

Centres of attraction

Ease of programming and high tech 5-axis capability are themes that Andrew Allcock discovered as he reviewed the rewards recent machining centre investments have brought their purchasers

Some 75 per cent of Bartlett Engineering's business is related to the booming petrochemical industry. And it is suitably located, being based in Tenby on the Pembrokeshire peninsula, half an hour's drive from one of Europe's largest oil and gas ports, Milford Haven.

A lot of high grade stainless steel is machined as well as a mix of other materials including boiler plate. Some of the alloys are difficult to machine, not only the tough, nickel-based materials and stainless steel, but also other ferrous alloys such as EN26W steel hardened to 350 BH (Brinell hardness).

HIGHER POWER NEEDED

The husband and wife team of Richard and Kay Scourfield now produce most of their work on Hurco machining centre and lathe technology. The company moved into CNC as

recently as 2005 with the purchase of entry-level lathes and machining centres from another supplier. It was a good introduction, but Mr Scourfield soon found that he needed higher power for the type of work that Bartlett traditionally receives.

This was true not only of turning but also of prismatic machining, so a Hurco VMX60 vertical machining centre with 1,524 by 660 by 610 mm travels and 24-position tool magazine was installed in September 2007.

One of the first components to be machined was larger than the X-axis, so after suitable safety measures had been put in place, the side door was opened to allow the 2.5 m-long part to protrude so that it could be clamped on the table. The job involved milling slots in steel cross members, sawn from a 203 by 133 mm H-beam. They formed part of a 20 m underframe chassis that Bartlett was fabricating for the Isle of Wight Railway.

Another early component that was longer than the VMX60's width was a superheater element for a boiler. Made from 220 mm diameter seamless carbon steel pipe, the 2 m-long element contained rows of holes that had been machined manually at Tenby for some years, production time being around 24 hours. Cycle time on the Hurco is just nine hours.

Half of the contracts received by Bartlett require reverse engineering, such as

replacement parts for petrochemical plant that have been manufactured overseas. Measurements taken from component samples are used to create drawings from which the CNC machines are programmed by manual data input on the shopfloor. All of the sub-contractor's programming is done this way, as finding staff in Pembrokeshire with G- and M-code skills is very difficult.

What Mr Scourfield and his operators particularly like about the Hurco machines is the proprietary MAX conversational control system. He says it is easy to produce machining cycles using the Windows interface and touch screen commands, and as programming is so quick, it is ideal for Bartlett's one-offs and small batch runs. The company has no need at all for off-line programming.

WINDOWS INTERFACE

Whereas Windows software was available on Hurco lathes from the time that they were introduced, this was not the case with the machining centres. Following the launch last year of the updated Windows-based software, Winmax, the MAX control on Bartlett's VMX60 has been upgraded, with significant benefits.

According to Mr Scourfield, programming is simplified and 20 per cent quicker using the Windows interface, and 3D colour graphics are improved. Advances in data smoothing have increased contouring speeds and there are many additional features that will be useful for future jobs, such as the ability to select the quality of surface finish.

Bartlett Engineering turned to Hurco when it needed more power





In June this year, a Hurco H320 – the largest in the company's range of rotary tables – was added to the VMX60. Conversational 4th-axis programming is standard on all WinMax controls, meaning that Bartlett was able to start programming rotary parts immediately, with only a couple of hours' additional instruction.

"We pride ourselves on machining parts that no-one else can or wants to produce, but we are only able to do that if our machines are of top quality and back-up is reliable," Mr Scourfield concludes.

"Our location in west Wales is perfect for ports and refineries, but relatively inaccessible for machine tool vendors. When we installed the first Hurco lathe, we were promised prompt service and that is exactly what we have received on the few occasions we have needed to call the supplier out.

EASE OF PROGRAMMING

Ease of use, particularly relating to on-machine CNC programming, is important for Fern Engineering, too. The company, based in Whitebirk, Blackburn, specialises in the design and manufacture of bespoke automation and welding systems. No two systems are ever the same, and the company set up by Andrew Beckley and

Paul Jackson in January 2004 has gone from strength to strength on the basis of its willingness to begin every project with the proverbial blank sheet of paper.

It is company policy to control the entire manufacturing process, and this is why, in 2007, Fern took delivery of an XYZ SMX 5000 manual/CNC bed mill. This 5.75 kW/5,000 rpm machine's 1,930 by 356 mm table with its load capacity of 850 kg, combined with X and Y axes travels of 1,524 by 596 mm, made it an ideal choice for one particular application. This called for the machining of various sizes of steel tooling plate for a self-contained robot welding cell ordered by Bolton-based Cell Security.

In continuous production since installation, the bed mill more than paid for itself in the machining of the 32 tonnes of steel needed to produce tooling plates for Cell Security's many different designs of cell doors destined for prisons, police stations and other security applications worldwide.

