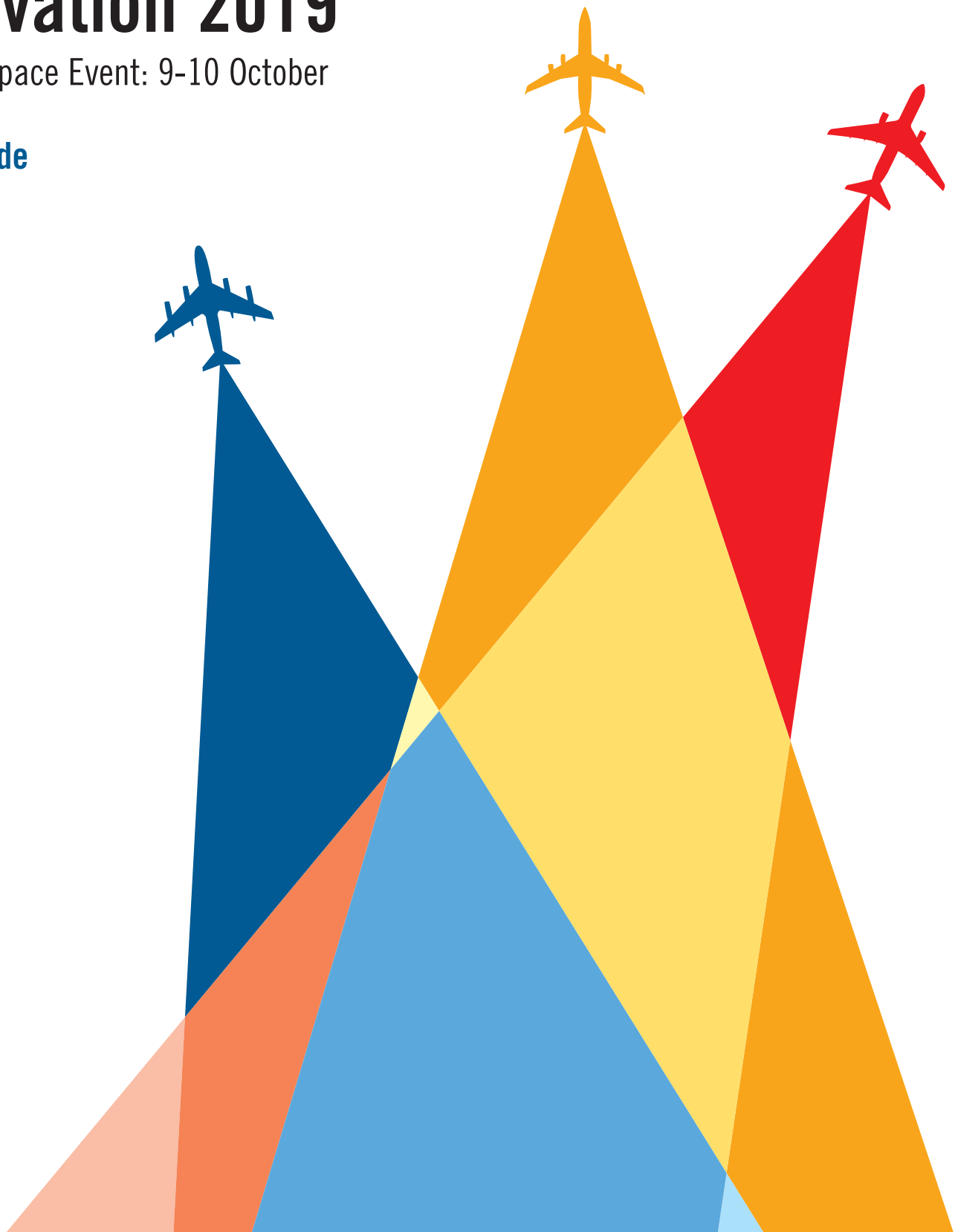
INSPIRATION THROUGH INNOVATION
9-10 OCT 19

SECO

Inspiration through Innovation 2019

The Aerospace Event: 9-10 October

Event guide



All clear for take off!

Welcome!

This year Inspiration through Innovation is focused exclusively on the aerospace segment and, working in close collaboration with over 25 technical partners, we have created an event that is both relevant and practical - as well as being innovative and inspirational.

Over the two days, there are nine machining demonstrations taking place. All have been designed in conjunction with our technical partners. And all are either actual customer components or replicate specific features and details found on real aerospace parts.

In addition to the machining demonstrations, a topical, manufacturing issues-based Seminar Programme will run over both days. These seminars, each one led by an industry expert, are informative and thought-provoking.

The event will also feature a business-to-business area to help encourage conversations that foster collaborative partnerships.

With Inspiration through Innovation, we've designed an environment of innovation and co-creation that celebrates best-practice in aerospace manufacturing. Thanks for joining us.

Mike Fleming,
Strategic Marketing, Products & Services Manager,
Seco Tools (UK).

