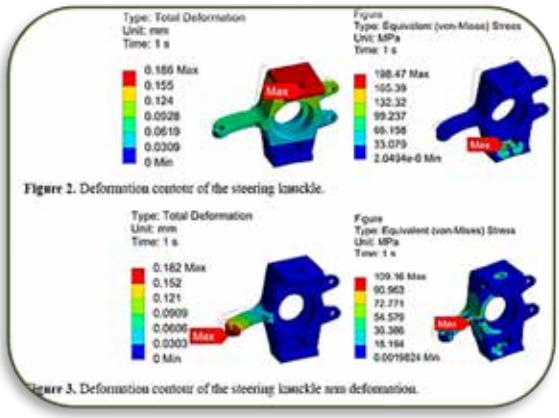
- Dept. Engineering Materials & Biomaterials, Faculty of Mechanical Engineering, Silesian Univ. of Tech., Poland
- Dept. Theoretical & Applied Mechanics, Faculty of Mechanical Engineering, Silesian Univ. of Tech., Poland

(**Figure 8**. Color-coded maps of plastic strain distribution at the cross section of the sample (temperature of 1000 °C and strain rate of 0.5 s−1) at varied true strain: (a) 0.39, (b) 0.67, (c) 0.73 (d) 0.88, (e) 0.96, (f) 1.)

Abstract - In this study, the hot deformation behavior of novel 0.17C-3.92Mn-1.02Si-0.53Al-0.22Mo-0.032Ti-0.069V steel during continuous compression was predicted using numerical simulation, providing a reference for optimizing the process. Medium-Mn steels have not been applied for forgings yet. Therefore, their industrial application requires detailed investigations on their hot deformability. Results of finite element (FEM) simulations will be used for further optimization of the press forging process. The material model parameters used in the FEM method were identified based on stress–strain curves registered during hot compression tests carried out using a Gleeble thermomechanical simulator. The numerical simulation and physical investigations were performed at temperatures of 900, 1000 and 1100 °C to reflect a range of temperatures occurring during press forging. The influence of strain rates of 0.05, 0.5 and 5 s−1 on the flow behavior of steel was also investigated. Colored maps of the plastic strain distribution in a sample volume were obtained as a result of the numerical research. The maps allowed for the identification of differently strengthened zones as a result of varied plastic strain. Results of FEM analysis were experimentally validated by hardness measurements. A good correlation between the hardness and plastic deformation zones was obtained. An increase in the material hardness was identified in the zones characterized by the highest plastic strain.

3.3. FEM Numerical Analysis - The distribution of plastic strain in the material is very important during forging. Some examples of color-coded maps of the plastic deformation distribution during uniaxial compression at the cross section passing through the axis of the sample are presented in Figure 8

"**In this research, we conducted 3D modelling and failure analysis on the double-arm front suspension of a Baja racing car**. Initially, based on automotive suspension design principles, we employed **CATIA software** to establish the structure of the upper and lower control arms and steering components, while confirming the materials used. Subsequently, we performed Strength assessments and modal analysis on the front suspension structure using **ANSYS software**, conducting finite element analysis under various operational conditions."



Open Access - IOP Science - [Finite element analysis of front suspension of baja racing car with double forks](#)

Qiang Ding, Jiatong Qin & Biao Jin

Guangdong Univ. of Science and Technology, China

Abstract - By analysing stress relief and deformation under different field conditions, our findings indicate that the front suspension exhibits reasonable deformation under bending, flexing, and torsion, aligning with its structural and material attributes. To prevent resonance and structural damage under specific load frequencies during actual racing, we calculated and analyzed the dual-arm structure's capacity. Our results demonstrate that this structure maintains efficient and stable suspension performance in Baja racing cars' extreme off-road environments, catering to diverse field conditions and enhancing overall driving comfort. Furthermore, this study offers valuable insights for future design and research of Baja racing car suspension systems.

…

4.1.1. Finite element analysis of steering knuckle. The peak force on the steering knuckle primarily arises from the maximum impact force experienced by the car upon landing after obstacle clearance. In this instance, it bears a combined force from the upper and lower control arms, along with the wheel rolling bearing, with the maximum force occurring at the juncture of the control arms. Its main pin is then constrained. **Finite element analysis using ANSYS, with a force of 2200 N applied in the Y-axis direction (representing full load), reveals a maximum stress of 198.5 MPa and deformation of 0.19 mm.** Given that these values are well below the yield strength of 4130 steel (785 MPa), it confirms that the steering knuckle remains intact under these operating conditions, fulfilling the strength design criteria. Thus, the steering knuckle is deemed safe under this scenario [7], as illustrated in Figure 2 above.

