# Ansys 2026 R1: Powering What's Next

Dr. Larry Williams

Distinguished Engineer

# Ansys 2026 R1 - Physics-First and System-Aware

## 2026 R1 Available March 9, 2026 on Customer Portal!

Ansys part of SYNOPSYS 2026 R1

- Physics-first, system-aware
- Intelligent Acceleration
- Twin-Driven Performance
- Systems to Silicon




Ansys part of SYNOPSYS

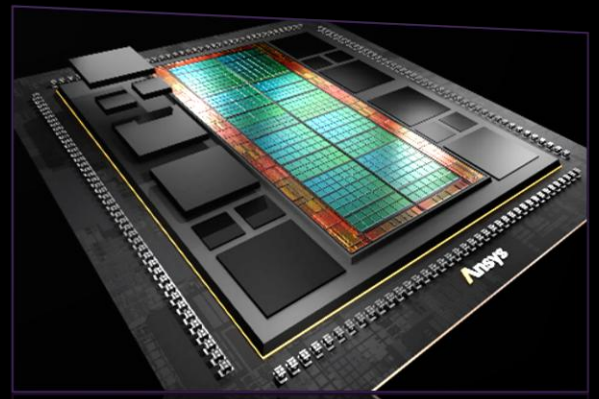
# Physics-first, system-aware

“The most immediate demand for integrated multiphysics simulation is in advanced semiconductor packaging — especially multi-die and 3D-IC designs — where digital, thermal, mechanical, power, and signal interactions must be solved together.”

SASSINE GHAZI
SYNOPSYS CEO

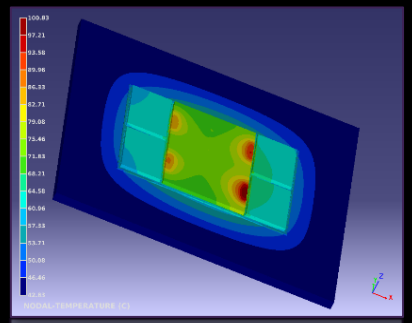
SYNOPSYS®

# Solving Advanced Packaging Multiphysics Challenges




**thermal + power + signal + structural integrity**
across advanced multi-die systems
IN ONE PLATFORM

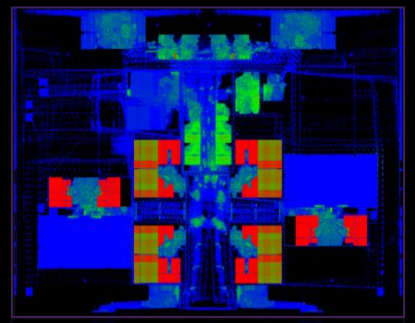
***Foundry-certified*** *electrothermal analysis for multi-die stacks*



RedHawk-SC Electrothermal™

THERMAL INTEGRIY

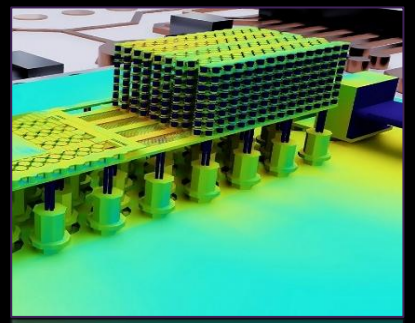
***Full-system*** *power delivery analysis across chiplets + interposers*



RedHawk-SC™

POWER INTEGRITY

***Accurate electromagnetic*** *analysis for high-speed interconnects at scale*



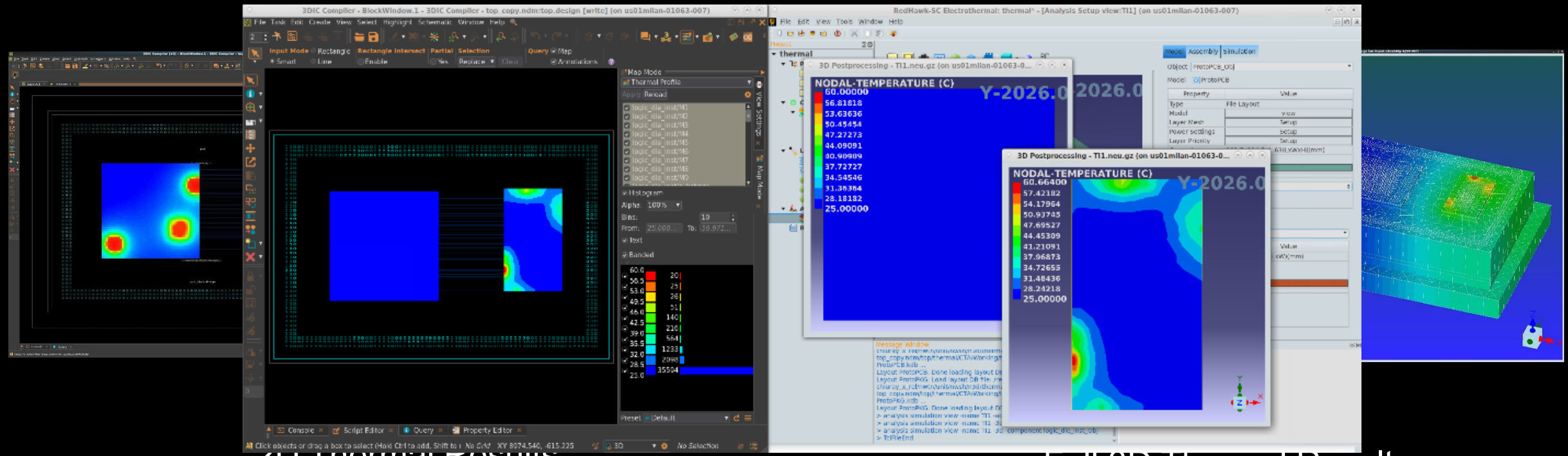
HFSS-IC™

SIGNAL INTEGRITY

# 3D-IC Compiler Integration FLow

## Flow highlights

- Integration of RHSC ET with 3D-IC Compiler in a Unified Cockpit for seamless 3DIC thermal flow
- Enable multiphysics-aware 3D-IC design and verification from early prototyping to signoff
- Support 3D GUI for design visualization and analysis result simultaneously for ease-of-use




2D Thermal Results Vis Results in 3DICC

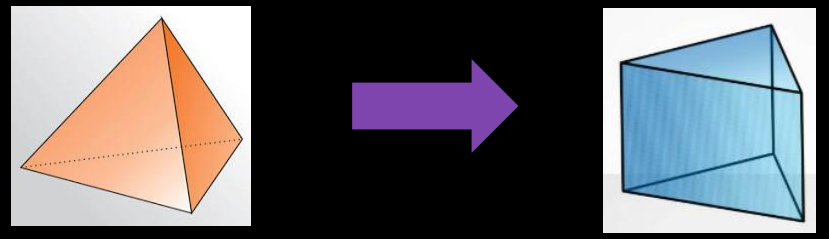
Full 3D Thermal Result Results in RHSC-ET

Simultaneous Multiphysics Signoff

# HFSS-PI - Broadband 3D Semiconductor Power Integrity

Ansys part of Synopsys 2026 R1

New Prism Meshing Element Tailored for Chip, Package, Board

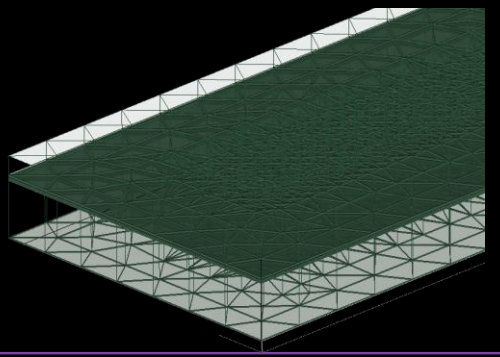


Tetrahedron Prism

HFSS-PI: Prism Solver[New]

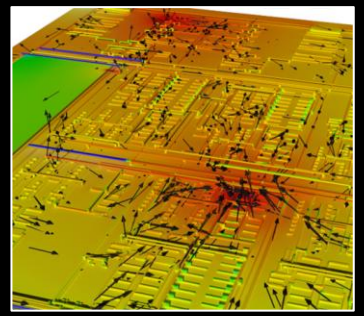
- Capacity and Speed
- Ground up implementation
- NextGen Prism Mesher[New]

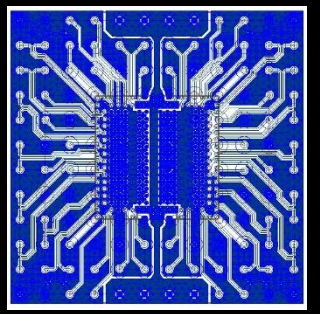
| | Initial Mesh Time |
|---|---|
| Tetrahedron | 3h40m |
| Prism | 30m |



HFSS-PI Explicit 3D DC Resistance

- Utilizes Gold standard Q3D conduction solver for robust and accurate DC point
- Efficient handling of SPICE circuit-elements





# Ansys Freeflow Smooth Particle Hydrodynamics (SPH)

SPH solver is like people in a crowd.

