TECOSIM
A Hinduja Tech Company

Tecosim Presentation

Oasys LS-Dyna UK Users' Conference 2025

Engineering better living

TECOSIM
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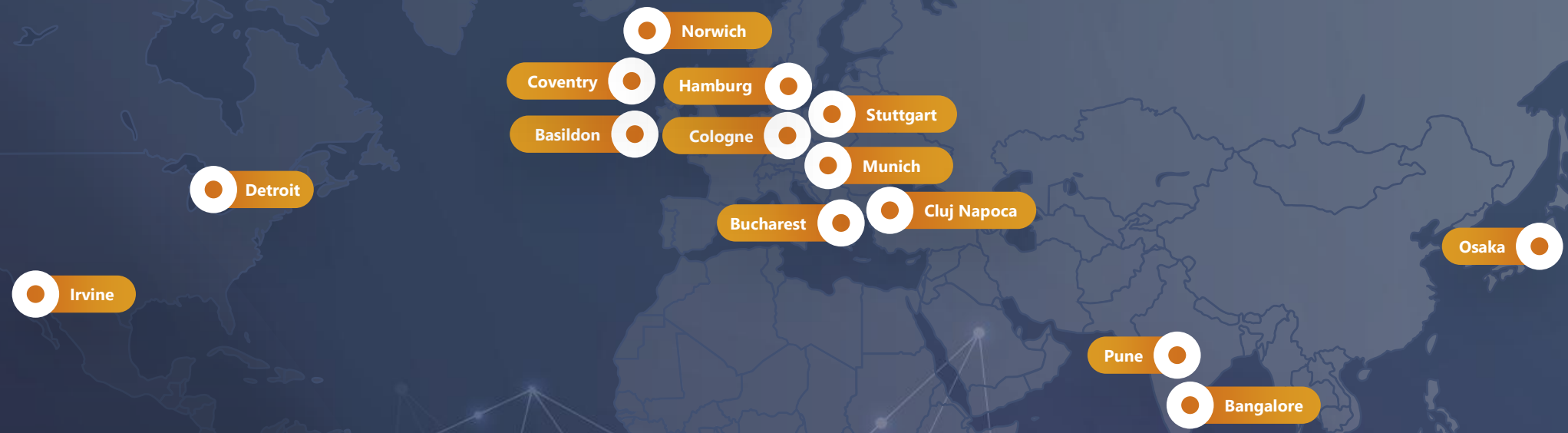

Founded in 1992, now with 650 employees, TECOSIM is a highly capable engineering consultancy and a world-leading specialist in computer-aided engineering. The group has 14 offices worlwide.

Hinduja Tech: Who We Are

We Deliver **SUSTAINABLE ENGINEERING & DIGITAL SOLUTIONS** across Mobility Industries

Purpose

Creating Sustainable Mobility

Vision

To be among the **Top 10** Global Mobility Engineering and R&D Companies

Our Group

Hinduja Tech, a key part of India's leading multibillion dollar transnational conglomerate, Hinduja Group

33 + years

of serving **100+** Global **OEMs**, **Tier 1s** and **Disruptive** players

360°

Ecosystem for PV/CV/ EV development using robust processes based on **Frugal engineering paradigm**

2650 +

Mobility and eMobility experts Globally

100 +

Co-developed vehicle models in Production and running

HINDUJA TECH Engineering Mobility!

End to End Vehicle Engineering & Integration

DRIVE SYSTEM DESIGN
A Hinduja Tech Company

An advanced Powertrain Engineering Division of Hinduja Tech

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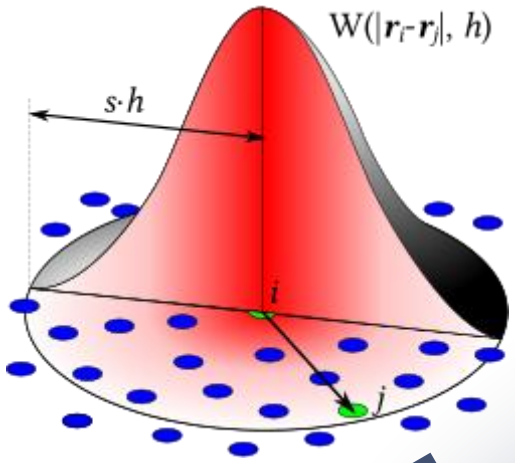
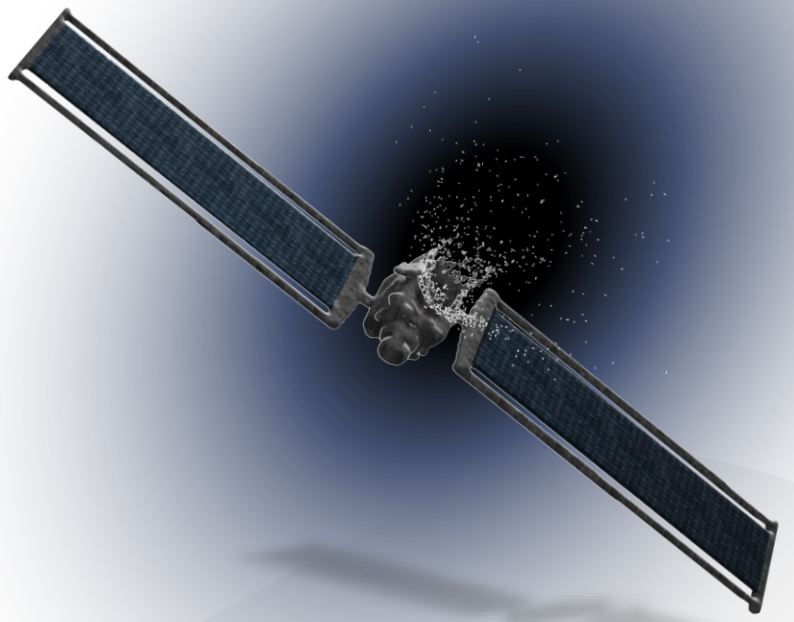
An advanced Virtual Simulation Division of Hinduja Tech

SPH





SPH | Case Studies

- Hyper Velocity Debris Impact
- Sand Dune Impact
- High Velocity Projectile Impact

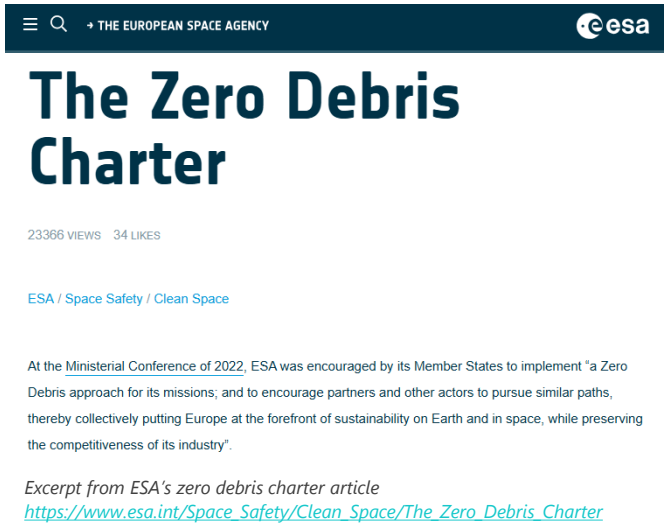
SPH | Hyper Velocity Debris Impact

Motivation

- Growing space industry
- ESA Zero debris charter
- Debris path prediction
- **Clean space!**

Methods Investigated

- Finite Element Method (FEM)
- Spring-connected DEM (Discrete Element Method)
- Arbitrary Lagrangian Elements (ALE)
- **Smoothed Particle Hydrodynamics (SPH)**



☰ 🔍 → THE EUROPEAN SPACE AGENCY esa

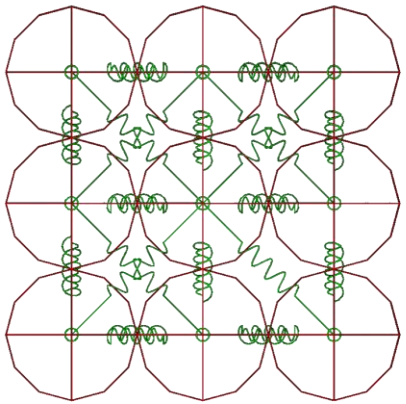
The Zero Debris Charter

23366 VIEWS 34 LIKES

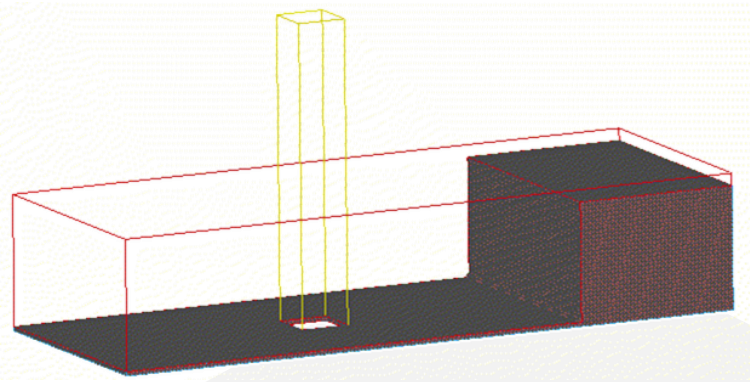
ESA / Space Safety / Clean Space

At the Ministerial Conference of 2022, ESA was encouraged by its Member States to implement "a Zero Debris approach for its missions; and to encourage partners and other actors to pursue similar paths, thereby collectively putting Europe at the forefront of sustainability on Earth and in space, while preserving the competitiveness of its industry".

