

## **Powerful, Reliable, and Precise – WAFIOS G 450 Spring End Grinding Machine**

Designed in Reutlingen, Germany, and drawing on expertise cultivated by WAFIOS there over the decades, a new generation of machines is being produced at WAFIOS' production company in Zhangjiagang, China, for the first time. The G 450 features the latest version of WAFIOS' WPS 3.2 EasyWay high-end control system, which has already proven its worth as one of the company's highly successful products. The new generation of machines has been developed with two key aims in mind: to provide a solution that addresses the needs of as many customers as possible, even if they opt for simply the basic version, and to deliver outstanding value for money.

In April of this year, the spring end grinding machine made its live debut in front of an audience made up of Germany's experts in the field at the WAFIOS In-House Exhibition in Wuppertal. The G 450 is a single-plate spring end grinding machine for grinding both compression spring ends simultaneously using the crush-grinding or down-feed grinding technique (see Fig. 1).

The machine's design combines proven technology with innovation: While the team of developers at WAFIOS was able to draw inspiration from successful solutions from WAFIOS' G6 range, already on the market, it also pursued entirely new directions during the development process.

### **Designed for common applications and optimized production output while maintaining outstanding quality**

The basic version of the G 450 comes with 8 axes (6 servoaxes and two frequency-controlled drives) that are used for driving and down-feeding the upper and lower grinding wheel, driving the loading plate, the horizontal and vertical axes of the dressing unit, and driving the protective shield. It also features a high-performance cooling and dust extraction concept as well as a rigid dressing unit with 2 axes. Thanks to its protective devices, the G 450 meets the requirements for CE conformity, particularly when it comes to the harsher conditions associated with the type-C standard for grinding machines.

The infinitely adjustable rotating speed of the grinding wheels, which ranges between 35 and 50 m/s, and the powerful, frequency-controlled three-phase motors (7.5 kW) for driving the two grinding spindles, enable the G 450 to achieve the very best levels of production output.

The new and highly robust machine design for grinding springs and for dressing grinding wheels ensures that quality remains consistently good. The extraction channel has been positioned tangentially to the grinding wheel and thus improves the extraction of grinding wheel dust.

Other features of the basic version are laser sensors for automatic grinding wheel positioning, ensuring wear compensation, plus a spring length measuring device for in-process monitoring.

### **Innovative solutions for reducing cycle times and downtimes**

The machinery system comes with numerous devices that are designed to assist the operator in the process of using it, ensuring excellent availability coupled with low operating costs.

Not only that, but the high-performance automatic dressing system also reduces downtimes. Thanks to the position of the dressing unit on the right-hand side, only minor soiling occurs during the dressing process. The extraction channel,

meanwhile, is located in a place that makes it possible to extract grinding wheel dust as soon as it appears.

The rigid design of the dressing slide ensures that a consistently high level of dressing quality is maintained throughout the entire stroke.

Even dressing at an angle is possible thanks to the control concept based on 2 servoaxes. The software package required for this is available to order as a separate option. In most cases, grinding wheels used in a dressing process are positioned so that they are parallel to one another (known as the down-feed grinding technique). However, this can result in springs in the outermost row of the loading plate being ground to a shorter length than springs that are positioned further toward the inside. The reason for this lies in the shorter grinding path that the springs on the inside of the loading plate experience (in other words, a smaller radius). Positioning either one grinding wheel or both at an angle, so that the distance between the grinding wheels at the central point is 1–3 mm larger, solves this problem as the lower contact pressure exerted during grinding compensates for the longer path that the outer springs experience.

Another feature designed to help the operator is the viewing window in the protective hood, which makes it easier to perform visual monitoring of the grinding process. The extraction and ventilation concept, with an extraction channel installed in the perfect position, is a crucial part of what makes the machine's availability so good. It is positioned as far as possible toward the front, directly behind the dressing system, and tangentially to the grinding wheel in order to prevent deposits in the grinding room as far as possible. The design of the grinding room itself features optimized flow characteristics and ensures that the extraction volume is kept even at all times. Two fans generate an air shower for actively cooling the grinding room during the grinding process, making it possible to take advantage of maximum speeds while at the same time reducing deposits (see Fig. 2).

