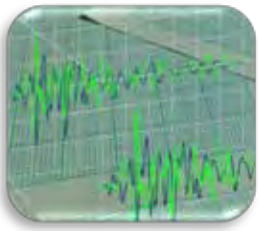
www.feantm.com Issue August 2021 ISSN 2694-4707

FEA Not To Miss Software
&
Engineering Solutions
Town Hall Meeting & Gossip

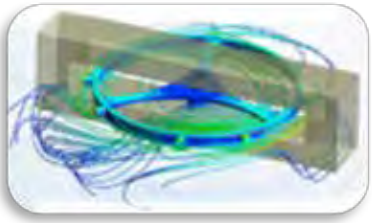
OASYS



MSC.Software

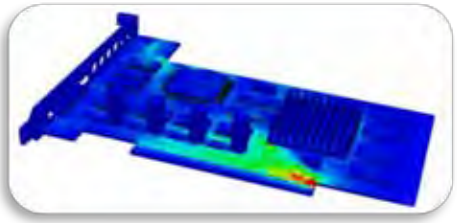
CADFEM Medical

CADFEM



DYNAmore Nordic

ANSYS



BETA CAE

OZEN

SIEMENS

Library - B. Blocken

ESI-GROUP

ALTAIR

Cattle Ranch - ESSS

Convention Center - Audi

Exhibit Poster - PSW

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

Our goal is to share information on companies with expertise and innovative products. Strengths that rely on smart work ethics in today's changing world.

Compensation

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Any company may opt-out at any time by writing to Marsha feaanswer@aol.com

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 Cattle Rancher."

The Old Retired Pilot

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

They are brothers - strange family

Contact us at: feaanswer@aol.com

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	Corrado	Recipe	Soft donut with Orange and Greek Yogurt
		REVIEW	Things you may have missed.

The respective websites will have the larger graphics, with full resolution.

Monthly town hall meeting.
Serving - coffee & Speculoos Cookies!

Our town comprises companies, engineers, scientists, mathematicians, universities, professors and students, consultants, and all individuals interested in software, hardware, and solutions. Oh, and gossip at the local coffee shop, and your pets are welcome.

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

- The FEANTM Town Police had no rhythm learning the Jerusalema Dance Challenge.
- Our police are now learning the Git Up Challenge. "Who just yelled, YeeHaw?"
- Annex Building - **Police - Git Up Challenge**. "HEY, STOP yelling Yeehaw!"
- K. Bui, please sit down and stop gossiping by the coffee, did you yell Yeehaw?

The Convention Center Construction is complete with a new Exhibit Hall & Exhibitor Booths.
Bicycle meetings will be held at the Convention Center. They were racing around the Annex Bldg.
Convention Center - Cycle Meeting - A scientific tribute to the breakaway kings and queens

Town secretary - The town secretary states that Muffin, from our K-9 unit, chased her down the hall. Our secretary ran from the building screaming, **"Send in your events to feaanswer@aol.com - subject Town Secretary.**

Someone please explain why the Town Police K-9 unit has this particular puppy on its budget? According to K-9 Unit records, including a picture of Muffin, Muffin is a Maltese puppy. Please retrieve Muffin from under the couch in Hall 12. Muffin is chewing the antique couch leg.

Fire Department - Where are the new fire hoses?

1. Who used the Fire Department budget buying 50,000 "Happy Day" balloons to fill with water?
2. Throwing them at a structural fire won't work! Yes, it was nice they gave you a 50% discount.
3. We do thank you for the balloons. Does anyone need "Happy Day" balloons for a party?
4. Annex Building - **Fire Dept - ARUP-LS-DYNA for Structural Fire Engineering.**

Town equipment - We are not using the cleaning budget for a Navy training helicopter!

1. We appreciate the old retired pilot 's suggestion for a new town helicopter business.
2. We have to deny his new business permit.
3. Someone explain to him that we do not have a "Town Navy!"
4. Annex Bldg. **Town equipment - Leonardo delivers first TH-73A training helicopter to U.S.N**

There is a Crop Harvester parked in the compact parking area! Town Hall is not a ranch.

1. We requested the agriculture students to "harvest crops." NOT a request for a "crop harvester."
2. Someone please ask the Old Cattle Rancher to take home his Crop Harvester.
3. **Cattle Rancher's Ranch - ESSS-Rocky DEM usage in the agricultural equipment industry"**
4. Last, I did ask who approved The Old Cattle Rancher to be located on the town map.
   All the town residents, all departments, and all guests have ignored answering me!

Town Map

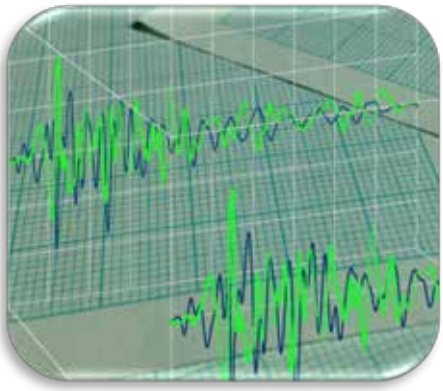
* The logos displayed, of content in our magazine, do not represent their endorsement.
* To be removed, please notify feaanswer@aol.com with the request.
* Your town lot will be auctioned, with the Town applying all proceeds to the coffee budget.
* The town map changes pending information, and rotational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

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

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

Not To Miss on YouTube

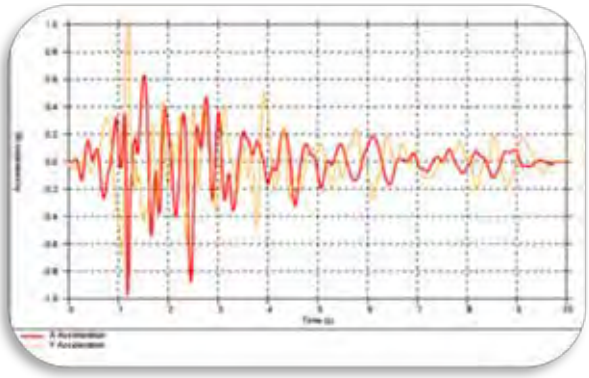
On line courses, **Sept 28** Intro to LS-DYNA)	**Webinars** - View The complete on line webinars **Sept 29** Advanced seatbelt modelling in Oasys PRIMER: fully fabric seatbelts, child seats & more



Oasys T/HIS is an XY data plotting package designed primarily for use with LS-DYNA.

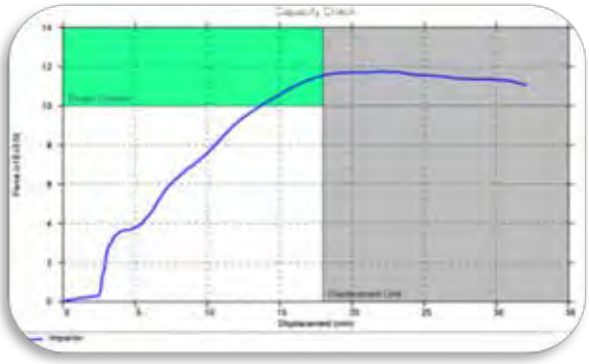
Process output data in a standalone Oasys T/HIS session or use the D3PLOT T/HIS link to view XY data side-by-side with 3D results.

Main Features	**Main Features**	**Additional Capabilities**
· XY data plotting package designed primarily for use with LS-DYNA. · Can read both the ASCII and binary results produced by LS-DYNA, basic CSV, DIAdem and ISO files. · Wide range of functions allowing manipulation of data into the format required, including basic mathematical functions, commonly used filters (e.g. CFC180), and a number of specialist functions for calculating injury criteria in automotive impact analysis (e.g. HIC, VC, THIV)	· Displays multiple graph windows across multiple pages. · Runs stand-alone or in a linked session with D3PLOT. · Timeline feature enables synchronised viewing of D3PLOT and T/HIS results. · FAST-TCF scripting language and JavaScript API for configuring automatic post-processing.	· Quick-pick menu for on-screen manipulation of curves. · On-screen manipulation of data points using the mouse. · Group curves together for easy handling.



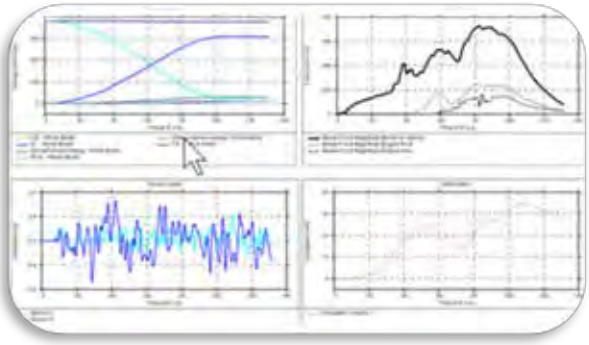
Curve History and Sampling

Curve history flow charts and FAST-TCF scripting allow you to quickly and easily postprocess analysis results.



Datum Lines

Datum lines can be added to graphs to show limits and reference curves.



Multiple Graphs and Pages

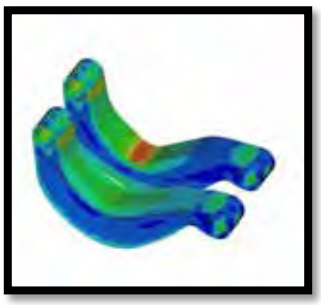
Multiple model handling and graph displays give you complete control over how the data is visualized.

Webinars · T/HIS Top-Tips · Curve Manager Tutorial · Macros Tutorial · Output Options Tutorial	· Curve Operations Tutorial · FAST-TCF Tutorial · Graph Properties Tutorial	· T/HIS Quick Pick Tutorial · Reading and Plotting Results Tutorial

.

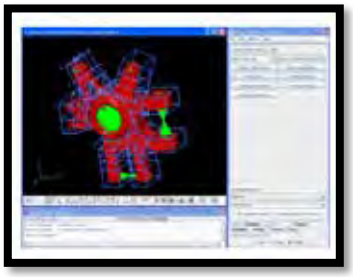
Optimization - Multiple tools for optimization and stochastic analysis from stand-alone software able to be linked to any simulation code up to complete software packages and postprocessors in non-linear finite element applications and design optimization capabilities.

LS-OPT, the graphical optimization tool that interfaces perfectly with LS-DYNA, allows the user to structure the design process, explore the design space and compute optimal designs according to specified constraints and objectives.



LS-TaSC - This tool is for the topology optimization of non-linear problems involving dynamic loads and contact conditions

VisualDOC is a general-purpose optimization tool that allows the user to quickly add design optimization capabilities to almost any analysis program.



GENESIS is a fully integrated finite element analysis and design optimization software package, written by leading experts in structural optimization.

ODYSSEE - Stands for Optimal Decision Support System for Engineering and Expertise. It is a powerful software package consisting of the 3 modules Lunar, Quasar and Nova.

Visit the website for further information and other courses offered
Seminars, webinars, video seminars and/or information days.

Element Types & Nonlinear Aspects - André Haufe, Karl Schweizerhof

Oct. 7 **A collection of different topics on nonlinear aspects surrounding LS-DYNA**. Emphasis is directed towards element technology and the specific elements implemented in LS-DYNA. Adaptive schemes for nonlinear problems are presented. Since more and more implicit features are included in LS-DYNA, another part of the class is dealing with implicit solver technology for nonlinear problems.

ICFD Incompressible Fluid Solver - Iñaki Çaldichoury

Sept. 30

An introduction to the incompressible fluid solver (ICFD) in LS-DYNA. It focuses on the solution of CFD problems, where the incompressibility constraint may be applied, e. g. ground vehicle, aerodynamics, hemodynamics, free-surface problems, ship hydrodynamics, etc. The solver may run as a stand-alone CFD solver, where only fluid dynamics effects are studied, or it can be coupled to the solid mechanics solver to study loosely or strongly coupled fluid-structure interaction (FSI) problems.

Introduction to LS-DYNA - Dynamore staff members

Sept. 14, 21, 27, Oct. 26, Nov. 16, Dec. 01, 07 - **Prior knowledge is not required.**

A quick, comprehensive introduction to the application of LS-DYNA and is recommended for simulation engineers who want to use LS-DYNA as an FE code to simulate general nonlinear problems.

Joining Techniques in LS-DYNA - Dynamore staff members

Nov. 23

Insight into the possibilities to model and simulate component connections in LS-DYNA. The most frequently used connections, such as adhesive bonding, bolt fastening, welding, spot-weld adhesive bonding or riveting, each require a specific structural and material model for numerical simulation. For this reason, we will thoroughly discuss the load carrying action of the individual connections as well as their structural stability and demonstrate possible modeling

Parameter Identification with LS-OPT - Katharina Liebold, Charlotte Keisser

Oct 12, Nov. 17 **Prior knowledge is not required.**

A brief introduction in LS-OPT with a focus on the application of LS-OPT to determine material parameters. The use of new materials, such as plastics, composites, foams, fabrics or high-tensile steels, demands the application of highly complex material models. These material formulations are generally associated with numerous material parameters... In the identification process, an automatic comparison is carried out between the experimental results and the simulation results of LS-DYNA. The error between experiments and simulations is minimized.

Excerpt:

Application example:
Rock drilling equipment.

PDF - Incremental Damage Model for Fatigue Life Assessment in Complete Machinery Simulation

- Marcus Lilja, Jesper Karlsson, Anders Jonsson, Daniel Hilding - DYNAmore Nordic AB
- Stefan B. Lindström, Daniel Leidermark, Peter Schmidt - Division of Solid Mechanics, Linköping University

Abstract: In CAE today a transition towards “complete machinery simulation”, away from the traditional component or sub-assembly simulation, is seen. The complete, assembled and pre-loaded machine is simulated with real loads and boundary conditions which minimizes the risk of errors in the boundary conditions and loading. The longer simulation time is mitigated by the reduction in the number of load cases needed and that a single simulation yields the results for all components. This “complete machinery simulation”-approach is not new, e.g. in the automotive industry LS-DYNA® has been used for realistic simulations for many years and this approach has now reached other industry sectors as well. When developing e.g. heavy industrial equipment, static strength is not a common failure mode, but fatigue is. Fatigue life estimation of a product is crucial and since fatigue tests are both expensive and time-consuming there is a need for accurate fatigue simulation methods.

Fatigue analysis within the CAE-process is commonly based on the rainflow count method for cycle counting and the Palmgren-Miner’s linear damage accumulation model. The fatigue life prediction is performed on the result history from a previous analysis and is dependent on the output frequency so that all peaks and valleys of the result variation are identified. This method is widely used and is well-suited for most of the common fatigue scenarios today. However, when using complete machinery simulation, shortcomings in the above method have been identified to be caused by the combination of very large models, high frequency output, and non-proportional loading. This tends to result in a great amount of data for the subsequent fatigue analysis. The amount of data makes post processing and fatigue analysis cumbersome and since development is an iterative process, disk space may become a critical factor.

This paper presents an implementation of the incremental fatigue model of Ottosen and co-workers [Int. J. Fatigue, 30:996-1006 (2008)] as a user-material for LS-DYNA. The model offers a uniform framework for multiaxial, non-proportional and non-cyclic loading. With this model, the fatigue assessment is made on the element level during the simulation. The model enhances performance in terms of faster integration, less data storage, and easier usage. A comparison of the fatigue life predicted using the new method to the standard rainflow count method for selected grades of steel and aluminum is presented.

CAViT - SCALE.result

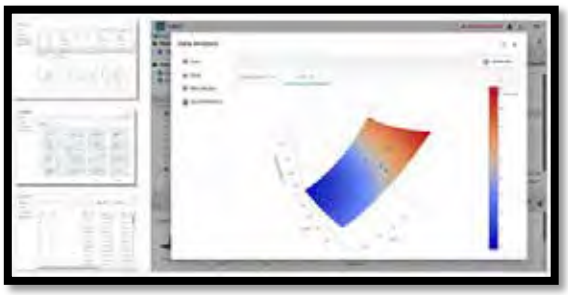
Post Data Management of Test and Simulation Results

- Visualization of test and simulation results
- Evaluation, reporting and export
- Intuitive user interface with customizable layout and functionality

Reporting

Evaluate, Assess and Compare

- Rich, attractive and complex report documents
- Export to Excel, PowerPoint, PDF etc.
- Interactive evaluation directly in the application



AI based Data Analysis

Visualization and Analysis of the Data with ML methods

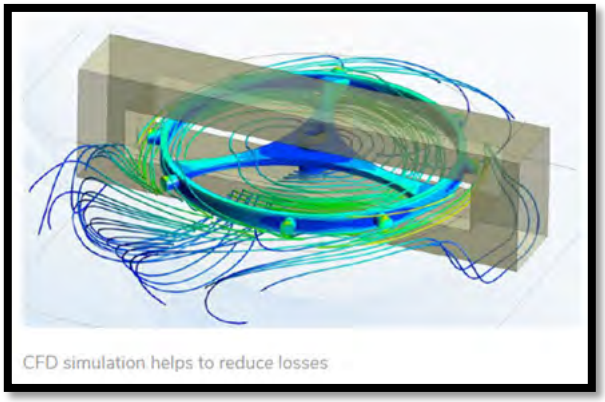
- Scatter and surface plots
- Approximation and prediction with neural networks
- Outlier detection

Contact

Martin Liebscher

Precise simulation for precise watches

CADFEM has acquired over the past ten years a recognized expertise in the simulation of watch parts and mechanisms. Our watchmaking experience allows us not only to support you in the implementation of simulation in your company but also to make this tool, as quickly as possible, productive in order to significantly reduce the number of prototypes.



PRECISE WATCH SIMULATION

Experience for the watchmaking industry

Recognized by the watch industry for its experience in watch calculation, CADFEM (Suisse) AG's team of engineers has been sharing its simulation know-how with watch manufacturers for 20 years. It provides watchmakers with effective tools to perform complex simulations, design more reliable products, accelerate the development process and reduce the research budget.

Indeed, simulation with Ansys facilitates the creation of many virtual prototypes, in a controlled environment where all physics are managed. These can be coupled together to facilitate the work of developers. To ensure that watch calculation is an efficient tool that is fully integrated into your research and development processes, the CADFEM team will guide you through your projects with local support.

(Excerpt - Each graphic on the website has a complete topic with graphics)

Visit the website for complete information

Watchmaking training courses

These training courses are based on concrete cases from the watchmaking world. Based on our experience in watch calculation, in the different physics, we transmit our know-how to you, adapted to your specific applications.

You have just built a watch construction but you do not know if it is correctly dimensioned. CADFEM offers you seminars specially designed to meet the needs of watch manufacturers. Our engineers will guide you through the calculations that take into account the specificities of the watchmaking world. Ansys Workbench allows you to check the strength of the parts and calculate the forces and torques acting in your assembly from the design stage.

Meeting aesthetic and technical requirements

PDF CASE STUDY - Parametric optimization for traditional watchmaking with Ansys

Task

The intersection between art and engineering makes it very special to develop luxury watches. Each step of the development of a new component is conducted under the careful supervision of mechanical engineers and designers working hand in hand. It is a real challenge to fulfill the technical requirements in an excellent way on the one hand but also to meet the high aesthetic criteria on the other.

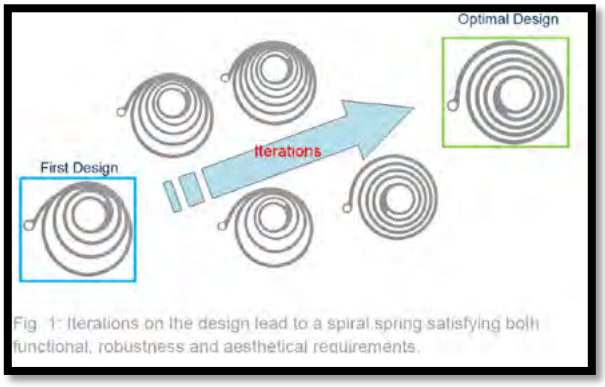


Fig. 1: Iterations on the design lead to a spiral spring satisfying both functional, robustness and aesthetical requirements.

From a mechanical point of view, a spiral spring has to meet precise specifications pertaining to its torque at specific loading angles and over many cycles as well as geometric requirements for its manufacturing. From a visual perspective it is important that the windings of the spiral stay concentric at all times (Fig. 1). The challenge is to find a geometry meeting all the requirements by only changing geometric parameters such as the number of windings, the dimensions and the shape of the spiral.