Excerpt from ESA's zero debris charter article
https://www.esa.int/Space_Safety/Clean_Space/The_Zero_Debris_Charter



Spring connected Discrete Element Spheres (DES)



ALE sloshing example sourced from www.dynaexamples.com

SPH | Background

What is SPH?

- A discrete lagrangian method
- Uses a smoothing function or ‘kernel’
- Material properties are interpolated based on interpolation between weighted elements

Why use SPH?

- Mass is conserved – even when eroded
- Tackles ‘mesh-tangling’ in high deformation cases
- Effectively deals with problems containing high strain-rate effects

Drawbacks of SPH?

- Numerical treatment of boundary conditions such as inlets, outlets and walls is complex
- Computational cost per SPH element is larger than conventional FEM

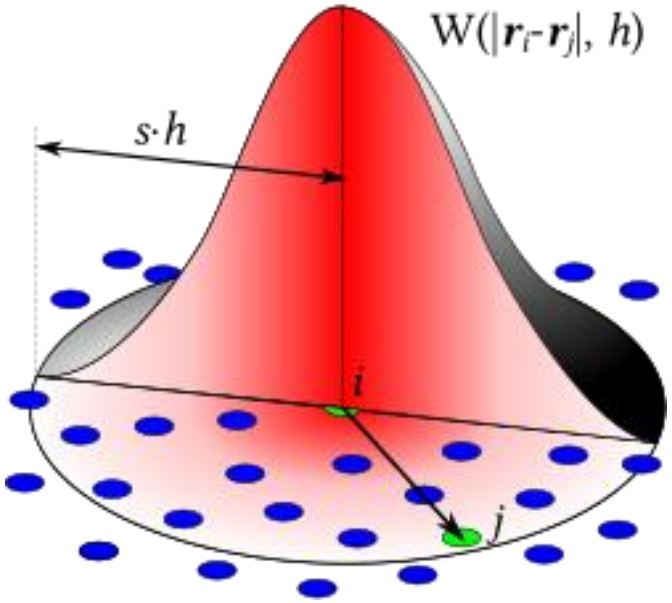
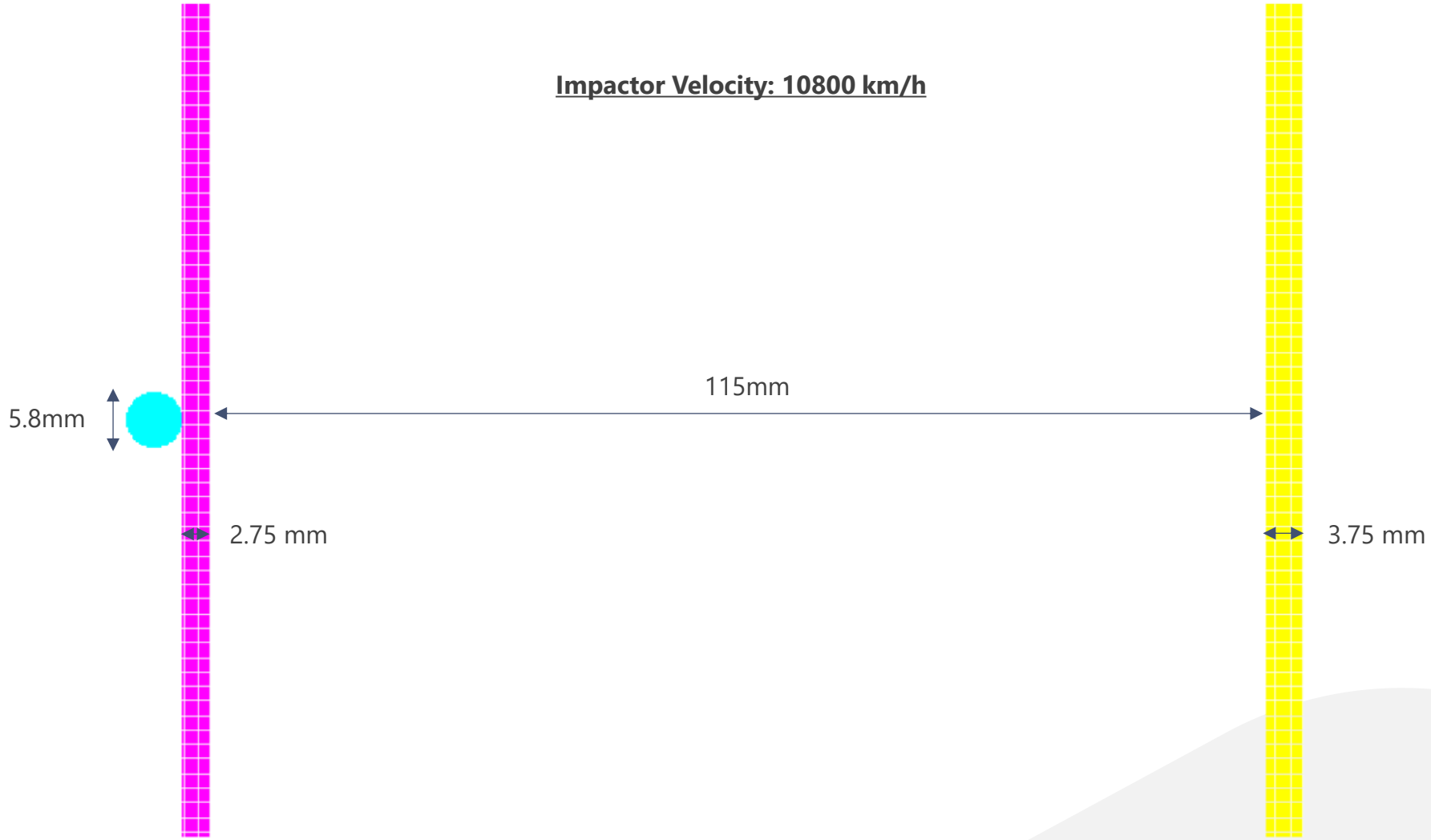


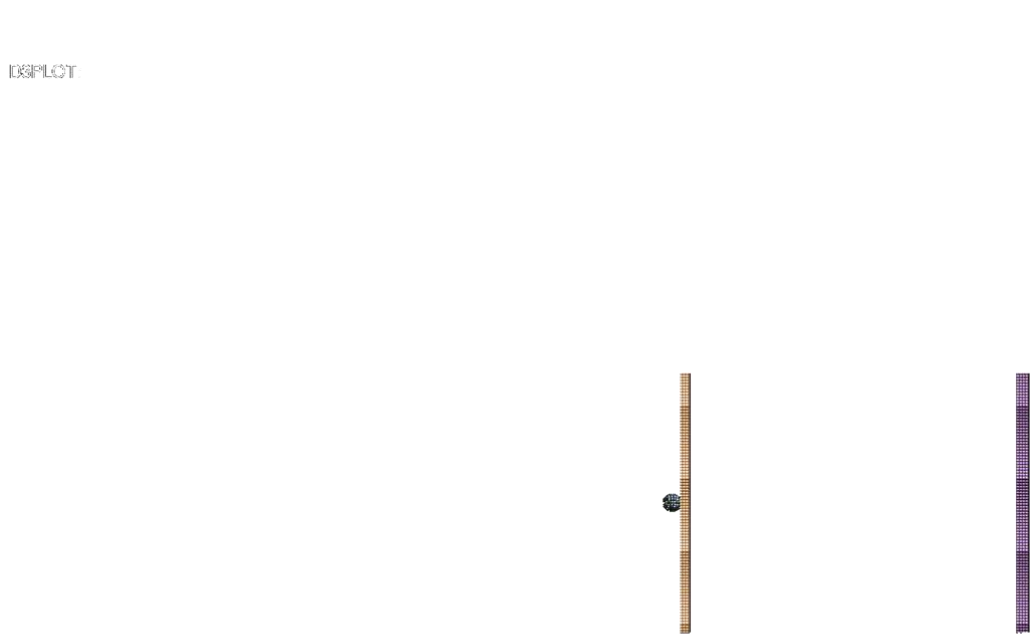
*Diagram of SPH Smoothing length (s.h) and kernel function **W***
https://en.wikipedia.org/wiki/Smoothed-particle_hydrodynamics

