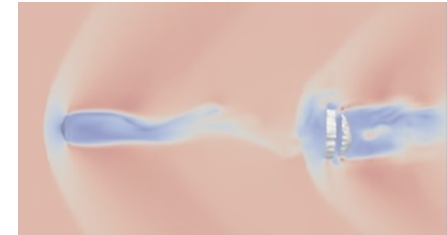
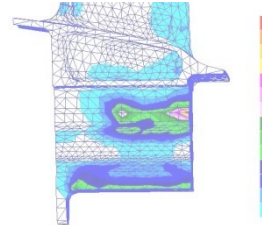
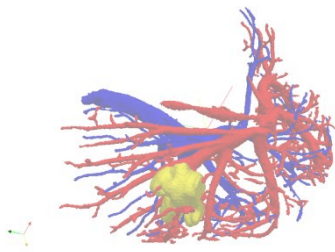




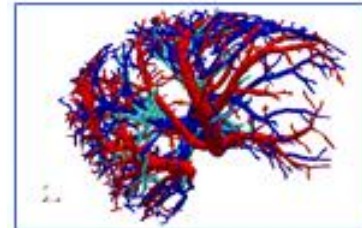
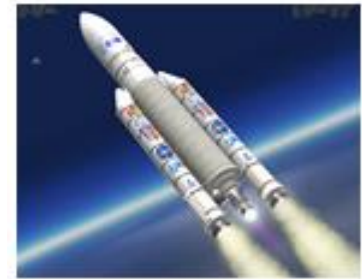
# INTRODUCTION TO

# NUMA Engineering Services Ltd



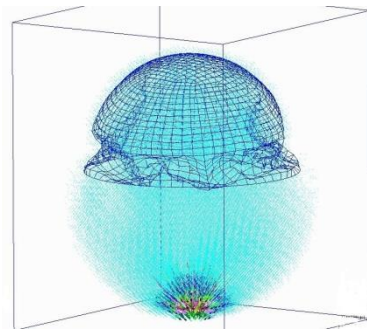
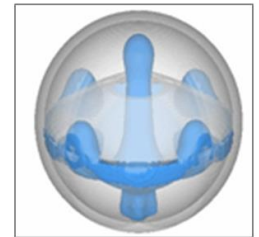
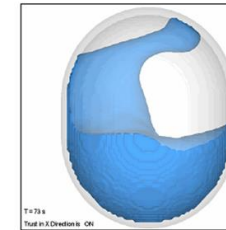
# Company Introduction

- Specialised Engineering Analysis Service:
  - Analysis & numerical code development
- Customers & Company Experience:
  - Commercial projects with a range of customers across Europe
  - European Space Agency programmes
  - EU FP7 & H2020 R&D programmes
  - Engineers with computational experience from aerospace & biomedical disciplines



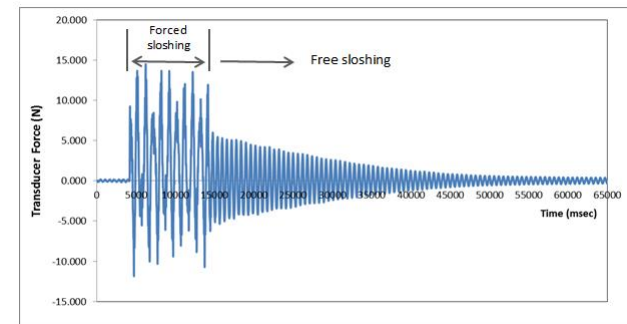
# Space Industry Experience

- Low gravity free surface computational fluid dynamics expertise
- Sloshing and propellant management projects

