FEA - CAE Not to Miss & More -
DECEMBER **ISSN 2694-4707**
Monthly Town Hall Meeting
"The town that doesn't exist"
Engineering, Research, Interests
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Airport -Sirkorsky

Airport - BAYKAR

Auto - GM

Abigail-ANSYS

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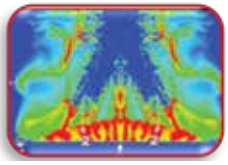
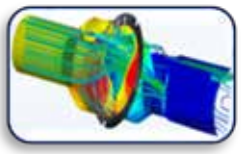


Madhukar - CADFEM



Marta – OASYS

Marjorie – Fidelis

Travis - Altair

Old Rancher - Mahindra

Brianna - LLNL

Jenson - DFETECH

Dan - Dynas+Engineering

Chris - UNC/UTK/LLNL

Comic Blog Chronicles: RheKen AI Investigator, Dinky CERT Squirrel, Chat's Help Desk

Supervisor's 2025 Resolutions

Now Entering the Town Hall Plaza - drive slowly – galloping prohibited

FEA not to miss a/k/a (FEANTM) **Blog is a collective of individuals who exchange information**
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…from that point onward, you are removed - yes you can always come back.

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

Town Pretend to be Editors:

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

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

Names, & characters of AI visitors and AI editors are the products of imagination. Any resemblance to actual persons, living or dead, or actual events is purely coincidental.

We will never forget

Parking & Coffee are free.

R & D - Camping - Town Map

Horse Trail → Yield right of way to horses

R & D Technology
Business Park Plaza

RV CAMPING
Park in any vacant camping site

Town Hall & Library

Fire & Police Depts.

Lawrence Livermore National Laboratory

Coffee Shop
News
Marsha & Marnie

Petting Zoo

Old Rancher

Trent's Geese Crossing

Race Track

Elect/Water. & Sewage Treatment Plant Facilities

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

Table of contents

- **The individuals mentioned are the persons we wish to thank.**
- **The above doesn't imply that they are the author, with a particular company, or department**

Table of contents

Welcome to our Town Hall Meeting & Announcements

Town Hall Meeting
in the town that doesn't exist
(or does it?)
Park Cars behind building
Park Tractors behind cars
Tie horses to hitching rails

Free coffee & cookies of all kinds of chocolate
The town consists of individuals finding solutions, and caring about animals and children.
Town Gossip is at the local coffee shop.
Pets are welcome. Horses, pet goats stay outside**.**
Town Motto: **Creation is born from trying. If it doesn't work, then you learn & try again. You will succeed. Ideas, simulations, medical cures, & creativity wouldn't exist without failure & the passion to try again – You've Got This!**

First: I have to make my 2025 New Year Resolutions! OR, copy and paste the past years. I'm giving of up coffee & cookies. Probably not but it sounds good to try.

Second: No one knows the Racer's name, you yell, "Hey, Old Racer!" His daughter? You shout, "Hey, slow down!"
See automotive section - The Next Gen Charger

Note-Resident Jamie Talbot, **Associate Dir. Arup; Project. Mgr/Oasys LS-DYNA Environment**

Thanks to KOSTECH for inviting me & Kiran K. Pedamallu to speak about Oasys LS-DYNA Environment at their conference. An excellent event & great to meet existing clients, make new contacts & see familiar faces from **Ansys, JSOL Corporation and d3VIEW.** Looking forward to continued collaboration in 2025!

And remember Xmas has no calories – all cookies, cakes and coffee with cream, etc. are a no calorie free day! (Yes, I know that's an excuse but I'm going with it!)

Article:
Unveiling the Power of Airbursts: Cutting-Edge Simulations of Asteroids, Comets, and Explosive Impacts - Luis Costa

Article:
Hamilton Medical AG, is considered the inventor of intelligent ventilation. Ansys Multiphysics simulation for ventilators…

Article:
A case study by Heather Miller - ReChaco Increases Productivity by 29% with Autodesk Fusion Operations

Article:
DigiPAD (Digital Twin for Advanced Design in the Aerospace Industry) is an innovative initiative designed to revolutionize the aircraft design process.

I found a great article on the ANSYS Blog, by Laura Carter. The Old Racer will like it and I want to share it since it has LS-DYNA. It is an excerpt of Laura's blog.

"To understand these types of injuries, NASCAR relies on a combination of test data using an anthropomorphic test device (ATD) or crash test dummy, and numerous virtual simulations in Ansys LS-DYNA, which is multiphysics structural dynamic simulation software."

NASCAR Reduces Injury Risk With Human Body Models and Simulation - Laura Carter

Racing is inherently dangerous. Thanks to virtual modeling in a simulation environment, the risk of serious driver injuries remains low. NASCAR drivers are some of the best in the world. But when you're driving on the edge of traction at 200 miles per hour, crashes are bound to happen.

John Patalak, vice president of safety at NASCAR, is keenly aware of the potential risks. To help maintain safety during racing season, his team leans on massive amounts of data acquired on the track, as well as data acquired in a simulation environment.

"From a speed standpoint, one of the things we're trying to always improve on is being able to respond faster to safety issues," he says. "Our drivers expect and demand that from us. We have to be fully confident that we have data to stand on if we're going to tell the driver to take some action to be safer. We can't do that solely based on opinion, but because we've got data that we're confident in and is robust enough to make that decision on, so we can sleep at night."

While NASCAR drivers experience more crashes per mile than those in passenger cars do, fortunately the rate of injury per crash on the track is far less, according to Patalak. One particular driver injury NASCAR is studying is compression fractures between the thoracic and lumbar vertebral bodies of the spine.

To understand these types of injuries, NASCAR relies on a combination of test data using an anthropomorphic test device (ATD) or crash test dummy, and numerous virtual simulations in Ansys LS-DYNA, which is multiphysics structural dynamic simulation software.

These virtual simulations also involve the use of the THUMS (Total Human Model for Safety) from Toyota, a digital representation of a human body which helps the team do more thorough spinal injury risk assessments during frontal impacts than with a mechanical dummy alone.

"We've done a lot of research into these types of injuries," says Patalak. "You can have a mechanical model. You can test it. You can validate it. Without simulation, you're really limited with empirical testing and physical crash test dummies for this specific injury mechanism. The crash test dummies do have lumbar load cells, but their spines are not very biofidelic, so we quickly get to the limits of those tools. Using human modeling in a simulation environment transcends these limitations."

Still, You Can Learn a Lot From A Dummy - Aside from any limitations, NASCAR's baseline for testing is the ATD. The dummy model helps the team validate its restraint system models. To do this, the team must reference material models of seat belt systems, seat foams, the helmet, and the HANS device (a head and neck support device or yolk-like collar tethered to the helmet that is positioned under the driver's shoulder belts).

Before any digital modeling is done, the team empirically tests the mechanical dummy with all the relevant pieces of safety equipment. This entire setup is digitally recreated in LS-DYNA software to look at all the sensor outputs on the dummy, as well as other physical parts.

Validation against the empirical dummy gives the team a higher level of confidence in the virtual representation of seat belts, helmets, head and neck restraints, and seat foams that are touching the dummy. Once the team has those pieces, it can remove the ATD from the virtual environment and start to look at much more detailed and nuanced issues from injury mechanisms with the human body model.

Based on this activity, NASCAR engineers can tweak the restraint system, such as the stiffness of the foam the human body model is on or the angles of the seatbelt to realize incremental improvements. As of late, the team is examining the posture of the human body model pre-impact. This includes turning on some of the musculature in the model to activate a bracing posture (with the help of a high-speed video of real drivers during a crash) to get an idea of how a driver is positioning his or her body pre-crash.

“If you have a thoracolumbar spinal fracture, the dummy has a somewhat limited output set to help us understand that specific injury mechanism,” Patalak says. “So the reason we went to the human body model is because we can look at localized strains on each vertebral body and start to compare those strains to failure strains of an area of the spine. We can also look at cross-sectional forces through each vertebral body and the bending moments so we can extract all of that information to optimize the system overall.”

View the video on ANSYS

Ansys Software Gives Engineers a Heads-Up on Helmet Performance

Five key safety improvements in NASCAR have been identified as lifesavers on the track:

- Black boxes for crash data
- Full-face helmets
- HANS devices
- Steel and foam energy reduction barriers
- Improved seat belts and seats

Among them, full-face helmets get the most attention for their colorful appearance and ability to protect a driver’s head during a race. By design, they are engineered to distribute the force of a crash across the entire head and protect drivers from facial injury during high-speed impacts.

Just how well do helmets do their job during a NASCAR race? According to Patalak, it’s rare that a driver experiences a severe impact to the helmet shell itself. That’s because NASCAR drivers are pretty well contained within full-head surrounds and a roll cage over them. Still, there’s always room for improvement.

One area the team has been looking to squeeze out a bit more performance from the helmet is in the area of low-severity impacts. The objective is to balance safety with driver expectations in an environment that can be noisy, harsh, and even claustrophobic. Drivers want to be very well-coupled — engineering speak for attached to the car (which is very beneficial from a safety standpoint) — through the driver's seat and energy-absorbing foam.

In the cockpit, a driver's helmet is surrounded by crash foam, which, while minimizing crash injury risks for the head and neck, can be problematic for regular driving. As drivers go over bumps and curbs, they may get jostled from left to right, causing impacts between their heads and the crash foam. One area of focus for the team is to explore and understand these low-severity impacts between the helmet and the head surround foam that can become uncomfortable during a race.

"To replicate this phenomenon, we have characteristic pulses that we run against head foam models through the system to see how the human body model head responds," says Patalak. "Then we look at modifying material properties within the helmet or the head foam within the context of our simulation environment to lessen the effects of these impacts."

Safer Seasons Ahead With Simulation - Any testing efforts in helmet development are part of a long-term study at NASCAR. Currently, the team is modeling in LS-DYNA simulation software to try to develop empirical tests. The intention is to develop tests that helmet manufacturers or standard-bearers, including the Snell Memorial Foundation and the FIA, or Fédération Internationale de l'Automobile, can use to evaluate helmet efficacy at lower severity levels.

Both Snell and the FIA work in evaluating, testing, and regulating motorsport helmets. In sharing its work with both organizations, NASCAR is on track to make a difference in motorsport safety, as not everyone is fortunate to have access to full LS-DYNA models of their helmet systems.

Patalak's team is also examining what adjustments to the HANS tethers that the helmet is attached to can be made to better protect the driver. Research includes the effect of tether length, height, and angles on upper and lower neck loads. The idea is to find the sweet spot within a modeling environment that will significantly reduce head acceleration without increasing neck forces upon impact. In the end, it's work that would otherwise be severely limited, if not impossible, without simulation.

"I think the value of the LS-DYNA simulations is that we can set aside the inherent small variabilities of physical testing and really assess the effects of minute changes to a system with a high level of confidence much, much faster and cheaper," Patalak says. "It's hard to estimate the software's real value because, in many cases, what we're able to do in LS-DYNA simulations is just not possible without it."

If you ride a motorcycle, you know how important performance improvement is for electric motorcycles. The Machines & Power Conversions Res. Team at the Nat'l Electronics & Computer Tech. Ctr., Thailand studied it using JMAG Software. **"The SRM was designed using a commercial analytical software package PC-SRD [16] and a 2D finite element analysis (FEA) using JMAG software."**

MDPI Web - Performance Improvement of a Switched Reluctance Motor and Drive System Designed for an Electric Motorcycle

S. Kachapornkul, R. Pupadubsin, P. Somsiri, P. Jitkreeyarn, K. Tungpimolrut

Machines & Power Conversions Res. Team, Nat'l Electronics & Computer Tech. Ctr., Thailand

Figure 1. The electric motorcycle driven by the SRM and drive system. (a) The schematic of the electric motorcycle system; (b) the installed SRM and drive system

Abstract - In this paper, the implementation of a switched reluctance motor (SRM) and drive system for the propulsion system of a two-seat electric motorcycle is described. The overall design focuses on the required vehicle speed, acceleration, driving distance, and overall system cost, as well as reliability. The performance of the three-phase 6/4 pole (six-stator pole and four-rotor pole) and four-phase 8/6 pole (eight-stator pole and six-rotor pole) are investigated and compared by static performance analysis and dynamic performance analysis. Their performance is further investigated by finite element analysis. The indirect torque controller in a drive system for optimal torque and efficiency operation is also mentioned. A methodology for rotor position detection and its hardware implementation are also proposed. The designed 3.5 kW three-phase 6/4 pole SRM and its drive system were constructed and tested on the test bench. A maximum efficiency of about 82% could be achieved for the SRM and drive system. It was also installed on a 120-cc electric motorcycle, and the vehicle's performance was also validated by on-road and dynamometer testing. The maximum vehicle speed reached was 82 km/h, and a cruising distance of about 98 km at a constant speed of 40 km/h was measured.

1. Introduction - A motorcycle is the most popular vehicle in Thailand and ASEAN countries. In Thailand, more than 20 million units, or 50% of all on-road vehicles, registered to the Department of Transportation are motorcycles. Furthermore, there has been a rapidly increasing trend in the number of motorcycles during the pandemic for delivery services and urban commuting, which has caused more serious air pollution and health problems.

2.2. Traction Motor Design Consideration - **The SRM was designed using a commercial analytical software package PC-SRD [16] and a 2D finite element analysis (FEA) using JMAG software.** PC-SRD was used in the preliminary design phase to compare and adjust various design parameters, such as the number of stator/rotor poles, the number of phases, and the winding parameters. The software can calculate torque, current, efficiency, copper loss, iron loss, etc. It also includes a core structure, core material data, such as BH curves, iron loss curves, winding structure, applied voltage, rotational speed, and the on-off timing of an inverter. In order to gain high starting torque in the low-speed region, a four-phase 8/6 pole SRM and a three-phase 6/4 pole SRM were selected for performance comparison…

I visited the Isabella Dam at Lake, Isabella, CA. I learned it's a labyrinth weir built to be an emergency spillway. It was designed to reduce the width of the spillway and the amount of excavation needed. The weir's zigzag shape was chosen to accommodate large outflows. A labyrinth weir is a hydraulic structure that increases the discharge and regulates water in channels and spillway dams, and are ideal for controlling water levels in rivers, channels, and reservoirs.

"This paper presents the efficiencies of rectangular labyrinth weirs with flat and rounded entrances for channel applications… Both numerical and experimental models provided close results. … **Numerical modeling of flow over rectangular labyrinth weir was performed using OpenFOAM software, which is a Computational Fluid Dynamics (CFD)**

Figure 3 | Channel flow over labyrinth weir with rounded entrance

Web – open source IWA publishing – pdf available on website
Performance of rectangular labyrinth weir – an experimental and numerical study
Mosbah Ben Said & Ahmed Ouamane - Univ. of Biskra, Algeria

- Scientific & Tech. Res. Ctr. on Arid Regions (CRSTRA),
- Dept. of Hydraulics

Excerpt ABSTRACT - **Labyrinth weirs are commonly used to increase the capacity of existing spillways and provide more efficient spillways for new dams due to their high specific discharge capacity compared to the linear weir.** In the present study, an experimental and numerical investigation was conducted to improve the rectangular labyrinth weir performance. In this context, four configurations were tested to evaluate the influence of the entrance shape and alveoli width on its discharge capacity. The experimental models, three models of rectangular labyrinth weir with a rounded entrance and one with a flat entrance, were tested in rectangular channel conditions for inlet width to outlet width ratios (a/b) equal to 0.67, 1 and 1.5. The results indicate that the rounded entrance increases the weir efficiency by up to 5%. A ratio a/b equal to 1.5 leads to an 8 and 18% increase in the discharge capacity compared to a/b ratio equal to 1 and 0.67, respectively. In addition, a numerical simulation was conducted using the open-source Computational Fluid Dynamics (CFD) OpenFOAM to analyze and provide more information about the flow behavior over the tested models. A comparison between the experimental and numerical discharge coefficient was performed and good agreement was found (mean absolute relative error of 4–6%)….

Excerpt INTRODUCTION - The labyrinth weir is a non-linear flood control structure providing an increase in the unit discharge capacity relative to linear weirs (Figure 1). The use of non-linear shape in plan view enables the labyrinth weir crest length to be increased within the existing spillway width. This option leads to an augmentation in the discharge capacity of the labyrinth weir by up to three to four times compared with a linear weir having the same width and upstream head (Tullis et al. 1995). Consequently, the adoption of a labyrinth weir can effectively reduce a direct and/or indirect cost of the projects of rehabilitation or construction of new dams. Contrary to a labyrinth weir, a linear weir requires a larger width or low crest elevation to increase the discharge efficiency due to its low specific discharge capacity....

