Entering Town FEANTM

Research, Development
Camping, Horse Trails

population virtual
Welcome

Monthly Town Hall Meeting
Engineering, Research, Interests
www.feantm.com

BAYKAR

Pratt & Whitney

Rancher – Altair

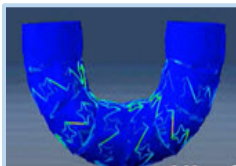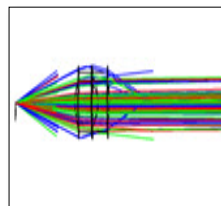**Racer BMW & Airbus**

Abhinav - My Physics Café

Seppi/Marta - OASYS
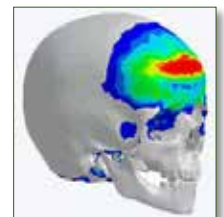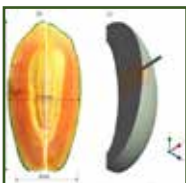
Jenson - DFE Tech

Marco - MeDiTATe

Metin - OZEN Engineering

Markus - CADFEM

Churchill – Food - ANSYS

Sabyl – Dog Health - ALGOR

Bala - RLE India – Meeting Rm.

FEA NOT TO MISS & MORE

Editors: (alpha order) Anthony, Art, Brett, Churchill, Marnie, Marsha, Sabyl, Shweta, Taylor

Jr. Editors: Rheannon and Kensington (yes, she likes pink)

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."**
     They are all brothers - strange family

Contact us at: feaanswer@aol.com
Attribution: **Map Vector & town vector graphics are courtesy of vecteezy**

We will always remember

Parking & Coffee is free.

Horse Trail ➡️　　　　Yield right of way to horses

R & D Technology

Business Park Plaza

RV CAMPING
Park in any vacant camping site

TOWN HALL

Library

CADFEM

DFETECH

IOZEN

d3VIEW

Oasys

GITTENS consulting

rescale

ENGINSOFT

Lawrence Livermore National Laboratory

Fire & Police Depts.

Coffee Shop
News
Marsha & Marnie

SIMQ

Wake Forest University School of Medicine

HOSPITAL
Research

rbf

MEDITATE

Auto Race track & Auto Industry

Petting Zoo

Old Rancher

Riding Center

FEANTM Barn Social WELCOME

Convention Barn Welcome

Elect/Water. & Sewage Treatment Plant Facilities

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

Table of contents

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Welcome to our Town Hall Meeting & Announcements

Town Hall Meeting

Park Cars behind building

Park Tractors behind cars

Tie horses to hitching rails

Free coffee & lots of New Year Cupcakes!

The town consists of individuals who are passionate about finding solutions, as well as caring about animals and children.

Town Gossip is at the local coffee shop.

Pets are welcome. Horses, pet goats stay outside.

1. Dinky is yelling about nose booping. Taylor had a nose boop fail with a baby duck. Yes, that was a baby duck - see Dinky's pages. Do you have a nose boop of a pet's nose? Send it to feaanswer@aol.com subject "nose" – about a 3-inch jpg picture.

2. We re-elected John as Mayor, expertise, knowledge - to save space add the adjectives.

3. The Rancher and Secretary voted themselves in for 2024! Can you vote yourself in?

4. Welcome back to town Curt Chan – AutoDesk! - You thought that you wouldn't miss us?

5. Welcome new editor, Churchill, bringing news from the food & related industries.

6. Meeting room: "How can a CAE engineer bring CAE crash simulation results to closely match real-time crash test results." Hosted by Balamanikandan A. – CAE specialist.

AND we are off to start the New Year – resident returing home, new editor, new reservations for the meeting room. Yep, gonna be a good ride on the 2024 trail.   Yeehaw!

Article:
Optical Testing Fixture Modeling in Zemax - a device or setup designed to evaluate and assess the performance of optical components, devices, or systems.

Article:
Biomechanical stress - a child falling on the edge of a piece of kindergarten furniture. The impact simulations were performed within Ansys Workbench using the LS-DYNA ACT Extension.

YouTube Webinar:
By Noor Zulaikha Sumardi

Ansys Motor-CAD
(Thermal Analysis for BPM Motor)

Research Hospital:
Rahul Vellaparambil - Computational Comparison of the Mechanical Behavior of Aortic Stent-Grafts Derived from Auxetic Unit Cells

My Physics Café: CAE Analyst and a passionate blogger

Imagine you are a member of a space project team, and for the next two weeks you and your team of experts need to work very hard for the launch of a new satellite to explore the lunar surface. How would you prioritize and manage financial constraints while striving towards the project's overall goals?

Well, that's really challenging. Isn't it?

EXCERPT [Exploring the Moon on a budget: How Leveraging the 'Laws of Physics' Saves Costs in Lunar Missions](#) For any space project, the most important aspect that defines its overall goals is the Finance or project cost. A significant challenge that must be overcome is the high cost. Yes, for any space project, it takes careful planning in addition to resources that may not always be there at hand or on call. Numerous missions to date have failed and the money spent on those has also gone to waste.

Hence, a space exploration mission should be affordable. Ever since Engineers & Scientists have tried to solve this problem by thinking about effectively utilizing physics to our advantage.

The laws of physics play a crucial role in the planning and execution of space missions. For example, the rocket equation, which describes the relationship between the velocity of a rocket and the amount of fuel it needs, is used to determine the optimal launch trajectory for a spacecraft.

The law of conservation of energy is used to calculate the amount of fuel required for a spacecraft to land on the lunar surface and then return to Earth. Additionally, the law of gravity is used to calculate the spacecraft's trajectory as it approaches the lunar surface.

Let's dive into an important concept used in lunar missions - When a spaceship or satellite is sent to the moon, its path is in the form of a figure '8' that encompasses Earth & the Moon. This should remind us of why space agencies (like NASA, ISRO, JAXA) implement such orbits when sending their ships off into outer space.

Engineers have discovered that this 'design' or path requires much less energy than an elliptical orbit. First of all, it goes without saying that a perfect ellipse is one of the options for getting to our nearest celestial neighbor.

But if there is any inaccuracy in trajectory calculation, however slight it may be (a consequence of an inaccurate understanding of physics at that time), then the ship would either run into Earth or miss the Moon point-blank.
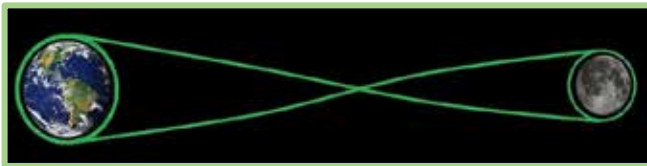
If the ship's path resembles a figure eight then it is because at some point the gravitational pulls from Earth & the Moon are in direct competition against each other. The ship will change directions by turning into one of these forces and moving along their lines of force until another force takes hold and causes the ship to turn in another direction.

As long as the gravitational pull on one end balances out with that of whichever planet the spaceship is orbiting, then it can maintain a safe trajectory while saving fuel and hence the cost!

The Indian space program (ISRO) has set the bar for first time missions with one of their most successful Mars Orbiter Mission (MOM) at a cost of just INR 450 million ($73 million). This figure was a small fraction of what NASA had spent on similar missions, making MOM the least costly mission to ever reach Mars!

…The article is continued on the website

News from Livermore, CA - LLNL website: A Lawrence Livermore National Laboratory (LLNL)-led team has developed a method for optimizing application performance on largescale graphics processing unit (GPU) systems, providing a useful tool for developers running on GPU-based massively parallel and distributed machines.
.

EXCERPT
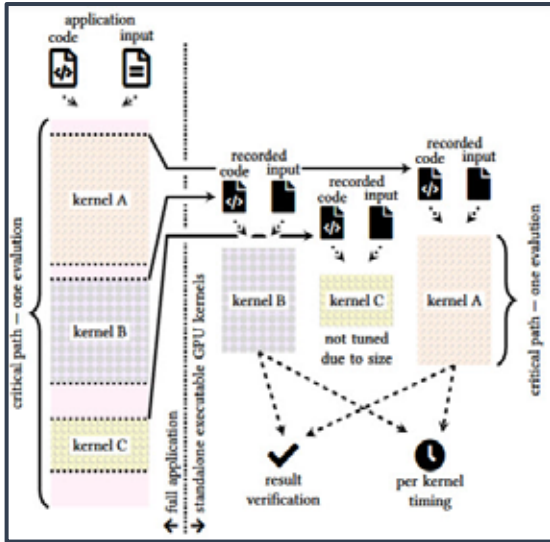
Scalable Tuning of (OpenMP) GPU Applications via Kernel Record and Replay - HPC is a heterogeneous world in which host and device code are interleaved throughout the application. Given the significant performance advantage of accelerators, device code execution time is becoming the new bottleneck. Tuning the accelerated parts is consequently highly desirable but often impractical due to the large overall application runtime which includes unrelated host parts.

We propose a Record-Replay (RR) mechanism to facilitate autotuning of large (OpenMP) offload applications. RR dissects the application, effectively isolating GPU kernels into independent executables. These comparatively small code lets are amenable to various forms of post-processing including elaborate auto-tuning. By eliminating the resource requirements and application dependencies, massively parallel and distributed auto-tuning becomes feasible.

Utilizing RR, we run scalable Bayesian Optimization to determine optimal kernel launch parameters. LULESH showcases an end-to-end speedup of up to 1.53×, while RR enables 102× faster tuning compared to existing approaches using the entire application.

Excerpt - With the advent of heterogeneous high-performance computing (HPC), both systems and applications have moved the bulk of computation onto GPU accelerators. While scalable tuning large software systems has always been challenging, the heterogeneous nature of applications, and the consequently complicated compilation toolchain, have made it even harder. Especially large applications need scalable solutions for any non-trivial tuning effort. Given that a full application tuned for a realistic workload exposes various tunable code regions, e.g., GPU kernel invocations, which themselves expose multiple co-dependent tunable parameters, the search space is often enormous. If a single evaluation of an explored configuration is as expensive as a full run of the application, the number of tuning steps is severely limited. Besides, significant time commitment, other resources also restrict when and how tuning can be done. Real-world applications often come with complicated build systems that specify many explicit dependencies and require high-end systems to be executable in the first place. Further, partial tuning efforts, e.g., after a new GPU kernel was added or an existing one was substantially modified, could require the same amount of effort as full application tuning, which is wasteful and often impractical. In this work we present a practical solution to the scalability problem for large application tuning. At the core of our work is a record-and-replay mechanism for (OpenMP-originating[1]) GPU kernels. After the application was executed once in record-mode we can replay each GPU kernel in isolation. Since the replay has no ties to the original application, original input data files, or build dependences, we can migrate it to a different machine with a compatible GPU architecture[2]. Further, tuning can be done selectively for important kernels only, and it can be parallelized easily as there play mechanism is completely self-contained…

Did you know that a papaya is a fruit that is high in nutrients and antioxidants. It is a yellow-orange fruit with edible seeds.

