



Case study

SMART device design substantiation

THE CHALLENGE

Frazer-Nash was commissioned by Sellafield Sites Limited to undertake the design substantiation of a SMART instrument for use in nuclear safety applications. The SMART instrument is an intelligent measuring device employing programmed electronic components to enhance the performance compared to conventional devices.

Sellafield and its C&I Nuclear Industry Forum (CINIF) partner companies wished to substantiate the required Safety Integrity Level of an Endress+Hauser SMART Coriolis Mass Flowmeter. It is intended that the instrument will be used in a safety application, in accordance with IEC 61508: 2010, in single channel mode. The Endress+Hauser SMART Coriolis Mass Flowmeter is a device that precisely measures the mass flow rate of a fluid.

OUR SOLUTION

First, we sought evidence of Production Excellence (PE) of the equipment to confirm that the instrument (supported by the manufacturer) had been specified, designed, built and tested to a standard suitable for use in safety applications. PE also determines the level of conformance of the manufacturer's production and support processes in accordance with IEC 61508.

Frazer-Nash then reviewed the "Independent Confidence Building Measures" (ICBM) of the equipment. This would reveal any additional activities and analysis that had been undertaken that give further confidence in the integrity of the instrument. ICBMs are typically activities, such as verification, undertaken by organisations independent of the manufacturer.

Endress+Hauser completed an EMPHASIS questionnaire to demonstrate the instrument was designed and developed in accordance with the requirements of IEC 61508. We then assessed the responses to the questionnaire and undertook an audit of the evidence at Endress+Hauser's premises in Reinach, Switzerland to support the PE leg and a number of ICBMs. The assessment and its findings were captured in an Engineering Assessment Report.

BENEFIT

Our assessment substantiated that the SMART Coriolis Mass Flowmeter met the required Safety Integrity Level. This supported the safety claim of the instrument for the plant Safety Case and enabled approval of the instrument for use in the safety system.

To achieve a successful assessment, Frazer-Nash provided a dedicated EC&I team that had direct relevant experience and knowledge of:

- ▶ Working with the Office for Nuclear Regulation
- ▶ ONR Safety Assessment Principles
- ▶ Relevant International Safety Standards
- ▶ SMART devices, including design substantiation processes
- ▶ Working knowledge of nuclear industry engineering procedures and requirements
- ▶ Providing high quality safety and assurance related solutions to the UK's nuclear site licensees
- ▶ Use of EMPHASIS assessment tool and Programmable Electronic Systems assessments.

Client

Sellafield Sites Ltd

Business need

Audit of SMART device design, and independent verification of its feasibility in the use of nuclear safety related applications.

Why Frazer-Nash?

Our expertise in the nuclear sector has grown for many years allowing us to become one of the most renowned consultancies in the UK nuclear sector.

For more information please email customercontact@fnc.co.uk

www.fnc.co.uk

Offices throughout the UK and Australia

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