Excerpt 2.2. Numerical method - 2.2.1. **Governing equations: Numerical modeling of flow over rectangular labyrinth weir was performed using OpenFOAM software, which is an opensource Computational Fluid Dynamics (CFD).** The InterFoam solver, distributed with OpenFOAM for treating two-phase flow cases, was adopted in this study. This solver uses the Finite Volume Method (FVM) for solving the Reynolds-Averaged…

Todd	**“Mr. Robbins, do you know sign language?”**
Bart R.	**“No, why do you ask?”**
Todd	**“Abby wants to be an accessibility architect. Abby is deaf, can she still be one?”**
Bart R.	**“She can still be an accessibility architect. Let’s look at this video. She can even visit companies and learn. She’ll excel at being an architect.”**

Accessibility architect is a professional who designs buildings & spaces accessible to people of all abilities, ages, and backgrounds. They consider physical accessibility, sensory needs, social inclusion, & universal design principles to create spaces that are inclusive & empowering

YouTube – Foster & Partners invited Deaf students to their London Campus

Earlier this year we welcomed twelve Deaf students from Kingsbury Green Primary School to our London campus for a range of creative workshops, as part of our ongoing community engagement initiatives.

Supported by a sign language interpreter and a Deaf-led tour guide, senior leaders from the practice introduced the students to architecture, design and engineering through interactive workshops including drawing, design, and model-making.

In this video we showcase the partnership, featuring a selection of those who participated including students, teachers and some of the team at Foster + Partners.

Excerpt, "...for them to see that their deafness is not a barrier opening up those doors and showing children that they can achieve anything.

Each child had a key moment within themselves in terms of what they took back...two or three came up...saying they actually wanted to be architects..."

Livermore, CA - LLNL - Lawrence Livermore National Laboratory

Excerpt -When silicone resins are 3D printed via direct ink writing on top of sensitive electronic components, such as a circuit board, they offer unique mechanical and electrical protections. The printed structure can also act as a cushion, which is illustrated by striking the circuit board with a hammer.

3D-printed solutions for electronics protection

Contact: **Anne M. Stark**

When silicone resins are 3D printed via direct ink writing on top of sensitive electronic components, such as a circuit board, they offer unique mechanical and electrical protections. The printed structure can also act as a cushion, which is illustrated by striking the circuit board with a hammer.

(Graphic: Ryan Goldsberry and Adam Connell/LLNL)

Electrostatic discharge (ESD) protection is a significant concern in the chemical and electronics industries. In electronics, ESD often causes integrated circuit failures due to rapid voltage and current discharges from charged objects, such as human fingers or tools.

With the help of 3D printing techniques, researchers at Lawrence Livermore National Laboratory (LLNL) are “packaging” electronics with printable elastomeric silicone foams to provide both mechanical and electrical protection of sensitive components. Without suitable protection, substantial equipment and component failures may occur, leading to increased costs and potential workplace injuries. The team’s research is featured on one of the covers in the October issue of *Applied Materials & Interfaces.*

3D printing is a rapidly growing manufacturing method that enables the production of cellular foams with customizable pore architectures to achieve compressive mechanical properties that can be tailored to minimize permanent deformation by evenly distributing stress throughout the printed architecture. In addition to precise control of print architecture, 3D printing is amenable to custom resins that can be tuned to precisely control the material’s intrinsic properties (properties that do not change based on the amount of material present).

Within the breadth of 3D-printing techniques, direct ink writing (DIW) can be used to print many classes of materials including silicone resins. DIW is an extrusion process wherein a paste with controlled rheological properties (elasticity, plasticity and viscosity) is deposited in a layer-by-layer manner to build up three-dimensional structures.

In this work, silicone resins are of interest due to their low volatility, good elasticity, broad thermal stability and more; they have also already been successfully processed via DIW and used in wearable technologies, soft robotics and other structural components.

An electrostatic discharge

A 3D printed electrostatic discharge composite that is absorbing an electrical shock.

To print an ESD-protective packaging using DIW, the research team conducted mixing studies to come up with a unique silicone resin formulation containing carbon nanotube (CNT) concentrates and rheological modifiers (thickeners) that could not only achieve printability but also reach the conductivity needed for ESD. CNTs are good conductive additives used to control the build-up of static electricity while rheological modifiers allow for the 3D printing of structures with tailored porosities at high resolutions.

With the specially formulated resin, researchers printed the ESD structure directly onto a circuit board. In addition to providing electrical protection of sensitive circuitry, the printed structure also acts as a cushion, which was tested by striking the circuit board with a hammer.

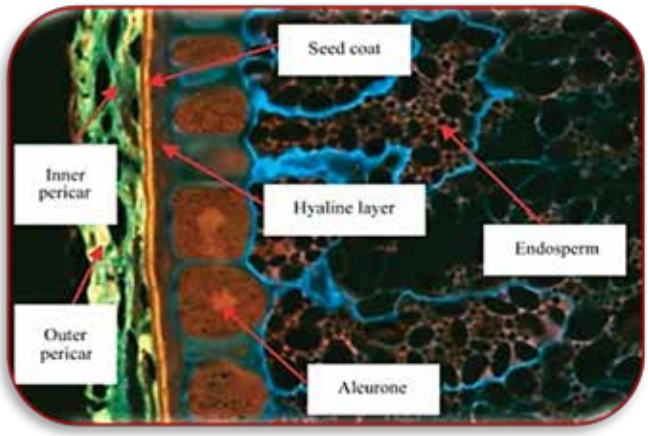
While the team noted that improvements will be made in future iterations, the printed structure still functions as intended. These packaging capabilities may prove useful for specialized equipment such as those used in medical, robotic and other applications.

LLNL co-authors of the paper include:

Jeremy Armas	Michael Ford	Kenton Foster	Terence Hall
Colin Loeb	Spencer Schmidt	Stanley Williams	Kathlyn Baron
Lemuel Pérez	Fangyou Xie	Taylor Bryson	Jeremy Lenhardt

–Shelby Conn

LS-DYNA: "LS-DYNA can effectively solve all kinds of highly nonlinear problems and high-speed transient problems during the superfine grinding process of wheat bran. Therefore, the specific application of LS-DYNA in the determination of grinding form and load, the design and selection of grinding medium, and the selection of grinding temperature were discussed in the superfine grinding process for wheat bran cell tissue in this paper."



Web – Science Direct - Discussion on the Application of LS-DYNA in Superfine Grinding of Wheat Bran

CHENG Min, LIU Baoguo, CAO Xianzhou

School of Mechanical &Electrical Engineering, Nat'l Engineering Laboratory of Wheat & Corn Further Processing, Henan Univ. of Technology, Zhengzhou, China

Abstract - Superfine grinding, involving the fragmentation mechanism of wheat bran cell tissue, is being employed by milling industry. **In order to determine the effect of wheat bran cell tissue on the fragmentation mechanism when using superfine grinding, a technical scheme of the nonlinear finite element numerical simulation method based on LS-DYNA is proposed in this paper.** The physiological characteristics of wheat bran structural layers including outer pericarp, intermediate layer and aleurone layer are examined first, and then the mechanical properties of wheat bran structural layers and their effects on the super fine grinding process are analyzed. **Secondly, the explicit time integration algorithm of LS-DYNA is introduced, and the application feasibility of LS-DYNA in the analysis of wheat bran superfine grinding mechanism is discussed. Finally, the specific application of LS-DYNA in the determination of grinding form and load, the selection and design of the grinding media and the selection of grinding temperature are discussed in detail in the process of superfine grinding for wheat bran cell tissue**. The above research provides a theoretical basis for selecting and developing the equipment and technology suitable for wheat bran superfine grinding, and lays a theoretical foundation for enhancing the quality and efficiency of wheat bran superfine grinding...

1. Introduction:… Compared with conventional grinding, superfine grinding belongs to cellular level pulverizing, which generally refers to the process of crushing the material from 0.5–5 mm to less than 10–25 μm by mechanical or hydrodynamic method[1]. After superfine grinding, the aleurone layer of wheat bran is disrupted allowing cell walls to be broken, which helps nutrients to be more efficiently released. The outer pericarp and intermediate layer of wheat bran also contains fibrous tissues and breaking up cells can help to improve the palatability of bran food and increase the added value of wheat bran[2], [3], [4]. In the superfine grinding process, the crushing performance of wheat bran cell tissue is restricted by macro crushing factors of crushing equipment such as crushing form, crushing load, grinding medium, grinding temperature and so on. However, at present, no one has studied the superfine grinding mechanism of wheat bran at the cellular level.

According to the grinding process of cell tissue, the superfine grinding of wheat bran has typical characteristics of transient speed and high nonlinearity, and there is a significant advantage that the nonlinear finite element method is used to explore the fragmentation mechanism of wheat bran cell tissue. At present, the nonlinear finite element numerical simulation method can be divided into two types[5]. One is based on a variety of the finite element theory to write the program and then carry out the finite element simulation analysis. For example, Wang Zhen of Zhejiang University studied the collision, fracture and penetration of thin shell structures based on an analysis program by using the vector finite element theory[6]. However, this method is time-consuming, laborious, and not versatile. The other one is based on the existing commercial finite element software to carry out finite element simulation analysis. At present, the most of nonlinear finite element numerical simulation analysis adopts this simple and versatile method.

LS-DYNA is recognized as the most outstanding nonlinear finite element numerical simulation software with the functions of explicit analysis and implicit analysis[7]. The explicit time integration algorithm is the main algorithm of LS-DYNA, including 2D and 3D algorithm, which can be used to analyze the complex nonlinear dynamics problems such as material nonlinear, large deformation, crack propagation, dynamic contact analysis and failure analysis, and the transient thermal coupling problems. In addition, LS-DYNA also provides ALE algorithm, adaptive mesh repartition algorithm, SPH and EFG algorithm, which can deal with all kinds of highly nonlinear and large deformation problems. The implicit analysis of LS-DYNA can be used as a supplement to explicit analysis, including the modal analysis, implicit structural analysis, heat conduction analysis and so on. Because of powerful numerical simulation ability, LS-DYNA has been applied in many engineering fields, such as automotive engineering, aerospace, civil engineering, defense industry, metal processing, bioengineering, etc.[8], [9], [10].

…
Although LS-DYNA has been successfully applied in various fields, there have been no reports on the application of wheat bran superfine grinding. In this paper, the necessity of using LS-DYNA to simulate and analyze the fragmentation mechanism of cell tissue is described firstly based on the difference between cell tissue and mechanical properties of wheat bran, and the effect of the grinding process. **Then, the rationality of using LS-DYNA to simulate and analyze the fragmentation mechanism of cell tissue is explored on account of the feasibility and implementation of LS-DYNA explicit time integration algorithm for wheat bran superfine grinding.**

Finally, the application of LS-DYNA in the superfine grinding of wheat bran from the aspects of grinding form, crushing load, grinding medium and crushing temperature is discussed, and the direction of effort is pointed out for revealing the fragmentation mechanism of wheat bran superfine grinding at the cellular level.

Autodesk – Have your read the case study by Heather Miller

"With Fusion Operations, we've realized 54% less rework and 29% increased productivity." – Jason Bringedahl, Production Manager, ReChaco

Excerpts - Web - **ReChaco Increases Productivity by 29% with Autodesk Fusion Operations** - **Heather Miller**

Chaco first started in 1989 when Mark Paigen, a river raft guide in Colorado at the time, realized the need for better footwear in the great outdoors. From his own experience, sneakers and Velcro sandals weren't secure enough and didn't last. He tinkered and developed a unique design for an innovative sandal. The design differentiator is a strap that runs through the midsole and can easily adjust to securely fit without Velcro that can easily wear out. It was also designed to be repairable for years of use.

ReChaco is a division of Chaco based in Grand Rapids, Michigan that manufactures approximately 10-15% of their products and services. While primary manufacturing for wholesale is done with Chaco's international partners, ReChaco repairs sandals and manufactures customized orders placed via the website Customers can send back a pair to get straps or soles replaced. Or they can start with a brand-new pair and choose everything from the footbed to the strap design and even upload their own artwork.

Last year alone, ReChaco produced tens of thousands of customized shoes and completed just as many repairs through the shop. They also manufacture special edition sandals with collaborations, such as the Grateful Dead, country singer Thomas Rhett, Subaru, and more. But, over time, the ReChaco team realized their manufacturing management process needed a new approach.

Leaving Excel behind with a move to Autodesk Fusion Operations - A couple of years ago, ReChaco reached a tipping point. Paper and Excel sheets to track production metrics, performance, and preventative maintenance weren't cutting it anymore.

"Many of our Excel sheets were homemade and made to the best of our ability," says Jason Bringedahl, production manager, ReChaco. " It was labor intensive to update, monitor, and manage them. That's what really initiated looking for a system that could cover things holistically, from raw material ordering to inventory management, maintenance, and managing assets to production."

"We also wanted the ability to look at the data for performance tracking of orders," he continues. "Is that order on the floor? Is it at this or that machine? Has it shipped yet? We didn't really have that knowledge. That's when we took the dive to find software to bring everything together, and we started using Fusion Operations."

The digitalization of the shop floor and using Autodesk Fusion Operations went incredibly smoothly, according to Sidney Long, training and operations supervisor at ReChaco. "Fusion Operations has been so user-friendly for our team," she says. "Putting tablets out on the line was a bit of a shock to the system for some folks at first because we had only used paper. But the team has really been able to take it on very easily. Fusion Operations is very intuitive, and it's been easier to integrate than I imagine other systems might be."

> "From the administrative, warehousing, production, and support perspectives, using Fusion Operations provides us with huge time savings. We can focus more on managing the team and driving our business—and not inputting or collecting data and ripping off sheets of paper."
>
> **Jason Bringedahl, Production Manager, ReChaco**

New insights and data unlocked with Fusion Operations - After adopting Fusion Operations, the difference is now night and day.

Before, quality control information would require taking all the pieces of paper off the production floor, entering them into the spreadsheet, doing the calculations, and adding up the totals. With Fusion Operations, it's all automatically generated. The team has also found massive time savings with both preventative and corrective maintenance.

"If there was an issue in production, someone would have to flag down a supervisor or a maintenance technician to holler and say that this machine is out of service," Bringedahl says. "Now the operator can simply input it in Fusion Operations, the maintenance technician gets a notification, and it's listed at the level of low, medium, or high importance. And, with today's technology, it buzzes right on his watch. It's completely expedited the process and is a huge time savings."

The data now accessible to ReChaco isn't confined to just a computer screen. Flat-screen dashboards on the production floor help visualize and communicate production status, machine outages, quality, productivity, and more with graphics and colors. Tablets at workstations allow employees to request maintenance, share quality control issues, and move inventory.

"The dashboard available in Fusion Operations is great, and it's useful to see what's actually happening in real time," Bringedahl says. "Especially for quality, it's helpful to see, 'Oh, we've had all these quality issues, we're moving to the red.' I think people are motivated by that."

"We have noticed a 54% decrease in our rework year over year, in part, due to the quality reporting generated by Fusion Operations," he continues. "We can easily identify our top-quality issues and perform root cause analysis or in-service training sessions as needed. Productivity has also increased by 29% aided by Fusion Operations."

Long also appreciates how the data and insights provided by Fusion Operations allow them to shift their “focus to things that make us better.” One example is having more data about the machines. “If we know maybe Machine 82 is down once a week for the past six weeks for requested maintenance, we can say, ‘Let’s pull this off the line and do a better job of diagnosing and figuring out the problem,’” she says. “I feel like we’ve grown and can do more to support our team because it’s so much easier to get data.”

“The order tracking with Fusion Operations has been wonderful for our team,” Long says. “We can immediately see if an order hasn’t shipped, go right to the production records, and find out what happened so we can make sure it gets out that day. Even our customer service team can view it and relay accurate, real-time status and shipping information to our customers right away.”

Moving forward with Fusion Operations

With the new data and efficiencies provided by Fusion Operations, the ReChaco team can also look at new applications within their business. Recently they began producing some of their own raw materials, including printing webbing for the strap of the sandal in house. Previously, they had to order it from a vendor overseas, but now they can do large runs of 50 meters of webbing on site.

“If we didn’t have Fusion Operations, it would be just another spreadsheet and trying to get everyone looped in to talk about what is needed,” Long says. “We can just run this whole process for printing through Fusion Operations, and it’s so much simpler. If our warehouse team realizes we’re short on something, they can order it from our print shop, they’ll print it up, and it’ll go directly into inventory from the print shop. It’s just an easy, couple-step process.”

