

# Cutting the mustard

**Machinery reviews a number of recent machining centre installations, highlighting benefits of latest technology. Five-axis machining is one clear theme**

**A**n 18.5 kW/12,000 rpm Mazak VTC 200C-II vertical machining centre is the latest instalment in Flexible Machining Systems' ongoing investment strategy.

The VTC series VMC with its 2,000 by 510 mm fixed table joins several other CNC machine tools supplied and installed by Yamazaki Mazak at Flexible's Horsham, West Sussex, site. This sub-contractor's focus is on supplying machined components to the medical, food processing, defence, oil and gas, and aerospace industries.

A 30 kW, 10,000 rpm Variaxis 730-5X II machining centre, capable of the 5-axis simultaneously-controlled machining of complex components weighing up to 500 kg, will bring the total complement of Mazak machining centres and turning centres to 10.

This investment in high technology production equipment, says John Sack, operations manager, reflects Flexible's determination to specialise in high precision CNC machining. "We deliver direct to line for a number of customers," he says, "and it is this success in securing long term scheduled business that enables us to plan ahead in terms of capital investment."

As part of a strategic review of its business activities, ISO 9001-accredited Flexible recently withdrew from non-essential operations to concentrate resources on its core competencies of CNC milling and turning, backed by electro-mechanical assembly and a 100 per cent inspection capability.

The company's ability to satisfy its customers' demanding expectations has



*Flexible Machining Systems now claims 10 Mazak machining centres and turning centres. Latest addition is a 5-axis Variaxis 730-5X II, helping the company to specialise on high precision work*

been highlighted on a number of occasions by long-standing customer Varian Medical Systems, notably when Varian launched its new Acuity System used to support radiation therapy.

## SMOOTHING THE WAY

According to Varian's supply chain manager, the sub-contractor's early supplier involvement "helped smooth specification queries and meet seemingly impossible lead times". Flexible is responsible for over 100 Acuity System assemblies, kits and components delivered every week in line with Varian's just-in-time requirements. And this

mutually beneficial position, as it is described by Varian, was marked in 2006 and 2007 with Platinum Supplier of the Year awards.

Having made the initial decision to buy its first Mazak VMC following extensive market research, Mr Sack says the decision to continue investing in more Mazak CNC machine tools has been made on the basis of machine performance and the standard of service provided by Yamazaki Mazak.

Based in Hayes, Middlesex, Murray Productions is a small company with some big customers. With 11 staff and a turnover of around £1 million, it is a

direct supplier to companies that include GE Aviation and AgustaWestland.

Managing director Warren Bell attributes the company's success to the high level of quality and delivery service it provides. To support and enhance this, Murray Productions has invested in two new machine tools from Matchmaker: a Mini Mill 610 vertical machining centre and a Matchmaker Super Slant 200S 2-axis CNC turning centre.

Westland has been a customer since 1960 and Smiths Aerospace – now GE Aerospace – since 1968. As Mr Bell explains: "They don't stay with the same people unless they have a good relationship with them. What we offer is that we can deliver on time to the quality they require. For GE, for example, we have to deliver 98 per cent on time and in full within a five day working window – no lates and a maximum of five working days early – with a minimum of 99 per cent on quality."

The company started in business as a toolmaker, and offers both machining and presswork to its customers – all of whom are in the aerospace and defence sectors. The work for GE includes both pressings and machined parts, with some components pressed and then machined to final tolerances.

"The machined parts we do for GE are fairly small items, maybe 12 by 15 mm,

*Matchmaker's Mini Mill 610 is not just a mill/tap centre but a powerful, 3-axis machining centre*



## Swedish innovator chooses Haas

Hydroforming Design Light (HDL) is an innovative Swedish company deploying newly developed, patented production methods to 'reinvent' the hydroforming process.

Today, the company claims to offer its customers the most cost-effective production of hydroformed components in the world. Hydroforming uses water pressure to deform material into dies which, at HDL, are machined on Haas machining centres.

Until recently HDL trusted die manufacture to local sub-contract machine shops. "We bought the Haas VF5 CNC vertical spindle machining centre from the local Haas Factory Outlet primarily to manufacture our tools and dies. A plant growing as quickly as this needs the capability to produce its own tools," explains managing director Alvar Palmcrantz. "In the long run, when we have more Haas machines, we will have enough capacity to undertake at least 50-60 per cent of our tooling requirements in-house."

