



# Performance cuts

*Walter tooling is making Zeus Engineering's £600,000 machine tool investment work more effectively*

**Machinery reviews recent applications of latest cutting tool technology. Large percentage cuts in cycle time plus longer tool life are common themes**

**B**y complementing a strategic programme of investment in modern CNC machining technology with equally high-tech cutting tools, Zeus Engineering is not only able to continually 'work smarter' and meet growing customer demands for cost-down supply, but in turn the policy helped this precision engineering operation thwart the negative effects of astronomical rises in raw material costs.

According to managing director Gareth McCracken, the company's new-found ability to utilise a comprehensive range of tooling from Walter GB of Bromsgrove – in particular the Tiger-tec cutting inserts – has meant it has achieved "outstanding reductions in cycle times" by capitalising on the higher speeds and feed rates available on its recently acquired CNC machine tools.

As a result, the progress being made is enabling the Airdrie (Scotland) based operation to pass onto its customers resultant cost savings – despite the fact that Zeus, at the time, had to absorb a 100 per cent hike in the cost of steel billet, for example.

#### **INVESTMENT IMPERATIVE**

"Frankly, if we hadn't embarked on our three-year, £600,000 capital investment programme, which began in 2007, it is seriously doubtful whether the business would be flourishing as it is today," says Mr McCracken.

The investment saw an Eagle 400 lathe, (with 15 inch hydraulic chuck), a large capacity Eagle 1600 vertical machining centre (with 22-tool ATC) and a SKT Hyundai Kia lathe (that sits among a bank of five CNC slant bed lathes), all

sourced from C Dugard of Hove.

"On reflection, our tooling strategy was generally based on the use of tools and inserts that were adequate for manual-type machining," continues works manager Tom McDonald. "But the new, high-class VMC needed tooling that was equally world-class, and Walter's Tiger.tec immediately opened our eyes to what was possible."

The Tiger.tec range of inserts – for machining steel (Tiger.tec Steel) and cast iron – enable up to 75-100 per cent more components to be produced per edge than competitor products, due to their improved process reliability, courtesy of a high resistance to flank wear, cratering and thermal cracking.

Highlighting how, in that first instance, the Tiger.tec inserts (high shear, series LNGX130712R and L55 WSP45)



*ITC tooling has been used effectively by APB Engineering for more than 10 years*

were applied to heat-resistant stainless steel workpieces and halved cycle times as well as generated tool life increases of three/four-fold, Mr McDonald says: "The lesson had been learnt!" Indeed, he adds, tool life is now up to ten times greater, in some cases.

"Okay, we are paying perhaps 30/40 per cent more per insert than before, but the Walter product is producing incredible tool life savings – and the fact that it can run at much higher feeds and speeds is generating additional cost benefits in terms of reduced cycle times and therefore reduced overall floor-to-floor times.

**WALTER FOR ALL**

"Our switch to Walter tooling is really a no-brainer, and it goes without saying that we have introduced Walter tooling packages – and especially Tiger.tec inserts as well as Xtra.tec for milling and the WAM 20 grade for turning stainless steel – simultaneous with every new CNC machine installation."

As a general sub-contract manufacturer, APB Engineering has produced some fascinating parts and assemblies that include bio-scopes for heart valves, golf club heads, motorcycle

parts and numerous obscure components that are all part of everyday life as a modern sub-contract manufacturer. Working with materials from nylons and plastics to brass, aluminium, stainless and mild steels, the Sandhurst-based company encountered numerous inefficiencies and difficulties with its cutting tools, until an ITC representative knocked the door almost 10 years ago.

The Berkshire based manufacturer was producing aluminium housings for a motorcycle assembly and the tooling that was in use caused imperfections where an aesthetically immaculate surface finish was required. The 2041 and 3041 Cyber Series high helix two and three-flute end mills from ITC made an immediate impact by generating remarkable surface finishes and improving tool life.

The previous tools left a poor finish that saw the APB team hand finishing the parts to achieve the required surface finish, a labour intensive task as the parts were produced in batches of 1,000. The ITC cutters eradicated this and improved tool life. Taking 6 mm deep cuts, the previous tools could only machine one batch of 1,000 before needing to be changed. The ITC 2041 and 3041 Cyber

Series comfortably machined upwards of four batches before tool wear created the need for a cutter change.

From the initial success of using ITC cutters, the company that opened its doors for business in 1984, continued to implement ITC tooling on numerous projects.

Another issue faced by the company related to a requirement for very high spindle speeds in the machining of grooves in golf club heads. The company's Bridgeport CNC machining centre had a maximum spindle speed of 6,000 rpm and this was insufficient for the high speed machining of the grooves, resulting in poor tool life.