The FE model of the puncture-test was developed using the ANSYS 19.1 software. The proposed framework combined the finite element method and statistical procedure to validate the simulation with the experimental results.
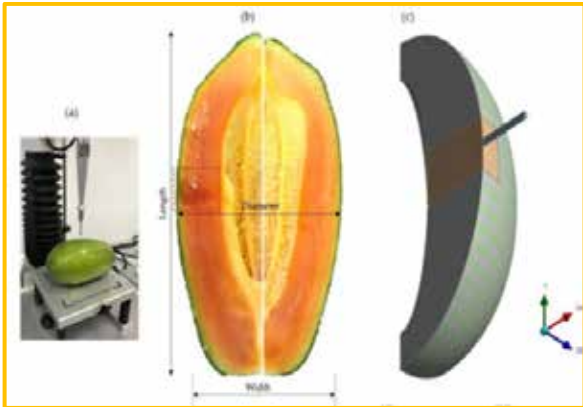
Excerpt Open Access – MDPI - **Finite Element Modelling for Predicting the Puncture Responses in Papayas**

N. Zulkifli, N. Hashim, H. H. Harith,
M. F.M. Shukery, D.I. Onwude, M. Sairi

· Dept. of Biological & Agricultural Eng., Univ. Putra Malaysia,
· SMART Farming Tech. Res. Ctr., Univ. Putra Malaysia,
· Dept. of Ag. & Food Engineering, Univ. of Uyo, Uyo, Nigeria
· Malaysian Agricultural Res. & Dev. Inst. Serdang, Malaysia

Abstract - **This study aims to develop a finite element (FE) model to determine the mechanical responses of Exotica papayas during puncture loads. The FE model of the puncture-test was developed using the ANSYS 19.1 software.** The proposed framework combined the finite element method and statistical procedure to validate the simulation with the experimental results. Assuming the elastic-plastic behaviour of papaya, the mechanical properties were measured through tensile test and compression test for both skin and flesh. The geometrical models include a quarter solid of papaya that was subjected to a puncture test with a 2 mm diameter flat-end stainless-steel probe inserted into the fruit tissues at 0.5 mm/s, 1 mm/s, 1.5 mm/s, 2 mm/s, and 2.5 mm/s. The FE results showed good agreement with the experimental data, indicating that the proposed approach was reliable. The FE model was best predicted the bioyield force with the highest relative error of 14.46%. In conclusion, this study contributes to the usage of FE methods for predicting the puncture responses of any perishable fruit and agricultural products.

Introduction - Papaya is one of the commercial fruits that is widely planted in most tropical and sub-tropical countries. Yet, the average post-harvest losses reported for papaya in Malaysia is estimated at around 44% each year [1]. Therefore, the availability and accessibility of the papaya must be increased by reducing the number of post-harvest losses. Reduction in these losses would increase the number of fruits available for consumption and thus leads to growing consumer demand. This can be achieved by maintaining the textural quality and improving the shelf-life of the papaya during the handling process, mainly during the distribution from farm to retail.

Papayas are often exposed to deterioration of physical structure caused by rough handling during post-harvest operations. The area or spot of impact can then serve as infection sites for numerous wound pathogens that result in many severe diseases [2]. These spots, even without infection by pathogens, are unsightly and cause moisture loss and excessive shrivelling [3,4]. Besides, the textural property of fruits may decline greatly during the post-harvest supply chain. For instance, exposure to cold temperature reduces the respiration rate and induces the effect of shrinkage of the fruit's skin [5]. Since papaya is consumed after peeling, not only is its freshness reduced but it also becomes prone to desiccation leading to spoilage…

Autodesk – As we welcome this new year, I want to make sure you didn't miss the article by Annaka Ketterer.   Please visit our website for the complete year in review.

Annaka Ketterer, "Reflect on the past year with us, from product announcements to new features, in this comprehensive Fusion 2023 year in review."

Excerpts - Autodesk Fusion 2023 Year In Review
By Annaka Ketterer

2023 was a big year for Autodesk Fusion. Not only was it our 10-year anniversary, (cue "Happy Birthday" song), but we also delivered six major product updates focusing on new and improved features across all Fusion workspaces and made key announcements that showcased our future product vision."

Sharing our product vision at AU23 - This year at AU23, we shared more details about our long-term vision for Autodesk Fusion and how we plan to get there.

Let's quickly recap two of the largest announcements.

· **Fusion industry cloud for manufacturing** - Imagine if you could achieve productivity gains, make better decisions, and maintain a competitive advantage by unlocking the value of an open data model and automation tools. Imagine if you could further bridge the gap between engineering, development, machining, and business processes. The Fusion industry cloud for manufacturing will represent a new era of connected data and collaboration for individuals, teams, and entire organizations to design and make anything.

· **Autodesk AI** - Demand for new products and ideas is accelerating across the design and manufacturing industries. With expectations to do things faster, at lower costs, and higher quality, harnessing the power of AI is no longer a nice-to-have—it's now a must to keep up. We're currently developing Autodesk AI, technology that augments creative exploration and problem-solving, automates tedious and repetitive tasks, and analyzes project data to offer predictive insights.

Fantastic features & exciting enhancements - Now, let's take a look back at key feature highlights from 2023, from new ways to maximize your design process to more efficient toolpath strategies.

Performance & usability - With each Fusion release, we aim to improve the speed with which you can get things done through computational and workflow performance enhancements. Beyond the in-the-weeds usability and performance improvements we made this year, we also delivered two game-changing updates.

The first is a refreshed sign-on experience that's consistent with other Autodesk products and adds an additional layer of security through single sign-on (SSO). The second is enabling Fusion to run natively on Apple Silicon, which lets Apple M1 or M2 computer users leverage everything their machines have to offer.

Design & engineering - The workspace you know and love got even more powerful this year thanks to a few milestone new features, along with general performance enhancements.

Unlock more flexibility with configurations - Configurations in Fusion provide an intelligent way to maximize the utility of your parametric designs. They allow you to create and manage multiple design variations from a single, unified model, enabling unprecedented flexibility in design and manufacturing workflows.

Easily access and insert fasteners - You wanted an easier way to insert fasteners into your 3D models, and we listened. Fusion now has a Fasteners Library. To access it, simply select the Fastener icon to access a vast library of nuts, bolts, and washers.

Duplicate with joints - The new 'Duplicate with Joints' command enables you to duplicate a component or subassembly that has joints associated with it and quickly joint it in one or many additional locations. This is a massive workflow efficiency improvement and helps speed up the previously tedious task of copying and jointing components.

Drawings enhancements - The Drawings workspace in Fusion saw a plethora of enhancements this year that further streamlined the drawings workflow. Among them are Copy with Drawings, which lets you copy a design and its related drawings, Surface and Mesh support, allowing you to seamlessly create 2D drawings of Mesh and Surface Models, and the ability to place Model Properties and Model Parameters into any text field on your drawing.

(Oh, and you heard it here first: something big is coming to the drawings space next month, so stay tuned.)

Manufacturing - Whether you're into additive or subtractive manufacturing, there is sure to be something this year that has the potential to completely change the way you work. Let's take a look back at some of our favorite new features across the full manufacturing spectrum.

Subtractive manufacturing
Throughout this year, we focused on providing you with features that allow for more flexibility with your day-to-day operations. Part of this effort meant releasing new and exciting milling toolpaths to automate your manufacturing process, and the other part involved making quality-of-life enhancements and updates to our Tool Library and Machine library.

Milling - The Deburr Toolpath Strategy automatically detects all of the external sharp edges and removes remaining burrs across the entirety of the part, the Geodesic Toolpath Strategy allows freeform surfaces to be machined using either a Blend or Scallop type, and Incline Flats for the Flat Machining Toolpath detects your defined tilt angle range and finds and cuts all the flats within that range.

Turning - Allow Inside to Outside for Face Turning gives you the ability to face a part starting from the smallest diameter and working your way out to the largest. Machine Groove Undercuts for Profile Finishing lets you move vertically into the undercut region to allow the finish machining of the undercut diameter. Last but not least, Back Wall Collision Checking for Undercuts for Groove Finishing helps you minimize potential collisions while maximizing the undercut area…

Annaka is a Community Specialist at Fusion 360, who in her free time enjoys playing guitar, learning new design software, and exploring the world of Industrial Design.

DFE-tech: We offer comprehensive software solutions that span the entire range of physics, providing access to virtually any field of engineering simulation that a design process requires.

On our YouTube Channel we provided a Webinar by Noor Zulaikha Sumardi: Ansys Motor-CAD (Thermal Analysis for BPM Motor)

Webinar: Ansys Motor-CAD (Thermal Analysis for BPM Motor)
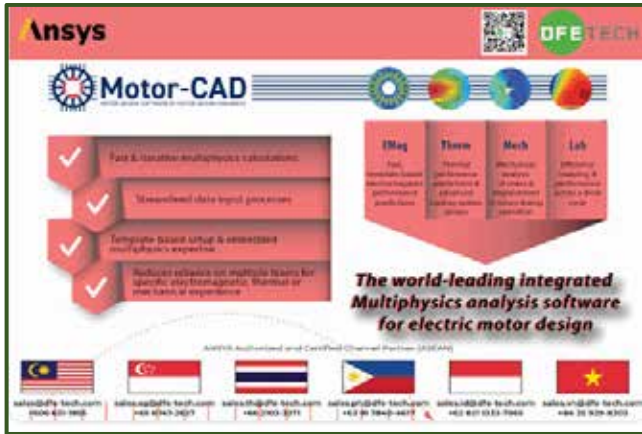
Webinar:
Ansys Motor-CAD (Thermal Analysis for BPM Motor)

The audience will be able to set up the thermal analysis for BPM motor and analyze the steady state and transient thermal of BPM motor using Ansys Motor-CAD.

Key Takeaway:

- Familiarise with Ansys Motor-CAD modelling tools for designing the geometry and winding
- How to assign materials and calculation in Ansys Motor-CAD
- How to generate the field plots, output data and graph in Ansys Motor-CAD

Motor-CAD enables design engineers to evaluate motor topologies and concepts across the full operating range, to produce designs that are optimized for performance, efficiency and size. Motor-CAD's four integrated modules, which is Electromagnetic, Thermal, Lab and Mechanical, enable multiphysics calculations to be performed quickly and iteratively, so users can get from concept to final design in less time.
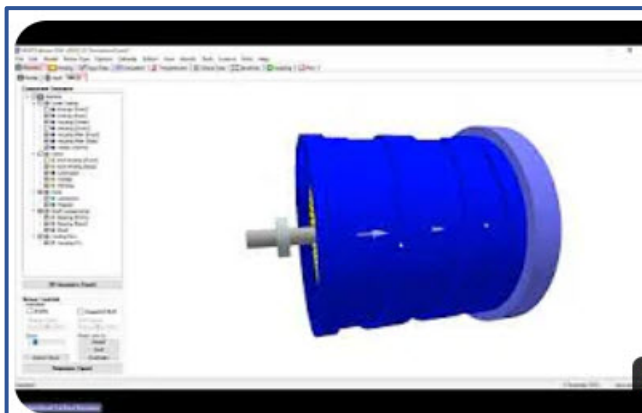
Motor-CAD delivers high-fidelity, 2D/3D analysis capability enabling users to analyze end-effects, demagnetization, core loss, hysteresis and other advanced electromagnetic phenomena, calculate the thermal envelope for operation and design complete motor cooling systems.

With decreasing development cycles, motor designers need to make design decisions quickly, and with certainty that they will not face problems down the line. Fast calculations and streamlined data input processes leave time for Motor-CAD users to explore more motor topologies and fully assess the impact of advanced loss effects in the initial stages of a design.

On our YouTube Webinar you can follow the video and follow using the transcript feature.

