

# On the inside at Seco

**A UK journalist hasn't been invited to Seco's production facilities in Sweden for over 15 years. So when the invitation was extended, *Machinery* eagerly accepted. Steed Webzell reports**

**W**ith a turnover in 2006 of €600 million, Seco Tools AB is the world's fourth largest cutting tool group, employing some 4,300 people globally.

Inserts remain the heartbeat of Seco, accounting for two-thirds of the company's revenue. Insert production, along with the majority of Seco's research and development, takes place at the company's principal site at Fagersta, some 150 km north west of Stockholm.

To create inserts, tungsten carbide (WC) powder is first mixed with additives such as TiC, TaC, NbC and VAX to provide various properties, along with a cobalt binder. An ethanol/water mix is then added before the concoction is milled using cemented carbide balls to produce a slurry, which is sprayed dry using nitrogen at 90°C. The result is a free-flowing, dry powder ideal for filling dies.

## INSERTS FORMING

Its future as an insert first becomes apparent when the milled, dry powder is pressed into dies using robot-loaded 12 tonne hydraulic presses. The cycle time for each insert is around two seconds per machine. Typical batch sizes are 10,000-20,000. The company has around 7,000 standard products.

After pressing comes sintering in CNC furnaces. Hydrogen is pumped into a vacuum before the temperature elevates to 1,500 °C, when the cobalt melts and binds during an 8-12 hour cycle. Astonishingly, inserts shrink some

*CrownLoc carbide tipped drill bodies are twisted so that coolant holes travel down the 'meat' between the flutes. They are made at Norrköping where around 70 per cent of business was generated by products less than five years old last year*

17-20 per cent during this process.

Grinding follows and around 80 CNC grinding machines, including Wendt, Agathon, Ewag, Studer and Kellenberger models, are deployed to perform face, periphery, chamfer and radius grinding operations, while diamond grinding techniques are used to manufacture CBN products. Blasting and ultrasonic cleaning takes place before PCD or CVD coating – highly guarded secret Seco processes – take place elsewhere at Fagersta.

In its quest to improve the machining of a broad range of materials, Seco has explored all the possibilities right down to the atomic level. The result is a special CVD process called Duratomic. With extreme levels of both toughness and wear resistance (producing inserts exhibiting over 30 GPa hardness), Seco says the Duratomic process will become

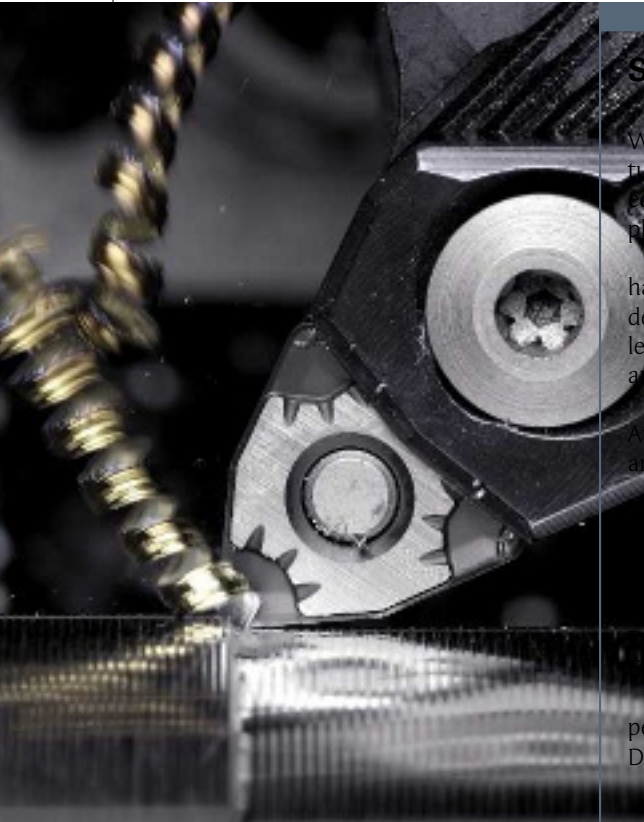
the framework for (insert) coating development for years to come, and will have a dramatic effect on the industry, raising the bar for productivity for everyone involved in metalworking.

Duratomic's secret lies in the nucleation stage, which builds the coating structure and orientates the atoms in the directions required to produce the crystals planes most suited to the application.

## ATOMICALLY MODIFIED

The world's first atomically modified coated insert is TP2500, a turning grade that has been shown to outlast and outperform any other grade on the market today in general purpose ISO P applications. Seco says coatings developed with Duratomic technology can be married with any number of different substrates to create an entirely





## Seco in the UK – inventive, innovative, distinctive

Warwickshire-based Seco Tools (UK) Ltd employs 100 people who help generate turnover of around £22 million. In a UK market worth around £165 million, this equates to a market share of around 13 per cent, making Seco the third largest player in the country.

However, Seco Tools in the UK is far from a 'me too' subsidiary. The company has been inventive, giving birth to ideas such as JetStream tooling, a concept that delivers coolant at high velocity directly to the cutting edge, shortening the contact length of the chip on the rake face. JetStream is a joint patent with Seco in the UK and Rolls-Royce, and provides increased cutting speeds and tool life.

Other developments by Seco UK include the company's Productivity Cost Analysis (PCA) software and Tool Management Systems. All of these innovations are now fully integrated into the Seco group portfolio.

"We've been inventive – not through choice but because we've had to be," says Mike Jewkes, Seco UK's marketing manager. "The carbide industry is like the record industry – you've got to keep coming up with new tunes."

