

# Success Story: Complete Product Development Innovation

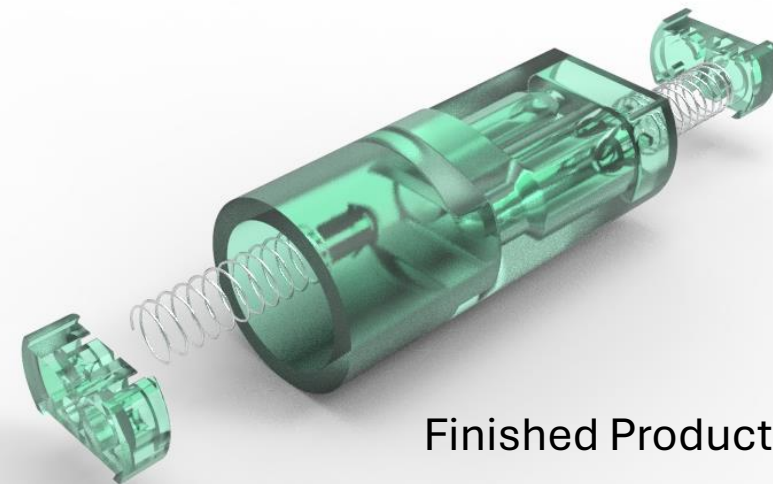
**Project Brief:** The requirements to have a valve that will open inwards to let air into the lungs when the pressure drops below a certain value and to let air out when the pressure goes above a certain value. This project was won by a competitive tender process via Interreg and Boost4Health initiatives.

**Activities Carried Out:**

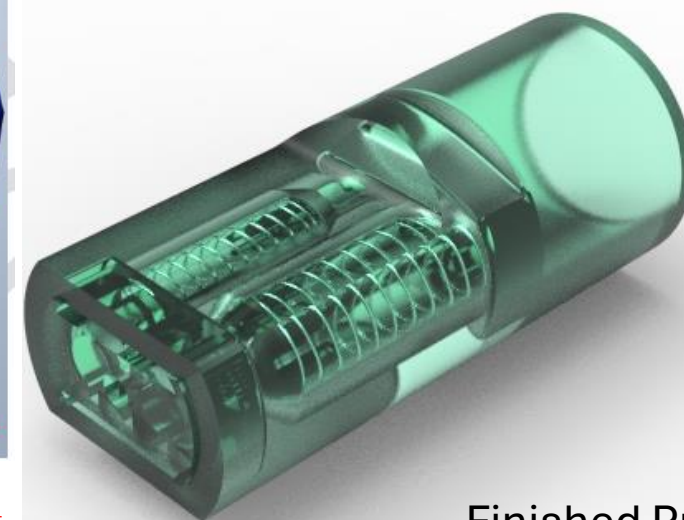
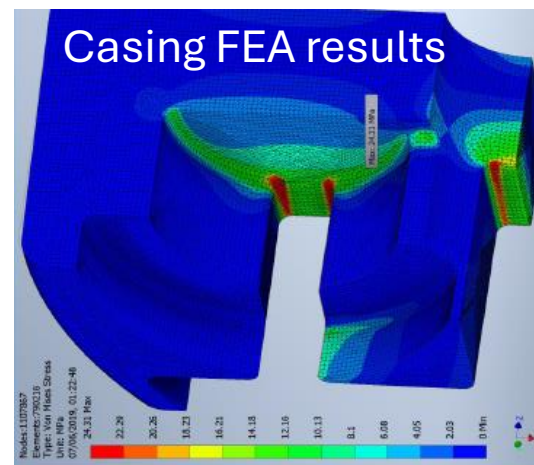
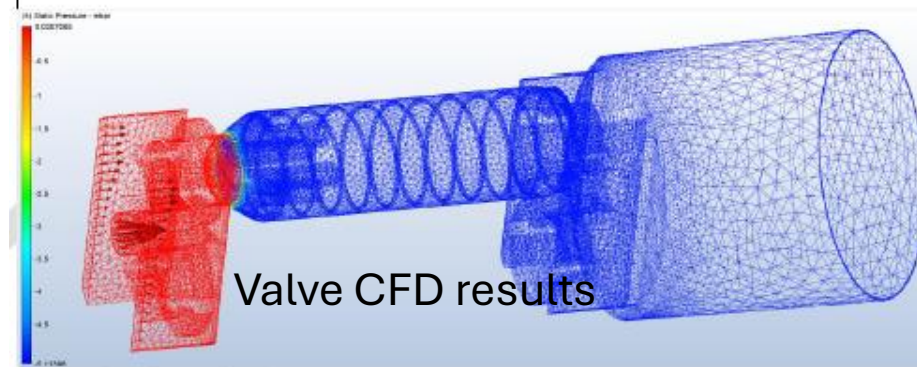
Complete development of the valve including 3D modelling, CFD, FEA, manufacturability and full scale commercialisation in accordance with **ISO13485**. CFD to determine pressure to calculate force required to overcome spring-rates, enabling opening and closing of the valve.

