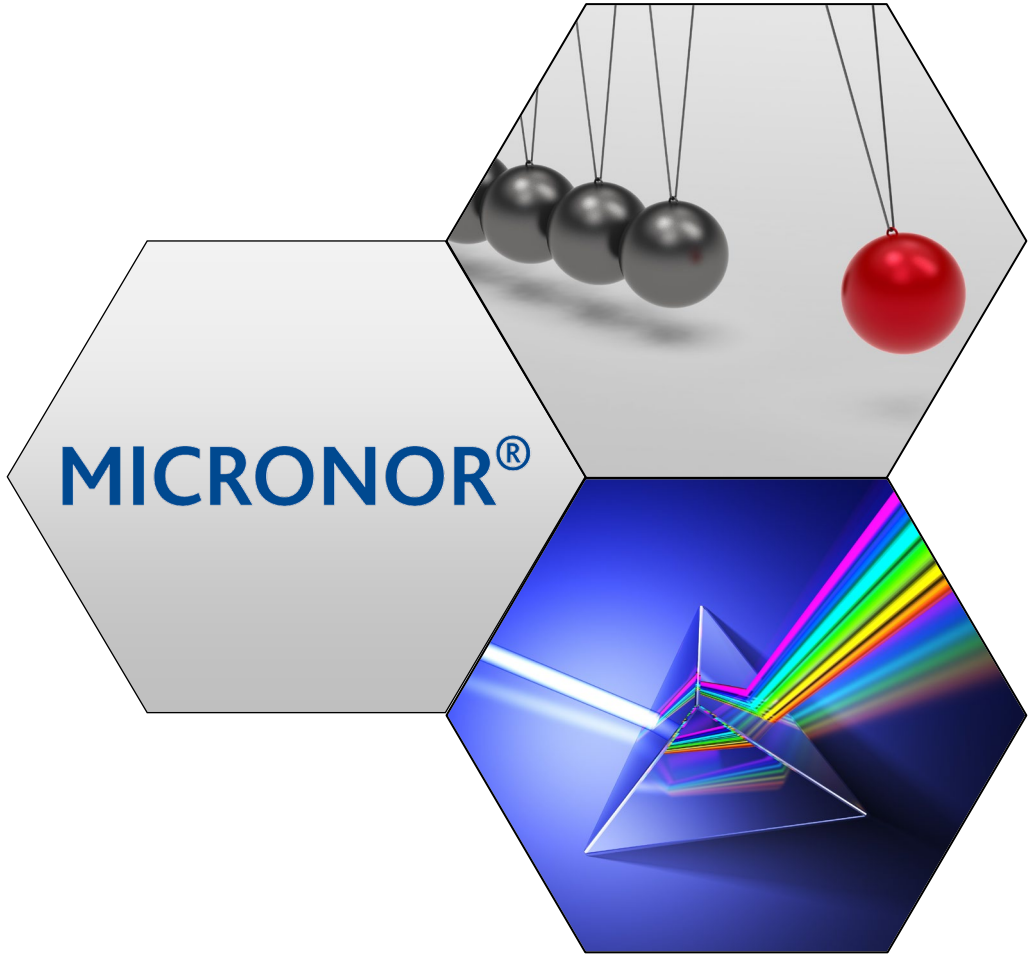
ITER Supplier Meeting

MICRONOR®



MICRONOR AG

Marius Zürcher
CTO / Project Leader ITER

Company Details

MICRONOR®

What Does Micronor AG Do?