Success Story / Simulation heals – Bite resistant despite jaw defect (PDF available on website)

Preprosthetic biomechanical - simulation implants

Learn how CADFEM Medical is helping KLS Martin Group to provide customized and functionally stable immediate rehabilitation to patients with insufficient bone and soft t issue.

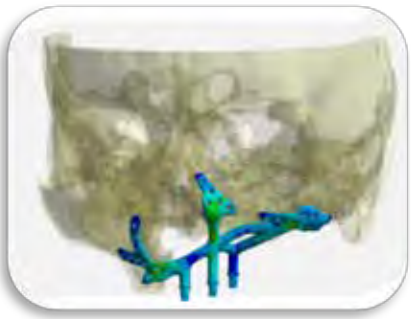
Learn how CADFEM Medical is helping KLS Martin Group to provide customized and functionally stable immediate rehabilitation to patients with insufficient bone and soft t issue.

The task

Solid and functional teeth mean quality of life. When teeth are lost, there are various ways to replace them. However, conventional treatment methods are often no options, especially for patients with severe malformations, defects after tumors or accidents. In order to nevertheless create fixed dentures, a functionally stable one-piece framework is implanted into which the denture is placed. To exclude complications regarding stability, anchoring and strength and to obtain proof of the durability of the patient-specific implant, the situation in the patient must be checked under biomechanical load conditions.

"At KLS Martin, we have dealt with the potential and possibilities of simulation in relation to our products at an early stage. In the meantime, simulation has become the standard for supporting the creation and maintenance of technical documentation for our products. It saves us a lot of time and money compared to conventional methods such as test bench, animal, ex-vivo or human testing."

The solution



In order to be able to offer the affected patients a quick and safe solution for fixed dentures, a segmentation from CT data and a simulation of the individual patient situation was first performed postoperatively to calculate the forces and loads occurring in the maxilla (Figure 1). The damage behavior, failure criteria and safety factors are evaluated according to the FKM guideline. In addition, a comparative check of the strength of a patient-specific implant with a physically tested variant is performed.

Fig 1 Simulations of patient-specific load conditions

Fitted Implant

The result

The products can be demonstrably improved by biomechanical simulation of the implants' behavior – to the benefit of the patient. The practitioner gets an insight into the functionality of the implants in the functionally stable situation before the intervention and can supplement his technical file (device history file) with objective results from the comparative simulation study. The recommended actions from the simulation allow the implant to be inserted in such a way that inflammation and a possible implant loss resulting from this (stress shielding) can be ruled out (Figure 2).

In addition, the practitioner receives proof of the functionally stable anchoring and sufficient strength of the highly stressed individual implant in the patient. The patient can thus look forward to a tested, durable implant and fixed teeth after just six weeks.

About the customer

The KLS Martin Group is an internationally active group of companies for innovative medical technology in almost all areas of surgery. With their innovative medical technology solutions such as implant systems, high-frequency surgical devices, surgical lasers, sterilization containers, surgical lights, surgical instruments as well as individual OR solutions, they have set new standards many times

About CADFEM Medical

The company was founded in 2014 and is part of the CADFEM Group. CADFEM Medical's products and services enable medical device manufacturers, clinicians and medical staff to practically apply numerical simulation and use it for more effective and safer patient care.

CADFEM Medical is committed to the standardization and broader application of in silico medicine as part of the Avicenna Alliance, thereby ensuring safe, affordable and cost-effective healthcare.

Your contact

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CTO

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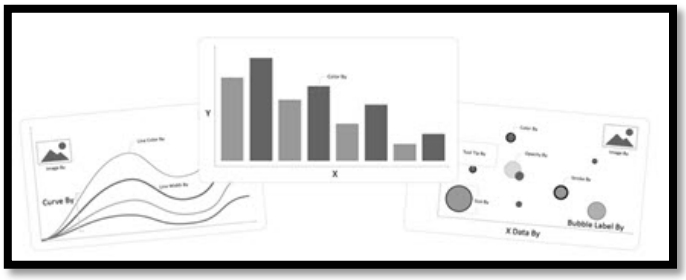
D3VIEW blog by Elisa



Progressive Data Visualization in Simlytiks Using Placeholders

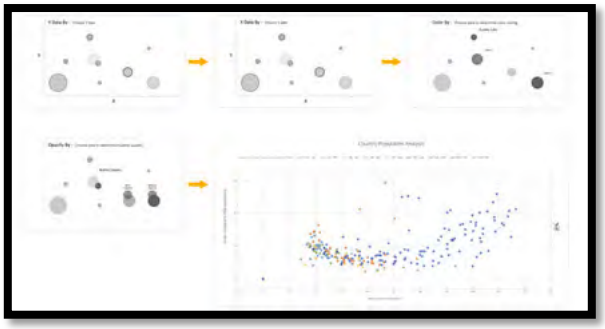
As d3VIEW is focusing on taking its users' experience to the next level, Simlytiks, which is our visualization application has been spruced up. We have been working on extending functionality to improve usability and understanding of Simlytiks.

One important improvement in the works pertains to the visualization placeholders – what the user sees before picking specifications for a chart, graph, etc. The updated placeholder images show detailed illustrations of each option available for each visualization. The key intention involves adding more clarity, so users feel empowered to create effective visualizations without any hesitation. Let's go over some examples of how these extensive illustrations aid in setting up remarkable visualizations quickly.

Explore Detailed Illustrations of Visualization Specifications

Each specification for each visualizer has a custom illustration to explain its function.

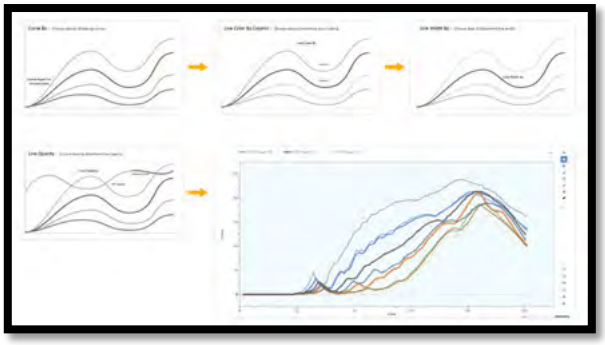
Here, we show the image placeholders for some of these specs, which are populated for vertical bar chart on cereal nutrition at the end.



View Unique Placeholders for Each Visualizer

Each visualization has options that may or not be similar to other visualizations, which makes having unique placeholders for every possible option in Simlytiks advantageous.

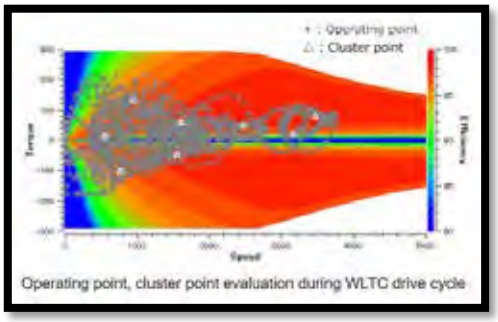
Here are some of scatter plot placeholders used for the finalized chart on country population at the end.



Preview All Possible Customizations Before Creating

Some visualizers have plenty of options which becomes much less overwhelming with simples examples for each.

For example, we have populated some important options for curve plot and shown an occupant safety pressure curve. Being one of the most used visualizations, this is only a fraction of the customizations curve plot has to offer.



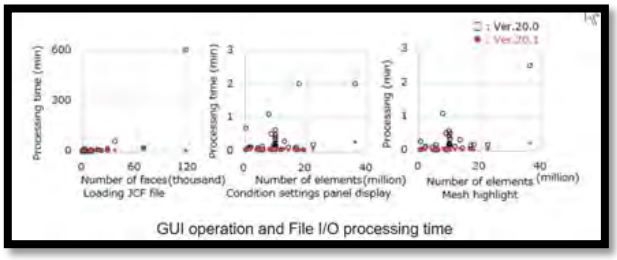
Introducing JMAG-Designer Ver.20.1 -

In JMAG-Designer Ver.20.1, continuous efforts are being made to improve software performance. For parametric analysis and optimization, running multi-case calculations using multi-core distributed processing achieves the right calculation time that completes within the design period.

For large scale models that require detailed calculations, mesh generation speedup has been achieved and parallel processing is supported. In addition, the time it takes for pre-post processing has been shortened to provide a stress-free design environment.

Enhancements that have been made in general purpose features include further customization of the analysis parameter view, as well as being able to quickly create design variable settings and simultaneously display the result evaluation in a single window. In multiphysics, a three-way coupled analysis of magnetic, thermal and structure is supported and even more improvements are being made in the accuracy of estimating simulations. In motor design, geometry libraries have been expanded and improvements have been made in efficiency map studies and JMAG-RT to realize efficiency in creating models and obtaining evaluations from various perspectives.

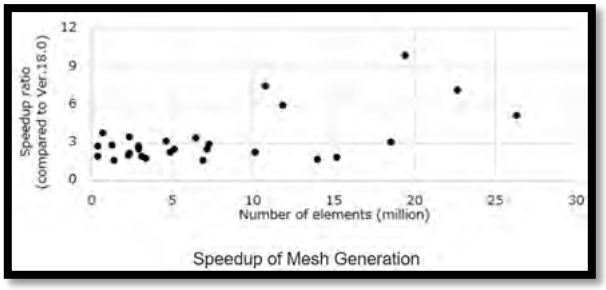
We encourage all our users to make the most of this latest version of JMAG with its many new enhancements.



1. Speedup Processing of Large Scale Models

Processing time reduced for multi-face models and models with tens of millions of elements.

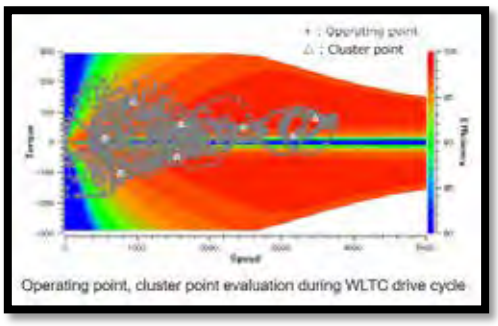
The processing time has been drastically reduced for models that took more than 30 min. to load JCF files. The time it takes to display the condition settings panel and highlighting mesh is reduced by up to approx. 30 sec.



2. Processing Time Reduced for Mesh Subdivision

Faster mesh generation for large scale models.

This graph compares mesh generation time in Ver.18.0 and V.20.1 for models that took more than five minutes to generate mesh. The larger the number of elements, the higher the speedup ratio.



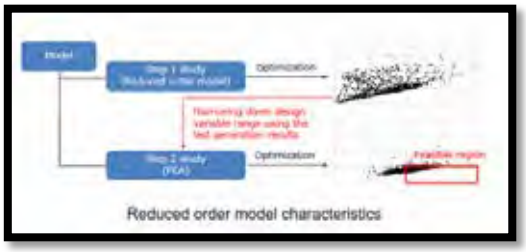
Operating point, cluster point evaluation during WLTC drive cycle

3. Input Function Added in Drive Cycle - Evaluate motor efficiency and losses in drive cycle.

The EV traction motor evaluates characteristics in a wide operating range. This graph shows the operating point and cluster point during WLTC drive cycle on the efficiency map. Average efficiency and energy consumption can be calculated from this information and used as the response value.

Evaluate motor efficiency and losses in drive cycle.

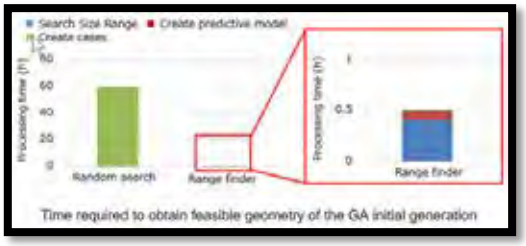
The EV traction motor evaluates characteristics in a wide operating range. This graph shows the operating point and cluster point during WLTC drive cycle on the efficiency map. Average efficiency and energy consumption can be calculated from this information and used as the response value.


Reduced order model characteristics

4. Narrow Down Design Space Using Reduced Order Model

Design space is narrowed down using only JMAG-Designer.

Prepare two steps of study for a single model. Optimize the step 1 study and obtain each design variable range of the last generation. Using this to perform design exploration of the step 2 study, will allow you to efficiently explore the area around the feasible region.

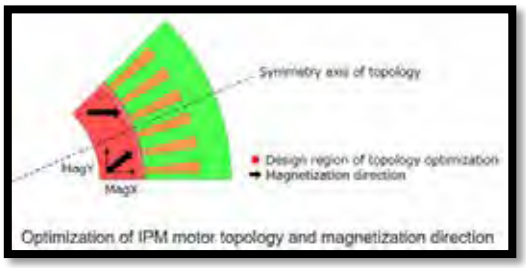


Time required to obtain feasible geometry of the GA initial generation

5. Official release of Range Finder

Generate geometry within short time with models that experience difficulty in obtaining valid geometry.

Parameter optimization is assumed for a model with 15 geometry design variables. The likelihood of obtaining valid geometry with random searches previously was 0.1%, requiring 60 hours to obtain 150 valid geometries. Using the range finder reduces this to a mere 30 minutes.

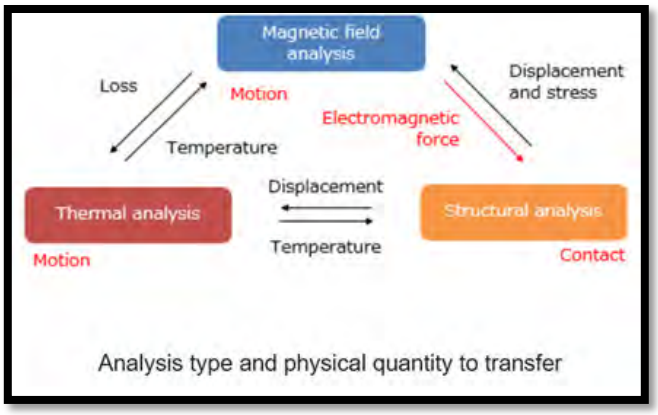


Optimization of IPM motor topology and magnetization direction

6. Simultaneous Optimization of Topology and Parameters

Effectively implement searches for designs strongly affected by topology and parameters.

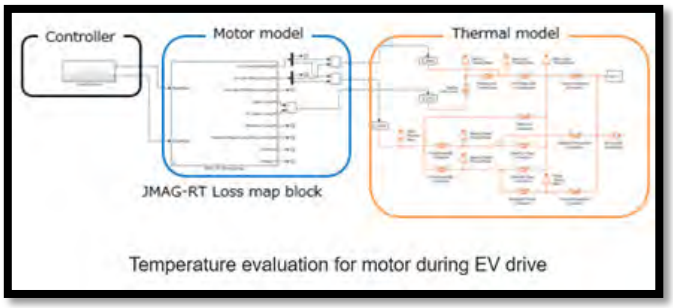
The design region is the tips of the stator teeth and the entirety of the rotor. Searches for topology are performed with three materials for the rotor side; iron, air, and the magnets. Magnet magnetization vectors (MagX, MagY) are then parameterized, and searches can be performed for optimum magnetization directions at the same time.



7. Expand Physical Phenomena Accounted for in Three-way Coupled Analysis

Expand applications for use in three-way coupled analysis.

In Ver.20.1, the applications written in red have been added as physical phenomena that can be accounted for. This makes coupling with structural analysis possible while accounting for motions in magnetic field analysis and thermal analysis. In structural analysis, displacement and stress can be evaluated using electromagnetic force of magnetic field analysis as load. In addition, contact between parts can be modeled.



8. JMAG-RT Loss Map Model

Can perform system simulation using JMAG-RT model.

Input vehicle speed history in driving mode to the controller, then output motor rotation speed and load torque. The motor model receives the information and outputs loss values referring to loss maps. The output loss values are used as heat source in the thermal model, and temperature history for parts can be confirmed.

Fluid Dynamic Simulations Advance Appliance Designs - Manilka Abeysuriya

In the competitive world of home appliance design, particularly refrigeration, cooking, laundry, dishwashing or range hoods, pushing performance boundaries means grasping a deeper understanding of how these products operate. Tighter environmental regulations coupled with more sophisticated user experience requirements pushes the designs into territories where subtle physical behavior starts to play a more prominent role. This can mean lengthy and expensive development and testing phases.

For instance, the moisture management inside refrigeration compartments is one area where understanding condensation, heat transfer and airflow is crucial to developing a better performing product.

New Zealand-based appliance designer Fisher & Paykel uses Ansys software to carry out simulations at the early stages of product development to identify and rectify potential issues, as well as optimize designs to meet various performance criteria. They had particular success using Ansys Fluent and computational fluid dynamics (CFD) to make ice-making improvements in their refrigeration products.

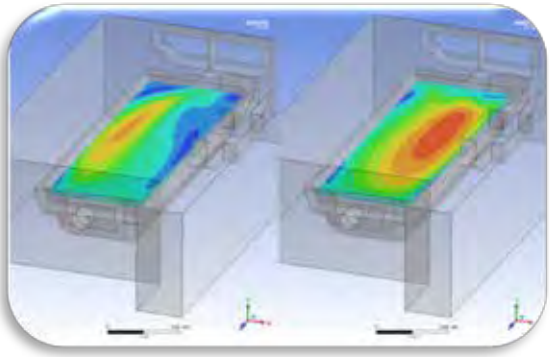
Simulations are also used extensively throughout the development process; especially when various design changes pop up as the designs of related systems mature. These analyses tend to be a case of assessing multiple solutions to prioritize those that are most promising. Because of subtle differences between some of these solutions and experimental uncertainty, CFD has become the most reliable means of their assessment.

Understanding Ice Making Challenges

Fisher & Paykel's goal was to develop a higher performance ice maker, which requires increasing air flow over the ice tray to improve the ice-making rate. This meant creating an air delivery system that is capable of channelling even flow over the ice tray.

This was no easy feat, since the company had to redirect some of the primary air that feeds into the freezer compartment into the ice maker. The challenges: dealing with the abrupt changes in flow direction and developing a design that could work with a range of different refrigerator models.

In initial discussions, the company realized multiple baffles wouldn't work due to the chaotic, swirling airflow at the source. The solution is a zone that allows the flow to buffer sufficiently in a controlled manner before releasing into the ice maker.



Initial ice maker design (left) and final design (right) showing improved velocity distribution over the ice maker tray.

Improving Ice Making Performance -
Fisher & Paykel engineers created initial designs using end-to-end, simple swept profiles and relatively convoluted flow paths because of the need for air to make drastic directional changes in two orthogonal transverse directions over a short length.

The solution was a redesign of the duct profile using a single baffle to better control diffusion across the two orthogonal planes independently. This resulted in a 67% decrease in pressure loss compared to the initial design.

Inspired by the swirling motion of ground surface water navigating around an obstacle – and with the help of Fluent's Adjoint solver – the company optimized the design to produce a flow with primary direction aligned with the ice tray. This resulted in an average velocity increase of over 50% and produced a more symmetric flow profile over the ice maker tray, which helps significantly improve ice-making performance.

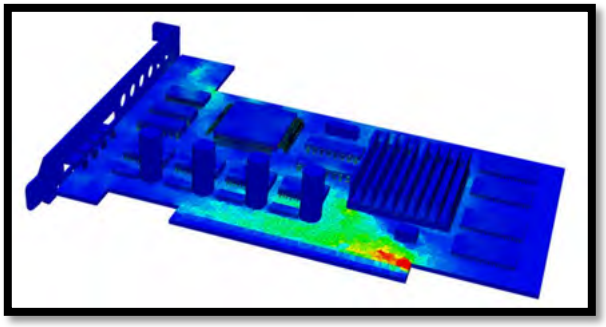
An optimized design produced a flow aligning with the ice tray, resulting in an average velocity increase of over 50% and a more symmetric flow profile over the ice maker tray.

How the Flow Field Was Designed - Flow entering the duct gets drawn down into a cylindrical chamber, encouraging a swirling motion with an axis in the transverse direction to the primary flow at the duct's entry. This allows the lateral translation of the primary flow, while minimizing losses. The flow then releases behind the ice maker through a short straight duct segment. Here, the bulge/cylindrical feature upstream of the duct outlet encourages and facilitates the transverse swirl motion, which is key when attempting to produce unidirectional flow over the ice tray.

