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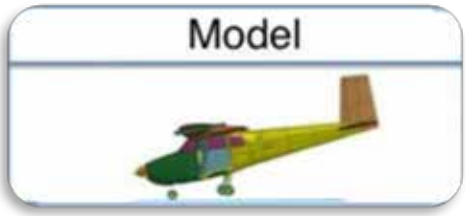
FEA Not To Miss Town

Software & Engineering Solutions

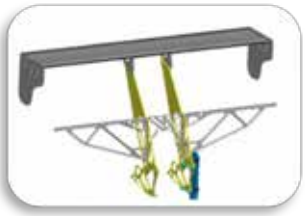
Town Hall Meeting, Blog & Gossip

AEROSPACE - GOKBEY

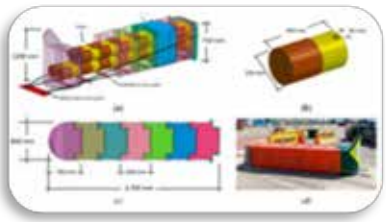
AEROSPACE - Cessna



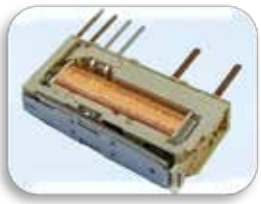
AUTOMOTIVE - OmniQuest



AUTOMOTIVE - Ulukar

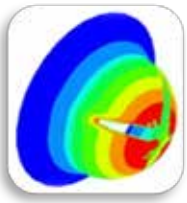


CADFEM

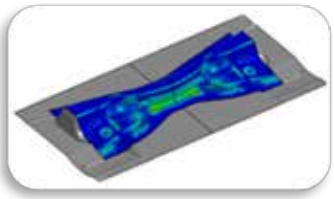


CADFEM Medical

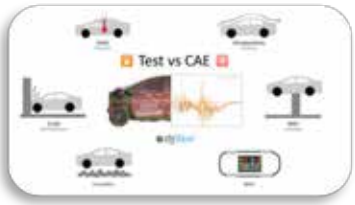
DYNAmore Germany



DYNAmore Nordic



D3View

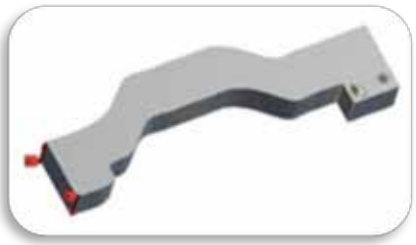


JSOL

MSC - Hexagon

OASYS

OmniQuest



OZEN

SECRETARY- Curt Podcast

Free publication & independently owned

FEA not to miss a/k/a (FEANTM) comprises a group of interested parties sharing information. Information is presented on the website www.feantm.com and this publication ISSN # 2694-4707.

Goal

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After that, going forward from the email's receipt, content (excluding that found on Twitter, Linkedin, YouTube, FaceBook and other social media) will not be included.

Editors: **(alpha order) Anthony, Art, Marnie, Marsha, Yanhua**

Town Pretend to be Editors

The Old Cattle Rancher - No one in town knows his name. You yell "Hey, Old Rancher."
The Old Retired Pilot - No one in town knows his name. You yell "Hey, Old Pilot."
The Old Retired 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

Map Vector & town graphics in our magazine are courtesy of vecteezy

Table of contents

Author and/or person using social media, or information from the company website
The websites used will have the complete articles, and higher resolution graphics/videos.

Town Announcements will be in this style box.
Thanks to Vecteezy for our **Map Vector/town and many of the graphics in our magazine**

Monthly town hall meeting. Serving - coffee & Baklava

Our town comprises companies, engineers, scientists, mathematicians, universities, professors, students, consultants, and individuals interested in software, hardware, and solutions.

Gossip at the local coffee shop, and your pets welcome.

Town secretary special hello wave: **Ahmet, Anthony, Alihan, Andreas, Atilgan, Ayse, David, Dandan, Emre, Emirhan, Eray, Eric, Esref, Francisco, Georgios, Hao, Igor, Jenson, Kadir, Kambiz, Kirill, Mabrouk, Madhukar, Marc, Marcus, Marleigh, Marta, Matt, Princess Alice, Rasmus, Sabino, Sagar, Stewart, Suleyman, Yuri**

Hi, Stewart and all the people, family, and pets of OmniQuest. We welcome our new resident. OmniQuest is now on our town map, and we have articles to share with our community.

First - please note that the email mv@feainformation.com does not route to me. You can reach me (mv) Marsha Victory at feaanswer@aol.com. My gavel is gone. The town secretary explained that it jumped out of her hand and threw itself at a wall. Please have the building department fix the hole in the wall and retrieve the gavel. She claims that the gavel had an engineering design flaw causing it to jump out of her hand. She is blaming engineers - all of you. We gave her a boomerang - it returns!

As presiding town Supervisor, I call this meeting to order:

Our Town secretary will announce the meeting, "YO, listen up Cowboys, meeting started!"

Please note that isn't the wording that I had in mind to start the meeting.

My inbox is full of complaints against The Old Rancher.

1. I stopped counting at 672.5 complaints. The .5 is the one written in chalk on the parking lot.
2. They all state that the Town Secretary said he's ordering animals. She claimed he's collecting bats!
3. Please note that he's ordering bats! Not bats!

That made no sense. Let me try that explanation again.

4. Wooden baseball bats! He didn't mean flying bats. Additionally, flying bats are classified as mammals

See Old Cattle Rancher - An Investigation into the Relationship between Wood Bat Durability and Bat Taper Geometry using LS-DYNA®

Our town information clerk had a purchase order for a helicopter

1. The old pilot suggested a new general-purpose helicopter for the town.
2. His use was for our hills, fire season, day or night use.
3. We had to turn it down - we don't have a helicopter pilot.

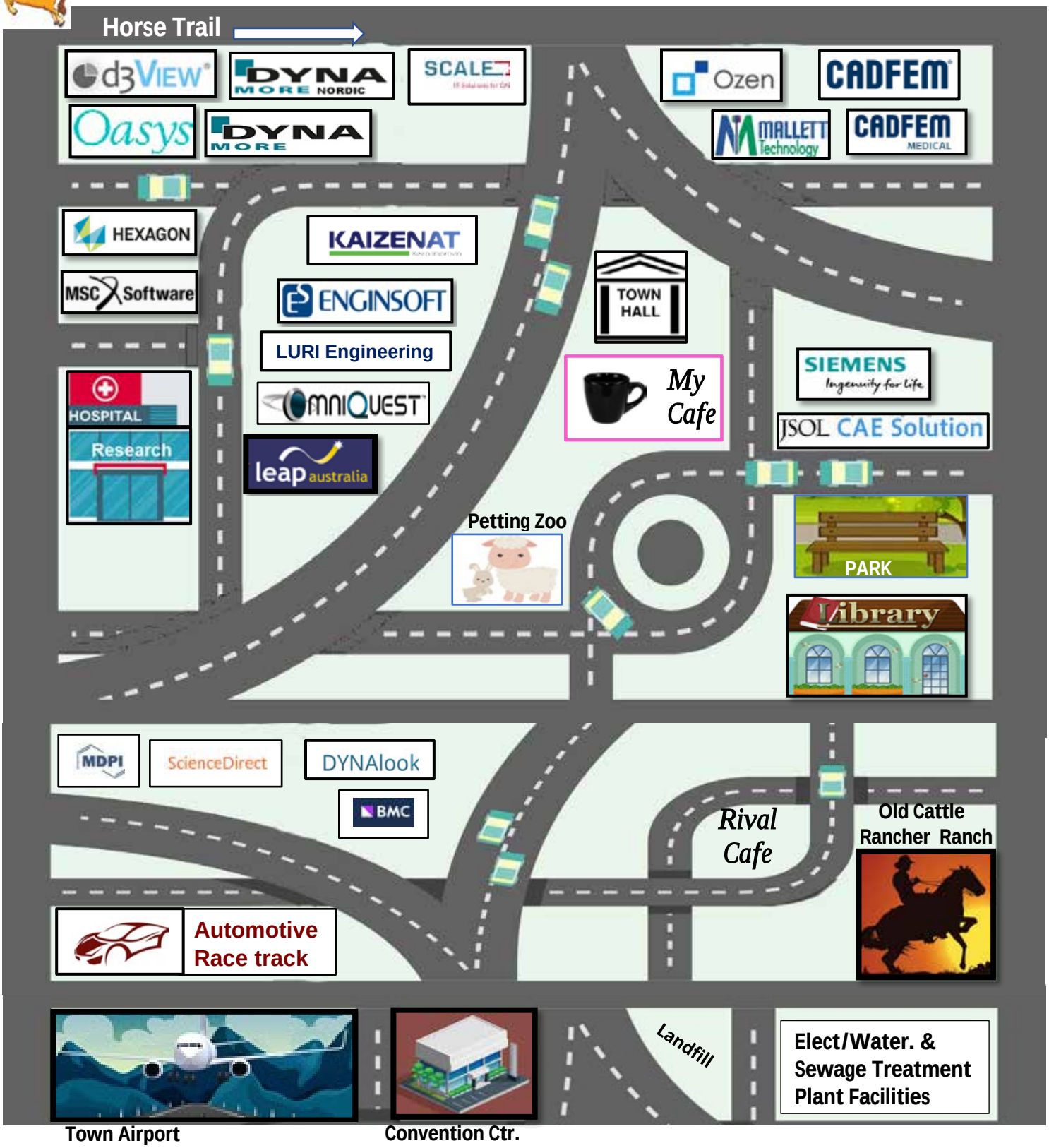
See Airport - GÖKBEY General-Purpose Helicopter

Attire vs. a Tire and Landing Gear is not a new dress!

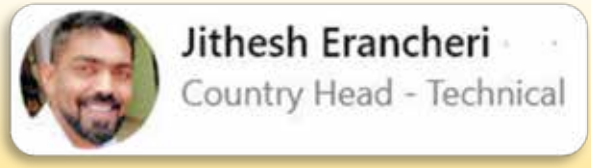
1. The secretary had a message on her answering machine to purchase "landing gear - a tire."
2. She thought attire instead of a tire and that landing gear meant clothes to wear when planes land.
3. THEN, she thought that the Old Pilot wanted her to greet the landing planes wearing new attire.
4. I told the old pilot, "Explain to the Secretary that she misunderstood your message."
5. His answer was, "She looks pretty in her new dress - why can't she wave to planes when they land?"
6. Why is everyone leaving work to watch her waving to landing planes? What budget paid for the dress?

See Exhibitor Booth - landing gear simulations

Town Map



* **The logos displayed, of content in our magazine, do not represent their endorsement.**
* **To be removed, please notify feaanswer@aol.com with the request.**
* **Your town lot will be auctioned, with the Town applying all proceeds to the coffee budget.**
* **The town map changes pending information, and rotational building rentals.**



We welcome Jitesh to our town meeting for a Meet & Greet with our town residents.

Did you know that KAIZENAT Technologies Private Limited (KTPL) was founded in 2012? Located in India Kaizenat sells and supports: ANSYS, LS-DYNA, LS-OPT, LS-PrePost, LS-TASC, LST Models, THUMS, d3View, Solidworks. Kaizenat also has their own License utilization and predictive analytics software LUPA.

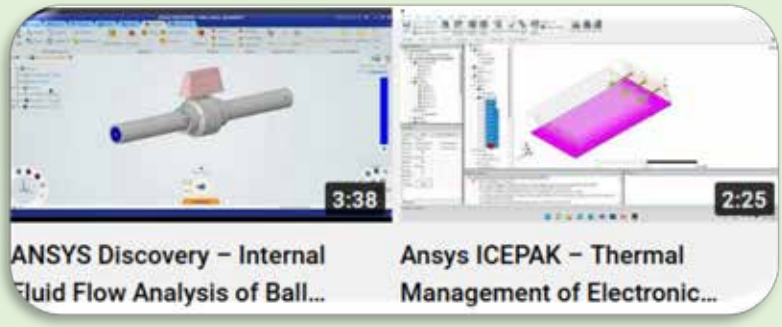
Excerpts from three Kaizenat offerings that I would like to share with you:

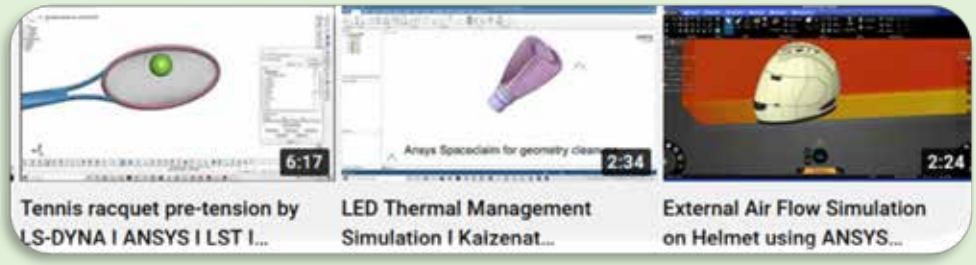
LUPA is a License Utilization and Predictive Analytics platform from Kaizenat Technologies Pvt Ltd, that helps engineers, Managers & IT -Dept to visualize the usage statistics and take business decisions accordingly. dynaLUPA is dedicated module for LS-DYNA Software.

Startup Programs - Our Kaizenat Startup Program gives you full access to simulation software bundles that are built and priced to help entrepreneurs grow their business quickly and cost-effectively. We realize that in the early stages of starting a business there is often limited funding and little to no revenue.

We created this program to help you grow your business to its full potential using the best tools possible — Kaizenat simulation solutions — with a minimal initial investment. Many of the world's greatest companies began as startups and Kaizenat is committed to partnering with today's startups to help them grow into tomorrow's industry leaders. Regardless of whether you are an individual startup, an incubator working with a variety of startups, or another key participant in the ecosystem, find out how Kaizenat can benefit you.

KAIZENAT YouTube Channel





Thanks to Curt Chan & Brian Sullivan (ANSYS) on social media

Brian, "Ansys Fluent can solve several complex aeroacoustics problems. Read this blog to learn how to do acoustic simulation in Ansys Fluent."

Article Excerpts - Videos are available on the website article.

An Introduction to Aeroacoustic Simulation

Author - Giovanni Petrone

Hear that? A plane flying over a neighborhood.
The fan on your laptop.
Acres of spinning wind turbines.

All around us, machines are making noise. How much noise is too much? How far does the sound travel? Where, exactly, is all this noise coming from?

In this article, we'll look specifically at automotive, where thousands of parts are being constantly impacted by flowing air.

Aeroacoustics simulation, the study of sound generated from a flowing fluid, is how engineers and designers identify the origin of a noise, understand its range of impact, and model solutions to reduce or eliminate the noise to comply with sound regulations and improve user experience.

Across industries, aeroacoustics simulation helps engineers analyze the generation of sound to improve comfort and safety. For example, in manufacturing, simulation can help identify hearing-loss hazards caused by the close proximity of equipment to operators. In marine turbines, it can help protect sea life by identifying ways to reduce underwater noise pollution.

In this article, we'll look specifically at automotive, where thousands of parts are being constantly impacted by flowing air. Here, aeroacoustics simulations can quickly identify the source of a sound and explore ways to silence it.

Aeroacoustics Use Case: Automotive NVH Analysis - As a passenger rides in a car, they can perceive a variety of sounds that contribute to overall noise — all of which provide their own challenges for modeling.

Figure 1: Noise sources in an Alfa Romeo Giulietta aeroacoustics simulation.

- **Tire noise:** Noise from the rotation of the tires contributes to external flow aerodynamic noise.
  Challenge: Modeling the interaction between a deformed tire and the road.
- **Wiper noise:** The noise from wiper movement contributes to external flow aerodynamic noise.
  Challenge: Modeling aero-vibro acoustics effect, complex physics, and turbulence models.

- **Sunroof noise**: When a vehicle is traveling with the sunroof or side window open, a resonance between the cabin acoustics and pulsating vortices crossing the opening can occur, generating a so-called “buffeting” noise.
  Challenge: Accurately predicting the turbulence structures of the flow reaching and crossing the opening, which has a strong dependency with speed conditions and geometry details.
- **HVAC system noise**: The noise from a car’s heating, ventilation, and air conditioning (HVAC) system contributes to overall perceived noise levels and has a major impact on passenger cabin comfort.
  Challenge: Completing a transient study with rotating components, accurate turbulent flow field resolution, and noise propagation up to the driver’s ear.
- **Door gap noise:** The flow-induced pressure fluctuations in a door gap cavity generates cavity noise.
  Challenge: Different speed conditions and different shapes of the door gap.
- **Side mirror and window noise**: Noise is generated from turbulent flow impinging on the window glass generated by the car’s surfaces and side mirror design.
  Challenge: The accuracy of turbulence models and the unsteadiness of pressure fluctuations on car surfaces.

How can Simulation Reduce Automotive Noise? Aeroacoustics simulation helps predict the combined impact of noise sources on the overall sound level in specified locations — for instance, the driver’s seat. Being able to predict noise enables designers to make modifications on car details (e.g., side mirror shape, some door gaps, vents, etc.) and materials to comply with regulations and improve the comfort of the passengers.

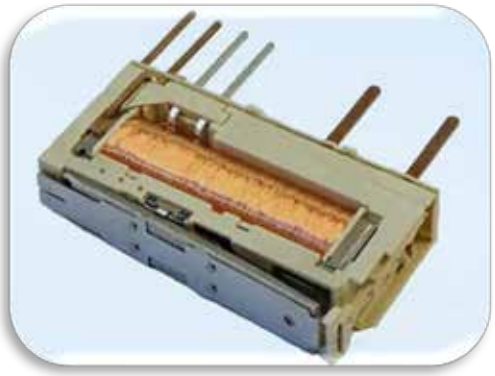
Ansys Fluent can solve complex aeroacoustics problems and provide an extensive set of modeling options and post-processing capabilities to improve acoustic design using a variety of methods:

- **Broadband noise methods,** where the steady solution is used as basis for noise source estimation.
- **Acoustic analogy methods,** where the computational fluid dynamics (CFD) solution is decoupled from the sound propagation via wave equation solutions.
- **Direct methods** (i.e., direct computational aeroacoustics), which fully couple the calculation of unsteady flow and acoustic fields.

Continue reading on An Introduction to Aeroacoustic Simulation

Giovanni Petrone - Lead Product Marketing Manager, Ansys

Giovanni is responsible for the Ansys Fluids Product Line's go-to-market and product marketing. He looks at new technologies like AI and Machine Learning to disrupt the way we go-to-market in a new digital era.