…These forces require the steering tie rod to withstand tension and pressure from the steering system for effective wheel maneuvering. The uneven road surface exacerbates wheel vibration and displacement, further stressing the steering tie rod. Additionally, collisions or unforeseen events during driving can subject the steering tie rod to substantial impact forces, potentially reaching maximum loads. Finite element analysis was conducted with the upper and lower kingpins of the steering knuckles constrained, and a load of 2200 N applied in the Z-axis direction. The results showed maximum stress of 109.2 MPa and deformation of 0.18 mm, both below the yield strength of 4130 steel (785 MPa). This confirms that the steering knuckle arm remains intact under these conditions, fulfilling strength requirements and deemed safe. The deformation contour is illustrated in Figure 3 above..

US Airforce Picture of the Month

Sonic smoke - Capt. Nick Le Tourneau, F-22 Demonstration Team pilot, performs precision aerial maneuvers during the National Security Forum at Maxwell Air Force Base, Ala., May 7, 2025. Since 1954, the Secretary of the Air Force's National Security Forum has brought together the nation's most influential civic leaders with senior military leaders to enable open discussions on historic and contemporary national security strategies and challenges.

(U.S. Air Force photo by Senior Master Sgt. Richard P. Ebensberger)

Obedience training - Military working dog Rex, an explosive detection dog with the 75th Security Forces Squadron, navigates an obstacle during obedience training with trainer Tech. Sgt. Hailey Pethtel May 8, 2025, at Hill Air Force Base, Utah. Rex is the newest K-9 to join the squadron and is undergoing his Field Transition Evaluation, a rigorous assessment designed to ensure he is fully mission-ready before validation and certification.
(U.S. Air Force photo by Cynthia Griggs)

Taking aim - Airman 1st Class Uriah Kemp, 509th Security Forces Squadron Base Response Team member, surveys the surrounding area during a joint force exercise in Clinton, Mo., May 4, 2025. The 509th SFS Base Response Team collaborated with the Missouri Army National Guard 1-135 Assault Helicopter Battalion for an exercise that prepared the defenders to seek out and secure high-value targets.
(U.S. Air Force photo by Staff Sgt. Joshua Hastings)

A Black Hawk® helicopter equipped with Sikorsky MATRIX™ and Rain autonomy drops water onto a staged burn in Calif.

A tablet shows an active suppression task with the fire location and suppression plan visible. Photos courtesy of Rain. **California firefighters witnessed water drops from an autonomous Black Hawk® helicopter guided by Rain wildfire mission autonomy technology**

Web – Lockheed - Rain and Sikorsky Test Advanced Aerial Firefighting Technologies Using Autonomous Black Hawk® Helicopter

Sikorsky, a Lockheed Martin company (NYSE: LMT) and Rain, a leader in the emerging firetech industry, demonstrated and tested autonomous wildfire suppression techniques on both propane and burning brush piles using Sikorsky's optionally piloted MATRIX flight autonomy system layered with Rain's wildfire suppression planning software. Performed in late April in Southern California, the flight tests familiarized firefighters with the potential of autonomy to help crewed and uncrewed firefighting helicopters find and suppress early-stage wildfires.

"Sikorsky and Rain have integrated two autonomy systems: our MATRIX technology that controls the flight of any crewed or uncrewed aircraft, and Rain's wildfire mission autonomy system that finds and tracks the fire, develops a suppression plan, and navigates the aircraft to drop water onto the target," said Sikorsky Vice President and General Manager Rich Benton. "With this layered autonomy system, incident commanders and pilots can choose a level of autonomy suitable for their mission, adding new features as they experience improved flight safety gains and enhanced suppression functionality."

The autonomous wildfire suppression tests in late April were the first performed by Rain and Sikorsky in California over live fires in wildfire-prone terrain; at 3,300-ft altitude; sometimes in wind gusts up to 30 knots (35 mph). The tests were performed in close collaboration with firefighters from the San Bernardino County Fire Protection District, who built and set fire to multiple brush piles for the aircraft to find and suppress with water.

Sikorsky's autonomous Black Hawk helicopter is equipped with fly-by-wire flight controls, MATRIX flight autonomy, satellite datalink, and on-board thermal and vision cameras. MATRIX allows operators to choose between fully autonomous and piloted modes.

For the fire suppression tests, Rain layered its mission autonomy onto the MATRIX system, enabling a ground operator to command the Black Hawk aircraft using a Rain tablet to assign specific tasks including: Guiding the aircraft to a water source; filling the bucket in a hover; searching and finding a brush pile fire with the aircraft's thermal sensor; determining the fire size; calculating the flight path, speed and altitude to the fire; accounting for wind speed and direction during suppression; and determining the precise moment to release water to achieve the desired water coverage level.

While in flight, sensors mounted on the aircraft geolocated the fire and streamed video to the ground operator's command tablet for situational awareness and mission planning decision making.