Benefits of FO -Sensors

100% EMI-Immune
(Immune to electromagnetic interference)

Completely Explosion-Proof
(Current-free & spark-free)

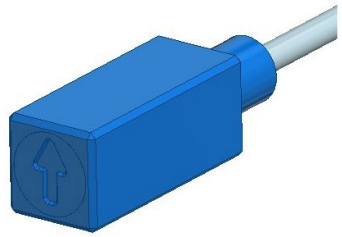
Highly Resilient
(Resistant to heat, cold & corrosion)

Long-Range Signaling
(Kilometers of transmission without loss)

Angle -and speed sensors



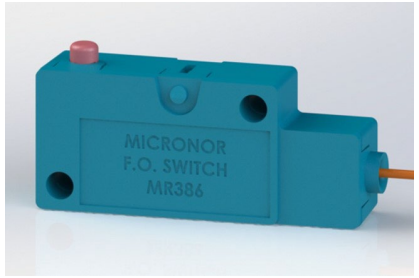
Acceleration Sensors



Linear Sensor



Microswitches



E-Stop and Signalling



FO-Cables



Project Description Overview

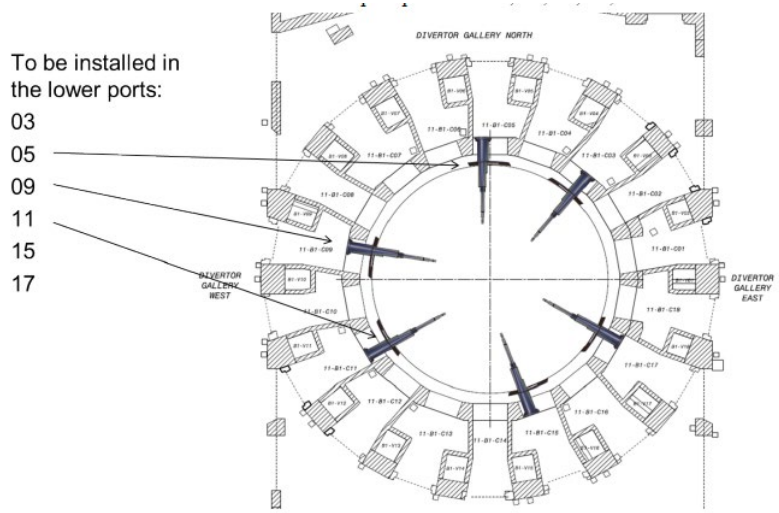
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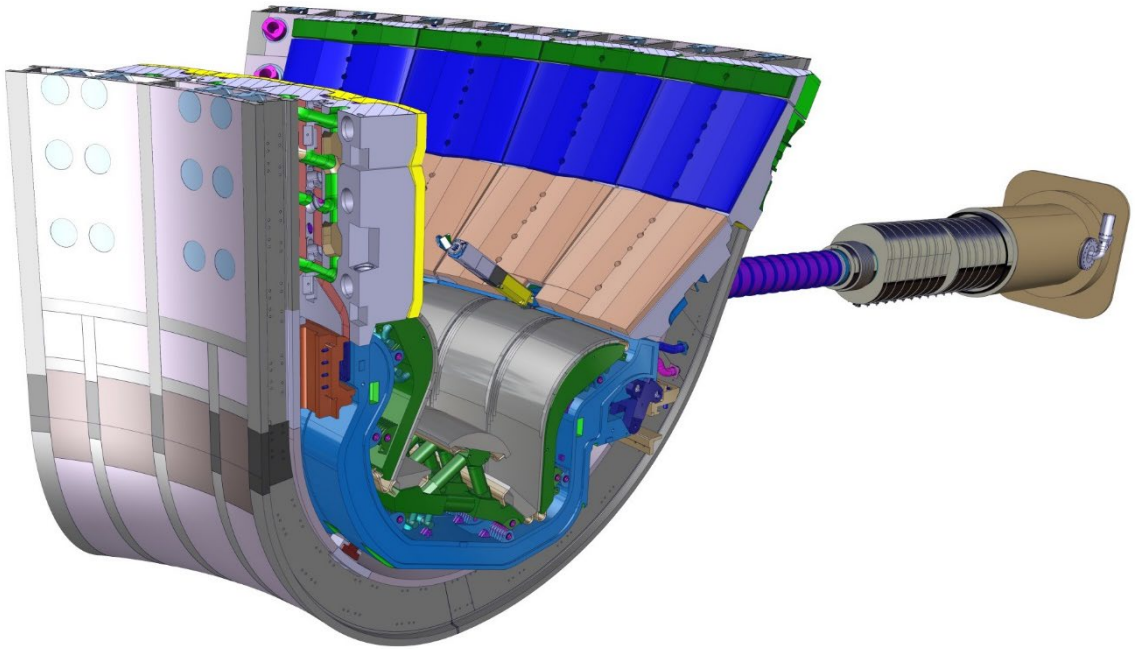
A combined **viewing** and **metrology** system allowing:

