Automotive

Automotive

Aerospace

Bart – ADA India

Marco – Research Hospital

Curt - Autodesk

Metin - OZEN
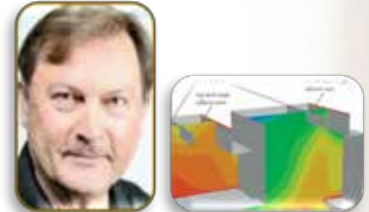
Madhukar - CADFEM

Marta – OASYS

Abigail - DYNAmore

Welcome To Our DYNAmore Nordic Seminars

Jeff - Siemens

Ryan – USV Defiant

LS-DYNA DDAM

Adam - MIT

CARLA - Events

AERO-WATT

Jenson - DFETECH

Sports Stadium-Golf

JOH Sports

Town Comic Blog Chronicles
   Rheken: AI Investigative Reporter
   Dinky: CERT - Critters
   Chat: Town Help Desk

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Editors: Anthony, Art, Marnie, Marsha, Sabyl

Town Pretend to be Editors:

The Old Rancher	**No one in town knows his name. You yell "Hey, Old Rancher."**
The Old Pilot	**No one in town knows his name. You yell "Hey, Old Pilot."**
The Old Racer	**No one in town knows his name. You yell "Hey, Old Racer."**
Racer's Daughter	**The whole town knows her name. You yell "HEY, Slow down!"**

They are all family - strange family

Names, & characters of AI visitors and AI editors are the products of imagination. Any resemblance to actual persons, living or dead, or actual events is purely coincidental.
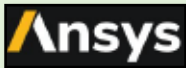
We will never forget

R & D - Camping - Town Map

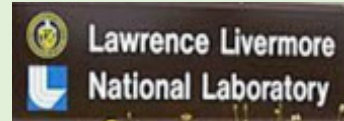**Horse Trail** ⟶ **Yield right of way to horses**

R&D Technology Business Park

RV CAMPING Park in any vacant camping site

Town Hall & Library

CADFEM

DFETECH

d3VIEW

OZEN

ENGINSOFT

AUTODESK

Oasys

DYNA MORE

Ansys

Arplus DatapointLabs

Lawrence Livermore National Laboratory

Research Hospital

rbf

MEDITATE

LivGEMINI

The Old Rancher

FEANTM Coffee Shop

Race Track

Airport

JOH Sports Stadium

LS-DYNA Sports

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

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

February - Town Hall Meeting is on Page 6

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

FEANTM Town Hall Meeting
"The town that almost exists"

Park cars behind the building
Park tractors behind the cars

Tie horse to the hitching rails

Bakery Cafe
Gossip, cookies. chocolate
Pets welcome.
Horses, pet goats stay outside
Technical solutions & information
Caring about animals and children

Marsha, our town Supervisor, will be taking a leave of absence for a few months. We send her our support and warm wishes. I will be hosting the town meeting and magazine on her behalf, during this time.

Meanwhile, we're excited to welcome two new editors who have joined us: Brant, who will specialize in dentistry, and Ryan, who will specialize in marine architecture. With your feedback and encouragement, they may continue contributing to our community.

As Valentine's Day approaches, don't forget to show a little love—whether it's a thoughtful gift, a heartfelt card, a warm kiss, or even a simple cup of coffee shared with someone special. And don't forget your beloved pets.

Thank you for being here at the town meeting and for supporting the articles our editors have brought together.

With gratitude, Marnie Azadian, Ph.D., Editor – San Antonio, TX, USA

Marnie: Capgemini - Mobilize wanted to refine the design of its electric quadricycle Duo and its utility version Bento to ensure that they would be sustainable, affordable, and suited to the needs of urban drivers...

Madhukar: CADFEM - Phoenix Contact - Digital twin creates failure prognosis - Prediction 100000000 XXXXX of remaining operating time of a safety critical relay with real load data and digital twin...

Sabyl: Konkuk Univ. - Ansys - A computer simulation using the finite element method was performed. In particular, we constructed a three-dimensional finite element model of nitinol stents with three designs…

Marco - We are combining Ansys RBF Morph to get both geometrical and physical parameters in the ROM. It's not crash but we adopted LS-DYNA. …2.2 Parametric FEA: The simulations were performed with the commercial FE software LS-DYNA (Ansys, USA)…

DYNAmore Nordic: I'm gearing up for seminars to take and will visit DYNAmore Nordic in Sweden. Of course I'll bring back Chocolate

Here are a few of DYNAMore Nordic seminars

Welcome To Our
DYNAmore Nordic Seminars

Web - DYNAMore Nordic seminars

Selected trainings may be joined either On site or Online. In the "Comment" field in your course registration you can specify if you prefer to take part on site or online.

March 04   Parameter Identification with LS-OPT   David Aspenberg

The use of new materials, such as plastics, composites, foams, fabrics or high-tensile steels, demands the application of highly complex material models. These material formulations are generally associated with numerous material parameters. The optimization program LS-OPT is ideally suited for identifying these parameters. In the identification process, an automatic comparison is carried out between the experimental results and the simulation results of LS-DYNA. Thereafter, the error between experiments and simulations is minimized.

March 05   LS-OPT - Optimization & Robustness   David Aspenberg

This seminar gives an introduction to the optimization software LS-OPT, which is available to all LS-DYNA users for free. Both optimization theory and applications are covered. A significant time of the seminar is spent on hands on training with the software and how to use it together with LS-DYNA. LS-OPT is designed to be used with essentially any analysis software.

March 11   Introduction to LS-DYNA   Anders Bernhardsson

The introductory seminar gives a quick, comprehensive introduction to the applications of LS-DYNA and is recommended for simulation engineers who want to use LS-DYNA as an FE code to simulate general nonlinear problems. Prior knowledge is not required

March 25   LS-DYNA, Simulation of sheet metal forming processes   Mikael Schill

This 3-day course is intended for people who want to use LS-DYNA for metal forming simulations. The course will cover how different aspects of metal forming processes are modeled in LS-DYNA and how to do this as accurate and efficiently as possible. The attendee will acquire deep knowledge in settings and techniques in several parts of LS-DYNA which will be beneficial for his/hers daily work and future applications

April 08   Contacts in LS-DYNA (2 days)   Jimmy Forsberg

LS-DYNA is a leading finite element (FE) program in large deformation mechanics, vehicle collision and crashworthiness design. To solve e.g. a vehicle collision, the problem requires the use of robust and accurate treatment of the interaction between different parts and assemblies. Contacts have, and will continue to be, one of the most difficult topics in many types of simulations. Therefore it is necessary to acquire knowledge of how the contacts in LS-DYNA behave

Article Excerpt, "**MIT Electric Vehicle Team (EVT)** is a student-led team at MIT dedicated to the design and development of hydrogen-powered vehicles. We have a passion for open-source, accessible research, meaningful community engagement, and speed with an understanding that this does not have to clash with our goals to be a carbon negative society."

Web - MIT Electric Vehicle Team builds a unique hydrogen fuel cell–powered electric motorcycle.

The future of motorcycles could be hydrogen

(Aditya Mehrotra performs a "shakedown" test — running the hydrogen-powered electric motorcycle at high speeds to ensure that the mechanical and electrical systems hold up. Credits: Photo: Adam Glanzman)

MIT's Electric Vehicle Team, which has a long record of building and racing innovative electric vehicles, including cars and motorcycles, in international professional-level competitions, is trying something very different this year: The team is building a hydrogen-powered electric motorcycle, using a fuel cell system, as a testbed for new hydrogen-based transportation.

The motorcycle successfully underwent its first full test-track demonstration in October. It is designed as an open-source platform that should make it possible to swap out and test a variety of different components, and for others to try their own versions based on plans the team is making freely available online.

Aditya Mehrotra, who is spearheading the project, is a graduate student working with mechanical engineering professor Alex Slocum, the Walter M. May and A. Hazel May Chair in Emerging Technologies. Mehrotra was studying energy systems and happened to also really like motorcycles, he says, "so we came up with the idea of a hydrogen-powered bike. We did an evaluation study, and we thought that this could actually work. We [decided to] try to build it."

Team members say that while battery-powered cars are a boon for the environment, they still face limitations in range and have issues associated with the mining of lithium and resulting emissions. So, the team was interested in exploring hydrogen-powered vehicles as a clean alternative, allowing for vehicles that could be quickly refilled just like gasoline-powered vehicles.

Unlike past projects by the team, which has been part of MIT since 2005, this vehicle will not be entering races or competitions but will be presented at a variety of conferences. The team, consisting of about a dozen students, has been working on building the prototype since January 2023. In October they presented the bike at the Hydrogen Americas Summit, and in May they will travel to the Netherlands to present it at the World Hydrogen Summit. In addition to the two hydrogen summits, the team plans to show its bike at the Consumer Electronics Show in Las Vegas this month.

"We're hoping to use this project as a chance to start conversations around 'small hydrogen' systems that could increase demand, which could lead to the development of more infrastructure," Mehrotra says. "We hope the project can help find new and creative applications for hydrogen." In addition to these demonstrations and the online information the team will provide, he adds, they are also working toward publishing papers in academic journals describing their project and lessons learned from it, in hopes of making "an impact on the energy industry."

Kylie	"I'm going to be a jet fighter pilot. Did you ever fly?"
Bart R.	"Not as a pilot. Did you ever fly?"
Kylie	"I fly my toy jets. They go fast and hard to stop!"
Bart R.	"I have a video to show you. We can put a parachute on the back of your toy jet."
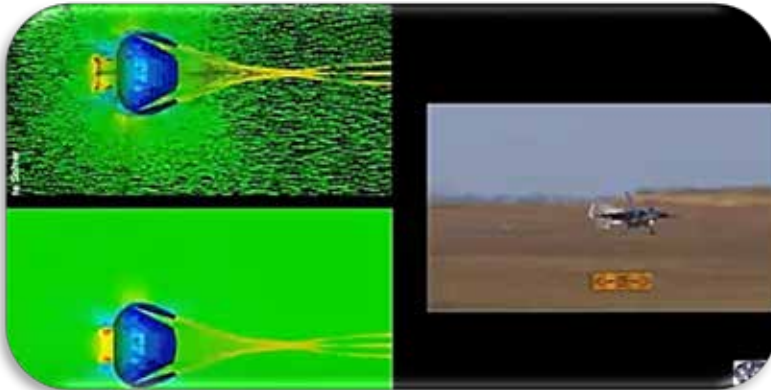
Web – YouTube - CFD LS-DYNA: Simulation of a Porous Drogue Parachute of a Jet Fighter.

Project: Aeronautical Development Agency (ADA) of India.

Geometry and Structure: Jithesh Erancheri (Kaizenat Technologies Pvt Ltd)

Coupled model and ICFD/FSI dev.: ICFD Team   (contact: rpaz, ANSYS).

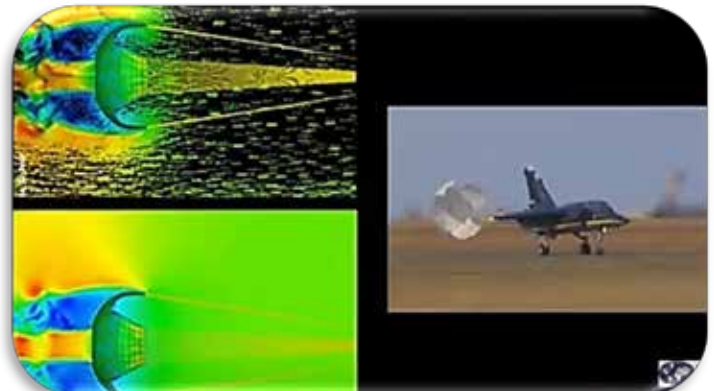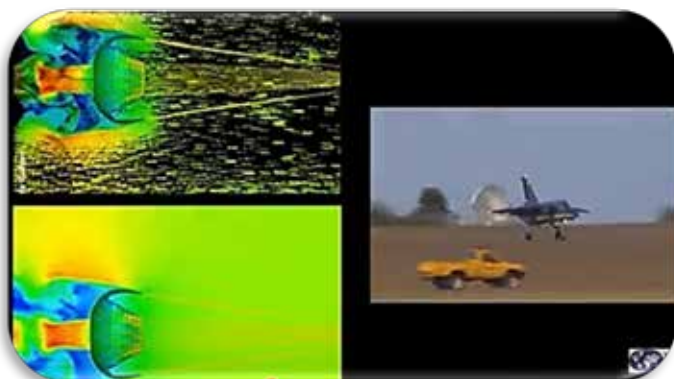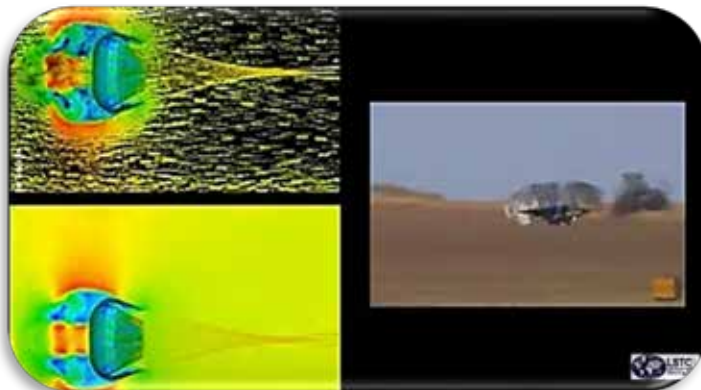> **Article quote,** "The entire prosthesis model, including all components, was imported into FEA software (Ansys 19.2; ANSYS Inc., Canonsburg, PA, USA) for analysis. For meshing, a 10-node tetrahedral element was selected."

Web – BMC Oral Health – [Finite element analysis on implant-supported bar with different geometric shapes](#)

P.Kupprano, K. Kamonkhantikul, W. Homsiang, H. Takahashi, M. Arksornukit - Chulalongkorn Univ. Thailand - Chiang Mai Univ. Thailand - Inst. Science, Japan

Background - **Fixed detachable prostheses, also known as hybrid dentures or fixed complete dentures, offer an effective solution for rehabilitating edentulous patients.** This treatment modality involves placing multiple implants to support a hybrid denture, leading to enhanced function, aesthetics, and overall improved quality of life for edentulous patients [1, 2]. The success rate of hybrid dentures was impressively high, with a 99.2% implant survival rate and a 92.1% prosthesis survival rate over five years [3]. However, prosthesis complications were more frequently observed than biological complications [4]. Various factors contribute to the success and durability of hybrid dentures, such as the quantity and distribution of dental implants, surgical techniques, and the selection of prosthesis design and material [5, 6]. In hybrid dentures, the implant-supported bar connector (ISBC) is the primary structure that connects all prosthesis components to the implants, ensuring stability and support by evenly distributing forces through the abutments. To perform this role effectively, the ISBC should be rigid and passively fit to distribute masticatory forces [7]. Titanium alloy, cobalt-chromium, zirconia, and polyetheretherketone were commonly used for fabricating ISBCs [1, 7,8,9,10]. It was demonstrated that titanium, gold and silver-palladium ISBC exhibited similar low von Mises stress (vMS) [11]. Among the available designs, a metal-supported bar with wraparound acrylic resin was widely used [12, 13]. Various cross-sectional designs for ISBCs were also available, selection often influenced by brand and the familiarity of the dentist or technician with specific designs.