Throughout this process, Fluent CFD simulations were used extensively. This use of simulation was much more cost and time effective compared to producing and testing 3D printed designs, which required three days per design iteration. The company could turn CFD simulations around in a single day. Additionally, when hunting for an organic shape to achieve the given performance criteria, the shape-morphing ability of the Fluent Adjoint solver was a superior approach compared to manually creating discrete design iterations.

CFD simulations also revealed an extensive description of the flow field, which enhanced the engineers' understanding of the flow behavior. Compared to physical testing, the ability to have a greater deal of control of the test environment in a virtual model also helped Fisher & Paykel refine the product design. As well as looking at the airflow behaviors, it was paramount that any aerodynamically generated noises were also kept to a minimum in order to produce a quiet refrigerator. For this, the company used Fluent aeroacoustics simulations to assure noise level requirements were met within the CFD analysis and physical tests for assessing the final design.

Product



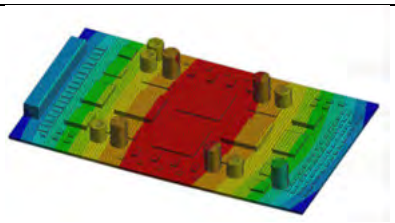
Ansys Sherlock for Predicting Thermal Stress Fatigue in Solder Balls

With embedded libraries containing over 500,000 parts, Sherlock rapidly converts electronic computer-aided design (ECAD) files into computational fluid dynamics (CFD) and finite element analysis (FEA) models. Each model contains accurate geometries, material properties and translates stress information into validated time-to-failure predictions.

Sherlock Application Programming Interfaces (APIs) for Automation

APIs are now available for Ansys Sherlock 2020 R1. Sherlock APIs enable users to:

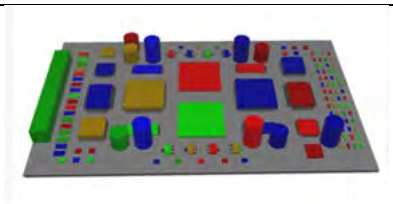
- Run Simulations in batch mode
- Automate processes and standardize methods
- Explore the impact of design and event variations on life prediction and other metrics.



Sherlock Plug-ins in Ansys Workbench

Sherlock-Worbench integration simplifies, accelerates, and expands mechanical, thermal and reliability simulations of electronics systems.

- Automates export of geometry and properties from Ansys Sherlock to Ansys Mechanical
- Automates the import of simulation results from Ansys Mechanical back to Ansys Sherlock for Life Prediction calculations



New Sherlock Meshing Engine

The new Sherlock meshing engine enables:

- A new default meshing approach with improved performance for higher quality meshes.
- Additional controls are available for PCB Modeling, Trace Modeling, etc. when preparing a model for simulation or export.

CASE Study - To begin product reliability analyses using Ansys Sherlock, the engineers at Continental imported a Zuken ODB++ file into Sherlock. Sherlock quickly read all information in the file and generated a representative board with complete stack-up data, including all components and mounting conditions with their exact locations and material characteristics. The board also featured mirrored BGA components and conformal coating that Sherlock modeled accurately using the available potting functionality.

Modern Stadium Design Inspired by Topology Optimization - by J. Ristic - Every four years, the Olympic Games brings together thousands of athletes and spectators for one of the biggest international sporting events. A country's opportunity to host the Olympics allows them to make an artistic statement about their culture as well as their innovative future.

(Left: A mock-up of the Colossus stadium design project created with Altair Inspire.A mock-up of the Colossus stadium design project created with Altair Inspire.)

For example, China's notable 2008 Olympics stadium is nicknamed "The Bird's Nest" because the structural beams used to support it resemble the intricate woven twigs found in bird's nests, the project's inspiration.

To support their Olympic bids, host countries will typically build brand new stadiums and other infrastructure, which requires careful planning and of course a massive amount of funding. For a project as big as a stadium, and with such a short time to prepare, ensuring the design is feasible, beautiful, and within budget is paramount.

Despite tight timeline and budget constraints, modern simulation software has made it possible for architects to create both innovative and structurally-sound stadiums while still showcasing key features of a country's culture and lifestyle within the design. Using topology optimization, designers have the freedom to interpret loading patterns on new concepts without risking structural issues.

Altair® Inspire™ accelerates the creation, optimization, and study of innovative, structurally efficient parts and assemblies. Its topology optimization technology was developed to mirror how bones grow in response to stress within the human body. A biomimicry-inspired approach enables design engineers to produce organic-looking load paths within a design space and ensure that the overall structure will meet strength and stiffness objectives using the least amount of material possible. The result is a beautiful and functional design that also benefits from savings on material cost.

Engineers at Altair used Inspire to create a stadium concept using topology optimization, an approach that influences many past Olympic stadium projects.

We spoke with Luca Frattari, Altair's senior director of global architecture engineering and construction, for more insight on the inspiration for his "Colossus" stadium PhD project, as well as his insights on what the applications of computer-aided engineering (CAE) in architecture will look like in the future.

What was the inspiration for the Colossus project? What technology and methods did you hope to show through this technology demonstrator? With this project, I tried to exploit the optimization techniques we had available, which is topology optimization applied on a three-dimensional domain. Every ring on the stadium is made with different architectural details. The stadium has two axes of symmetry, so if you were to mirror one quarter of the design two times, it would mimic the entire design layout. When this project was worked on in 2010, we did not have a computer powerful enough to handle a model of this size, so we could only work on one quarter of it at a time.

From a research point of view, the intent was to utilize topology optimization to obtain as much insight as we could. If you look closely at the outer ring, it's different from the middle and bottom ring, and the supports of each ring have slightly different designs. My goal was to avoid limitations of the technology just to see what type of outcome I could obtain and create a literal interpretation of the modeling result. I didn't rationalize the structure to be made of standard beams, rods, or linear elements. I wanted to have as many connections as possible and have the flow of the structure "move" from top to bottom. At the time as a designer, I wanted to see how much I could create with this type of approach. That led me to what you see in this picture, leaning more toward aesthetics than what you'd typically see in a design like this.

Can you walk us through the re-design process? In Inspire, this version was made with reinforced concrete but as you can see here, the interpretation is heavy, meaning that the designer is extracting a lot of information from the original design and creating a new version very different from the initial concept.

(The re-design of the stadium using topology optimization techniques.)

It's more structurally savvy because it already embeds established structural concepts, but it doesn't necessarily push aesthetic boundaries, so that's what I wanted to do with the latest interpretation. To clarify, the scope of this project was to demonstrate that this technology can generate these types of concepts but will not substitute the designer. Generative design may feel like it's taking the designer out of the design but in actuality, it's augmenting the abilities that designers have to be creative. This technology allows the designer to not only explore new shapes, but also the potential of creating 'out of the box' structural designs that theoretically are also structurally sound.

Does topology optimization account for materials in its optimization? Can users evaluate different materials to assess cost and performance tradeoffs? At the very early stages of design, the type of material you select may not be what makes it to the final design depending on the material density or characteristics required of the project. Maybe you know the style and want it to be a very traditional stadium like a British soccer stadium, or more organic like some of the stadiums you see now in the Middle East…

Which areas of a stadium design are most important to focus on during initial design? Are there areas that are less obvious to an outside observer that also benefit from optimization for weight reduction? In general, when designing stadiums, there are obviously a few mandatory design requirements to look at including structural safety, accessibility, and cost. In this case in the concept phase, my interest was in the supports or columns…

What are some of the most challenging aspects of stadium design?

Safety is where architects, designers, and engineers should focus, of course…

What is the current state of simulation in civil engineering? How do you see the use of CAE for large-scale architectural projects evolving in the future? I would say there is a big use of CAE in civil engineering, with a strong presence in 3D structural design and optimization…

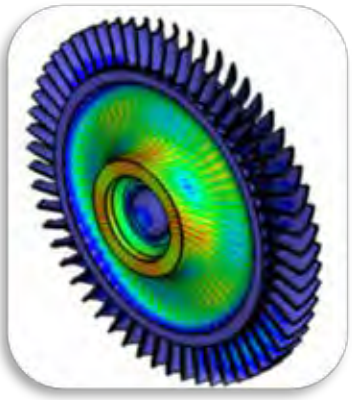
Do you have a favorite Olympic stadium design? What about this stadium makes it so innovative from a design perspective?

The 1972 Munich Olympic stadium by Frei Otto… (Visit Altair for complete article)

EPILYSIS - Our own FEA solver

The EPILYSIS solver is the new addition to the BETA CAE Systems analysis tools family and is available with the ANSA/EPILYSIS/META suite.

Named after the Greek word for solution, it operates as a solution in the field of Finite Element embodying the accumulated knowledge from 25 years of collaboration with the CAE community. EPILYSIS covers numerous solution types and intends to bridge the gap between pre- and post-processing for disciplines such as Structural, NVH, Optimization, and more.

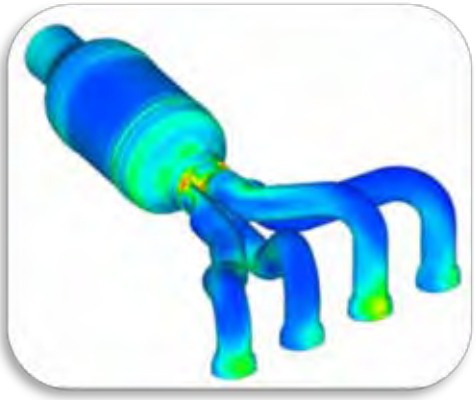


Structural Linear

- Perform structural linear static analysis on models subjected to static loads when materials do not exceed their yield limit and deformations remain small with respect to overall dimension.
- Perform real symmetric Eigenvalues analysis to evaluate the natural frequencies and the normal modes of structures. The Block-Lanczos and Automated Multi-Level Substructuring (AMLS) methods are supported.

Dynamics

- Execute frequency response analysis using the direct or the modal method to evaluate the behavior of structures in the frequency domain.
- For frequency response analysis the Fluid-Structure interface may also be employed.
- Efficient solution of modal frequency response analysis for large scale models with a relatively high number of normal modes through the implemented Fast FRA algorithm.
- Perform direct or modal transient response analysis to determine the response of structures in the time domain

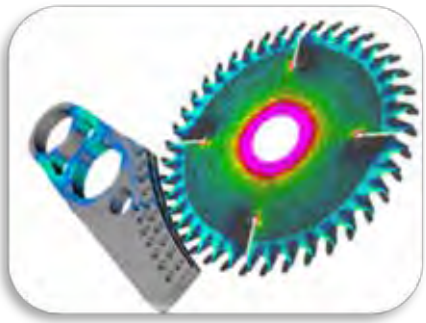


Structural non-linear

- Perform quasi-static simulation between rigid and/or deformable structures that have small strains (linear materials) when non linear contacts are present.

Substructuring

- Reduce large scale models using the static condensation process based on the Guyan method.
- For dynamic problems, dynamic substructuring is also supported based on the Component Mode Synthesis (CMS) method.



High Performance Computing

- Shared memory parallel process technology that utilizes all the available system processors to reduce solution times
- Designed to solve analyses on large scale models with sophisticated in-and-out of core capabilities.

Applications

- A wide range of FEA problems that are often addressed by engineers require a structural analysis. EPILYSIS solver can cover several structural simulation scenarios effortlessly in combination with the several pre-processing tools of ANSA.
- In Safety analysis it is a common practice to depenetrate the dummy from the seat. Making use of a predefined scenario, the seat depenetration tool is based on the EPILYSIS solver to perform depenetration automatically.
- The NVH Console in ANSA is a powerful tool to conduct the NVH analyses of multi-component assemblies. In collaboration with the EPILYSIS solver, it is able to calculate in the same environment the required modal reduced models (components) and beam stiffeners and continue with a FRF based assembly analysis.
- Several optimization tasks can be set within the Task manager of ANSA and invoke the use of the EPILYSIS solver. The solver provides the necessary results as input data for the optimizer according to which it will continue its optimization cycle.
- The ANSA and META products offer the perfect environment for composite modeling by introducing unique features that make the whole process more efficient. The EPILYSIS solver can drive this process one step further with the analysis of several loadcases in composite structures.
- EPILYSIS can support a streamlined process from ANSA to META that is able to provide an optimized mesh based on the results of discretization error in critical areas of a structure.

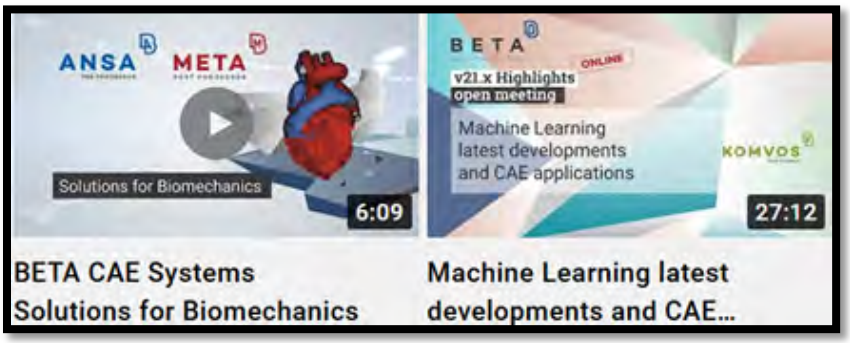
Features

- Thoroughly tested for robustness and accuracy with respect to NAFEMS other well-known benchmark tests
- Advanced tools for early detection of modeling errors
- Available solution error messages show the root of the problem
- Can be run in batch mode without any user interaction
- esigned to solve large scaled models efficiently
- The analyses are using a shared memory parallel process (multi threading)
- Features several solution types applicable in many industry sectors

Benefits

- Decreases costs through less physical prototyping
- Explores a variety of "What-if" scenarios with minimal cost
- Completes the analysis process from pre to post processing in an efficient and intuitive way
- Maximizes the return on software investments
- Being in a pre-processing environment makes complex processes easier
- A solver that is integrated in a well known pre-processor environment with numerous assistant tools

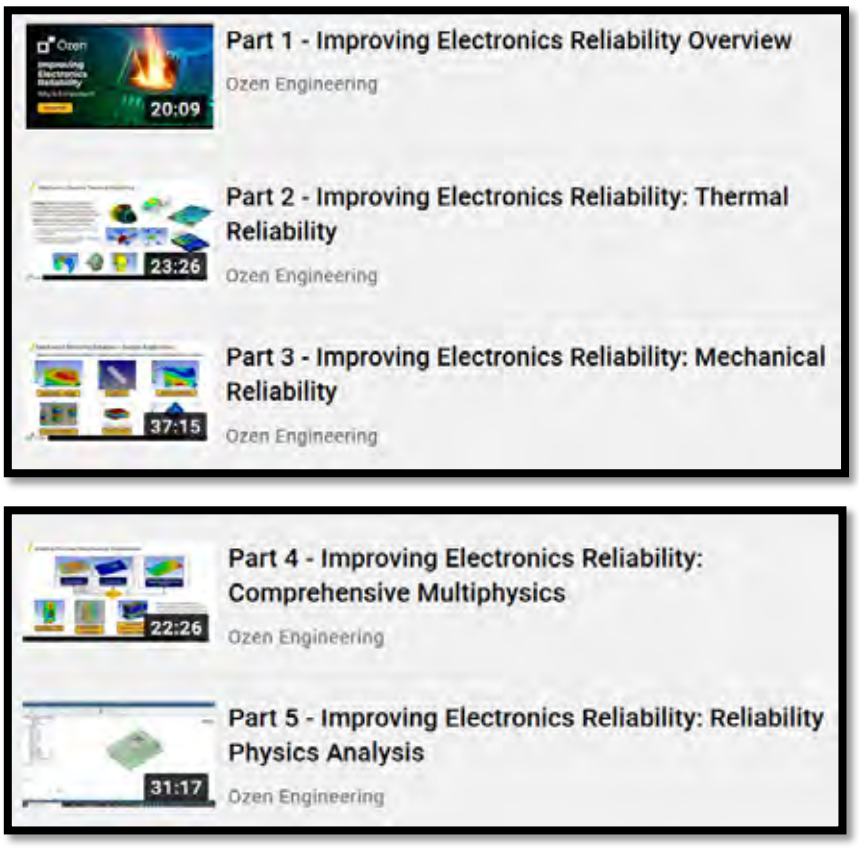
View at [BETA CAE Systems YouTube Video Channel]



Webinar Series Recordings:

Improving Electronic Reliability

If you missed our 5-part webinar series on "Improving Electronics Reliability", the YouTube video recordings are now available in our YouTube Channel



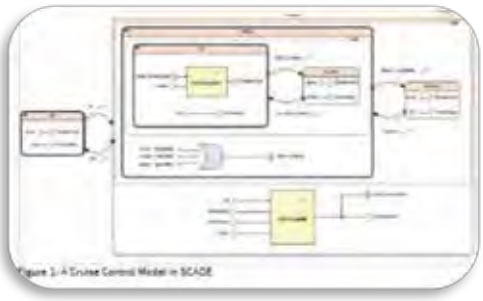
If you want more information, please contact us at info@ozeninc.com.

Why is it important? One of the biggest barriers to getting a product to market is unexpected failures during prototype or physical testing. This can result in numerous design cycles, increased costs, delays, and loss of market share.

Businesses that manufacture printed circuit boards (PCBs) can solve these issues by introducing simulation early in the design cycle to determine and predict reliability before physical testing.

Overall, the primary questions to be addressed are:

- How do I meet urgent market demands faster than my competition AND be confident that my product is reliable?
- How does simulation save me money and expedite the design cycle?
- What are the current drivers of electronics reliability?
- What kinds of analysis and testing can I perform using simulation software?

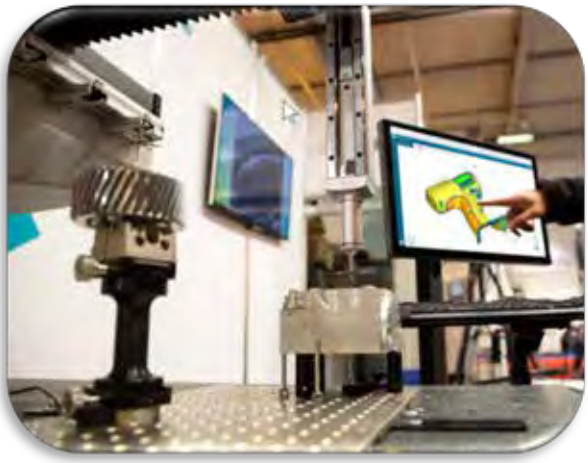


Ozen - White Paper Library

There's a lot of reading material available here to increase your technical knowledge of Ansys, simulation and design optimization – Enjoy!

Among the white papers:

- A Methodology for Superior Die Design – Combining the Best of Art and Science r
- A Primer on Using CFD to Tackle UAV Aerodynamics Problems
- A Virtual Engineering Methodology to Prevent Erosion-Related Accidents in the Petroleum Industry
- 16X Speedup in ANSYS Maxwell DSO on 32-core High-Performance Compute Farm Doubles Traction Motor Design Productivity at General Motors
- A Collaborative Approach to Solving Engineering Problems with CFD …
- Advanced Turbulence Modeling Methods Provide Accurate, Efficient Results in Any Fluid Flow Application
- The Role of Engineering Simulation in the Continued Evolution of Unmanned Aircraft Systems
- The Role of Simulation in Innovative Electronic Design
- Thermal Solutions for 3-D IC, Packages and System
- Using Computational Modeling in the Development and Design of Alternative Powertrain Vehicles
- Calculating and Displaying Fatigue Results
- Electromagnetic Safety in Wireless Communications and Bio-Medical Technologies
- Electromagnetic Simulation of Antennas Installed Inside Automobiles
- Electronic Power and Thermal Management
- A Critical Engineering Challenge for Next-Generation Unmanned Systems
- High-Performance Electronic Design – Predicting Electromagnetic Interference
- How to Optimize Oil and Gas Refinery Operation Profits with Engineering Simulation
- Integrating System and Software Engineering for Certifiable Avionics Applications
- Overcoming the Challenges of Hybrid-Electric Vehicle Traction Motor Design
- Package on Board Simulation with 3-D Electromagnetic Simulation
- Parametric Analysis The Key to Rapid, Robust Design



Introducing NX Mold Connect - By _vanessa_

NX Mold Connect provides a faster, easier way to collaborate on injection molded parts. The browser-based app lets part designers and tool shops

(Industrial machine that shapes metal elements and tools precisely)

A few years ago, I had an opportunity to visit a company that designs and manufactures injection molds. The company is based in Windsor, Canada across the border from Michigan. Windsor and the surrounding areas in Ontario are a hotbed of tooling companies due to the Automotive OEMs in Michigan. Majority of the injection molds this company manufactures are for the Automotive OEMs and Tier 1-2 suppliers that dot the landscape in Michigan and Ohio. They also manufacture molds for consumer products such as home appliances and electronic devices. This aligns pretty well with the overall usage of molds in various industries.

