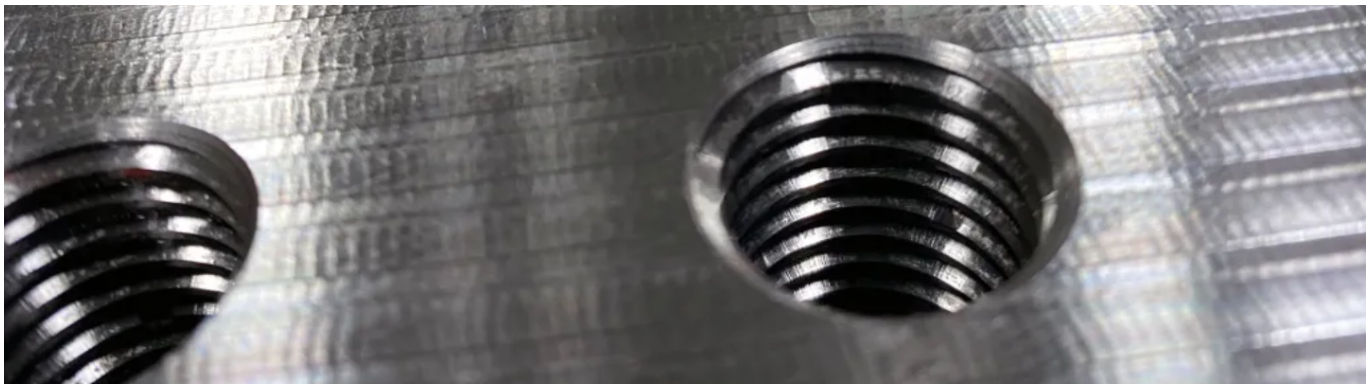

Holemaking & Threading

Thread Milling in One Pass–OSG AT-1

Brought To You by OSG | Dec 01, 2022

AT-1 thread mill slashes machining time in artificial lift system component production

Bob Kress, OSG USA

Founded in 2014, Flowco Production Solutions is an artificial lift solution provider for the oil and gas industry. The company specializes in the design, manufacturing, and installation of artificial lift systems. Headquartered in Houston, Texas, USA, Flowco Production Solutions currently employs 200 staff and has 30 locations in North America.

Flowco Production Solutions is committed to achieving the highest standards of manufacturing quality. The company always strives to safely maximize the lifespan and efficiency of oil and gas wells by using high-performance parts and components in all of its artificial lift systems. Recently, Flowco Production Solutions' Fort Worth, Texas location, which has an estimated land area of 67,000 square feet, was seeking to resolve a threading issue on its production of flanges and blocks made of AISI 4130 L80 material. The application requires the threading of blind holes that are 7/8-9 UNC in size at a depth of 1.1-inch (27.94 mm). A Hass VF-5/40 vertical machining center and a YCM TV188B vertical machining center are used for the processing.

Flowco Production Solutions was originally using a competitor thread mill for the application but was troubled by slow cycle time and tool breakage. Seeking to improve machining performance, Flowco Production Solutions contacted its tool distributor Kenny McClure, MSC Industrial Supply's senior metalworking specialist, who reached out to OSG for tooling recommendations. Upon a detail evaluation of the application, OSG recommended the ***AT-1 thread mill from the A Brand series***.

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The AT-1 is a revolutionary 1-pass thread mill engineered for high-quality threading. Conventional thread mills often require several passes to generate a thread. The AT-1's capability to generate threads in one pass lies in its unique tool geometry. The AT-1 has two patented technologies registered in Japan for its tool geometry. The first patented technology is the AT-1's left-hand helix geometry. Conventional right-hand helix thread mill is vulnerable to deflection as the cutting process begins from the tip. In contrast, the AT-1's right-hand cut and left-hand helix geometry begins the cutting process from the shank side, thereby minimizes deflection. The second patented technology is the unequal spacing and variable lead flute geometry, which is commonly applied in end mills. The unequal spacing and variable lead flute geometry minimizes chatter.

The competitor 7/8-9 thread mill was used at 2,315 rpm and 3.1 ipm. Three passes were needed, requiring a total of six minutes to process a hole. A 7/8-9 (0.539-inch cutter diameter, 2-inch length of cut, 5-flute) AT-1 thread mill (EDP# 1662502417) was brought in for the test run. OSG's AT-1 ran at 2,122 rpm (91 m/min) and 10.61 ipm (270 mm/min) in a single pass, completing a hole in 30 seconds, which is 12 times the efficiency versus the competitor thread mill. This application has an annual part production of only 120 pieces. However, the boost in efficiency has generated a cost savings of $10,984 versus the previous tool.

This success led to additional trials of the AT-1 in different thread sizes. Flowco Production Solutions was troubled by tool breakage issues with the original competitor tool in their 3/4-10 UNC application, which has an annual production volume of 3,600 parts. The competitor tool was used at 2,315 rpm and 3.148 ipm. Four passes were needed, requiring a total of two minutes to thread a hole. A 3/4-10 (0.461-inch cutter diameter, 1.7-inch length of cut, 5-flute) AT-1 thread mill (EDP# 1662502117) was brought in for the test run. Both the competitor tool and the AT-1 had issues of breakage during initial testing. To resolve the challenge, OSG applications engineer Daniel Dominski was dispatched to inspect the cutting condition on-site. After conducting a few tests, it was determined that compensation was needed on

the feed rate to prevent over engagement of the thread mill. With the adjustment, the AT-1 was able to slash machining time from two minutes to 54 seconds, running at 1,864 rpm (68.5 m/min), 1.8 ipm (45.72 mm/min) and completing a thread in just one pass. An estimated cost savings of $50,635.41 will be achieved by switching to the AT-1 thread mill.

With the significant processing improvements made by the AT-1, Flowco Production Solutions is currently testing additional applications throughout the shop to maximize productivity. Five cost savings have already been completed, ranging from $2,407 to $50,635, totaling to $96,547.

“OSG’s thread mills are by far the best in the market,” said Robert Jackson, senior manufacturing engineer at Flowco Production Solutions. “For one of our most time-consuming applications, we are able to reduce machining time from nine minutes per hole to 30 seconds per hole,” said Jackson. “It’s an unbelievable cost savings for our company.”

For more information, see ***OSG’s AT-1 thread mill***, ***OSG USA*** and ***Flowco Production Solutions***.

