



UNIVERSITY OF
SURREY

**MACHINE LEARNING
INNOVATIONS FOR
STRUCTURAL INTEGRITY
AND NET ZERO GOALS**

WORKSHOP PROGRAMME

15 May 2025

OUR SPONSORS



The Institute of Advanced Studies (IAS) at the University of Surrey sponsors workshops and Fellowships at the 'cutting edge' of science, engineering, social science and the humanities. Through this scheme the Institute fosters interdisciplinary collaborations and encourages a flow of international scholars to visit, enjoy their stay at Surrey and leave behind excellent ideas and innovations.

ias.surrey.ac.uk



Sente Software Ltd. was created in 2001 to take responsibility for the long-term commercial development of JMatPro®. It now leads the development of the new scientific capabilities in JMatPro® alongside the development of its powerful graphical user interface.

sentesoftware.co.uk



The Surrey Impact Acceleration Account (IAA) provides highly flexible and internally administrated funding to support knowledge exchange, the acceleration of impact, and to bridge the gap between UKRI (EPSRC, STFC, ESRC, and MRC) funded research to facilitate impact for the benefit of society including translation towards commercialisation. This in turn will demonstrate the impact Surrey's research has had and is having on society in the UK, both socially and economically.

surrey.ac.uk/impact-acceleration-account

INTRODUCTION

Structural integrity assessment and management are critical challenges across engineering sectors, with significant economic implications. These challenges are essential for optimising materials performance, extending system lifetimes, and reducing maintenance costs. This workshop builds on the successful collaboration between the University of Surrey, UK Atomic Energy Authority (UKAEA), National Physical Laboratory (NPL), and Sente Software Ltd. It highlights the seamless integration of cutting-edge materials characterisation and mechanical testing breakthroughs with a machine learning (ML)-powered modelling approach, leveraging robust data analysis algorithms to address residual stress challenges in fusion and transform structural integrity prediction. While ML holds transformative potential, challenges such as resistance to new methods and the reliance on high-quality datasets must be overcome. By bringing together leading experts across industries, the workshop will evaluate scientific achievements and societal impact through panel discussions and interviews. These advances are crucial for the sustainability and safety of future technologies, contributing to Materials 4.0, establishing a new paradigm for materials assessment and lifecycle

management. The ultimate goal is to drive industry adoption of this ML-powered framework, supporting critical sectors while advancing net-zero goals and promoting sustainable industrial practices.

Organising committee:

Dr Tan Sui, Dr Mark Whiting and Dr Bin Zhu (School of Engineering)

Administrative support:

Yuheng Du, School of Chemistry and Chemical Engineering and Louise Jones, Institute of Advanced Studies

PROGRAMME

THURSDAY 15 MAY

Treetops, Wates House

(BST)	
09.00 – 09.45	Arrival, Registration and Exhibition
09.45 – 10.15	Keynote talk I: University of Surrey Welcome / Chair - Dr Tan Sui
10.15 – 10.45	Keynote talk II: Sente Software Ltd
10.45 – 12.00	Short Industrial Presentations Chair - Tony Fry
12.00 – 12.30	Keynote talk III: NPL
12.30 – 13.00	Keynote talk IV: UKAEA
13.00 – 14.00	Lunch and Exhibition
14.00 – 14.50	Roundtable discussion: 'Advancing the digital transformation for materials evaluation innovation' Facilitators - Mark Whiting & Stefanos Giannis
15.00 – 15.50	Group I: Lab tour Group II: One-to-one interviews
16.00 – 16.50	Group I: One-to-one interviews Group II: Lab tour
16.50 – 17.30	Photography, Networking, Depart

EXHIBITORS AND PARTICIPANTS



National Physical Laboratory

The [National Physical Laboratory](#) (NPL) is the UK's National Metrology Institute (NMI), developing and maintaining the national primary measurement standards, as well as collaborating with other NMIs to maintain the international system of measurement. As a public sector research establishment, we deliver extraordinary impact by providing the measurement capability that underpins the UK's prosperity and quality of life. We develop the metrology required to ensure the timely and successful deployment of new technologies and work with organisations as they develop and test new products and processes.