**Outcome:** Successful Delivery of the Design Package.

**Benefits to Client:** Product development where none exists, design, and verification within time, to cost, and assessment of multiple options.



Finished Product



Finished Product

**Alignment With UN SDGs**



**3** GOOD HEALTH AND WELL-BEING  
**8** DECENT WORK AND ECONOMIC GROWTH  
**9** INDUSTRY, INNOVATION AND INFRASTRUCTURE  
**17** PARTNERSHIPS FOR THE GOALS

[Link to Interreg North West Europe Project Brochure](#)

# Success Story: Sustainable Product Development

**Project Brief:** Achieve reduction in mass and material consumption against the existing design whilst retaining a minimum safety factor of 2.

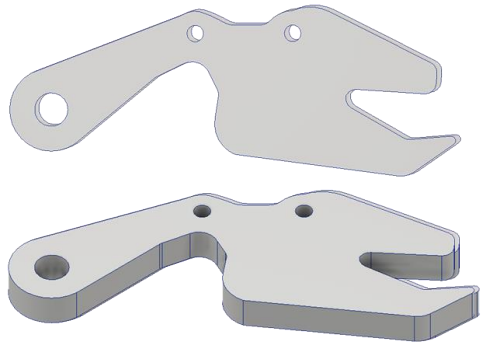
**Activities Carried Out:**

Redesign of the component with Computer Driven Design principles, and Generative Design

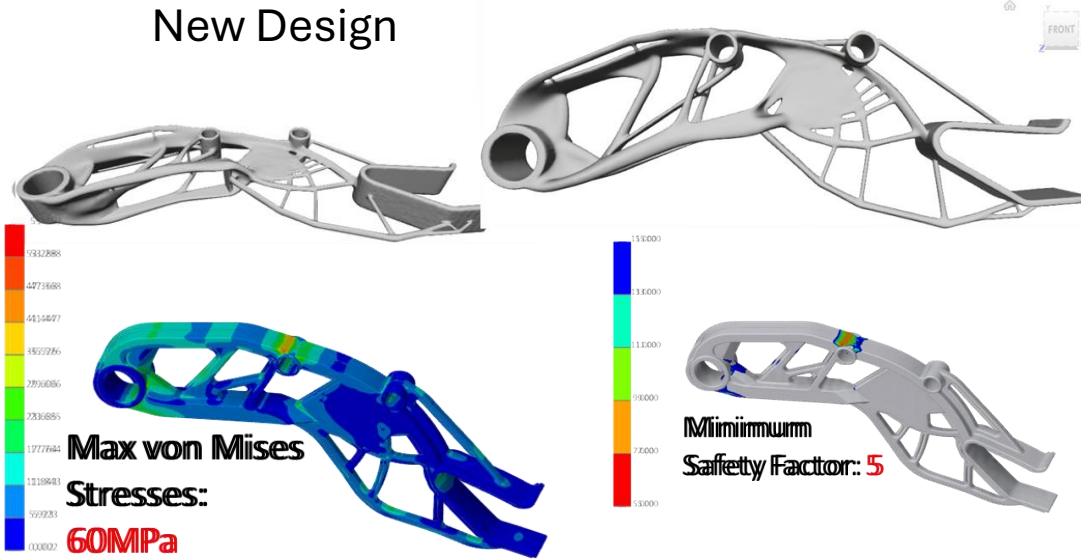
**Outcome:** New design around 73% lighter, minimum safety factor 2.

