



3D METROLOGY CONFERENCE

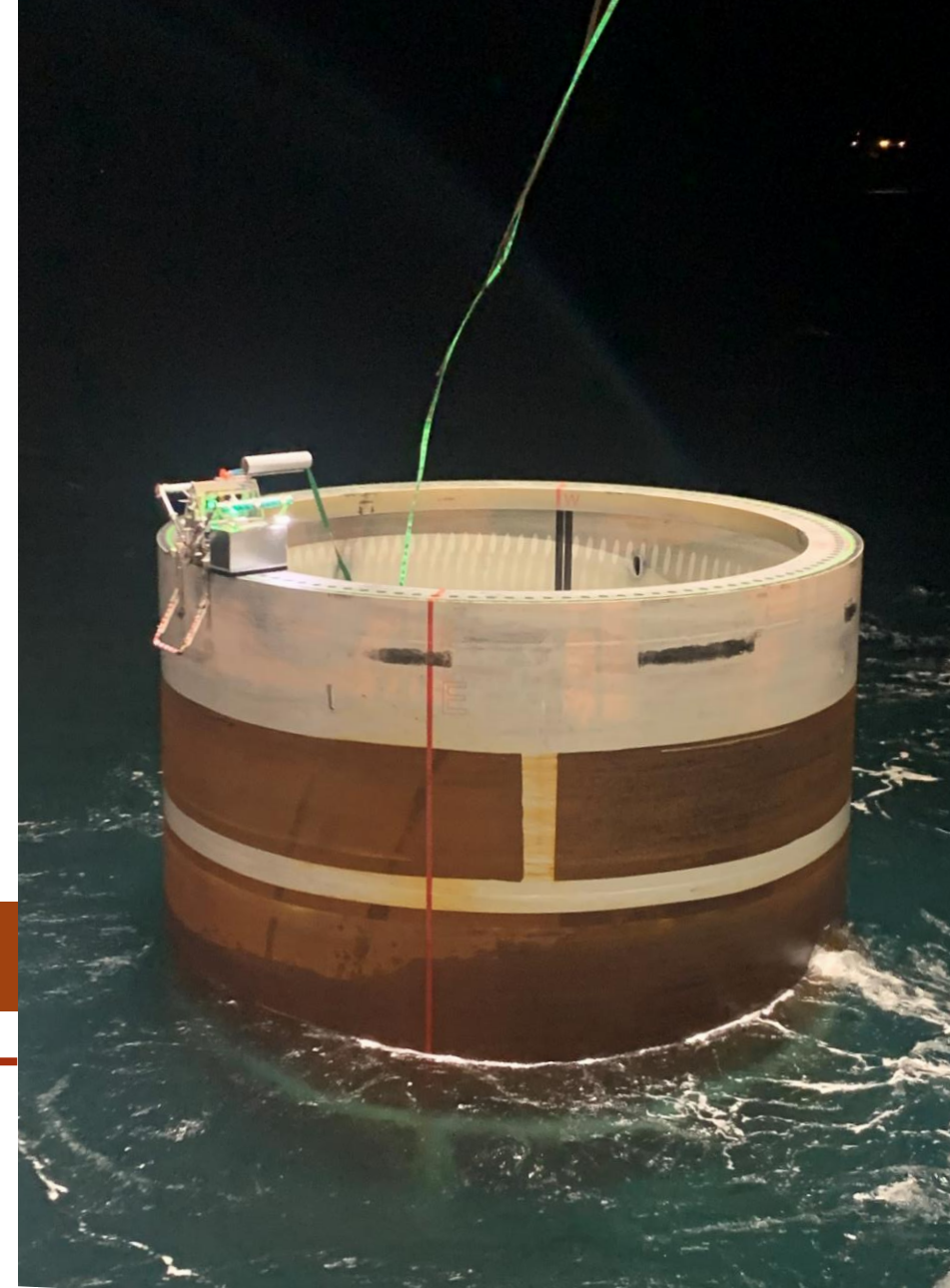
24-26 September 2024 (Loughborough, UK)



Joseph Toma (Axist Robotics Division - R&D Manager)

Rover PROMETEO

Off-Shore Flange Dimensional Inspection Solution





(2001)

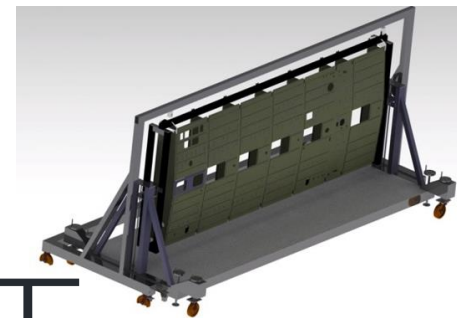


- Metrology Service with Portable Instrument.



(2024)

- Reverse Engineering
- Applied Topography, 3D Laser Scan & Specialized Drone Operation.
- CMM Machine programming
- Equipment desing.
- Assembly & Maintenance.
- Non-conformity Management.
- Inspection Software and Hardware Training
- ***Custom Projects for Automated Dimensional Inspection***



Industrial sectors.

Axist operates in several sectors such as aeronautics, automotive, space and research, steel, energy, oil & gas, nuclear, nautical and railway.



> Automotive



> Aerospace



> Physics



> Steel



> Energy & Boiler



> Telecommunications



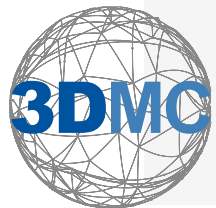
> Industrial plant



> Environment & territory



> Infrastructure | Public works



Axist. Locations.