- visual inspection of the Plasma Facing Components (2D pictures)
- erosion-related measurement (3D clouds of points)

Six IVVS units, comprising of a **viewing/measurement probe** mounted on a **deployment arm**:

- stored in B1-level Port Extensions during plasma operations;
- inserted into the VV, between the divertor and blanket;
- either between plasma pulses, during short-term (STM) or long-term maintenance (LTM).



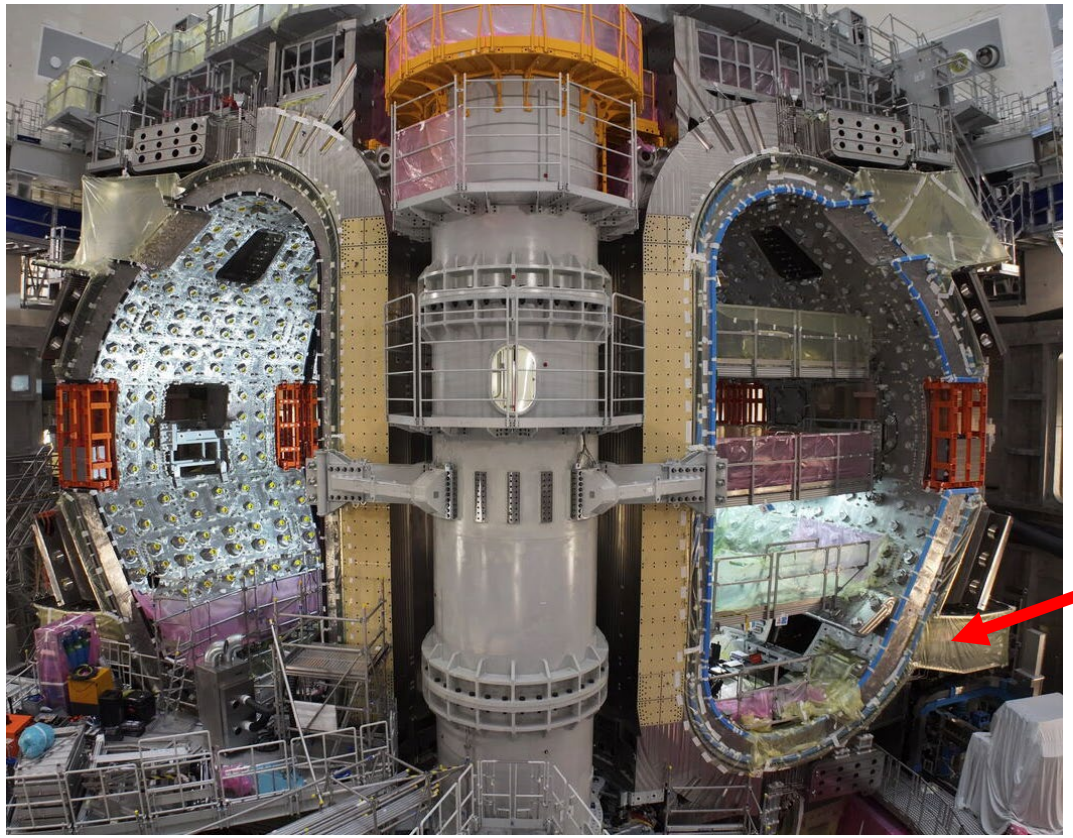


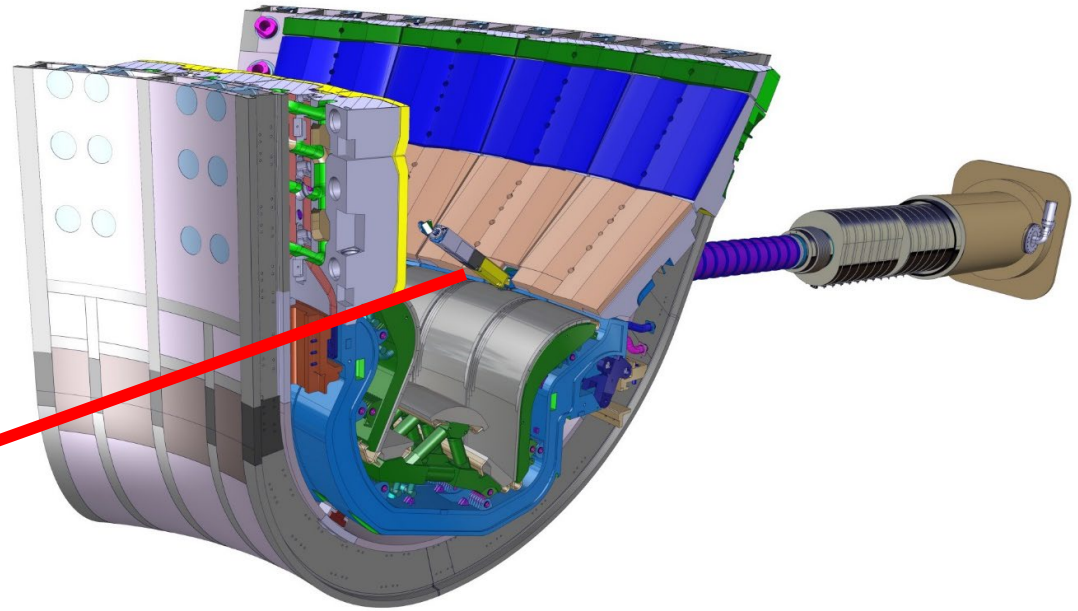
- Stringent operational requirements, viewing/metrology performance
- A unique set of environmental constraints in ITER:
  (for a multi-actuated opto-electro-mechanical device)
  - **Pressure:** high vacuum (5.10^{-4} Pa) & atmosphere (1 bar)
  - **Magnetic field:** up to 7T (10^{6} above earth mag. field)
  - **Gamma radiation:** up to ~4 kGy/h and 2.5 MGy TID
  - **Neutrons:** up to ~8.10^{+15} n.cm^{-2}
  - **Operating temperatures:** ~20°C (@ 1 bar) and ~70°C (@ HV)
  - **Bake-out temperature:** 120°C up to 500 cycles

Project Description Overview

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Where is this inspection tool placed at ITER?