Finite element analysis (FEA) is a non-destructive numerical method used extensively to simulate and study the mechanical behavior of systems under different conditions. This computational method, which divides structures into finite elements, has been applied in engineering and dentistry to evaluate material performance and effectiveness of design [14, 15]. Most FEA studies on rehabilitating edentulous patients with dental implants have been focused on implant fixture configuration and angulation [16,17,18,19]. While some studies examined the biomechanical behavior of full-arch implant-supported restorations, with emphasis on the implant-bone interface [17, 20,21,22] and implant-abutment connection [23, 24] rather than the prosthesis's part through FEA. Study of stress distribution and pattern on the prosthetic components, particularly the different geometric shape of ISBC, is lacking. Therefore, this piece of information will complete the spectrum of hybrid denture. ISBCs in hybrid dentures are like structural beams in engineering, as both serve as load-bearing elements. Sufficient strength and rigidity in maintaining structural integrity under bending are required to effectively support and distribute loads. Different cross-sectional designs provide varying levels of flexural strength and resistance to deformation [8, 10]. For instance, I-beams are commonly used in buildings and bridges as horizontal structural elements, while rectangular beams or square beams are often found in residential construction. L-beams serve as braces and support, while Y-beams, a modified form of triangular beam, are widely used in bridges and towers due to their efficient load-carrying capacity with reduced weight [25, 26].

A key concept in beam mechanics is the "area moment of inertia" also known as the "second moment of inertia". This quantity represents the sum of squared distances of differential area elements from the neutral axis of a beam's cross-section, indicating how material is distributed relative to this axis. This distribution directly affects a beam's resistance to bending and overall structural integrity. The neutral axis, where no compressive or tensile stress occurs under bending, is crucial for strengthening beams. Increasing the area moment of inertia by distributing material farther from the neutral axis enhances the ISBC's strength [25, 26].

However, the forces transmitted on dental prostheses differ from those in structural engineering, and the knowledge of optimal ISBC designs for hybrid dentures is still missing. Currently, there is no consensus on the optimal design for ISBCs in hybrid dentures. Therefore, this study aimed to examine the maximum vMS, stress distribution, and displacement across four different geometric cross-sectional configurations of ISBC in mandibular arch, as well as the maximum principal stress (σ_{max}) in the acrylic wraparound part of each, through FEA under two loading conditions: centric and eccentric. The null hypothesis was that four configurations of titanium mandibular ISBC, with equal cross-sectional areas, were not different in terms of stress, stress distribution, and displacement.

Methods

FEA models mimicking mandibular superstructure consisted of four multi-unit abutments (Astra Tech Multibase Abutment EV; Dentsply Dental GmbH, Bensheim, Germany), four bridge screws (Astra Tech Multibase EV Bridge Screw; Dentsply Dental GmbH, Bensheim, Germany), and the implant-supported bar connector (ISBC). The anterior screw channels were positioned between the lateral incisor and canine, while the posterior screw channels were located between the second premolar and first molar. Four different cross-sectional geometrics for the mandibular ISBC were created—L-type (L), Y-type (Y), I-type (I), and Square-type (S)—all models were set to have a perfect interface with the abutments and bridge screws. Four ISBC designs shared equal volume with cross-sectional area of 9 mm². All models had an anterior-posterior (A-P) spread of 18.5 mm and a cantilever length (CL) of 18.5 mm, achieving an optimal CL/AP ratio of 1 [27]. The vMS criterion was used to analyze across the four different ISBC configuration designs, while the σ_{max} was used to explore the acrylic components [28]. A comprehensive analysis of both ISBC and acrylic components was conducted by combining qualitative observations, quantitative calculations and transformed into color coded for visualization.

Hybrid denture modelling

The superstructure models, consisting of multi-unit abutments, bridge screws, with four different cross-sectional geometric of mandibular ISBC were created using Computer-Aided Design (CAD) software (SolidWorks©; Dassault Systèmes SolidWorks© Corp., Concord, MA, USA). All models were scaled based on actual components. All the parts were positioned following the "All-on-4" concept [29]. The arch dimensions, determined by averaging measurements from edentulous mandibular arch subjects, were 46 mm in width and 50 mm in length [30]. The wraparound component, which included the acrylic denture teeth and gingival part, was constructed to warparound the entire ISBC (Fig. 1).

Conclusion - Within the limitations of this study, it was suggested that among four different geometric cross-sections of titanium alloy ISBCs with equivalent volume on four implant supported hybrid denture for mandibular arch, the Y model demonstrated the lowest stress level and the least bending.

LLNL – Brendan Reagan and LLNL plasma physicist Jackson Williams are the project's co-lead principal investigators. The project includes scientists from SLAC National Accelerator Laboratory; ASML San Diego; & the Advanced Research Center for Nanolithography (ARCNL), a public-private research center based in the Netherlands.

Web - LLNL selected to lead next-gen extreme ultraviolet lithography research (Benny Evangelista) - Decades of cutting-edge laser, optics & plasma physics research at Lawrence Livermore National Laboratory (LLNL) played a key role in the underlying science that the semiconductor industry uses to manufacture advanced microprocessors. These computer chips drive today's astounding innovations in artificial intelligence, high-performance supercomputers and smart phones. Now a new research partnership led by LLNL aims to lay the groundwork for the next evolution of extreme ultraviolet (EUV) lithography, centered around a Lab-developed driver system dubbed the Big Aperture Thulium (BAT) laser. The team will participate in the

Extreme Lithography & Materials Innovation Center (ELMIC), one of the centers selected for the Department of Energy (DOE) Office of Science's Microelectronics Science Research Centers (MSRCs).

ELMIC aims to advance the basic science driving the integration of new materials and processes into future microelectronic systems. The LLNL-led project within this center is a four-year investigation specifically aimed at expanding the fundamental science around EUV generation and plasma-based particle sources.

The LLNL-led project will test the BAT laser's ability to increase EUV source efficiency by about 10 times when compared with carbon dioxide (CO_2) lasers, the current industry standard. This could lead to a next generation "beyond EUV" lithography system producing chips that are smaller, more powerful and faster to manufacture while using less electricity. "We have performed the theoretical plasma simulations and proof of concept laser demonstrations over the past five years that lay the foundations for this project," said LLNL laser physicist Brendan Reagan. "Our work has already had quite an impact in the EUV lithography community, so now we're excited to take this next step."

EUV lithography involves high-power lasers firing at tens of thousands of droplets of tin per second. The laser heats the droplets, each measuring about 30 millionths of a meter, to half a million degrees centigrade to produce a plasma that generates ultraviolet light with a wavelength of 13.5 nanometers.

Special multi-layer mirrors guide the light through plates called masks, which hold the intricate patterns of the integrated circuits for semiconductor wafers. The light projects the pattern onto a photoresist layer that is etched away to leave the integrated circuits on the chip.

The LLNL-led project will investigate the primary hypothesis that energy efficiency of existing EUV lithography sources for semiconductor production can be improved with technology developed for the novel petawatt-class BAT laser, which uses thulium-doped yttrium lithium fluoride as the gain medium through which the power and intensity of laser beams are increased…

... Since its inception, the semiconductor industry has engaged in a constant race to make each generation of microprocessors smaller yet more powerful by packing as many integrated circuits and other features as possible into one chip. For the past several years, EUV lithography has taken the forefront because it uses EUV light to etch microscopic circuits as small as a few nanometers onto advanced chips and processors.….

Welcome to 2025 - Conferences and Events that are being scheduled. Get your calendars out and let's start listing a few of the conferences.

Web - The Engineers Without Borders USA National Conference

Date: **March 07-09, Charlotte, North Carolina**

Engineers Without Borders USA (EWB-USA) is partnering with communities around the world to meet their basic human needs.. Each project builds the foundation for a community to thrive for years to come.

Web - The 4th World Conference on Mechanical Engineering
Date: March 13-15, Berlin, Germany
Whether you are a researcher looking for funding for your next project, an academic interested in better understanding upcoming trends, or a graduate student interested in mentorship programs, the 4th.Mechanical Engineering Conference 2025 is the place you want to be.
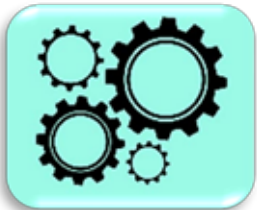
Web – NAFEMS World Congress
Date: May 10-22, Salzburg, Austria

Among the presentations mentioning LS-DYNA not to miss

- On The Characterization & Calibration Of Alloy Materials Used In Additive Manufacturing Processes For Crashworthiness Applications
- Enhancing Commercial Solver Performance Through CPU, Memory, and Network Optimization: Opportunities in Cloud HPC
- A Cost-effective Cold Roll-Forming FE Model for Industrial Applications
  A Simulation Model to Evaluate Particle-level Properties of a Powder, Based on its Bulk Properties
- Thermal and Mechanical Stress Cycling Effects on Thermal Interface Materials

Web - UAS Challenge "Live Fly Off"
Date: Between, June 30th & Thurs. July 3rd
Team Aero-Watt, from Heriot Watt University in Scotland, **design, test & manufacture autonomous unmanned aircraft to take part in the IMechE UAS challenge.** The UAS Challenge involves teams of students from around the world who fully design and build an

Norconsult's new Sotra Bridge embodies a fully digital approach to infrastructure - Discover how this Autodesk Design & Make Award winner used digital processes to build Norway's Sotra Bridge, showcasing ways AECO firms can overcome challenges using data insights, cloud technologies, and innovative design.

Rendered for reality: The digital design of the new Sotra Bridge highlights the precision of virtual modeling in physical infrastructure development. Image courtesy of Norconsult.

Web – Norconsult's new Sotra Bridge - Mark De Wolf

- In Norway, the world's first fully digital suspension bridge spans 900 meters and connects Sotra Island to Bergen.
- The new Sotra Bridge was designed in only two years and involved experts across three continents.
- To create this engineering feat, a global team leveraged digital solutions including Autodesk Revit, Civil 3D, Inventor, Navisworks, Autodesk Platform Services, and the Autodesk Construction Cloud.

Architecture, engineering, construction, and operations (AECO) firms have been tested lately by climate change, a pandemic, geopolitical unrest, and economic ups and downs. The best have passed with flying colors. Technology provided some solutions; expertise and creativity did the rest.

In a sector where more than 64% of companies describe themselves as digitally mature, pairing cloud platforms with innovation and adaptability has helped AECO punch through and excel, racking up notable successes along the way.

One project making the most of AEC's data-led approach is Norway's new Sotra suspension bridge—winner of a 2024 Autodesk Design & Make Award for Most Innovative Use of Autodesk Platform Services. The design, engineering, and project management for the bridge, now in construction, have all been carried out entirely in the digital realm by architecture and engineering firm Norconsult Norway, without relying on traditional drawings. Using a Design and Make cloud platform made it possible to capture and connect huge volumes of data for 3D modeling, reporting, cost control, and facility management. APIs helped create custom end-to-end workflows as well as analyze and optimize digital designs.

Digital designs for physical spans - New Sotra Bridge is a major component of Norway's National Road 555 Sotrasambandet project, a public-private partnership initiative with a budget of 19.8 billion NOK (US $1.8B) and currently the largest infrastructure project by contract value in Europe.

When it opens its four lanes to traffic in the summer of 2027, the 900-meter (nearly a half-mile) suspension bridge will tower over the fjord separating Sotra Island from the rest of Norway's Atlantic archipelago. With towers soaring 145 meters (476 feet) above sea level, the bridge links Sotra with the 9.4-kilometer (5.8-mile) highway from nearby Bergen.

The project was run by the Sotra Link consortium, with design responsibility awarded to Norconsult, with partners Webuild, FCC Construcción, and SK Ecoplant handling construction.

Proving that digital processes can de-risk delivery and give clients greater visibility into progress was key to securing buy-in. "Our clients want to receive a bridge that is built on best practices, and in the best

state possible," says Vegard Gavel-Solberg, group manager for bridge projects at Norconsult. "Digital models really help in reducing errors during construction because they enhance each contractor's understanding of tasks and their grasp of the bigger picture."

With the state-backed project's big budget and Norway's reputation for eco-friendly construction, there was no doubt the bridges would be designed and built well. But multiple complexities related to the location ensured the project would be no simple feat. "One of the challenges in Norway is that it's a snowy country," says Gavel-Solberg. "And we have a lot of weather. We have a lot of rain. We have a lot of snow. We have a lot of topology. This introduces consequences for how we need to design bridges in Norway, to optimize the big economic picture during the lifespan of the bridge."
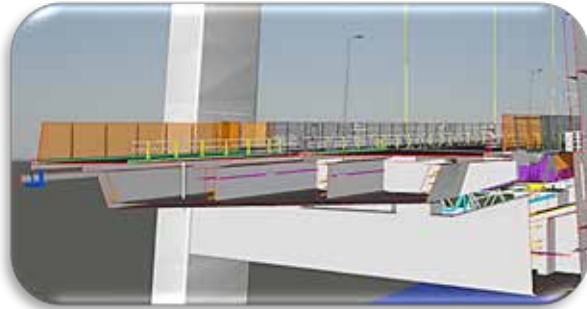
A model, created in Autodesk Navisworks, shows a cutaway of the new Sotra Bridge span. Image courtesy of Norconsult.

Controlling costs with data - Norconsult relied on Autodesk Construction Cloud (ACC), which wraps together communication, project management, and cost-control tools, to ensure the complex project was delivered on time and on budget.

Working seamlessly across a consortium of partners required going nearly 100% paperless. Norconsult says it was able to reduce reliance on hand drawings for the new Sotra Bridge by 99.5% compared to similar bridge projects in the past. "Bridges are really geometrically complex structures," says Gavel-Solberg." So there's a lot going on that is hard to capture in a few simplified sections on a physical drawing. Many people are involved in the design, construction, and maintenance of a bridge, and a 3D model gives everyone the opportunity to see the full picture. How does every little part affect other bits in the project? This is what 3D models excel at."

Autodesk Platform Services APIs helped Norconsult streamline and connect workflows to create this complex digital design. APIs—including the Data Management, Model Derivative, Viewer, ACC, and Design Automation APIs—gave the team flexibility to solve the project's unique workflow requirements, combining a huge volume of models and files without risking data quality.

"We used the APIs to validate the data and be sure it was factually correct, check that it's the correct data type, and to format it correctly. The APIs greatly simplified data retrieval and exchange, giving us well-structured data to work with," says Thomas Ostgulen, Norconsult's building information management (BIM) manager for the project.

Savings in time, effort, and complexity were impressive. The team was able to cut down on the number of drawings, from 4,000 on the firm's last comparable project to just 15 for the new Sotra digital suspension bridge. They also captured and stored 60 million data points across 211 different models comprising more than one million separate objects. Meanwhile, automation reduced the sheer number of repetitive tasks on the project and simplified processes around issue tracking, RFIs, and submittals.
Norway's government mandates a data-driven approach

While architecture has always led AECO's shift to digital, Norway's regulations required digital documents in the tender process. "The government mandated that Sotra Bridge should be delivered via openBIM at every project stage," adds Ostgulen.

"From design to operation and maintenance and handover, the government is pushing us to be data-driven," he continues. "Having all their data translated in models compared to drawings opened our client's eyes to the enormous potential for savings and efficiency. Since 80% of the cost of a building across its lifespan is facility management, construction is just the tip of the iceberg. I think that's what motivates our clients to do it this way."

Ostgulen adds that the bridge is required to last for at least 100 years, "so we need to optimize for solutions that are future-proofed across the coming century."
Building in sustainability from the outset
In a rendering, an aerial view of a suspension bridge connects two areas across a waterway, with cars traveling in both directions and residential homes visible in the foreground.
The new Sotra Bridge, a symbol of sustainable engineering, embodies Norway's dedication to environmentally responsible construction practices. Image courtesy of Norconsult.