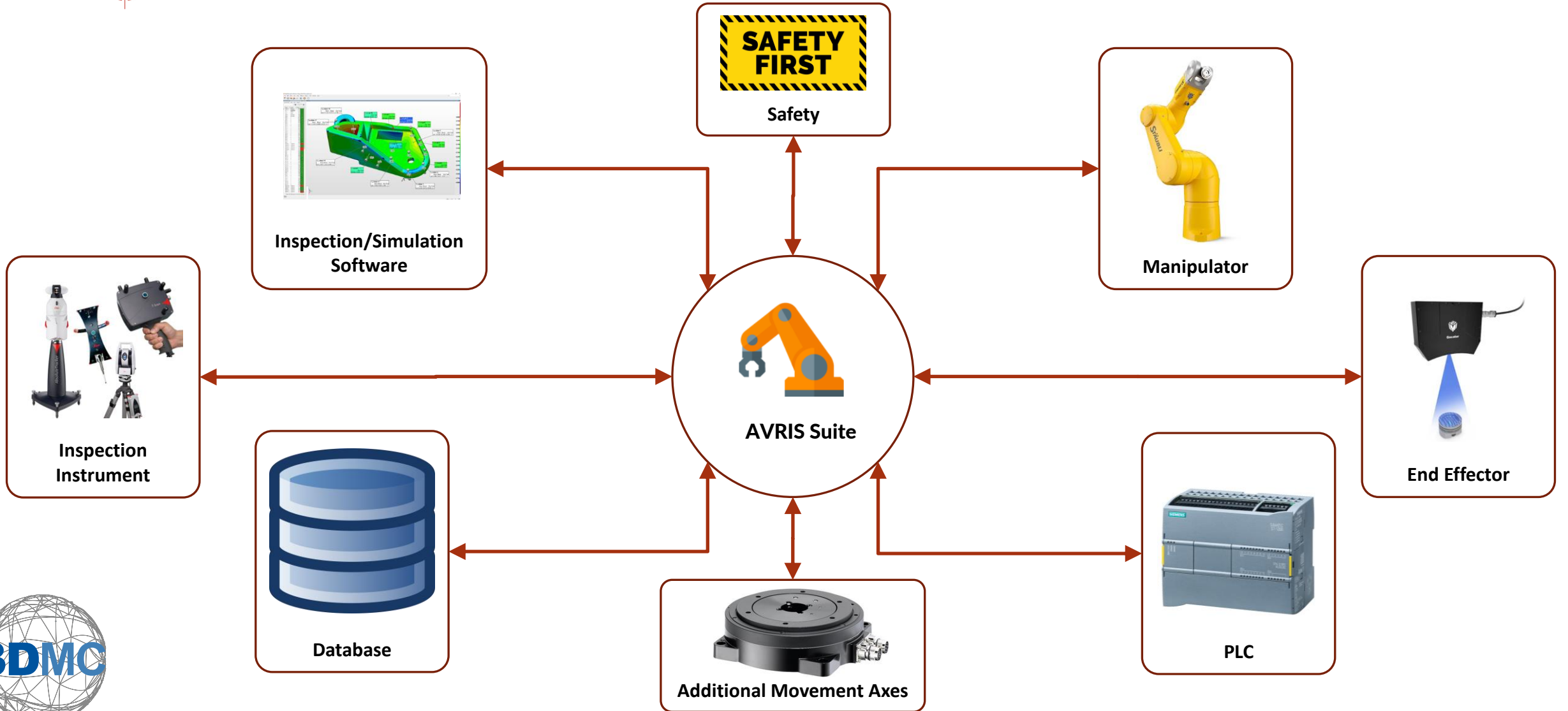
ITALY

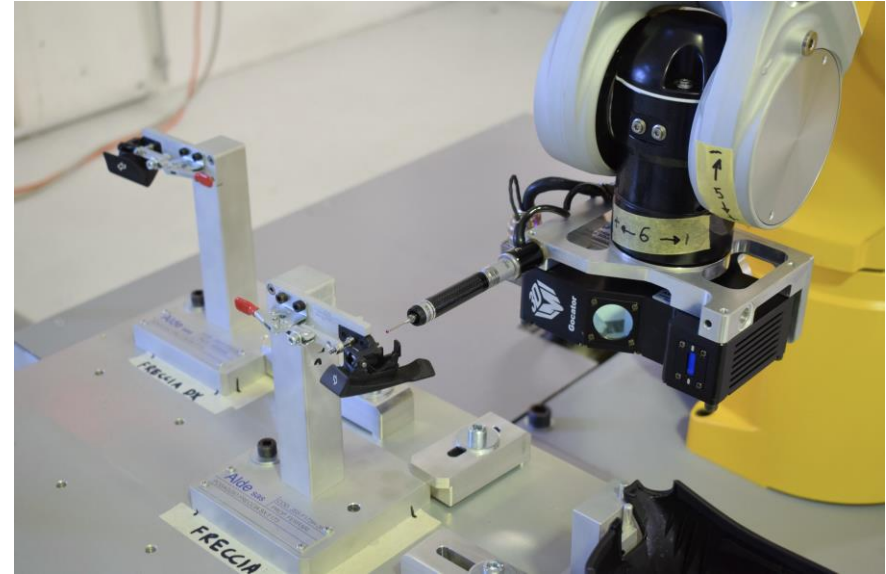
- > **Rivoli** | Service (TO)
- > **Torino** | R&D (TO)
- > **Verona** (VR)
- > **Pomigliano d'arco** (NA)
- > **Grottaglie** (TA)
- > **Mesagne** (BR)

ABROAD

- > **Abu Dhabi** (UAE)







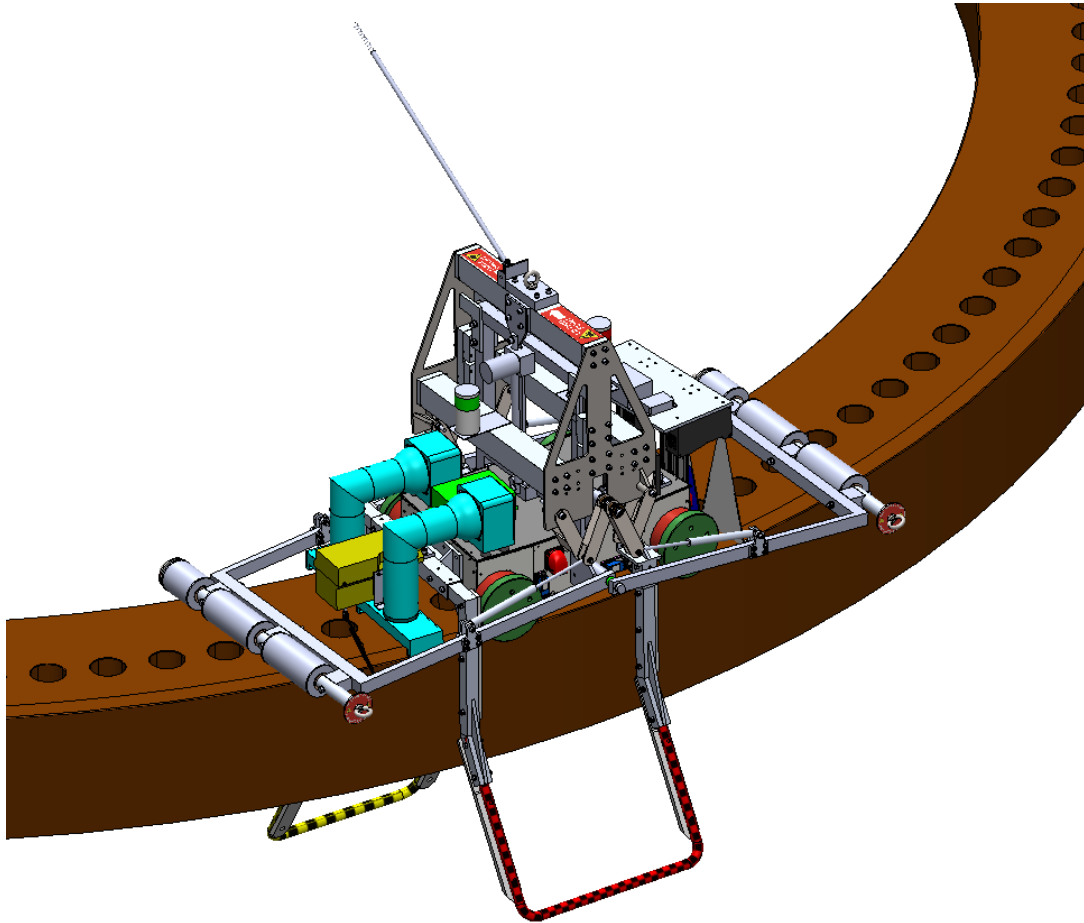
➔ Marry-Up of the Military Training Aircraft M346 Fuselage Sections.

➔ Engine Nacelle Assembly.



