

TESTING SOLUTIONS FROM LUCIDEON

we'll give you the knowlEdge





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“I DIDN'T KNOW YOU DID ALL THAT!”

It's a phrase we hear often, especially from clients. Because quite simply, many don't realise just how broad our testing and development capabilities are.

They're wide-ranging and diverse - from looking at surface atoms to weather testing huge structures. But even more surprising is the way we understand, interpret and integrate the data that's produced to find solutions to the challenges you, your products and your business face.

And that brings me to what really makes Lucideon unique: our people.

It's their expertise, experience and innovative thinking that makes us a world leader in testing and development. It's their consultative approach that builds a relationship with you and makes them an extension of your team. And it's their dedication to accuracy and quality that gives you every confidence in what they do.

Working as a team, they share their knowledge across industries to give you the insight you need to get your products to market quickly, to optimise their performance, to ensure they're fit for purpose and to develop those materials, technologies and products of the future.

We call that insight the knowEdge. It's what makes Lucideon different, and makes all the difference to you.

LUCIDEON
insight creating advantage



Dr Richard White, Head of Testing.

This is Lucideon.

We're an international organisation, a world leader in materials, product and process testing and analysis, technology development, and assurance.

Our focus is on problem-solving and innovation.

We test to national and international standards, and also provide bespoke testing programmes.

We constantly invest in our facilities to ensure we offer you cutting edge technology and the latest techniques.

We have state-of-the-art ISO 17025-certified laboratories in the UK and USA, and Lucideon approved laboratories around the world.

In the UK we're a UKAS-accredited testing laboratory (No. 0013), and our pharmaceutical laboratories are accredited to cGMP by MHRA.

In the US we're NADCAP-accredited and have 10 CFR 50 Appendix B Quality Assurance accreditation.

We archive your data for a minimum of 7 years.



These are our People.

- Over 200 in our team
- 1 in 8 have PhDs, nearly half have degrees
- In total, they have 2204 years of experience!
- Materials and analytical expertise includes ceramics, glass, metals, polymers, composites, powders, gases and liquids
- Cross-industry knowledge and technology transfer
- Consultative approach
- Innovative thinking
- Right first time
- Accurate
- Quick turnaround
- Always at the end of the phone
- An integral part of your team
- We listen!

We can help you:

- understand materials and products through characterisation
- ensure consistent quality and performance
- comply with regulations
- understand failures quickly and prevent them reoccurring
- prove products are fit for purpose
- improve product performance





Characterisation.

Understand your materials.

Improve your products.

The key to improving performance, developing future products and preventing failures is understanding what materials are made from, their structure and properties, and how they interact with each other and their environment.

To do this, we use a variety of techniques:

Chemical analysis

Qualitative and quantitative assessment of elements and compounds, to identify contaminants or monitor batch consistency.

Microstructural evaluation

Evaluating how chemical building blocks are built up to form crystal phases and structures to make materials and products. From simple parameters, such as grain size, to understanding complex multi-component structures.

“Understanding microstructures can lead to improved products, identification of potential problems and a detailed insight into the impact that processing can have.”

Dr Giles Blundred, XRD Specialist

Surface analysis

Characterising surfaces, coatings and treatments at the nanometre scale on the surfaces of products, to better understand contaminations, problems with adhesion and optimisation of coating thickness, for example.

In practice...

Why were white tablets turning yellow?

A pharmaceutical client had a problem with white tablets showing yellow discolouration when exposed to daylight – and we used ToF-SIMS (Time-of-Flight Secondary Ion Mass Spectrometry) to show why.

Visit www.lucideon.com/tablet to find out more.



Consistency.

Of quality, and of performance.

Consistency of product is vital to give you peace of mind, satisfy clients and comply with regulations. So whether you need to test raw materials, qualify new suppliers or meet in-house protocols, our high quality, accurate and speedy service will prove invaluable.

Our people will work with you to develop quality assurance programmes to ensure material and product consistency to specified criteria, with testing done batch-to-batch or at appropriate intervals.

And if you have problems with quality and performance of your process or product, we'll help you identify what's causing the issue and where in the process it's occurring.

In practice...

Generating consistency in turbines.

The power generation industry relies on turbines in many instances. And our extensive metallography and metallurgy expertise together with mechanical testing and other analyses are used to evaluate their components.

This includes:

- Verifying raw material quality
- Evaluating outsourced processes and treatments
- First piece qualification
- Production acceptance testing

Our expertise extends to casting, welding, brazing, thermal spray and heat-treatment processes, and our capabilities include testing for tensile strength, hardness, adhesion, creep, stress relaxation and rupture.

An Integrated Approach.

That's what we take to help you understand, improve and develop your materials and products.