**Benefits:** Truly rapid prototyping, multiple 'what-if scenarios', smart product development, sustainability, flexibility, affordable, agile, increased productivity

Old Design



New Design



3D Printed Finished Component

**Alignment With UN**





# Success Story: Product Design and Development

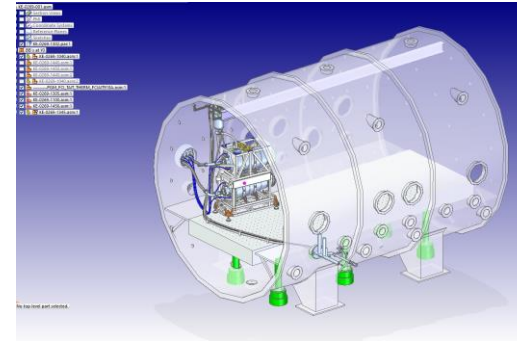
**Project Brief:** Lead the design from concept design to manufacturing drawings, creation of 3D parts and assemblies representing designs for Optical Ground System Equipment in the form of black body targets to test, characterise, calibrate and validate two systems – the Flexible Combined Imager, and the Infra-red Sounder (IRS).

**Activities Carried Out:** Starting with a completely blank screen over two years ago, we modelled individual parts, to assemblies, frames & harnesses, then from these produced manufacturing drawings to BS 8888. Using MRP & BOMs we co-ordinated activities of the various precision engineering companies to manufacture the components that make up the five variable conductance helium gas-gap heat switch controlled calibration targets.

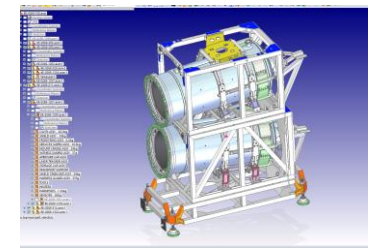
**Outcome:** Extensive testing and FEA was carried out in various environments to establish optimum conditions and meet the requirements specified by the two customers. Part of this involved extensive testing of the bi-metallic seal that separates the aluminium cavity and stainless steel LN2 jacket, which both react in different ways while subjected to the large changes in high and low temperatures but still have to be helium leak compliant to a very high level.

**Benefits to Client:**

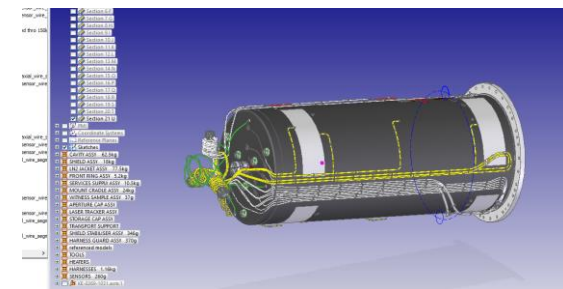
Design, development and manufacturability assessments done on time, to cost and quality, giving confidence in the product, and project timescales to multiple stakeholders.



TAS-F Chamber Interface



TAS-F Variable & Deep Space Black Bodies with integration frame



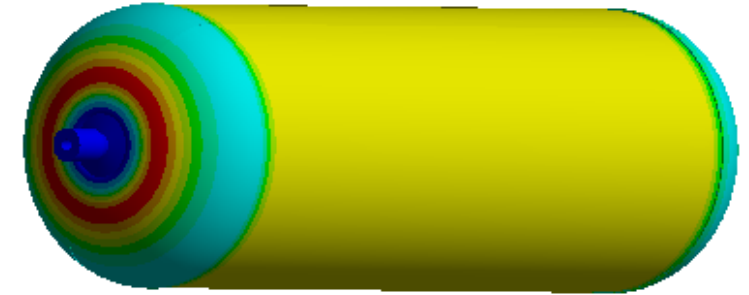
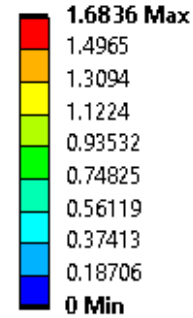
Cutaway section of Black Body showing partial harness

