
VOLVO CARS & MITSUBISHI MATERIALS

SUCCESS STORY



ACHIEVING OPERATIONAL EXCELLENCE WITH
MITSUBISHI MATERIALS' DRILLS





MPS1 - Pin journal through to main bearing journal deep hole drilling on a twin spindle Grob BZ530 machine

ABOUT THE MPS1 SUPERLONG DRILLS

Profile	Solid carbide drills for high performance, reliable deep hole drilling.
Sizes	Ø3 - 20 mm
Geometry	From l/d 3 up to l/d 40 Double margin flutes and optimised point geometry.
Features	AlTiCrN PVD coating. Through coolant holes on all diameters. Optimised core diameter and helix angle to prevent flexing.

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Widely recognised among the premium automotive brands for passenger cars, Volvo Car Group has built its business and reputation on both comfort and safety, ranging as far back as 1959 when the first 3 point seatbelt was introduced in its cars. Environmentally friendly and cost-effective processes and products have also been a high priority throughout their history. For high volume applications where precision and long tool life are critical to business, Volvo Cars relies on sustainable, future proof tooling solutions. By utilising Mitsubishi's MPS1 Superlong drills in their crankshaft machining, Volvo has reached over 30 percent increase of the number of parts machined without changing the drill, thereby reducing the tooling cost in this application by more than 40 percent.

Building on over 90-years of manufacturing history, the plant in Skövde, Sweden has become the heart of Volvo's engine manufacturing and its biggest manufacturing facility for car engines with capacity of 565.000 engines per year. "At such production volumes, reducing the total cost of ownership through efficient processes and equipment remains a key priority. By investigating and testing different solutions in the market, new avenues of opportunity open up that enable us to identify certain application improvements, with the optimum

tools", explains Per Carlson, Tooling & Gauging manager at Volvo Cars in Skövde.

Skövde is the only site that accommodates production lines for every major engine part, namely the cylinder blocks and heads, crankshafts and camshafts. Production facilities for Volvo worldwide include other manufacturing and assembly plants in Sweden, as well as Belgium, China, India and Malaysia. Additionally, modern Research and Development centres in Sweden, Denmark and the USA ensure technology and innovation remains at the highest levels. Since the Chinese Geely Holding Group took over Volvo Cars in 2010, significant investments have been realised in new facilities to secure the company's constant growth. In the next two years, Volvo Cars targets increases in sales volume by 30 percent to a new record level of 800.000 cars. "The key to success is simple; qualitative tools coupled with operational excellence. Mitsubishi's tools, especially in deep-hole drilling applications, have showed an exceptional level of performance in every aspect, hence we value the advice of the Mitsubishi experts when such challenges occur", Per continues.



A critical procedure - Hole entry strategy under discussion.



Diagonal hole Ø5.00 mm, 100 mm deep.

MPS1 SUPERLONG DRILLS EXCEED EXTENDED EXPECTATIONS

Volvo Car Engine's manufacturing engineering department with more than 250 engineers has a centralised function to ensure that product quality and machining processes are consistent across the Group. The company's matrix organisation enables a seamless knowledge and technology transfer to all business units worldwide. "During the implementation phase of manufacturing of components we carefully choose, among other aspects, the most suitable cutting tools for each application", Per says.

The latest crankshafts manufactured in Skövde are made from forged C38 steel rather than cast iron due to greater stability it provides for such an important component. Improving specific machining applications of this key component was an area where efficiency improvements needed to be carefully planned. The critical oiling of the main bearing and pin journals requires a hole to be drilled diagonally from the pin journal, directly through the crank web to the main bearing. Improvement in the drilling of this important oil hole to increase manufacturing efficiencies was the target of the application. Niklas Helsing, tooling engineer at Volvo Cars in Skövde says: "The goal was to reduce the cost per part rather than the cycle time. Therefore, long tool life and reliability were

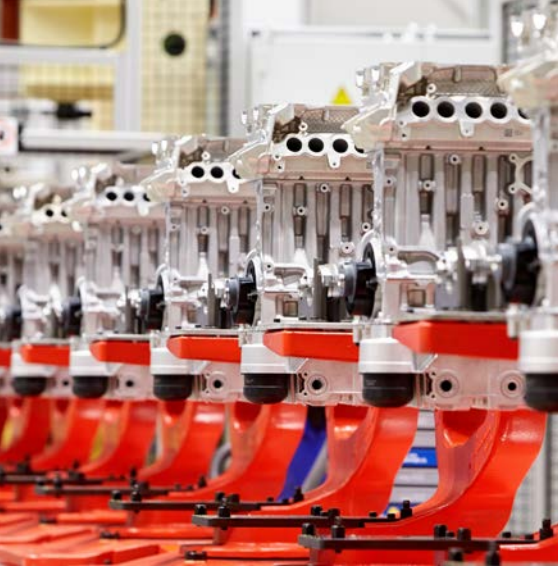
essential." The reliability aspect posed the technical challenges and the well known problem of a drill point breaking through a non perpendicular plane meant that the acute angle between the pin journal hole and the breakthrough from the oil feed hole was the key focus point of reliability, especially for a small Ø5mm drill at 20 x D depth. Volvo's improvement target: increase machined pieces from 300 to 425 pieces per drill. One of Volvo's cutting tool suppliers, Colly Verkstadsteknik*, accompanied the project from the beginning and it was they that introduced Mitsubishi's MPS1 superlong drills.

