

# Turning up the productivity

**Andrew Allcock reviews a number of turning technology investments. While one-hit machining is a common theme, there are others too, he finds**

**W**akefield-based hydraulics company Hydraulic System Products (HSP) has installed a 5-axis Colchester-Harrison Tornado T6MS mill-turn centre with main and sub-spindle (600 Centre) to improve productivity, quality of surface finish and aid reduction of overall product lead times.

So significant have these savings become that in one case, overall machining times are now a quarter of what they were before. The pursuit of higher productivity is key to HSP maintaining an enviable record of 75 per cent of production being exported to 15 countries overseas.

A broad range of standard valves for applications that include test equipment and components for fluid power systems requiring a wide variety of shaft-type components that vary from 17 to 45 mm diameter and are up to 150 mm long mean that gone are the days when cam autos alone satisfied HSP's staple diet of turned parts.

Today, output is centred on a trio of 52 mm bar diameter Tornado T6MS mill-turn centres, each fitted with auto bar feed systems that enable the machines to run unmanned and lights out. "As a result," says managing director Gerald Gosnay, "the Colchester-Harrison machines have not only transformed our traditional methods of producing turned parts, but they also effectively represent a watershed in the way we approach the complete manufacturing operation.

Components can be produced more cost-efficiently if manual intervention can be



*HSP has moved from cams to one-hit CNC turning*

minimised or eliminated altogether. The three Tornados are enabling us to do exactly that – in a particular case, for example, the T6MS with its 12-station driven tool turret has transformed one job from a three-operation sequence of turning, the milling of flats and drilling into a more progressive one-hit, single-set-up task. As a result, we have reduced our machining time to a quarter of what it was before."

HSP's introduction to Tornado mill-turning six years ago was spurred by the combination of a growing international order book and the recognition that the

traditional single-spindle cam autos had to be replaced. The company was looking for more effective and efficient turning capacity to enable the 16-employee operation to remain a world player.

#### UNMANNED ADVANTAGE

Colchester's own-brand MBF 1000T bar feed system partner each Tornado at HSP and are key to the successful exploitation of 'lights-out' production. The Tornados are set and loaded with bar at 3.30 pm, then left to run unmanned overnight to produce batches of 2,000 or so components.



"Round-the-clock, one-hit machining – much of it unmanned – to maximise all available productivity opportunities is the only way that UK companies will compete nowadays. I'm never going to be satisfied with our operation until we're doing as much of that as we possibly can," concludes Mr Gosnay.

Stroud-based Precision 82 is yet another convert away from cam autos, this time to the sliding-head cause. Managing director Tony Mathews, who runs the five-man firm with partner Samantha Turner, readily admits that he used to be afraid of CNC machines back in 1988 when, as a user of plugboard lathes, manual cam autos and sliding-head lathes, he started to notice that his competitors were investing in CNC sliding-head technology – "and they always seemed to be Citizen machines", he recalls.

"I was convinced that nothing matched the production time of a cam auto for volume turned parts – despite

what was happening all around me."

For example, when Precision 82 won a monthly contract to produce 500,000 heat sink pins, it took just 10 seconds to produce each fairly straightforward part on a cam machine compared to 18 seconds on a CNC lathe. "Of course, then you couldn't match the overlapping operation advantage of a cam auto, so I was therefore a firm believer that 'cam could and CNC couldn't," he says.

#### CHANGE OF MIND

But he changed his mind when he found that a multi-operation part for the photocopier industry was taking three minutes to turn and produce with cross holes, milled flats and countersinks. Worse still, the part required a second operation set-up just for radiusing and cleaning – yet it could be completed in a single set-up in under a minute on a Citizen CNC sliding-head machine.

Finally, what convinced him that CNC sliding head technology was the best way

forward, was a visit to a customer who was installing a Citizen to replace a machine that he was about to buy. Reflecting, Mr Mathews doubts if he'd still be in business if it were not for Citizen CNC sliding-head technology and the help and support of the machine supplier, NC Engineering of Watford.