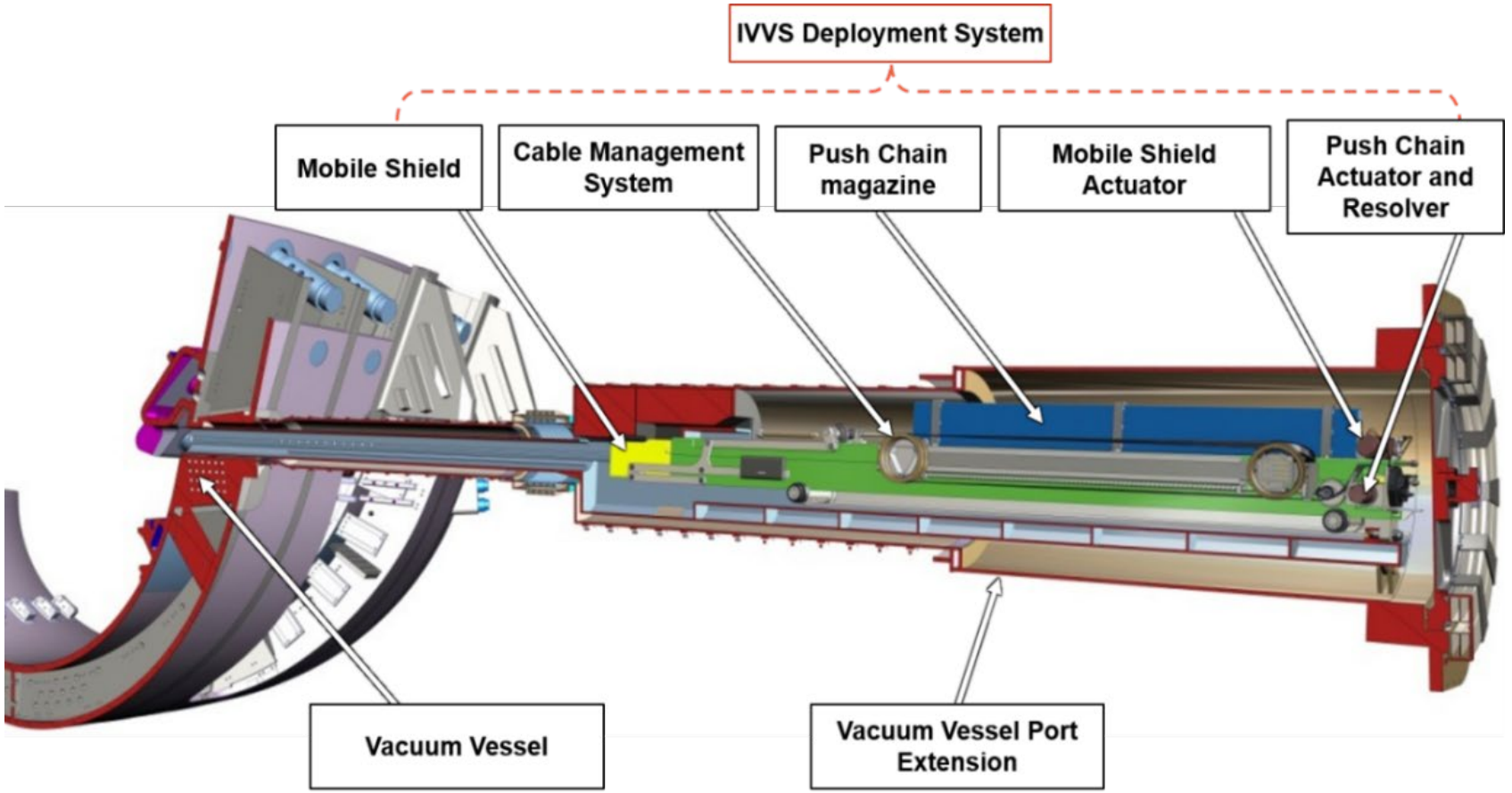




Project Description Overview

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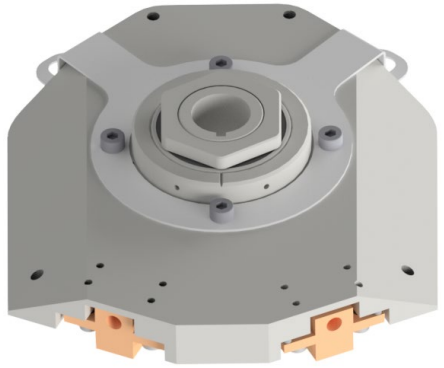
Setup of the Measuring Arm