Each person has their own space, and when others get too close, pressure builds and motion changes

Video courtesy: https://www.youtube.com/watch?v=_bHzDtxVFxM

# Unlock **new opps** across industries with **Ansys FreeFlow**

- **Fast** and **easy-to-use** (particle-based → no meshing required!)
- **Complement** high-fidelity VOF method with **mid-fidelity SPH**
  - Applications include free surface flows and spray simulations

**~7X reduction in solve time compared to Fluent CPU solution**

## FUEL TANK SLOSHING

**Causes issues including**

- *Vehicle instability & rollover risk*
- *Reduced braking efficiency*
- *Increased wear & structural stress*

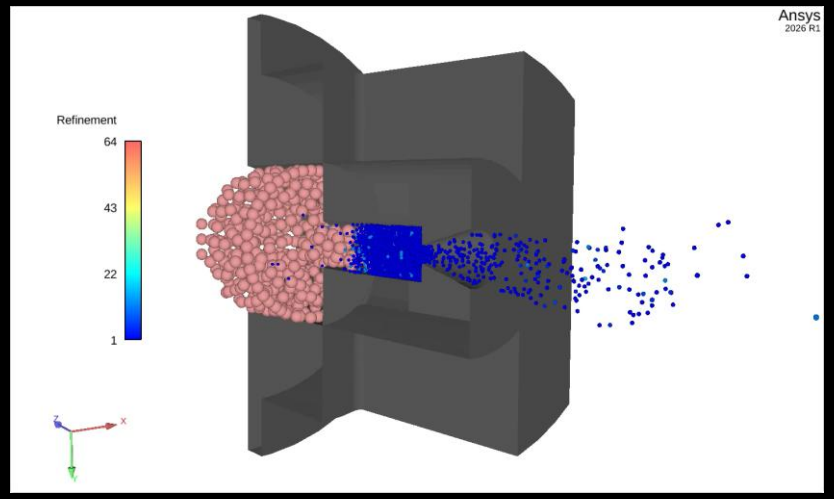
**21 sec of runtime**

- **1x L40: ~3 days**
- **VOF (CPU): ~21 days**

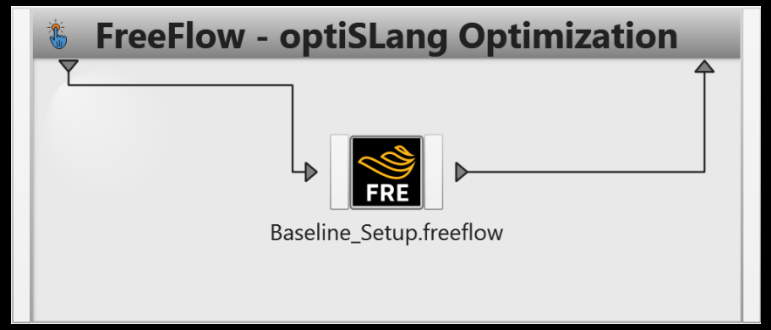
**Courtesy of:**
**A. Haghnegahdar**

# Freeflow in 2026 R1

***Enhanced for many particles like nozzles, flows over obstacles and hydraulic valves.***




***Enhanced integration between FreeFlow and Ansys optiSLang.***




***Ansys EnSight post-processing is available for FreeFlow visualiation***

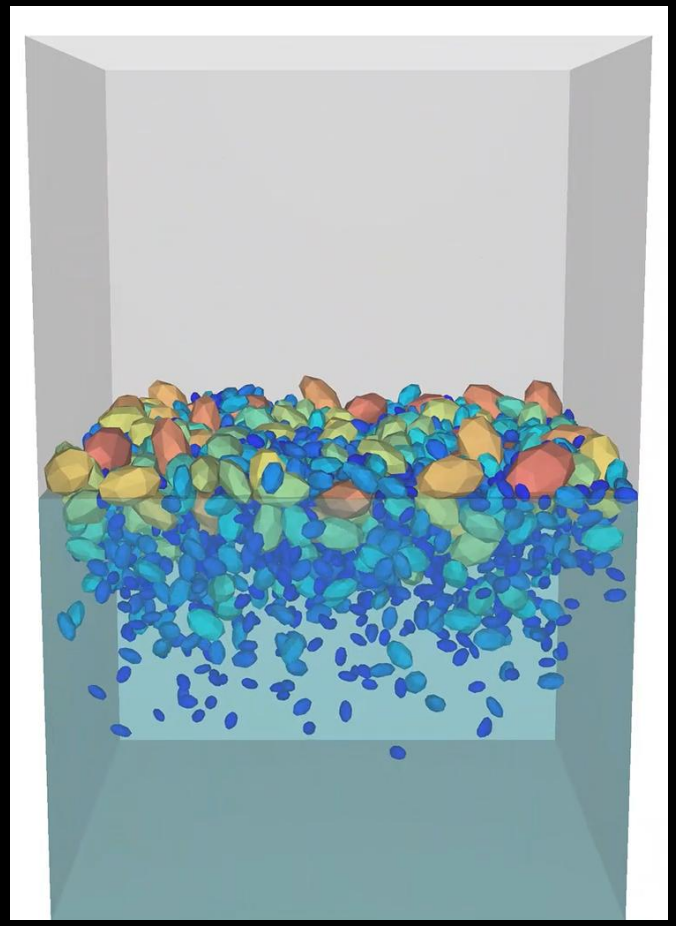
# Ansys Rocky Intermolecular Forces and 1-Way Free Surface

## New ready-to-use modules available in Discrete Element Model (DEM)

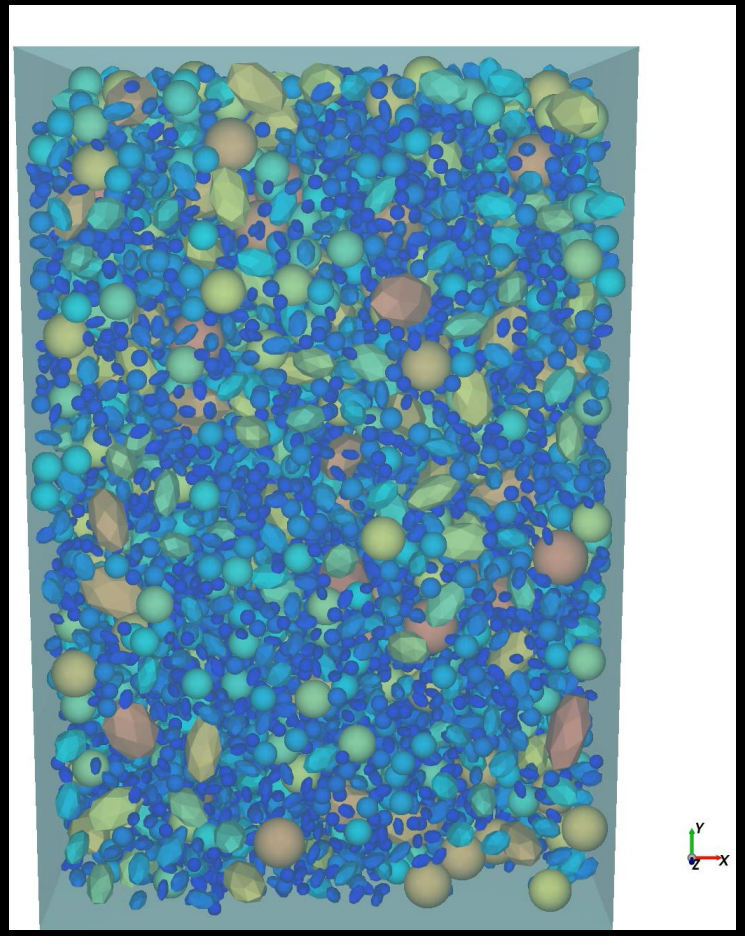
- **1-Way Free Surface** module allows you to incorporate free-surface physics for liquids within a simplified DEM framework
  - It works by tracking the fluid level and applying fluid-related forces (*capillary*, *buoyancy* and *stokes*) to particles

- The **Intermolecular Forces** module allows you to include *van der Waals* and/or *steric repulsive* force in the particle-particle interaction

**Fixed Free Surface**



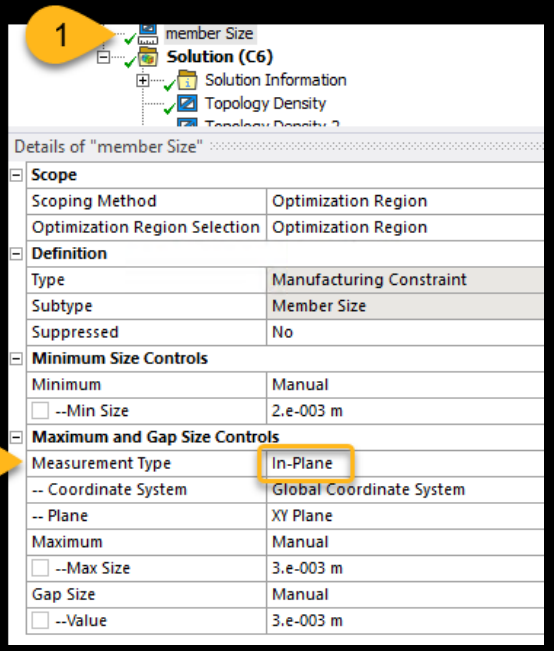
**Moving Free Surface**




Note: The fluid is fictitious, and it is not direct modeled. This is good **(performance optimization)** when user is mostly interested in the effect of the fluid over the DEM.