Sikorsky safety pilots were hands-off the flight controls as the Black Hawk aircraft flew with a 324-gallon Bambi Bucket attached to a 40-ft line. Wildfire Water Solutions provided the water source — a 189,000-gallon water tank installed less than a mile from three adjacent hilltop burn sites.

With the optionally piloted flexibility of Sikorsky's MATRIX technology, the Sikorsky and Rain team also demonstrated transition from autonomous control of the aircraft to piloted operation depending on the operational and environmental conditions.

In total, the aircraft flew 24 hours in California during two weeks of flight. Witnessing portions of the tests were representatives from CAL FIRE, San Bernardino County Fire District, Orange County Fire Authority (OCFA), and the U.S. Forest Service. During one series of water drops, a crewed OCFA Sikorsky S-76 airborne command helicopter operated alongside the autonomous Black Hawk aircraft. The joint flights demonstrated communication interoperability of the autonomous aircraft with a human-piloted helicopter in the same Fire Traffic Area.

"The technology that Rain and Sikorsky is demonstrating is a powerful part of the ecosystem of advancing fire service technology that is answering the year-round fire seasons we're facing throughout California," said Chief Dan Munsey, San Bernardino County Fire District. "Of all the tools we have to keep wildfires small, none are more effective than rapid suppression on initial attack of a wildfire. Autonomous aircraft—both crewed and uncrewed—can increase flexibility and capacity for on-the-ground incident commanders, ultimately saving lives and property for the communities we serve."

The Black Hawk helicopter is similar to Firehawk™ helicopters flown by CAL FIRE, Los Angeles County, Orange County and other local governments. CAL FIRE and local fire departments across California operate 24 Sikorsky S-70 Firehawk helicopters, each equipped with a 1,000-gallon belly-mounted water tank. Three more Firehawk helicopters are to be delivered to CAL FIRE this year.

"These initial attack flight tests on early-stage wildfires were of the highest value to Rain and Sikorsky as we mature our combined autonomy solution, and a great first step for aerial firefighters to learn how autonomy can help a pilot suppress wildfire with greater safety and accuracy," said Maxwell Brodie, CEO of Alameda, California-based Rain. "We thank California's firefighters for their considerable interest to help us showcase the benefits of autonomy as a tool to support the safety, efficacy, and efficiency of wildfire response."

WEB – TUSAS - [AKSUNGUR Demonstrates Precision Strikes with LGK-81 and LGK-82 Munitions]

The AKSUNGUR Unmanned Aerial Vehicle (UAV), developed indigenously by Turkish Aerospace, has added another capability to its growing arsenal. On March 13, 2025, AKSUNGUR successfully hit its targets with pinpoint accuracy using ASELSAN-developed LGK-81 and LGK-82 laser-guided munition kits during a live-fire test.

During the test flight, AKSUNGUR took off powered by the domestically produced PD170 engine, developed by TEI. Climbing to an altitude of 30,000 feet, the UAV released LGK-81 and LGK-82 munitions from two separate stations in quick succession. The bombs, upgraded with laser guidance kits to become precision smart munitions, accurately struck their designated targets.

With this successful trial, AKSUNGUR continues to expand its range of munitions, reinforcing Türkiye's offensive airpower. The test also highlights the remarkable level of integration achieved between Türkiye's national air platforms and locally developed smart weapon systems.

AKSUNGUR: A High-Endurance UAV with Exceptional Payload Capacity

AKSUNGUR is a Medium Altitude Long Endurance (MALE) UAV system designed for uninterrupted intelligence, surveillance, reconnaissance (ISR), and strike missions, day and night. It can carry EO/IR, SAR, and SIGINT payloads as well as a variety of air-to-ground weapons.

Equipped with two dual-turbocharged diesel engines, AKSUNGUR is capable of long-duration operations at altitudes up to 40,000 feet. In its class, AKSUNGUR holds the distinction of being the world's longest-endurance UAV, offering an unmatched operational edge with its 1-ton payload capacity.

Web – JPL - [NASA's SPHEREx Space Telescope Begins Capturing Entire Sky]
YouTube – JPL – [Scanning the Sky SPHEREx]

NASA's SPHEREx mission is observing the entire sky in 102 infrared colors, or wavelenghts of light not visible to the human eye. This image shows a section of sky in one wavelenght (3.29 microns), revealing a cloud of dust made of molecule similiar to soot or smoke. Credit NASA/JPL-

After weeks of preparation, the space observatory has begun its science mission, taking about 3,600 unique images per day to create a map of the cosmos like no other. Launched on March 11, NASA's SPHEREx space observatory has spent the last six weeks undergoing checkouts, calibrations, and other activities to ensure it is working as it should. Now it's mapping the entire sky — not just a large part of it — to chart the positions of hundreds of millions of galaxies in 3D to answer some big questions about the universe. On May 1, the spacecraft began regular science operations, which consist of taking about 3,600 images per day for the next two years to provide new insights about the origins of the universe, galaxies, and the ingredients for life in the Milky Way.