Digital twin - simulation in operation

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

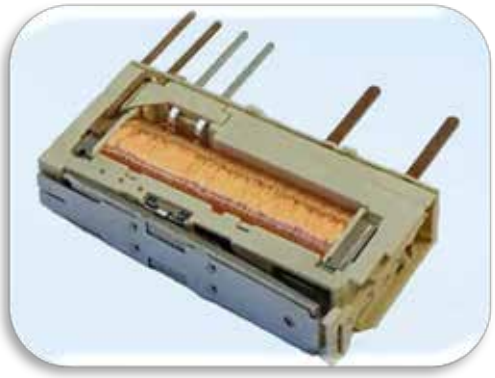
Branch: Electrical engineering/electronics

Specialist field: Electromagnetics, Structural mechanics, System simulation

Remaining life prognosis of a safety critical relay

Task	Solution	Customer benefits
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 shall compute the true state.	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 the system simulation within ANSYS TwinBuilder. The physical relay sends sensor data to an IoT platform, which computes wear and remaining life.	The Digital Twin enables an analysis and prediction of lifetime relevant characteristics, when real sensors can't really do the job. A study by the US Department of Energy has shown an average cost reduction of 25% and a reduced downtime of 70%. In addition, it is the basis for improved next generation product development and new business models.

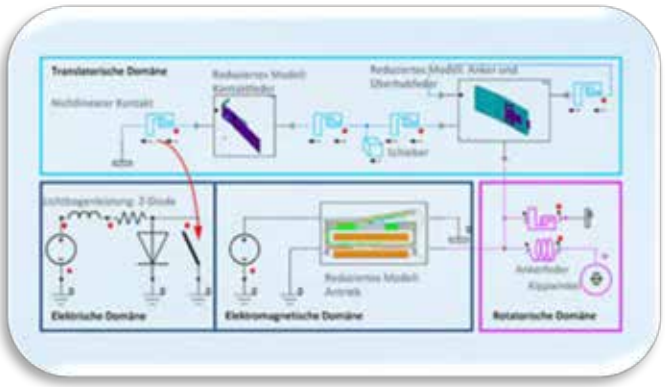
Task



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.

Model of system with behavioral models from 3D-FEA-analyses of magnetics, mechanics, temperature

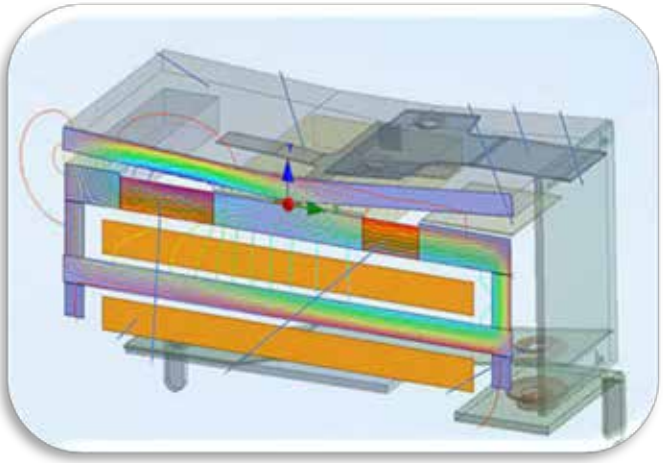


Solution

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.

Products applied in the project

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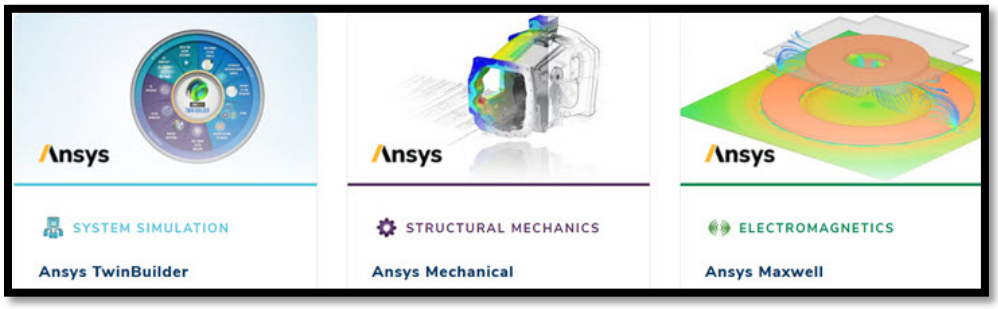


Excerpts - please visit for complete information & Demo

docq VIT

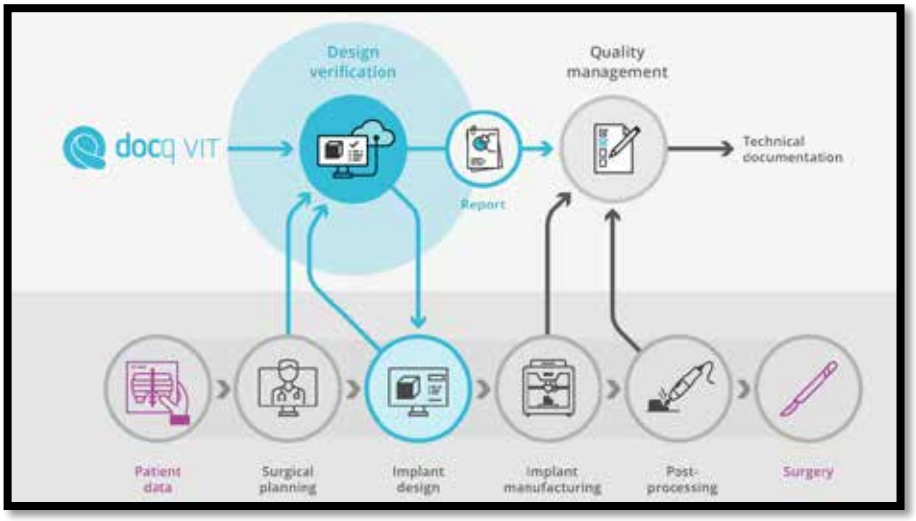
Digital verification of implants. Simple, fast and compliant with new regulatory requirements.

docq VIT at a glance

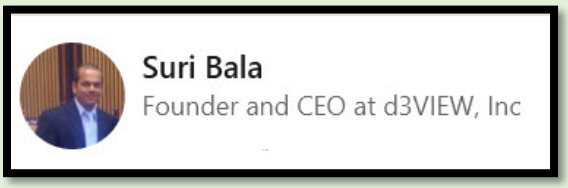
· Test custom implants with simulation · Support for decision making in the design process · Selecting different workflows within the software for different implant types and anatomical regions · Increased safety for doctor and patient · Development of additional workflows within the software · for manufacturer-specific implants	· Visualization of the acting loads and forces on the individual implant restoration · Automated report generation based on FDA guidelines for technical documentation · Development of additional workflows within the software for manufacturer-specific implants · Visualization of the acting loads and forces on the individual implant restoration · Automated report generation based on FDA guidelines for technical documentation

Video can be viewed on website
One software solution for all anatomical regions

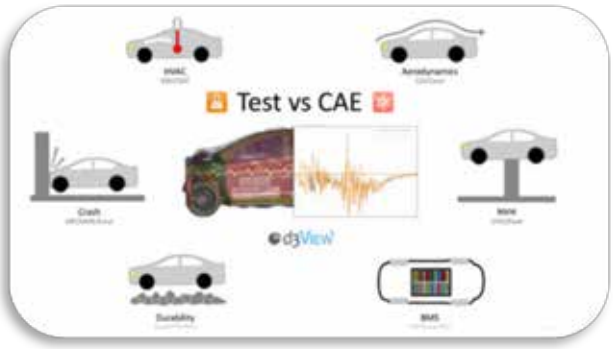
Make your implants more efficient and safer



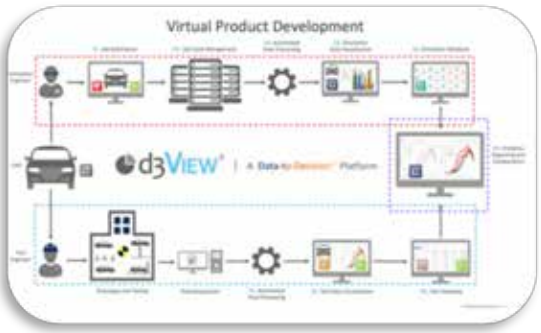
docq VIT comes into play where decisions are made



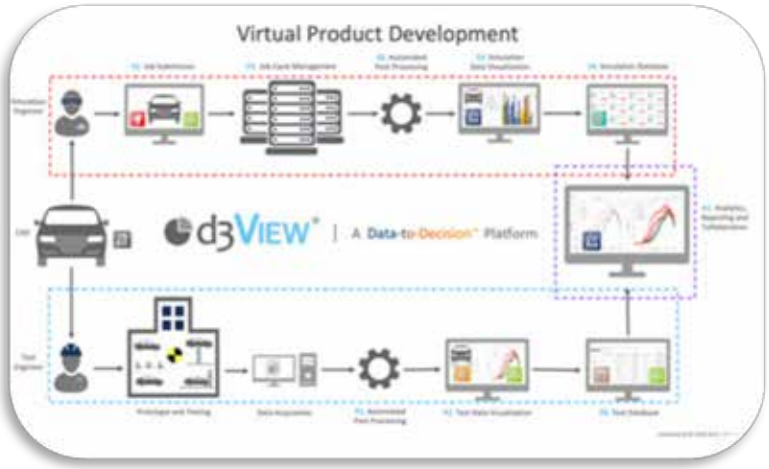
"d3VIEW isn't just a general data mining and visualization platform. Scientists from the early ages until now, have relied on experiments to better understand nature. Today, as simulations drive product-development, experiments continue to play an important role in improving our simulations."



EXCERPT - Physical Tests - A Comprehensive Application for Tracking Experiments.



No Data Left Behind - Test-data comes in a variety of data-for mats and supporting these formats is critical to bringing data from different labs. The table to the left indicates the different formats currently supported by d3VIEW and is growing. The readers are designed to be fast and can run on multiple OS in single or parallel processing.



An All-Encompassing Platform - d3VIEW, from its early versions, has focussed on providing a unified, simple-to-use platform to store and manage experimental data across sciences and most importantly to overlay Test vs CAE and increase our understanding of simulations.

As illustrated to the right, the importance of having a single platform, as in d3VIEW, facilitates the accessibility of both simulation and physical tests using identical storage, transformation and visualization

Comprehensive Support - d3VIEW's Workflows application helps make data-import, sanitize and visualize easier by automating data processes. Employ test data import workflows which include d3VIEW's templates, data extractions, workers and visualizers in one simple data-pipeline.

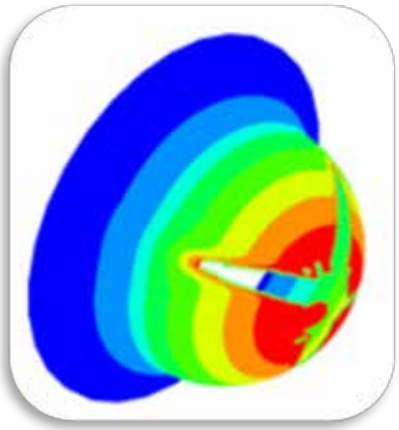
A Perfect Pair - Prepare, integrate and explore test and CAE data together using d3VIEW's new match maker feature and data visualization application Simlytiks®. Match Maker simplifies mapping physical test and simulation responses together, while Simlytiks® houses a variety of charts and graphs which aid in analysis such as time-series plotting, image re-orientation and media overlay.

DYNAmore - Material Competence Center

The aim of the LS-DYNA Material Competence Center is to offer the entire engineering service from a single source, starting with the execution of the test up to the delivery of a material card calibrated for the special customer application.

LS-DYNA is regarded as one of the world's most powerful software tools for structural simulation - both in terms of possible model sizes, achievable speed-up in parallelization for cluster systems, and the availability of complex and specialized material models. This offered functionality is extended towards many application areas where coupled systems, e.g. thermal, electromagnetic or fluid dynamic problems, play a significant role.

Access to high-quality material data down to the failure and fracture range is critical for the predictive capability of corresponding simulation calculations, enabling the identification of all necessary model parameters and ultimately the successful calibration of material models. To this end, DYNAmore has in recent years advanced the data acquisition from experiments and the efficient parameterization of material models and recently bundled the competences of our employees with the move to new premises and the creation of a Material Competence Center in Leinfelden-Echterdingen at one location.



Calibrated material cards and optimal modeling techniques

- Metallic materials up to failure prediction (GISSMO, eGISSMO, DIEM, etc.)
- Polymers and composites (non-reinforced, short fiber-reinforced, continuous fiber-reinforced)
- Elastomers
- Glass (float, thermally or chemically tempered) and ceramic materials
- Connection technology (punctiform, linear, flat)

Furthermore, we see our competence in the calibrated transfer of simulation process data from component manufacturing (injection molding, extrusion, forming, heat treatment, hot forming, casting, solid forming, draping, etc.) into downstream component or full scale simulations (crash, impact, stiffness, etc.). For this purpose we regularly use our process mapper ENVYO, a DYNAmore in-house development.

Experiments

The mechanical properties of many materials that are required for simulation are often unknown. Defining these precisely is typically very expensive and often involves a considerable wait. In contrast, the experiments we select in accordance with the specific requirements of the client provide a quick and reliable basis for generating predictive material cards for polymers, metals and composite materials.

Our services

- Static, dynamic, and cyclic testing
- Tensile, compression, puncture, and bending testing
- Component testing
- Sample conditioning
- Sample processing and collection from components, sheets and panels
- Optical 3D strain measurement and detailed local distortion evaluation

Your benefits

- Testing and adjustment from a single source
- Time and cost efficient
- LS-DYNA developer team is always nearby

Contact

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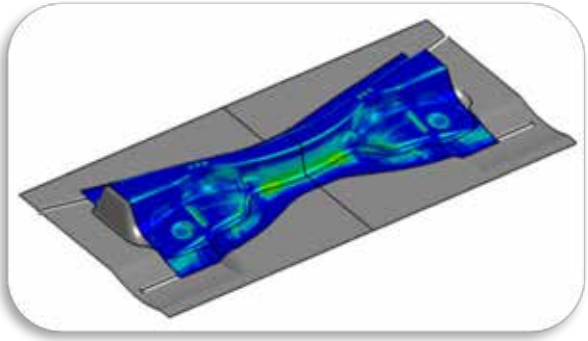
f +49 711 45960029

Thank you, Rasmus, and Mikael for assisting the FEA community.

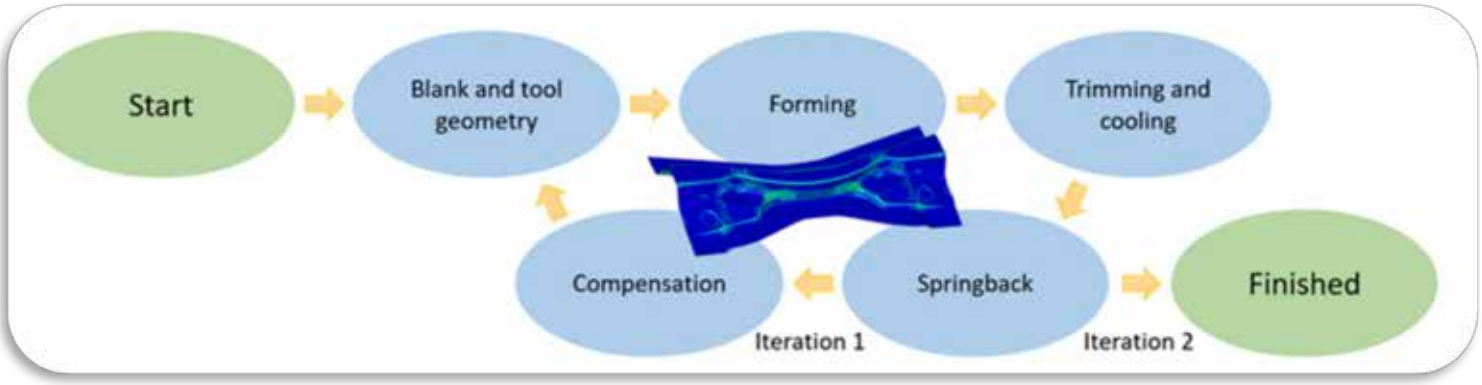


Hotforming of aluminum

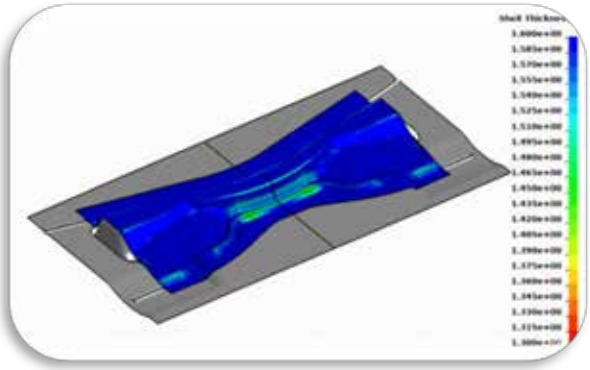
Case study: Simulation of Hot Forming of an aluminum car body crossmember with springback compensation

Simulating Forming Processes

When simulating a forming process, the main task is to follow how the part is changing through the various forming steps. One needs to mimic the physical process as accurately as possible in every step. To accommodate this, the user should have the possibility to choose the most appropriate solver and method required for the present forming step. LS-DYNA contains multiple solvers that can either be used individually or combined to create a multiphysics analysis, all within one single license. Below we present a flowchart of the forming process of the aluminum part. The geometry and the material state are transferred between the different process steps through a virtual version of the actual component. Multiple solvers and functionality are used through the simulation process using the same license and software.



The benefits of doing virtual tool and process design before going to hard tooling are several. First of all, possible issues with the forming process can be identified, such as wrinkling and tearing. These issues can be addressed and solved before producing the hard tooling, saving a lot of cost and development time. The press forces can also be determined through simulation, enabling the tool designer to dimension the press line and amount of blankholder force. Furthermore, the out of tolerance deformation due to springback can be evaluated and compensated for in the tooling geometry.



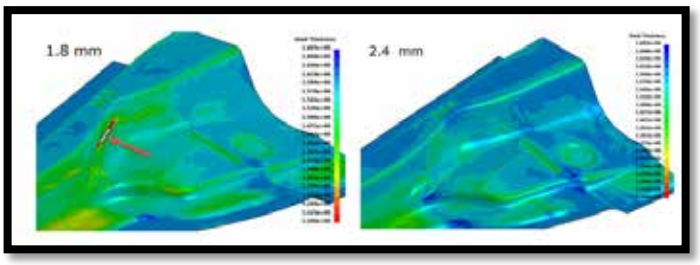
Deepdrawing and Hot Forming - Conventional deep drawing can be a challenging task, but the simulation setup on the other hand is quite straightforward. Setting up the simulation process chain is made easy with the use of tailored software such as DYNAFORM from eta. The die designer quickly gets acquainted with the various tool parts and is guided through the forming process parameters, such as the tool movement and blankholder forces. DYNAFORM also helps with choosing the proper LS-DYNA parameters to use with the various simulation steps. Therefore, there is no need to be a simulation expert to run these types of problems.