# Mixable Density in Mechanical – Rib Design

- Topology optimization for simulating thinner products now possible
- Add Ribs, stiffeners while evaluating design for manufacturability



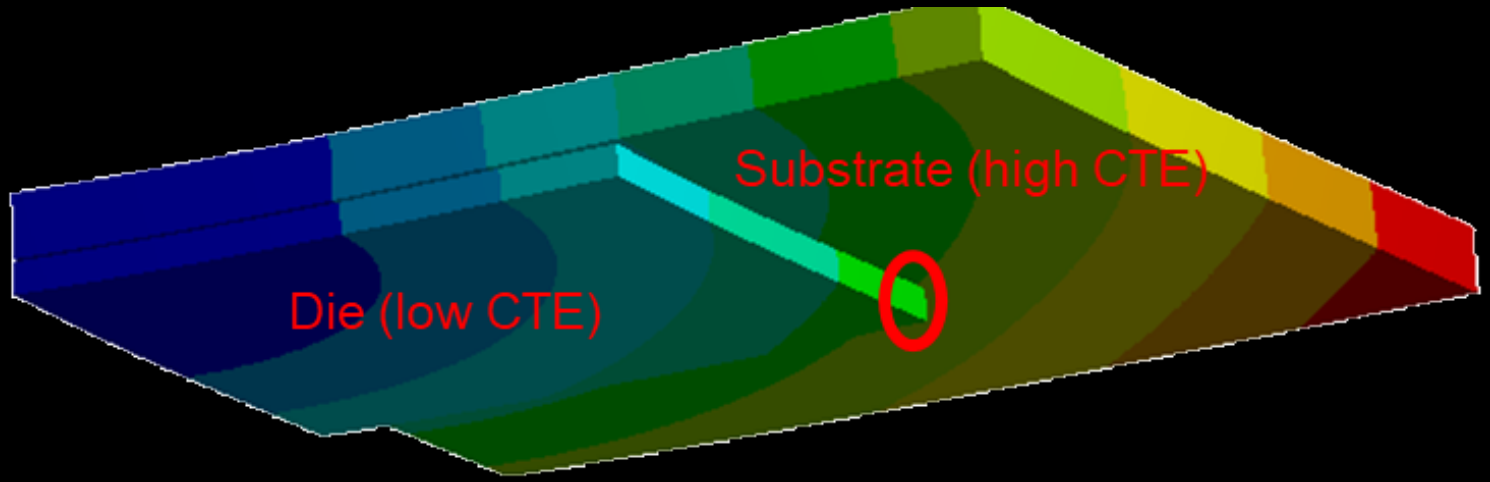

# Intelligent Acceleration

“GPU-accelerated computing is revolutionizing design — enabling simulation at unprecedented speed and scale, from atoms to transistors, from chips to complete systems, creating fully functional digital twins inside the computer… empowering engineers to invent the extraordinary products that will shape our future.”

JENSEN HUANG,
NVIDIA CEO

NVIDIA

# Structural Analysis With Ansys Mechanical

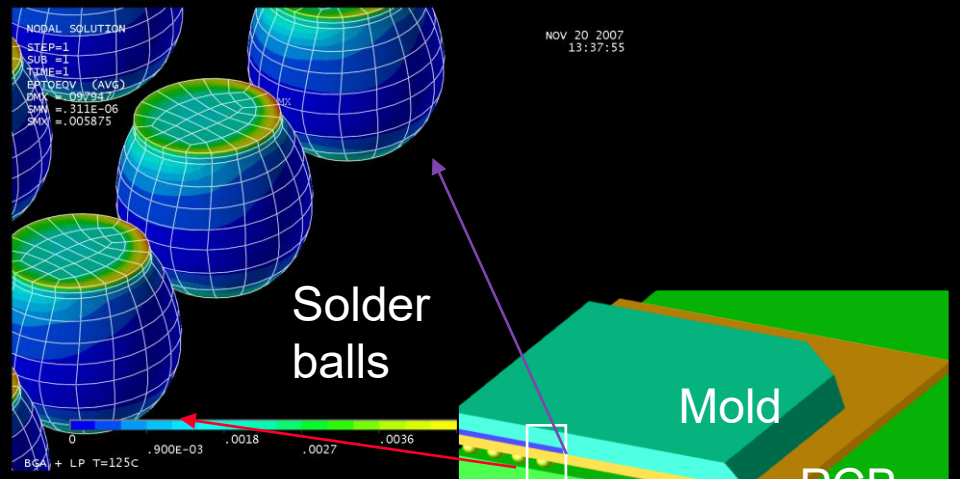



**CTE = Coefficient of Thermal Expansion**

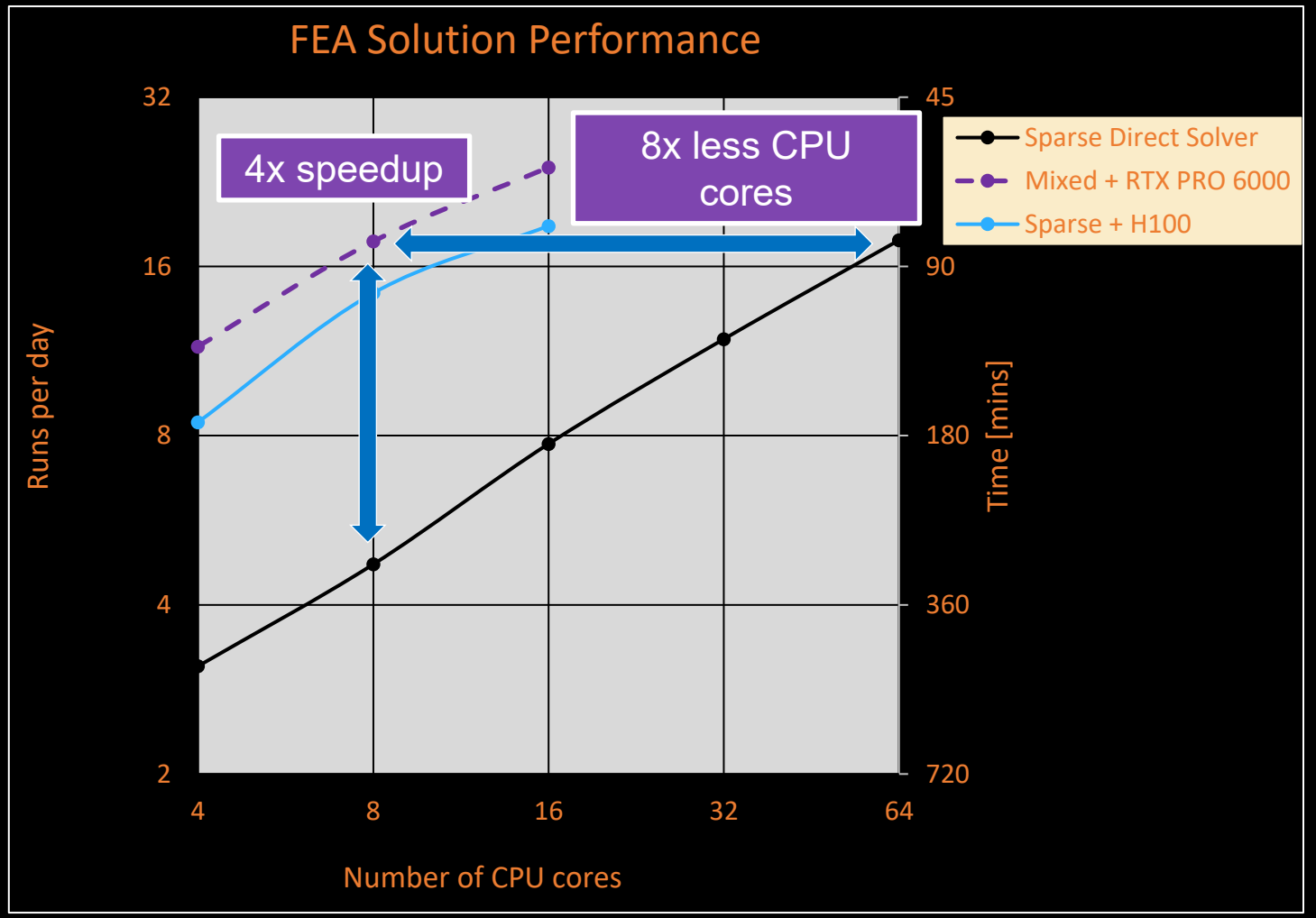
When the IC gets hot, the Semiconductor Die expands at a different rate than the Substrate

