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FEA Not To Miss+ Town

Software & Engineering Solutions

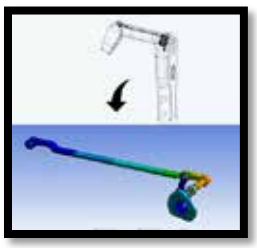
Town Hall Meeting, Blog & Gossip

AEROSPACE – Test Pilots

ANSYS

AUTOMOTIVE - Mahindra

CADFEM



CATI

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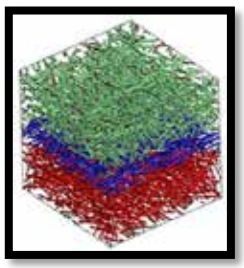

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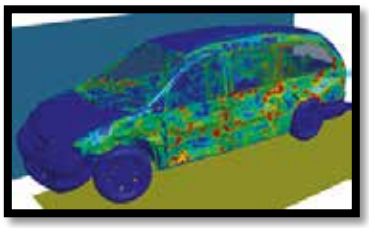

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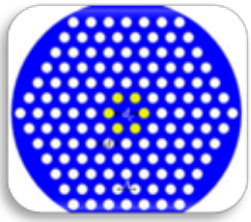

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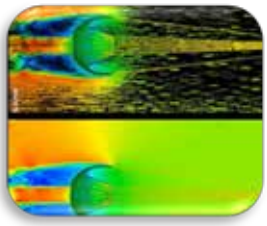

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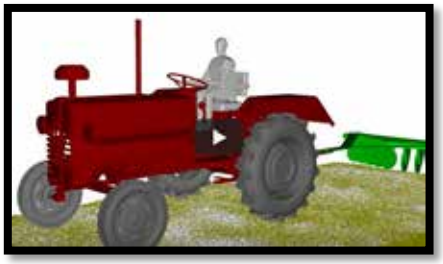
Rancher – Rocky DEM



Supervisor – Gossip

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

Town Pretend to be Editors

The Old Rancher - No one in town knows his name. You yell "Hey, Old Rancher."
The Old Retired Pilot - No one in town knows his name. You yell "Hey, Old Pilot."
The Old Retired Racer - No one in town knows his name. You yell "Hey, Old Racer."
They are all brothers - strange family

Contact us at feaanswer@aol.com

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

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First author or person using social media, or information on the company website

- **The websites used will have the complete articles, and higher resolution graphics/videos.**
- **We always reference and link to the source listed below.**
- **This blog/magazine is a positive venue for editorial purposes and not revenue derived**

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Thanks to Vecteezy for our **Map Vector/town and many of the graphics in our magazine**

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We always reference and link to the articles/information.
This blog/magazine is a positive venue, for editorial purposes, and not revenue derived

Serving coffee & tiramisu!

Our town comprises individuals interested in solutions for the future and, of course, animals and children.

Gossip is at the local coffee shop.

Pets are welcome. (Small pets, horses stay outside!)
(Pet goats or pigs also stay outside)

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

1. Who ordered software, for game developing, using my coffee budget?
2. No, it isn't to learn how to become a gamer!
3. Why are you handing out laptops and who purchased them?
4. Why is Town Grandpa taking my laptop, and where is everyone going?
5. HEY, we have a meeting to go over. Why is everyone heading to the library?

Library Learning Center – Be A "Game Developer" and not a "Gamer" by Town Grandpa

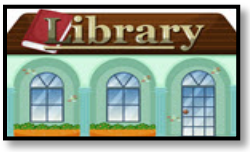
The Old Rancher and the Town Secretary are arguing about agricultural equipment.

1. Who ordered tractors?
2. The Rancher uses his Farmall F 12 international Harvester 1936
3. The secretary still thinks Rocky DEM is ice cream!
4. She thought Rocky DEM was ice cream last year! Explain to her software vs. ice cream.

Rancher - Rocky DEM provides the data to predict particle behavior in agricultural equipment.

Use Case: The human lung

Leibniz Supercomputing Ctr. of the Bavarian Academy of Sciences and Humanities



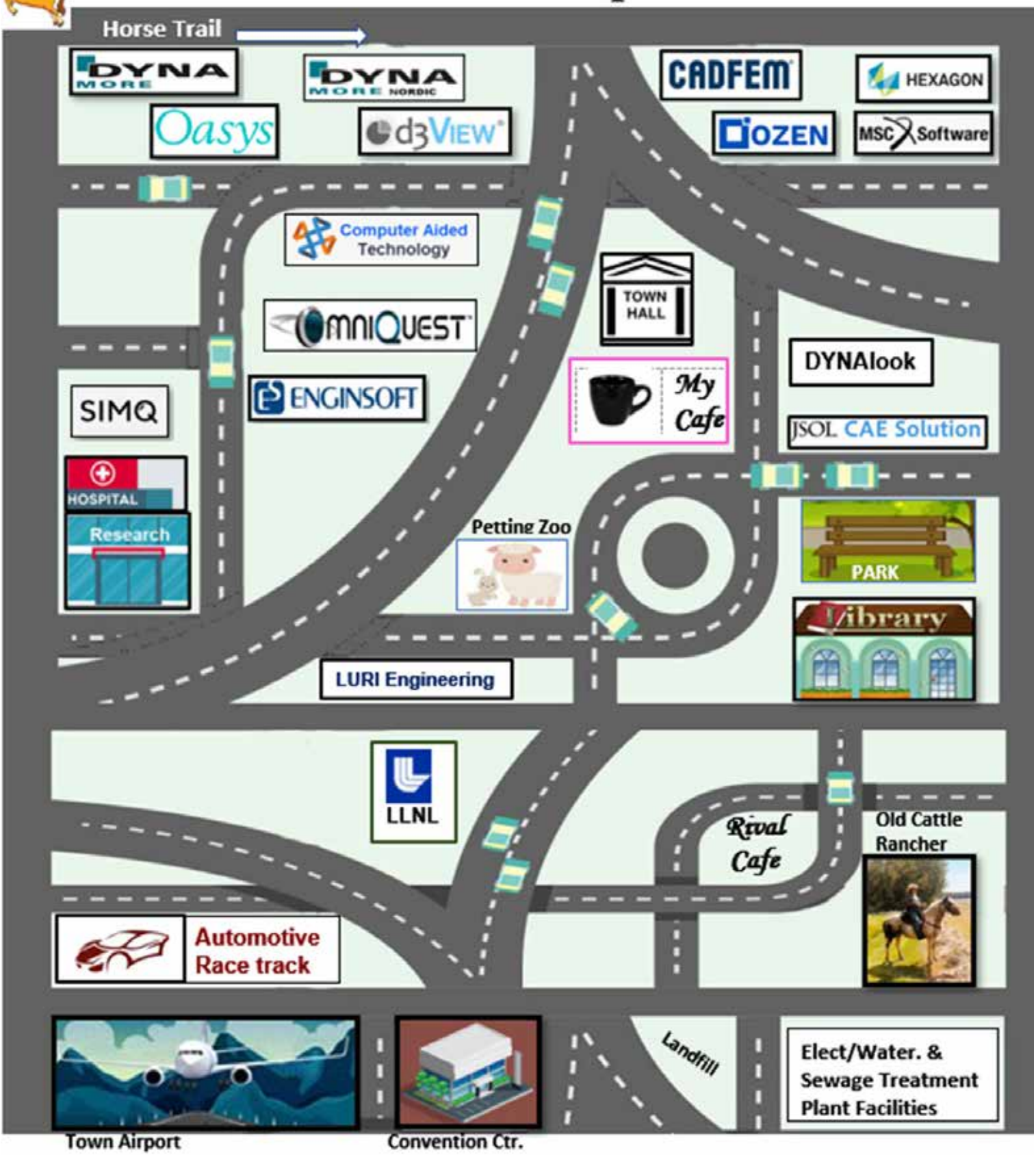
Library Learning Center – Kids That Code

Be a "Game Developer" and not a "Gamer" – Town Grandpa

DYNAmore 16th LS-DYNA Forum
Oct. 11-13

DYNAmore Nordic LS-DYNA Forum
Oct. 18-19

Town Map



To be removed, from the map, 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.**

Excerpts - Read the full article and graphics on the website

Children's Hospital of Philadelphia uses Ansys LS-PrePost within LS-DYNA to pre-process, submit simulations, and postprocess their results.

Excerpts from paragraphs - **Steering Car Seat Development in a Safer Direction with Simulation**

Laura Carter, Staff Writer, Ansys Advantage

Kids require a lot of special gear, and parents' confusion over what to buy often begins even before a newborn baby leaves the hospital. Child safety is a huge focus for most parents-to-be, and car seats are at the top of the list…

Where Car Seat Research Gets its Chops - To address these challenges, researchers at the Center for Injury Research and Prevention at Children's Hospital of Philadelphia (CHOP) are using Ansys LS-DYNA simulation software for collision simulations to better understand how to optimally protect children in car seats.

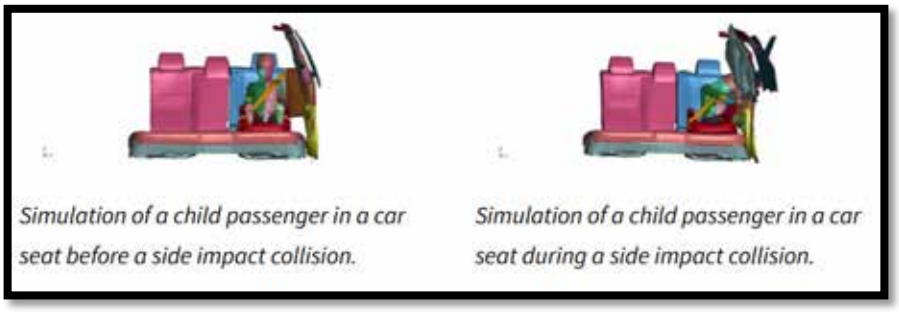
"The mission of our center primarily is to pursue innovative solutions to prevent injuries in children, youth, and young adults through rigorous research and collaboration with industry, policymakers, and governmental agencies to improve product design policies and educate parents and caregivers about correct child seat use," says Jalaj Maheshwari, MSE, Research Project Engineer and a Lead Project Investigator at CHOP. "Ansys simulation helps support the computational modeling efforts in the safety research we're conducting."

Maheshwari and his team are tasked with assessing car seat safety systems designed for children across a wide range of ages, which increases the complexity of testing. Pediatric occupants are a particularly challenging population to model. There isn't a set anthropometry, or human body measurement, that you can use for all cases. The algorithm inputs of an 18-month-old child are completely different from that of a 3-yearold, which are completely different from that of a 6-year-old, and so on. Restraint systems change dramatically during the birth-to-11- year trajectory as a child grows, moving from rear-facing to forward-facing seat, and finally a belt-positioning booster seat.

Traditionally, children's car seats have been evaluated using physical crash tests by securing a child-sized crash test dummy onto a properly installed car seat. The test bench, or sled, is then accelerated and decelerated at various pulses that mimic different crash scenarios to test occupant movement and injury potential. During testing, all the elements, from the dummy positioning, harness and chest clip positioning to harness tightness, must be in accordance with federal testing standards.

Testing helps ensure that the child seat provides adequate protection by ensuring the occupant surrogate or crash test dummy complies with the injury thresholds, or the protocols identified by the National Highway Traffic Safety Administration (NHTSA), Consumer Reports, and other regulatory or consumer information bodies.

These physical tests are expensive, which makes investigating multiple crash scenarios economically challenging for all involved. While physical testing is an essential aspect of safety assessment and cannot be eliminated, manufacturers have discovered that combining it with simulation can speed up restraint assessment and enhance development of car seats that perform well in all types of crashes.



Simulation of a child passenger in a car seat before a side impact collision.

Simulation of a child passenger in a car seat during a side impact collision.

You can't Always Predict ... or can You?

More often than not, children are fidgety, and don't necessarily sit straight up and look forward all the time.

Further, research by CHOP and others indicates that a large percentage of child restraint systems are installed with at least a minor user error[3,4], like loose belts, unused or out of position chest clips, and so on.

Using LS-DYNA enables the simulation of real-world, in-vehicle scenarios, such as different seating postures where the occupant is leaning forward or leaning inward[5], and installation errors. Other test-worthy scenarios — including pre-crash maneuvers such as swerving or sudden braking enabled by advanced driver assistance system technologies — can also dramatically change the child's position in the car seat.

For researchers at CHOP, it's important to assess what happens when a child is in as many positions as possible when a crash occurs. Will the seat belt slip off, and if it does, is there a way to prevent it from happening? Or is an advanced restraint system mechanism needed that pulls the seat belt in such a way that it provides a better fit on the child in the event of a crash?

Move Over, Dummy

Anthropomorphic test devices or crash test dummies are essential tools to assess injury and restraint performance in physical crash tests. While crash test dummies are humanlike, they're not exactly human. To advance safety, it's important to understand how an actual human body behaves. **Using LS-DYNA with validated virtual human body models, CHOP can simulate different crash conditions with child models of varying anthropometries[6].** To do this, the team must first develop a 3D computer-aided design (CAD) model of the child seat and the vehicle seat/test bench from specific dimensions according to engineering data. After that, the finite element (FE) model is generated by meshing each component and assigning it appropriate material properties. The individual FE models of the child, child seat, and vehicle seat/test bench are brought into one environment, positioned as necessary, restrained with seatbelt FE models, assigned boundary conditions, and then loaded into a processor to run the crash scenario being investigated.

Using a virtual human body model during simulation requires a variety of mesh sizes within different boundary conditions. Researchers evaluate their meshes and assign them to each body part. This activity often involves finer meshing in certain areas of the body to maintain the features and the complexities of the geometry they are using.

Human body models are a key component of Maheshwari's simulations to help evaluate how safety aspects of the child restraint could change across a wide range of child age and size. The resulting data enable vehicle safety system and child restraint design for children of all sizes and ages, and also help policymakers shape policy and testing standards that effect positive change on child safety.

Ansys LS-DYNA: A Tool for Academic Research

CHOP uses Ansys LS-PrePost within LS-DYNA to pre-process, submit simulations, and postprocess their results. Maheshwari starts by bringing in individual models he has created meshes for with specific material properties. The seating environment is defined, and LS-PrePost is then used to position the occupant in the seating environment, which could be a full vehicle or a test sled with the child in an age-appropriate child seat.

Different types of pre-simulations run in LS-DYNA help position the occupant and deform or compress the seat to reflect the physical world. The child seat and human body model are positioned in the vehicle environment and adjusted in accordance with gravity. Once those models are settled, the team restrains the child seat and child to the vehicle, applies the desired boundary conditions of the crashes, and runs the simulations.

In the physical world, says Maheshwari, vehicle crashes are over in an instant, lasting 120 milliseconds; however, simulation times can take anywhere from two hours to seven days depending on the complexity of the model they are using. Once the simulation is complete, the data can be exported for further analysis.
Curbing Research Costs, not Testing

With all of this testing, costs can really add up, which is what makes simulation an excellent option for academic research. Ansys supports Maheshwari's research by making licenses more affordable for the team.

An Ansys license doesn't limit the team to how many tests they can run, but to the life of the license. Using LS-DYNA, they can run as many parametric simulations as they wish. Right now, they are at 100+ full-impact simulations and counting using a virtual human body model — an achievement that is economically prohibitive and time consuming with a physical sled test.

See site for references and complete graphics in the article

...

Dexter is a robotic surgery system designed by Distalmotion that gives surgeons direct access to both the patient and the robot. This concept is called on-demand robotics.