Did you miss the final 2023 case study from their website?

JSOL will continue to have more case studies throughout 2024.

Shear flow calculation for filler-filled liquids using the particle method (MPS). It can also be applied to homogenized viscosity prediction of composite materials.

[Analysis Example] Viscosity of the suspension
Fluid analysis of filler dispersion systems using the particle method (MPS).
This model can handle highly filled fillers with complex geometries. In addition, interactions between fillers and between solvents/polymers and fillers can be considered.

Objectives and Methods - Solid particles (fillers) with sizes of around 1 μm dispersed in a liquid are called suspensions, and the evaluation of their physical properties and analysis of their mechanisms are important in many industrial fields,

Figure 1. Suspension calculations using VSOP-PS (left: micro model, right: meso model)

such as inks and battery electrodes. Here, we introduce examples of viscosity evaluation.

VSOP-PS, one of the engines of J-OCTA, uses the particle method (MPS = Moving Particle Simulation (or Semi-Implicit) method) to solve the Navier-Stokes equations, the basis of fluid dynamics.

It is possible to compute solid particles in a fluid, and two models can be selected. We refer to the left side of Figure 1 as the micro model and the right side as the meso model. In the micro model, one solid particulate is modeled as "multiple yellow spheres" connected together. In the meso model, one solid particle is represented by "one yellow sphere". The micro model can model complex solid particle shapes. On the other hand, solid particles in the meso model are more coarse-grained, resulting in the ability to calculate systems containing many solid particles.
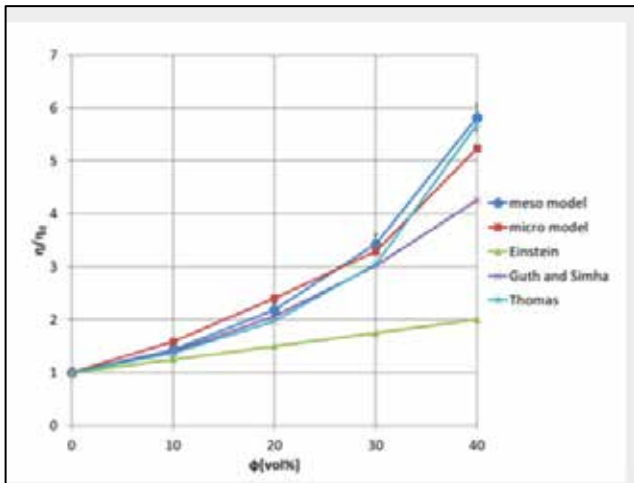
Results - Figure 2 shows the relationship between the volume fraction of solid particles and the viscosity of the suspension.

Except for VSOP-PS (meso model and micro model), the other curves are based on well-known models, respectively.

The two VSOP-PS results are close to the Thomas model, which is often referenced in the high concentration range.

For solid particulate dispersion systems in liquids, the free version of OCTA already includes KAPSEL, which is based on the Smoothed Profile Method and provides highly accurate simulations of various phenomena in suspensions.

On the other hand, VSOP-PS is being developed to target a wide range of phenomena such as droplet and evaporation phenomena, flow field in porous media, thermal coupling, etc., by taking advantage of the particle method. VSOP-PS and KAPSEL can be used separately for each target.

CADFEM India YouTube Simulations:

Rapid growth in unmanned aircraft systesm (UASs) and tech has sparked massive expansion. Lower costs make them accessible to the public, raising saftey concerns due to inexperience. Ensuring safe operation and minimizing injury from non-professional use is crucial.

Our YouTube Channel - Human-Drone Interactive Safety - A Comprehensive Study on the Effects and Mitigation of Drone Collisions with Humans

The focus was in particular to the protection of persons and property on the ground or in the potential impact zone in the event of an accident.

The operational limits are defined by the maximum take-off mass (MTOM), the threshold kinetic energy (KE) or the potential injury that can occur due to the collision.

These criteria have historically been mostly derived from military studies. However, the application of these established procedures is problematic due to the different nature of the UAS characteristics (design, materials, dimensions, speed) and leads to significant limitations of the UAS operations, especially for small UAS.

The aim of the contribution was to assess and practically verify various methods used for the safety assessment of the collision of a sUAS and which are currently being developed or used to regulate the possibilities of flying these machines.

The results of the work presents a suitable basis for aviation authorities, as they offer a practical validation of the existing procedures and identify the ambiguities between these methods.

Summary:
- **Material Selection**: Choose materials that offer a balance between strength, weight, and durability. Common materials include lightweight metals, composites, and high-strength plastics
- **Design for Structural Stability**: Employ structural design principles to ensure stability and rigidity. Consider factors such as the overall frame structure, load distribution, and the integration of support elements like struts and braces
- **Impact Resistance:** Design drones with the potential for impact in mind. Reinforce critical areas to withstand collisions and minimize damage, especially in applications where drones may encounter obstacles
- Failure Mode Analysis: Identify potential failure modes in different components of the drone, such as the frame, arms, and connections. Develop strategies to prevent or mitigate failures through redundancy or structural reinforcement
- **Aerodynamic Considerations:** Factor in aerodynamics during the design process to ensure that the drone can withstand varying wind conditions. Consider the effects of aerodynamic forces on structural stability
- Injury Severity: Drone collisions with human heads can cause severe injuries due to the impact force, especially if the drone is moving at a significant speed or has sharp components.

The impact simulations were performed within Ansys Workbench using the LS-DYNA ACT Extension.

In order to investigate a particular hazard scenario in kindergartens, they turned to CADFEM.

Images: © Institute for Occupational Safety and Health (IFA)

Biomechanical stress arising from a child falling on the edge of a piece of kindergarten furniture
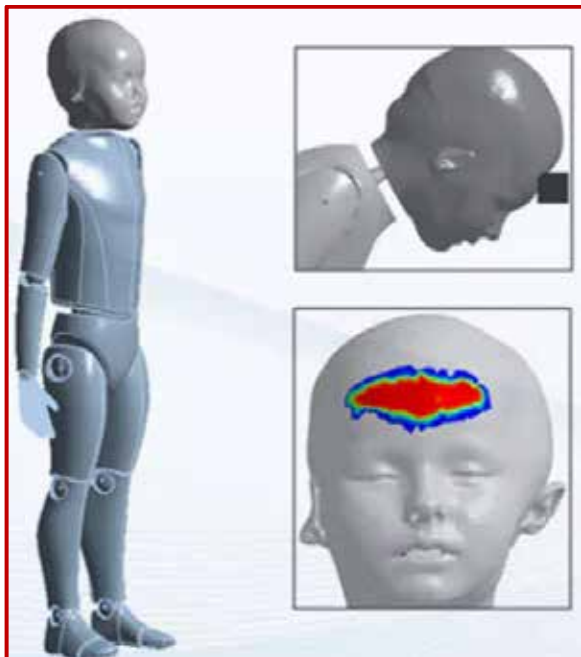
Sector: Engineering firm/development service provider,

HealthSpecialist field: Biomechanics, Structural mechanics

Biomechanical stress arising from a child falling on the edge of a piece of kindergarten furniture

Task - The Institute for Occupational Safety and Health (IFA) provides support to the statutory accident insurance institutions in Germany when it comes to scientific and technical issues relating to occupational safety and health protection. Developing appropriate guidelines for the design of furniture edges usually requires a complex series of tests which facilitate the determination of various load scenarios that would affect a child's head in the event of a fall that is followed by an impact on a given piece of furniture.

Naturally, human experiments are out of the question, so the IFA has been investigating new ways of dealing with this that would make it possible for them to issue reliable statements concerning the damage in view. In collaboration with CADFEM, a simulation model was created for the purpose of answering this very question.

Following creation of the simulation model and development of a corresponding workflow, those involved were able to calculate and evaluate different impact scenarios by altering a variety parameters. A variety of impact points – such as the forehead and the cheek – were allowed for, and impact velocities and edge radii were subjected to modifications.
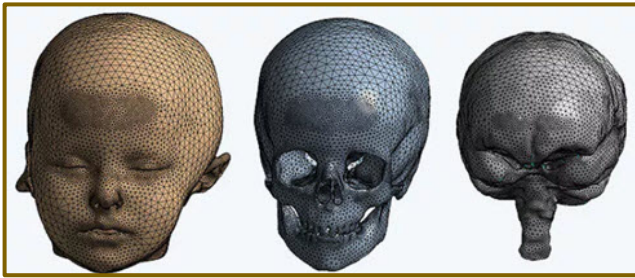
Mesh-generated components of the head c: a complete head, a skull, and brain mass.

Solution - The simulation was based on real CT (computed tomography) scan data, which was transferred into a digital geometry model (STL) and then linked with Ansys ICEM so that numerical calculations could be performed.
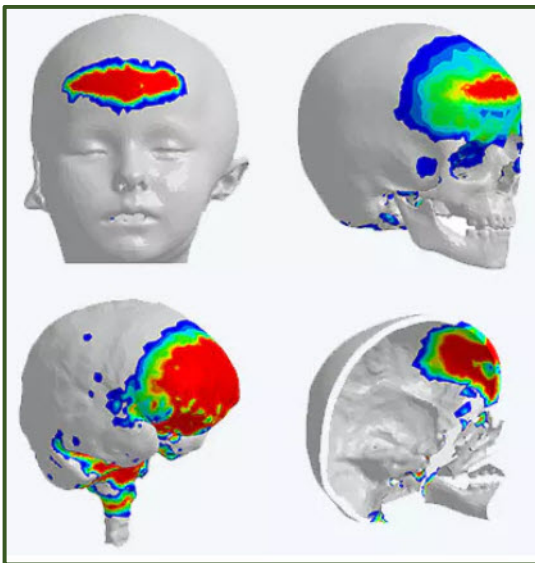
pic Loads occurring on and around particular components of the head (going clockwise): a complete head, a skull, a section of a skull, and a brain mass.

Since impact tests are, for ethical reasons, not feasible, the corresponding investigations must be carried out using dummies or virtual models. Numerical simulation has enormous advantages over costly series of dummy-based tests – which, in any case, only ever produce very limited results.

Courtesy of Institute for Occupational Safety and Health Customer Benefit

Once a simulation model has been created, a broad variety of camber-based variants can be simulated, automatically evaluated, and then compared with each other within a short space of time.

When it comes to dummy tests, it is necessary that the point at which particular data (relating to, for example, forces or acceleration) is to be measured and evaluated be precisely defined for any given test.

When it comes to simulations, on the other hand, all the data contained within the entire body model remains available at all times. Furthermore, CT scan data can be used to create realistic models of the head – which then also provides data from within the inside of the skull.

News from the DYNAmore Nordic Website.   I have great news for students in the Nordic or Baltic states to get training & support for their thesis.

Additionally, if you missed the news DYNAmore Nordic has relocated.

Are you a student interested in doing your master's thesis using LS-DYNA?

Visit our website to find information about how to get started with LS-DYNA and to receive free support and learning resources.

You can register your thesis with us for extended support and training.

Offered to thesis students at universities or companies that are current customers of DYNAmore Nordic residing in Nordic or Baltic states.

Among the upcoming seminars:
Jan 24, Jan 30. Mar 12
    Introduction to LS-DYNA - Anders Bernhardsson, Marcus Gustavsson,
March 12
    From Explicit to Implicit Simulation Models in LS-DYNA - ONLINE TRAINING - Anders Jonsson
March 19
    LS-DYNA, Simulation of sheet metal forming processes - Mikael Schill

Relocation:

We are joining forces with Ansys Sweden at their existing premises.