# Ansys Mechanical - Mixed Solver Performance on GPU

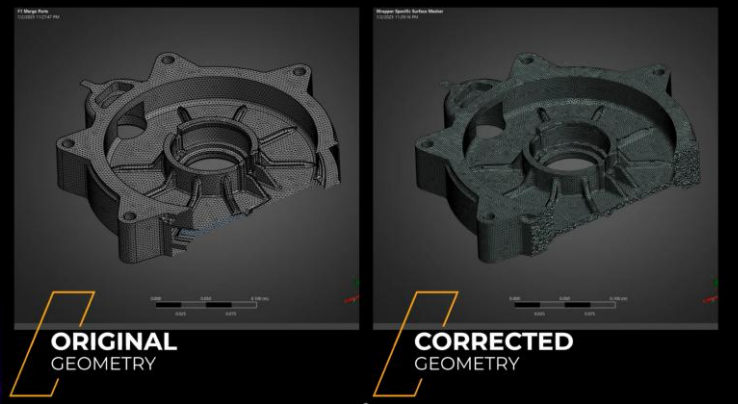
**NVIDIA H100 NVL** → $30k (Extremely limited availability)
**NVIDIA RTX PRO 6000** → $8k (Widely available)




- 16 million DOF
- Nonlinear transient analysis involving creep and nonlinear geometric effects solved to full convergence
- Windows workstation; 2 AMD Ryzen 9335 (Turin) processors, 768 GB RAM, SSD, NVIDIA RTX PRO 6000 (Blackwell) GPU, Windows Server 2022



# AI POWERED
## intelligent meshing

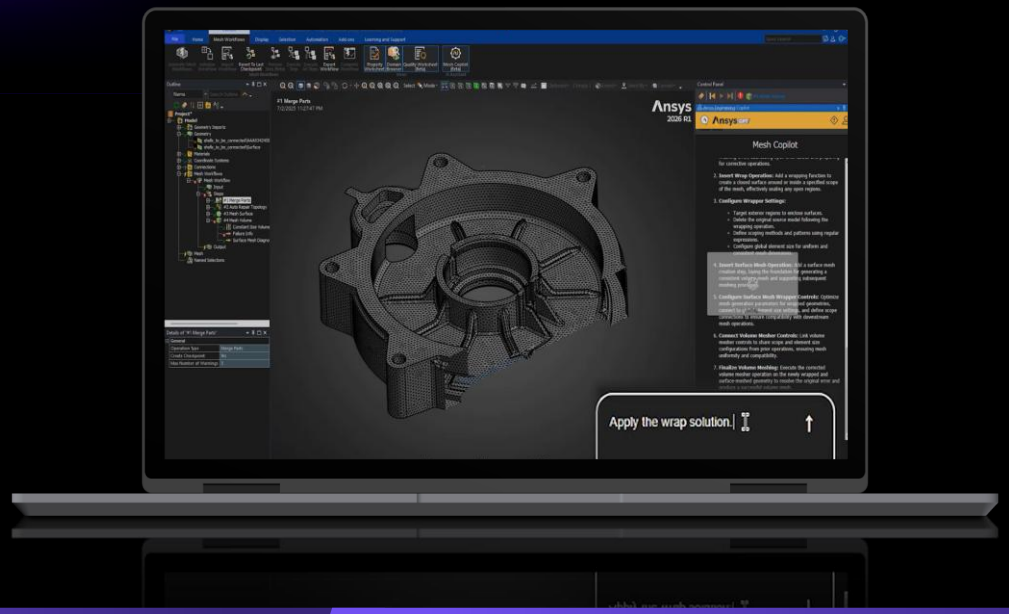



automatically detect + diagnose meshing failures

guide engineers through proven remediation steps

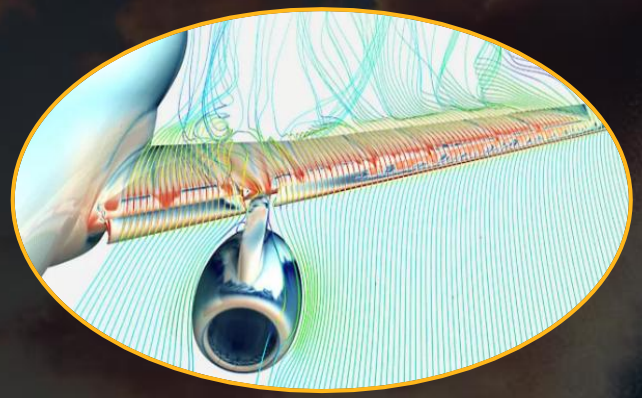
increase confidence in model readiness

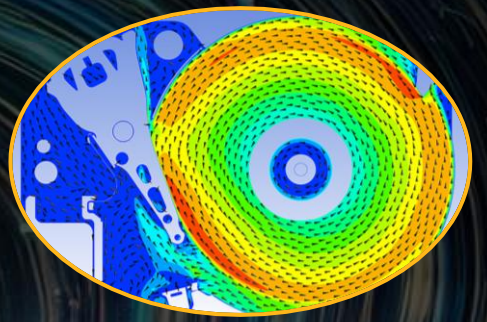
reduce setup time



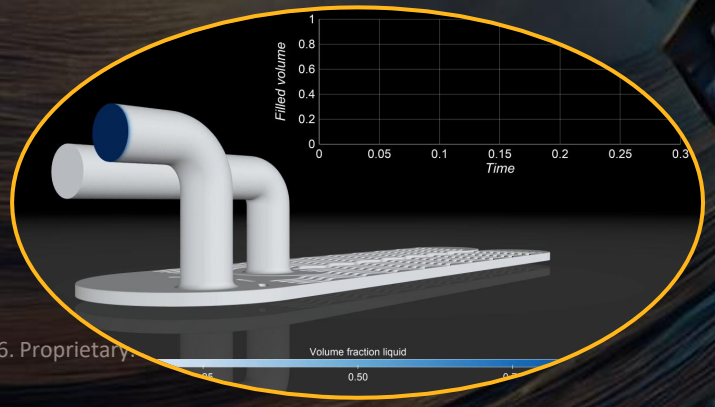

**FASTER MODEL READINESS** | **FEWER INTERRUPTIONS** | **GREATER CONFIDENCE**

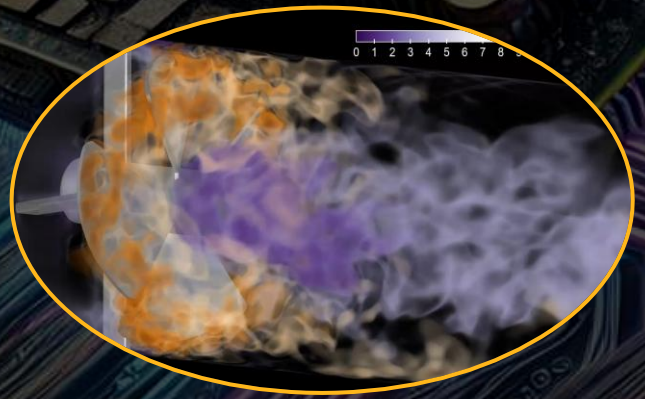
# Multi-GPU solver optimized for expanding range of applications