Although a relatively young company, its turnover already stands at more than €1.5 million. However, at the end of 2008, HDL says this will be as much as four times higher than that.

"We also bought the Haas machine because we want to be very quick to service our customers," continues Mr Palmcrantz. "One of the impressive factors about the Haas is that we can machine steel dies as quickly as aluminium dies, which we make occasionally for lower volume orders. That said, many of the cavities we machine are extremely complex and it is not unusual for some dies to stay on the Haas for a full day or even two."

with some as small as 6 by 8 mm, and some of the tolerances are pretty hairy," says Mr Bell. "Some of the instrument parts we make are eventually fitted with ruby bearings and they have to be in line within microns across the part, and we are doing these in batches of 300 at a time – we can do multiple set-ups of that kind of job on the Matchmaker Mini Mill.

"A lot of the machines on the market that call themselves mini mills are just mill/tap centres, but the Matchmaker Mini Mill 610 is a powerful 3-axis vertical machining centre. We are very impressed with it. And although it is a small machine it is big enough for us. With the work we are doing you can get two or three fixtures on the table. The Mini Mill can hold 16 tools, but we have never needed to have the carousel full yet."

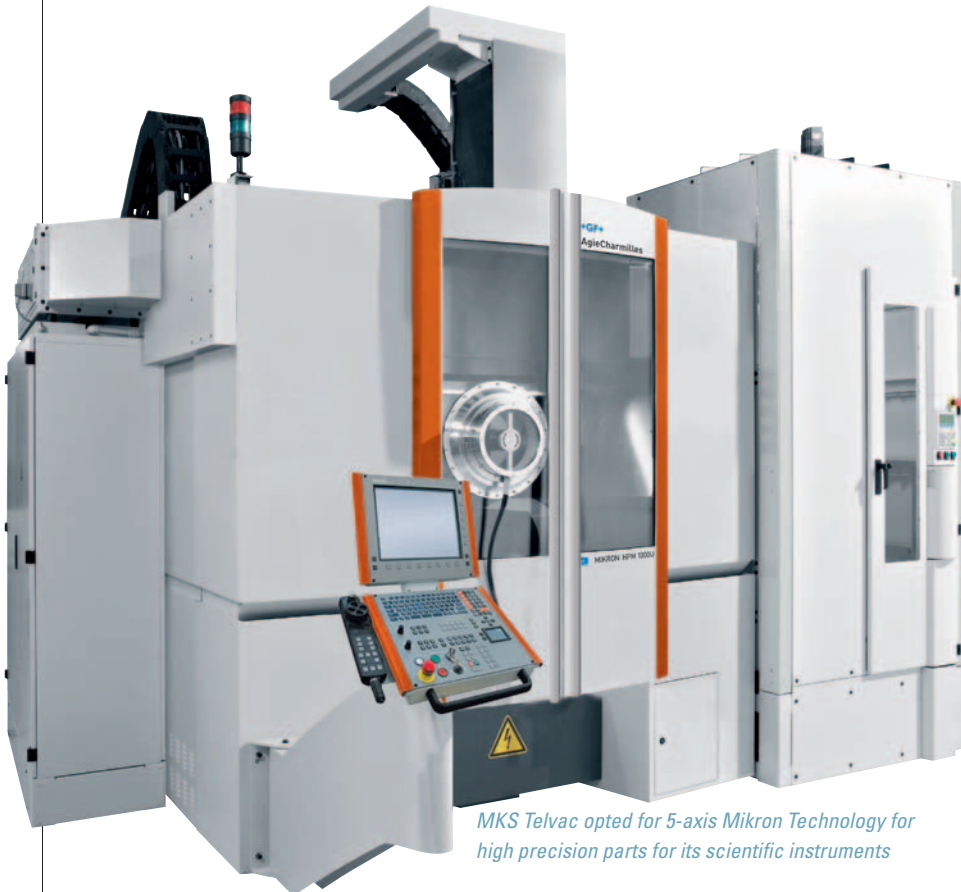
The Mini Mill 610 has traverses of 610 by 305 by 460 mm in X, Y and Z axes and an 8,000 rpm BT 40 spindle.

