



Metaltech's directors have benefited from C Dugard's Hyundai-Kia horizontal technology and the company's willingness to tailor it

Whys and wherefores

With *Machinery's* 5-axis supplement accompanying this issue, Andrew Allcock looks at 'traditional' horizontal and vertical installations to see who's buying what and why

Competitive spreadsheet analysis is undertaken by Metaltech Precision Engineers' two directors, Ken Elphick and Peter Smallwood, before making any proposed purchase.

A major supplier to the pump industry, almost 70 per cent of the components passing through the sub-contract machine shop of the Hailsham, East Sussex-based business are produced

from 316 stainless steel, while Hastelloy, Inconel, Monelmetal and Duplex materials are also processed. Not surprisingly, the company's benchmark for machine comparison focuses on power and torque at both the spindle and axis drives, as well as overall machine rigidity. Typical tolerance requirements for machined parts are between 0.02 and 0.04 mm with

typically 0.8 CLA on surface finish.

"We've spent around £700,000 on new equipment over the last couple of years and while we carefully check out machine performance capability and suitability, we obviously also have to consider budgets," says managing director Ken Elphick, "Ongoing support from the supplier is also vitally important, and when we decided to go

for our first Hyundai-Kia horizontal machining centre, we were pleasantly surprised how our purchase procedure ticked the boxes."

Indeed, so successful was the first installation that Metaltech now has two Hyundai-Kia horizontal machining centres. The first, a KH63G, was installed in 2006 to meet the growing demand generated by a specific valve project. This machine was the first horizontal machine to be installed in the UK by C Dugard of Hove following its appointment by Korea's largest machine tool company to represent it in the UK and Russia.

NO PROBLEM CUSTOMISATION

The machine with twin 630 mm square pallets, a 22 kW spindle drive and X, Y and Z axis strokes of 950 by 825 by 760 mm, also has B-axis rotation of the pallet. What had already impressed the Metaltech directors about previous machine purchases from Dugard – including Dugard Eagle 1000 and 600 vertical machining centres, and a Niigata horizontal machining centre installed some five years before – was the willingness of the supplier to tailor the specification.

The same was true for the KH63G. Metaltech make extensive use of heavy duty tombstone location plates to hold fixtures and clamps which are all produced in-house. To manipulate these heavy tombstones onto the pallets, the setters also mount the tombstone on a sub-plate and employ a jib crane arm to lift and swing the assembly onto the pallet in the machine.

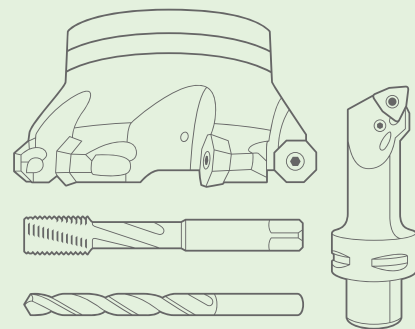
However, the normal pallet area door and support frame on a horizontal machining centre can make access with a crane arm very awkward, so the two directors requested that the guard doors be removed at the front while still maintaining the machining area guarding using electronic light curtains while giving total freedom. "Dugard was more than willing to accommodate us and did exactly the same when we installed the second Hyundai-Kia," said Mr Smallwood.

Dugard was able to provide a complete package from removal and disposal of old machinery to being able to reposition any equipment that would be likely to hinder the installation of the new machine without causing too much disruption to production.

The second machine, a smaller capacity Hyundai-Kia KH50G, was installed in 2007. It has twin 500 mm pallets and axis travels of 760 by 705 by 650 mm in X, Y and Z, a B-axis and an 18.5 kW spindle. And, like the KH63G, it met the directors' requirements, having the same Fanuc 18i-M control, BT50 taper and 40 tool magazine, enabling them to maintain commonality of preset tooling and familiar Alpha CAM system programming.

Mr Smallwood comments: "We strongly believe that profitability is only generated when spindles are running and swarf is pouring from the conveyor, so we try and keep methods and tooling as standard as possible but do insist on high quality tooling. We make our own fixturing and try to schedule as many

SINGLE-MINDED BENEFITS
DON'T COME FROM
MULTIPLE SUPPLIERS.





Thame Workholding installed two Mazak Nexus 5000-II horizontals following reliable performance from a previous horizontal from the same company

similar or families of parts through our Preactor planning system as possible in order to reduce changeover times."

Another recent investor in horizontal technology is workholding specialist Thame Workholding (the trading name of Thame Engineering company), which is operating two Mazak horizontal machining centres.

Thame's ISO 9001:2000-accredited factory is kept busy machining a wide range of components, ranging from soft and hard chuck and vice jaws to modular fixturing systems for co-ordinate measuring machines, special chucks, fixtures and 'cubes' for vertical or horizontal machining centres.

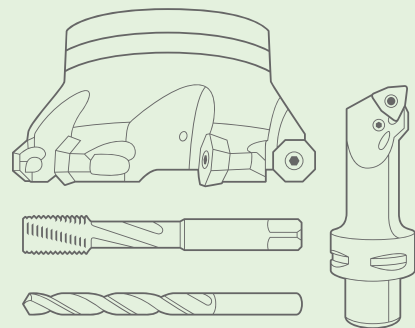
DESIGNS TESTED ON SITE

"We are constantly modifying our designs and improving our manufacturing processes," says David Handley, director, "and we are in the fortunate position of being able to test most of our designs in a working environment." That working environment is a four-bay building on the industrial estate in Long Crendon, near Aylesbury, housing five horizontal and six vertical machining centres.

