

Investment backs boom

A record-breaking Farnborough Airshow has set the scene for a busy period in the aerospace sector, where the rewards for those prepared to invest will be significant, says Steed Webzell

Ask any one of the 132,000 trade visitors who attended the recent Farnborough Airshow and they will say that aerospace is big business today. New orders worth approximately £44.35 billion for some 480 aircraft and equipment systems were announced at the event. More impressive is that this figure more than doubled the previous record set at the last show in 2006.

The upshot is certain to be a busy time for those in the aerospace supply chain, which is why investment in the latest manufacturing technology has never been more important.

One of the many already benefiting from investment and business opportunities is Somerset-based AIM. It recently acquired a new Mikron UCP600 Vario 5-axis milling machine from GF AgieCharmilles for the manufacture of complex aerospace parts from solid aluminium billets.

PRODUCTIVITY GAINS

"A new contract for increased volumes meant that we had to review the way we made this family of parts," says managing director Rob Kendall. "The nature of the component, and the quantities required, pointed us in the direction of a 5-axis simultaneous machining solution with integrated automation."

The 'Vario' 5-axis machine is designed for production and is equipped with an integrated 7-station automatic pallet changer. Along with a bespoke cube (4-face) workholding solution, the overall productivity gains have been impressive. Previously, one part was produced every 40 minutes whereas now four parts are

produced every hour.

At Sussex-based HySpeed CNC, investment levels have topped £1.5 million over the past two years, and evidence of this continuous thrust is a pair of new Hyundai-Kia V50D twin-pallet vertical machining centres and a Hyundai-Kia VX950 VMC from Dugard.

The latter machine, with its high speed RISC processor to multi-buffer blocks of program and manage feed, speed and acceleration by auto recognition of any curved surface, was acquired to produce long aerospace parts from solid billets requiring significant roughing and finishing cycles. "Quite often these parts

can be on a machine for 12 hours," says technical director Gary Francis, "but that is at least 30 per cent quicker than we could achieve before." With each part worth more than £700, most weeks see four (two left- and two right-hand) parts machined on the 2,700 by 950 mm table.

Prismatic machining technology with a horizontal spindle is installed at Sussex-based HPC Precision Engineering, where a Makino A100 twin-pallet machining centre has been added to two similar machines in a flexible manufacturing system. The latest machine has a 50 kW, 18,000 rpm BIG Plus spindle and vacuum clamping on both pallets, making it



Two Hyundai-Kia VMCs from C Dugard are part of a £1.5 million spend by HySpeed CNC

suitable for producing structural aircraft components, 24 hours a day. The company has, incidentally, recently attained AS9100 status, an important aerospace industry standard.

The purchase was part of a £2.3 million investment in prismatic machining capability, of which three-quarters went on the Makino A100 for the FMS.

"Even before we received AS9100, we had already started quoting the civil aviation sector for production from solid aluminium fuselage components such as frame supports, door sills and bulkheads," says Chris Pellett, HPC's sales manager. "We are now actively seeking contracts for machining wing components."

Another aerospace specialist taking the horizontal spindle route is Bournemouth-based Magellan Aerospace, which has recently installed an EcoSpeed FHT twin-pallet, 5-axis machining centre from DS Technology. This produces false rear spar trailing edges for the Airbus A380 in faster cutting cycles than was possible on the machines used previously. Also, the parts are completed in two set-ups, one per pallet, rather than three or four separate operations on two different machines.

DST's linear kinematically-driven, 2-axis Sprint Z3 spindle head is the key to



HPC Precision Engineering has added a Makino A100 twin-pallet machining centre to two similar machines in a flexible manufacturing system to boost its aerospace machining capacity

reducing the number of machining set-ups and removing the need for bench polishing of areas on the component where there used to be a slight mismatch in adjacent cutter paths. The head tilts through $\pm 40^\circ$ in the vertical rotary A-axis as well as in the horizontal rotary B-axis, the latter aided by equal and opposite

rotation of the table carrying the fixtured part, which further improves access. The result is that short cutters, predominantly from Mitsubishi Carbide, are able to reach even the most awkward areas on the component without reclamping.

Tooling innovation on horizontal machining centres is also providing rewards at the Glamorgan facility of contract machinist Gardner Aerospace, where a Mazak/Iscar turnkey solution has just been installed.

EDM measures up

Of course, whatever cannot be achieved by metalcutting operations, can usually be done by metal erosion. A case in point being the recent installation of a Sodick AQ300L wire EDM with linear drives at the Coventry facility of Hi-Tech Aerospace Components. The machine is being deployed to produce hardened steel probe bodies used to measure aero engine attributes such as pressure and temperature.

"We process a lot of exotic materials, including titanium, which is particularly difficult to machine using EDM techniques," says the company's co-director Bob Duffin. "Sometimes we might only be producing a £250 feature on a component worth £3,000. However, the feature might require tolerances as tight as 0.005 mm, which puts a lot of pressure on the operator and the performance of the machine."

The new AQ300L at Hi-Tech is used to machine the aero engine probe bodies in batches of around 40-off. The shaft-like components are approximately 200 mm in length and feature a series of 'chimneys' at one end that accept the different sensors required by the customer. The probe bodies, which have a net value of approximately £1,200 each, take around two to three days to produce in a short series of wire and spark erosion operations.