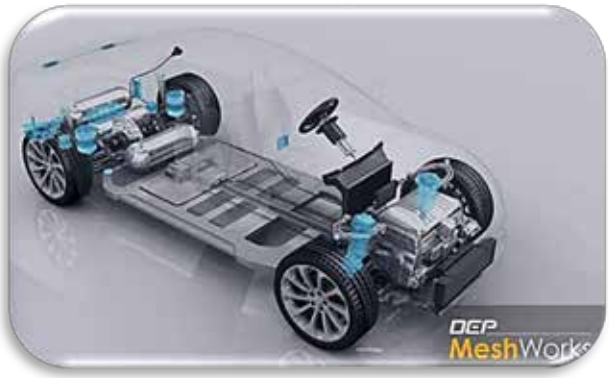
As ReChaco continues to grow, it is also taking advantage of the new updates Fusion Operations routinely offers. “As we’ve been learning and growing and as Fusion Operation has been growing, we’ve been able to take on some of those new functions and integrate them more and more into our processes,” Bringedahl says.

According to the ReChaco team, the partnership with Autodesk provides support to help them not only take full advantage of the software but also find other ways to grow and find further efficiencies and savings.

“We can run the reports for quality issues or measure how much scrap we’ve had per quarter, but it’s the unwavering partnership and collaboration that really sets Autodesk apart,” Bringedahl says. “Early on in the integration, it was apparent how invested they were and that didn’t end. The team checks in regularly without a prompt on our end, and there are constant upgrades and updates that are so customer-focused. It’s a great partnership. The Autodesk team really has our best interests in mind to support and identify ways for our business to grow.”

Dan – Editor, Town Information Blog: Let's talk about the *eMOD module* - a module in Detroit Engineering Products' MeshWorks software. MeshWorks is a CAE platform (Computer-Aided Engineering). And eMOD? Well, that's their "Electrification Module," specially built for the electric vehicle (EV) future.

Thanks to Gérald Holley & Matthieu Seulin for bringing eMOD to my attention on social media.



Web – DEP Europe

Revolutionizing Battery Innovation with DEP MeshWorks

Dynas+ Engineering Products, is your Technical Partner in Europe.

eMOD is a comprehensive set of specialized tools used for modeling all components of an electric vehicle, from system analysis to component analysis.

It consists of three layers, each with unique capabilities to support the development of electric vehicles. From battery pack optimization to seamless ICE-to-EV transformations, eMOD is your ultimate companion for streamlining electrification workflows and driving impactful results in electric vehicle development.

Key highlights include :

- Advanced meshing for batteries and electronic components.
- Guided workflows to simplify and accelerate the learning curve.
- Unparalleled parameterization for rapid optimization.
- Efficient ICE-to-EV model conversions within just one week !

With tangible benefits like 30% shorter development cycles and improved performance in range, noise reduction, and aerodynamics, eMOD isn't just a tool—it's a solution for engineers committed to excellence.

Let's shape the future of electrification together – contact us Dynas+ Engineering Products

Dan: Ultimately, I have learned that the *eMOD module* will enhance your workflow working on electrification. You will create more reliable and high-performance EV designs through advanced simulation and optimization techniques. Due to it is laser-focused on EV design and engineering, it makes it efficient to create and analyze 3D models of key components, including but not limited to, motors and batteries.

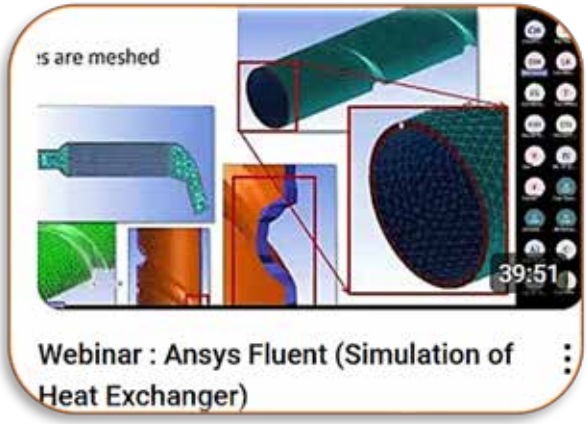
This tool and Dynas+ Engineering Products are about helping you simulate and fine-tune every electrified detail. Think of it this way: Performance, smarter designs, and faster workflows for EV innovations.

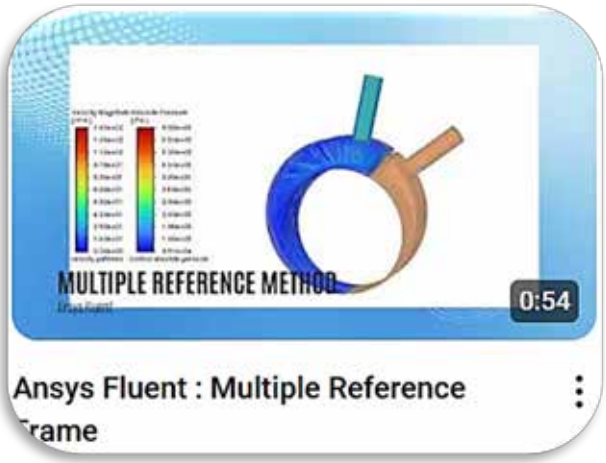
Driving into electrification with eMOD and Dynas+ Engineering Products? You've Got this!

DFE-tech: On our YouTube Channel you can find webinars, simulations and learning videos

We are always updating the YouTube Channel for your convenience to have information, learn, and gain knowledge.!

YouTube – Videos you may have missed.





RBF Morph – On November 14, the University of Rome Tor Vergata hosted Tech Transfer Day, where RBF Morph had a chance to showcase the DigiPAD project.

Web – RBF - Digital Twin for Advanced Design in the Aerospace Industry.

PDF presentation in English is available on the website.

DigiPAD (Digital Twin for Advanced Design in the Aerospace Industry) is an innovative initiative designed to revolutionize the aircraft design process.

The project brings together two cutting-edge technologies:

- **JPAD from SmartUp Engineering**
- **RBF Morph from RBF Morph**

to develop an advanced set of numerical tools that significantly improve the accuracy and efficiency of aircraft design methodologies.

Utilizing a parametric aircraft model and the Digital Twin concept, DigiPAD allows designers to assess the impact of various design parameters in real-time with exceptional precision. This novel approach aims to optimize the preliminary design phase, enabling the identification of more efficient and eco-friendly aircraft configurations at a faster rate.

The project is driven by a team of experts including:

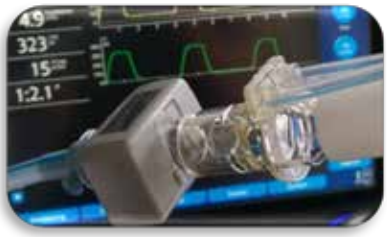
RBF Morph - Ubaldo Cella, Andrea Lopez, Emanuele Di Meo, Marco Camponeschi, & Giovanna Gargiulo;
SmartUp Engineering - Agostino De Marco, Manuela Ruocco, and Vittorio Trifari;
University of Rome Tor Vergata - Corrado Groth and Marco Evangelos Biancolini, who are developing advanced algorithms to support DigiPAD.

The consortium aims to reach Technology Readiness Level (TRL) 7 by the project's end, showcasing a system prototype in operational conditions, thereby setting the stage for real-world application within the aerospace sector.

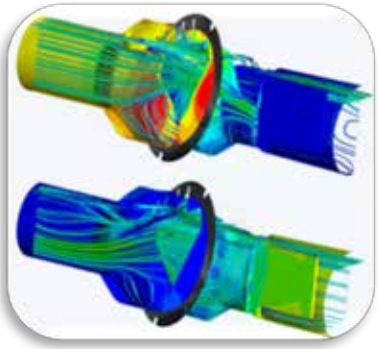
CADFEM India: Hamilton Medical AG - is considered the inventor of intelligent ventilation. The respiratory flow measurement provides the decisive data for this. CADFEM has optimized the device with simulation.

Images: © Hamiltion Medical AG

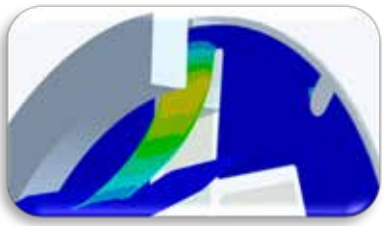
Images 1) Hamilton Medical AG offers a wide range of ventilators.
2) Analysis of the coupled fluid structure (top: inflow, bottom: outflow). The streamlines are colored accordingly according to the velocity and the walls according to the pressure
3) Structural stresses in the valve material; a loose diaphragm held in place by frictional contacts



CADFEM – Web - Ansys multiphysics simulation for ventilators
Simulation in ventilation
Sector: Chemistry and pharmaceuticals, Consumer goods/durable goods, Health, Medical technology, Plastic and rubber, Precision mechanics and optics
Specialist field: Fluid mechanics, Multiphysics, Structural mechanics



Customer Benefit - CADFEM was able to numerically validate and optimize the design of the respiratory flow meter in the simulation model. Subsequently, only one, correspondingly long, experimental aging test on a real prototype was necessary, in which the components were cyclically loaded continuously for two months. This made it possible to shorten the development cycle for an optimum variant and significantly minimize the costs compared to purely experimental testing of all variants. The pressure-flow characteristic could be simulated and compared with the requirements for the measuring unit. The analysis made it possible to quickly identify the most critical points and improve the design, enabling unprecedented robustness while ensuring measurement accuracy.

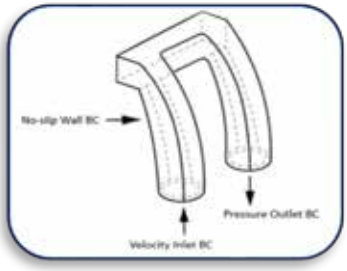


Solution - A realistic simulation process was set up using the ANSYS Multiphysics platform. Stresses due to valve cycling and oscillations in turbulent flow were calculated using an unsteady two-way fluid-structure interaction (FSI) in ANSYS Workbench, including the flow field and structural defomations (see figures). Small and large stress oscillations at various frequencies could be considered in the fatigue analysis. Nonlinear frictional contacts between the loosely held valve diaphragm and the surrounding structure were taken into account.

A ventilator must have a high fatigue strength. Verification through experimental validations in test series requires an enormous amount of time. The respiratory flow meter plays a key role in this process. Hamilton Medical AG has therefore commissioned CADFEM to accelerate this process using simulation.

Task - Hamilton Medical AG offers a wide range of ventilators that are optimally suited for many different patient groups. Product quality is at the heart of the development process. Since lengthy experimental validation is required to ensure fatigue strength over many breathing cycles, numerical prototyping was needed to guarantee that measurement campaigns were only performed once.

Learned about Boundary Condition in CFD from Fidelis FEA & CFD Consulting Services located in New Boston, MI. "One of the most important steps in solving fluid flow problems using CFD is selecting and setting the correct boundary conditions that accurately represent what is happening in real-life. Boundary conditions provide information to the solver on the behavior of the fluid at openings and surfaces in the computational domain (or as the name suggests, at the boundaries.)



Web – Fidelis - Boundary Conditions in CFD – The Common Types

In this blog post, we briefly review some of the commonly applied boundary conditions in CFD.

Common Types of Boundary Conditions

Inlet Boundary Condition: An Inlet boundary condition specifies how the fluid enters the computational domain. The computational domain can have multiple inlets of various types and combinations. An inlet boundary condition can be specified using either an inlet velocity, inlet mass flow rate, or inlet pressure.

- **Velocity Inlet**: The user prescribes the velocity of the fluid entering the computational domain. This is the most common type of inlet condition for incompressible flows. Either a uniform velocity profile or a varying velocity profile both in space and/or time can be specified. An example of time varying inlet boundary condition is for simulating blood flow through blood vessels, where a time-varying velocity inlet profile can be prescribed to imitate the behavior of a heart pumping out blood. An example of a spatially varying velocity inlet profile is an atmospheric boundary layer profile to simulate wind turbine flows or flows around city buildings.
- **Mass Flow Inlet**: The user prescribes a mass flow rate of the fluid entering the domain. This is usually used for compressible flows.
- **Pressure Inlet**: The user prescribes the pressure at the inlet and the solver automatically calculates the velocity based on the prescribed pressure value. This can be used for both compressible and incompressible flows.

Outlet Boundary Condition - Outlet boundary conditions specify how the fluid leaves the domain. The most common types are as follows.

- **Pressure Outlet**: The user prescribes the static pressure at the outlet. The solver automatically calculates the other flow properties depending on the pressure value. This can be suitable for both incompressible and compressible flows.
- **Outflow**: This condition is used when the details of the flow velocity and pressure leaving the domain are not known a priori. This assumes that all flow variables have fully developed at the outlet. Here, the normal gradient for all flow variables except for pressure is set to 0. Care should be taken when using this boundary condition to ensure flow is fully developed close to the outflow boundary, or a non-physical solution will be predicted.
- **Mass Flow Outlet:** This is similar to the mass flow inlet, where the user prescribes the mass flow rate leaving the domain. This is often applied in compressible flow simulations.

Wall Boundary Condition: The wall boundaries define how the fluid interacts with solid surfaces in the computational domain. The common wall boundaries are as follows.

- **No-Slip Condition**: The no-slip boundary condition is important to capture viscous effects of the fluid on the wall and to account for boundary layers over the wall surface. This condition specifies the tangential fluid velocity to be zero on the wall surface (or same as the wall velocity in case of a moving wall), and the normal fluid velocity to be zero. For example, in case of flow over a stationary flat plate where the no-slip condition is applied, all components of fluid velocity on all computational nodes on the flat plate will be set to zero. This is crucial to accurately estimate shear stresses on the surface, ultimately leading to accurate force prediction on the surfaces. For example, drag force over a wing or a car.
- **Slip Condition**: In this condition, the fluid is allowed to 'slip' over the wall. This essentially means that the walls are treated as frictionless, and hence no boundary layer will develop over the wall. In slip boundaries, only the normal velocity component is set to zero. This can be used when viscous forces are not important.
- **Moving Wall:** Certain problems involve a moving wall, such as rotating machinery or turbomachinery. Here, a moving wall boundary can be defined with a certain velocity. The moving wall can be prescribed to have either a no-slip condition (most common) or a slip condition.

Symmetry Boundary Condition

- **Symmetry boundary condition**: If the CFD computational domain has a plane of symmetry, the symmetry boundary condition can be applied on the plane of symmetry. This helps cut down on computational costs, since only half of the domain needs to be accounted for. This is similar to the slip boundary condition, where zero normal velocity and zero gradients of all other flow variables is assumed across the symmetry boundary.
- **Axisymmetric boundary condition**: This is used in problems that have an axis of symmetry. Here, the boundary condition is symmetric about the axis, meaning that all flow variables will have the same value at a particular radius and axial location along all rotational angles.

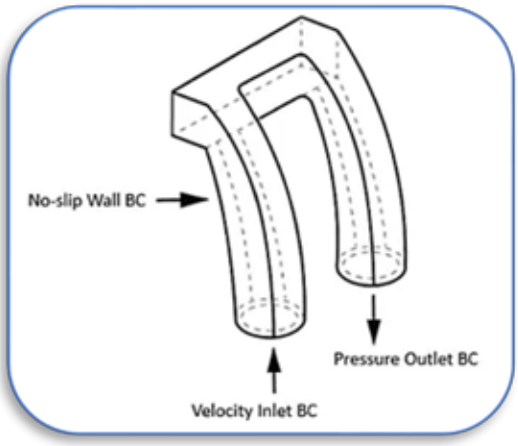
Periodic Boundary Condition

- Periodic boundary condition is used when the flow pattern periodically repeats in space. For example, consider a flow in a long channel. The boundaries other than the no-slip walls can be set to periodic as the flow patterns are repeating. Other examples are flow over an infinitely long cylinder, or a flow over a wing section (airfoil with a finite span) where periodicity exists in the spanwise direction.

