Mould habits die hard

No sector of manufacturing has had to fight harder for survival in recent years than mould and die shops. Steed Webzell reports

No one can deny the impact that China has had on the mould and tool making sector over the course of the past decade. While the initial exodus looked like panic to many, today the UK moulding industry remains in positive trading territory. This is because someone who wants a value-added service for the tooling and production of complex moulded components doesn’t go to China. Lead time, project management and tooling modifications are other factors influencing the decision to source tools from the UK.

A case in point is Hashimoto’s tooling repair division at Boldon, Tyne & Wear, which provides fast response services to automotive operations at Nissan, Honda, Toyota and Land Rover, as well as BMW Mini.

The toolroom works a three-shift system with responsibility for engineering changes, tool modification and repair services, and it is often working against the clock to prevent roll on effects and possible line stoppages at its customers’ assembly plants.

For this reason, equipment used has to be reliable. This factor was high on the decision maker’s checklist when replacement wire cut EDM machines were sourced from 600 Centre in the form of a Fanuc Alpha Robocut 1ic wire EDM, Joemars 430 FZY vertical EDM and, more recently, a second but smaller Fanuc Alpha Robocut Oic.

Hashimoto’s toolroom has gained some important savings on cutting cycles by using the Fanuc machines. The automatic wire re-threading without having to drain the tank and the ability to avoid moving back to datum start position have proved to be a boon, and the company confirms savings such as a 25 per cent cycle time reduction on profiling a 125 mm thick block that took some four hours previously.

PRESCRIPTION FOR SUCCESS

Aside from EDM, the latest machining centre technology also remains in high demand. Take, Cheltenham-based Pharma Tooling, for example, which has more than doubled its maximum tool size capacity with the purchase of a Hurco VMX64 vertical machining centre, supplied with a rotary turntable and high pressure coolant delivery.

There are no prizes for guessing that a sizeable proportion of Pharma Tooling’s business is for the pharmaceutical industry. Blister pack tooling is regular work, which involves machining a 1.6 m long, aluminium bed-way that joins the forming and sealing sections in the production line. The bed-way is now machined in one hit on the Hurco, rather than in two set-ups as previously.

Another company making good use of recently acquired machining centre technology is Bedford-based Midas Pattern Company, which offers a composite tooling system called MRIM – a production moulding solution that can produce runs from 1 to 5,000-off.

The Midas process starts by using CADCAM software to generate cutter...
path codes that are downloaded to one of the company’s five recently installed Haas CNC vertical machining centres – including a 12,000 rpm VF-4SS, a VF-6 with a 4th axis Haas rotary table, or a large 2 by 1 m VF9 – typically cutting the master pattern equipment from polyurethane tooling board.

Once we have the master pattern equipment we use it to produce a composite metallised resin injection mould tool – MRIM,” says technical sales manager Rachel Collier. “That’s about as much as I can tell you. The detail of the process is closely guarded secret. The skill – the Midas touch, you could say – is being able to make a good quality tool from the master pattern.”

Each of the company’s CAD engineers is also a machine setter, programmer and operator, so when it came to choosing a CNC machine tool, top of the list of essential criteria were reliability and user-friendliness.

The machines have helped Midas complete a number of high profile MRIM projects recently, including the tooling and parts for a new front cover for Lynton Laser’s Lumina intense pulsed light and laser system for cosmetic, medical and conservation applications.

POLISHED PERFORMANCE
Gosport-based sub-contractor Norjon Engineers has doubled its turnover to more than £1 million by recently acquiring the order book of a local business specialising in thermoforming moulds for the food industry. Owner and managing director Kevin Fox decided to invest in new machine tools to produce the aluminium moulds to improve their quality and lead time.

From a shortlist of three machining centres, the decision was taken to invest in a Hermle C 20 U from UK agent Geo Kingsbury Machine Tools, despite the machine being a little more expensive.

“Surface finish is important on our moulds as good cosmetic appearance is a prerequisite for plastic packaging in the consumer industry,” enthuses Mr Fox.