NX Mold Connect addresses challenges in the tooling industry

One of their biggest challenge as per the business development lead at this company, is streamlining the bidding process that'll help them with competitiveness. Based on tooling industry reports and survey, tooling companies win less than 50% of the jobs they quote and, in many cases, even less. A significant amount of effort goes into creating an accurate quote. Like many tooling companies, this company also relied on manual processes in generation quotes that may not be accurate due to errors in cost and lead time estimation. According to a survey of 370 mold-makers conducted by Tech-Clarity, an independent research firm, respondents report that on average, molds cost 27% more than they estimated during bidding, and it takes 28% longer to deliver it than they expected when they bid for the job.

Another challenge that mold-makers face is collaboration during the tool design phase. Data from the same survey shows that poor communication can add 26% to the cost of the tool. As per the Tech-Clarity eBook based on the survey results 'Breaking the Mold', these costs can come from many places. For example, consider a change that is not adequately communicated, and major design work is based on outdated information, or maybe the wrong size steel is ordered, or perhaps the wrong version of a drawing is released to manufacturing. All of this can result in scrap and rework that adds to the mold cost.

To address these two key challenges of streamlining the bidding process and enhancing collaboration between the stakeholders, the team at Siemens has been developing a browser-based app to modernize the injection mold development workflow. We would like to introduce you to NX Mold Connect.

Try our new browser-based app: NX Mold Connect

NX Mold Connect provides a faster, easier way to collaborate on injection molded parts. The browser-based app lets part designers and tool shops:

- examine the 3D geometry, add mark-ups and share over a secure, cloud-based hub
- perform Design for Manufacturability checks to ensure part quality
- speed-up the RFQ process with automated feature recognition for cost estimation

NX Mold Connect requires no installation and can be run on any device

The Early Access Program for NX Mold Connect is where you can get hands-on with the app to test it with your product development workflows and share your feedback with us via the NX Mold Connect community.

Simulation software ensures shoe heels don't break under pressure

Milan-based manufacturer steps ahead of the competition by putting high heel designs through their paces with simulation software

"We need to understand why shoes break, so, as designers, we can push materials to their limits to make more intricate heels, both higher and thinner, with confidence that they are ready to wear, and will last," says Davide Carminati, R&D manager, Tacchificio Villa Cortese.

With Marc, Tacchificio Villa Cortese can perform structural analysis of a heel design at the beginning of a project. In this way the company can identify which combination of geometries and materials will deliver the optimal balance between style and functionality without going to the expense of producing unworkable prototypes.

High heels are a physics-defying choice of elegance over comfort, so it is important they don't trip up their wearers by snapping or cracking unexpectedly. They also need to be fashionable or even avant-garde, especially when they are being produced for the world's leading shoe brands. And increasingly they have to meet customer demand for heels made with environmentally sustainable materials. Faced with a growing range of design challenges, Mila based Tacchificio Villa Cortese, which manufactures heels for some of the biggest names in shoes, decided to enhance its craftmanship with the latest in design simulation software from MSC Software.

The R & D division applies a combination of simulation software, laboratory tools for the characterisation of materials, and physical tests to get the best possible results.

Tacchificio Villa Cortese is a family run business that has been producing high heels for world-leading shoe brands since 1961.

It started off specialising in wooden heels, but today it also applies its skill to new materials that allow more intricate styles. One of Tacchificio Villa Cortese's imperatives when working on new designs is to evaluate what is wearable and durable.

Davide Carminati "We need to understand why shoes break, so, as designers, we can push materials to their limits to make more intricate heels, both higher and thinner, with confidence that they are ready to wear, and will last," says Davide Carminati, R&D manager, Tacchificio Villa Cortese. The reasons heels break include the impact of a static load when the wearer is standing still; damage from metal inserts that intensify stress on the plastic component of the heel and material fatigue due to viscoelastic effects.

Traditionally, manufacturers explored the viability of heel designs by creating several physical prototypes, fitting them to shoes and asking a person to try them out, before developing physical-mechanical tests. The process, however, is expensive. It is also slow; a disadvantage in a market driven by the tight deadlines imposed by fashion seasons. In addition, physical trial and error limits designers' insight into which materials and structures work and why, so Tacchificio Villa Cortese turned to Marc, the structural simulation software from MSC Software.

Completed heels ready to be assembled to the shoe.

Identifying successful designs early. With Marc, Tacchificio Villa Cortese can perform structural analyses of a heel design at the beginning of a project. In this way the company can identify which combination of geometries and materials will deliver the optimal balance between style and functionality without going to the expense of producing unworkable prototypes. Marc also makes it possible for designers to explore the feasibility of geometries that stray from the tried and tested.

Davide Carminati "Traditional, manual testing means prototypes have to be physically manufactured first, but testing on a computer screen with the Marc software means designs can be tweaked to balance craft and science, giving us confidence in the quality before a single piece is made," says Davide Carminati. "This also gives us more flexibility to experiment more, and to make better products."

Marc is a nonlinear finite element analysis software which works by simulating how complex materials such as plastics behave and interact under large deformations and strains. Using Marc's automatic two-dimensional and three-dimensional remeshing, the heel maker is able to analyse structures as they undergo substantial distortions and understand how cracks propagate. Marc also helps mechanically validate new materials, including recycled, hybrid materials formed from waste and renewable sources and bio-based and biodegradable substances. It does this through the use of a digital twin that allows designers to virtually test the materials' behaviour. Tacchificio Villa Cortese's physical tests include mechanical lateral impact resistance and fatigue, which are evaluated by an external certifier for ISO regulation, with designers able to work directly on the Computer Aided Design (CAD) file to make preliminary assessments based on the geometry. As well as simulating heel use during regular walking, the company plans to carry out tests on the effects of impact, and one-off stresses such as stumbling and ankle sprains. The results of the analysis are used to rectify or rework the CAD model if necessary, which is then sent to the customer for approval, with a detailed analysis report. If requested, an additive manufacturing prototype is also produced and delivered with the geometry.

Stress analysis in Marc software.

The fastest route to optimization

The time saved is considerable. Typically, it takes almost five and a half hours to run a full physical fatigue test on a single heel and at least three tests need to be carried out, bringing the total time up to around 17 hours. Furthermore, creating moulds for sample production takes at least four hours, and uses 15kg of raw metal on average.

Davide Carminati "And, of course, this is all wasted if the tests are unsuccessful," says Davide Carminati. In contrast, simulating the static equivalent of a fatigue test on a moderately complex model, generally takes around 30 - 45 minutes. Even when a simulation takes longer, it is still the most effective use of resources. "The real advantage is evaluating problems early on, which avoids the need to perform further tests on more variants," says Davide Carminati. "Even if an optimisation analysis takes a full day, we can avoid tests with specific moulds or specific inserts, which would take more time and resources, and could still be unsuccessful."

Impact analysis in Marc software. The heel of the shoe is made of an exterior, connection and spine which is impacted by a blunt object. The stress contours are shown with and without the spine.

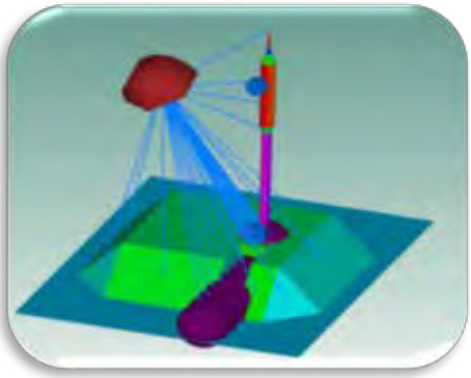
Ray Tracing: A Saving Grace for the Aerospace Industry?

Virtual Prototyping predicts exterior noise levels for launchpad acoustics

By Dr. Bryce Gardner

Avoiding a space catastrophe - We have liftoff! What wonderful and exciting words to hear for anyone in the space industry – and even for those watching from the sidelines. What's not so great for spacecraft engineers and manufacturers to hear? How damaging the extreme acoustic environment can be on launch vehicles and their payloads. Surviving this acoustic load is critical to the proper functioning of the vehicle and payloads. Therefore, predicting the acoustic load is essential to providing necessary input to determine the structural vibration and sound transmission through the vehicle structure – or else the results could be catastrophic.

Although predicting exterior noise levels when dealing with structures like the launch pad and launch vehicle is critical, these are also too large to model with conventional deterministic methods and become computationally expensive. And what about the environment surrounding the launch pad? Minimizing exterior noise also plays a large part in operator safety and comfort, contributing to greater overall efficiency.



Ray tracing model of the launch vehicle and the launch pad with CAS and sensor locations

The impact that launch acoustics, large structures and noise pollution have on space exploration

As mentioned, launch acoustics are the most damaging loads that the rocket and everything inside of it experience. It can be so severe that the noise level can vibrate and shake apart key components of the rocket, the guidance system or the satellites inside, which can cause a catastrophic failure. During lift-off, the exhaust plume from the engines generates a considerable amount of noise, which induces high vibration loads – and happens to be quite complex and difficult to characterize. Because of this, it becomes essential for engineers to:

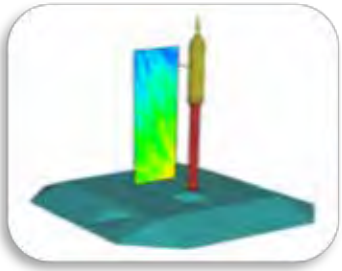
- calculate the exterior loads accurately
- run through the standard simulation process using ESI's industry-standard coupled BEM and SEA solutions

And, for a moment, let's stop to think about these structures we are dealing with – structures that can reach up to 300 feet tall. In cases like these, everything becomes exacerbated, including the modeling of the structures. For many years, it was common practice for industry leaders to turn to deterministic methods for noise prediction. Because of the sheer size of these structures, this becomes impractical, as models become larger, working with them is more challenging, time-consuming and costly.

Today, another major challenge the space industry must contend with is exterior noise. Considering the noise is so loud – about 180 decibels – that it can damage parts of the spacecraft itself, imagine the damage it could do to the structures and the people in the vicinity. Teams must be cognizant of the acoustics around the launch vehicle, for example in the control tower and the surrounding area and work to minimize the noise.

Today, another major challenge the space industry must contend with is exterior noise. Considering the noise is so loud – about 180 decibels – that it can damage parts of the spacecraft itself, imagine the damage it could do to the structures and the people in the vicinity. Teams must be cognizant of the acoustics around the launch vehicle, for example in the control tower and the surrounding area and work to minimize the noise.

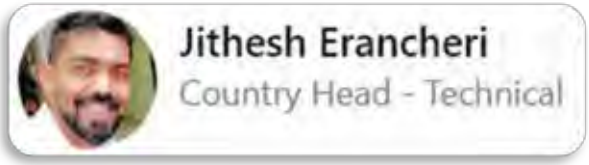
Ray Tracing – quick and accurate analysis of the acoustic environment - ESI's Ray Tracing capabilities extension combined with its existing industry-standard vibroacoustic offering provides engineers an integrated, all-in-one vibroacoustic solution. Engineers can, with the full details of the launch pad, get an accurate load to place on the launch vehicle in order to calculate the structural qualification and dynamics. This ray-based technique provides a mesh and frequency-independent method and, subsequently, an efficient alternative for a quick and accurate solution. With ray tracing and its ability to push to high frequencies for a large model, one can survey and predict the noise around the entire launch pad area in addition to getting the acoustic levels on the fairing and the payload, which is critical to the space industry. This combined approach offers a quick and accurate solution for predicting the acoustic environment in general as well as the dynamic response of the structure and interior cavities in the presence of large and complex shaped geometry.



Left: Exterior sound field due to a rocket launch

For more information watch our webinar on Structural Integrity and Acoustic Qualification of Space Hardware

Dr. Bryce Gardner - is the Lead Acoustic Scientist at ESI Group working on the VA One simulation solution team. He has been solving structural acoustics problems for the past thirty-some years, both in the aerospace and automotive industries. He has a PhD from Purdue University and serves on the NASA Engineering & Safety Center Loads & Dynamics Technical Discipline Team.



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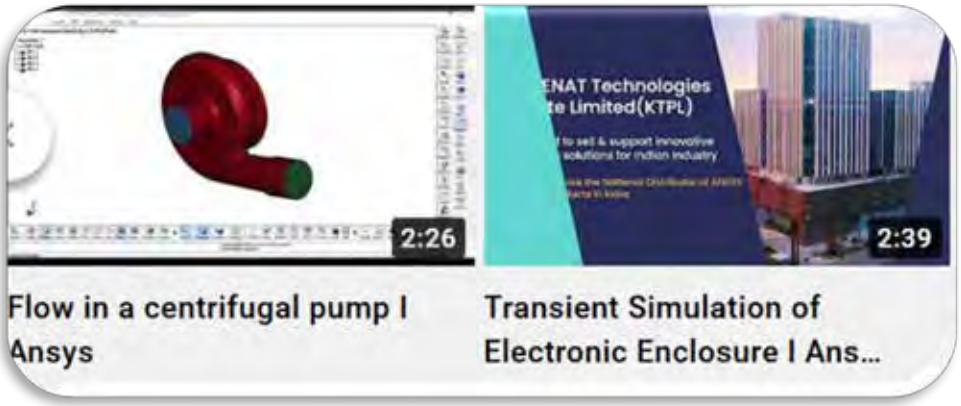
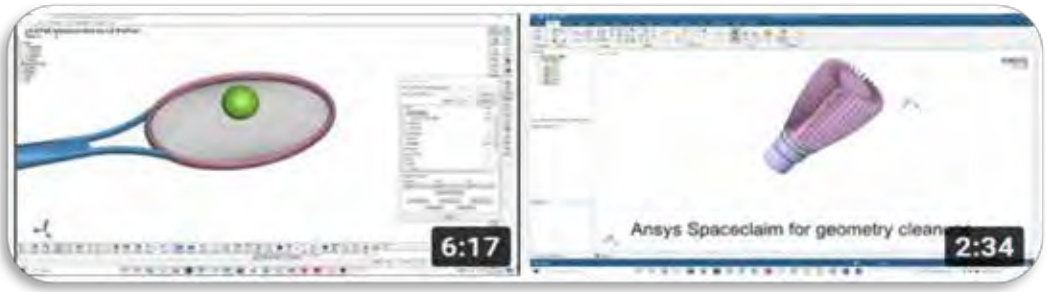


Internal Fluid Flow Analysis

Buckle Clip Simulation

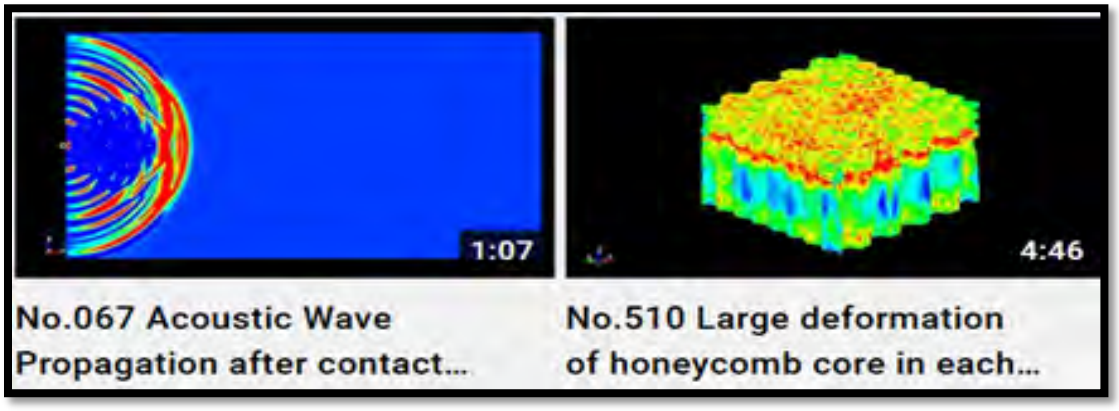


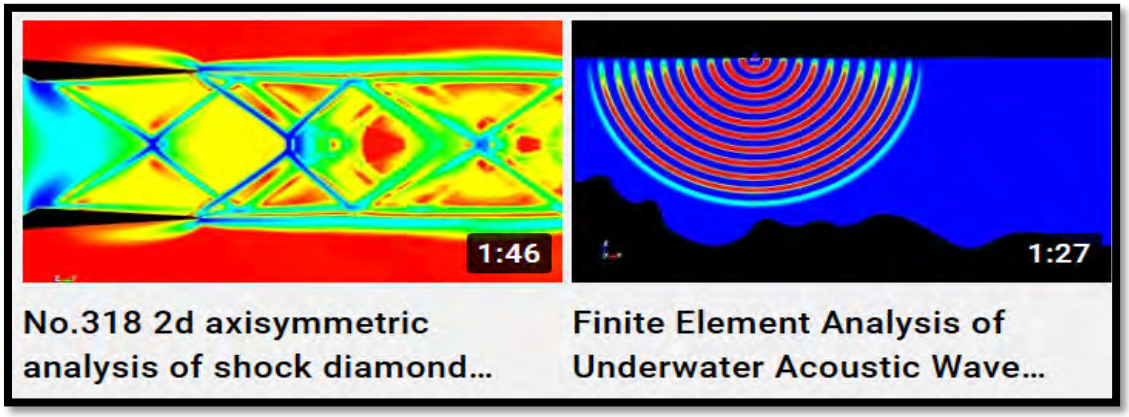
Tennis racquet pre-tension by LS-DYNA

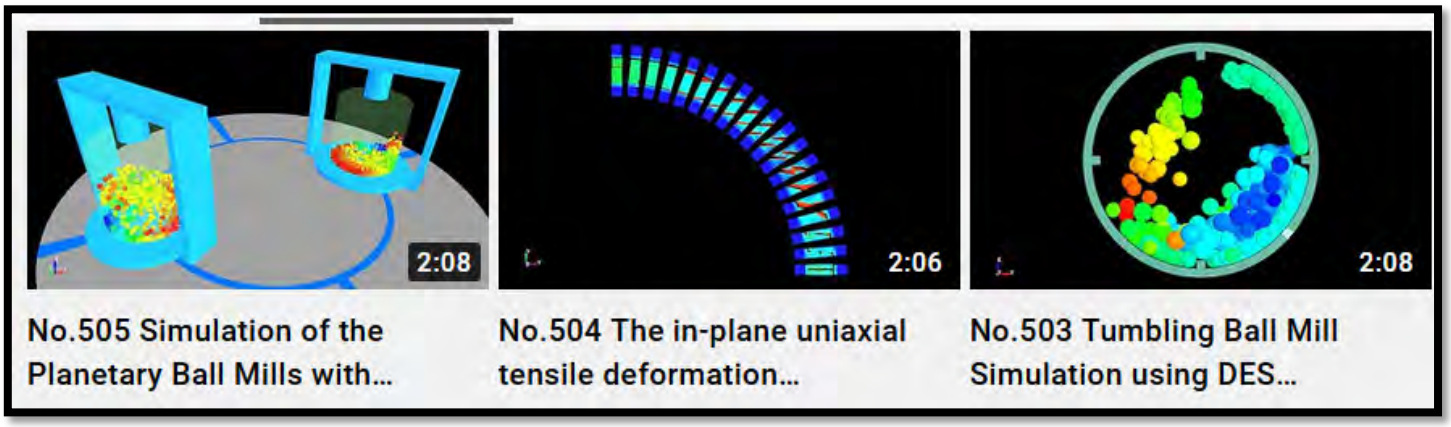
LED Thermal Management

Videos

YouTube - LANCEMORE







EnginSoft Expertise is Case Studies - The Corporate site is at EnginSoft

Excerpts: For this month our editors have chosen the following two case studies.