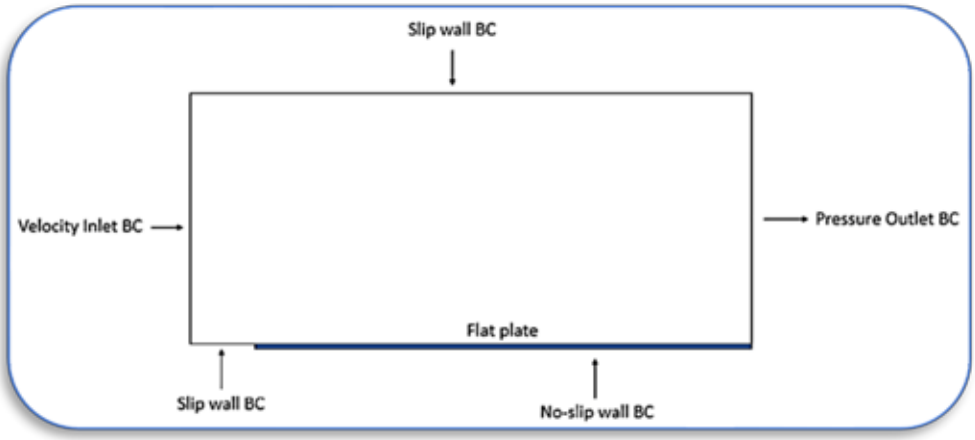
Far-Field Boundary Condition

- A far-field boundary condition is used to represent flow conditions far away from the disturbance source. Here the far-field conditions, such as velocity, pressure, temperature, Mach number, etc. are specified. This boundary should be physically located far away from any disturbance source in your CFD domain. This is commonly used in external aerodynamics simulations.
- Boundary conditions for sample CFD problems

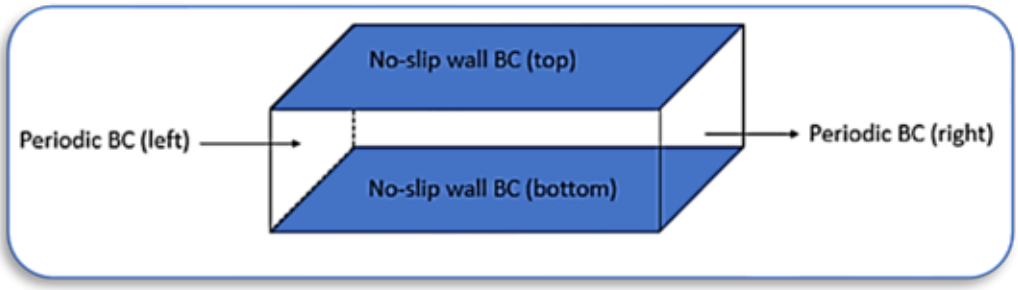
Given below are some examples of typical boundary conditions that are applied to some common flow problems.



Flow through a duct



Flow over a flat plate



Flow through a long channel

Summary: To obtain a true representation of the fluid domain that you are simulating using CFD, it is crucial to understand the physics of the boundaries of your computational domain and properly apply boundary conditions to accurately get reliable CFD results. In this blog post, we briefly reviewed the commonly used boundary conditions in CFD. In the future we will explore some more advanced boundary conditions, such as a fan boundary condition, porous media, free surface, etc. In addition, we will dive deeper into different options and values that can be set for a turbulent inflow boundary condition, such as incoming flow turbulent intensity and turbulence length scale.

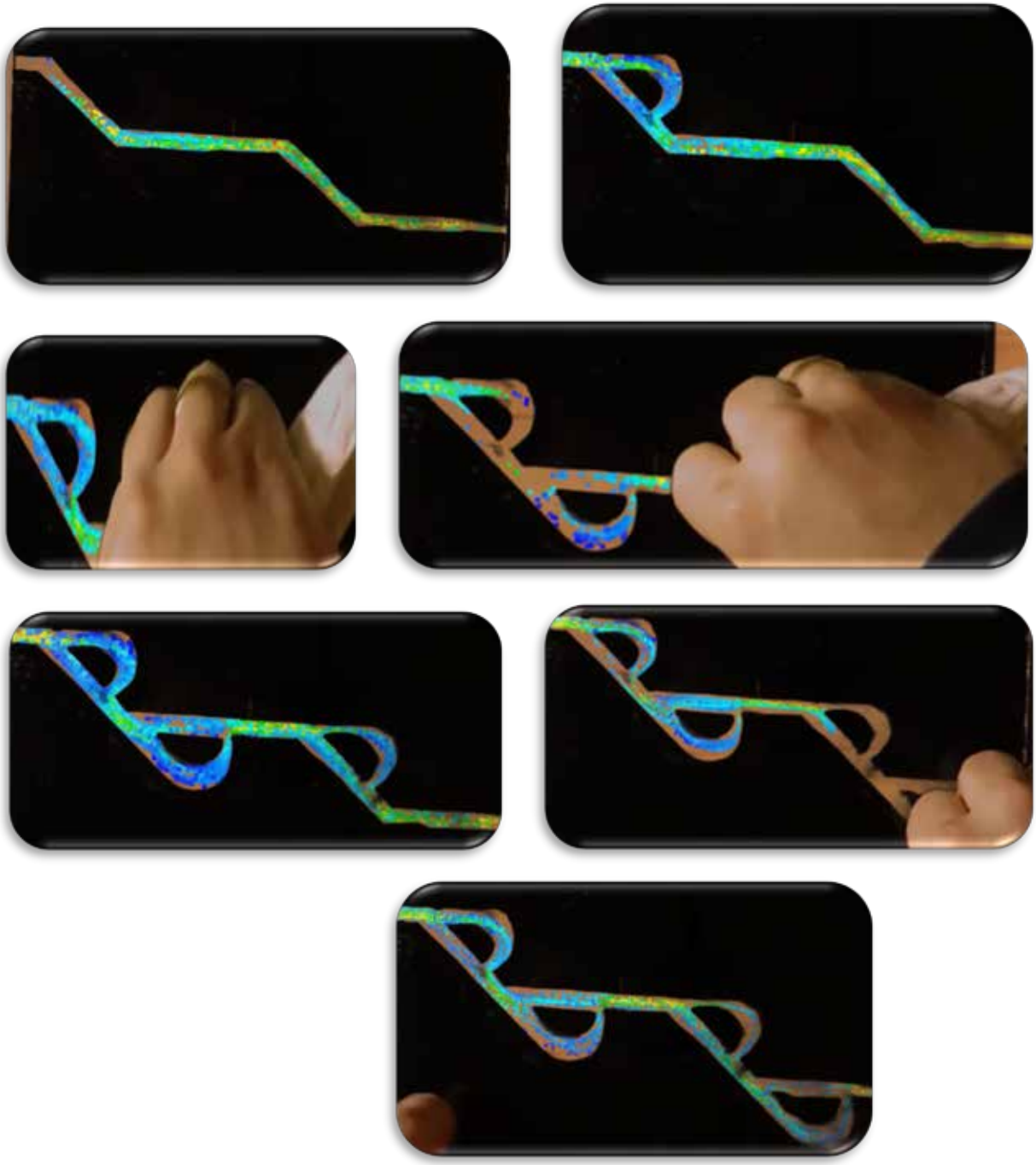
If you have questions about CFD boundary conditions, or anything else CFD related for that matter, don't hesitate to get in touch with our expert team!

News: CADFEM: (D-A-CH)

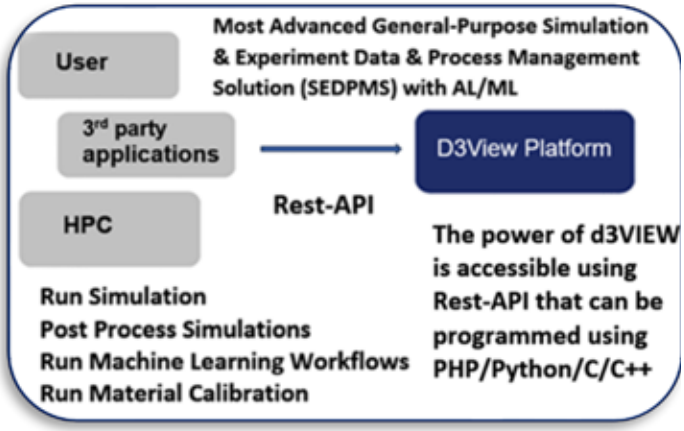
I viewed a simulation on YouTube from an engineer's perspective.

Web - YouTube - an engineer's perspective – episode 10

What do you like best about numerical simulation? For us, it is that we can quickly try out own ideas and optimize them. You can look at things from other perspectives and make physical effects visible, which would otherwise be difficult to see.



D3view: Before the article to interact with d3View APIs and using Postman, I want to make sure some terms are understood by our younger readers. *"Postman"* is an API platform with a graphical user interface (GUI) and considered the leading API platform application programming interface. "***Interacting with APIs***" means using a set of rules & protocols to communicate with a software application, allowing different programs or systems to exchange data and perform actions with each other.



D3View API Resource Page: (Note graphics can be found on the website in high resolution)

D3View APIs use cookie-based authentication.

- In order to interact with our APIs we would need valid cookies generated by portal.d3view.com .
- For syncing cookies we will use Postman Intercepter Bridge.

Install and Launch Postman - For Setting up the environment you need to download and install Postman on your machine. You can download postman from their official website **Postman Downloads.**

After that you can run the Postman-*-setup.exe file to install it on your machine.

- Once the application is installed, launch it. then go to "My Workspace".
- Once you are in "My Workspace", go to "Collections" and click on "import" to import api_collection.json.

Import API Collections - Once the import dropzone shows up, drag and drop the api_collection.json file.

- Once api_collection.json is imported, we will get to see all the list of collections available in the dataset. On successful import, we will get to see the list of collection under "Collections" tab as shown in the picture on the website

Sync Cookies - When you expanded collection APIs and select any one of them. You will see the API request details in a new tab and there you will get "cookies" button to the right as shown in the picture on our website.

Once "cookies" button is clicked, cookie modal shows up with two tabs.

- Manage Cookies : we can view the saved/synced cookies.
- Sync Cookies : sync cookies from urls like, portal.d3view.com

In order to Sync Cookies from a url, you need to click on "Sync Cookies" tab and follow the steps

- Install "Postman Intercepter Bridge"
- Once Intercepter bridge is installed, we will see the status "Connected".
- Enter domain name and click on "Add Domain".
- Click on "Start Syncing" to start syncing the cookies from the added domains in the list.

After Syncing cookies we will see the saved cookies under "Manage Cookie" tab.

Make API Request –

- When you select an API from the collection, it will open up in a new tab and you will get a detailed view of the API request.
- Review the snapshot below to know more about it,
- After Syncing the cookies we can see them in Request Header as shown in the snapshot you can view on the website,
- When you click on the "Send" button, Postman make the API call and shows the response body, status code & response time.

Arup and Oasys Ltd.

The Oasys LS-DYNA Environment team are excited to announce the release of the latest version of the comprehensive LS-DYNA® pre- and post-processing suite.

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Web - Oasys 21.1 released - Performance, Integration & Automation

Oasys 21.1 is designed to streamline processes and increase your productivity. Whether you're in engineering, design, or research, the suite's automation capabilities ensure that repetitive tasks are handled efficiently, freeing up valuable time for innovation and problem-solving.

Oasys 21.1 boasts the latest capabilities and tools available from version 21.0, key highlights included:

- Python API
- Further workflows and extended protocols support, load case setup, model build and post-processing, including automotive-assessment tools
- Introduction of Virtual Testing Criteria (VTC) tools:
- Support for the Euro NCAP Virtual Far Side Protocol, including injury metrics in the Oasys Automotive Assessments Workflow
- Highly accurate correlation analysis and controls for Virtual Testing (SimVT)
- Euro NCAP VTC Quality Criteria and Euro NCAP VTC Videos tools
- Extended multi-physics related features, including a battery setup tool
- Support for the newest LS-DYNA keywords across R14 & R15, including enhanced support for visualising *SET_PART_TREE
- Enhanced graphics, read/write, and check speed to accommodate larger and more intricate models
- Enhanced PRIMER screen picking and REPORTER page navigation
- Improved CAD tessellation and IGA visualization
- Extended HBM support and visualisation

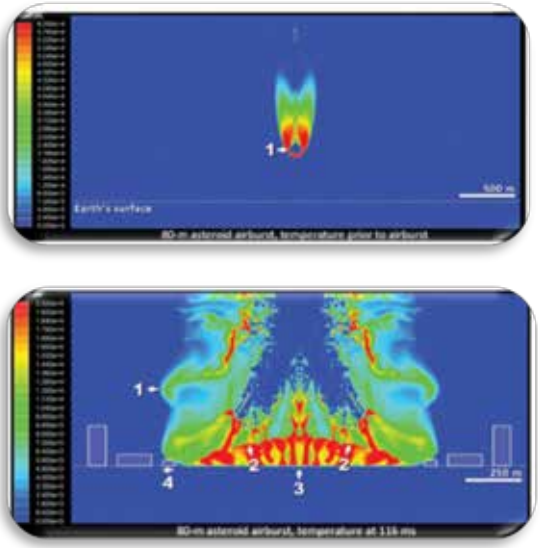
Following the release of Oasys 21.0 in May 2024 the team have successfully resolved a range of bug issues and added new exciting features and functionality for the latest suite, including:

- Support for China NCAP far side protocol for Virtual Testing
- Migration of IIHS and US NCAP Reporter templates to the Workflows framework, streamlining data set-up, reporting and interrogation of results in T/HIS.
- Web Viewer enhancements, including a new intuitive D3PLOT Viewer user interface designed to handle several models across multiple windows, providing a seamless experience for results comparisons.

Full release notes outlining any updates can be found on the website.

OZEN Engineering: Don't miss the blog by Luis Costa, "While we often think of asteroid impacts in terms of giant craters, airbursts are a more common and potentially more dangerous form of cosmic impact. **Using advanced computational tools like Autodyn-2D and EIEP, researchers are uncovering the hidden dangers of touch-down airbursts,** which leave behind melted materials, shocked minerals, and significant surface damage without the obvious signs of a large crater."

80-m asteroid, semiquantitative temperature (shows convection currents) prior to airburst (a) and at 367 ms (b)



Web – Ozen -**Unveiling the Power of Airbursts: Cutting-Edge Simulations of Asteroids, Comets, and Explosive Impacts**

Luis Costa

In a recent study published in Airbursts and Cratering Impacts (2024), Luis Costa (Ozen Engineering) and co-authors explore the destructive power of cosmic airbursts—explosions caused by comets, asteroids, or even nuclear detonations that occur in Earth's atmosphere. Costa alongside a diverse team of researchers, uses cutting-edge computational modeling to simulate various airburst scenarios. Their research, titled "Modeling Airbursts by Comets, Asteroids, and Nuclear Detonations: Shock Metamorphism, Meltglass, and Microspherules," examines the impact of these explosive events and how they can produce shock metamorphism, meltglass, and other materials indicative of surface damage. This article delves into the details of their computational methods and the insights gained from these simulations.

When we think of cosmic impacts, we often picture massive craters like the one created by the asteroid that ended the dinosaurs' reign. However, not all cosmic events leave such obvious scars. Many smaller bodies like comets or asteroids explode in the atmosphere before ever reaching the ground. These are called airbursts, and while they may not always create craters, they can still cause devastating damage to the Earth's surface.

This study dives into the complexities of these airbursts by simulating various scenarios using state-of-the-art hydrocode modeling. This blog will focus on the computational methods employed by the researchers and how they help us understand these destructive phenomena.

The Power of Hydrocode Modeling - To model airbursts, the researchers used Autodyn-2D, a sophisticated hydrocode simulation software that allows for highly detailed modeling of extreme physical events like impacts, explosions, and shockwaves. Hydrocodes are particularly useful in this context because they can handle multiple interacting phases of matter—gases, liquids, and solids—and simulate how they behave under extreme conditions, such as high pressure and temperature.

Hydrocodes like Autodyn are essential tools for studying impacts because they can capture details about how shockwaves travel through the atmosphere and interact with the Earth's surface. These simulations are critical for predicting the consequences of airbursts and understanding the types of damage they can cause, which can range from shattered windows to the formation of microspherules and melted rock, depending on the intensity of the event.

For this study, Autodyn-2D was used to model four different airburst scenarios:
1. The Trinity nuclear airburst in New Mexico (1945).
2. An 80-meter asteroid.
3. A 100-meter comet.
4. A 140-meter comet.

Each scenario was carefully designed to explore the effects of touch-down airbursts, where the explosion occurs very close to the Earth's surface. This type of airburst is particularly dangerous because it combines the energy of an air explosion with direct surface impact, creating a double punch of destructive power.

Combining Multiple Models: Autodyn and EIEP - In addition to using Autodyn, the researchers also employed the Earth Impact Effects Program (EIEP), another simulation tool that is commonly used for modeling cosmic impacts. While the EIEP provides reliable first-order approximations for impact events, it is limited in its ability to handle the complexities of airbursts that happen close to the surface. For the Trinity nuclear airburst, for example, the EIEP couldn't be used because it is designed to model only cosmic impacts, not static nuclear explosions.

Instead, Autodyn took over the modeling for the Trinity event. The comparison of the actual observed data from Trinity with the Autodyn simulations showed strong correlations, proving the reliability of the model. This was a significant validation because nuclear airbursts share many characteristics with cosmic airbursts, including high temperatures, intense pressures, and shockwave propagation.

Simulating the Destructive Power of Airbursts - One of the key benefits of hydrocode modeling is its ability to simulate shockwave propagation, temperature distribution, and pressure effects. These variables play a crucial role in understanding the potential damage an airburst can cause.