When simulating a hotforming process, thermal physics are added, and the simulation problem becomes multi-physical. The proper way to solve this is to use a coupled approach where the two physical regimes exchange information. Thus, the thermal problem affects the mechanical, e.g., by changing the material properties due to temperature. The mechanical problem affects the thermal, e.g., by cooling through contact between the tool and the blank. As always, the secret is in the details, and having a sound formulation of the problem makes the simulations much more accurate. For instance, one major issue is being able to predict the temperatures during the forming process accurately. This is accommodated in LS-DYNA by allowing the tooling to heat up by the blank and by precisely modeling the heat transfer between the tool and the blank, e.g., as a function of tool pressure.

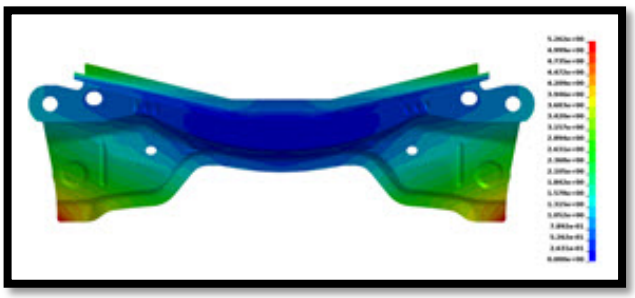
Describing aluminum at elevated temperatures - It is well known that temperature affects the blank material. First of all, as the material heats up, it expands and subsequently shrinks during cooling. The shrinkage affects the residual shape of the part. Also, as the material heats up, it generally softens. This is why it is essential to model the temperatures accurately, since a hotter part of the blank will inevitably strain more than a cooler part, which could render a part with excessive thinning. Aluminum sheets often have different properties depending on the direction of the blank. It is due to, e.g., texture and/or rolling of the sheet. Tensile testing of aluminum at elevated temperatures shows that these properties also depend on the temperature. Thus, depending on the material temperature, the material is either more prone to material draw-in or thinning. The material models in LS-DYNA can include this behavior and account not only for the thermal softening, but also the difference in anisotropic properties.

Forming simulation, Springback and Springback compensation

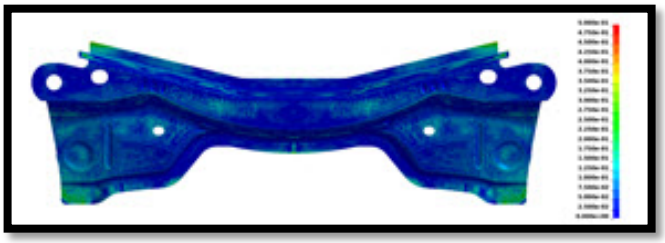
In this case, the forming simulation process starts with a tool design suggestion which is imported into DYNAFORM where the simulation process is set up. The blank stretch is generated using drawbeads with a constant gap between the binder and the blankholder.



Thus, the first issue is to determine a gap that renders a part without tearing but still has a sufficient amount of stretch. The blank thickness is 1.6 mm, and several different gap sizes are simulated to find a process without tearing.



As the blank stretch is reduced to eliminate the risk for tearing, the risk of excessive springback is increased. Springback is a phenomenon where the elastic stresses are released as the component is removed from the die. The residual stresses force the part out of tolerance. In this case, the deviation after trimming, springback and cooling of the part is approximately 5.3 mm, which is not acceptable, see the illustration.

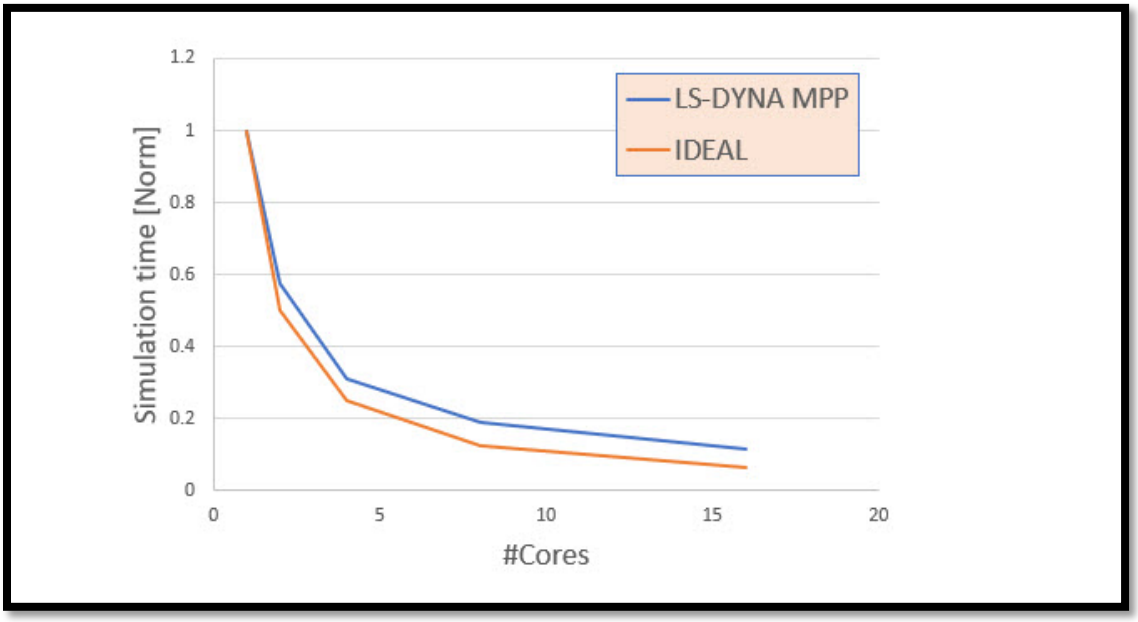


There are several ways to address springback deformation, where one is to compensate for the out of tolerance in the tooling. The part deviation is applied in the opposite direction in the tooling with a scale factor, which causes an overbending of the geometry.

The idea is that as the part spring backs, it should attain the nominal shape. In this case, a scale factor of 1 is used, and new tool geometries and trimming curves are generated by LS-DYNA and simulated using the same process settings as before. Using springback compensation proved successful in this case as the out of tolerance deviation was reduced to approximately 0.5 mm.

In this example, only 1 iteration of compensation was performed, but the process could be repeated to improve the tolerances further. At this point of the design process, it might be fruitful to check the stability of the process by modifying for example the temperature of the blank, the tool friction, or the material properties, to find out if these variations render parts that are not acceptable.

Simulation time - The computer time spent simulating the forming process is a key factor for a short turn around time of the virtual die design. **Here, LS-DYNA utilizes the increasing number of cores in modern-day computers by allowing a distribution of the model on several cores through MPP (massively parallel processing), and the simulation time then decreases with the number of used cores.**



Accordingly, the licensing model of LS-DYNA allows for full versatility when deciding on the number of parallel jobs and cores. Thereby, the customer can balance cost and performance depending on their typical forming processes and parts.

Simulations have time and again proven to be a cost-effective product development tool that avoids costly tooling redesign. We have the software and knowledge required so that you may learn to perform these simulations yourself. We will guide you all the way, including training and support. To learn more, please contact one of our technical experts

Marco Begotti, Managing Director, Ride Tek Engineering S.r.l. "For the past 15 years we have relied on the expertise of EnginSoft. EnginSoft helps us with decision making during the design phase of highly sensitive projects such as Roller Coasters, providing us with a real understanding of ride behaviour, in particular regarding the structural response point of view, resulting in reduced design time and reduced overall costs without compromising safety."

The Structural Design of Roller Coasters - An integrated CAD-CAE procedure

ABSTRACT - There is no amusement park ride that produces the ultimate adrenalin rush in all of its passengers better than a roller coaster ride does.

Modern roller coaster designs require both creativity and rigid adherence to regulations that ensure high quality standards, which guarantee the safety of the roller coaster ride even when equipment may malfunction.

Whilst ensuring that safety comes first in all designs, engineers need to also keep in mind that structural details and construction related issues have a significant influence on the final cost-benefit analysis for the roller coaster manufacturer.

Designing a Roller Coaster - The development of a new roller coaster track is affected by a number of factors such as:

- location of the structure
- availability of space
- type of roller coaster
- interference/interaction with other facilities and attractions which is of particular importance in countries where roller coasters are installed in small playgrounds or malls

Engineers will normally need to evaluate a number of different designs, only one of which will result in the final construction configuration. This is why numerical simulation plays an indispensible role in roller coaster design.

With over 20 years of experience in the design and structural verification of roller coasters, at EnginSoft we work closely with our customers to help them improve their design and verification procedures. As an example we have jointly developed an integrated CAD-CAE procedure, which allows engineers to efficiently create a virtual roller coaster prototype, for one of our long time customers Ride Tek Engineering. With this tailor-made procedure the customer is able to generate prototypes of tracks within an integrated 3D CAD-CAE environment, providing immediate assessment of its consequences on cars or users in terms of longitudinal, transverse and normal accelerations. For example, the procedure allows them to adjust the banking angle to mitigate effects on passengers or to improve constructability related to industrial calendering operations.

The Role of Numerical Simulation in Roller Coaster Design

The complexity of a Finite Element Analysis (FEA) model used for analysis and verification of a roller coaster design can vary. In many cases the use of beam and shell models are generally sufficient to investigate stress and strain in structures and components. In cases where a deeper detail analysis is required Finite Element Brick models can be also developed. Design code checks are performed according to recognized international standards (e.g. DIN 4112, EN13814 and related codes) and must guarantee sufficiently high safety levels for end users, with particular reference to structural details that minimize the occurrence of fatigue cracks.

Software tools for roller coaster analysis and design must include the following features:

- finite Element Beam, Shell and Brick Analysis in linear and non linear regimes
- non linear Analysis capability: geometry non linearity, material non linearity, contact and construction stage analysis
- ultimate load carrying capabilities, accounting for plasticity effects
- linear and non linear buckling analysis of slender structures
- seismic analysis of fixed or isolated structures
- detailed Finite Element Analysis for local stress and fatigue investigation of systems and components
- interaction with programming languages or set of APIs to efficiently address repetitive or design tasks such as fatigue checks and result extraction

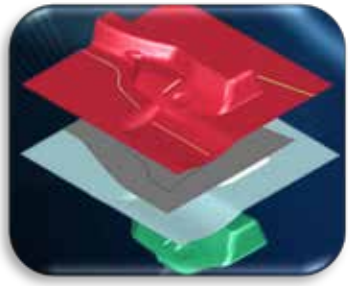
THE BENEFITS OF DEVELOPING A WELL DESIGNED COMPUTER ENGINEERED REUSABLE MODEL FOR ROLLER COASTERS

A well-designed roller coaster numerical model should provide:

- an easy way to modify the track interactively based on space constrains, the maximum speed and other important parameters
- instant designs starting with the model design up to the finite element analysis of the track with all load conditions applied. Self weight conditions need to be accounted for together with all dynamic interface forces between each car and the track
- a structural analysis and verification in short order, by running a series of predefined procedures

The use of such a model can substantially reduce the time to market for roller coasters, because far fewer physical prototype models need to be built.

Within the context of this type of integrated design, EnginSoft is your ideal partner for the development of tailor-made applications and procedures. Our consultancy spans the analysis of the structural response for the entire structure, as well as the cars, to the definition of fatigue checks of structural details performed in accordance with stringent and field-specific regulations.



JSOL JSTAMP - Support tool design and process design for forming

Integrated forming simulation system JSTAMP

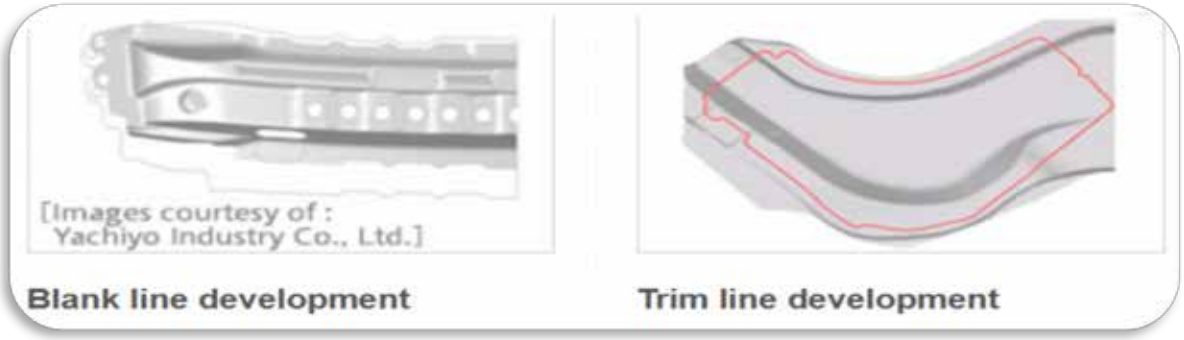
- Dieface Design Support
- Blankline/trim line development
- Crack, wrinkle, and springback prediction
- CAD output of SB-compensated tool
- Material database as standard equipment

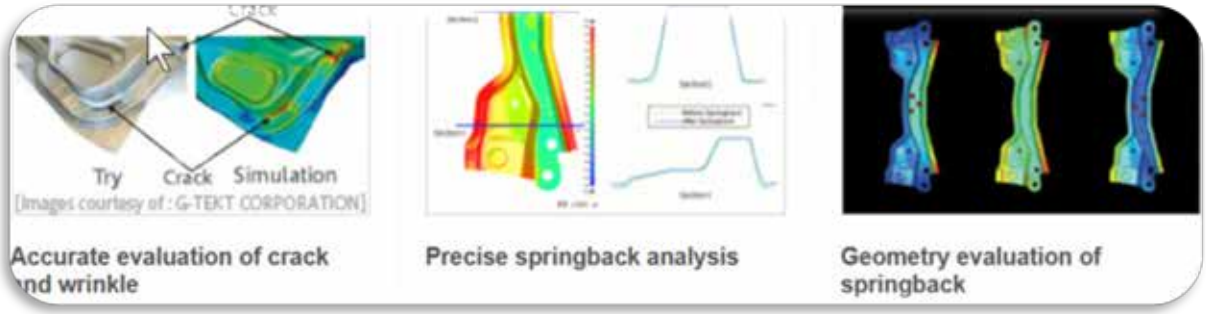
Among the Functions (Excerpt - for full information please visit the website)

Address various tasks in tool shop - JSTAMP represents the Sheet metal forming process virtually by numerical simulation. Users can examine the simulation result, output it to CAD, and directly use the CAD as a countermeasure by using JSTAMP.

Designers can avoid the challenges of trial and error. JSTAMP provides an adequate result and reduces the lead time and cost of tool design.

JSTAMP provides comprehensive support throughout the design process from the first trial to the final stage. The feature for addressing complicated process stages, low formability materials, and latest technologies covers various tasks in the Sheet metal forming process.





Excerpt from PDF

PDF can be downloaded on website - Reduced order modeling of advanced versatile seats Faurecia Brières Tech Center - France

Overview: ODYSSEE CAE helps Faurecia reduce the time required for crash seating simulations by over 97% for the Cockpit of the Future.

ODYSSEE CAE helps Faurecia reduce the time required for crash seating simulations by over 97% for the Cockpit of the Future.

Faurecia was founded in 1997 and has subsequently become a world leader in automotive parts. One in three cars uses Faurecia components.

Faurecia is a top ten global automotive supplier with the majority of global OEMs using their components. Their seating division employs 42,515 employees in 77 locations and 13 research centers dedicated to maintaining the safety and the comfort of the occupants.

Faurecia recently developed a low carbon footprint seat as a step towards their goal of being carbon neutral in 2030. With the goal of inspiring mobility, Faurecia is working towards the “Cockpit of the Future”.

Fig 1: Four severe seat load cases at high speeds, top left is a front crash, top right is a rear crash, bottom left is a 18kg luggage crash, and bottom right is seatbelt anchorage test.

Challenge: Faurecia is creating the “Cockpit of the Future” with better seating and intuitive console electronics and displays. The increasingly adjustable seating is crucial in giving passengers the most comfortable driving experience. While comfortable, the seats must ensure that the passengers remain safe in all seated positions during a crash scenario. Faurecia is implementing regulatory bodies’ request for extensive virtual crash testing. The crash analysis should be performed for all possible crash configurations and all occupant types including the newer elderly and obese models. Faurecia finds that using FEA analysis to fully model all these crash simulations would take years of computational time and large amounts of power, hindering their goal of being carbon neutral by 2030. Could ODYSSEE CAE offer a better way to simulate every crash scenario while limiting the computation time and power needed?

Solution: **Faurecia was enthusiastic to use ODYSSEE CAE machine learning to reduce the computational time needed to analyse a crash configuration.** ODYSSEE CAE was put to the test to showcase its ability in analysing four intensive crash scenarios. The first crash scenario was the luggage test to determine the direction of the final velocity of a 18kg luggage during a crash. The next two scenarios were the high-speed front and rear crashes. The fourth scenario was the seatbelt anchorage test to determine if the seatbelt would restrain the passenger during the crash. ODYSSEE CAE developed reduced order models (ROM) using machine learning techniques to each of the scenarios. The first three ROMs each were trained on 60 FEA simulations to achieve high fidelity results. The seatbelt anchorage ROM was trained with the front crash simulation ROM instead of FEA analysis. ODYSSEE CAE reduces the computational time and power for FEA level results. Faurecia was enthusiastic to use ODYSSEE CAE machine learning to reduce the computational time needed to analyse a crash configuration. ODYSSEE CAE was put to the test to showcase its ability in analysing four intensive crash scenarios. The first crash scenario was the luggage test to determine the direction of the final velocity of a 18kg luggage during a crash. The next two scenarios were the high-speed front and rear crashes. The fourth scenario was the seatbelt anchorage test to determine if the seatbelt would restrain the passenger during the crash. ODYSSEE CAE developed reduced order models (ROM) using machine learning techniques to each of the scenarios. The first three ROMs each were trained on 60 FEA simulations to achieve high fidelity results. The seatbelt anchorage ROM was trained with the front crash simulation ROM instead of FEA analysis. ODYSSEE CAE reduces the computational time and power for FEA level results.