Alignment With UN

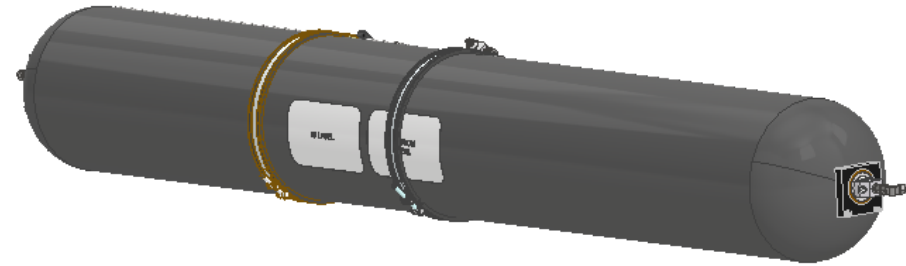


# Success Story: Design of Cylinders

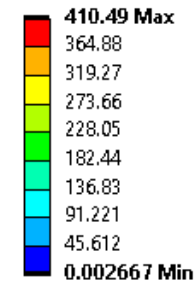
1. Design and validation of hydrogen carrying cylinders to withstand typical compressed hydrogen storage pressures (typically around 350 to 700 bar), and phenomena like embrittlement
2. Experience of developing systems as per standards such as ISO 11119, ISO 9809, ISO 7866, EN 13445, EN 1491 amongst others
3. Design for Manufacture
4. Validation and analysis
5. Experience of working with low permeability materials



Displacement under 500bar Pressure



3D Model of Cylinder Assembly



Von Mises Stresses under 500bar Pressure

## Alignment With UN SDGs



# Success Story: Product Design and Development

## *Project Brief:*

Lead the design of complete MGSE hardware to support Rotopod & Instrument positioning system for Sentinel 4 Satellite program.

## *Activities Carried Out:*

- Design and manufacture of supporting instrument cart including full FEA analysis and verification.
- Design and manufacture of cleanroom trolley system with floor mounted rails. All FEA verified.
- Supported the design of bespoke chamber hardware specific to this project. Such as dedicated shroud panels, windows etc...

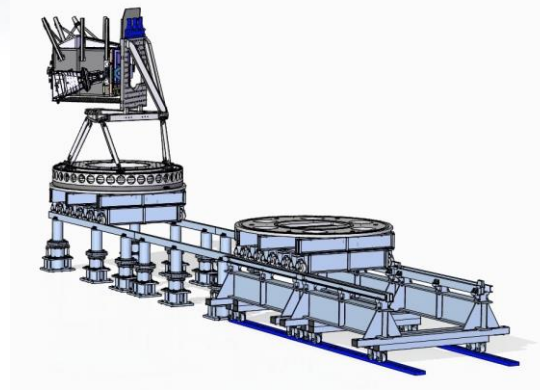
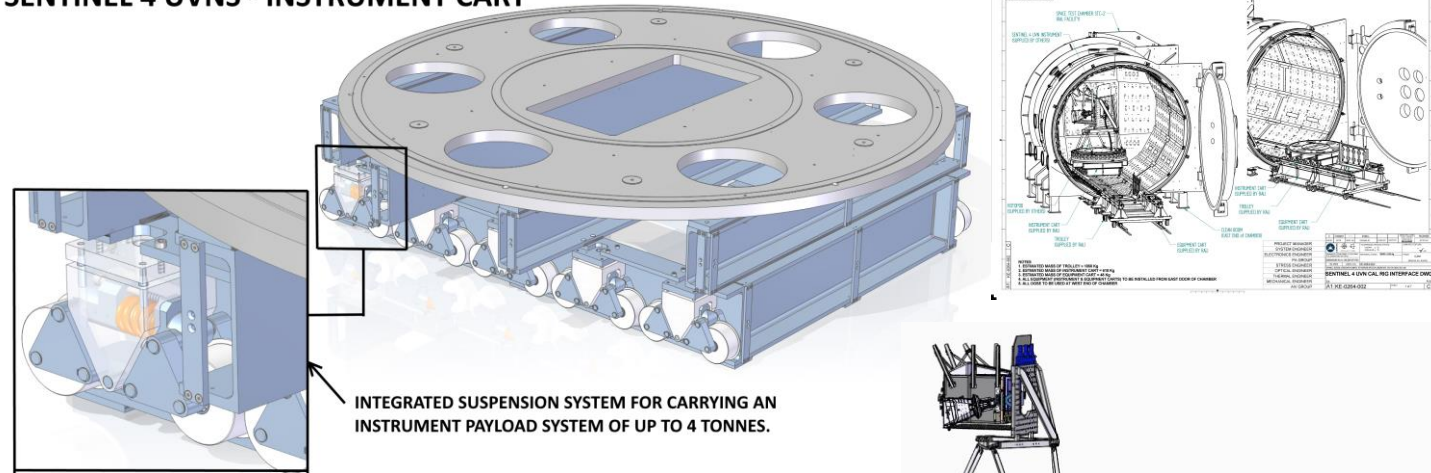
## *Outcome:*