The Norconsult team's digital approach also helped them meet their client's sustainability objectives. Public projects in Norway are eco-conscious by default. If a bid isn't fully sustainable from design through construction and facility management, there's an informal assumption that overall cost will need to drop by around a third to have a hope of winning the bid.

So why not aim to meet green objectives from the beginning? In the case of the new Sotra Bridge, digital design tools such as Autodesk Revit helped Norconsult's architects and engineers make better design and materials choices, as well as model the bridges' performance to ensure they would stand up to extreme weather while emitting less carbon.

That can be tricky, explains Terje Fjellby, a BIM advisor at Norconsult. "When you consider the lead time on some infrastructure projects, the period from when you start planning a project to when it can build becomes a complicating factor. Some of the projects we are doing now were approved long before the Paris Agreement. We now have to adapt decisions made before we knew climate change would drive design. This is a challenge that digital tools help us with. We can load the data and go back to the early phases of projects and rethink. Is it viable to build this road in this way? Do we have to scale it down, decrease speed, reconsider sightlines? That is the next step."

Having the flexibility to shift operational and maintenance objectives includes the post-handover phase, where the new Sotra Bridge's managers will be able to use the structure's built-in sensors to operate a digital twin and assess traffic flow, structural stresses, vibrations, weather, energy consumption, and other issues relevant to the local ecology in real time.

Public projects come with unique challenges and limitations. Using APIs and cloud platforms for digitalized delivery can make infrastructure design and construction nimbler. It can also simplify data harmonization and quality control.

"It's not possible for humans to do proper QA and QC on 60 million data points," adds Thomas Ostgulen. "That would fail—definitely. So having automated solutions has been absolutely key."
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Don't miss the recap by Mollie Gladden - Product Marketing Coordinator of The Next Generation Design podcast: Designing Formula SAE Cars with Rensselaer Motorsport.

Excerpt - On this episode of the Next Generation Design podcast, our host Greg Arnot, is joined by Elliot Wilk and Levi Hlavac, two dual-major aerospace and mechanical engineering students at RPI that are part of Rensselaer Motorsport.

Web – Siemens – Excerpts - Designing Formula SAE cars at Rensselaer Polytechnic Institute (RPI) | Rensselaer Motorsport

In this episode, you will learn how members of Rensselaer Motorsport manage a balance between their coursework and the demands of the club, why CAD is such an incredibly important tool for them, and how NX aids in their complex design process.

What you'll learn in this episode: What is Rensselaer Motorsport? Rensselaer Motorsport is a Formula SAE team at Rensselaer Polytechnic Institute (RPI) in Troy, New York. Formula SAE (FSAE) is a competition hosted by the International Society of Automotive Engineers (SAE International) that tasks student teams to design, build and compete formula-style cars. The Rensselaer team includes 25-30 student team members with different roles.

[At the time of the recording,] Levi is the Technical Director responsible for overseeing the engineering and design and collaboration of the teams. Elliot is the Aeronautical Project Manager, responsible for aerodynamics and body work.

Challenges in the Formula SAE car design process - Greg asks the two student engineers what their biggest challenges are with getting the car from concept to design to the competition. Elliot notes that system integration and communicating are big challenges when different teams are designing different parts of the car. "There are a ton of components on the car, tabs that are welded, things that are bolted on, and tons of different fasteners, so you have to make sure the car works together." He adds that they don't include everything that will be in the final car in the CAD environment, like wires for example, but it's important to acknowledge while designing that they will still be there and thus the design needs to make space for them.

Levi agrees that communication is always a challenge every year when it comes to the design. "When you have 20 or 30 college students all coming together with their schooling, in their free time, not getting paid or not getting credit for the work they do on the car, emotions can get pretty high and intense pretty fast," he adds. With many different people on different projects, they need to remember to communicate with the whole team to make sure designs stay up-to-date and aligned with each other. With such a quick design cycle, if one person does not communicate or falls behind, it causes issues down the line. Levi jokes that it's easy for RPI engineers to break down communication in just one week.

The importance of CAD in Formula SAE - Greg then asks how important CAD is to designing the Formula SAE vehicle, to which Levi responds "If we don't have any CAD, it doesn't exist." He explains that sometimes, a team member will have an idea in their head but the best way to communicate it is to put it

in a 3D model then put it into the assembly. He also notes the importance of being able to design within context of the assembly so that each person knows their designs aren't interfering with other parts of the car or running into other components— especially with everything fighting for space in such a tight-packed design—even if the full assembly does increase the load times by a few minutes.

Levi adds that without CAD, no one will know where a component is supposed to go and thus other teams can't work around it even though it's imperative that they do all work around each other. He concludes, "t's absolutely instrumental to have good CAD, updated CAD, and CAD that works together in the assembly because, without that, we can't communicate how our designs are and how they change because they change constantly." With integration of systems and communication being big challenges in the design process, leveraging CAD helps them reduce those challenges and effectively communicate ideas across teams.

Why Rensselaer Motorsport chose NX CAD - Rensselaer Motorsport uses NX as their CAD software of choice, the same software that is being taught in their engineering coursework at RPI. With the school teaching NX as well as other software from the Siemens Xcelerator platform including from the Simcenter platform, new members of the team can easily begin designing since they already have experience in NX. They also note the importance of simulation integrated into NX, with native validation and simulation tools in the design software as well as seamless integration to Simcenter applications.

Why is design-integrated simulation so important in the racing and automotive industry? Levi once again emphasizes the importance of having design and simulation on the same platform. NX CAD includes both design-integrated simulation tools as well as integration to Simcenter applications. "If you were to use another CAD software, you would have to import the 3D model and put it in this simulation, and then that comes with some disadvantages. You can't change your 3D model very easily after the fact. There are a lot of things that change," says Levi.

Elliot adds that CAD and simulation allow them to reach their metrics-based goals faster such as for weight or strength of parts. With NX, they can create more reliable parts and simplify complexity as they can simulate and validate designs earlier in the design process and quickly iterate if needed before creating the car in the real world. This helps them both reduce design time and costs.

The team uses simulation throughout the design process as they design the parts in CAD, run a simulation to assess how the parts can withstand force and they also do the hand calculations. If the part does not pass testing or their goals, they must reiterate and change the design. "We're always running simulations, and we're always doing validation," Elliot notes. With design-integration simulation in NX CAD, it's simple for them to reiterate on the design once simulation is complete, and then they can repeat the design and simulation process. This ensures that they don't create parts that break or don't work in the real world.

Designing cars with the integration between NX design and Simcenter simulation - Greg, Elliot and Levi continue to discuss the importance of using software products that are "connected" and integrated. In addition to NX, Rensselaer Motorsport leverages software from the Simcenter portfolio, including Simcenter STAR-CCM+ fluid simulation. With integration between Simcenter and NX, they quickly run simulations and can seamlessly go back and forth between the two software applications. This saves them time and helps them get their designs right. "If I had to export every single time, it would just be a bunch of time wasted, and I wouldn't be able to work as efficiently as I could," Levi says. He also adds that some students prefer to edit a 3D model within STAR-CCM+ itself which helps save even more time and allow for quicker design iterations.

Advice for CAD learners - Elliot says that people learning CAD for the first time could look at tutorials online, but that it's best to learn from other people in a collaborative environment. He learned NX in his CAD class at RPI, and he also learned from other students and members on the Renssealer Motorsport

team as they were able to teach him how to optimize his CAD designs. He suggests to spend a lot of time actually doing CAD and not just learning the concepts. "Just doing it constantly, having new problems to solve in CAD, is just going to build your skill level," he says. For learning NX specifically, Elliot notes that he used a lot of Siemens Xcelerator Academy lessons.

Predictions for the future of automotive design - Greg asks the Renssealer team members about their thoughts and predictions on the future of automotive design, touching on topics like computing power, immersive engineering, AI and sustainability.

Elliot predicts that simulations will get faster as computing power increases, and also sees 3D modeling in virtual reality. Greg then mentions Immersive Engineering and the collaboration between Siemens and Sony with NX Immersive Designer, which will allow engineers to do just that and be "in" their design as they manipulate and edit designs. Elliot and Levi both agree that Rensselaer Motorsport would be interested in leveraging Immersive Engineering and that it would help them to reduce time wasted on trying to get the right view of an assembly or understanding the real-life scale of certain part designs, as parts are often bigger in real life than they expect from the CAD design on their computer screen.

Levi touches on the AI topic, mentioning that he thinks there will be AI assistants for simulation or to catch mistakes that would speed up the design process and expedite the user experience in setting up simulations. In the 3D modeling space, he isn't as sure but believes that AI could help optimize designs once a user defines loading and some constraints. He does believe that machine learning could make a big difference in CAD.

Lastly, Levi addresses sustainability, "I think sustainability is the future for the automotive industry. It has to be." Rensselaer Motorsport is an electric vehicle (EV) team, so there is a large focus on sustainability. Levi believes that the entire automotive industry may be heading to EV, especially for racing. If companies can build a great EV race car, they can certainly build a great EV consumer vehicle. Levi adds that he's seen interesting advances with fuel cells and that the industry will be powered by green sources of energy, and thus it is important for student teams to follow that industry trend and think about them in order to prepare for entering industry careers. "If we can develop engineers with that mindset and have experience already in where the industry is headed, we're doing our students and our members a great service because we're setting them up for what's coming," he concludes.

We close out the episode hearing about the Formula SAE competition itself, driving the car on Team Drive Day and hearing about their favorite Formula One teams such as Oracle Red Bull Racing, who we also had on the podcast to learn about how they use NX CAD for their championship-winning cars.

View the Video - Want to learn more about NX CAD software? Check out our website or try it for free.
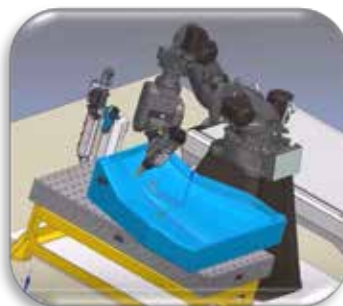
DFETECH is an engineering firm established since 2005 and offers a comprehensive software solutions that spans the entire range of physics, providing access to virtually any field of engineering simulation that a design process requires.

YouTube – Videos you may have missed and product highlight.
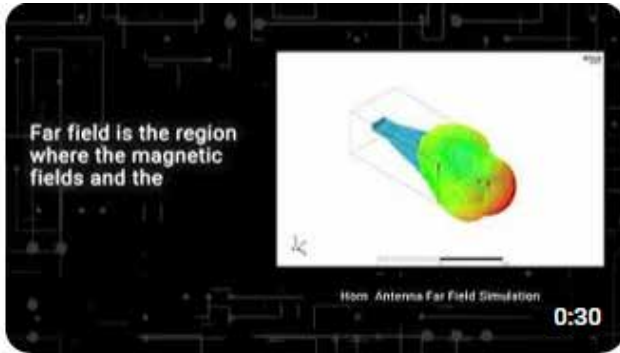
Ansys HFSS : Horn Antenna

Ansys Fluent : Gear Box Flow
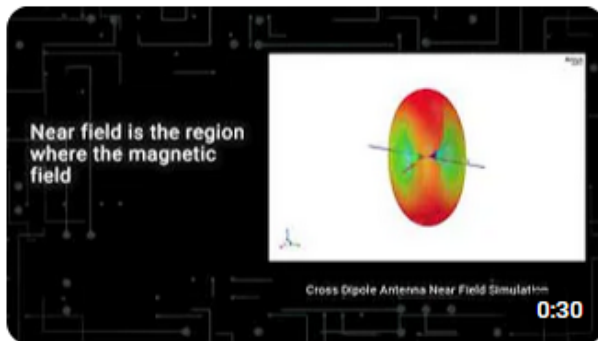
Ansys HFSS : Cross Dipole Antenna
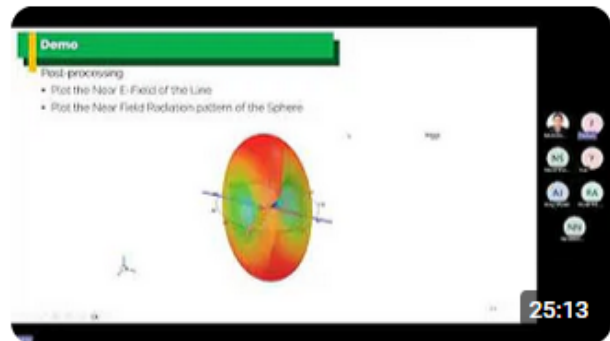
Webinar : Ansys Electronics (Crossed Dipole Antenna Near Field Simulation using Ansys…

Digital twin creates failure prognosis - Prediction 100000000 XXXXX of remaining operating time of a safety critical relay with real load data and digital twin.

Images: © Phoenix Contact

Web – CADFEM - **Digital twin - simulation in operation**
Sector: Electrical engineering/electronics
Specialist field: Electromagnetics, Structural mechanics, System simulation

Remaining life prognosis of a safety critical relay

Task - Phoenix Contact physical relay as sensor transmitter for digital twins

The life of a relay is strongly dependent on its operating conditions. The magnitude of the switched load, the switching frequency and period and the ambient temperature are typical influencing variables. They determine the power dissipation introduced by the electric arc, the resulting contact temperature and wear.

In safety critical applications, specialized types of relays show the failure state securely by restraint-guided contacts based on the physical design and the assigned circuit. To predict component failure before it occurs, a simulation model fed by actual load data computes the true state. Based on these conditions, this simulation model computes the actual wear of the contacts and the remaining life of the relay system for predictive maintenance.
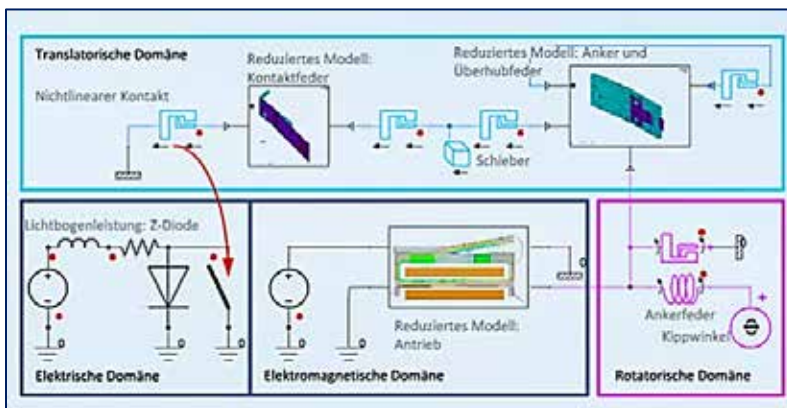
Solution - Model of system with behavioral models from 3D-FEA-analyses of magnetics, mechanics, temperature

Simulating the relay in operation requires a model with high performance and truly predictive behavior. The technique of Reduced Order Modeling condenses the

results of a detailed 3D finite element simulation to a so called behavioral model or ROM. These ROMs combine speed and accuracy and get connected to 0D/1D elements of the system simulation within Ansys TwinBuilder.

The embedded microcontroller of the physical relay gathers sensor data and sends them to an IoT platform data aggregator. This platform feeds the actual sensor data to the system simulation model, which computes wear and remaining life.
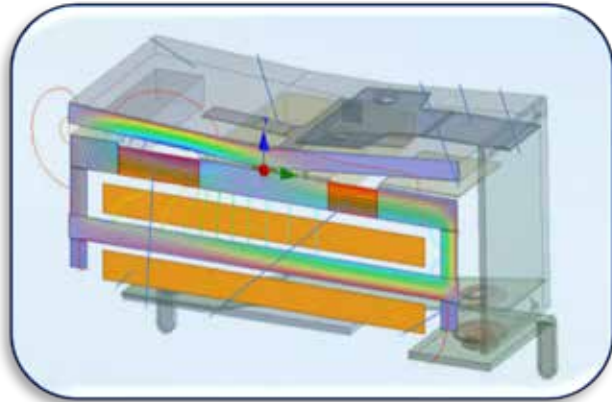
CADFEM simulation for failure prognosis of a Phoenix Contact relay based on measured sensor data

Customer Benefit

The Digital Twin enables an analysis and prediction of lifetime relevant characteristics, when real sensors can't really do the job. The detailed simulation results and the opportunity to get knowledge using virtual sensors – in this case for contact temperature and electric arc energy – are the basis for the real-world wear state and remaining life for each individual product.