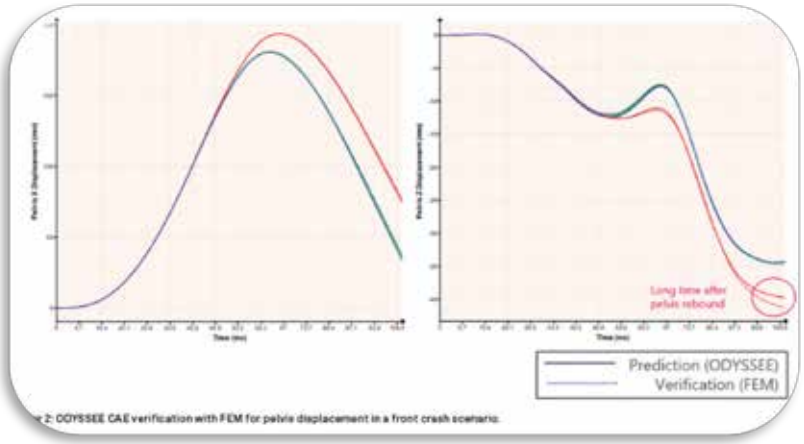


Fig 2: ODYSSEE CAE verification with FEM for pelvis displacement in a front crash scenario.

Results - Time ODYSSEE CAE's simulations does not need a computational cluster, freeing it for other simulations. A computer with 8-cores using the ROM simulations was much faster than a 28-core cluster performing the FEA analysis. The front crash scenario was modeled in 1min compared to the 11hr FEA analysis. The seatbelt anchorage test was performed in 27min compared to the 10hrs for FEA analysis. The rear crash scenario was completed in 1hr compared to the 14hr FEA analysis. With over 97% reduction of computational time, Faurecia can perform 14 or more similar simulations in the same amount of time needed for a single FEA analysis.

Accuracy - ODYSSEE CAE attains FEA level accuracy with ROM. The luggage model was achieved to the desired error range with further training possible to reduce the error. The ROM front crash scenario was accurately modeled to less than 1mm difference with the FEA analysis. This is less than the 5mm optical tracking uncertainty in physical testing. The rear crash model accurately captured the global displacement and identified locations of concern. The seatbelt anchorage model predicted the same critical failure in the same location and time as the FEA simulation. Faurecia uses ODYSSE CAE to predict extensive crash scenarios accurately and quickly. The lower computing power needed for the models aids Faurecia in achieving their carbon neutral ambitions and the limited computation time enables more diverse crash scenarios to be modeled. ODYSSEE CAE empowers Faurecia to make the safest "Cockpit of the Future" through comprehensive virtual simulations.

Marta Kempa, MBA - Marketing Coordinator & Seppi
Oasys LS-DYNA
Oasys Software, Tutorials & Classes Not To Miss

Not To Miss on YouTube -

Oasys SHELL Your portal to the Oasys LS-DYNA Environment

Oasys SHELL provides you with an easy way of accessing each stage of your analysis from model set-up in Oasys PRIMER to interrogation and reporting of your results in T/HIS, D3PLOT and REPORTER.

Oasys PRIMER, T/HIS, D3PLOT, and REPORTER can all be launched from the Oasys SHELL.

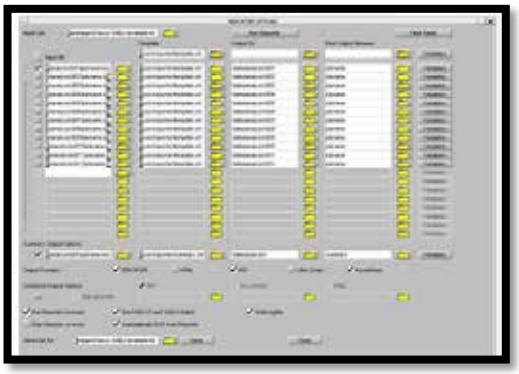
Most importantly, there is an advanced LS-DYNA submission shell for submitting analysis that gives you easy access to the all the various options available when submitting an LS-DYNA run. It also provides easy access to the Oasys and LS-DYNA manuals.

Main features:

- Online, background, batch and queue (NQS/LSF/ CODINE) submission.
- Full control over queue and job CPU and memory limits.
- Selection of all LS-DYNA input and output files.
- Switch from the LSTC to the Arup naming convention (d3plot vs jobname.ptf).
- Simplified restart procedure.
- Run Oasys REPORTER templates in batch.
- Access to manuals (both HTML and PDF available).

LS-DYNA Job Submission

The LS-DYNA submissions windwo withon Oasys SHELL gives you full access to the Various options available when submitting and LS-DYNA job and will work with most major queuing systems. It also allows users to easily choose the required dump file when performing an LS-DYNA restart.



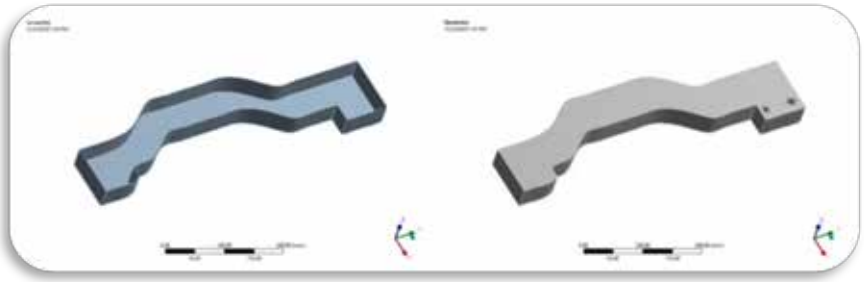
Oasys REPORTER Templates in Batch

Oasys SHELL allows you to configure batch runs of your Oasys REPORTER templates, allowing you to generate reports for multiple jobs automatically

Genesis® for Ansys® Mechanical (GSAM/GTAM) adds the power and versatility of Genesis® structural optimization capability to the ANSYS environment.

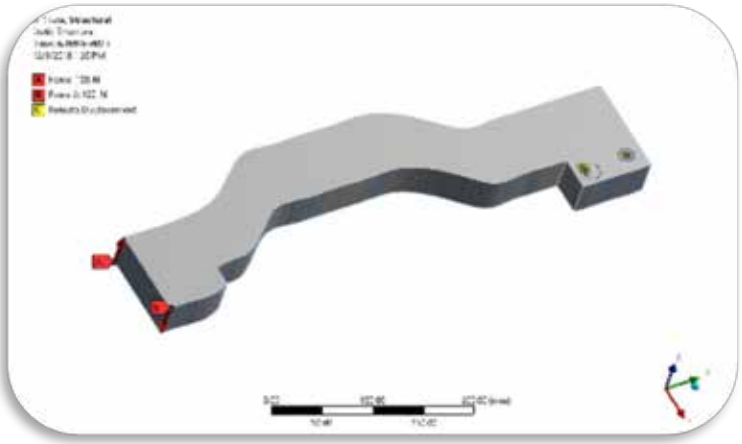
Topology Optimization for Designing Reinforcing Ribs Engineers can enlist the rich breadth of Genesis® optimizations, performing optimization data definition, solving, and post-processing all within the Ansys analysis systems. In this article, we would like to show it is very easy to set up a topology design in GSAM to optimize the performance of the structures.

Topology optimization is to find the optimal distribution of material in a given package space. In this example, topology optimization is used to design the reinforcing ribs for an automotive c-channel beam.



The model includes the non-designable c-channel shells, and the solid part which is the candidate design region for reinforcing ribs. We would like to maximize the stiffness with no more than 20% of mass of the candidate design region.

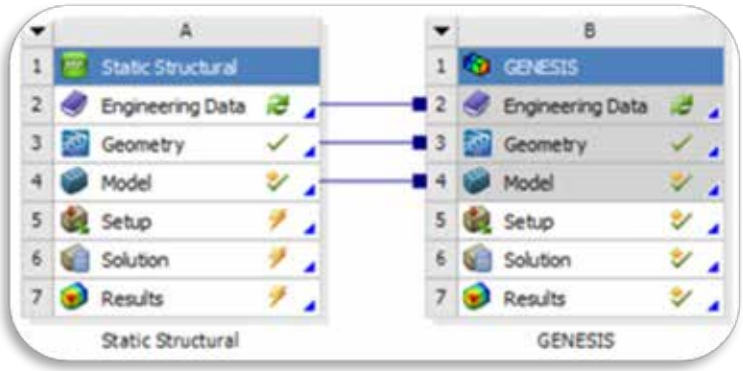
Figure 1. C channel enclosure shell and solid fills.



1. Loading Conditions - This model includes one loadcase. The model is fixed at one end, and the other end is under torsional load.

Figure 2. Structure under torsional load.

Project Schematic



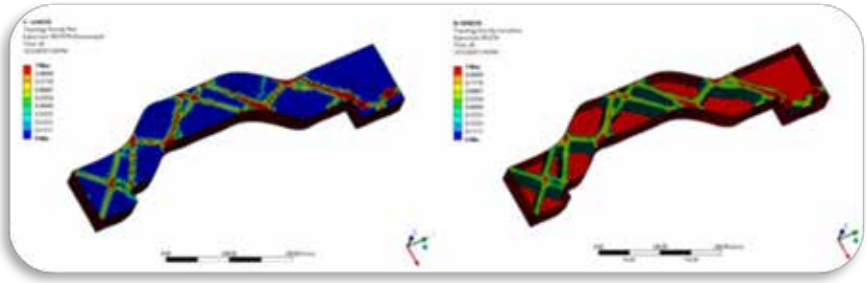
2. Add GENESIS System to The Workflow - In the workbench main window, we drag GENESIS system from the component list, and drop onto the model cell of the system A. By doing this, GENESIS will share the same model as existing analysis systems.

Figure 3. Adding GENESIS system to the project workflow.

3. Optimization - In ANSYS Mechanical window, we add the Objectives, Constraints, and Topology Regions objects to the GENESIS system, and define the corresponding data as described below.

- Objective: Minimize strain energy
- Constraints: mass fraction < 0.2
- Topology Design region: the solid part
- Fabrication constraints: Extrusion along Z direction. The referencing coordinate system is the global coordinate system

4. Post-Processing



Once optimization finished, we can check the topology element density result or the density isosurface result. The elements in blue are low densities, and the elements in red are high densities. Here we used a lower cutoff 0.3 for plotting the density isosurface.

Figure 4. Topology element density plot and density isosurface plot.

From the topology result, we can see multiple ribs are created to stiffen the c channel. A summary about the design can be found in genesis.html in the solver files directory. You can start from this topology result and create new shells for these ribs, and do a sizing optimization to further refine the design.

Objective

	Goal	Design Cycle 0	Design Cycle 20	Change
	Minimize Respo[illegible]e	8.526437E+00	2.555519E+00	-70.0%

Objective Response

	Response-ID / Loadcase-ID / Type
	1 / 1 / SENERGY

Maximum Constraint Violation

	Design Cycle 0	Design Cycle 20	
	0.0%	0.0%	

Figure 5. Summary in genesis.html .

The final design cycle had 1 active constraints. The run was stopped by hard convergence

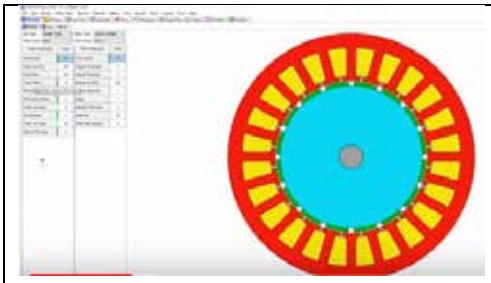
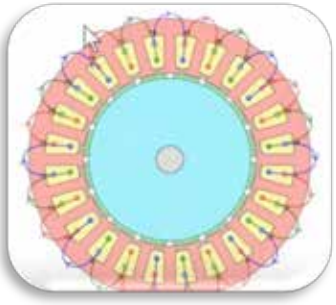
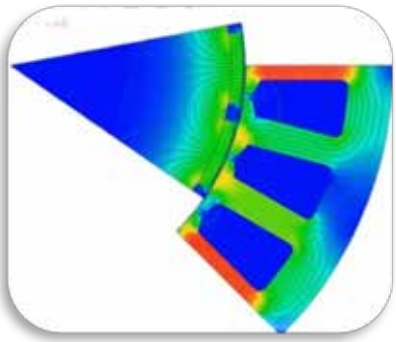
Topology optimization is a great tool in GSAM, which is easy to set up but also very useful for design improvement. For more details, please contact us at gsam.support@omniquest.com

Hi there! In this video we are going to show how to use MotorCAD by Ansys to analyze a BLDC motor.

BLDC is getting more popular and MotorCAD is a great tool to simulate them.

Content:

Demo Introduction - MotoCAD Initial Inputs - MotoCAD Vs. - Thesis Data - MotoCAD Setup Results

		
		Ansys Motor CAD is a dedicated electric machine design tool for fast multiphysics simulation across the full torque-speed operating range. **As an Ansys Elite Channel Partner, we will be more than happy to deliver an update to your company related to the latest ANSYS software release.**

We are located in Silicon Valley (Northern California). On top of educating engineers on different Mechanical, Electrical, and Digital Twin Software products, we have been providing consulting services for different industries. Visit our website for complete information and to contact us.

Ulukar - LS-DYNA

The crashworthiness of the system was evaluated both numerically and experimentally. **The finite element model of the design was developed and solved using LS-DYNA** (971, LSTC, Livermore, CA, USA), in which the impact performance was evaluated considering the EN 1317 standard

Impact Performance Evaluation of a Crash Cushion Design Using Finite Element Simulation and Full-Scale Crash Testing

Figure 1. Severity of road accidents with narrow and rigid objects.

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Kenan Kurucuoğlu
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Abstract - Crash cushions are designed to gradually absorb the kinetic energy of an impacting vehicle and bring it to a controlled stop within an acceptable distance while maintaining a limited amount of deceleration on the occupants. These cushions are used to protect errant vehicles from hitting rigid objects, such as poles and barriers located at exit locations on roads. Impact performance evaluation of crash cushions are attained according to an EN 1317-3 standard based on various speed limits and impact angles. Crash cushions can be designed to absorb the energy of an impacting vehicle by using different material deformation mechanisms, such as metal plasticity supported by airbag folding or damping. In this study, a new crash cushion system, called the ulukur crash cushion (UCC), is developed by using linear, low-density polyethylene (LLDPE) containers supported by embedded plastic energy-absorbing tubes as dampers. Steel cables are used to provide anchorage to the design. The crashworthiness of the system was evaluated both numerically and experimentally. **The finite element model of the design was developed and solved using LS-DYNA (971, LSTC, Livermore, CA, USA), in which the impact performance was evaluated considering the EN 1317 standard. Following the simulations, full-scale crash tests were performed to determine the performance of the design in containing and redirecting the impacting vehicle. Both the simulations and crash tests showed acceptable agreement**. Further crash tests are planned to fully evaluate the crashworthiness of the new crash cushion system….

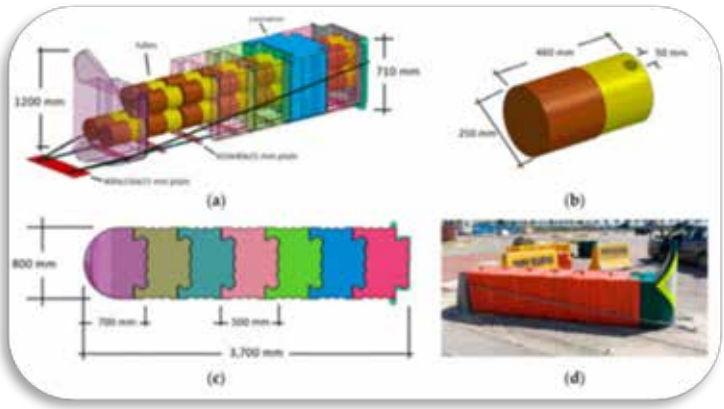
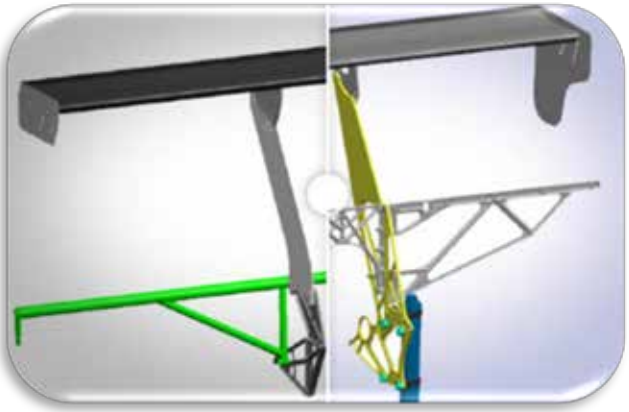


Figure 2. Details of Ulukur Crash Cushion Developed - Ulukur crash cushion (UCC) design is composed of linear, low density polyethylene (LLDPE) containers, energy-absorbing tubes, steel cables, lower plates, and back support plate. Geometrical details of these materials are provided in Figure 2.

OMNIQUEST



Corvette Daytona Prototype Topology Tail Frame Structure

CHALLENGE: Reduce the weight of the Corvette prototype wing/body (tail frame) but don't compromise structural integrity

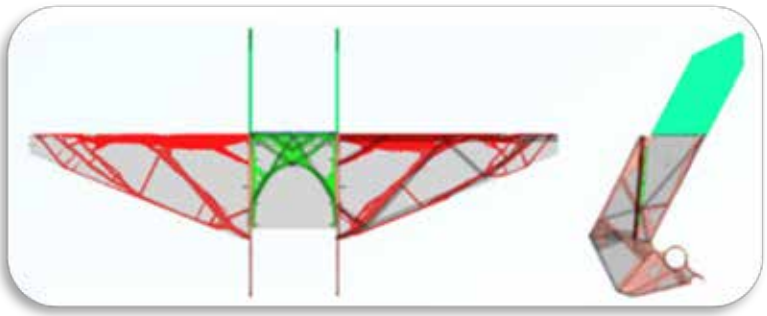
OUTCOME: Genesis Optimized Tail Frame is 33% lighter, and surpassed Pratt Millers stiffness and strength requirements

Pratt & Miller Racing uses VR&D Genesis Topology Optimization to reduce the weight of the Corvette prototype wing/body (tail frame) without compromising structural integrity.

