



 **techdays**  
15. - 17.06.2021 Metrology meets Production

Bruker alicona

# TechDays 2021

3 Days | 21 Speakers



## Event Facts

1

Event Platform

3 Days

15-17 June 2021

21

Speakers

16

Companies

17

Sessions

1

Round Table

## Experience the TechDays 2021!

17 lectures by 21 international speakers from Germany, Switzerland, Austria, France, UK and USA offer you an exciting, varied and interactive lecture program over 3 days.

With our guests from research and production, we will discuss trends in machining, focus on newer processes such as additive manufacturing and talk about automated production processes by linking robotics, artificial intelligence and measuring equipment.

Be there and ask your questions - we look forward to seeing you!

# Agenda

## Day 1 | 15 June



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9:00 am – 9:30 am

### Hans-Christian Möhring

Director Institute for Machine Tools IfW  
University of Stuttgart  
Germany



### Optimization of manufacturing processes through optical measurement technology

Machines networking is one of the major topics at the Institute for Machine Tools at the University of Stuttgart (Germany). Research is dedicated to machines networking and technologies to implement self-optimizing production manufacturing strategy. One focus of its research activities is process control of e.g., additive-subtractive process chains with automated measurement technology. An example where this is successfully applied is wear analysis. Prof. Christian Möhring describes which methods are used in milling technology to understand, for example, wear mechanisms as well as the correlation between the workpiece surface machining and surface condition. This discussion with Bruker Alicona Managing Director Christian Janko also focuses on the role of metrology in various manufacturing processes. It addresses particularly the production of functionally relevant surface structures, a clear trend that will increase the importance of sensor technology in metrology.

9:45 am – 10:15 am

### Martin Reisacher

Head of R&D  
DMG MORI Ultrasonic Lasertec  
Germany



### What does the ideal measurement technology in laser technology look like? A discussion about what measuring equipment manufacturers promise, what works in practice and what the visions for the future are

DMG MORI is a leading global manufacturer of machine tools. Holistic automation and end-to-end digitization solutions extend the core business of turning and milling machines, advanced technologies (ULTRASONIC, LASERTEC) and additive manufacturing.

In laser precision machining, as in all areas for turning, milling, grinding and laser technologies, cross-process know-how is combined with innovative technology solutions. This opens highly efficient machining strategies and new economic opportunities for the user in the production of technical surface structures, diamond tools, fine cavities and engravings, (micro) drilling and additive manufacturing of metal components. The more complex the geometries of the components, the more demanding the metrological challenges. With DMG MORI ULTRASONIC | LASERTEC, we talk about what measuring equipment is in use and what requirements it must meet. With hole measurement, whose accuracy is verified using a special hole standard, Martin Reisacher, Head of Research and Development, also presents an innovation in quality assurance.

# Agenda

## Day 1 | 15 June

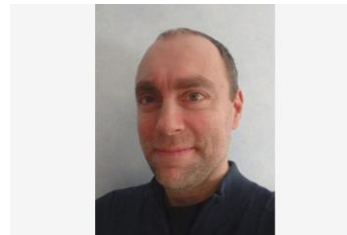


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10:30 am – 11:00 am

### Michaël Fontaine

Assistant Professor  
ENSMM, Micro Mechanics Engineering School  
France



### Why new measurement methods are needed to make new manufacturing technologies measurable

Development and optimization of new technologies for production of components with tolerances in the single-digit  $\mu\text{m}$  range is one of the core activities of MIFHySTO, a facility at FEMTO-ST research institute in Besançon, France. Michael Fontaine's research deals, amongst other projects, with the question on how to increase machining accuracy of micro-machining machines. Industrial partners are often very good at producing parts but are facing challenges in terms of controlling them. In this interview with Anne Calvez from the French Bruker Alicona team, Michael will present how optical metrology can particularly help to optimize micro EDM, turning and milling manufacturing processes through 3D metrology learnings on machined surfaces and tools. Applications presented include wear analysis, GD&T measurements and surface roughness measurement of tools and micro precision parts. In addition, new fields of use such as measurement of nano textures on steel, carbide or coating is presented. Also under discussion is why established measurement methods available in his lab are no longer sufficient for some applications and what new technologies are needed to make new production technology possibilities measurable.