MAJOR CONTRACT CATALYST

Winning a major contract for the supply of titanium nacelle frames for the Bombardier Dash 8-400 turboprop was the catalyst for seeking a new manufacturing solution. Machining the tough material in larger volumes combined with greater component complexity meant that Gardner's existing machining centres, and the cutting tools, were struggling to achieve the required accuracy and production volumes.

For this reason the company opted to install a turnkey system to produce the mid and forward nacelle frames, which

are horseshoe-shaped and measure approximately 900 by 750 mm and from 50 to 115 mm thick. The chosen supplier was Mazak which delivered one of its FH8800 4-axis, twin-pallet, horizontal-spindle machining centres complete with programs and tooling. For the latter, Mazak selected Iscar, predominantly solid carbide cutters and a variety of indexable insert mills and drills.

HIGHER FEEDRATES

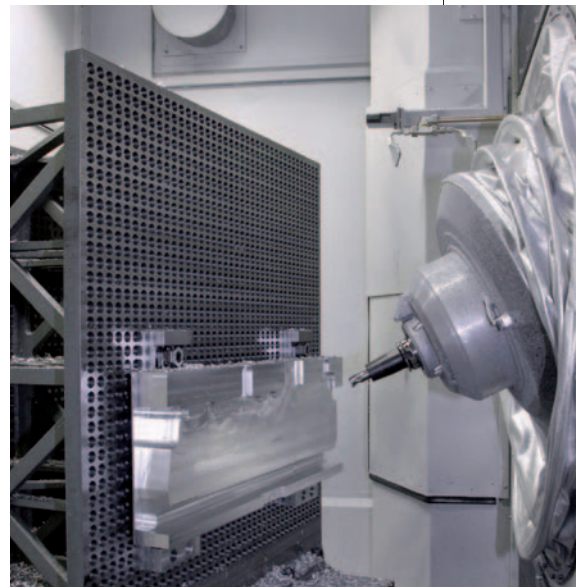
David Walters, general manager, says that productivity has been doubled using Iscar tools by being able to take larger depths of cut at higher feedrates, which the Mazak machines support thanks to their greater rigidity and high torque spindles.

He says also that tool breakage is rare these days. This, combined with the ability to hold tolerance easily, has resulted in a four-fold reduction in scrap rate to below one per cent of the 200 frames produced annually. This is

important to profitability as components can cost as much as £10,000 each.

The latest turning technology is also in high demand from aerospace manufacturers. Take Bristol-based Avon Valley Precision Engineering which is well located to support the wealth of global aerospace manufacturers in the area. To enable the aerospace sub-contractor to meet the increasing demands of this customer base, it has acquired three DMC turning centres from Leader CNC: DMC 6GL, DMC 8GL and DMC 210TM models.

"We are always looking to increase our capacity and update some of our machine tools," says director Barry Damsell. "We looked around for flexible turning centres to work in the 10 mm to 12 inch diameter capacity range that could comfortably produce small batches from 10 up to 10,000-off. While some of our aerospace work is quite complex, some jobs only require a small amount of processing, but volumes are relatively high and machine



Magellan Aerospace's EcoSpeed FHT machine features the still novel Sprint Z3 head

reliability is paramount."

These sentiments are sure to be shared by Fred Moser, owner of Techno Group, which comprises precision turned parts specialists Rugby-based Technoset and



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Hi-Tech Aerospace chose the EDM route

Hastings-based Technoturn. Star Micronics has supplied 10 of the 16 CNC sliding-head mill-turn centres in operation at Technoturn as well as six of the 11 sliding-head machines in service at Technoset.

Over 80 per cent of Technoset's turnover derives from aerospace and much of the work that the company undertakes requires tolerances of a few microns. One recent job put on a Star SR-

10J required a component to be produced measuring 230 micron in diameter, +5 micron, -0.

"We are finding that aerospace customers are asking us to hold ever tighter limits, a request that we think is being driven by the need to manufacture more efficient, eco-friendly and quieter aircraft," says Mr Moser.

The majority of the Star machines acquired by Techno Group are fitted with high pressure coolant delivery and swarf management to cope with the difficult materials machined and the need to keep the working area free from chips to maintain high precision cutting.

On the subject of coolant, throughout its 40-year history Cimcool has been a consistent supplier of cutting fluids to the aerospace sector with products such as Cimstar MB602C, Cimstar 603 and Cimperial 22DB helping it gain approvals from Rolls-Royce, SNECMA, Pratt &

Whitney, Boeing and Goodrich.

In one example, at a company manufacturing turbine vanes and blades, the application of Cimcool's products resulted in a sustained cost reduction. This particular customer had a total of 30 creep-feed grinders in its manufacturing facility. In 2005, Cimcool was invited to support this customer with its Cimtech A31F fluid. However, to gain maximum benefit, a high quality water (soft water) supply is required and so Cimcool also recommended a reverse osmosis system that could generate the required standard of water (between 0 and 5 pH).

While the initial investment in this system was relatively high, the resulting savings more than offset the outlay. In the first year of operation, manufacturing costs were more than halved. With Cimcool's ongoing technical support this customer is now enjoying a 62 per cent saving over the original cost per year.□

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