Large collaborative effort between RAL Space and Airbus Defence and Space (ADS) regarding rotopod to instrument cart interfacing. Both parties had to come to agreement on the best method. Proof of load carrying capacity of the cart and trolley was of major importance to ADS.

## *Benefits to Client:*

Design, development and manufacturability assessments done on time, to cost and quality, giving confidence in the product.

SENTINEL 4 UVNS - INSTRUMENT CART

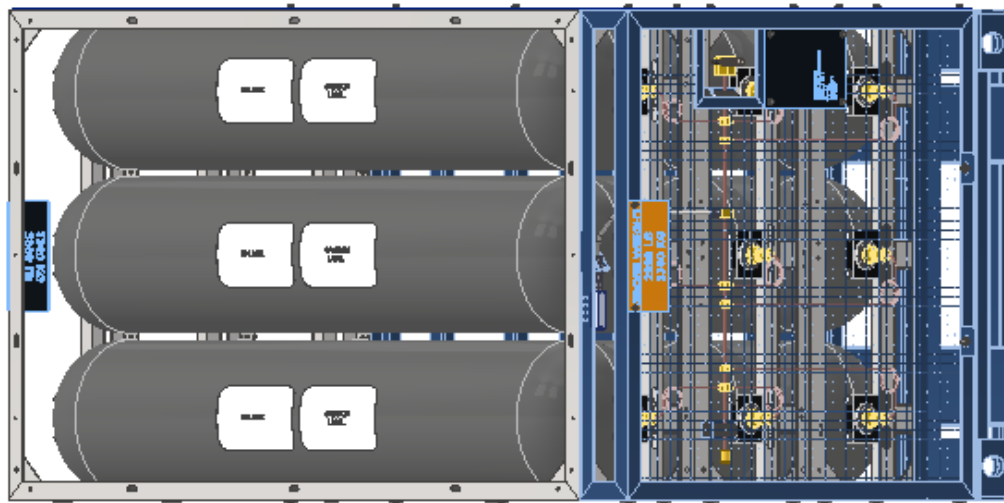


## *Alignment With UN*

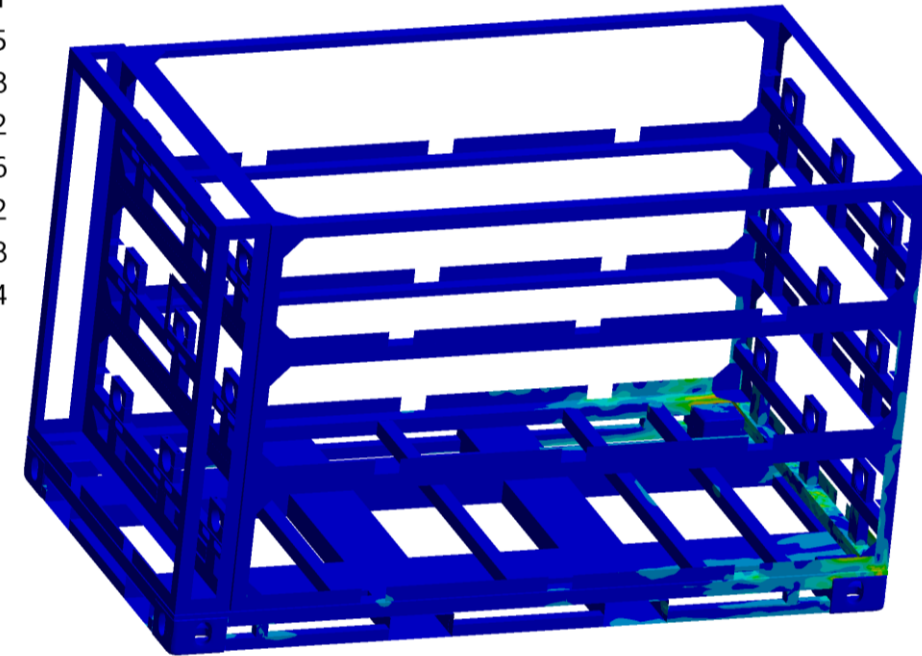
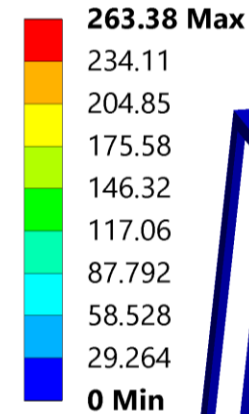


# Success Story: Design of Cylinder Transportation Frames

1. Design and validation of hydrogen cylinder transportation frames
2. Experience of developing systems as per standards such as ISO 10961, amongst others
3. Design for Manufacture
