



# Laboratory and Technology Services





## Metallurgy, Inspection and Non-Destructive Testing

Metallurgy is a branch of science and engineering relating to the study of metals and materials. By understanding the fundamental behaviour of metals, our metallurgists can determine how a component or structure should react in any given environment or under certain mechanical loads.

Brookes Bell offer professional expertise and experience in investigation of quality issues and defects and failures relating to all types of metallic components.

### Capabilities

**Forensic Engineering and Metallurgical Consultancy** – Investigation of engineering components and systems to determine mechanisms of failure. Advice on selection and suitability of materials.

**Material Identification** – Material analysis and identification using a range of analytical equipment, sample preparation and microscopy techniques.

**On-site Inspection and Analysis** – Site inspection and analysis of material using a range of portable analysis techniques.

**Laboratory Inspection and Testing** – Inspection and testing of metals using advanced inspection techniques including advanced digital microscopy and scanning electron microscopy.

**Non-Destructive Testing (NDT)** – The scientific process of inspecting, testing or evaluating materials components or assemblies for discontinuities. NDT can also detect differences in characteristics without destroying the serviceability of the component.

### Capability

We develop and deploy technical solutions across complex industry sectors to enhance operational efficiency to improve product quality and to reduce the risk of failure for our clients. Utilising a wide array of analysis techniques, we evaluate the properties of a material, component system or structure, without causing harm.

Material testing using advanced leading-edge equipment, collective knowledge, talent and innovation to deliver best in class results.

Corrosion mapping of structures and components of ferrous and nonferrous material along with weld inspection and testing of fabricated structures.

Asset integrity evaluation of marine and offshore structures and systems. Critical sizing and monitoring of material anomalies in high value systems and infrastructure to prevent downturn and optimize performance.

## Fuel and Liquid Cargo Services

Our modern analytical chemistry laboratory is equipped to carry out a range of different routine and complex tests, these include detailed analysis programmes such as those designed to assess compliance with ISO 8217 Table 2 test requirements. We can also investigate the presence of adulterants (which may place the fuel in breach of the general requirements of the international standard) and can assist in the exploration of causal damage mechanisms such as contamination.

Our high-end analytical equipment includes GCMS, ICP, FTIR, XRF and SEM.

### Capabilities

In addition to our analytical capabilities, our in-house fuel chemistry specialists have extensive experience in fuel specification issues and can provide comprehensive advice in cases of dispute. Our in-house specialists are able to assist on a range of fuel and liquid cargo cases, the scope of these services include:

**Crude Oil and Petroleum Products** – We have extensive experience in the carriage and analysis of crude oil and petroleum products and have provided advice in many different areas.

**Bunker Fuel Oil Quality Disputes** – Including investigation of ship-board engine operating difficulties and fuel handling issues. We can offer a multidisciplinary team including technicians, expert fuel chemists, marine engineers and metallurgists.

**Analysis of Fuel Samples** – We can design the relevant testing regime to trace the nature, extent and cause of contamination and to ensure the continued provenance of the samples and results throughout.

We are also involved in a range of other types of fuel and scientific investigations. To discuss our capabilities in more detail, please contact us.

## Paint and Coatings

Brookes Bell can offer expert advice on flake sampling and coating failure inspection. Coating defects can be examined using advanced digital microscopy (including our Olympus DSX1000 Microscope) which can utilise long working distance lenses for uneven or problematic samples and high magnification, high resolution lenses for close inspection (magnification up to x 2800 possible). The top and bottom surfaces of the paint flakes can be examined for contamination, inclusions and presence of rust and scale, and the information used to assess the degree of surface preparation. Cross-section of the flakes examined show the number of coats, colour and individual coating thicknesses. Voids, vacuoles and penetration of rust staining, if present, can also be seen.

### Capabilities

We can respond to any investigative, analytical and troubleshooting enquiries providing independent, accurate advice on:

- Root cause analysis of coating failures on yachts and ships. Specific areas include underwater hull, chemical tanks, cargo holds, ballast tanks and grey water tanks.
- Vessel inspections and surveys.
- Maintenance and repair coating recommendation.
- Technology advice.
- Coating selection and specification.
- Cleaning technologies i.e., hull cleaning.
- Regulatory advice e.g., BPR.
- Expert witness testimony at arbitrations.

Further investigatory analysis of coating samples, including paint flake and blister fluid composition, can be carried out in house utilising our SEM, FTIR and GCMS equipment.



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## Company profile

Brookes Bell are continuing to build upon their reputation as a leading multi-disciplinary technical and scientific consultancy, by developing state of the art laboratory applications which provide analysis services to the marine, energy, industrial and manufacturing sectors.

Founded in Liverpool in 1903, Brookes Bell operate in London, Glasgow, Shanghai, Hong Kong and Singapore and have a well-established presence in the field of forensic analysis, technical dispute resolution and expert witness work.

Our laboratory services seek to provide the best in metallurgy, non-destructive testing, fuel and liquid cargo analysis and coating inspection. These services can be provided in support of our existing marine inspection and technical.

consultancy capabilities or as bespoke inspection applications for a range of other sectors. We have some of the most advanced laboratory and portable inspection equipment available globally and have highly qualified technicians and in-house experts.

Brookes Bell's reputation for excellence is founded upon integrity and proficiency and we are proud to include some of the world's most eminent large scale engineering companies, asset managers and insurance firms as our clients.

Whatever your technical or scientific requirements Brookes Bell has a highly skilled and experienced team of experts ready to help you. For more information please visit our website ([www.brookesbell.com](http://www.brookesbell.com)) or contact us on **+44 (0)151 236 0083**.