11:15 am – noon

### Michael Marxer

Lecturer for Production Metrology  
Eastern Switzerland University for Applied Sciences  
Switzerland



### Role of production metrology and future challenges

Production metrology in today's understanding started with the industrialization. Beside shopfloor measuring equipment, highly specialized measuring equipment such as form testers, comparators and many others were developed. With the introduction of CMMs in the years after 1960 things began to further develop. Today, there is a wide range of sensors available that can be even used in collaboration and chosen taking the measurement requirements into account. With production metrology, information is generated, among other aspects, for feedback loops with design, for controlling the manufacturing processes and for quality assurance. One important role of production metrology is to deliver reliable information for taking decisions. Results for taking these decisions need to be available fast, with high information, low measurement uncertainty as well as in a flexible, comparable procedure. At the same time, they need to be provided in an economical way. These challenges increase if today's metrology needs are investigated such as metrology for continuously smaller and more complex parts with tighter tolerances e.g. optical or integrated micro components or as well for continuously bigger parts e.g. wind turbine parts. In-process/In situ can be one answer to overcome some of the challenges.

# Agenda

## Day 1 | 15 June



2:00 pm – 2:30 pm

### David Scherrer

Business Development Manager  
Universal Robots  
Austria



## Humans, robots and measurement technology - one of the latest success stories in automation

It's hard to imagine industrial manufacturing without cobots from Universal Robots (UR). Almost everywhere you look, you see collaborative robotic arms in a wide variety of designs for every conceivable application, from machine loading, welding, gluing, palletizing - to name just a few of the most common applications. UR Business Development Manager David Scherrer will present what has made UR a market leader for cobots since its foundation in 2005 and the philosophy behind the successful product. Furthermore, OEM cooperation with Bruker Alicona will be in focus: What makes the combination of UR robots with Bruker Alicona's high-resolution optical 3D measurement sensors so unique? Examples from practice illustrate the high compatibility of the two manufacturers and illustrate the advantages for users in automation.

# Agenda

## Day 2 | 16 June



9:00 am – 9:30 am

### Richard Leach

Professor in Metrology  
University of Nottingham  
UK



### Towards uncertainty evaluation with optical coordinate metrology

Coordinate metrology is mainly applied to ensure production quality. Prof. Richard Leach introduces the different types of coordinate metrology and how they differentiate. In particular, the difference between traditional tactile (contact) technologies and new optical methods are discussed in detail. One of the key aspects in terms of verifying measurement accuracy is the use of standards and how measurement uncertainty comes into play. Here, Richard Leach will focus on how this is handled in relation to optical coordinate metrology. Also, an outlook on further developments in the field of calibration for coordinate measurement technology is given.

9:45 am – 10:30 am

### Vivian Schiller

Research Associate  
Karlsruhe Institute of Technology  
Germany



### Higher efficiency, better product quality, function prediction in micro gearing – production integrated optical measurement technology makes it real!

Key functions of complex products can often only be realised by using high-precision components. The production of micro-components close to the technological limits, which often have tolerances of only a few  $\mu\text{m}$ , represents a major challenge for manufacturing. The wbk Institute of Production Science at KIT is researching approaches of function-oriented quality assurance of micro gears. The vision is to implement intelligent quality control loops by integrating in-line measurement technology into production systems, which will improve product quality as well as increase efficiency in production. The combination of measurement data with artificial intelligence is intended to optimise not only the quality of the manufactured gears, but also the functional behaviour of the end product. Based on the functional predictions, strategies for adaptive manufacturing and intelligent assembly of micro-gears are to be developed. The optical micro-coordinate measuring machine  $\mu\text{CMM}$  is used for in-line metrological acquisition during micro-gear production

# Agenda

## Day 2 | 16 June



Bruker alicona

10:45 am – 11:15 am

### Frank Uibel

Managing Director  
Uibel Consulting  
Germany | Session Language 



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#### Einpresszonen messtechnisch bewerten – was muss ein Messsystem bieten, um entscheidende Geometrien präzise messen zu können & damit eine Bewertung von Einpresszonen zu ermöglichen?

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Alle Einpresszonen, die am Markt verfügbar sind, weisen eine Gemeinsamkeit auf: Die Geometrie ist ein entscheidender Faktor für eine sichere, stabile, gasdichte und gut leitende Verbindung. Messtechnisch heißt das, es müssen komplexe geometrische Merkmale wie Kantenradien, Hüllkreise an bestimmten Positionen oder Übergänge wie der von der Einpresszone zur Einpresszonenspitze geprüft werden. Frank Uibel, langjähriger Experte und Unternehmensberater in der Einpress- und Stanztechnik, unterhält sich mit Bruker Alicona Vertriebsleiter Urban Muraus darüber, worauf es bei einem Messsystem ankommt und spricht vor allem über Anforderungen an Präzision, Messgeschwindigkeit und Benutzerfreundlichkeit.