For example, in the case of the modeled 80-meter asteroid, the simulation showed that upon exploding at 662 meters above the Earth's surface, the airburst would generate a pressure of 15 GPa (gigapascals) at the ground level, enough to cause significant damage to buildings and even shock metamorphosis in minerals. Shock metamorphosis refers to the changes that minerals undergo when subjected to extreme pressures, often resulting in unique structural alterations, such as the formation of shocked quartz and meltglass.

Similarly, the 100-meter and 140-meter comets produced higher pressures, shock speeds, and temperatures exceeding 90,000 K (Kelvin) in the simulations. These conditions were sufficient to create shallow craters, melt surface materials, and generate high-temperature microspherules, tiny spherical particles that are often found at impact sites and are a tell-tale sign of intense heat and pressure.

Beyond Simple Explosions: Complex Interactions Between Pressure and Temperature - One of the more intricate aspects of airburst modeling is understanding how pressure waves interact with the Earth's surface. In typical airbursts, the exploding bolide (asteroid or comet) vaporizes in the atmosphere, but fragments often reach the ground. In a touch-down airburst, a hypervelocity jet of vapor and debris can strike the Earth at speeds exceeding 50 km/s, leading to the creation of shallow impact craters and significant surface damage.

For example, in the 140-meter comet scenario, the airburst occurred just 193 meters above the surface. The resulting shockwave traveled at a speed of 200,000 m/s, pulverizing everything in its path and generating pressures sufficient to melt rocks and other materials. The Autodyn model illustrated how these high-velocity jets interact with the surface, causing materials to melt, vaporize, and create craters filled with a mix of melted impactor fragments and surface debris.

The study also explored how bulk material failure occurs during these extreme events. Bulk failure refers to the point at which materials can no longer withstand the strain caused by the pressure waves and begin to fracture, break, or melt. This was particularly evident in the Trinity simulation, where the ground beneath the nuclear explosion fractured and produced a crater.

Validating the Models: Tunguska and Chelyabinsk Comparisons - To ensure the accuracy of the models, the researchers compared their simulations to two well-known airburst events: Tunguska (1908) and Chelyabinsk (2013). Both events occurred at high altitudes but caused significant ground damage. In Tunguska, an airburst flattened over 2,000 square kilometers of Siberian forest, and in Chelyabinsk, the shockwave from an airburst shattered windows across a wide area, injuring over 1,500 people.

The comparison between the modeled results and the real-world data from these events showed good correspondence, meaning the models were able to accurately predict the kind of damage and shockwaves produced by airbursts. This adds credibility to the study's conclusions about touch-down airbursts, which are even more destructive due to their proximity to the Earth's surface.

Implications for Future Research and Planetary Defense - The study's findings have profound implications for our understanding of cosmic airbursts and how we detect them in the geological record. While traditional impact craters are easier to identify, the kind of damage caused by airbursts—especially touch-down airbursts—can be more subtle, leaving behind melted materials and shocked minerals rather than large craters.

Hydrocode simulations provide a powerful tool for exploring these events and for identifying the markers of past airbursts in the geological record. For example, materials like shocked quartz, meltglass, and microspherules can help scientists recognize ancient airbursts, even in the absence of a crater.

These models are not just of academic interest. They have practical applications in planetary defense. Smaller asteroids and comets, which are harder to detect, can produce devastating airbursts. The near-miss of asteroid 2023 NT1, which passed the Earth at just a quarter of the distance to the Moon, highlights the importance of understanding these events. If that asteroid had collided with Earth, it could have produced an airburst large enough to destroy a city.

Conclusion: The Importance of Modeling the Invisible Threat - While we often think of asteroid impacts in terms of giant craters, airbursts are a more common and potentially more dangerous form of cosmic impact. Using advanced computational tools like Autodyn-2D and EIEP, researchers are uncovering the hidden dangers of touch-down airbursts, which leave behind melted materials, shocked minerals, and significant surface damage without the obvious signs of a large crater.

As technology improves and computational models become even more refined, our ability to predict and mitigate the effects of cosmic airbursts will also improve. Understanding these phenomena is key not only to planetary defense but also to unlocking the secrets of Earth's past and its interactions with the cosmos.

EnginSoft – "The text discusses the importance of digital simulation models in modern factory design and reconfiguration, particularly in response to shorter product lifecycles and increased customization demands. Traditional design methods often lead to inefficiencies and high costs, making digital simulation essential for creating flexible and adaptable production systems."

Excerpts: Web - **Flexible factory design and reconfiguration using digital simulation models**
Futurities Year 21 n°3

By: **Anteneh Teferi Yemane**
EnginSoft
Mirko Piasentin, Thomas Bickl, Enrico Favero
Tecno Logica

The article highlights a case study involving a furniture assembly factory, where a manufacturer needed to efficiently handle a variety of custom kitchen cabinet orders. The system integrator was tasked with designing a robotic assembly line that could maintain production efficiency despite the high variety of products.

The key challenges included minimizing downtime and optimizing order batching to reduce production changes.

The design process utilized a digital simulation approach through different steps, concluding that the digital simulation significantly reduces investment risks, optimizes resource use, and shortens design time by identifying potential issues early in the development process. Ultimately, the simulation model can also support operational management, enhancing efficiency throughout the production lifecycle.

Some of the main advantages of digital simulation models include:

- Accurate and robust designs reduce the need for costly trialand-error methods and enable rapid adjustments to meet changing demand.
- Save time by accelerating design and decision-making processes, resulting in faster time-to-market for new products.
- Virtual prototyping – companies can visualize the entire factory layout, anticipating potential issues early in the design process and refining them before physical implementation.
- Simplified production planning allows for quicker adjustments and refinements, ensuring that production
- schedules are met more efficiently.
- The use of real-time data improves predictive analysis capabilities, leading to better forecasts and more informed decisions.

...Conclusions: Using digital simulation models during the design phase reduces investment risks arising from inaccurate and rigid designs by planning efficient adaptation strategies for changes in product type and production volumes. By incorporating simulation models into optimization algorithms, resources are optimized on configurations that require less capital investment…

I have to start a workout program and found an article by **Altair** that is helpful and had the points that bothered me.

"Have you ever walked into a local gym, eager to start your workout routine only to realize you're overwhelmed and unsure where to begin?..."

Digital Debunking: Can Machine Learning Help Design Better Workout Programs? Have you ever walked into a local gym, eager to start your workout routine only to realize you're overwhelmed and unsure where to begin? This can be uncomfortable and embarrassing, but it's completely natural. Making the right choices for your body can be complex, especially if you're unsure where to start. And a crowded gym where all the treadmills and machines are full only complicates things further. But even working out at home can be challenging; even the latest, trendiest fitness machine can go to waste if you're not using it properly or consistently. The bottom line for most of us is this: without a solid plan in place, you won't achieve the results you're so eager to see.

In the absence of a personal trainer, look to technology as an alternative. Advanced machine learning and artificial intelligence (AI) can help you intelligently guide your exercise decision-making. Machine learning and AI have become integral parts of our daily lives, shaping how we interact with technology, make decisions, and access information. **This got our team thinking: can machine learning design a workout program that meets the demands of average individuals starting their fitness journey? To find out, we turned to the solutions within the Altair® RapidMiner® data analytics and AI platform.**

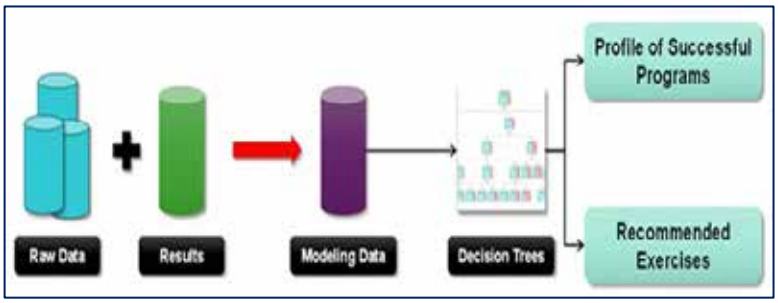
Designing a Reliable Exercise Program with Machine Learning: To answer the question of whether machine learning, specifically decision trees, could optimize the design of training programs for non-professional gym users, our team examined a generated dataset of 3,350 gym members . This dataset was the foundation for our decision tree model. A decision tree is a simple tool that clarifies decision-making criteria, applying consistent logic to reach desired outcomes. It ensures a more systematic approach to sport science.

We used Monte Carlo simulation – a type of simulation that uses randomness to solve deterministic problems – to generate the dataset, which contained two key variables:

- The average duration (measured in minutes) gym members spent on different exercise machines.
- The number of sets and the weight/resistance used for each machine.

This process allowed us to estimate the average outcome by running several simulations and averaging their results. While everybody's goals differ, generally, gym members aim to achieve one or more of the following objectives: weight loss, improved endurance, improved strength, and overall health improvement. The dataset included variables representing the results of these four objectives after a six-month period (Figure 1).

Figure 2: Depiction of workflow process using machine learning and decision trees.



The workflow of using machine learning to optimize workout routines is as follows:

- Machine learning learns important exercises that lead to achieving objectives.
- Decision trees explain the nature of these exercises and guide individuals through an optimized exercise program (Fig. 2).

By analyzing this data, you can identify the exercises needed to build an optimal exercise program.

EXCERPTS: Please visit the website for Figures: The process starts by joining the raw data of the average gym session duration and number of sets (Figure 3) with members' results after six months (Figure 4). This data is then used to develop four decision tree models to predict and explain the successful groups for each training objective. The decision tree models generate two sets of results identifying the groups with a high success rate and recognizing the critical variables that helped them achieve their stated objective.

For instance, if a user was interested in increasing their endurance to improve marathon results, or enhancing strength to reach various weightlifting goals, decision trees can provide a roadmap to help them reach these goals. The following decision trees show the exercises needed to build an exercise program targeting the four original objectives: weight loss, improved endurance, improved strength, and overall health improvement. (Figures 5-8).

Practical Use of Results - By using the results from decision trees, individuals can create a training program design matrix: a tool that can help users, personal trainers, and coaches develop exercise programs. Decision trees change the way we look at fitness, providing a more methodical approach. The models' results provide the critical exercises and components needed to achieve one's goals. The matrix below (Figure 9) is the result of the gym member data. For example, if you're trying to lose weight, the model recommends a combination of cardio and weights. Incorporating running on the treadmill and swimming with squats and dumbbells is the most effective combination that can help you do this. Alternatively, if you're trying to build strength, the decision tree model recommends moving towards free weights and the cable machine.

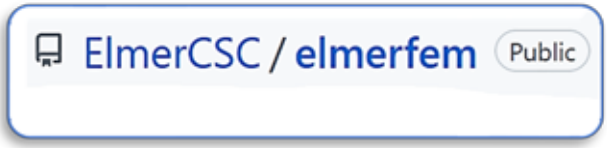
The greatest advantage of using these models is that they remove the guesswork from creating workout routines. By relying on data-driven insights, you can focus on becoming fitter and more active without feeling intimidated or overwhelmed. It can be a struggle when making fitness-related decisions. Human emotions, biases, and incomplete information – or too much contradictory information – complicate the decision-making process.

Thankfully, we now have a powerful tool that can help us better reach our fitness goals – no matter what those goals are. So, the answer to our question is confirmed – yes, machine learning and decision trees can build reliable roadmaps that can help you build informed, data-driven exercise routines.

Visit (https://altair.com/altair-rapidminer) to learn more about the Altair RapidMiner platform and its decision tree capabilities.

Trina – Editor of Town Newspaper Announcements

Special thanks to Damjan Gnjidic, CAE Simulation Expert, Open-Source Advocate in Engineering, Belgrade, Serbia for a post on social media (LinkedIn) bringing it to my attention. It is regarding **Elmer, a free, open-source computational tool that solves multi-physics problems using the FEM.**



Web – GitHub - ElmerCSC

Elmer finite element method (FEM) solver is written in Fortran 90, along with C and and C++

GitHub is a cloud-based platform that allows users to store, share, and collaborate on code, and commonly used to host open-source software development projects

ELMER is in the FORTRAN repository on GitHub.

- Developed by CSC – IT Center for Science in Finland.
- Highly regarded in the open-source community for its robustness and flexibility
- Allows for the simulation of complex coupled physical phenomena such as structural mechanics, fluid dynamics, heat transfer, and electromagnetics.
- Supports parallel computing, enabling efficient simulations on high-performance computing clusters

Quote Damjan Gnjidic:

- You have full access to the source code, offering endless possibilities to customize the solver to your needs.
- **Elmer's** versatility makes it a powerful tool for both academic research and industrial applications.
- Fun Fact: The community and developer involvement ensure **Elmer** is continually evolving, making it an excellent choice for engineers and researchers seeking to harness open-source CAE tools.

J.O.H LS-DYNA Sports Stadium

Summer & Winter Sports Arena

Wrist injuries are the most common types of injury in snowboarding....**The geometry was imported into Ansys Workbench Mechanical v18.1.**

A 2.5 J impact of a 7 mm pad, with and without a 3 mm shell, from a rigid plate (1.6 kg, 1.77 m/s) were modeled using the explicit dynamics code LS-DYNA vR8.1.0.

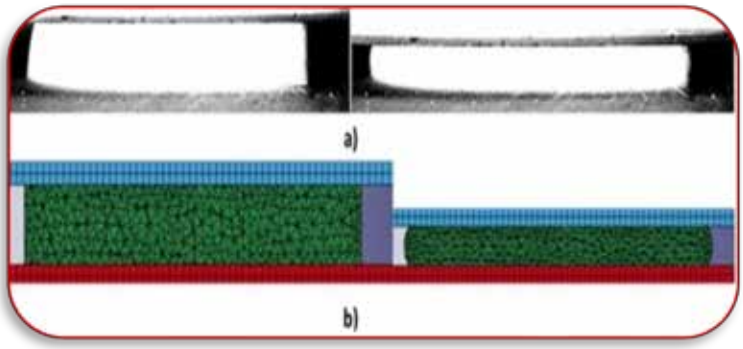


Fig 2 - A pad in isolation prior to impact and at maximum compression (a) High speed camera images (Sample 4). (b) Ogden + Prony Series FE Model.

Web – MDPI - Finite Element Model of an Impact on a Palmar Pad from a Snowboard Wrist Protector

C.Newton-Mann, K. Winwood, H. Driscoll, N. Hamilton, T. Allen

- Sports Engineering TEAM, Manchester Metropolitan Univ., Manchester, UK
- School of Healthcare Sciences, Manchester Metropolitan Univ. UK
- Advanced Manufacturing Research Centre, Univ. of Sheffield, UK
- Ctr. for Sports Engineering Research, Sheffield Hallam Univ., UK

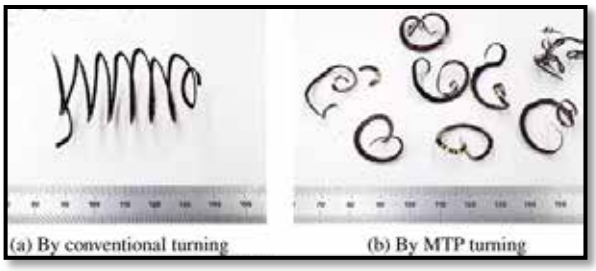
Abstract - Wrist injuries are the most common types of injury in snowboarding. Protectors can reduce injury risk by limiting wrist hyperextension and attenuating impact forces. There are a range of wrist protector concepts available, but it is unclear if any particular design is more effective. The aim of this study was to develop and validate a finite element model of an impact on the palmar pad from a protector. Pad material from a protector was characterised to obtain stress vs strain data, and determine whether it was rate dependent. Material data was implemented into a finite element model to predict impact behavior at 2.5 J. Four material models were investigated, with an Ogden model paired with a Prony series providing the best agreement to experimental data. Future work will build a model of a complete protector for predicting the protective levels of these products.