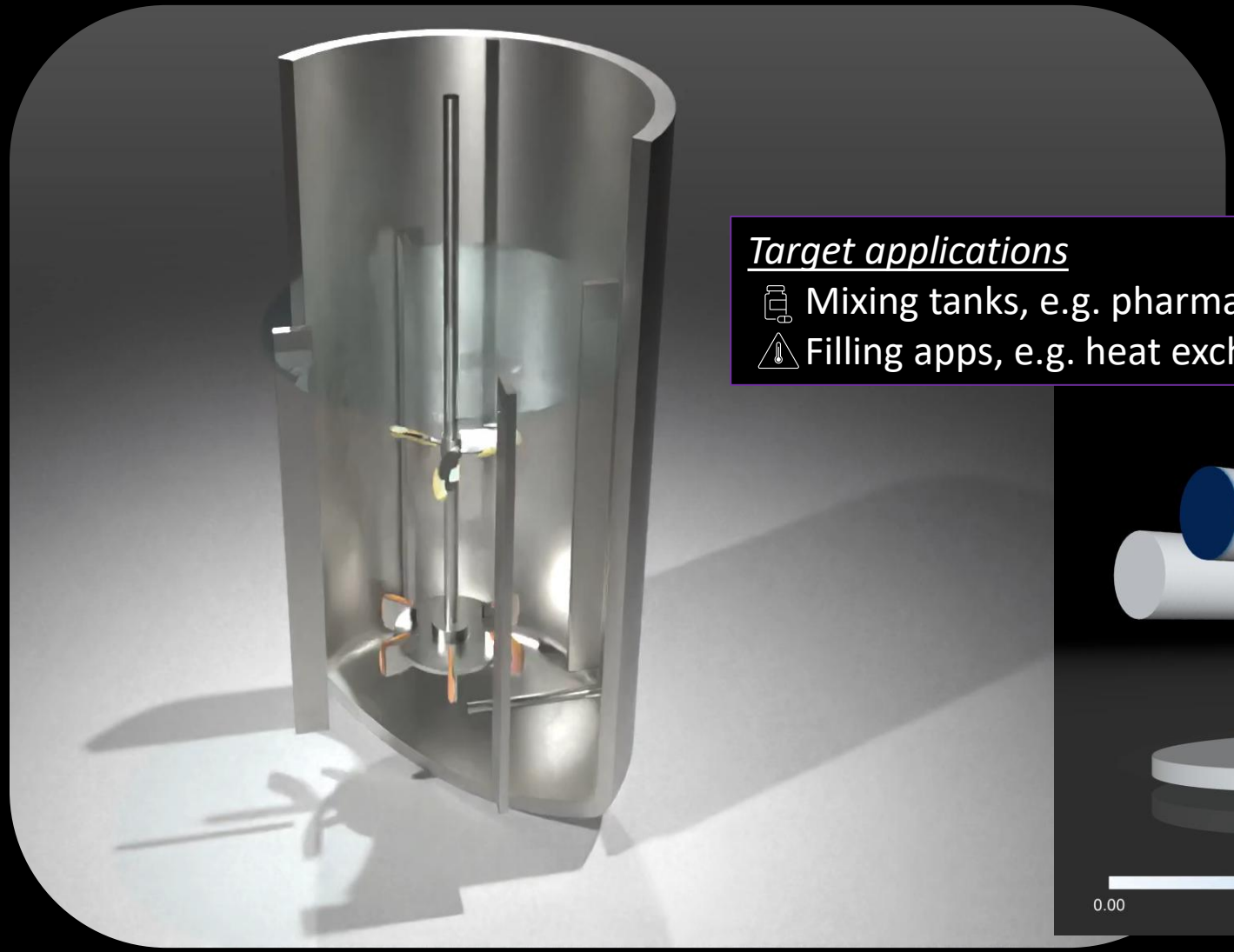


- Higher fidelity modeling in more relevant time
- or: Much less time than now to gain same insights
- or: Many more designs/conditions in same time




# Now run the **Fluent VOF** (volume-of-fluid) multiphase model on **GPUs**!

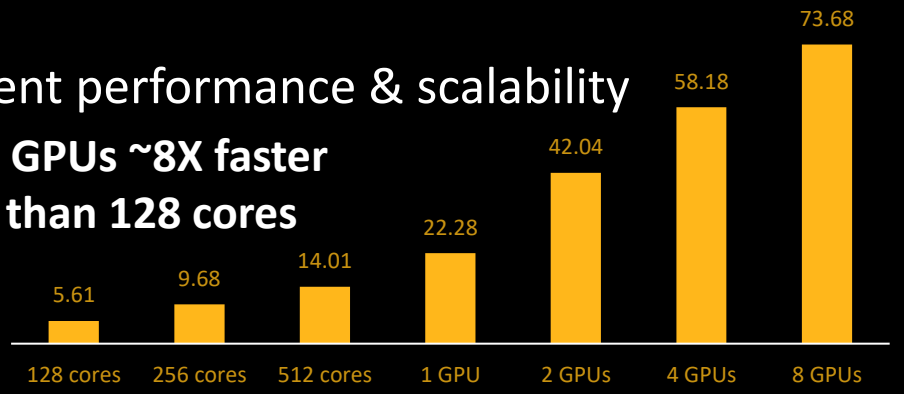


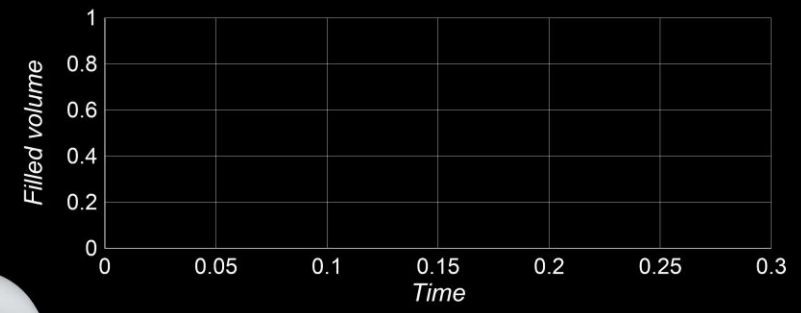
*Target applications*

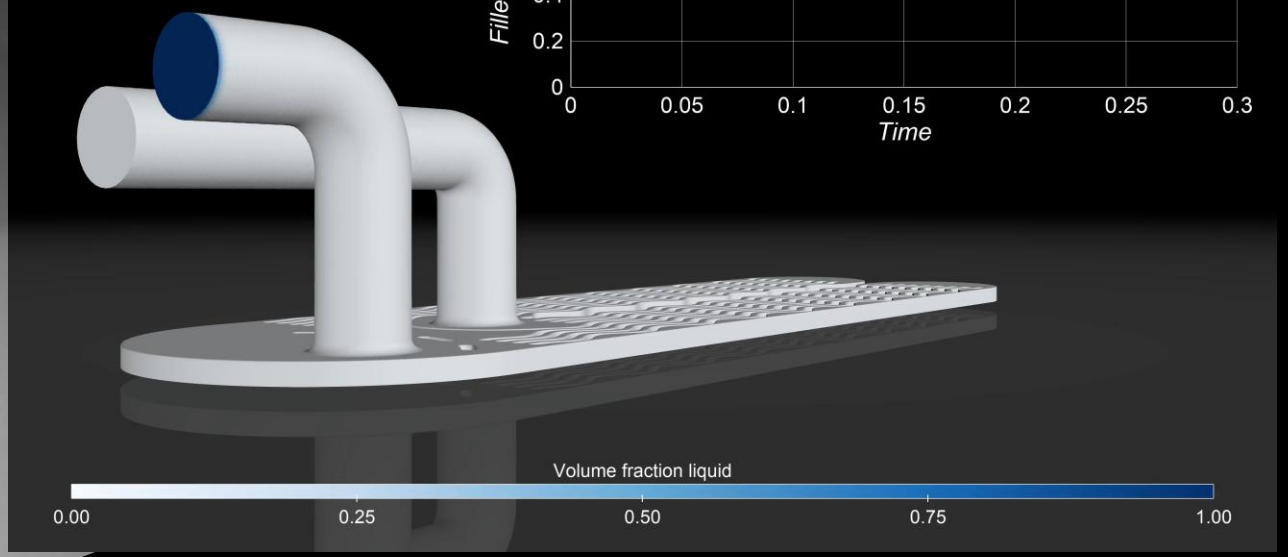
- Mixing tanks, e.g. pharma mfg
- Filling apps, e.g. heat exchangers

Excellent performance & scalability

**2 GPUs ~8X faster than 128 cores**

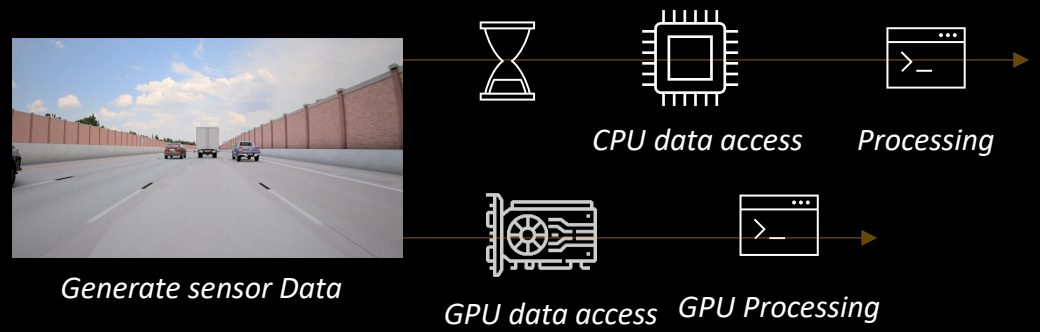


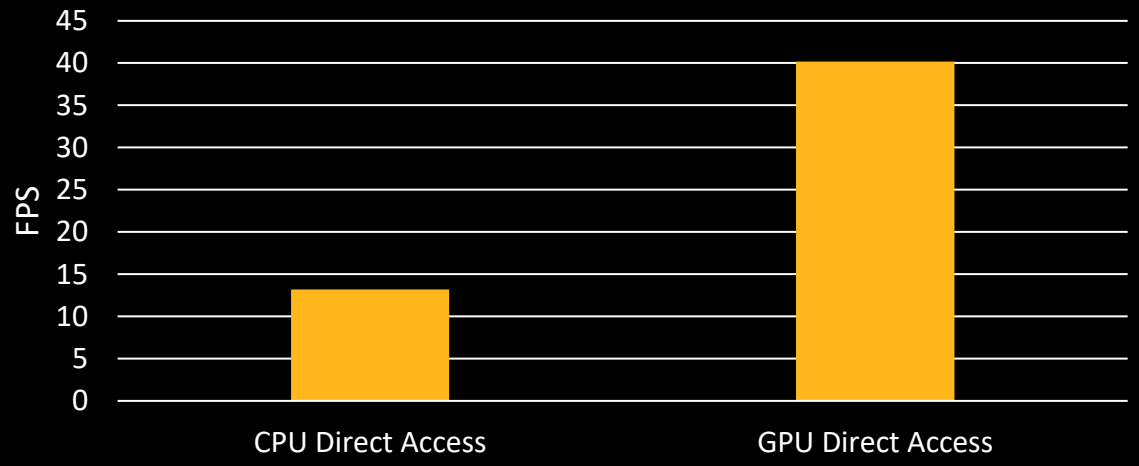



# AVxcelerate Direct GPU memory access - Fast sensor data access

- From 26 R1, raw sensor data can now be accessed directly on GPU (without going through the CPU & Memory).
- Fast GPU postprocessing or fast data transfer for HiL injection are now possible.




