

WAFIOS IoT Suite – SmartGrind to Simplify Process Analysis for Spring End Grinding

Carrying out a detailed analysis of spring end grinding reveals a complex process which – as part of the process chain for manufacturing helical compression springs – is expensive and presents significant scope for improvement. While many years of experience combined with extensive paperwork and lengthy trials may enable industry experts to generate excellent process settings, there are a number of influencing factors that are not being taken into account.

As part of the newly developed IoT suite, WAFIOS is offering the **SmartGrind** application for spring end grinding machines. The application enables the process to be recorded down to the last detail for the very first time, it enables an understanding of the technology to be fostered, the process analysis to be greatly simplified, the design of new processes to be assisted, and potential for optimization to be highlighted.

The extensive machine and process data is stored in a database via the IoT gateway. The intuitively designed WAFIOS **SmartGrind** app provides access to data from several machines and its various tools enable users to filter, group, and search the data selection they require, meaning that only certain records are selected for analysis.

A clearly structured report is created automatically for the selected records, with the results listed so that they can be compared. The evaluation contains performance data and efficiency factors (e.g., G ratio) which are combined to create a performance index. This weighted index enables all the results to be compared against each other and the weighting allows customers to determine the individual significance of each result for themselves. For example, for one company, efficiency may be more important than performance, while for another, the focus may be on achieving a high output. In addition, process expenditure based on user-defined inputs relating to tool and machine costs is calculated and displayed.

The best process record based on the weighting is shown in the overview. Associated machine, tool, and process parameters can be viewed using additional detail displays. The setting parameters for the best process result can be called up and analyzed with ease.

The data for the individual grinding wheels is also made available. Reports covering the total service life of the grinding wheels, known as the “transparent grinding wheel”, can be called up. From here, questions regarding service life, consumption values, efficiency, and other details are answered. Of particular interest are the profiles for the efficiency and performance factors, as the way in which they change throughout the wheel’s service life provide information regarding quality and usage. It is also possible to track how much of the grinding wheel was used for dressing and what the reasons for this were. Based on this, customers can assess and compare the grinding wheels they are using at a glance. In addition, detailed information can be provided to manufacturers of grinding wheels regarding how individual parameters change if a tool is optimized.

The planned further development of the **SmartGrind** app will make it even easier both to identify the relationships between influencing factors and results and to derive effective process adjustments. What’s more, it will be possible to send order-related feedback and suggested improvements to individual machines. As a result, new findings will be reincorporated into the process quickly and reliably, which in turn will reveal where there is still room for improvement.

The hardware and software system is available both as a cloud-based and local server solution. In the cloud version, plans are in place to allow anonymized data to be shared between different companies in future and subsequently used to make optimizations.

Order	G Ratio	Gd Ratio	Dressing interv. [Pcs]	Grinding cycles [Pcs]	Grinding capaci [Pcs/h]	Performance index	Job costs [€]	Standardized costs [€]
WAFIOS Sample Spring 5mm	1,34	0,00	0,00	1	5.236,36	0,48	2,22 €	154,34 €
WAFIOS Sample Spring 2mm	0,19	0,00	0,00	2	8.361,29	0,32	2,80 €	97,25 €
WAFIOS Sample Spring 3mm	0,32	0,00	0,00	5	6.750,00	0,30	9,25 €	128,44 €
WAFIOS Sample Spring 5-32	0,00	0,00	1,67	3	2.154,02	0,27	22,82 €	1.056,62 €
WAFIOS Sample Spring 4mm	0,35	0,00	0,00	3	5.514,89	0,26	10,62 €	245,90 €

Fig.1 Order overview with result parameters and weighted performance index

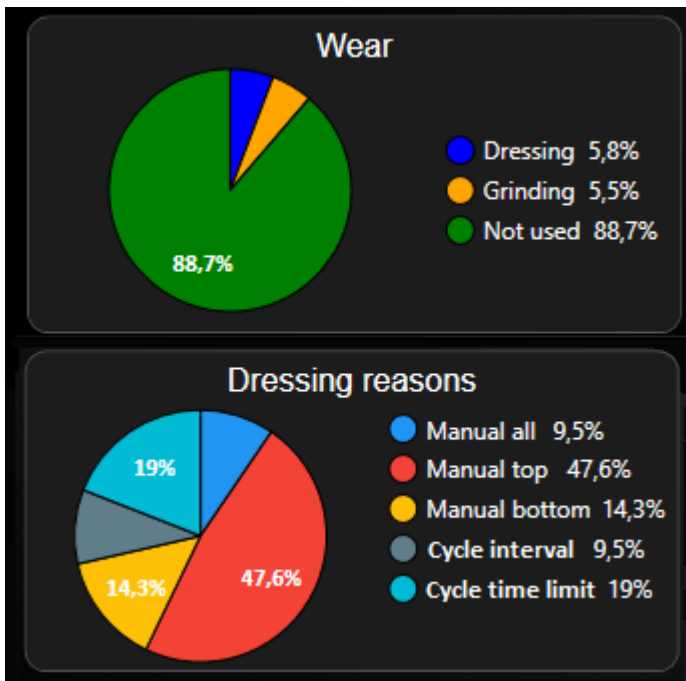


Fig. 2 Overview of wear and dressing reasons for a grinding wheel

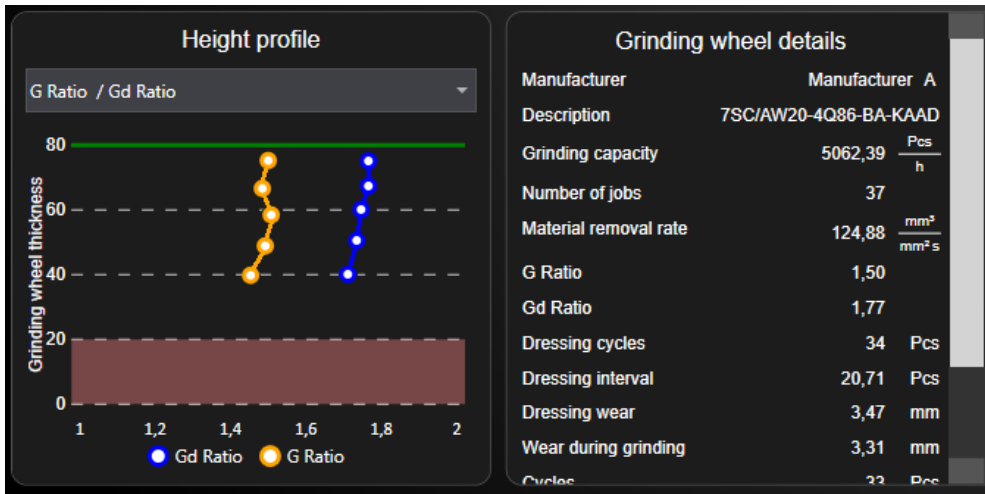


Fig. 3 Profile for efficiency factors regarding grinding wheel thickness and usage details