FEA - CAE Not to Miss & More

JUNE 2026 ISSN 2694-4707

Town Hall Conversations - the town that almost exists
Town Plaza: Drive slowly – Galloping Prohibited

Airport - Baykar

Airport - Lockheed

Auto - BMW

Racer – Mustang.

Marco – RBF Morph

Madhukar – CADFEM

Metin – OZEN

Mi&Ke – Nightly News

Jenson – DFE TECH

Marta – OASYS

Yury – LS-DYNA

Brent – GOENGINEER

Curt – Proud Dad

FEANTM Town videos (Supervisor's Page)

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

Parking & Coffee are free.

R & D - Camping - Town Map

Horse Trail → Yield right of way to horses

R&D Technology Business Park

RV CAMPING
Park in any vacant camping site

Town Hall & Library

CADFEM
OFETECH
OZEN
SYNOPSYS
Oasys
Simu Tech Group
Ansys
DYNA MORE
SCALE
d3View

rbf.LAB
rbf

MEDITATE
LIVGEMINI

Lawrence Livermore National Laboratory

Race Track

The Old Rancher

Airport

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

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Articles via "social listening" from company blogs, or media.

03 Town Explanation and Marsha, our Town Supervisor, Announcements
04 Town Map in case you get lost
07-08 Town meeting - (Resident Announcements & Marnie's welcome + announcements**)**

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

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

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

Welcome to Town Conversations

Creation **is born from trying. If it doesn't work, learn & try again. You Will succeed. Inventions, simulations, cures, wouldn't exist without the passion to keep trying**

Park cars behind building

Park tractors behind cars

Tie horses to hitching posts

Café - Conversations & Town Gossip

Cookies, Chocolate, Cakes and Pies

Pets are welcome

Horses, pet goats stay outside

Resident Conversations You Don't Want To Miss

Marta: The Angel of the North ...its unmistakable silhouette, the Angel of the North has watched over the A1 for more than two decades. …

Madhukar: Article by A. Kunz, …Pöttinger the company delivers on this customer promise through reliable partnerships and the use of the latest methods. .

Mi & Ke: SimuTech - Using Topology Optimization to Design a Lightweight 3D-Printed Barbell Bracket in Ansys Discovery

Marco: YouTube Video: how VR & reduced-order modeling come together .... Bring real-time simulation and immersive design into your development

Marnie: ANSYS - Get Started with Ansys Mechanical – FREE Learn practical simulation engineering techniques

Yury – I released an additional section titled "Solid Mechanics Laws," which describes most of the analytical laws of mechanics in LS-DYNA material models.

Our publication features a diverse mix of papers, articles, and simulations from various fields.

As always, we strive to integrate new and interesting content for your enjoyment and learning

FEANTM June 2026 edition.

Hello, and welcome to the June 2026 edition of FEANTM.

The month of June presents us with the Summer Solstice. This year's Summer Solstice falls on June 21 and marks the astronomical start of summer in the Northern Hemisphere. It also marks the beginning of summer fun. School is out, people vacation and enjoy being outdoors.

According to ThoughtCO.com, June has a number of significant happenings in the World of Science and Invention. For example, in June 1895, the gasoline-powered automobile was patented. In June 1887, Coca-Cola's iconic bottle label was officially trademarked, and in June 1724, John Smeaton, a British engineer, invented the air pump for diving gear.

We have an abundance of information to share with you. Our Engineering and Industry section shares links to Synopsys, Scale, LLNL, CADFEM, and information on LS DYNA among others. Be sure to stop by the Research Hospital where Marco presents an article on Advanced Simulation of an Operating Room. Check out the Airport section for a link to the USAF pictures of the month. Those of you who enjoy the Ranch News and Gossip, be sure to visit the Gossip Page.

We wish everyone a fun-filled and sunny summer.

Thank you for you continued interest in FEANTM.

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

June

We tuned up our tractors (grabbed a cup of coffee) and drove around the town that almost exists.

Why? This way we find the articles and videos that catch our attention and share why we think they may be useful to the community.

Together we've Got This.

At the close of our local coffee discussions, we have decided to continue shaping FEANTM and the FEANTM Community channel.

We voted & will slowly move toward our own independent reviews and conversations.

The FEANTM Community YouTube Channel sparked a good discussion around the coffee shop. Thank you for the emails & ideas.

Among our informal reviews and conversations will be:

- What we feel brings information to LS-DYNA users
- What YouTube Channel Video caught our attention

This month a great video about the Golden Gate Bridge digital twin caught our attention and we listed it on our YouTube Community Channel. Our town is about a one-hour drive from the Golden Gate Bridge. We are a neighboring town to Livermore, CA. As we all know LS-DYNA© was originally developed by John O. Hallquist in Livermore, California

Where is our town channel? Glad you asked.

FEANTM Community YouTube Channel

Now on to my creation tries at animation video.

It was created for my grandkids. SO, if you need a thinking break that starts with, "WHAT is that old woman trying to do now?" Head on over - I guess we can call it the old town supervisor meets AI animations?

FEANTM Town Animations

Town Coffee with Aaron – Finding AI, Engineering, Innovations.

I found a blog by Marin Stanev you need to read

Article, "Automakers everywhere are feeling the pressure of rapidly expanding software content in modern vehicles...'

Excerpts – read the website for complete information and videos

Web – SYNOPSYS - Volvo Cars' Digital Twin Advantage

by Marin Stanev of Synopsys.

Volvo Cars' Software Testing Centre in Gothenburg, Sweden (Source: Volvo Cars)

Automakers everywhere are feeling the pressure of rapidly expanding software content in modern vehicles. As features become more electronics-driven and interconnected, integrating them late in the development cycle is no longer tenable. And waiting for physical prototypes often leads to delays and late-stage surprises that increase both cost and risk

The entire automotive industry is forging a new path forward, and Volvo Cars is leading the way.

The esteemed automaker is bringing more software development in-house. It is shifting from component-centric to whole-vehicle validation. And it is pulling these efforts into the earliest stages of design and development.

To make these transformations possible, Volvo is pioneering the use of cloud-based electronics digital twins (eDTs). As virtual replicas of a vehicle's electronic and software systems, eDTs allow developers to test, validate, and optimize those systems long before hardware exists.

To build its eDTs, Volvo is leaning on a team of complementary technology leaders:

- Synopsys provides virtual electronic control units (ECUs) that model how Volvo's production software runs across the vehicle.
- **AWS** supplies the cloud infrastructure needed to run full virtual vehicles at scale.
- **QNX** offers a virtualized version of the operating system powering the vehicle's main computer.
- **RemotiveLabs** contributes simulations of the broader physical systems, including signals and interactions from sensors, actuators, and networks that reflect real-world behavior.

Together, these collaborators are helping Volvo validate software and electronics earlier, faster, and more comprehensively than would be possible using traditional methods

“We have a long history of working with Synopsys Silver for embedded ECUs,” says Johannes Foufas, technical manager for Volvo Cars Software Factory. “It has the benefit of being fast and stable with a good capability of adding functional mock-up units.”

This type of ECU and software modeling gives Volvo developers a consistent foundation for integration — one that aligns with their existing tools and workflows.

“Silver supports Linux and command line execution,” says Foufas, “which is essential for our software factory.”

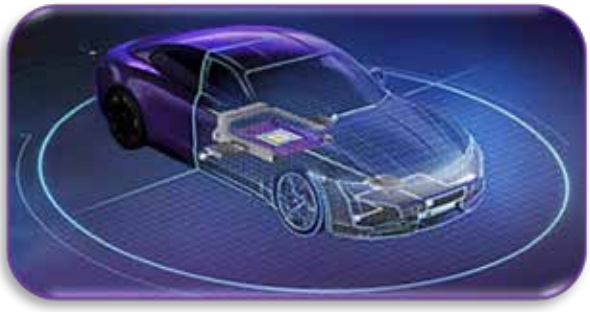
Scalability and early detection - Scalability is an equally important piece of the puzzle. Because the eDTs run in the cloud, multiple teams can spin up complete virtual vehicles simultaneously, without waiting for scarce hardware benches or specialized facilities.

“By combining AWS Services such as Amazon EKS and Amazon EC2 Graviton processors with Synopsys Silver virtual ECUs in a digital twin testing environment, OEMs can now perform complex vehicle integration testing at scale,” says Mohammed Hashem, senior industry solutions architect at AWS. “This accelerates development and validation cycles while reducing dependency on physical prototypes.”

It also enables early detection of software problems.

Volvo has tied the eDTs to its continuous integration (CI) pipelines, allowing every code change to be tested in a full-vehicle context. If a new software update prevents the virtual vehicle from reaching a basic “drivable” state, the issue is identified immediately.

According to Volvo, roughly 30% of all code changes are rejected by this early virtual testing process, catching issues long before they would appear in hardware tests or, worse yet, on the road.



Reliability and realism - Reliability and realism are central to the effectiveness of eDTs. When the simulated environment accurately reflects the real system — from operating system behavior to network timing to the way electronic components exchange information — teams gain a more comprehensive and granular view of the platform and can better understand how the software will behave under real conditions.

“By virtualizing the QNX OS together with Synopsys Silver virtual ECUs in the cloud, we provide a digital twin that mirrors production hardware with exceptional fidelity,” says Sheridan Ethier, vice president of engineering middleware at QNX. “It helps ensure that what works in simulation will work on the road.”

“What this eDT setup demonstrates is that system-level validation doesn’t have to wait for hardware,” adds Aleksandar Filipov, CTO of RemotiveLabs. “By combining virtual ECUs, target binaries, and realistic network infrastructure simulation, teams can validate end-to-end vehicle behavior early, when changes are still inexpensive to make.”

Collaboration and continuous improvement - Through collaboration and innovation, Volvo hasn’t just gained a digital replica of the car, but a faster, safer way of developing it.

“Volvo Cars is rapidly adopting holistic, whole-vehicle validation, and we’re bringing that rigor into the earliest stages of design and development,” Foufas says. “Core to this transformation is working with Synopsys to pioneer the use of electronics digital twins. With virtualized ECUs, our teams can ‘shift left’ test and validation before hardware exists, enabling us to reduce development cost, increase software quality, and accelerate innovation throughout the lifecycle of our vehicles.”