4. Validation and analysis to include impact, roll over and fall over protection systems as per ISO 10961
5. Experience of working with various metals



3D Model of Multi-Cylinder Transportation Frame



Stresses due to Impact as per ISO 10961





# Offshore Wind Capabilities

## Design and Development of Components to IEC

We have the capability to develop components to IEC 61400-1: Design requirements

61400-2: Small Wind Turbines

61400-3: Offshore Wind Turbines

61400-4: Gearboxes

## Certification Support

Component level certification

- Certification Systems: IEC, AWEA, GL, BWEA etc
- Accreditation Bodies: UKAS, A2LA etc
- Certification Bodies: Intertek, BV, DNV-GL, etc

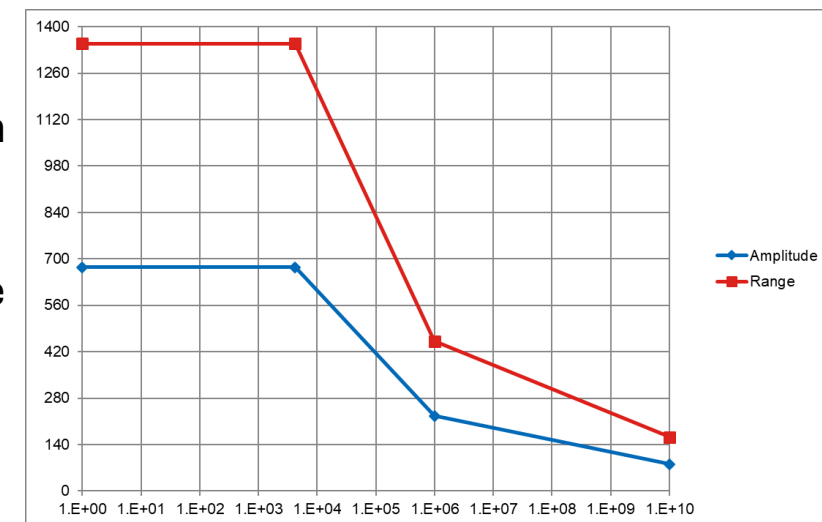
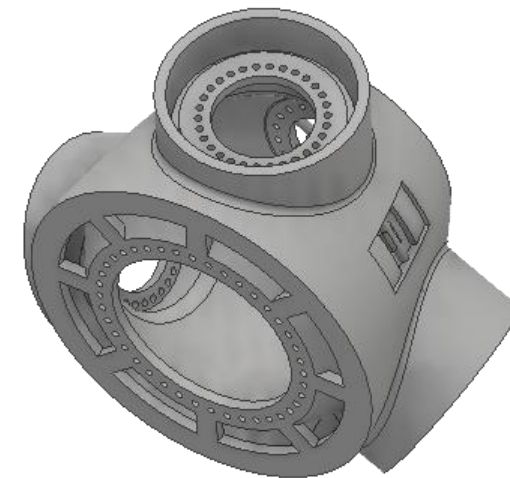
## Independent Third Party Verifications/Assessments

Independent verification and assessments of other designs, fulfilling certification requirements.