CONTENTS

Innovation Hub:

Great minds like a think

innovationhub

Imagine a place that's been specifically designed for component manufacturers. A place where they can find time to think. A place where they can discuss their current and future machining issues and challenges with a range of technology experts and partners. And a place where they can work securely and collaboratively, in specially constructed project teams, designing and optimising machining processes.

Welcome to Innovation Hub - a new concept in precision machining that is focused on continuous improvement and on helping component manufacturers achieve dramatic improvements in productivity, performance and profitability.

INNOVATION HUB: THE ADVANTAGES

Meet and talk directly with technology partners from key technologies used in machining processes:

- machine tools
- CAD-CAM
- work holding
- tooling
- metalworking fluids
- metrology
- automation
- etc.

Engage with these partners about your machining challenges and your future and existing projects, tapping into their knowledge and expertise.

Work in collaboration with a specifically designed project team (comprising selected technology partners), focused on delivering significant, scalable and repeatable productivity improvements and/or cost reductions.

The **Innovation Hub** concept is a logical extension of Seco's annual **Inspiration through Innovation** manufacturing best-practice event which, since its inception in 2014, has promoted the benefits of teamwork and demonstrated the advantages that can be obtained from adopting collaborative approaches to problem solving.

At this year's Inspiration through Innovation event, focused on the aerospace segment, the power of positive partnerships and of collaboration in action can be seen clearly in the nine machining demonstrations, involving more than 25 different technical partners.

Target 50 (T50):

Let's talk BIG numbers

Because we have operated in highly-competitive manufacturing environments for so long, we have been conditioned to believe that any competitive advantage achieved by any manufacturer can only be marginal in nature and short-lived.

We beg to differ. With Target 50 (T50 for short), we're doing something quite unique in the world of component manufacturing.

T50 - WE DON'T DO INCREMENTAL

target50

T50 is ambitious and is about achieving stretch targets.

At its heart is a commitment to challenge the 'status quo' by using and fully exploiting the potential of new and emerging technologies.

Through T50 we aim to optimise a customer's manufacturing processes by either:

DOUBLING THEIR PRODUCTIVITY

or

REDUCING THEIR OPERATIONAL COSTS BY HALF

Such impressive performance gains do not happen by chance but are achieved when customers become part of the Innovation Hub and work collaboratively with hand-picked teams of technical partners on their particular machining or manufacturing projects.

Knowledge sharing and knowledge transfer are key ingredients to the success of these individual customer projects. And the interchange of innovative thinking and recognised best-practice occurring within the positive 'can-do' atmosphere of the Innovation Hub produces real business benefits and synergies.

Inspiration through Innovation: Flight plan

Aerospace component machining demonstrations

Look - the part

In conjunction with a number of our technical partners we have organised 9 different machining demonstrations for this year's Inspiration through Innovation event.

All the demonstrations taking place are innovative, challenging and relevant to aerospace component manufacturers and the aerospace supply chain.

The machining demonstrations selected are actual (recently machined) customer components or replicate specific machined details or features from real customer parts.

The demonstrations highlight how, by working collaboratively with technical partners and by harmonising different technologies, significant improvements in productivity, component accuracy, surface finishes and process reliability can be achieved.

Machining demonstration 1
Aluminium aircraft hinge

The focus:
Improve productivity

Machining demonstration 2
Inconel aero-engine disc

The focus:
Cycle time reduction and achieving a superior surface finish

Machining demonstration 3
A350 fuel connector

The focus:
One hit machining and process optimisation

Machining demonstration 9
Titanium and Inconel blisk segments

The focus:
Rigid machine setup and process optimisation

Machining demonstration 4
Titanium wing pylon

The focus:
High metal removal rates using tools with long overhangs

Machining demonstration 5
Titanium blisk

The focus:
5-axis machining process reliability and security

Machining demonstration 8
Inconel combustion chamber

The focus:
Achieve high component accuracy and surface finish

Machining demonstration 7
Blade tip repair

The focus:
Process efficiency and effectiveness using additive/subtractive technology

Machining demonstration 6
Composite passenger aircraft seat

The focus:
Component quality and surface integrity

Machining demonstration 1:

Aluminium aircraft hinge

- Material: **Aluminium**
- Technologies: **Twin spindle machine, Renishaw Equator, Automated pallet system**
- Technical partners:

  Machine: Chiron DZ15 provided by Engineering Technology Group
  Coolant: Quaker Houghton
  Metrology: Renishaw
  Coolant Saver: Wogaard
  Tools: Seco

FUNCTION/PURPOSE:

Aerospace hinges are high precision components and possess a very high strength-to-weight ratio. These hinges are embedded within a vast array of aircraft applications and can be found on passenger and service doors, cargo, gallery systems, and wing and tail assemblies.

MANUFACTURING ISSUES/CHALLENGES:

As with the majority of aerospace components, there is a requirement to reduce weight as much as possible without compromising the integrity of the component's function. This aim applies to aircraft hinges as well. Once the strength-to-weight ratio has been optimised, the next challenge is to maximise productivity to create an effective cost structure.

MACHINING 'BEST PRACTICE' SOLUTION:

Using the Chiron DZ15 twin spindle capacity, we are able to demonstrate two aircraft hinges being machined simultaneously, doubling capacity over the more common single spindle machines.