Over 3X Faster!




Performances gain with an external imager model for an 8MP camera simulation

Ansys
part of SYNOPSYS®

# Introducing Ansys GeomAI

Ansys GeomAI **empowers engineers and designers to generate and explore innovative geometrical design ideas using AI-trained models.**


It learns from past designs to create **new ones**. It can be used for **idea exploration, optimization, or generative design workflows**.

# DESIGN reimagined by AI

transform proven designs into new possibilities

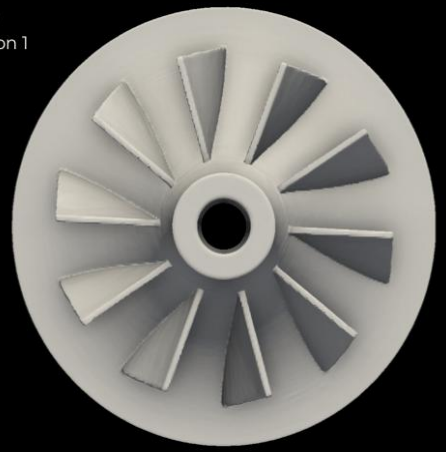
accelerate topology innovation at scale

simplify generative design

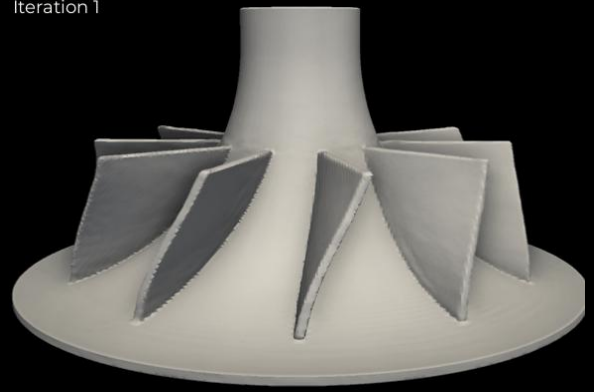
Ansys

GEOMAI

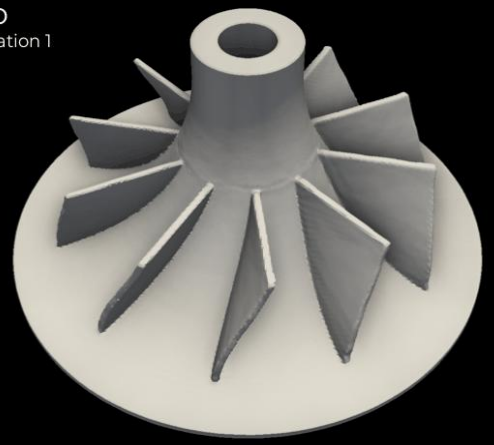
Top
Iteration 1



Front
Iteration 1



Iso
Iteration 1



GENERATIVE DESIGN | IDEA EXPLORATION | TOPOLOGY VARIATION

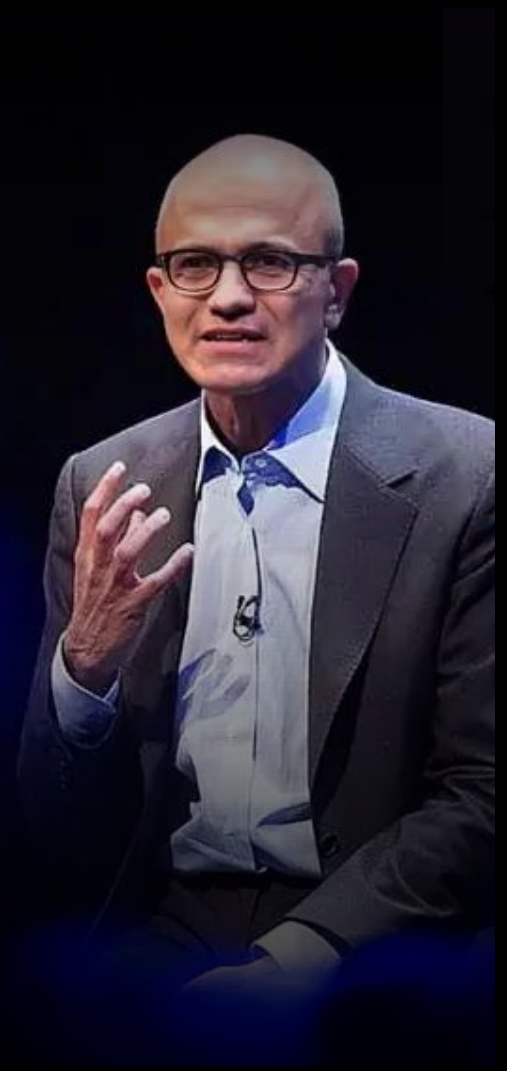
# Exploring and Optimizing an Automotive Exhaust Header

# Twin-Driven Performance

“…we now have a new role called a full stack builder. Because if you think about it, we have now put these powerful tools, where a designer, a product manager, and a front-end engineer can all come at it as full stack product builders.”

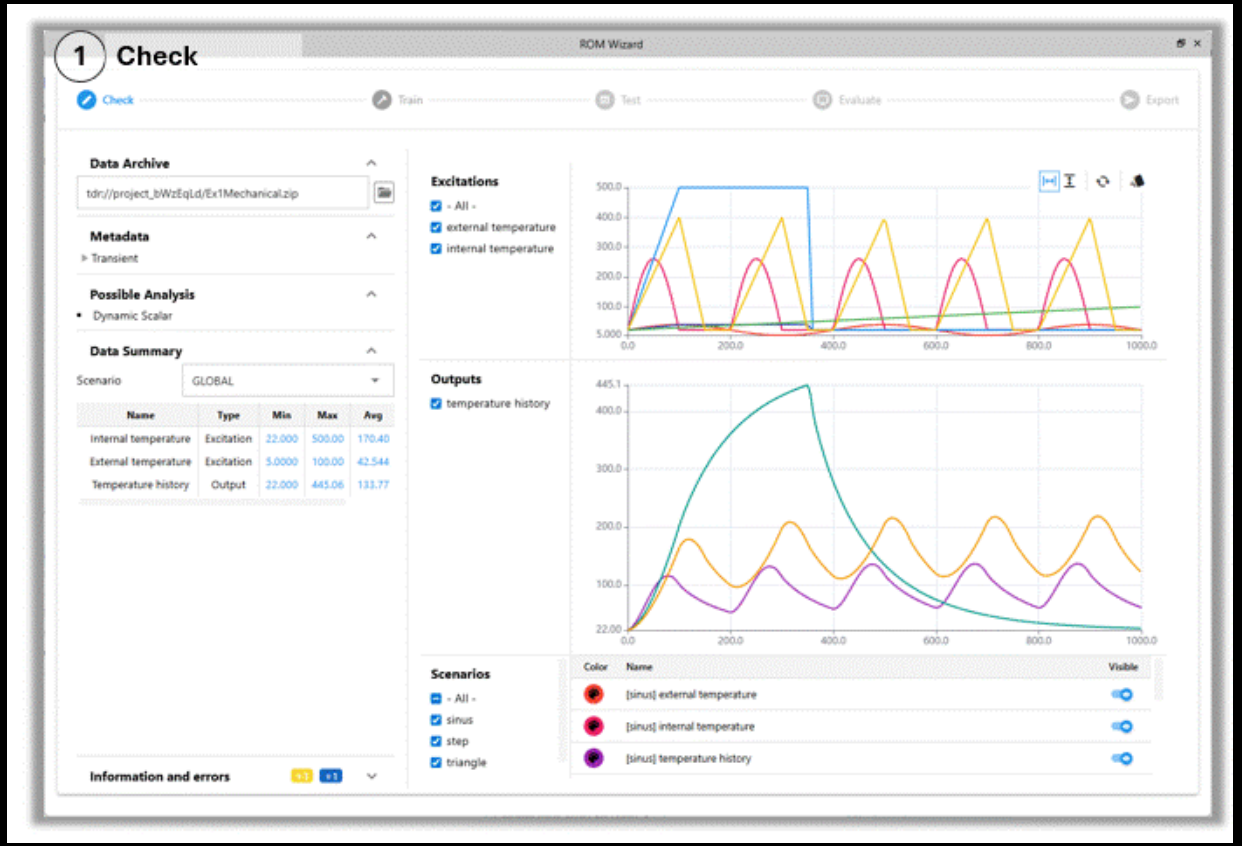
SATYA NADELLA
MICROSOFT CEO

Microsoft



# New ROM Wizard in Twin AI

- Guided, intuitive interface – from data import to ROM export
- Built-in auto-detection of relevant ROM methods based on data characteristics
- Three ROM workflows currently available:
  - Parametric:
    - Aggregation (Non-Linear)
    - Hyperplane (Linear)
    - Gaussian Process
  - Dynamic:
    - TDVF (Pole-Residue)
    - Linear State Space
    - Non-linear State Space
  - Linear Time Invariant (LTI)