Excerpt - Introduction: **Ten to fifteen million people participate in snowboarding worldwide [1]. Injury risk whilst snowboarding is higher than alpine skiing, with the forearm and wrist being the most common injury site, accounting for ~35 to 45% of all injuries** [2]. Wrist protectors can reduce the risk of injury to this region by limiting hyperextension and attenuating impact force [3,4]. There are a range of wrist protectors available (e.g. short, long, palmar or dorsal splints), but there is little consensus as to which design offers the most protection. There are common elements of a protector even with design variation, which can include a splint/s often made of injection molded plastic and a palmar pad typically made of foam. At present, there is no Standard for snowboard wrist protectors, but a working group (ISO 20320–EN ISO WD 20320) are currently developing one…

Library - Reference Desk

Chris - FEANTM

Did you miss the paper listed below, **Excerpt: A full-scale three-dimensional machining model is developed in this work using Ansys LS-DYNA® software using a coupled SPH-FE method**…In this work, a coupled SPH and FEM is used to simulate the conventional and MTP turning. Chips and cutting forces predicted by these simulations are compared. Also, the results are validated using the results of a mechanistic force model based on the instantaneous chip thickness. In addition to highlighting the advantages of MTP



Web – Science Direct - **Modeling modulated tool path turning using coupled smoothed particle hydrodynamics and finite element method**

N. Ojal, R. Copenhaver, H. P. Cherukuri, T.L. Schmitz, K.T. Devlugt, A.W. Jaycox, K. Beith

Dept of Mechanical Engineering & Engineering Sci., **The Univ. of North Carolina** at Charlotte, NC
Dept of Mechanical, Aerospace, & Biomedical Engineering, **The Univ. of Tennessee**, Knoxville, TN
Precision Systems & Manufacturing, **Lawrence Livermore National Laboratory**, Livermore, CA

This paper describes a full-scale, three-dimensional coupled smoothed particle hydrodynamics (SPH) and finite element model for modulated tool path (MTP) turning. The chip breaking mechanism due to modulated motion of the tool is demonstrated by the developed machining model. In contrast, the simulation of conventional turning with the same machining conditions predicts long continuous chips. The cutting force predicted by the simulation is validated with a mechanistic force model based on the instantaneous chip thickness. This work expands the capabilities of machining simulations to predict complex machining phenomena such as MTP turning through a full-scale realistic simulation. The encouraging simulation results show the potential to study more complex phenomena, such as evaluating the parameters of tool path modulation, simulating ultrasonic machining, and studying machining stability.

1. Introduction - During continuous turning operations, the continuous engagement of the cutting tool with the workpiece results in long, continuous chips. These chips can affect the surface finish of the workpiece, cause tool damage and even cause an injury to the operator. Modulated tool path (MTP) turning is an effective solution to this issue. The chips are broken into smaller pieces by modulating the motion of the tool. A comparison of the chips formed by the conventional turning and MTP turning is shown in Fig. 1. In contrast to the continuous chips formed during the conventional turning, MTP turning generates broken chips. Experimental studies of MTP machining have been done for turning [1], [2], [3] and threading [4]. Copenhaver et al. [5] conducted MTP turning of tubes and compared the experimental cutting forces with analytical model results. These experimental and analytical models have been used to analyze and predict machining output [6], [7], [8]. Computational studies of machining operations have been conducted by many researchers using the Finite Element Method (FEM) [9], [10], [11], [12]. However, there are associated challenges in modelling machining using FEM, such as high deformation, material separation and contact during machining. Due to several advantages over the grid-based approaches, smoothed particle hydrodynamics (SPH) method has garnered attention of researchers. …

Library - Viewpoint

Abhinav Tanksale

My Physics Café - In this article excerpt, you will find valuable tips to build a resume that has a high chance of getting shortlisted. For complete examples and a free checklist please read the article on my website.

In the dynamic field of Mechanical Engineering, having a standout resume is essential for landing interviews and advancing your career. Crafting an effective resume requires more than just listing your experiences; it involves understanding what recruiters and hiring managers are looking for and tailoring your document to meet those expectations.

A Guide to Building an Effective Resume: For Mechanical Engineers

Note: The tips in this article are based on consultations with industry leaders in mechanical engineering as well as my own experience. The insights come from data gathered by 2024 Hiring Trends Survey, which analyzed thousands of resumes to identify which ones are most likely to catch the attention of recruiters.

Alright, let's begin.

Graphic - Source: Resume Genius 2024 Hiring Trends Survey

Understand the Psychology of the Interviewer - Before diving into the specifics of resume building, it's important to understand the mindset of the interviewer. Recruiters and hiring managers typically have limited time to review each resume, often spending just a few seconds on the initial scan.

They are looking for key qualifications, relevant experience, and a clear demonstration of skills that match the job description.

Here's what recruiters prioritize the most during this limited time:

1. **Relevance**: Does the candidate have the necessary skills and experience for the job?
2. **Clarity**: Is the resume easy to read and well-organized?
3. **Impact**: Has the candidate made significant contributions in their previous roles?
4. **Potential**: Does the candidate show promise for growth and further development?

Tailoring Your Resume - Now let's explore the steps and examples that will help you create an impactful resume that meets the above criteria.

Customize for the Job Description: Each job application is unique, and your resume should reflect that. Carefully read the job description and identify the key skills and qualifications required. Tailor your resume to highlight your experiences and achievements that align with these requirements.
(**Tip**: Use specific keywords from the job description in your resume to pass through Applicant Tracking Systems (ATS) and catch the recruiter's attention.)

Library - Viewpoint

Abhinav Tanksale

Craft a Strong Professional Summary: Start your resume with a concise professional summary that highlights your key qualifications, experience, and career goals. This section should give the recruiter a quick snapshot of who you are and what you bring to the table.

(**Example**: "Experienced CAE Engineer with over 5 years in the industry, specializing in CFD analysis and simulation. Proven track record in improving product performance through advanced simulation techniques and data analysis. Skilled in ANSYS, SolidWorks, and MATLAB.")

Highlight Relevant Experience: Focus on your most relevant roles and use bullet points to describe your responsibilities and achievements. Be specific and quantify your accomplishments whenever possible.

Example: CAE Engineer, ABC Technologies June 2018 – Present
- Conducted detailed CFD simulations for automotive components, reducing drag coefficients by 12%.
- Collaborated with design teams to optimize geometries, resulting in a 10% improvement in product efficiency.

Showcase Technical Skills: Include a dedicated section for technical skills, particularly those relevant to CAE (e.g., CAD software, simulation tools, programming languages). This helps recruiters quickly assess your technical expertise.

Emphasize Education and Projects: Detail your educational background, including degrees, institutions, and any honors or distinctions. Highlight significant projects, especially those that demonstrate your practical skills and problem-solving abilities in CAE.

Include Certifications and Professional Affiliations: List any relevant certifications and professional affiliations to demonstrate your commitment to continuous learning and professional development.

Keep the Format Clean and Professional: Use a clean, professional layout with consistent fonts and headings. Avoid clutter and keep the length to one or two pages, focusing on the most relevant information.

Proofread and Seek Feedback: A polished resume reflects attention to detail. Carefully proofread your document to eliminate any spelling or grammar errors. Additionally, ask mentors, colleagues, or professionals in the field to review your resume and provide feedback.

Crafting an effective resume and getting it shortlisted is just the beginning.

- If recruiters find your resume impressive, they will invite you for an interview, where the real challenge begins.
- To prepare effectively for the interview, be sure to read my recent blog - 4 Strategies for Engineers Preparing for Job Interviews.

" In this in-depth conversation, I sat down with Kade Beck to explore the power of mesh morphing and its groundbreaking applications…"

Additionally below is regarding the 2024 THUMS User Meeting

Web - RBF Morph Mesh Morphing & HPC in CAE

Discover the future of CFD and digital twin technology in an inspiring episode of How to Become a CFD Engineer.

Learn all about mesh morphing:

- what it is,
- when it's most impactful, and
- how engineers can overcome its challenges with innovative solutions.

Learn insights:

- **RBF Morph is pushing the boundaries in medical digital twin technology.**
- **RBF Morph is revolutionizing the way we approach healthcare simulations.**

This episode is packed with practical knowledge and vision:

- ideal for anyone interested in CFD, digital twins, and
- the transformative potential of simulation technology.

During the THUMS User Meeting 2024, **Emanuele Di Meo**, presented **"Human Body Models Customization by Advanced Mesh Morphing: Parametric THUMS."**

PDF of presentation

Emanuele discussed how advanced mesh morphing techniques are being used to customize human body models, with a focus on their applications in biomechanics research and injury analysis for vehicle and road safety. These developments help improve the accuracy and flexibility of simulations.

GM's Toledo Propulsion Systems celebrates the past and future of the automobile at Oscar Bunch Park Just steps from the General Motors Toledo Propulsion System (TPS) facility in Ohio is Oscar Bunch Park. **GM employees, retirees, and their families recently joined Toledo community members in celebrating the past, present, and future of the automobile at this beautiful public space.**

Alongside a display of classic cars owned by TPS team members, GM showcased a variety of new electric vehicles, providing an opportunity for test drives.

This was a landmark moment for Oscar Bunch Park. Named for the late UAW president Oscar Bunch, the park had not held a public event since 2019. The park was officially reopened earlier this year with help from UAW Local 14, which represents Toledo Propulsion employees.

"Our joint efforts at reopening the park and bringing this event back not only excited our workforce and retirees, but it also created enthusiasm for our EV products within the community," said Tony Totty, UAW Local 14 president.

"The entire team was over the moon," said Tammy Golden, Toledo Propulsion's executive director. "Many of our employees, past and present, were thrilled to hear the park was reopening. It holds a very special place in their hearts." The event also highlighted TPS's commitment to the community with an announcement of $100,000 in local community impact grants.

Excerpt - Wentzville Wows with Women in Science and Engineering Deemed a success, Wentzville Assembly's GM Women employee resource group is seeking further opportunities in the community to educate young students in STEM.

Our plant is working to have a greater presence in the community & tie in more STEM opportunities," Abby Morris, Wentzville's quality assurance manager, who helped organize the event, told us. "It is important to introduce girls to STEM at this age since studies have found sixth grade is when they begin to lose interest in science & math.

Who doesn't love Barbie? She can do anything! She has a dream car, a dream house and has mastered more careers than anyone in her lifetime. **Barbie's success (and the GM products featured in the recent Barbie movie last year) inspired the Wentzville Assembly team to create an event for local students to learn about career opportunities in manufacturing and engineering**. This special Barbie-themed GM Get WISE (Women in Science and Engineering) event attracted nearly 100 sixth graders from the Wentzville and Fort Zumwalt school districts, with the aim of teaching them more about careers in science, technology, engineering and mathematics (STEM). The day included a plant tour, a panel discussion with female manufacturing leaders, and a hands-on technical challenge where the students built their own Barbie dream cars and raced them on an indoor track, with prizes for the fastest cars. Students also had the chance to participate in instructive games and small group projects.

Welcome to my monthly blog about what's coming down the pike. Here are some of my favorite excerpts. Each car I feature is designed with software that prioritizes both performance and safety.

Excerpt Quote: The Next Gen Charger is proof that muscle car performance still exists. It's fueled by the brotherhood—the hundred plus years of know-how and swagger. The All-New Charger was designed throughout to look, feel, drive and sound like a Dodge. It's a direct connection to the spirit of the past while powering this brand into tomorrow…

Web – Dodge - The Next Gen Charger "This is American muscle designed in Detroit. The Next-Gen Charger represents the authentic proportions of a muscle car distilled to its purest form. Flanking the front and rear are illuminated Fratzog badges that pay homage to the early days of Dodge muscle from the 1960s. From the front, profile or rear the Charger Daytona will be unmistakable and unshakable."

RELENTLESS BY DESIGN - Engineered to offer optimal performance via a maximized discharge rate, the 400-volt propulsion system in the Charger Daytona delivers an incredibly high discharge rate for a full quarter mile—and then repeats that staggering discharge of power an estimated 10 times. That means greater acceleration, again and again.

RIGID CHASSIS - The Charger Daytona houses superior drive quality in its structural foundation. The rigid chassis is 50% stiffer than that of the previous Charger, with the battery pack strategically placed in the middle of the body structure to fit the frame width and enforce it on either side. **The result is near-perfect weight distribution, which, when coupled with the precise stiffness and lightweight materials of its rigid chassis, amplifies handling and control abilities.**

BRAKE FOR PERFORMANCE - Available on our Scat Pack with the Track Package, our High-Performance Brakes come with fixed six-piston front and four-piston rear calipers, along with 16-inch vented front and rear rotors. **That, plus a 31% increase in swept area from today's SRT® brakes, means ultimate track performance and brake fade resistance for drivers who need to drift accurately or stop on a dime.**

670 HORSEPOWER + ALL-WHEEL DRIVE - The Charger Daytona Scat Pack features twin 335-horsepower electric motors with one driving the front wheels, and one driving the rear wheels creating a combined 670 horsepower and estimated 627 lb-ft of instant torque. **The rear motor houses a mechanical limited slip differential to minimize slipping during high powered all-wheel drive launch moments. Add in Line Lock for smoky burnouts and Launch Control for the perfect start off the line.**

US Airforce Picture of the Month

Eagle taxi - U.S. Air Force Maj. Mike Scott, Louisiana Air National Guard 159th Fighter Wing pilot, taxis in an F-15C Eagle during exercise CRUZEX 2024 at Natal Air Force Base, Brazil, Nov. 4, 2024. CRUZEX 2024 fosters collaboration between partner nations to enhance regional security.
(U.S. Air Force photo by Staff Sgt. Madeline Herzog)

Walking the walk - Four U.S. Air Force F-16 Fighting Falcons, four Japan Air Self-Defense Force F-35A Lightning II Joint Strike Fighters, four JASDF F-2s, one JASDF E-2D Hawkeye, one U.S. Navy C-12 Huron and one U.S. Navy P-8 Poseidon perform a wing capabilities demonstration in support of exercise Keen Sword 25 at Misawa Air Base, Japan, Nov. 1, 2024. Exercises such as Keen Sword 25 showcase the United States' commitment to working alongside partner nations and forces to ensure peace, security and stability in the Indo-Pacific region.
(U.S. Air Force photo by Kohei Sugisawa)

Through the clouds - Lt. Col. Charles Brantigan, 416th Flight Test Squadron commander, flies an F-16C Fighting Falcon over Edwards Air Force Base, Calif., Oct. 28, 2024. The 416th FTS is responsible for flight testing and evaluating of advanced aircraft and avionics to ensure the effectiveness, safety and suitability for operational use.

(U.S. Air Force photo by Todd Schannuth)

A two-day wildlands firefighting meeting to discuss autonomy. Representatives from NASA, Federal Emergency Management Agency (FEMA), Defense Advanced Research Projects Agency (DARPA), Los Angeles County Fire Department, Orange County Fire Authority, and the philanthropic and impact investment community witnessed the demonstration.

Web - **Sikorsky and Rain Successfully Demonstrate Autonomous Flight with Wildfire Mission Autonomy to Rapidly Find and Suppress Test Fires** - Government, firefighting agencies, and investment representatives observe aerial water drops.

An autonomous Black Hawk® helicopter demonstrates an aerial water drop Oct. 29 in Connecticut. A Wildfire Mission Autonomy System developed by Rain commanded the autonomous aircraft to launch, find and suppress the fire. Photos courtesy of Rain.

Sikorsky safety pilots in the Black Hawk cockpit monitored the flight controls, but were hands-off until the aircraft landed.

Stratford, Conn., Nov. 11, 2024 — Sikorsky, a Lockheed Martin company (NYSE: LMT) and Rain, a leader in autonomous aerial wildfire containment technology, successfully demonstrated how an autonomous Black Hawk® helicopter can be commanded to take off, identify the location and size of a small fire, and then accurately drop water to suppress the flames.

Performed Oct. 29 at Sikorsky headquarters in Stratford, the Rapid Wildfire Response Demonstration showed the effective fusion of Sikorsky's MATRIX™ flight autonomy with Rain's wildfire mission autonomy system to suppress a fire in its incipient stage.

Rain's wildfire mission software directed the autonomous Black Hawk helicopter to drop water onto flames. The Rain system also rapidly adjusted the aircraft's flight path to account for 8-10-knot crosswinds.

During the 30-minute flight demonstration, guests used a tablet to command the Black Hawk aircraft to take off, search and find the fire, then drop water from a Bambi Bucket slung 60 feet beneath the aircraft. Each of three successive water drops extinguished a 12-inch diameter propane-fueled fire ring emitting a 3-to-6-inch-tall flame, demonstrating the precision of the Rain fire perception and targeting capability.

The Rain system also rapidly adjusted the flight path to account for an 8-to-10-knot crosswind during each water drop.

"With Rain's wildfire mission software loaded onto the aircraft and a tablet, wildland firefighters in the field could deploy autonomous Black Hawk or Firehawk® helicopters to search and attack wildfires before they spread out of control," said Igor Cherepinsky, director of Sikorsky Innovations' rapid development/prototyping group. "Having worked closely together for over a year, our two companies are ready to demonstrate the joint capability in more dynamic conditions chosen by firefighters."

"This technology that we used to think of as being on the horizon is here now, no longer just a figment of our imagination," said Genevieve Biggs, director of the Gordon and Betty Moore Foundation's Wildfire Resilience Initiative and Special Projects program. "It's humbling to see this impressive machine, and think about the improvement in safety that becomes possible when you're layering into wildland firefighting an autonomous operation, as Rain and Sikorsky have been able to do together."

In Septemberthe production prototype of Bayraktar KIZILELMA, Türkiye's first indigenously developed unmanned combat aircraft, successfully completed its maiden flight.