Further productivity benefits have been realised by Seco Tools working in collaboration with the Engineering Technology Group (Chiron agents) to optimise component stability, minimise cycle times and maximise tool life.

Finally, by incorporating the Renishaw Sprint in process metrology, we will check component dimensional quality during the machining process, to further enhance process efficiency and create a complete closed loop.

Machining demonstration 2:

Inconel aero-engine disc

- Material: **Inconel 718**
- Technologies: **Optical 3D metrology, waveform turning, Jetstream ceramics, advanced CBN material, custom Jabro dovetail technique, MEP, Aero ISO S fluid technology, quick-change workholding**
- Technical partners:
  Machine: DMG Mori CTX 1250
  Coolant: Quaker Houghton
  Coolant Saver: Wogaard
  CAD-CAM: Hexagon, Product: Edgecam, Verification: NC SIMUL
  Workholding: Schunk
  Metrology: Bruker-Alicona
  Tool-setting: Zoller Smile 420CNC
  Tools: Seco

FUNCTION/PURPOSE:

Machined from technically advanced materials, discs are the solid core to which an engine's fan, compressor and turbine blades are attached, usually by dovetail or fir-tree root. These complex and critical parts exhibit a range of demanding features - all of which are machined to the highest possible standard. Producing engine discs necessitates understanding and implementing the latest and most innovative cutting processes.

MANUFACTURING ISSUES/CHALLENGES:

One challenge for any manufacturing company is verifying that the product is correctly made according to exact specifications - both on a large and a micro scale. On items such as a disc, "flash" burrs can present a problem as do edge-rounding and surface integrity in critical locations.

MACHINING 'BEST PRACTICE' SOLUTION:

From rough forging through to finished part, this demonstrator showcases latest manufacturing techniques, waveform turning and advanced materials (Jetstream ceramics) used in roughing operations, showing:

- Significant cycle time savings over 50%.
- High speed semi-finish and finishing of nickel alloys using latest technology carbide (TGH1050 and TH1000 grades) and advanced CBN material.
- Surface speeds of up to 300m/min.

Dedicated ISO S grades and geometries take care of critical hole making operations. Custom Jabro dovetail solutions and machining techniques are used to produce axial slots. The Mechanical Edge Profiling (MEP) process completes the machining elements with no need for additional machining or hand processing.

The DMG CTX 1250 5-axis mill turn technology allows all manufacturing operations, including axial dovetail slots and gear forms, to be performed in a single setup.

Edgecam, a product of Hexagon, has waveform turning and milling, B-axis turning and on-machine probing and inspection, CMM, SPC and factory simulation turnkey services.

This demonstration uses Quaker Houghton's latest Aero ISO S fluid technology for fluid management.

Schunk's bespoke solutions offer a flexible, repeatable and accurate quick-change workholding solution.

Bruker-Alicona's G5 and SL systems provided the metrology element of the demonstration in advance of the event.

Machining demonstration 3:

A350 fuel connector

- Material: **Aluminium ABS5323A200 - Plate alloy**
- Technologies: **Simultaneous 5-axis machining, optical measurement, automated pallet system**
- Technical partners:
  Machine: Hermle C32
  Coolant: Quaker Houghton
  Coolant Saver: Wogaard
  CAD-CAM: Tebis
  Workholding: Thame
  Metrology: GOM
  Automation: Erowa
  Pre-setting: Zoller Smile 420 Pilot 1
  Tools: Seco

FUNCTION/PURPOSE:

As the name suggests, the A350 fuel connector is designed to efficiently transfer fuel to the aircraft engine, in this case, on the Airbus A350. For a critical aerospace component such as the fuel connector, the parts are always machined to AS9100 Aerospace quality management accreditation.

MANUFACTURING ISSUES/CHALLENGES:

Machining from billet to finished component, the challenge is producing a curved bore with quality finish in one operation.

Due to the complex form of aircraft fuel connectors, they are often machined in two separate operations and set ups. For such a critical component, this is not ideal from a productivity perspective or for meeting the exacting quality requirements for aerospace worthiness directives.

MACHINING ‘BEST PRACTICE’ SOLUTION:

The challenge and solution demonstrated is to machine the complete fuel nozzle in one operation. This was achieved by adopting a collaborative approach with technical partners, representing all disciplines in the machining process. The partnership approach helped to optimise the complete machining process and resolve boring access issues to produce the component from start to finish in one operation.

Machining demonstration 4:

Titanium wing pylon

- Material: **Titanium 6-4**
- Technologies: **Solid milling, Indexable milling including large Helical and Disc, Hole Making**
- Technical partners:
  Machine: Heller
  Coolant: Jemtech
  Coolant Saver: Wogaard
  CAD-CAM: Siemens NX, Programmed by Andrews Manufacturing Services
  Toolholding: Nikken
  Verification: CGTech VERICUT
  Pre-setting: Zoller Venturion 450 Pilot 3
  Tools: Seco

FUNCTION/PURPOSE:

Aerospace structural components require materials be lightweight with a high strength-to-weight ratio to improve fuel efficiency and reduce emissions. As such, titanium alloys are used extensively throughout the entire aircraft.

