Design Substantiation

EASL provide a wide array of engineering integrity analysis solutions for a number of different industries. With our highly trained, specialist team of engineers and scientists, we offer a solution focussed service to clients, taking into account all the potential risks and issues within the client's environment.

Within design substantiation, we provide an overall assessment of a range of designs to ensure not only code compliance, but that our client has a clear understanding of and can mitigate against potential safety challenges arising through life.

Whether it's demonstrating compliance to ASME III, ASME VIII, RCC-M, PD5500, BS EN 13480 or many other design codes, EASL can offer reliable and independent consultancy based upon decades of experience.

Our solutions can provide clarity to clients, offering cost effective responses to design work relating to anything from pressure vessels, piping and structures within the civil nuclear, power generation, defence, chemical, oil and gas industries.

What is Design Substantiation?

Design substantiation or design qualification is a service that involves a comprehensive review and assessment of a structure, system or component (SSCs) for design code compliance, structural integrity and fitness for purpose (or fitness for service) against the safety requirements for the applied loading conditions, for normal operation, faults and hazards.

The design substantiation reports provide support to various safety cases made during the life of a SSC from construction, fabrication, testing and commissioning to operation through periodic safety reviews, plant life extension, decommissioning and disposal or recycling.

Common codes for design and fabrication that EASL have worked with include:

- PD 5500, BS EN 13445
- ASME Sections II, III and VIII for pressure retaining parts and vessels
- BS EN 13480,
- ANSI B31 for pipework,
- BS 5950, BS 8110
- Eurocodes 1991 to 1994 for structural steel and concrete

EASL's design substantiation can deliver cost effective and comprehensive assessment to allow clients a clear view of potential risks concerned with designs. By having this expert insight, clients can be assured that the very best design for their needs is produced.

EASL Design Substantiation Services

The scope of the design substantiation varies depending upon the safety significance. When approaching design substantiation, EASL will take into account all the potential environmental and structural inputs on the design object. This ensures that not only will the client receive a realistic assessment, but also an appreciation of the potential risks over the lifetime, allowing for safety case development to reduce the threat of shutdowns and other potentially expensive failures.

A SSC or weld may be classified as High Integrity (HI), Incredibility of Failure (IoF) or Incredibility of Guillotine Failure (IGoF) where the consequences failure would be very severe. In these cases, a fitness for purpose (or fitness for service) assessment demonstrates safe lifetime operation against all potential failure modes including collapse, fracture, fatigue or creep.

The assessments consider consequences of actual or postulated cracks, defects, flaws and excessive corrosion against the requirements of:

- R5 (creep)
- R6 (defects)
- BS 7910
- API 579
- ASME B31G

A fitness for purpose assessment uses validated engineering principles to assess the structural integrity and determine the remaining safe life of a structure, system, component or weld containing cracks, defects, flaws and excessive corrosion.

Shutdowns, unplanned or otherwise, are expensive in terms with loss of production and costs incurred during the shutdown to solve a particular issue or any emergent issues.

Design substantiations aim to ensure the safe reliable operation of a SSC or weld throughout its operating life. They can assist system engineers to improve reliability and availability by identifying potential problems and take mitigating steps to monitor, repair or replace to ensure continued safe operation. Design substantiations are applicable to a wide range of industries, including power, oil, gas and chemical.

Design substantiations

- Support construction, fabrication, testing and commissioning, operation, periodic safety reviews, plant life extension and decommissioning
- Give increased reliability and availability
- Improve maintenance and inspection programmes
- Improve safety
- Determine safe lives

Our process involves appropriate use of walkdowns, a review of the operating history and maintenance activities, classical strength of materials hand calculations, conventional code compliance and inverse code assessments through to complex non-linear finite element analysis to demonstrate full structural integrity and fitness for purpose.

We can provide you with a reliable, trustworthy consultancy on a wide array of design substantiation aspects, offering you a clear insight into the most efficient, safe and cost effective solutions to your problems. EASL have an extensive experience in the production of design substantiation reports. Our staff are highly experienced in the production of structural integrity and fitness for purpose safety case arguments in all areas, assessing design code compliance, fracture mechanics, fatigue damage and creep rupture.

To find out more about our related solutions and services or previous work, take a look at our case studies and articles below, or if you'd like to discuss something in particular, don't hesitate to get in touch through our contact section.

Related Services

- Design Code Assessment
- Finite Element Analysis (FEA)
- Computational Fluid Dynamics (CFD)