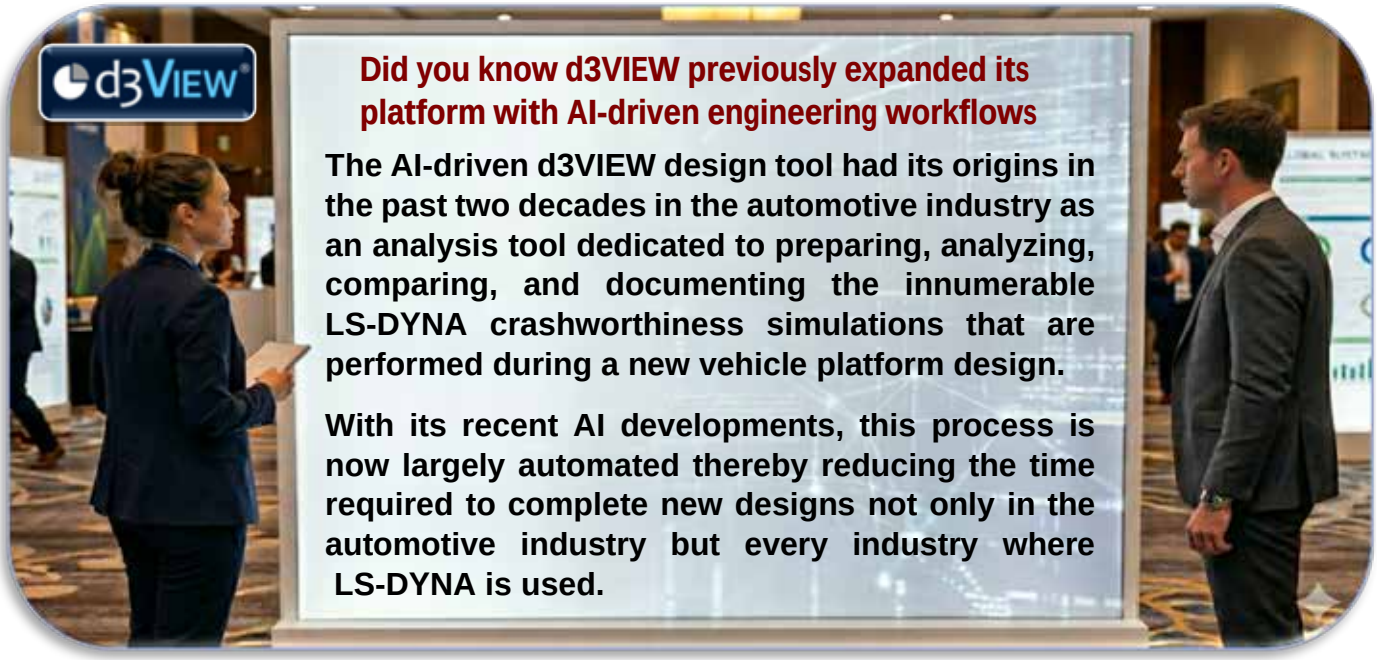
The company continues refining the environment, exploring improvements such as stronger security, synchronized timing across components, and enhanced sensor and graphics simulation. Each step brings the virtual and physical vehicle closer together.

By embracing cloud-based digital twins, Volvo is demonstrating how legacy automakers can adapt to the realities of software-centric vehicles. And with support from technology leaders, it is on the fast track to delivering safer, more capable cars.

Watch on YouTube Synopsys Electronics Digital Twin Platform

To help reduce your workflow burden and frustrations, d3VIEW has again expanded its platform with additional AI-driven engineering workflows.

With you in mind they have designed a page with current updates you want to know: Platform Enhancements, Bug-Fixes & New Features



Rather than manually connecting scripts, tools, and processing steps, you can use natural-language driven workflows to organize and execute multi-step engineering processes in a more consistent and repeatable way. The system integrates access to more than 1,500 engineering-focused tools that can assist your tasks such as simulation setup, DOE execution, optimization, model debugging, machine-learning development, material calibration, and validation workflows.

One of the practical advantages is improved repeatability and traceability. Your teams can standardize workflows, reduce manual process variation, and more easily document how results were generated. That is an important requirement for validation and collaborative development environments.

The current d3VIEW Agentic Engineering Solutions (AES) library allows you to deploy pre-built workflow components, modify existing workflows, or create custom engineering agents through a visual whiteboard-style interface rather than relying entirely on custom scripting.
As the AES library continues to expand through 2026, our focus remains on helping you reduce repetitive process overhead, shorten iteration cycles, and spend more time on engineering decisions instead of workflow management.

What does this bring you? saved time and we all can use reduced frustration. You will gain repeatability, fewer errors and easier workflows. Additionally, don't forget you will have traceability, faster iteration, and less manual overhead

Don't wait! Write to us & request your demo. It's waiting for you. **info@d3view.com.**

Article quote, "CADENAS successfully cooperates with faculties and schools around the world whose students use the 3Dfindit portal as a free 3D search engine for their projects and education. One of them is the University of Novi Sad (Serbia), with which we have excellent cooperation thanks to Dr. Zeljko Santosi and MSc Dejan Bozic who recently visited us again to discuss and agree on new projects" **Excerpt Web – 3Dfindit**

Web – 3Dfindit - University of Novi Sad – CADENAS 3Dfindit collaboration - Dalibor Pejicic

Enhancing Visual Learning - One of the key advantages of 3Dfindit lies in its extensive library of high-quality, detailed 3D models. These models act as powerful visual tools that transform abstract engineering and architectural concepts into tangible representations.

The Faculty of Technical Sciences at the University of Novi Sad (Serbia) is a regional leader in education, research, and innovation. With a rich history of academic excellence, the Department of Production Engineering focuses on bridging the gap between traditional manufacturing and Industry 4.0. A core component of this collaboration is the involvement of undergraduate students. By providing real-world industrial data and challenges, 3Dfindit enables students to base their Bachelor's theses on practical problems. Under the mentorship of Dr. Santosi, students gain hands-on experience with digital parts catalogs, 3D modeling, and standardized engineering data management.

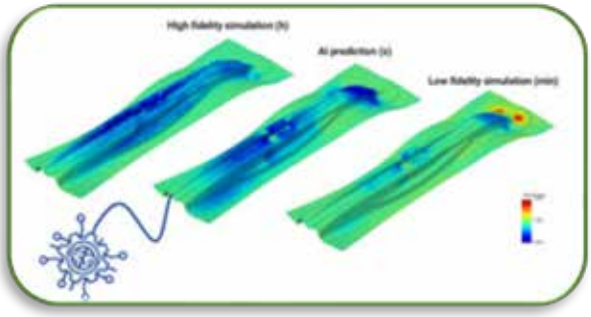
Dr. Zeljko Santosi is an assistant professor at the Department of Manufacturing Engineering, Faculty of Technical Sciences University of Novi Sad. His primary research area is related to production engineering, 3D digitization and reversible engineering, with a special focus on the application of these technologies in industry, medicine and cultural heritage preservation. He is intensively involved in the development and optimization of photogrammetric methods for non-contact 3D digitization, especially in the context of the reconstruction of objects that do not have a pronounced visual texture. He also deals with solving complex challenges in the field of reversible engineering - from precise data collection by 3D scanning to the processing of point clouds and polygonal meshes into usable CAD.

MSc Dejan Bozic has extensive technical expertise in CAD/CAM systems and production planning. His focus lies in the practical application of engineering software to solve complex manufacturing challenges. In this cooperation, MSc Dejan Bozic serves as a vital link between student researchers and industrial requirements, overseeing the technical accuracy of collaborative projects and ensuring that academic outputs meet the rigorous standards of the modern engineering sector.

Dr. Zeljko Santosi explained: 'In the final year of Bachelor studies, within the course Reverse engineering and CAQ, students are introduced to 3Dfindit and use it to identify appropriate parts based on 3D scan data obtained by a 3D scanner. They gain new knowledge of how to search the huge 3Dfindit database and use it in their future projects."

We thank our esteemed guests for their visit and look forward to strengthening our established and successful cooperation!

Article, "…The training data are generated from approximately 5,000 LS-DYNA forming simulations and cover a broadly varied, physically consistent parameter space. ...Validation was based on the Kirchhoff Automotive demonstration **LS-DYNA model**, which served as a reference high-fidelity model (HFS) – **a LS-DYNA model with die**, punch and holder – for comparing predicted and model-based system states"



Your Partner for SDM and CAE Processes

Web - SCALE - AI-Based Predictions of Forming Effects for Enhanced Crash Simulation

I. Lepenies (SCALE) - ESAFORM, April 2026

Abstract and Paper is available on the website in pdf format

Overview

- The paper examines how artificial intelligence can be used to predict forming effects in sheet metal forming processes more accurately and quickly.
- The focus is on the use of data-driven models that can complement or partially replace classical numerical simulations, in particular finite element methods.
- The goal is to predict process quantities such as forces, geometric deviations, or potential defects early and efficiently.
- It is shown that modern machine learning approaches offer great potential, especially for complex or time-critical manufacturing processes.
- By combining experimental data, process monitoring, and AI models, development times can be shortened, simulation effort reduced, and process reliability improved. Thus, the work contributes to a central trend in modern manufacturing engineering: the intelligent, data-driven optimization of forming processes.

GOENGINEER Article "At Van Buren Technology Center in Lawrence, Michigan, instructor Josh Bridges teaches his 11th and 12th-grade students about the many facets of design. But Josh doesn't just prepare his students to take a test, he prepares them for the workforce.**"**

Web – GOENGINEER - Van Buren Tech Shapes Young Engineers with SOLIDWORKS

Article by Nick Sweeney

Many of Josh Bridges former students have gone on to have extremely successful college careers and have even been asked to lead various design clubs at their schools.

We met with Josh after his recent presentation at 3DEXPERIENCE World in Houston to talk about his passion as a teacher, the projects his students are working on, and how he prepares his students for engineering life beyond the classroom.

Teaching SOLIDWORKS to High School Students - Some teachers may tell you that the current generation of students can be difficult to reach. At times, it can feel like they're speaking a different language, and they have to deal with ever-shorter attention spans. But, Josh has his students for 2-1/2 hours a day during the school year, and each is excited about his class. How does he do it?

"I teach theory to my students, and at the beginning of the year, they get a lot of it. But I also work it into projects, trying to make it interesting."

Josh always starts the year by having his students sketch in 2D in SOLIDWORKS. While he acknowledges that SOLIDWORKS isn't designed to be a 2D CAD program, it helps him lay the foundation for his students to create solid sketches in the future.