Optimization of the Dexter® surgical robot -

Simulation of the gravity compensation mechanism on the DEXTER surgical robot with Ansys Workbench

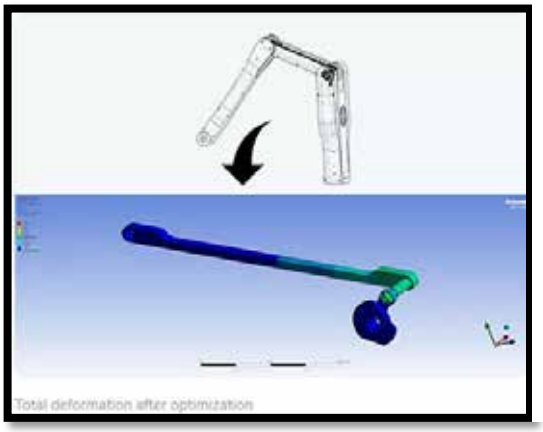
Sector: Health, Medical technology

Specialist field: Structural mechanics

Distalmotion is a medical device company based in Switzerland that establishes new standards to deliver best-in-class minimally invasive care for patients in general surgery, gynecology and urology.

It has developed the Dexter surgical robot, which combines the benefits of laparoscopy and robotics. At the prototyping stage of the development process simulation helped identify the failure mode of the transmission system for design optimization.

Distalmotion benefits at two levels from its relationship with CADFEM, which provides support through the Ansys Startup Program and in the implementation of simulations, thus enabling its products to be made reliable very quickly.



Task - The surgeon console is responsible for precisely capturing the surgeon's hand movements in order to transmit them to the robotic arms that operate the surgical instruments. These movements are received by passive master arms that support the various sensors. In order for the surgeon to maintain the greatest precision of movement and for the system to transfer these movements with finesse, it is imperative that these master arms have as little resistance as possible. This means that the force required to move these arms must be small and constant over the entire workspace.

To achieve this, the force of gravity due to the masses of the moving elements must be compensated as accurately as possible according to the position of the master arm. The balancing system for the two degrees of freedom that are significantly affected by gravity is passive, with the compensating force being provided solely by linear compression springs.

During the development of a working prototype, it was observed that the balancing mechanism worked perfectly for the first degree of freedom but was not optimal for the second degree of freedom, showing a noticeable variable displacement force in certain areas of the workspace. It was quickly identified that the problem came from the force transmission system between the first and second degrees of freedom, a parallelogram mechanism. The goal of this project is to identify the failure mode of the transmission system and to optimize its design in order to achieve the objectives in terms of user-friendly and precise handling.

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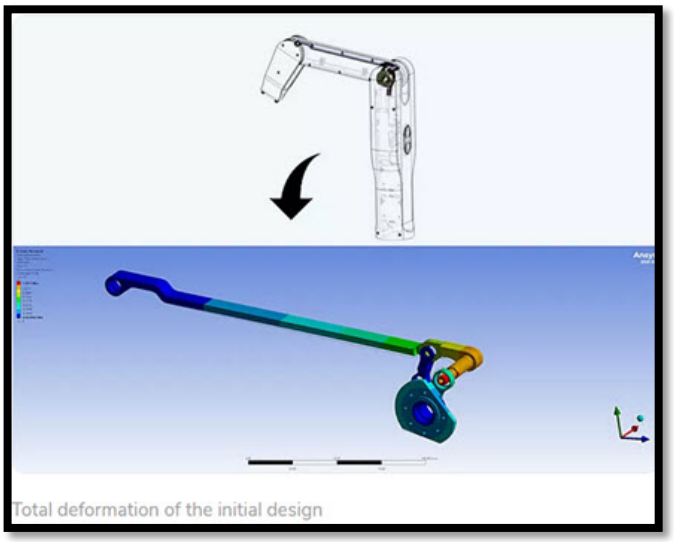
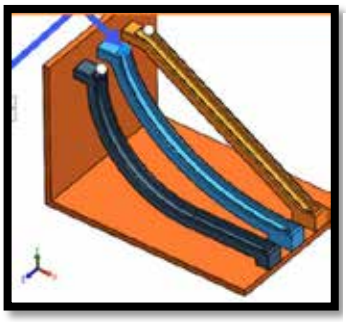


Solution - The structural analysis of the initial design allowed for the quick identification of the failure mode of the transmission in the prototype, i.e., an excessive deformation of the parallelogram due to a suboptimal design and an underestimated torsional load. The simulations were performed in Ansys Workbench through the static analysis module. The simulation allowed for a significant simplification of the final design by removing the intermediate arm, which had led to torsional brittleness, and by adjusting the choice of material in order to reduce the total deformation by 50% and to achieve homogeneous behavior, regardless of the position.

Customer Benefit - Structural simulation eliminated costly testing steps and enabled a quick solution while simplifying the design. The analysis also improved understanding of the various forces involved in transmission and helped find a solution that met the specifications expected by users.

Additionally, access to the Ansys Startup Program offered by CADFEM enabled Distalmotion to integrate simulation into its R&D processes in order to accelerate product development from the start, while limiting the financial impact.

You have to make learning fun, right? So, while anyone can go take a course about SOLIDWORKS Motion and understand how to use the tool, it's way more interesting when we can prove something that was first thought about by Galileo almost 400 years ago! That's what we're going to do today, make learning SOLIDWORKS Motion fun by taking a look at the Brachistochrone Curve.



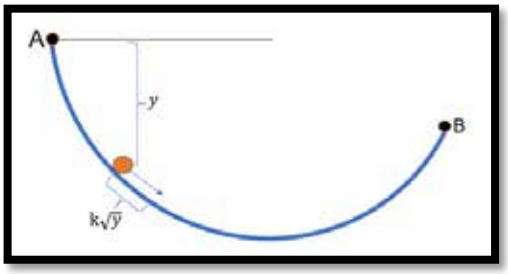
EXCERPT – **Between Two Points is a Straight Line?**
Author - Nick Pusateri, Senior Application Engineer Specialist, Simulation

Background - Everyone always says the shortest distance between two points is a straight line. But, is it really a straight line and is that the shortest amount of time? Have you ever heard of something called the Brachistochrone Curve?

The word "Brachistochrone" /brekistekron/ is actually two words in Greek for "shortest time." This was first pondered by Galileo Galilei in 1638, who thought that an arc of a circle would be the best option for a particle of light going from point A to point B in the shortest period of time. The arc is a good option, but there are better solutions.

Let's fast-forward to 1696, Johann Bernoulli posed the shortest path thought as a challenge to all the mathematicians, specifically Isaac Newton. At that time, Sir Isaac was a lot older than Johann. Oddly, Isaac Newton didn't like to be challenged by someone he felt was beneath him academically. So, he decided to take on the challenge and found a solution within a single night while it took Johann two weeks to solve. Isaac then proposed his answer anonymously in a journal called "Philosophical Transactions". Apparently, after Johann read it, he responded with "I recognize the lion by his claw".

So, what Johann concluded was that as the particle moves down a curved path, because of conservation of energy, the velocity (v) of the particle is proportional to the square root of the distance from the top of where the particle started. See Figure 1 below. Therefore, the loss in potential energy can then be set equal to the kinetic energy. If we take those equations and solve for the velocity, we see that the velocity becomes proportional to the square root of the distance "y" from the top of where the particle started. See Figure 2 below. Now, since v is proportional to y it follows that as the particle moves down the curve it is also following what is called Snell's law everywhere on the curve. See Figure 3 below.



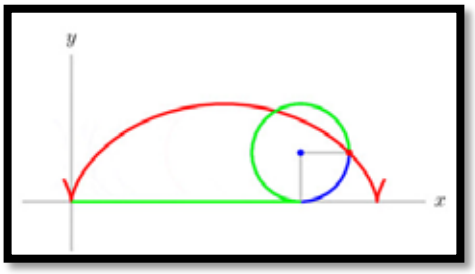
$$\frac{1}{2}mv^2 = mgy$$

$$v = \sqrt{2gy}$$

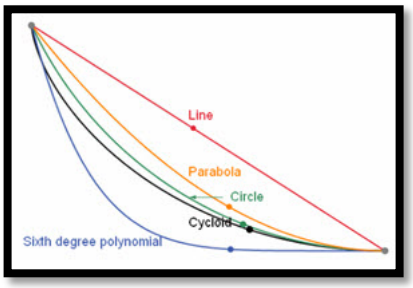
$$v \propto \sqrt{y}$$

Snell's law: $\frac{\sin(\theta)}{\sqrt{y}} = \text{constant}$

Fig. 1 Particle on curve path
Fig. 2 Velocity proportional to square root of y
Fig. 3 Snell's Law correlation



So, if we look at whatever the time minimizing curve is, and take any point on a curve, the sine of the angle between the tangent line at that point and the vertical divided by the square root of the vertical distance between that point and the start of the curve will become some constant independent of the point chosen. After seeing this Johann recognized it as the differential equation for a cycloid. Cycloid being the shape traced by a point on a rim of a rolling wheel. **See Fig. 4.** Cycloid traced path



Now, you may be asking what does sine of theta divided by the square root of y have to do with a cycloid. Well, in 2015 a professor and mathematician at Penn State named Mark Levi published a note showing that if you look at the geometry of a cycloid, and through a few modifications at the right places, the principle of velocity over the sine of theta becomes constant. From there we find Snell' law is embedded into the motion of the cycloid itself. This was a great discovery in proving why the cycloid path would be the shortest time a particle would have to take to get from point A to point B.
Fig. 5 Cycloid path versus other paths

Testing and Learning with SOLIDWORKS Motion - Now, enough with the theory and math, let's have some fun. Is there a way to show this phenomenon in SOLIDWORKS? The answer is yes using SOLIDWORKS Motion analysis which is available in SOLIDWORKS Premium and in all SOLIDWORKS Simulation packages. A problem like this is exactly the thing to start learning SOLIDWORKS Motion and getting our feet wet. To do we want to design something similar to Figure 6 below. The key thing is to make sure of is that one ramp is a straight path (orange ramp), the other is a cycloid path (middle blue ramp), and the third ramp is shaped more like a parabola. See Figures 7 to 9 below for the dimensions I used.

Fig. 6 Finished model views

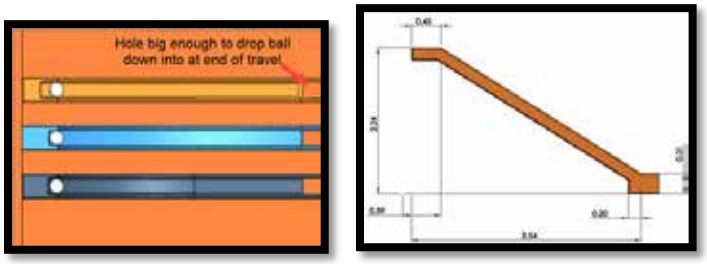


Fig. 7 Straight shaped ramp dimensions (in)

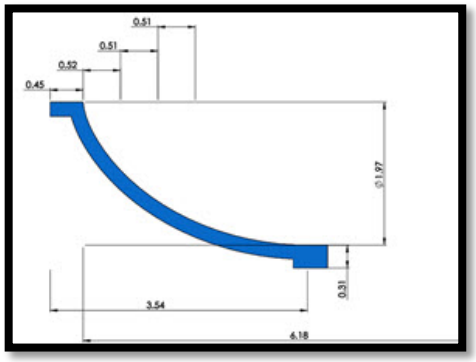


Fig. 8 Cycloid shaped ramp dimensions (in)

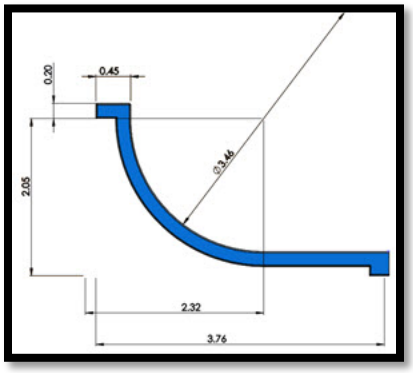
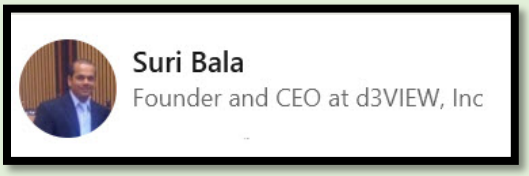


Fig. 9 Parabola shaped ramp dimensions (in)

Visit the website for Figures 10-19 with explanation and complete information and full article

Final Thoughts - I hope you found this blog useful in learning what the Brachistochrone Curve is, a bit of the history behind it, and how to create your own model in SOLIDWORKS and then use learning how to use SOLIDWORKS Motion analysis to prove the theory. I know I did!

Nick Pusateri, Senior Application Engineer Specialist, Simulation



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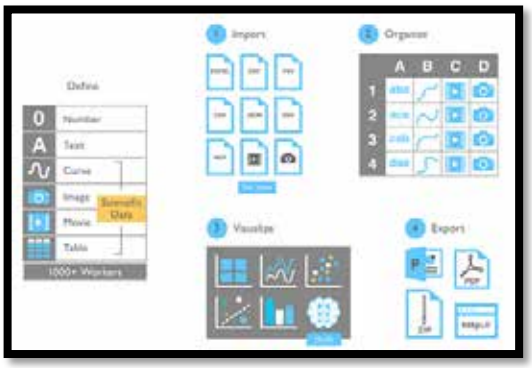
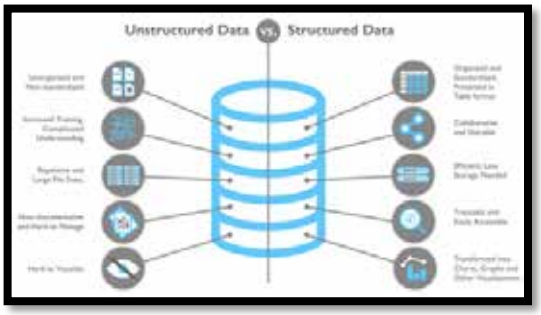


Scientific Databases

Databases' centralized data management system eases sharing between multiple users, while the integration of interactive visualizers powerfully support productive decision-making.



Structure Your Data - Structuring your data through Databases takes away the hassle of organizing it yourself.

Plus, structured data is easier to comprehend, track, is much more collaborative and sharable, takes up less storage and can be transformed into visualizations instantly.

Database Tools

- Store scientific data formats such as curves, images, movies and tables.
- Keep bad data away using built-in sanitize and clean up procedures.
- Using advanced filter and search capabilities, find the the data you want quickly.

Database Comparisons and Statistics

- Compare and visualize your data with just a few clicks.
- Group important data together and utilize view templates to make comparing your structured data quick yet insightful.
- Review a summary of your data with built-in visualized statistics.

Databases Through Workflows

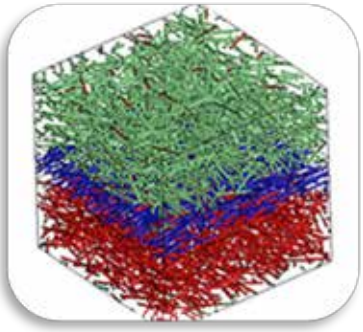
- Productively manage your Databases by utilizing its integration with our Workflows application.
- Employ our Database workers to create LS-DYNA Material Databases and add a plethora of data records efficiently.

Make the Transition

- Eliminate the stress of manually organizing and examining data.
- With Databases, data regulation becomes simple, swift and effective.
- Make the transition to superior data management today.