Integrated Simulation of Commercial Pasta Manufacturing

The Virtual Optimization PAsta production process (OPAV) research project, which resulted in a simulation model

ABSTRACT - This study was part of the Virtual Optimization PAsta production process (OPAV) research project, which resulted in a simulation model that could be used by industrial pasta manufacturers to help them improve the quality and production process of their pasta.

The model created allows the user to adjust rheological, mechanical and technological parameters that are peculiar to the pasta production process in order to optimize the characteristic of the final pasta production.

CAE helps Aprilia Racing improve the performance of its MotoGP motorbikes

Optimising racing engine inlet ducts using fluid dynamics

ABSTRACT - Racing engines are continuously evolved and fine-tuned to allow them to achieve extraordinary levels of performance, albeit with great complexity. However, MotoGP regulations restrict engine development by constraining some of the main design parameters. This means that traditional design methods increasingly fall short and so designers are progressively turning to new CAE methods to achieve performance improvements.

This technical paper describes a method that was used to optimize the fluid dynamics in the intake valves and ports of the Aprilia RS-GP motorbike in order to enhance the engine's volumetric efficiency and minimize pressure losses to maximize the intake mass-flow rate – while guaranteeing design feasibility. To save time and computational processing power for the simulation, the engineers followed a two-step optimization procedure after which the new designs were validated through physical experiment.

Scientists develop a new geometry for a neutron source platform for NIF

M. Padilla

The National Ignition Facility (NIF) at Lawrence Livermore National Laboratory (LLNL) has added a new tool to its growing list of capabilities.

(In the inverted-corona platform, laser beams are pointed onto the inside walls via laser entrance holes. Graphic provided by Matthias Hohenberger.)

A team of scientists has demonstrated a new geometry for a neutron source platform for NIF, called the inverted-corona platform, which does not rely on spherically symmetric laser irradiation.

This new tool has significantly less-stringent laser-symmetry requirements than conventional laser driven neutron sources on NIF. In this technique, laser energy is used to heat the inner surface of a millimeter-scale capsule. The wall material expands and launches a centrally stagnating shock into the gas fill to heat the gas to fusion conditions.

“This platform has relevance to applications in effects testing or forensics,” said Matthias Hohenberger, LLNL staff scientist. “We have an experiment scheduled in 2022 for exploring applications as a neutron backlighter, and as a neutron source for nuclear-cross-section measurements with sample materials attached to the outside of the capsule.”

Hohenberger said there are other potential applications in basic science, and is one-of-a-kind in its geometry flexibility. “It also represents a challenging problem to simulate because of the relatively low plasma density,” he said. “So we’re using it to test mix models in state-of-the-art simulation codes, and to train junior scientists.”

The work, highlighted in a paper in Review of Scientific Instruments, presents a novel neutron-source platform for NIF. Typically, NIF neutron platforms are based on the spherical compression of a capsule filled with deuterium and tritium (DT) fuel, thus achieving the pressures and temperatures necessary for the DT to undergo fusion reactions. This is achieved using either indirect-drive intertial confinement fusion (ICF) platforms or directly-driven exploding pushers. In these platforms, the incident laser results in a pushing action from the outside of the capsule, accelerating the capsule wall inwards — either from the X-rays generated in the hohlraum, or from the laser incident on the capsule itself. That means performance is highly sensitive to drive asymmetries, as they result in an uneven push of the wall, and eventual mixing of fuel and wall material into the hot spot, said Hohenberger, who is the lead author of the paper.

“This can, and does, affect fusion performance,” he said. “It also means that the wall composition must be controlled tightly. Even small impurities in the wall, thickness variations or even surface roughness will affect the performance and neutron yield.”

Pointing lasers onto the inside of capsule wall

Hohenberger said in this new scheme, which was tested on the OMEGA laser and the NIF, the laser beams are pointed through laser entrance holes onto the inside wall of a ~5-millimeter diameter, gas-filled (D2 or DT) capsule. This causes the wall material to ablate inwards, which then launches a converging shock wave into the gas fill. The shock stagnates on center and heats the gas fill to fusion conditions (similarly to an exploding pusher). However, because the laser beams are incident onto the inside wall, the capsule wall itself is pushed outwards and away from the center, and the fusion performance is dominated by the ablatively-driven shock.

Hohenberger said this work has two key advantages. First, it decouples the wall composition from the neutron source and significantly relaxes requirements on capsule quality such as thickness uniformity, material purity and surface roughness, because the wall does not mix with the hot spot since it is pushed out rather than inwards. Second, the performance is highly insensitive to low-mode asymmetries. That means it is possible to have laser beams incident from only one side, rather than symmetrically distributed around the target, without a reduction in neutron yield.

The platform was successfully demonstrated in experiments on both the OMEGA laser and NIF. The work was funded through LLNL's Laboratory Directed Research and Development program.

In addition to Hohenberger, co-authors include Nathan Meezan, Bob Heeter, Rick Heredia, Nino Landen, Andrew MacKinnon and Warren Hsing from LLNL; Will Riedel and Mark Cappelli from Stanford University; Neel Kabadi and Richard Petrasso from Massachusetts Institute of Technology; Chad Forrest from the Laboratory for Energetics at the University of Rochester; Loosineh Aghaian, Mike Farrell and Claudia Shuldberg from General Atomics; and Franziska Treffert and Siegfried Glenzer from SLAC National Accelerator Laboratory.

Arcelor Mittal - VLOG #4 - Video Multi Parts Integration - Double Door Ring

In this fourth episode of a series of videos about breakthrough applications of laser welded blanks, Jessé Paegle, Head of Product & Solution Development at ArcelorMittal Tailored Blanks, shows how the Multi Part Integration (MPI) concept applies to the Double Door Ring, the biggest part of a car structure.

MPI radically simplifies the vehicle production process by reducing the number of operations, leading to significant sustainability gains and potential cost savings.

What is Multi Part Integration?

Multi Part Integration (MPI) is a new concept from ArcelorMittal Tailored Blanks which is designed to incorporate many parts into one laser welded blank (LWB). MPI uses press hardenable steels (PHS) and hot stamping LWB technology to create the single part. The goal is to simplify production for OEMs.
What are the benefits of Multi Part Integration?

The MPI concept brings significant benefits for OEMs including:

- Radical simplification of the vehicle production process
- One common and modular solution for multiple powertrains
- Enhanced crash management
- Considerable sustainability gains including a lighter finished vehicle
- Potential cost savings of up to ten percent

Building on our experience: The MPI concept builds on the success of ArcelorMittal projects such as S-in motion® and the single-piece door ring. The door ring has been adapted for different vehicle segments and successfully introduced into several vehicles by the global automotive industry.

To help prove the practical viability of the MPI concept, teams from ArcelorMittal Tailored Blanks and ArcelorMittal Global R&D have completed an MPI analysis for the rear, underbody, and rails of an S-in motion® SUV vehicle. Known as the ‘rear H-frame’, the concept replaces 11 separate parts with one. The solution can be applied to almost any powertrain simply by adding patches to reinforce local areas.

Further projects are already in development and will be announced later in 2021.

One-part rear H-frame: To prove the validity of the MPI concept, teams from ArcelorMittal Tailored Blanks and ArcelorMittal Global R&D have developed a new LWB H-Frame solution for the rear of an SUV vehicle. The S-in motion® SUV was used as the basis for the design.

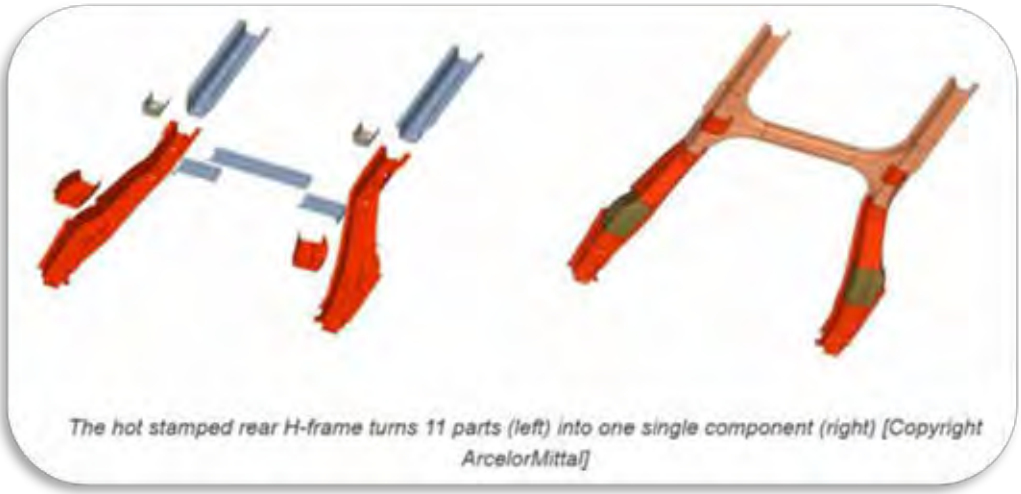
Integrating 11 parts into one: The new rear H-frame integrates 11 separate parts – including the rear rails and rear crossmember – into one LWB. The solution makes maximum use of hot stamping technology and PHS grades such as Usibor® and Ductibor®.

The rear H-frame concept has also been adapted for different vehicle powertrains including BEV and PHEV cars. The solution meets all relevant safety requirements for the global market and has been tested against both European and North American rear-crash load cases.

Advantages for OEMs - The solution offers key advantages for OEMs as it:

- Converts 11 parts (weighing a total of 14.45 kg) into one single component (weight 13.05 kg). The total weight saving on the part is just under 10 percent.
- Can be used for a variety of powertrains including ICE, BEV, HEV, and PHEV. Patches are added to the front of the part to add strength for specific powertrains.
- Has been assessed against all relevant safety requirements for the global market including the IIHS Rear Impact and Full Width Rear Impact tests. The simulations demonstrate that there is no contact with the battery pack or fuel tanks on the S-in motion® SUV PHEV or BEV models.
- Uses advanced nesting to increase material utilisation. For example, the 11 parts in the baseline can be achieved with a material utilisation rate of 74 percent. By contrast, the one-part MPI rear H-frame has a material utilisation rate of 86 percent. That's a saving of 4.3 kg of material per vehicle.
- Cuts the working space required. ArcelorMittal estimates that the factory footprint needed to produce the 11 parts in the baseline vehicle would be just over 400 m2. By contrast, the MPI single-part concept requires just over 200 m2, a reduction of almost half.
- Cuts costs by around three percent per vehicle for the sub-assembly.

Why hot stamping? Hot stamping has been chosen as it offers the best geometric possibilities for large parts. An MPI part can be obtained with cold stamping technology, but PHS for hot stamping offer the best mechanical properties for optimal crash performance. They are also the best option to achieve significant weight savings.



The hot stamped rear H-frame turns 11 parts (left) into one single component (right) [Copyright ArcelorMittal]

Advanced Modeling & Simulation (AMS)

High Fidelity Automated CFD Meshing for the Aerospace Sector - AMS Seminar Series

Posted - PowerPoint and live software demo.

Speaker: Vangelis Skaperdas, BETA CAE Systems

NASA Advanced Supercomputing (NAS)

Abstract

The mesh is the backbone of a CFD simulation. The simulation will only be as good as the mesh on which it is calculated. A CFD mesh must:

- Represent the geometry of the real model as accurately as possible.
- Resolve all flow features that must be predicted.
- Satisfy strict quality criteria that will allow for an accurate and robust simulation.
- Ensure that the cell count is sufficient but not excessive, so as to perform the whole process (pre/solve/post) in an efficient manner with respect to time and hardware resources.

Given the ever-increasing number of simulations in the design process and the increasing cell count of the models, it is of paramount importance that the meshing process is as automated as possible and thus repeatable in a consistent manner, avoiding errors and leaving the CFD engineer occupied only with the actual results of the simulation.

In this webinar, we will demonstrate the meshing functionality of the pre-processor ANSA, as applied to typical aerospace models like the ones in the High Lift Prediction and Geometry and Mesh Generation workshops. We will address topics like:

- Geometry import and clean up.
- Recognition of features such as sharp edges, leading edges, trailing edges, proximities etc.
- Setup of Size Fields to control mesh size distribution.
- Setup of the batch mesh tool of ANSA for the automation of surface and volume meshing.
- Speed and memory usage for large CFD models.

Biography - Vangelis Skaperdas

- Manager of the CFD Applications team of BETA CAE Systems, Customer Services department, which he joined in 2001.
- He received his MEng in Aeronautical Engineering from Imperial College and his MSc in Automotive Engineering from Cranfield University.
- He is involved in the planning of the CFD related development of the pre-processing software ANSA, according to the needs of the market in all industry sectors, as well as the organization of the CFD team technical support tasks.

The Vintage Plane quiz was left in the suggestion box by The Old Retired Pilot. No one in town knows his name. You yell, "HEY, Old Retired Pilot." We are sending it out to the residents and guests - he stuffed the suggestion box with 6,226 quizzes. We mailed quite a few to the neighboring town. We received the envelopes back, "Return to Sender"

This quiz was hand written on paper. Use a #2 pencil, not provided. For corrections use the eraser he did provide. He requested that we advise you that the laptop delete key will not work for this quiz, you must use his eraser.

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

1 Name_____

2 Name_____

3_____

4. EXTRA CREDIT_____

Maj. Kristin Wolfe, F-35A Lightning II Demonstration Team pilot and commander, flies in formation with retired Lt. Col. Greg Anders, Air Force Heritage Flight Foundation P-51 pilot, in Tacoma, Wash., July 3, 2021.

The F-35 Demo Team headlined both the 2021 Gig Harbor Wings and Wheels and Tacoma Freedom Fair air shows for the Fourth of July weekend.

(U.S. Air Force photo by Capt. Kip Sumner)

An MC-130J Air Commando II flies off the coast of New South Wales, Australia, during exercise Teak Action 21, July 3, 2021. Through strict COVID-19 precautions, the 353rd Special Operations Group was able to train bilaterally with Royal Australian Air Force airmen, sharing tactics and procedures to foster increased interoperability across the Indo-Pacific.

(U.S. Air Force photo by 1st Lt. Joshua Thompson

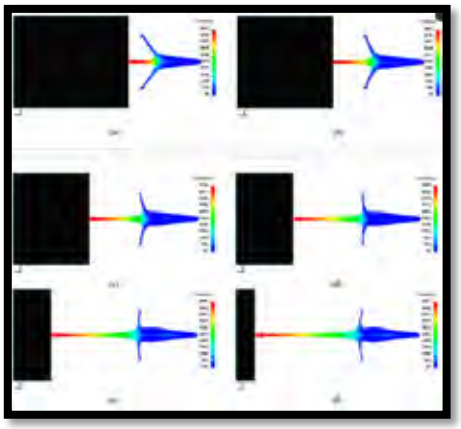
An AC-47 Spooky from Topeka, Kan., and an AC-130J Ghostrider from the 4th Special Operations Squadron at Hurlburt Field, Fla., fly in formation around Topeka June 25, 2021, in preparation for a gunship legacy flight that will be flown at EAA AirVenture, July 30-31, in Oshkosh, Wisc. Air Force Special Operations Command Airmen and aircraft will be among the highlighted programs at EAA AirVenture Oshkosh 2021.

The AC-47 belongs to the American Flight Museum in Topeka and is restored as John Levitow's Medal of Honor aircraft.

The AC-130J primary missions are close air support, air interdiction and armed reconnaissance.

(U.S. Air Force photo by Master Sgt. Christopher Boitz)

Excerpt



Numerical Analysis and Experimental Test for the Development of a Small Shaped Charge

Piotr Malesa, & **Grzegorz Sławiński**
Faculty of Mechanical Engineering, Military Univ. of Tech.,
Gen. Sylwestra Kaliskiego Street 2, 00-908 Warsaw, Poland

Karolina Pęcherzewska
Ministry of National Defence, 00-911 Warsaw, Poland

Abstract

Currently, shaped charges are widely used in many fields of science and industry. Due to the high efficiency of piercing materials with high strength and hardness, shaped charges are commonly used in mining, military and for structural damage. The main application area of shaped charges is the military industry, where they are used in missiles with warheads (torpedoes, rocket launchers) and for piercing vehicle armor or bunker walls. When analyzing the existing solutions of shaped charges, one can find many typical solutions designed for specific applications. However, there are no universal constructions which, after appropriate regulation, will fulfil their role in a wide range of applications. The subject of this article is a new solution for a shaped charge that is characterized by compact dimensions and a short preparation time. This article presents the results of experimental research and the numerical analyses of such a charge.

Keywords: shaped charge; jet; cumulative charge; numerical simulation; LS-DYNA

1. Introduction

Cumulative charges have been widely used for many years, including in military technology [1,2] (mainly in anti-tank weapons) and in the mining industry (drilling holes) [3]. The nature of this phenomenon also allows for its use in the process of developing new design solutions intended for special applications [4].

The analyses carried out in 2017, aimed at identifying the optimal design solution for one such application, showed the need to use a shaped charge which, depending on the need, will enable the pierceability of approximately 80 mm to 200 mm to be obtained. Additionally, such a charge should be as small as possible in weight and dimensions, with a short time to prepare for use and the possibility of detonation with a time fuse.

The analysis of the state of the art in this field has shown that there are known design solutions that enable the adjustment of the distance between the base of the cumulative insert from the surface being destroyed by means of feet (these solutions are protected by patent law) [5]. However, they did not meet the requirements due to the lack of a fuse with a timed electronic system and because of the extended amount of time that it took to prepare the charge for use. Therefore, there was a need to develop a new design solution.

Numerical Analysis and Experimental Test for the Development of a Small Shaped Charge

The developed conceptual design assumed the achievement of the required pierceability through the use of a conical, copper shaped liner and a pressed octogen (HMX) explosive in the structure of the charge. The quick adjustment of the height of the load and the distance from the base of the accumulation insert to the destroyed surface was to be ensured by placing the load casing in an additional sleeve in a way that allowed for an abrupt change of the position of both elements in relation to each other. An additional advantage of this solution was the minimization of the dimensions of the load in the transport position. Neodymium magnets, placed in the flange at the base of the sleeve (in the case of mounting the load on steel structures), or the use of a special, universal tape (in the case of the need to mount the load on other types of surfaces), were to ensure the possibility of quick fastening of the load to the destroyed element.

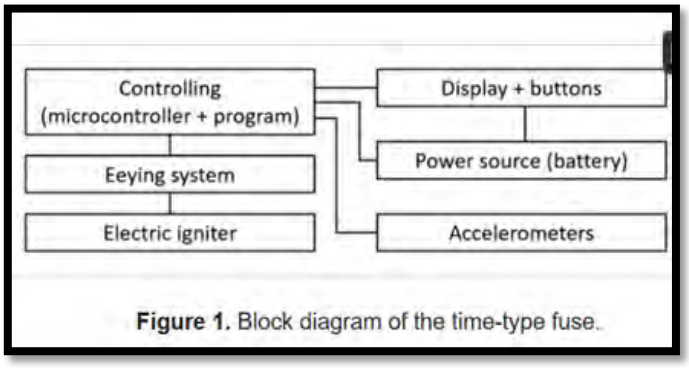
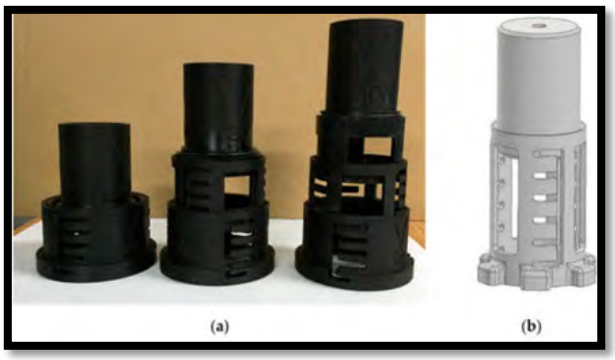


Figure 1. Block diagram of the time-type fuse.

The developed conceptual design also included the construction of a time-type fuse with a self-destruction function. Its block diagram is shown in Figure 1.