In this digital age, our world-leading measurement science provides confidence in data, which enables innovation and international trade to flourish. We align our capabilities with the most important national challenges like energy, health, security, net zero and the prosperity of the nation, and lead major national programmes that deliver impact across the UK.

NPL is a Public Corporation owned by the Department for Science, Innovation and Technology. We have a partnering agreement with the Department for Science, Innovation and Technology and the University of Strathclyde and the University of Surrey. NPL is part of the National Measurement System (NMS) which provides the UK with a national measurement infrastructure and delivers the UK Measurement Strategy on behalf of the Department for Science, Innovation and Technology.

Participants

Tim Kamps, Senior scientist

Tony Fry, Principal scientist / Visiting Professorship at University of Surrey

Louise Crocker, Senior scientist

Valerie Livina, Principal scientist

Stefanos Giannis, Principal scientist / Visiting Professorship at University of Surrey

David England, Surrey-NPL joint PhD

Brandon Steels, Surrey-NPL joint PhD



UK Atomic Energy Authority

The [UK Atomic Energy Authority](#) (UKAEA) is a global leader in fusion energy research, dedicated to developing fusion as a safe, sustainable, and low-carbon energy source for future power generation. UKAEA carries out world-class research and innovation across a broad range of disciplines, including plasma physics, advanced materials, robotics, tritium handling, and systems engineering. Its mission is to solve the complex scientific and engineering challenges involved in delivering commercially viable fusion energy — from plant design and operation to end-of-life decommissioning.

UKAEA operates fusion research facilities and centres of excellence, both supporting UK programmes and collaborating internationally. A flagship initiative is the STEP (Spherical Tokamak for Energy Production) programme, which aims to deliver a prototype fusion power plant in the UK. UKAEA also works closely with industry to develop key technologies and accelerate the growth of a commercial fusion sector. Beyond technical innovation, UKAEA plays a central role in enabling the wider fusion community: growing a skilled workforce, supporting regulation and policy development, fostering innovation clusters, and identifying opportunities for the fusion economy.

Participants

Yiqiang Wang, In-Vessel Engineering Section Leader
Alex Leide, Senior Materials Scientist
Chris Hardie, Group Leader of Design by Fundamentals
Omar Mohamed, Surrey-UKAEA joint PhD



Sente Software Ltd

The [National Physical Laboratory](#) (NPL) is the UK's National Metrology Institute (NMI), developing and maintaining the national primary measurement standards, as well as collaborating with other NMIs to maintain the international system of measurement. As a public sector research establishment, we deliver extraordinary impact by providing the measurement capability that underpins the UK's prosperity and quality of life. We develop the metrology required to ensure the timely and successful deployment of new technologies and work with organisations as they develop and test new products and processes.

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Participants

Jean-Philippe Schille, Managing Director
Zhanli Guo, Principal Materials Scientist
Rafael Miranda, Senior Software Developer
Jianan Hu, Senior Materials Scientist



Plastometrex Ltd

Built on research developed by former University of Cambridge materials scientists, [Plastometrex](#) is revolutionising mechanical materials testing with a bold vision: achieving high-integrity data without complexity or delay. Founded by a team of materials scientists, engineers, computational modellers, and scientific programmers, many with strong ties to industry and academia, the company is committed to making mechanical testing faster, simpler, and more insightful.

At the heart of Plastometrex's innovation is PIP testing (Profilometry-based Indentation Plastometry), a breakthrough technology that delivers full stress-strain curves from samples too small for conventional tensile testing. From tiny specimens the size of a nail head to large metal components in the field, PIP testing provides accurate, hassle-free results with speed and scientific robustness. Their mission is to enable rapid, reliable access to mechanical property data, transforming how industry and research approach materials characterisation.