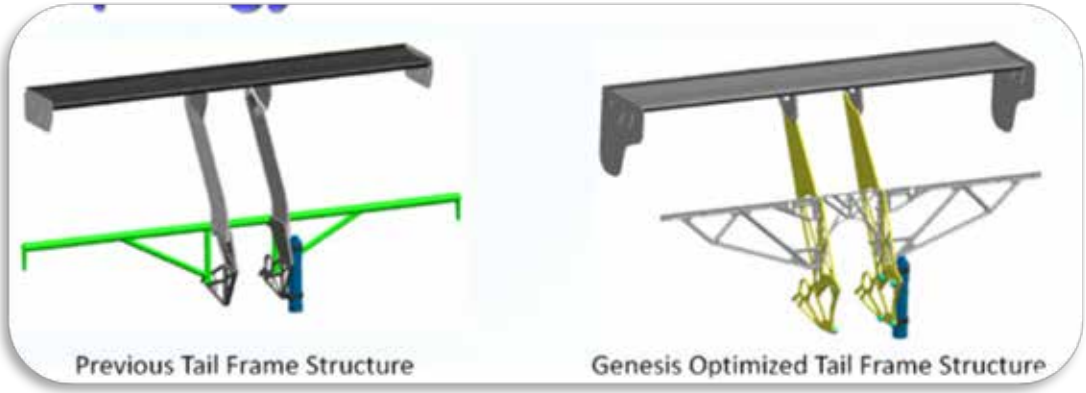
Corvette Daytona Prototype
Designed and built: Pratt & Miller

Genesis Optimized Tail Frame

"It's safe to say that Genesis optimization has quickly become a standard step in the majority of critical Pratt & Miller designs" – Pratt & Miller Engineering



- The available design space (i.e. topology region) is shown in grey
- Topology Optimization migrates the specified amount of mass to the stiffest configuration while maintaining specified design constraints
- Load path interpretations are overlaid by the analyst as translucent black bars



The Genesis Optimized Tail Frame: is 33% lighter, and surpassed Pratt & Millers stiffness and strength requirements.

"Genesis has become an invaluable tool that regularly allows us to cut roughly 30% of the weight out of existing competitive designs without sacrificing the stiffness and strength endurance racing requires" – Pratt & Miller Engineering

FINAL TAILFRAME

Racing History & Camera Swivel Mount

This month we bring you a few facts on the history of Drift Racing, courtesy of Wikipedia.

Kunimitsu Takahashi - The famous motorcyclist turned driver, **Kunimitsu Takahashi, is widely regarded as the foremost creator of drifting techniques** He is known as the Drift King for his nontraditional use of drifting in non-drifting racing events and his role in popularizing drifting as a motorsport.

Drifting Driving technique - the driver intentionally oversteers, with loss of traction, while maintaining control and driving the car through the entirety of a corner. The technique causes the rear slip angle to exceed the front slip angle to such an extent that often the front wheels are pointing in the opposite direction to the turn (e.g. car is turning left, wheels are pointed right or vice versa, also known as opposite lock or counter-steering).

Drifting originated in Japanese automobile racing. It was most popular in the All Japan Touring Car Championship races. One of the earliest recorded drift events outside Japan took place in 1996 at Willow Springs Raceway in Willow Springs, California, hosted by the Japanese drifting magazine and organization Option.

Why Special Drifting Cameras? In racing, you want a perspective from the driver's visual. The easiest for viewing is with an onboard camera. Without a mounted on board camera it would be impossilbe to capture the view with the speed the cars are traveling.

Swivel Mount - Always pointing in the direction that the car is sliding Visit our website for complete information **Designed for drifters, By a drifter.** Troy, a Mechanical Design Engineer, started drifting his 1993 325i BMW in the fall of 2017 in the New England area.

Designed by Troy - He started recording videos on his GoPro from the car's roof or the inside of the cockpit. This proved unsatisfactory due to the static positioning of the camera.

Troy knew he had to change the design. He started designing, 3D printing, and prototyping a new design that would swivel with the car as it went sideways. With his engineering background and love of the sport, he developed Swivel Mount

Compare the top view of a camera mounted in a solid position always facing the front of the car, to the bottom view of our Swivel Mount.

Always pointing in the direction that your car is sliding

Excerpt Paper 14th International LS-DYNA Conference

LS-DYNA® finite element models were generated to simulate the three test conditions.

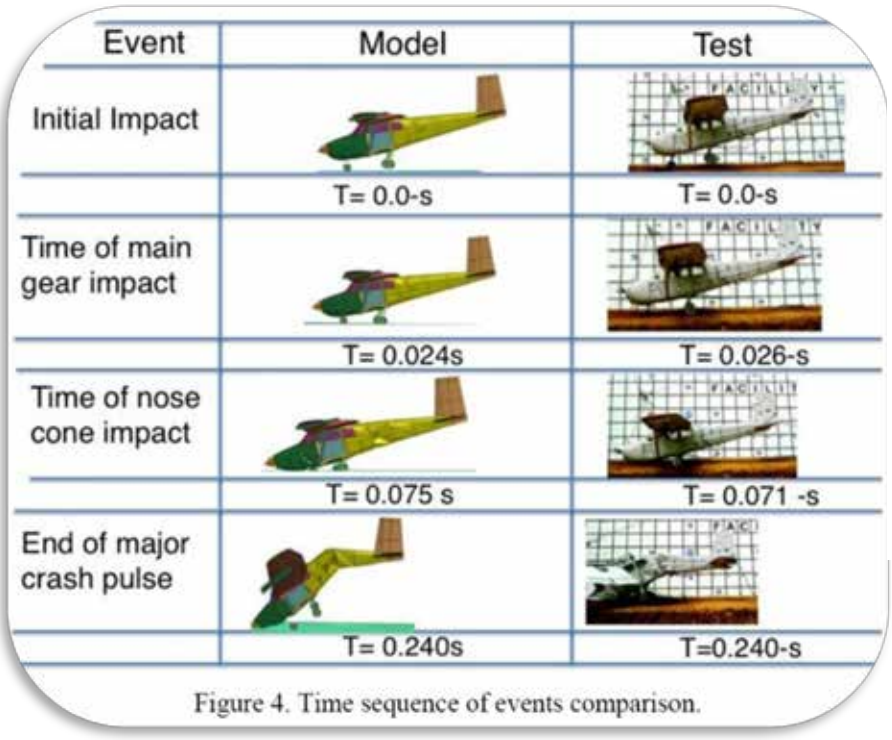


Figure 4. Time sequence of events comparison.

Crash Testing and Simulation of a Cessna 172 Aircraft: Pitch Down Impact onto Soft Soil

Edwin L. Fasanella,
Nat'l Institute of Aerospace

Karen E. Jackson,
NASA Langley Research Center

During the summer of 2015, NASA Langley Research Center conducted three full-scale crash tests of Cessna 172 (C-172) aircraft at the NASA Langley Landing and Impact Research (LandIR) Facility.

The first test represented a flare-to-stall emergency or hard landing onto a rigid surface.

The second test, which is the focus of this paper, represented a controlled-flight-into-terrain (CFIT) with a nose-down pitch attitude of the aircraft, which impacted onto soft soil.

The third test, also conducted onto soil, represented a CFIT with a nose-up pitch attitude of the aircraft, which resulted in a tail strike condition.

These three crash tests were performed for the purpose of evaluating the performance of Emergency Locator Transmitters (ELTs) and to generate impact test data for model validation. LS-DYNA ® finite element models were generated to simulate the three test conditions. This paper describes the model development and presents test-analysis comparisons of acceleration and velocity time-histories, as well as a comparison of the time sequence of events for Test 2 onto soft soil.

The quiz was left in the suggestion box by The Old Retired Pilot. We are sending it out to the residents and guests. No one in town knows his name. You yell, "HEY, Old Pilot."

The Old Retired Pilot and the Town Secretary are arguing in the hall. She's yelling that she's not a Dragon. He asked if she knew of the Dragon Lady. Then he claimed that she purchased a twenty-dollar drone on Amazon - that is not what he requested. NO, we don't have a budget to buy his April requests. We can afford two of the ones listed below!

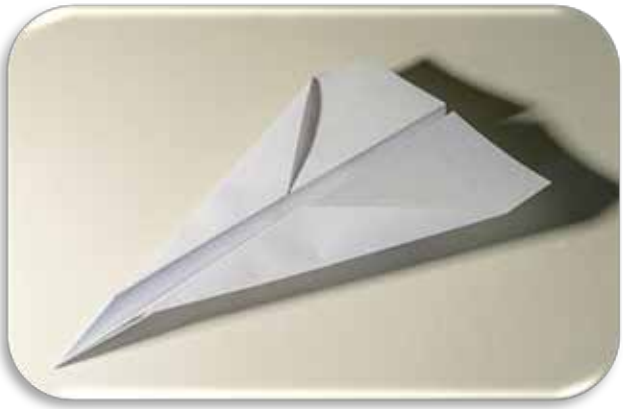
Quiz - can you name the four planes below.

Extra Credit - The town can afford 2 of them. Name the two and you have free coffee!

(The answers are at the bottom of the Goodbye page)

A_____

B_____



C_____

D_____

GÖKBEY General-Purpose Helicopter - GÖKBEY General-Purpose Helicopter, capable of operating effectively even in the most challenging climates and geographies, at high temperatures and altitudes, in day and night conditions, is designed and manufactured using national means and capabilities. GÖKBEY is designed for superior performance and quality with advanced avionics with not only today's but the future's operational requirements in mind.

With a large cabin area having a high load capacity, GÖKBEY can be easily configured for various mission profiles of civilian and military users across the globe.

The Original Helicopter Program carried out with the aim of meeting the general-purpose helicopter needs of the Turkish Armed Forces and other authorities in need with a unique platform was launched by the decision of the Defense Industry Executive Committee (SSIK) convened on June 15, 2010. The program budget and calendar was defined by the SSIK of January 3, 2013 and a contract was signed between the SSM and Turkish Aerospace on June 26, 2013.

GÖKBEY General-Purpose Helicopter, capable of operating effectively even in the most challenging climates and geographies, at high temperatures and altitudes, in day and night conditions, is designed and manufactured using national means and capabilities. Launched based on the knowledge, experience and talent pool acquired during the ATAK Program, the Original Helicopter Program features the design and manufacture of critically important systems such as structural and avionics systems, transmission, rotor and landing gear using fully national resources.

Featuring the capability of carrying out a wide range of missions, the helicopter can carry out carriage, VIP, cargo, air ambulance, search and rescue and offshore transport missions.

The first General-Purpose Helicopter manufactured by domestic means, GÖKBEY flew for the first time with a success at 06:00 on September 6, 2018, and is projected to be serially manufactured by 2021.

The helicopter is pending for certification by EASA (European Aviation Safety Authority) and SHGM (Civil Aviation General Directorate).

Being among the top hundred global players in aviation and space industry, Turkish Aerospace is organized under six strategic business centers depending on the projects, including:

- Structural Group,
- Aircraft Group,
- Helicopter Group,
- Unmanned Aerial Vehicle (UAV) Systems Group,
- Space Systems Group,
- National Combat Aircraft (NCA) Group

In addition, integrated logistics support is provided for all products designed/manufactured by Turkish Aerospace.

Nellis Air Force Base, Nev. - Two F-16 Fighting Falcons assigned to the 64th Aggressor Squadron fly past downtown Las Vegas, Nev., following exercise aerial combat operations during Red Flag-Nellis 22-2 at Nellis Air Force Base, Nev., March 9, 2022. Red Flag-Nellis 22-2 is an exercise demonstrating tactical integration of airpower from the U.S. and its primary allies. (U.S. Air Force photo by Tech. Sgt. Alexandre Montes)

Marine Corps Base Kaneohe, Hawaii - F-22 Raptors assigned to the Hawaii Air National Guard 199th Fighter Squadron and 19th Fighter Squadron, are staged on the flightline of Marine Corps Base Kaneohe, Hawaii, March 3, 2022, during Agile Combat Employment exercise Ho'oikaika. ACE is an operational concept that leverages networks of well-established and austere air bases, multi-capable Airmen, pre-positioned equipment, and airlift to rapidly deploy, disperse and maneuver combat capability throughout a theater. (U.S. Air National Guard photo by 2nd Lt. James Ro)

Kadena Air Base, Japan - Four F-35A Lightning IIs assigned to the 355th Fighter Squadron, Eielson Air Force Base, Alaska, fly in a formation during a routine mission over the Indo-Pacific region, March 4, 2022. These missions are flown routinely and visibly to demonstrate commitment to allies and partners through the employment of military forces, demonstrating strategic predictability, while becoming more operationally unpredictable to adversaries. (U.S. Air Force photo by Airman 1st Class Yosselin Perla)

NCBI Resources frontiers in Physiology

Both the passive and active material laws were implemented as a user defined material subroutine in the explicit non-linear FE solver LS-DYNA - In order to determine the active material parameters used for the 2-state contraction model, numerical optimization was performed with the software LS-OPT

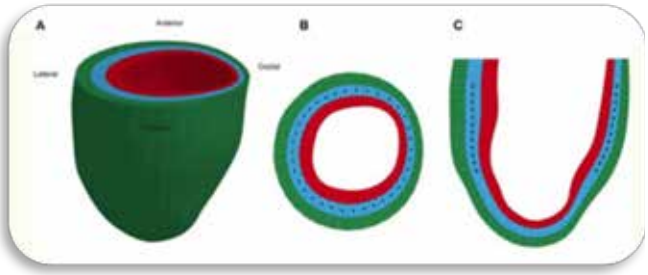


Figure 1

Evaluation of a Novel Finite Element Model of Active Contraction in the Heart

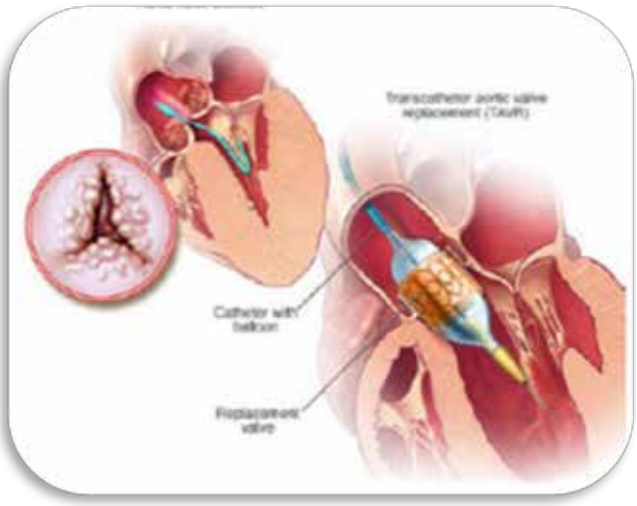
Xiaoyan Zhang,1 Zhan-Qiu Liu,1 Kenneth S. Campbell,2
Jonathan F. Wenk1,3,

1Dept. of Mech. Eng. Univ. of Kentucky, Lexington, KY
2Dept. of Physiology, Univ. of Kentucky, Lexington, KY
3Dept. of Surgery, Univ. of Kentucky, Lexington, KY,

Fig 1. Representative animal-specific FE model of a rat LV. (A) Full view of the LV model with the four segments labeled, (B) Short axis view of a mid-ventricular slice, and (C) Long axis view of a longitudinal slice. Stars represent the points in the model where strain was compared to experimental measurements during the optimization.

Abstract

Finite element (FE) modeling is becoming a widely used approach for the investigation of global heart function. In the present study, a novel model of cellular-level systolic contraction, which includes both length- and velocity-dependence, was implemented into a 3D non-linear FE code. To validate this new FE implementation, an optimization procedure was used to determine the contractile parameters, associated with sarcomeric function, by comparing FE-predicted pressure and strain to experimental measures collected with magnetic resonance imaging and catheterization in the ventricles of five healthy rats. The pressure-volume relationship generated by the FE models matched well with the experimental data. Additionally, the regional distribution of end-systolic strains and circumferential-longitudinal shear angle exhibited good agreement with experimental results overall, with the main deviation occurring in the septal region. Moreover, the FE model predicted a heterogeneous distribution of sarcomere re-lengthening after ventricular ejection, which is consistent with previous in vivo studies. In conclusion, the new FE active contraction model was able to predict the global performance and regional mechanical behaviors of the LV during the entire cardiac cycle. By including more accurate cellular-level mechanisms, this model could provide a better representation of the LV and enhance cardiac research related to both systolic and diastolic dysfunction.



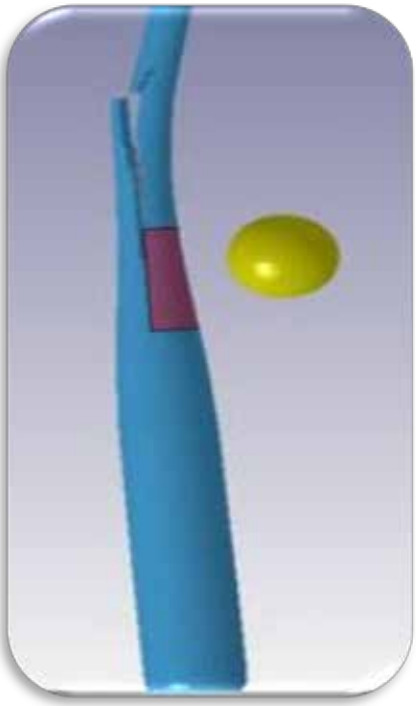
Numerical Simulation Transcatheter Aortic Valve Implantation and Mechanics of Valve Function

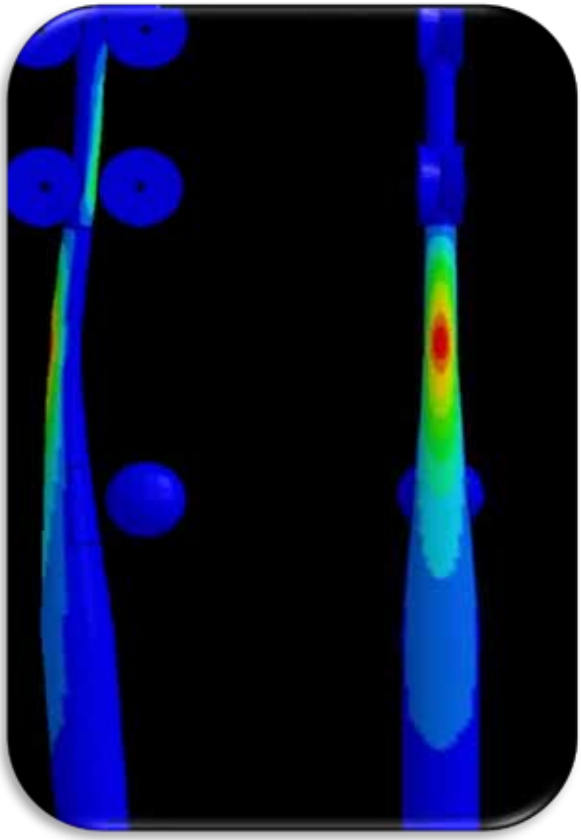
M.S.Hamid, Ph.D
Advanced Computational Systems LLC

The LS-DYNA® multi-physics capabilities of fluid structure interaction is presented.

As the older population increases, age-related diseases such as aortic stenosis is a common heart condition in which there is a thickening and calcium deposition in the aortic root and aortic valve leaflets. This results in a host of symptoms like angina, embolism, stroke and sudden death. Current default treatment for severe aortic stenosis is surgical aortic valve replacement.