As the students progress into 3D models, Josh challenges them with various design challenges. For example, his students ran their own SOLIDWORKS Jack-o-Lantern design contest for Halloween. Around the holidays, they designed ornaments for the in-class decorations to get into the holiday spirit.

Going Beyond Just CAD - As any designer can tell you, CAD models are only part of the job. So, instead of teaching only SOLIDWORKS, Josh instructs his students to take a complete approach to designing. They start in CAD before creating scale models in their lab using anything from CNC machines and hand tools to 3D printers.

But just like in the field, designs don't always go according to plan on the first try. "Sometimes they'll 3D print a scale model, and they go, 'oh shoot, I didn't think about that.'"

Students even participate in design reviews that simulate what designing is like in the real world. As Josh put it, "I can tell you a thousand times that you didn't dimension the drawing right. But when another student says, 'hey, you missed a dimension', that's powerful."

This simulation of real-world experiences prepares the students at Van Buren Tech for the next step they take – whether that be a college engineering class or the real world.

Learning Translates to Success - There's no doubt that Van Buren Tech students have a leg up when it comes to determining their next step if they want to continue with engineering.

"I've had students come back and tell me that they got to their college engineering class and while their classmates were trying to learn the CAD program, they were already busy with their designs."

This success translates to the field as well. Josh said he's had situations where students would shadow industry professionals. They'll talk to their mentors about SOLIDWORKS and certifications, mentioning their achievements and certifications from Van Buren Tech. Meanwhile, the SOLIDWORKS users that the Van Buren Tech students are shadowing don't yet have those certifications for themselves.

What Comes Next? - For Josh, it's apparent that he loves what he does and takes pride in his teaching. It's not always flashy, as the students recently completed a project to augment the humble clipboard. Students participated in a review process with industry professionals acting as the judges. As one judge put it, "You took a really boring topic and made it interesting."

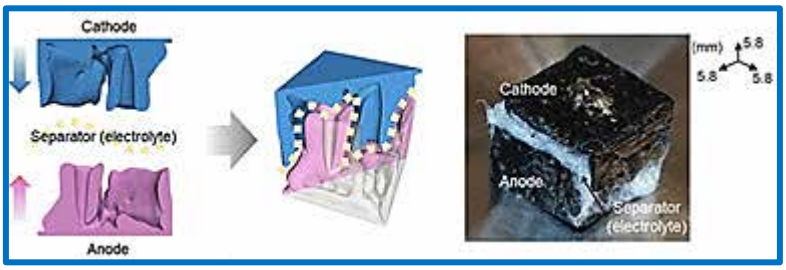
As for the students, they're always looking at their next SOLIDWORKS certification. Throughout the school year, the students at Van Buren learn and apply skills, leading up to the days they take their Certified SOLIDWORKS Associate exam in February or March. Josh sees tremendous success across the classroom, and once the students pass the certification, some even begin working on their Certified SOLIDWORKS Professional tests.

"I think what I'm most proud of is that since I started teaching this class, I've had 67 kids pass their CSWAs or CSWPs.

And the fact that we've been able to get so many kids certified and job-ready or into college with 9 credits of classes already under their belt is huge."

LLNL Article, "Good electrochemical energy storage (EES) devices such as rechargeable batteries and supercapacitors can store a lot of energy and release it quickly, but these design goals are often at odds with each other.."

Web – LLNL - [3D--printed interlocking electrodes demonstrate optimization potential for energy storage,](#)
Jeremy Thomas



Model of a full-cell assembly with interlocking 3D-printed electrodes. (Courtesy image)

Using design optimization and 3D printing, a team led by engineers and scientists at Lawrence Livermore National Laboratory (LLNL) have overcome this tradeoff and demonstrated a 3D-printed electrode design for EES that maximizes storage capacity under practical conditions.

The 5.8-millimeter, ultra-thick device, made with two interlocking electrodes that maximize active material and facilitate ion and electron transport, outperformed conventional designs and showed the potential of optimization for advancing next-generation energy storage. Their results were published in a recent paper in Materials Horizons.

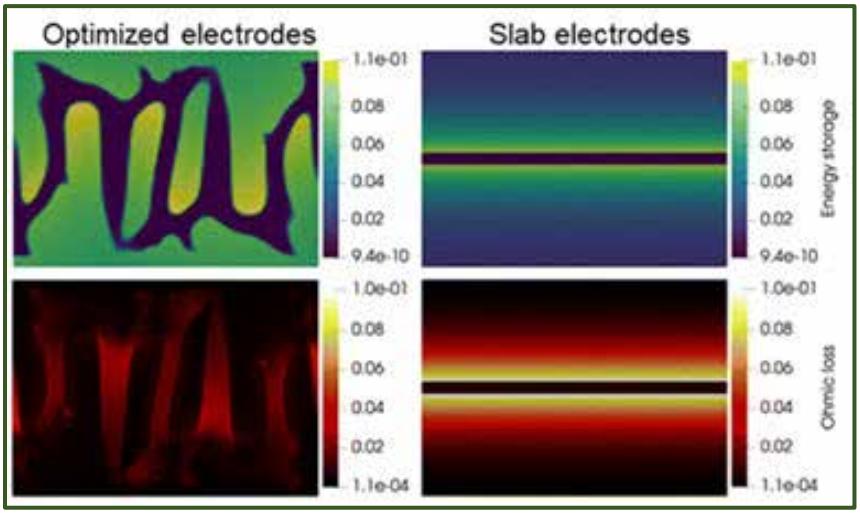
EES devices store and release energy through electrochemical reactions. Having thick electrodes provides more active material and therefore higher storage capacity, but it also impedes the transport of ions between the anode and cathode, which limits power (e.g. charging speed). The team thought a solution might lie in the structural design of the electrodes.

"In conventional slab-like designs, a lot of the battery material becomes underutilized because ions cannot reach deep regions efficiently, creating dead zones and concentrated resistive losses near interfaces," explained Giovanna Bucci, a co-author and staff researcher in the Computational Engineering Division (CED) at LLNL.

Exploring new design spaces - 3D printing unlocks significantly larger design spaces to work with, and computational design optimization allows researchers to explore them efficiently and find non-intuitive design solutions to complex problems. While optimization has been used to design EEC electrodes before, the team was the first to optimize both electrodes simultaneously.

"The computer can produce geometries that are hard to intuit from experience alone, but are directly aligned with the device's limiting physics," said CED researcher Hanyu Li. "It helps us understand why certain geometric features are good, and how different geometries are appropriate for different use cases."

The team built an optimization framework based on experimental data to generate designs, then print them with a unique resin formulation and multi-material microstereolithography (PμSL). The electrodes were printed in two steps: first, a base layer of porous graphene oxide sheets to facilitate ion fusion; then, a layer of gold deposited on the surface to increase electronic conductivity.



The optimized, interdigitated electrodes (left) increase energy storage and reduce ohmic loss.

The 4-millimeter electrodes are interdigitated, meaning they interlock like fingers of folded hands. This distributes the active material to reduce "dead zones" and increases the surface area to give electrode-particles plenty of entry and exit points to facilitate transport.

"This study treats electrode architecture as a performance lever just as important as the material itself," said CED researcher Thomas Roy. "The optimized interpenetrating 3D layouts create many accessible pathways for ions, while the integrated conductive network supports electron transport through the structure."

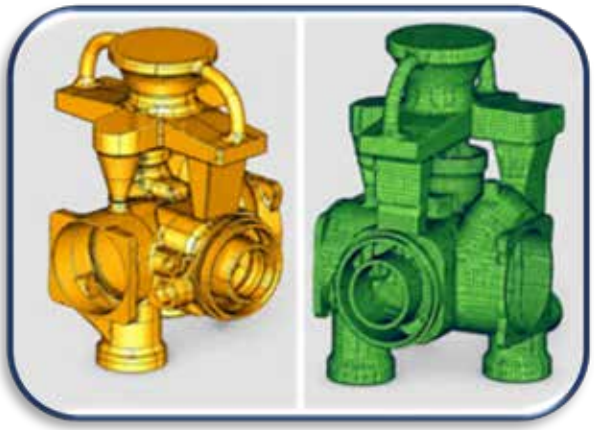
The optimized electrodes outperformed both conventional 2D designs and other 3D-printed carbon-based supercapacitors, demonstrating better capacitance capabilities, improved charge storage and energy storage performance and lower resistance. The device also showed impressive stability and reliability over more than 7500 charge/discharge cycles.

"The real breakthrough is not one component in isolation, it is the integration," said Physics and Life Sciences researcher Marcus Worsley. "The interdisciplinary nature of the project demonstrates how our team and LLNL are uniquely positioned to tackle such collaborative projects and complex problems."

The team plans to build on their success by extending the optimization framework for other devices, such as lithium-ion batteries, chemo-mechanical co-design of stretchable batteries, electrochemical flow batteries and electrochemical mineral separation. They also plan to explore ways to use their technique for large-scale manufacturing to help deliver optimized next-generation EES devices for applications including consumer electronics, electric vehicles, renewable energy sources and more.

Other co-authors on the paper include LLNL's Nicholas Cross (CED) and collaborators Zhen Wang and Xiaoyu (Rayne) Zheng from the University of California at Berkeley. –Noah Pflueger-Peters

DFE-tech article quote, "In today's competitive manufacturing industry, achieving high-quality cast components while reducing production cost and lead time is a major challenge for foundries and manufacturers. Traditional trial-and-error approaches in casting processes often result in defects, material waste, rework, and production delays**."**



Web -DFE Tech - Common Casting Problems & How Simulation Solves Them

By: Riqy Rizqyandra
Application Engineer, DFE-Tech Indonesia

Investment Casting Solution by CAST-DESIGNER

With the advancement of casting simulation technology, manufacturers can now predict and prevent casting defects before production begins.

One of the solutions widely used in the industry is CAST-DESIGNER, a casting simulation software designed to optimize casting processes and improve product quality.

Common Casting Problems in Manufacturing

1. **Shrinkage Porosity** - Shrinkage porosity occurs when cavities or pores form inside the casting during solidification due to uneven cooling and insufficient feeding of molten metal.

   Impact:

   - Reduced product strength
   - Quality issues
   - Increased scrap and rework cost

   How Simulation Helps: CAST-DESIGNER helps engineers identify shrinkage-prone areas early by simulating the solidification process. Engineers can optimize riser placement, gating design, and cooling conditions before actual production.

2. **Misrun Defect** - A misrun happens when molten metal fails to completely fill the mold cavity before solidification.