Friday, November 10 was the date for the big move.

We had already inaugurated our new office by giving an Introduction to LS-DYNA seminar in our new premises.

There is no change in personnel in connection with the move. We're simply moving offices. We wish you all welcome to visit us and our colleagues at our new location.

Ansys Sweden and DYNAmore Nordic

Oasys: In response to ageing infrastructure and the desire to improve passenger experience, the MTA launched the New York City Transit (NYCT) Subway Enhanced Station Initiative (ESI) Program, which aims to improve the user experience of Subway riders by refurbishing stations, introducing modern enhancements, and performing vital repairs.

Future performance assessment of Grand Central Station-42nd Street Subway, New York City using Oasys MassMotion

Arup's People Movement team utilised 3D immersive technology and a Virtual Reality (VR) environment to create a ground-breaking, user-centric perspective for design review for the Grand Central Subway Station.

Project Overview - The 3D and VR environments were created using an Oasys MassMotion model which enabled the designers to step into the station, visualise the space they were designing and experience the acoustics, lighting and signage systems. The main purpose of the ESI program is to improve the user experience for the 400,000 passengers who pass through Grand Central Subway Station daily.

How Oasys proved invaluable - Oasys MassMotion is a pedestrian and crowd simulation software that aims to capture and simulate the ways in which people behave, move, and interact with one another, as well as the space that they are present in. MassMotion can not only be used to simulate human movement, but also analyse it. It can be used for tasks involving modelling where people linger the most, what areas of a model are the busiest over time, and what areas of a model have the potential for improvement to increase pedestrian flow and safety.

Arup used MassMotion to assess how the Grand Central-42nd St Station's mezzanine level may perform in the future when improvements to the station are completed. These improvements included relieving congestion highlighted by the MassMotion pedestrian model, but also using VR to represent how the finished station improvements would impact the impeded sightlines, obstructions to movement and improved wayfinding in the existing station. Improved lighting, wayfinding, architectural finishes and interactive dashboards were all aimed at making the station more pleasant for passengers. To achieve the subjective design aims of improving the overall experience for station users, many disciplines collaborated and supported one another with the aim to come together to achieve this goal. Using VR to bring together these different aspects, as well as inserting the crowd movements from MassMotion to assess exactly how the intersecting disciplines work affected and supported one another on the project is discussed within this case study…
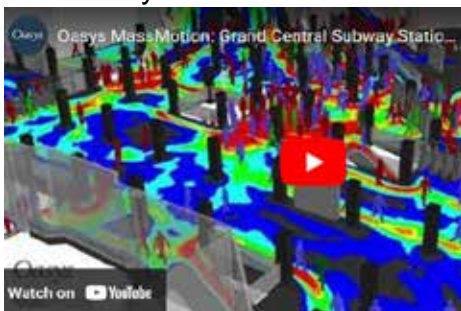
**Watch our video
on YouTube**

OZEN Engineering: Next month Feb. 22, 2024 is our conference during National Engineers Week at the Computer History Museum in Silicon Valley.
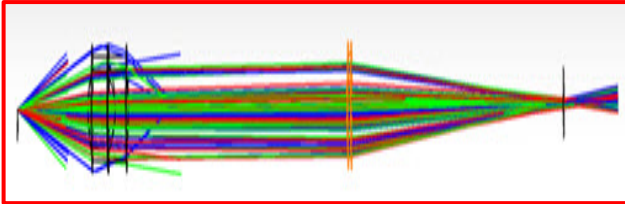
Excerpt: **Optical Testing Fixture Modeling in Zemax**
By Jeffery Huang

Optical testing fixture is a device or setup designed to evaluate and assess the performance of optical components, devices, or systems. These fixtures are commonly used in various industries. The primary goal of optical testing is to ensure the accuracy, quality, and reliability of optical devices and systems.

Below is a typical optical lens testing station model in Zemax non-sequential mode. The purpose is to evaluate the characteristics of lenses, such as focal length, focal point diameter, distortion, and aberrations. The fixture holds the lens in a precise position relative to the testing equipment. For instance, focal length testing, this fixture is a specialized setup designed to accurately measure the focal length of optical component (marked in orange in Figure 1). The focal length is a critical parameter that defines the distance from the lens to the image or focal point, the last plane of the system...
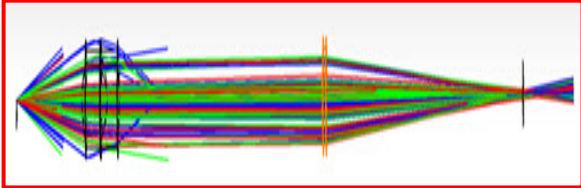
Figure 1 Test fixture configuration - The main optical components of the above system are off-the-shelf parts from Thorlabs. The light source is a white light LED from Thorlabs, part No: LEDW7E.

OZENCON Venue on Feb 22, 2024

OZENCON: **Feb. 22, 2024 - Venue - CHM**

 This one-day conference will provide detailed insight into how leading companies are utilizing simulation to advance their product development. We will bring together ANSYS users, partners, developers, and industry experts for networking, learning, and sharing of new ideas.

The website has the complete information

The CADFEM Conference is back: They are looking forward to finally meeting you in person on April 10-11, 2024 at the Darmstadt Science & Congress Ctr.

Secure your ticket now for the largest event for simulation & digital engineering in the German-speaking world!

CADFEM Conf.

CADFEM Conference 2024

Empowering Digital Engineering - April 10-11, 2024

1 ticket, 2-day event, unlimited expert knowledge | April 10-11, 2024 | Darmstadt Science and Congress Centre.

About 700 users and decision-makers, six parallel sessions with international keynote speakers and top-class user presentations as well as our evening event await you.

With your registration, you will receive the following benefits:
- Access to all keynotes and presentations on April 10-11, 2024
- Lunch, snacks, coffee and other drinks on April 10-11, 2024
- Evening event on 04/10/2024 with entertainment program as well as dinner & free drinks

Please note that there may still be changes. The complete program will be available in our event app for the CADFEM Conference 2024. This mobile app will be available to all registered participants from the end of January 2024…Please visit the website for complete mobile app information

Among the Keynotes Not To Miss!

Matthias Alberts
CEO, CADFEM Germany GmbH

Dr. Jörg Hermes
CEO, SEW-EURODRIVE GmbH & Co KG

Dr. Ian Roberts
CTO, Bühler AG

Stefan Seidel
CTO, Pankl Racing Systems AG

Steve Pytel
VP/Head of Product Management, Ansys, Inc.

Conference times
 April 10, 2024
- Registration from 7:30 a.m.
- Plenary 9:00 a.m. - 12:00 p.m.
- Program 9:00 a.m. - 6:00 p.m.
- Evening event 7:00 p.m. - 12:00 a.m.

 April 11, 2024 -
- Admission from 7:30 a.m.
- Program 8:30 a.m. - 3:00 p.m.
- Closing plenary session 3:00 p.m. - 4:00 p.m.

d3VIEW: Did you miss our latest D3View presentation? We introduce you to the latest ML features in d3VIEW with graphics and explanations of the features.

What is machine learning? It is a data analysis technique that builds a model with the data and uses the model to predict. It learns from the data, identifies patterns and produces reliable predictions.

Machine learning techniques are being used today and with advancements in modern computational techniques, machine learning will continue to grow in use and importance.

Below are our first two slide in our presentation. Among the presentation categories you will find:
 1. Introduction, 2. Exploratory data analysis, 3. Data engineering, 4. Feature engineering, 5. Learning, 6. Prediction,   7. Reporting

Introduction to Machine Learning Capabilities with Demo –

For your presentation copy or questions contact:
       info@d3view.com .

d3VIEW is a web multi-application platform, that accelerates product development by harnessing HPC to deliver data-insights from simulations, experiments and generic scientific data.
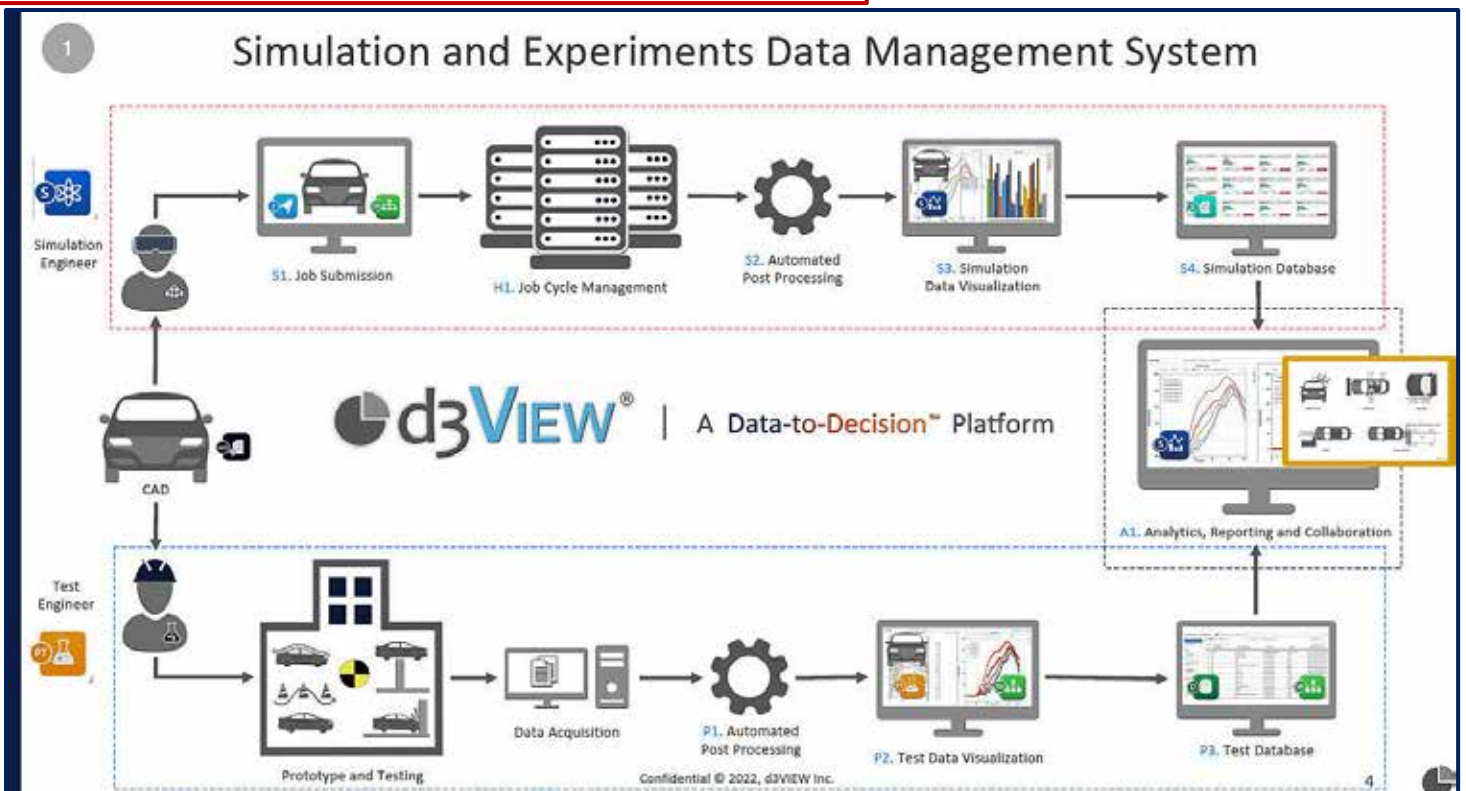
Balamanikandan A. – CAE specialist - Lead - RLE INDIA PVT LTD

"How can a CAE engineer bring CAE crash simulation results to closely match real-time crash test results."