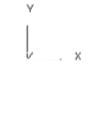
SPH | Hyper Velocity Debris Impact

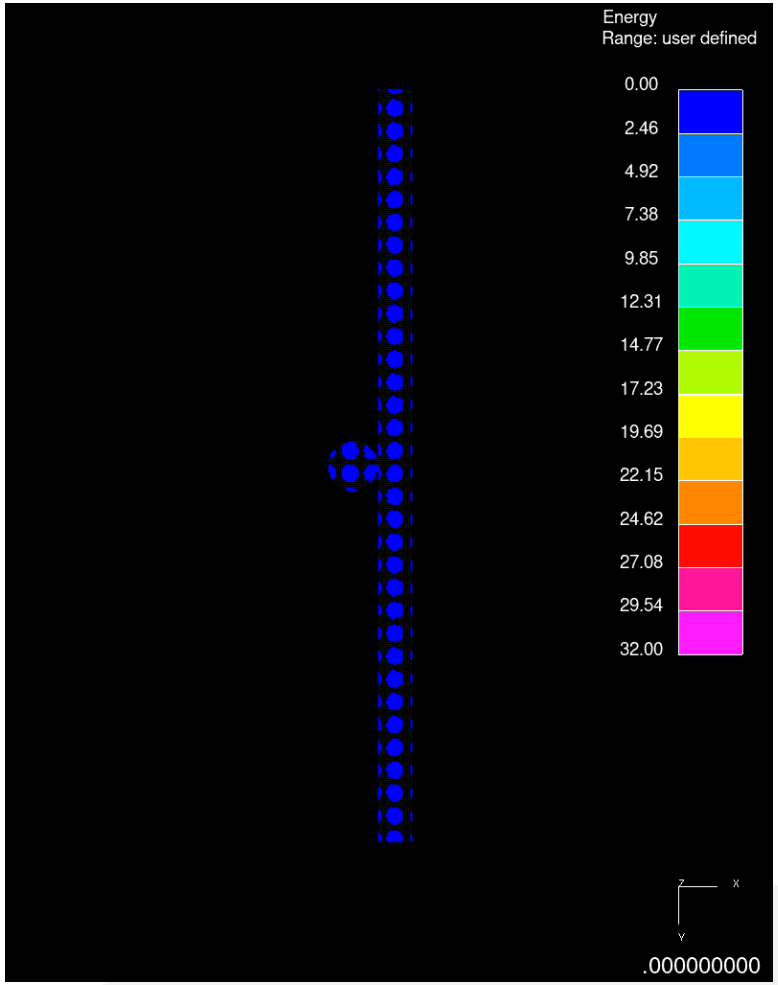
PRIMER: M1:



SPH | Hyper Velocity Debris Impact







SPH | Hyper Velocity Debris Impact

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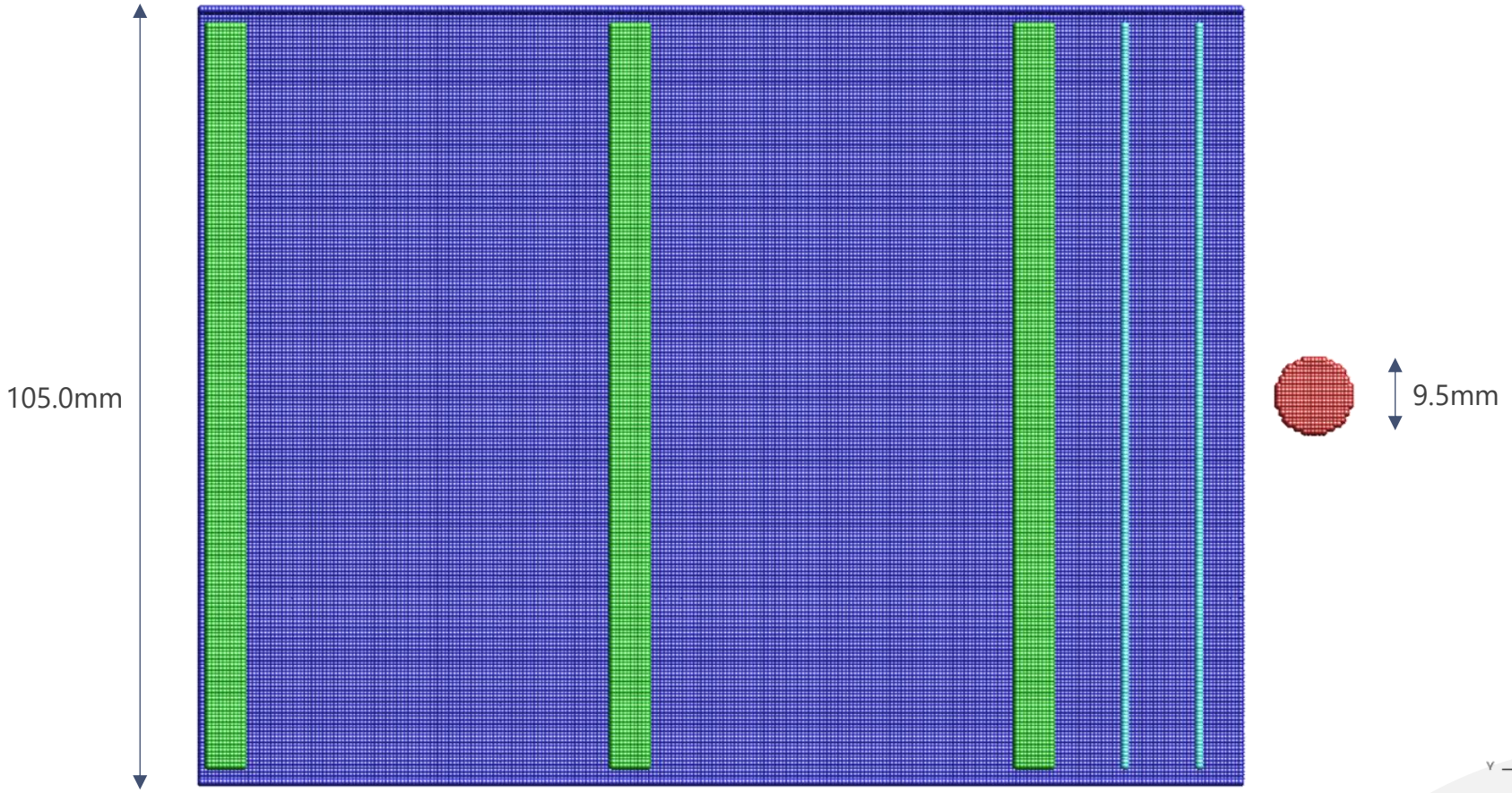
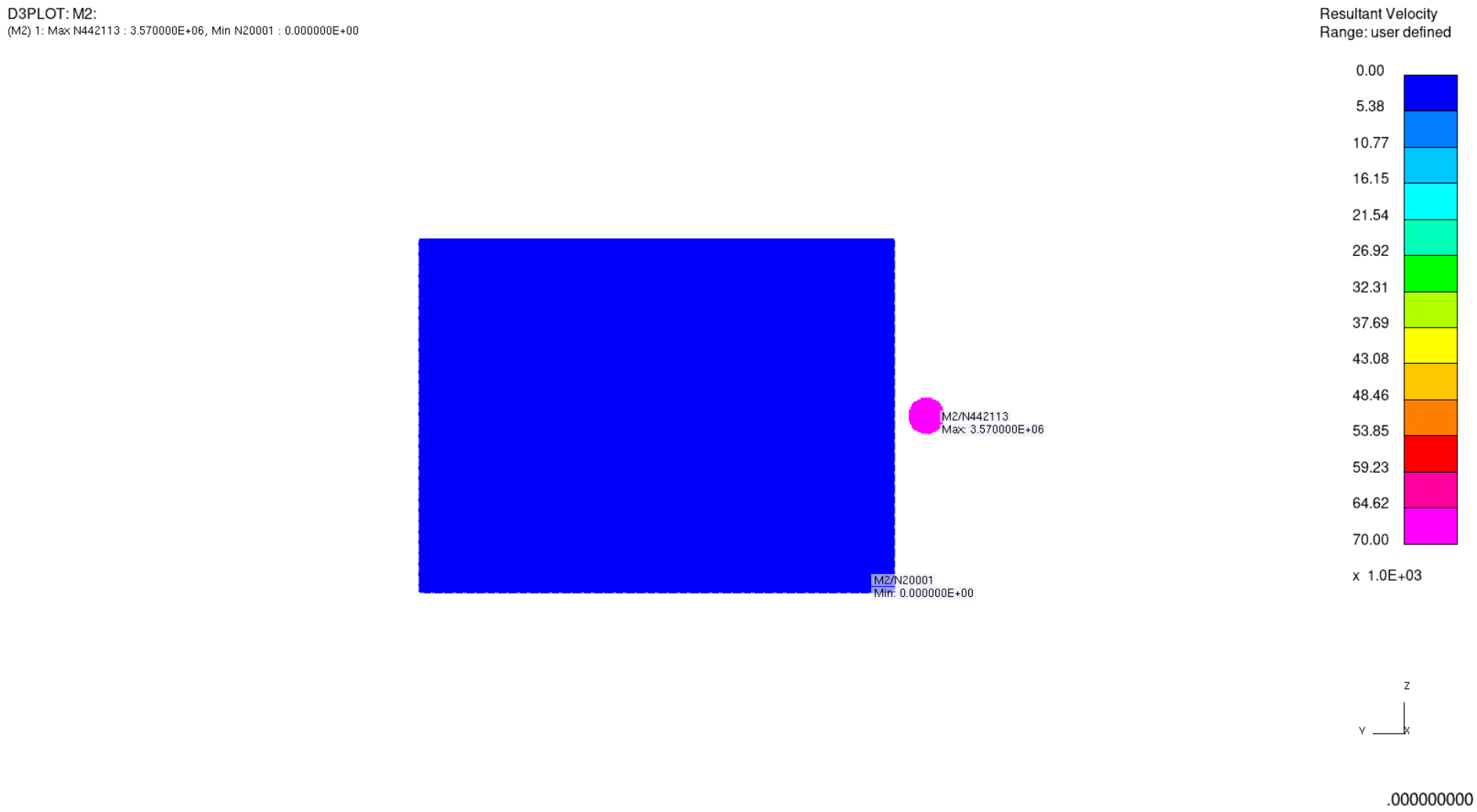
D3PLOT: M2:

