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One Tap Does It All

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Multi-Purpose A-Tap Series Helps Automotive Manufacturer Simplify Tool Management

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If you ask me to compare work to running, I think our daily work is a 100-meter dash, providing cutting tool solutions is a 1,500-meter race, and recommending appropriate new products is a 4x400-meter relay. What kind of a race would satisfying customers' needs be?

In my opinion, it would be an endless marathon.

During the lean production meeting about a year ago, we visited the northern city, which is famously known as the Detroit of China for its automotive industry. The entire 1,200 km journey is equivalent to the distance from London to Budapest. However, in this remote city, there are more than 300 automotive factories, and our customer is one of the biggest manufacturers in China with over 130,000 employees. During this journey, we visited one of their production facilities with approximately 600,000-square-meter of production floor space and over 1,500 staff.

In the automotive industry, no matter how stable production is, every factory has its own requirements for cost control and processing efficiency, which also applies to the cutting tools they employ.

An automobile consists of many different parts made of various materials, such as aluminum, carbon steel, alloy steel, cast iron, stainless steel and more. Each material has different characteristics. For example, to effectively machine aluminum alloy, the cutting tool needs to be sharp with capability to withstand welding. Cutting tools used for machining cast iron must be rigid and have good wear resistance. For stainless steel, tools should have a good balance between wear resistance and toughness. Having a cutting tool specifically designed for a designated material is ideal. However, when it comes to tool management, the idea of material-specific tooling can become inconvenient. When a manufacturer works with a new product with a different material, cutting tools would have to be repurchased, and this procedure is especially common in threading processes.

Figure 1. Chip evacuation problem was a headache for the client in their production of aluminum engine cylinder block. Cutting chips had to be removed manually every time, which affects the stability and efficiency of the production.

OSG introduced the A-Tap series to one of its customers to assist in tooling consolidation management, as it is designed to accommodate a wide range of materials. The customer, whose name cannot be disclosed due to confidentiality reasons, did not have any previous experience with multi-purpose taps and was highly suspicious of the concept.

OSG's A-Tap is an all-purpose tap series designed to simplify tool management and to excel in a wide variety of materials and applications. Achieving trouble-free chip evacuation with a spiral tap in blind holes is particularly challenging and is a main cause of headaches for many manufacturers (***Figure 1***). To resolve this problem and to improve the ejection of chips, OSG's A-Tap ***A-SFT*** has adopted a variable helix flute design, which encourages stable chip evacuation and reduces cutting forces. The helix angle changes from the chamfer, where chips are formed, to the flutes, where chips are evacuated. This unique geometry enables greater chip control that can help produce tightly compacted chips for easy ejection from the hole (***Figure 2***).

To accommodate a wide range of cutting conditions, powdered metal HSS and OSG's patented V coating have been employed in this series to achieve excellent wear resistance. In addition, to enable high speed machining, the A-Tap series incorporates a unique cutting edge design that emphasizes sharpness. Not only does the A-Tap series perform well in general steel, it also excels in difficult-to-machine materials such as stainless steel and mild steel. The A-Tap is compatible with various types of machining equipment, from manual machines to the latest advanced machining centers.

After sharing a great deal of cutting data with successful results, the customer was willing to put the A-Tap A-SFT spiral tap to the test.

During the cutting tool trial, we used six pieces of A-SFT (M8x1.25) to process three different materials – carbon steel, aluminum alloy and stainless steel, on the same machine. We ran the trial twice with a new tool for each material to measure results.