Mechanical and bioprosthetic heart valves are common choice for surgical replacement of the diseased valves. However, surgical intervention is extremely risky for a large population of frail patients. Transcatheter Aortic Valve Implantation (TAVI) is being used selectively as a percutaneous alternative to surgical aortic valve replacement. This is a very complex procedure and involves very coordinated team work. This procedure involves steps from valve crimping to implantation and monitoring. Computational simulations of the TAVI help evaluate the valve functioning. In present study, a step-by-step complex numerical simulations of the TAVI procedure including the stent crimping and balloon inflation are presented. The stent frame is assumed as stainless steel and the outer skirt is assumed as polyethylene material. The stent frame is modeled with 3D hexagonal finite elements and the skirt is modeled as thin shell elements with fabric material property. The valve leaflets are modeled as Mooney-Rivlin material. The results of valve crimping and blood flow during ejection phase are presented. The SPH technique is used in modeling the flow through the aortic valve. The stent deformation and the stresses induced due to crimping are presented. The normal and calcified leaflets opening are presented. The LS-DYNA® multi-physics capabilities of fluid structure interaction is presented.





14th International LS-DYNA Users Conference

An Investigation into the Relationship between Wood Bat Durability and Bat Taper Geometry using LS-DYNA ®

J. Smith, J. Sherwood, P. Drane
Univ. of Massachusetts Lowel Baseball Research Center
D. Kretschmann,
U.S. Forest Products Laboratory, U.S. Forest Service

Changes in the Wooden Baseball Bat Standards (WBBS) by the Office of the Commissioner of Baseball in cooperation with the MLB Players Association in response to recommendations made by a task force comprised wood and baseball science experts have produced a 65% reduction in the rate of multi-piece failures (MPFs) of bats since 2008. It is hypothesized that the rate of MPFs can be further reduced if regulations on the allowable geometries of the taper region for the bats used by MLB teams are implemented in the WBBS. To develop a fundamental understanding of the relationship among (1) the angle of the taper region of the bat, (2) the starting point of the taper along the length of the bat, and (3) wood density, **a series of actual and generic bat profiles was investigated using LS-DYNA for bat/ball impacts.** In this paper, the results of these bat/ball impact simulations are shared, and a summary of the various combinations of these geometric parameters on bat stress and strain is presented. The durability information gained from these studies is then used to develop an understanding of why certain bat profiles used in professional baseball have relatively high rates of MPFs while other profiles exhibit relatively low rates of MPFs.

-

03/28/2022 - I have been corrected that I don't have feral animals on my property but wild animals. I don't see them as "wild" since they are very orderly? ANYWAY, I guess we will call them ranch residents. They were all born on the property.

SO here is the ranch resident Raven - Now, every morning, he eats the leftover dinner chicken - This morning, I didn't put out the chicken, but he was eating. I quietly asked our Raven, "Why are you eating a squirrel?"

His caw-back question was, "Why do you drink coffee?" Okay, that ended the discussion.

I cleaned stalls, and Caw-Caw continued to be gross and eat. He did swear it was dead in the road and not one of the ranch residence squirrels.

03/21/2022 - It was dentist week for the horses!

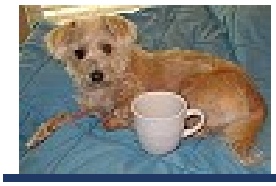
Yes, that is our miniature horse getting sharp points filed. Yes, he is sedated.

03/14/2022 - Yes, we have a new spin-out past the house in the morning.

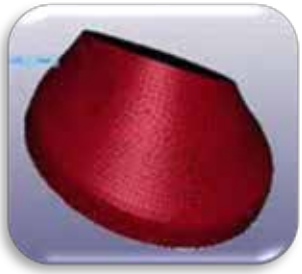
Accidents are now getting to be a regular occurrence on our curve. The only thing that changes is the color of the car and the make of the vehicle! Spin red car spin! Tire blew out - nice guy - just hit that HUGE bump speeding on went all over the road! Videos are in an accident file on the site

LAST ACCIDENT - white car! spin white car spin!
360 Video Jan 13th - **2.2MB .mov file**

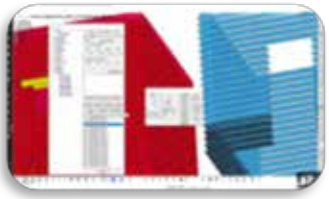
03/07/2022 I feed him under the fence by his squirrel entrance - these are ground squirrels. Anyway, hoping he is safe from hawks, the bobcat, coyotes, AND the owl. I do lecture the predators on the ranch to leave the little squirrel alone!



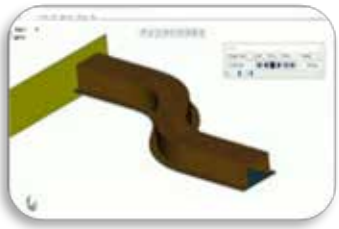
Tutorials



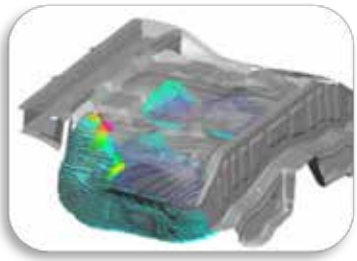
Jeanne D - unfold part using LS-DYNA with LS-Prepost



A. Topa - Segment Set for TIEBREAK CONTACT for Masonry Building



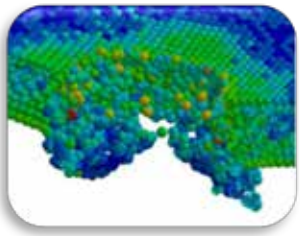
R.P Santiago - LS DYNA WS18: SRAIL crash (P2)



Oasys LS-DYNA Environment - Introduces the ALE solver in LS-DYNA for modelling FSI and other problems

Papers

PDF - R. Stuart - Modelling liquefaction of soils with LS-DYNA using a SANISAND-based material model

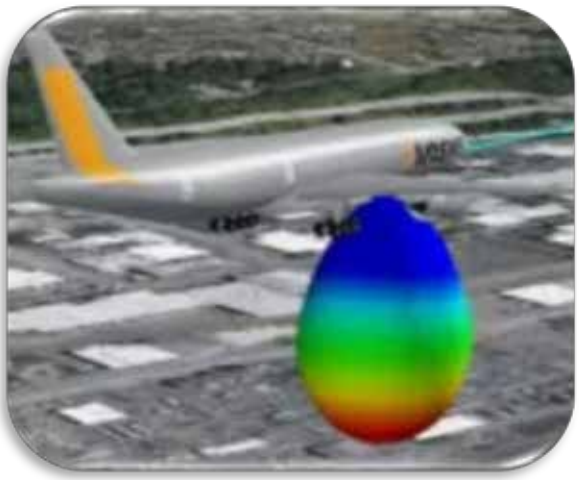


V. Lapoujade - Multiphysics SPH simulation of flow drilling process

PDF - T. Cloake - A critique of the THUMS lower limb model for pedestrian impact applications

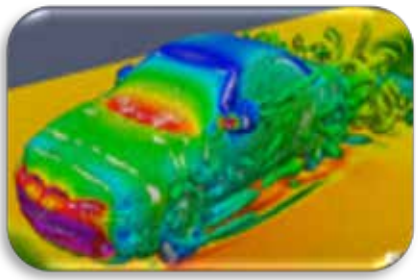
MSC.Software PDF Case Study available to download - Real-time design of 3D-printed orthopedic insoles

OmniQuest - Frequency Response Optimization – Total Control



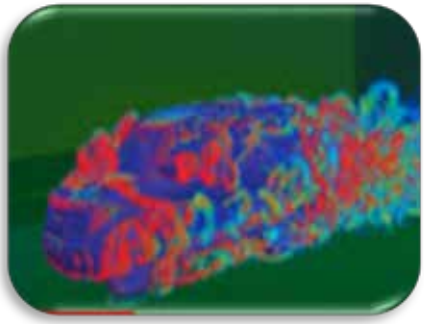
S. Carpenter - ANSYS - 5G and Aircraft Safety Part 3: How Simulation Can Validate Interference Scenarios

DYNAmore - Call for Papers 16th LS-DYNA Forum in Bamberg, Germany on Oct. 12 and 13.



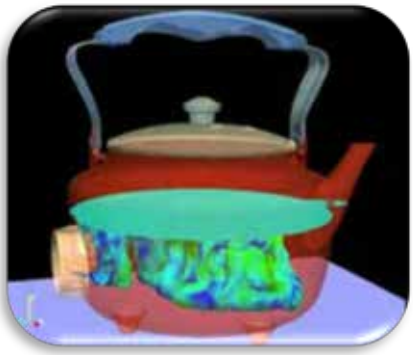
I owned a 1972 Pontiac LeMans back in 1972!!! SO this reminds me of it. Yes, I bought it new! EGAD! I'm old! Quick - someone get me coffee so we can head to watch a Grand Prix - anyone remember those? I do!

CFD analysis using LS-DYNA for the Pontiac Grand Prix sedan



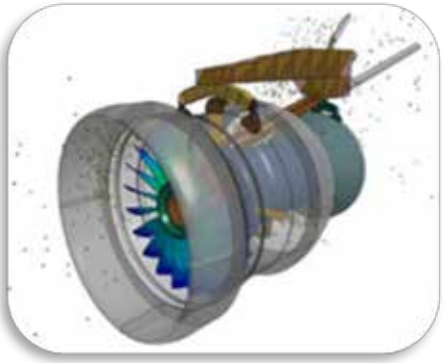
I was going to try walking in a wind tunnel while drinking coffee. I think the coffee cup would blow away. That's why a simulation is safer - wonder if I would blow away? Simulation is safer!

LS-DYNA simulation of Honda Element in the Honda Wind tunnel. Volume render of Q criterium for Q=5e5[1/s].



Yes, I know I showcased the tea kettle simulation last year. I'm trying to drink tea. Maybe I can pretend it's a coffee kettle? I need coffee!!!

LS-DYNA - Electric Kettle simulation. Multiphysics capabilities - CFD solver coupled to the solid thermal solver and the Electromagnetism solver.



Today we will name our coffee "Don't fly near moving blades!" I am not sure how to say that in bird language, but the video may help them see bird dust. I will explain to all the birds on the property to fly lower to the ground. NOW coffee and saving birds are the goal for today!

LS-DYNA Multiphysics Channel

Bird Strike on Ti-6Al-4V Fan Blades using SPH. Inspired from the AWG ERIF Test Case 2.1.

My Virtual Travel Outing

Thank you for joining me on my visit to this month's museum. I visit a new museum every month.

Forty minutes from our FEANTM town in Fairfield California is an interesting museum to share. You can take a virtual tour!

American Armory Museum - Fairfield Ca.: To Educate Future Generations About, And Impress Upon Them, The Sacrifice, Bravery and Enduring Significance Of The United States Military Through Military Vehicle Displays, Armaments, Other Military Related Items And Educational Videos.

Remember; FREEDOM Is NOT FREE

[LLNL constructing high-power laser for new experimental facility at SLAC](#) - Breanna Bishop

Lawrence Livermore National Laboratory's decades of leadership in developing high-energy lasers is being tapped to provide a key component of a major upgrade to SLAC National Accelerator Laboratory's Linac Coherent Light Source (LCLS).

Over the next several years, LLNL's Advanced Photon Technologies (APT) program will design and construct one of the world's most powerful petawatt (quadrillion-watt) laser systems

Researchers work in the "MEC hutch" of SLAC's LCLS Far Experiment Hall. The MEC optical laser system creates extreme temperatures and pressures in materials and the LCLS X-ray laser beam captures the material's response. Image by Matt Beardsley/SLAC.

(MEC) experimental facility at LCLS, funded by the Department of Energy's Office of Science-Fusion Energy Sciences program.

The new laser will pair with the LCLS X-ray free-electron laser (XFEL) to advance the understanding of high-energy density (HED) physics, plasma physics, fusion energy, laser-plasma interactions, astrophysics, planetary science and other physical phenomena.

The existing MEC facility uses optical lasers coupled to X-ray laser pulses from LCLS to probe the characteristics of matter at extreme temperatures and pressures. MEC experiments have produced groundbreaking science, such as the first observations of "diamond rain" under conditions thought to exist deep inside giant icy planets like Uranus and Neptune.

The MEC-Upgrade (MEC-U) is motivated in part by increasing calls for the United States to re-establish world-class leadership in high-power laser technology, such as in the 2018 National Academies of Science, Engineering, and Medicine report, "Opportunities in Intense Ultrafast Lasers: Reaching for The Brightest Light

SLAC is partnering with LLNL and the University of Rochester's Laboratory for Laser Energetics (LLE) to design and construct the MEC-U facility in a new underground cavern. LLNL's rep-rated laser (RRL), able to fire at up to 10 Hz (10 pulses per second), and a high-energy kilojoule laser developed by LLE will feed into two new experimental areas containing a target chamber and a suite of dedicated diagnostics tailored for HED science.

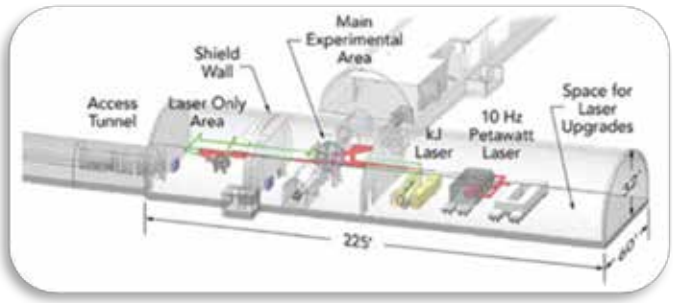
The LCLS, part of SLAC's two-mile-long linear particle accelerator in Menlo Park, Calif., is capable of delivering 120 X-ray pulses a second, each one lasting a few femtoseconds (quadrillionths of a second). A concurrent upgrade dubbed LCLS-II will deliver a million pulses a second in an almost continuous X-ray beam that, on average, will be 10,000 times brighter and will double the X-ray energy previously attainable

"The new high-power lasers being designed by Livermore and Rochester are world-leading in their own right," said Alan Fry, the MEC-U project director. "Coupling them to LCLS dramatically increases their scientific utility and the combination will be an unprecedented capability."

“With the 10-Hz petawatt laser that we’re building, along with LLE’s long-pulse compression laser and the upgraded LCLS capabilities, the LCLS and its MEC-U facility will become the U.S. flagship for high-repetition-rate, laser-driven HED experiments," said Vincent Tang, NIF & Photon Science program director for High Energy Density and Photon Systems.

“Marrying the latest and the best ultrafast laser technologies with the LCLS beamline at the MEC-U facility will give the United States a fundamentally new high-throughput HED capability for discovery science and national security research,” Tang added. “We will be able to rapidly increase our understanding of plasmas and materials at extreme pressures and temperatures, while advancing our ability to operate HED technologies and systems at a repetition rate and scale relevant to important future applications like inertial fusion energy.”

The National Nuclear Security Administration (NNSA) has also expressed interest in developing a high-energy long-pulse laser that could team with LCLS to support NNSA’s core mission areas. Among the goals would be to improve scientists’ ability to predict the performance of next-generation materials in extreme environments, understand how material aging affects material properties, and study the microphysics of inertial confinement fusion.



Conceptual design for the new MEC-U cavern at the end of the LCLS XFEL. The facility will include space for LLE’s kilojoule (kJ) laser, LLNL’s 10-Hz rep-rated petawatt/long-pulse laser system, a main target chamber, and a multi-purpose second interaction site downstream of the main target chamber. Images by Gilliss Dyer/SLAC.

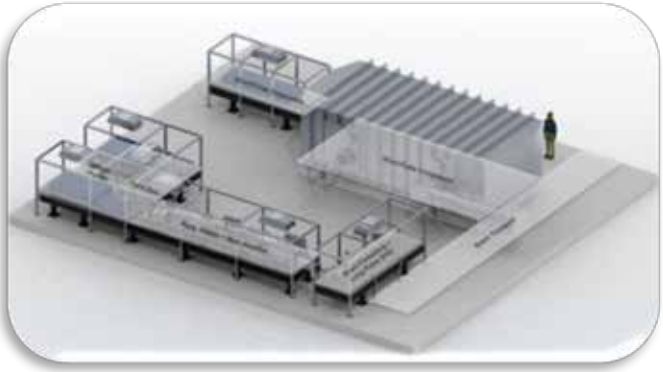
HAPLS supercharged - Tom Spinka, project manager and chief scientist for LLNL’s RRL, said that it will be a simplified and more energetic version of the High-Repetition-Rate Advanced Petawatt Laser System (HAPLS), designed and developed by the APT Program from 2014 to 2018. HAPLS, the world’s first all-diode-pumped petawatt laser, is now a key component of the European Union’s Extreme Light Infrastructure Beamlines facility

in the Czech Republic (see “Advanced Laser Promises Exciting Applications”).

“The RRL will build on the groundbreaking work that was done on HAPLS,” Spinka said. “It will pair the direct chirped-pulse amplification technique used in NIF’s flashlamp-pumped neodymium-doped glass Advanced Radiographic Capability with the HAPLS diode-pumped glass pump laser technology in a refined architecture developed through LLNL’s Laboratory Directed Research and Development program.

“This architecture, originally dubbed the Scalable High-power Advanced Radiographic Capability, or SHARC, eliminates the lossy second (titanium-doped sapphire) stage of the HAPLS laser system,” Spinka said, “ultimately delivering about five times higher energy than HAPLS at the same peak power and repetition rate.”

LLNL's RRL for the MEC-U facility will be developed in parallel with performance ramping of the HAPLS (now known as L3-HAPLS) laser at ELI-Beamlines to its full design specifications. It also will leverage additional advanced laser technologies being developed by APT, including a new high-energy Faraday rotator developed under a Cooperative Research and Development Agreement with Electro-Optics Technologies Inc.



Rendering of the design for the LLNL petawatt laser to be installed in the MEC-U facility.

Enabling new physics - "MEC-U is a core part of NIF&PS's strategy for developing next-generation high-average-power ultrafast lasers and enabling high rep-rate HED science," Tang said. "The new physics the MEC-U enables is broad-ranging and highly applicable to LLNL missions. It is an exciting opportunity for LLNL and the community."

"Not only are we working with some of the leading laser laboratories in the world," Fry added, "but we're also working with world experts in experimental science, high-energy-density science, and the operation of DOE Office of Science user facilities, where scientists from all over the world can come to do experiments."

Access to the facility will be facilitated in part by LaserNetUS, a research network that is boosting access to high-intensity laser facilities at labs and universities across the country.

MEC-U was approved by DOE's Office of Science last fall to move from the conceptual design phase to preliminary design, with construction expected to start in approximately two years.