- ➔ Measurement of the main Thread Hole Geometrical Features: Pitch, Diameter, Inclination, Fillets Angle, Number of Fillets.
- ➔ Locate of Measuring Hole into Vacuum Vessel Networks Reference System, using Laser Tracker.
- ➔ Ad-Hoc HMI User Friendly Interface and Spatial Analyzer connection for Analysis.
- ➔ Accuracy of a single measured cloud point of $\pm 0.02\text{mm}$

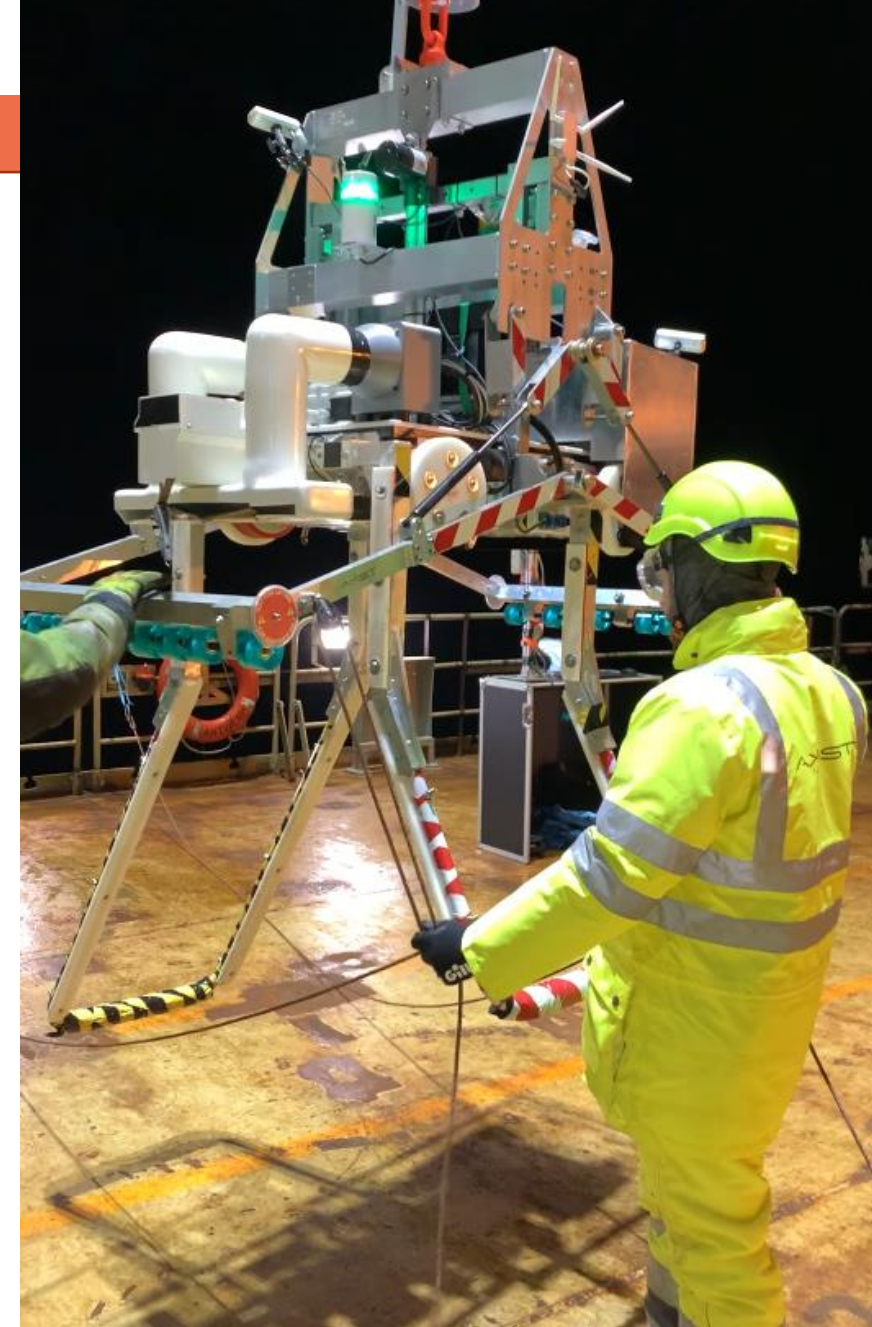




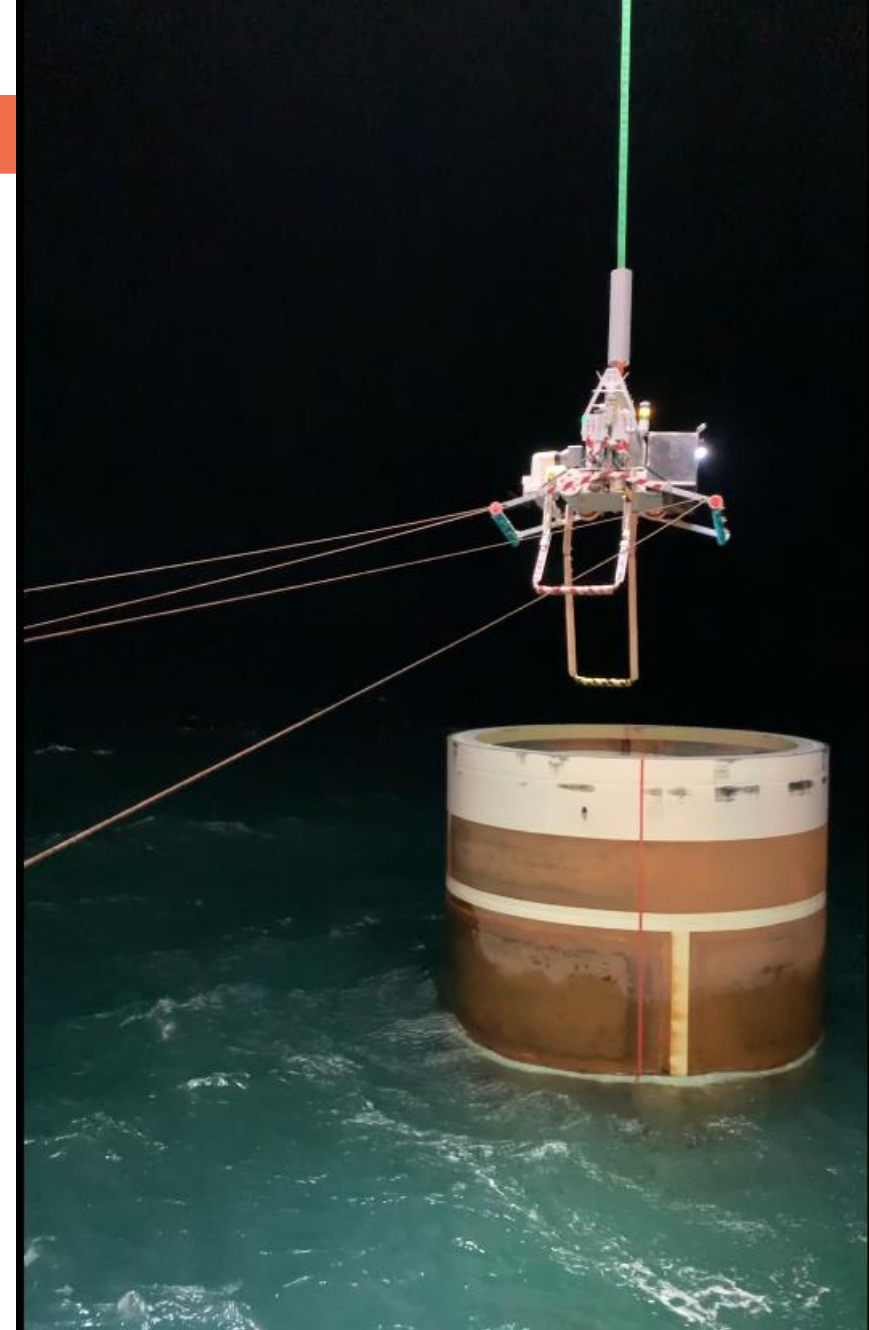
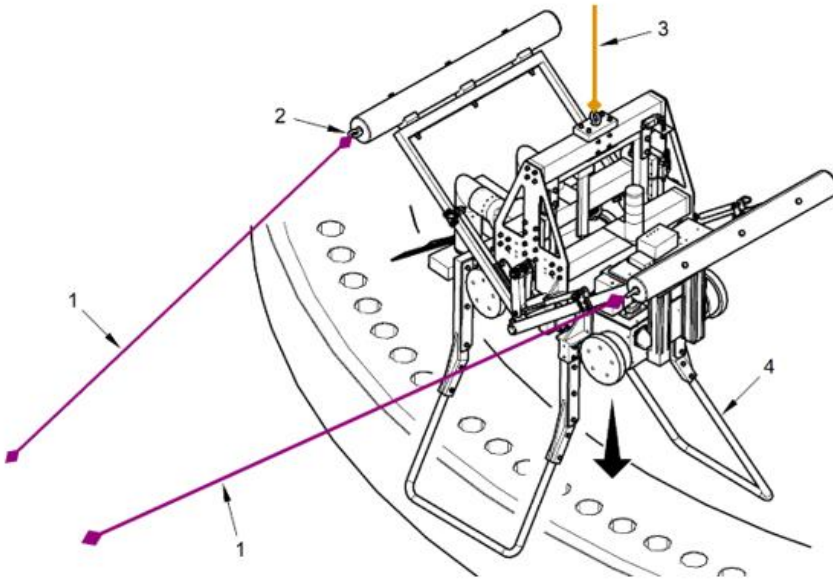
Off-Shore Flange Dimensional Inspection Solution