MANUFACTURING ISSUES/CHALLENGES:

Titanium has become one of aerospace's most common manufacturing materials and, as such, customers are continually looking for improved manufacturing methods that reduce costs and improve productivity levels. Specific challenges include:

- Removal of large volumes of difficult-to-cut material while maintaining the material's structural integrity.
- Having machine tools capable of exploiting a cutting tool's full potential for large metal removal rates.

MACHINING 'BEST PRACTICE' SOLUTION:

By combining knowledge and expertise, Heller, Nikken, Siemens NX, Jemtech and Seco have developed the optimum solution.

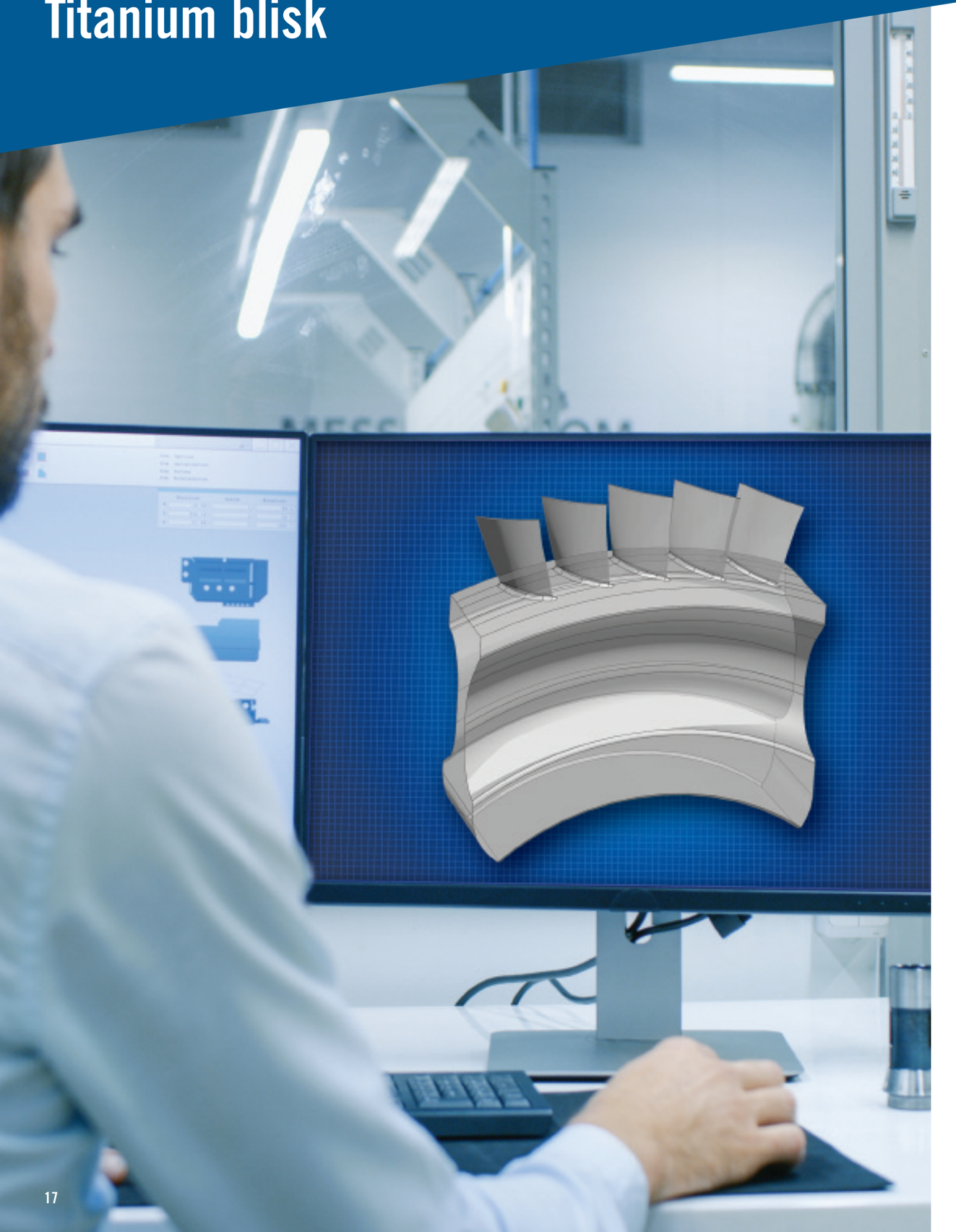
A particular advantage with the new method is the ability to maintain high metal removal rates using tools with long overhangs.

This incorporates the latest machining strategies alongside the most rigid and precise machine tools, spindle tooling and work holding - which also allows full access to all sides of the component.

The demonstration uses large indexable mills and solid carbide along with advanced machining strategies to optimise removal rates, while maintaining the structural integrity of the material.