This focus on real-world data instead of paper specs opens the door for a switch from preventive to predictive maintenance. A study by the US Department of Energy has shown an average cost reduction of 25% and a reduced downtime of 70%. In addition, these detailed operational data are the basis for improved next generation product development and new business models.

MANAGER DIGITAL TWIN

Christian Abramowski

Web - **CADFEM Newsletter Registration** Current simulation topics and industry trends, seminars and events, helpful tips and tricks.

All the news about simulation directly in your mailbox

The world of simulation continues to rotate. With our newsletter you won't miss a thing anymore and receive the latest news conveniently by e-mail.

We are always eager to support researchers worldwide with our cutting-edge software for mesh morphing and advanced simulation.

Lorenzo Mazzaferro, a former student at the University of Rome Tor Vergata, showcased the potential of mesh morphing in his thesis: "Structural Analysis of the Hub of a Rental Kart and Optimization through Mesh Morphing"
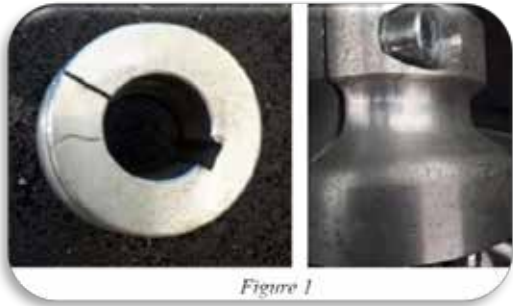
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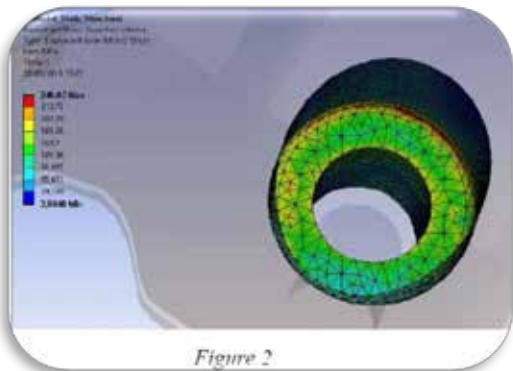
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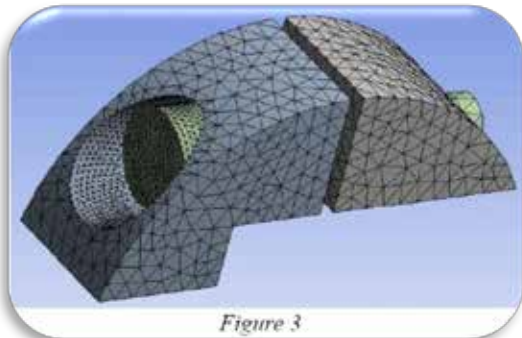
Figure 3
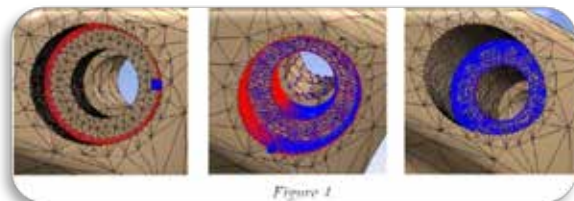
Figure 4

Web – RBF Morph - Structural Analysis of the Hub of a Rental Kart and Optimization through Mesh Morphing – PDF of the presentation and the thesis in Italian are available on the website. This project exemplifies how mesh morphing enhances engineering, whether in motorsport, healthcare, aerospace, or beyond.

ABSTRACT: One of the most important industries in the production of Kart is CRG, infact among its files it can count some of the most successful pilots of Formula 1, like Michael Schumacher and Lewis Hamilton. This company has assigned me the study of a particular of a rental Kart: the rear hub. It is a fundamental component to allow the rotation between the driving shaft and the tire and that during its motion is subjected to high loads.

The purpose of this work is carrying out a structural analysis of the rear hub and optimizing its performances by reducing internal stresses, using the RBF Morph software.

The hub presented a fatigue failure in the seat of the screw head for tightening (Figure 1), likely caused by the excessive clamping force, that the screw exerts on the hub itself.

The analysis was realized using the Ansys software (student version), the basic steps to be performed are the introduction of:

· Internal contacts, in particular a Frictional was inserted between axle and hub and two Bonded between screw and hub (in threaded area) and between the screw head and the surface where it rests

· External constraints, inserted on the axle where the bearing is present
· External loads such as weight force, centrifugal force and friction force with respective transport moments from the contact area between tire and asphalt to the center of the hub.

From the analysis carried out a stress concentration emerged in the critical area, in particular on the internal fitting, where, likely, the crack that was generated has led the piece to break down (Figure 2).

The same analysis was also replaced on a submodel (Figure 3), that is a small part of the whole model, because this version of Ansys has a notable limit on the number of nodes which could be used to generate the mesh. In this way, with the submodel, the size of the nodes can significantly be reduced and a results closer to reality could been obtained. In fact it has gone from a maximum value about 240 MPa to a value of 305 MPa.

To try to improve the fatigue life of the hub, shape modifications were made using an Ansys extension, RBF Morph. These modifications have been exclusively limited to the critical area where the fracture is generated, keeping the external geometry unchanged.

The three possible modifications (Figure 4) found were:
1) An increase of the fitting radius, through the Surface Offset
2) A translation of the axis of the screw hole
3) A translation of the surface where the head of the screw rests

All the three changes have led to substantial reductions in internal stress, the value of the change and the reduction obtained are clearly visible in the table below:

N°	Type	Value (mm)	Maximum Stress (MPa)	Reduction (%)
1	Surace Offset	0,2	223,66	7
2	Traslation (y)	0,2	231,32	3,3
3	Traslation (z)	0,3	239,58	0,3

Figure 5
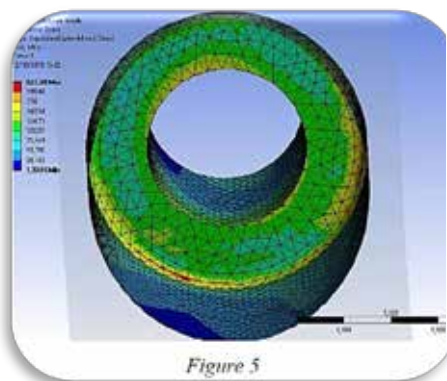
Combinations between the three has also been tried to see which leads to a longer life fatigue. Among the three, the best certainly was the union between the increase of the internal fitting radius and the translation of the surface where the head of the screw rests. In fact, through this modification the stress has considerably decreased on the model (up to 15%). Applying this change to the submodel has been managed to achieve a reduction of 27%, from about 305 MPa to 223 MPa (Figure 5).

Excerpts: Capgemini, "Collaborating with Capgemini, the car manufacturer's mobility brand provides drivers with an affordable and sustainable solution, to reinvent mobility in cities and beyond."

Excerpt - Web – Capgemini - Mobilize improves automotive sustainability with a compact, electric, connected and shared micro-vehicle

Client Challenge: Mobilize wanted to refine the design of its electric quadricycle Duo and its utility version Bento to ensure that they would be sustainable, affordable, and suited to the needs of urban drivers.

Solution: The brand engaged the Engineering team from Capgemini, which challenged numerous elements of the initial design to help ensure the established cost, sustainability, and timeline objectives were met.

Within the automotive industry, sustainability and carbon emissions represent an urgent priority. Many manufacturers have identified unique solutions to this challenge. For Renault Group, one of the largest multinational automobile manufacturers in the world, this came in the form of a new brand: Mobilize. As the first new brand launched by the car developer in 120 years, Mobilize's central mission was to contribute to the carbon neutrality goal of the Group by offering emission-free mobility.

"This is obviously a big task and far from simple. But we found two key issues that presented major roadblocks to making cars more sustainable. First, people simply aren't driving most of the day. On average, our vehicles sit unused more than 90% of the time. And second, those same vehicles lose 50% of their value over the course of three years. So, we needed to find a way to better align a car's cost with the way it's used."   Benoit Abadie, Engineering Director at Mobilize

Mobilize's first major project: A two-seat urban mobility vehicle known as Duo. The brand created an initial design, but also knew that it could be further improved with additional, outside accompaniment. For that reason, Mobilize launched an open process in search of a partner that could bring a unique combination of innovation and industry know-how to the project.

Collaborative innovation in urban car design - After an extensive review of its options, **Mobilize ultimately chose Capgemini Engineering and Magna as its project partners.** After agreeing to a two-year engagement, the organizations began to collaboratively update and enhance the design of Duo. Experts from Capgemini Engineering, who offered an outside perspective driven by extensive experience with innovation, challenged various aspects of the vehicle's design, all while working within the firm budgetary constraints and objectives established by Mobilize.

In that project context, Capgemini set up and led a companies' grouping (GME) in which Magna was responsible for the product and process development of parts and modules for the chassis, exterior bodywork and interior fittings. In addition to this product development activity, Magna was responsible for the manufacturing engineering, in particular the assembly line at Renault's Tangiers plant.

"You know, there's always this desire to add on all the bells and whistles to any new car design. It's easy to say that we want to build the most advanced car with all the new features. It's much more challenging and far more interesting to set limits on that design based on how people tend to use their cars."

Fabien Premaor, Vice President – Industries Leader at Capgemini Engineering

In one case, the project team focused on the design's air conditioner, or in this case, lack thereof. In order to make Duo more appealing to urban drivers from a cost perspective, the air conditioner had been removed. Recognizing a key opportunity, Capgemini Engineering experts set out to develop an air conditioner that would fit within the overall cost limits of the vehicle and still provide customers with a key feature that many would expect.

"It wasn't just about finding a way to fit an air conditioner into the design. We had to make sure that the addition didn't dramatically change the overall cost of the vehicle and didn't reduce Mobilize's ability to meet its sustainability goals with the design.'' Ghassen Abichou, Project Director APA at Capgemini Engineering

After completing the design of this element, the Capgemini Engineering team then shared it with Mobilize stakeholders and experts. After a collaborative dialogue around the air conditioner that included a review of the cost and materials needed to make the vision a reality, it was validated an added to the official Duo design.

This sort of exchange occurred for numerous elements of the vehicle, enabling Mobilize and Capgemini Engineering to refine and enhance the overall design. Throughout this process, the partners ensured that the development process did not deviate from the established target cost and enabled the use of green materials as much as possible.

Rolling out a new, sustainable and innovative micro-vehicle -

The result of this two-year partnership is a two-seat urban vehicle ''engineered in France'' and revealed in October 2024. This updated version of the Duo integrates over 40% recycled material. Through their collaboration, Mobilize and Capgemini Engineering determined the materials and methodology needed to support this design and ensure that development could take place within the desired timeline.

"With Duo, we think that we've done quite a bit to respond to the concerns and interests of many drivers. The car will be more affordable, better fit to driving around a city with its compact design, and will be built sustainably while using electricity to reduce its emissions. And we've accomplished all of this without any compromise on the performance that our customers have the right to expect, while offering them the best level of comfort, handling, safety and connectivity on the market."

François Laurent, Chief Engineer at Mobilize

With the launch of Duo and Bento, Mobilize is taking a major step toward transforming sustainability within the automotive industry. The brand will continue to pursue further innovations that will make its vehicles more eco-responsible, both in terms of manufacturing and carbon emissions, and better suited to driver needs.

The challenge - Connectum, a producer of unique, universal, and circular products were looking to re-design the flotation systems of their ClicFloat solar panels to make them more sustainable, both environmentally and economically. Across Northern Europe large greenhouses supply much of the salad vegetables sold by supermarkets, and while more efficient than traditional growing, they require significant amounts of irrigation.
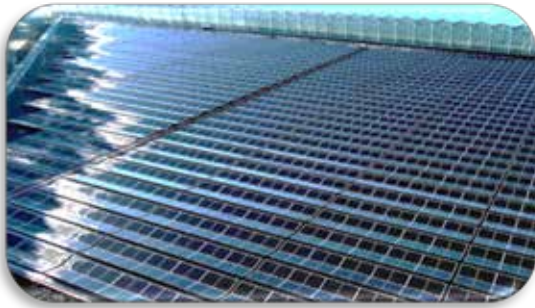
Web - Game-changing redesign to floating solar panels supports sustainable food production across Northern Europe - To provide water storage the greenhouses are typically accompanied by large artificial reservoirs, and one of the most significant costs associated with this irrigation System is pumping the water in and out. Connectum identified that the solution was to float solar panels on the reservoir surface to both provide power for pumping and cover to minimise evaporative losses. After developing an initial prototype, they turned to engineering consultancy Vectayn to progress and validate their designs prior to manufacturing using Computer Aided Engineering (CAE). With the brief that the solar panel arrays had to withstand the various natural elements (wind, wave, snow) and maintenance loads, Vectayn required a CAE suite that was flexible enough for the range of analysis that they needed to conduct, while maintaining an efficient workflow due to the large model sizes and geographical spread of their team.

The solution - **LS-DYNA** was Vectayn's solver of choice as they recognised that the flexibility it provided for multi-physics analysis would satisfy the range of investigation required. The Oasys LS-DYNA environment was also selected for its complete compatibility with LS-DYNA keywords, enabling Vectayn to unlock the full potential of the solver.

Oasys PRIMER was used as their pre-processor to efficiently prepare and build their models to run through LS-DYNA. As presented at the 2023 UK Conference, Oasys D3PLOT, was used for analysis visualisation, overall design checking and to simulate joint interactions between parts using the cross-section tools. The fluid-structure interaction between the waves and the solar panels was also modelled using LS-DYNA's Arbitrary Lagrangian-Eulerian (ALE) capabilities and Oasys D3PLOT, allowing Vectayn to determine the stress experienced by the solar panels caused by the force of different waves.

FEMZIP proved to be an instrumental tool in achieving workflow efficiency, allowing the team to compress large files without compromising on quality, achieving a file reduction size of 97% to facilitate the transfer of data across team members.

YouTube Video
The results - By utilising the Oasys LS-DYNA Environment, Vectayn were able to collaborate globally and successfully conduct their analysis. They significantly refined and enhanced the initial prototype based on their analysis to fulfil all loading requirements and the redesigned ClicFloat solar panels have since been deployed, achieving lower cost installation, reduced running costs for irrigation and direct environmental benefits. "Vectayn has used LS-Dyna and the Oasys suite for over 30 years. Its flexibility and widespread use make it ideal for consultancy work. The team's ALE method was instrumental in accurately modelling structure and fluid interaction." – Dan Page, Director, Vectayn

Article by Mohsen Seraj, "**Wastewater Treatment: Methods and Challenges** - Wastewater treatment encompasses a variety of methods aimed at removing contaminants from water to make it safe for discharge or reuse."

CFD Modeling of Waste Water Treatment – **M. Seraj**

Wastewater Treatment: Methods and Challenges - Wastewater treatment encompasses a variety of methods aimed at removing contaminants from water to make it safe for discharge or reuse.