Visit the website for complete information on Scientific Databases

Coupling DIGIMAT to LS-DYNA allows users to consider the micro-mechanical behavior of their composite materials during the complete structural analysis.



DIGIMAT is a state-of-the-art nonlinear multi-scale material & structure modeling platform, which helps engineers to design and optimize composite materials in a fast and cost-effective way.

From small scale nanocomposites via honeycomb sandwich panels up to fiber reinforced plastics, rubber and hard metals, DIGIMAT software covers a large variety of materials being used in automotive, aerospace, consumer and industrial equipment industries. With its six different tools which can be licensed separately, the DIGIMAT modeling platform also offers a high degree of modularity.

Mean Field homogenization for fast and accurate prediction of non-linear behavior

Using the Mori-Tanaka and double homogenization schemes, DIGIMAT-MF allows the prediction of material properties for all kinds of inclusions and inclusion sizes. Different material models for both, the matrix and the inclusions can be applied to define the micro-structure as accurate as possible. Mechanical, thermal and electrical loadings can be used to analyze the corresponding material behavior for single-layer microstructures as well as for multilayer materials. Different failure modes such as maximum stress/strain, Tsai-Hill, Tsai-Wu, Hashin and many more can be considered as well. A tree data structure makes this modeling tool user friendly.

Finite Element analysis of representative volume elements (RVE)

With DIGIMAT-FE, realistic RVEs can be generated, considering all kinds of inclusion shapes and material properties. So far, a direct coupling to LS-DYNA is not possible but shall be in the future. By now, RVE geometries can be exported as common CAD formats: .step, .iges & .brep.

Material eXchange platform for DIGIMAT users and material suppliers

DIGIMAT-MX gives its users access to experimental data as well as to material models created with DIGIMAT for both, homogenous and composite materials. These data are in general available for different temperatures, humidity, strain rates and loading angles. This helps the user to reverse engineer his material properties without extensive testing and with a huge amount of references when linking this feature to DIGIMAT-FE. For confidential purposes, encryption is also available.

Coupling of FEA – software to enable a multi-scale analysis of composite materials and structures

Coupling DIGIMAT to LS-DYNA allows users to consider the micro-mechanical behavior of their composite materials during the complete structural analysis. By using the “hybrid” solution method, no additional calculation time is required and by mapping fiber orientations from process-simulation software, the full process chain from produceability to serviceability is considered during the structural design. DIGIMAT-CAE analyses can be performed implicit and explicit. The coupling to process simulation is available for all the main software tools available on the market such as Moldflow for moulding simulations or Simulayt for draping.

Mapping tool, closing the gap between process- and structural analysis

This very useful feature allows the mapping of mid-plane shell properties onto multi-layered shell models as well as the mapping between 3D continuum elements. It is also possible to transform the properties between different FE-meshes used for the process- and the structural analysis. Scaling, translation, rotation and superposition of the donor- and the receiving mesh is also available. Error indicators which are output directly after the mapping allow the validation of the quality of the generated mapped data.

GUI guided workflow tool for coupled analyses

With “Reinforced Plastics” e-Xstream poured 10 years of experience into a GUI guided tool that aids the setup of coupled analysis in an easy and understandable way, uniform to all communities. This release will support the setup of 3D analyses with LS-DYNA, Marc, MSC Nastran, Abaqus, and Ansys based on Moldflow, Moldex3D, Sigmasoft or Timon 3D processing results. All Digimat solution technologies are supported. Jobs can either be run and monitored on a local computer or packaged for the remote solution on a cluster.

Prediction of composite sandwich panels micromechanical behavior

This tool allows the definition of honeycomb core ands skins pile-up as well as the computation of failure indicators for core and skin layers. An automatized mesh generation is also available for three steps of mesh refinement: coarse, average and fine. The pile up can be symmetric and anti-symmetric. Standard loadings such as three/four-point bending and in-plane shear can be applied with customized positions and amplitudes for loading points and fixations.

Digimat-VA (“Virtual Allowables”)

An efficient solution that empowers engineers to virtually compare materials before going into the lengthy physical allowables. By generating virtual allowables, engineers can now start the component design in parallel to the physical allowable campaign.

Digimat-VA is a vertical solution developed to virtually compute the behavior of composite coupons (unnotched, open hole, filled hole). It allows engineers to screen, select and compute the allowables of composite materials in less time and at less cost.

A standard combination of the different DIGIMAT tools for licensing would be DIGIMAT-MF, DIGIMAT-map and DIGIMAT-CAE, allowing engineers to close the gap between process simulation and serviceability simulations as well as the consideration of micromechanics in their full scale analysis. For an in-depth look into the material, DIGIMAT-FE allows the user to generate RVEs, mesh them and even perform micromechanical simulations with the generated structures. Willing to avoid extensive experimental testing and sharing generated data with other users of the DIGIMAT community, the DIGIMAT-MX exchange platform is recommended for a first approach during the basic material characterization.

CONTACTS:

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@ Kathleen Fritz

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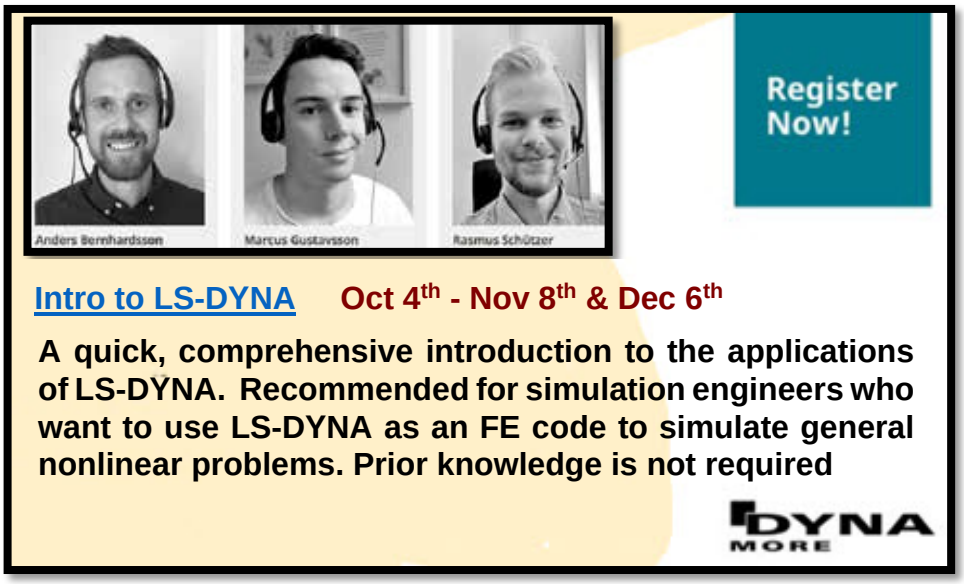
@ Kathrin Faas

"The countdown has started! Are you ready for October 18-19?
Nordic LS-DYNA Users' Conference 2022 Join us in Gothenburg, Sweden.



Video Library - Welcome to DYNAmore Nordic's Video Library! Here you find training videos and tutorials about numerous LS-DYNA applications and all other products

OCTOBER – The full calendar for training & Webinars are on our website

10th	**Material Models in LS-DYNA - Jesper Karlsson** In this seminar we will give you the theoretical background of a number of material models in LS-DYNA and point at their differences. The seminar includes a number of computer exercises.
11th	**Non-Linear Implicit Analysis in LS-DYNA - Anders Jonsson** This course presents a theoretical and practical introduction to the implicit capabilities in LS-DYNA with a focus on structural analysis. The course is suited for users with at least some previous experience from using LS-DYNA for explicit analyses or for experienced users of other implicit FE-programs.
25th	**Parameter Identification with LS-OPT - David Aspenberg** In this seminar, a brief introduction in LS-OPT is made with the focus on the application of LS-OPT to determine material parameters. No prior knowledge about optimization or the application of LS-OPT is required.
26th	**Contacts in LS-DYNA (2 days) - Jimmy Forsberg** This is an excellent opportunity to quickly assess a deeper understanding of contacts, very valuable for anyone working with contacts in LS-DYNA. You will gain some insight in the LS-DYNA methodology regarding contact treatment as well as the used terminology when discussing contacts. The aim is to explain some of the standard contact situations and how the different contact algorithms will treat them. Theoretical presentations are in this course mixed up with various small exercises which illustrate some of the features of the different contacts available.

Every year, many master's students use LS-DYNA for their thesis.
At Dynamore Nordic, we encourage that by offering classes and support.

We would like to acknowledge the work by Nils Olofsson and Max Nylund from Chalmers University and their work on **"Rib fracture injury risk function assessment for the THOR-50M using population-based finite element crash reconstructions"**. In their work, they used LS-DYNA and LS-OPT.

Master's thesis in APPLIED MECHANICS AND AUTOMOTIVE ENGINEERING
Max Nylund Nils Olofsson

In their work, they used LS-DYNA and LS-OPT to run a population-based study of 1000 simulations with varying car interiors to compare the predicted risk for rib fracture of different injury risk functions with real-life data from NASS/CDS.

Their conclusion was that PC score should be used for evaluating thorax injuries with the THOR dummy. Great work!

ABSTRACT - Frontal crashes account for around 50% of all fatalities in passenger cars and thorax injuries are common in this type of crash. To evaluate car crash performance, mechanical representations of human occupants are used, which are called Anthropomorphic Test Devices. The most advanced for frontal crashes is the Test device for Human Occupant Restraint (THOR), which has multiple deflection measurement locations in the chest. This study used a generic Finite Element (FE) car interior model, that was based on several different cars, and was meant to represent the cars present in a selection of NASS/CDS accident cases. Several different injury criteria were used to evaluate the risk of sustaining a three or more severe injury on the Abbreviated Injury Scale (AIS3+), four or more Number of Fractured Ribs (NFR4+) or NFR3+ level of thorax injury. A population based stochastic simulation study was set up and 1000 simulations with parameterized and morphed car interior models were run in the explicit FE solver LS-DYNA, and parameters were sampled using the optimization software LS-OPT. Using logistic regression and a generalized linear model, risk curves were generated for several rib fracture risk criteria, based on the simulations results. These risk curves were then compared to the AIS3+ rib fracture risk from the NASS/CDS field data. From the analysis of the results, it was apparent that the rib fracture risk criterion TIC NSFR fit the NASS/CDS risk curve the best. The rib fracture risk criteria based on Rmax and Dmax overpredicted the injury risk considerably, with a Winsmash Δv of 56 km/h and 49 km/h for 50% risk of AIS3+ rib fracture for Rmax and Dmax, respectively, while the NASS/CDS risk curve predicted a risk of 50% at 99 km/h. The rib fracture risk criterion T ICNSF R had the 50% risk at a Winsmash Δv of 95 km/h, which was indeed closer to the NASS/CDS risk curve. However, since TIC NSFR seemed to be too insensitive, with few risk predictions above 20%, it is not recommended as the best available rib fracture risk function to be used with the THOR ATD based on comparison to the risk of rib fracture in the selection of NASS/CDS data. The injury criteria TIC NFR and PCscore showed better sensitivity, while performing well compared to the selected NASS/CDS data. PCscore is slightly preferred, for it is defined for the same injury classification as used in NASS/CDS, AIS3+. PCscore is therefore recommended as the best risk function, among the ones considered, for evaluating the risk of rib fracture with the THOR-50M ATD.

In this technical article, we demonstrate how to apply a one-way coupling technique using a combination of ParticleWorks and LS-DYNA to estimate tsunami damage to a vehicle. Particleworks is a Particle Method Based CFD Software developed by Prometech Software Inc. Japan

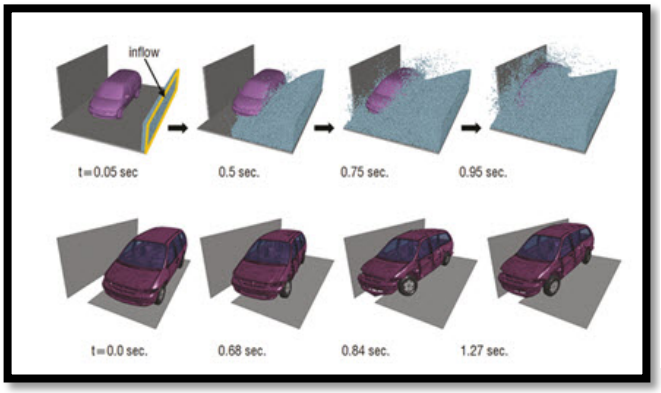
Estimation of tsunami damage to vehicles using simulation with Particleworks and LS-DYNA

MPS method in fluid computational dynamics offers possibilities for improving the design of vehicle safety

ABSTRACT - Moving particle simulation (MPS) method can be applied in a two-stage simulation in computer aided engineering to resolve fluid structure interaction problems for industrial design..

In this technical article, we demonstrate how to apply a one-way coupling technique using a combination of ParticleWorks and LS-DYNA to estimate tsunami damage to a vehicle. This technique can be used for resolving problems with incompressible fluid dynamics in various industries in the product design, development and manufacturing phases.

In the first stage of this simulation, we create the vehicle as a rigid body particle cluster, calculate the pressure distribution on the particle structure and map it on the STL vertexes to obtain the pressure history, which is converted into pressure load for the second stage of the simulation.



In the second phase, we obtain the deformation and stress distribution on the vehicle from both the impact of the tsunami and the vehicle's consequent impact with the nearby wall.

UP: Results of tsunami simulation using Particleworks

DOWN: Motion of the vehicle caused by the pressure of the tsunami

In recent years, various particle methods have been developed as numerical simulation techniques and used in product design and development. The particle method provides some advantages which can be summarized as follows:

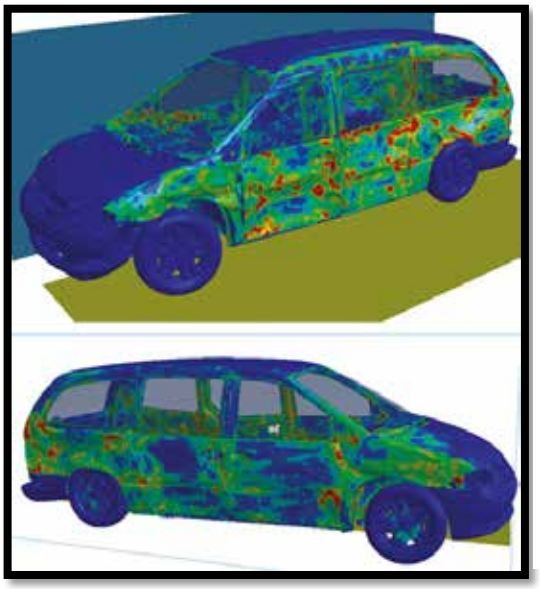
(1) Complex spatial mesh generation is not necessary.
(2) Special treatment to track free surface motion is not necessary.
(3) No mesh distortion in the case of large deformation.

Since the particle method is fully Lagrangian, the advection term can be omitted in the governing equation. Hence numerical diffusion coming from the advection term treatment can be eliminated through the computation. A unique particle method called MPS has been developed and used in various CAE application problems. MPS was originally developed as a discretization scheme of incompressible viscous flow and the first paper dedicated to MPS was published in 1996[1].