"By investing in the multi-axis Citizen L20-VIII I could scrap five cam autos. It's the best thing I've ever done," he insists.

The cam auto route – initially with a secondhand machine – was embarked upon after one customer placed an order for 10,000 turned part. Then came further automation through plugboard machines. "Up until the mid-1990s I could pick and choose which jobs I wanted – for straightforward turning applications, using the cam autos meant every job was like shelling peas," he says.

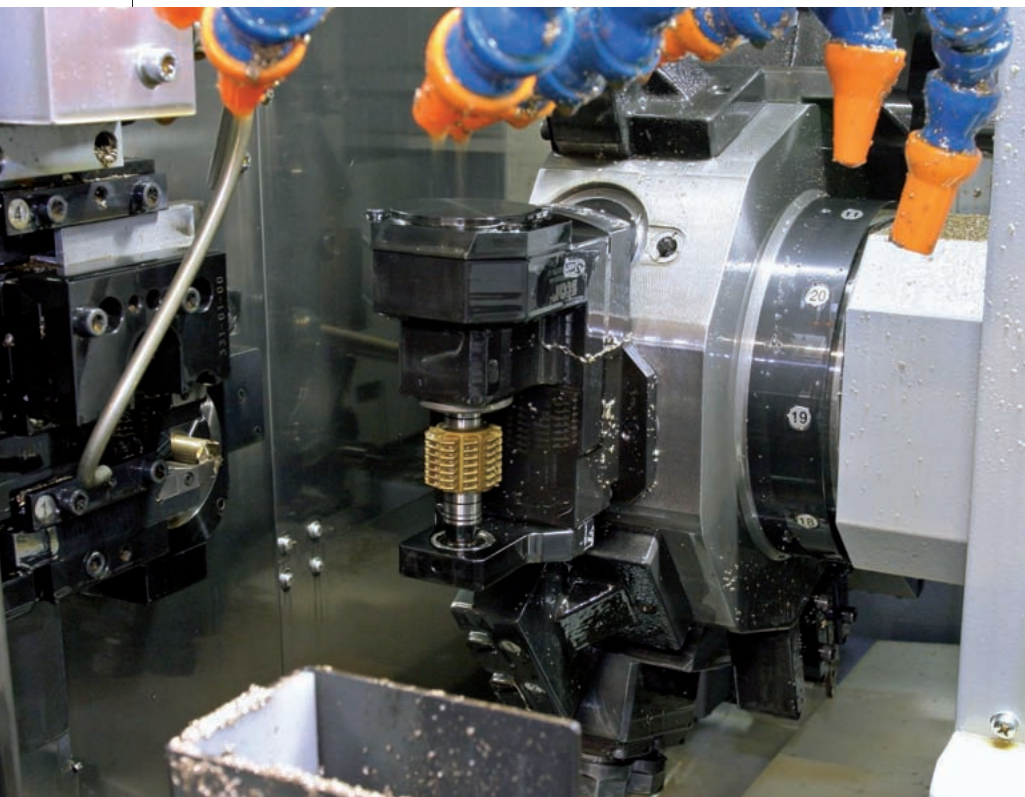
"But as with so many other small sub-contract companies in the UK, I then started to see a lot of the high volume work go to China and India – the heat sink pin job was a classic where the customer found he could buy the whole assembly abroad for less than I was charging to machine the pin alone."

"However," he insists, "every cloud has a silver lining, and as the simple turning contracts disappeared, the Citizen technology has enabled me to move into more complex applications involving milling, for example, as well as turning, where the machines' 'one-hit' capabilities have truly saved the business."

Cam autos have also got the chop at Macvere Engineering. "There are no sub-32 mm components that we cannot put on our 11 sliding-headstock mill-turn centres," says Gary Macey, joint managing director with his brother, Mark, of the Hampshire general sub-contract shop.