Impactor Velocity: 10800 km/h



SPH | Hyper Velocity Debris Impact



SPH | Hyper Velocity Debris Impact

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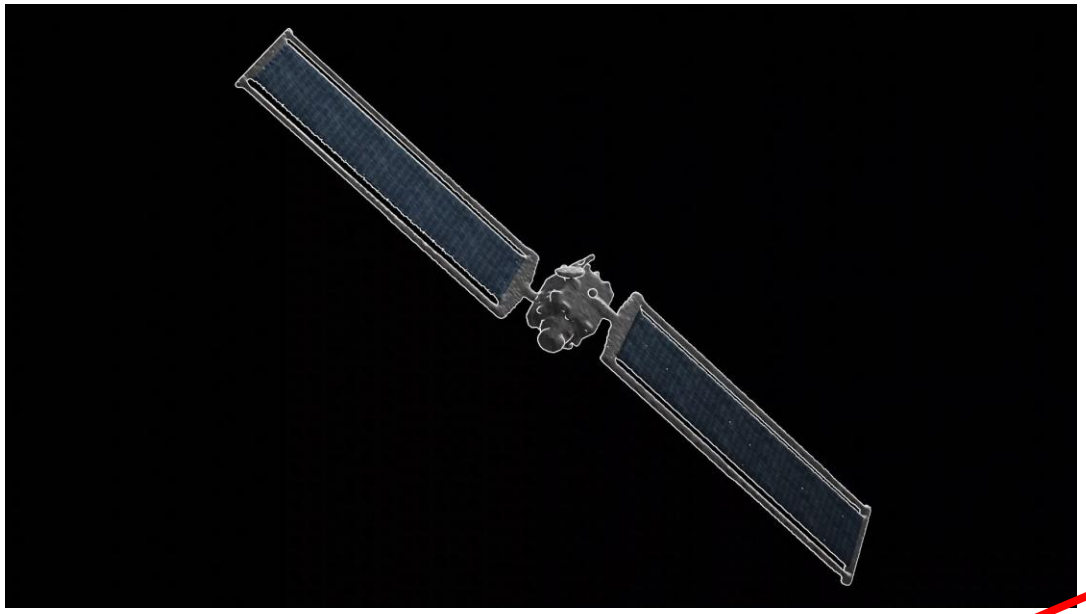