The original MPS adopted a semi-implicit time integration scheme, and the abbreviation MPS stands for “Moving Particle Semi-implicit” method. In the meantime, also a fully explicit version of MPS has been developed. Today, MPS is known as a “Moving Particle Simulation” method. MPS is a suitable numerical procedure for the simulation of ordinary incompressible flow, it is applied in particular for different fluid flow problems in the engineering field. In this article, an efficient one-way coupling technique to estimate deformation of products using the MPS-based CFD software Particleworks and the explicit FEM software LS-DYNA is presented. The numerical procedure of MPS is also discussed briefly.

An efficient technique to treat Fluid Structure Interaction problems - FSI problems need to be solved very often in industrial product design and development. LS-DYNA offers capabilities for modeling FSI problems using SPH (Smoothed Particle Hydrodynamics) or ALE (Arbitrary Lagrangian Eulerian) methods. However, computation of FSI problems with SPH or ALE is very time consuming because a compressible flow solver needs to be used in an explicit time integration scheme with very small time steps. In contrast, MPS, as an incompressible flow solver, can take larger time steps and treat the fluid region very efficiently. Thus a combination of Particleworks and LS-DYNA may be a practical solution to treat the FSI problem. The application example using Particleworks and LS-DYNA presented here is a tsunami simulation of a vehicle. The purpose is the damage estimation of a vehicle drifted by tsunami. If passengers can escape from the drifted vehicle by opening the doors, more people may survive the disaster. A safer design to protect passengers from the impact of a tsunami may be realized. In this context, the suggested procedure of the simulation is as follows:

(1) Perform tsunami simulation using Particleworks in the first phase of the simulation. The vehicle is modeled as a rigid body using the STL format geometry. The vehicle is constructed using rigid body particle cluster generated in the given STL geometry. The vehicle is washed away and impacts with a rigid wall. (2) Pressure history on the surface of the vehicle is obtained from the first stage of the simulation. Pressure is calculated on each rigid particle and it is mapped on the STL vertexes. (3) Pressure at the particles on the surface of the vehicle is converted to the pressure history load data acting on each finite element. During this data conversion process, we search for the particle closest to a shell element. (4) Execute crash simulation of the vehicle against the rigid wall in the second phase of the simulation. The vehicle is pushed towards the rigid wall by the pressure load and causes damage.



The flow of the tsunami and the behavior of the vehicle are obtained in the first stage as shown in Fig.2. The vehicle is placed at the position of 1,000 mm from a rigid wall at the beginning of the simulation. Water entries the model from the inflow with a velocity of 4,000 mm/s. The vehicle is washed away and crashes against the wall. The event interval was 1.35 seconds. With this simulation, we could obtain the pressure history acting on the surface of the vehicle. The pressure was calculated on each particle during the simulation and then it was mapped on the STL vertexes by post processing.

Deformation & Mises stress distribution of the vehicle at 1.0 sec.
UP: tsunami side DOWN: wall side

After the tsunami simulation, the pressure history was converted into pressure load for the LS-DYNA crash simulation. Figure 3 shows the mapping process of the pressure distribution through particles to finite elements. In the second phase, a transient analysis of the vehicle model using LS-DYNA was executed and deformation and stress distribution was obtained through the simulation. The vehicle motion caused by the tsunami is shown in Fig.4. As the illustration details, the vehicle is pushed towards the wall, hit against the wall and lifted up by the pressure of the tsunami. As a result, large deformation occurs on the vehicle body. Figure 5 shows the deformed geometry and von Mises stress distribution of the vehicle. Large deformation can be seen not only on the right hand side where the vehicle contacts with the rigid wall, but also on the left hand side.

EXCERPTS - Algorithm of MPS method - For accuracy of Algorithms please visit the website

$$\frac{D\rho}{Dt} = 0$$

$$\frac{Du}{Dt} = -\frac{1}{\rho}\nabla P + \nu\nabla^2 u + g$$

The governing equations for incompressible flow are the continuity condition Eq.1 and the Navier-Stokes equations Eq.2,

where, ; density, u; velocity, P; pressure, v; diffusion coefficient, and g; gravity.

MPS defines the kernel function of the form as…

$$w(r) = \begin{cases} \frac{r_e}{r} - 1 & (r < r_e) \\ 0 & (r \geq r_e) \end{cases}$$

Conclusions

An efficient one-way fluid structure coupling technique using Particleworks and LS-DYNA was presented. Because MPS in Particleworks can be applied for incompressible fluid dynamics, this simple procedure can be used widely for product design, development and manufacturing in various industries. The numerical procedure of the particle method MPS was also introduced briefly.

Newsletter EnginSoft Year 11 n°3

Sunao Tokura | Technical Advisor for Prometech Software Inc.

A measurement can be accurate without being precise, or precise without being accurate. For a manufacturer to be confident about the quality of their products, they need accuracy and precision. Confused? Read on.

What is the difference between accuracy and precision?

By Richard Baldwin

There is an old story that goes like this: A man walks to work every day past a watch shop. This shop advertises a particular clock, said to be the most accurate ever made. The man is in the army, and one of his responsibilities is a ceremonial duty. He has to fire a gun into the air, every day at noon from the highest point in the city. To make sure he fires the gun at the same time every day, he walks past the clock shop and sets his watch according to this highly accurate clock.

One day, after several years, the man decides to go into the watch shop and ask about this super accurate clock. What's it made of? How does it work? And finally, how can the proprietor be so sure of its accuracy?

The shop keeper explains: "Every day at noon a soldier fires a gun from the top of the hill, and this clock has never deviated, never lost a second. That's how I know."

We could say that both the clock and the firing of the gun are precise because they both produce a repeatable and consistent result. The clock always strikes 12 at the same time the man fires his gun. However, they are not accurate. The measurement in this case is biased because the instruments (clock and gun) are not calibrated correctly.

In non-scientific language we often use the terms 'accuracy' and 'precision' interchangeably, but they are not the same. To take a reliable measurement both are equally important.

The definition of "accuracy" and "precision"

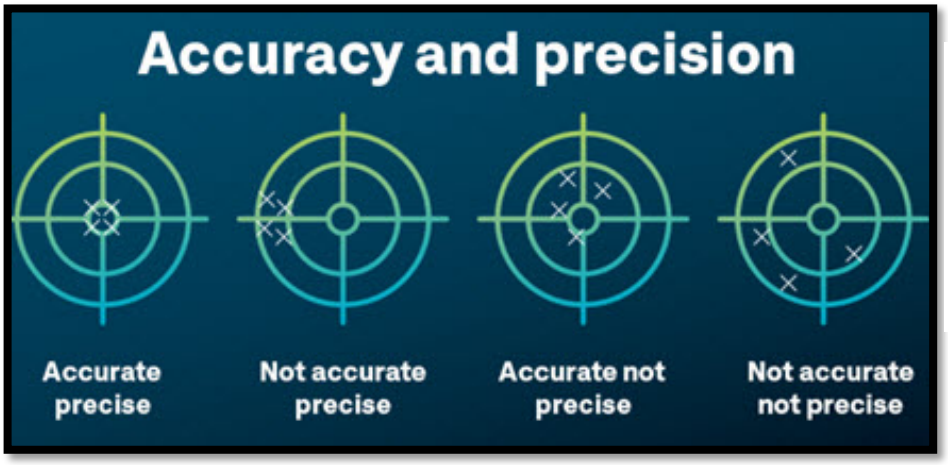
- Accuracy can be defined as the closeness of a measured value to a 'true value'.
- Precision is defined as the ability of a measurement to be consistently reproduced.

Accuracy means getting the correct answer. Precision means getting the same answer every time.

Even a stopped clock is accurate twice a day

If a student adds up 1 + 1 and reaches an answer of 2 they are accurate. To be accurate and precise the same student would need to add up 1 + 1 several times and always find the same answer. However, if that same student repeatedly finds an answer of 3, they are (of course) not accurate, but they are precise.

Returning to our analogy of clocks. Imagine an unscrupulous manufacturer who claims to sell a perfectly accurate watch but fails to mention that the watch never gives a precise reading. One day it tells the correct time. The next day it's a few seconds slow. Another day it's fast. If you take an average reading over a month, the watch is perfectly accurate, but at any one occasion the owner will never know precise time.



Accuracy is not the same as precision

Why do accuracy and precision matter? We all make measurements every day. Simply looking at a clock to tell the time is a measurement. Every time you step on the bathroom scales you are taking a measurement. Boil the kettle and when it turns off automatically at 100 degrees, that's a measurement.

But these two concepts are far more significant than the temperature of your morning cup of tea.

Manufacturers need to have confidence in their components. Reputations, contracts, businesses, even lives might depend on it. By striving to improve accuracy and precision in manufacturing, engineers can make safer products. They can reduce waste materials. They'll make better, more reliable products that last longer and cost less to maintain.

Excerpt - If you're interested in reading more articles on basic and applied metrology concepts there are lots of resources available. Visit our popular Metrology 101 materials…. and for a more solution based approach check out our fascinating "Can I Measure It?" video series.

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

September 21, 2022

Series 1 – Pedestrian Safety Tools: Pedestrian markup and pedestrian model build

This webinar covers the use of the Pedestrian Markup tool within Oasys PRIMER, to generate pedestrian impact points and markup lines, and to then build models with impactors in position.

Webinar Host - Harry Buttery

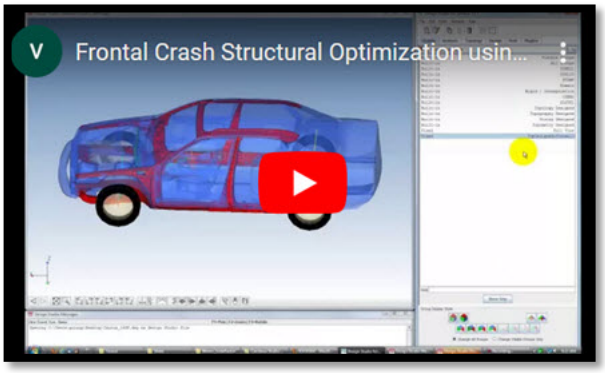
Harry has over 4 years experience working on the Oasys Suite as part of his role as a Software Developer. He has helped to develop a range of different features within Oasys PRIMER including the Pedestrian Markup tool, the Implicit Setup tool, and the Mesh Morphing tool; and has also delivered the Introduction to PRIMER training courses.

Oct 4th - Series 2 – Pedestrian Safety Tools: Oasys REPORTER Template
Webinar Host - Rory Bradshaw - Rory has over 3 years of experience using the Oasys Suite during his day job as a Structural Engineer. He has worked on a range of projects around the world including seismic, offshore, geotechnical, structural dynamics and fatigue engineering. He has also delivered a number of Oasys training courses and you might also recognise him from the popular 'Oasys Top Tips' video series.

Oct. 26th Series 3 – Pedestrian Safety Tools: Head workflow – HIC Area Calculator and Pedestrian Run Builder
Webinar Host - Katie Lampl - Katie is an Engineer at Arup's Advanced Digital Engineering group with around 3 years' experience using LS-DYNA and the Oasys software. She has used LS-DYNA on a wide variety of projects, including civil, seismic and automotive

.

Introducing ESLDYNA - An optimization software that couples Genesis® optimization to the LS-DYNA® Nonlinear Analysis.



ESLDYNA

Large Scale Optimization for LS-DYNA® Analysis

ESLDYNA is an optimization software that couples Genesis® optimization to the LS-DYNA®(*) Nonlinear Analysis.

ESLDYNA is based on the Equivalent Static Loads (ESL) method which takes advantage of the ability of Genesis® to solve large scale optimization problems using external responses from the LS-DYNA nonlinear finite element solver. One of the key advantages of ESLDYNA is to significantly reduce the run time by identifying high performance designs with only five to ten nonlinear analyses.

(*) LS-DYNA is a trademark of LST/ANSYS. LS-DYNA is a general-purpose finite element program capable of simulating highly nonlinear, transient dynamic problems.

Benefits

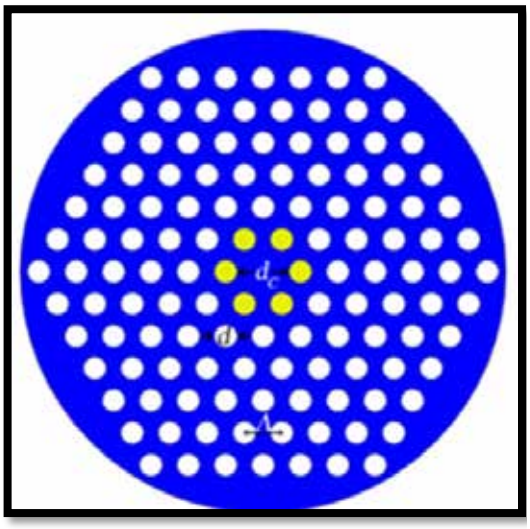
- Reduced Computational Cost. Solution converge in only 5 to 15 design cycles
- Easy implementation of Shape, Sizing, Topology, Topometry, Topography, and Freeform design changes
- Simple and efficient coupling using a Design Studio Plugin

Highlights

- Seamless integrates Genesis® optimization capabilities with LS-DYNA® analysis
- Multiple LS-DYNA® loading conditions or input files can be considered simultaneously
- Linear loading conditions/analysis can also be used in the same optimization. This allows for MDO optimization (e.g. simultaneously optimize for stiffness and NVH)
- Ability to transfer data between FE Meshes of different resolutions

Metin Ozen
Principal & CEO at Ozen Engineering, Inc. and Mallett Technology, Inc.

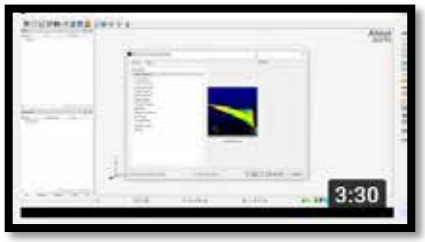
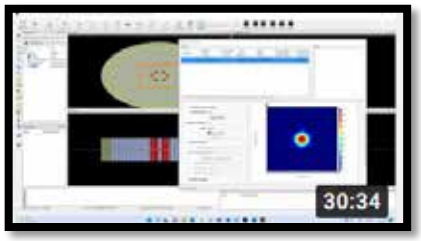
Excerpt - **Dispersion Engineering in Photonic Crystal Fiber- Lumerical Mode** by: **Majid Ebnali Heidari**



Tool Description

- The primary Lumerical MODE feature is the "eigenmode solver". This tool is used to design, analyze and optimize guided wave components, such as silicon photonic waveguides, Fiber, Photonic crystal fibers and waveguides.
- We use FDE solver from Lumerical MODE to engineer the dispersion of PCF.
- Lumerical MODE also includes solvers for simulating the propagation of optical fields. There are two solvers: a) 2.5D Finite Different Time Domain method, and b) Eigenmode Expansion method. These are used to simulate, design and optimize photonic components.
- We make use of Lumerical Mode to calculate the dispersion, Loss, and effective area of photonic crystal fiber based on this paper: [1] M. Ebnali-Heidari, et.al, “Proposal for Supercontinuum Generation by Optofluidic Infiltrated Photonic Crystal Fibers,” IEEE Journal of Selected Topics In Quantum Electronics, vol. 20, no. 5, 2014.

Don’t miss our current YouTube Channel

	**How to transfer a .res file from CFX to Ensight (Transient Solution)?** This video shows you how to translate a .res file from CFX into an Ensight Case file format for post-processing purposes.
	**Dispersion Engineering in Photonic Crystal Fiber- Lumerical Mode** You'll learn how to simulate photonic crystal fiber using Lumerical MODE, how to calculate dispersion, loss, and group index, as well as how to manage dispersion in this video. Using Lumerical mode, you can design photonic crystal fiber as follows: · The first step is to open the Lumerical MODE on your computer. · Describe the geometry of a photonic crystal fiber in detail. · Provide the material with the parameters it requires. · Determine where the simulation will take place. · Extraction of the results from the results.