Machining demonstration 5:

Titanium blisk



- Material: **Titanium - Ti 6Al 4V**
- Technologies: **5-axis advanced roughing and barrel milling, VERICUT Force technology**
- Technical partners:
  Machine: Grob
  Coolant: Jemtech
  Coolant Saver: Wogaard
  CAD-CAM: Open Mind
  Pre-setting: Zoller Venturion 450 Pilot 3
  Verification: CGTech VERICUT Force
  Tools: Seco

FUNCTION/PURPOSE:

The blisk function in a gas turbine is to expand the hot gases which come from the combustion chamber to provide the necessary thrust required for the propulsion of the aircraft, making the turbine blisk the most critical part in a gas turbine engine.

MANUFACTURING ISSUES/CHALLENGES:

A blisk is a complex single piece component with a very high added-value. To achieve the necessary compression ratio, a blisk blade has a very slim profile with sharp, rounded edges and the surface profile has a tight tolerance in respect to size and surface finish.

The challenge for manufacturers is to remove the excess material between the blades in an efficient manner while maintaining an effective strategy to support the blades during the finishing process to ensure the blade is to the correct profile and surface finish requirements.

Common issues include:

- Tool cost, due to quantity of blades.
- Difficult-to-machine materials.
- Swarf evacuation.
- Reliability (validated tool geometries and validated re-conditioning).

MACHINING ‘BEST PRACTICE’ SOLUTION:

This demonstrator will showcase:

- 5-axis advanced milling strategies for roughing and semi-finishing, together with barrel milling techniques for efficient blade finishing using the latest CAM and tooling technologies.
- Bespoke work holding and blade machining development with advanced dedicated 5-axis simultaneous CAM processes from Open Mind.
- Physics-based feed-rate optimisation with VERICUT Force, resulting in shorter cycle times, improved part quality and increased tool life.

Machining demonstration 6:

Composite passenger aircraft seat

- Material: **Carbon fibre**
- Technologies: **CNC Robotics multi-cube robot cell, Kuka KR10 Agilus robot**
- Technical partners:
  Machine: CNC Robotics
  CAD-CAM: Siemens NX
  Workholding: Seco
  Verification: CGTech VERICUT
  Tools: Seco

FUNCTION/PURPOSE:

With fuel accounting for approximately 25% of an airline's total expenditure, there is a constant demand for more fuel-efficient aircraft. One way to increase fuel efficiency is to reduce aircraft weight. For example, an Airbus A380 aircraft is certified for up to 868 passengers and there is significant opportunity to reduce weight on each passenger seat by moving away from aluminium/steel/plastic seat structures - which typically weigh 8kg each - to a stronger and lighter composite/Ti seat.

A composite constructed seat can be as much as 40% lighter and therefore, will have a significant benefit on aircraft fuel efficiency and ultimately the environment.

MANUFACTURING ISSUES/CHALLENGES:

When machining composites, the most common issue is delamination. The machining process can generate stresses on the composite and cause layers to separate. This can weaken the integrity of the material and could ultimately lead to component failure.

Carbon fibres encapsulated in resin means that composites, by their very nature, are abrasive. Maintaining a sharp cutting edge is critical to obtaining a clean-machined surface and edges as well as limiting heat build-up, which can be detrimental to the machined surface. Maintaining the consistency and integrity of the cutting edge during the machining process is a challenge constantly faced by manufacturers.

MACHINING 'BEST PRACTICE' SOLUTION:

The CNC robotic multi-cube robot cell, coupled with a Kuka KR10 Agilus robot, allows the undertaking of multi-direction machining on large components. The machining process is optimised by Siemens NX software to maximise in-cut time and minimise unproductive time. Composite surface finish and minimal fibre pull-out on the machined surface is achieved by optimising the cutting process and tool life with Seco Tools JC875 solid carbide end mills.

Machining demonstration 7:

Blade tip repair

- Material: **Inconel**
- Technologies: **5-axis advanced milling with barrel milling technologies, adaptive toolpath generation, on-machine contact scanning, additive hybrid platform, adaptive manufacturing**
- Technical partners:
  Machine: Mazak Variaxis j-600AM
  Coolant: Quaker Houghton
  Coolant Saver: Wogaard
  CAD-CAM: Open Mind
  Metrology: Renishaw Sprint
  Pre-setting: Zoller Smile 420 Pilot 1
  Tools: Seco

FUNCTION/PURPOSE:

The turbine blisk is a critical part in a gas turbine engine. It develops the power required to drive the compressor and other accessories.

MANUFACTURING ISSUES/CHALLENGES:

Fan, compressor and turbine blades are difficult and expensive to manufacture and repair. Geometrical accuracy of the blade repair is critical as the key features - leading/trailing edge profiles, aero-foil shape and chord width - are essential to the overall efficiency and performance of the engine.

Knowing the theoretical shape of the blade (e.g., CAD model) is insufficient to repair a blade to the required precision and could result in varying stock level amounts and position. In addition, there is a variety of challenges associated with machining Inconel.

Standard repair techniques require multiple offline operations, making the repair process inefficient and expensive.

