Big ideas for small components

Micro-machining is the focus of the forthcoming MM Live event, the UK's first exhibition devoted to micro-manufacturing technology and services. *Machinery* reports

Running alongside the TCT conference and exhibition on 21 and 22 October at the Ricoh Arena in Coventry, MM Live covers micro-manufacturing equipment, component suppliers, micro mould-making, inspection equipment and product development services.

As Arthur Turner of Deckel Grinders, which is the headline sponsor for the show and UK agent for Kern machining centres, explains: "We want to introduce more customers to what you can do with micro-machining. People aren't aware of the dimensional tolerance and surface finishes that milling can achieve. On our Pyramid Nano machine, for example, we can achieve accuracies down to 0.3 microns and surface finishes as good as RA 0.04, with no need for further benchwork."

Three Pyramid Nano machines are already in service in the UK, two in toolmakers and one in the space and scientific sector. Specifications can include spindle speeds up to 160,000 rpm, 5-axis capability, measurement systems and automatic workpiece changing.

"The hardest part in micro-machining is the second operation, so we try and do everything in one clamping," says Mr Turner.

RAPID PROTOTYPING

He is also involved with another of the exhibitors, Rainford Precision, which sells cutting tools from Union Tool – a large Japanese manufacturer. Up until now the range of diamond drills and cutters offered by the company started at 0.1 mm, but Rainford is launching 0.06 and 0.08 mm diameter ballnose milling cutters at MM Live.

Another machine tool supplier, Spinner UK, will be exhibiting two new machines.

"We are specifically addressing the medical and rapid prototyping industries by going to this exhibition, so we are showing two machines that have been developed for machining small, very complex components to micron and sub-micron tolerances," says Spinner UK's John Branson.

Left, Rainford Precision will be 'talking small', as will be Spinner UK, above, with its novel machine

The first of these machines, the Realmeca RM3, is a 7-axis mill-turn centre, which will be shown for the first time ever at MM Live. Designed for the complete machining of components in one set-up from bar, the RM3 is essentially a travelling-column machining centre with a turning spindle and sub-spindle.

"With this machine the whole concept is that by working from bar you overcome the problem of clamping the component," says Mr Branson, He adds that another key feature of the machine is its size – small enough to fit through a standard doorway.

"Many companies in the rapid prototyping market are still based in offices rather than workshops, so a lot of the machines they might want to buy are too big or too heavy for their premises."

The second machine on the Spinner

Caption

UK stand is a 3-axis laser processing centre, with fine cutting and welding heads mounted on the same machine. It has been built for work on material up to 0.2 mm thick with a kerf width down to just 10 microns. Based on a moving table vertical machining centre, the Realmeca 200 is also available in 4- and 5-axis versions.

LASER WELDING

Also in the field of laser processing, Rofin-Baasel UK is exhibiting its new Starweld Select fine-welding laser centre. This incorporates a 100 W solid-state laser and full CNC capability and can also operate in manual or semi-automatic modes. It can achieve a very fine spot size – down to around 0.1 mm and would typically be used on micro-components for medical devices, electronics, sensors and other fine mechanical parts as well as for repairing micro features on very fine injection mould tools.

"The advantages of laser welding for these small parts include the low heat input, low distortion and the ease of automation. Laser welds are very repeatable because the pulse-to-pulse stability of the beam is very good, " says Dave MacLellan of Rofin-Baasel UK.

The Starweld was launched just over a year ago and units are already in use in the UK for medical device welding and mould tool repair.

Micro-moulding machines will also be on show. MTT Technologies, previously known as MCP Tooling Technologies, will demonstrate a machine that can mould components down to 28 milligrams and also run conventional tooling. Primarily aimed at the medical and electronics markets, this will be running a multi-drop tool that leaves no sprue or runner.