On the basis of the developed conceptual design, a 3D CAD (Computer Aided Design) model of the cargo casing was created, which was then produced using the FDM (Fused Deposition Modeling) 3D printing technique in Figure 2a. On the basis of the developed conceptual design, a 3D CAD (Computer Aided Design) model of the cargo casing was created, which was then produced using the FDM (Fused Deposition Modeling) 3D printing technique in Figure 2a.

In 2018, the first preliminary tests were conducted at the Military University of Technology to verify the developed cargo design concept, which confirmed its correctness.

The next stage of work was the optimization of the structure, aimed at minimizing the weight and dimensions of the load. As a result, modifications to the housing structure were introduced. The number of components was reduced so that the structure consists of a spacer sleeve and a housing. The view of the final cargo structure after the modification is shown in Figure 2b.

The developed solution of the final shaped charge was then subjected to experimental tests and multi-variant numerical analyses, which are presented in the following chapters.

(The complete publication is on the website)

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EXCERPT

Aerodynamic drag in cycling team time trials Journal of Wind Engineering and Industrial Aerodynamics 182:128-145

Authors: Bert Blocken, Yasin Toparlar,
Thijs van Druenen, Thomas Andrianne,

Abstract

In a team time trial (TTT), the main strategy is based on drafting, where team members alternately take the lead while others ride behind the leading cyclist. TTTs can contain up to 9 riders of the same team. To the best of our knowledge, systematic aerodynamic studies of drafting groups from 2 up to 9 riders have not yet been published.

Therefore, this paper presents such an analysis for up to 9 drafting cyclists in a single paceline, with wheel-to-wheel spacings d ¼0.05, 0.15, 0.5, 1 and 5 m. A total of 47 Computational Fluid Dynamics (CFD) simulations are performed with the 3D RANS equations, standard k-ε model and scalable wall functions and validated with wind-tunnel measurements. In groups of up to 5 identical riders with d up to 1 m, the last rider has the lowest drag but this is not the case for larger groups. A closely drafting group of 7, 8 or 9 riders has an average drag that is about half that of an isolated rider. However, for much longer theoretical single pacelines, a staggered peloton configuration can yet be about two times more drag efficient

Introduction

A team time trial (TTT) is a road cycling race in which cyclists of the same team race together as a group against the clock in a competition with other teams. The main strategy in TTTs is based on drafting, where team members alternate in taking the lead (also called: taking a pull) while others take advantage of the slipstream behind the leading rider(s). This allows the drafting riders to recover while the leading rider is overcoming the largest air resistance. After his or her turn, the leading rider will move away in lateral direction and towards the back in riding direction, allowing the second rider to take the lead.

The leading rider will generally get back in line at the very end of the formation. As such, the TTT group rotates and every rider gets to take the pull for a certain duration, and this process is repeated many times during a typical TTT.

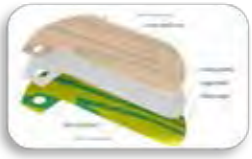
Typical TTTs can contain from 2 up to 9 riders. Two of the most popular configurations are the single paceline and the circular paceline. Examples of the single paceline in competitive TTTs are shown in Fig. 1.

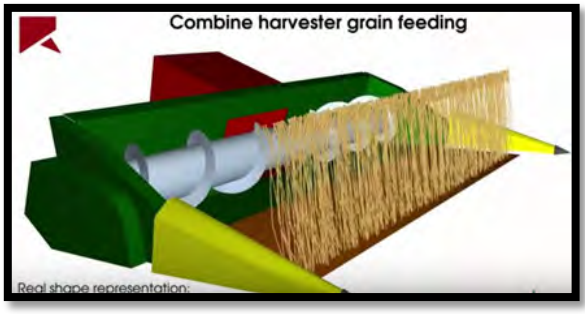
Typically, the recorded finishing time will be the time of the n-th rider of the team, where n is smaller than the total number of riders. For example, for TTT teams of 8 or 9 riders, often the time at which the 4th rider crosses the finish line is taken as the time of the team and this time is awarded to all 4 riders that finished first, while the other riders if they come later will be given their actual finishing time. TTT strategy might include “dropping” the least performing riders towards the end of the race and aiming at getting the best possible time for the first four riders and hence to win the TTT.

It is well-known that the greatest potential for improvement in cycling speed is situated in its aerodynamics (Wilson, 2004). At professional racing speeds (about 54 km/h or 15 m/s), the aerodynamic resistance or drag is about 90% of the total resistance (Kyle and Burke, 1984; Grappe et al., 1997; Lukes et al., 2005). Therefore, reducing the aero-dynamic resistance of every rider but also of the group as a whole is of paramount importance for a successful TTT. Aerodynamic drag in cycling can be assessed by field tests, wind tunnel measurements and numerical simulation by Computational Fluid Dynamics (CFD). The use of CFD in wind engineering, also referred to as Computational Wind Engineering, has seen a rapid growth in the past 50 years (Murakami, 1997; Statho-poulos, 1997; Baker, 2007; Solari, 2007; Tomimaga and Stathopoulos, 2013, 2016; Meroney and Derickson, 2014; Blocken, 2014, 2015, 2018; Meroney, 2016). As part of wind engineering, also the field of cycling aerodynamics has adopted the use of CFD (Blocken, 2014; Crouch et al., 2017).

Most previous studies on cycling aerodynamics focused on the drag of a single (isolated) cyclist (e.g. Kyle and Burke, 1984; Dal Monte et al., 1987; Grappe et al., 1997, 1998; Padilla et al., 2000; Jeukendrup and Martin, 2001; Defraeye et al., 2010a, 2010b; 2011; Crouch et al., 2014, * Corresponding author. Department of the Built Environment, Eindhoven University of Technology, P.O.Box 513, 5600, MB, Eindhoven, the Netherlands. E-mail address: b.j.e.blocken@tue.nl (B. Blocken).

Article Continued on the Website…

	Computational ballistic analysis of the cranial shot to John F. Kennedy **C. Then, K. Nelson, T.J. Vogl, K.E. Roth**
	Cyclist aerodynamics through time: Better, faster, stronger **Fabio Malizia Bert Blocken**
	Numerical Simulation of the Forming Process of Veneer Laminates **David Zerbst , Christian Liebold, Thomas Gereke, Chokri Cherif**



[Rocky DEM usage in the agriculture equipment industry:]

Combine harvester header simulation including hay breakage and plastic deformation of the stems. Particles were modeled using Rocky DEM flexible fiber particle type to model the crop.

Agriculture Equipment - Test your equipment using particle simulation and enhance the efficiency of your agricultural processes. Rocky DEM is used the world over to help companies optimize their bulk agricultural materials.

Rocky DEM provides the data you need to predict particle behavior in agricultural equipment.

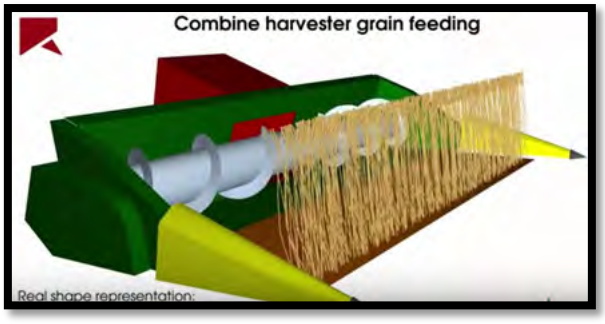
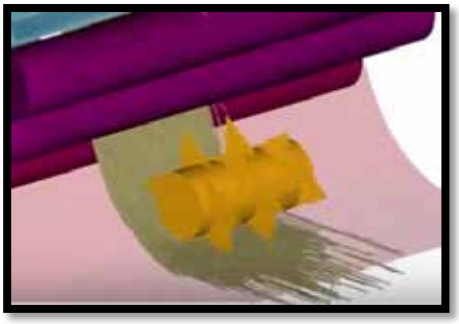
Understand particle behavior with precision and accuracy. Rocky DEM also provides a unique tool for engineers and designers to reduce the negative impact of variability in the bulk flow characteristics of feedstock, which can help increase productivity.

Crop Harvesting - Rocky DEM's flexible-fiber shape representation and complex motion capabilities provide insight critical to evaluating harvester equipment under different operational conditions.

Soil tillage, fertilizing and seed spreading - Companies all over the world use Rocky DEM to simulate soil preparation and tillage as well as investigate efficiency and robustness of seed and fertilizer spreaders.

Storage Silos - Couple Rocky DEM with Ansys mechanical and fluid tools to study silo issues related to particle segregation, blockages, motion, and equipment failure. Unique flexible-fiber particle shapes provide the key to accurate simulation.

Conveyors - To avoid material losses and minimize wear, enhance conveyor equipment reliability by modeling different operational conditions and materials.

YouTube - Harvester simulation using Rocky DEM	Hay baler machine simulation
	

A Slogan with History: Audi marks 50 Years of "Vorsprung durch Technik"

On this momentous occasion, the company is looking back at a plethora of innovations over five decades that demonstrate why "Vorsprung durch Technik" isn't just a slogan for Audi – it's also an expression of the company's future-oriented approach.

The Audi slogan "Vorsprung durch Technik" is marking its 50 year anniversary this year. Even half a century after its inception, the world-famous slogan of the Four Rings hasn't lost any of its appeal. And each year, there's a little bit more history behind it.

The birth of the slogan - 1969 saw the merger of Auto Union GmbH, headquartered in Ingolstadt, and Neckarsulmer NSU Motorenwerke to form Audi NSU Auto Union AG at the Neckarsulm location. The new company's range of models spanned from the air-cooled engines of the rear-wheel drive NSU Prinz series and the water-cooled four-cylinder engines of the front-wheel drive Audi 60 and Audi 100 to the rotary engine of the futuristic-looking NSU Ro 80. The idea to communicate this technological diversity as a competitive advantage came in 1970 from Hans Bauer. The employee in the Audi NSI advertising department devised the slogan that people around the world would come to recognize: "Vorsprung durch Technik."

The new slogan made its first appearance in a large-sized ad in January of 1971. Soon, customers also saw it in Audi NSU brochures. Audi 100, Audi 100 Coupé S, Audi 80 or Audi 50 – they all now represented "Vorsprung durch Technik." The slogan was adapted over the years in many ways, including "Audi. A nice bit of technology." or "Audi. Relaxed driving with perfect technology," but the company soon returned to the catchy original. With the introduction of the Audi quattro in 1980, the slogan was used more frequently in advertising. The largest illuminated advertisement in Europe at the time was installed on a high-rise along the A9 Autobahn at the exit for Ingolstadt-Nord: the reddish-brown Audi oval with the slogan "Vorsprung durch Technik." The slogan became a clear part of the Audi Corporate Identity by October 1986, when it was also used in the sales brochures for the Audi 80. Today, fifty years later, it's synonymous with the company.

YouTube 50 years of "Vorsprung durch Technik" | Oliver Hoffmann on engineering

(German -For other languages for CC - In YouTube in settings select CC settings for translation then pick language translation)

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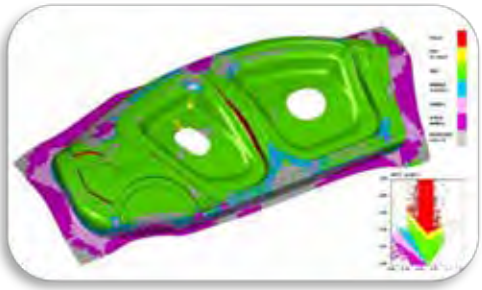
Visit Website for Complete Information

DYNA FORMING ENGINEERING & TECHNOLOGY (DFETECH). Malaysia, Singapore, Thailand, Singapore



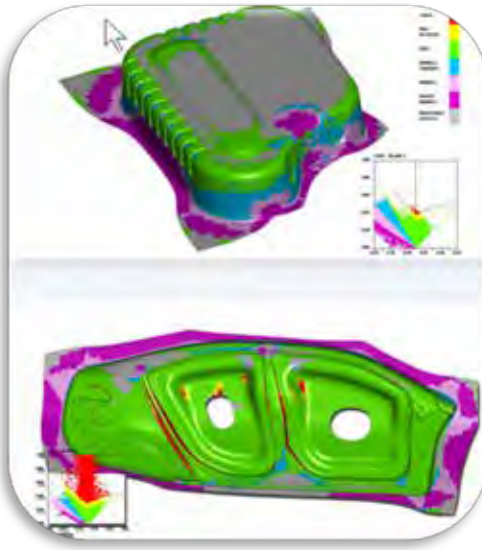
ETA's DYNAFORM is a complete die system simulation solution. It allows organizations to bypass soft tooling, reducing overall tryout time, lowering costs, increasing productivity & providing complete confidence in die system design

DYNAFORM also allows for the evaluation of alternative and unconventional designs and materials for optimal solution.

Blank Size Engineering (BSE) - BSE is widely used for estimating blank size, along with blank nesting for maximum material usage, scrap & piece price.

This module offers enhanced forming limit diagram (FLD), thinning, thickening and thickness strain.

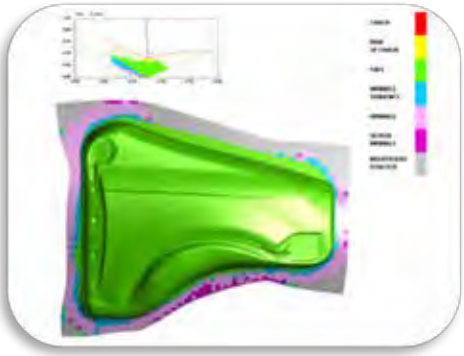
Beginning with the 3-D part geometry, BSE can quickly unfold the flanges and flatten the geometry to produce a blank outline for blank size estimation along with piece price and scrap calculation. Product feasibility and cost analysis can be thoroughly evaluated using BSE.



Formability Simulation (FS) - This module facilitates the rapid development & validation of single-station & progressive die designs.

FS help to uncovers hidden problem areas & enables designers to optimize designs based on accurate forming results.

The Formability Simulation module uses LS-DYNA for accurate physics modeling, efficient calculation and in-depth simulation of the formability based on the die design. The FLD (forming limit diagram), thinning map, wrinkling, material draw-in, circular grid, light strip and skid mark results identify weaknesses of the die design.



Die Evaluation (D-Eval) - Die Evaluation (D-Eval)

A CAE solution, D-Eval is tailored to support engineers in the early stages of the product design cycle.

It allows engineers to take manufacturability into consideration early in the design process, ahead of the tooling stage.

D-Eval includes the INCSolver, which allows engineers to generate reliable formability results in a reasonable response time.

Since most tooling designs are done in a CAD environment, DYNAFORM's D-Eval Module is specially created to support and analyse CAD based tooling and engineering designs. D-Eval provides useful CAE tools to enable engineers to quickly modify die design.

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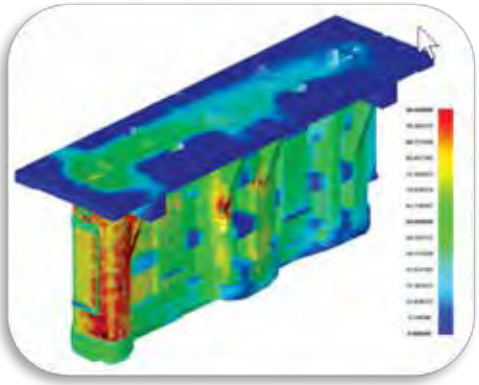
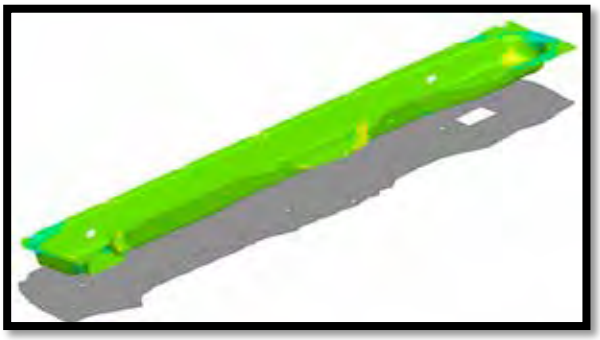


Die System Analysis (DSA) - DSA efficiently predicts many stamping related concerns within the die production line. It is used to analyse scrap shedding/removal, die structural integrity & sheet metal transferring/handling.

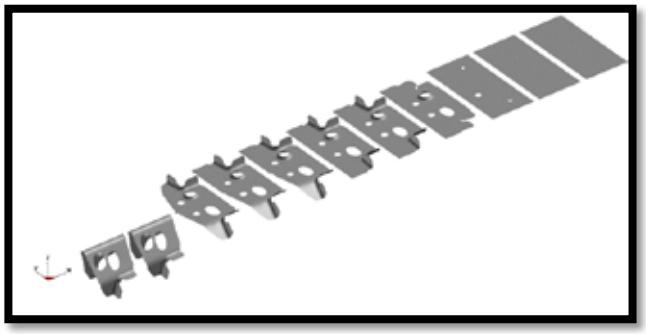
Die System Analysis (DSA) simulations streamline die system design through the analysis of scrap shedding/removal, structural integrity and sheet metal transferring/handling.DSA's process guidance approach allows engineers to use simple graphic interfaces to execute complicated preparation and simulation processes.

ABOUT - DFETECH is an engineering firm established since 2005 to provide advanced engineering solutions to industries ranging from automotive and aerospace to electronics, consumer products, civil engineering and defense. Our expertise includes CAE, modern stamping engineering, dimensional engineering and variation prediction.

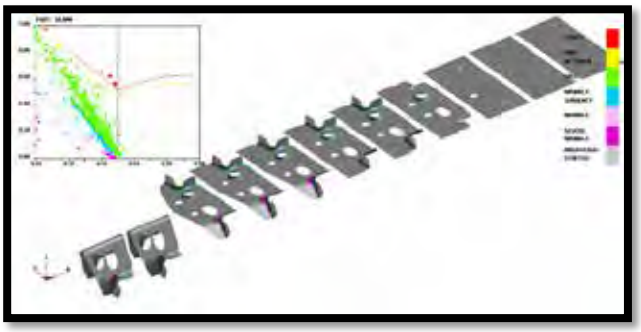
Blank Size Engineering



Progressive Die Simulation (Deformation)

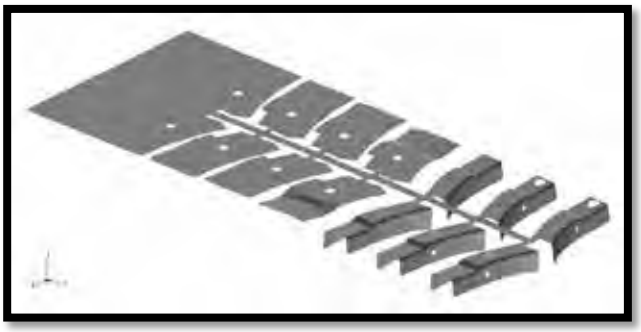


Progressive Die Simulation (Forming Limit Diagram)

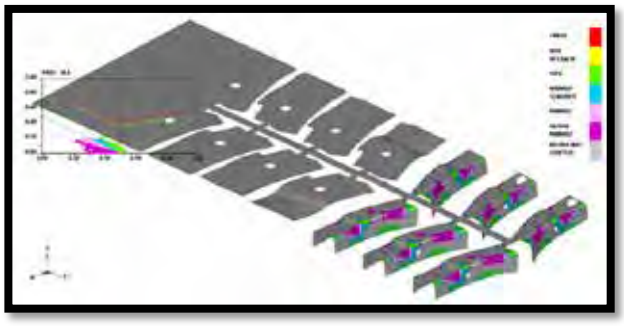


Progressive Die Simulation (Thinning Distribution)

Progressive Die Simulation (Deformation)



Progressive Die Simulation (Forming Limit Diagram)



For the complete graphics below, and explanations please contact DFE-TECH

- **Progressive Die Simulation (Thinning Distribution)**
- **Deep Drawing Simulation (Forming Limit Diagram)**
- **Deep Drawing Simulation (Forming Limit Diagram)**
- **Deep Drawing Simulation (Thickness Distribution)**
- **Deep Drawing Simulation (Thinning Distribution)**
- **Deep Drawing Simulation (Circular Grid Analysis)**

From the blog written by Bert Blocken©

A scientific tribute to the breakaway kings and queens

Realizing a successful long breakaway, as a lone rider, against a chasing peloton or a smaller group of chasing riders, is very challenging. Not many riders in the professional cycling peloton are capable of such an undertaking. These performances appeal to our imagination and our emotions. But also from an objective, scientific point of view, these performances are exceptional.