NISMO Festival returns in December at Fuji Speedway Experience the excitement of Nissan Racing DNA and the NISMO brand

YOKOHAMA, Japan – Nissan and NISMO fans can again look forward to seeing their favorite Nissan race cars and drivers up close at **the 23rd annual NISMO Festival on Dec. 4 at Fuji Speedway in Shizuoka, Japan.**

The annual fan appreciation event enables fans to experience the excitement of motorsports, Nissan Racing DNA and the NISMO brand. This year's event will highlight the history of the NISMO Festival and Fairlady Z race cars. **Online content will be available for fans who can't participate in person.**

After being held for 22 years, the NISMO Festival was regrettably canceled the last two years to help contain COVID-19 and ensure the well-being of fans, participating teams, exhibitors, and Nissan and NISMO employees. This year, Nissan and Nissan Motorsports & Customizing Co., Ltd. (NMC) have decided to hold the festival to meet the expectations of fans while making the upmost effort to prevent the spread of COVID-19.

Takao Katagiri, head of Nissan's Motorsports Business Unit Office and president of NMC, says, "Over the past two years, we have heard from many fans who are eagerly waiting for the NISMO Festival to be held again. As NMC was established to integrate the strengths of NISMO and AUTECH, we're excited to showcase an even more attractive NISMO brand. This year we will also hold an AUTECH owners group Shonan homecoming meeting, which had previously been canceled due to the pandemic. We will take thorough precautions to help prevent the spread of COVID-19 and ensure the well-being of all participants at the event. We're looking forward to seeing you there."

- Event name NISMO Festival at Fuji Speedway 2022
- Event outline: Racing car demonstration/exhibition, vendor booths, online content
- Date: December 4, 2022
- Time: 9:00 a.m. to 3:30 p.m. (scheduled events)
- Venue: Fuji Speedway, Shizuoka Prefecture, Japan
- Organizer: Nissan Motorsports & Customizing Co., Ltd.
- Partner: Nissan Motor Co., Ltd.

EXCERPT - Mahindra launches the Scorpio Classic – the new avatar of its legendary Scorpio SUV - Mahindra & Mahindra Ltd., pioneers of the SUV segment in India, today announced the launch of the Scorpio Classic, a new avatar of its iconic brand Scorpio.

Retains the original silhouette of the legendary Scorpio; now offered with a refreshed design, enhanced performance, improved ride quality, and built-in technology

Mahindra & Mahindra Ltd., pioneers of the SUV segment in India, today announced the launch of the Scorpio Classic, a new avatar of its iconic brand Scorpio.

Over 20 years, the Scorpio has attained legendary status and represented the tough and authentic DNA of Mahindra SUVs. To celebrate this monumental achievement of two decades, **Mahindra has launched the Scorpio Classic, which retains the silhouette of the original and is offered now with refreshed looks, contemporary interiors, and a new powerful engine, among others.**

…

R. Velusamy, President, Automotive Technology and Product Development, M&M Ltd., said, "The Scorpio was the first-ever modern SUV designed and developed entirely in-house, establishing Mahindra's engineering credentials. Its immense popularity has established Mahindra's reputation as a manufacturer of tough yet sophisticated automobiles that have a universal appeal. The Scorpio Classic has been engineered to present strongly its propositions of stand-out design, built-in technology, powerful performance and premium interiors to carry forward the legacy of the Scorpio."

About Scorpio Classic - The Scorpio Classic can be distinguished by its new bold grille along with a muscular bonnet with hood scoop and the new twin-peaks logo. The new DRLs with the signature Scorpio tower LED tail lamps and new R17 diamond-cut alloy wheels further add to the appeal of the original form.

Scorpio Classic boasts superior performance – powered by an all-aluminum lightweight GEN-2 mHawk engine, producing a whopping 97 kW (132 PS) of power and 300 Nm torque. A substantial 230 Nm of low-end torque is produced at only 1000 rpm. Scorpio Classic boasts superior performance – powered by an all-aluminum lightweight GEN-2 mHawk engine, producing a whopping 97 kW (132 PS) of power and 300 Nm torque. A substantial 230 Nm of low-end torque is produced at only 1000 rpm.

The engine is 55 kilos lighter and is 14 percent more fuel efficient than the engine that powered the previous model. To further refine the driving experience, a new six-speed cable shift has been introduced in the manual transmission. The suspension set-up has been enhanced with MTV-CL technology to deliver superior ride and handling. Significant advancement has been made in the steering system for easy maneuverability and control.

The Scorpio has always stood out for its refined SUV interiors….

EXCERPT - DEFIANT Pilots Talk Future Long-Range Assault Aircraft - Test Pilots: Ed Henderscheid (Boeing), Bill Fell (Sikorsky)

Read about Bill and Ed's Excellent DEFIANT Helicopter Adventures and watch the video

Sikorsky pilot Bill Fell and Boeing pilot Ed Henderscheid have a combined 60-plus years of helicopter experience between them, and are part of the program to bring the Future Long-Range Assault Aircraft (FLRAA) to the United States Army. In this Q&A, they share what they love about the Lockheed Martin Sikorsky-Boeing SB>1 DEFIANT technology demonstrator and the DEFIANT X, which the companies are proposing for the FLRAA program.

Q: What's it like to fly the Sikorsky-Boeing SB>1 DEFIANT, the DEFIANT X technology demonstrator based on X2™ technology that the companies are offering for the U.S. Army's Future Long-Range Assault Aircraft (FLRAA)?

Bill Fell: The DEFIANT is a great helicopter with a long list of accomplishments. The roll rate is crisp and sporty, the acceleration is exceptional, the low-speed maneuvering is as good as any helicopter and the demonstrated external lift is superb. There are two distinct ways to fly DEFIANT:

- You can fly it with the prop (the rotating blade on the back of the aircraft) engaged. In this mode we still fly it like a helicopter in the low-speed environment. That helps with acceleration or pitch pointing the aircraft. This feature has awesome safety implications. The pilot can provide some reverse prop to keep a nose-low attitude to get a better view of everything in front of them. This is helpful in obstacle rich environments not only for combat, but also for any application.
- You can fly DEFIANT with the prop disengaged. This adds amazing survivability as the tail of the aircraft is no longer flight critical like, for example, a tail rotor. If DEFIANT takes significant combat damage to the prop, the pilot can disengage the clutch and fly home at speeds higher than helicopters fly today.

Having the ability to fly DEFIANT with and without the prop engaged also allows us to manage the acoustic footprint based on the environment and greatly increases survivability.

What's amazing about this aircraft is how quickly pilots take to it in the simulator and in the aircraft. The robust flight controls provided in the full authority system even make it easy for those with no flight experience to fly the aircraft. The flight controls in DEFIANT X will add all the bells and whistles expected of a modern aircraft. It will make flying the aircraft a lower-workload task, so the pilots can focus on the mission.

Did you know Turkish Aerospace has Technology Centers?

Turkish Aerospace Technology Centers engage in various activities according to its duties and responsibilities defined below in coordination with the other engineering directorates.

- Research studies on new, advanced and critical technologies
- Studies aimed to improve the technological depth on the company's thematic areas of technology
- Hands-on research studies to increase the competitiveness of products
- Knowledge transfer, dissemination of developed and derived knowledge
- Contributing to the training of high-quality human resources
- Encouraging award-winning competitions on innovative topics

Turkish Aerospace' four (4) Technology Centers focus on the following innovative studies.

İMPET İLERİ MALZEME PROSES VE ENERJİ TEKNOLOJİLERİ	· Research studies on new, advanced and critical technologies · Studies aimed to improve the technological depth on the company's thematic areas of technology · Hands-on research studies to increase the competitiveness of products · Knowledge transfer, dissemination of developed and derived knowledge · Contributing to the training of high-quality human resources · Encouraging award-winning competitions on innovative topics
ÖMAT	· Research on advanced materials (e.g. nano materials) · Research on new manufacturing techniques (e.g. layered manufacturing) · Research on new energy generation and storage systems · Joint projects with universities and research institutions · Implementation and laboratory testing of the researched technologies in the aviation and space industry · Development of processes to industrialize the researched technologies
GeHAKT GELİŞMİŞ HAVA ARACI KONSEPTLERİ	· Conducting basic research for new aerial vehicle concepts and performing the modeling, design and simulation works · Researching new system concepts such as innovative flight control systems, increased use of electricity in aerial vehicles · Conducting scientific studies with universities and research institutions
DKTM DÖNER KANAT TEKNOLOJİ MERKEZİ	· The Rotor Wing Technology Center (DKTM) was established in Turkish Aerospace METU Teknokent facilities under the Original Helicopter Program Agreement signed between the Defense Industry Undersecretariat (SSM) and Turkish Aerospace on June 26, 2013. · The purpose of DKTM is to research and acquire the future helicopter technologies, improve the university-industry cooperation, and contribute to the manpower trained in areas of helicopter technology in the long term. · DKTM was established to develop technologies that are not available in the helicopter industry in the world or are not accessible in our country.

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

The Old Pilot and the Town Secretary are arguing.
Has anyone noticed they seem to argue every month.

The hint that he told her was to think about storms - she is screaming Cyclone? Hurricane?
He keeps answering NO you have to guess again. With every wrong guess she's getting louder!

Quiz - can you guess the names?

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

A_____

B_____

C_____

D_____

US Airforce Week in Pictures

Strategic deterrence - A U.S. Air Force B-2 Spirit, assigned to 509th Bomb Wing, Whiteman Air Force Base, Mo., taxis at Royal Australian Air Force Base Amberley, Australia, in support of a Bomber Task Force mission, July 25, 2022. The BTF employs the aircraft to conduct joint training and strategic deterrence missions alongside allies and partners in support of U.S. Indo-Pacific Command's commitment to a free and open Indo-Pacific.

(U.S. Air Force photo by Tech. Sgt. Dylan Nuckolls)

Falcons in flight

F-16 Fighting Falcons from Luke Air Force Base, Ariz., prepare to be refueled by a KC-135 Stratotanker from the 161st Air Refueling Wing during a local sortie, Aug. 6, 2022. The 161st ARW, from Goldwater Air National Guard Base, Ariz., conducts regular air refueling missions with their regional partners at Luke AFB.

(U.S. Air National Guard photo by
Staff Sgt. James A. Richardson Jr.)

Arctic Thunder

The U.S. Air Force Air Demonstration Squadron "Thunderbirds" perform during the Arctic Thunder Open House at Joint Base Elmendorf-Richardson, Alaska, July 29, 2022. The Thunderbirds are scheduled to perform nearly 70 air shows in almost three dozen locations this year.

(U.S. Air Force photo by Senior Airman Jordan Smith)

Thanks to Madhukar Chatiri

Excerpt- Use Case: The human lung - When we think of simulation, most people think of models of climate, environment, technology or the universe. At the Chair of Computational Mechanics at the Technische Universität München, an interdisciplinary team led by Prof. Dr. Wolfgang Wall has developed a fascinating and useful #model of the human lung: In recent years, this has become increasingly detailed, accurate and now also spatial. Today it serves as a basis for individualising medicine. During the corona pandemic, the model showed its worth. It helped to tailor ventilation to the needs of individual patients and so it helps to save lives:

Graphic, three-dimensional image of the human lung. Graphic: Chair of Numerical Mechanics/TUM

Leibniz Supercomputing Centre of the Bavarian Academy of Sciences and Humanties
Use Case: The human lung

Ever tried to blow up a figure balloon - with ears, legs, paws and more? It doesn't always go well: sometimes only one ear fills up, sometimes legs remain small or limp, sometimes the thing bursts. Ventilation of the lungs is very similar. The only difference is that intensive care physicians are faced with the delicate task of evenly filling millions and millions of small ears or, better, filigree bubbles with air. Some of them, however, are already full of water or mucus and can therefore only absorb a small amount of air; in others, the tissue is stiff or brittle, and they need be filled with extreme caution. Last but not least, doctors are not only working under extreme time pressure during ventilation, they also cannot see how which parts of the lungs are filling up and where there may be a risk of excessive pressure. Ventilation is a complex task and it comes with high risks: According to experience from hospitals, up to 50 percent of ventilated patients still lead to death.

A solution to this intolerable dilemma is now being provided by the academic field of mechanics and its spin-off, numerical mechanics. These disciplines have long been devoted not only to machines, technology or production processes, but increasingly to organ functions or even living beings: "All physical, biological, chemical phenomena can be described by mathematical equations," explains Professor Dr. Wolfgang Wall, head of the Chair of Numerical Mechanics (LNM) at the Technical University of Munich (TUM). "And mechanics plays a very essential, though long underestimated, role in living systems." Mechanics focuses on interactions of forces and motions as well as deformations of solid, liquid or gaseous bodies and substances and their calculations; numerical mechanics, in turn, develops models, equations, even computer programs to digitally reproduce flows and deformations or even organs. In recent years, Wall's department has developed a highly regarded, extremely accurate model of the human lung, which breaks with traditional ideas, helps medicine to better understand the processes involved in ventilation and, in any case, to gently and individually fill the millions and millions of bubbles of what is probably the most complex figure balloon today.

Kids-that-Code Computer Games – By Grandpa

Pre-Pandemic I wrote Kids-that-Code that focused on children between 5-10 years old.
You can find that document on the below drop box link
(https://www.dropbox.com/s/6ubnlzwmpzxugl3/kids-that-code.pdf?dl=0)

My granddaughter, Rheannon, is now 11. Like many children her age, she's interested in collaborative online gaming (e.g., Minecraft). I decided now is the best time to introduce her to game development software. I would prefer Rheannon aspire to be a "game developer" and not a "gamer." The best part is that you can justify buying yourself a more powerful computer, so your child has the best equipment to become a game developer.

The top 2 three-dimensional game development software packages are Unreal Engine and Unity. The best two-dimensional package is BuildBox. These packages are free for personal use. A license fee is required to install the game you develop onto another device (e.g., a tablet, PlayStation, Xbox).