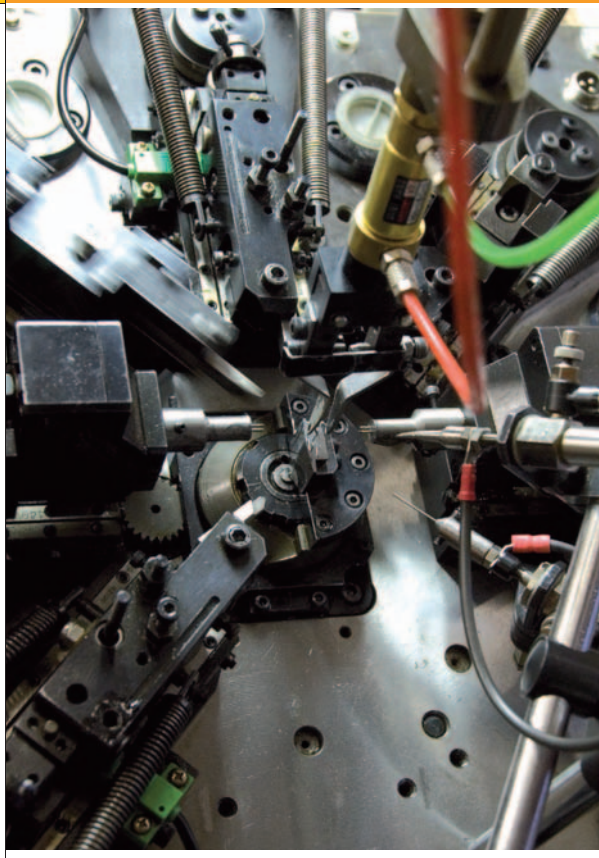
OPTICAL MEASUREMENT

Having made parts to sub-micron tolerances, the next challenge is to measure them. Chris Browne of Vision Systems says that its entire range is designed specifically for tight tolerance parts, hence its presence at the show.

"We deal with all kinds of industries and the key thing for us is that we have patented optical technology that means we can see the part you are measuring in fantastic detail. There are other ways of measuring a part – such as touch probes, video systems – but optical systems are entirely suitable when you need absolute precision to see the edge of the part. With video you are relying on the computer to calculate that, and it is difficult to use a touch probe on very small and intricate parts," says Mr Browne.

Product identification can also be a problem at this scale, and labelling specialist Lighthouse will be showing a 400 dpi printer suitable for producing very small rating plates, equipment ID labels and so on.

As well as equipment, companies



offering manufacturing and development services are also represented.

Micro Systems (UK) specialises in micro-machining and the design and manufacture of micro-moulds and moulded parts using equipment that includes micro-EDM, 5-axis milling, and super-precision turning. On its stand it will be micro-moulding fibre optic connectors measuring 5 by 2.8 by 1.5 mm with 0.2 mm diameter holes through the 1.5 mm thickness.

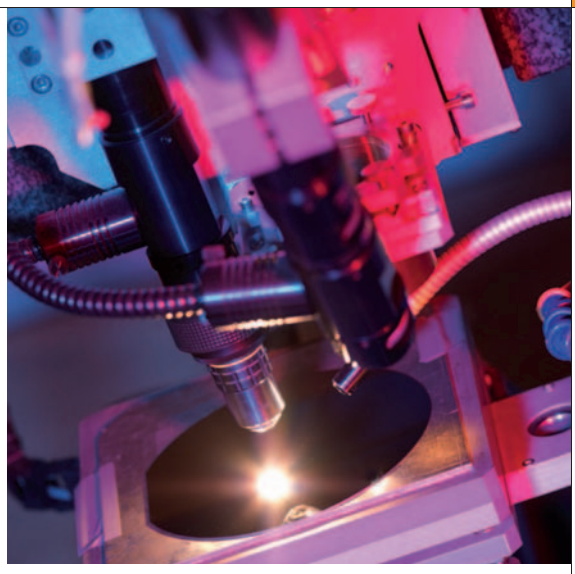
PRODUCT DEVELOPMENT

The Precision Manufacturing Centre (PMC) at Nottingham University offers facilities that include high precision machining centres operating to 0.5 micron accuracy, ultra-high precision metrology systems and, the latest piece of equipment to be installed, a Carl Zeiss ultra-high precision microscopy and machining centre that combines a focused ion beam and scanning electron microscope.

"The PMC can help people bring micro-scale product developments to market, says the Centre's Rachel Brereton. "As well as our research-based activities, we have the equipment and the trained engineers to help companies do proof-of-concept work, prototyping and small volume manufacture."

Laser Micromachining, in the commercial sector, also helps industry bring new products to market.

"What we want to show is that new product ideas can be evaluated, prototyped and machined very easily with laser methods," says the company's general manager, Nadeem Rizvi.



Laser Micromachining – helping companies bring new products to market, it says

Parts and devices typically range in size from a few microns to a few hundred microns, in all types of materials including metals, polymers and silicon.

Mr Rizvi adds: "The industries we help include biotechnology, micro-electronics, photonics, displays and solar cells."□