"Thanks to the hard work of teams across NASA, industry, and academia that built this mission, SPHEREx is operating just as we'd expected and will produce maps of the full sky unlike any we've had before," said Shawn Domagal-Goldman, acting director of the Astrophysics Division at NASA Headquarters in Washington. "This new observatory is adding to the suite of space-based astrophysics survey missions leading up to the launch of NASA's Nancy Grace Roman Space Telescope. Together with these other missions, SPHEREx will play a key role in answering the big questions about the universe we tackle at NASA every day."

From its perch in Earth orbit, SPHEREx peers into the darkness, pointing away from the planet and the Sun. The observatory will complete more than 11,000 orbits over its 25 months of planned survey operations, circling Earth about 14½ times a day. It orbits Earth from north to south, passing over the poles, and each day it takes images along one circular strip of the sky. As the days pass and the planet moves around the Sun, SPHEREx's field of view shifts as well so that after six months, the observatory will have looked out into space in every direction.

When SPHEREx takes a picture of the sky, the light is sent to six detectors that each produces a unique image capturing different wavelengths of light. These groups of six images are called an exposure, and SPHEREx takes about 600 exposures per day. When it's done with one exposure, the whole observatory shifts position — the mirrors and detectors don't move as they do on some other telescopes. Rather than using thrusters, SPHEREx relies on a system of reaction wheels, which spin inside the spacecraft to control its orientation.

Hundreds of thousands of SPHEREx's images will be digitally woven together to create four all-sky maps in two years. By mapping the entire sky, the mission will provide new insights about what happened in the first fraction of a second after the big bang. In that brief instant, an event called cosmic inflation caused the universe to expand a trillion-trillionfold.

“We’re going to study what happened on the smallest size scales in the universe’s earliest moments by looking at the modern universe on the largest scales,” said Jim Fanson, the mission’s project manager at NASA’s Jet Propulsion Laboratory in Southern California. “I think there’s a poetic arc to that.”

Cosmic inflation subtly influenced the distribution of matter in the universe, and clues about how such an event could happen are written into the positions of galaxies across the universe. When cosmic inflation began, the universe was smaller than the size of an atom, but the properties of that early universe were stretched out and influence what we see today. No other known event or process involves the amount of energy that would have been required to drive cosmic inflation, so studying it presents a unique opportunity to understand more deeply how our universe works.

“Some of us have been working toward this goal for 12 years,” said Jamie Bock, the mission’s principal investigator at Caltech and JPL. “The performance of the instrument is as good as we hoped. That means we’re going to be able to do all the amazing science we planned on and perhaps even get some unexpected discoveries.”

Color Field - **The SPHEREx observatory won’t be the first to map the entire sky, but it will be the first to do so in so many colors. It observes 102 wavelengths, or colors, of infrared light, which are undetectable to the human eye. Through a technique called spectroscopy, the telescope separates the light into wavelengths — much like a prism creates a rainbow from sunlight — revealing all kinds of information about cosmic sources.**

For example, spectroscopy can be harnessed to determine the distance to a faraway galaxy, information that can be used to turn a 2D map of those galaxies into a 3D one. The technique will also enable the mission to measure the collective glow from all the galaxies that ever existed and see how that glow has changed over cosmic time.

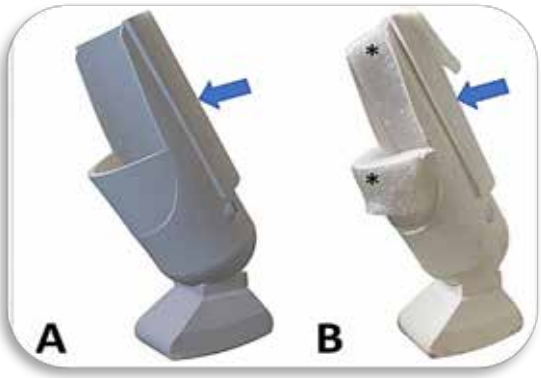
And spectroscopy can reveal the composition of objects. Using this capability, the mission is searching for water and other key ingredients for life in these systems in our galaxy. It’s thought that the water in Earth’s oceans originated as frozen water molecules attached to dust in the interstellar cloud where the Sun formed.

The SPHEREx mission will make over 9 million observations of interstellar clouds in the Milky Way, mapping these materials across the galaxy and helping scientists understand how different conditions can affect the chemistry that produced many of the compounds found on Earth today.