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11:30 am – 12:15 pm

### Steffen Schoellhammer

Manager Toolshop | TE Connectivity  
Germany | Session Language 



### Uwe Soldner

Manager Toolshops EMEA | TE Connectivity  
Germany | Session Language 



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#### Was macht eine effiziente Produktion aus? Das Beispiel Steckerverbindungen zeigt: Ein Messmittel in mehreren Stadien der Fertigung einsetzen können!

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Die Ansprüche aller Branchen an Steckerverbindungen sind hoch. Reduzierte Größe und geringer Stromverbrauch bei gleichzeitig höherer Leistung in auch rauen Umgebungen sind typische Qualitätsanforderungen an die elektronischen Bauteile. Höchste Präzision, verifiziert mit moderner Messtechnik ist daher eine der obersten Prämissen, die bei TE Connectivity während des gesamten Fertigungsprozesses gelebt wird. Uwe Soldner, Toolshop Manager EMEA, und Steffen Schoellhammer, Toolshop Manager am Standort Wört, sprechen mit uns über effiziente Produktion und wie Messtechnik zu dieser Effizienz beitragen kann. Ein Aspekt ist, dass ein Messverfahren von der Werkzeugentwicklung bis hin zur Qualitätsprüfung des Endprodukts in mehreren Phasen der Produktion angewendet wird. Ebenfalls Diskussionsgegenstand in dieser Runde: Wo liegen die Stärken und Schwächen eines CTs im Vergleich zu einem optischen KMG?

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# Agenda

## Day 2 | 16 June



2:00 pm – 2:30 pm

### Thomas Lankmair

Director Application Competence Center  
Bruker Alicona  
Austria



### Automatic defect detection: One of many new possibilities artificial intelligence creates in measurement technology

Artificial intelligence has already found its way into many areas of our everyday life. Common devices such as our smart phones have capabilities that were only dreamed of a few years ago. Machines learn from experience and as a result can solve the most complex problems. This is primarily made possible by new types of algorithms, improved computing power and a large amount of collected data. These decisive developments also expand the spectrum of possibilities for manufacturers of measuring equipment. At Bruker Alicona, we use AI in algorithms for measuring high-resolution 3D optical data, and for automatic evaluation of this same 3D dataset. In this session, Thomas Lankmair, Head of Application Competence Center (ACC) at Bruker Alicona, will show which measurement jobs can be solved based on AI. He will present applications that would have been difficult or impossible to solve using conventional methods. These also include an AI-based solution for automatic defect detection and measurement. We will also show you how you will be able to soon integrate AI into your measurement technology independently.

2:45 pm – 3:30 pm

### Kevin Mathy

Application Expert  
Bruker Alicona  
Austria



### Automation and digitalization in the age of Industry 4.0 – What answers does measurement technology provide?

Industry 4.0, digitalization and robotics are buzzwords omnipresent in our everyday lives. What impact do these developments have on coordinate measuring technology? What will be required of measuring systems to comply with highly connected manufacturing environment in the future? These questions are addressed by Bruker Alicona application expert Kevin Mathy together with Thomas Lankmair, Head of Application Competence Center (ACC). We will give you an insight into how we, at Bruker Alicona, are responding to these rapid developments and what automation solutions are available for you. Our solution array includes offerings for cutting edge measurement, measurement of shape and position of complex components as well as software packages based on artificial intelligence.



# Agenda

## Day 3 | 17 June



9:00 am – 10:00 am

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### Round Table Additive Manufacturing: Trend analysis, advantages and visions of additive manufacturing methods

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There is hardly any manufacturing process that has shaken up the existing technology landscape in recent years as much as additive manufacturing. Production of complex single parts with many free-form surfaces, customized applications or individually designed components are just some of the advantages attributed to additive processes. Manufacturing companies speak of increased agility and flexibility even in the production of small quantities. Questions remain: What else needs to be done in additive manufacturing? What are current research activities? What potential for optimization still exists compared to subtractive processes? And what can metrology achieve here? These and other questions will be discussed in the 1st Bruker Alicona Round Table with experts from research and industry. Our experts are Robin Day from the Fraunhofer Institute for Production Technology (Germany), James Hunt from the Advanced Manufacturing Research Center (AMRC, UK) and Henry Greenhalgh from the international manufacturer HIETA Technologies (UK), specialized in the use of Additive Manufacturing (metal 3D printing), particularly in the areas of thermal management and light-weighting. We look forward to the exchange with our guests and your questions!