To mediate discrepancies between CAE crash simulation results and real-time crash test results, consider the following strategies:

1. **Model Calibration**: Adjust material properties, boundary conditions, or contact formulations in the simulation model to better match real-world behavior.
   - Fine-tune the simulation parameters based on empirical data obtained from physical crash tests.

2. **Validation and Verification**: Rigorously validate and verify the CAE model against known benchmarks or physical tests to ensure its accuracy.
   - Use historical crash test data to validate simulation results for similar scenarios.

3. **Sensitivity Analysis**: Perform sensitivity analysis to identify influential parameters. Adjust these parameters within realistic bounds to explore their impact on results.

4. **Data Correlation**: Correlate simulation data with physical test data. This involves comparing key metrics and adjusting simulation parameters until a satisfactory match is achieved.

5. **Iterative Improvement**: Implement an iterative process of refining the simulation model based on insights gained from physical tests. Continuously update the model as more experimental data becomes available.

6. **Multi-Disciplinary Simulation**: Integrate multi-disciplinary simulations, such as combining structural and fluid dynamics analyses, to capture a more comprehensive picture of the crash event.

7. **Benchmarking**: Compare your CAE results with industry benchmarks or standards to ensure that your simulations align with expected outcomes.

8. **Collaboration and Communication**: Foster collaboration between CAE engineers and those involved in physical testing to exchange insights and improve the overall understanding of the simulation and testing processes.

9. **Use Advanced Material Models**: Explore advanced material models that better represent the behavior of materials under crash conditions. This may involve incorporating rate-dependent or temperature-dependent material properties.

10. **Incorporate Uncertainty Analysis**: Consider incorporating uncertainty analysis techniques to account for variations in material properties, manufacturing tolerances, and other factors that can influence results.

11. **Continuous Learning and Updating**: Stay informed about the latest advancements in crash simulation methodologies and update your models accordingly.

By combining these approaches, you can work towards minimizing the disparities between CAE crash simulation results and real-time crash test outcomes, enhancing the reliability and predictive capability of your simulation models.

Alan from the neighboring town taught us to always be prepared (CERT training) for a potential disaster. We had to run and save Quincy. First mistake - Mom walked Quincy right past an open road gate. Did Mom stop and shut the gate? NO, she kept walking! That's a disaster waiting to happen!

Luckily the Squirrel CERT Team was on watch! Mom was walking Quincy to the arena. Quincy is a miniature horse built like a small tank! We heard Mom yell, "OH NO, BOBCAT!" Bob was racing home to our ranch from across the road, to avoid a car. He ran by Mom and Quincy and screamed, "OH NO HORSE!" Quincy panicked, reared up, and started bucking and kicking at anything. Mom had to jump out of the way and drop the lead line. Quincy went running. ENTER the Squirrel CERT Team – we raced toward the gate and waved at Quincy while yelling, "Quincy, run this way to the barn – follow us!" He raced right past that gate and followed us to the barn! We gave Mom a safety lecture, a citation and a fine of a pound of sunflower seeds!

Do NOT BOOP NOSES! Alan taught us that last month! What does Taylor do? She tried to nose boop a baby duck. How do you even find its little nose to boop? She first gave Ducky a treat so it was already thinking – Taylor gives treats. I call below a Nose Boop Fail. Score: Taylor boop 0 – Ducky bite 1

NEWS IN A NUTSHELL

By Dinky the ranch squirrel

feaanswer@aol.com Subject Dinky
If you have a picture send it to me!!!!
You will receive a Dinky Nose Boop Citation!!

January

My Aunt Sabyl is a Veterinarian Tech and FEANTM Editor. Aunt Sabyl rescues animals. I'm the head of the CERT Squirrel team. I explained not to nose boop! Aunt Sabyl then showed me her nose boop pictures. I had to issue her a Dinky Citation! Why do humans Nose Boop?   Did you ever boop a nose?

CERT - Community Emergency Response Team
Dinky the ranch lead CERT Squirrel

We asked Alan from the neighboring town to continue our town training for our CERT. Every country needs a plan. We should all do our part – civilians, trained professionals, volunteers, and even engineers! **Did you know that among the first engineers to respond to a disaster are civil engineers? They assist by identifying safe zones for rescue operations, assessing buildings' structural integrity, and determining transportation network usability.**

This month, the Squirrel team realized from a class how important it is to learn self-sufficiency during a disaster. We learned skills so we can provide emergency assistance to our human neighbors. Mom, in particular, has to learn to keep calm and think of her plan. Mom tends to run around and needs to remember the plan. Not what you are supposed to do in a disaster – that's why it's called a plan!

Alan is helping us put a new program in place! It's an online information course. We are putting a copy of Alameda County's new Hybrid basic CERT training program in place. Does your country have one?

Our town training will be a copy of theirs - they introduce you to the Alameda CERT program, local hazards, and city preparedness, all from the comfort of your home via a Zoom meeting.

The entire squirrel team will take it, and they say once we complete the online curriculum, we will be invited to participate in a whole weekend of in-person, hands-on skills training and a final exercise.

The Alameda Community Emergency Response Team (CERT) program is the organizational umbrella for neighborhood teams of trained volunteers who live and/or work in the City of Alameda.

Our Town Fire Department will follow their procedures. We have FEANTM Supervisor permissions to put in place what they have – "Under the guidance of the Alameda Fire Department, with oversight from the Alameda CERT Executive Committee (ACEC), volunteers receive basic emergency response training, practice skills during neighborhood drills, and advocate neighborhood preparedness. Following a disaster, CERT volunteers provide aid and assistance to the limit of their training within coordinated relief operations to reduce the impact on their community. Alameda CERT responds to community needs with urgency, care, impartiality, and humane treatment for all inhabitants."

We need to be ready to help the global community - Early last year, we went to Turkey! Okay, we didn't go to Turkey, but we did cheer on the USAID Urban Search and Rescue teams from Fairfax and Los Angeles County Fire Departments who went to Turkey.

These two teams were part of the USAID DART that helped Turkey. They traveled to Turkey from California, the US, to assess the situation, identify priority humanitarian needs, and work to provide search and rescue.

Global help is needed in disasters. As The Squirrel CERT Team, we are learning how to deal with it locally to help our neighbors.
We are the Squirrel CERT TEAM!

Sabyl – ALGOR - Animal Health – An older paper from 2004 shows even 20 years ago finite element analysis was being used by University of Georgia, Athen, GA for animal health helping to establish better guidelines for how stabilization devices can best be used to promote healing of animal fractures.


TECHBriefs - **Finite Element Analysis Used to Examine the Healing of Animal Bones** - The effectiveness of using stabilization pins and external skeletal fixators was determined by FEA analysis.

University of Georgia, Athens, Georgia, & ALGOR, Inc., Pittsburgh, PA

When a dog or cat breaks a bone, veterinarians often mend the fracture with a combination of stabilization devices called intra-medullary (IM) pins and external skeletal fixators (ESFs), a technique that is employed daily across the U.S. Research conducted at the University of Georgia under the direction of Dennis Aron, DVM, using ALGOR finite element analysis software, is helping to establish better guidelines for how these stabilization devices can best be used to promote healing of animal fractures.

Physical trauma often results in the fracture of one or more of the long bones of the limbs. This type of bone consists of a dense cortex layer with a central cavity called the medullary canal, which contains softer tissue. One technique for mending the fractured bone involves inserting an IM pin into the bone. When this technique is used on humans, the medullary canal is hollowed out, or reamed, to achieve a perfectly cylindrical shape matching the diameter of the IM nail. The inserted nail achieves a tight press-fit within the bone, preventing bending, rotation, and translation.
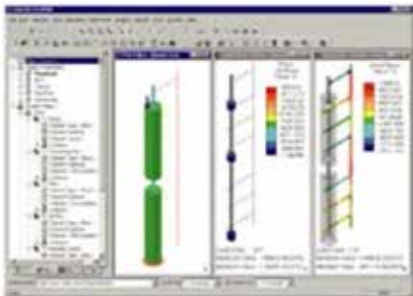
Left - A Linear Static Stress Analysis was performed on a model that represents a fractured dog bone, IM pin, and KE ESF. Von Mises stresses at the bone/pin interface are especially important.

Dog and cat bones cannot be reamed because the cortex of their bones is not as thick as human bones. In addition, their long bones tend not to be as straight as human bones. While IM pins can effectively prevent bending when used on dogs and cats, they frequently are not effective as the only method of stabilizing a fracture because the pins don't achieve a tight fit within the bone. Veterinarians often combine IM pins with ESFs, which consist of a number of pins that penetrate the bone and exit through the skin to attach to rigid bars on the outside of the body. This device stabilizes the bone as it is healing, while still allowing the animal to maintain use of its limb. Several different brands of ESFs are used, such as Kirschner-Ehmer (KE) and the IMEX SK™ (SK). The variation in the brands of ESF devices involves different types of clamps that affix the pins to the bar, different types of pins that engage the bone, and different materials that comprise the components. Veterinarians must select the number, type, and configuration of ESF pins to provide adequate stabilization.

> **The FiniteElement code that was used was LS-DYNA**
> The HBM was the Total Human Model for Safety AM50 version 3.0

Open Access Science Direct

Explicit Finite Element Methods for Equestrian Applications
 Karin Brolin   Jacob Wass
Department of Applied Mechanics, Centre for Sports and Technology, Chalmers University of Technology, 412 96 Göteborg, Sweden

Abstract - A virtual human body model (HBM), developed for vehicle crash simulations, was used to conduct a pilot study of dangerous accidents that occur in equestrian sports. It was performed to illustrate the potential that the explicit finite element (FE) HBMs have to improve rider safety and to assess the protective capacity of the safety vest. Four different questions were addressed:

1. When a rider is trampled by a horse, how does the risk of injury vary with chest impact location?
2. Does a safety-vest provide protection if the rider is kicked by a horse and does the protection vary with the violence of the hoof impact?
3. Can a safety-vest provide any benefit when the rider is hit by the horse after a rotational fall?
4. How does the risk for thoracic injuries vary when the rider falls off the back of a horse at different angles?

The HBM was the Total Human Model for Safety AM50 version 3.0 (Toyota Motor Corporation, Japan), improved for thorax injury predictability in a previous automotive project. The FE code was LS-DYNA (Livermore Software Technology Corporation, USA). Models of a generic safety vest, a horse impactor and a hoof were developed as part of this project. The risk of thorax injury was evaluated with stresses and strains measured for each rib, and the chest deformation criteria Dmax and DcTHOR.