- ➔ Rover **PROMETEO** enables an Off-Shore Automatic Flange Dimensional Inspection.
- ➔ The System measures the entire Flange ensuring a **Full Flange Coverage**
- ➔ Rover **PROMETEO** is fully autonomous during the measurement process. It is controlled by an operator through a Remote Controller and the Telemetry allows diagnostics and working status.

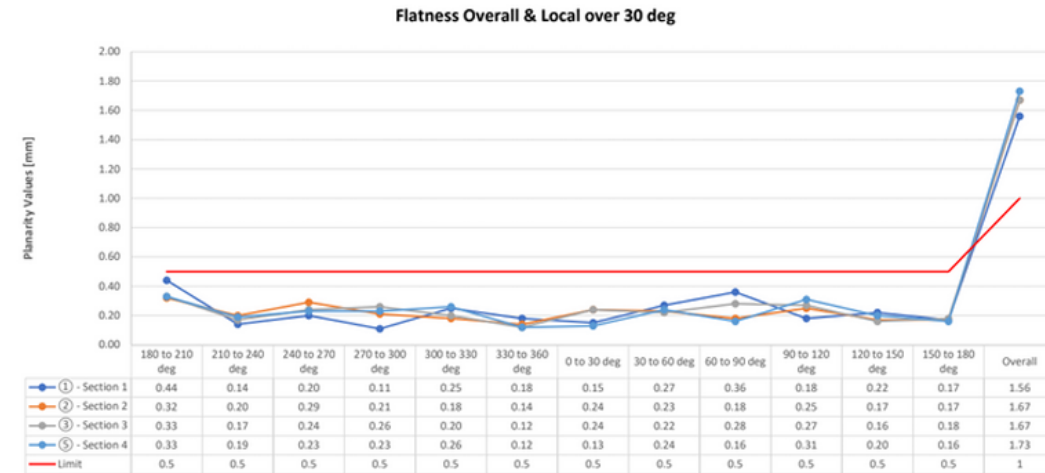
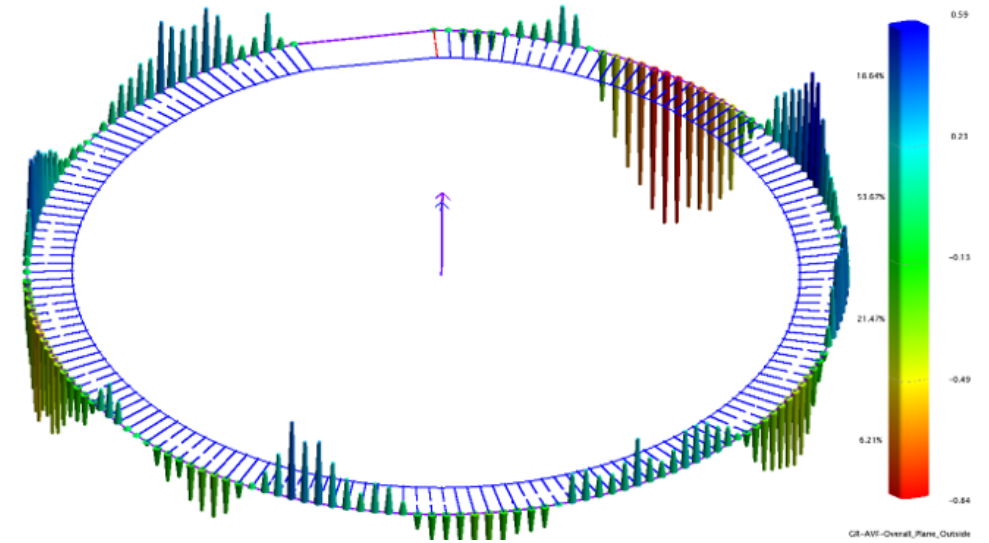


- ➔ Rover **PROMETEO** lands autonomously on the Flange.
- ➔ The System requires a simple Crane to be delivered on the Flange and two Tag Lines to drive the orientation.