ITC was again able to offer a solution, this time in the form of an Air Turbine Spindle bolted to the spindle of the Bridgeport VMC. The 625JS Air Turbine Spindle generates a maximum spindle speed of 40,000 rpm and this proved ample for the grooving of the golf clubs.

**SEVEN TIMES MORE**

Combining the spindle with a 0.9 mm diameter 155 Series solid carbide Metal Removal ballnosed cutter from ITC, APB immediately improved tool life from 70 parts per cutter to over 500 parts per cutter.

"As a general sub-contractor, we produce an almost endless array of parts from all types of materials and these jobs often demand exceptional surface finishes and tight tolerances," underlines managing director Adam Busby. "The ITC cutters have helped us to maintain, and in many cases improve our surface finishes. As well as using the ITC tools on our machining centres for small batch and one-off workpieces, they are also used on our Tornos sliding-head turning centres for large batch work. The reliability and consistently high quality of the ITC range gives us confidence that the tools can be loaded in machines that run 24/7 unattended."

Elsewhere, Albion Automotive, a wholly owned subsidiary of American Axle & Manufacturing, is one of Scotland's most prestigious automotive manufacturers with over 100 years of



*Machining axle components at Albion Automotive with the help of TaeguTec tooling*

manufacturing history. Concentrating upon commercial vehicle production, Albion now manufactures driveline systems such as axles, crankshafts and transmission components. In a review of certain manufacturing processes, TaeguTec has been able to provide Albion with some positive results.

As a supplier to automotive OEMs such as Volvo, Caterpillar and Leyland Trucks, Albion produces over 12,000 axle sets per annum and in excess of 120,000 gears per annum.

Working with TaeguTec for over four years through regional distributor ABT Tools, Albion has continually driven costs down. Predominantly machining steel and cast iron, TaeguTec has introduced new initiatives that have contributed to increased productivity, reduced downtime and improved efficiency throughout the plant.

One particular success was achieved on an Endomatic twin-spindle milling machine which is milling an external part of an axle (half shaft) from forged EN19T steel with up to a 10 mm depth of cut. As the parts are manufactured from forgings, the skin on the parts had created considerable flank wear with the original milling inserts. However, the introduction of TaeguTec's TT7030 grade

immediately reduced the wear. The previous insert was running at a feed rate of 0.4 mm per revolution and a running speed of 200 rpm with a table feed of 126 mm and 125 mm width of cut. Using the 200 mm diameter face mill with 14 inserts each with eight sides, the previous insert was machining 20 parts per edge. Operating at identical parameters, the change to the TaeguTec TT7030 grade now machines 650 parts before needing an insert index. TaeguTec has now reduced the insert edge cost per part from £0.57 to £0.04 – a cost saving of 93 per cent.

**VIBRATION SOLUTION**

Again on the milling front, Albion was experiencing difficulties machining flats on turned parts on its Kingsbury turning centre. The driven tooling unit on the turning centre was experiencing vibration that gave poor surface finishes. As Albion's head of tooling services, Billy Stevenson, recalls: "We were doing some face milling with a 50 mm diameter cutter on a driven tooling unit. Making 3 to 4 mm deep cuts we were experiencing vibration that reduced tool life, gave poor surface finishes and caused machine down time either through excessive insert changes or breakdowns. We knew that

the machine had ample rigidity and the problem was in the cutting tools. The introduction of TaeguTec's TT7030 inserts immediately reduced vibration, improved surface finish and improved tool life."

As Mr Stevenson continues: "Serving such a competitive industry, we have to strive for productivity gains in all our processes. As a large supplier to the automotive sector we aim to keep costs to a minimum and maximise efficiency in all departments – and tooling from TaeguTec has contributed to this. We receive excellent product and technical support, and the Korean manufacturer is always looking to improve upon not only competitor products but also its own tooling."

TaeguTec's cost reduction program at Albion is currently seeing trials being conducted with CBN inserts for the hard turning of gears where TaeguTec is competing against its own products. Machining a 'Sun Gear' that is 62 HRC on a Hardinge Cobra turning centre, the current TB650 grade insert is producing 10 to 12 parts before edge chipping. Each component requires 10 passes with a cycle time of 1 minute 20 seconds per part. The trial conducted by TaeguTec UK is still ongoing, but despite the trial still being in progress, the introduction of a wiper insert T18WZ-LN in the same TB650 grade now produces between 30 and 50 parts prior to failure.

With both inserts running at the same parameters of 444 rpm and feed rate of 0.15 per rev, the benefit on this occasion lies in the extended tool life. Increasing the number of parts per insert now sees each cutting edge working for 48 minutes as opposed to the previous time of 14 minutes 40 seconds per edge. This extended tool life will not only reduce tooling costs but also improve productivity as the turning centre is not stopping for insert changes as often. The trial continues and TaeguTec aims to further improve upon these test results. □



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