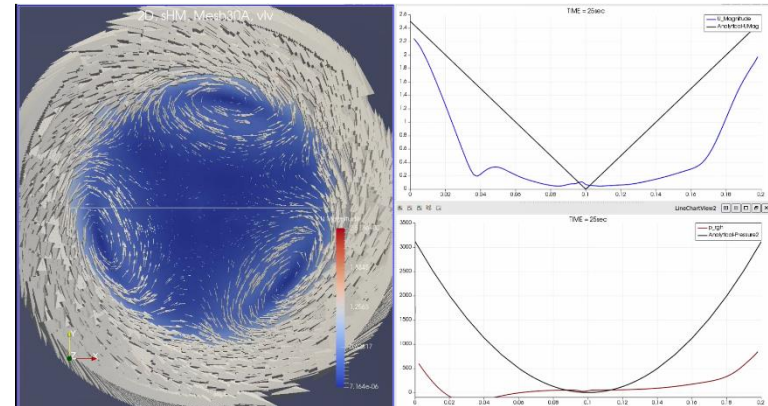


- Fluid/Structure interaction for diaphragms for satellite fuel tanks

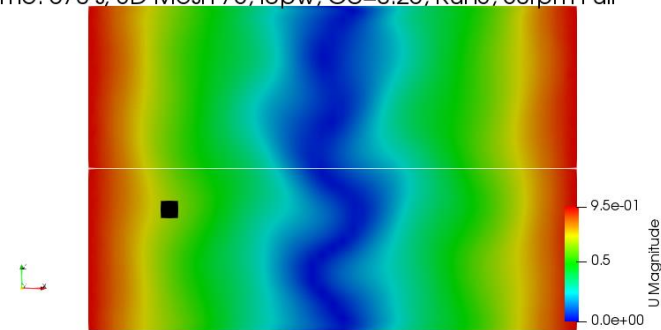
- Sloshing breadboard testing for CFD code validation (isothermal & 1g)



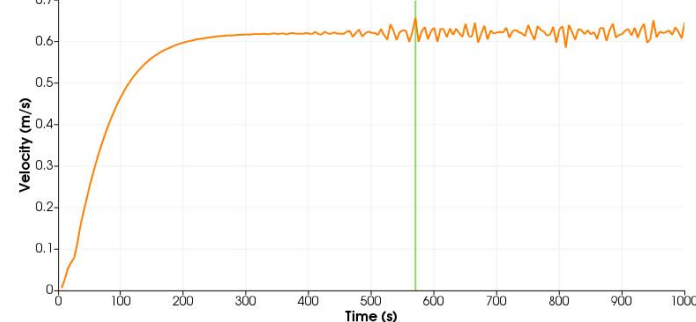
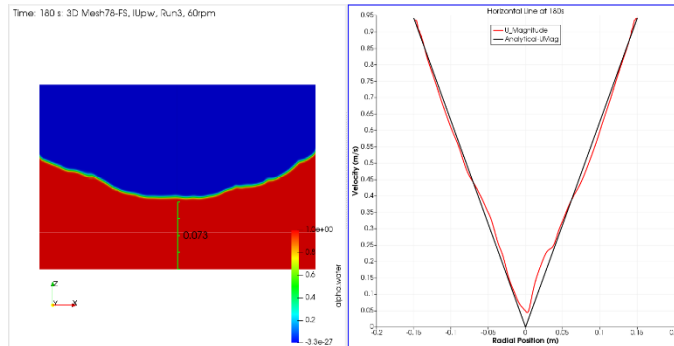
- CFD study with OpenFOAM on spinning tanks
- Objective was to understand the occurrence of physical and numerical instabilities:
  - Test rig results for validation
  - Convection scheme study
  - Free surface solver review



Time: 570 s; 3D Mesh 76, 1Upw, Co=0.25, Run3, 60rpm Full

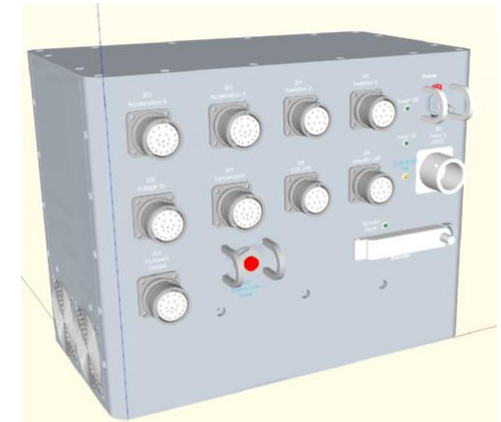


UMag at Selected Cell (R = -0.1, H = 0.075)

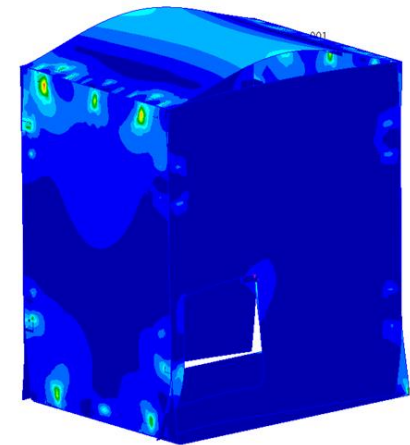


## Design & analysis projects for space structural hardware (e.g. satellite electronic components):

- Structural & thermal analysis to meet launch functional requirements:
  - SolidEdge & MSC.Patran/MSNastran
  - Static & dynamic analysis (modes, sine, acoustic, shock) with MSC.Nastran
  - Thermal analysis with ESATAN, Thermica & Sinda including orbital analysis.
  - scFLOW & OpenFOAM CFD analysis
  - **Design** → **Simulate** → **Test**