COULD IT BE MADE IN A BETTER WAY?

HOW DOES STRUCTURE AFFECT THE PERFORMANCE?

HOW CAN IT BE IMPROVED?

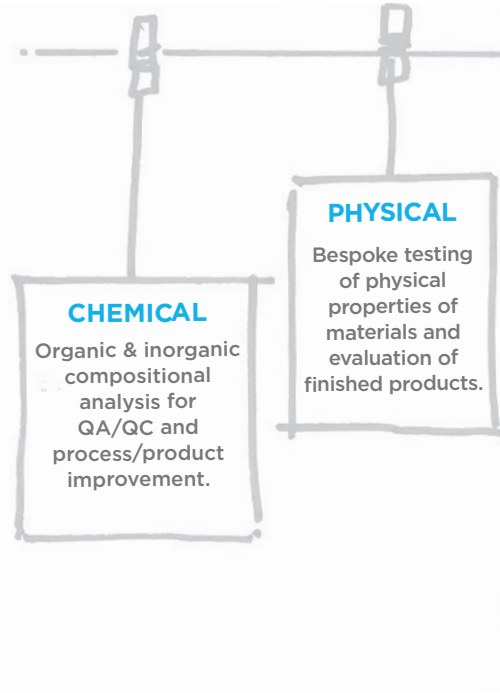
IS ITS QUALITY AND PERFORMANCE CONSISTENT?

ANALYSE >

MEASURE > IMAGE > IMPROVE >



YOUR MATERIALS/ PRODUCTS



CHEMICAL

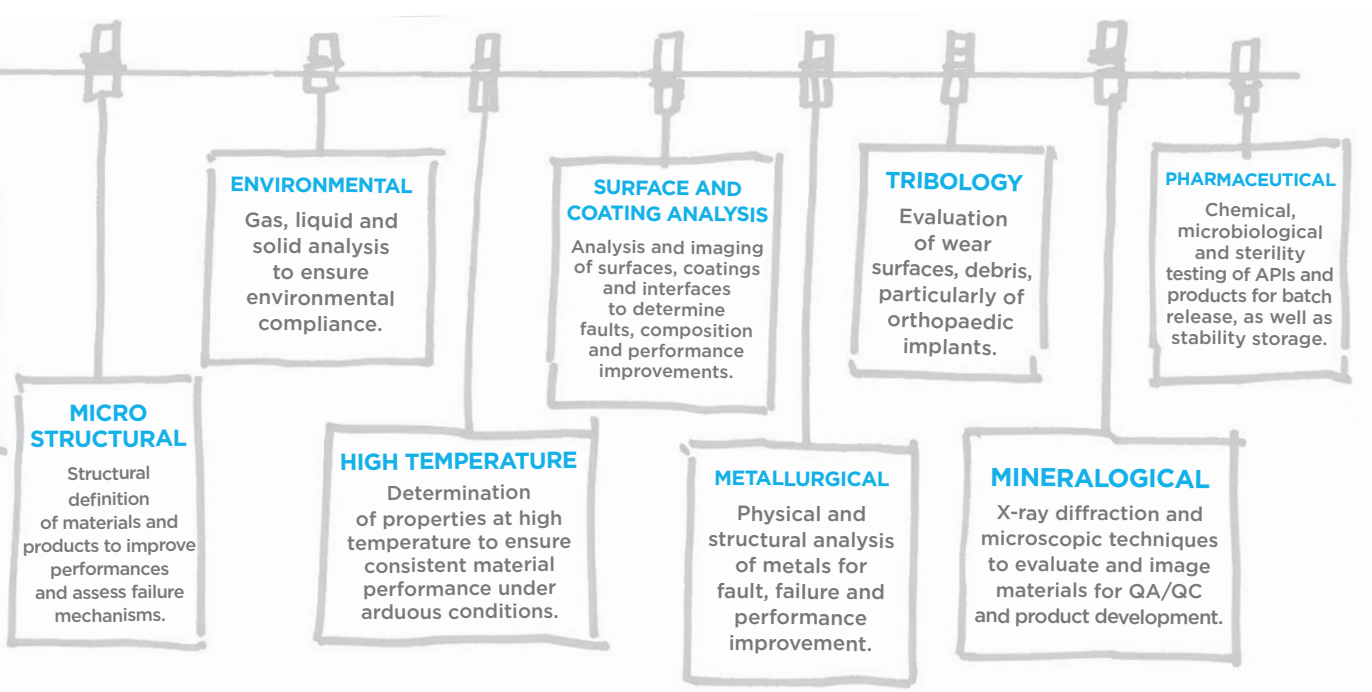
Organic & inorganic compositional analysis for QA/QC and process/product improvement.

