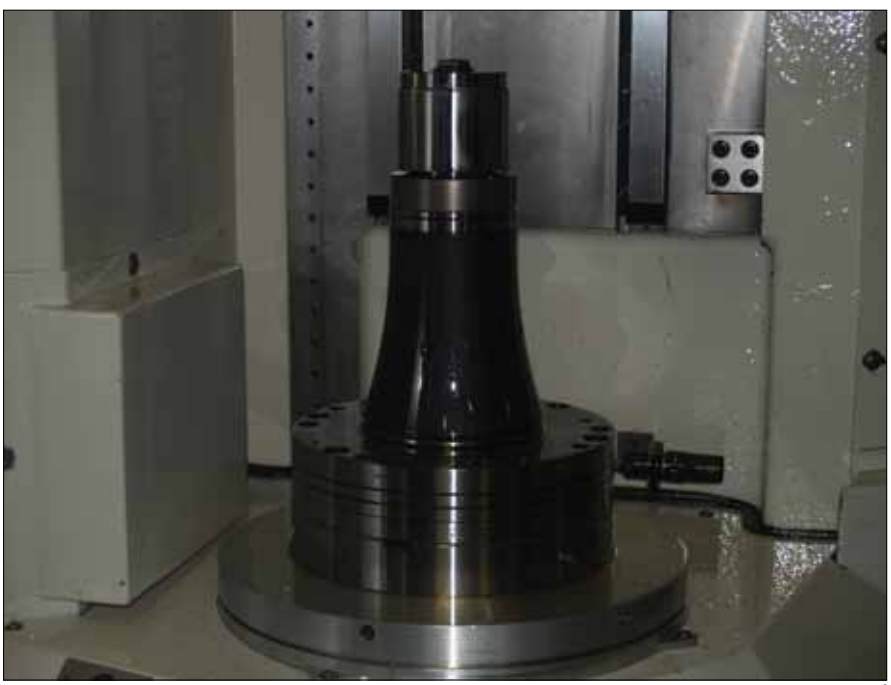
Minimum Setup Time, Maximum Machining Capability

Hainbuch Offers Workholding Solutions for United Gear

Matthew Jaster, Associate Editor

One of the goals of having Kapp's KX-500 on United Gear's shop floor was to utilize the form generation capabilities for increased throughput on the machine. Kapp representatives explained that the original workholding United Gear was using for single tooth profile grinding was not going to be rigid enough and they may experience part chatter or vibrations. Since Kapp Technologies had a positive experience in the past with Hainbuch's workholding solutions, they suggested Hainbuch to United Gear.



The workholding solution currently in place at United Gear is a series of Hainbuch T213 style mandrels (courtesy of Hainbuch).

"United Gear had a very large family of parts that they wanted to run through the machine with significant differences in part geometry," says Matthew Block, regional sales engineer at Hainbuch. "Having this high mix coupled with mid to low lot sizes meant that there may be a need to set up the machine multiple times per shift, and it was important to have something that would minimize the idle time on the machine. Hainbuch fit the bill in all these areas."