Participants

Jimmy Campbell, Chief Technology Office
Chizhou Fang, Computational Materials Scientist
Amalie Lyneborg, Head of Marketing



Alemnis AG

[Alemnis](#) is a pioneering company dedicated to advancing scientific instrumentation for material testing. Their mission is to equip researchers and industries with high-precision, innovative solutions that drive a deeper understanding of material properties and performance. With a strong commitment to excellence, innovation, and collaboration, they continuously push technological boundaries to support cutting-edge research and industrial applications. From academic institutions to high-tech industries, Alemnis delivers state-of-the-art solutions that empower discoveries and breakthroughs in materials science.

Participants

Nicholas Randall, Vice President Business Development
Sam Nunez, Technical Sales Specialist (Merrow Scientific Ltd)
Ben Proudlove, Founder and Director (Merrow Scientific Ltd)



TESCAN-UK Ltd

[TESCAN](#) is a global leader in nanoscale imaging and analysis, providing advanced solutions for the geosciences, materials science, life sciences, and semiconductor industries. With over 30 years of experience, TESCOAN is renowned for its innovative development of electron microscopy, micro-computed tomography (micro-CT), and specialised software technologies that serve both academic research and industrial applications. For example, TESCOAN's TENSOR is the first 4D-scanning transmission electron microscope (4D-STEM) built from the ground up for a totally new level of performance and user experience. TESCOAN's commitment to continuous product improvement drives competitive advantages for its users, enabling high-resolution insights and precise material characterisation. Through active participation in leading research projects and close collaboration with major players in electron microscopy and microanalysis, TESCOAN has secured a prominent position in the world of nano- and microtechnology. Its growing global presence reflects a strong reputation for scientific excellence and innovation.

Participants

Colin Edwards, Sales Manager

Jeremie Silvent, Sales and Marketing Manager



Fidgeon and Stresstech

[Fidgeon](#) has been a trusted supplier to non-destructive testing (NDT) industries for over 40 years. During this time distributorships have been formed with many of the world's leading NDT equipment & consumable manufacturers. Earlier in 2019 Fidgeon Limited became the UK and Ireland agent for Stresstech Oy and their products.

[Stresstech](#) has been providing non-destructive and destructive testing solutions for over 30 years, supporting process control and quality inspection across industries. Headquartered in Finland, with additional offices in Germany and the United States, Stresstech operates a global network of sales and service representatives to meet the needs of customers worldwide. Stresstech serves the manufacturing industry, research institutes, universities, and quality assurance organisations by delivering high-quality testing equipment and expert knowledge. With expertise that spans the entire spectrum—from fundamental science to industrial production—Stresstech brings comprehensive insight and innovation to every solution it provides.

The company's mission is to support quality control and materials research by equipping clients with reliable and effective tools. Its vision is to ensure that all manufactured components are sustainable, reliable, and safe. By developing science-based, user-friendly testing solutions, Stresstech aims to make advanced quality control accessible and valuable for every manufacturer within its target industries.

Participants

Scott Nixdorf, Technical Sales

Matthew Maskery, Technical Sales



COMSOL

[COMSOL](#) is a leading developer of mathematical modelling software, empowering innovation across physics, engineering, and scientific research. Its flagship product, COMSOL Multiphysics®, is widely used in engineering, manufacturing, and academia to model complex multiphysics systems, enabling users to understand, predict, and optimize designs and processes with confidence.

Beyond traditional simulation, COMSOL enables users to create and share custom simulation apps based on their models, extending the power of simulation to collaborators both within and beyond the core modelling community.

COMSOL's mission is to provide intuitive, powerful software solutions that address engineering challenges, while supporting users in making the most of their modelling capabilities. With a strong commitment to usability and scientific rigor, COMSOL continues to advance its technology to serve as the go-to tool for engineers, researchers, and educators involved in high-tech product development and academic instruction.

Participants

Alex Brown, Academic Sales Engineer

Robbie Balcombe, Technical Director



Deben UK Ltd

[Deben UK Ltd](#) is a globally recognised designer and manufacturer of advanced accessory products for Microscopy and Computed Tomography (CT) systems. Deben specialises in providing technical solutions for researchers and scientists conducting a wide range of in situ testing, including, but not limited to, tensile and compression testing, environmental control (heating and cooling), and electron and X-ray detection. Their products are widely compatible with systems from leading original equipment manufacturers, supporting techniques such as SEM, Optical Microscopy, AFM, XRD, X-Ray CT, TEM, and Synchrotron applications, enhancing the value and versatility of users' existing equipment.