Blisks often require adaptive machining, whether that be root blending, edge machining, or in this case, tip repair. Tip repair is traditionally a multi-stage offline process; this is both time-consuming and often unreliable:

1. Weld material onto blade tip.
2. Measure the blade to understand the shape to be machined (on or offline).
3. Align component on 5-axis machine tool.
4. Machine and blend new material to existing blade.

MACHINING ‘BEST PRACTICE’ SOLUTION:

With the advancement in hybrid additive/subtractive machines and contact on-machine scanning for rapid data capture, this repair can be performed “in-one”.

Machining demonstration 8:

Inconel combustion chamber

- Material: **Inconel**
- Technologies: **5-axis simultaneous machining, 3 + 2 positional (5-axis) machining**
- Technical partners:
  Machine: Nakamura MX100
  Coolant: Quaker Houghton
  Coolant Saver: Wogaard
  CAD-CAM: Siemens NX
  Workholding: ETG
  Verification: Siemens NX Internal Simulation and Verification
  Tools: Seco

FUNCTION/PURPOSE:

The combustion chamber is where fuel and air mix is ignited to create the energy that drive the thrust. High-pressure air produced by the forward fan blades is mixed with fuel prior to entering the combustion chamber. The fuel/air mix is then injected into the combustion chamber through a set of nozzles and ignited in a controlled manner.

MANUFACTURING ISSUES/CHALLENGES:

Dependant on the engine size, combustion chambers are large diameter components with thin wall sections, tight tolerances and intricate profiles and are produced in difficult to machine materials. One of the major challenges during machining is avoiding surface chatter due to harmonics from machining a thin wall sectioned component without support produced in a difficult to machine material.

Combustion chamber design also supports a number of flanges, pockets and bosses, commonly known as features, which are generated from the core casing material. The challenge is to generate the most effective and cost efficient machining strategy, while delivering component quality and tolerances.

MACHINING 'BEST PRACTICE' SOLUTION:

Machining an Inconel 718 combustion for this demonstration required copy turning and solid carbide milling. For the turning, the goal is to demonstrate excellent surface finish and tolerances achieved with optimised machine set up and cutting tool selection.

Focusing on the machining of various fan-casing features, Nakamura MX100, Siemens and Seco Tools have combined their expertise to enhance the machining process in terms of machining stability, machining process strategy and tool life. Challenges such as chatter have been eliminated and tolerances and surface integrity are maintained while optimising the process to deliver a cost effective machining solution.

Machining demonstration 9:

Titanium and Inconel blisk segments

- Material: **Titanium and Inconel 718**
- Technologies: **Twin pallet and unique machine design to minimise and balance movement of the masses**
- Technical partners:
  Machine: Starrag NB151
  Coolant: Quaker Houghton
  CAD-CAM: Open Mind
  Workholding: Bespoke

FUNCTION/PURPOSE:

A blisk's blades are machined from a solid billet. Also known as an integrally bladed rotor (IBR), blisks have commonly replaced discs where the blades are pre-manufactured and assembled into the dovetail slots machined into the disk hub. Blisks offer significant benefits over discs in reduced weight, greater service life and reduced maintenance. Compressor blisks are made from titanium because they are located at the cooler front of the engine. At the hotter combustion end of the engine, the turbine blisks are produced from nickel-based superalloys.

MANUFACTURING ISSUES/CHALLENGES:

As blisks are machined from solid, they represent significant challenges when machining. Blisks require complex production processes, impeccable quality and high levels of process stability and control. To achieve the needed results, manufacturers must integrate a mix of the latest in machine, software and cutting tool technologies. To overcome machining challenges such as the complex geometry of the blades, the difficult-to-reach machining and the thin wall sections, a long overhang tool is needed.

MACHINING 'BEST PRACTICE' SOLUTION:

In this demonstration, the Starrag NB151 twin-pallet machine will be machining a segment of a titanium blisk and a segment of a Inconel blisk - all in a single setup. The machine is equipped with two rotary axes that were developed and manufactured in-house for the sole purpose of machining blisks.

In addition, both titanium and Inconel materials are difficult to machine with short tool lives and a tendency to generate long irregular shaped chips (swarf). By working closely with Open Mind, Quaker Houghton, Starrag and Seco Tools, the machining process has been optimised, using lollipop solid carbide tools, improved machining processes and a rigid machine setup.

7 best-practice seminars

Plane speaking

Sharing knowledge and best practice is at the heart of Inspiration through Innovation. And nowhere is this commitment to helping component manufacturers improve their performance better exemplified than in our Seminar Programme.

Focusing on the latest technological developments and on new ways to improve productivity, component quality and process reliability - the seminars taking place at this year's event are all focused on the aerospace segment, and are a 'must' for manufacturers looking to raise their game.

Each seminar is presented by an industry expert, and all are guaranteed to be thought-provoking, informative and inspiring.

Our seminars:

Wednesday 9th October

SEMINAR 1: 10.00-10.30
PREPARING FOR INDUSTRY'S INCREASING BLISK DEMAND

SEMINAR SYNOPSIS:

The seminar will discuss the challenges facing industry with the growing blisk manufacturing demand and the cost effectiveness of meeting the requirements with traditional blisk manufacturing routes. The seminar will describe work being performed at the AMRC, understanding alternative methods of manufacture and the opportunities that are arising through emerging and already developed technologies.