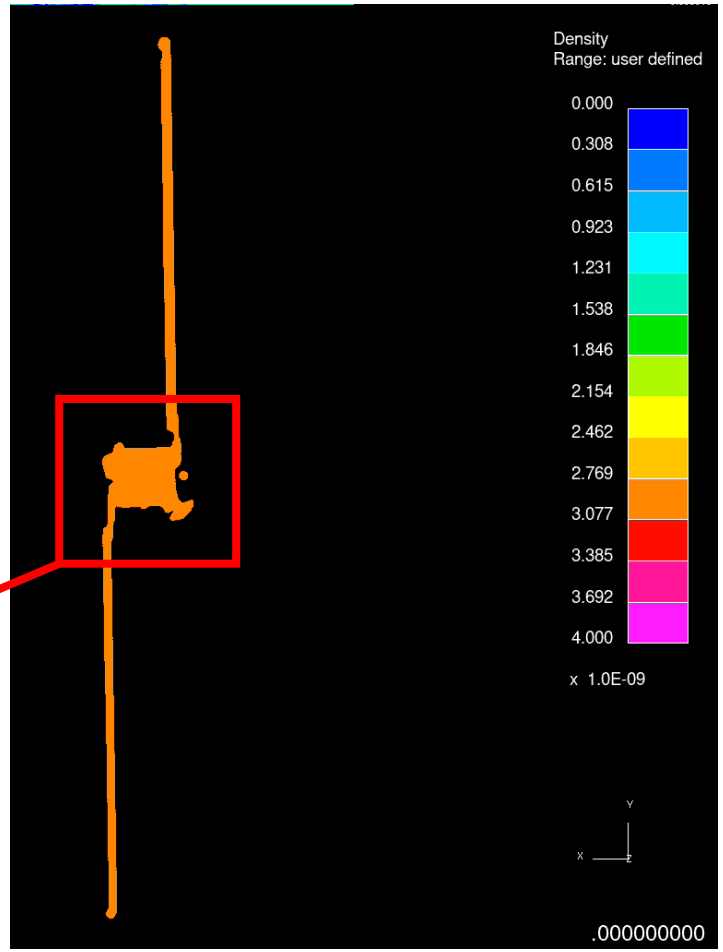

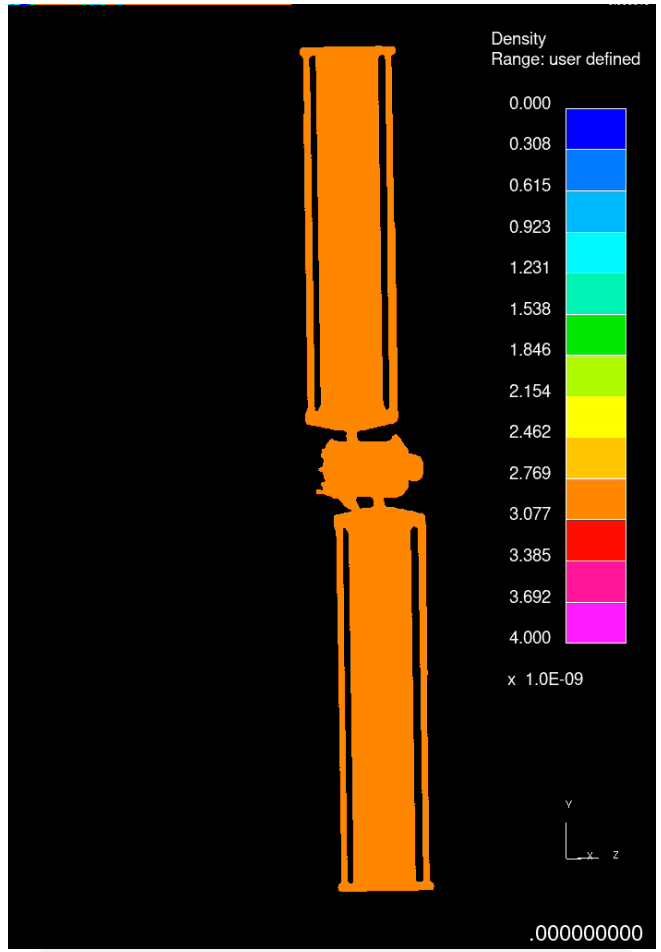

SPH | Sand Dune Impact

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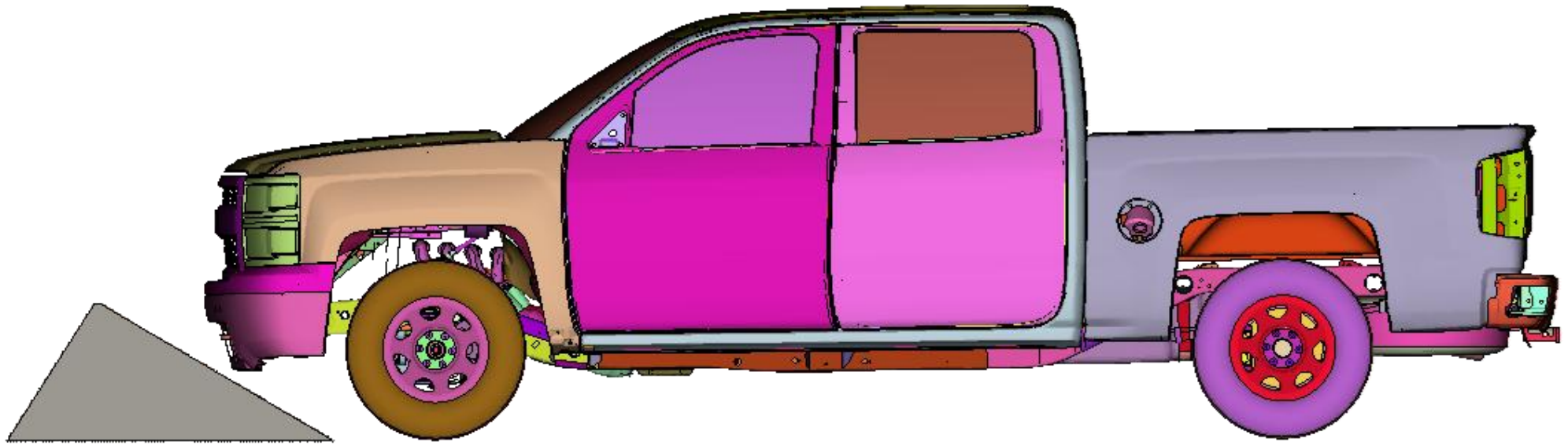
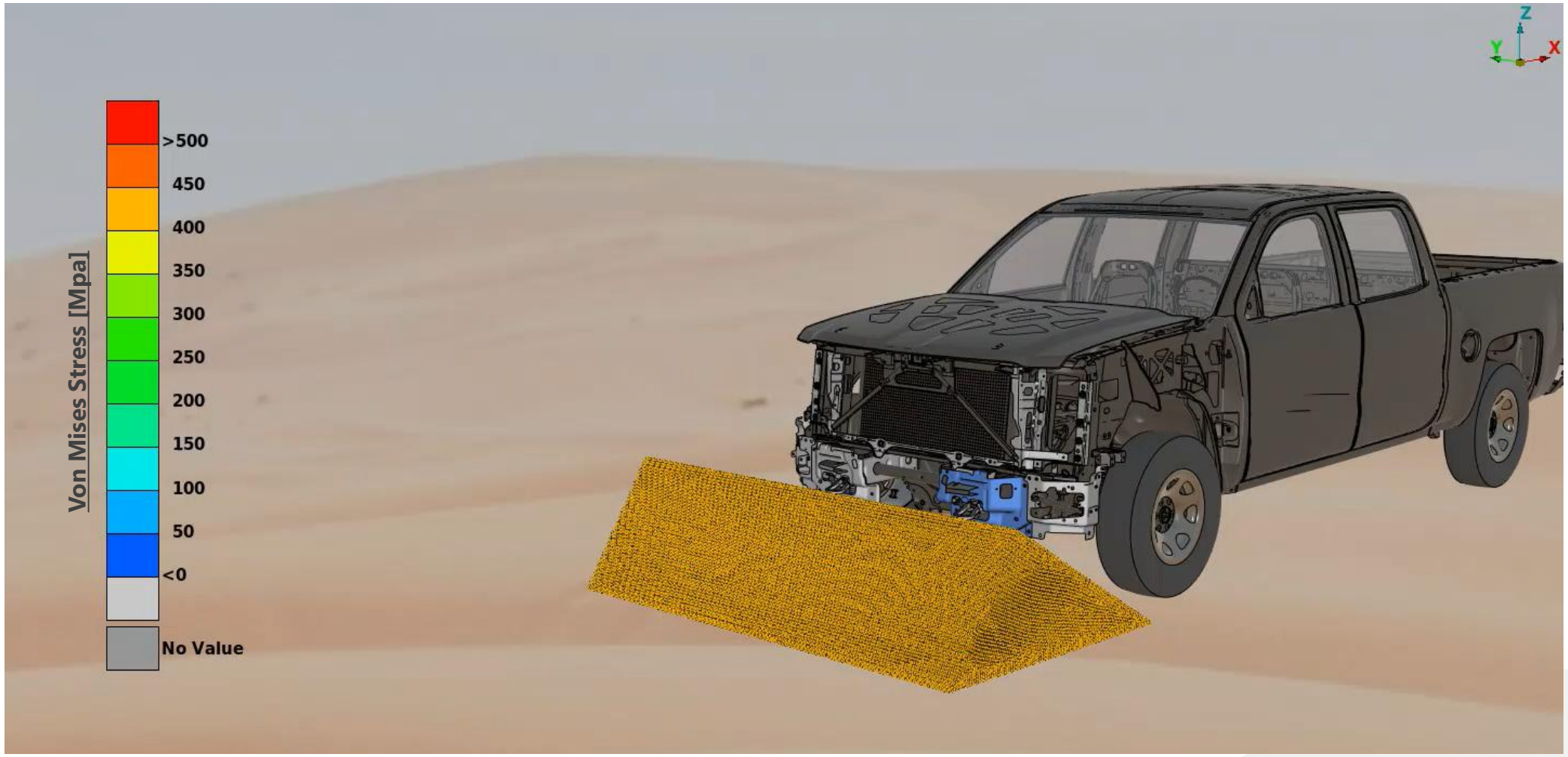
Impact Velocity: 70km/h

