

Milling more accurately and faster

Pioneer Products Inc. wanted greater accuracy when finishing hub ODs deep inside clutch housings, so it replaced an endmill with a special hollow mill from Allied Tool Products. Out-of-roundness decreased from 0.001" to 0.0001".

Also, the new tool allowed Pioneer Products to eliminate a chamfering tool it had been applying to the hub's OD. Moreover, the special tool reduced the daily job's cycle time by 20 percent. "This tool has really helped out," said Tom Seidel, a process engineer with Pioneer Products.

Previously, the Racine, Wis., machine shop applied an endmill and a chamfering tool to the housings to finish and chamfer the OD of a 0.235"-deep x 4.408"-dia. hub. The endmill finished the hub via circular interpolation, removing material in two passes at a speed of 20 ipm. The chamfering tool then took 1 minute to chamfer the hub's OD.

However, the tools had to reach 8.8" inside the housing. "That's pretty deep," Seidel said. Also, the hub is located in a narrow ribbed area, so Pioneer Products could use only a 0.50"-dia. endmill and a 0.25"-dia. chamfering tool. "Otherwise, you'd hit [the ribs]," Seidel said.

Out-of-roundness was close to the hub's maximum tolerance, so Pioneer Products had to monitor the process carefully, compensating for the cutter as it became dull and checking the hub's OD with a gage.

The chamfering tool would also become dull, so both tools needed to be adjusted two or three times a day to ensure the hub was within its tolerance. "That's downtime," Seidel said. "You're probably losing 10 minutes every time."

Consequently, Pioneer Products sought a solution and got it from Allied Tool Products, Milwaukee. The solution was a special form tool from the toolmaker's Micro-Adjustable System product line: a CAT 50, integral-shank

END USER: Pioneer Products Inc.
(262) 633-6304
www.pioneerproducts.com

CHALLENGE: More accurately finish the OD of a hub deep inside a clutch housing.

SOLUTION: A special hollow mill with adjustable inserts that finishes and chamfers the hub in one plunge.

SOLUTION PROVIDER

Allied Tool Products
(800) 558-5147
www.atptools.com
Information Services #303

to Milan Petrovic, Allied Tool's national sales manager, the tolerance doesn't seem tight unless a person considers that the tool is 10.96" long from the inserts' tips to where the shank exits the machine tool spindle.

With the form tool, the hub's OD is an order of magnitude more accurate. It's now less than 0.0001" out of round. "It's now round," Seidel said, "as round as round can be."

Also, the new tool shortened the clutch housing's cycle time from 14 minutes to 11 minutes, 15 seconds. Finishing and chamfering the hub's OD had taken 3 minutes with the endmill and chamfering tool. Performing both steps simultaneously, the hollow mill takes 15 seconds.

Moreover, the new tool hasn't required any downtime thus far to compensate for wear, which is minimal. After 3 months in production work, the original two inserts had finished and chamfered 5,000-plus housings and hadn't yet required indexing.

The shorter cycle time and reduced downtime improved Pioneer Products' productivity. On average, the shop can now machine five clutch housings per hour instead of four. With two 8-hour shifts, the company makes 16 more housings per day, which benefits the customer. "They get their product faster because we can make more parts," Seidel said.

Petrovich estimated that a set of two inserts would machine between 15,000 and 20,000 workpieces before all

of its cutting edges were worn out. As for the tool body, he said, "If taken care of and maintained, it could last up to 5 years or longer."

Consequently, with 5,000 housings completed so far, Pioneer Products can expect its savings to increase more before finalizing the savings rate based on insert wear. Δ



Two coated carbide inserts and a long, custom tool body are components of a special, adjustable hollow mill that allows Pioneer Products to decrease cycle time 20 percent for a job compared with the endmill and chamfering tool previously applied.

tool body that accepts two double-end, zirconium nitride-coated carbide inserts that both finish the hub's OD and chamfer it. Also, the tool body is held directly by the machine tool's spindle, not by a toolholder.

Each insert can be independently adjusted for size in 0.001" increments for a total tolerance of ± 0.001 ". According