Written by Bert Blocken, full professor Building Physics at KU Leuven and Eindhoven University of Technology (TU/e). Aerodynamic advisor to Cycling Team Jumbo-Visma. His areas of expertise are Urban Physics, Wind Engineering and Sports Aerodynamics.

He tweets with handle @realBertBlocken.

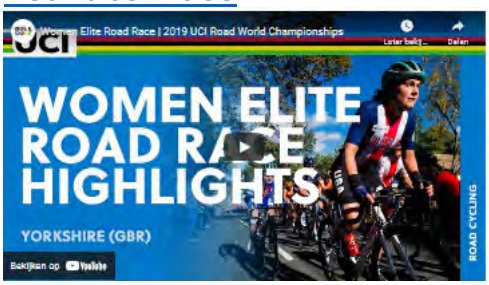
Bert Blocken in the wind tunnel at Eindhoven University of Technology | © Bert de Deken

Rewind to Saturday 13 July 2019. Tour de France, Stage 8. Our fellow Belgian countryman Thomas De Gendt, in the breakaway all day long, abandons his fellow breakaway rider Alessandro De Marchi at 13 kilometres from the finish line and embarks on an impressive solo ride. Thibaut Pinot and Julian Alaphilippe, the latter targeting the famous yellow jersey, give their maximum effort in chasing De Gendt, but De Gendt wins the stage with a six second lead. A prestigious and impressive stage win, after almost two hundred kilometers in the breakaway. TV commentators and journalists run out of superlatives.

Fast forward to two and a half months later. Saturday 28 September 2020. World Championships in Yorkshire. Dutch female rider Annemiek van Vleuten starts a spectacular solo breakaway at 104 kilometres from the finish. She systematically increases her lead, for the peloton never to see her again. “Masterly”, “phenomenal”, “historical” are the news headlines of the day and the newspaper headlines the day after.

YouTube Video

YouTube Video

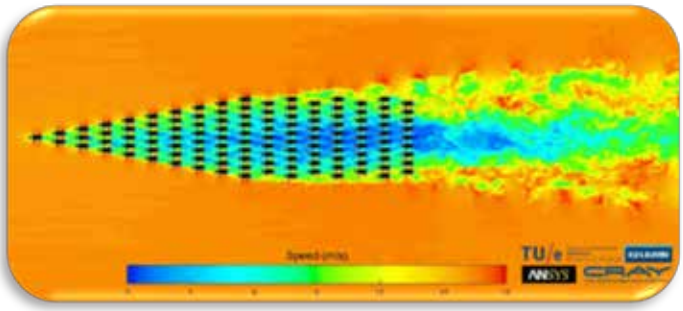


From the most distant past, we remember the breakaways of key riders like the Frenchman Jacky Durand and Belgian Ludo Dierckxsens, who were also known for their nearly endless fighting spirit.

These efforts and the subsequent victories appeal to our imagination. But how exceptional are these performances really? To answer this question, we combined our research results from wind tunnel testing, computer simulations and a mathematical cycling power model.
Breakaway rider against chasing peloton

We note that it is often impossible to predict an entire race with fysical-mathematical models. We do try this, but there are too many unknown parameters, such as the individual positions of every rider in the peloton as a function of time, the wind speed and wind direction as a function of space and time… Every research effort, whether in the wind tunnel or by computer simulation, is therefore based on some idealized situations and some assumptions. We often assume either no cross-wind or constant cross-wind, while evidently the wind speed and direction can change throughout a race. We also assume some specific peloton configurations, while a real cycling peloton is highly dynamic and variable. The translation of our model results to reality should take into account these assumptions. Nevertheless, the modeling efforts often provide predictions that are close to reality.

In a research consortium with colleagues of KU Leuven, Eindhoven University of Technology, the University of Liège and our USA partners Ansys and Cray HPC Supercomputing, we investigated the aerodynamics of a tightly packed full peloton by wind tunnel tests and computer simulations (see animation below). These computer simulations – the largest CFD simulation in sports in terms of computational demand – showed that the air resistance (so not the total resistance) in a tightly packed peloton of 121 riders can go down to less than 10 percent of a cyclist riding alone. Averaged over all riders in the peloton, the air resistance of a peloton rider is about 20 percent of that of a solo rider. If we added the rolling resistance between tires and road, the wheel-bearing friction and the friction in the drive train, then the average aerodynamic resistance in the peloton, at a speed of 50 km/h, is about 30 percent of that of a solo rider. So if a single rider escapes, the chasing peloton is tightly packed and every rider in the peloton takes an equal share of the total effort by the peloton, one can state that the solo rider has to deliver about three times more power and energy than those in the chasing peloton.



(View Simulation on Website) Computer simulation showing the air speed in a peloton of 121 riders (top view). Orange represents the cycling speed, which is 15 meters per second or 54 km/h. Yellow, green and blue colors are lower air speeds. The lowest air speed and therefore the lowest air resistance is experienced in the area colored in deep blue. (Source: Blocken et al. 2018a)

However, a peloton is not always tightly packed, certainly not when taking bends or in climbs or descents, or on very narrow roads. When the peloton stretches out, the air resistance for the riders in the peloton will increase substantially. On the other hand, not every rider in the peloton works equally hard. Riders planning a later breakaway, to chase the current breakaway, might hide in the belly of the peloton until they launch their own breakaway. So, this number of 30 percent as an average for riders in the peloton remains a reasonable assumption.

Breakaway group chasing the solo rider

Let us now assume that the chase is not performed by the whole peloton, but only by a group of ten riders. From our earlier research work, we know that the average air resistance in a paceline of nine to ten riders is about 50 percent that of a solo rider (see table on the right). Including all resistances this becomes 60 percent. So in this case, one can conclude that the solo rider has to provide 1.7 more power than the chasers in order to keep the same lead time. If he or she does not achieve this higher power, the chasers will evidently narrow the gap with the breakaway rider.

If the chase is only engaged by two riders, such as in the final stage of the breakaway by Thomas De Gendt in stage 8 of the 2019 Tour de France, and both riders work equally hard in the chase, then the chasing riders have about 80 percent of the air resistance of the solo rider, and about 90 percent of the total resistance of the solo rider. In this case, Thomas De Gendt has to overcome 10 percent more resistance than the chasers to keep his time lead.

These are evidently calculations based on a number of underlying assumptions, but the results are very large percentages. The order of magnitude of these percentages do not change if these assumptions change within reasonable boundaries.

Therefore, based on scientific research, we can substantiate the statements in the media that the above-mentioned efforts and victories by breakaway kings and queens are exceptional. These are top performances of top athletes that did not only shape and color the race of the moment, but also contribute to the large public admiration for the beautiful sport that cycling is. They also contribute to the well-deserved admiration that we have for the athletes realizing these efforts. To such great athletes, we, as scientists, engineers and cycling fans, we take the deepest bow.

Acknowledgements

I would like to thank the cycling part of my research team at TU Eindhoven and KU Leuven (names in sources below).

I thank the partner organizations:
University of Liège, Ansys and HPC Cray Supercomputing.

I'm grateful to the long-time partners:
Cycling Team Jumbo-Visma, Equipe Cycliste Groupama-FDJ, Cycling Ireland and Paralympics Ireland, for the collaboration that has co-inspired this work.

I acknowledge
NWO, the Dutch Organization for Scientific Research and
the companies SURF Supercomputing, CustomCompany, Tenax and FlexForm.

Sources

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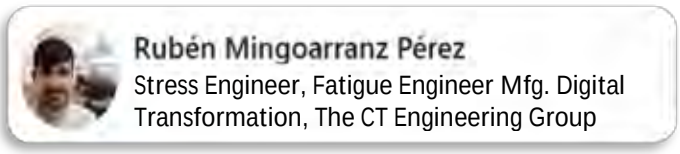
- Blocken B, Toparlar Y, van Druenen T, Andrianne T. 2018b. 'Aerodynamic drag in cycling team time trials' Journal of Wind Engineering & Industrial Aerodynamics 182: 128-145

KU LEUVEN blogt
Groepsblog van personeel en studenten van de KU Leuven

Excerpt About: *KU Leuven blogt* is a blog for and by staff and students at KU Leuven. (Nope, that's not a typo; 'blogt' is the third-person present form of the Dutch verb for 'to blog'.)



This is a model aircraft F1D indoor competition from West Baden, Indiana.

The full length can be found in the YT channel of duckcammer and I recommend giving it a look.

The Fédération Aéronautique Internationale (FAI) is the federation that organizes and promotes air sports. Aeromodelling, ballooning, skydiving, you name it. One of the sports covered is the indoor model's category.

A F1D is an indoor free flight model that permits rubber motors of up to 0.6 gram in an aircraft with a minimum weight of 1.2g without the rubber motor. That means planes of less than 2 grams of weight that are capable of 40 minutes flights. Since those models requite little thrust and lift, they flight in a light and slow manner.

Fast Facts

- The US hosted the 2018 FAI F1D World Championship for Free Flight Indoor Model Aircraft.
- The contest will take place in French Lick, Indiana, at the historic West Baden Springs Hotel.
- The hotel, which opened to the public in 1902, features a 200-foot-span atrium
- A total of 14 countries were represented at the competition.
- The first FAI F1D World Championship was held in 1961 at Royal Air Force Cardington, in Bedfordshire, England.
- The Academy of Model Aeronautics, founded in 1936 Headquartered in Muncie, Indiana,
- AMA is a membership organization representing those who fly model aircraft and drones for recreation and educational purposes.

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).

EXCERPTS

PSW Engineering Comprehensive and precise

Start with concept development. Create an optimally designed & legally compliant overall vehicle concept.

Develop complete body shells ready for approval right up to market.

The entire interior (cockpit, seats, trim) and exterior (doors, covers) - Integrate electrical systems and electronic components. Technically perfect solutions: with our fields of expertise in engineering, we shape the mobility of the future together with our customers.

The LURI Engineering team shows all the software platforms they proudly represent.

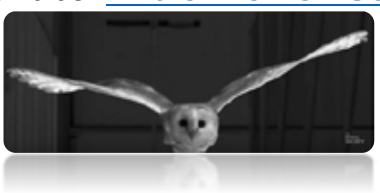
Fabian Leonov S. Lopez, CAE Engineering Mgr/COO

Lurie Engineering, Mexico.

Lurie Engineering - follow us on LinkedIn

Richard Bomphrey, Professor of Comparative Biomechanics
Royal Veterinary College, UK
'Would planes be better if they were more like birds?'
The Royal Society's SummerScience events.

YouTube: Intro movie - science behind Eagle-Inspired Engineering online content.

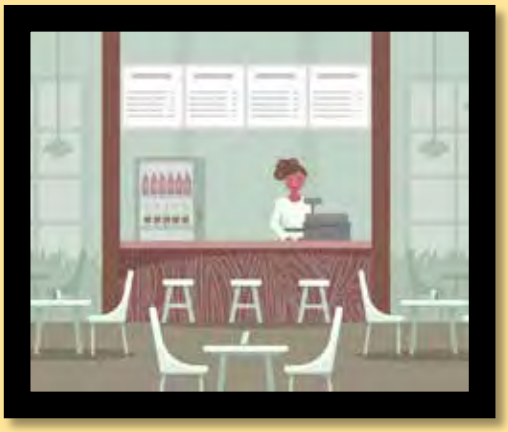


YouTube Booth Map - this month exhibitors

CADFEM | DYNAMORE | LS-DYNA Multiphysics | Oasys LS-DYNA

ANSYS
Ozen Engineering
Predictive Engineering
Rescale

Free Coffee for Guests visiting our exhibitor booths



Kaizenat
BETA CAE Systems
Siemens
RbfMorph

Ameen Topa
Lancemore JP

MSC.Software
Luri Engineering

Andrea Gittens
Innovation Promotion Director

When one thing leads to another .... and researchers find a way to identify possible medicines to treat COVID-19

By: Andrea Gittens

"Thank you to Alexandra St. Clair for the lovely illustration of brainstorming at Spanish midday coffee break." A.G.

It all started in March 2020

A couple of University researchers were gathering for their Spanish midday coffee break in a bar at the University Campus (before Corona pandemic) and talking about statistics and the studies they are working on. Antonio Falcó, director of ESI-CEU Chair at Cardenal Herrera University and animal friend, spoke about his ethical dilemma. He was asked to help a committee, at his university to reduce animal testing and tracing using his mathematical skills to find an optimal answer. Although, it was very painful for Antonio (who has a dog and cat at home) to be involved in such topic, he saw an opportunity to make the world a better place; protecting and saving many animals, which otherwise would suffer unnecessary tortures and death. With this deep motivation, he took the challenge, got involved and applied computational optimization methods based on available data.

Shortly after Antonio started his mission, COVID-19 spread around the world and changed all our lives. There was no vaccination to protect humans from COVID-19 infections, nor any medical treatment to cure people. Development of effective vaccination and medicines with related testing requirements would take an unknown amount of time for development; not to forget legal certification procedures following any development.

Inspired by discussions with many other researchers from medical, pharma and material science at Cardenal Herrera University (during Spanish midday coffee breaks) he learned that proteins are polymers, and that similar material is treated in engineering. He also learnt that biological communication between proteins is built on compatible structures which led to the idea that topological analysis, which is well-known in automotive and aerospace engineering could eventually be applied to solve problems in other industries.

As Antonio, Paco (Francisco Chinesta) and Jean-Louis Duval collaborate on scientific engineering research, Antonio introduced them the idea and explained the basic approach. They decided to apply a novel computational pipeline aimed to accelerate the process of identifying drug repurposing candidates which allow to compare three-dimensional protein structures. It is the first time that a topological data analysis-based strategy has been used to compare a massive number of protein structures to identify existing medicines to treat COVID-19.

This new topological optimization strategy could be applied both to the SARS-CoV-2 coronavirus and its new variants, as well as to any new viruses that may appear in the future, identifying their proteins and comparing their topological structure to that of the target proteins in known medicines.

Thank you to Antonio Falco to share your WHY;

why to investigate, engage to study and research “A COVID-19 Drug Repurposing Strategy through Quantitative Homological Similarities Using a Topological Data Analysis-Based Framework”.

A copy of the scientific research paper can be downloaded from MDPI Open Access Journals website here:

A COVID-19 Drug Repurposing Strategy through Quantitative Homological Similarities Using a Topological Data Analysis-Based Framework

Thanks to the team of researchers Universidad CEU Cardenal Herrera and ESI Group who worked together to make the world and life of all living beings a bit better.

Antonio Falco
(Chair Director, ESI International Chair of the CEU (CEU UCH),

Joan Climent Bataller
(Dept. of Animal Production and Health of the CEU UCH),

Raul Pérez Moraga, Jaume Forés Martos, Beatriz Suay García
(Dept. of Mathematics, Physics and Computing Sciences of the CEU UCH),

Jean-Louis Duval
(ESI Group, partner of the CEU UCH in the ESI-CEU international Chair),

Prof. Francisco Chinesta
(Ecole Nationale Supérieure d'Arts et Métiers, Paris)

Town Note: Curt is also an important person in our town

Quoted on LinkedIn: Aleksandra Egelja-Maruszewski,
Vice President, North America, ANSYS Customer Excellence,
"As part of the employee spotlight series, Ansys is focusing on employees that help make the impossible possible. Meet Curt and learn how he's been able to take his career to the next level."

Curt Chan

- My title is Sr. Product Marketing Manager
- My job is to shake things up

WHAT INSPIRES ME

- spending time with my three kids
- golfing
- mountain biking

WHAT I'M PASSIONATE ABOUT

Engineering in the defense and medical industries

WHY I CHOSE ANSYS

I came to Ansys for the opportunity to learn something new. I was already skilled in CAD and manufacturing and wanted the chance to tackle simulation.

WHAT I LIKE MOST

I have three mentors, so I have access to three different perspectives. I always look forward to our discussions about work and life.

HOW TO SUCCEED HERE

As you evolve in your career, it's important to think about your next move. Ansys does great things with career mapping and helping you get to those next levels.

Month	Start Date	Organized by	Conference - Symposium - Event
Sept.	12	SAE	15th International Conference on Engines & Vehicles
Sept.	28	Magna Powertrain	Electrification & All-Wheel Drive Congress - EAWD'21
Sept.	29	ARAI	Symposium on International Automotive Technology 2021
Oct.	05	DYNAmore	13th European LS-DYNA Conference 2021
Oct	12	Hexagon	HxGN LIVE Design & Engineering 2021
Oct.	19	Carhs	Automotive CAE Grand Challenge
Oct.	19	ESI Goup	9th OpenFoam Conference 2021
Nov.	17	EnginSoft	37th Int'l CAE Conference and Exhibition - EnginSoft
Dec.	02	Cadfem Medical	Cadfem Medical Conference 2021

[DIGITAL HEALTHCARE]

Christophe J. Bianchi, "I'm attending CADFEM Medical Conference 2021. Will you attend as well? What is your Digital Health focus?"

Conference Information - Registration information and registration form

**These courses were in our suggestion box (listed as electronics) by The Old Retired Pilot.
No one knows his name. You yell, "HEY, old retired pilot."
He hangs out at our town airport. (His brother is The Old Cattle Rancher - very strange family)**

Electronics Engineering Courses - ANSYS

**Our Town Police Dept. had zero (yes, "0") rhythm doing the Jerusalema Dance Challenge.
SO, to make it easier we found men in uniform doing the GitUp Challenge.
Whoever keeps yelling YeeHaw, stop yelling. This month they will watch Bexar County!**

Let's all give a big shout out - "GO Deputy Estrada - GitUP"

Bexar County Sheriff Recruiting Team

GitUp Challenge -The Dancing Deputy

Deputy Estrada

Fire notice: It is against fire dept. regulations to fill the balloons with water to throw at structural fires. We will use the balloons at the annual picnic. The below paper, by ARUP, will help you learn what happens during a structural fire. Please fully read the paper on DYNAlook.

Use of LS-DYNA for Structural Fire Engineering PDF

Egle Rackauskaite, Graeme Flint, Ahmed Maani, Alastair Temple, Panagiotis Kotsovinos - Arup Fire, UK

12th European LS-DYNA Conference 2019, Koblenz, Germany © 2019

Excerpt
Introduction

Structural response in fire is complex and can only be properly investigated using finite element analysis considering non-linear geometry and material properties. Full scale fire testing to investigate the real response of structural forms to severe fires represents significant risks to researchers and is also expensive and difficult to undertake effectively. Therefore, computational tools are necessary for the safe design of structures under fire conditions. The majority of the computational tools currently used for structural fire analyses use static solvers. Explicit dynamic solvers such as in LS-DYNA are rarely used even though they are capable of dealing with highly non-linear problems.

LS-DYNA is used within Arup for a range of complex non-linear assessment purposes, from seismic design to investigations of blast and vehicle impacts. Therefore, there is a benefit in extending its capabilities for use in the structural fire assessment domain. However, there is no benchmarking of LS-DYNA currently available in the fire science literature for such applications.

This paper presents an overview the work undertaken by Arup and Imperial College London to benchmark LS-DYNA for heat transfer and structural fire analysis of steel and steel-concrete composite construction against analytical solutions, other static numerical codes, and experimental data

Multiple problems that encompass a range of thermal and mechanical behaviours in fire are simulated. They include 0D, 1D, 2D and 3D heat transfer of structural members composed of steel, concrete, and fire protection materials incorporating radiating enclosures and gaps subjected to heating under convective and radiative boundary conditions.

The mechanical problems include 2D steel beams and frames, and 3D steel-concrete composite structures subjected to linearly increasing uniform heating, a standard fire, or a natural fire. A parameter sensitivity study is carried out to study the effects of various numerical parameters on the convergence to quasi-static solutions.

The use of LS-DYNA for structural fire engineering applications is demonstrated through applications to Arup commercial projects in the built environment sector. These include heat transfer studies of concrete filled steel columns and structural fire analyses of high-rise structures with unique geometries.