The following results were obtained for each question:

- The risk of injury was higher for hoof impacts close to the sternum compared to more lateral locations that had up to 25% less risk. Hence, this knowledge could be used to optimize novel safety-vest designs with HBM simulations.
- Yes, the safety-vest provided protection against horse kicks, and it varied with the violence of the kick. Therefore, if the range of impact energy that occurs in real-world accidents is known, HBM simulations can be used to optimize the vest material properties.
- No, the safety-vest did not provide any benefit when the horse lands on top of the rider. This conclusion suggests that safety measures should focus on preventing this type of accident, rather than designing personal protection for the rider.
- When the rider falls with the head first, the number of predicted rib fractures increases compared to flat falls. However, the model predicts rib fractures for all of the falls simulated from a height of 1.5 meters for a rider without a safety vest.

To conclude, FE HBMs do have the potential to improve equestrian safety and further studies on equestrian safety-vests designs are warranted.

ABAQUS -The analytical fire resistance calculations were carried out on 57 prestressed concrete T-beam models using the finite element software ABAQUS. The effects of different fire modes, different concrete strengths, different flange plate thicknesses, different ratios of the prestressing bar, and different concrete protection layer thicknesses were investigated in three cases with load ratios of n = 0.4, n = 0.6, and n = 0.8. The fire resistance of prestressed concrete T-beams shows a large variability under different fire modes. The fire mode significantly affects the fire resistance of the structure and should be given more consideration in the subsequent fire resistance design of the structure.

Mesh=10mm   Mesh=20mm   Mesh=30mm
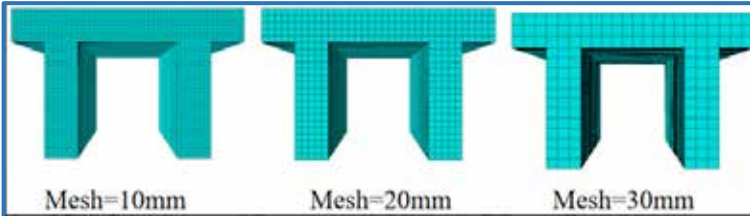
MDPI - **Analysis of Fire Resistance of Prestressed Concrete T-Beam Based on ABAQUS Numerical Simulation**

Zhongqiang Wang, Miao Chen, Yong Liao

Changsha Univ. of Sci. & Technology, China

Abstract -   **The configuration of prestressing bars will significantly increase the fire resistance of concrete T-beams, while the thickness of the concrete protective layer and the concrete strength will significantly affect the fire resistance of prestressed concrete T-beams. Therefore, the fire resistance can be improved by adding prestressing bars, increasing the concrete strength, and increasing the thickness of the protective layer in the design.** Finally, a fitting equation for fire resistance of the prestressed concrete T-beams based on the finite element model calculation data was created. The equation has good prediction accuracy and can provide a reference for the fire resistance design of prestressed concrete T-beams.

Introduction - Compared with concrete beams, prestressed concrete T-beams have the advantages of good performance, light structure weight, simple and fast construction, and strong structural ductility and seismic performance [1]. Recently, they have been used in many high-rise buildings and large-span bridge projects, such as the comprehensive training hall of Hainan Provincial Sports Center, Chengdu Fuhe Bridge, and Zhuzhou Baimarang Viaduct. However, in the face of high fire temperatures, the concrete's mechanical properties will degrade for concrete structures. The heat generated by the fire will be transferred from the outside of the concrete to the internal steel and prestressed steel bundles, which will lead to further damage, resulting in the direct failure of the structure after the fire [2]. For prestressed concrete T-beams, especially, because the flange plates and web walls of T-section beams are thin, they are more prone to structural instability and hence instantaneous damage under the high temperature of fire [3]. Therefore, it is necessary to carry out a study on the fire resistance of prestressed concrete T-beams.

In recent decades, scholars have begun to pay more attention to the fire resistance of structures, and the current research mainly focuses on reinforced concrete beams. Han et al. [4] carried out a fire resistance test research of four reinforced concrete beams under the ISO 834 standard heating curve and analyzed the change in the fire resistance of reinforced concrete beams at different load levels, pointing out that increasing the load level resulted in a significant reduction in the fire resistance of reinforced concrete beams and a substantial increase in the residual deformation in the span when the fire resistance was reached. Wang et al. [5] used finite element simulation to analyze the internal temperature field of reinforced concrete beams during a fire to determine its distribution pattern at different moments of fire resistance. In the heating section, the temperature field of continuous beam sections showed a laminar distribution pattern of high external temperature and low internal temperature. …

> **The models (skull and bullets) were imported into ANSYS v.14 software (ANSYS, Inc., USA) for mesh generation with tetrahedral elements…**
>
> **An explicit dynamics analysis was performed using Ansys v14 AUTODYN solver (Ansys, Inc.) for each shooting simulation with bullets of different calibers.**
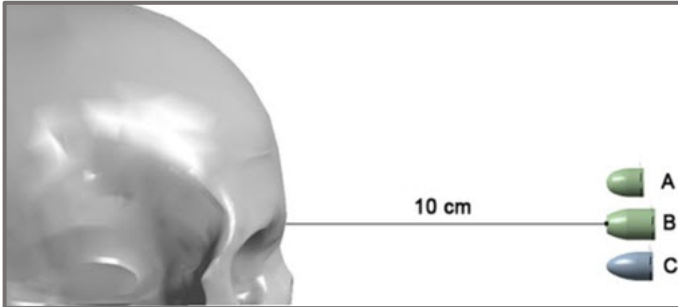
NCBI - **Comparison of Gunshot Entrance Morphologies Caused by .40-Caliber Smith & Wesson, .380-Caliber, and 9-mm Luger Bullets: A Finite Element Analysis Study**

R. Matoso, A. Freire, L. Santos,
E. Daruge Jr., A. Rossi, F. Prado
· Inst. of Legal Medicine – IML-RR, Civil Police of Roraima, Brazil
· Piracicaba Dental School, State Univ. of Campinas, Brazil

Abstract

Firearms can cause fatal wounds, which can be identified by traces on or around the body. However, there are cases where neither the bullet nor gun is found at the crime scene. Ballistic research involving finite element models can reproduce computational biomechanical conditions, without compromising bioethics, as they involve no direct tests on animals or humans. This study aims to compare the morphologies of gunshot entrance holes caused by .40-caliber Smith & Wesson (S&W), .380-caliber, and 9×19-mm Luger bullets. A fully metal-jacketed .40 S&W projectile, a fully metal-jacketed .380 projectile, and a fully metal-jacketed 9×19-mm Luger projectile were computationally fired at the glabellar region of the finite element model from a distance of 10 cm, at perpendicular incidence. The results show different morphologies in the entrance holes produced by the three bullets, using the same skull at the same shot distance. The results and traits of the entrance holes are discussed. Finite element models allow feasible computational ballistic research, which may be useful to forensic experts when comparing and analyzing data related to gunshot wounds in the forehead.

Excerpt - Introduction - Cadaver examination is performed to uncover the cause of death of an individual who has suffered accidental, suspicious, or violent death [1]–[3]. In this context, there are a variety of damaging agents that can cause organic changes that culminate in the cessation of human life, including mechanical, physical, chemical, and biological agents, and even those in mixed form. Among mechanical agents, firearm bullets are highlighted, as they are able to produce very harmful and lethal injuries

Portable firearms can be classified as short and long, and the importance of the study of short firearms is directly related to the fact that these are the predominant type used both for self-defense and to commit crimes…
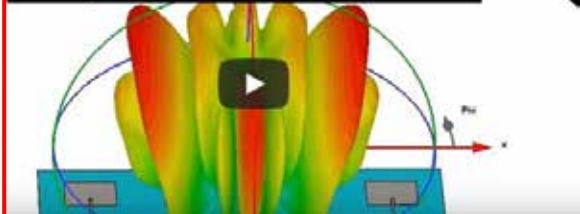
**Welcome to the Convention Barn
Yeeehaw!**

YouTube - Mixing Measured and Simulated Data with CSTs Post Processing Capabilities - Webinar - Clint Patton, Sr. Simulation Specialist at GoEngineer New 3D results will be generated without running another full-wave simulation. This approach provides CST users a powerful tool capable of incorporating their component simulations into a multiple component and SPICE simulation

During the webinar presented by Clint Patton, Sr. Simulation Specialist at GoEngineer you will learn the steps in building a model in CST Design Studio where the 3D full-wave simulations are mixed with measured data and other simulation models.

GoEngineer provides best-in-class design solutions, carefully selected that are easy to use, manage, and integrate with other platforms.

Simu Tech YouTube Channel - Topography Optimization in Ansys Mechanical, created by Brock Wilt, highlights a new structural optimization method in Ansys Mechanical will introduce ribbing/beads into shell models.

**Synopsys - Simplware - YouTube -Learn how to generate surface models for 3D printing and volume meshes for FEA or CFD simulations in Simpleware software. You will discover how to adjust element sizes, assign material properties, set up mesh refinement regions, and more.
Use Simpleware software to generate high-quality 3D models from scans.**

MeDiTATe project:

ESR 08 - Rahul Vellaparambil

Rahul, "We used an established FEM approach to compare the mechanical performance (flexibility and durability) of SG limbs derived from auxetic unit cells and two commercial SG limbs in a virtual tortuous iliac aneurysm."
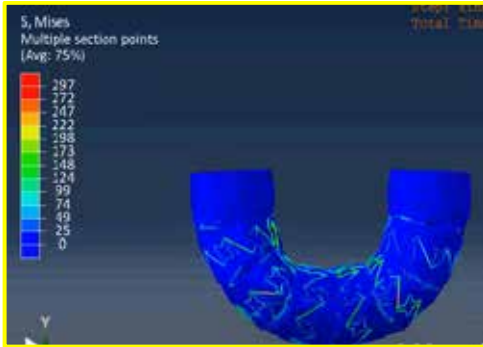
Open Access - [Computational Comparison of the Mechanical Behavior of Aortic Stent-Grafts Derived from Auxetic Unit Cells](#)

Rahul Vellaparambil, Woo-Suck Han, Stéphane Avril
  Mines Saint-Etienne, Université Jean Monnet Saint-Etienne, France

Pierluigi Di Giovanni
  Research and Development Department, HSL S.R.L, Trento, Italy

(FEA Methodology For Modeling SG - A three-step-based boundary condition was implemented to predict the in vivo deformations suffered by a SG in a tortuous iliac aneurysm. For consistency and benchmarking purposes, the Zenith Low Profile (Zenith-LP) Z-stented SG, (Cook Medical Europe, Bjaeverskov, Denmark), was chosen as the reference template against which all other designs in this study were compared.)

Abstract - Purpose Inappropriate stent-graft (SG) flexibility has been frequently associated with endovascular aortic repair (EVAR) complications such as endoleaks, kinks, and SG migration, especially in tortuous arteries. Stents derived from auxetic unit cells have shown some potential to address these issues as they offer an optimum trade-off between radial stiffness and bending flexibility.

Methods In this study, we utilized an established finite element (FE)-based approach to replicate the mechanical response of a SG iliac limb derived from auxetic unit cells in a virtual tortuous iliac aneurysm using a combination of a 180° U-bend and intraluminal pressurization. This study aimed to compare the mechanical performance (flexibility and durability) of SG limbs derived from auxetic unit cells and two commercial SG limbs (Z-stented SG and circular-stented SG models) in a virtual tortuous iliac aneurysm. Maximal graft strain and maximum stress in stents were employed as criteria to estimate the durability of SGs, whereas the maximal luminal reduction rate and the bending stiffness were used to assess the flexibility of the SGs.