PHYSICAL

Bespoke testing of physical properties of materials and evaluation of finished products.



> ASSURE > ANALYSE > MEASURE > IMAGE > IMPROVE > ASSURE >





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Regulations.

Compliance is crucial.

You need to get new products to market quickly. But you also need to prove they meet national and international regulations. That's where our experts can help.

We can put together bespoke testing programmes so you'll have all the data you need to submit products for approval. Here is just the briefest snapshot of areas we work in:

Ceramics

Toxic Metal Release of Ceramic Ware to EN 1388-1 and EU 2005/31/EC

Medical Devices

Support of FDA 510(k) submissions and European equivalents

Environmental

Analysis of landfill gas to Environment Agency limits

Construction

CE mark testing of tiles to ISO 10545

These are just a few of the standards and regulations we test to. If you're looking for a particular one, visit www.lucideon.com and type it into 'Search'.

Or call our Customer Liaison Team on +44 (0)1782 764428.



We're the people for...

Pharmaceutical Testing and Analysis

We're MHRA inspected and work to cGMP, and offer chemical and microbiological testing to USP, BP, Ph. Eur., JP and ACS.

Our microbiology testing includes:

- Sterility Testing
- Antimicrobial Efficacy Testing (AET)
- Microbial Limits Testing
- Bioburden Determination
- Endotoxin (LAL) Testing
- Environmental Monitoring & Identification
- Water Analysis

Fit for Purpose.

Is your product fit for purpose? We'll prove it.

At the development stage, during production or in use you'll want your products to always offer optimum performance. Failure should not be an option - that's why testing is so important.

Is it strong enough? Will it perform in all weathers, sometimes to extremes? Can it withstand thermal shock? How will it wear? What's its shelf life? How will it react with its environment?

These are just a few of the questions that our people can answer.

Performance testing

This might include crushing a brick to test its strength, wear testing an orthopaedic implant to determine its lifespan, or testing a tile to make sure it's not slippery. We've even dropped a massive snowball onto a roof to check its structural properties (part of the new safe confinement at Chernobyl - read the case study at www.lucideon.com/roof/)!

Surface analysis

This can validate the cleanliness of a product, such as a medical device, and prove if a product's doing what it claims to - for example, we helped a global manufacturer prove that its toothpaste does remineralise teeth.



In practice...

Avoiding construction catastrophes.

Failures in construction materials can be catastrophic. Lucideon is well-equipped to put them through their paces.

"We can test products from bricks, concrete, tiles, lintels and walls to chimneys, insulation panels and roofing and flooring systems, right up to three-storey structures.

Our strong-floor and anchorage system means we can build and develop bespoke tests for your products, and we also do a lot of on-site structural testing."

Simon Hall, Physical Testing Manager.



Failure Analysis.

Why they happen. And how to prevent them.

Failures mean downtime, disrupted product development, no product approval, law suits... all of which you can do without.

The easiest way to avoid them?

Test during development.

But if you don't and a failure occurs, you'll want to find out why, where, when and how... and quickly. We can tell you, using various techniques.

Surface analysis

Detects contamination and adhesion problems.

Microstructural testing

Examines morphology and structure of defect to establish likely mechanism of failure.

Metallographic evaluation

Looks at things like fractures and corrosion.

Microbiology

Determines sterility, contaminations, bioburdens, endotoxins and antimicrobial efficacy.

High temperature testing

Highlights problems with refractory linings and toughened ceramics.

Performance testing

Quantifies a range of physical attributes such as strength, thermal shock and permeability to help pinpoint the root cause of a failure.





Our People...

Jan Theron, Refractories Consultant

Jan is our expert on refractory maintenance management. He focuses on cost-effectively improving lining integrity, which involves failure analysis, refractory selection, quality control, design evaluation and commercial contracts.

He's a member of the Refractories Association of South Africa and Institute of Refractories Engineers, and has over 16 years' experience from across the industry - from incinerators, reformers, heaters, arc furnaces, induction furnaces, through to rotary kilns, shaft kilns, sulphur burners, boilers, CFB reactors and FCC units.

With such diverse knowledge, Jan also trains inspectors, commercial personnel and plant managers to improve awareness of refractory applications in their organisations.

How our People Create the Future with You.

Your business relies on improving and developing products, materials and technologies.

Our aim is to help you stay ahead of the game, be first to market and gain a competitive advantage by helping you develop the next generation of products.

So with you, we'll put together a comprehensive testing and development programme to make sure they're fit for purpose, comply with regulations, are consistent in quality and performance and free from failures.

Essentially our people will use their knowledge, experience and our state-of-the-art analytical capabilities to become an extension of your R&D team at every stage of the development process.