Here are home page links for this software:

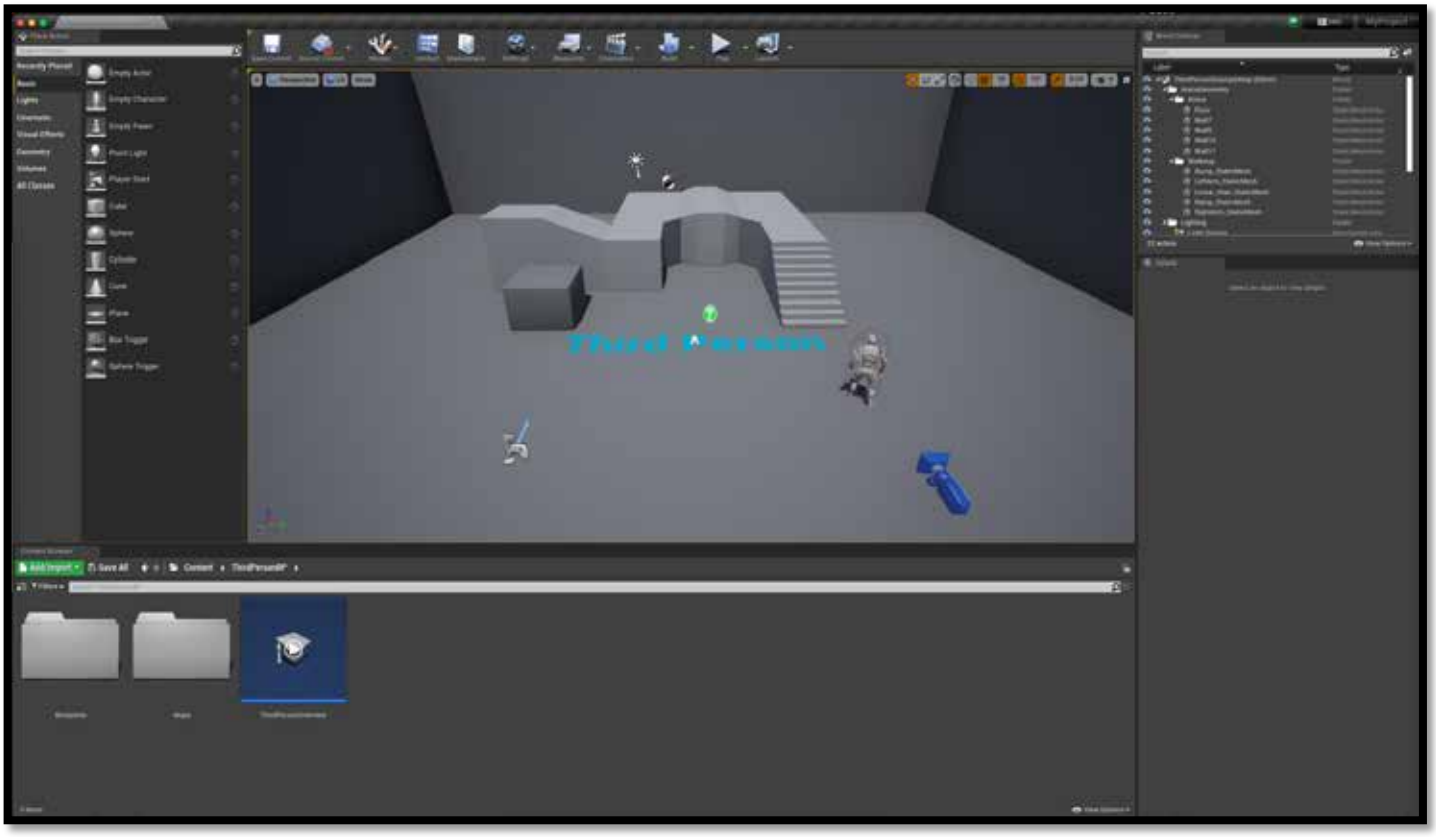
Unreal Engine: https://www.unrealengine.com/en-US/
Unity: https://unity.com
BuildBox: https://signup.buildbox.com

I decided to focus on using Unreal Engine (UE) because of the excellent online tutorials. UE is as complex to learn as any finite element software, including the pre- and post- processors, that you have used.

This video (https://www.youtube.com/watch?v=qC5KtatMcUw) by UE developers presents some of the capabilities of the latest release called UE5. Skip the first minute of the video to jump to the technical specifications.

The best starting point for a newbie is using the 8-part tutorial series https://www.youtube.com/watch?v=iTwxuahe5B4. This tutorial is for the previous release of Unreal Engine known as UE4. I suggest downloading UE4 to follow this tutorial. UE5 has a different graphical user interface (GUI). There are online tutorials presenting the new UE5 GUI and the differences from UE4.

The first UE4 tutorial covers: (1) How to create a new project, (2) How to move around in 3D, and (3) How to use the UE4 GUI. Creating a new project is facilitated by pre-installed templates. The following figure shows the UE4 window system consisting of several panes. The center pane displays the template to create a third person game. The template includes a dummy asset with motion controlled by keyboard arrow keys, mouse buttons, track ball, or game controller. Additional assets are stairs and platforms with contact definitions so the dummy walks on the surfaces and not through the objects. Also included is a camera asset that follows the dummy so you have a view of what the dummy is seeing as it moves through the game world.



Notice the geometry building blocks (e.g., cube, sphere, plane, etc.) in the second pane from the left in the above figure. This is similar to a finite element pre-processer as a way to build complex objects. Motion physics and interactions will be correct if the game world objects are created using real world dimensions. The dummy is 180 cm tall.

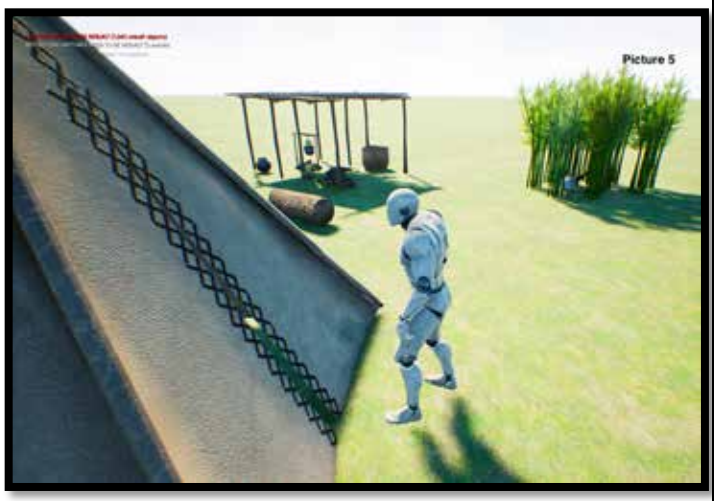
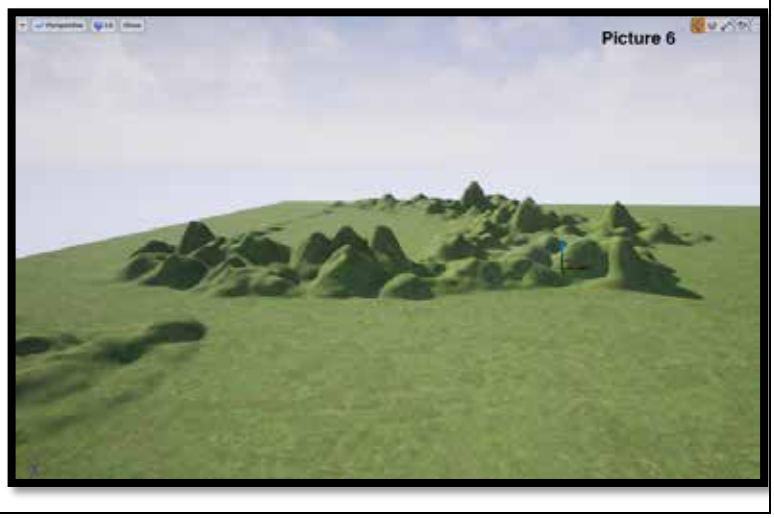
A California fifth grade school curriculum requirement is a multi-week project studying the history of California missions (https://californiamissionsfoundation.org/the-california-missions/). Children make models of a mission using cardboard, Lego bricks, or paper mache. **Rheannon decided to use UE4 to create a mission in a game world. Shown in the following figure sequence are the beginning stages of her game world.**

This is a birds-eye view of the game world showing the mission church, an Indian village, and a stream.

The dummy is looking at the Church and will move forward to enter it. Notice the shadow. The sun position is from behind the dummies right shoulder.

The dummy is inside the church and can move around while exploring the interior.

The dummy is leaving the church and moving toward the Indian village. Notice the dummies shadow on the floor.

Can you find the code bug in this picture? Notice the dummy is floating off the ground and not attached to its shadow. The fix is to correct the gravitational force.	Here is her attempt to add hills to the landscape. Uh-Oh! We have a flat Earth. The dummy will fall off to negative Z-infinity if it reaches the edge. "GAME OVER – YOU LOST"
 Picture 5	 Picture 6

Now comes the justification to buy yourself a new computer. We started with a Mac mini computer having a 6-core, 3.2 GHz, Intel i7 CPU running at 3.2 GHz and an Intel 630 Graphics Card. This was powerful enough to perform the tutorial exercises. All game world surfaces are defined by triangles. As the number of surfaces in the game world increase, so does the triangle count. Then with the addition of lighting and hidden surfaces, the CPU time to render a scene rapidly increases. The motion of the dummy is no longer smooth and starts to ratchet. A metric to determine computer power for a given game is frames per second rendered. For the Mission project we were getting around 10 fps. The motion remained smooth for this simple game world.

However, as we created game worlds with more assets and interacting objects (e.g., several dummies and animals) requiring contact and hidden surface calculations, motion became jumpy as fps rendered decreased. So, I bought a new computer for my granddaughter - see how easy that was! We are now running on a Mac M1 Ultra with a 20-core CPU, 48-core GPU, 64 GB memory and obtaining 100+ fps.

To make the development process easier, we found the following helped

1. Logitech MX Master 3 Mouse for moving around the UE4 code development window panes and menus.
2. Kensington Expert Trackball Mouse for navigating the 3-dimensional graphical design space.
3. Playstation Game Controller when activating the "Play" button to see how the game worked.

All 3 devices connect by Bluetooth and to my amazement seamlessly worked together.

No fee [The Structural Dynamics Innovation Course]:

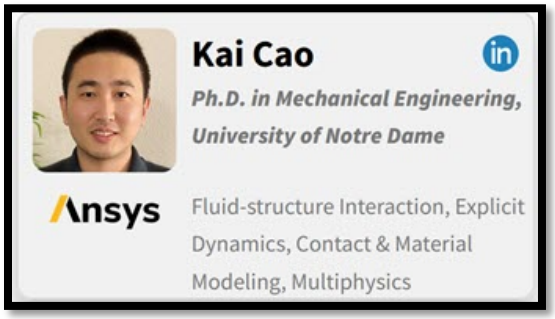
What is time domain dynamic analysis? It solves for the response of a structure or material with respect to time.

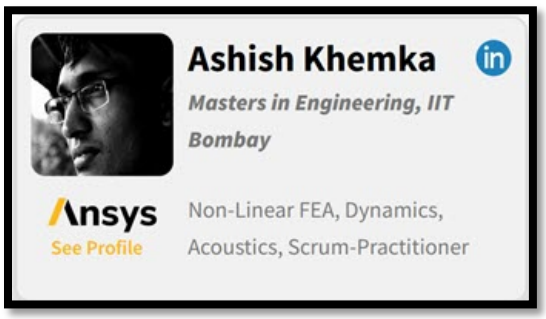
On the website it shows the car crash as an example. If we were to study the effects of this crash, it would be in the time domain — how does the damage increase as time goes on?

In this course, you will learn the basic principles and applications of structural dynamics in engineering.

The dynamic behavior of structures is an important concern across many disciplines of engineering. By understanding structural dynamics, civil engineers can design buildings that can withstand severe dynamic loading from earthquakes and hurricanes, aerospace engineers can control the vibration of aircraft wings under turbulence, and mechanical engineers can design crash protection features to reduce the force of a collision.

Meet the Instructors





Course Content

Lesson 1
- Intro to Dynamics

Lesson 2
- Time and Frequency Domain Dynamics

Lesson 3
- Vibration Mitigation Measures

Lesson 4
- Homework,
- Quizzes,
- Simulation Examples, Structural Dynamics

Lesson 5
- Structural Dynamics
- Summary

Post Completion Survey

The Old Rancher

No one knows his name.
You yell, "HEY, old rancher."
Agriculture, Soil, Equipment, Cattle,
and whatever he wants.

This month sitting on my
Farmall F 12 international Harvester 1936
I'm bringing you:

Rocky DEM Particle Simulator

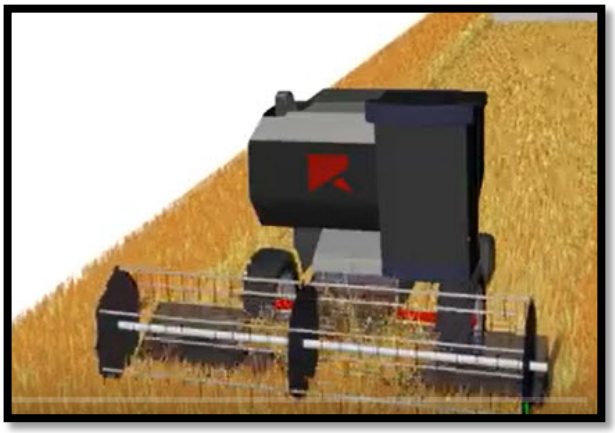
Rocky DEM provides the data you need to predict particle behavior in agricultural equipment.

YouTube - Tractor motion kernel spring-damper

The motion kernel of Rocky DEM enables to analyze a variety of cases. Watch this complex simulation of plow the land involving multiples motions (free body motions and prescribed motions).

YouTube - Disk Harrow equipment simulation

Soil Tillage simulations can be carried out in Rocky DEM trough use of the Free Body Motion capability to accurately represent a Disk Harrow equipment.



YouTube - **Combine harvester simulation | Prediction and comparison of operating and design conditions**

In this simulation, different operating and design conditions of a Combine Harvester are predicted and compared using Rocky DEM. Rocky's unique Custom Flexible Fibers are used to model the crops, and cutting is also accounted for using discrete breakage.

API custom inlets produce realistic field patterns, whereas API custom outlets remove the harvested crops allowing accurate measurement of the total throughput. The effect of different operating conditions on harvesting performance provides valuable insight during the equipment design phase and on-site operation.

My Virtual Travel Outing

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

National Museum Of The United States Air Force – Early Year Exhibits

The National Museum of the U.S. Air Force galleries present military aviation history, boasting more than 360 aerospace vehicles and missiles on display -- many rare and one-of-a-kind -- along with thousands of historical items and powerful sensory exhibits that bring history to life and connect the Wright brothers' legacy with today's stealth and precision technology. We invite you to take an online glimpse of our galleries by clicking on a gallery name to see exhibits, including aircraft, engines, equipment and weapons of the USAF.

Curtiss P-6E Hawk

Northrop A-17A - The A-17 series was a direct descendent of the pace setting Northrop "Gamma," made famous by the aerial explorer Lincoln Ellsworth. It replaced the Curtiss A-8 and A-12 Shrike and was the last of the pre-World War II single-engine attack aircraft ordered into production by the Army Air Corps.

Martin B-10 - The B-10, the first "modern" all-metal monoplane bomber produced in quantity, featured such innovations as retractable landing gear, a rotating gun turret and enclosed cockpits. Powered by two 775-hp Wright R-1820 Cyclone engines, Martin's advanced design made the B-10 50 percent faster than contemporary biplane bombers and as fast as most of the fighters. This capability convinced many U.S. Army Air Corps planners that bombers could successfully attack strategic targets without long-range fighter escort.

My Virtual Quiz Outing

The DYNAmore Nordic team had a fun quiz. Can a quiz be fun? Yes, this one is fun. You aren't getting graded on the quiz.