"The flexibility of these machines, together with our eight fixed-head lathes, machining centres and wire eroders, means that we can offer customers a complete machining service across a whole package of work."

Nine of the sliding-head lathes at Macvere are from one supplier, Star Micronics. The first was installed in 1996,



Nine sliding-head machines at Macvere are from one supplier – Star Micronics GB



*By investing in the multi-axis Citizen L20-VIII "I could scrap five cam autos. It's the best thing I've ever done," says Tony Mathews of Precision 82*

since which time Macvere has progressively replaced the cam autos that Mr Macey's father, Richard, bought when he started the company back in 1972. The last cam machines were decommissioned in 2007 when the latest two Star lathes were delivered, although two cam autos have been brought back temporarily into service for a big switchgear parts order.

To illustrate how versatile CNC sliding-head lathes are, Mr Macey cited a connector block that he used to produce manually from rectangular brass extrusion for an electric meter manufacturer. The previous manufacturing process, comprising four separate operations, was to saw the block to length, drill and tap it in a jig, and reset it in another jig to drill the end. Floor to floor time was 90 sec.

The same part was subsequently machined much more economically in one hit on a Star sliding-head lathe in a 30-second cycle, despite only driven tool operations being needed in the main and counter spindles; there was no turning, apart from parting-off.

Mr Macey continued: "We put most of our mill-turned parts on the sliding-head lathes because they have faster axis movements than our fixed-head turning machines and so are quicker and more productive. The parts come off in one hit, as all of our sliding-head machines have a counter spindle and live tooling, whereas some of our bar-fed, fixed-head models do not."

#### COMPLEMENTARY INVESTMENT

Evesham-based sub-contractor Rotec has invested in a Nakamura-Tome Super NTY3 twin-spindle, three-turret, three Y-axis turning centre which will allow it to produce components up to 42 mm diameter from bar faster, and with more milling power than its sliding-head machines can offer on parts up to 32 mm diameter.

Rotec's customers span a wide range of industries, from the automotive sector to packaging equipment, mining, medical and defence. It also finds itself making some unusual things such as

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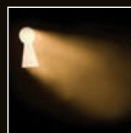
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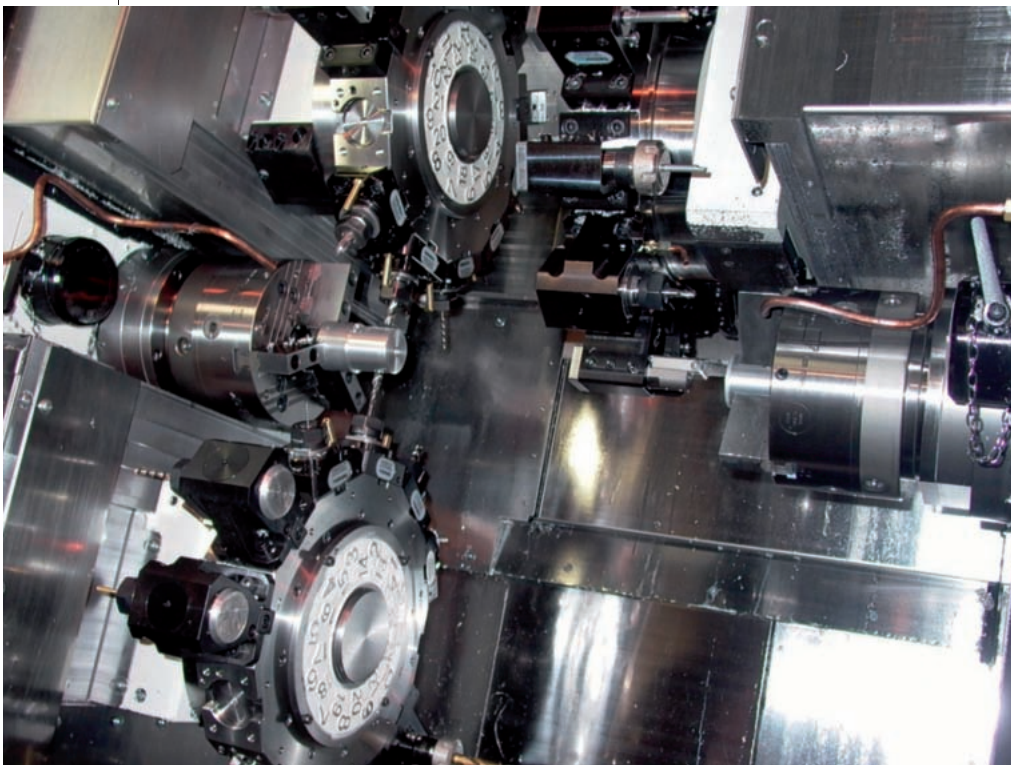
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*Rotec has located its Nakamura Super NTY3 fixed-head machine within its sliding-head section "because that is the type of work that it is going to be doing", says Paul Butler, managing director*

