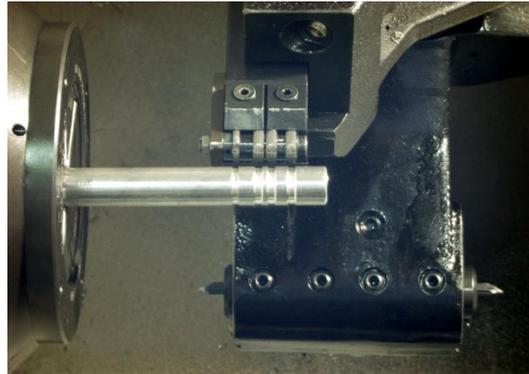


# HORN CUTTING TOOLS Ltd.

*PRESS RELEASE*

## Tooling Application Story

### DENSO PRODUCTIVITY GETS IN THE GROOVE WITH HORN UPGRADE



Switching from custom-ground high speed steel grooving, part-off and chamfering tooling to a Horn 'Standard Plus' carbide insert based tooling package has allowed Denso Manufacturing UK Ltd, Telford, to achieve major cost savings on volume produced precision tube components.

The seven second cycle time reduction (from 27s to 20s) and much improved tool life provided by the tooling package – supplied by Horn Cutting Tools Ltd., Ringwood - has 'created' significant extra capacity in the existing four machine cell. As a result a substantial increase in overall production volume has been possible with investment in a single additional twin spindle CNC lathe. Initial planning based on the old tooling had called for two of these machines. In addition process capability has improved, reflected in a Cpk of 2.7.

The components comprise a family of parts manufactured from type 6063A aluminium alloy tubing. These are common to all air conditioning units produced at Telford. Production of 10000 units per day is required to service a customer base including UK, mainland Europe and USA – based vehicle manufacturing sites.

Tube diameters of 12.0 mm and 14.5 mm are required to be produced to lengths ranging from 80.5 mm to 597.0 mm. Other than length and diameter the machined feature set for all of these components is identical.

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Both tube ends are chamfered and one end has four unequally spaced parallel grooves machined around the circumference. These provide a quality-critical location point for a pressed metal shell and interference fit sealing for a rubber connecting hose. The hose is forced over the tube and clamped by crimping the shell as part of the onward manufacturing process.

Denso production engineer Lewis Welch comments. "The groove dimensions, depth and position are critical to ensure sealing of the joint. For some time we operated the machining process using custom ground HSS single point tooling for production of the grooves and form tools to part-off and chamfer the tubing. It produced satisfactory components but rising demand for our product exposed its poor efficiency and high tooling costs."

For some years the tubes are manufactured in a cell of four twin opposed spindle single turret bar fed CNC lathes. The original process used one custom-made grooving tool to produce three of the grooves and a second tool to produce the narrower fourth groove. A chamfering tool was then used to smooth the tube end. The opposed spindle then came in to grip the tube and draw it out to the assigned length – to accommodate longer tubes this step sometimes requires two cycles of opposed spindle movement. This was followed by part-off using a specially profiled part-off tool which also chamfered the tube end on the outside diameter. Chamfering of the tube back end on the inside diameter was the final operation.

Examination of the process was initiated by Denso production engineer Eddie Wright. The project then passed to contract engineer Tyrone Holmes prior to Mr Welch's involvement.

"It was soon established that the existing process was significantly underperforming," said Mr Welch. "Tool life was poor; production time between regrinds was two days and tool breakage was fairly common. The regrind price was £25 per end and a replacement length of HSS bar cost £90 so direct costs were high. In addition, tool changeover took around 20 minutes." Multiplied by four machines over a one year period, the costs added up to a tidy sum.

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More pressing, however, was the fact that Denso's success as a first tier supplier to the automotive industry meant that many more tubes – and hence more machining capacity - would be required. Based on the historic productivity data two new machines would be needed. It was at this point that contact was made with Horn Cutting Tools Ltd with a view to improving process economics.

“We realised that assistance was needed to streamline the process,” Mr Welch continued. “Initially, Horn concentrated on the grooving operation and progressively developed the chamfering and part-off. Total machining time saving has been around 7 seconds per component whilst tool life has increased beyond measure. On those occasions when tooling has needed replacement it takes around 3 minutes with excellent positional repeatability.”

The grooving operation is now carried out using a bank of four Horn Type 312 custom ground triangular inserts in a single Type 340 holder. This enables the features to be produced in a single hit, saving over 3.5 seconds. As well as being faster this method guarantees groove dimensional and positional accuracy. Tool cost is significantly reduced as tool life is trebled and cost-per cutting edge is reduced by around 87 per cent.

Similarly the Horn part-off tool, using a specially ground Type 312 three-edged insert in a Type R360 holder provides a 750 per cent increase in tool life at around a third of the cost of the previous tooling.

Lastly, the chamfering process has been radically altered by using a double-ended Horn B105 holder with Horn Supermini Type 105 inserts. The 3.5 second time cycle saving results from elimination of the turret index needed when two separate tools were used. In addition Denso gains on tool life by a factor of three whilst tooling cost is halved.

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“The Horn tooling package has transformed the process, significantly reducing tooling cost and improving productivity and quality.” Mr Welch concluded.

“We have also had excellent technical assistance from Horn. As a result of re-tooling it has proved possible to achieve the required increase throughput with one, rather than two, new twin spindle turning machines representing an additional major saving.”

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