

Machining

Complete Chip Control

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OIL-S-XPF forming tap enables stable and chip-free tapping in cylinder piston production

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Saving a few seconds may not sound like much at first, but when you are making over 1 million parts per year, every second counts. Consider what saving 10 seconds per part, reducing scrap rate, shortening final assembly time, all while enjoying three times the tool life could do! This is a reality for Flickinger Industries, a contract machining and manufacturing company in Fort Wayne, Indiana, United States.

Flickinger Industries started in Fort Wayne in 1960 primarily servicing the pump and pneumatic/hydraulic cylinder industries. Today with 45 full-time employees, Flickinger Industries is still leading these industries while also serving customers in the agricultural, automotive and medical fields. Over the years, Flickinger Industries' personnel have become adept at rapid changeover. Machining small batch parts has become one of the company's specialties. By utilizing its state-of-the-art 75,000-square-foot facility along with 23 modern CNC lathes and vertical CAT40 machining centers, Flickinger Industries can handle runs from two to 200,000 pieces with ease.

One of Flickinger Industries' larger customers is a well-known world leader in motion and control technologies. The company has been producing aluminum air cylinder pistons in sizes ranging from $\frac{1}{2}$ " diameter up to $3\frac{1}{2}$ " diameter and in lot sizes of typically 2,000 to 5,000 pieces – totaling over 1 million pistons per year. The parts are made from T356 aluminum bar stock and each piston has a threaded center hole. The thread finish needs to be free of smearing and burrs that would hamper assembly. Threading the center hole is challenging because the tool is stationary, while the part is rotating. Flickinger Industries was using a competitor cut tap for many years and became accustomed to periodic catastrophic tap breakage inherent with long chipping materials like aluminum.

In early 2019, a breakage damaged a lathe turret, causing excessive downtime and costly repairs. It was at this time that I visited Flickinger Industries with a distributor, and discussed the issues caused by the lack of chip control. The tool being used at that time was a competitor $5/16$ "-24 cut tap in bright finish, spiral fluted with modified bottoming chamfer in 2B class of fit. I showed Flickinger Industries OSG's XPF forming tap series and explained how chip control issues would be a thing of the past by utilizing form taps, something the company knew of, but had never thought would remedy their issue.

Because a forming tap forms screw threads through plastic deformation of work material, no cutting chips are created. With no cutting chips, chip evacuation troubles can be completely avoided. The XPF is OSG's high performance forming tap that produces no chips and is optimized for machining materials up to 35 HRC. It is uniquely engineered with a low-torque design to facilitate longer life at faster speeds. Its V coating also enables extreme wear resistance. The XPF is available with or without coolant holes, and in standard or long shank style.



OSG's XPF high-performance forming taps

After a detailed evaluation of the application, I offered to bring a test tool of the OIL-S-XPF tap under OSG USA's guaranteed trial order. The XPF tap has been one of my strongest weapons against the competition. It has claimed victory in several materials, competing against every well-known manufacturer in the market. For the machining, Flickinger Industries uses a Mori Seiki SL lathe and WSO emulsion coolant at 12 percent. As anticipated, the trial was a major success. Within the first 10 minutes, the operator commented "That's twice as fast as the old tap!"

The competitor cut tap required approximately 20 seconds per part, whereas the XPF forming tap only needs 10 seconds. During periodic spot checks for pitch diameter and thread finish, all were well within optimal specifications. Normal tool life for the previous competitor tap was 3,000 pieces, which the XPF achieved and surpassed with ease. Flickinger Industries' Plant Manager Tom Schroeder said he was '...sold on the XPF since we are saving so much time per part.'

The first test tap completed over 14,000 pieces before some slight thread galling was observed, but the tool could still continue to be used. The second test ran just as well as the first, and the next question

from Flickinger Industries was "Does OSG make the XPF in $\frac{1}{2}$ "-20 and $\frac{7}{16}$ "-20 thread sizes?" And the answer is "Yes, we do!"

Tool life for the OIL-S-XPF is now set at 10,000 pieces as the standard, even though testing has proven that they could carry on further. Nevertheless, the cost per unit dropped from \$0.017 to \$0.006 per part, enabling an estimated annual cost savings of \$37,775. I'm proud to say that today, every aluminum piston made at Flickinger Industries uses taps from OSG's XPF series. By employing OSG's XPF forming taps, Flickinger Industries is able to resolve chip control issues, reduce breakage, and avoid future machine damage to maximize performance.

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