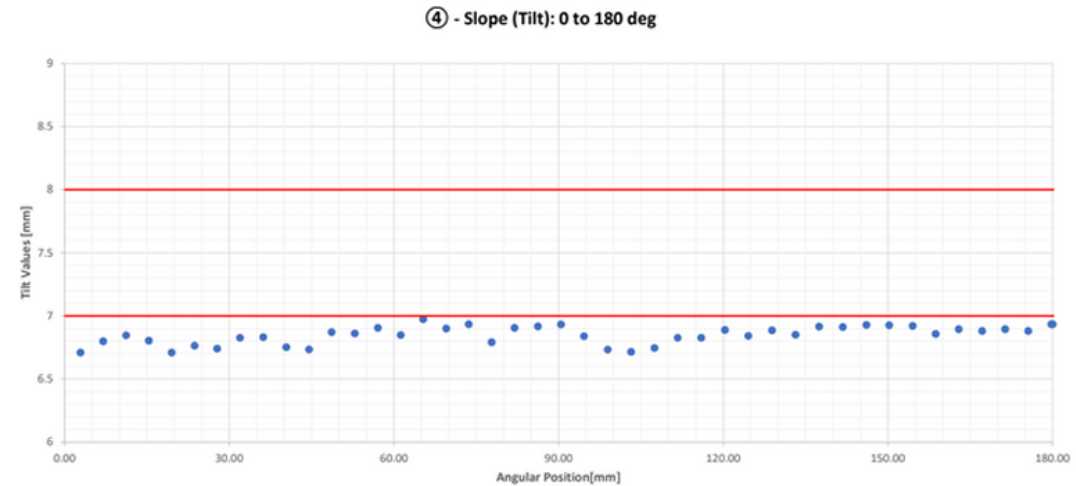
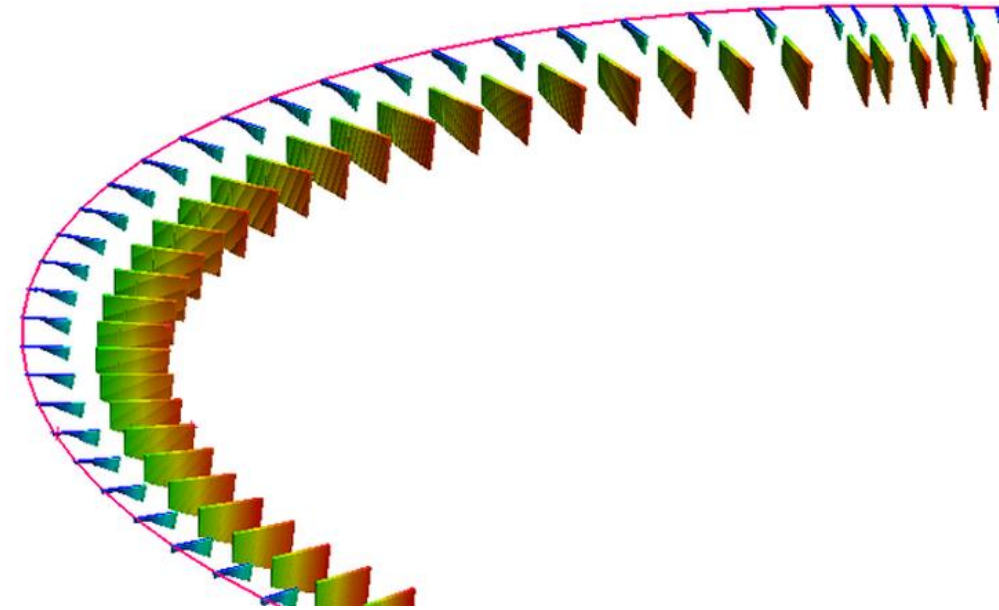
➔ Rover **PROMETEO** uses a combination of three main sensors (Inclinometers, Encoders and Laser Scanners) to measure main Features:

- ➔ Overall Flatness and Waveness
- ➔ Local Flatness and Waveness
- ➔ Tilt or Slop
- ➔ Flange Surface Quality via recording picture with Camera
- ➔ Flange Inclination compare to Gravity.



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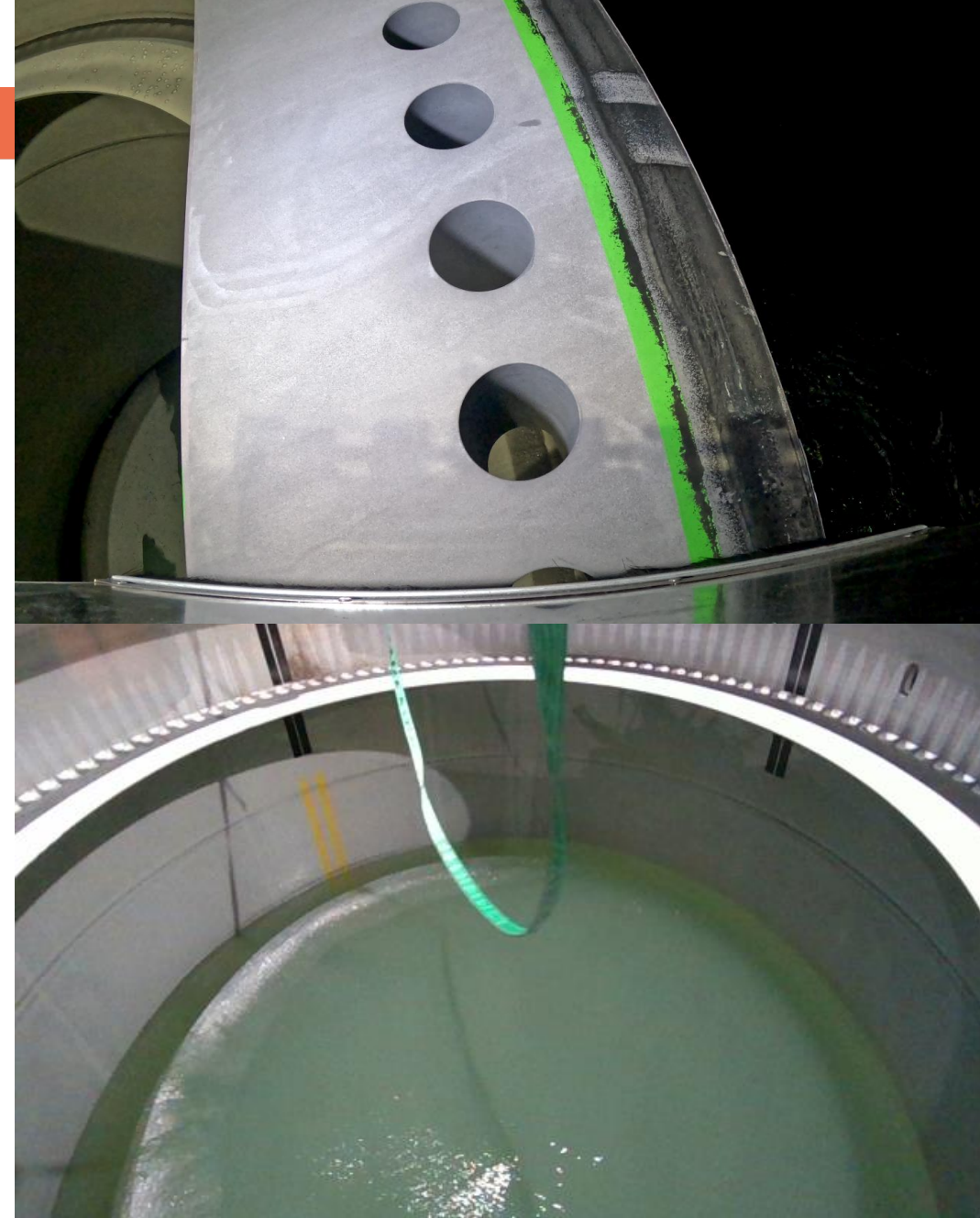
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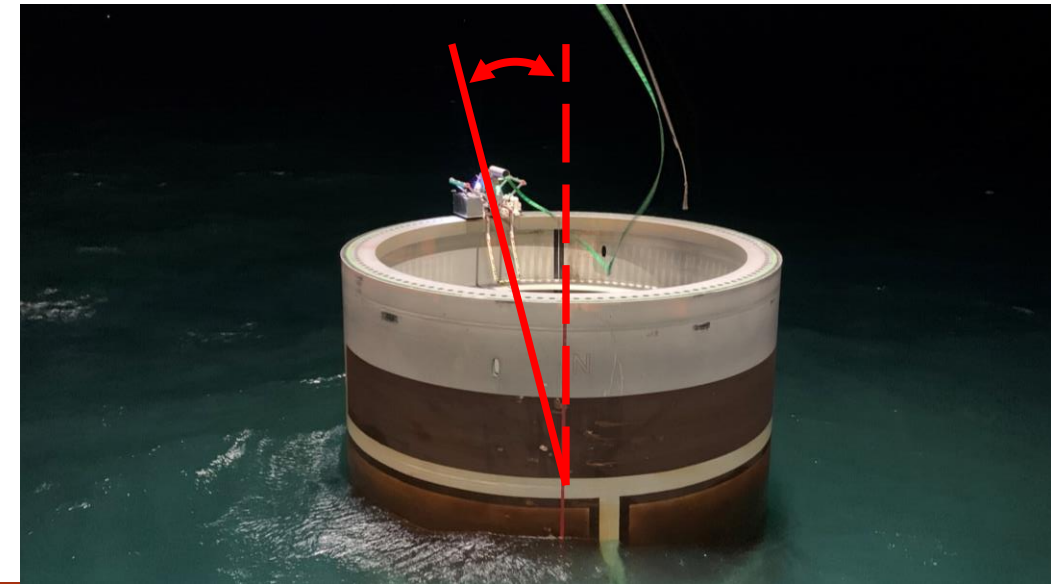
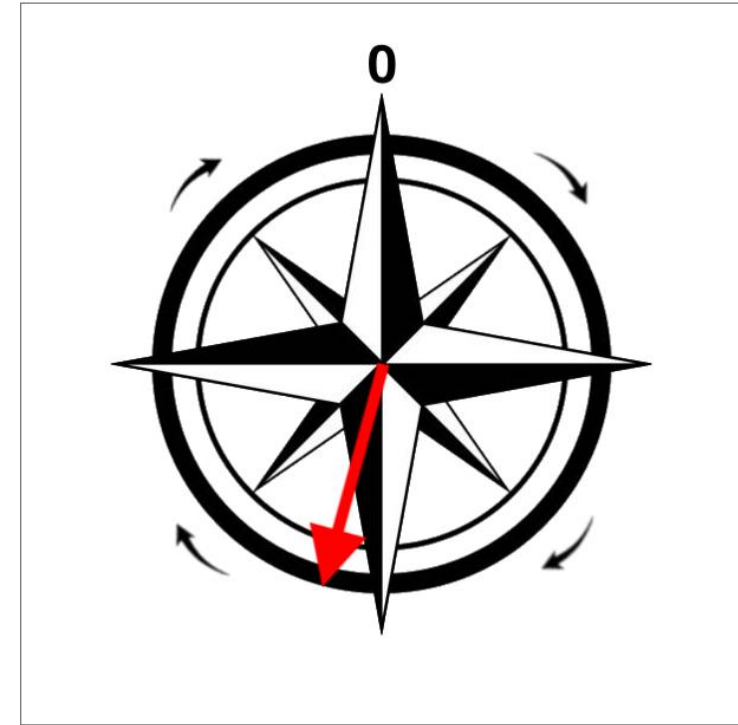
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Angle Position [°]:
195.3