   - **Impact**:
   - Incomplete casting parts
   - Production rejection
   - Material waste

   How Simulation Helps: By using casting flow analysis, engineers can study metal filling behavior and improve gating systems, pouring temperature, and filling speed to ensure complete mold filling.

3. **Cold Shut** - Cold shut defects occur when two metal flow fronts meet but do not fuse properly, creating weak lines or cracks on the casting surface.

Impact:

- Weak structural integrity
- Surface defects
- Reduced reliability

How Simulation Helps: Simulation enables engineers to analyze flow behavior and temperature distribution to improve mold and gating design for smoother metal flow.

4. **Sand Inclusion & Air Entrapment** - Sand particles or trapped air during casting may create surface defects and internal imperfections.

Impact:

- Poor surface finish
- Reduced casting quality
- Increased rejection rate

How Simulation Helps: CAST-DESIGNER helps identify turbulence and air entrapment areas through flow analysis, allowing process optimization before manufacturing.

5. **Distortion & Warpage** - Uneven cooling and residual stress may cause casting deformation after solidification.

Impact:

- Dimensional inaccuracies
- Assembly problems
- Additional machining cost

How Simulation Helps: Simulation predicts distortion tendencies early, helping engineers optimize cooling systems and process parameters to maintain dimensional accuracy.

Moving Towards Smart Manufacturing - As industries continue moving towards Industry 4.0 and digital manufacturing, simulation technology plays an important role in improving productivity and decision-making.

Investment casting simulation solutions like CAST-DESIGNER allow manufacturers to validate and optimize their casting processes virtually before physical production, helping companies stay competitive in today's fast-changing manufacturing environment.

Casting defects can significantly affect product quality, production efficiency, and manufacturing cost. By integrating simulation technology into the casting workflow, manufacturers can predict issues earlier, reduce risks, and improve production performance.

With advanced solutions such as CAST-DESIGNER, foundries and manufacturers can move towards more reliable, cost-effective, and optimized casting operations.

Quote Article by Alexander Kunz, "**More successful with Pöttinger" – the company delivers on this customer promise through reliable partnerships and the use of the latest methods.** In product development, this means making intensive use of simulation technology and continuously expanding its application.

… Simulation enables Pöttinger to manage growing product complexity while driving innovation and ensuring maximum quality.

Web – CADFEM - With Ansys and CADFEM to High-Quality Agricultural Machinery Agricultural Technology From Pöttinger: Succeeding With Simulation
by Alexander Kunz

Pöttinger is an internationally leading specialist in agricultural machinery. | © Pöttinger

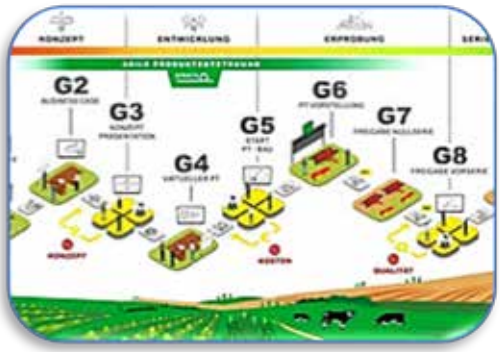
Summary

- At agricultural machinery specialist Pöttinger, simulations are an integral part of the development process for all products.
- Especially in the early development phase, simulation is used extensively so that virtual prototypes already reach a very high level of maturity.
- The examples of the JUMBO loader wagon and the HIT large-area tedder show how simulation makes a decisive contribution to innovation, quality, and sustainability.

Pöttinger has been using simulation for more than 25 years. Initially, Ansys was used as an application on a CAD workstation. In 2007, the company established a dedicated department equipped with several Ansys licenses and a close partnership with the CADFEM Austria team. Since then, simulation has been a core element of the agile, networked, and collaborative product development approach known as the "Pöttinger Creation Process" (PEP).

Josef Bruckner has been a simulation engineer at Pöttinger since 2016 and has headed the simulation team of the internationally leading agricultural machinery specialist ever since.

Most of the simulations focus on structural mechanics and cover a wide range of complex tasks such as analyzing folding processes or evaluating welded joints. Together with his team, Josef Bruckner solves these challenges and thus contributes significantly to the innovation and quality for which the Pöttinger brand is known in the agricultural sector



Simulation Firmly Embedded in the Development Process - “We practically do not develop anything without simulation,” says Josef Bruckner, emphasizing its importance. Within PEP, simulation is required everywhere – from design-driven idea evaluation in early concept phases to detailed series development and performance analysis during serial production. Simulation work is never done in isolation but always collaboratively with other stakeholders: design, measurement and testing, prototyping, production, and product management.

Das Team von Josef Bruckner und seine Simulationen mit Ansys sind ein integraler Bestandteil des Pöttinger Entstehungs-Prozess“ (PEP). Entwickelt wird agil, vernetzt und kooperativ. | © Pöttinger

Highly Mature Virtual Prototypes From the Start - Most of the numerous simulation hours per product are invested in the early stages – pre-development. The reason is simple: during these phases, design decisions and changes do not yet incur significant costs. Alternatives can be explored, solutions identified, and key decisions made – and Ansys simulation tools make this possible. The goal and added value of simulation at Pöttinger is that the very first physical prototype already reaches a high level of maturity.

When asked about highlights, Josef Bruckner names two examples from “countless others”: the drawbar of the JUMBO loader wagon and the highly complex folding processes of the HIT large-area tedder. **"We practically do not develop anything without simulation anymore" Josef Bruckner, Head of Simulation at Pottinger.”**

Robust and Lightweight: A Topology-Optimized Drawbar - JUMBO is the name of Pöttinger’s successful loader wagon model. During dynamic loading, the drawbar is subjected to numerous and highly variable mechanical load scenarios and must function with absolute reliability. During its development in 2010, an additional heavy welded component was initially planned as reinforcement. In parallel, a lighter alternative was investigated. Using topology optimization in Ansys Mechanical, unnecessary material was identified and removed. The result was a variant that was lighter and at the same time more robust than the original concept. A long-lasting success: the JUMBO continues to use this optimized design to this day.

In 2010, the reinforcing welded component of the JUMBO was optimized using topology optimization in Ansys Mechanical so that it fulfilled all functions with reduced material usage. | © Pöttinger

Precise and Reliable: Folding Processes Without Dead Points - The HIT large-area tedder is one of Pöttinger's flagship products in grassland technology. Even in its largest version, with 16 rotors and a working width of 17 meters, it adapts to different field shapes and ground conditions. Its standout feature: tedding is performed with minimal dirt contamination from soil particles that might enter the forage when tines touch the ground. Using Ansys simulations, Pöttinger identified the critical dead points in the folding processes and adjusted parameters so that contamination is avoided. This is an essential requirement, ensuring top-quality animal feed.

Ansys simulations revealed the critical dead points in folding processes. By optimizing parameters, contamination of animal feed was minimized. | © Pöttinger

Pöttinger's Formula for Success: Observe, Follow, Implement - Pöttinger's strong belief in the potential of simulation and its intensive use of Ansys in product development are key success factors. Together with CADFEM, the company continuously identifies new application areas, refines processes and workflows, and evaluates and integrates new technologies. Examples include automation solutions and a custom toolbar tailored to the company's needs. Pöttinger is also advancing the use of Python for efficient analysis of load data from testing, as well as the integration of AI. **Together with CADFEM, Pöttinger monitors and assesses emerging trends – and when they show clear added value, they are implemented in line with Josef Bruckner's motto: "There is always room for improvement."**

CADFEM meets Josef Bruckner – YouTube CADFEM Channel

Simulation bei Pöttinger: So entstehen robuste Landmaschine...

In a conversation with CADFEM Austria team member Florian Hollaus, Josef Bruckner, Head of Simulation at Pöttinger, offers deeper insights into product development at Pöttinger – with special focus on simulation, its history, its role within the Pöttinger Creation Process (PEP), its value especially in structural mechanical tasks, and how it continues to evolve.

"**RBF Morph - - Watch the video on YouTube to see how VR and reduced-order modeling come together to enable next-generation engineering workflows. Bring real-time simulation and immersive design into your development**

Not every innovation is new — but some are still ahead of their time.

We're revisiting one of our most impactful demos**:** **Redesigning a Piaggio Connecting Rod in VR Using Mesh Morphing.**

In this video, we showcase how immersive VR combined with advanced simulation techniques can transform the way engineers approach design optimization in an industrial context.

Using RBF mesh morphing integrated into rbfVR, along with a Reduced-Order Model (ROM) trained on high-fidelity FEM simulations, engineers can:

- Interactively deform complex geometries in real time
- Instantly visualize stress distribution changes
- Identify and reduce peak stresses in critical regions
- Explore multiple design alternatives without rerunning full simulations

This approach represents a shift from traditional, iteration-heavy workflows to a real-time, decision-driven engineering process — dramatically reducing development time while improving design insight.

For industries where performance, weight, and durability are critical
(automotive, motorsport, aerospace), this means faster innovation cycles and more efficient use of simulation data.

Don't miss out on this great offer from ANSYS: The cost is free. What is the skill level needed? The good news is that the skill level is beginner. It is a 1-2 hour duration and your gained skills will be in ANSYS Mechanical.

You will receive a completion badge. Login to check availability.

WEB- ANSYS – Structures - Get Started with Ansys Mechanical – FREE

Learn practical simulation engineering techniques while following along with hands-on examples that can be completed either using your valid commercial/academic Ansys license or with Ansys Student.

When working with any computer-aided engineering software, it is important to understand its workflow and user interface so you can be more productive and efficient when performing your analysis in the software. In this course, you will get familiar with the Ansys Mechanical user interface and learn important tips and tricks to be more productive with your simulation workflow.

Learning Outcomes:

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

Course Prerequisites: None

Estimated Time Required: 1 hour

A course completion badge allows you to showcase your success. With our badging platform, digital badges can be easily shared in email signatures, digital resumes, and social media profiles, helping you highlight your achievements. The digital image contains verified metadata that describes your participation in our course and the topics and skills that were covered. This badge is for successfully completing the Get Started with Ansys Mechanical course.

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

The ranch Coyote by the food pan

Interesting on the internet not to miss

[Flip Book – Melody Moth](#) finds her light. when you want a fun time to read engineering break.