Highly resistant to wear, the grinding table plates can be turned around in the entry and exit area and can thus be used on both sides. They have a significant role to play in cutting downtimes and operating costs. The pneumatically driven ejection flap enables the springs to fall down through the grinding table.

A special lift-out device makes it easier and safer to change the grinding wheels in an ergonomic way, while the optional balancing device helps the machine to perform its functions reliably by making it possible to minimize any imbalance in the flange-mounted grinding wheels as a preparatory measure.

Available as an option, the particulate deflector reduces and prevents deposits in the grinding room (see Fig. 3) thanks to a special alloy that is applied to the G 450's extraction channel lining. This feature also provides advantages due to the alloy components preventing the build-up of deposits, and the ability of the extraction system to remove dust from the grinding room. This means that no tools are required for removing deposits, machine availability is increased, and there is no need for frequent cleaning.

### **Modern Operating Concept – High-End WAFIOS WPS 3.2 EasyWay Control System**

The WAFIOS G 450 is controlled using a 21.5" multitouch screen, and comes installed with the WAFIOS WPS 3.2 EasyWay control program. Featuring clearly presented screen masks, this control system is easy to use thanks to its intuitive operator guidance concept. WPS 3.2 EasyWay provides the operator with support during every stage of the grinding process – covering not only the spring input data, but also programming and monitoring of grinding cycles as well as grinding path control and sparking time. It also provides the electronic control elements for the down-feed grinding technique.

### High degree of automation thanks to automatic loading unit

This feature requires an optional interface to be integrated into the machine. With the addition of the automatic loading unit, available as an option, the G 450 becomes a highly automated piece of equipment. Fig. 4 shows an example of an automatic loading unit: This solution uses two buffer lines with three rows in each case to accommodate the loading plate, creating maximum availability. The associated handling robot simplifies the set-up process and ensures that operation is able to continue reliably. If the automatic loading unit is installed, there is also the option of equipping the machinery with a camera system for the reversing device on request, making it possible to align conical springs. The sorting unit is also available as an option.

When it comes to operating the machinery system in climate zones exceeding 40 degrees, the options of an air conditioning unit as well as a compatible isolating transformer for voltage equalization are available as additions to the pair of fans installed as standard.

Also available as an option, the automatic central grease lubrication system consistently increases availability by ensuring that lubrication is accurately and continuously maintained. Adding a teleservice connection also provides a rapid solution for keeping downtimes caused by machine problems to a minimum.

Typical applications for the G 450 involve grinding valve and clutch springs in the automotive industry, but it can also be used in areas of mechanical engineering such as industrial and press springs (die springs).

There are plans to unveil a version featuring two loading plates in the near future – allowing maximum production rates to reach as much as 5,000 to 6,000 springs per hour, depending on the spring geometry.

Outline of technical data	WAFIOS G 450
Wire diameter	1.0–9.0 mm
Outer spring diameter	max. 100 mm
Spring length	approx. 350 mm for new grinding wheels
Grinding wheels	450 x 80 x 100 mm (outer Ø x height x bore hole Ø)
Loading plate diameter	580 mm
Loading plate bore hole Ø	50 mm
Plate speed	Infinitely variable from 0.2 to 50 rpm
Grinding wheel rotation	Infinitely variable from 35 to 50 m/s
Installed power of grinding spindles	2 x 7.5 kW
Dimensions (LxWxH) (without extraction)	2,100 x 2,200 x 2,900 mm
Weight (without extraction)	approx. 3,600 kg



Fig. 1: WAFIOS G 450 spring end grinding machine



Fig. 2: Loading plate – active cooling concept

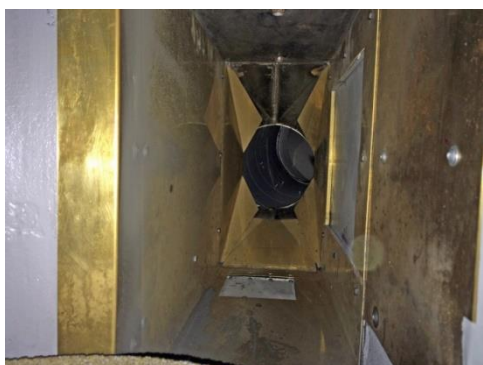


Fig. 3: Particulate deflector



Fig. 4: Automatic loading unit