Amplitude [°]:
0.09

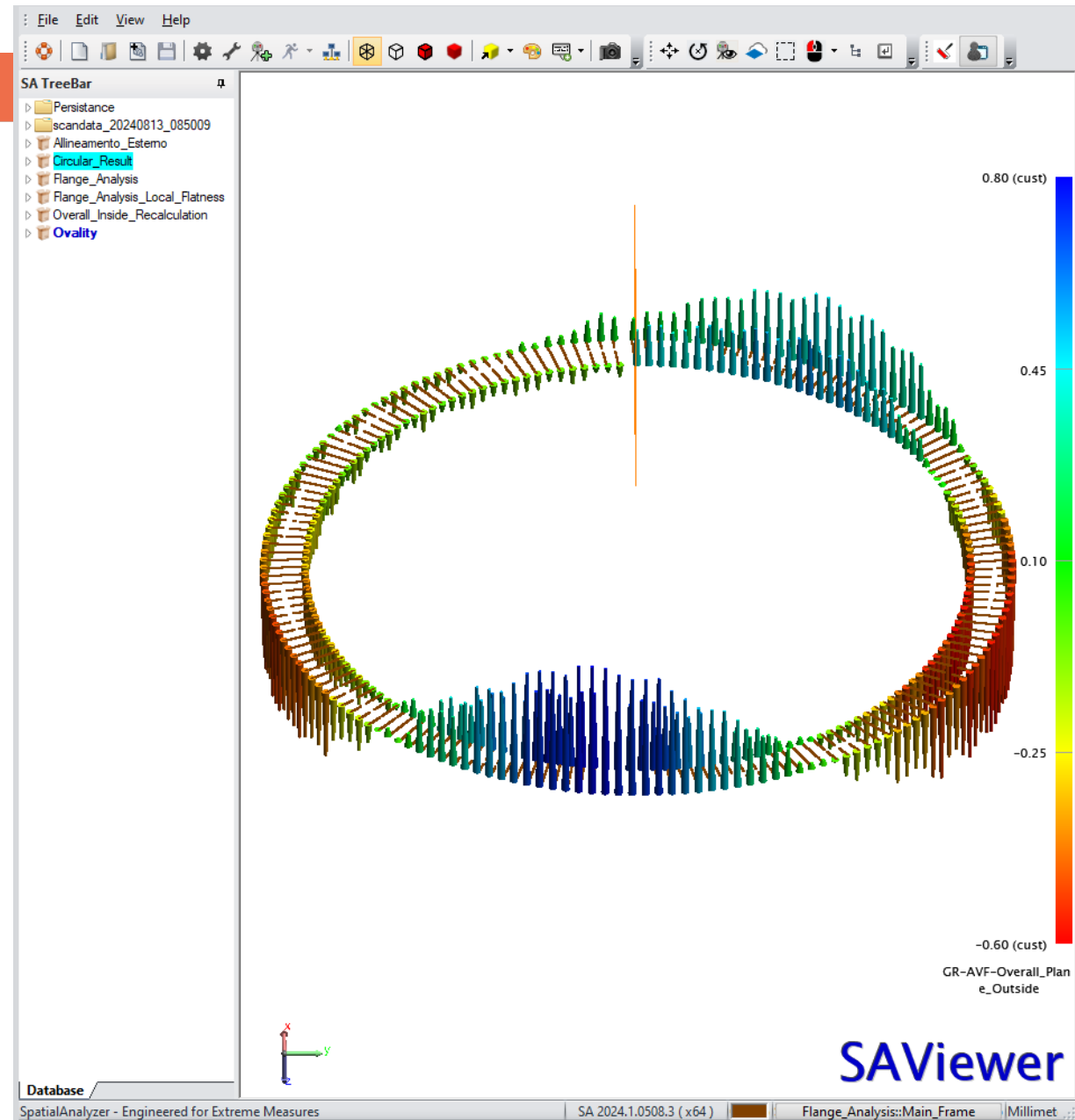




Measured Features

➔ Rover **PROMETEO** uses Spatial Analyzer Inspection Software to Analyze Measurement Data.