IDENTIFICATION OF
BUSINESS OBJECTIVES

CREATIVE
BRAINSTORMING

RESEARCH

FEASIBILITY
STUDIES

LABORATORY
TRIALS

PILOT SCALE
TRIALS

MANUFACTURING
SCALE TRIALS

PROCESS
IMPLEMENTATION

Our Techniques.

A summary.

Below is a summary of the most common testing techniques we use. Our people also have the expertise to create bespoke testing solutions. To find out more, simply visit www.lucideon.com.

- **3DSEM (Three Dimensional Scanning Electron Microscopy)** - combines the high resolution imaging of SEM with quantitative surface metrology information.
- **AFM (Atomic Force Microscopy)** - stylus profilometry to produce highly detailed topographical images.
- **DIC (Digital Image Correlation)** - a non-destructive, non-contacting optical technique used to obtain full-field surface strain measurements on objects under load.
- **Dynamic SIMS (Secondary Ion Mass Spectrometry)** - elemental composition of materials from the surface to depths of 100 micrometres.
- **FTIR (Fourier Transform Infrared Analysis)** - identification of chemical functionality in the near-surface region of materials; a broad range of compounds can be identified.
- **GC (Gas Chromatography)** - major organic compound analysis such as gases or volatile components.
- **GC-MS (Gas Chromatography - Mass Spectrometry)** - trace volatile organic compound analysis as gases or solvent extractions from solids.
- **GPC (Gel Permeation Chromatography)** - measurement of molecular weight distribution of polymers.
- **Hardness Testing** - including Vickers hardness, Vickers Micro-hardness and Rockwell hardness.
- **High Temperature Testing** - thermal properties including thermal conductivity, linear expansion, pyrometric cone equivalent, permanent linear change, creep and refractoriness-under-load (RUL).
- **IC (Ion Chromatography)** - analysis of liquids/solutions for anions such as halides and sulphates.
- **ICP-OES (Inductively Coupled Plasma Optical Emission Spectroscopy)** - trace analysis of inorganic materials, down to parts per million (ppm).
- **ICP-MS (Inductively Coupled Plasma - Mass Spectrometry)** - trace analysis of elements to identify individual masses and isotopic fingerprints, with detection limits at or below parts per billion (ppb).
- **LC-MS and HPLC (Liquid Chromatography - Mass Spectrometry)** - chemical separation and quantitative analysis by mass spectrum, useful for isomers and low concentration analytes.
- **Metallography - including EPMA (Electron Probe Micro-Analysis)** - visual, microstructural and compositional information. Full evaluation of physical, strength or performance characteristics.
- **Pore Size Distribution by Mercury Intrusion Porosimetry** - pore size distributions for both diameter and area determinations in the mesoporous and macroporous ranges.
- **Rheology and Viscosity Measurements** - rheological characterisation and viscosity measurements across a wide range of shear rates.

- **SEM/EDX (Scanning Electron Microscopy/ Energy Dispersive X-ray Analysis)** - microstructural analysis, fault diagnosis, imaging topography and elemental analysis with spatial resolution of solid materials.
- **Surface Area Brunauer-Emmett-Teller (BET) and Barrett-Joyner-Halenda (BJH) Pore Size and Volume Analysis** - precise specific surface area evaluation of materials.
- **Thermomechanical Testing** - thermomechanical properties including flexural and compressive modulus of elasticity, modulus of rupture, compressive strength, flexural creep and fracture toughness.
- **ToF-SIMS (Time-of-Flight Secondary Ion Mass Spectrometry)** - elemental and molecular information in spectral or imaging mode with low detection limits and sampling depth of 1-3nm.
- **UV-Vis (Ultraviolet Visible Spectroscopy)** - quantitative determination of analytes that absorb light of known wavelength.
- **WLI (White Light Interferometry)** - topographical information from the surface including 2D, 3D images and profilometry as well as roughness parameters.
- **XPS (X-ray Photoelectron Spectroscopy)** - quantitative elemental, chemical state and functional group information from the surface of materials.
- **XRD (X-Ray Diffraction)** - mineralogical analysis of solid materials for phase identification and quantification.
- **XRF (X-Ray Fluorescence Spectrometry)** - major, minor and trace bulk elemental analysis of inorganic materials.
- **Zeta Potential Measurements** - surface charge of solid powder particles in suspension.

Become a Technology Partner. Reap the benefits.

The most efficient way to work with the people at Lucideon is to become a Technology Partner. There are three levels of membership, each giving you access to a variety of benefits.

These range from a technical helpline and information centre to research projects and a service allowance for testing.



Contact Details.

Our Customer Liaison Group is your first port of call should you have a query or need any more information.

Call them on **(UK) +44 (0)1782 764428** or **(US) +1 518-382-0082**.



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