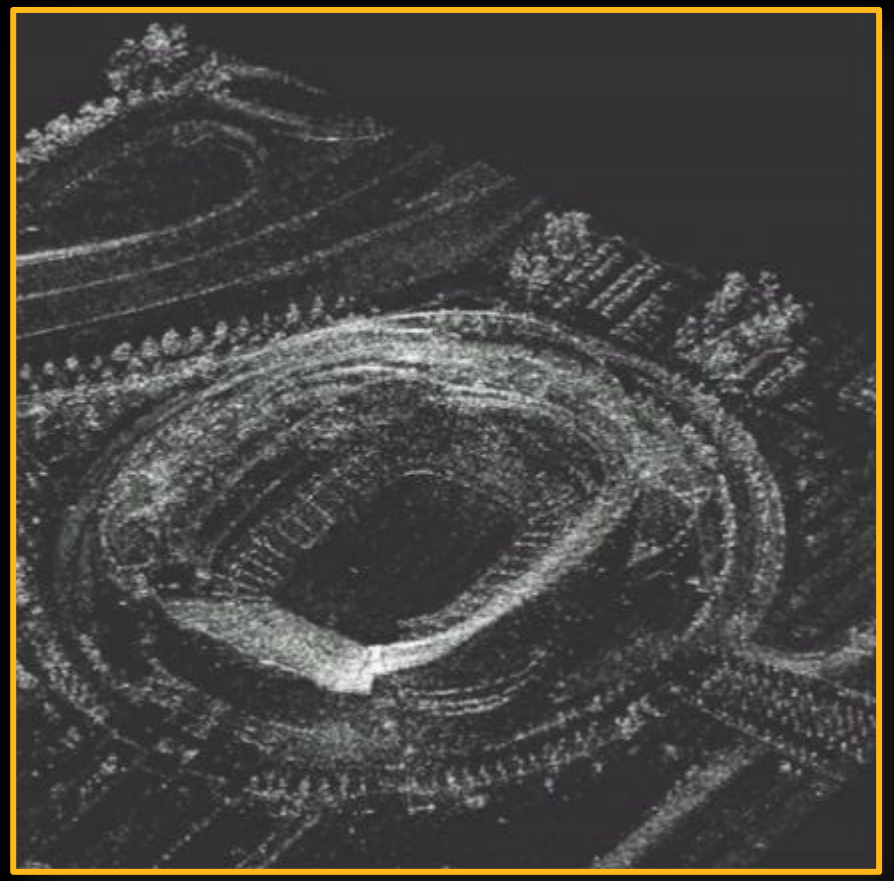


# Introduction of RF Channel Modeler Radar in STK

Engineers needing performing only radar-specific analysis now have the option to purchase an application-specific version of Ansys RF Channel Modeler.

Whether evaluating radar performance in SAR/ISAR applications or generating large data sets suitable for training AI/ML systems, customers now have a dedicated module fit for purpose.

- Exercise radar designs against multi-domain targets.
- Test proprietary detection algorithms against various potential targets
- Generate large Synthetic Aperture Radar images
- Target signature generation for operator training



# Unlock **new opps** across industries with **Ansys FreeFlow**

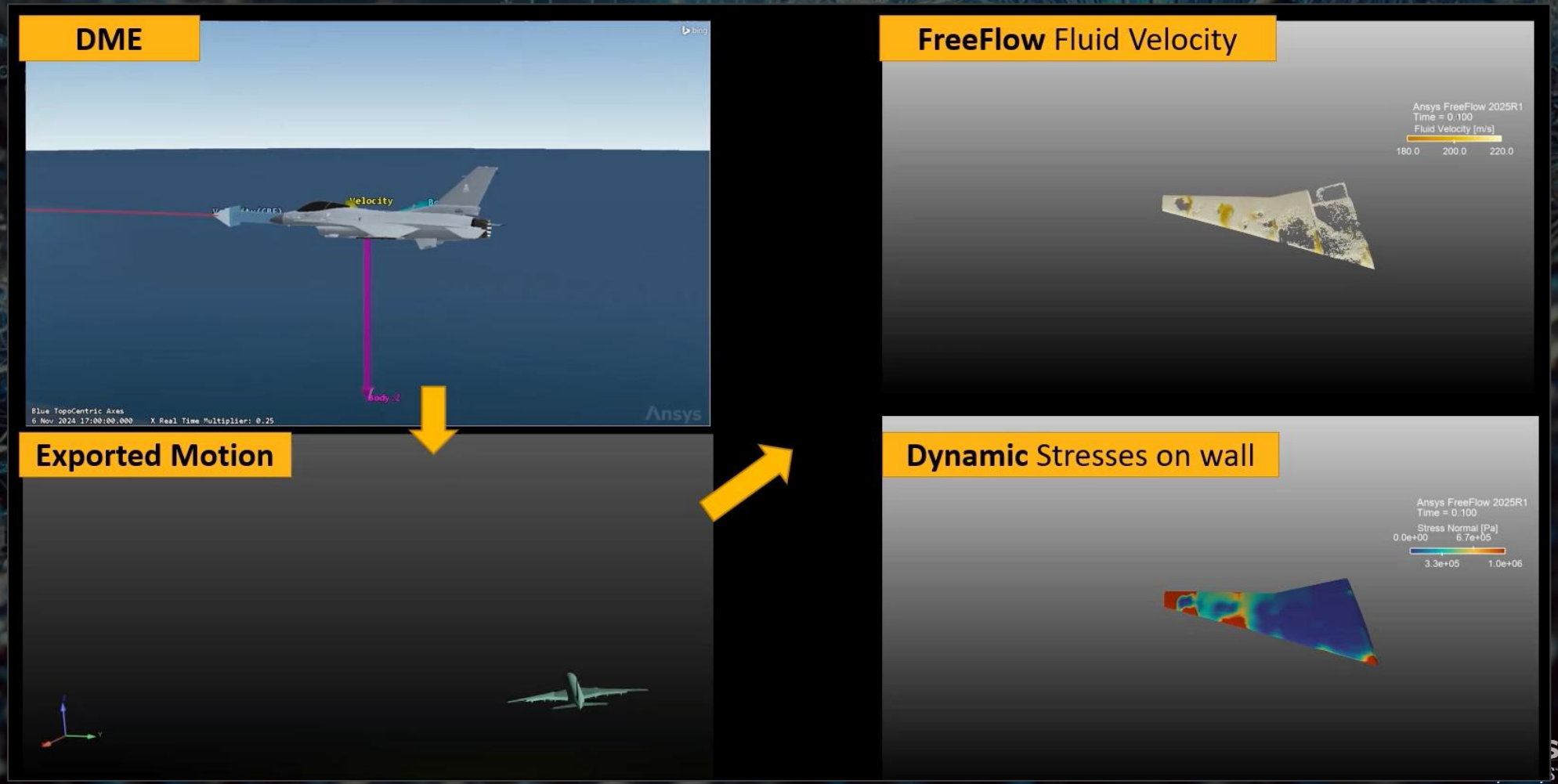
- **Fast** and **easy-to-use** (particle-based → no meshing required!)
- **Complement** high-fidelity VOF method with **mid-fidelity SPH**
  - Applications include free surface flows and spray simulations

**FUEL TANK SLOSHING**

**ANSYS DME**
**+**
**ANSYS FreeFlow**

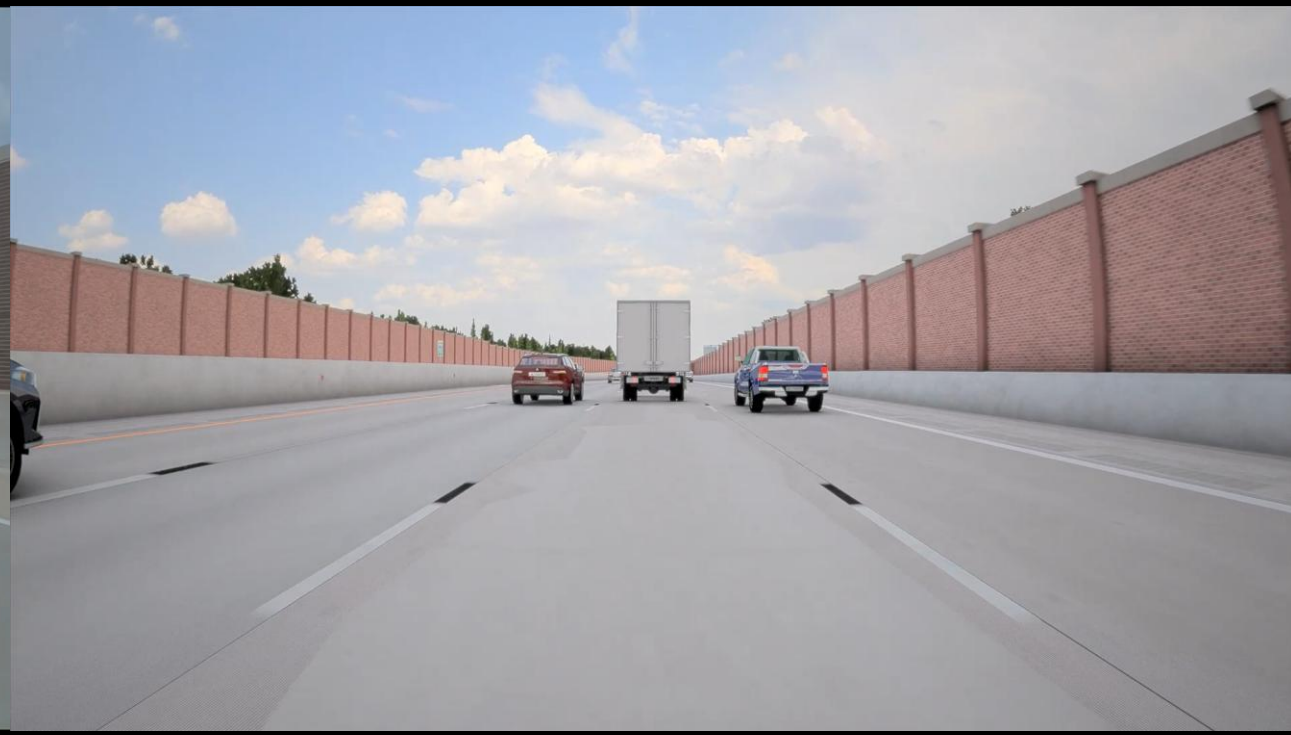
***Dynamic Liquid Stresses can be then passed to ANSYS Mechanical for Structural Analysis***

