

# Through-life assurance services for rotating equipment

ASSET  
MANAGEMENT  
SERVICES

The Lloyd's Register Group has earned the reputation of being the leading provider of cost effective, high quality engineering consulting and technical support services. We have more than 240 offices worldwide and employ around 6,000 people. Our core competency is to provide advanced engineering, risk management, certification and validation services. We provide services throughout the complete lifecycle of an asset, from concept and evaluation and design, through in-service operation and maintenance, to plant-life extension and decommissioning.

## Asset performance assurance

The Lloyd's Register Group is a leading provider of world class machinery and rotordynamic services to meet your critical performance needs when and where you need it.

Our services are available throughout the life of all kinds of rotating machinery, from concept evaluation and design, through in-service operation and maintenance, to asset-life extension and decommissioning studies.

The Lloyd's Register Group is experienced in providing through-life advanced engineering consultancy, certification and validation services which are independent, objective and uncompromising.

## Our expertise

Our expertise includes high, medium and low speed rotating equipment and covers the following technologies for use in marine, off-shore and land based environments:

- diesel engines
- turbo machinery
- reduction gears
- compressors
- generators
- marine propulsion
- steering systems
- electricity generation
- auxiliary systems.

## Independent and objectives services

Our independent and objective Asset Management services for rotating equipment include the following.

### During specification and design phase:

- design appraisal of machinery and components to verify compliance with recognised national, international and industry codes, rules and regulations
- vendor / sub supplier evaluation and surveillance services
- rotordynamic design consultation



- bearing design and diagnostic evaluation.

### During construction and fabrication phase:

Independent verification of:

- shop acceptance testing
- field commissioning.

### During the in-service phase:

- root cause analyses and corrective action and corrective action determination
- Computational Fluid Dynamics (CFD) including 2D and 3D steady flow, 2-phase flow and Fluid Structure Interaction (FSI)
- noise and vibrations measurements
- post failure analysis
- thermodynamic performance analysis
- new and used lubrication oil analysis
- risk based maintenance management schemes.



## How we can help Verification and compliance

The Lloyd's Register Group is one of the world's leading independent providers of engineering equipment certification with wide delegation and recognition from national governments.

We can confirm compliance against a wide range of national or international standards, or against client specifications.

## Conformity assessment

We are a leading provider of Type Approval statutory conformity assessment services in accordance with a number of EC directives leading to CE marking, a pre-requisite for many applications in Europe. Lloyd's Register Verification and LRQA are appointed as notified bodies for a range of directives. Being one of the leading notified bodies for many years, we understand the application of EC directives across a range of industries.

As our client, you will benefit from our wealth of experience, and we can work with you as your notified body for the most relevant directives.

## Knowledge Based Management

As part of our asset management offering, we also utilise KBAI (Knowledge Based Asset Integrity) – the software service developed by Knowledge Based Management Ltd (KBM) - a member of the Lloyd's Register Group.

KBAI is a system solution for optimising the maintenance function.

The benefits of using KBAI include the following:

- risk-based methodology delivering revised maintenance schedules generating substantial savings over conventional time-based planned maintenance solutions,
- incorporation of regulatory local compliance
- improved understanding of failure consequences
- identification of critical assets
- helps optimise maintenance expenditures
- maximises the reliability and availability of critical assets

- creates a maintenance by need environment rather than maintenance by habit
- reports on what-if scenarios for varying maintenance strategies
- facilitates continuous improvement and innovation in the design process and asset specification.

Should there be a defined requirement for rotating equipment, we can study the proposal and decide on way forward and model appropriate for the equipment within the KBAI framework.

## Rotordynamic analysis from Ødegaard & Danneskiold- Samsøe (ØDS)

ØDS, part of the Lloyd's Register Group, has in-house, state-of-the-art software for rotordynamic and bearing dynamic calculations. This enables us to tailor-make the software to solve nontrivial problems. ØDS has also recognised commercial programs to predict fluid dynamic forces in seals and other clearances and has well-established contacts with leading universities and laboratories around the world. This implies that we can assist in organising both component testing and advanced research at the most qualified institutes.

## Summary of business benefits

- Regulatory compliance.
- Stakeholder satisfaction and company's equity enhancement.
- Optimised inspection, mitigation and repair cost.
- Reduced system and equipment failure.
- A systematic managed approach to repairs and replacements.

If you would like to know more about the nature of the services that the Lloyd's Register Group provides for rotating equipment, please use the contact details provided.

[www.lr.org](http://www.lr.org)

For further information  
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LIFE MATTERS