Report #1: SimuTech Group
[E.Taskin Series, Digital Twin, Golden Gate Bridge](#)
Ansys Twin Builder

[Chosen by Randy](#)
The history of LS-DYNA

[FEANTM Town animations](#)
Featuring monthly
The town sneaky Raccoons

In the Northeast, few structures are as instantly recognisable as the Angel of the North - a landmark where art meets engineering. Back in the 1990s, Arup engineers used Oasys structural and geotechnical engineering software to model and analyse the Angel, designing for demanding wind actions, tight stress paths at the "ankles," and challenging ground conditions on a former colliery site. ***Picture © Paul Carstairs / Arup***

Web – OASYS - Standing tall in the heart of the Northeast: Oasys and the Angel of the North

Rising above Gateshead with its unmistakable silhouette, the Angel of the North has watched over the A1 for more than two decades – an enduring symbol of Northern ambition and engineering ingenuity. Just as the steel-and-copper giant continues to command the landscape, Oasys has remained quiet force behind projects shaping human spaces across the region and far beyond for five decades. And the connection runs deeper than symbolism: back in the 1990s, Arup engineers used Oasys software to model, analyse, and bring this now-iconic landmark to life.

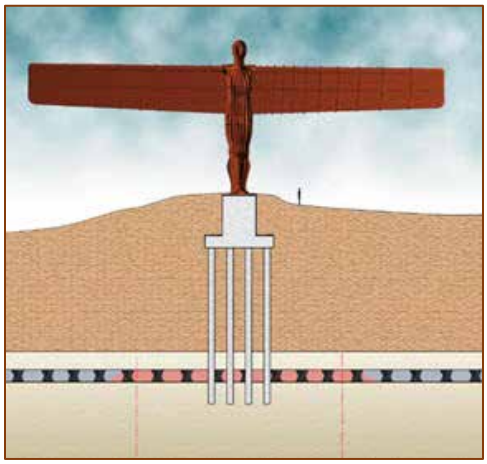
The initial design was created by artist Antony Gormley, commissioned by Gateshead Council and funded by the National Lottery. Completed in 1998, the iconic structure is the result of brilliant artist design, extensive structural analysis and design. Arup engineers used in house powerful structural analysis and design capabilities for the design contributing towards its resilience to weather conditions and ground conditions over the past two decades. Award winning, breath taking and enormous, the Angel of the North proves to be a structurally sound piece of artwork that is now an integral part of Northeast England.

With a wingspan bigger than a Boeing 757 and able to withstand winds of over 100mph in its exposed hilltop location, the steel sculpture stands 20m tall on the site of a former coal mine between the A1 and A167 adjacent to the road interchange.

Antony had the idea of creating 'The Angel' using heavy industrial and shipbuilding techniques to construct a material image of a spiritual being. The inner body is a plate modelled of Antony's own body. Gormley created the 3D design model of the sculpture by scanning his own body using innovative geomatics and plotting coordinates to create a virtual 'angel'. The body weighs 100 tonnes and the two wings each weigh 50 tonnes.

Structural engineering - Once the scale and form of The Angel had been decided, Gateshead Council commissioned Arup's Newcastle office to advise on the structural design. A common challenge many engineers face is ensuring a structure will remain standing in all conditions. The main problem of The Angel was its ability to withstand wind. The structure stands on a hill, meaning it is even more susceptible to high winds. We know that when we try to balance ourselves in the wind, we must move our body to avoid falling over. As The Angel is unable to move and the wings offer a huge amount of resistance to the wind, the design of the structure had to cater towards that element precisely. The most critical part of the structure is the ankles where the forces to be resisted are large, but the cross-section is small. When wind blows on The Angel's front, it is resisted by the tension in the shins and compression in the heels. The distance between the heel and shin had to be as large as possible

to the shins and compression in the heels. The distance between the heel and shin had to be as large as possible to minimise these forces. The visible vertical 'ribs' and the 'skin' of the body also help to carry the wind forces and in particular helps to resist the twisting of the body when a gust of wind hits one wing only.



Picture © Arup - Arup developed the final design of the body and wings, refining the earlier calculations of the plate thickness and working out the whole shape would be defined for fabrication. The data for the body was scanned into a computer while the wings were defined geometrically on the drawings.

Geotechnical engineering - The sculpture stands on a site that was once a colliery pit head, reclaimed and capped with up to 15 metres of fill over the rockhead. Site investigations revealed two coal seams beneath the area, requiring stabilisation before construction could begin. As part of the foundation works, grouting was carried out to secure the old mine workings. This involved drilling 100 holes, each 33 metres deep through soil and rock, and injecting a sand–cement mixture.

For the main foundation, 750 mm diameter bored piles were selected, designed to end-bear on the underlying rock. Eight piles were drilled to a depth of 20 metres and filled with reinforced concrete. These were tied together with a substantial concrete pile cap measuring 12 metres long, 8 metres wide, and 1.5 metres thick, ensuring all piles remain in compression even under extreme wind loads.

Above this, a 4-metre-high concrete pedestal was constructed to support the sculpture. Once complete, the pedestal was buried so that the Angel appears to rise naturally from the hill. To secure the structure, 52 holding-down bolts, each 50 mm in diameter and 3 metres long, were cast into the pedestal using a precision template aligned with the sculpture's base plate.

Don't miss June 12 UK Users' Conference 2026 -

SimuTech YouTube Channel

"Tutorials to predict ice accumulations on aircraft rotorcraft and UAV's.

SimuTech Group on YouTube Videos

Part 1: Airflow Simulation for Aircraft Icing | FENSAP-ICE Tutorial

- In this first tutorial of a four-part series, we demonstrate how to compute the airflow solution required for aircraft icing simulations using Ansys FENSAP-ICE.
- The simulation uses a NACA 0012 airfoil at 4° angle of attack, solving the compressible Navier–Stokes equations to obtain the aerodynamic field needed for droplet impingement and ice accretion modeling.
- This airflow solution forms the foundation for all subsequent icing simulations.

Part 2: Droplet Impingement Simulation | FENSAP-ICE Tutorial

- In Part 2 of this tutorial series, we model droplet impingement and collection efficiency using the DROP3D module in Ansys FENSAP-ICE.
- Using the airflow solution computed in Part 1, DROP3D calculates the trajectories of supercooled water droplets and determines where droplets impact the airfoil surface.

Part 3: Ice Accretion Simulation | FENSAP-ICE Tutorial

- In Part 3 of this tutorial series, we model ice accretion on an airfoil using the ICE3D module in Ansys FENSAP-ICE.
- Using airflow and droplet results from earlier simulations, ICE3D solves the surface mass and energy balance equations that determine freezing fraction and ice growth.

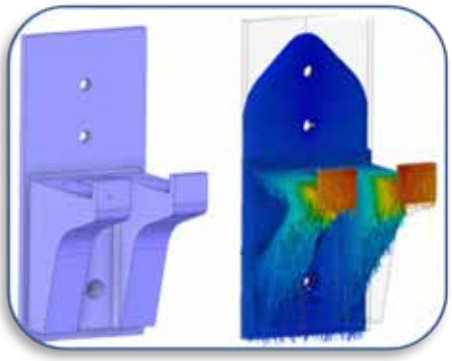
Part 4: Multi-Shot Aircraft Icing Simulation | FENSAP-ICE Tutorial

- In the final part of this tutorial series, we demonstrate multi-shot icing simulations in Ansys FENSAP-ICE.
- Unlike single-shot icing simulations, multi-shot workflows update the geometry as ice accumulates, allowing the aerodynamic solution and droplet impingement to evolve as the surface changes.

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

Mi, "Quiz time – Ke, how did you do with the barbell bracket**?"**

Ke, "Didn't do well until I called Mike at Ozen.
He knows where to find the answers."



Web – SimuTech - Using Topology Optimization to Design a Lightweight 3D-Printed Barbell Bracket in Ansys Discovery

Not every engineering project starts in a lab or on a job site. Sometimes it starts at home. In this piece, Strategic Account Engineer Zac Reed walks through how he used topology optimization to design and 3D print a lightweight barbell holder. It's a simple project, but one that highlights the power of simulation-driven design.

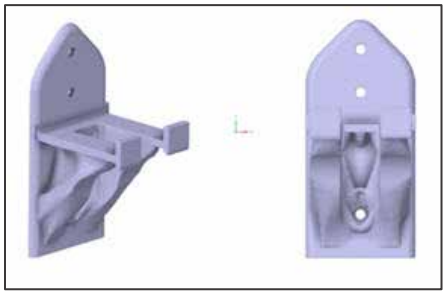
Introduction to Topology Optimization Using Ansys Discovery - Structural support brackets are commonly used to efficiently transfer loads between components and mounting interfaces. Traditionally, these brackets are manufactured from steel or other metals using bending or machining processes due to their high strength and low cost.

With additive manufacturing, engineers now have the opportunity to create complex, organic geometries that are not feasible with traditional fabrication methods. This project explores how topology optimization can be used to guide the development of a lightweight, 3D-printed polymer bracket subjected to a static cantilever load. The objective was to use simulation as a physics-based design exploration tool to inform geometry development completely within Ansys Discovery.

System Description and Engineering Challenge - The component analyzed is a wall-mounted bracket designed to support a vertically hanging barbell under static load. The bracket attaches to a wall using three vertically spaced fasteners and supports the load at a cantilevered distance from the mounting surface.

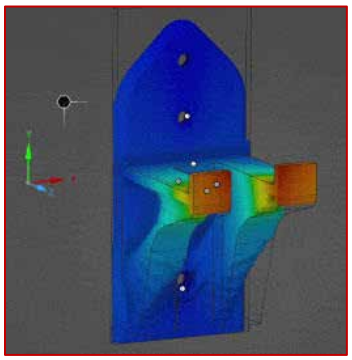
A static load was applied at the bar support interface, with additional margin to account for both normal use and the transient load of placing the bar onto the bracket. Fixed support boundary conditions were applied at the mounting interfaces to represent wall attachment. Material properties were defined using data provided by the filament supplier for the selected 3D printing material.

The target for this study was a 70% material reduction relative to the initial fully solid geometry. While a specific stiffness target could have been used to drive the optimization, this study focused on volume reduction while maintaining acceptable structural behavior.



Unlike traditional steel brackets, 3D-printed polymer components require careful consideration of stiffness and load path continuity due to lower modulus and strength. The engineering challenge was not simply determining whether a geometry would survive the applied load, but also understanding how material should be distributed within the design space to achieve structural efficiency.