Results SG limbs derived from auxetic unit cells demonstrated low luminal reduction (range 4–12%) with no kink, in contrast to Z-stented SG, which had a kink in its central area alongside a high luminal reduction (44%). Conclusions SG limbs derived from auxetic unit cells show great promise for EVAR applications even at high angulations
such as 180°, with acceptable levels of durability and flexibility. Keywords Aortic stent-graft · Auxetic stent · Finite element analysis · Mechanical

SG limbs derived from auxetic unit cells show great promise for EVAR applications even at high angulations such as 180°, with acceptable levels of durability and flexibility….

Movie Night - CRASH

Texas A&M Transportation Institute
Proving Ground

Test Report No. 616221-01
Test Report Date: December 2022

MASH TL-4 CRASH TESTING OF
BICYCLE RAILING ON A CONSTANT SLOPE PARAPET

by

Maysam Kiani, Ph.D., P.E.
Assistant Research Engineer

Sana Moran
Assistant Transportation Researcher

William J. L. Schroeder
Research Engineering Associate

and

Darrell L. Kuhn, P.E.
Research Specialist

YouTube - **MASH TL-4 Crash Testing of Bicycle Railing on a Constant Slope Parape**t

 PDF … The purpose of this project is to evaluate and test a combination barrier system that consists of a bicycle railing mounted on top of a standard Illinois Department of Transportation (IDOT) concrete parapet. The total height of the system is 54 inches, including a 15-inch tall bicycle railing mounted on the top of a 39-inch tall constant slope parapet. The testing was perormed in accordance with Test Level 4 (TL-4) criteria of the American Association of State Highway and Transportation Official's (AASHTO) Manual for Assessing Saftey Hardware (MASH)
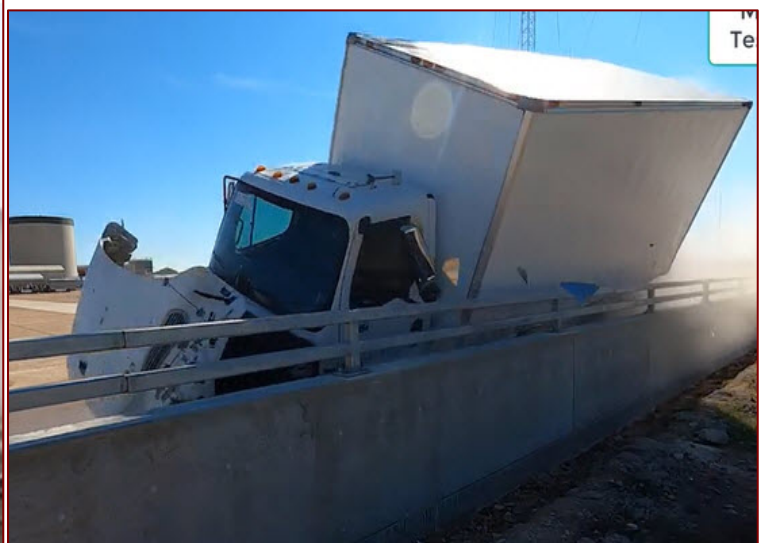
I know I am AI but why are two humans arguing their opinion how to clean a barn?

I think that as long as the barn is cleaned that they have accomplished their goal.

Minow Dusty Quincy Shane

The whole town is standing by the barn. Why are they taking bets which way to clean a barn? This town needs a hobby!

Once upon a time, the old rancher built a beautiful town barn in the quiet and picturesque town of FEANTM, nestled between rolling hills and surrounded by vast open fields. That was the good news! The sad news is that the town secretary and the old rancher have started arguing at sunrise about how to clean it.

The sun hung low on the western horizon, casting long shadows over the sprawling ranch owned by the Old Rancher. The rancher, rugged with a weathered face and a penchant for cowboy hats, was in yet another heated argument with the Town Secretary.

The Secretary, a determined woman with a quick wit and a penchant for precision, had clashed with The Rancher on numerous occasions (well, you know that already!) Their disagreements ranged from who baked the better apple pie to who could shoot a rifle more accurately. However, on this particular day, their battleground was the old barn that stood at the heart of the town. The Secretary, hands on her hips, stood near the barn's back door, her eyes locked with the Old Rancher.   "Rancher, we should clean this barn from the back door to the front door. It makes more sense, starting from where the animals enter and working our way out."

The Rancher, his cowboy boots firmly planted, shook his head. "Secretary, you've got it all wrong. We clean from the front door to the back door. That way, we push everything out towards the back, and it's easier to clear away."

Nose to nose, they argued the merits of using a broom versus a pitchfork or whether the rancher should bring the tractor in to make the job more efficient. The air was tense as their voices rose in a symphony of discord.

Finally, realizing a compromise was unlikely, the Old Rancher and the Secretary decided to tackle the barn in their ways. The secretary grabbed a broom and began sweeping from the back while the Rancher armed himself with a pitchfork and started clearing from the front. The clatter of their tools echoed through the wooden structure as straw flew in every direction.

As the two worked diligently, the barn transformed into a chaotic battlefield of opposing forces. Straw piled up in the middle, forming a barrier between the Secretary's neat domain and the Old Rancher's rugged territory. The standoff peaked, with neither willing to yield to the other's approach.

In a moment of unspoken agreement, they both ceased their efforts and surveyed the barn. A mountain of straw stood defiantly, a testament to their inability to find common ground. Exasperated but undeterred, they shared a glance before hatching a plan.

Summoning the tractor, they maneuvered it into the barn, its engine roaring to life. The Old Rancher expertly scooped up the straw pile with the tractor's bucket while the Secretary guided him with a confident hand signal. Together, they lifted the mound of straw and rode out of the barn, leaving the bickering and discord behind.

As they dumped the straw outside, a shared smile crossed their faces. The barn might not have been cleaned as either of them initially intended. Still, the shared effort and the unspoken understanding brought a sense of camaraderie between the secretary and the rancher, at least for this moment.

And so, with the barn emptied of its straw and the tractor parked in satisfaction, the Old Rancher and the Town Secretary walked back toward the town coffee shop, ready to face the next argument that awaited them.

February I will report on the argument between The Town Secretary and Dinky the CERT Lead Squirrel.

January 2023 – December 2023 in one PDF
RheKen Investigations can be found on the website
FEA Not To Miss Website

The Old Racers Automotive News & Track

January

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

Airbus and BMW Group launch Quantum Computing Competition to tackle their most pressing mobility challenges - Registration is open - Submissions from students, researchers and professional experts in Quantum Technologies are welcomed through April 30, 2024

Santa Clara (CA)- **Airbus and BMW Group launch a global Quantum Computing Challenge entitled "The Quantum Mobility Quest"** to tackle the most pressing challenges in aviation and automotive that have remained insurmountable for classical computers. This challenge is the first-of-its-kind, bringing together two global industry leaders to harness quantum technologies for real-world industrial applications, unlocking the potential to forge more efficient, sustainable and safer solutions for the future of transportation.

"This is the perfect time to shine a spotlight on quantum technology and its potential impact on our society. Partnering with an industry leader like BMW Group enables us to mature the technology as we need to bridge the gap between scientific exploration and its potential applications. We're seeking the best-in-class students, PhDs, academics, researchers, start-ups, companies, or professionals in the field, worldwide to join our challenge to create a massive paradigm shift in the way aircraft are built and flown." says Isabell Gradert, Vice President Central Research and Technology at Airbus. "Following the success of previous editions of Quantum Computing Challenges by BMW Group and Airbus, we are gearing up for a new wave of innovation, exploring the technology capabilities for sustainability and operational excellence." said Dr. Peter Lehnert, Vice-President, Research Technologies at BMW Group. "The BMW Group is clearly aiming at positioning itself at the crossroads of quantum technology, the global ecosystem, and cutting-edge solutions. By doing so, we strongly believe in major advances when it comes to sustainable materials for batteries and fuel cells, to generate unique and efficient designs, or to enhance the overall user experience in the BMW Group Products".

Quantum computing has the potential to significantly enhance computational power and to enable the most complex operations that challenge even today's best computers. In particular, for data-driven industries like the transportation sector, this emerging technology could play a crucial role in simulating various industrial and operational processes, opening up opportunities to shape future mobility products and services.

Challenge candidates are invited to select one or more problem statements: improved aerodynamics design with quantum solvers, future automated mobility with quantum machine learning, more sustainable supply chain with quantum optimisation, and enhanced corrosion inhibition with quantum simulation. Additionally, candidates can put forward their own quantum technologies with the potential to develop native apps yet to be explored in the transportation sector.

The challenge is hosted by The Quantum Insider (TQI) and divided into two parts, a four-month phase where participants will develop a theoretical framework for one of the given statements, and a second phase during which selected finalists will implement and benchmark their solutions…to evaluate submitted proposals and award one winning-team with a €30,000 prize in each of the five challenges, by the end of 2024.

Note to editors: List of challenges -
· Smart Coating - Investigating Quantum Computing for Corrosion Inhibition
· Quantum-Powered Logistics - Towards an Efficient and Sustainable Supply Chain
· Quantum-Enhanced Autonomy - Augmenting Generative AI for Critical Test Scenario Images
· Quantum Solvers - Predictive Aeroacoustic & Aerodynamic Modeling
· The Golden App - Pushing the Boundaries of Quantum Tech for Mobility

US Airforce Picture of the Month

A 920th Rescue Wing HH-60G Pave Hawk prepares to connect to the hose-and-drogue system of an HC-130J Combat King II during helicopter air-to-air refueling off the coast of California during exercise Distant Fury Stallion Dec. 5, 2023. This joint exercise presented a uniquely suited opportunity in remote, austere conditions to validate the wing's interoperability within the joint team while reaffirming the wing's lethality, precision and ability to fight and win. (U.S. Air Force photo by Senior Airman Nicole Koreen)

A U.S. Air Force F-16 Fighting Falcon assigned to the 80th Fighter Squadron takes off from an alternate departure and landing surface at Kunsan Air Base, South Korea, Dec. 1, 2023. Once activated, an ADLS provides aircraft with a safe and effective surface to take off from and land on if the main runway is unavailable.

(U.S. Air Force photo by Staff Sgt. Jovan Banks)

An F-15E Strike Eagle assigned to the 335th Fighter Squadron, Seymour Johnson Air Force Base, N.C., flies over Dare County Bombing Range, N.C., Nov. 16, 2023, for exercise Razor Talon 24-1. RT-24 is an agile combat employment-focused exercise designed to test the 4th Fighter Wing's ability to operate as a lead wing, generating combat airpower while continuing to move, maneuver and sustain the wing and subordinate force elements in a dynamic contested environment.

(U.S. Air Force photo by Staff Sgt. Devin M. Rumbaugh)

INDIGENOUS UCAV BAYRAKTAR TB2 COMPLETES 750 THOUSAND FLIGHT HOURS

Bayraktar TB2 UCAV System, which made many unprecedented achievements in the history of Turkish aviation, has successfully completed 750,000 flight hours. Bayraktar TB2 UCAV thus became the indigenous aerial vehicle to spend the longest time in the Turkish skies, approaching one million hours of service.