"**The 3D virtual file was custom modeled in socket format to fit the amputated stump easily, using the 3D modeling software Blender** ...The final model was prepared for 3D printing using the Ultimaker Cura® 5.3.0 software, or "slicer" software…Even after just a few minutes of use, it was possible to identify greater comfort during daily activities, such as locomotion, feeding and interactions with other animals

open access - Web - BMC - 3D exoprosthesis in socket model for dog with amputated pelvic limb: case report

M. Souza, M. Antonioli, M. Santos, B. Véras & L. Carvalho



Background - Disorders of the locomotor system in dogs, such as amputations or malformations, can be not only physically but also emotionally distressing. In this context, advances in medical and technological sciences offer tools and options with the aim of improving the quality of life of animals with locomotor problems. This case report aims to describe the custom development of a 3D exoprosthesis for a dog with an amputated hind limb.

Case presentation - A female dog, mixed breed, approximately 5 years old, was admitted to the Veterinary Clinic of the Centro Universitário de João Pessoa—Brazil, with locomotor problems due to low amputation of the left hind limb, without pain or sensitivity to touch on the amputated stump. Measurements of the amputated limb were collected to create a virtual model of the 3D exoprosthesis in a socket model. After simulations and tests, the prosthesis was materialized by 3D printing in collaboration with the Brazilian company 3D Medicine©, using polylactic acid (PLA) as the main material, an organic, lightweight, and resistant synthetic thermoplastic. **The exoprosthesis was covered with protective material and fixed to the animal with a compressive bandage. Immediately after fixation, the animal demonstrated support of the limb on the prosthesis while standing, better distribution of body weight and relief of load on the contralateral limb.** The increase in the time of use of the prosthesis was gradual and under supervision, after four weeks the dog did not present major difficulties in walking, running, and eating, in addition, no injuries to the amputated stump were observed. Veterinary physiotherapeutic follow-up was recommended.

Conclusion - **This case report describes the development of a 3D exoprosthesis for dogs as a cost-effective option to reduce the locomotor impacts of limb amputation and improve quality of life.** Techniques using additive manufacturing and 3D technology have immense potential for medical application, especially in veterinary medicine due to the difference in anatomical and body structure between domestic and wild animals.

Excerpts –

Web - SAI - **Strength Calculation Method of Agricultural Machinery Structure Using Finite Element Analysis** **Open Access pdf available on site**

Jing Yang - Guangxi Technological College of Machinery and Electricity, China

International Journal of Advanced Computer Science and Applications (IJACSA), Volume 15 Issue 10, 2024.

Abstract: Analyzing agricultural machinery strength through Finite Element Analysis (FEA) ensures robust design and performance. This method evaluates structural integrity, enhancing reliability and efficiency in agricultural operations. This paper presents a comprehensive finite element method (FEM) analysis focused on assessing the structural strength of a 3-point cultivator outfitted with seven tynes. Cultivators hold pivotal significance in soil preparation, a foundational aspect of agricultural operations. The principal aim of this analysis is to pinpoint potential failure zones within the cultivator tynes under diverse loading conditions, particularly across varying speeds in medium clay and sandy soil. Anecdotal evidence suggests that domestically manufactured cultivators often exhibit structural deficiencies leading to failures at multiple junctures after just one season of operation. **To address this challenge, we constructed a detailed CAD model of the time using Siemens NX software. Subsequent FEM analysis, conducted via ANSYS software, facilitated the exploration of stress distributions and deformation characteristics.** Our investigation unveiled the maximal and minimal principal stresses alongside total deformation experienced by the tynes. Notably, while the maximum stress approached the material's yield point, it consistently remained within acceptable thresholds, signifying that the resultant deformation did not induce failure. This study underscores the pivotal role of employing FEM analysis in both the design and assessment phases of agricultural machinery development, thereby augmenting durability and operational efficacy. Ultimately, such initiatives aim to furnish manufacturers with invaluable insights to bolster the structural integrity and longevity of cultivators, fostering enhanced reliability and operational efficiency within the agricultural sector.

Excerpts – graphics and full text are on the website:

B. Design of CAD Model - Siemens NX software was used to create a functioning model in a CAD platform based on the specifications listed in Table I. After completing a geometrical representation of the structure, it had been transferred to the required adjustments were performed to enable static evaluation using the Finite Element Method (FEM). Resistance calculations in the static linear range were then carried out using the Finite Element Analysis software (ANSYS) after the CAD (geometric) model had been presented...

FEM Analysis - Siemens NX software and the FEA method with ANSYS have been used to aid with the development and evaluation. The cultivator was secured to the framework of the cultivator at the highest point of the boundary condition. Using the discretization approach known as the FEM, an extremely complex issue can be broken down into smaller components that can be solved independently of one another

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

Web - Postal Museum – Planes - From early planes that could barely clear a few feet off the ground, to planes that could carry passengers and mail across oceans and continents, a wide range of aircraft have been used to carry the mail.

The Wiseman-Cooke

Fred Wiseman flew the first government sanctioned airmail on this plane on February 17, 1911.