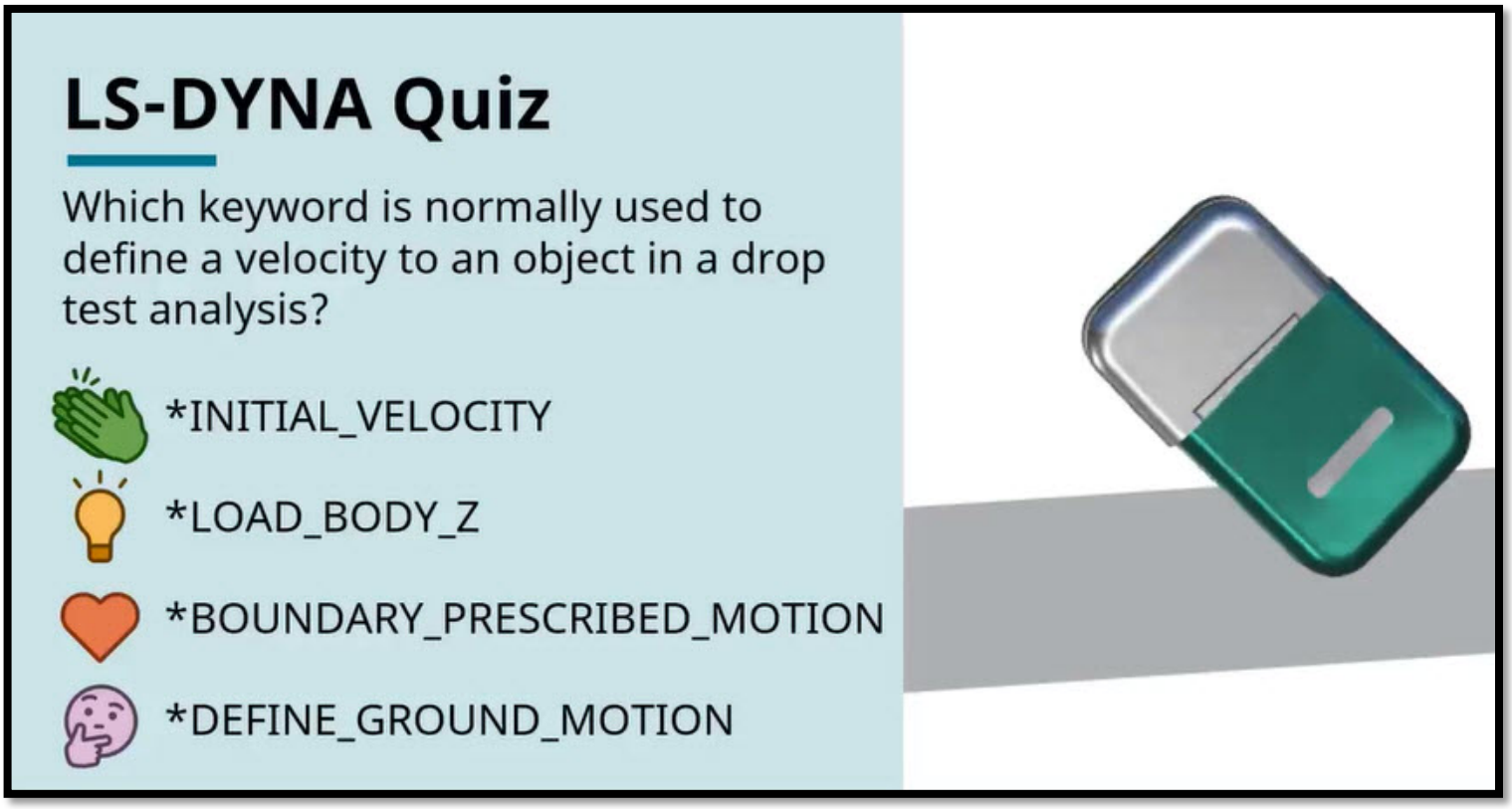
Find your number 2 pencil and eraser and get started. There is no time limit.

DYNA MORE Nordic

[DYNAmore Nordic Website]

Circle your choice(s) below with your number 2 pencil.

The answer is on the Good-bye page. (guess where that page is located?)



Would you believe me if I said I taught Dusty to count to three using his hoof to bang on the rail? Okay here is the quiz answers

1. DUSTY learned to count to three
OR
2. Dusty is rude and banging the rail for food.

Well, wish I could say it was number 1 and I taught him manners. BUT he is spoiled and if I don't move fast enough with his food he bangs the rail. Yes, that is very bad horse behavior AND can cause some damage to his hoof.

Cattle in the next pasture.

I like the one facing away from the others.

Strive to be Different.

Here is my Coyote. I say mine since she in in my territory and has been for a number of years.

My territory – my rules.

We were both walking toward the backyard at the same time. I was coming from the barn and she was coming down from the pasture.

I pretend I don't see her and we both keep walking. Yes, I do start walking slower so she can get ahead of me. She keeps watching me and we keep walking - I went up the stairs to the porch and she kept walking to wherever she was heading to.

Town Residents Poster Board of news, events, gossip not to miss.

Book - The Innovation Factory
Author Prith Banerjee - CTO at ANSYS, Inc.

Provides essential, practical guidance for all parties wishing to work toward successful collaborations that achieve innovation in its many aspects. Perhaps you have already launched some partnerships; if so, this book will help both of you make them more successful. Whether you have or have not, this is the only book you need to launch and partner in open innovation initiatives.

Book - Did we learn anything from WTC towers collapse?. Critical Review of final NIST reports and more.
Author G. Szuladziński

Presents at least three types of material: The discussion of the report as presented by NIST volumes - The background material and information to better grasp what is missing or poorly explained in the NIST report - The third is the analysis of expected results of a similar attack against the new 1-WTC building.

Blog - **Collapse of the Tacoma Narrows Bridge on Nov 7, 1940 – just 4 months after it was opened.**
LEAP Australia –

As engineers, we've all seen this video from our engineering degrees and for many it remains a vivid reminder of the devastating potential of forced harmonic resonance on a light structure – noting particularly that this bridge collapse occurred during relatively normal speed winds (of just 68 km/hr) which unexpectedly produced aeroelastic flutter that matched the bridge's natural frequency. This resonance in turn led to movement and deformation of the bridges girder and supporting structures such that the cables eventually exceeded their allowable stress & failed.

	**DYNAmore 16th LS-DYNA Forum** Oct. 11-13
	**DYNAmore Nordic LS-DYNA Forum** Oct. 18-19 LS-DYNA
	YSA22 - Young Stress Analyst Competition **Sponsored by AIRBUS**
	Nov.16 – 17 Human Modeling and Simulation in automotive engineering

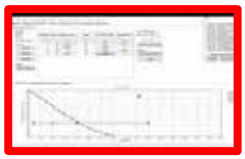
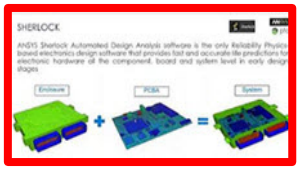
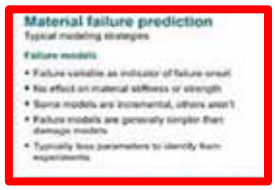
CONVENTION CENTER
YouTube Booths

September

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).

Current videos
from our booth visits:
During the month of August

Free Coffee for
visiting our exhibitors

Computer Aided Technolog			Rodrigo Paz
Ameen Topa			Oasys LS-DYNA
Ozen Engineering			ETA
Expert FEA			LEAP
MEETING ROOM			DYNAmore

If you have a YouTube Channel, send us the URL feaanswer@aol.com

Curt Chan

Did you know that Using simulation, doctors can determine the magnitude and location of brain strains, enabling them to improve concussion treatment?

Excerpt from the LS-DYNA Product Page – ANSYS Website

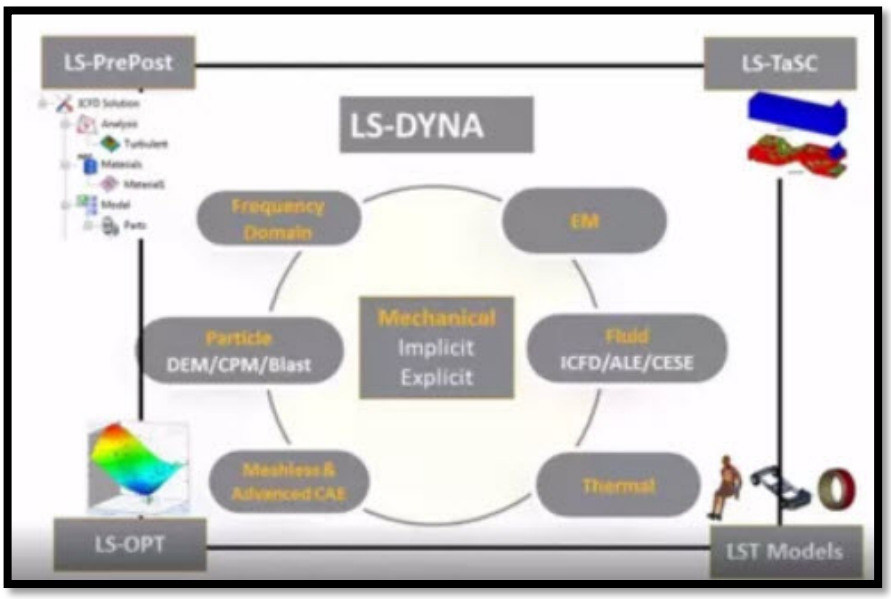
Read the Article: [Sudden Impact: Simulating MMA Head Shots]

By Stephen Tiernan, Senior Lecturer of Mechanical Engineering
Institute of Technology Tallaght
Dublin, Ireland

By applying an LS-DYNA simulation-based workflow, clinicians can obtain a player's acceleration level and convert that into strain levels across different parts of the brain.

Clinicians are unclear about how to measure the damage incurred by head impacts. Concussions diagnosed by magnetic resonance images (MRIs), computed tomography (CT) scans and blood tests often deliver inconclusive results.

Dr. Michael Power leads clinical care at Beaumont Hospital in Dublin, Ireland, which specializes in the treatment of head injuries — many of which occur during contact sports. Several years ago, he aligned with CADFEM Ireland — Ansys' channel partner in Ireland — on a mission that would combine engineering simulation with clinical expertise to research the mechanisms of concussion. They sought to understand whether simulation software could help define the causes of concussions, reduce their number and improve concussion treatment.



Webinar

Learn more about LS-DYNA

Scroll down on page for video

Watch Ansys LS-Dyna Overview

Kathleen Fritz - DYNAmore GmbH

The Preliminary Agenda 16th German LS-DYNA Forum 2022 is now available

Why should you join us? It is the main event dedicated to LS-DYNA in Central Europe.

The 16th German LS-DYNA Forum will take place from October 11-13, 2022 in Bamberg and online.

- approx. 100 technical presentations,
- an accompanying hardware and software exhibition
- Presenters can present in English or in German.
- keynotes from renowned speakers
- the opportunity to speak with engineers in your field
- You can optionally submit your abstract for the Ansys "Level-up 3.0" online conference.

Schedule 2022

- Monday, 10 Oct. from 6 p.m.
  Get together in the exhibition and conference registration
- Tuesday, 11 Oct. from 8 a.m.
  Start of the conference
- Tuesday, 11 Oct. from 8 p.m.
  Gala Dinner
- Wednesday, 12 Oct. from 8:30 a.m.
  Second conference day
- Wednesday, 12 Oct.
  Day 1 Online Conference
- Thursday, 13 Oct.
  Day 2 Online Conference

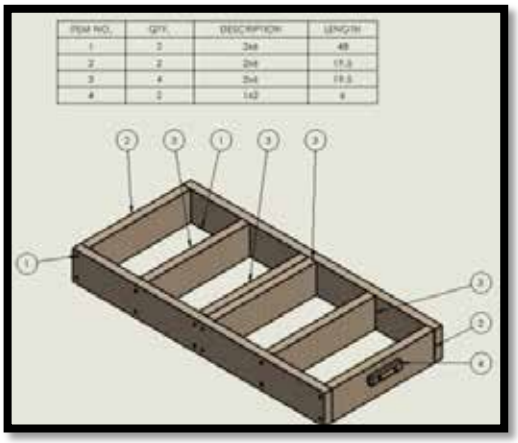
VENUE - Welcome Kongress hotel Bamberg

Specially designed for congresses and conferences, it awaits you with impressive architecture. Walking from their location, directly on the banks of the river Regnitz, will bring you to the historic old town of Bamberg. Bamberg's Old Town has been on the UNESCO World Heritage List since 1993. The city grew continuously around a medieval core and today has one of the largest unspoiled old town centers in Europe.

ORGANIZERS:

Kit MacDonald, Application Engineer at Computer Aided Technology,

If you're still using assemblies for everything, you're doing it WRONG!
Multi bodies are wayyyy easier to create and edit interconnected geometry.
SOLIDWORKS Multibody Parts When Custom Fitment is the Only Option

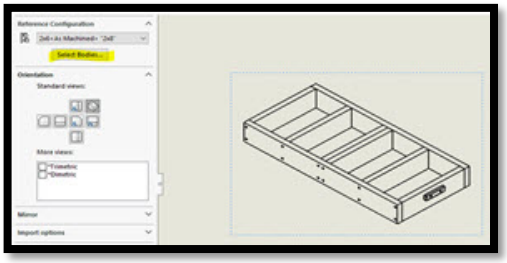


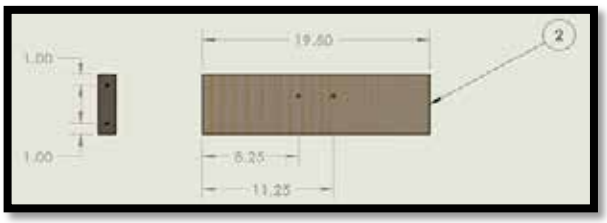
Excerpt **Detail a Multi-Body Part in SOLIDWORKS**

Craig Maurer, Elite Applications Engineer

I have been working my way down the design path of using different design methods in SOLIDWORKS. So far weldments are the most advantageous as we could get a cut list. I explored this in my last blog "Bottom up Assembly vs Multi-Body vs Weldments" and I really like the idea of setting up saw stops for quickly cutting my pieces. Now, the issue is that we only have one part. So, how do I get a view of just one body to dimension? With multi-body, weldments, and sheet metal parts I cannot select an individual file to place into my drawing view. However, I need to define these pieces that need extra work. Let's look at how we would detail a multi-body part in SOLIDWORKS.

Detailing Multiple Bodies - With the cut-list I can still balloon to the bodies to point at their location just like a bill of material. The next step is breaking out each body into its own view. To do this, copy the view and reselect it to get the option to "Select Bodies".





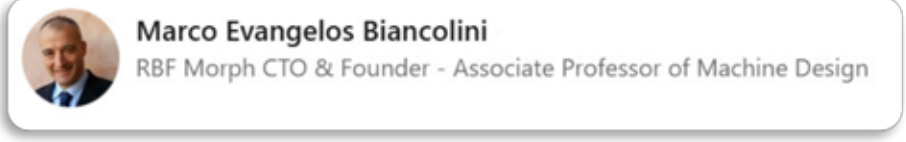
Select one body, and say ok.

From here we can re-orientate our view to face forward and project the other sides as necessary. Of course, we should add some dimensions and put on a balloon. The balloon for the view is still linked to the original cut list, so the item number will work correctly. If you would like to reorder the cut list, the balloon will update.

Repeat the procedure for the bodies that need extra detailing work. This should simplify the workflow as I don't have to break out each body to their own part file and reassemble it into an assembly for a bill of material. I have now accomplished that from my cut list using "Select Bodies". There are of course reasons to do that, but in this case, once each section is secured together, it becomes "One Part". I can pick it up any body and move it around as one solid unit and each stack will be a different part with varying heights. It is up to the design team how they would like to define "A Part", and I leave that choice up to you.

CONVENTION CENTER
Booth - MeDiTATe

September



First article published for our Eirini Kardampiki, ESR 12 of the MeDiTATe project! Eirini's article "The Hemodynamic Effect of Modified Blalock–Taussig Shunt Morphologies: A Computational Analysis Based on Reduced Order Modeling" is available on Electronics MDPI Journal!