Fern employs eight people and Mr Beckley says it is important to maintain the flexibility and fast response of a small business. This, he adds, requires every member of the team to be multi-skilled. So, although a control engineer by training, he is equally at home developing and refining the company's proprietary Supervisory Control and Data Acquisition

(SCADA) software or machining components for the latest project.

"Engineering companies that we know do good work have XYZ machines and we took note of their recommendations when it came to our choice of machine tool," he says. However, it was a demonstration at XYZ Machine Tools' regional showroom in Blackburn that provided convincing evidence of the manual/CNC bed mill's metal removal capability and the ease of use of its ProtoTRAK SMX control. Featuring plain English prompts and with no codes to learn, it is possible for an operator with little or no CNC experience to be up and running within a day. "It is this ease of use that really appeals," says Mr Beckley.

COST DOWN PRESSURES

From ease of programming to the current hot topic of 5-axis machining. Next time you see a bomb disposal robot in action, hopefully on a television screen, it will

Fern Engineering's XYZ-supplied machine more than paid for itself on a single job involving the machining of 32 tonnes of steel tooling plates





Burdon has made massive investment in DMG 5-axis technology

probably be carrying a stainless steel component machined by Turntech Precision Engineering on its new OKK 5-axis vertical machining centre (VMC).

Supplied in September 2007 by Whitehouse Machine Tools, UK agent for the Japanese machine builder, the VP400 machining centre is the first 5-axis prismatic metalcutting machine at the sub-contractor's Wimborne facility. A workpiece setting probe and tool breakage detection from Renishaw have been fitted to speed set-up and minimise scrap.

According to managing director Tony Pigott, the OKK was bought primarily to help Turntech meet inexorable 'cost-down' demands imposed by the aerospace industry. About a quarter of the firm's business is in this sector, so serious attention has to be paid to maintaining profitability when machining a diverse range of components, many of them complex.

"We produce a typical aerospace part

in two hits on the 5-axis machine, whereas it previously required three, four or even five operations, often on two different machine tools," says Mr Pigott.

"Actual cycle times are not much different, but savings in handling and reclamping components make an enormous difference to the cost of production.

"I estimate that if we cut the numbers of ops down from three to two, there is a 25 per cent cost saving, and if the part previously needed five ops, the saving is more like 50 per cent." In one exceptional case, an aluminium component had to be machined on six faces in six separate clampings on a 3-axis VMC.

The same component is now produced in two set-ups on the OKK. Economies on this scale are allowing the sub-contractor to win more business, pay for the 5-axis machine and maintain a reasonable margin on aerospace contracts.

When interviewed in February 2008, Mr Pigott said that the machine had been used only in 3-axis simultaneous mode, using the rotary table and its supporting swivelling trunnion in fixed positions to orientate components for more efficient access. However, he is actively looking for fully interpolative 5-axis work to maximise the machine's potential.

FURTHER 5-AXIS FORAY

Another 5-axis technology fan is Burdon Engineering which is about to install a Deckel Maho DMU 200FD 5-axis mill-turn centre at its Stokesley facility just outside Middlesbrough. The machine is a 44 kW swivelling head milling centre with axis travels of 1.8 by 2 by 1.1 m and is part of a continuing investment programme.

The company is a first tier supplier to the aerospace, oil and gas, earth-moving, medical and specialist automotive sectors. Over the last three years, more than £8 million has been committed to the business largely to bring together a 5-axis milling and multi-axis mill-turning capability plus infrastructure to support this level of technology.

Opened in 2005, the company's model production facility occupies some 25,000 ft² on the six-acre site at Stokesley near Middlesbrough. The machine shop is spacious and clean and immediately conveys an air of precision with five, high specification multi-axis machining centres supplied by DMG (UK) of Luton over the last two years. There is also a separate area containing similarly impressive, large capacity turn-mill lathes and a fully temperature controlled measuring room containing a 4 by 2 by 1.1 m gantry co-ordinate measuring machine.

WORKING VOLUME WINNER

The Deckel Maho machining centres include a DMC 160FD duoBLOCK installed in 2005 that became the door opener for the company to the oil and gas and medical sectors with the machining of large rings for body scanners. This installation of the 1.6 by 1.25 by 1 m working volume, universal 5-axis machine also kick-started Burdon's schedules for aerospace contract work.

With orders growing rapidly, a Deckel Maho DMU 200P and DMC 125FD duoBLOCK universal 5-axis machines were then installed followed by the most recent purchase in Quarter 2 of 2007 of a second DMC 160PFD duoBLOCK and a DMC 125FD duoBLOCK machine. Each machine has the capability to provide full simultaneous, 5-axis tool positioning.

According to managing director Barry Hindson, the philosophy behind the infrastructure of the contract machining facility is 'we are here for the long haul', and he outlines plans to progressively triple the size of the business which will involve a further capital investment programme of £25 million. □