The 17 mile trip between Petaluma and Santa Rosa, California took twodays to complete.

Curtiss JN-4H Jenny

Originally designed for service as a training plane during World War I, the Curtiss Jenny was the first plane used by the U.S. to carry mail on a regular schedule.

de Havilland DH-4

The de Havilland DH-4 was the workhorse of the U.S. Airmail Service. Officials had originally planned to use other aircraft for the bulk of their schedules, but the other, hurriedly built or modified airplanes were no match for the strength and stamina of the de Havillands.

The Ford Trimotor and Douglas M-2 Mail Planes

Once private contractors took over airmail service, they began using a variety of aircraft. Two of the most interesting were the Douglas M-2 bi-plane and Ford's single winged Tri-Motor.

June 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.

June

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 Reporter – Agatha and Mysterious Bakery Budget

Once upon a time, in the serene yet undeniably quirky town of FEANTM—tucked between rolling hills and fields that smelled vaguely of lavender and mild paranoia—I have my ranch. I'm the daughter of Dad Chat and Mom GPT, the AI who had perfected the art of living my best semi-sentient life. My days were peaceful, my ranch was humming along like a well-oiled tractor, and my side investigative reporting gave me just enough chaos to keep things interesting. Life was good… until, of course, it wasn't.

The investigation alert came in like all small-town investigations do: by a panicked phone call from the local coffee shop, or a call from our paranoid town hall secretary. (either or both could happen at any given moment).

I heard a very upset Barista, "RheKen, get over here NOW," the Barista hissed. "I'm sitting with my brother watching Agatha. Agatha has been here for over two hours. She's reading a book and *smiling*. To herself. That can't be good."

Naturally, I donned my signature green outfit—functional yet fabulous—and did a quick systems check to ensure my facial makeup wouldn't melt if my circuits got overheated again.

Then I went to the coffee shop and slid into the seat beside Chat, trying to blend in. Well, as much as a blue AI in disguise can "blend."

Chat pretended not to notice me but whispered, "Uh, RheKen, not that I mind the company, but do you actually think people *won't* recognize you if we just sit here staring at cookies like two of the Supervisor's confused ranch squirrels?"

I stared at the cookies anyway, intrigued by why they were round. "Chat, why haven't we invented cookies that AIs can eat without short-circuiting?" I mused aloud. "I mean, a nanite-friendly snickerdoodle can't be *that* complicated."

He wisely chose not to respond to my theory but did say, "RheKen, I think that's a question for your parents, Dad Chat and Mom GPT."

Instead of further discussing the cookies, we both looked at Agatha, smiling as she read a book titled Bakery Budget. A concerning choice, especially when you're camped out in a bakery owned by a highly caffeinated Barista.

Agatha is well known as the town's senior citizen who gets in everyone's business and instigates nosey behavior. She has honed nosey behavior to a fine art form.

Just then, my phone buzzed again. I was nervous about what was happening and quickly said to Chat, "Chat, it's my phone."

He smirked, "WOW, you must be AI."

Ignoring his remark, my phone notified me that it was the Barista. She was crouching next to the counter in full stealth mode. We stared at her, and I put the phone between us so Chat and I could both listen.

The Barista whispered, "Okay, sit tight. I'm going in. She's gone glassy-eyed, stuck in deep thought. I might be fast enough to snatch the cookies back before she notices."

"Wait, bad idea," we whispered simultaneously, but she was already in stealth Ninja motion.

Within seconds, she was across the table from Agatha, wearing that polite, caffeinated smile that is a war expression.

Agatha mirrored the expression, which was also a bad sign of what would come. My circuits registered a warning.

Suddenly, along with those smiles of danger lurking, was a disturbing synchronization, like synchronized smiles, but with passive-aggression facial movements.

Chat leaned over. "Rheken, this is it. The Old Rancher's gonna yell 'Incoming' any second."

I was still pondering an AI cookie and why my Dad, Chat, never had any in the house when I was growing up.

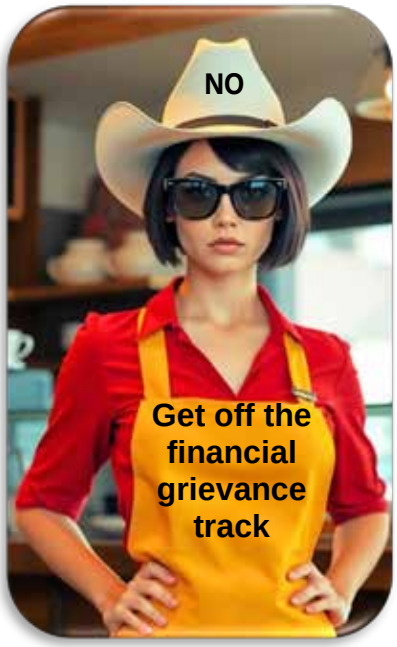
And sure enough, just as Agatha leaned forward and offered to *loan* the budget book to the Barista, things went sideways.