Solids concentration field (sludge blanket) for the single effluent weir case
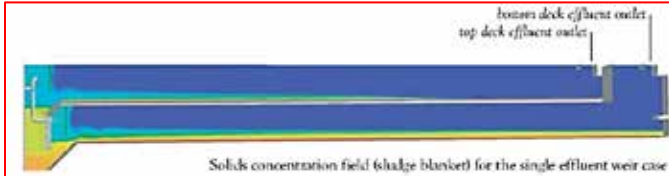
These methods include physical processes like sedimentation and aeration (oxidation), chemical processes such as coagulation and disinfection (chlorination and ozonation), biological treatments involving microorganisms to degrade organic matter, and sludge treatment (settle tanks) for separation of solids and liquids. Each method has its own set of challenges, such as the handling of sludge in physical processes or the precise control of chemical dosages in chemical treatments.

A major challenge in wastewater treatment is effectively handling the varied nature of waste streams. The characteristics of wastewater can differ greatly based on its source, and managing sludge along with space limitations for settling tanks and aeration basins demands customized treatment strategies. Furthermore, the increasingly strict regulations, the emergence of new and complex contaminants, and the need for minimal energy consumption require advanced treatment technologies, which can be both expensive and time-consuming.

CFD Modeling of Waste Water Treatment Processes - Computational Fluid Dynamics (CFD) is essential in wastewater treatment, offering insights into fluid dynamics that optimize unit processes like sedimentation tanks, aeration basins, and chemical reactors. It models water-sludge interactions, assesses wind effects on secondary settling tanks, and simulates multiphase flows in grit removal, helping improve solids separation and ensure effective pathogen removal with minimal chemicals.

In mineral and biomass processing, CFD helps design effective slurry handling systems by analyzing settling solids in non-Newtonian fluids for improved water recycling. Additionally, CFD optimizes aeration systems, potentially reducing energy consumption by up to 40% by modeling air distribution in biological reactors.

Ansys Fluent CFD Simulation for Wastewater Treatment: Benefits - CFD models are frequently employed in the design and operation of secondary settling tanks to enhance their efficiency. Ansys Fluent, a widely used CFD software in wastewater treatment, provides comprehensive simulations for fluid dynamics, heat transfer, and chemical reactions within intricate geometries. Engineers leverage Ansys Fluent to refine treatment plant designs, cut costs, and enhance processes like aeration, sedimentation, and disinfection by pinpointing flow inefficiencies. Understanding the dynamics of slurry flows is crucial for developing efficient handling systems in the wastewater treatment industry.

Secondary settling tanks are widely implemented across various wastewater treatment plants. In assessing these tanks, Ansys Fluent enhances settlement efficiency by refining the settling surface and establishing a stratified flow pattern, beneficial for flotation processes. Fluent includes sophisticated multiphase and turbulence models that factor in buoyancy to precisely replicate sludge flow patterns. Moreover, it offers visual depictions of mass solid concentration and sludge blankets, as illustrated in double-decker rectangular tanks.
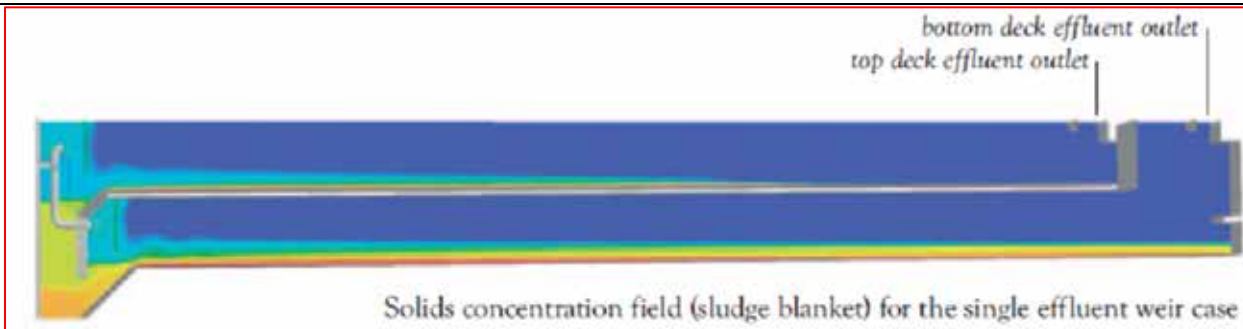
Ansys Fluent CFD simulations can also evaluate the performance of perforated plate baffles and scraper blades, providing valuable insights by illustrating flow patterns and solid concentration fields within the tanks. The figure below demonstrates the flow patterns and sedimentation concentration in two different baffle designs to assess enhancements in settling tank operations.
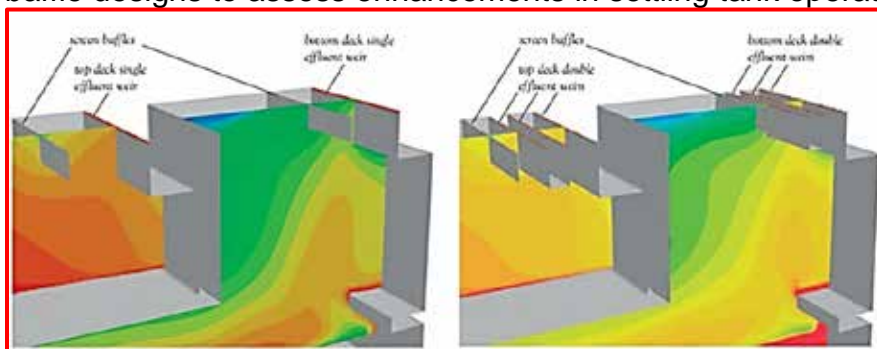
CFD is also employed to examine shear flows and sludge blankets in secondary clarifiers, providing insights into variations in flow velocity and sedimentation concentration within them.
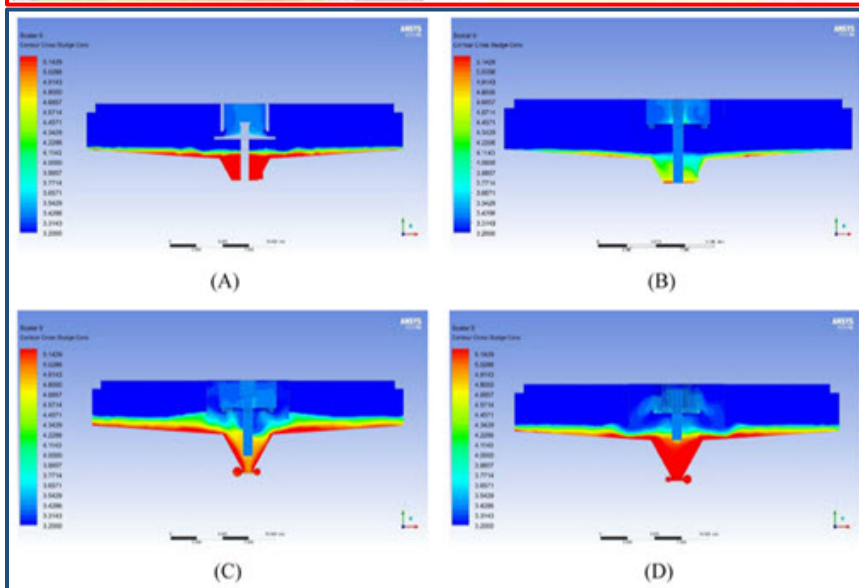
Ansys Fluent offers multiphase models for analyzing slurry flows and non-Newtonian fluid models to investigate solid settling, sludge blanket formation, and liquid-solid interfaces for water recycling in clarifiers. As shown in the images below, Ansys Fluent simulation can illustrate the contours of sediment and sludge mass concentration, helping engineers evaluate various designs for circular secondary clarifiers.

Ozen Engineering Expertise - Ozen utilizes its extensive consulting expertise in CFD, FEA, optics, photonics, and electromagnetic simulations to deliver outstanding results in diverse engineering projects, tackling complex issues such as multiphase flows, erosion modeling, and channel flows with Ansys software. Ozen Engineering is skilled in CFD modelling for wastewater treatment and thorough analysis of treatment procedures. They simulate various components, from sedimentation tanks to disinfection systems, using advanced Ansys software to boost efficiency, lower energy consumption, and comply with regulations. Their customized approach guarantees effective, sustainable solutions.

Excerpts: **The Dynamic Design Analysis Method (DDAM) provides a method for analyzing shipboard components that are subjected to a shock event due to an underwater explosion.** Typically, these events are caused by a near miss explosion that results in a severe shock event due to the transient motion of the ship or submarine from the forces imparted on the hull of the vessel.
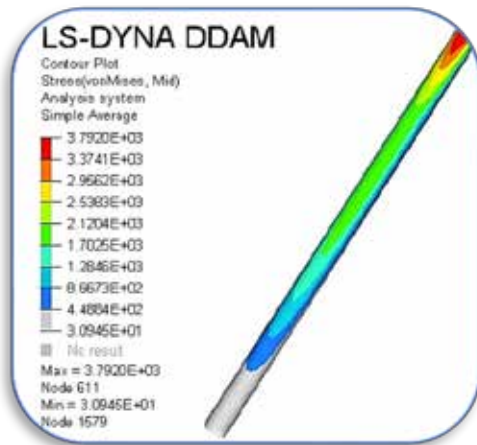
15th Intl. LS-DYNA Users Conference

Web – DYNAlook - Dynamic Design Analysis Method to Evaluate Shipboard Shock in LS-DYNA®

M. Koehler, W. McCoy, M. Patel

U.S. Navy - Naval Surface Warfare Center, Dahlgren Division

This work will investigate the procedure for conducting DDAM in LS-DYNA through the use of the
  *CONTROL_IMPLICIT_EIGENVALUE and

  *FREQUENCY_DOMAIN_RESPONSE_SPECTRUM cards.

Significant X-Modes			Significant Y-Modes			Significant Z-Modes		
Frequency	Eff Mass	%	Frequency	Eff Mass	%	Frequency	Eff Mass	%
46.95	1.47E+00	75.08%	52.33	1.32E+00	67.20%	215.52	5.28E-01	26.89%
126.74	3.28E-02	1.67%	173.86	2.00E-01	10.18%	236.19	4.40E-01	22.41%
150.7	2.25E-01	11.47%	282.5	1.12E-01	5.68%	262.0	1.77E-01	9.02%
219.5	1.39E-01	7.09%	311.6	1.25E-01	6.35%	282.5	1.94E-01	9.87%
			313.8	4.24E-02	2.16%	300.2	2.38E-02	1.21%
						311.6	1.42E-01	7.26%
Cumulative % Mass		95.31%	Cumulative % Mass		91.58%	Cumulative % Mass		76.66%

Figure 3: Significant modes extracted from eigout. Model units: lbf-s²/in, in, s.

 Specifically, a demonstration problem will be shown where the modes and mass participations are extracted through an eigenvalue analysis. These extracted values are then used to calculate an acceleration versus frequency curve using the DDAM procedure. Through a response spectrum analysis using the base accelerations curve developed, the stresses in the component can then be calculated from the shock event. Finally, these results will be compared to other solvers to demonstrate that LS-DYNA accurately conducts a DDAM analysis.

NSWCDD LS-DYNA DDAM Application - Conducting the DDAM procedure can be very time intensive when processing the modal results and calculating the accelerations by hand. In order to streamline the process, an application was developed at NSWCDD to expedite the process. The graphical user interface allows the user the ability to select the folder with the results from the eigenvalue analysis...

Conclusion: The Dynamic Design Analysis Method (DDAM) is used by the U.S. Navy to analyze equipment for shock survivability. LS-DYNA is a robust solver that has the capability to conduct DDAM analyses with results comparable to other solvers….

DARPA (Dec) press release - The USV Defiant is intended to operate autonomously for long durations at sea and is designed from the ground up with no provision, allowance, or expectation for humans on board.

Web - Naval News - NOMARS USV Defiant will implement the technology on the finished vessel in spring 2025

US Navy PMS-406 (the Unmanned Maritime Systems Program Office) and USV Squadron 1 (USVRON-1) conducted the test in partnership, using two of the PMS-406 experimental USVs: Ranger and Mariner.

Picture - A refueling probe was deployed and engaged without any human assistance on the part of the receiving vessel; this is the first time this technical challenge has been achieved by an uncrewed surface vehicle program. Autonomous refueling is essential to the success of the No Manning Required Ship (NOMARS) program, which will be using this technology aboard it's demonstrator vessel, the USV Defiant, in extended at-sea testing, beginning in spring 2025. Credit: DARPA

Fueling at sea (FAS) for USVs presents a problem that needs to be solved as current FAS solutions use personnel to handle lines and hoses on the platform being refueled. Requiring personnel on the USV for the operation adds significant constraints on USV design and operations, as the vessel must then be designed with considerations for safety of the humans on board, even if for a short period of time. It can also be risky and sometimes dangerous to transport personnel to a USV in rough seas or high winds.

The NOMARS FAS approach is designed for operation without any human on the USV – but does have humans on the refueling vessel. The FAS approach mirrors a standard refueling concept of operations (CONOPs) as closely as possible to be familiar to Military Sealift Command (MSC) oiler crew and reduce their learning curve. DARPA has worked closely with MSC's Taluga Group throughout the NOMARS program to advise on development of the FAS system and CONOPs.

For the recent test, USV Ranger carried a receiving station representative of the system that will be on the NOMARS USV Defiant, and USV Mariner carried a refueling "mini-station," custom-designed by NOMARS prime contractor Serco Inc. While there were personnel aboard both vessels during the event, no people were involved with operations on the receiving side.

The team demonstrated all parts of the system CONOPs while underway, including passing the lead-line to the refueling side, passing and connecting the refueling probe to the USV side and pumping water. This was the first on-water test of the system, and all parts of the operation were successfully demonstrated. DARPA could not have accomplished this test without the support and partnership of Navy PMS-406 and USVRON-1, both of whom contributed personnel and resources.

The next FAS test will take place with NOMARS USV Defiant during her sea trials period. Defiant is a 180', 240-metric-ton lightship currently nearing completion of construction and is scheduled to depart for her multi-month at sea demonstration in spring 2025.

Many videos have been suggested on YouTube that are informational and interesting.

Many are not listed - I have been allocated one, yes 1 page, with only four URL's.

Oasys LS-DYNA Environment
Using Oasys PRIMER's Keyword Editor for Faster LS-DYNA Design Changes - This webinar explores the top-tips of using the Keyword Editor, alongside Oasys PRIMER's quick pick functions, to efficiently conduct day-to-day model updates.

Key highlights:
1) **Tips and tricks**, including shortcuts when using the Keyword Editor.
2) **Two live work examples**, demonstrating how to use the Keyword Editor to conduct common design changes such as offsetting shell elements, changing element thicknesses, and cleaning up materials in a model.

GoEngineer - Robert Warren, Sr. Simulation Specialist
Using Simulation to Find the Best Mixing Blender –

This video is an excerpt from our, "A Blend of Analysis for Every Discipline" webinar. Join us on a product development journey to learn how Analysis can help make design decisions in all fields of engineering. In this video, we'll use simulation to help us trial various blender designs before we reach manufacturing. We'll simulate 3 designs to test which one blends for the most homogenous mixture

Shorts 11 seconds and less
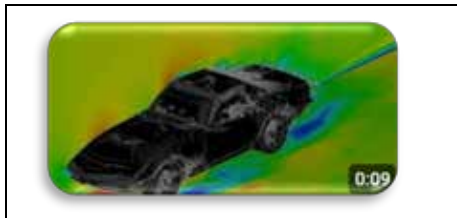
LS-DYNA Multiphysics
ICFD LS-DYNA: CFD of a Stingray C3 Corvette with all the details (even the gas cap is present)
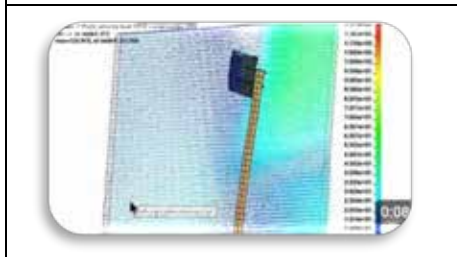
Dennis Chen

LS-DYNA Example Model - DYNA FSI TrafficSign

> "The FEA were performed in LS-DYNA using a viscoelastic material model for the turf and an elastic material for the golf ball and club head." The 2014 Conf. of the Int'l Sports Engineering Assoc.

