Affolter Technologies SA of Malleray, Switzerland, has introduced a new line of gear hobbing and micro-milling machines for the manufacture of small gears, worms and similar parts used in watches and medical and dental instruments.

The Gear AF100 gear cutting center, introduced a year ago at EMO, is an eight-axis CNC gear hobbing machine for cutting parts up to 36 mm diameter and 50 mm length. The machine can cut spur, helical, tapered or convex teeth on gears, shafts and pinions, either by hobbing or tooth-by-tooth using an indexed milling cutter.

Parts are held between centers and are direct-driven by two independent motor spindles. The cutting tool is driven by a third motor spindle. All three spindles are electronically synchronized, with rotation speeds of up to 16,000 rpm.

The Gear AF110 micro-milling center, introduced in September at the AMB show in Stuttgart, Germany, is designed for gear hobbing, screw cutting and micro-milling.

The AF110 is also capable of hobbing gears up to 36 mm diameter and 50 mm length. However, unlike the AF100, the AF110 has no tailstock motor spindle, which allows the cutting spindle to be inclined up to 90° for machining worms, straight bevel or face gears, bone screws and other medical or dental tools and parts. With the AF110, the part is collet-clamped and may be supported by a tailstock center, steady rest or guide bushing.

Both machines have mineral-cast frames, designed to provide thermal stability and vibration absorption. All linear axes have direct measurement scales for positive feedback, with system resolution less than 1 μm.

Affolter has developed and built machine tools for more than 10 years, says Raymond Graf, sales and marketing manager. But until recently, those machines were manufactured for the use of sister company Affolter Pignons SA, a manufacturer primarily serving the Swiss watch industry.

Affolter Pignons, which today manufactures more than 30 million gear trains per year, created its own demand for new and updated machine tools. So, in 1991, Affolter Pignons started up a new, separate company to develop its machine tool capabilities. That company is now Affolter Technologies SA. In the beginning, Affolter Technologies worked mainly on machine retrofits, working with lathes and gear hobbing machines.

In 1996, Affolter entered into a partnership with Wahl to develop an eight-axis CNC hobbing machine. That machine was the Wahl W100. However, about two years ago, Affolter decided to redesign the machine and begin marketing it under its own name, Graf says.

Over time, Affolter Technologies has developed expertise in a number of areas of machine tool manufacture. The company makes its own CNC controls—including both hardware and software development—as well as its own spindles, "the most important mechanical component of the machine," Graf says.

"We wanted to master the whole technology," Graf says. "First we only did retrofits of existing machines, and finally, we got all the know-how to develop the machine completely."

The company has two more gear machine models in the works. The Gear AF90 will be a high-productivity gear hobbing machine. The first AF90 is scheduled to be completed and presented to a customer by the end of 2006, Graf says.

In addition, Affolter is working on the Gear AF120, an eight-axis CNC micro-grinding machine, equipped with an 80,000-rpm grinding head motor spindle. The AF120 is designed for grinding gears, tools and parts for the medical sector. The machine will be available early in 2007, Graf says.

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