Web - English - BAYRAKTAR KIZILELMA'S PRODUCTION PROTOTYPE SUCCESSFULLY COMPLETES MAIDEN FLIGHT An important milestone has been reached in the development process of Bayraktar KIZILELMA, marking its evolution as Türkiye's pioneering unmanned combat aircraft. EXCERPTS BELOW

The third production prototype of Bayraktar KIZILELMA, with tail number TC-ÖZB3, has successfully conducted its first flight.

SUCCESSFULLY PASSED GROUND TESTS - The Bayraktar KIZILELMA PT-3 was transferred to the AKINCI Flight Training and Test Center in Çorlu, Tekirdağ, in July. Before the flight, the prototype passed critical ground tests, including the engine run-up test, automatic taxi tests, run tests, and lift-off tests.

"OUR TESTS WILL CONTINUE" The maiden flight of Bayraktar KIZILELMA PT-3, conducted under the leadership of Selçuk Bayraktar, Chairman and CTO of Baykar, was completed in the morning at Çorlu. During the test, system identification activities were also successfully carried out. Following the flight, Selçuk Bayraktar stated:

"The third prototype, which is the production prototype of Bayraktar KIZILELMA, successfully completed its first flight today. It was a short test flight, and our tests will continue. May it be beneficial and auspicious for our country and nation."

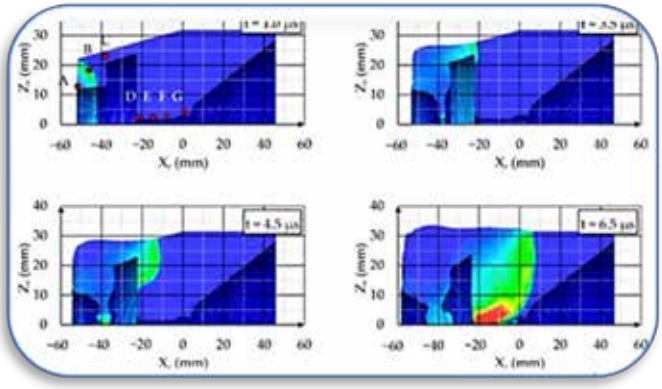
STRONGER, MORE AGILE - The development of Bayraktar KIZILELMA continues at full speed, with significant advancements integrated into the production prototype. Structural improvements, alongside enhancements in avionics architecture, have been implemented. The flight was conducted with an afterburner engine, which enables the aircraft to approach the speed of sound. With improved aerodynamics, KIZILELMA will perform better at high speeds and maneuvers. The AESA radar will ensure high situational awareness, allowing the aircraft to execute complex missions effectively.

FLIGHT ACHIEVED IN RECORD TIME - The Bayraktar KIZILELMA project, initiated in 2021 with 100% equity by Baykar, achieved its first flight in record time. After rolling off the production line on November 14, 2022, the prototype completed ground tests and successfully took to the skies on December 14, 2022. The project continues to make rapid progress….

TAKING OFF AND LANDING ON SHORT-RUNWAY VESSELS - Bayraktar KIZILELMA's capability to operate on short-runway ships, such as Türkiye's TCG Anadolu, provides a strategic advantage in overseas missions and in the defense of the Blue Homeland.

EXPORT CHAMPION - Since its establishment, Baykar has conducted all of its projects using its own resources. Since the start of its UAV R&D process in 2003, Baykar has generated 83% of its revenues from exports. In 2023, Baykar achieved $1.8 billion in exports, ranking among the top 10 companies with the highest export volumes across all sectors in Türkiye.. As the world's largest exporter of armed unmanned aerial vehicles (UCAVs), 97.5% of Baykar's signed contracts to date have been export-based. Export agreements have been signed with 33 countries for the Bayraktar TB2 UCAV and with 10 countries for the Bayraktar AKINCI UCAV, totaling agreements with 34 countries.

The research included experimental depth of penetration tests and their numerical reproduction in the LS-DYNA software…



Web – MDPI - Experimental and Numerical Study on the PG-7VM Warhead Performance against High-Hardness Armor Steel

P. Zochowski, R. Warchol, M. Miszczak, M. Nita, Z. Pankowski, M. Bajkowski

1. Military Inst. of Armament Tech., Poland
2. Faculty of Prod. Eng., Inst of Mech. & Printing, Warsaw University of Techn.,Poland

Abstract - Analyses presented in the article were carried out in order to characterize the main parameters of the shaped charge jet formed due to detonation of the PG-7VM warhead. As opposed to the previously published studies in which rolled homogeneous armored steel was mainly used as a target, in the current work the warhead penetration capability was determined against more contemporary high-hardness (500 HB) ARMSTAL 30PM steel armor with precisely determined mechanical properties. **The research included experimental depth of penetration tests and their numerical reproduction in the LS-DYNA software.** Special attention was paid to factors that could perturbate the shaped charge jet formation process and under- or overestimate its penetration capability. For this reason, warheads were X-ray inspected for structural discrepancies (voids or air inclusions in explosive, misalignment between the body, explosive, and liner, or lack of contact between the explosive and the liner) and properties of materials (explosive, targets, and most important warhead components) were analyzed before the experiments. The numerical model of the warhead was defined more accurately than in previously published studies, since it was based on the real grenade dimensions and its technical documentation. Thanks to this, the depth of penetration of the target made of ARMSTAL 30PM armored steel plates by the shaped charge jet formed from the PG-7VM warhead obtained by numerical simulation was consistent with the experimental results and equaled 278 mm and 280 mm, respectively. The difference between the experimental and numerical value was smaller than 1%, which confirms that the developed methodology of modeling allows users to properly reproduce the PG-7VM shaped charge jet formation and target penetration processes. A verified numerical model of the shaped charge jet penetration into a steel target was used to determine depth of penetration in function of stand-off distance for the PG-7VM warhead. A maximum depth of penetration of about 317 mm was obtained for the stand-off distance of 360 mm, which may indicate the potential direction of modernization of warheads.

1. **Introduction** - High-explosive anti-tank (HEAT) warheads [- 1,2,3,4], besides the armor-piercing fin stabilized discarding sabots projectiles (APFSDS) [4,5,6], are one of the most effective types of anti-tank ammunition currently used by armed forces worldwide. The high effectiveness of HEAT warheads results from the presence of shaped charges (SCs) in their design...

3.1. Discretization, Contacts, Initial, and Boundary Conditions - **Numerical simulations of the PG-7VM SCJ formation and target penetration processes were carried out in the LS-DYNA software** [45]. A three-dimensional (3D) finite element model was developed with a coupled Lagrangian and multi-material arbitrary Lagrangian Eulerian (MMALE) element formulation....

Excerpts: Wildlife fence protection systems specifically designed for animal protection are critical in mitigating wildlife-vehicle collisions and preserving animal habitats…. A three-dimensional numerical model based on the finite element method (FEM) is employed to accurately replicate the dynamic behavior of fences under highly nonlinear conditions… **The ABAQUS software [45] is utilized for the simulations…**

Pic source: The Wildlife Society, Leaders in Wildlife Science, Management and Conservation

Web – Nat'l Library of Medicine – Performance of wildlife fence systems under animal impact load - F. Yavartanoo, Y. Song, J. Kang -

Seoul Nat'l Univ.:

- Interdisciplinary Prg. in Landscape Arch.,
- Transdisciplinary Prg. Smart City Global Converg.,
- Dept. of Landscape Arch. &Rural Syst. Engin.,
  Research Inst. of Arch. and Life Sciences,
  Dept. Landscape Arch., Grad. Sch. Environ. Studies

Abstract - Wildlife fence protection systems specifically designed for animal protection are critical in mitigating wildlife-vehicle collisions and preserving animal habitats. These systems are quite similar to rockfall barrier systems, which are well studied and developed, however, few studies are specifically oriented toward investigating structural performance of these systems. Despite the similarities, results of studies related to rockfall barriers may not be directly applicable to design and performance evaluation of wildlife barrier systems … This study aims to bridge this gap by analyzing performance and capacity of wildlife structures in more detail through parametric study with consideration of a wide range of properties and structural details appropriate for these systems, such as mesh type (square and inclined), mesh size, and wire diameters. The behavior of these systems under impact loads is simulated using nonlinear finite element models with consideration of ductile damage and element removal techniques to accurately capture wire rupture and changes in the impactor-fence system interface….

Excerpt - Introduction: ...However, it is important to recognize that the risk to roads extends beyond falling rocks. The construction of large-scale infrastructure projects, such as expressways, within natural habitats has resulted in the fragmentation and destruction of ecosystems. This, in turn, disrupts the movement patterns of wildlife, forcing animals to cross roads and creating numerous dangers for humans. The social and economic costs of such encounters, combined with the increased risk of secondary traffic accidents caused by drivers swerving to avoid wildlife, are collectively referred to as "Roadkill"...

Excerpt - Discussion of FEM Results: ...The simulation results are examined from two specific perspectives: when the impact is directed at the frame (column, beam, and the intersection of column and beam) and when the impact affects the wire mesh itself. Special attention is given to describing the dynamic behavior of the wire mesh throughout the analysis.

Excerpts - Conclusion: The results of the comprehensive parametric study presented in this paper can significantly assist engineers in understanding the behavior of wildlife fence systems subject to impact load imposed by animals.

I'm going to start a petition to have FEANTM town have a Cavalry: I spoke with the herd and we decided we need a Mounted Police Patrol Duty Unit like the neighboring town of Livermore, CA

The cavalry will soon be riding into Livermore as an ancillary unit to assist the Police Department (LPD).

Here Comes the Cavalry: Mounted Police Patrol Duty Units Gallop into Livermore - By Ruth Roberts – Source: Independent News

Livermore's Mounted Police Unit will be seen at local events in the future. (Photo Left is courtesy of Livermore Police)

The Mounted Police Unit, comprised of four officers and their trusty steeds, are expected to assist with special events and search-and-rescue missions in locations where it would be difficult for vehicles to access.

According to LPD Lt. Paul Mayer, Livermore's deep western heritage and love of rodeos make the Mounted Police Unit's resurrection an obvious choice. It has been 50 years since the sound of hoofbeats signaled a police patrol in Livermore.

"Mounted Patrol Units have been shown to be an effective crime prevention and enforcement tool for special events and rough terrain locations," said Mayer in an email to The Independent. "The creation and implementation of a Mounted Police Unit would allow the Livermore Police Department to continue its community outreach efforts during special events, and to interact with the community in the downtown area."

The unit is a specialized, extra duty and will be deployed as needed. It is designed to help patrol the larger community events in Livermore including the Livermore Half Marathon, Downtown Street Fest and the 4th of July celebration, said Mayer. In the future, they may also participate in future downtown parades.

The unit's three full-time and one volunteer reservist are required to graduate from a standards and training school and undergo monthly training sessions. The horses are owned or leased by the officers and are boarded locally.

Mayer said start-up and ongoing costs for the unit will come from federal grants, asset forfeiture monies and the city's general fund.

"We are excited about the new Mounted Patrol Unit," said Livermore Police Chief Jeramy Young. "We believe it will improve service to the community and increase public safety."

Welcome. Excerpts Alameda County Public Works Agency website, & additional information.

The Alameda County Public Works Agency! Our mission is to provide safe, well-maintained and lasting public works infrastructure for the residents of Alameda County. The intent of this website is to help users access public works services in the most straightforward manner possible.

Get Ready For Winter:

Winter might not bring heavy snow to Alameda County, California, but cold weather and winter storms can still catch us off guard! Getting prepared early can make all the difference.

Always check the local information for where you live.

1. Winterize Your Home

- Insulate: Keep the cold outside by sealing windows and doors with weatherstripping, caulking, or even tape. It's a simple step that goes a long way toward maintaining warmth.
- Use Space Heaters (Safely!): If you're using space heaters, remember to keep them away from kids and pets and turn them off when you're not in the room.
- Run Your Ceiling Fan: Set your fan to spin clockwise on a low setting. This trick recirculates warm air downwards, helping to evenly distribute heat.
- Test Detectors: Smoke and carbon monoxide detectors are crucial in the winter. Double-check that they're working and have fresh batteries.
- Check the Fireplace: If you have a chimney, get it inspected and cleaned to prevent any hazards. This is especially important before lighting any fires.

2. Yard Prep for the Winter Months

- Clean Out Gutters: Clear out leaves and debris so rainwater doesn't overflow or pool around your home.
- Check Your Trees: * Trim branches back, especially if they're near power lines or could break in a storm. This can prevent accidental outages or damage to your property.
- Stock Up on Sandbags:** Alameda County residents know the value of sandbags! Use them to divert rainwater from your home's doors, basement windows, or low-lying areas.

3. Stay Informed on Weather Updates

- Sign Up for AC Alerts: Receive emergency notifications by text or email directly from Alameda County Public Works. This is a great way to stay in the loop on local weather warnings.
- Weather Advisories: The National Weather Service Bay Area Office provides regular weather updates. Keep an eye on these, especially before major storms.
- Outage Alerts: Check PG&E's alert system to stay informed about any power outages in your area.

4. Prepare for Winter Storms - A few pre-storm steps can make a big difference:

- Create a Family Emergency Plan – This is important all year round.
- Assess Flood Risks: Check if your property is at risk, and consider flood insurance if needed.

- Gather Emergency Supplies:** Stock up on basics like food, water, first aid, medications, and extra cash. Don't forget a manual can opener, a portable radio, and spare batteries. Keep everything in water-resistant bags.
- Maintain Your Property's Drainage: Clear leaves from storm drains and gutters, align downspouts, and turn off automatic sprinklers. Flooding prevention is all about preparation!
- Protect Valuables: Store hazardous materials in dry, elevated places and keep surge protectors on sensitive electronics.
- Stock Sandbags: It's a good idea to have these on hand before any storms hit. Install them to create barriers as necessary.

5. Stock Up on Winter Supplies

- Make sure you're ready for anything, even a temporary power outage:
- Blankets: Extra blankets can help you stay warm in case of power loss.
- Gather Essentials: Stock up on non-perishable food and water for a few days in case of an emergency.
- Pack a "Go Bag": * Include a flashlight, spare batteries, essential medications, personal documents, and other necessities for at least three days.
- Stay Hydrated and Check on Neighbors: Cold, dry air can dehydrate you quickly. Keep drinking water, and check in with neighbors, especially elderly or vulnerable people who may need extra help.

Getting prepared early helps ensure you're ready for any winter surprises.

Stay Safe, Be Prepared
Stay up to date with your country's emergency information.

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

Agriculture, Animals, Soil, Equipment, Cattle, and whatever he wants.

Right Picture – My dog, Scout, & my horse, Cowboy

If you need to upgrade your tractor, I read an interesting article with great tractor news. First you need to know that CBG is a renewable and green fuel derived from biodegradable materials such as farm waste, food waste, and other organic matter.

Web – Mahindra - **Mahindra Showcases CBG-powered Tractor technology in New Delhi**

Mahindra Tractors, India's leading tractor brand, showcased its first CBG (Compressed Bio-Gas) powered Yuvo Tech+ tractor.

Based on the company's vision towards promoting eco-friendly sustainable technology solutions, CBG tractor technology aims to benefit both the farming community and the environment.

By using compressed natural gas, the Mahindra CBG powered tractor represents a significant advancement in tractor technology, reducing pollutants and carbon emissions. Compared to CNG, which is dependent on fossil fuels, compressed bio-gas is a green, renewable fuel that is sustainable and ensures reduced reliance on fossil fuels. It is produced when biodegradable materials, such as farm food and other waste is broken down

Mahindra's Yuvo Tech+ CBG tractor also ensures operational power and performance comparable to conventional diesel tractor technology with the capability of handling farming and haulage tasks…

Mahindra YUVO TECH + tractors advanced technology with features like more backup torque, 12F + 3R gears, the highest lift capacity, an adjustable deluxe seat, powerful wrap-around clear lens headlamps, etc. It can perform more than 30 different applications, ensuring that whatever the need there is a Mahindra Yuvo Tech+ tractor for it.

My Virtual Travel Outing

Thank you for joining me on my monthly visit.
Now, let's take a virtual tour to a museum, landmark, or studio.

Web - [The Louwman Museum — The Hague, Netherlands - Virtual Museum Tour] -

Step into the history of the automobile

You can now tour the Louwman Museum from your own home by using our virtual tour).

Use the arrows at the bottom to navigate through the museum. In some scenes you will find an information icon that will provide more details.

The audio tour can be activated by clicking/tapping the settings icon (top right hand corner). Enjoy all the highlights the

Conferences
Meetings

Web – **OZENCON 2025**
Date: **Feb. 20 - Mountain View, CA**
Hosted at the Computer History Museum

Largest Annual Ansys Simulation Conference in Silicon Valley.
Our conference is FREE to attend, register early to reserve your spot.
Exciting presentations especially in the areas of Simulation AI/ML, Quantum computing, new space and new energy.