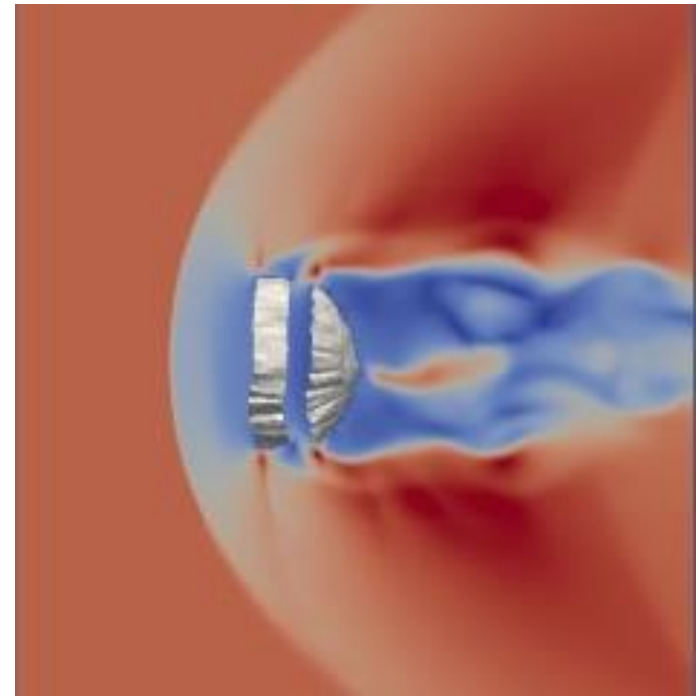
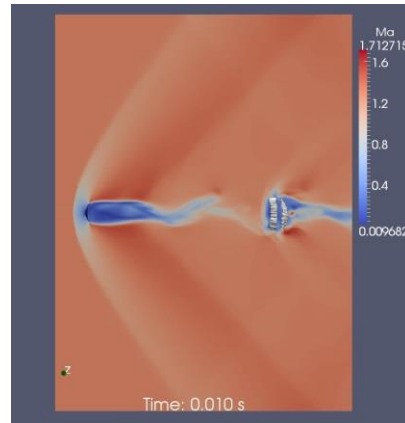
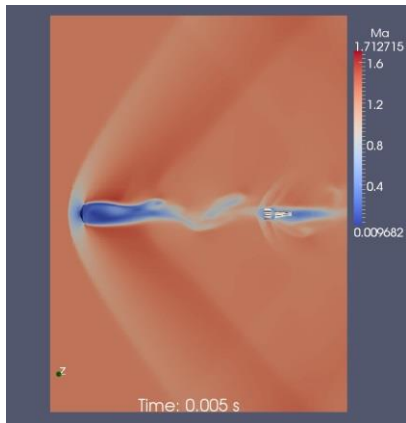
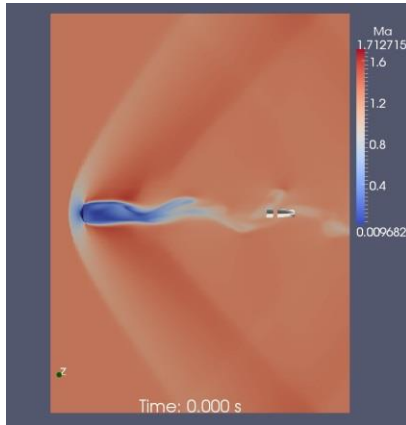


**Electronic Component for ISS**

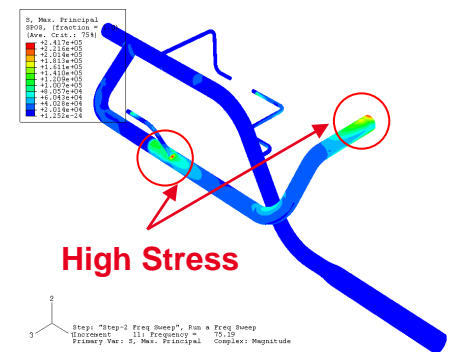
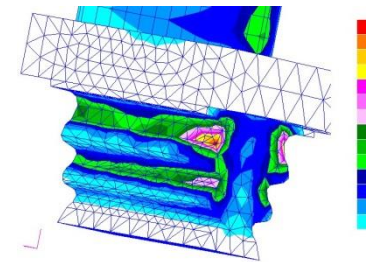
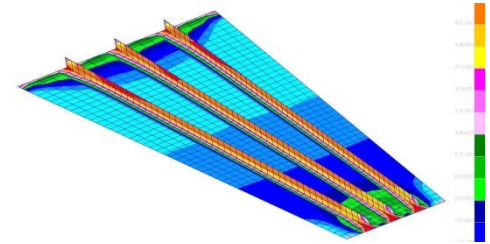


