



## ENGINEERING

# Industrial research using Diamond

The eternal dream to explore matter at its deepest level has continually driven scientists to build more and more powerful instruments from simple microscopes to elaborate X-ray sources.

Diamond Light Source is a sophisticated synchrotron light facility which can generate highly intense beams of light ranging from IR and UV to

X-rays, all of which are making research at the cutting edge of modern science possible. Diamond provides specialist analytical techniques for the atomic to microscale characterisation of materials as diverse as novel pharmaceuticals, catalytic materials, coatings, motor oils, and large engineering components.

Our dedicated Industrial Liaison Team of highly skilled

scientists is available to support you in every step of your research. The team can help to translate your R&D challenges into meaningful analytical solutions by making use of its diverse expertise in synchrotron methods.

*Some examples of how Diamond can be used for engineering research are outlined overleaf.*



## Applications

### Strain & stress

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- Measure the strain and stress to evaluate the mechanical performance of an engineering component or system in real time;
- Study the residual strain and stress in a component by non-destructively mapping the strain profile in 3D;
- Investigate failed components to determine the underlying cause.



### Corrosion

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- Chemically map the corrosion region to look at chemical segregation and understand nucleation points;
- Understand the structure and chemical composition of corrosion products;
- Apply imaging methods to give a 3D view of the corroded region and measure physical features.



### Sustainability & waste

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- Characterise the microstructure of a material and understand how it evolves during the product life cycle;
- Explore processing conditions to improve the microstructure and engineering performance;
- Chemically and crystallographically map the material phases and determine detrimental features.

### X-ray imaging

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- Apply non-destructive imaging techniques to view inside a full engineering assembly at high magnification;
- Understand solidification of materials by performing high speed radiography and tomography;
- Uncover hidden cracks and deformation in static conditions or during *in situ* loading.

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**For further information**

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