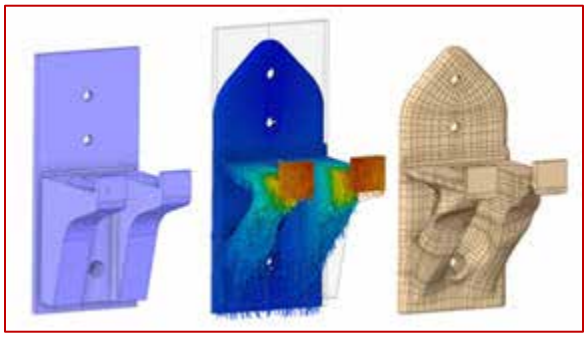
Simulation and Optimization Approach - To explore material distribution, a structural model was developed representing the available design space for optimization. Loading, boundary conditions, and material properties were applied to reflect the expected service conditions.



The analysis included:

- Linear static structural physics
- Fixed support boundary conditions at the wall interface
- A cantilever load applied at the bar support location
- Linear elastic material properties representative of the selected 3D-printed polymer

A fully solid baseline geometry was first evaluated to establish initial stiffness behavior within the defined design space. A topology optimization region was specified, identifying the portions of the geometry eligible for material removal. The optimization was then iterated to determine the most efficient material distribution while preserving structural performance.



The optimization objective was to reduce total volume while preserving structural stiffness. Using the Ansys Discovery GPU solver, optimized geometry was generated rapidly (in under 5 minutes, in this case), revealing an organic structure shaped by the underlying load paths. The resulting form resembled naturally efficient structures where material is concentrated only along the critical path.

Engineering Insight - The topology optimization results revealed that structural behavior was dominated by a small number of primary load paths connecting the load application region to the mounting interfaces.

The lower attachment region exhibited the highest stiffness, and the optimization results indicated that this region should retain significant material to maintain structural integrity. In contrast, large portions of the initial solid geometry contributed minimally to stiffness and were removed during optimization.

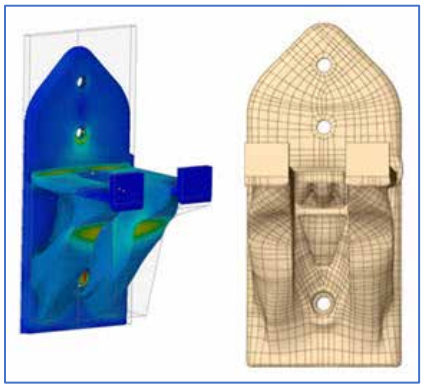
Key insights included:

- Structural performance was driven more by load path continuity than total material volume
- Efficient geometries emerged directly from physics-based optimization rather than manual reinforcement assumptions
- Significant material reduction was achievable without compromising stiffness
- Simulation provided immediate visibility into structural behavior that would otherwise require iterative prototyping

This analysis established a clear and informed design direction prior to fabrication.

While further refinement using higher-fidelity solvers (such as the MAPDL solver within Discovery or Mechanical) could have been performed, stress levels were well below material yield limits for this application and did not require additional detailed analysis at this stage.

From Optimization to Fabrication - The topology-optimized geometry was exported and refined into a smooth SubD hybrid model to prepare it for additive manufacturing. At this stage, if further design improvements were needed, features such as the Bridge tool in the SubD ribbon could be used to add lateral stiffness.



This refinement process demonstrates the flexibility of integrating simulation-driven geometry directly into manufacturing workflows. Rather than rebuilding the part from scratch in traditional CAD, the optimized structure provided a physics-informed starting point for final geometry development.

Topology Optimization In Conclusion - Topology optimization provides engineers with a powerful method for exploring structural efficiency early in the design process. By allowing physics to guide material placement, engineers can:

- Develop lighter, more efficient structural components
- Reduce unnecessary material usage
- Improve confidence in design concepts before fabrication
- Accelerate early-stage design exploration

While this example involves a relatively simple bracket, the same methodology applies to far more complex applications—including aerospace structures, industrial equipment, and additively manufactured components where performance and efficiency are critical.

Simulation in this context was used to inform and guide geometry development, not to replace risk-based validation or physical testing methods. When applied appropriately, topology optimization enables engineers to better understand structural behavior and make more informed design decisions.

Abstract, “Docking vessels are used to transport and launch landing crafts, for launching offshore platforms, and in other marine operations. This research develops a new concept for docking vessels, with the aim of optimizing landing operations... “ (Excerpts)

Web – MDPI - A New Concept for Docking Vessels Adi Tal and Nital Drimer - Faculty of Mech. Engineering. The Technion-Israel Inst. of Tech, Israel

Abstract - Our idea involves separating the functions of transit and landing into two different vessels, where the transporter is the docking vessel of the lander. This generates an effect concept, as efficient transportation craft and efficient landing craft have different properties to fulfil their functional requirements. The separation enables the design of each vessel with appropriate performance in areas such as cruising speed, range and seakeeping. These functional specifications affect the whole naval architecture of the vessels. This concept is applicable for shores with no harbor facilities, where landing may be necessary for supply or survey. The transporter provides a floating base to the landing craft, with advanced cruising performance, while the lander design has optimal features for shallow water maneuvering and for landing. The docking vessel is of a Semi-SWATH (Small Water-Plane Area Twin Hull) type. A critical aspect of the design concept is the feasibility of launching and docking operations. This research develops this new concept for docking vessels and applies hydrodynamic response analysis to the transporter’s interaction with the lander, for several operational sea states. The method used for the hydrodynamic analysis involves modeling the vessels and solving the wave–body problem for the two interacting vessels, in the frequency domain as well as in the time domain. The time domain analysis enables us to determine the motion of the vessels in real sea spectra, including the representation of the nonlinear response of fenders between the vessels. We apply the AQWA software 2021 developed by ANSYS. The results validate the suitability of this docking application up to a significant wave height of 1.5 m, which present a margin of 0.1 m above the upper limit of sea state 3: 1.4 m. This shows the feasibility of conducting launching and docking operations using this unique design; there is a significant possibility of using this technique to achieve fast and comfortable transportation to a natural shore with no terminal facilities.

Analyses Methods and Results - The hydrodynamic analysis of waves with interacting structures was conducted using ANSYS-AQWA 2021 software. The mathematical formulation of the wave–body interaction theory, for a single body as well as for several interacting bodies, in the frequency domain and in the time domain, is well established and verified to be practical and applied for design. For the hydrodynamic analyses in this study, we apply AQWA; as such, we recommend the AQWA Theory Manual [28] as a comprehensive reference for a complete formulation of the theory as well as the numerical formulation. The objective of our hydrodynamic analysis is to validate the applicability of launching or docking, as well as assessing the limit sea state. This critical design aspect is analyzed in the frequency domain (Section 3.1) and in the time domain (Section 3.2). Two wave directions (0° and 90°) and three wave heights (0.5 m, 1.0 m, 1.5 m) are analyzed to assess the applicability of the launching or docking operations under varying sea conditions. …

LS-DYNA is what keeps you constantly learning and becoming the best version of yourself.

Every LS-DYNA material card implements named physics — a yield criterion, a hardening law, a damage model, or an equation of state. Browse by what the material does, not by keyword number

Web – Material Map

Constitutive Laws

Last month, I released an additional section titled “Solid Mechanics Laws," which describes most of the analytical laws of mechanics in LS-DYNA material models.

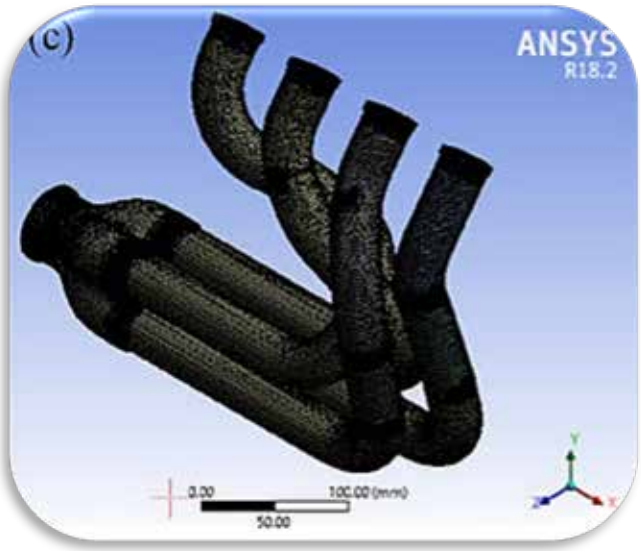
Then we had a long weekend here in Germany, and I decided I could make it even better. Now each law is accompanied by an interactive 2D/3D visualization with annotations explaining the physical meaning of the parameters used. It’s a shame this wasn’t available when I was studying at university.

In addition, I redesigned the search UI in the materials database, so now you can also search by “Solid mechanics laws.”

The complete list is on the website:

"**For the simulations, the ANSYS FLUENT 12 was employed**.

For the investigation of the exhaust gases' characteristics, the governing equations of the k-ε model were employed."



Picture © (c) Simulation meshing

Web – MDPI - 3D Modeling, Analysis, and Construction of an Exhaust System in a Formula Student Car

A. Lontos, A. Gregoriou

Department of Mechanical Engineering, Frederick University, Nicosia 1036, Cyprus

Abstract - This paper presents a new stainless-steel exhaust manifold system designed for a Formula Student racing car. The exhaust system meets The exhaust system meets the Formula Student regulations and is designed to be mounted on on a 600 cc engine. Special consideration was given to the aspect of fitment. Due to the fact that the engine will fit on a steel tube chassis. The design of the exhaust system considers the importance of equal-length runners and the individual primary exhaust pipes of the header, which are ideal for increased engine performance. For the simulations, the ANSYS FLUENT 12 was employed. For the investigation of the exhaust gases' characteristics, the governing equations of the k-ε model were employed.

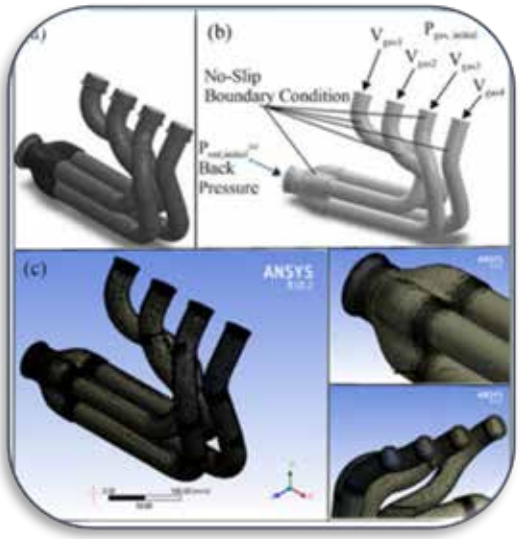


Figure 1. Exhaust manifold: volume of combustion gases that occupies the exhaust manifold. (a) Manifold design. (b) Boundary conditions. (c) Simulation meshing.

