

Joachim Uhing KG GmbH & Co.  
Kieler Straße 23  
24247 Mielkendorf

Ph.: +49 (0) 4347 – 906 – 0  
Fax: +49 (0) 4347 – 906 – 40



Contact person: Mr. Wolfgang Weber

Ph.: +49 (0) 4347 – 906 – 22  
Email: [weber@uhing.com](mailto:weber@uhing.com)

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## **60 Years Uhing Rolling Ring Drive, or "Archimedes' Dream"**

**This may well have been the dream of the mathematician Archimedes (278 to 212 B.C.) and his contemporaries: Since Ancient Greek times, there has been the desire for a helical gear variable in terms of pitch and direction. Electrical engineer Joachim Uhing made this dream come true by inventing the rolling ring drive. In 1952, he launched the first version of this device. This year, Joachim Uhing KG celebrates the 60th anniversary of its renowned product.**

The story begins in 1943: Joachim Uhing establishes an engineering bureau. His first jobs as a freelancer were: 35-mm cameras and wall clocks, but also a forerunner of today's 4 axes for machining clamped items from various sides. Inventing thread guides for industrial knitting machines, the young businessman gained an international reputation.

"This was the time when Joachim Uhing laid the spiritual cornerstone for his expanding business", says Burkhard W. Bohn, Uhing KG's Engineering head. "The idea of carving out interesting niches by providing smart proprietary solutions has been the company philosophy until today. It continues to be the motivating force behind our ongoing success."

Close cooperation with the knitting machine manufacturers led to the most important product developed by the house of Uhing: The customers asked for means to automate the traversing movements of the knitting carriage operated manually until then. For Joachim Uhing, this was an incentive to come up with an innovation that finally led to the concept and production of the first rolling ring drive.

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### **Too late for Archimedes – but a blessing for the industry**

The threads of the first samples proved detrimental to the variability the target applications demanded of the device. Uhing soon abandoned threaded rods and instead used a plain shaft. Instead of a nut, he devised a housing with rolling rings travelling on the shaft at a variable pitch angle. This invention was certainly too late for Archimedes but just in time for a multitude of applications in various industrial sectors.

One of key applications is the winding of ribbon-type material on spools. “Formerly, the distribution of the material between the spool flanges was mostly done by hand”, explains Bohn. “Later, this manual procedure was replaced with cross thread spindles featuring left-hand and right-hand threads. These threads moved a nut with an internal thread reduced to a short segment only. To change the direction of travel, a deflection unit at the stroke ends switched from one pitch direction to the other. This proved to be a simple and cost-effective solution – as long as the same feed rate per spool rotation with the same stroke width, namely the same distance between the spool flanges was used in relation to the width of the material to be wound.”

A material or spool width change required a complete replacement of the cross thread spindle with a suitable version, resulting in longer winding machine downtimes due to the conversion. Furthermore, investments into different versions were necessary.

### **Step by step to a convenient, robust product**

Traversing units with a threaded spindle whose direction of rotation was changed with a reversing gear mechanically actuated in the end positions proved to be much more convenient and cost effective. This allowed the traversing width to be matched to new spools. More flexible were traversing units featuring circulating



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belts with the clamping unit of a traversing carriage being alternately fastened to the opposite ends of the belt.

But the optimum solution was Joachim Uhing's rolling ring drive boasting variable stroke width, pitch and pitch direction that became a worldwide success as the rolling ring traversing unit. "Typical for this engineering masterpiece," explains Bohn, "is the shaft driven by the winding shaft via a belt. It drives and also synchronises the speed of the rolling ring drive with the spool speed. This synchronisation is of major importance as the spool speed continually drops towards the end of the winding process due to the increasing coil diameter and the material to be wound usually moves at a constant speed."

In the anniversary year, a highly pleased Wolfgang Weber, Uhing's Marketing head, also looks back on the success story of the rolling ring drive: "Throughout all the decades of its application, Joachim Uhing's engineering innovation proved to be a device easy to operate, robust, cost-effective and requiring little maintenance. Even in today's era of electronically controlled motion systems, the mechanic rolling ring drive holds its ground in a wide range of industrial applications. It has found and continuously developed its niche."

### **Synonym for the product group**

Of course, the drive has undergone a number of functional enhancements and design changes during its six decades of existence. Meanwhile, it has become a synonym for an entire range of products.

Based on the worldwide patented rolling ring drive principle, the engineers of Joachim Uhing KG developed the linear drive nut, a non-positive helical drive without internal switch-over mechanism in 1983. Featuring zero backlash, the linear drive nut soon became

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a coveted drive element, in particular for measuring machine manufacturers. In 1989, the Z-Drive timing belt drive, a non-positive linear drive, was added to the product portfolio. The Uhing easylock® fast-action clamping system marked the entry into a wide range of tool-less clamping and fastening elements for plain shafts in 1992. In late 2002, the Uhing® U-Clip clamping element was added to the product range.

“In the 1990es, Joachim Uhing KG focused on a product range modernisation,” says Weber. “Regarding quality and design, the ` - 2 ´ generation of Uhing rolling ring drives represents one of the key milestones in the company’s history. In 2001, the smallest Uhing rolling ring drive, Kinemax KI-5, was the first of its kind worldwide featuring a polyamide housing. Increased use of high-quality plastics reduced the weight of the modernised 2002 Easylock® fast-action clamping system variant by approx. 50% and further facilitated handling.

### **Automation by electronic components**

Uhing is a renowned manufacturer of purely mechanic products. But in 1998, the company also started developing electronic add-ons to the rolling ring drives in order to increase the automation level of the traversing units. This led to winding technology components offering the automatic adaptation of the rolling ring drive stroke length to the respective coil width. Traversing units equipped with flange scanning system FA find their reversing point automatically. Application of the Automatic Winding Width Controller (AVS) ensures a perfectly cylindrical winding pattern, in particular in the critical flange area. The operator is relieved from adjusting work and can focus on other tasks, a demand as topical as ever.

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## Press Release

**1203-02 RG 60 years**

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The Managing Directors of Joachim Uhing KG and their team are certain: Archimedes would be delighted to see the Uhing rolling ring drive, its development and worldwide success.