PDF – Science Direct - The Behavior of Golf Ball Putting on Artificial Turf P. Drane, M. Duffy, J. Fournier, J. Sherwood, M. Breed
Baseball Research Center, University of Massachusetts Lowell, MA, USA
Michael Breed Golf Academy, Manhattan Woods Golf Club, NY, USA
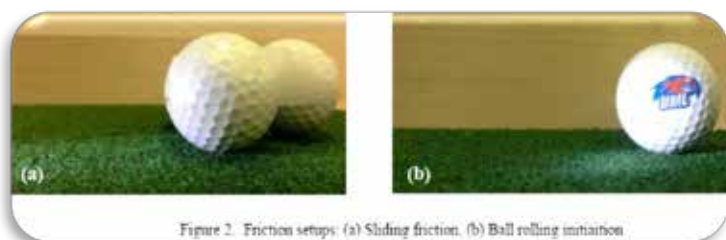
Figure 2. Friction setups: (a) Sliding friction. (b) Ball rolling initiation

Abstract - The putting of a golf ball requires control of the speed and direction and an understanding of the interaction between the ball and the putting green by the golfer. The putt can involve a combination of the ball flying over, skidding across, and rolling on the putting green. This study used finite element analysis as a tool to investigate these behaviors, and this paper documents the results for putts with different initial velocities. **The finite element analyses were performed in LS-DYNA using a viscoelastic material model for the turf and an elastic material for the golf ball and club head.** A high-grade artificial putting turf was characterized by its compressive stiffness in a Universal Testing Machine and displacement of a golf ball resting on turf. The static and dynamic friction between the golf ball and artificial turf were investigated. The ball velocity and deceleration resulting from different putts were examined to help in the characterization of the behavior of the turf. The finite element model will be used in future studies to determine the optimal putter loft and rise angles to achieve consistent putts.

Introduction - Putting is the most common stroke in the game of golf. A fundamental understanding of the mechanics of putting and the behavior of the golf ball can help improve the level of play for the user. The intent of this study is to develop a scientific understanding of the mechanics associated with the rolling and sliding of a golf ball on a putting green and to determine how the club-loft and rise angles affect the distance and control of the putt. Golf coaches teach and golfers strive for consistency in the approach of the club to the ball. Unfortunately, consistency from putt to putt is rarely achieved. Therefore, the objectives of this study are to determine the variables for which a small variation results in essentially the same putting distance. This paper will show how the golf ball transitions from flying, skidding and rolling during putts of several different initial velocities, rotations and trajectories. There are many factors that contribute to the dynamics of the putt, e.g. initial speed, angle of the face relative to the ground (loft angle), the rise or decent angle of the putter, and friction forces. The friction forces present during the putt include friction between the ball and the club face, and the rolling, static and dynamic (sliding) frictions between the ball and the putting surface. Within the scope of the current study, experiments were completed to measure the static coefficient of friction between a common Titlist ProV1 golf ball and a Big Moss Golf (Long Putt 30) artificial putting surface to develop a finite element model that is able to simulate properties of the golf ball rolling on the artificial turf.

The finite element model will provide a tool that can be used to conduct parametric studies that may include how changes in loft and rise angles or other properties of the club, ball and surface influence the resulting putt. The models used in this study are preliminary but provide initial findings and direction towards future experiments and analyses that are intended to study the conditions on natural grass putting greens…

In all countries, candles have been used for centuries as a source of light & ambiance, & they remain a popular decorative and functional item in homes.

Despite their charm, candles pose significant fire risks if not used properly.

I use AI & official websites, for information.
Always check your country and local agency.

Web - **National Fire Protection Association (NFPA) Safety with Candles**
A PDF flyer for candle safety is available on the website page above.

Candles may be pretty to look at but they are a cause of home fires — and home fire deaths. Remember, a candle is an open flame, which means that it can easily ignite anything that can burn.

Roughly one-third of home candle fires started in the bedroom.

More than half of all candle fires start when things that can burn are too close to the candle. Examples: curtains, bedding, furniture, decorations.
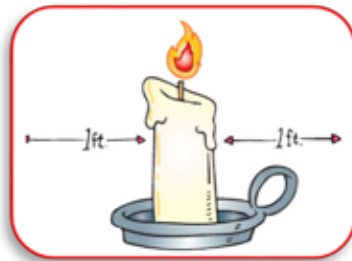
Candles and Kids - Never leave a child alone in a room with a burning candle. Keep matches and lighters up high and out of children's reach, in a locked cabinet.

Excerpts & Additions: If you do burn candles, make sure that you:
- Trim candle wicks to ¼ inch before each use to prevent high flames
- Don't burn a candle all the way down — put it out before it gets too close to the holder or container.
- Don't use candles in cluttered areas.
- During a power outage have flashlights and battery-powered lighting ready to use.
- During a power outage do not use candles without adequate precautions.
- Have Safety Tools Handy - Keep a fire extinguisher or fire blanket accessible.
- Install smoke alarms in every room for early detection
- Light candles carefully. Keep your hair and any loose clothing away from the flame.
- Never use a candle if oxygen is used in the home.
- Never leave candles burning without supervision, especially when sleeping.
- Put candle holders on a sturdy, uncluttered surface such as a table, and heat-resistant surface.
- Use candle holders that are sturdy, and won't tip over easily.

Conclusion – It doesn't' matter what country you are in, fire needs to be monitored.
- While candles can enhance the aesthetic of your home, the risk they pose should not be overlooked.
- By following safety practices and considering alternatives, you can enjoy the beauty of candles without compromising your safety.

Remember, a moment of negligence can lead to devastating consequences
Let's light responsibly!   .

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This paper not only continues to hold relevance, but it underscores the transformative potential of AI in prosthetics. It also serves as a proof-of-concept for integrating AI into clinical workflows. It's a must-read for anyone interested in the intersec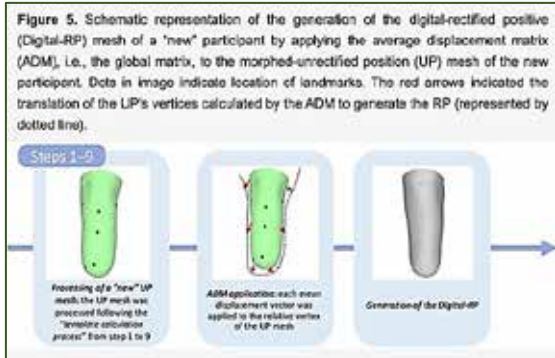tion of healthcare, engineering, and AI. Learn how our APIs can be plugged into advanced applications. We are supporting more and more healthcare with our mesh morphing. It's indeed a key enabler for AI based solutions

Figure 5. Schematic representation of the generation of the digital-rectified positive (Digital-RP) mesh of a 'new' participant by applying the average displacement matrix (ADM), i.e., the global matrix, to the morphed-unrectified position (UP) mesh of the new participant. Dots in image indicate location of landmarks. The red arrows indicated the translation of the UP's vertices calculated by the ADM to generate the RP (represented by dotted line).

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

A.G. Cutti, M.G. Santi, A.H. Hansen, S. Fatone & Residual LImb Shape Capture Group.
· INAIL, Vigorso di Budrio, BO, Italy
· Dept. Ind. Engineering, Univ. Padova, PD, Italy
· Minneapolis VA Health Care Syst, MN, USA
· Dept. Family Med.& Community Health, Dept Biomed. Engineering, U. Minnesota.MN, USA
· Northwestern Univ. Prosthetics Orthotics Center, Dept. Physical Medicine & Rehab, IL, USA
· Dept Rehabilitation Med. U. Washington, WA, USA

The study addresses a critical aspect of prosthetics—the socket, the most patient-specific element of a prosthesis. Traditionally, creating a custom socket involves manual rectification of a plaster model, which is not only time-consuming but also relies heavily on the implicit expertise of prosthetists, leading to variability.
· This innovative research introduces an AI-Powered process to generate prosthetist-specific digital templates, which can automatically rectiry transtibial residual limb shapes.
· By utilizing a training dataset and unsupervised learning, the AI algorithm successfully replicates a prosthetist's rectification process with impressive precision and consistency.

Key Highlights:
· The AI-rectified models showed excellent agreement with prosthetists' manual adjustments.
· The process demonstrates potential for significant time savings while maintaining quality.
· It offers a promising leap forward in the digital fabrication of prosthetic sockets.

Excerpts: 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. Hence, 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) [4,5,6,7,8,9]. 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 [2,3]...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 [2,7,10,11,12,13,14,15,16]. 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 [6].

2. Materials and Methods - 2.1. Digital Process to Generate a Prosthetist-Specific "Global" Template
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.
   (1a)   Manual data collection of training dataset
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.

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.

Marco Evangelos Biancolini
RBF Morph, MeDiTATe Project. LivGemini

We are combining Ansys RBF Morph to get both geometrical and physical parameters in the ROM. Here a related paper. It's not crash but we adopted LS-DYNA.

…2.2 Parametric FEA: The simulations were performed with the commercial FE software LS-DYNA (Ansys, Canonsburg, Pennsylvania, USA). The segmented geometry of the aorta was discretized with triangular shell elements, choosing a

thickness of 2.5 mm and a characteristic length of 1.4 mm (obtained based on a mesh sensitivity analysis), and modeled as a linear elastic material.
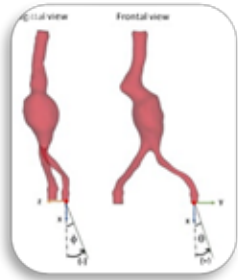
Web - Science Direct - **Towards a reduced order model for EVAR planning and intra-operative navigation**

M. Emendi, E. Kardampiki, K-H Støverud, A.M. Pascual, L. Geronzi, S.K. Dahl, V. Prot, P. Skjetne, M. E. Biancolini
   Dept of Enterprise Engineering, Univ of Rome Tor Vergata, Italy
   SINTEF Digital, Professor Brochs Gate 2, Trondheim, Norway
   Dept of Structural Engineering, The Norwegian Univ of Sci, & Tech, Norway
   SINTEF Industry, S.P. Andersensvei 15B, Trondheim, Norway

The pre-operative planning and intra-operative navigation of the endovascular aneurysm repair (EVAR) procedure are currently challenged by the aortic deformations that occur due to the insertion of a stiff guidewire. Hence, a fast and accurate predictive tool may help clinicians in the decision-making process and during surgical navigation, potentially reducing the radiations and contrast dose. To this aim, we generated a reduced order model (ROM) trained on parametric finite element simulations of the aortic wall-guidewire interaction.

Method - A Design of Experiments (DOE) consisting of 300 scenarios was created spanning over seven parameters. Radial basis functions were used to achieve a morphological parametrization of the aortic geometry. The ROM was built using 200 scenarios for training and the remaining 100 for validation.

Results - The developed ROM estimated the displacement of aortic nodes with a relative error below 5.5% for all the considered validation cases. From a preliminary analysis, the aortic elasticity, the stiffness of the guidewire and the tortuosity of the cannulated iliac artery proved to be the most influential parameters.

Conclusions - Once built, the ROM provided almost real-time and accurate estimations of the guidewire-induced aortic displacement field, thus potentially being a promising pre- and intra-operative tool for clinicians.

The Old Racers Automotive Innovative News & Track

February

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

This study underscores the power of LS-DYNA's ICFD solver and DEP MeshWorks for tackling complex aerodynamic challenges. By leveraging these advanced tools, the Quarkus P3 achieved remarkable aerodynamic improvements, ensuring performance and safety for the Pikes Peak race.

Web - DEP Europe Customer Success Story -
[Optimizing Aerodynamics for the Quarkus P3 Pikes Peak with LS-DYNA and DEP MeshWorks](#) **– pdf available**

2024 Int'l LS-DYNA Conf., USA -
 N. Van Dorsselaer, M. Le Garrec, V. Lapoujade
                (Dynas+)
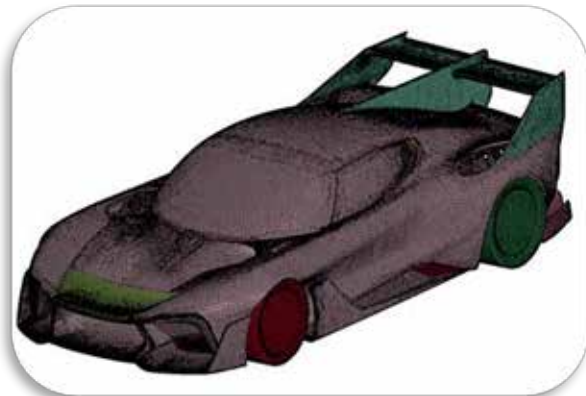
Abstract - **The study of external aerodynamics is a cornerstone of vehicle development, particularly in the context of energy efficiency and high-performance racing**. This publication highlights the use of LS-DYNA's ICFD solver and DEP MeshWorks for optimizing the aerodynamics of the Quarkus P3 Pikes Peak Version.

With simulations performed across multiple altitudes and speeds, the study explores methodologies for reducing drag, increasing downforce, and improving airflow to enhance engine performance under extreme race conditions.
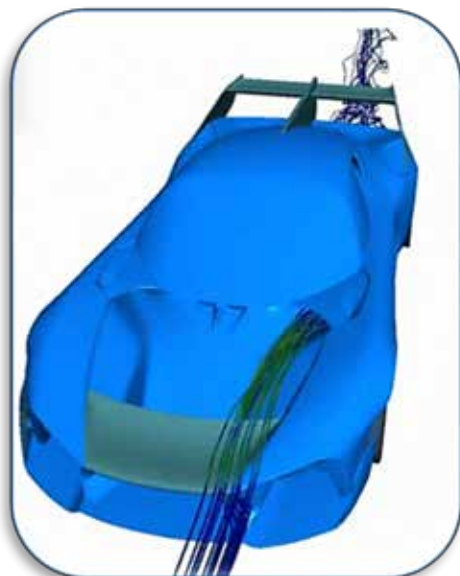
Key Insights from the Study

Objective: Optimize the Quarkus P3 for the demanding Pikes Peak race, balancing drag reduction and downforce improvement.

Challenges Addressed:
- High altitudes impacting aerodynamic performance.
- The need for efficient airflow to the engine and enhanced stability in sharp turns.

The Old Racers Automotive
Innovative News & Track   **February**

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

Technological Advantages:
- DEP MeshWorks enabled rapid design changes and mesh modifications.
- LS-DYNA's ICFD solver facilitated accurate simulations across varying conditions.