SPEAKER:

Tom McCready, Technical Fellow, AMRC.

SPEAKER BIOGRAPHY:

Tom joined the AMRC in 2010 following the completion of his MEng Master's degree at the University of Sheffield. Tom has worked in the area of Aerofoil manufacturing research throughout his time with the AMRC and now leads a small team dedicated to this area.

At the AMRC, Tom has led several large programmes which have developed manufacturing methods resulting in significant improvements in yield and cost for Aerospace sector companies. Alongside this work, Tom leads the Machining Groups' SME engagement, working with UK companies to improve their manufacturing approach.

SEMINAR 2: 11.30-12.00
INDUSTRY 4.0 AND METROLOGY: HOW TO IMPLEMENT A SMART STRATEGY AND PROCESS THAT WORKS FOR YOU

SEMINAR SYNOPSIS:

Industry 4.0 may promise a lot, but any system that promises so much is only as good as the strategy and the process that encompass it, and more importantly the people who implement it.

SPEAKER:

Guy Brown, Central Development Manager, Renishaw.

SPEAKER BIOGRAPHY:

Guy has 30 years of manufacturing experience, from shop floor to production management and product development, working directly for or associated with Renishaw PLC.

With 12 years implementing innovative metrology, process control and productivity data collection solutions across dozens of companies worldwide, Guy is currently a product development manager at Renishaw. He draws on his shop-floor and customer relations experience to ensure that the importance and diversity of metrology data is used to its full potential within Industry 4.0 solutions.

SEMINAR 3: 13.30-14.00
GLOBAL MACHINING PRODUCTION ECONOMICS

SEMINAR SYNOPSIS:

When we refer to global machining production economics, we mean global in the sense of total or all included. When it comes to "cost calculations", there are many cost factors that people prefer not to talk about. True in-depth analyses reveal that it's these cost elements that form the big bulk of costs. In neglecting them, we also do not take care of them, instead concentrating on cost elements that, in the end, are only minor.

SPEAKER:

Patrick De Vos, Business Manager, Consultancies, Seco Tools.

SPEAKER BIOGRAPHY:

Patrick De Vos was born in Belgium in 1959 and has a Masters in Mechanical and Electrical Engineering. From 1981 to 1983, he was Postgraduate Lecturer and Researcher specialising in strategies for optimising metal cutting processes and production economics.

From 1983 to 2006, he was employed by Seco Tools Benelux in a number of technical, commercial, marketing and management positions. Since 2006, he has been Seco's global STEP Educational Services Manager. Over the last 35 years, he has trained over 70,000 people in more than 65 countries worldwide. He has authored the books: Metal Cutting, Theories In Practice; Applied Metal Cutting Physics, Best Practice; Tool Deterioration, Best Practices and The NEXT STEP - Metal Cutting Technology and Production Economics.

SEMINAR 4: 15.30-16.00
INNOVATION HUB: THE INTEGRATION OF EXPERTISE AND TECHNOLOGY

SEMINAR SYNOPSIS:
Innovation Hub is all about team integration and using advanced technology in the pursuit of big leaps in progress in manufacturing, specifically in the aerospace and medical sectors. In this seminar, we will discuss how this works and what our approach could mean for the future of manufacturing.

SPEAKER:
Jon Shipley, Technical Manager, Seco Tools.

SPEAKER BIOGRAPHY:
Jon Shipley has been with Seco Tools UK since 2011, first as an Area Business Manager, and now as Technical Manager. He oversees the Innovation Hub and turnkey projects in the UK, especially in the Aerospace and Medical sectors. He believes that the integration of collaborative teams is the foundation of true innovation.

SEMINAR 1: 10.00-10.30
DRIVING INDUSTRIALISATION OF ADDITIVE MANUFACTURING

SEMINAR SYNOPSIS:
A peek into what and how Materials Solutions and Siemens are driving industrialisation through innovation and traditional thinking.

SPEAKER:
Phil Hatherley, General Manager, Materials Solutions Ltd - a Siemens business.

SPEAKER BIOGRAPHY:
Phil Hatherley is the General Manager of Materials Solutions - a Siemens business based in Worcester, UK. He is responsible for a dedicated team of experts that are tasked with turning complex engineering ideas into reality using Additive Manufacturing, or 3D printing of metals. He has worked for Siemens for 12 years with assignments in Germany, USA and UK - he is married with two children.

SEMINAR 2: 11.30-12.00
CHALLENGES AND ADVANCES IN NICKEL-BASED SUPERALLOY TECHNOLOGY

SEMINAR SYNOPSIS:
Aircraft engines and cycles are continuously evolving to provide improved efficiencies for reducing fuel consumption and emissions. However, whilst propulsive and aerodynamic optimizations of aircraft engines are possible, the increased demands upon superalloys, which are used in the hot section parts, limit the thermal efficiency improvements that can be achieved.

