

# Devonport Materials and Environmental Laboratory

## Overview

The Devonport Materials and Environmental Laboratory (DMEL) at DML is the primary support laboratory for Devonport Royal Dockyard. The facilities offered by DMEL therefore suit the requirements of a working dockyard and the naval vessel refit programmes. The scope for simulating corrosive environments is limited, however DMEL also provide other laboratory services, detailed below.

## Accreditation

DMEL is accredited by UKAS and is registered to BS EN ISO 9001.

## Metallurgy

A comprehensive range of metallurgical examination and mechanical testing is undertaken, including

- Material identification and certification
- Identification of wear debris, particulate inclusions, etc.
- Microstructural characterisation
- System and component validation and revalidation
- Welder and weld procedure qualification
- Failure investigation
- Materials and product development
- Tensile, impact and hardness testing
- Examination and testing of non-metallic materials, including timber and composites

Test equipment includes: Olympus bench microscopes; stereo-zoom microscopes; Zeiss SV11 & Discovery; portable microscopes; Cambridge SEM with Link X-ray analyser; Vickers universal hardness tester; Leitz microhardness tester; portable hardness tester; Dartec test machine (600kN); Avery Denison test machine (200kN); Nene test machine (30kN); Avery Denison Charpy impact tester.

## Chemistry

Chemical analysis can be undertaken on a wide range of materials, including:

- Ferrous and non-ferrous metals
- Petroleum products, solvents, cleaner, degreasants and derustants
- Compressed gases
- Effluents, trade waste and discharges
- Asbestos, asbestos products, lagging and insulation
- Weld consumables

Tests and analyses can be carried out to British Standards and ASTM, UKAS or HSE approved methods.

Test equipment includes: energy dispersive X-ray fluorescence spectrometer; Fourier transform infrared spectrometer (with long path-length gas cell); atomic absorption spectrometer (flame and furnace systems); ultra-violet/visible light spectrometer; dispersive infrared spectrometer; carbon and sulphur auto analyser; gas chromatograph with various detectors (electron capture); plasma ashing oven.

## Reactor Chemistry

A range of analyses can be carried out on a variety of radioactive materials, including:

- Measurement of gamma emitting nuclides present in liquids and solids
- Measurement of tritium in water and effluents
- Measurement of specific nuclides (such as Ni-63 and Fe-55) in water and effluents after classical chemical separations
- Analysis of natural, de-mineralised and high purity waters including measurement of dissolved oxygen

Additional methods can be developed to suit customer requirements.

Instrumentation includes: gamma spectrometers; liquid scintillation counters; ion chromatograph; gas chromatograph; atomic adsorption spectrometers; ultra-violet/visible light spectrometers; gross alpha counters; gross beta counters; gross gamma counters.

## ***Environmental Monitoring***

Sampling, identification and analysis of:

- Asbestos and other fibres
- Dust
- Particulate matter in oils
- Welding and other fumes
- PCB's in insulating oils
- Toxic substances in the atmosphere
- Flammable and other hazardous substances in confined spaces (plus issue of appropriate naked light, hot work and entry certificates)

## ***Calibration***

There are in-house facilities for the calibration of a wide range of metrology, pressure and temperature inspection, measurement and test equipment. The laboratory can also outsource calibration of items through various partnering agreements.

Various measuring instruments and associated standard test pieces can be calibrated, including:

- Scales
- Telescopes
- Theodolites
- Timers and clocks
- Linear measuring devices
- Screw gauges
- Inspection grade and workshop grade block gauges
- Angle measuring devices
- Flatness measuring devices
- Torsion measuring devices

Temperature and humidity measuring device can also be calibrated over the range  $-30^{\circ}\text{C}$  to  $300^{\circ}\text{C}$  and 0% to 85% humidity, including:

- Glass thermometers
- Resistance thermometers
- Thermocouples
- Pyrometers
- Thermohygrographs

Pressure test gauges and barometers can also be calibrated, over the range  $-30''$  Hg to 50 000 psi, including:

- Standard test gauges
- General purpose gauges
- Absolute gauges
- Barometers
- Manometers
- Digital pressure indicators and transducers
- Dead weight testers

Other measurement devices that can be calibrated include:

- Mechanical and electrical revolution counters (30 – 10 000 rpm)
- Portable oil/gas monitoring equipment

The Electrical Laboratory undertakes calibration, repair and portable appliance testing, of a broad spectrum of equipment covering almost every make of commercial test equipment from Hand Held Digital Multimeters, Frequency Counters and Oscilloscopes through to High Frequency Generators and Microwave Components

- Insulation & Continuity Testers
- Handheld Digital & Analogue Multimeters
- Panel & Switchboard Instrumentation
- Oscilloscopes
- Frequency Meters & Counters
- RF Frequency Generators
- Microwave Signal Sources
- Power Meters
- Microwave Attenuators ,Terminations & Couplers
- Safety Test Equipment
- Analogue & Digital Clamp Meters
- Fixed Value Resistance , Capacitor , Inductor, and Decade boxes
- Signal and Spectrum Analysers
- Current Injection Transformers
- Precision RF & Microwave Coaxial Components
- Oscillators
- Function Generators
- Thermocouple simulators
- Synthesisers
- Multifunction Calibrators

The Nucleonic laboratory is able to carry out calibration of Gamma, Beta or Alpha equipment, both portable and installed equipment. Gamma measurements can be made using Isotopes of Cs137, Co60 and Am241. Measurement using Cs137 can be made from background level to 2 Sv/Hr.

- Gamma Survey Meters
- Alpha Contamination Rate Meters
- Personal Dosimetry Scaler ratemeters
- Whole Body Monitors
- Continuous Air Monitors
- Environmental Monitoring Systems

## **Contact**

If you would like to know more, or if you would like to discuss a particular application, please contact us at:

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