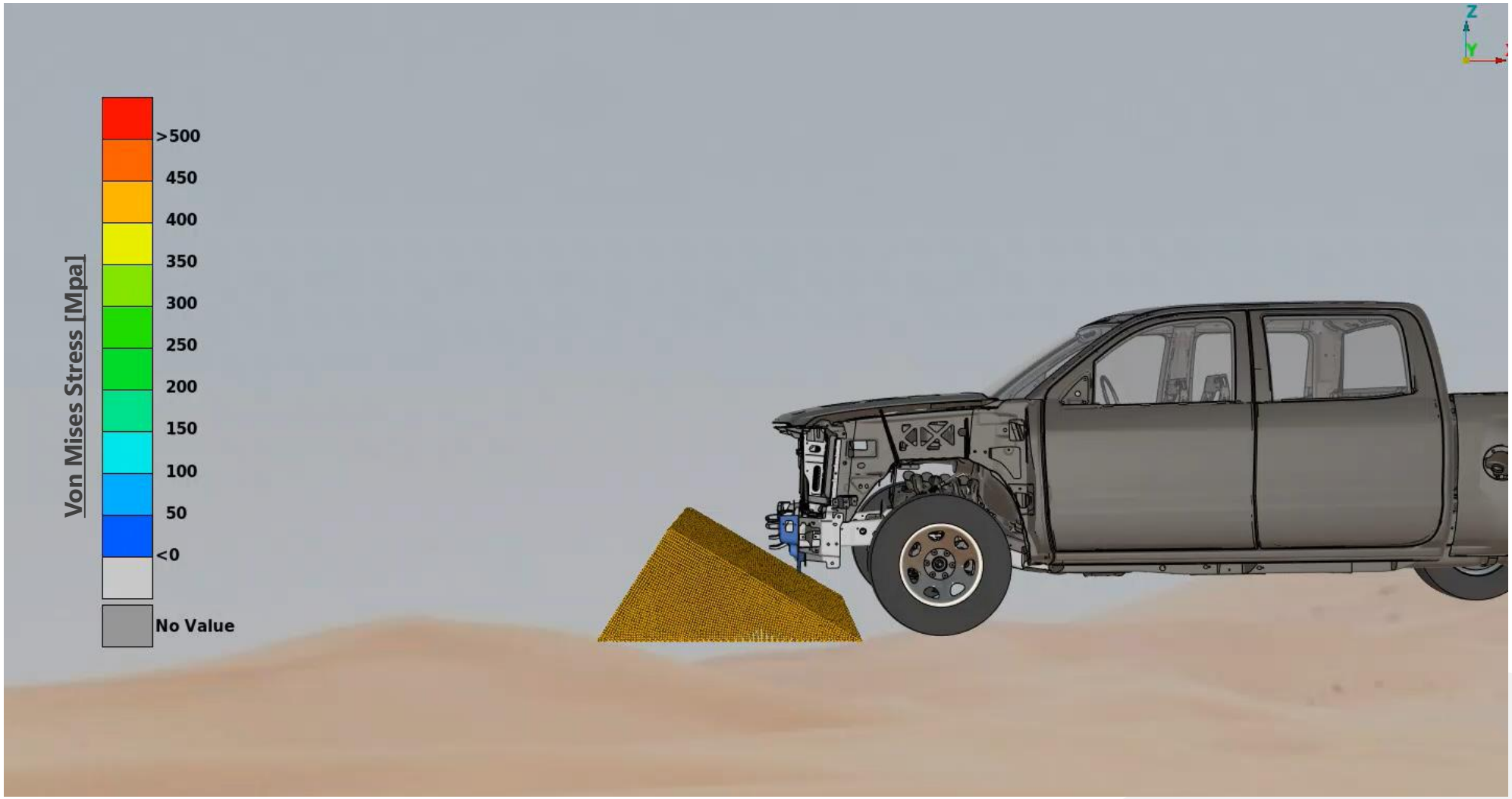


SPH sand ramp

SPH | Sand Dune Impact



SPH | Sand Dune Impact



SPH | High Velocity Projectile Impact

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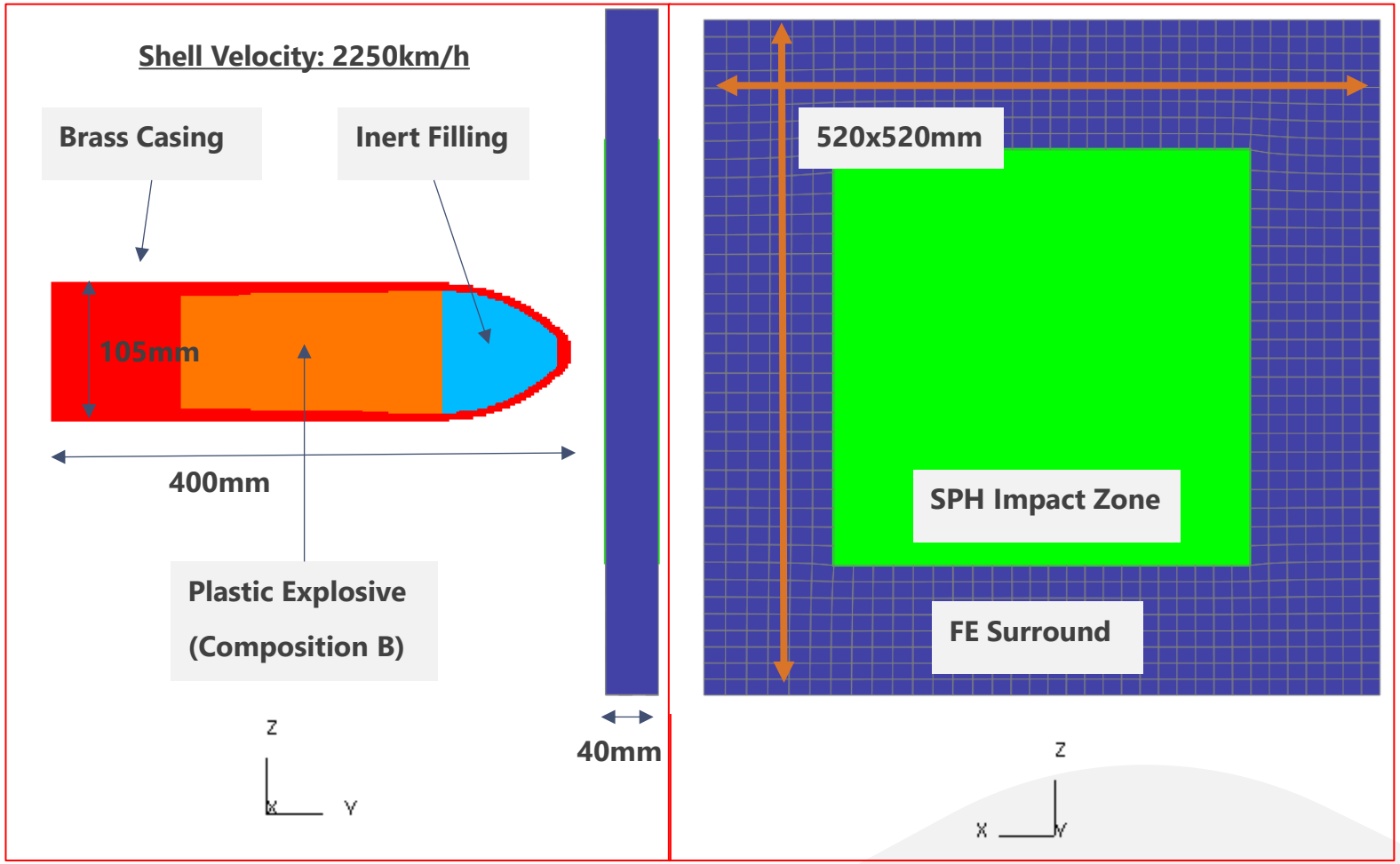
Impactor Model

- HESH (High-Explosive Squash-Head)
- Uses armour against itself via shockwave superposition
- Timed fuse

Armour Model

- RHA (Rolled Homogeneous Armour)
- Hot rolled single composition steel
- Commonly found in WWII vehicle plating
- SPH coupled with FE surround



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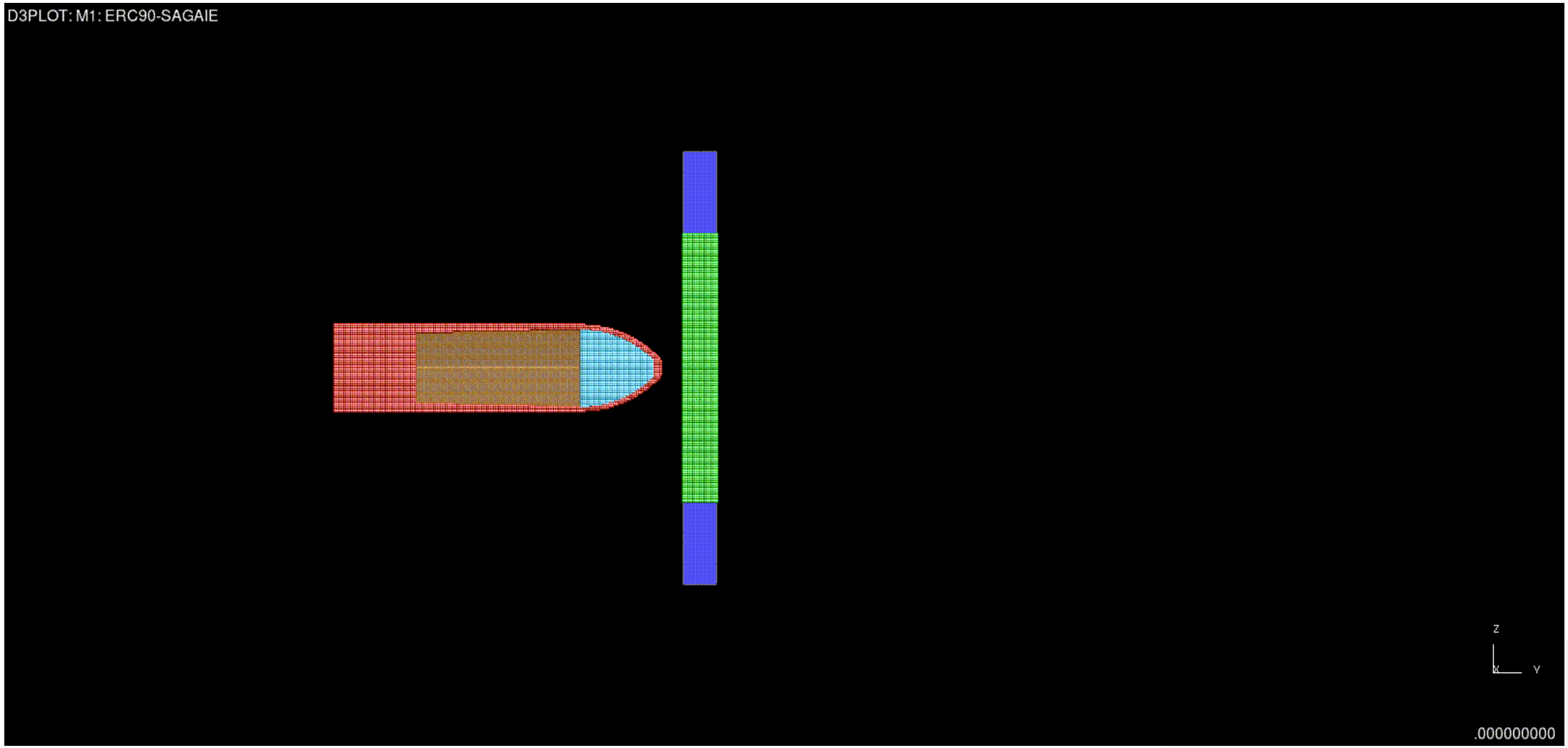