"The Hemodynamic Effect of Modified Blalock–Taussig Shunt Morphologies: A Computational Analysis Based on Reduced Order Modeling"

The open access full text is available here.

The work was developed in collaboration with Emanuele Vignali and Simona Celi from BioCardioLab (Fondazione Toscana G. Monasterio), Dorela Haxhiademi from Critical Care Unit (Fondazione Toscana G. Monasterio), Duccio Federici from Paediatric Cardiosurgery Unit (Fondazione Toscana G. Monasterio). A further contribution was given by Edoardo Ferrante, Margherita Cioffi and Emiliano Costa from RINA, Stefano Porziani and Andrea Chiappa from RBF Morph, Corrado Groth and Marco Evangelos Biancolini from the Department of Enterprise Engineering (University of Rome Tor Vergata).

Abstract - The Modified Blalock Taussig Shunt (MBTS) is one of the most common palliative operations in case of cyanotic heart diseases. Thus far, the decision on the position, size, and geometry of the implant relies on clinicians' experience. In this paper, a Medical Digital Twin pipeline based on reduced order modeling is presented for fast and interactive evaluation of the hemodynamic parameters of MBTS. An infant case affected by complete pulmonary atresia was selected for this study. A three-dimensional digital model of the infant's MBTS morphology was generated. A wide spectrum of MBTS geometries was explored by introducing twelve Radial Basis Function mesh modifiers. The combination of these modifiers allowed for analysis of various MBTS shapes. The final results proved the potential of the proposed approach for the investigation of significant hemodynamic features such as velocity, pressure, and wall shear stress as a function of the shunt's morphology in real-time. In particular, it was demonstrated that the modifications of the MBTS morphology had a profound effect on the hemodynamic indices. The adoption of reduced models turned out to be a promising path to follow for MBTS numerical evaluation, with the potential to support patient-specific preoperative planning.

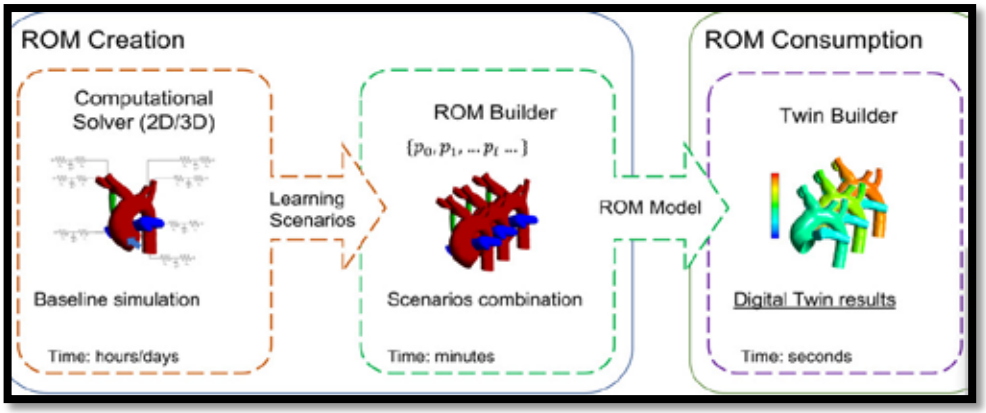
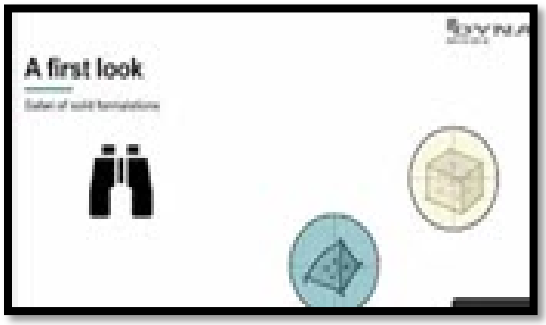


Fig 1 - ROM workflow with the description of its main sections and the estimation of each step's time frame

Molly Anne – FEANTM Editor, Specializes in hiding dog cookies.

Do you realize what you've missed? Well, I've decided to help you by showing some of the postings. Additionally, I was disappointed when I learned the dog-bone tensile test didn't test the flavor of dog bone cookies. It doesn't resemble a dog bone cookie from my dog bone view. You can tell a fellow dog didn't pick the name!

R. Paz -
Sonar Drogue Porous Parachute in Free Fall.



C. Schmied, -
Solid Element Formulations in LS-DYNA

PDF – August Issue DYNAmore Nordic Newsletter, Issue 67

DYNAmore Nordic - Here in Sweden we are gradually getting back up to speed again after the holiday season and are looking forward to reconnecting with all of you. We hope your summer holidays have been just as pleasant as ours, and that those of you who are still on holiday are having a nice and relaxing time.

Kaizenat - High Heels Shoes stability check by LS-DYNA - it is necessary to have good stability of heels during normal walk as well as in case of low-speed impact. By using LS-DYNA we can ensure the stability as well as safety which may lead to ankle injury or nerve damage.

CONVENTION CENTER

Booth - Rasmus Schutzer

September

Rasmus Schutzer - DYNAmore Nordic AB

"The countdown has started! Here is the Preliminary Agenda
Are you ready for October 18th?
Register now and join us in Gothenburg, Sweden. "
Nordic LS-DYNA Users' Conference 2022 will be held 18-19 October 2022 in Gothenburg, Sweden.

Nordic LS-DYNA Users' Conference 2022 will be held 18-19 October 2022 in Gothenburg, Sweden.

On October 18-19, LS-DYNA users from the Nordic countries, the Baltic states and the rest of Europe will meet at The Swedish Exhibition & Congress Centre (Svenska Mässan) in Gothenburg. Participation is free of charge but you must register your participation in the conference via link below Register to conference.

The central part of this event is the user presentations about the software and its usage. This event is an ideal forum to discuss your experiences on LS-DYNA and LS-OPT with other expert users in simulations of complex mechanical problems.

The conference will provide a great opportunity to share and discuss experiences, to obtain information on upcoming features in LS-DYNA, LS-OPT and LS-PrePost and to learn more about new application areas. For further information please klick on Call for Papers on link below.

If you have any questions, please contact us using e-mail: conference@dynamore.se

- In order to make the most out of these conference days we kindly ask for your cooperation and encourage you to make an oral presentation, where you talk about your experience in CAE and using simulations to facilitate your work, improve quality, reduce cost, research and any other exciting areas you may use simulations for.
- The presentation should be no more than 20 minutes and we would like to receive a short abstract of your topic for organisational purposes.
- Abstract should be submitted no later than May 20.
- Please send us your abstract using the link on our website noted above.

In addition to interesting presentations we also invite you to attend the conference dinner in the evening of the 18th. You must pre register your attendance via link Register to conference below.

Important dates

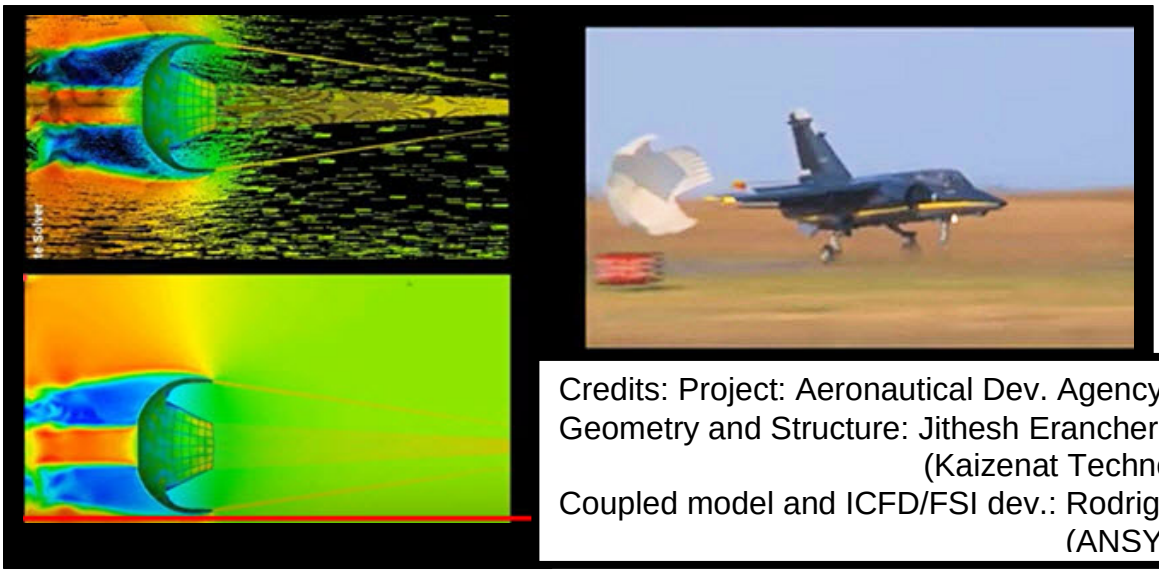
- **Register to conference: 16 September 2022**
- Conference date: 18-19 October 2022

For more information visit our conference page - We look forward to meeting you in Gothenburg.

I have uploaded to my YouTube Channel parachute simulations.

Visit my channel for additional simulations and subscribe.

Simulation of a Porous Drogue Parachute of a Jet Fighter.



Solver: ICFD/FSI LS-DYNA.

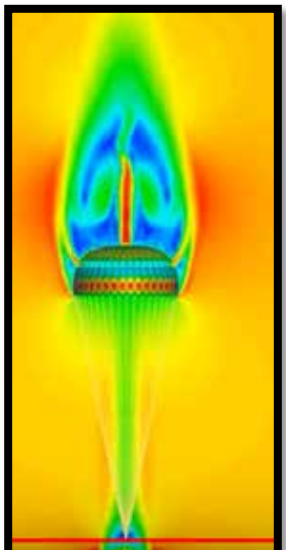
Credits: Project: Aeronautical Dev. Agency (ADA) of India.
Geometry and Structure: Jithesh Erancheri (Kaizenat Technologies Pvt Ltd)
Coupled model and ICFD/FSI dev.: Rodrigo R. Paz (ANSYS-CONICET).

Sonar Drogue Porous Parachute in Free Fall.

Geometry by Amit Nair,

FSI/ICFD solver dev by Rodrigo Paz.

ICFD LS-DYNA Parachute Solver.



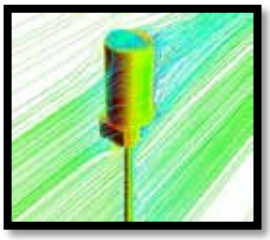
Deployment of the Orion's Porous Parachute by FEM-FSI modeling.

- parachute's porous fabric type: MIL-C-7020 type III.
- falling speed: 80 m/s.
- **our dev in ICFD/FSI solver of LS-DYNA.**

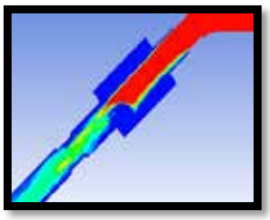
Computational Fluid Dynamics, In this field FIGES provides almost every sector, including but not limited to, the industries of defense, automotive, maritime, aviation, energy, domestic appliances, construction, turbomachinery, and chemistry, with analysis services. Services in the areas such as single and multi-phased flows, heat exchanges, turbulence modelling, phase exchanges, chemical reaction flows, flow-induced noise (acoustics), free surface flows, optimization, and fluid-structure interaction.

Computational Fluid Dynamics - What is Hydrodynamics? The science of fluid motion. The behavior of fluid flow can be examined under three separate categories, namely experimental, theoretical, and numerical. Recently, a computational approach, through which equations of mass, momentum, and energy conservation are solved numerically, have been adopted because of the high-costs and time associated with conducting experiments. Computational fluid dynamics (CFD) is the science of forecasting the fluid flow (laminar or turbulence), heat exchanges, mass transfers, and chemical reactions by using a numerical process, while simultaneously managing these processes by solving them with mathematical equations. Typically, by using the engineering data dealing with CFD, it is possible to conduct studies on the existing system behaviors, create new conceptual designs, develop detailed products, and perform troubleshooting or improvements.

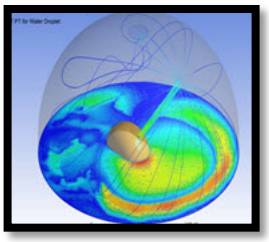
APPLICATION AREAS – Part 1



Analyses of Internal and External Flow - Typically, the flow problems are divided into two groups: internal and external. Fundamentally, the internal flow analysis is defined as the analysis of any flow passing through a closed object. The external flow analysis, on the other hand, focuses on the effects generated by the flow passing over a design or system. These flow problems are solved by ANSYS-CFD software with the best approach depending on the flow regime (i.e., laminar or turbulent) in the most accurate and fastest manner…



Heat Analyses - …Heat can be transferred via three different mechanisms, namely transmission, transportation, and radiation. Heat transmission is the process through which heat is transmitted from a high-temperature area to a low-temperature area via molecular motion. Heat transportation is, on the other hand, occurs when a liquid passing through a surface reaches a different temperature than the surrounding solid surface via macroscopic liquid motion. As for hear radiation, it emerges once an object with limited temperature emits energy through electromagnetic waves.



Multi-Phase Flows - …Liquid simulations have several types such as boiling, cavitation, distribution of multi-phases, immiscible flows, and particulate flows. For any flow to be defined as a multi-phased it must combine at least two phases. For example, ice-water mixtures, blood enzyme tests, clean drinking water filtering systems, etc. are defined as multi-phased flow problems. Being capable of accurately simulating complex problems (i.e., how do liquids, solids, and gasses interact?

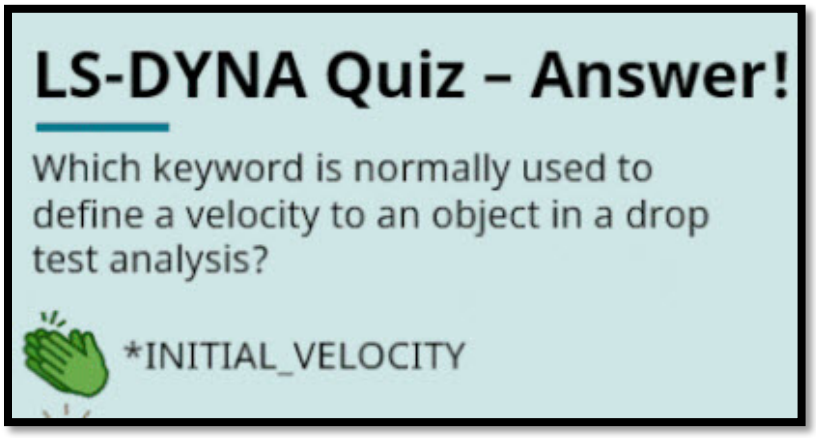
Graphics Courtesy of Vecteezy

Goodbye and Come Back Soon

The Panavia Tornado is a family of twin-engine swing-wing fighters jointly developed by the United Kingdom, Germany and Italy.

NEWS from Panavia - The Successful Panavia Tornado Programme - In terms of the number of aircraft built and delivered, Tornado remains Europe's largest military aircraft co-operation programme.
Successful makeover for the German Tornado: Tornado Service Life Enhancement

Recce ECR GR.4/4A A Tornado! I liked using that as a hint – Did you catch the hint?



Our Town Salutes our US military, NATO and Friends of the US and NATO. We salute Freedom.