Free Workshop
July 6

OPTICAL MEASUREMENT OF ENGINEERED SURFACES

UNIVERSITY OF BIRMINGHAM

aicona
INVITATION

Free Workshop, 6th July, 2016
hosted by the University of Birmingham and Alicona

The workshop is organised by Alicona UK and is kindly being hosted by Professor Stefan Dimov at the Advanced Manufacturing Technology Centre at Birmingham University.

This workshop will explain the processes involved and the results of on machine closed loop measurement, the modern approach to shot peening as a finishing technique and the role of the National Physical Laboratory in Surface Engineering. All display the advantages of using optical metrology over conventional tactile methods in the modern manufacturing environment.

Places are limited and will be allocated on a first come first served basis. You can register via the e-mail address shown below.

The workshop will take place at:
University of Birmingham
Department of Mechanical Engineering
School of Engineering
Edgbaston B15 2TT

Registration
The workshop is free, however, registration is required before June 27th, 2016: metrology@alicona.com

AGENDA

9:00 am–10:00 am
Registration and coffee

10:00 am–10:15 am
Introduction and Alicona Company Presentation
Brian Kyte, Director of Alicona UK Ltd

10:15 am–11:00 am
Focus variation - based system-level tools for laser micro processing
Dr Pavel Penchev, Laser Micromachining Group, Birmingham University

11:00 am–11:45 am
The Role of the National Physical Laboratory in Surface Engineering
Eric G Bennett, Senior Research Scientist, Advanced Engineered Materials Group, NPL

11:45 am–12:00 am
Coffee and tea break

12:00 am–1:00 pm
The use of shot peening in surface treatment
Colin McGrory, Technical Director, Sandwell UK Ltd

1:00 pm–2:00 pm
Lunch

2:00 pm–4:00 pm
Laser texturing and Alicona optical 3D measurement
» Demonstrations
» Live measurements

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Focus variation - based system-level tools for laser micro processing

Dr Pavel Penchev, Laser Micromachining Group, Birmingham University

The talk will present the development of three generic integration tools based on the Focus Variation (FV) technology for improving the system-level performance of reconfigurable LMM platforms. In particular, the presentation will describe:

» The design and implementation of modular workpiece holding device for integrating LMM with FV-based inspection and other processing modules
» Automated work-piece setting up employing FV in-line and in-process measurements
» The use of FV measurements for performing close-loop multi-axis LMM machining employing rotary stages

An experimental validation of their accuracy, repeatability and reproducibility (ARR) on a representative state-of-art LMM platform will be discussed. The results will demonstrate the in-line and in-process capabilities of the FV technology to address important system-level issues in LMM.

The Role of the National Physical Laboratory in Surface Engineering

Eric G Bennett, Senior Research Scientist, Advanced Engineered Materials Group, NPL

After a short overview of NPL and a deeper insight into the role of the Materials Division and the evaluation of Surface Engineering, the talk will address the measurement and the characterisation of the processes which degrade the surfaces of materials. These surfaces may have been coated with additional layers to improve for service life under adverse operating conditions. These processes include wear, erosion, corrosion, fatigue and fracture. After testing or having been in use, all of these surfaces have topography which cannot be easily visualised using an optical or scanning electron microscope.

The technological revolution which has occurred in the last 20 years or so with computing capability and software have made the capture of datasets which allow 3D images to be constructed quickly and accurately. These 3D datasets allow quick and easy measurement of parameters such as height, primary profiles, roughness and volume.

Examples of how these surfaces are measured and why will be given. Also, how 3D microscopy has been used in an international “Round Robin” to determine the causes of uncertainty in hardness measurements of hardmetals using both Vickers and Rockwell tests.

The use of shot peening in surface treatment

Colin McGrory, Technical Director, Sandwell UK Ltd

As designers are very specific about using certain materials for certain components it is important that the manufacturing processes maintain those required material properties. The journey through manufacturing often results in both positive and negative stresses being introduced to the material.

There are a number of techniques including heat treatment, coatings and vapour deposition processes to maintain or enhance the material performance, but shot peening remains fundamental to providing a controlled method of reducing manufacturing stresses and significantly increasing fatigue life.

This discussion will aim to demonstrate the effects on material and component performance and the change in surface state as a result of shot peening methods.
Colin McGrory
Sandwell UK Ltd

Colin has a background in Aerospace working as a Metallurgist at Lucas Aerospace before moving into Formula 1 Racing.
He worked as a Quality Engineer and set up the first shot peening cell in F1. He progressed to Research Engineer working on various projects before being employed by Jackie Stewart in 1996 to set up Stewart Grand Prix, later to become Jaguar Racing and Red Bull Racing.
In 2002 he left Jaguar Racing to concentrate on his own business and developed Sandwell Uk Ltd to meet the needs of the F1 industry. This business has now grown and encompasses many industries but with F1 still at its core.
Sandwell participates in partnership with other companies on various research projects primarily focussed on surface engineering.
Colin is also on the SAE Standards Committee for surface enhancement.

Pavel Panchev
University of Birmingham

Pavel Penchev received the BEng degree in mechanical engineering from the University of Birmingham, UK, in 2012 and the Ph.D. degree in laser micro-processing from the University of Birmingham, UK, in 2016.
Since 2015, he has been a Research Fellow in the Laser Micromachining Group within the AMTC at the University of Birmingham. His research interest broadly centres on the implementation of reconfigurable laser platforms for addressing challenging technological requirements of complex multi-length scale products and on the generic system-level tools and techniques for improving the machine tool performance of reconfigurable laser processing platforms in relation to their process reliability, flexibility and robustness.

Eric G Bennett
NPL

Eric joined the National Physical Laboratory as an Assistant Scientific Officer in 1981.
In 1986 Eric became a Fellow of the Royal Microscopical Society and has been a member or co-opted member of the Materials Section since then. In 2014 he was elected as Chair of the Materials Section until it became the Engineering and Physical Science committee at which point he was elected to Council of the RMS.
He is the NPL Technical Expert (UKAS accreditation to ISO 17025) for Vickers hardness measurement of metallic materials as well as “The measurement of microstructural features using image analysis”. He is also a member of two BSI committees, ISE/065 Sintered metal components and CPW/172 Optics and Photonics.

For questions and registration please contact metrology@alicona.com