

The drive for productivity

With many firms installing sliding-head technology, Steed Webzell examines latest tooling and toolholding innovations for these machines

The demand to machine small, high precision components in a single setting is the driving force behind the ascent of the sliding-head lathe. Although these compact, multi-axis turning machines can offer short cycle times and have the capability to run unmanned, these demands are only satisfied via a combination of machine functional and appropriate cutting tool/toolholding solutions.

This can be verified by Wallington-based Monument Tools, a provider of tooling solutions for the plumbing, heating, roofing, gas, pipe testing and drainage industry. In response to the company's call for help to improve its productivity, the activities of companies such as NC Engineering and Sandvik Coromant have not only strengthened the business through improved quality, keener pricing and better delivery, they have also set the scene for continuous improvement across the site.

Following the installation of two Citizen M32 CNC sliding-head autos to replace fixed-head lathe and milling machines, Monument's works manager, Jon Norton has forged a strong and close working relationship with NC Engineering's application engineering team and Sandvik Coromant's tooling engineers. Since then, scores of different parts have been programmed and re-engineered – and the result is that



production cost savings of up to 60 per cent have been achieved. Lead times, too, have been slashed by allowing the production of parts with up to five operations in a single mill-turn cycle on the company's Citizen machines.

ONE OPERATION: MANY PROCESSES

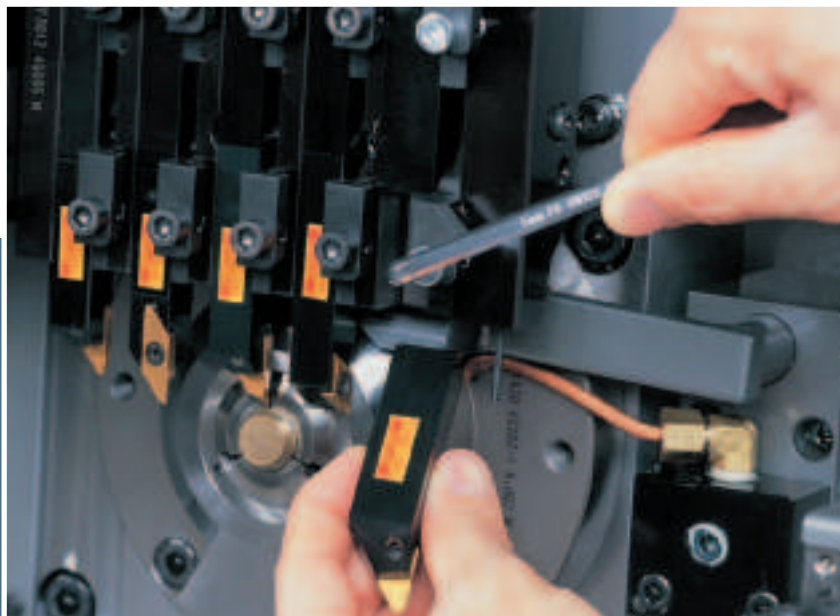
Processes performed in-cycle on the Citizens now include turning, milling and drilling with cross-drilling and milling; milling of tapered hexagons; wobble broaching internal hexagons; thread rolling of studding (which used to be a bought-out item); slotting and milling of keyways and polygon turning.

Previously, Monument produced components with hexagon shape

requirements either out of hexagon bar or on a Profilator as a separate operation. This process is now combined into the single machining cycle of the Citizens.

Sandvik's tooling engineers designed a special profiling tool body to accept Sandvik standard boring cartridge units. By using milling grade inserts to withstand intermittent cutting, the unit is used to polygon turn the required number of flats on materials as diverse as mild steel, brass and stainless steel.

As a result, up to 1,500 parts are now polygon turned before any insert change is required, producing flats, squares and hexagons directly out of round bar. The new tool also uses only three inserts that cost just over £3 against a previous



Left, WNT's System 3000 – the company's response to sliding-head demands. Above, Sandvik Coromant's QS (Quick Start) tooling system developed in partnership with Citizen allows fast removal and accurate replacement of toolholders. It delivers both a safer and faster operation

The new Coroturn QS Quick Start system replaces the conventional wedge locking system that requires three screws and a wedge clamp to capture the toolholder. The new system also enables the toolholder to be removed quickly and replaced accurately via its single locking screw, enabling the insert to be indexed or changed out of the confines of the machine. Not only does this make access to the tool easier, it reduces the likelihood of either the insert or locking key being dropped into the machine.

Some conventional one-piece toolholders can take 12 steps to change, resulting in lengthy periods of inactivity that are costly and unproductive whereas QS can be set-up in minutes.

PURPOSEFUL PARTNERSHIPS

Another supplier of sliding-head machines, Star Micronics, also uses preferred tooling partners in order to develop specific customer solutions. The company recently provided a fully engineered system for turning, thread cutting, milling and gun drilling titanium alloy tips and transducers for ultrasonic aspirators used in the treatment of brain tumours to the Andover factory of

Integra Neuro Sciences. The tips are now produced 26 per cent faster, despite requiring a fine 80:1 length-to-diameter hole drilled down the centre.

The machine package is based on a Star SV-20 sliding-head, multi-axis, mill-turn centre fitted with a JBS guide bush that is able to compensate for variability in the diameter of the bar.

Also fitted to the machine is a range of tooling that best suits the various cutting operations. Ceratizit inserts are employed for profile turning and threading, Iscar Multi-Master tooling with modified chamfers have been chosen for milling hexagon flats, while solid carbide Botek gun drills are sourced through Mollart.