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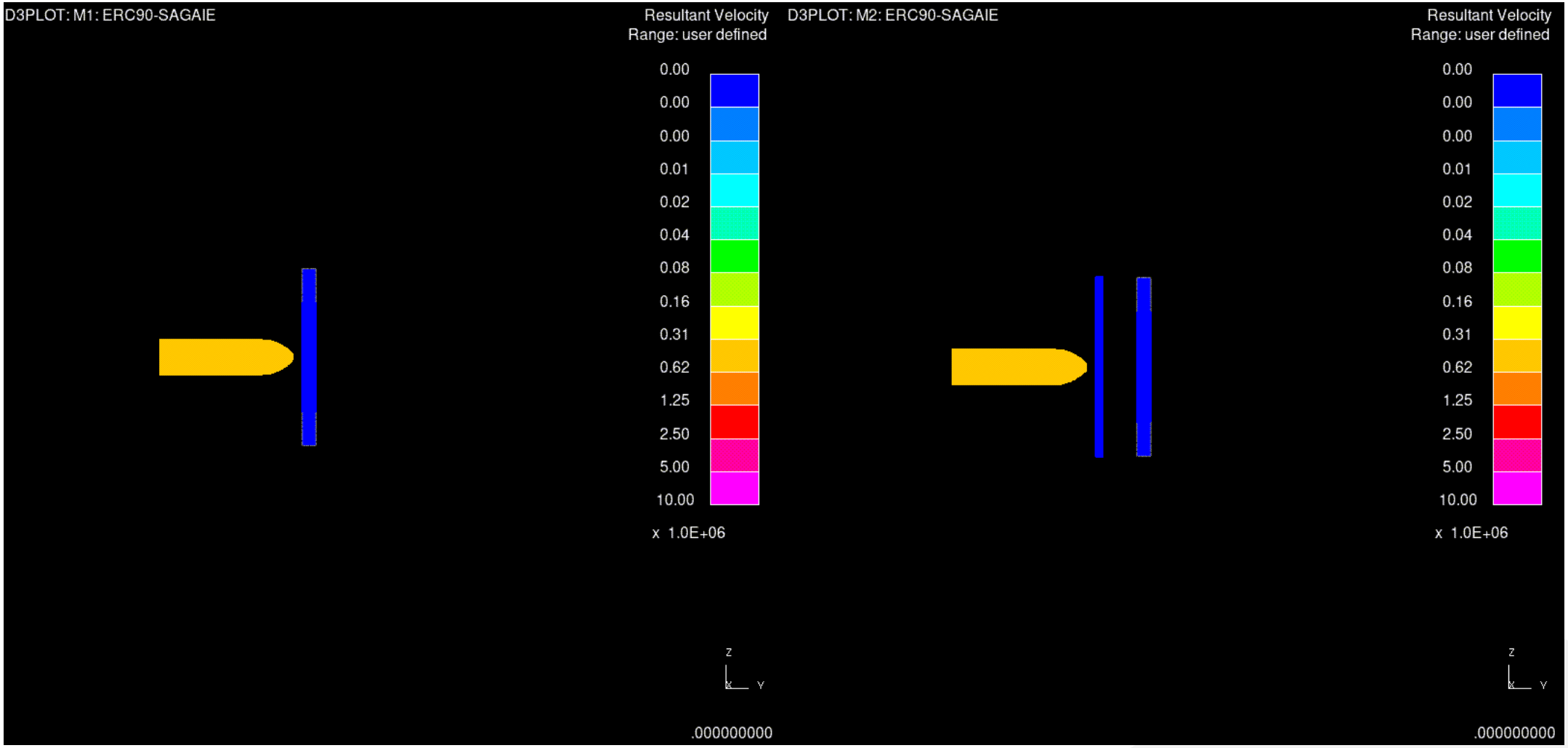

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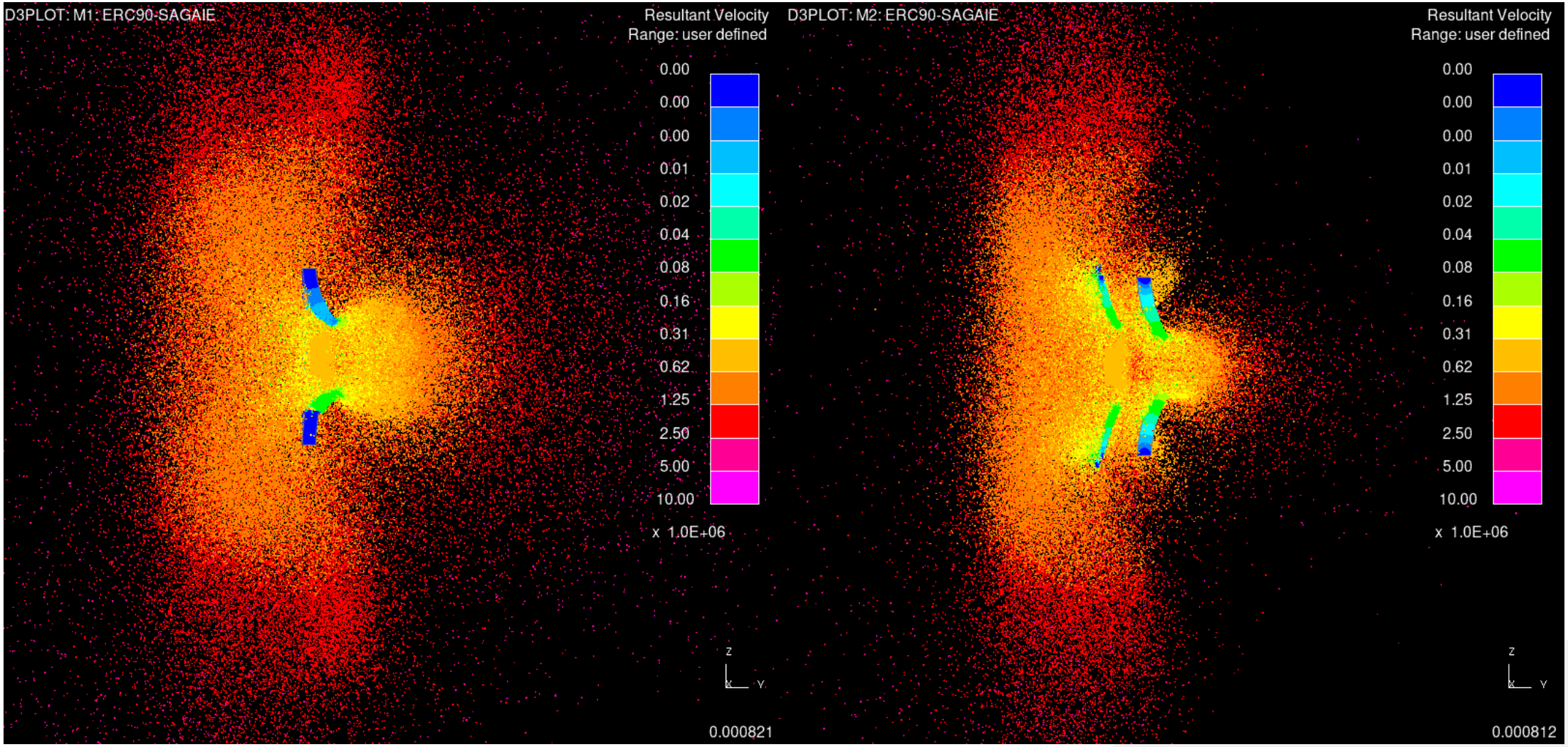