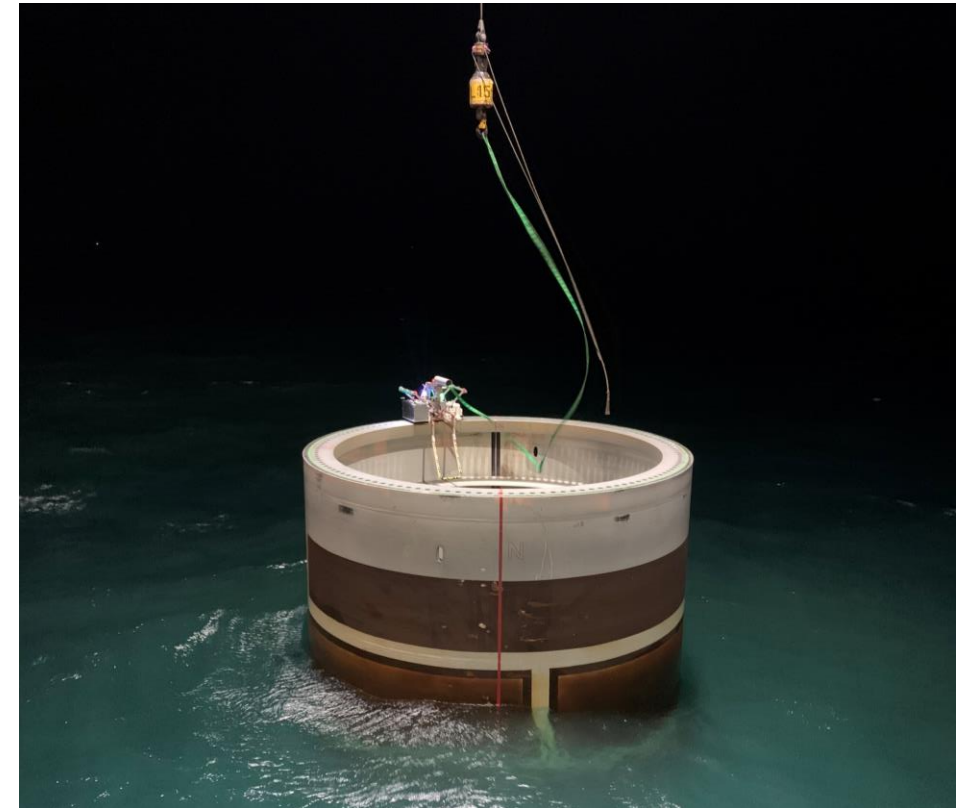
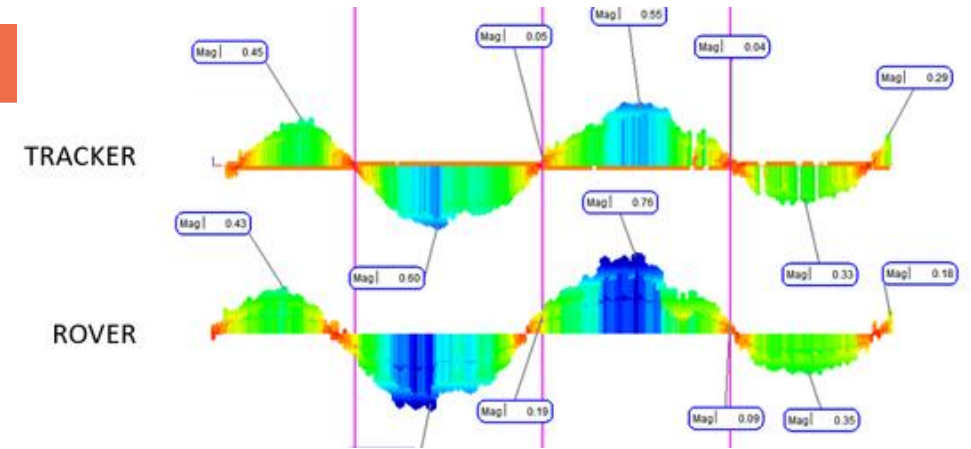
The HMI Software send the measurement to SA using the **SA Pipeline Instrument** and a combination of SDK and MP Script for Analysis and Reporting.



➔ Rover **PROMETEO** accuracy has been validated using the comparison with Laser Tracker measurement. The Accuracy Average Error is 0.1mm.

➔ Rover **PROMETEO** can be use with following Environmental Working Range:

- ➔ Wind (steady): up to 50km/h
- ➔ Temperature: -10°C to 40°C
- ➔ Protection IP52 – Dust and Water resistant.



➔ Rover **PROMETEO** has a wipe and blower to clean and dry the flange survey prior measuring.

Cleaning System is able to remove:

- ➔ Dust
- ➔ Water
- ➔ Oil
- ➔ Greasy



- ➔ To protect the rover integrity and battery quality, Rover **PROMETEO** is stored and transported in a heated box to maintain a steady temperature during the sailing.
- ➔ The box functions as a homebase for the rover when it's not measuring, and for calibration process.
- ➔ The rover is prepared for the measurement during the piling and delivered to the flange by crane.
- ➔ The delivering and landing takes approximately 5 minutes.
- ➔ To scan a flange with a diameter of 7.5m every 100mm the Rover takes 45 minutes. The whole activity of Preparation, Landing, Measure, Collect Data and Reporting, takes less than 1 hour.





Rover **PROMETEO** is completed autonomous during Measuring Process.

Operator is able to



Use Remote Control di adjust the Rover position before the Measurement Process.