Seco's biggest market is the aerospace sector, currently accounting for 25 per cent of business and there has been plenty of activity testing Seco's new Duratomic inserts (left) on aerospace materials such as nimonics, inconel and titanium – all with high levels of success.

"I've been with Seco for 35 years but I have never seen so many experienced people get so excited," comments Mr Jewkes on the potential impact of Duratomic. "It will genuinely differentiate Seco in the marketplace."

new generation of general application grades. Additional Duratomic turning grades are imminent for stainless steel and cast iron, with two Duratomic milling grades set for introduction in October.

Returning to the production facility at Fagersta, inserts coming back from coating operations are subjected to automated inspection and laser marking before packaging and despatch.

Tools can be tested on customer applications in a demonstration area furnished with a Mori Seiki SV500 turning centre, a Mazak Integrex e-410H and a Hermle C800U 5-axis machining centre.

Seco's toolholding products, both traditional and shrink-fit, are produced at the company's Arboga facility, around 80 km south of the main site at Fagersta. Here, 126 people produce toolholding products such as Monobloc, Combimaster and Graflex, along with the newest addition to the family, Seco-

Capto, for rotating tools.

Launched in August 2006, Seco has already sold thousands of its Capto toolholders, with C6 (at 40 per cent) being the most popular size. The product has been introduced in response to the global trend towards Capto, particularly for multi-tasking machines. Seco says only German machine tool builders are resisting, preferring to stick with HSK.

### THE CAPTO EFFECT

Thanks to Capto, the Seco plant at Arboga has witnessed a 40 per cent increase in demand in the past 12 months. At the end of 2006 the plant was machining 7,000 pockets a week. With additional employees working a weekend shift, this has now climbed to 7,500 pockets a week. By early 2008, the goal is 9,000.

New investment in the form of three Mikron 5-axis HSM 600U ProdMod machining centres is set to help the company achieve its target. One has

already been delivered and has reduced toolholder (42-45 HRC) machining times from 35 to 13 minutes, running at 23,000 rpm (36,000 rpm max) and 40 m/min axis speeds. Once installed, all three new Mikron machines will be served by Erowa automation.

The aim at Arboga is to achieve 80 per cent up-time from the 168 hours available each week and the company is targeting 85 per cent Overall Equipment Effectiveness to become truly world class. To this end the company now monitors each machine tool, tackling the biggest recorded losses accordingly.

Arboga also has a custom tooling manufacturing facility where a new Hermle C30U 5-axis machining centre with Erowa automation takes pride of place. This technology allows the custom unit to run unmanned overnight, even with small batch sizes.

Located around 130 km south west of Stockholm lies Norrköping, Seco's hole-making/drilling centre. The



*Seco-Capto holders are about to be released. The company believes that drilling is an underestimated process – it can remove material faster than can milling*

Norrköping facility can boast the highest levels of growth in the Seco group, recording an average annual business expansion of 13 per cent since its inception in 1989. Today the company is producing its fourth generation of indexable drills, its third generation of solid carbide drills and its CrownLoc products, cited by the company as representative of the future – “a move away from re-grinding”.

**TARGETING HOLES**

According to Seco, hole-making accounts for around 16 per cent of the world market for metalcutting tools (milling 38 per cent, turning 36 per cent). By its own admission, the company should be more prominent in hole-making markets than is currently the case. To this end, Seco is investing heavily in both research and manufacturing at its Norrköping plant to

meet ambitious growth targets.

Seco pitches its hole-making products at the top end of the market, steering clear of low-cost catalogue competition. Its customers want operational security when drilling expensive billets of material. New products that allow the user to increase spindle speeds and feed rates are always being developed. A new Seco-Capto drill will be released within weeks.

According to the company, drilling is underestimated in many applications, such as pocketing, where more material can be removed faster by drilling than using milling techniques.

Unlike Arboga, Norrköping is a stand-alone facility (R&D also takes place here). Such is the plant’s track record in development that in 2006, around 70 per cent of its business was generated by products less than five years old (far

higher than the Seco group figure – a still impressive 40 per cent).

Custom design is a big feature of the company’s success. The Custom Design facility on the Seco website allows customers to design their own drill via question/answer functionality. Around 60 per cent of the enquiries for custom tools are generated this way – although Norrköping additionally provides some 40 quotes a week for custom tools.

Around 10 years ago the production plant at Norrköping employed 90 people – today there are 70, yet throughput has doubled via the application of production techniques such as TPM and lean manufacturing.

Achieving actual cutting time of 70 per cent, Norrköping is organised into three flow groups: solid carbide drills, insert drills and CrownLoc products.

Solid carbide drills begin life by over-grinding shanks on a Junker Quickpoint 3000/50 served by a Fanuc LR Mate 100i robot – this can run unmanned for 40 hours. Geometry grinding takes place on six Walter Helitronic Power grinders overseen by just two operators.

Insert drills are first machined on a selection of Okuma, DMG and Matsuura machining centres before final shank grinding takes place in a Danobat cell, tended by Motoman NX100 robot, with integrated laser marking.

CrownLoc bodies featuring coolant holes are first twisted by induction heating using a special Seco-designed machine before body flutes are added by Matsuura MC800V and Okuma LU15 machining centres fitted with Mecatron load/unload units. CrownLoc tips are produced on Deckel S20 and S22 grinding centres. Coating is outsourced to Fagersta.

Seco says that in the future, drills will go deeper, be more precise and will not need re-grinding. MQL (minimum quantity lubrication) is also set to be a significant industry driver. □

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