FUSION FOR ENERGY

TECHNOLOGY OFFER

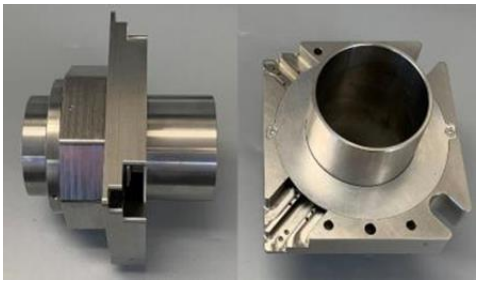
High-resolution Fiberoptic Encoder

F4E and Micronor have developed a high-resolution fiber optic incremental encoder system which can function in a high magnetic environment. The all electronically passive design enables many potential applications where electronic based position encoders cannot be used. Micronor and F4E are currently working to achieve radiation resistance encoders that meet ITER requirements.

The technology

Developed for the In-Vessel Viewing System (IVVS) of ITER, the technology is used to take extremely precise measures and have direct feedback on what's happing inside the vacuum chamber. The system operates based on CWDM (Coarse Wavelength Division Multiplexing): two wavelengths of 850nm and 1300nm are sent via an optical multimode fiber to probe the rotation of the encoder disk. This intensity modulated light is guided back by a secondary multimode fiber, then, an optical demultiplexer resolves the optical power signals and reconstructs the directional aware quadrature signal. One additional pair of fibers is used to sense the absolute index on the encoder disk.

Flat Form Factor Design



Large Hollow Shaft Design

Long-range extremely precise fiber optic position measurements

This fiber optic technology is offering unprecedent high resolution of 157,050ppr (Pulses Per Revolution) and angular resolution down to 0.01mrad. The current system can be deployed several hundred meters away from the control electronics without loss of accuracy or signal quality.

A technology adapted to particularly demanding environments

The system measures the position solely based on light and thus is impervious to any EMI/RF, radiation high voltage or magnetic fields. It is also able to work at very high or very low (cryogenic) temperature. These characteristics would offer the possibility to apply the technology in domains where electronics-based encoders are too weak to function.

Collaboration opportunities

This technology package is available for further adaptation and fine tuning to meet specific requirements. The extensive knowledge about encoders could be also offered to find the best possible solutions.

Fusion for Energy
Email:
technologytransfer@f4e.europa.eu