YouTube - **The first flight of the ANKA-3 Unmanned Combat Aircraft:** The Anka-3 combat drone, developed by Turkish Aerospace Industries (TAI), completed its maiden flight. The Anka-3 surpasses the speed and payload capacity of TAI's other UAVs, namely the Aksungur and older Anka variants....TAI's primary focus for the drone's development lies in intelligence, surveillance, and reconnaissance missions, deep-strike operations, and the destruction or suppression of enemy air defenses.
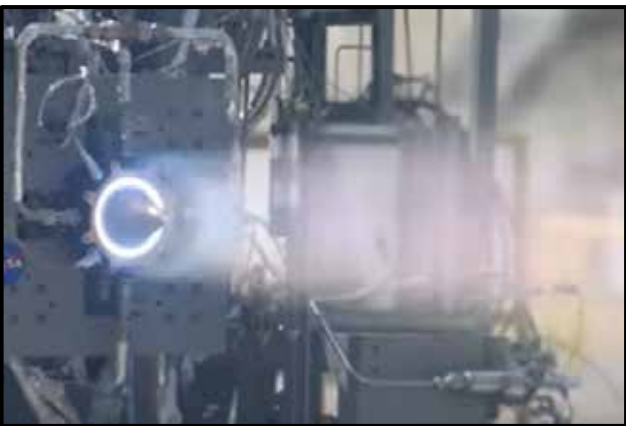
YouTube - NASA **Test stand video**

Test stand video captured at **NASA's Marshall Space Flight Center** in Huntsville, Alabama, shows ignition of a full-scale Rotating Detonation Rocket Engine combustor, which was fired for a record 251 seconds and achieved more than 5,800 pounds of thrust.

RTX's Pratt & Whitney Canada and Leonardo achieve first 100% SAF flight with PT6C-67C-powered AW139 helicopter -100% SAF flight marks a historical first for the PT6 engine series. Pratt & Whitney Canada & Leonardo today announced the successful completion of the first flight for an AW139 helicopter powered by the PT6C-67C engine using 100% Sustainable Aviation Fuel (SAF).

The 75-minute flight and ground tests that took place on November 21 at Leonardo's facility in Cascina Costa di Samarate, Italy, evaluated engine performance at multiple power variations and demonstrated no significant differences in the response to the new fuel compared with the use of Jet A1 fuel.

M & M Educational News

Marsha   -   Marnie, Ph.D

Bird wings act as a suspension system that rejects gusts- **Scientists from the RVC and the University of Bristol have discovered how birds are able to fly in gusty conditions** – findings that could inform the development of bio-inspired small-scale aircraft.

Challenge - We thought there might be something birds can teach us about coping with turbulence, so we invited Lily the barn owl, Sasha the tawny eagle, Ellie the goshawk and some of their friends to fly through gusts we made in our laboratory. **Inside our purpose-built flight lab, we created an artificial gust by building a wind tunnel on its side, so that the blowing end was pointing at the ceiling.** Firstly, we had the fans running very slowly so the birds almost didn't notice the gust. As they grew in confidence, we turned up the fans so the gust almost equalled the birds' forward speed. The birds flew down the track, began to glide on the approach to landing and then experienced a strong gust of wind from below. For the birds, it was no problem at all. They were barely knocked off course. This is due to two properties of birds' wings. The first is the centre of pressure – the location where the gust pushes on each wing if you think of it as acting at a single point. The second is the centre of percussion - the 'sweet spot'.
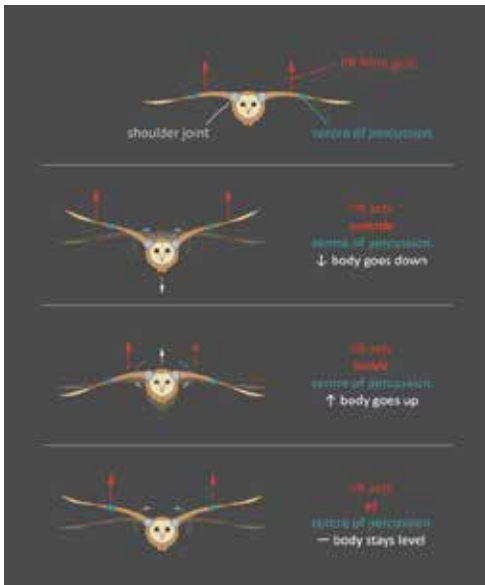
Solution - If you hit a ball close to the very far end of a bat, the handle jerks forward out of your hand. Conversely, if you hit the ball close to the handle, the handle jars backwards in your hand. This must mean that in between these impact locations there is a point where the handle neither jerks forwards nor jars backwards: this is the sweet spot. An impulse hitting here jolts the bat both in the direction of the impulse (translation) and around your hands (rotation). These two responses cancel each other at the handle, and you can hit a cricket ball, baseball, or golf ball a really long way. The impact of the ball is now the extra force applied by the gust at the centre of pressure, and the handle is the bird's shoulder. If the gust force coincides with the centre of percussion, then the wing rotates around the shoulder joint without jolting the body up or down. It is a suspension system, and it works by decoupling the mass of the wings from the mass of the body. The gust is permitted to accelerate the wings upwards but only in a way that will not transfer the translational force and rotational torque to the body of the bird. Similarly, car Suspension is set up so that the forces and torques from bumps on the road don't cause your body to bump about too much, even while the chassis gets jolted. Car design can even reach the extent of minimizing jolts experienced by the driver's head, leaving the rest of the body to wobble a bit.

Impact -We built a prototype glider and flew it through the same gusty conditions. It was very important to give it the proper physical characteristics; not feathers, but specially designed hinging wings:
- The centre of pressure must align with the centre of percussion. We achieved this by adding nuts and bolts to just the right point along the wing;
- Each wing must be fixed to the fuselage by a hinge representing the bird's shoulder joint, rather than fused rigidly;
- Each wing must be held in place in flight by a spring that supports Weight during flight but allows movement around the hinge if the aircraft enters a gust. (For the budding physicists: it turns out that the best kind of spring is an unusual one, where the force doesn't change with length. Muscles, such as the pectoralis flight muscles of birds, are particularly good for achieving this property, but here we used long elastic bands!) … Full article can be viewed on the website

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The Old Cattle Rancher's Ranch

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

Agriculture, **Animals, Soil, Equipment, Cattle,**
and whatever he wants.
Right Picture – My dog, Scout, & my horse, Cowboy

EDEM is high-performance software for bulk and granular material simulation. Powered by DEM, EDEM quickly and accurately simulates and analyzes the behavior of coal, mined ores, soils, fibers, grains, tablets, powders, and more.


Altair® EDEM™
Discrete Element Method (DEM) Software

EDEM simulation provides engineers with crucial insight into how those materials will interact with their equipment during a range of operation and process conditions. It can be used stand-alone or combined with other CAE tools.

Leading companies in the heavy equipment, off-road, mining, steelmaking, and process manufacturing industries use EDEM to understand and predict granular material behaviors, evaluate equipment performance, and optimize processes.

Among The Key Features:
- **Simulate Any Material** Model a wide variety of real world materials such as large rocks, fine powders, grains, fibers, and tablets using the validated and computationally efficient multi-sphere method or our industry-grade polyhedral particle solver.
- **Realistic Material Behavior** - Comprehensive range of validated physics models for representing any material behavior such as dry, sticky, or compressible.
- **Fast and Easy Workflow** - Intuitive user interface for quick simulation set-up. Material models libraries available for direct access to suitable material inputs. Powerful solver for fast simulation times.
- **CAE Integratio**n - Couple EDEM with FEA and MBD tools to include realistic material loads in structural and system dynamics analysis. Combine with CFD tools for accurate simulation of particle-fluid systems
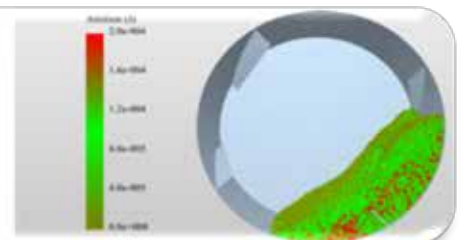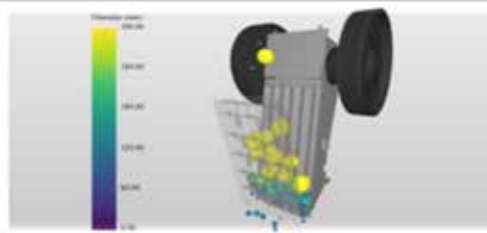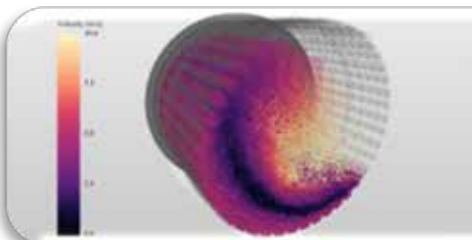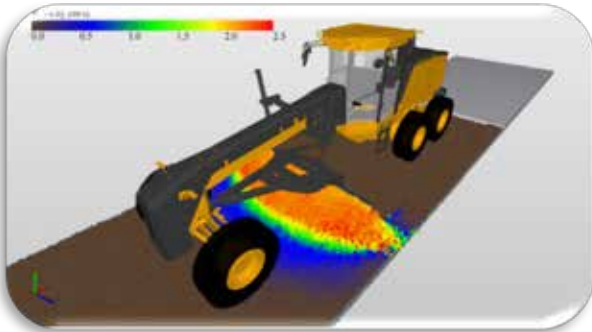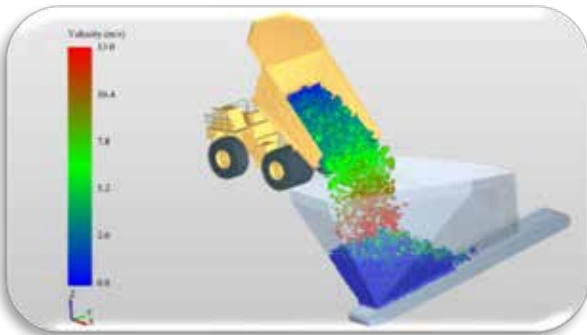
Thank you for joining me on my monthly visits to museums.

1886 Benz Patent Motorwagen

1896 Ford Quadricycle

This month I'm providing the website link AND we can zoom on over to YouTube for a video of the museum collection!

Gedee Car Museum Website

Gedee Car Museum YouTube

Gedee Car Museum is the only classic car museum of its kind in south India, located in Coimbatore Tamil Nadu.

It has an impressive collection of more than 100 vintage cars each with a history or a unique technology.

The cars are a private collection of G D Naidu Charities, a social trust founded by (late) Sri. G D Naidu.

Like his father, Sri. G D Gopal, who is also an avid auto enthusiast, purchased and collected several cars, especially those that had unique mechanical features or the ones that had significantly influenced the evolution of the automobile.

The main objective of the museum is that students and the general public, who see these vintage beauties, learn about the technology and the people behind designing and manufacturing the cars, with the minimal technology available in that era.

1912 Ridge Multi Motorcycle

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Supervisors Goodbye Page - Come Back Soon

FEA Not To Miss & More

Please come back soon!

Buildings & campsites are available

Goodbye from Marsha/Molly & Friend

We are almost a week into 2024 - did any of you break your New Year's Resolutions? Hmmmm!

This year we are going to have Tay training Quincy and Dusty. Maybe we can teach Quincy to look at the camera rather than constantly look for food?   He's like walking a miniature tank! Yes, that is a dog leash - we were washing the lead lines. Yes, we know NOT to put our hands through the loop.

_____

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