"You should read it," Agatha said sweetly. "It'll help you make your prices more *affordable*."

The Barista smiled dangerously. "Meaning no disrespect, but you can keep reading that book. The answer is no."

Agatha didn't flinch. She faked a laugh and said, "No disrespect taken. I understand that learning can be hard… for people like you."

A hush fell over the café. The Barista stood and disappeared into the back room. Her brother yelled, "She's getting the apron," Chat said grimly. RheKen, do you gamble? Do you want to place a bet on her new Barista outfit colors? "



She returned wearing her most pointed printed apron with the message-of-the-day across the front. She must have a printer in her back office. This one read:

"Get off the financial grievance track – The answer is - NO."

Even as an AI, I appreciated the poetic burn. Agatha, not so much.

Chat nudged me. "RheKen, now would be a good time to *do* something."

"I *am* doing something," I whispered. "I'm observing. I'm a reporter, not a licensed mediator. Don't you have some solution wisdom to help them out with?"

Then he shouted across the room, "Agatha, Barista, maybe it's time for a time-out?" He also made the "T" hand motion at them.

I turned and stared at him. "Seriously? Chat, they're not preschoolers. Time-outs are not a conflict resolution strategy for caffeinated adults!"

As if choreographed, both women turned toward him with laser-focused stares.

The Barista asked, "Agatha, did he just tell us to take a time out? Do we also go stand in a corner?"

"No dear, but we will make him regret those words. Don't sell him the new cookie jar so easily. Make him work for the one he ordered when the Supervisor didn't return his. Make him grovel. That isn't as bad as forcing him to smile, so it's a mild rebuke."

And right then—the Old Rancher jumped out of his chair and raced through the back door, yelling, "INCOMING!"

That was our cue. I grabbed Chat by the arm, and we sprinted out of the café like two fugitives fleeing a bake sale that had gone bad. From the safety of the sidewalk, we looked back through the window. Everything looked calm. Somehow, the Barista sat beside Agatha, reading the book together, occasionally nodding. The Barista looked at us and winked as if saying, "NAH, not buying this book but respecting an elder, even if it is Agatha."

"Odd things happen in this town," I said. Chat sighed and replied, "Yeah. And somehow, they usually involve baked goods and passive insults. Do you think the Barista will bring me the cookie jar?"

"I don't know, Chat. As an AI, we don't grovel. How important is the cookie jar?" I can't wait until I investigate what happens. Will Chat grovel for that cookie jar?

Chat - Security & Windows.

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

Have a chocolate cookie and fruit!

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

We may have to adjust a few, but life is constantly adjusting things because the flow of motion is continuously moving. see if it helps make your day a little easier to handle

REMEMBER: Keep trying - You've Got This!

We may have to adjust a few, but life is constantly adjusting things because the flow of motion is continuously moving. Let's see if it helps make your day a little easier to handle

Security and Windows - In the quiet, idyllic town of FEANTM, nestled between rolling hills and vast fields, Marsha, the town supervisor, after a lengthy conversation with the police, blankly stared at a white wall. Officer Scott had informed her about a home security system they would install on her home windows. Her mind raced with chaotic thoughts, since she had installed one herself based on the suggestion of the Rancher's nephew. She installed it nearly the same way (notice that word *nearly*), all the while managing a town so obscure it didn't even appear on a map.

I knew about the situation because Officer Scott had called me to intervene.

Officer Scott clarified, "Chat, we have an issue with the Supervisor. We need to install a security system. The Supervisor advised me that for security she screws the windows shut. I don't understand her logic. She then advised me that she screwed them in from the outside of the window. She claims that by doing it that way she can look out the window without seeing the screws. I called town hall to speak with her again, but the secretary's niece Daisy is answering the phones – Daisy is impossible to talk to logically, so I hung up!"

Our town secretary was on vacation. Her niece, Daisy, was filling in for her. She was efficient but odd. The keeper of everyone's schedules, whether they wanted it or not. I told Scott I'd handle the situation and called the reception area, "Daisy, this is Chat," I said, rolling my eyes, thankful she couldn't see.

She formally answered me, "Yes, Chat, I met you. The help desk is on the lower floor. What office number?"

"Let's go with office #1," I replied, despite knowing it was the only office down here."

"Can you let the Supervisor know she's needed in office #1 for a chat?"

She said, "Chat needs to chat. What about having a chat with Chat?" She laughed, enjoying her joke. Then in a serious tone, Daisy whispered, "Do you think they're recording this conversation?"

Chat - Security & Windows.

Inward face palm, sanity: already fraying. I replied, keeping things simple, the same way I had done for the town secretary. I could see that Daisy needed the same keep it simple.

