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## **COLCHESTER-HARRISON PROVIDES BUSINESS RAMP UP**

### **CAPABILITY FOR YOUNG SUBCONTRACT MACHINISTS**

Darren Grainger is 27 and has recently installed a top of the range Colchester-Harrison Tornado T8MSY mill-turn centre with subspindle and Y-axis crossfeed to the 12 station driven tool turret in order to capitalise on his fast appreciating success against a rising order book for precision turned parts.

His business, Hi-Spec Precision Engineering that started just 3½ years ago, is located on a small industrial estate in the middle of the Leicestershire countryside. From manual capstan lathes and milling machines it has grown rapidly following the installation of a Colchester-Harrison MultiTurn 2000, flat bed combination lathe in December 2005 that became the launch pad into real success.

Said Mr Grainger: "I still cannot believe the impact on customers that our first venture into CNC had on the business. So as quickly as we could, in February 2006 we installed a Colchester-Harrison Tornado T6M driven tool mill-turn centre to provide more automated turning and combine operations. Then when this machine brought in so much more work, by July 2007 we were ready to take delivery of a larger capacity Tornado T8M. This was installed in our new unit that doubled the size of our shopfloor to 1,800 ft<sup>2</sup>."

He then described the feedback from customers, that stretch from the south coast to Scotland and across to Norfolk, who responded with even more orders and wanted larger sizes of components produced by his new capabilities.

Prior to setting up, Mr Grainger was a CAD designer in an hydraulics company where his father was also workshop manager. Following an illness, his father retired and it was after a family meeting in September 2005 that it was decided to set up a small subcontract shop with three manual machines on the Market Overton Industrial Estate near Oakham.

His previous employer immediately offered help and was keen to use his ex-employee's experience to top up its capacity and produce overflow work and supplied material on a free-issue basis. In response, Mr Grainger's mother came along to help operate the manual machines alongside his wife who, at the time, was eight months pregnant. After eight months of weekends and very late evenings plus a growing customer base and order book involving lots of small jobs and prototype work, it was obvious that his low overheads and willingness to deliver were helping to secure orders and enabling him to really get going.

But he also knew he had to be more productive to expand the business so a family council decided that CNC would make the lives of everyone far easier. Mr Grainger was very computer literate but lacked CNC knowledge so he found the Manual Guide *i* programming on the Colchester-Harrison MultiTurn was ideal for him. The control enabled him to quickly set up a job and then use the CNC to run the batch while he did other things, only having to return to the machine to unload and load.

The result of this investment was rocketing expansion that is described by him in retrospect as almost unbelievable but enjoyable. “The capability of the machine took significant man hours out of a job,” he said, “but being more competitive and productive means I was hit with loads more work that had need of drilling, tapping and milling.” And so a discussion with Colchester-Harrison resulted in the decision to go full CNC with driven tools in order to combine operations where possible.

“It was almost like turning a switch,” he said. “Even more orders came in and work that we had taken on previously and on which we knew we were not making money, suddenly became profitable.” He described a small coupling for hydraulic power units with a tang and slot with the two features tightly toleranced to each other. He said: “It would be a pain to produce without turn-milling but the Tornado T6M just produces the parts in an automatic cycle without any problem.”

“Customers were beginning to increase pressure on him to produce even larger components and so Mr Grainger decided to step up a machine size to a three-axis Tornado T8M with driven tools and 66 mm bar capacity. “I could not believe the difference the 22 kW spindle made. It was really impressive cutting stainless and EN24T hydraulic cylinders,” he said.

He then described a cylinder that had an off-centre bore. “We put special jaws on the chuck and ran the spindle to 850 revs/min before we had to counterbalance the chuck as vibration began to set in. We then pushed a 40 mm diameter U-drill straight through without any protests from the machine except swarf banging on the guarding.”

Hi-Spec Precision Engineering has definitely benefited from Mr Grainger's seven year background in design. "I understand the needs of the hydraulics industry," he said, "and can innovate my way around jobs to produce what they need." For instance, he described how he has eliminated grinding on piston rods and honing on some cylinder bores and is obtaining the component geometry by single setting machining. Tight tolerances and surface finish requirements are being met by diamond burnishing. He added: "We can easily hold 15 microns size on stainless, EN24T and EN8 and between 0.2 and 0.4 micrometers surface finish."

He also hard turns Rockwell C 60 steel on the T8M Tornado using CBN inserts without coolant to produce bearing bores for conveyor rollers and pulleys. "It's easy," he said, "for a 38 mm bore, run it at 100 m/min, 0.1 mm rev feed and it's no problem."

With his wife at home helping with the bookkeeping and his mother looking after his father, Mr Grainger now employs three full time people, one a skilled setter and two operators. Materials passing through the Tornados and MultiTurn, that is now used for smaller quantity batchwork, include free cutting steels, aluminium, bronze, brass, 303, 304 and 316 stainless steels, EN 16T, 19T and 24T in quantities that have risen from five or so to 50, 100 and even up to 3,000.

"I can set the machine on Saturday, prove the program, come in the next day and 500 parts are completed," he said. Today, there are 26 customers on Mr Grainger's order book, of which 18 are very regular in placing orders. Currently over 800 different part orders are being processed and he is now even holding small stocks of parts for customer call-off.

But once again, customer pressure is building for more work to be produced out of Hi-Spec Precision Engineering and a greater need for heavier duty milling prompted a response to add yet another Tornado to the stable. In his new unit, the T8MSY has just been installed opposite the T8M. He said: “We are getting more demand for heavier milling where the Y-axis crossfeed to the turret provides an effective solution.”

He is now looking forward to the advantages of the new high rigidity Sauter turret design of the latest machine with HSK 83 tool interface that puts 10 kW of direct drive power behind the cutting tool – almost doubling the previous version of the machine.

The driven tool speed is also twice as fast at 10,000 revs/min for axial and radial approach to the workpiece, with  $\pm 40$  mm of travel that is ideal for the general machining capability that Mr Grainger is providing.

However, what Mr Grainger is really keen to exploit is the ‘one-hit’ single cycle capability and the ability to combine multiple operations into one. “The machine will be absolutely ideal for hydraulic type parts that have a high requirement for geometrical relationships between features. This could mean I could be combining up to seven operations into just one.” he said.

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