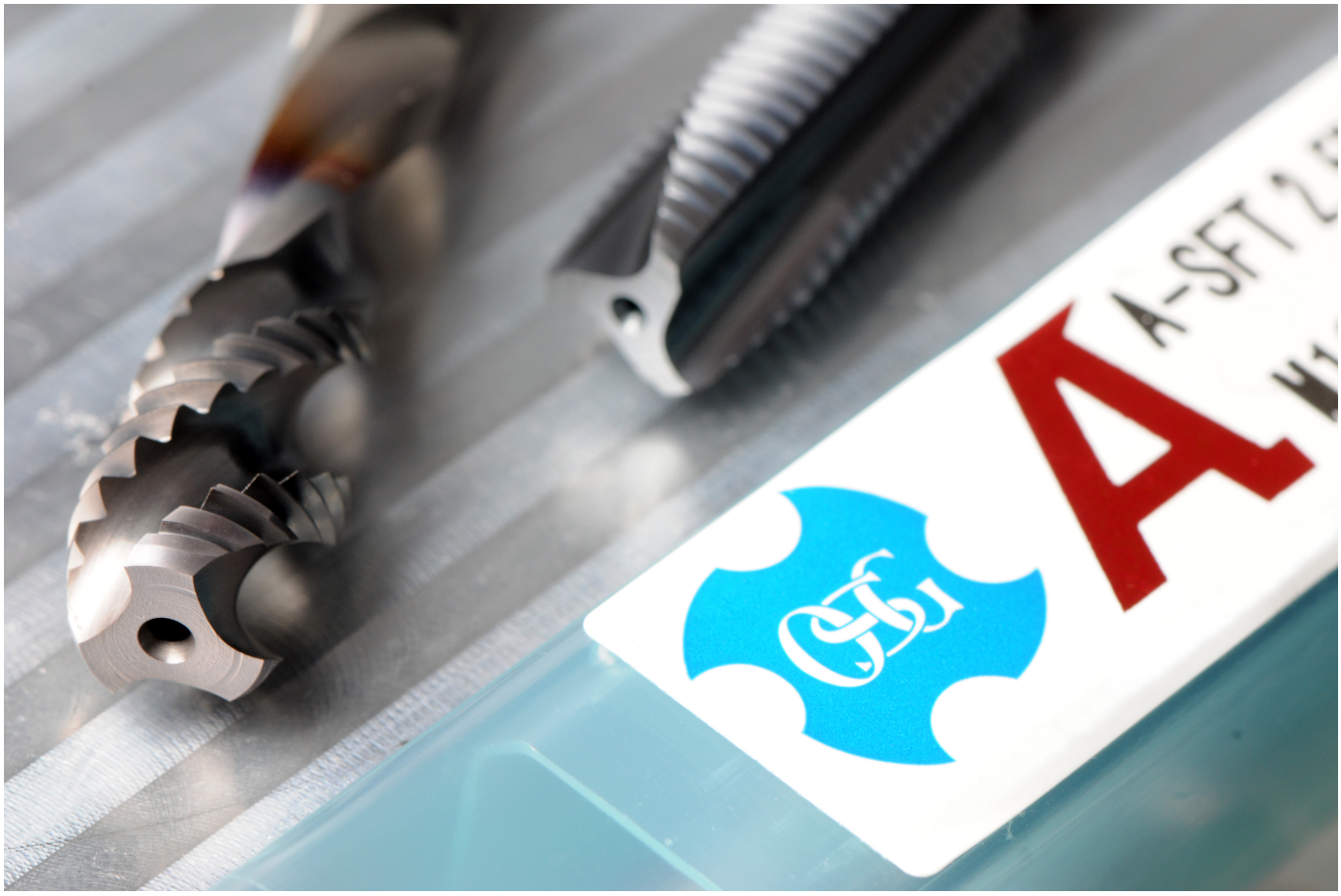
At the end of the trial, the average tool life was 1,400 holes in S50C at a cutting speed of 15 mm/min,

4,000 holes in ADC at a cutting speed of 20 mm/min, and 1,000 holes in SUS304 at a cutting speed of 10 mm/min. What's more impressive is that all of the taps could continue to be used due to minimal wear. Because of the excellent versatility, performance and tool life, the number of taps required for this customer's production could be reduced by 15%.

Figure 2. A clean thread produced by a custom A-SFT with extra oil holes on the side. A-Tap. The A-Tap is known for its superior chip evacuation capability.

After this initial success, this client consulted with us on a different process – the threading of an aluminum engine cylinder block with an annual production volume of approximately 250,000 pieces. A M20x1.5 tap is used to thread a bottom-through cross-hole using a local Chinese brand vertical machining center. The client's previous tooling choice had chip evacuation problems, where the chips would have to be removed manually every time, which affects the stability and efficiency of the production.

After a throughout evaluation of the application, we concluded that the A-Tap A-SFT is also a great fit for the process. In order to resolve the problem completely, we recommended adding oil holes on the side of the A-SFT, which OSG offers as a custom item. With the aid of the extra cutting lubricant, the cutting chips are able to be ejected from the hole smoothly during the threading process.



The A-Tap is known for its superior chip evacuation capability. It is an all-purpose tap series developed to accommodate a wide variety of materials and machining environments, helping manufacturers simplify tool management.

Moreover, with the previous tooling choice, in order to create stable chip shape, the cutting speed had to be maintained at 35 mm/min. If the cutting speed exceeds 35 mm/min, the volume of the spiral chip would be enlarged, making it more difficult to be evacuated. With the A-SFT, on the other hand, the cutting speed is able to be increased from 35 mm/min to 50 mm/min, which increases the processing efficiency by 42.8%.

With an increased processing efficiency and the capability of being able to average 20,000 holes in tool life, this client could not be more satisfied and has since implemented more of the A-SFT in their production lines.

The demand of manufacturers is constantly evolving and the need for improvement is never-ending, just like an endless marathon. Although there is no end, we must continue our journey of continuous development to help manufacturers stay ahead of their race.

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