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#### Robin Day

Head of Department „Directed Energy Manufacturing“  
Fraunhofer Institute for Production Technology IPT  
Germany



#### James Hunt

Head of Strategy for Additive Manufacturing  
AMRC, University of Sheffield  
UK



#### Henry Greenhalgh

Engineer  
HiETA Technologies  
UK



# Agenda

## Day 3 | 17 June



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10:30 am – 11:00 am

### Franz Helmlí

R&D Director | Bruker Alicona  
Austria



### Stefan Lehmann

Software Developer | Bruker Alicona  
Austria



## Accuracy and usability - How the $\mu$ CMM optical coordinate measuring system meets these requirements

Measurement accuracy when verifying complex geometries and high usability are typical requirements that users place on a measuring system. In this session, R&D Manager Franz Helmlí will present how Bruker Alicona meet these requirements in relation to the features and possibilities offered by our optical  $\mu$ CMM coordinate measurement system. The focus of this session will be a presentation of MetMaX operator software, which is designed to ensure that users do not need to have any special metrology knowledge to perform robust measurements. This session features measurement planning in CAD, measurement automation as well as reporting functionalities. Accuracy and measurability of complex geometries will be illustrated with a connector measurement. This measurement clearly shows how the two technologies, Focus Variation and Vertical Focus Probing, interact here and enable the precise, optical 360° measurement of components with vertical walls.

2:00 pm – 2:30 pm

### Soran Jota

Managing Director  
Otec Präzisionsfinish  
Germany



## Smoothing, polishing, rounding and deburring - How measurement technology can ensure process efficiency in edge preparation

Some things do not change, even with continuous technology advances. In the past and today, machine tool manufacturers must produce components with perfect surface quality and ensure the process reliability of their production strategy. Innovative technologies have always made a decisive contribution to competitive advantage. Soran Jota from OTEC Präzisionsfinish management has been using Bruker Alicona's Focus Variation for a decade. He reports first-hand how the reliability of his processing machines as well as the quality of drill components, milling cutters and gear parts could be optimized using this measurement technology. With the launch of a new mass finishing machine, OTEC is currently preparing the next step in its quality assurance strategy by measuring in the machine. Soran Jota talks to Bruker Alicona Sales Manager Urban Muraus about how this is intended to work in production.

# Agenda

## Day 3 | 17 June



2:45 pm – 3:15 pm

### Franz Helmlí

R&D Director | Bruker Alicona  
Austria

### Kerstin Zangl

Software Developer | Bruker Alicona  
Austria



### A short ABC of standards in measurement technology: Overview of applicable standards, background information and outlook

Since its foundation in 2001, Bruker Alicona has been actively involved in the development and publication of international standards. Among other institutions, R&D Manager Franz Helmlí is a member of the "International Organization for Standardization" (ISO) and is present in several working groups on form and roughness measurement. In this presentation, he will give a detailed overview of the most important standards currently in force in coordinate metrology and roughness measurement, address current problems and present what is planned for the future. He will also report on the status quo of the new VDI guideline on cutting edge measurement, which should massively simplify the daily work for tool manufacturers and users by providing new standards for measuring and evaluating edges and radii.

4:00 pm – 4:30 pm

### Trent Woodcock

Application Engineer  
Third Wave Systems  
US



### Accelerating new process introduction for machining applications: How metrology can enable physics-based analysis of material behavior

With Trent Woodcock, Applications Engineer at Third Wave Systems (TWS)/US, we are happy to uncover the role of metrology in machining analysis. TWS is one of the premier Computer Aided Engineering (CAE) provider for companies that machine. Their technology helps to dramatically reduce the cost of machined components, accelerate design cycles, improve part quality, and get to market faster. The Bruker Alicona system is situated in their Testing and Validation Center to perform accurate and repeatable measurements of inserts and solid end mills. Advanced metrology has enabled TWS to further understand material behavior in high stress/strain cutting scenarios. Their detailed analysis of temperature, stress, and chip flow enable users to identifying optimal process conditions and understand the impact on tools and machined surfaces. In an interview with Faran Misaghi, a member of the Bruker Alicona US team, Trent will discuss a use case in the Aerospace and Defense industry. A study that significantly reduced the process of selecting the cutting tool best suited for high efficiency machining of titanium.