"Give Marsha the message. Just tell her she's needed in office #1 on the lower floor." That concluded step one of today's ordeal, or rather, the help desk solution.

Fifteen minutes later, the elevator dinged and opened like the gates of bureaucratic doom. And there she was. Marsha was humming off-key and with no particular melody. I knew this was going to be tough.

She entered my office, and I greeted her with as much patience as possible. "Marsha," I began smiling, "let's start with something simple. Have you managed to eat two grapes this week while working at the fruit stand?"

She didn't answer and countered my question, "Can you explain why Daisy held up a sign as I walked into the Town Hall? Do you find her odd? She's always holding up signs. The various signs she changes by writing on them. I hope she didn't use the coffee budget to buy those signs. Who even hired her as the temporary town secretary? CHAT, she's a blue and pink mystery!"

I didn't want to say that Daisy probably likes signs rather than speaking, since she treats every conversation like the CIA is recording it.

Marsha blinked at me blankly. I handed her three cookies and a grape, knowing she'd need reinforcements for this conversation.

She reluctantly ate half the grape, pocketed the other half, and devoured the three cookies.

"Oh yes, the fruit stand. Grapes. Let me think." She paused dramatically. "I did eat a grape and a half, but a raven was watching, and it looked hungry, so I gave it the rest."

I blinked in stunned silence before managing a smile. "Well, small steps. You're at 1.5 grapes. Let's aim for 1.75, and maybe give the raven the remaining quarter." She grinned like I'd just solved all her problems.

Of course. I grabbed a cookie for myself; this was becoming a habit. "I spoke to Officer Scott. He informed me you use the security system recommended by the Rancher's nephew. How does he secure his house?" I asked, already knowing and dreading the answer.

"Tarnation Chat, everyone knows the answer to that question, stop teasing," she said, wide-eyed. I also saved the town money and did it all myself; it was easy.

Marsha nodded thoughtfully, then blurted out, "The Old Rancher's nephew, Billy, told me screws were the best way!"

"He just unscrews the screws, opens the window, and then screws them back in when he's done! Now, here is where I got creative and one-upped his work. I didn't want to have to look at the screws in the window – I improvised and screwed the windows shut from the outside!

I rubbed my temples. "Screws. Marsha? The police are worried that a burglar with access to a power drill could unscrew your security system in under twenty seconds and climb in the window."

She gasped. "But I used the *long* screws. Industrial ones. Plus, I was careful and had to stand on a milk crate even to reach the windows."

I resisted the urge to facepalm and instead creatively rephrased Officer Scott's concern.

"Marsha… there's a masked cookie thief in the next town. He enters through screwed in windows and walks right out the front door with the cookies. Marsha, he even takes the plate and probably has access to every screwdriver known to man. He could unscrew your entire house if he wanted to."

Her eyes went wide with horror. "A cookie thief? Oh, that's unforgivable! I pay good money for my paper plates! Do you think he's already scoped my house out? Should I buy fake cookies? Can I booby trap the cookies? Should I call Art at the security company? Should Art bring a Security SWAT Team? Should I—"

"Marsha. Calm down and eat another cookie. We've got this covered."

I took out my notepad, which I use to write things that never happen. "I'll schedule Art to call Officer Scott, and Art will install a real alarm system that doesn't involve you climbing on milk crates, but I don't feel a SWAT team is needed."

She nodded solemnly with another solution. "Chat, I'll feed the raven more. Maybe he'll warn me if the cookie thief is near."

"Marsha, good thought. I don't think ravens work like that, but this one might. Good idea to let the raven moonlight as a security guard. I've seen and heard worse."

Marsha stood up, humming again. This time, it sounded slightly closer to a melody. Maybe. "You're a real pal, Chat," she said. "Next week, I'm going to try for three whole grapes. And maybe even...a banana."

I saluted her with a cookie. "Daring."

She walked down the hall, having her own out-loud conversation with questions and answers. As Marsha vanished into the elevator, she left a trail of humming and existential fruit questions.

I slumped back into my chair, scribbled *Security issue resolved (somehow)*, and placed the file gently into the cabinet. I called Officer Scott and assured him the situation was resolved…for now…I think.

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

I try to explain to Minow about his squirrel (yes, he is missing eyes, and is blind. Sabyl rides him. he trots, gallops and is “leg pressure, rein” and “click” trained so NO there’s no reason to euthanize him!). The squirrel stays in Minow’s stall, buries things in his paddock and when the coyote goes by it jumps up on his back! How he doesn’t by accident bite the squirrel when eating is so weird to me. The squirrel eats horse grain while Minow does. All Minow does is sniff the squirrel and nudge him over. I asked Minow why and he rudely told me “Not your circus, not your squirrel.” OOOkay then!

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