Star has also developed a working arrangement with WNT (UK) for its guide bush and collet requirements. The deal has seen the installation of two of WNT's Tool Service vending units at Star. Tool Service records every tool that is dispensed and an automatic stock order is generated at the end of each day, a move that simplifies greatly the paper trail for those using the system.

In fact, Star is now buying other types of tooling from WNT. "With the increase in popularity of sliding-head machines, the extra technology of driven tooling and additional axes has created additional growth for sliding-head tooling," explains Adrian Fitts, WNT's business development manager. "This is something that we are well aware of and the resulting extensive range of sliding-head tooling such as our System 3000 along with ancillary equipment, including guide bushes and collets, has helped us to make major inroads into what once would have been seen as a niche market."

A longstanding supplier of cutting tools for Swiss sliding-head autos is Floyd Automatic, and today the company is still enjoying considerable success with manufacturers across the country. For example, Edmonton-based precision turned parts sub-contractor Turnomatic

tooling cost of £45 each.

Further examples of savings on the Citizens are demonstrated by simply changing from 2.5 mm to a 1.5 mm wide Sandvik part-off insert, which has saved some 1,000 m of steel in the production of pipe cutter wheels.

The partnership between Citizen and Sandvik offers the user many advantages. For instance, changing toolholders at the gang toolpost on a Citizen CNC sliding-head mill-turn centre can now be performed in just 20 seconds with the position of the insert cutting edge set automatically by the toolholder against a dead stop and therefore not requiring any additional adjustment.



Integra Neuro Sciences is employing a number of tooling solutions on its Star sliding-head lathe, including this Botek gun drill supplied by Mollart

is using Applitec inserts from Floyd to help it produce a wide cross section of complex turned parts on its five Tornos sliding-head lathes.

The CNC side of Turnomatic's business has grown from zero to 45 per cent in recent years; a fact that works manager Ray Reeve says would not be achievable without the introduction of CNC sliding-head lathes. A key element in the company's successful use of this technology is Applitec tooling from Floyd Automatic.

"The main advantage of the sliding-heads is that components that were produced in several operations on the rotary transfer machines can now be completed in one hit," says Mr Reeve. "This has cut our set-up times dramatically, as well as our work in progress – we can just turn and ship the parts. However, while this sounds simple, we rely heavily on the quality generated by Floyd's Applitec inserts."

The Applitec-fitted sliding-head lathes work daily producing a wide variety of parts from brass, steel, phosphor bronze and aluminium for industries such as the electrical, electronic, display and modelmaking sectors. Overnight the machines are often set with Applitec tooling and left to run 'lights out', something Mr Reeve says he can do with confidence, safe in

the knowledge that the combination of machine and tooling will hold tolerances of 0.02 mm consistently.

Floyd Automatic has also recently unveiled the new Applitec Modu-Line quick-change pre-settable tooling programme. The concept of Modu-Line enables a range of Applitec quick change insert holders of either pre-set or fixed length type, and often with an increased number of tools, to be used on the machine. The holders use the Applitec ridge location system to ensure a rigid and repeatable tool change.

INTO THE GROOVE

Broaching and grooving tools, such as Horn's Supermini Type 105 have enabled Ottaway Engineering of Eastleigh to develop a highly efficient sliding-head process route for single-cycle manufacture of miniature ballscrew nuts.

Without the broaching tooling, it would have been necessary to wire erode the applicable feature, thereby adding an additional operation, increasing lead time and incurring fixture costs. Likewise, the profiled grooving tool is used to generate the helical ball track; this feature had proved impossible to produce economically by tapping as the material, hardened 17-4 pH stainless steel, is difficult to machine.

Recognising the increasing demand for suitable tooling, Sumitomo Electric Hardmetal has developed a range of cutting tools for sliding-head machines known as Mini Toolholders, which are available in various configurations to suit operations including parting-off, back turning, copying, general turning, grooving, threading and boring, as well as internal grooving, internal threading and drilling.

"The main grades for the Sumitomo Mini Toolholders are ultra hard nano technology ZX coated carbide inserts that comprise 2,000 layers of coating less than 3 micron overall thickness – at 4,000 Hv they are almost as hard as CBN," explains Sumitomo's director and general manager, Terry Reynolds.

"The thin coating layer enables the

Hanging by a thread?

The combination of a Vargus Threading Solutions' Vardex MiniL thread turning tool and Vardex VHX TiN coated HSS inserts has cut thread generation cycle times from eight minutes to 3.5 minutes on aerospace 316 austenitic steel locking nuts at Peter Day Precision Engineering in Christchurch.

In addition, the tooling solution – applied on a Citizen M32 sliding-head auto – has extended tool life compared to former methods and, because the job is completed in a single set-up, has eliminated secondary machining.

With reduced surface speed on the Citizen machine (10 m/min instead of 25 m/min as required with carbide), the sequence of machining on the 13-axis machine with main and sub-spindle is now to turn OD, knurl, mill flats and cut out, centre drill and bore, chamfer lead for thread and turn down the face. The part is then picked up on the sub-spindle, rough and finish turned, and a groove is generated before re-boring and thread turning.

"The Vargus Threading Solution has transformed a job that was once a headache," exclaims managing director Dave Causley. "In addition to at least halving cycle times and eliminating secondary/finish machining, because the tool is very stable – there's no chatter or noise, tool life is also much improved."

retention of sharp cutting edges at full depths of cut and feed rates to be increased thanks to a high shear cutting capability emanating from superior heat and wear resistance." □

Enter 160 at www.machinery.co.uk/enquir