

**CATAPULT**  
Offshore Renewable Energy

**MATERIALS  
SERVICES**



## INTRODUCTION

The Offshore Renewable Energy (ORE) Catapult's Materials Services team offers a variety of high-quality examination processes and testing services, either as a standalone service or as part of a wider testing regime alongside other teams at the Catapult.

ORE Catapult's National Renewable Energy Centre in Blyth has always offered world leading testing and validation services in relation to next generation blades, turbines and high voltage (HV) insulation systems, with the support of the materials specialist personnel. In response to rapidly growing client interest in this area, the Catapult recently collected this expertise together to offer a comprehensive lab based service for our clients.

ORE Catapult is a UKAS accredited testing laboratory No.2769, see back cover for the QR code to our accredited scope.

Our Materials Services team offers a complete set of testing services under one roof, which include:

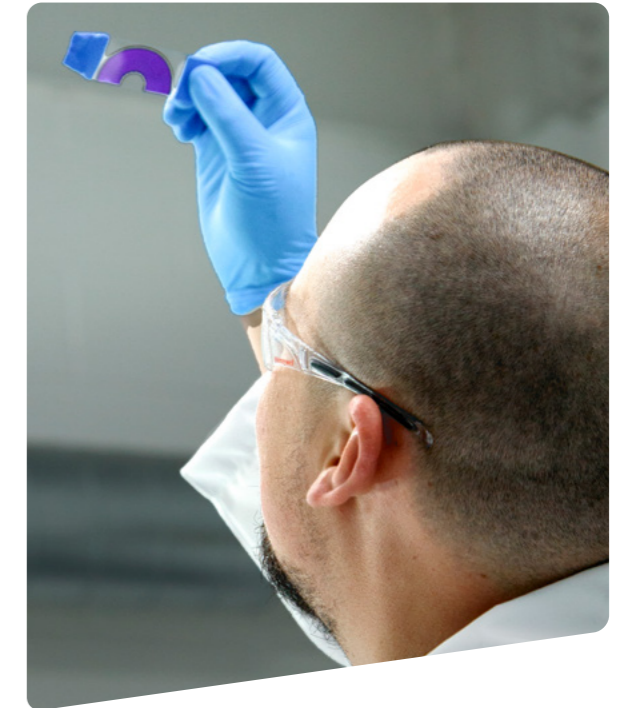
- **NON-ELECTRIC HV CABLE TYPE TESTING**
- **LEADING EDGE EROSION TESTING AND ANALYSIS**
- **TRIBOLOGICAL ANALYSIS**
- **ROOT CAUSE ANALYSIS FAILURE INVESTIGATIONS**
- **MATERIALS/COMPOSITES RESEARCH**
- **ACCELERATED AGEING**

## HV CABLE TYPE TESTING

The Materials Services laboratory offers the full suite of non-electrical type tests on cables rated up to 500 kV, both single core and three-phase cables, and is capable of testing cables to the following standards:

- IEC 60502-2 (2014)
- IEC 60840 (2020)
- IEC 63026 (2019)
- IEC 62067 (2011)

Test witnessing can be accommodated in person or remotely, with a comprehensive test report including photographic evidence provided and of course, we offer the accredited HV electrical testing alongside these materials tests.



## BLADE EROSION TESTING

ORE Catapult's blade erosion testing facility offers state of the art, accredited testing into the effects of rain on the leading edge of a wind turbine (WT) blade.

Our highly experienced team have the capacity to manufacture samples, conduct numerous post-test analyses with a range of analytical tools at their disposal and can offer advice on materials selection, including thermo-mechanical properties, impact physics and degradation chemistry.



## TRIBOLOGICAL TESTING

Currently under development, our new tribology laboratory will initially offer tribometric characterisation of materials, including friction calculations, ageing estimations and wear properties.

We also offer grease/oil analysis to quantify the amount of metallic content and quality of the greases.

This area of materials science is a new and exciting addition to our Materials Services offering and enables our experts to support clients with lifetime analysis of their products.

Watch this space for new equipment and techniques becoming available in the near future.



## MATERIALS / COMPOSITES RESEARCH

The team is now regularly being asked by clients to contribute to product development and design improvement, by providing analytic characterisation of materials and designing test programmes to compare and evaluate material properties, ageing properties and analysis of individual cable layers.

The team has expertise in HV insulation materials, blade leading edge composites/coatings and metallurgy associated with drive train wear, and can offer support with everything from simple functional testing through to the delivery of large scale, complex research projects.



## FAILURE INVESTIGATIONS

The Materials Services team has a great deal of experience in providing forensic dissection and root-cause failure analysis as well as witnessing services.

Utilising the team's collective electrical, mechanical and materials knowledge on every project, clients can be assured of fast, accurate and definitive failure investigation services.

HV cables, WT blades and HV bushings are examples of particular specialisms at ORE Catapult.



## ADDITIONAL SERVICES

### ACCELERATED AGEING

The laboratory currently offers a range of accelerated ageing techniques to assess product longevity:

- Wet age HV cables testing
- Dynamic HV cable fatigue
- Thermal / environmental ageing capability
- UV ageing
- Weathering analysis
- Turbine blade leading edge lifetime estimation
- Sample preparation for examination – slice sample to view breakdown
- Water tree analysis – and general 2D/3D microscopy
- Moisture content analysis
- Arrhenius curve calculations on HV insulation



### MATERIALS ANALYSIS

The team has extensive experience of materials analysis in the following areas:

- DSC to show any increase in temperature in comparison to a static section
- FTIR / TGA – looking at the effects of chemical bonds, composite batch analysis and degradation
- Tensile test – comparing virgin material, wet aged samples and wet energised samples
- Impedance – measuring complex dielectric properties on small scale samples
- HV breakdown strength testing:
  - On small or large scale
  - Comparing the effect of long-term submersion along vs energisation
- Microscopy (inc. staining) to identify voids and other physical degradation in insulation



### COMPONENT LEVEL MECHANICAL TESTING

One philosophy of materials science is to explain the world of green power from the molecule up to a full-size complete turbine.

A critical path in our understanding is materials selection and how each individual component combines to make a whole.

An example of this is our DMA fatigue testing, where we age individual layers of cable or blade composite, which can feed into modelling processes and the additive effect can then be extracted.



### IN-HOUSE ANALYTICAL CAPABILITY

The team possesses significant analytical skills to support client's requirements:

- Tensile testing platform (compression, 3-point bend, peel)
- Density measurements
- X-ray fluorescence – metallic content analysis
- FTIR – materials analysis
- Karl Fischer – moisture analysis
- Digital Microscope (2D/3D)
- Dynamic Mechanical Analysis
- Thermal Analysis: TGA / DSC
- Comparative Tracking Indexing



## CONTACT

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## ENGAGE



Use this QR code  
to view Certificate  
of Accreditation

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