3. Simulation of the Exhaust System - Figure 1 shows the solution domain with the boundary conditions. More specifically, that figure shows the exhaust system and the 3D volume of exhaust gases, with the boundary and initial conditions within the exhaust (the solution domain simulated). In addition, the discretized solution domain, including cut-cell elements at the outlet of the manifold, the entrance of exhaust gases into the manifold, and the entire 3D volume simulated, is presented.

The simulations were conducted in ANSYS Fluent using the k-ε model. ANSYS Fluent uses two-equation models to evaluate the behavior of turbulent bounded flows. It basically makes the turbulent velocity and the lengths to be evaluated independently available through two transport equations [7]. The solution domain consists of 106,000 elements. The density of the mesh is noticeable.

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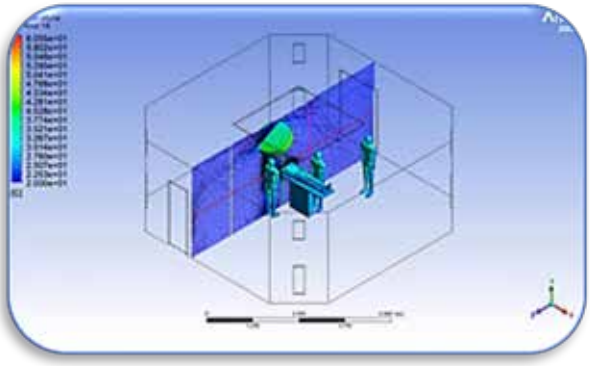
"We have always supported research like the PhD thesis by Giovanna Gargiulo:

The work combines CFD, Reduced Order Models, and morphing techniques to build a digital twin of an operating theatre, enabling real-time evaluation of airflow, temperature, and contamination."



Web – RBF Morph - From simulation to the operating room: when digital twins become clinical allies

"Advanced Simulation of an Operating Room: From the Virtual Model to the Digital Twin"

Presentation or Thesis is available to download

Simulation is no longer just a design tool – it's becoming operational - In modern operating rooms, performance depends not only on surgical skill, but also on air quality, ventilation, and human interaction — all areas where simulation can now provide real-time insight.

With tools like RBF Morph, geometries can be quickly adapted, enabling fast, high-fidelity analysis and predictive models. We're moving toward living simulations that actively support safer and more efficient healthcare environments.

The research goal is the build of an operating theater Digital Twin (DT).

Definitions of DT are: Mega model, device shadow, mirrored system, avatar, or synchronized virtual prototype

- Digital Twin: where and why
- Digital Twin & CFD and workflow
- Mathematical models
- The ventilation systems in operating theatre: requirements and configurations
- Software & tools
- Case study: the S. Gerardo operating theatre
  - The geometrical model
  - The CFD Setup
  - Operating theatre model with cylindrical dummy
  - Operating theatre model with human dummy
  - Operating theatre model with human dummy & CO_2
  - ROM setup
  - Design of Experiment
  - ROM vs ROM
  - CFD vs ROM
  - Twin Builder – Digital Twin
  - Subscale model
- Beyond S. Gerardo's simplified model
  - Complete model: lamp positions and size effects
  - Complete model: different ventilation systems
- Conclusions

The main areas of interest for a DT:

- Meteorology
- Manufacturing and process technology
- Education
- Cities, transportation, and energy sector
- Health

In Air Quality control a DT can be an essential help in:

- operating room
- offices
- waiting rooms
- common areas

by providing technology for air quality control, energy saving in buildings, regulation and management of people flow, maintenance, detection, and management of plant failures.

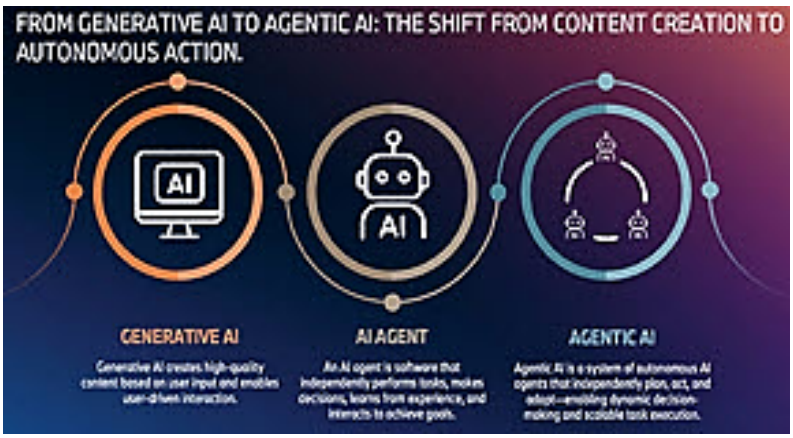
No one knows his name. You yell, "HEY, old racer."

When technologies deliver tangible benefits, progress is the result. At the BMW Group, agentic systems are taking artificial intelligence (AI) to the next level: by automating processes and establishing new routines, they free employees to focus on higher-value activities. This is especially evident in areas that have traditionally required detailed coordination, extensive validation and significant manual effort.

Web – BMW - How agentic AI is making life easier at the BMW Group.

Two examples – from our customer fleet business and specialised-tool inventories – demonstrate just how powerful agentic AI can be.

When AI creates space for new ideas. AI has long been more than just a digital tool running in the background: it writes texts, organises information and answers questions. What's more, a particularly advanced form is currently on the rise: agentic AI.



The principle is simple: agentic AI not only helps generate content but also initiates workflows, collates information and manages repetitive tasks within complex processes. This makes it even more powerful than the generative AI we have come to know from our everyday interactions with chatbots. This is precisely where its value lies: agentic AI supports teams, accelerates processes, and frees employees to focus on strategic thinking, creative solutions and considered decision-making.

Two examples from the BMW Group illustrate this clearly: one in the offer process at Alphabet, the other in fully automated specialised-tool inventory management within Purchasing.

From email to automated workflow. - When it comes to ordering large numbers of vehicles for company fleets, enquiries are rarely 'standard'. They are handled by our European fleet business, which BMW Group Financial Services has consolidated under the Alphabet name. The teams here support corporate customers with fleets of more than 50 vehicles.

As the number of enquiries increases, so too does their complexity. Emails from fleet managers are often unstructured, requesting customised, multi-brand vehicle solutions as well as details on mileage models or contracts. Until recently, processing these enquiries required significant manual effort: each one was reviewed individually, and relevant information was drawn together from multiple systems.

Thanks to agentic AI, this is now changing. A dedicated agent developed in-house now supports the process, largely through automation. Within the new workflow, the system autonomously transfers data

to internal applications and directly initiates the necessary steps. This replaces around 90 percent of previously manual tasks – significantly streamlining workflows and freeing capacity for direct customer engagement and support.

Prepared by AI, decided by people. Despite the high degree of automation, control over content remains firmly with Alphabet's team members. They review the AI's proposals, refine them as needed and intervene where necessary. So, while the technology handles the preparation, decision-making remains firmly with humans.

250,000 special tools, one much leaner process. Another example, this time from Purchasing and Supplier Network, further illustrates the potential of agentic AI: the BMW Group manages approximately 250,000 specialised tools worldwide, ranging from casting moulds and models to templates. These tools are used in areas where precision is critical – in component production and the maintenance of large machines at suppliers' facilities.

Until recently, inventorying them was time-consuming, labour-intensive and complex. Today, however, an agentic system supports Purchasing teams by automatically drafting inventory orders, sending them to suppliers, reviewing responses and approving unproblematic cases. Crucially, this new approach eliminates many of the repetitive aspects of the process, requiring human intervention only where specialist understanding and expertise are needed.

The new system is built on Purchasing and Supplier Network's primary AI application, the multi-agent system Alconic. This interconnects various data sources, creates tasks, verifies output and provides transparency across all process steps. It makes inventorying considerably leaner, more transparent and more efficient – as well as less labour-intensive.

Technology with clear benefits.

In its use of AI, the BMW Group focuses on processes that are already effective in daily business – because that's where agentic AI can fully realise its strengths.

It not only automates complex workflows to a large extent but also supports employees and improves the quality of outcomes.

Excerpt - Web - Ford - [The Mustang Dark Horse SC: A New Standard for Race-Bred Engineering] - Arie Groeneveld

In my 30 years at Ford, I've worked on everything from powertrains to plant management, but I had never had the privilege of working on a Mustang.

When I was asked to serve as chief program engineer for a new high-performance Mustang from Ford Racing, I knew the assignment was a rare honor. There is an emotive power in a Mustang that you don't find anywhere else in the industry, and for the Ford Racing team, the track isn't just a testing location, it's a second home.

The Mustang Dark Horse SC was developed by engineers who live their lives at racing circuits, and that track-first mentality is woven into every bolt and calibration of this car.

To engineer the most advanced, powerful, and track-capable* Mustang Dark Horse in the stable, we didn't work in a vacuum. We took the Dark Horse SC to Sebring and Virginia International Raceway to test alongside the Mustang GTD supercar and the Mustang GT3 race car. This collaboration bore immediate fruit.

By working with the GTD team, we were able to adopt Brembo carbon-ceramic brakes and Michelin Pilot Sport Cup2 R tires for the Mustang Dark Horse SC Track Pack. The aerodynamic changes on Mustang Dark Horse SC — like its new hood and the carbon-fiber venting, as well as the revised fascia and underbody venting — all benefited from the raw data we shared at the track.

But this partnership was a two-way street. During development, our team engineered a specific ducktail-shaped decklid for the Mustang Dark Horse SC Track Pack that improved the rear wing's efficiency by 10 percent without requiring a larger wing or higher angle of attack, both of which could impact rear visibility.

The impact was so impressive that the Mustang GTD team actually adopted a similar design for the supercar.

While the supercharged 5.2-liter V8 and seven-speed dual-clutch transmission provide the heart-pounding soundtrack, the real story of the Mustang Dark Horse SC is the relentless pursuit of physics.

By utilizing carbon fiber wheels and those Brembo carbon-ceramic brakes, we reduce about 120 pounds of unsprung weight versus the base Mustang Dark Horse SC. The vehicle also has a Ford Racing suspension and numerous other upgrades to make this the most track capable* Mustang Dark Horse ever.