The majority of the work that Murray Productions is currently doing for Westland is parts such as liners, bushes, plugs and inserts for the repair and

maintenance of helicopter gearboxes. These are turned on the Matchmaker Super Slant 200S lathe, with second ops, such as cross-hole drilling and slot milling, carried out on the Mini Mill 610. With the increased number of flying hours through deployments in Iraq and Afghanistan, combined with operations in sandy and dusty conditions, demand for these components is high.

Of the investment as a whole, Mr Bell says: "When we analysed our shortlist of possible suppliers, Matchmaker came up with the best package from every consideration. Not just the price and specification, but also the size of the machines, the warranty, the support and the training. We also wanted the Fanuc control because that is what we already had on our other machines. We have been dealing with Matchmaker since the 1970s. What we like about them is that when they say something is going to happen, it does happen."

"What we wanted were straightforward, modern machines that were easy to use. And while these are



MKS Telvac opted for 5-axis Mikron Technology for high precision parts for its scientific instruments

fairly straightforward machines they are supporting a very high level of service and quality."

High precision instrumentation manufacturer MKS Telvac (part of MKS Instruments Group; USA) has recently installed a Mikron HPM 1000U 5-axis machining centre from GF AgieCharmilles. The machine has X, Y and Z-axis travels of 1,000, 800 and 600 mm, and has 140° tilt and 360° rotation on its two rotary axes.

**HIGH VALUE COMPLEXITY**

Installed at MKS Telvac's 25,000 ft<sup>2</sup> facility in Telford, it is being used in 3+2 mode to machine high precision complex parts and components which are assembled to create a range of high value scientific instruments such as mass spectrometers and chemical testing equipment used across the thin-film, semi-conductor, medical and analytical



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instrument markets.

Parts manufactured on the HPM 1000U are made from either stainless steel or aluminium, and are usually machined from solid. Batch runs are short – 10-off being a typical requirement.

The decision to invest in a 5-axis machine was made back in 2005, as Matthew Ensor, machine shop manager, recalls: "We knew about all the benefits of 5-axis machining in terms of fewer set-up times and reduced fixturing and workholding costs, etc – and we recognised that there was a 'natural fit' between this technology and the type of manufacturing we were involved in. All we had to do was decide which machine was best suited to our needs."

These needs included high volumetric accuracies when machining large parts; excellent surface finishes; an increase in productivity; and manufacturing

flexibility via automation.

"Many of the parts we manufacture – such as instrument housings and casings – are large, they have an awkward shape and require high precision features to be machined on them," says Mr Ensor. "The 5-axis machine solution we were looking for had to be able to deliver high volumetric accuracy and fast material removal."

**NO HAND POLISHING REQUIRED**

Accuracies required by MKS Telvac differ from job to job but achieving 20 micron accuracy on large parts is often par for the course, with precise bore alignments over 750 mm another hurdle. Surface finishes can be 0.8 Ra down to 0.4 Ra on precision parts, thereby eliminating the need for secondary hand polishing operations.

Automation was also key in the selection of the Mikron machine. The

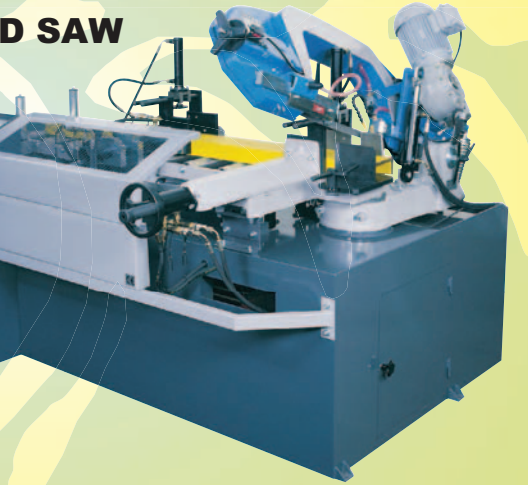
HPM 1000U machine is equipped with a 5-station APC and 210-tool position ATC. "These have helped us increase work throughput and to benefit from unattended operation. These in turn have helped us cut lead times and reduce the cost per part," explains the machine shop manager.

Post installation, further benefits have been exploited, he adds. "The Mikron machine is equipped with SMART technology software. Modules such as APS (Advanced Process System) help us optimise the 5-axis process by alerting us to real time machining operations issues."

An example of this was a roughing operation where deep pockets were being milled. During the operation, the APS system flagged excessive vibration with the operator reducing the depth of cut but increasing the feeds. Without APS it is likely that part quality, tool and spindle life would have all been impacted.□

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