## Development and Synthesis of Material Data

Synthesis of material properties, based on FKM Guideline, DNV GL guidelines with the intention of fulfilling 25 year lifecycles with multiple loading scenarios

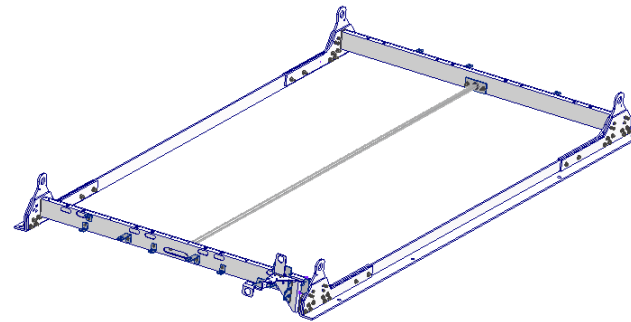
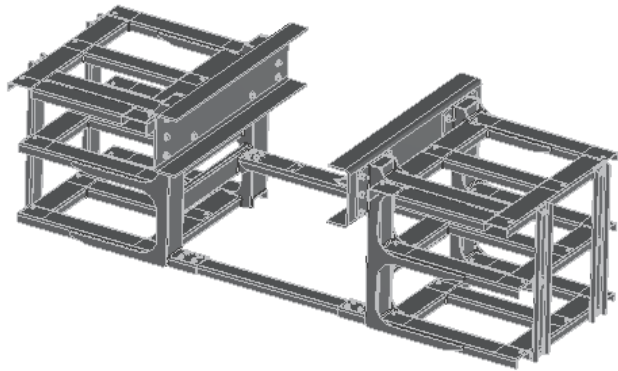
## Alignment With UN SDGs



# Success Story: Design and Validation of Onboard Frames

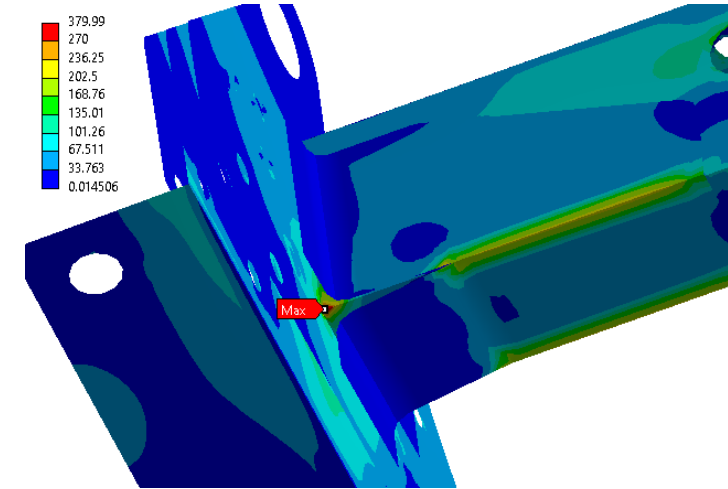
Design of hydrogen frames for trucks and buses as per the following standards amongst others:

1. EC79: type-approval of hydrogen-powered motor vehicles
2. ECE-R115: retrofitting compressed gases as part of motor vehicles' propulsion systems
3. ECE-R134: safety-related performance of hydrogen-fuelled vehicles

