Asset integrity management

Increasing the safe operational life and productivity of assets and substantiating the integrity of tomorrow's technologies.

FRAZER-NASH CONSULTANCY
A KBR COMPANY

With decades of experience working across major industrial sectors for world-class organisations, we recognise that no two situations are the same. Using our comprehensive expertise in testing, trials, inspections, design codes and standards, advanced numerical methods and digital technologies, we tailor the right solution for you.

We provide you with deeper insights and understanding of the physical behaviour of materials, components and systems, increasing the safe operational life and productivity of your assets, and to substantiate the integrity of tomorrow's technologies.

Design substantiation

Our design substantiation services provide the assurance and evidence that enable you to be confident in the technical solution you are looking to deliver. From conception, through operation, to decommissioning, our structured systems engineering approach, coupled with deep understanding of asset integrity can provide this.

We work to understand the requirements of your challenge, developing structured solutions that are rigorously substantiated, based on our understanding of:

- Design codes and standards
- Engineering science
- Structural integrity safety cases and
- Materials selection and assurance.

We work at the interfaces of multiple disciplines, offering specialist solutions in test rigs, mechanical handling, machinery interface, seismic substantiation, and infrastructure engineering.

We can also provide independent assessment of your design, giving confidence to original equipment manufacturers (OEMs) that they can progress their designs, and to financiers that designs are feasible for investment.

Through life integrity and life extension

Our scalable service keeps systems running safety, reliably and economically, up to and beyond their design life.

Throughout the life of plant, equipment degrades, processes change, operational demands evolve and the unexpected can happen. Each different situation requires a tailored approach, to enable the life of an asset to be managed safely. We provide a scalable service, ranging from component parts to large complex, integrated facilities, to keep systems running safety, reliably and economically, up to and beyond their design life.

Here are just some of the services we provide to support your through-life integrity and the life extension of your assets:

- **Remnant life prediction and life extension justification:** We predict the future of your assets, by capturing the knowledge of their past, and understanding their specific behaviour and degradation within their unique operating environments. We enable you to make informed and intelligent asset management decisions, by exploiting advanced lifing methods, probabilistics, and techno-economic studies.
- **Return to service:** Our end-to-end service supports you, through inspecting, prioritising and substantiating the activities needed to return high value plant to operational service, following planned or unplanned outages.

- **Operational and capital investment decision support:** We perform engineering and feasibility studies that identify the balance between cost and risk, underpinning your robust investment decisions.
- **Operation and maintenance (O&M) scenario planning:** By delving deep into the history of how your assets operate, we help you to capitalise on the margins between design assumptions and actual operations – we often reveal opportunities for life extension, improvements to maintenance and inspection plans, or additional performance and value that could be produced by your assets.

Failure and defect investigation

We gather evidence to understand the causes of plant or equipment failure, and implement actions to put things right. Your plant or equipment can start to behave in unexpected ways, show premature or excessive signs of degradation or, in some cases, fail. We gather evidence to work out what is going on, and why, and plan and implement actions to put things right.

Whether it's commissioning and accepting new equipment, using existing plant in a new regime, or simply equipment ageing, systems can do the unexpected for many different reasons. Finding the root cause and delivering a lasting solution requires a breadth of skills and a robust and systematic approach, as no two situations are ever the same.

We take a four-stage approach to resolving your plant and equipment issues:

- **Characterising the situation:** We gain understanding of your systems' operational history, extracting data from your records, and drawing upon your users' experience through tools including stakeholder workshops.
- **Understanding the cause:** Employing techniques such as condition monitoring, measurement trials and engineering analysis, we identify the fundamental mechanisms that are causing your problems.
- **Developing the solution:** Using the same methods applied to understand the cause of your issue, we explore solutions to eliminate it, such as: process conditions, system redesign, component replacement/upgrade, and modified monitoring and maintenance.
- Demonstrating the outcome: We deliver confidence in our proposed solution through demonstrating your issue's remediation, prior to implementing any changes, using our analysis techniques; and then confirming its effectiveness in operation with our trials and measurements systems.

Materials science

Our materials expertise optimise your operational assets to perform their function safely, reliably, sustainably, and cost-effectively.

You want your products, systems and infrastructure to perform their function safely, reliably, sustainably, and at the best possible cost. At the core of achieving these goals is the understanding of how materials behave in complex systems. Our materials expertise, encompassing metallics, ceramics, composites and polymers, helps you to optimise the operational performance of your asset, from cradle to grave.

We help you to understand how to mitigate the effects of operating conditions on your materials. This may be in design, where our engineers and scientists choose and qualify materials based on operational experience, in line with relevant legislation and standards; or during operation, where we develop material models and lifing approaches that account for degradation mechanisms such as creep, fatigue, thermal ageing, corrosion, irradiation and wear.

Our expertise includes:

- **Material modelling:** We quantify the risk of damage to your asset under harsh operating conditions. Our multi-disciplinary team develops physics-based material models within a probabilistic framework to predict asset health, both now and in the future.
- **Material management:** Through employing innovative digital and non-destructive technologies we enhance your asset integrity management plans, helping you to improve the creation, extraction, storage and analysis of your data to provide insight and smarter decisions.
- **Material selection:** We offer expert insight into the most suitable material for your application, with a clear audit trail on all decision making. This delivers the assurance you need that your components and systems are fit for their duty, meet their specifications and will achieve their intended design life.
- **Material regulation:** We provide you with confidence that the materials used in your project are legal, and compliant with applicable legislation and regulation. We author materials management plans, compiling processes to demonstrate to regulators that material hazards are as low as reasonably practical.
- **Corrosion and degradation:** We use our understanding of corrosion mechanisms to predict how your asset may degrade through life, or to investigate in-service issues and advise on modification to the design or usage.