The requirement for reduced core sizes and increased temperatures and stresses poses a complex set of seemingly conflicting properties for the materials considered for safety-critical disk rotor applications. This talk will examine these challenges and propose some possible solutions with particular reference to new compositions, understanding and prioritising critical material properties and attributes, understanding phase stability, environmental damage, material manufacturing challenges and optimising properties through microstructure.

SPEAKER:

Dr. Mark Hardy, Corporate Specialist - Nickel Alloys, Engineering Fellow, Rolls-Royce.

SPEAKER BIOGRAPHY:

Dr. Mark Hardy is a Rolls-Royce Engineering Fellow specialising in Nickel Alloys. He has been at Rolls-Royce Derby for 20 years, working on RR1000, other Ni disc alloys and Ni alloy powder applications. His PhD from Swansea University examined short fatigue cracks in a near-alpha Ti alloy, with experimental work conducted while he was working for the UK Ministry of Defence in Farnborough. He is a Fellow of the UK Institute of Minerals, Metals and Materials (IOM3) and a TMS member.

In 2020, Dr. Mark will have served the TMS International Superalloys conference for 12 years, chairing the 2016 conference. He has chaired 2 Symposia at TMS Annual Meetings in the USA. He established the IOM3 OPTIMoM conferences, chairing the 2010 Conference and co-chaired the IOM3 Eurosuperalloys 2018 conference. He has authored/co-authored over 70 technical publications and invented/co-invented 17 patent applications/patents.

SEMINAR 3: 13.30-14.00
MACHINABILITY CONSIDERATIONS IN HIGH-STRENGTH HEAT-RESISTANT SUPERALLOYS

SEMINAR SYNOPSIS:

High-strength heat-resistant superalloys are used to manufacture components in aero-engines and industrial gas turbines. The material displays excellent oxidation and creep resistance and does not deform under high temperatures. However, these characteristics impact machining strategies. In this seminar, we will present best practice machining solutions and strategies that can be used to machine high-strength heat-resistant superalloys more productively.

SPEAKER:

Patrick De Vos, Business Manager, Consultancies, Seco Tools.

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Technical partners

Our technical partners, which include machine tool builders, CAD-CAM providers and workholding, metalworking fluid and metrology suppliers, are attending Inspiration through Innovation 2019.

All partners have been involved in the design and development of at least one of the nine machining demonstrations taking place over the two days - and will be available to talk directly to visitors about their technology solutions, and the ways in which they were used to optimise the machining processes.

AUTODESK
Bruker alicona
CARFULAN
CGTECH VERICUT
chiron
DMG MORI
Engineering Technology Group
EROWA
FUSION
gom
GROB
HELLER
HEXAGON
Jemtech
Kingsbury
Mazak
Nakamura-Tome
NIKKEN
OPEN MIND THE CAM FORCE
Quaker Houghton
RENISHAW
SCHUNK
SECO
SIEMENS
starrag
iebis
THAME
WOGAARD

MACHINE TOOLS

CHIRON	chiron.de	Demonstration 1
CNC ROBOTICS	cncrobotics.co.uk	Demonstration 6
DMG MORI	uk.dmgmori.com	Demonstration 2
ENGINEERING TECHNOLOGY GROUP	engtechgroup.com	Demonstrations 1, 8
GROB	grobgroup.com/en	Demonstration 5
HELLER	uk.heller.biz	Demonstration 4
HERMLE	kingsburyuk.com	Demonstration 3
KINGSBURY	kingsburyuk.com	Demonstration 3
MAZAK	mazakeu.com	Demonstration 7
NAKAMURA-TOME	nakamura-tome.co.jp/en	Demonstration 8
STARRAG	starrag.com	Demonstration 9

METALWORKING FLUIDS

FUSION	fusioncoolant.com	Exhibit
JEMTECH	jemtech.co.uk	Demonstration 4, 5
QUAKER HOUGHTON	quakerhoughton.com	Demonstrations 1, 2, 3, 7, 8, 9
WOGAARD	wogaard.com	All demonstrations

CAD-CAM

AUTODESK	autodesk.co.uk	Exhibit
CGTECH	cgtech.co.uk	Demonstration 4, 5
HEXAGON	hexagonmi.com openmind-	Demonstration 2
OPEN MIND	tech.com	Demonstrations 5, 7, 9
SIEMENS	plm.automation.siemens.co	Demonstrations 4, 6, 8
TEBIS	m tebis.com/uk/en	Demonstration 3

TOOLING/WORKHOLDING

EROWA	erowa.com	Demonstrations 3
NIKKEN	nikken-world.com	Demonstration 4
SCHUNK	schunk.com	Demonstration 2
THAME WORKHOLDING	thameworkholding.com	Demonstrations 3

METROLOGY

BRUKER-ALICONA	bruker.com	Demonstration 2
CARFULAN GROUP - ZOLLER	carfulan.com	Demonstration 2, 3, 4, 5, 7
GOM	gom.com	Demonstration 3
HEXAGON	hexagonmi.com	Exhibit
RENISHAW	renishaw.com	Demonstrations 1, 7

CUTTING TOOLS

SECO TOOLS	secotools.com	All demonstrations

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