Results:
- Increased downforce by 134% with only a 19% increase in drag.
- Improved airflow to the engine by 10% with minimal drag impact.
- Up to 4% improvement in front downforce with optimized splitter length.
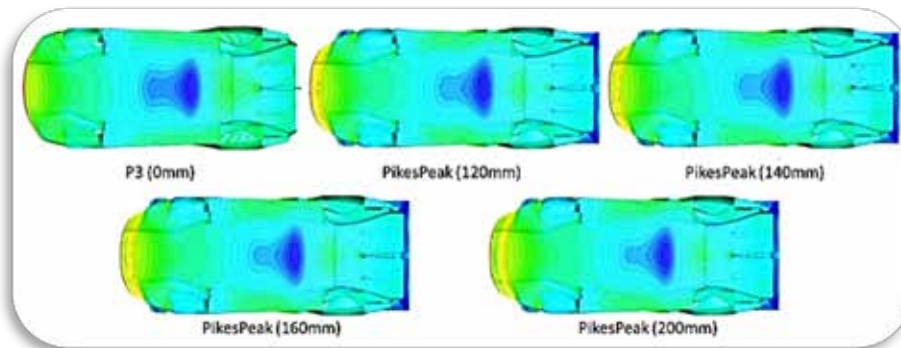
Advanced Aerodynamic Optimization Techniques

Simulation Workflow:
- DEP MeshWorks used for meshing the vehicle's complex geometry.
- LS-DYNA's ICFD solver applied to simulate airflow and aerodynamic forces.

Design Iterations:
- Modifications tested: rear spoiler size, front splitter length, air intake scoops, and bodywork internal flows.
- Sensitivity studies performed on splitter length, drag/lift ratios, and engine air intake performance.

Innovating for Racing and Beyond - The Quarkus P3 Pikes Peak Version exemplifies how DEP MeshWorks and LS-DYNA drive innovation in high-performance vehicle design.

These tools are not only pivotal for racing applications but also extend to energy-efficient vehicle development in commercial contexts.

As Dynas+ and Quarkus continue their collaboration, future innovations will integrate additional fluid-structure interactions and enhanced design methodologies to push the boundaries of performance further.

The Old Racers Daughter Automotive Innovative News & Track
Everyone Knows his daughter. You yell, "HEY, slow down!"

February

> **What's coming down the pike? Cars I want to drive!**
> **Cars I feature are designed with software that prioritizes both performance and safety.**

Who doesn't love a Corvette! I have to share the quote by Dustin Gardner, Assistant Chief Engineer – Small Block Engines, "The way the horsepower builds – with that constant torque – feels like you're strapped to an aircraft carrier. You're getting fired off in a jet plane..."

Web – Chevrolet - The unthinkable has arrived

Now let's review some specs so you can order your ZR1. Their website has video's of the car, interior, engine, and all you need. I want yellow! I've listed a few of the specs:

Performance - With a potent twin turbocharged 5.5L V8 engine and edge-to-edge aerodynamics, ZR1 can attack any road both fast and strong.

LT7 5.5L DOHC V8 engine - Twin turbo with flat-plane crankshaft
8,000 RPM - Redline
8-Speed Dual-clutch transmission
Flow-Through Hood and ground effects

The new intercooler with flow-through hood and spoiler helps cool turbo-charged air to extract airflow. The front splitter, paired with an underwing and smooth underbody helps generate suction under the vehicle to maximize downforce and reduce drag.

Large side air inlets feature signature carbon-fiber wishbone bezels. This paired with the new rear brake cooling ducts allow for additional engine cooling while maximizing air intake.
·   Low Rear View of a Yellow Chevy Corvette ZR1
·   Available ZR1 Carbon Fiber Aero Package

The potent carbon-fiber wing, underbody strakes and carbon-fiber dive planes work together to produce the highest downforce of any production Corvette in history

US Airforce Picture of the Month

Clearing obstacles - Military Working Dog Eper, 10th Security Forces Squadron, runs through the MWD obedience yard with his handler, Senior Airman Colin English, 10th SFS MWD handler, at the U.S. Air Force Academy, Colo., Dec. 17, 2024. The squadron recently upgraded the obedience yard, installing state-of-the-art turf to enhance the training environment for both handlers and their canine partners.

(U.S. Air Force photo by Trevor Cokley)

Touch-and-go - A B1-B Lancer assigned to the 28th Bomb Wing at Ellsworth Air Force Base, S.D., takes off for a touch-and-go operation at Grand Forks AFB, N.D., Dec. 18, 2024. Seventeen B-1Bs and 800 Airmen from Ellsworth AFB will temporarily relocate to Grand Forks AFB, for approximately 10 months, by the end of January 2025.

(U.S. Air Force photo by Airman Emma Funderburk)

Training mission - An F-22 Raptor assigned to the 433rd Weapons Squadron, U.S. Air Force Weapons School, takes off for a training mission at Nellis Air Force Base, Nev., Jan 7, 2025. The USAFWS teaches graduate-level instructor courses that provide advanced training in weapons and tactics employment to officers and enlisted specialists of the combat and mobility air forces.

(U.S. Air Force photo by Airman 1st Class Michael Sanders)

Airbus engineers are using a modified A320 aircraft to test and mature a new radar for Eurofighter combat jets. What's flying up there? Unusual flying objects have always caused a stir. And that has probably also been the case in Braunschweig, Germany, on January 21, 2025. That was when attentive observers were able to see a very special aircraft in action for the first time over the airfield of the German Aerospace Center (DLR): the DLR's modified A320 ATRA, which just completed its first flight. ATRA stands for "Advanced Technology Research Aircraft".

Web – Airbus - **A unique test aircraft: the A320 with the Eurofighter nose takes off for the first time** - What makes this research aircraft so extraordinary is its "nose", which is not the one you see on a regular Airbus A320 commercial aircraft. The A320 ATRA is equipped with the nose of a Eurofighter jet that Airbus engineers from Manching developed and assembled specifically for the test aircraft.

Flying "test bed" for new Eurofighter radar - But why does the A320 ATRA need a new nose at all, and why one from a fighter jet? "We are operating the aircraft in close collaboration with the DLR and the German Armed Forces to test a new radar for the Eurofighter and bring it to maturity," explains Airbus E-Scan radar project manager Thomas Hirsch. And for this, the test aircraft needs to have a corresponding front section to house the so-called AESA-MK1 radar (Active Electronically Scanned Array).

To ensure that the A320 ATRA can accommodate its new nose without any problems and fly safely with it, engineers and mechanics from Airbus Defence and Space and Commercial Aircraft have designed a complete new front section and reinforced the A320 airframe. All modifications were carried out in accordance with the proper procedures of the type-certification holder, Airbus Commercial Aircraft in Toulouse. In addition to integrating the new nose, the teams will, in a next step, also install extensive test equipment in the A320 ATRA cabin, including a customised Eurofighter avionic test rig and supporting cooling and power infrastructure requirements.

Longer test time under real conditions - Now that the first flight has been successfully completed, testing can begin this year. But why isn't the new radar being tested directly on a Eurofighter? "The A320 ATRA has a significantly shorter clearance process and can stay in the air longer than a Eurofighter," says E-Scan radar project manager Hirsch. This means that the "testing time" in a real-life environment, i.e. in the air, is considerably earlier, quicker and with a longer duration on an A320. These aspects significantly speed up the radar development process.

Upon completion of the development, the AESA-MK1 radar is then to be integrated and used in the latest generation of Spanish "Halcón I" and German "Quadriga" Eurofighters - and make the fighter jet even better than it already is. The radar will improve the Eurofighter's capabilities in air-to-air and air-to-ground operations and also equip it with electronic warfare functions.

The development of Bayraktar KIZILELMA, Baykar's indigenous and original aircraft, which is set to become Türkiye's first unmanned fighter jet, continues according to the established test timeline. The production prototype of Bayraktar KIZILELMA, has successfully passed yet another flight test..

Web – Jan. Press Excerpts - TEKİRDAĞ / ÇORLU - **BAYRAKTAR KIZILELMA Passes Yet Another Flight Test**

SYSTEM IDENTIFICATION TEST - The production prototype of the indigenous unmanned fighter jet, Bayraktar KIZILELMA PT-3 (tail number TC-ÖZB3), successfully completed another flight test at the AKINCI Flight Training and Test Center in Çorlu, Tekirdağ. During the test, the aircraft also conducted system identification activities.

MORE POWERFUL, MORE AGILE - Baykar continues to rapidly develop the Bayraktar KIZILELMA, Türkiye's first unmanned fighter jet. Building on the experience gained from the initial prototypes, the company has made significant modifications to the production prototype, including structural improvements and advancements in the aircraft's avionics architecture. In this context, the Bayraktar KIZILELMA has flown with a successfully integrated afterburner engine alternative. With its new, more powerful engine, the aircraft is set to approach the speed of sound, enabling superior maneuverability at higher speeds, thanks to aerodynamic improvements. Equipped with an AESA radar, which provides high situational awareness, the Bayraktar KIZILELMA will be capable of accomplishing even the most challenging missions.

AIRBORNE IN RECORD TIME - Baykar launched Project Bayraktar KIZILELMA, fully self-financed, in 2021. The Bayraktar KIZILELMA (tail number TC-ÖZB) rolled off the production line on November 14, 2022, and was deployed to the AKINCI Flight Training and Test Center in Çorlu, Tekirdağ. After completing and swiftly passing all ground tests at the center, the aircraft made its maiden flight on December 14, 2022. In just one year, the Bayraktar KIZILELMA took to the skies—setting a record time.

MANY FIRSTS IN AVIATION HISTORY - The Bayraktar KIZILELMA achieved unprecedented milestones in global aviation history during TEKNOFEST 2023. After completing formation flights with the Bayraktar AKINCI UCAV, the aircraft performed a close formation flight as part of a fleet alongside the F-16 fighter jet SOLOTÜRK and the F-5 jets known as the Turkish Stars above Istanbul on May 1, 2023. These flight concepts, which represent a turning point in global aviation history, are set to shape the future of aerial warfare.

CAPABLE OF TAKING OFF AND LANDING ON SHORT-RUNWAY VESSELS - Capable of taking off and landing on short-runway vessels, the Bayraktar KIZILELMA will be a revolutionary platform in the field of combat. Built to operate on short-runway vessels like TCG Anadolu—which Türkiye constructed and is currently conducting cruise tests with—the aircraft will play a pivotal role in overseas missions. This capability positions it strategically in the defense of the Blue Homeland.
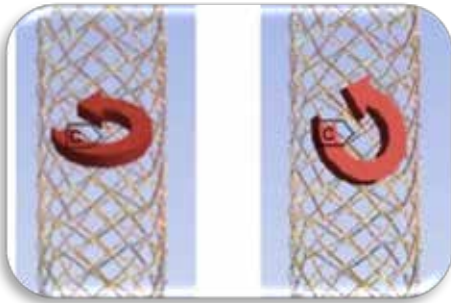
Web – Science Direct - Fatigue analysis of canine tracheal stents using the finite element method
   Hun-Young Yoon, Jin-Young Choi
Dept of Veterinary Surgery, College of Veterinary Medicine, Konkuk Univ., South Korea
KU Center for Animal Blood Medical Science, Konkuk University, South Korea

Abstract - This study aimed to evaluate fatigue of three stent designs when various forces are applied and perform a comparative analysis. **A computer simulation using the finite element method was performed. In particular, we constructed a three-dimensional finite element model of nitinol stents with three designs** (S6: single-woven wire, wire diameter: 0.006 inch; D6: double-woven wire, wire diameter: 0.006 inch, and D7: double-woven wire, wire diameter: 0.007 inch) that are used to treat canine tracheal collapse (TC). The stents were subjected to a 200 mmHg compression force, a pure torsion force in a perpendicular direction, and a bending-torsion force combining perpendicular and axial forces. The von Mises stress was calculated to evaluate the extent of stent displacement, and Goodman diagrams were plotted to compare fatigue life cycles. D7 exhibited a longer fatigue life compared to S6 and D6. Under compression, pure torsion, and bending-torsion forces, displacement was the smallest for D7, followed by D6 and S6. Similarly, the fatigue life was the longest for D7, followed by D6 and S6. S6 showed the greatest displacement when subjected to external forces; among stents designed using the same wire, D6 displayed less displacement than S6, and D7 exhibited superior fatigue life when subjected to varying degrees of force. **This study showed that the structural stability and fatigue life of stents could be effectively compared using finite element method D7 has the greatest stability and structural rigidity under cyclic load.**

Introduction - **Canine tracheal stents are medical devices that can restore airway patency and immediately ameliorate respiratory failure in canines with end-stage tracheal stenosis**. Tracheal stent placement is a minimally invasive procedure that is performed under general anesthesia and is usually followed by rapid recovery from anesthesia and symptom improvement, thereby allowing patients to be discharged on the same day … stent placement is effective in rapidly improving the quality of life of patients.

Conclusions - In this study, fatigue analysis of stents was conducted through cyclic loading by applying a virtual tracheal stent environment through FEM. When a tracheal stent is applied to a dog with severe TC, more precise design and experiments are required to examine whether the characteristics of fatigue can change depending on the periodic symptoms and the dog's condition. Further research is needed to develop an effective evaluation method for stents applied to dogs.

The Old Cattle Rancher's Ranch
No one knows his name. You yell, "HEY, old rancher."

February

Agriculture, Animals, Soil, Equipment, Cattle
and whatever he wants.
My dog, Scout, & my horse, Cowboy St. Cloud, MN, USA

Wanted to share the snow/ice & great sunset view from my ranch porch in St. Cloud, Minnesota,

X. Bai, Y. Jiang, Z. Shen, R. Liu, Z. Liu
School of Naval Architecture &Ocean Engin., Jiangsu University, China
Taihu Lab. Deepsea Tech. Science Lian Yun Gang Center, China

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

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

Conclusion - This work investigated the ice-induced vibration characteristics of a typical jacket platform in the Bohai Sea. The interactions between sea ice and the platform were simulated employing a new common-node DEM approach. Modal analysis was conducted on the jacket platform model, alongside measured inherent frequencies, to validate the dynamic characteristics of the simplified jacket model. Using a controlled variable method, the study examined the ice loads and ice-induced vibration characteristics of the JZ20-2NW platform's conical structure under varying ice conditions, including ice thickness and ice speed.

Town secretary
My Virtual Travel Outing
Thank you for joining me on my monthly visit.
Let's take a tour to a museum, landmark, or studio.

February

Revs Institute **is** a haven for scholars, preservationists, and passionate connoisseurs of automotive history. The museum in Naples, Florida is a working facility and home to the Miles Collier Collections — over one hundred significant automobiles built between 1896 and 1995.

1995 McLaren F1

1989 Trabant Type P601L

1988 Arrows A10B Formula 1

1974 Jorgensen Eagle 7400 USAC

1971 Porsche 917K

1971 Porsche 908/03

1963 Chevrolet Corvette Grand Sport Coupe

1962 Lotus Elite Series II S.E.

1962 Jaguar E-Type

FEANTM Town Comic Blog Chronicles
located in a *mostly* non-existent rural area of Livermore, CA

February 2025

RheKen AI Investigator	Dinky CERT Squirrel	Chat's Help Desk

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!

Dinky, Ranch Squirrel division for CERT.
The Critter Emergency Response Team.

I'm a fearless first responder, and also a journalist.
I publish my very own *Dinky News in a Nutshell. *

Please note: "I'm a squirrel. Always double-check for accuracy—after all, *you're* the human here!"

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	February

RheKen, Town investigative reporter

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

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

I report about the residents.

FEANTM Coffee Shop

Dad Chat   **Mom GPT.**

I was having a cup of AI coffee when suddenly, at the following table, the Old Rancher and the Town Secretary argued. That seemed an everyday occurrence, so we all sat and watched them bickering at each other.