# Agenda

## Day 3 | 17 June



4:45 pm – 5:30 pm

### Mark Raleigh

Managing Director  
EDM Intelligent Solutions  
US



### EDM or laser? How to achieve the highest possible precision and efficiency in manufacturing

It is a controversial debate in industry: Are laser processes increasingly replacing EDM (Electrical Discharge Machining) technologies? Mark Raleigh from EDM Intelligent Solutions shares this opinion only to a limited extent. He still sees applications where EDM is the better technology and combines the strengths of the tried and tested with the advantages of the new technique. Consequently, he increases both efficiency and product quality in production by applying highest possible machining precision and machining speed. In this interview with Bruker Alicona General Manager Christian Janko he highlights the differences and similarities between the two processes and explains the metrological challenges he sees in the quality assurance of relevant component characteristics.

# Your Speakers

## TechDays 2021

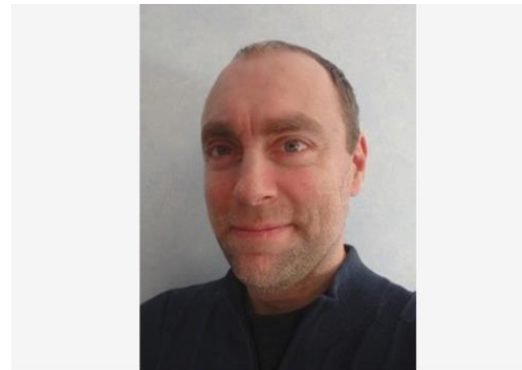


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**ROBIN DAY**

Head of Department „Directed Energy Manufacturing“ |  
Fraunhofer Institute for Production Technology IPT



**MICHAEL FONTAINE**

Assistent Professor |  
ENSMM, Micro Mechanics Engineering School



**HENRY GREENHALGH**

Materials and Applications Engineer |  
HiETA Technologies



**FRANZ HELMLÍ**

R&D Director | Bruker Alicona



**JAMES HUNT**

Head of Strategy for Additive Manufacturing |  
AMRC, University of Sheffield



**SORAN JOTA**

Managing Director | Otec Präzisionsfinish

# Your Speakers

## TechDays 2021



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**THOMAS LANKMAIR**  
Director Applications Competence Center | Bruker Alicona



**RICHARD LEACH**  
Professor in Metrology | University of Nottingham



**STEFAN LEHMANN**  
Software Developer | Bruker Alicona



**MICHAEL MARXER**  
Lecturer for Production Metrology |  
Eastern Switzerland University for Applied Sciences



**KEVIN MATHY**  
Application Expert | Bruker Alicona



**HANS-CHRISTIAN MÖHRING**  
Director Institute for Machine Tools IfW |  
University of Stuttgart

# Your Speakers

## TechDays 2021



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**MARK RALEIGH**  
Managing Director | EDM Intelligent Solutions



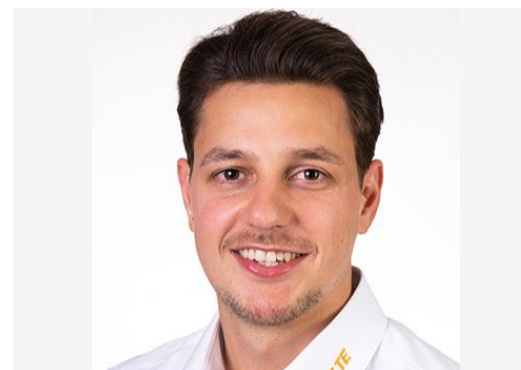
**MARTIN REISACHER**  
Head of R&D | DMG MORI Ultrasonic Lasertec



**DAVID SCHERRER**  
Business Development Manager |  
Universal Robots



**VIVIAN SCHILLER**  
Research Associate | Karlsruhe Institute of Technology



**STEFFEN SCHOELLHAMMER**  
Manager Toolshop | TE Connectivity



**UWE SOLDNER**  
Manager Toolshops EMEA | TE Connectivity

# Your Speakers

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**FRANK UIBEL**  
Managing Director | Uibel Consulting



**TRENT WOODCOCK**  
Application Engineer | Third Wave Systems



**KERSTIN ZANGL**  
Software Developer | Bruker Alicona



# Your Hosts

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**CHRISTIAN JANKO**  
General Manager | Bruker Alicona



**URBAN MURAU**  
Sales Director | Bruker Alicona



**ANNE CALVEZ**  
Head of Sales France | Bruker Alicona



**FARAN MISAGHI**  
Systems Sales & Customer Service | Bruker Alicona