In addition, Deben offers a comprehensive range of SEM chamber accessories, including heating and cooling stages, STEM, backscattered detectors, cathodoluminescence detectors, and chamberscopes. With a strong focus on quality, performance, and usability, Deben UK delivers expert customer service and technical support from its UK headquarters and through a trusted network of global agents, ensuring reliable assistance and solutions for customers worldwide.

Participants

John Gilbert, Support Engineer

Ed Brown, Principal Engineer and R&D Manager

Stephen Zeller, Sales Director

STFC-ISIS Neutron and Muon Source

The [ISIS Neutron and Muon Source](#), located at the STFC Rutherford Appleton Laboratory in Oxfordshire, is a world-leading centre for research in the physical and life sciences. Operated by the Science and Technology Facilities Council (STFC)—part of UK Research and Innovation (UKRI)—ISIS provides unique tools that help scientists explore the structure and behaviour of materials at the atomic scale.

By producing beams of neutrons and muons, ISIS enables cutting-edge, non-destructive experiments that are not possible with other techniques. These beams are used in a suite of highly specialised instruments, often referred to as “super-microscopes”, each tailored for specific scientific investigations.

Serving a vibrant national and international user community of more than 2,000 researchers, ISIS supports pioneering work across a broad range of disciplines, including physics, chemistry, materials science, engineering, geology, and biology. Its mission is to harness neutrons and muons to advance knowledge and improve lives, and its vision is to lead the world in the development and application of neutron and muon science, technology, and instrumentation.

Participants

Ruiyao Zhang, Industrial Liaison Scientist

Diamond Light Source (DLS)

[Diamond Light Source](#) is the UK’s national synchrotron facility, located at the Harwell Campus in Oxfordshire. Functioning like a giant, ultra-powerful microscope, Diamond accelerates electrons to near light speed, producing intensely bright light—10 billion times brighter than the sun. This light is directed into state-of-the-art laboratories, called beamlines, where researchers use it to study a vast range of materials at the molecular and atomic level. From exploring ancient fossils and artworks to advancing drug development, vaccine design, and next-generation engineering, Diamond supports groundbreaking research across physical, life, and environmental sciences. Its capabilities allow scientists to investigate everything from virus structures to jet engine alloys—at a scale 10,000 times more powerful than a traditional microscope. Diamond Light Source is a not-for-profit limited company funded as a joint venture between UK Research & Innovation (UKRI) and Wellcome Trust. Diamond provides national science infrastructure that is free at the point of use.

Participants

Konstantin Ignatyev, Principal Beamline Scientist (I18)

Uyanga Jargalsaikhan, Surrey-DLS joint PhD



Surrey Ion Beam Centre

The [Surrey Ion Beam Centre](#) is the lead site for the UK National Ion Beam Centre and sits within the Advanced Technology Institute of the University of Surrey. The Surrey Ion Beam Centre is a world-leading research facility specialising in ion beam technology, offering cutting-edge capabilities that support breakthroughs in nanotechnology, semiconductors, quantum computing, biosciences, and healthcare.

Equipped with five state-of-the-art ion implanters—including two dedicated single-ion implantation systems for quantum device development—the Centre provides a unique platform for tackling fundamental materials challenges. Its advanced infrastructure enables a wide variety of research using ion implantation, ion beam analysis, and complementary facilities.

The Centre's mission is to promote and enable world-class ion beam research for UK academia, industry, and global collaborators. It also plays a vital role in training and educating researchers in ion beam applications and transferring knowledge to industry and universities alike.

Through strong partnerships, technical excellence, and innovation, the Surrey Ion Beam Centre remains at the forefront of scientific discovery—helping shape a more advanced and sustainable technological future while contributing to the prosperity and competitiveness of UK industry.

Participants

Nianhua Peng, Liaison Fellow



**FACULTY OF ENGINEERING
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