easl
A DIVISION OF KINECTRICS

About us

EASL is an advanced engineering consultancy specialising in providing cost-effective solutions to structural integrity problems. Experts in design, analysis and assessment, our methodology and innovative approaches take the stress out of structural integrity, and we specialise in delivering solutions for structural integrity-related Generic Design Assessment (GDA) tasks in the UK.

Office for Nuclear Regulation	HPC	HORIZON NUCLEAR POWER
UKEPR AP1000	Continuous since 2012	ABWR

EASL is currently a member of the R6 panel and has remained an EDF Energy Structural Analysis Group partner for over 20 years. We are also actively contributing to the UK's biggest civil nuclear new build project, the Hinkley Point C (HPC) project.

Our experience in GDA dates back to 2012 when we were involved in the assessment of the EDF and AREVA UK EPR™ and the Westinghouse AP1000® designs, in 2012 and 2017 respectively. In 2018/19 we helped to resolve the assessment findings from the Hitachi-GE UK ABWR GDA process which was suspended in 2019. EASL has also contributed to the structural integrity assessments of primary components for all reactor designs that have achieved the UK Design Acceptance Certificate in the last 10 years.

Our vision is to work collaboratively on SMR projects, focusing on structural integrity classification and defect tolerance aspects. By amalgamating with Kinectrics Inc., we can leverage their experience with design engineering of nuclear and BOP systems, safety analysis, licensing strategies and code compliance expertise, we are now able to offer a more comprehensive set of services, including full lifecycle support.

Step	Description	Indicative ONR Assessment Timescales
1	Initiation	12 months
2	Fundamental	12 months
3	Detailed	24 months

Fig. 1 Indicative ONR's assessment timescales.
(Source: ONR - New Nuclear Power Plants: Generic Design Assessment Technical Guidance)

The GDA Process Timescales

STEP 1 INITIATION

This comprises the GDA initiation and scope. In this context, the GDA scope refers to the boundaries of the assessment. This will need to include factors such as what systems, structures or components or technical assessment topics are considered. Estimated duration 12 months.

STEP 2 FUNDAMENTAL ASSESSMENT

The focus of the assessment in this Step is towards the fundamental adequacy of the design and safety and security cases, and the suitability of the methodologies, approaches, codes, standards and philosophies which form the building blocks for the design and generic safety and security cases. Our past experience shows that the choice of codes, standards and philosophies is a crucial success factor for subsequent demonstration of structural integrity. Estimated duration 12 months.

STEP 3 DETAILED ASSESSMENT

The focus of the assessment is an in-depth assessment of the design and safety and security cases. This will involve a fully detailed examination of the available evidence, on a sampling basis, provided in the safety and security submissions. This is expected to be undertaken at a level of assessment akin to the TAGs and will fully consider whether the proposed design reduces risks to ALARP and meets the requirements of the NISR. Estimated duration 24 months.

Our proposed services for SMR

The technical services offered by EASL span the whole asset lifecycle. Our solutions include GDA Support, Safety Case Production, Regulatory Compliance, Design Substantiation and Hazard Analysis.

STEP 1

Limited opportunity for collaboration.

STEP 2

Our proposed contribution towards this phase (GDA) is represented in the table below:

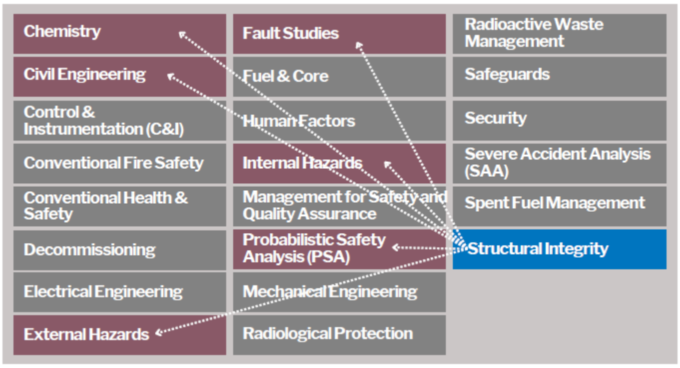

Fig. 2 Typical Technical Assessment topics (source: ONR - New Nuclear Power Plants: Generic Design Assessment Technical Guidance). Cross-cutting topics appear in purple.

The areas of expertise and capabilities that EASL can cover for this step are highlighted in blue and purple. Kinectrics' contribution covers all of the additional areas.

Most of our previous experience has been work related to this step. However, in our experience, being involved in the fundamental assessment phase ensures that any required changes to the methodology that may generate comments on step 3 can be addressed and sorted in advance, saving time and resources. These would likely result in assessment findings which would be carried through to the licensing phase and could prove quite costly. Our experience from the licensing phase of EPR can help to illustrate this and the benefits that early involvement could have.

STEP 3

By leveraging our team of experts in this step of the GDA we are certain that we can deliver added value by applying some of the lessons learnt in previous projects.

Our specialist knowledge during the design phase for a nuclear power plant range across:

- Design Substantiation
- Degradation Review
- Hazards
- Regulatory Compliance
- Expert Review

Detailed description of our work for nuclear reactor design

EASL carried out specific tasks for the project:

Preliminary review of Structural Integrity Classification

- Review of Structural Integrity Classification method and interaction between Safety Class, Code Class, Seismic Class and SIC
- Review the approach to the selection of candidate HICs.
- Review selection of candidate HICs
- Independent review of the application of the SIC method to selected components
- Use of R3 assessment procedure for internal and external hazards

A detailed review of Structural Integrity Classification

1 - Review SIC methodology & determine the scope of candidate HICs

2 - Guide and develop the SIC for one typical candidate component (MCL)

3 - Guide & develop SIC for some typical component parts (nozzles & manway of PZR)

4 - Formal written review of SIC report for one candidate HIC

5 - Technical support to assist in responding to significant ONR feedback (RO/RQ/RI) on SIC reports.

Review of fracture toughness testing strategy covering implications from proposed pre-service and in-service inspections, and manufacturing methods

Defect tolerance assessment (DTA) of reactor pressure vessel (RPV) using R6 assessment procedure

- Assessment of RPV inlet nozzle crotch corner (parent material location but fatigue crack initiation conceded)
- Comprised stress analysis of pressure, self-weight, nozzle loads (including seismic & LOCA) and transient thermal stresses
- Calculation of end-of-life limiting defect sizes (for 28 fault cases)
- Calculation of lifetime fatigue crack growth (for 66 plant operating events)

DTA of nuclear island components

- DTA of reactor coolant pump (RCP) flywheel
- DTA of RCP inlet nozzle
- DTA of steam generator tubesheet to head weld (primary side)

DTA of secondary side components

- DTA of steam generator tubesheet to body weld (secondary side)
- DTA of main steam isolation valve body (parent material locationsbut fatigue crack initiation conceded)