On the Mustang Dark Horse SC Special Edition, we even brought over 3D-printed titanium accents from the GTD program, because at this level of performance, every gram matters.

This is a story about a total integration of hardware and software, including next-generation MagneRide dampers with revised spring rates and knuckles.

The aerodynamic profile was another area where we refused to compromise. The new aluminum hood features a massive vent that improves powertrain cooling and helps manage front-end dynamics. When the hood vent tray is removed, it creates 2.5 times the downforce of the standard Mustang Dark Horse hood vent, while the Mustang Dark Horse SC with Track Pack's carbon-fiber wing helps generate a staggering 620 pounds of rear downforce at 180 mph.

To ensure the driver can actually harness this capability, we integrated a Variable Traction Control system with five distinct levels, in addition to fully deactivated ESC, to dial in the desired amount of traction assistance.

We also adopted the GTD's leather-wrapped, flat-bottom steering wheel featuring a 12 o'clock stripe with integrated performance controls, surrounded by Alcantara and carbon-fiber accents. Optional Recaro leather and Dinamica sport seats are included in the Track Pack, which offers Space Gray or Teal accents and replaces the rear seats with a storage shelf.

The result is a vehicle that sits in the top tier of the Mustang stable — between the Mustang Dark Horse Performance Package and the Mustang GTD.

It is a high-powered Mustang that I don't think the world saw coming, but it is exactly what happens when you let racing engineers design a road car.

Arie Groeneveld is Mustang Dark Horse SC chief program engineer.

US Airforce Picture of the Month

KARMA formation - U.S. Air Force F-15E Strike Eagles assigned to the 494th Fighter Squadron fly in formation over the United Kingdom, May 7, 2026. Members of the 48th Equipment Maintenance Squadron painted the aircraft in a camouflage pattern to honor the legacy of Operation El Dorado Canyon and pay tribute to Capt. Fernando Ribas-Dominicci and Paul Lorence, who were lost during the mission in 1986. Their call sign, “KARMA 52”, was painted on the aircraft in tribute.
(U.S. Air Force photo by Maj. Dorian Javidi)

A glimpse into the future - Defense Advanced Research Project Agency’s XRQ-73 hybrid-electric experimental aircraft takes off at Edwards Air Force Base, Calif., April 30, 2026, as part of DARPA’s Series Hybrid Electric Propulsion Aircraft Demonstration program. The flight marked a step forward in demonstrating the military utility of hybrid-electric propulsion. (Courtesy photo by Airman 1st Class Raymond LaChance)

Capture the flag - An F-35A Lightning II assigned to the 422nd Test and Evaluation Squadron at Nellis Air Force Base, Nev., takes off during exercise Checkered Flag 26-2 at Tyndall Air Force Base, Fla., May 4, 2026. Checkered Flag immerses aircrew in high-intensity scenarios designed to test mission execution while integrating multiple generations of aircraft

(U.S. Air Force photo by Senior Airman Zeeshan Naeem)

2.4. **Finite Element Model Setup - The thermo-mechanical stress analysis of the torque tube was performed using the finite element method implemented in the ANSYS Workbench simulation environment**.

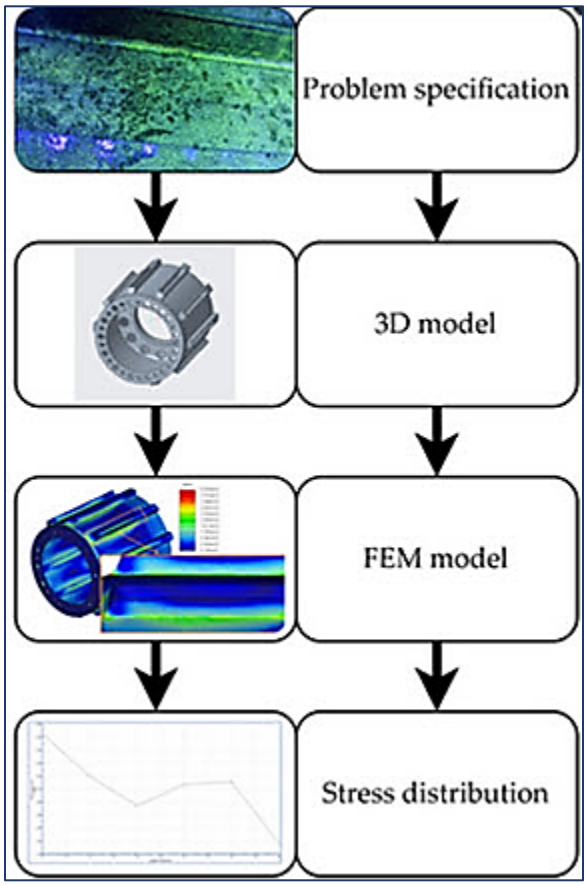


Figure 2. Methodology flowchart for the finite element (FEM) investigation of an Airbus A300 brake torque tube.

Web – MDPI - Stress Analysis of an Aircraft Torque Tube Component

M. Hovanec, S. Al-Rabeei, H. Pacaiova, I. Kolarikova, P. Kassav, R. Catlos, J. Kessler

Dept. Aviation Engineering, Faculty of Aeronautics, Technical Univ. Kosice, Slovakia

Abstract - Aircraft brake torque tubes are safety-critical components subject to combined torsional and thermal loading. As such, in aging aircraft, fatigue cracks frequently occur at the side walls of the grooves near the fillet transitions. This study presents a detailed analysis of the stress–strain state of the torque tube support section using a thermo-mechanically coupled finite element model (FEM) developed in ANSYS 2023 R2 Workbench. The model parameters are based on operational and design data provided by Röder Component Service Center Ltd. Unlike previous studies using idealized models, this approach integrates real-world non-destructive testing (NDT) evidence to identify critical areas with high stress concentrations. The model evaluates stress distributions under normal and emergency braking. Results show that the baseline 1 mm groove fillet exhibits pronounced stress peaks, correlating with observed crack initiation sites. Increasing the fillet radius to 3 mm reduces peak equivalent stress and improves the safety-factor distribution, significantly lowering crack-initiation propensity. These findings demonstrate that even minor local geometric refinements can enhance the structural robustness of torque-transmitting components. This FE–inspection integration framework offers a transferable method for reliability assessment and design improvement in aging aircraft fleets.

Introduction - The wheel brake system of a transport aircraft is one of the primary safety-critical subsystems during landing, taxiing, and aborted takeoff, as it must dissipate a large amount of kinetic energy in the form of heat in a short time while simultaneously transmitting high mechanical loads through complex multi-disc brake assemblies and hydraulic components. Spline–groove interfaces in these assemblies are notoriously susceptible to fatigue due to high stress concentration factors, which requires precise numerical modeling of the local geometry [1,2,3].

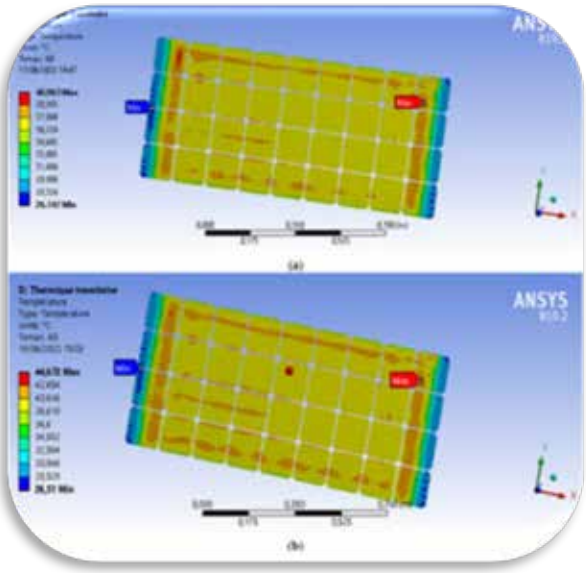
YouTube – [BAYKAR - Baykar Technologies]

Gururla ve Onurla! | With Pride and Honor!

The Bayraktar TB3 is a medium-altitude long-endurance (MALE) unmanned combat aerial vehicle (UCAV) for maritime deployment, it is uniquely designed to autonomously take off and land on short-runway amphibious assault ships and aircraft carriers

AI-based autonomous flight

"PVT Solutions - The proposed system involves circulating water through the PVT system before delivering it to the crops...Based on ANSYS Fluent simulations, we analysed the temperature distribution of a specific PV module without a cooling-equipped network, considering two solar irradiance values: 800 W/m2 and 1000 W/m2"



Web – MDPI - Enhancing Agricultural Sustainability Through Intelligent Irrigation Using PVT Energy Applications: Implementing Hybrid Machine and Deep Learning Models

Y.E Mghouchi, M.T. Udristiouiu

- Dept. of Energetics,, Moulay Ismail Univ. Morocco
- Dept of Physics, Faculty of Sciences, Univ. of Craiova, Romania

Figure 3. PV module temperature distribution without cooling systems under solar irradiance of 800 W/m2 (a) and 1000 W/m2 (b).

Abstract

This research focuses on developing an intelligent irrigation solution for agricultural systems utilising solar photovoltaic-thermal (PVT) energy applications. This solution integrates PVT applications, prediction, modelling and forecasting as well as plants' physiological characteristics. The primary objective is to enhance water management and irrigation efficiency through innovative digital techniques tailored to different climate zones. **In the initial phase, the performance of PVT solutions was evaluated using ANSYS Fluent software R19.2, revealing that scaled PVT systems offer optimal efficiency for PV systems, thereby optimising electrical production.**

Subsequently, a comprehensive approach combining integral feature selection (IFS) with machine learning (ML) and deep learning (DL) models was applied for reference evapotranspiration (ETo) prediction and water needs forecasting. Through this process, 301 optimal combinations of predictors and best-performing linear models for ETo prediction were identified. Achieving R2 values exceeding 0.97, alongside minimal indicators of dispersion, the results indicate the effectiveness and accuracy of the elaborated models in predicting the ETo. In addition, by employing a hybrid deep learning approach, 28 best models were developed for forecasting the next periods of ETo. Finally, an interface application was developed to house the identified models for predicting and forecasting the optimal water quantity required for specific plant or crop irrigation. This application serves as a user-friendly platform where users can input relevant predictors and obtain accurate predictions and forecasts based on the established models.

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

Below are some of our videos on our Town YouTube Channel to make you smile.

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