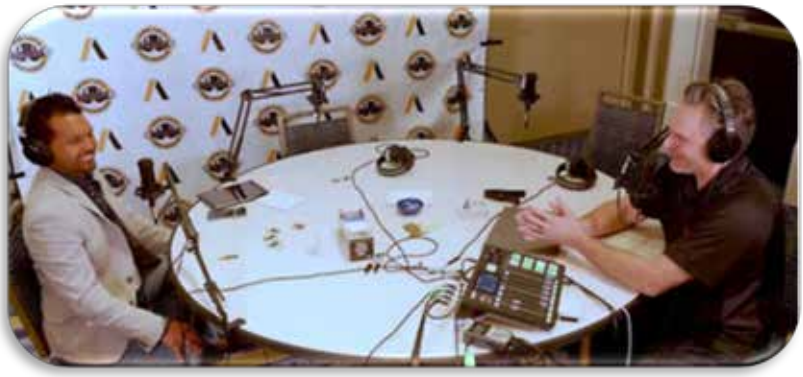
The APT RRL team is led by Tang as the senior team lead; Spinka as project manager and chief scientist; Robert Plummer as project engineer; and Brendan Reagan as laser architect.

Other team members joining the project include Anthony Gonzales, Anthony Vella, Barry Fishler, Bill Maranville, Bob Deri, Brandon Buckley, Chris Stolz, David Alessi, Ed Koh, Edwin Davila, Emily Link, Frantisek Batysta, Hoang Nguyen, Issa Tamer, Jeremy Lusk, Jessica Jimenez, John Peterson, Justin Galbraith, Katherine Velas, Kathleen Schaffers, Kevin Eseltine, Ken Terzi, Leily Kiani, MariAnn Albrecht, Mark Ammons, Michael Erickson, Pam Utley, Sachin Raghothaman, Sandrine Herriot, Staci Riggs, Steve Fulkerson, Steve Telford, Tom Galvin, Vinod Gopalan and Zhi Liao.

– Charlie Osolin

Podcast - Curt Chan and Josh Poley

Thank you for joining me listening to the pilot podcast episode. The podcasts are brought to you by co-hosts Curt Chan and Josh Poley, with Mary Kate Joyce as your third podcast host.



[Introducing 'Hover Cars and Hard Problems' — The Ansys Podcast That's Not About Ansys]

Author: Tim Palucka - Senior Marketing Communications Writer, Ansys

Excerpts: In the pilot episode of the "Hover Cars and Hard Problems" podcast, co-hosts Curt Chan and Josh Poley set the tone. They use light banter mixed with serious questions about the future of engineering.

This podcast is not a commercial for Ansys software. It is a forward-looking exploration of the challenges that engineers are now trying to solve and will solve in the future. Of course, we can't even imagine what some of these challenges will be yet.

In 18-25 minutes, Curt and Josh, sometimes accompanied by Mary Kate Joyce, interview engineers and other people from inside Ansys or other companies where engineers attempt to solve complicated problems facing society.

"You know what?" Curt starts the conversation. "I really thought that there would be hover cars in the 21st century." His deadpan delivery reveals his disappointment, with the tone of a child who didn't get what he asked for on Christmas morning.

"I know," Josh replies. "I'm so disappointed right now in the lack of hover cars being everywhere. … I thought it was a forgone conclusion. I thought I'd have a hover car at the age of 16." There's a chuckle in his voice.

They blame it on Hollywood, (film industry, CA US) — on the cartoon series The Jetsons from the 1960s, whose opening theme features the four members of the Jetson family flying in a hover car to their daily routines — and on the movie Back to the Future, which features a hovering, time-traveling DeLorean car.

"Is [developing hover cars] really that difficult to solve?" Curt asks. "I think it is," Josh says. "It's pretty difficult."

Hence the title of the podcast. Hover cars act as a stand-in for all the hard problems that engineers have yet to solve. But the podcast is also about all new technologies and the hard problems they are creating in turn.

What's Your Hover Car Moment?" That's the question the hosts ask every guest on the podcast. Everyone has a different answer to the question because what fascinates us is a personal thing.

TUNE in to read and listen to the complete Hover Cars Hard Problems Podcast!

Welcome to our Convention Center exhibit hall & Coffee Cafe. Coffee, of course vanilla, hazelnut, and other flavors are courtesy of our favorite coffee shop (not the rival coffee shop).

Poster Board area is on the internet, news, or Social Media Posts Not To Miss

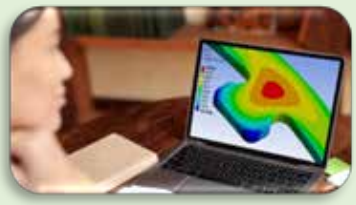
Automated perfection in automotive - Tofaş - Turkey

The Tofaş measurement team **uses a variety of Hexagon metrology equipment, including 3 Global model CMM systems.**

Laser tracker automated inspection for automotive at Tofaş

DYNAmore France 2022 Training Brochure

DYNAmore France is set for the 2022 Training Season to bring you up to speed on your learning needs. Don't miss reading their brochure to pick the courses you want.



Thanks to Mauricio Dwek, Regional Academic Program Mgr.at Ansys

FEANTM doesn't want you to miss two of the 5 free student options from the Blog by Susan Coleman

Ansys Discovery Student **Ansys LS-DYNA Student**

Applus+ achieves accreditation to certify all types of drones

The Laboratories Division has been accredited to certify all types of #drones and drone accessory kits under the new European Regulation (EU 2019/945). Applus+ Laboratories is the first European laboratory to be accredited for the complete scope of the Regulation, with which compliance will be mandatory as of 1st January 2023.

LS-DYNA

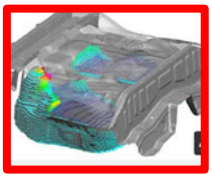
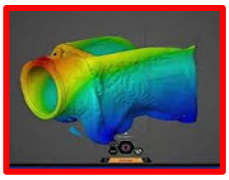
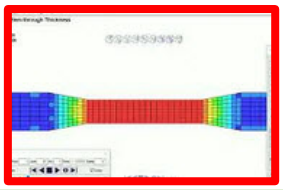
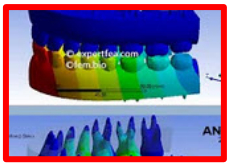
Koray Akcengiz - **Tempa Engineering & Commerce Inc**

At Tempa Engineering, we provide services in project, technical support and education issues together with the sale of ANSYS & LS-DYNA. Founded in 1992, has been involved with engineering consultancy directed towards CAD/CAE activities that take place in defense, aerospace, automotive, agriculture, household appliances and medical industries.

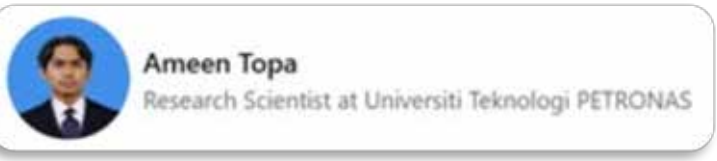
CONVENTION CENTER
YouTube Booths

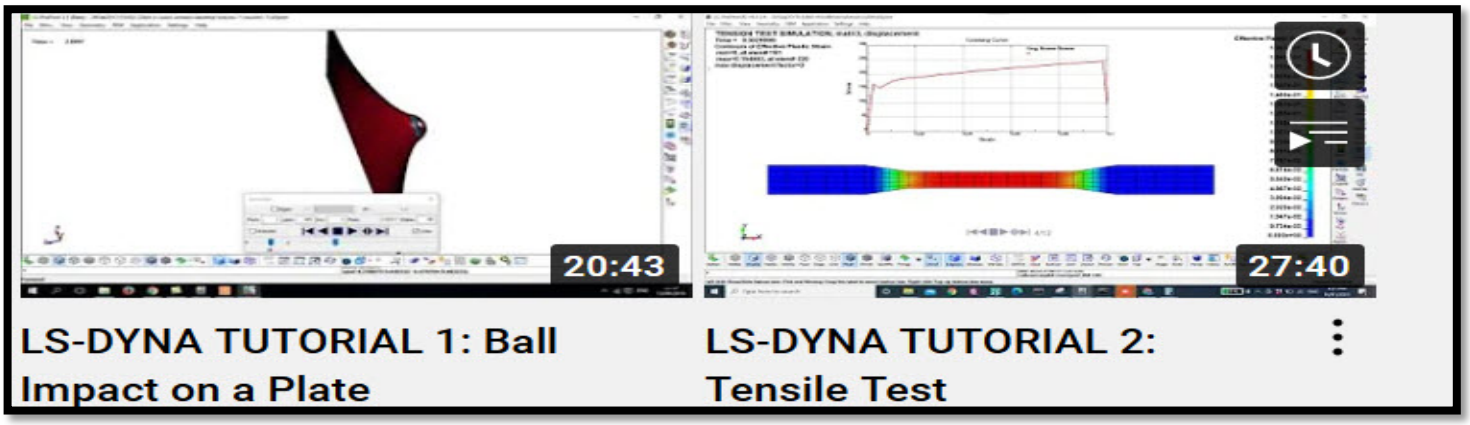
Current videos
from our booth visit:
March 29th

Free Coffee for
visiting our exhibitors

Ameen Topa			Kaizenat
Altair			Oasys LS-DYNA
LEAP Australia			R.P Santiago
Expert FEA			DYNAmore
ROCKY DEM			Ozen Engineering
MEETING ROOM			HEXAGON

If you have a YouTube Channel, send us the URL feaanswer@aol.com
Simulation videos for consideration should be minimum 10 sec long



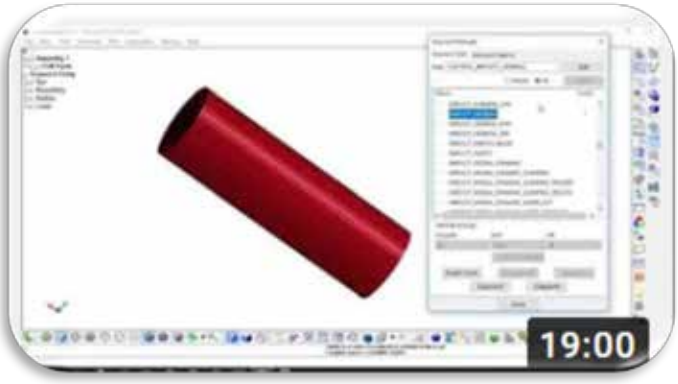


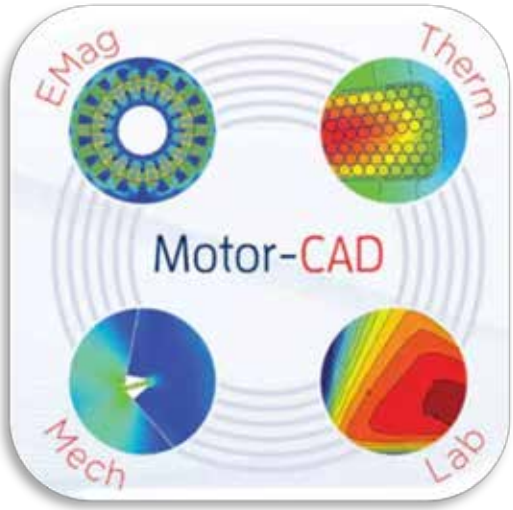
Basic LS-Dyna Tutorial: A video on how to make a simulation of a projectile hitting a plate

Basic LS-Dyna Tutorial: A video on how to make a simulation of a simple tensile test.

In this tutorial, we gonna do a simulation of a simple Bird Strike problem.

In this tutorial, we perform numerical simulation on a static problem.





Ansys Motor-CAD is a dedicated, industry-leading tool for electric motor design and simulation.

Intuitive, template-based setup simplifies and automates the analysis process while its built-in electromagnetic, thermal, and mechanical solvers offer valuable multiphysics insights into a motor design.

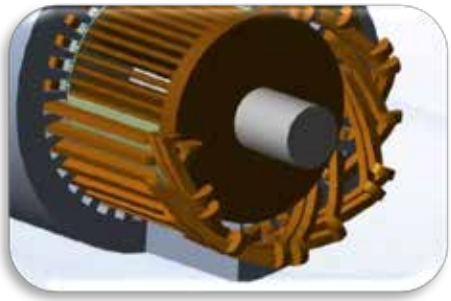
PDF **Simulation Based Motor Design**

CADFEM is your ideal partner for Motor-CAD & Ansys products for electromagnetic simulation

Motor-CAD: Multiphysical simulation for electric motors - Many different parameters come into play when designing and dimensioning an electric motor: electromagnetics, thermal aspects, mechanical loads and operating efficiency. These parameter investigations take time. Motor-CAD enables you to quickly find your direction, which you can then perfect with Ansys tools.

The right Solution for you: We support you with know-how to quickly and reliably enhance your motor and generator designs using simulation methods

- Together we develop a conceptual strategy that enables you to factor in thermal and mechanical effects in addition to electromagnetics in the initial concept phase
- Our training offers will help you step by step into the simulation of motor characteristics, maps and driving cycles



Motor-CAD is one of the most complete electrical and thermal design software on the market for rotating electrical machines. With its three integrated modules – EMag, Therm and Lab – Motor-CAD enables motor designers to quickly and easily perform electromagnetic and thermal performance tests on many and varied machine topologies

Dr. Markus Kellermeyer
Professional Development for Simulation

Finite-element-based heat transfer simulations
Virtual thermography through simulations

Based on practical examples you will learn all important aspects of the simulation of temperature fields with Ansys Mechanical.

You will be able to solve heat transfer analyses that use conduction, convection and radiation. You will also learn how to model transient processes including phase transitions.

Software used: Ansys Mechanical

Temperature changes determine the product behavior more than often assumed, they reduce the service life, change material properties and cause thermal distortion of assemblies. Thermal simulations can answer many technical questions: How much power can I run my engine with without it overheating? How can I improve my machine accuracy? What additional stress is my structure subjected to at high or low operating temperatures? How should I dimension my heating or cooling system? Where do I have to use expensive high-temperature materials and where are cheaper ones sufficient? How fast does my machine heat up to operating temperature?

Benefit - You will see examples of coupling to other types of analysis, how convective boundary conditions can be taken from a flow analysis, how the temperature field can be transferred as a load into a deformation analysis or how the effects of electrical-thermal interactions can be studied.

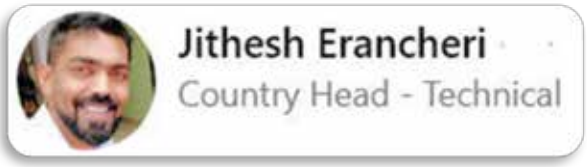
Overview

Level: Advanced
Target group: Users, Instructors
Prerequisites: Basic knowledge of Ansys Mechanical
Benefits:

- Efficient mapping of heat conduction, convection and radiation
- Simulate transient heating and cooling processes yourself
- Coupling to flow, structural and electromagnetic simulations
- Independent, targeted planning of thermal analyses

Take a look at it: Request a free eLearning module:

Test the first module for 30 days and start your eLearning journey!"

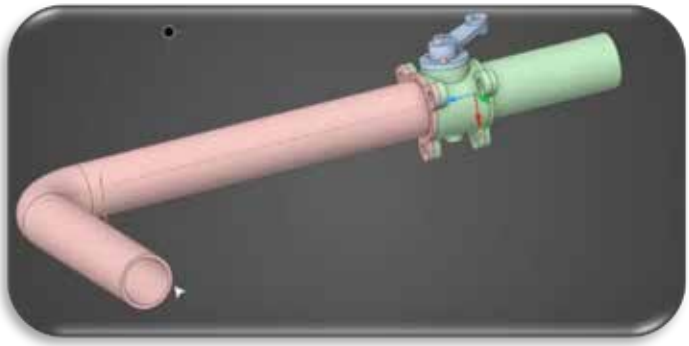


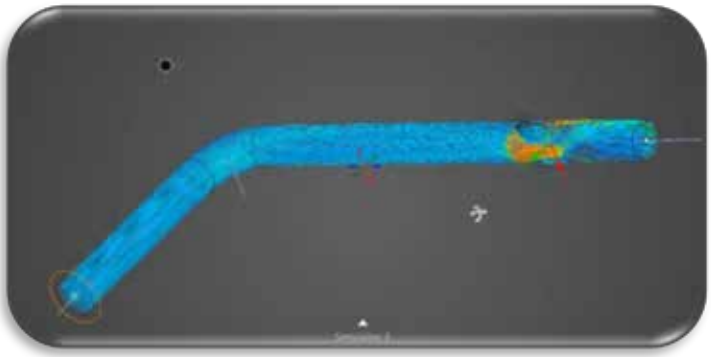
[Kaizenat Features Videos] [Kaizenat Website]

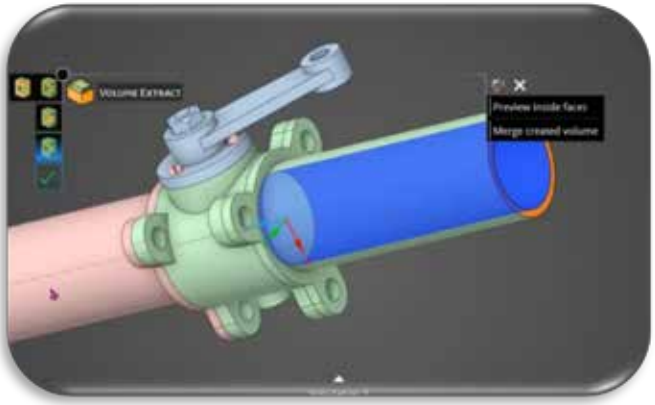
ANSYS Discovery – Fluid Flow Analysis of Butterfly Valve at an Angle of 45º | CFD | ANSYS Fluent

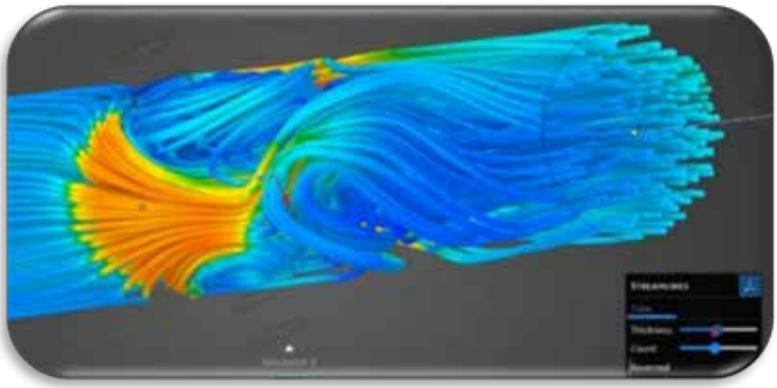
Valves are used by Pipeline Industries to restrict or regulate the movement of Fluid particles at a specified point.