“The finish off the Hermle is of such high quality that we do not have to hand-polish moulds after machining.”

The company is now looking to take on additional work that is suited to the machine’s capabilities, including other types of moulds and tools with the exception of plastic injection moulds.

As well as the machining centre, the correct choice of cutting tool can also have significant impact on the success of many mouldmaking projects, as Birmingham-based MNB Mould Services can testify.

“Not so long ago, an ITC representative offered us carbide tooling and we were reluctant because of the cost implications,” says director Frank Ryan.

“However, we had one machine milling cavities on a multi-cavity tool that consisted of numerous small cavity blocks. With so many cavities at approximately 40 mm square and 40 mm deep, we decided to give the carbide a go, and we haven’t looked back since.

“The Asian economies have forced prices for mould tools through the floor
in recent years and we have invested considerably to stem the flow of work to the Far East. Working alongside our machine tool investments have been the latest tooling developments from ITC.

Among the ITC tooling employed by MNB are Hanita VariMill square end carbide and diamond coated cutters for roughing and finishing operations, and diamond coated Hanita tools, in diameters from 0.5 to 6 mm, for machining intricate patterns.

Many suppliers of machining technology develop products aimed at specific manufacturing sectors and mould and die is no exception. For instance, LMT has introduced a new generation of milling insert that overcomes problems associated with ballnose copying style inserts where zero cutting speed at the centre causes error of form and premature insert failure.

The FlatBall indexable insert combines the advantages of both ball and toroidal style indexable inserts for mould and die type applications in what LMT describe as ‘double-edger’ geometry.

The design of the FlatBall, which has a 2 mm flat on a 10 mm diameter insert, overcomes the absence of cutting speed as the spindle rotates around the centreline of the tool, an effect that causes a normal carbide insert to suffer from the rapid rise in temperature created by the resulting ‘rubbing’ rather than cutting action.

FLATTER TO PLEASE LMT’s solution, as the FlatBall name suggests, is to flatten the ball, or more technically, to reduce the radius of the insert until it becomes a double-edged cutter. This modification of form means the insert works at a constant speed at its centre but without losing any of the advantages gained by the ball shape. This design also prevents any accumulation of chips or built-up edge at the tip of the ball when an initial cut is made into a slope or a helix. In addition, it can also reduce the number of individual cutting paths required, thus shortening cycle times when complex contours have to be machined.

Elsewhere, the combination of ultrasonics to provide tool oscillation at a frequency of up to 48,000 times a second to enable hard machining, as well as high speed and conventional milling processes in the same spindle of a vertical machining centre, is a DMG development.

The Ultrasonic HSC 20 Linear uses these pulsing cycles in combination with simultaneous tool rotation (0.3 to 3 mm diameter) at up to 12,000 rpm to remove micro-particles from the surface of the workpiece. By maintaining a precise and continuous gap between the tool and workpiece, forces normally created in a conventional machining process are reduced and surface finish can be maintained up to 0.2 Ra with less possibility of surface damage to the part.

Another machining centre developer, Yamazaki Mazak, says the introduction of its new Nexus 700D-II vertical model with 50-taper spindle was in direct response to demand from the mould and die market. The machine is built for heavy metal removal and fine finishing operations, coming with an 8,000 rpm, 30 kW integral spindle/motor delivering torque of 302 Nm. Ballscrew core cooling is standard on all axes.

Enhancements to controls and software have also been made to suit users in the mould and die sector. For instance, Anilam’s multi-axis 6000 Series CNC now has enhanced mould and die capability (scaling, mirror image, modal corner rounding/chamfering), as well as a host of canned cycles including mould rotation and draft angle, while Vero’s latest VISI 15 CADCAM software for mouldmakers now features reflection rendering, hole feature texture mapping, perspective view, dynamic sections and true 1:1 scale viewing.

And let’s not forget the master craft of mould polishing, where superabrasive finishing specialist Engis say its polishing brushes have been developed to hold diamond compounds longer and provide more cutting action at lower costs.

While mould and die manufacture may not have changed much over the years, the associated technology has evolved beyond recognition.