parts for harps, cannons for model ships and curtain rails for dolls' houses.

Rotec currently runs both sliding-head machines and larger fixed CNC turning centres. "The reason we use the sliding-head machines," explains managing director Paul Butler, "is because they are very quick and reliable on small parts, which makes them suitable for unmanned running and, unlike the cam autos they replaced, they are infinitely adjustable.

#### BIGGER CAPACITY

"The problem for us is that, because of technical limitations, the upper size limit for these machines is 32 mm diameter. We bought the Nakamura because we believe that, although it is a fixed-head machine, it is effectively going to move the capacity we have on our sliding-head machines from 32 up to 42 mm.

"We have actually installed the Nakamura in the sliding-head section

rather than the fixed-head section because that is the type of work that it is going to be doing. By using the techniques and philosophies that we have learnt on the sliding-heads, we think we will save a lot of time on the Nakamura and it will give us a competitive edge.

"There has traditionally been a big jump in part prices as soon as you went above 32 mm. From talking in pence per part you start talking pounds as the machining technology changes from sliding-head to fixed-head. By applying sliding-head thinking on the Super NTY3 we are hoping that there is a market opportunity for us to exploit at that crossover point."

Each of the Super NTY3's turrets boasts Y-axis, each able to work on either of the spindles, and the machine has up to 72 driven tools available at any time so that a standard set-up allows the production of an

extremely wide range of components.

"We have always invested in the best possible equipment we could afford," says Mr Butler. "And although we are often doing relatively low value work we do it on high specification machine tools. That way we find we get a robust set-up, reliability and quality parts. We have already established that the Nakamura is very fast, and we expect it to be a good contender with the sliding-head technology in terms of quality and reliability."

#### RAPID MANUFACTURING

One component that has already shown the potential of the Super NTY3 is an actuator for a motorsport fire extinguisher. It has 26 separate features to be machined – including off-centre drilling and threading, internal threads and threaded cross-holes. Using 28 driven tools, it can be produced on the Nakamura in just four and a half minutes.

"I want to continue investing in machinery so that we can take the rapid prototyping approach and apply it to manufacturing. We want to be able to get 90 per cent of the jobs on the machine within hours of getting the order, hit them very hard and turn them round very quickly using the best possible technology.

"And we want 100 per cent machine utilisation so that we can compete with all the guys around the world who are trying to nail us on price. To do that we need to be clever with the way we organise our work, rationalising requirements across our customer base and minimising set-up times. The Nakamura Super NTY3 supports that vision."□

□ To catch up with latest turning technology developments from companies such as

Turning Technologies (and others, too), make a date to visit MACH 2008, to be held at Birmingham's NEC, 21-25 April – pre-register at [www.mach2008.com](http://www.mach2008.com).