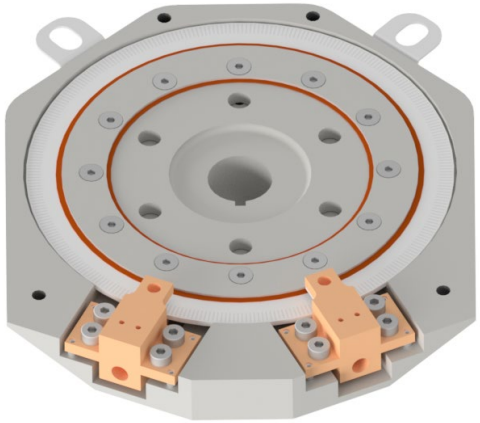
Project Description Overview

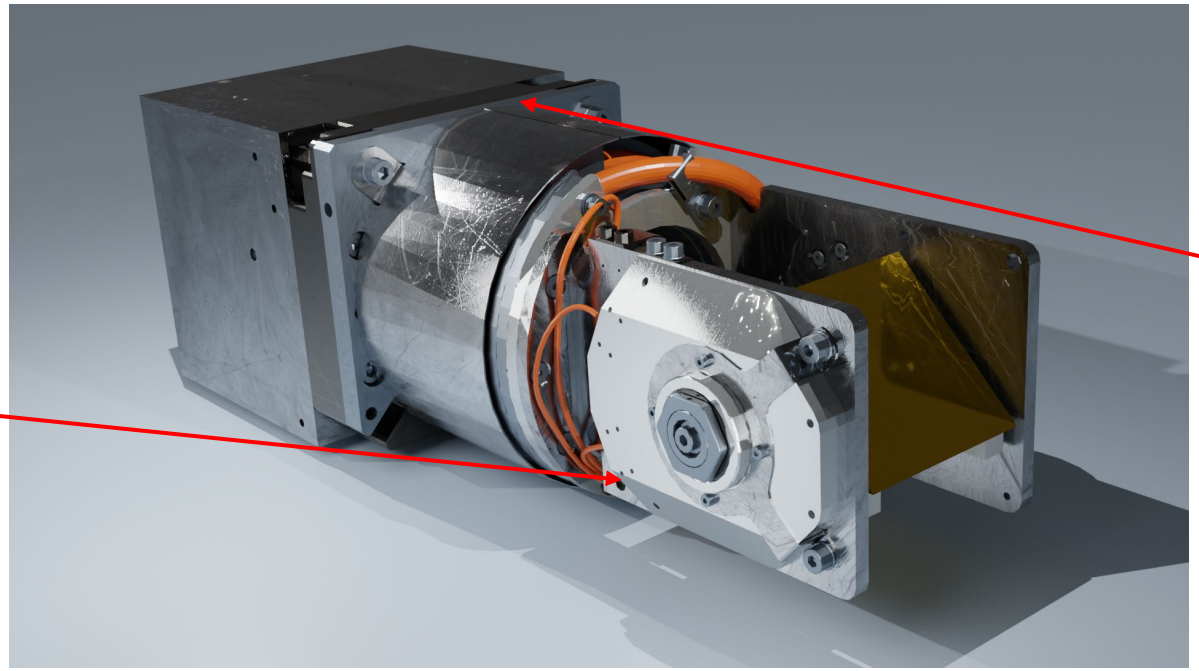
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Optical scanning head



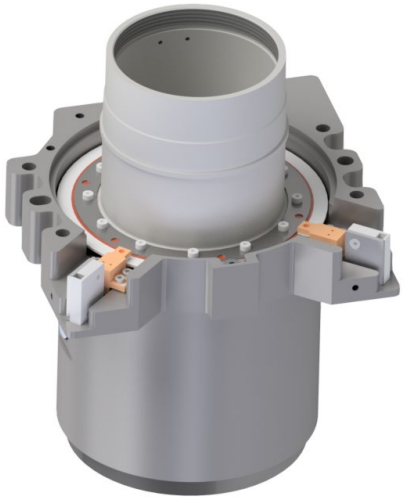
Tilt encoder







Pan encoder



Project Description Overview

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Rad-hard scanning System

Rotary position read by optical encoders

- Rad hard discs & lenses
- 300m Fiber pathway
- 3141 Increments for Pulses
- 1 Index for Reference
- 0.04 mrad resolution

All components (bearings, glues, fibres, cables, connectors) validated for 1Mgy