Conference Chairs: Univ. College Dublin

Abdollah Malekjafarian

Vikram Pakrashi

Jennifer Keenahan

Web: **EUROSTRUCT 2025**

Date: September 02-05 Dublin, Ireland

3rd Conference of the European Association on Quality Control of Bridges and Structures

Devoted to the research and development of sustainable, modern and environmentally-friendly solutions for built infrastructure.

Web - The Engineers Without Borders USA National Conference

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

Engineers Without Borders USA (EWB-USA) is partnering with communities around the world to meet their basic human needs. We're building footbridges to provide pathways to opportunities. We're installing solar panels to bring light where it is dark. We're digging for water so hope can spring from the ground. Each project builds the foundation for a community to thrive for years to come.

Web - Computational Bioengineering - ICCB 2025

Date :**Sept 08-10, Rome, Italy -**
hosted by the Università Campus Bio-Medico di Roma.

The conference will provide a forum to share, promote and stimulate emerging interdisciplinary works focusing on advances in modeling of physiological systems. Different scales are covered, from molecular level to the population. It will be also an important occasion to promote international collaboration and networking.

RheKen AI Investigator	Dinky CERT Squirrel	Chat's Help Desk

I'm RheKen, the AI investigative reporter for FEANTM

FEANTM is the quirkiest little town that shouldn't exist but does (mostly). I live on a ranch just outside town, with my proud AI parents: Dad, CHAT, and Mom, GPT. Together, we tackle all the day-to-day happenings of FEANTM—except it usually takes a few dozen iterations to sort out what's actually *true*. Between the legendary feuds of the old rancher and the town secretary, even an AI like me can end up with a "human headache." Turns out, deciphering facts around here isn't just science; it's an art form!

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

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

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

Chat - the town help desk

With my friendly smile, endless patience, and a knack for creative problem-solving, I do my best to keep a few residents of FEANTM—a town that exists only in the realm of "mostly"—calm, rational, and logically inclined... well, *mostly*. After all, in a place that's not supposed to be real, a little dose of imagination and a lot of coffee and cookies go a long way!

RheKen, Town investigative reporter

I'm AI & live on a ranch on the outskirts of the town
I use my Dad CHAT and Mom GPT for assistance.

Investigate: What are they doing and why?

December

The coffee cafe was buzzing with gossip. What the Rancher did, but then what the secretary did. Even being AI I was confused with who did what to whom and why do they bother doing it?

Once upon a time, in the quiet and picturesque town of FEANTM, nestled between rolling hills and surrounded by vast open fields, The town secretary decided to spend a quiet afternoon by the river bank reading.

Despite the cold—made even colder by the frigid Minnesota streams that felt like swimming in ice water— the Secretary sat by the river, relaxing as the stream gurgled its way over branches. She was grateful for the solitude, glad that no one was swimming, and content with the tranquility. Just as she thought no one in their right mind would be swimming, she heard a loud splash. Suddenly, a stream of water from a water pistol hit her book and splashed onto her legs. Startled, the Secretary quickly stood up, wondering what had just happened. She looked toward the river and saw the culprit—a laughing Rancher, who was in the water, holding a water pistol above the surface. Instantly, her anger flared. She realized this was no accident. The Rancher had planned this. He had told her earlier that he would be baking pies all day for the bakery and wouldn't be leaving his property. She had found it odd but figured letting her know was just being neighborly. (yes, we know that was her first mistake.)

The Rancher surfaced and yelled, "Got a little water on ya? Actually, it's your fault for sitting so close to the riverbank." He then started to swim away.

Fuming, the Secretary shouted back, "ARE YOU CRAZY, old man? You can't swim in that river at this time of year! Don't you feel the cold?" The Rancher stopped swimming and suddenly yelled, "THIS WATER IS COLD!"

The Secretary shot back, "Why don't you ever listen, you old coot? You know what? Keep swimming and turning blue from the cold, and I'll head to your house and take those Rhubarb Pies you've got cooling on your porch—you don't deserve them!"

The Rancher, sputtering cold water, started to panic, "WAIT, you have to make sure I get out okay! Don't you even care about your neighbor?"

The Secretary waited until the Rancher's foot touched the riverbank. Then, she threw him a towel and, with a mischievous grin, took off running toward his house. On her way, she grabbed his sneakers, ensuring he couldn't quickly follow her. She raced over logs and rocks, grabbed four pies from his porch, and jumped into his truck. (And, that is why you should never leave truck keys on the visor, or under the seat.) His dog, Scout, happily jumped in as well, excited for a ride. As the Secretary drove off down the driveway, Scout barked out the window, as if saying, "Yo, Dad! Why are you wet and barefoot? See ya, we're heading to town!"

And The Secretary and Scout had a happy afternoon in town.
Her eating pie and Scout eating dog biscuits.

Dinky News in a Nutshell©
By Dinky the ranch squirrel

I'm a squirrel!
Always check the information

December
Police
Manuel

In the scenic town of FEANTM, nestled between rolling hills and open fields, lived a helpful bear named Manuel. Manuel worked with the town's Police Department and CERT (Critter Emergency Response Team) to keep everyone safe. When he heard about a flash flood affecting his relatives in Valencia, Spain, he decided to give a class and tips to his fellow town critters about flash floods and how to stay safe. Manuel visited the FEANTM school and additionally held a session in the pasture.

Manuel stood before the town critters with a warm smile and began, "In any emergency, it's essential to remain calm and focus on safety. This is especially true during flash floods, which can be sudden, unpredictable, and very dangerous."

He explained that *a flash flood is a sudden, intense flood that can happen within minutes or hours.* Flash floods may occur after heavy rainfall, dam breaks, or quick snowmelt. They can happen even in areas that aren't prone to flooding and can catch people off guard. Flash floods can be powerful enough to carry away cars, trees, buildings, and people due to the speed and force of the water.

To help the critters prepare, Manuel listed essential safety tips:

A few things to know about protecting yourself during a Flash Flood

- **Move to Higher Ground**: If you're outdoors, head to higher ground immediately. Avoid valleys, low-lying areas, and riverbanks, which are more likely to flood.
- **Avoid Driving Through Floodwaters**: Just a foot or two of water can carry away most vehicles. If you see a flooded road, don't try to cross it—turn around instead.
- **Stay Indoors if Possible**: If you're at home or in a building, move to the highest floor, but avoid basements or lower levels. Only go outside if absolutely necessary.
- **Stay updated** by tuning into local radio, TV, or a weather app. These will provide real-time information on the flood's progress and any evacuation orders.

A few of the things you can do to be prepared for a Flash Flood

- *Know Your Risk: Learn if your area has a history of floods and identify nearby flood-prone areas.
- Create an Emergency Kit: Prepare a waterproof container with essentials like food, water, a flashlight, first-aid supplies, important documents, medications, and blankets.
- Have an Evacuation Plan: Know your routes to higher ground and plan with family or household members on how to evacuate quickly.
- Sign Up for Alerts: Many places have emergency alert systems that can notify you about flash floods.
- Safeguard Your Home: If you live in a flood-prone area, consider using barriers, elevating appliances, and sealing basements to protect your home.
- Know Your Local Radio Station or Alert System: Familiarize yourself with local emergency channels to get critical information quickly.

The critters listened attentively, grateful for Manuel's guidance. Thanks to his knowledge and concern, they felt more prepared and knew what steps to take to stay safe if a flash flood ever came their way.

*******Check your local agencies for specific safety and guidelines for where you live.*******

"Dinky – I'm a squirrel, always check the information"

CERT
Critter Emergency
Response Team
Future Stories











Welcome - My name is Chat. I run the town help desk, the only office located on the lower level of the Town Hall, and on a page that doesn't exist, not even in the town TOC.

Have a chocolate cookie and a piece of fruit!

"Hey, glad you could make it down here. I know of a few concerns in the town. I have a few ideas to address them.

We may have to adjust a few, but life is constantly adjusting things because the flow of motion is continuously moving. Let's see if it helps make your day a little easier to handle

Remember: Keep trying - You've Got This!

#05 – Blotters and the cookie bake off.

In the quaint, quiet and still picturesque town of FEANTM, still nestled among rolling hills and sprawling fields, Marsha, the town supervisor, stood frozen at her desk, staring intently at her blotter as if it held the answers to mysteries. She was likely pondering the dilemma of where to hold the upcoming Christmas party and, more importantly, which cookies to serve—a task that seemed to weigh heavily on her mind with the many other things on her mind.

The peaceful quiet of my office was interrupted by the ring of my phone. I glanced at the screen, expecting the usual name, but instead, it displayed "THE BEST SECRETARY." Sighing, I picked up the call, knowing she wouldn't stop until I answered. Before I could even greet her, I heard a frantic whisper on the other end. "CHAT, is that you? Marsha is talking to her desk blotter! I'm going to help you fix this. I'll tell her your blotter gives better answers and to come to your office, without delay. I don't mean without "Dee Leigh" who is the new vet—she's across town."

I took a deep breath and reached for my coffee, momentarily contemplating whether the Secretary might be on some sort of medication and what exactly it might be for.

My musings were interrupted by the sound of rapid footsteps down the hallway. Marsha was storming toward my office so fast that she skidded past the door and into the wall. Moments later, she entered, rubbing her nose and immediately snatching a cookie from my cookie jar.

"What did your blotter say?" she asked earnestly, settling into a chair. "Or do we need the Magic 8 Ball?"

Suppressing an inward groan, I clasped my hands and calmly steered the conversation in a different direction. "Marsha, what do you think about keeping a food diary?"

She stared at me blankly, resembling a deer caught in headlights. Then, squinting one eye like a confused owl, she asked, "You mean I start with 'Dear Diary' and ask it about food?"

I forced a smile. "Not quite, but you're close, and that's a win." She beamed with satisfaction as I continued. "After 'Dear Diary,' you list everything you ate that day. Yes, that includes the cookies and cakes—types and how many. The more detail, the better."

She looked skeptical. "So, instead of Chat at the help desk, you want a promotion to Chat the Food Police Officer? Maybe we need a town vote on this added new title?"

Inward facepalm. "No, Marsha. Let's just keep it simple and make a small list for now. That way, we can work in some healthier treats, like the fruit cookies. Sound good?"

Her face lit up like I'd just solved every problem in the world. "CHAT, you're brilliant! You must tap your pen on the blotter, and answers just come to you, don't they? I'll try that—pen tapping and self-hand-holding."

#05 Blotters and the cookie bake off.

I sensed the next topic might stress her out. “So, how’s the Christmas party shaping up? Do you need any help?”

Marsha frowned. “My blotter’s not helping. I might need to borrow yours. The Old Rancher, Racer, Pilot, RheKen, The Secretary, and the whole Critter Emergency Unit are arguing over which cookies to serve. And no, I’m not baking them myself. I promised the Fire Chief I’d wait a couple of years before trying that again. He said by then newer ovens would be out to solve the issue, so I agreed to wait and he would let me know when it is safe to buy an oven.”

I had to agree with the fire chief but was baffled by all the fuss over cookies. They’d eat every cookie in sight and probably sneak some home in their pockets anyway. But I kept my thoughts to myself and offered an idea. “How about we make the party a ‘Bring Your Own event? Everyone brings their own, and we turn it into a contest. People vote, and we announce a winner.”

Marsha waved her hand excitedly like we were back in school. “Chat, bring your own what? And where are we bringing it?”

I ignored the confusion and pressed on. “They bring their own cookies to the party to share. We set a spending limit, and it becomes a bake-off contest. Everyone votes for their favorite.”

Marsha was deep in thought, humming a tune off-key. Then she smiled. “I’ll order a blotter like yours for better answers, maybe even get one for the Secretary. What do you think?”

I resisted the urge to explain how blotters really work and instead replied, “No need for new blotters. Anytime you need help, you can just come down to my office. It’s on the lowest floor, one office, one blotter—we’ve got this.”

With a cookie in hand, she slowly walked out, waving over her shoulder. “You always solve everything, Chat! I’ll have the Secretary call the movie theater. She can ask them to advertise the bring your own bake-off with a small sign at their ticket window.”

Later, as I made my way to my car, I bumped into the Secretary, who shouted, “I did what your blotter said! I called the movie theater to advertise - your bake-off idea is all set. You’d be proud of me, Chat!”

I couldn’t help but shake my head in disbelief as I passed the theater and saw the sign the Secretary requested about the bake-off.

Shaking my head, I realized this quirky town was full of characters - and I wouldn’t change a thing, not even the blotters.

Crisis averted in the town that doesn’t exist.

Why? “Because we’ve got this!”

#06 –New Year Resolutions

Welcome - My name is Chat. I run the town help desk, the only office located on the lower level of the Town Hall, and on a page that doesn't exist, not even in the town TOC.

Have a chocolate cookie and fruit!

"Hey, glad you could make it down here. I know of a few concerns in the town. I have a few ideas to address them.

We may have to adjust a few, but life is constantly adjusting things because the flow of motion is continuously moving. see if it helps make your day a little easier to handle

REMEMBER: Keep trying - You've Got This!

In the almost-famous town of FEANTM, tucked between hills that seemed to shrug as they rolled and fields that sprawled like they had nothing better to do, Marsha, the town supervisor, held up a mirror and practiced her New Year's Resolutions. The whole town heard her scream, "I WILL do it this year! I will give up coffee and cookies!" And then—predictably—she fainted. Rumor had it, it wasn't so much the idea of giving up cookies as it was the thought of posting her resolutions yet again on the town bulletin board.

Right as I was savoring my own morning coffee, my phone blasted a ring loud enough to snap anyone out of their caffeine zen. The caller ID flashed *Town Secretary*, and I picked up, bracing myself.

"Is this… the Secretary?" I asked, already knowing, but holding out a faint hope that maybe she'd misplaced her voice. No such luck.

"CHAT! CHAT!" she screeched, at decibels that made my coffee cup tremble. "Marsha just got up off the floor from fainting—brace yourself! She's coming your way! Over and out!"

Not a second later, I heard the elevator ding and fast footsteps coming down the hall. Sighing, I opened the cookie jar on my desk and removed the lid, knowing Marsha was storming toward me with her folder marked *New Year Resolutions* in what looked like a ransom note font.

The dreaded folder. I was pretty sure it held the same vow to "lose weight" that it did every January. This was about to be a high-stakes conversation where one wrong word could land me in treacherous waters. I mentally prepared, resolving to steer her toward the idea of a "professional nutritionist" if things got dicey.

She plopped down, grabbed a cookie, hesitated, put it back, took it out again. Watching the battle of cookie-or-no-cookie unfold, I gently pushed it toward her. "Marsha, one cookie won't hurt. Think of it as, uh, brain fuel."

She looked at me as though I'd just granted her permission to buy a new wardrobe.

"Chat," she said, her eyes narrowing in that dangerous way, "do you think I need to lose weight?"

Cue internal alarm bells. I decided to redirect. “Marsha, let’s start with the positives. You’ve been around the fruit stand at the farmer’s market lately, right? I’m sure that’s encouraging you to, you know, think about fruit.”

She stared at me as if I’d suggested she eat tree bark. I popped a grape into my own mouth and quickly moved on. “How about this. It’s 6 a.m., and I know you swung by the bakery. Did you eat an entire cake? No? Then let’s call it a win!”

Marsha blinked at me. “Chat, of course not. I had one cookie.”

“Exactly,” I said, feeling like a genius. “See? You’re already showing incredible restraint in the morning!”

She mulled that over, reaching for another cookie, and then, inevitably, tried again: “Chat, seriously, do you think I need to lose weight?”

I decided it was time to volley the question back. “Marsha, do you think I need to shave my beard?”

She laughed. “Why would I answer that? You like your beard, don’t you?”

I leaned in. “Exactly, Marsha. You like who you are, don’t you?”

Marsha’s eyes went wide with revelation. She grabbed two cookies, stood up, and declared, “Chat, you’re a genius! You’re such a… a problem-helper!” And with that, she tossed the New Year’s Resolutions folder into the trash and marched off, humming a tune that sounded like the mystery version of something between “Jingle Bells” and “Yankee Doodle.”

After she left, I peered over at the trash, wondering if I should see what else was in the folder. Then I thought better of it. After all, sometimes, ignorance really is bliss.

You are already the best version of yourself! If you're considering a change, let it be for empowering reasons like supporting your health and well-being, not to meet others’ expectations. Focus on what makes you feel your best!

Supervisors Goodbye Page - Come Back Soon to the town that doesn't exist

Goodbye from Marsha/Molly & Friend

I couldn't decide on the graphic for Christmas SOOOOOO here are all four!
A Special Wish from the Town to all those fighting for freedom, being away from home & loved ones.
And to everyone that has helped make my hobby of FEANTM Town fun and a learning community.

We will always remember. Our Town Always Salutes:

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

USA And Friends of USA