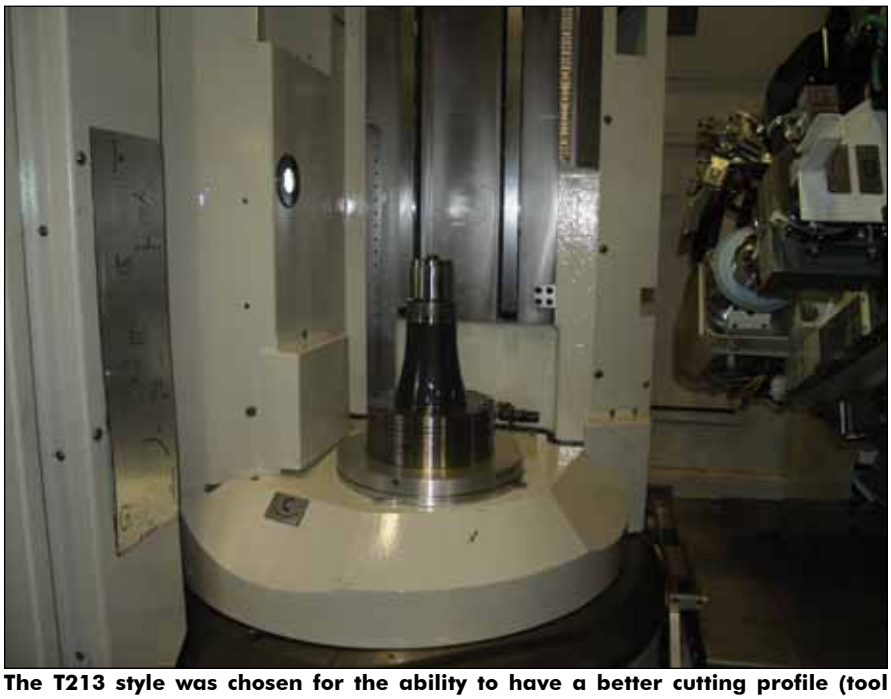
There are only three mandrel bodies that cover the whole family of parts, and within those three mandrels, changing from one part to the next is as easy as changing the bushing and part endstop. When the time comes to change out the mandrel body, this can be done in as little as 8–10 minutes. "Obviously, since this is a finish grinding operation, the accuracy needed to be top-notch," Block says. "Based on previous part examples from Hainbuch, and the recommendations from Kapp, United Gear was convinced that the accuracies that could be achieved would be second to none."

The workholding in place currently is a series of Hainbuch T213 style mandrels. These units are self-

contained and hydraulically actuated. The T213 style was chosen for the ability to have a better cutting profile (tool clearance) while still maintaining a highly rigid clamping solution. "All of the Hainbuch mandrels utilize a vulcanized rubber between hardened steel segments which allow for true parallel clamping and higher accuracies than most other devices," Block says. "The vulcanization also protects against 'accidental actuations'—if the operator accidentally actuates the unit without a part on it, there is no failure in the clamping unit. With the old style of clamping, if an operator actuated without a part, he or she would most likely need to replace the spring steel ID collet."

Another benefit to the T213 style mandrel is that the draw-bolt and clamping element are connected together in a manner that helps prevent grinding swarf from building up in the workholding. This reduces the need for operator intervention to clean the workholding.

While this is the first experience for United Gear with Hainbuch's solutions, the company is currently looking into several other areas where these workholding tools will be beneficial.



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"Setup time from one part to the next was between 30–45 minutes because the fixtures needed to be dialed in after each diameter change. With the Hainbuch solution, changing from one diameter to the next can be as little as two minutes to change the clamping bushing or if the whole man-

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drel body needs to change, about 8–10 minutes. Most of the time, just bolting the Hainbuch mandrels on the table, they are concentric within less than 0.0001"," Block adds.

In addition to the setup time reductions, United Gear saved four minutes per part by not needing the tailstock supports to run the parts. The Hainbuch workholding has a pull-down effect to properly seat the part in the Z-direction while increasing clamping rigidity. Because of this pull-down effect, many times, tailstock supports are not required at all.

"As United Gear moves from single profile grinding wheels to form generation wheels, they are seeing further cycle time reductions of 20 percent or better and this just was not possible using the old style workholding because of the lack of rigidity. Every time a particular job comes around, the operators push the machine and workholding a little further to see if they can better the last cycle times they ran on that part," Block says.

The increased accuracy directly translated into a reduced scrap rate and an increase in process stability. With the old fixtures, United Gear would struggle at times to hold 0.001–0.002" on some parts. With the new Hainbuch units, they hold less than 0.0005" all the time.

"One of the intangible benefits from this is that the machine operators no longer hold any animosity for the quality/measurement department. We all know that a happier employee is a more productive employee; it is just difficult to accurately quantify productivity based on personnel mood," Block says.

The benefits of this collaboration have been recognized by everyone from the operators all the way to upper management. United Gear was pleased with the support and project consultation as well as the start-up assistance. Onsite setup and operator training allowed for questions to be addressed immediately. As mentioned earlier, this collaboration will result in future projects between the companies.

"In the past, having quick change often meant that there was a loss in accuracy or rigidity or some other feature. There was always some type of give and take, something needed to be sacrificed and companies would always need to play this kind of balancing game to figure out what works best for them," Block says. "Hainbuch is eliminating that old mentality. With the quick change features that are built into the product, there is no compromise in quality, rigidity, accuracy or functionality. This is a product that really does have it all in one package."

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