Hakan Oldin, a technician at Colly and expert for Mitsubishi Materials tooling solutions states. "When we analysed Volvo's machining requirements we considered Mitsubishi's new MPS1 drill as the perfect match for this application. It stood out due to features such as optimised coolant supply, double margin flutes for stability and accuracy, a strong cutting edge design and Z-thinning point geometry for easy penetration". Volvo Cars tested the new range and soon integrated the drill into the crankshaft cross hole drilling process. Mitsubishi's MPS1 drill coped well and the target of 425 components was surpassed. After optimising the cutting parameters on the twin spindle Grob BZ530

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**PER CARLSON (TOOLING & GAUGING MANAGER)
VOLVO CARS**





(From left to right): Hakan Oldin (technician, Colly Verkstadsteknik), Kjell Ahl (key account manager, Colly Verkstadsteknik), Niklas Helsing (tooling engineer, Volvo Cars), Conny Erixon (product manager Colly Verkstadsteknik), Per Carlson (Tooling & Gauging manager, Volvo Cars)

ABOUT VOLVO CARS

Volvo Cars is a Swedish automobile manufacturer originally founded as part of AB Volvo in 1927. It was part of AB Volvo until 1999, when Ford bought the car manufacturing section. In 2010 ownership was taken over by Zhejiang Geely Holding Group of China. Volvo Cars head office is in Gothenburg, Sweden, also site of the Torslanda plant. The Torslanda plant includes Volvo's major development department, a crash test centre, central warehousing and several other important units. Manufacturing, assembly and development also takes place in the plants in Skövde and Olofström (Sweden), Ghent (Belgium), Chengdu, Daqing and Zhangjiakou (China), Bengaluru (India), Shah Alam (Malaysia) and Copenhagen (Denmark). In 2018 a plant will also be opened in Charleston (USA).

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ABOUT MITSUBISHI MATERIALS & COLLY VERKSTADSTEKNIK

Mitsubishi Materials Corporation is a leading Japanese company, specialising amongst others, in the production of materials, coatings and precision tools for the metal working industry. Mitsubishi Materials Corporation operates Head Offices in Europe, India, Brazil, China, USA, Japan and Thailand, a modern Research and Development Centre in Japan and several production facilities throughout the world. The Corporation employs over 24,000 people in more than 77 countries.

Colly Verkstadsteknik is the authorised distributor of Mitsubishi Materials in Sweden that specialises in cutting tools and tool holding equipment. With a wide range of standard items and an unlimited range of special tools, Colly's 27 dedicated employees find tailored solutions to customer's specific requirements. In addition Colly is authorised by Mitsubishi Materials to handle re-grinding of cutting tools at its facility in Sweden.

Colly Verkstadsteknik

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machining centre at 80m/min speed and 1018 mm/min feed rate, it was found to reliably machine 475 crankshafts before a change of drill was required, leading to a tooling cost saving of over 40 percent in this application.

Volvo Cars has been using the MPS1 drills successfully for the last one and a half years and the efficient remanufacturing service provided by Colly gives an added value to the cost per part ratio. "To identify the drill's tolerance under extreme conditions, we stretched the regrinding cycle up to six times, which is way over the recommended limit. However, for absolute process security, we are confident that even after regrinding the drills three times, they perform as well as new drills", Niklas reports.

In 2019, Volvo Cars will introduce new four and three cylinder engines as well start manufacturing in-house a mass balancing system (MBS) for reduced engine vibrations. Additionally, with the new generation of hybrid cars, equipped with both combustion engines and electric motors, new machining challenges will occur for tool manufacturers. Kjell Ahl, key account manager at Colly and responsible for the

Volvo site in Skövde, says: "Every year, we discuss in advance all upcoming projects and targets and we set priorities together with our customer. With our local office in Skövde, only a few kilometers away from the site, we have minimised distances and can provide constant on-site support". Per and Niklas agree on one point: "Service oriented suppliers with a wide portfolio of tooling solutions offer us new machining insights and opportunities. We are pleased to have established a professional, inventive collaboration over the years".

Conny Erixon, product manager for Mitsubishi Materials at Colly, adds: "As one of the oldest distributors of Mitsubishi Materials in Europe, we have experienced an advance in development of their tools and technologies over the years. The ability and flexibility to think out of the box and deliver state-of-the-art tools with a consistent quality and performance coupled with a high level of technical expertise is definitely one of Mitsubishi's major strengths.

*Colly Verkstadsteknik is the authorized distributor of Mitsubishi Materials in Sweden.