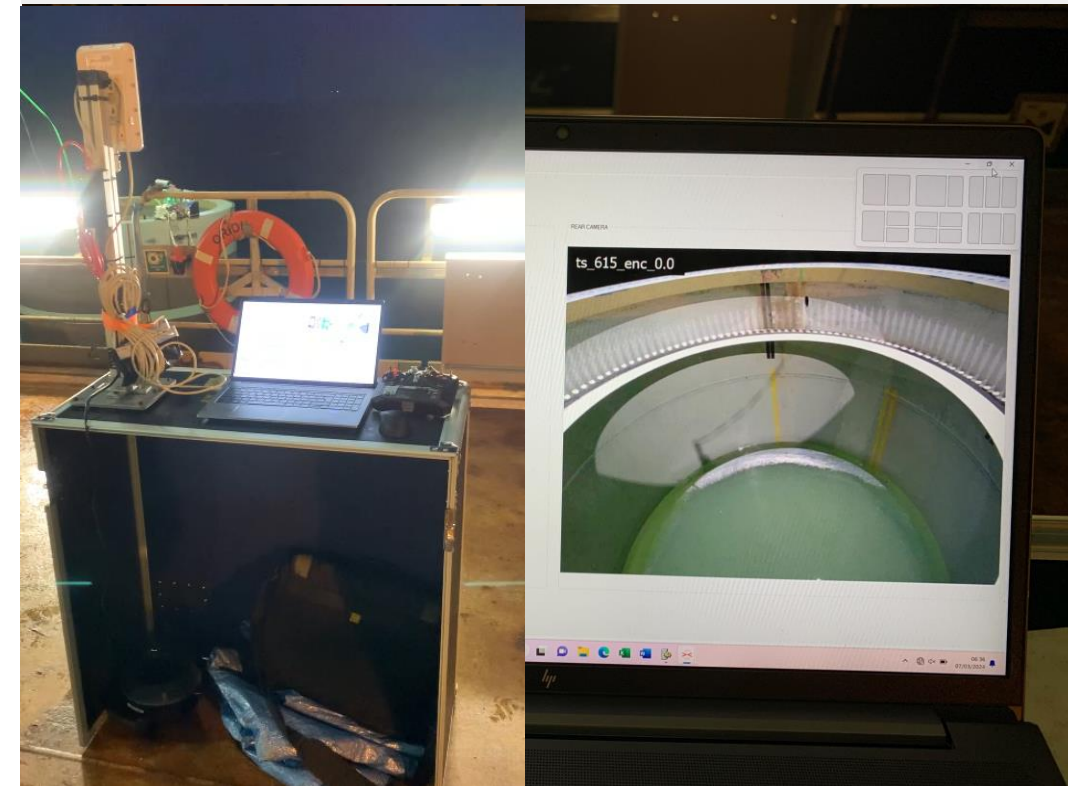
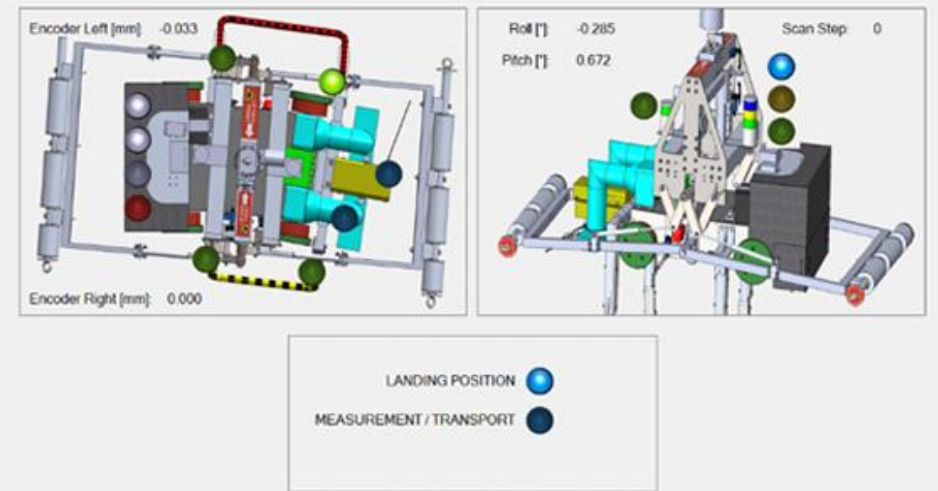
Monitor all Rover parameters via Telemetry in Real Time.

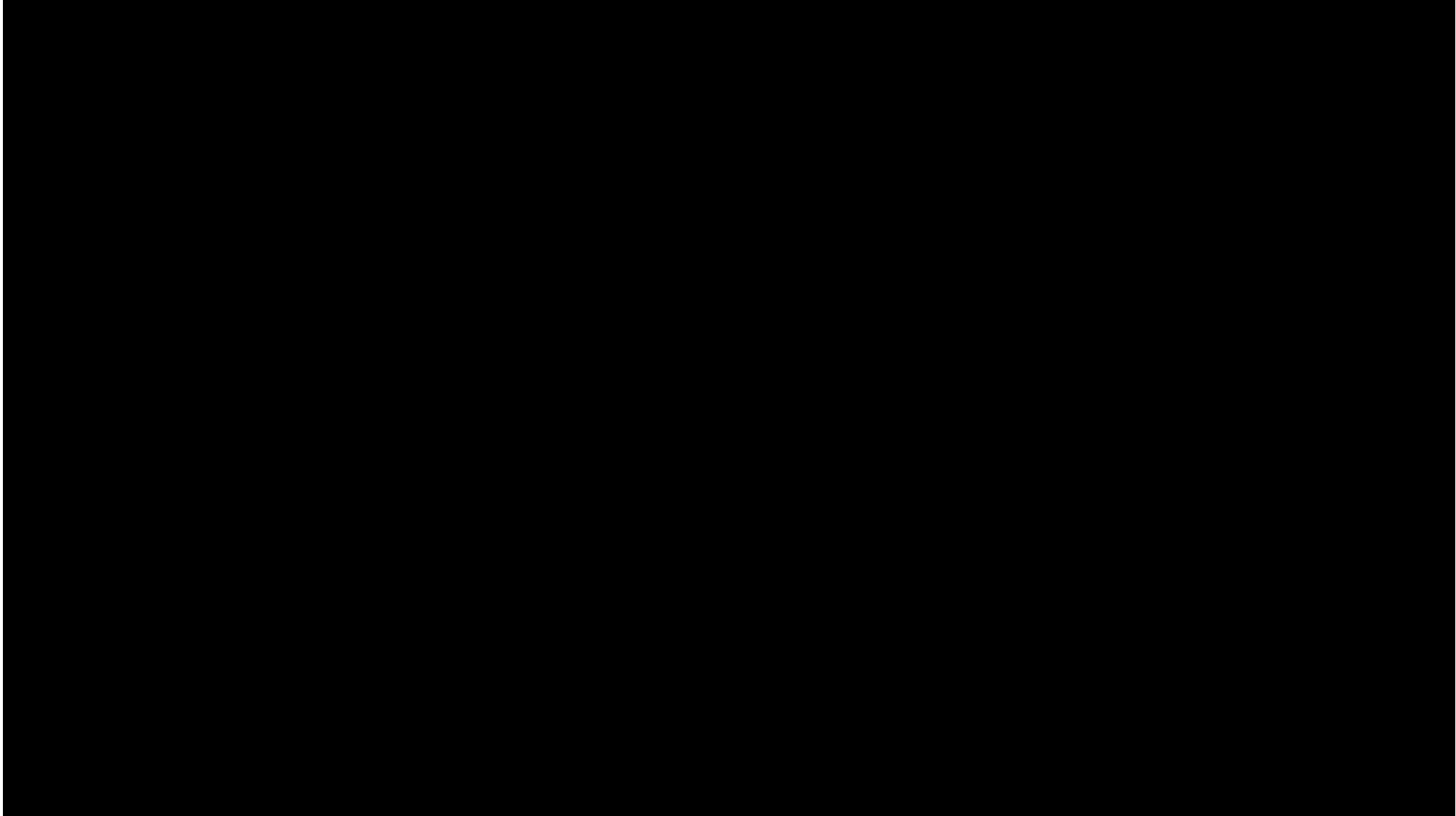


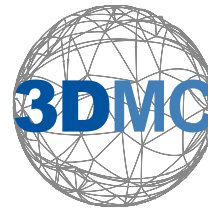
Download and Upload Rover Configuration.



Check the Raw data Quality before to pick-up Rover from Flange.







GRAZIE ... FOR YOUR ATTENTION

Rover PROMETEO

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