….(please read pdf for complete information)

Summary In this paper, an overview of the work undertaken by Arup and Imperial College London to benchmark LS-DYNA for heat transfer and structural fire analysis of steel and steel-concrete composite construction against analytical solutions, other static numerical codes, and experimental data has been presented.

It has been shown that LS-DYNA provides good predictions of the key variables of structural response during fire. For all benchmarks, it is able to predict the development of temperatures, and development trends of displacements, axial forces, and bending moments with increasing temperature within acceptable level of accuracy if input parameters are carefully chosen.

The use of LS-DYNA for structural fire engineering applications has been demonstrated through application to Arup commercial high-rise building project in London. For the case study presented, the use of LS-DYNA enabled Arup to demonstrate that the structure with optimised fire protection layout can maintain its' stability under a range of severe fires.

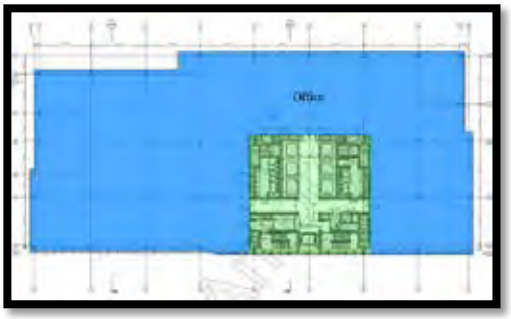
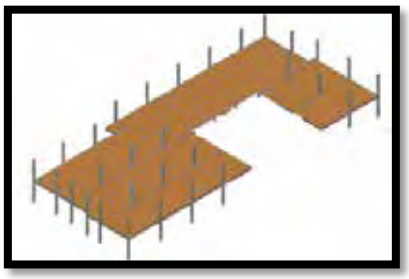


Fig.5: Rendering of the new high-rise commercial office building in London where structural fire engineering assessment using LS-DYNA has been applied (left); and plan of a typical office floor (right).



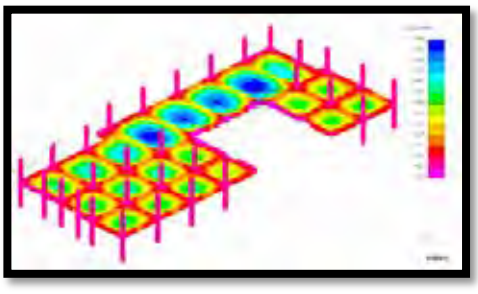


Fig.6: LS-DYNA model geometry of a typical office floor plate (left); and a contour plot of vertical displacements in the model at the end of fire exposure (right).

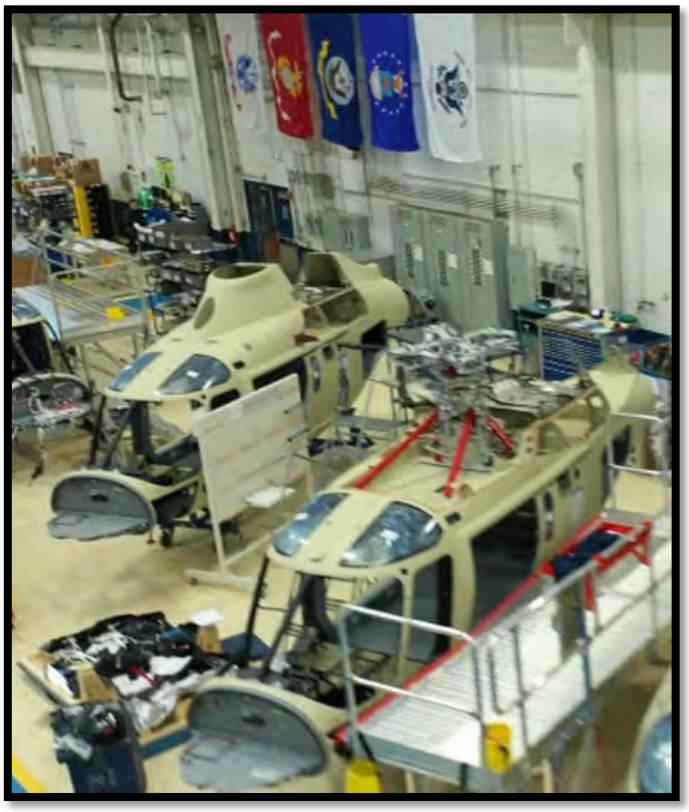
We are not using the cleaning budget for a Navy training helicopter!

1. **We appreciate the old retired pilot 's suggestion for a new town helicopter business.**
2. **We have to deny his new business permit - We do not have a "Town Navy!"**

LEONARDO - The U.S. Navy receives its first TH-73A training helicopter. Great goal for the team in Philadelphia - June 10th saw the delivery of the first TH-73A training helicopter to the U.S. Navy, during a ceremony held at our Philadelphia campus, in the presence of high ranking officials of the U.S. Navy, Leonardo Helicopters Managing Director Gian Piero Cutillo, Chief Executive Officer of Leonardo Helicopters in the US William Hunt as well as members of the local, state and federal institutions.

The TH-73A is based on the Instrument Flight Rules (IFR) variant of the commercial AW119Kx, certified as the only single engine helicopter in decades to meet current IFR requirements, allowing pilots to operate the aircraft safely in low visibility and challenging weather conditions, thanks to advanced avionics by Genesys Aerosystems and redundant helicopter flight systems.

The TH-73A is extremely flexible and can satisfy every training flight requirement, featuring an adjustable observer seat that provides a complete view of the cockpit, allowing for more effective learning, even when seated in the back.



At the beginning of 2020, Leonardo, through AgustaWestland Philadelphia Corp., was awarded a contract for the production and delivery of 32 TH-73A helicopters, initial spares, support and dedicated equipment, and specific pilot and maintenance training service to be produced at Leonardo's Philadelphia facility. In late 2020, the US Department of Defense announced the decision to exercise the options for the production and delivery of 36 additional TH-73A aircraft, still to be produced at our site in Philadelphia. The total requirement is for 130 aircraft with delivery to continue through calendar year 2024.

We have quite a few veterans from the Navy working in Philadelphia. Let's hear their voice and how they feel working on such an innovative and important program for their former employer, the U.S. Navy, in this video.

(Please visit the website for the video)

07/26/2021 - It is dry and hot here. We now look like a bird bath spa. They take a bath in the horse water troughs, then stand on their paddock rail to dry off then fly higher for full drying. Here is one of the vultures on the pole.

07/19/2021 - I bought the Bobcat a whole chicken (it was on sale). I put it down near my truck, but didn't have enough time to leave. Suddenly, Bobcat was a few feet away. Bobcat looks at me as if saying, "WHAT are you doing here? BE QUIET I'm hunting." SO, I didn't move or tell it that the chicken it is stalking is store bought. I'm standing still, and it stares at the chicken.

I finally got down on one knee and took a picture. Bobcat looked over at me, "Didn't I say to stay still!" Okay, I'm now learning HowTo Hunt 101 - don't move any muscles! Finally, it did this giant pounce on the store-bought chicken and ran away with it. I'm not afraid of the Bobcat, but the baby skunk? RUN - fast in the opposite direction!

07/12/2021 - The ranch this entire week was a bird war zone - blackbirds moved onto the ranch. I counted 20 blackbirds! I have nothing against them, but their mob mentality of let's move out my Ravens? Not on my watch! SO, they finally figured out they can't land by my house - I ran out with a pot and banged on it with s a spoon!

My two Owls and Ravens are now back by the house. The blackbirds have taken over a tree at the end of the property. Maybe they are crows - I have no clue other than they are noisy and have a mob mentality.

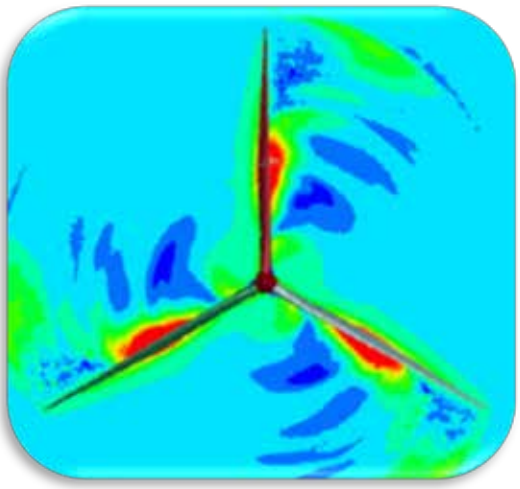
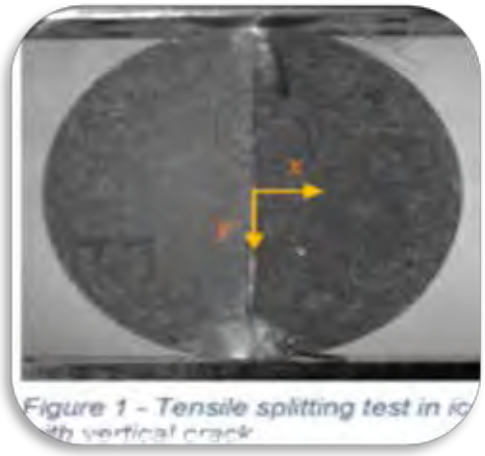
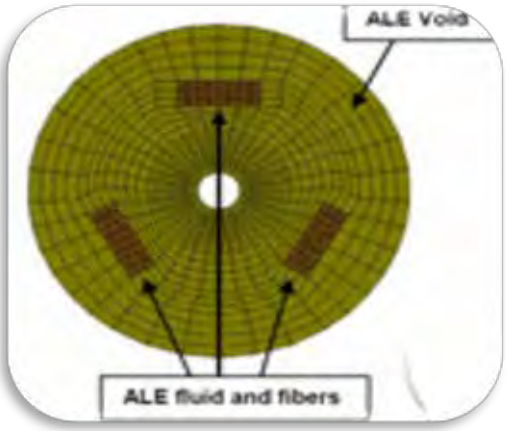
07/05/2021 - My favorite squirrel picture - BUT the bobcat is back!

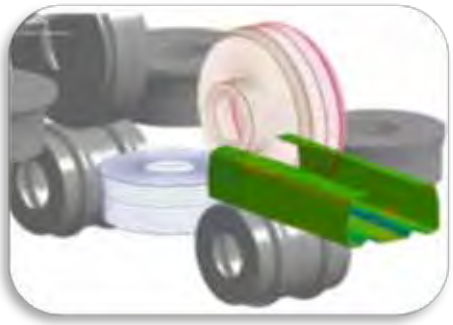
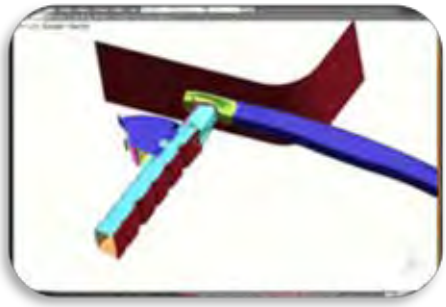
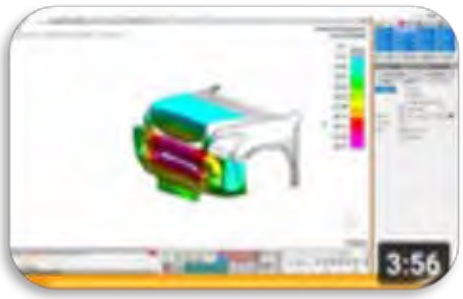
That is SO not good for my squirrels

06/21/2021 - There is always the one individual that sees a different perspective.

06/13/2021 - Well, below is the skunk, but he is early. He eats about 9:00 p.m. It was light out tonight - as soon as I put the food down, he was walking toward it - OH and past me! I froze!

Odd, I am not afraid to slowly walk past the bobcat or the coyote but the little skunk? NO WAY!

07/26/2021 - **P. Bristo (NIO)** - Development of carbon fibre floor structure for NIO premium electric SUV	07/19/2021 - **I. Çaldichoury** - Introduction of Sliding Capabilities in the ICFD LS-DYNA® Solver
	
07/12/2021 - **H. Herrnring** - A Cohesive Model for Ice and its Verification with Tensile Splitting Tests	07/05/2021 - **M. Duhovic** - Development of a Process Simulation Model of a Pultrusion Line
	

	07/26 - J. Chen - ETA & Profile Intro and Live demo -
	07/19 - OASYS Pre-processing in LS-OPT with Oasys PRIMER
	07/12 - OASYS export 3D models in Oasys D3PLOT and share them
	07/05 - CADFEM Ansys SCADE Student - Airplane Roll Control (English)

07/26/2021

BETA CAE

[Release of the major version v22.0.0]

07/19/2021

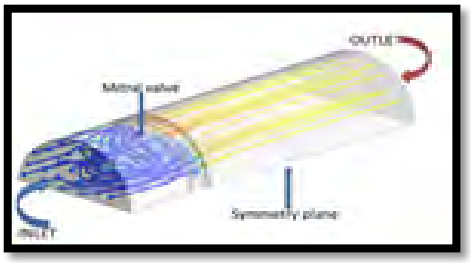
MSC.Software

[MSC Apex Generative Design]

07/12/2021

S. Coleman - ANSYS

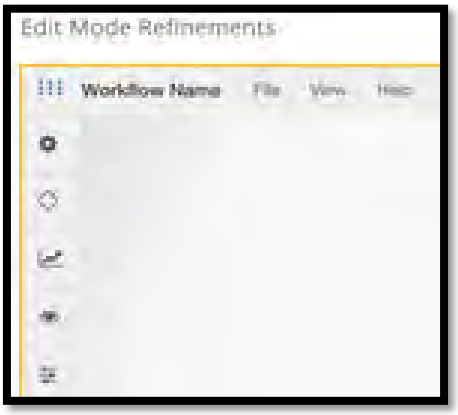
[Using Ansys for Doctorial Research in Cardiovascular Engineering]



07/05/2021

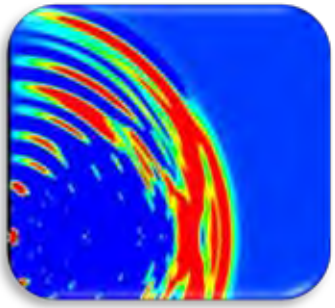
Elisa - d3View

[New and Refined Workflows User Interface (and a sneak peak into Workflows)]



07/26/2021 - I have been thinking of ease-of-use coffee cups. So far Oaysis has beat me out on thinking - they have quite a few ease-of-use ideas SO we will head over and watch them. THEN we can all think of new ease of use coffee cup ideas.

OASYS - R. Taylor - Ease of use and performance - seatbelts

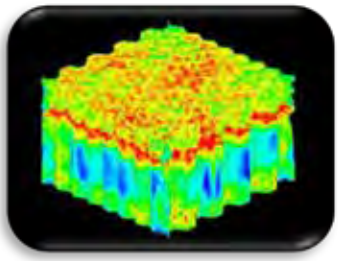


07/19/2021 - This week we are having acoustic coffee. And, if you swirl it in your coffee cup you can have waves! That is as close to the simulation below as you will get with coffee!

Lancemore - Acoustic Wave Propagation after contact between ball and thin plate using LS-DYNA

07/12/2021 - I threw a coffee cup into a beam in my shop - it didn't do anything to the beam. I really threw it hard at the beam! SO, to see what it should have done IF it had high velocity and was not a coffee cup, let's watch SimuK do it professionally in a simulation.

SimuK - **Ansys LS-DYNA** - High velocity impact on beam



07/05/2021 - Did you actually think that I thought a honeycomb was about bees? WHO yelled yes! Well, we will grab cofee and drive to YouTube to learn about the below honeycomb!

Lancemore Large deformation of honeycomb core in each loading direction with LS-DYNA

Soft donut with Orange and Greek Yogurt

Simple, good and fragrant dessert. Suitable for breakfast and a delicious snack. It is also quick to prepare, with the ingredients ready and weighed in 5-7 minutes it goes into the oven.

What more do you want?

Ingredients

- A mold of 24 cm or more. Nonetheless, otherwise the dessert is too high and the internal cooking is not the best. I used a donut mold, but any shape is fine as long as it is wide.
- Electric whips.
- Oven turned on at 180 degrees, or slightly more if static oven
- 290 g of granulated sugar
- 300 g of flour
- 2 large eggs
- 280 g of thick Greek yogurt. Classic yogurt is no good.
- 1 sachet (16 g) of baking powder
- 180 ml of seed oil, peanut for me
- 70 ml of orange juice - the grated peel of 2 large oranges, the most fragrant possible

Execution

1 - Add the yeast to the flour and sift everything. It is essential to avoid lumps in the dough

2 - Scrape the peel of the two oranges. Keep aside

3 - Squeeze one or two oranges, to obtain 70 ml of juice. No more or the dessert will be soggy

4 - Add half a vial of vanilla extract to the juice

5 - add a pinch of salt and mix to make it melt. Keep it all aside.

6 - Grease and flour the mold.

7 - In a large bowl break the two eggs and pour the sugar.

8- Work with the electric whisk for 4-5 minutes, in order to incorporate air and make the cake very light.

9 - Add the orange juice and work a little with a whisk to incorporate it

10 - Add the yogurt and work with a whisk to mix well

11 - Add the oil and work with a whisk

12 - Add the flour 3-4 times and work well with a whisk, in order to avoid lumps

13 - Put away the electric whisk, add the grated orange peel and incorporate with a normal spoon or a pot licker, because if you use the electric whisk the grated peel will remain all on the whips. I know it.

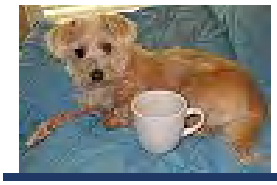
14 - Pour the mixture into the mold and let it rest for a few minutes to let the air bubbles emerge. In the meantime, tidy up the mess in the kitchen. I know it.

15 - Bake for 50 minutes45-50 min at 175-180 Celsius - - It depends from the oven - First time is for tuning, but anyway better a soft cake than a crunchy one

16 - Remove from the oven and leave to rest for 5 minutes, the draft will be easier.

17 - Do not taste the dessert until it is cold, resist.

It is a delicious doce, they will compliment you, which increases self-esteem



DYNAmore Nordic AB is a project partner in human modeling research!

Active human body models for virtual occupant response has entered its fifth stage

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Applus+ IDIADA **How 3D modelling decisions can influence the thermal performance predictions within a vehicle cabin environment**

Charalampos (Babis) Tsimis

"I got the chance to showcase the R&D our CFD team, and particularly my good colleague Paul Marston, was working on in the last few months on the topic. The focus of the work is to validate the CFD methodology (developed with Simcenter STAR-CCM+) against experimental climatic chamber results, and doing so while minimizing the amount of parameter tuning typically used in these type of simulations. I hope you enjoy it and learn something from it."

Ozen Blog - Introduction to ANSYS nCode

Ansys nCode DesignLife works with Ansys Mechanical and Ansys LS-DYNA to reliably evaluate fatigue life. Using the results of finite element analysis (FEA) from Ansys Mechanical and Ansys LS-DYNA, it accumulates damage from repetitive loading to determine a product's predicted life.

Alasdair Parkes - 3D results on the web, for everyone! We've launched a brand new way of communicating engineering analysis. With D3PLOT Viewer you can:

- Explore in 3D with your team in meetings and design reviews
- Share animated 3D models with designers and suppliers
- Give your clients 3D project deliverables

Find out just how excited I am in the video - Head straight to our website for information and to play with the demos (no registration required).

You are now leaving
Our Town
FEA Not To Miss
(Population - Virtual)

Please come back

Real estate available

Goodbye and Come Back Soon
Feel free to send a picture

Picture chosen and sent to our town by Kyra Z. It's from the free "waving" pictures at Vecteezy.

Graphics Courtesy of Vecteezy

QUIZ Credit - questions 1-3 doughnuts - question 4 you are served Coffee!!!!

1. Bleriot XI In 1909 French aviation pioneer Louis Bleriot completed the first successful crossing of the English Channel by air. PHILIPPE HUGUEN/AFP/AFP/Getty Images

2. The Super Constellation was known for its distinctive triple tail. First flight: 1943
PIERRE VERDY/AFP/AFP/Getty Images

3 Airbus A300 - Air France was the launch customer of the Airbus A300. First flight: 1972
STRINGER/AFP/AFP/Getty Images

4. Vulture - US Made and used for environmental clean-up.