In fact, Thame has just placed an order for a second Mazak Nexus 5000-II horizontal machining centre that will be sited alongside the existing HCN 5000-II installed in April 2007: both machines are dedicated to the machining of standard catalogue items which number more than a thousand. Specials are usually allocated to the VMCs equipped with Thame's Zero Point system, because set-ups are quick, flexible and better suited to one-offs and small batch runs.

According to David Handley, the decision to purchase the two Nexus horizontal machining centres was primarily to do with pallet load capacity and drum size, although the reliability of an earlier 15 hp/10,000 rpm Mazak HTC 400 horizontal machining

**KNOW-HOW IS
NOTHING WITHOUT
KNOW-WHY.**



centre played its part. "That machine has run night and day for 10 years and has done a fantastic job for us," he says.

Equipped with the sixth-generation Mazatrol Matrix CNC system, the HCN 5000-II twin-pallet horizontal machining centre accommodates up to 750 kg on its 500 m² pallet, and has a wide machining area 730 by 730 by 740 mm in X, Y and Z, respectively. Even so, this 30 kW machine with its 18,000 rpm spindle and 60 m/min rapid traverses, takes up just 2,330 by 5,530 mm of valuable factory floor space. It is ideally suited to the machining of multiple workpieces, these being held on dedicated fixturing.

"Companies buying machine tools don't always think it through in terms of the tooling and workholding needed to get the best from their investment," says David Handley. "Before I ordered the second HCN 5000-II I knew exactly how it was going to be set up and exactly what I intended to do with it. I accept that it is slightly different for us because we actually design workholding equipment to get the maximum from any machine's capacity. Customers regularly send in component details for our design team to suggest the most cost-effective and productive workholding solutions."

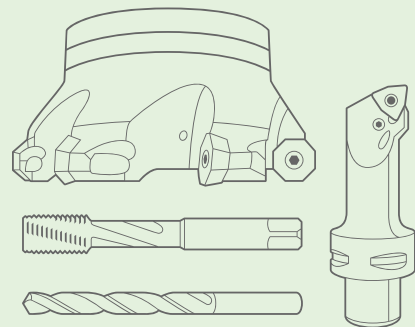
PRICE AND EASE-OF-USE PRIORITIES

Moving to a smaller scale and lower volume environment, price and ease of use were key for entrepreneur Steve Atkins. Following graduation from the University of Abertay, Dundee, Mr Atkins established a career as a car designer with companies such as Peugeot, Jaguar and Aston Martin, while spending his spare time designing his own motorbike. Four years ago he built a first prototype. Two more prototypes followed, the last in October 2006, just in time to launch the concept at The International Motorcycle & Scooter Show at the NEC, where he took his first order. The customer paid a deposit there and then. This plus a small amount of government funding was the catalyst for BFO Motorcycles.

Based on the Honda Fireblade motorbike, BFO manufactures a kit costing around £6,500 plus VAT and, within a month, converts the donor bike into a bespoke motorcycle called the 'switch:BLADE' (below). Only the Fireblade's wheels, suspension, brakes, wiring and engine are retained; the rest is replaced in the



INNOVATION DOESN'T
HAPPEN IF YOU'RE
AFRAID TO CHANGE.





BFO's Steve Atkins is a designer not a CNC programmer, so the Hurco's Max CNC makes it easy for him to construct programs conversationally

makeover. The plan is to build 100 kits before moving on to a second donor bike, the Suzuki Hayabusa, and a repetition of the exercise in collaboration with international motorcycle stylist John Keogh.

Manual machines would have been too labour intensive for series production, making the kits too expensive, added to which there is potential for inaccuracies to creep in due to human error. Learning conventional CNC programming using G and M codes would have been very time-consuming. All Mr Atkins wanted to do was get accurate bike components off the machine quickly

He therefore bought a Hurco VM1 machining centre in mid-2007 – priced at £27,900 – which, with its 660 by 356 by 457 mm working volume was, he says, ideal for milling motorcycle components. With financial constraints operating as the business grows, he is postponing investment in a lathe and

using a 3-jaw chuck and circular interpolation on the Hurco to produce most of the turned parts for his company's bikes as well.

Apart from machine price, ease of use was key because Mr Atkins is a designer not a machinist.

"The way the Hurco's Max control manipulates geometry is similar to my I-DEAS CAD system, so I am in a familiar environment. The touch screen control makes it very easy to build up a cutting cycle based on the geometry of the part and the tooling I have available. You simply redraw the part on the Max screen, input feeds and speeds and the program writes itself."

COMPLEX CUTTER PATHS

For machining more complicated 3D parts such as patterns for producing areas of the carbon fibre bodywork and the seat, which was styled by John Keogh, Steve has installed a OneCNC CAM package that will allow input of

complex, 3D cutter paths directly into the Max control.

He continued, "Just by machining the patterns for the switch:BLADE in house rather than having to sub-contract the work, I have saved one third of the cost of the Hurco.

"All the formed 7020 aluminium tubing for the frame has to be machined so that it fits together first time. There are fork clamps, mudguard brackets, foot rests, brake calliper mounts, handlebars and a host of other components to be machined from billet, plus most of the traditionally turned parts – I now only have to sub-contract the turning of headstocks, which are a little too long for the Hurco.

"I calculate that there is about £2,000 worth of machining in each switch:BLADE kit, so together with the saving in pattern machining, the Hurco will have paid for itself after nine bikes. Everything after that will be for free, except for tooling and running costs." □