**Shock Response Plot  
(Stress & Deformation)**

- **Supersonic Parachute Inflation - Fluid/Structure Interaction Simulation Tool Development & Wind Tunnel Validation**



- **COMPOSITE & METALLIC MATERIALS**
  - Stress analysis of nacelle & wing composite structures
  - Stiffness analysis of Formula One chassis
  - Complex nonlinear analyses ; contact, plasticity
  - FE code development including contact mechanics
  
- **GAS TURBINE ENGINES**
  - Stress analysis of fan rotor, compressor, turbine
  - Thermo-mechanical analysis of bolted joint assemblies
  - Complex meshing techniques for air cooled blades
  
- **FLUID MECHANICS & HEAT TRANSFER**
  - Fluid/structure vibration in sub sea oil pipelines
  - Heat transfer of subsea oil pipelines and risers
  - Heat transfer of automotive and gas turbine engines



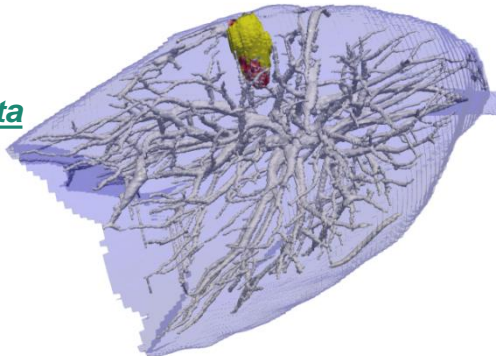


**CT Scan – Liver Geometry**

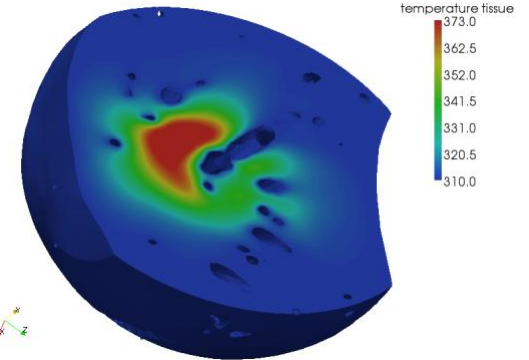


**Patient Specific Data**

- Organ & vessels
- Needle position
- Liver blood flow



**Liver Tissue Temperature Prediction**



**Simulated & Actual Dead Cell Lesion**

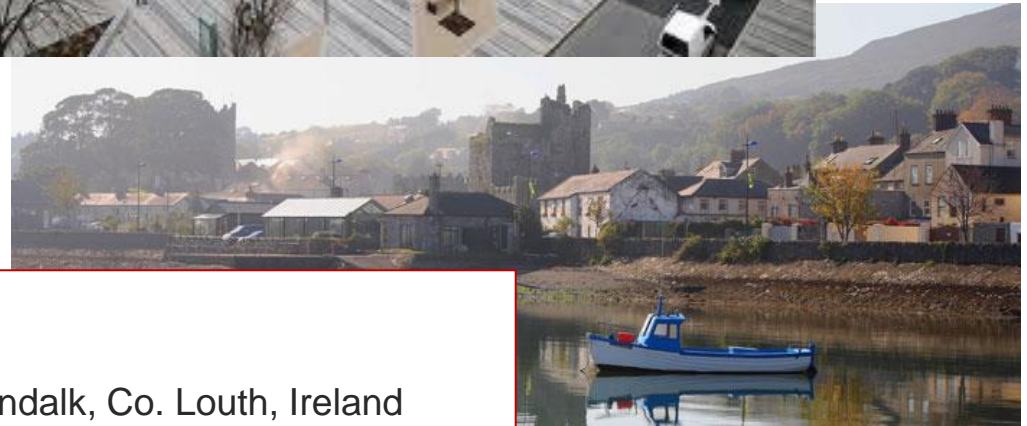
**Simulation Framework for Minimally Invasive Cancer Treatment:**

- Radiofrequency Ablation (RFA)
- Microwave Ablation (MWA)
  - Cryogenic Ablation
- Liver / Kidney / Lung





# NUMA Engineering Services Ltd



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