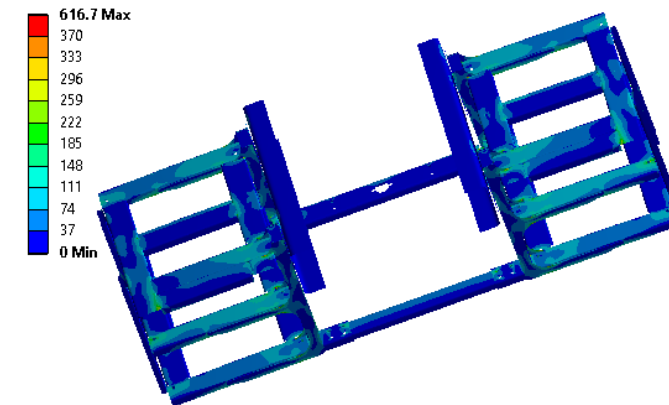


3D Model of Battery Frame Assembly

3D Model of Cylinder Frame Assembly



Stresses on Frame as per ECE - R134



Stresses on Frame as per EC79





# Success Story: Product Design and Development

## Project Brief:

Lead the design, development & manufacture support of necessary equipment to facilitate onsite testing for Sentinel 5 Satellite program

## Activities Carried Out:

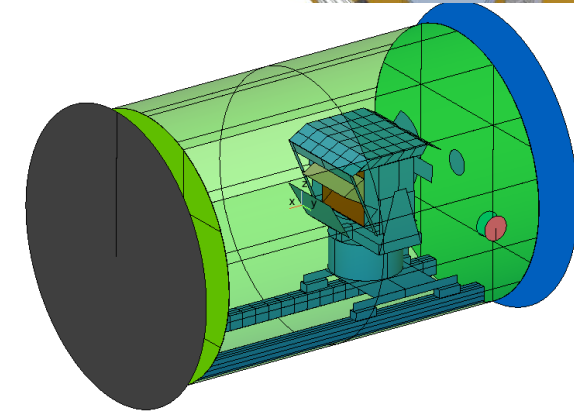
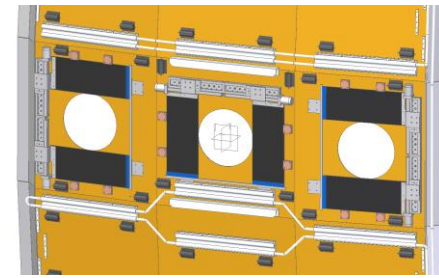
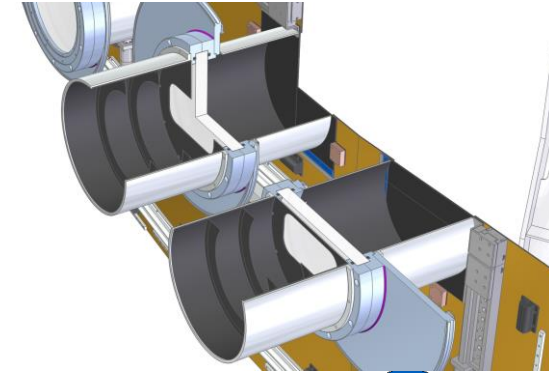
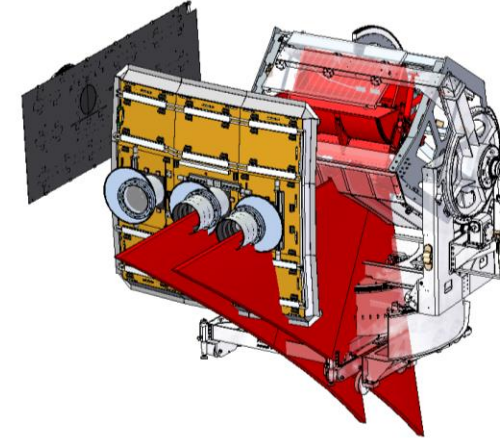
- Overseeing of sub-contracted MGSE Design and Manufacture.
- Design & Manufacture of appropriate chamber hardware based on parameters of MGSE.
- Design & Manufacture of support systems such as chamber flanges, feedthroughs, baffles, actuated window shutter mechanisms, cold traps etc.
- Development of adjustable model for checking beam positioning with respect to chamber window positions.

## Outcome:

Major influence on MGSE design as chamber parameters defined the geometry of the MGSE hardware. Being supplied by our MGSE supplier in Switzerland.

## Benefits to Client:

Design, development and manufacturability assessments done on time to cost and quality giving confidence in the



*Alignment With UN*