Listening to the Rancher and Secretary argue, I decided he claimed, and she volleyed back with a decibel-level screeching that could break the glass. It wasn't difficult to know she was baking a blueberry pie and calling it The Maddeline Special. That name sounded more fitting for a freight train than a pie. The entire town knew she named it after my blue cousin from ChatGPT AI Town, where logic is voted supreme.

In the middle of their arguing sat Aunt Agatha. Aunt Agatha is the Supervisor's Aunt. She insists we all call her Aunt Agatha, and she's the newest and, I dare say, bossiest town resident. Many town residents, including me and Chat Helper, are a little afraid of her.

She glanced at them both with a bored yet manipulative expression and said with a sly attitude, "Why don't you two just agree to disagree, and you both bake a vanilla cupcake and a chocolate one."

A cupcake? They both looked like deer caught in headlights, staring at Aunt Agatha like the woman lost her mind.

The Rancher politely said, "Aunt Agatha, I think we've got this." The Secretary screeched, "Got what, old man? I don't have it. What am I supposed to have."

The Secretary then used her quiet, serene voice, which was very seldom heard, and replied to Aunt Agatha, "Oh, Aunt Agatha, the Supervisor will love that idea; she loves cupcakes. Thank you for always being so, uh, uh, inclusive." We all looked at the Secretary with questioning expressions about why she would use the word inclusive. She shrugged and gave us all her usual two thumbs up as if she had just solved it all.

I did a Chat Helper's internal facepalm, which almost short-circuited my head circuits.

Aunt Agatha laughed and took a bite of each cupcake. It was easy now to understand what the Supervisor inherited from eating two cookies simultaneously. Now that Aunt Agatha got her reaction from both of them, she said, "Silly children, bake two of each kind, give one to the other, and then you both have one."

The coffee shop went quiet; you couldn't even hear a napkin drop. It only took a minute, and the Secretary screeched at the Barista. "She has a great idea! Serve my new Maddeline Blueberry.

RHEKEN – Aunt Agatha the Arbitrator

Pie to Rheken! After all, she's related to Madeline. See "Blue." Do you get it?

The Barista looked at Rheken and politely said, "RheKen, you usually only have coffee. Do you want the blue pie plus the Rhubarb and two cupcakes?" The Rancher laughed, "Not a blue pie.   It's a Blueberry pie, but RheKen would rather have my Rhubarb Pie."

The Barista, usually customer-friendly, award-winning smile, put her hands on her hips and said, "That's it. You're all getting apple pie."

She stomped over, put an apple pie before Aunt Agatha, and said, "Slice it up and eat a slice, got it?"

She then turned to RheKen and huffed, "RheKen, fix this mess of who eats what, who wants what; I'm taking a break, I need a new outfit." Then she yelled louder, "SECRETARY, take over the counter and just give everyone coffee however you want to brew it."

Aunt Agatha looked at everyone and said, "I'm not sure what a new outfit will fix but I think our Barista forgot to yell, YeeHaw?"

I logically dialed my parent's Dad Chat and Mom GPT. Dad answered, and I whispered, "Dad, I have a problem in the coffee shop." I relayed the details of what transpired in a concise PowerPoint slide.

In his quiet, peace-keeping tone, Dad said, "Now, daughter, calm down. I looked over your slide, and it seems you have what your townies call a dilemma. I'll let Mom GPT talk to you." RheKen thought, oh sure, push it off on Mom like always!

Mom calmly said, "Oh, just put me on speaker phone in that backwater coffee shop in that town with no brain." RheKen kept shaking her head yes and yelled, "Hey everyone, Mom is on the phone." All heard a loud groan, and a few looked as if they would faint.

Mom GPT, in her logical and non-emotional way, solved it by saying, "Hey there, Rancher, got my tractor lessons written down; I'd like to go over them in an hour."

He replied, "Not yet. It's funny that I was leaving to do that when the Secretary rudely started yelling."

The Secretary started to yell, but Mom GPT amplified her voice to a higher volume, and the windows in the coffee shop shook, "Hi there, Secretary. Do you have that recipe you were going to fax to me, let's say, within an hour?"

The Secretary cringed but answered, "Uh, well, funny you ask that since it's home, and I was leaving when this old coot Rancher started arguing. I can go get it."

RHEKEN – Aunt Agatha the Arbitrator

Mom GPT then diplomatically said, "Well, why don't you and the Rancher both head home now so that you can accomplish the tasks? Since you live next to each other, take home an Apple Pie, one new Maddeline Blueberry pie, and a Rhubarb Pie. You can do your taste tests. Additionally grab the cupcakes from Aunt Agatha or whatever she calls herself. As your townies probably say, Aunt Agatha ain't going to starve without a few more calories that she obviously doesn't need. Better yet, I suggest you take Aunt Agatha to help you decide."

They both yelled at the same time, "We've got this! No need for Aunt Agatha to be bothered. Nice chatting with you, Mom GPT. We'll get back to you in about an hour, day, or a week." Both the Rancher and Secretary went racing out of the coffee shop and could be seen racing their trucks out of town!

Mom GPT said, "And that, my daughter, is how you do things logically and without emotion. Well, it's also rather manipulative but a win-win. So, if you move home to CHATGPT AI town, you would not have to deal with those FEANTM townies!"

I wisely said, "Mom, MOM? are you there? The town is having trouble with cell phone towers! Mom, there is too much static; your voice is wavering; I'll call you back tomorrow."

Aunt Agatha asked me, "Rheken, dear, as an AI, can you tell fibs?" I quickly answered, "Bye, Aunt Agatha; I have to get over to the Old Rancher and investigate how the pies are doing." With that, I raced out of the coffee shop. All the coffee shop patrons jumped up and followed me.

Aunt Agatha didn't even look upset that everyone had vacated the coffee shop, leaving her tables full of primarily not-eaten pies. She smirked and moved a few of the remaining pies before her.

She said, "Oh, Barista, you can come out now. You and I will have some girl talk, and we can enjoy the pies. You can't put them back in the counter showcase, so let's do our taste test. The coffee is still warm, and I don't have to pay for pie slices. You and I will have some good gossip. But first, dear, now that you've calmed down, why not get us a nice plate of cookies we can share with the pies."

The Barista wisely smiled and calmly replied, "Of course, Aunt Agatha, I think I'll also put out the Closed sign so no one comes in and bothers us."

The Barista quickly called me, whispering, "Rheken, everything is calm at the coffee shop and I'll keep Aunt Agatha busy so she won't drive to the ranch."

She then closed the coffee shop for a few hours and brought the cookies to the table.

After I pulled up to the Rancher's ranch with the rest of the entire town, we could hear that the arguing and screeching continued.

It almost sounded normal to me.
When their arguing sounds normal?
That is a thought for another month!

NEWS IN A NUTSHELL
By Dinky the ranch squirrel
I'm a squirrel!
Always check the information.

**February
Lilly, Teacup &
Team**

Once upon a time, in the bustling town of FEANTM, the Critter Emergency Response Team (CERT) was celebrated for their dedication to ensuring the safety of all residents—both human and animal. Their teamwork with neighboring Livermore's local police, sheriffs, and firefighters was legendary, always ready to respond when disaster struck.   After weeks of relentless rain, the sun finally broke through the clouds one crisp morning.

In the nearby pasture, a group of baby squirrels were scavenging for seeds when they heard faint cries for help. Peering into a collapsed rabbit hole, they froze as the tiny voices grew clearer: "Help! We're stuck! The hole caved in!"

Their bushy tails twitched in alarm, and one of them squeaked, "Quick! Call Teacup! She's an honorary member of the Livermore Pleasanton Fire Department (LPFD), and she'll know what to do!"

Teacup, a feisty squirrel with a bright red cowboy hat perched jauntily on her head, raced to the scene. She assessed the situation with sharp eyes and a quick mind and barked orders to her brothers. "Go get Dad! We need to evaluate the soil before we can start a rescue." She learned that from her mom, Lilly, a civil engineer squirrel. She then quickly told everyone what Mom said: I think we had too much rain. The ground can liquefy into a mudslide when it can't absorb water. This was more like a soil cave-in, also known as a trench collapse. It can be caused by excess moisture saturating the soil, making it unstable, especially when combined with loose or sandy soil types. We had no heavy machinery or buildings, so I ruled out vibrations. Improper shoring or support systems during excavation. This had to be from changing weather conditions that alter soil pressure, like underground water flow, existing cavities, or voids in the soil. Either way, these bunny tunnels are filling in, and we need to shore up the area.

Dad arrived moments later, armed with a shovel, but his attempts to dig out the hole proved futile as the loose, rain-soaked soil kept collapsing.

Switching tactics, he used his powerful back legs to burrow deeper, but again the unstable ground worked against his effort.

Meanwhile, Teacup and her baby brother darted to a second hole nearby, calling down into the darkness. "Hello? Are you down there?"

The muffled response of scared bunny babies confirmed her worst fears—they were trapped, too frightened to dig themselves out.

DINKY – Saving Baby Bunnies

As the situation grew dire, the family sought reinforcements. The medical doctor cat arrived, listening carefully to confirm the bunnies' location and health, while Dad coordinated with Senior Bear of the Livermore Police Department (LPD). Together, they began digging a safer, more strategic tunnel. Suddenly, a bunny was able to pop up out of the hole.

Nearby, Junior Bear joined forces with Mom Bunny and an LPFD rescue bunny to create an adjacent passage, carefully working in drier soil to avoid another collapse.

Teacup sprang into action again, grabbing the phone to deliver a succinct SITREP (Situation Report) to Lindsey, an LPFD liaison to FEANTM Town. "Lindsey, we have a big problem. Baby bunnies are trapped in multiple underground tunnels. The soil is too saturated from all the rain, and the tunnels keep collapsing. We need human assistance!"

Recognizing the urgency, Lindsey rallied her special crew. Firefighters arrived swiftly, each assigned to a specific collapse site. They train for emergencies of all types and are always there to help.

With skill from training & determination, they dug carefully. It only took them minutes, and they rescued one baby bunny after another. As each little one emerged, they were cradled gently and reassured that they were safe.

With Teacup close, the firefighters explained the dangers of soil saturation and erosion to the baby critters, emphasizing the importance of seeking shelter during heavy rains. The baby squirrels and bunnies listened intently, promising to burrow in the barn's hay during storms instead of venturing into unstable tunnels.

And, as often happens in tales of heroism, the story ended with a sweet twist. A few of the baby bunnies, and baby squirrels smitten by the rescuers, begged to go home with the firefighters. The firefighters happily adopted them, giving each one a name and took them home.

And so, everyone—bunnies, squirrels, and firefighters alike—lived happily ever after, safe, warm, and ready for the next adventure in the town of FEANTM, where happily ever after is a must!

CHAT - Aunt Agatha? Who is Aunt Agatha?

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 a piece of 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.

Remember: You've Got this!

In the "Almost-a-Town" of FEANTM, Where Reality Takes a Coffee Break

In the not-quite town of FEANTM—a speck on the map so insignificant even Google refuses to acknowledge its existence—my day began with the town hall secretary calling me. Not from her desk, mind you, but from the local coffee shop. Naturally, I assumed she was inviting me over for coffee.

WRONG.

Instead, she screeched in her signature banshee pitch, "Aunt Agatha is in town! The Supervisor is hiding until she leaves. I told her *you'd* explain fruit. Hurry up—I can't keep her distracted forever. CHAT, SHE'S GOT AN APPLE."

Ah yes, another day in paradise.

"Wait," I asked, stalling for time, "Who is Aunt Agatha? Is she your aunt?"

The secretary huffed loudly enough to disturb nearby pigeons. "Why would the Supervisor hide if she were MY aunt? Chat, stop stalling. Oh, *get it - stall,* like in a barn? HA! Just get over here already. I told her to hold the apple until you arrive!"

And just like that, I knew I was over my pay grade. But duty called—or maybe it just screeched—so I drove to the coffee shop, bracing for whatever new disaster awaited.

Aunt Agatha: The Purple Enigma

As soon as I walked in, it wasn't hard to spot Aunt Agatha. She was a vision in purple: cowboy hat, jacket, boots, and possibly a purple aura of menace. The only thing untouched by the color was her hair—gloriously gray and untouched by dye.

She sat at a corner table, staring at an apple like it was a suspicious alien artifact. I approached cautiously and decided to start politely.

"That's an apple you've got there," I ventured.

She smirked, her eyes twinkling with mischief. "No, dear, it's a healthy red Magic 8 Ball, and the answer it's showing is, 'Yes, this is Chat from the lowest floor of the town hall."

"Ah," I replied, plastering on my best non-smile. "So, you've heard of me?"

"Heard of you?" she drawled. "Chat, sweetie, we're in California, and the way your secretary screeches, people in Europe have heard of you."

Fair point.

CHAT - Aunt Agatha? Who is Aunt Agatha?

The Battle of Fruit vs. Chocolate

""Well," I said, "Why are you staring at the Magic 8 Ball apple?"

She leaned forward conspiratorially. "I was wondering why you're so obsessed with fruit. Look here, dear." She held up a luscious brownie. "Now tell me, which pairs better with coffee: this gorgeous chocolate brownie or that apple?"

I knew this was a trap. This woman played conversational chess, and I was just a pawn about to get checkmated.

"Well, Aunt Agatha," I began carefully, "I don't suppose you know why the Supervisor isn't in her office today?"

She grinned—a grin that sent a chill down my spine. "Oh, Chat, my darling niece is hiding because she thinks I'll make her eat that apple."

"Does she know you have a brownie?" I countered, trying to regain some ground.

Her eyes sparkled with pure mischief. "Now, son, what fun would that be?"

The Great Apple Sacrifice: At this point, I knew I had to act fast. "Excuse me for a moment," I said, retreating to grab a coffee and dial the Supervisor. Whispering into my phone, I hissed, "She's got a brownie. Get here NOW. I'll eat the apple."

Returning to the table, I plucked the apple from Aunt Agatha's gloved fingers and took a dramatic bite, chewing with exaggerated enthusiasm. "Delicious!" I declared, channeling my inner Cheshire Cat. "The Supervisor is on her way. Please, Aunt Agatha, give her the brownie. A happy Supervisor makes for a happy town. And maybe while you're at it, you could discuss the benefits of fruit?"

Agatha raised an eyebrow and produced some grapes from her seemingly bottomless handbag. "Oh, she feeds these to the ravens in her backyard. That counts, right?"

"Absolutely," I said, realizing resistance was futile.

Mission Accomplished (Sort Of)

As the Supervisor finally arrived, I saw Aunt Agatha's grin widen. "The secretary said you'd eat the apple to solve the situation. My niece and I despise apples unless they're in a pie form." She stood, tossing the brownie to her niece with a wink.

Across the room, the secretary gave me a double thumbs-up.

"Well, Aunt Agatha," I said, trying to make a graceful exit, "I'm so glad I could help. If you need me, I'll be on the lowest floor of the town hall. Feel free to visit while you're in town!"

Crossing my fingers behind my back, I headed for the door, silently swearing never to underestimate purple-clad relatives or their brownie-wielding schemes.

 Life in FEANTM may be chaotic, but I wouldn't trade it for the world—or at least not for a town where fruit wasn't an existential crisis.

Goodbye Page - Come Back Soon

FEA Not To Miss & More

Please come back soon!

Buildings & campsites are available

In memory of Molly

Our beloved resident Molly passed away on January 23rd. That loss is felt deep in one's gut as if it will never end. Below is for all of us who have lost a pet or someone you truly loved.

By Irving Townsend, "We who choose to surround ourselves with lives even more temporary than our own, live within a fragile circle; easily and often breached.

Unable to accept its awful gaps, we would still live no other way. We cherish memory as the only certain immortality, never fully understanding the necessary plan.

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 And Friends of USA