**Courtesy of:**
**A. Haghnegahdar, T. Neely, V. Vitti**



# Brand new Light Propagation Engine (LPE) in AVxcelerate

*REAL DRIVE*



*SIMULATED DRIVE*




Ansys part of SYNOPSYS®

# New Light Propagation Engine (LPE)

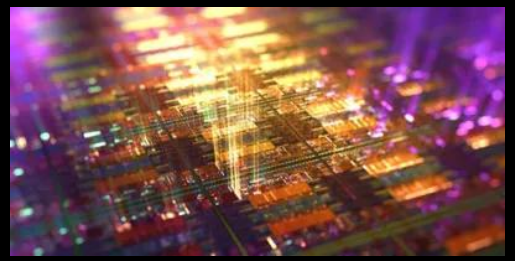
The Light Propagation Engine (LPE) delivers physically accurate, multispectral image sensing by modeling true light propagation from the environment to the sensor,

Enables realistic behavior in bright or dark conditions and adverse weather with dynamic responses to lighting, speed, and wind.


*Nighttime Pedestrian detection – rainy conditions*

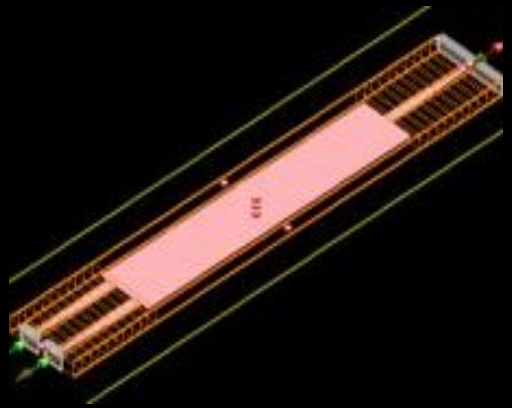
# Systems to Silicon Solutions

# Synopsys Photonics With Ansys 2026 R1

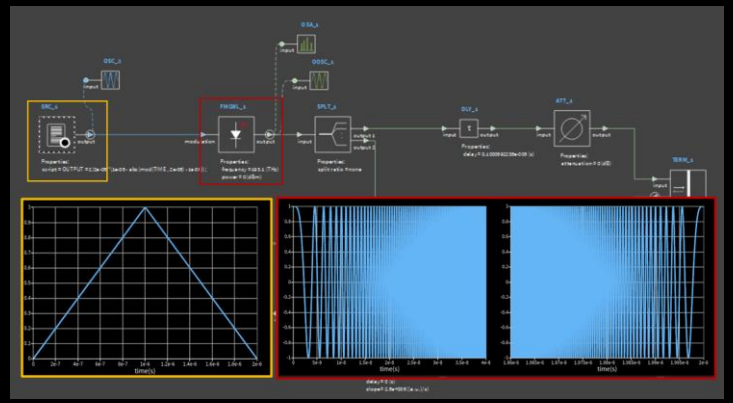


The Synopsys photonics platform unifies electronic-photonic design so engineers can design, simulate, and verify complex photonic integrated circuits (PICs) with true multiphysics accuracy

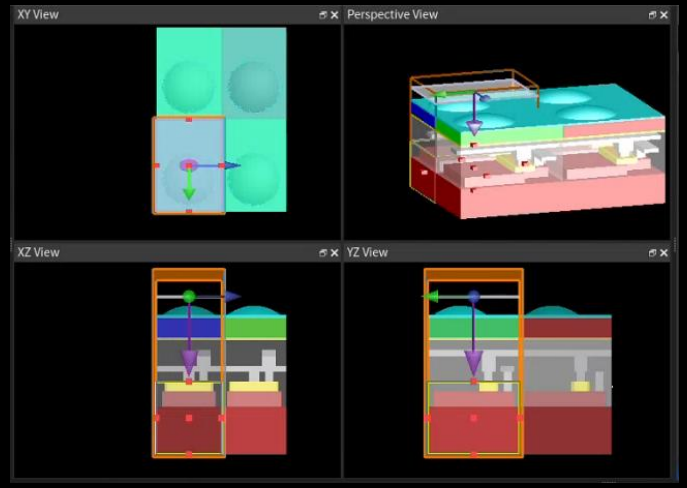
***Direct Bridge between Synopsys OptoCompiler and Ansys Lumerical 3D Component Modeling***



***OptoCompiler can select Lumerical INTERCONNECT solver and extensive Compact Model Library***



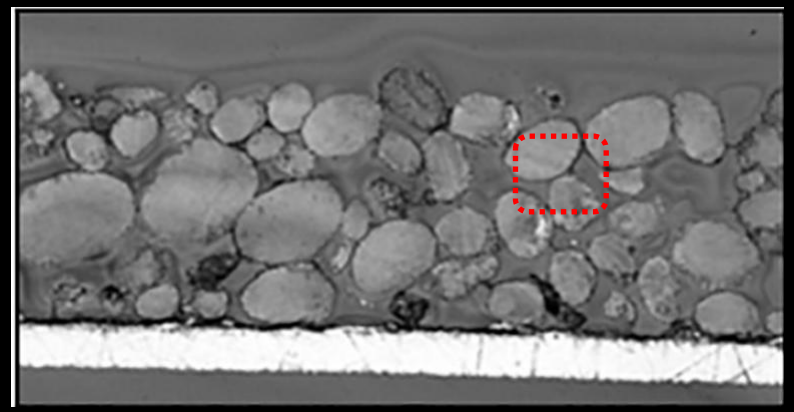
***Sentaurus TCAD to Lumerical FDTD Workflow***



# Tool Integration For Battery Calendering

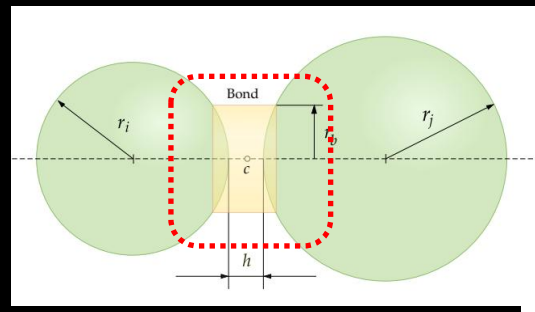
## From Atoms to Polymer Binder to Macroscopic Manufacturing

Battery Calendering: Manufacturing process in which electrode sheets are compressed between heated rollers to densify the active material, reduce porosity, and improve thickness uniformity and electrochemical performance.

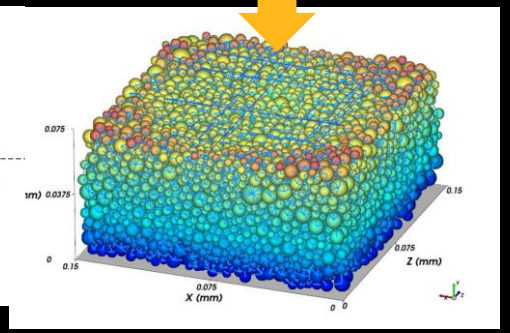


Ansys Rocky

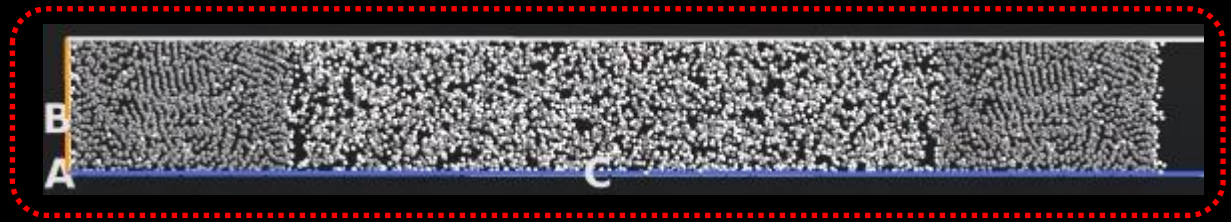
QuantumATK




Pressure




Ansys Granta MI




QuantumATK: Synopsys atomic-scale modeling and simulation of materials and nanodevices

# Ansys 2025 R2 - Physics-First and System-Aware

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