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Oasys D3PLOT Viewer

D3PLOT Viewer | Connecting With Clients

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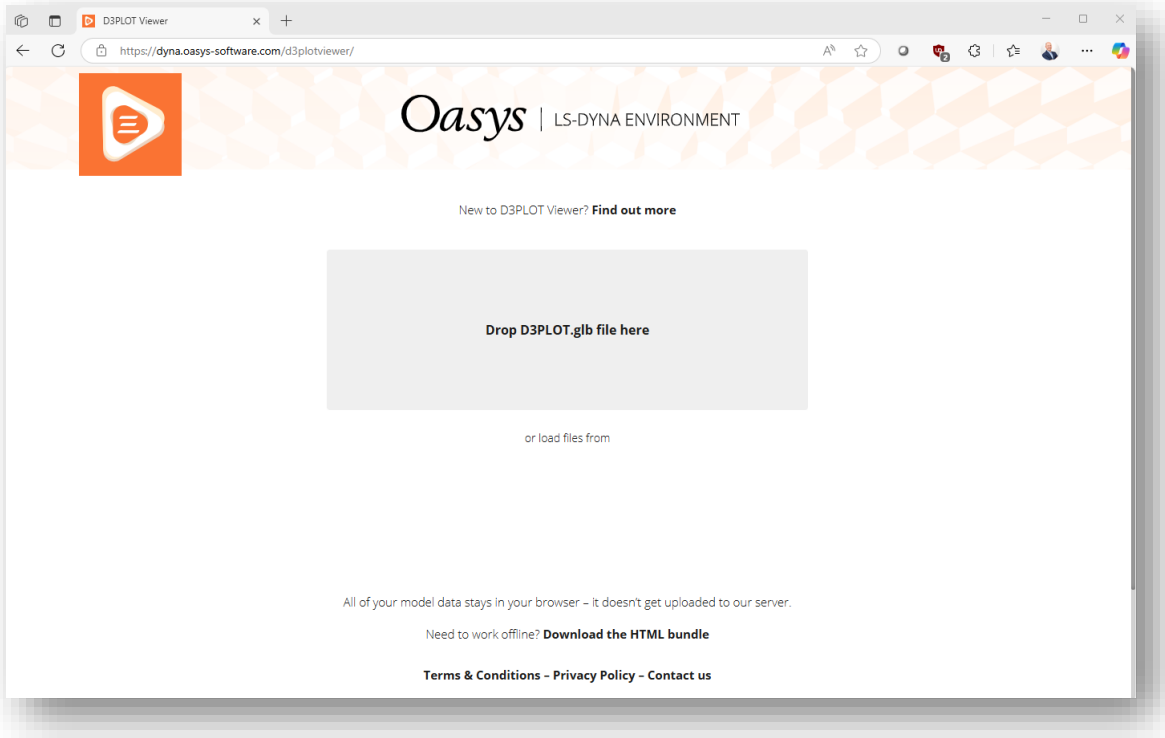
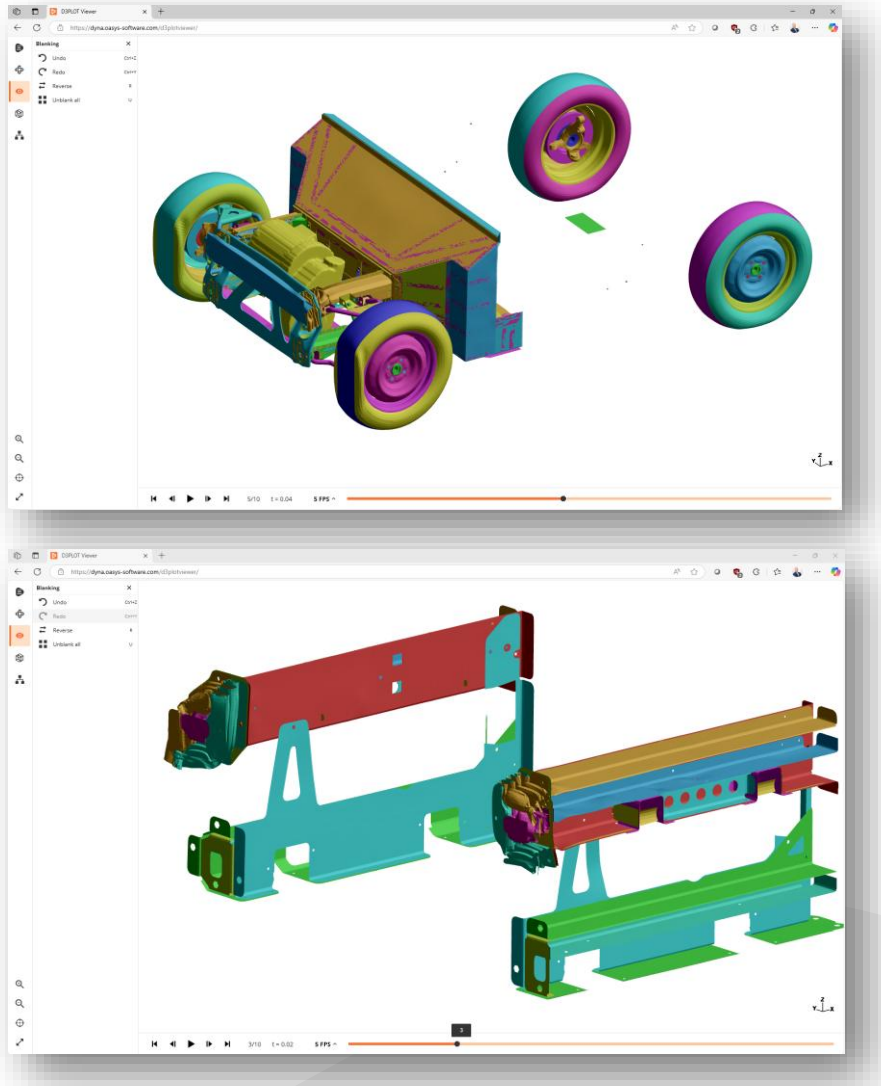
In the last 6 months ..

- 3 Smaller Clients (2 x Automotive, 1 x Rail)
  - Limited CAE capabilities and resources
  - Very experienced engineering teams
  - A real interest in a deeper understanding of engineering systems
- Easy & Secure sharing of D3PLOTnnn.glb files
- Superb platform for discussing the outcome of simulations
- Detailed feedback on engineering/model behaviour



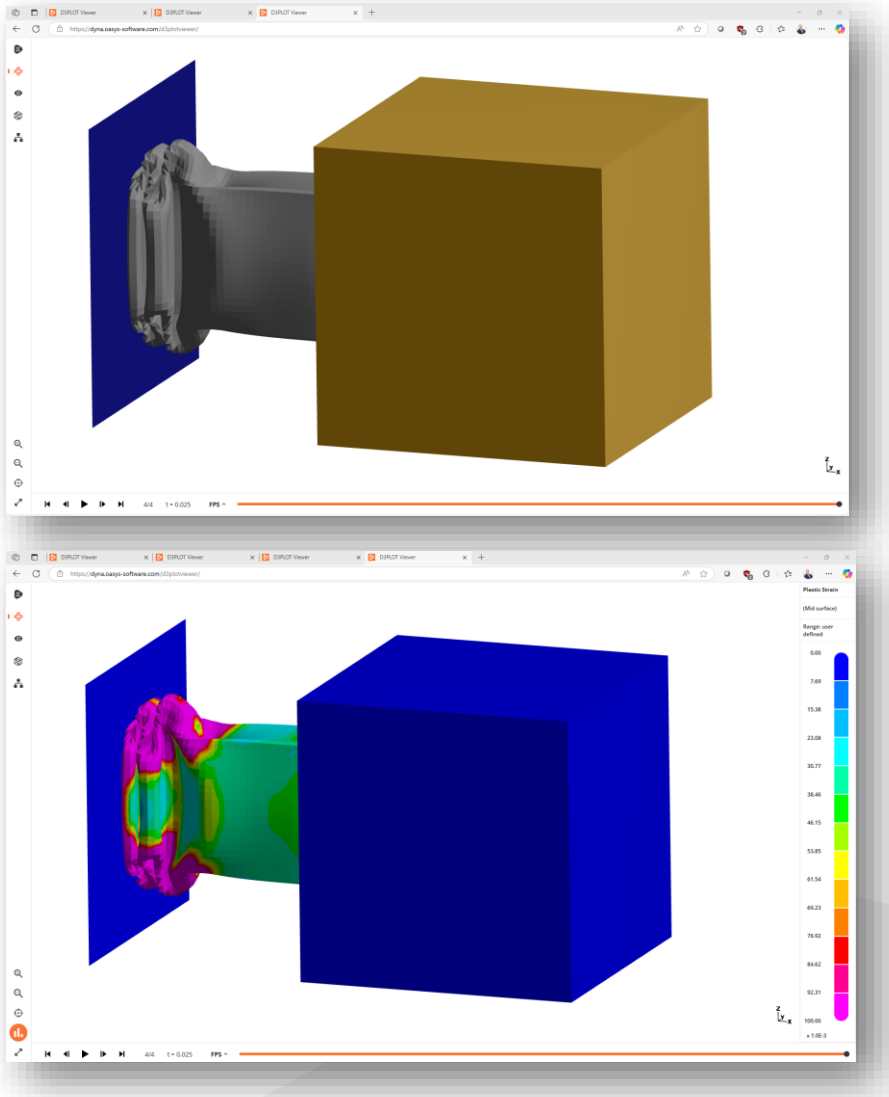
D3PLOT Viewer | New Opportunities

- New interactive way of sharing CAE results
  - .. avoid PowerPoint fatigue …
- Licence free model viewing ..
  - .. no need to chase licences to view a model ..
- Very small files
  - IT → “we are critically low on space .. please clean up old runs”..
  - Example: d3lotnn = **1.5GB** vs D3PLOTnnn.glb = **15MB** → **1%**



D3PLOT Viewer | New Mindset

- D3PLOT Viewer is not D3PLOT ..
  - Accept limitations but keep pushing for necessary updates
    - We need to listen to our clients and their needs → D3PLOT Viewer is 'their' tool
- Laying 'bare' the CAE model ..
  - It's a bit daunting to share the CAE model
  - But .. smaller clients do not see CAE models they see engineering tests
  - And .. we have full control of what parts to include in DPLOTnnn.glb file



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Thank you

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