In this analysis a Butterfly Valve is used to determine the pressure drop across terminals by varying the position of Valve. Thereby determine the mass flow rate and volume flow rate at the Inlet and Outlet.









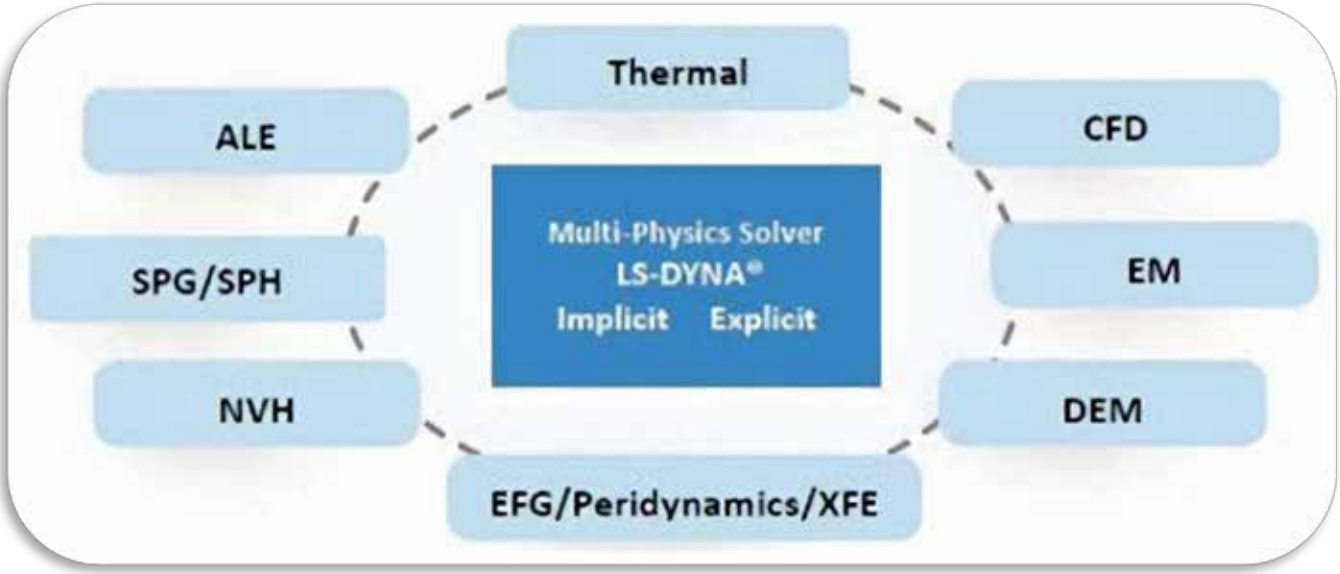
Fabian Leonov S. López - CAE Engineering Manager/COO
LURI Engineering México Automotive/ Structural Analysis FEA
Ask if you are interested in learning more- leonov.lopez@luriengineering.com.mx

LS-DYNA Multiphysical finite element solver.

Ask for your demo and quote!

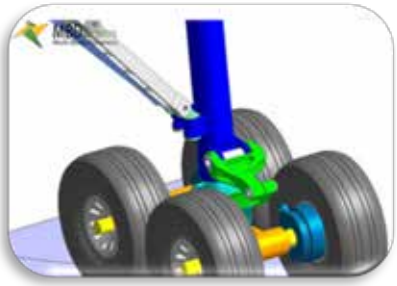
leonov.lopez@luriengineering.com.mx

Already know LS-DYNA, I invite you to watch this video where we show you the capabilities of the LS-DYNA finite element software!



Simulation of landing gear dynamics is a cornerstone of aircraft loads analysis, as well for vertical loads resulting from touch-down as for longitudinal and lateral loads resulting from braking, steering and towing.

A detailed description and history of the landing gear on all generations of the Boeing 737.
The Boeing 737 Technical Channel

	
Aircraft Nose Landing Gear Simulation Kaizenat	Tutorial - Ansys Simulation Landing Gear Model - Airbus A400M (Motion Study) - Anuj Kaushal
	
MBS (Multi Body Simulation) Landing Gear RaiserEngineering	MBD for ANSYS Solutions - Landing Gear RecurDyn

We will have 125 classes in Germany (including Swiss and France) and 36 in Sweden.
Many of them are available online and in English.

MAY

02	Simulation of continuous fiber reinforced composites
02	LS-DYNA Compact: Introduction to LS-TaSC
04	Simulation of short fiber reinforced composites
04	LS-DYNA Compact: NVH
09	LS-DYNA Compact: Contact Modeling in LS-DYNA
10	LS-DYNA Compact: Introduction to PRIMER for LS-DYNA
11, 16	Metal Forming with LS-DYNA
13	Support days LS-DYNA
16	LS-DYNA Compact: CESE Compressible Fluid Solver
18,31	Intro. to LS-DYNA
19	Basics of Structural Optimization
20	Cloud Solution for LS-DYNA
23	Implicit Analysis using LS-DYNA
23	Modeling Metallic Materials
30	Intro. to LS-PrePost

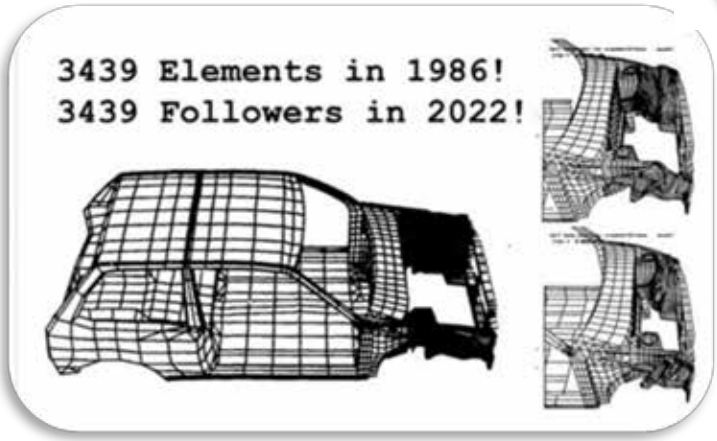
May 17-20 **Crash Analysis**

Contact

Maik Schenke

Oct. 11-13

Post On LinkedIn by Marcus Gustavsson - Why celebrate this odd number, some of you may wonder?



Well, it's a number as good as any other. It's also a big part of LS-DYNA's history and the number we are pleased to announce of our Linkedin followers! Join us on LinkedIn.

Two numbers - both 3439

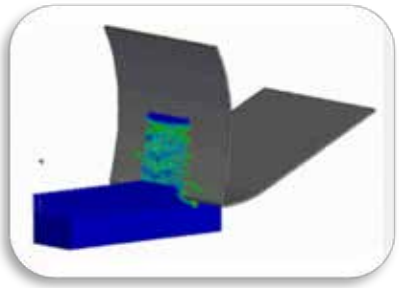
- We have gained many Linkedin followers in the last year. We are proud to announce that we have reached 3439 followers.
- The first full vehicle crash simulation performed with LS-DYNA's predecessor, DYNA3D, had a mesh consisting of 3439 shell elements!

A small number by today's standards but back then a huge step towards where we are today. We hope that you find what we post on LinkedIn and in FEANTM Magazine helpful and interesting. There is more to come on LinkedIn in our FEANTM Booth.

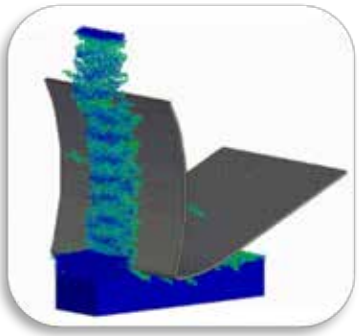
The work done for the article from the 1986 Computers in engineering conference Application of DYNA3D in large scale crashworthiness calculations, by JD. Benson and J.O. Hallquist at LSTC and M. Igarashi, K. Shimomaki, and M. Mizuno. from Suzuki Motor Co. is something that we who work with LS-DYNA probably use in some way every day. That's worth celebrating!

The paper presents an example of an automobile crashworthiness calculation. Based on our experiences with the example calculation, we make recommendations to those interested in performing crashworthiness calculations.

DID YOU KNOW?



If you are working with applications involving large deformations and material failure where an element-based solution is likely to end up with distorted elements, you should take a look at the SPG particle method! Apart from allowing for extremely large deformations, SPG has a bond-based material failure that does not violate the mass conservation that erosion-based methodologies will.



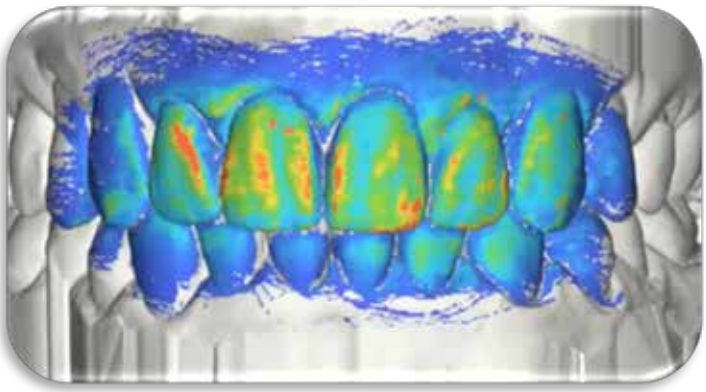
Other advantages are that the time- step is not sensitive to large deformations and that it can be coupled with FEM. Examples of applications for SPG are modeling of fasteners like self-piercing rivets and flow drill screws or machining.

David Graham • Technical Marketing & Strategic Account Manager at LEAP Australia

”Last month on March 20th it was World Oral Health Day. As engineers we're always striving to further optimise daily life, so why not use simulation to quantify the uniformity of our brushing intensity? Thanks, Rocky DEM Particle Simulator!"

YouTube - Toothbrush head design evaluation using Rocky DEM

Rocky DEM's unique features helped to evaluate a toothbrush's head design. Flexible fiber particles were used to represent the brush's bristles. Frozen elements modeled bristles' ends attached to the brush. Then, brushing efficiency was analized using the boundary collision statistic feature.



Project Circleg, "**A huge shout out to CADFEM GmbH** who provided us with the Ansys start-up Bundle, a Simulation Software package at an affordable price – especially for start-ups! Beside the most common Simulation Software Ansys the bundle also contains great services and general support.
Thanks a lot CADFEM GmbH!"

Project Circleg - The Art of Simulation

When developing a qualitative leg prosthesis, simulations are essential. In addition to looking like works of art, they allow us to structurally optimize the Circleg components, which ultimately translates into increased functionality, comfort and a cost-effective price of the prosthesis.

Project Circleg is more than just a prosthetic system. It is about empowering people to enjoy freedom of mobility, to generate social and the environmental values, and to celebrate diversity in all shapes and colours. Our values are aligned with the UN Sustainable Development Goals (SDGs).

Modular System - The Circleg prosthetic system consists of a polycentric knee, a pylon and a dynamic foot. Its components can be adjusted individually to the body measurements of users and are connected with the well-known pyramid adapters.

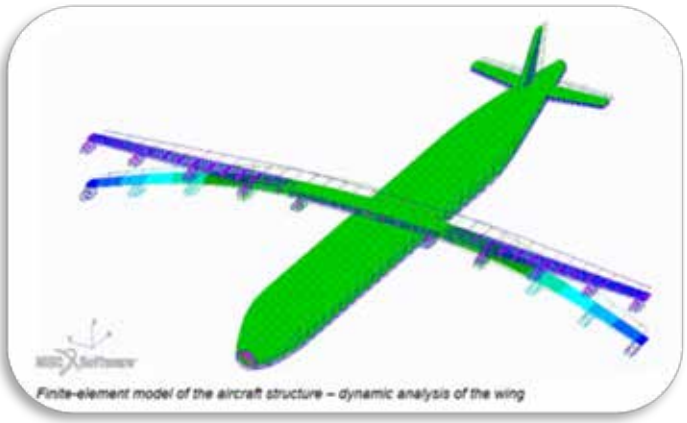
Interdisciplinary Development - Project Circleg's team of designers and engineers is currently refining and testing the prosthetic system in close exchange with acclaimed experts, academia and industrial partners in Switzerland and East Africa. For this, we follow the procedures outlined by the European Medical Device Regulations ensuring quality and safety for the users.

Story - Charlotte Kangume - Changing the Image of Disability

Excerpt - Charlotte, you are a jack of all trades: a trained lawyer, an early childhood educator and an advocate for disability and sexual assault. Currently, where are you most engaged in?

"Right now, I mainly work for an organization that I co-founded, which is called «Amputee Self-help Network Uganda». It's an organization that gives psycho-social rehabilitation to amputees, because it is not a readily available service in hospitals. We go to the hospitals and counsel amputees as well as people that are due for amputation. Apart from that we create empowerment activities that we provide to amputees, that they can bring their lives back to normal. We also advocate for their rights – at the workplace but also generally in our society."

Thanks to Ataberek Ozaydin for liking DLR on social media


Finite-element model of the aircraft structure – dynamic analysis of the wing

Aircraft Configurations with Distributed Propulsion – Effects on Loads, Structural Mass, and Aeroelasticity

The concept of distributed electric propulsion units has great potential on the track to zero-emission aircraft. Investigations raise expectations that distributed propulsion engines improve the aerodynamic performance, flight mechanical aspects as well as the aircraft loads.

Reduced loads will lead to a reduction of the structural weight. Besides environmental aspects, the physics and technical based aircraft characteristics are of great importance.

Thus, the following article adresses the structural design, including the estimation of the mass of the primary structure, the loads of the elastic structure and the aeroelastic characteristics of such a configuration. Distributed propulsion units lead to unusual structural dynamic characteristics compared to conventional aircraft with two or four engines and influence therefore the flutter characteristics.

Figure 1: SynergIE-Configuration, regional aircraft with distributed propulsion

In the project SynergIE (2018-2021, 5th German national Luftfahrtforschungsprogramm) the design of a regional aircraft for about 70 passengers (see Figure 1) using a distributed propulsion architecture was the main focus. In the course of the project several variants for such aircraft have been set-up using statistic-based conceptual design methods (using the conceptual design tool openAD from the DLR Institute for System Architectures in Aeronautics). The variants comprise changes in the number of the electrically powered propeller engines, ranging from two to twelve, two different tail concepts (T-tail, conventional tail) and wing aspect ratio variants, 14.3 and 17.

Continue Reading on the Website and the many other interesting articles.

The DLR Institute of Aeroelasticity is a leading research institute in the topics of aeroelasticity, structural dynamics, unsteady aerodynamics and dynamic loads. More than 90 collaborators focus on theoretical-numerical and experimental investigations dedicated to aircraft, rotorcraft, turbomachinery and wind turbines applications. The institute operates three of the DLR large-scale research facilities to address fundamental and application-oriented experiments in wind tunnels as well as for ground and flight tests.

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Dr. Markus Kellermeyer

Video - [CADFEM Learning]

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Thanks to EY for bringing this to our attention

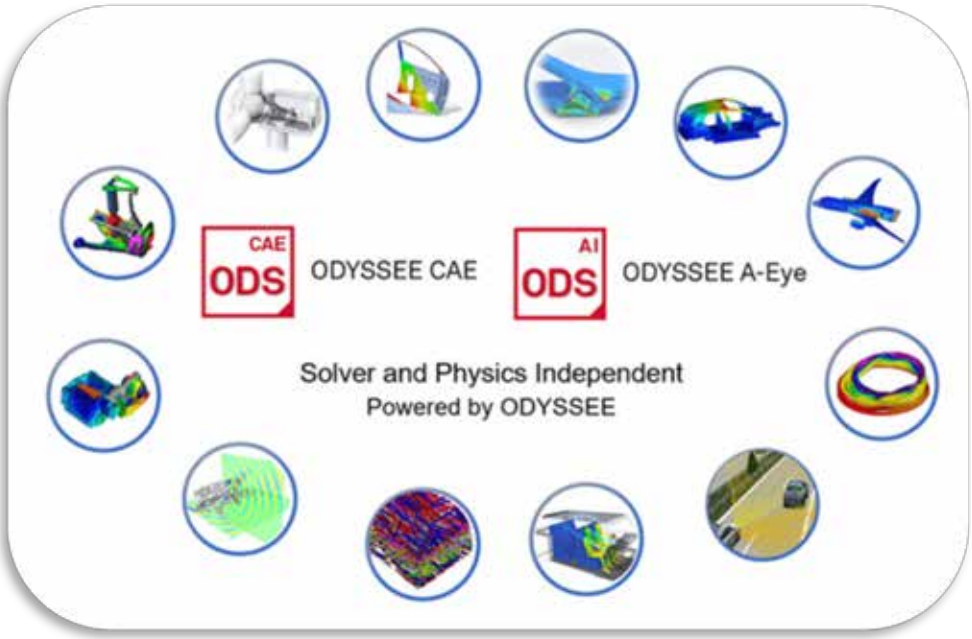
YouTube - ODYSSEE **(DYNAMORE Channel)**
Speaker: Kambiz Kayvantash (CADLM)

ODYSSEE is a powerful portfolio of 3 modules (Lunar, Quasar and Nova) from CADLM. It is a unique and powerful CAE-centric innovation platform that allows users to apply modern Machine Learning, Artificial Intelligence (AI), Reduced Order Modelling (ROM) and Design Optimization to workflows.

ODYSSEE employs algebraic or machine learning solutions for reducing the volume of data while preserving the most important parts of the information contained within that data. This is commonly done via decomposition or machine learning or other efficient data fusion techniques.

Such techniques allow for creating on-board and real-time applications based on existing experimental or simulation results.

Typical applications are optimization, parametric sensitivity analysis and robustness.



HEXAGON - ODYSSEE - Solving your engineering problems in real-time

ODYSSEE A-Eye is a unique and powerful image-based machine learning solution that accelerates product design and development via real-time parametric simulation and optimization using machine learning and artificial intelligence (AI) solutions.

ODYSSEE A-Eye allows you to create your own AI application based on image data, sensor data, scalars, labels, curves, and CAD data as inputs and then predicts responses using the known data of your system. This insight enables designers and production technicians to explore the design space more extensively and interactively and improve next-generation products without prohibitive computing cost or time.

Graphics Courtesy of Vecteezy

Goodbye and Come Back Soon

QUIZ Credit - Correct Answers A-B - you are served chocolate ice cream!
Correct Answer C & D you are served BIG chocolate chip cookies!

A. The Lockheed U-2, nicknamed "Dragon Lady"
B. Turkish Bayraktar TB2
C. Paper Airplane
D. Mini RC Plane KIT Beechcraft T-34 Fly Aircraft, Balsa Wood

Our Town Salutes our US military and the military of friends of the US.

The Town stands with Ukraine

And our Russian friends supporting peace - This town doesn't judge a person by their country, but their actions