

REISHAUER

Gear Grinding Technology

ARGUS Monitoring System



MACHINE

AUTOMATION

TOOLING

TECHNOLOGY

DIGITAL

SERVICES

Generating gear grinding in detail



Swiss precision. Made by Reishauer.



Since it developed the world's first generating gear grinding machine and its constant drive for innovation, Reishauer has had a decisive influence on modern gear manufacturing. With its high-tech gear grinding machines, pioneering digital applications, economical tools, and modern clamping devices, Reishauer makes the manufacture of hard-wearing, efficient, low-noise gears possible.

Highest quality and precision through innovation

The ARGUS Monitoring System enables Reishauer to do pioneering digital work in the manufacturing of gears and transmissions. It provides a digital platform for the intelligent networking of all gear grinding machines in the Reishauer Cloud and takes the user a big step closer to zero-defect production. It thus lays the foundation to meet the ever-increasing demands for efficient, high-performance transmissions and innovative powertrains.

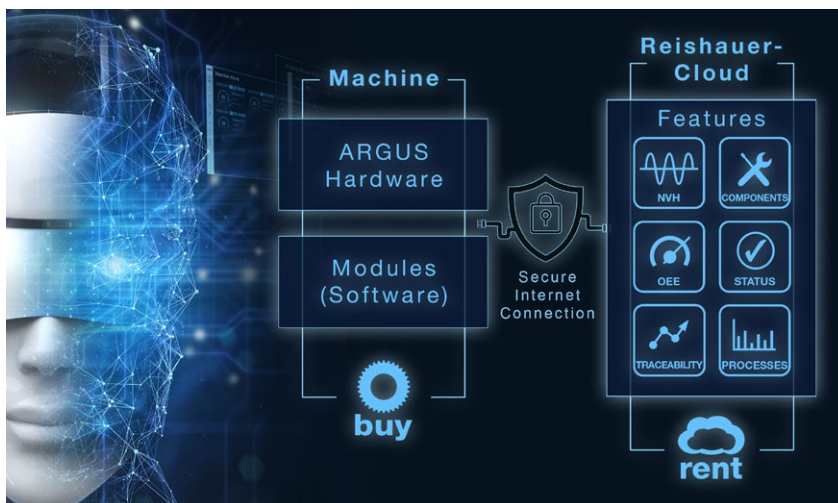
ARGUS makes the connections visible

ARGUS is an innovative system for monitoring, analyzing, and optimizing the grinding process on Reishauer Generation 4.0 machines. ARGUS evaluates data taken from the dressing and the grinding processes using various measuring techniques, including extremely sensitive vibration sensors, to identify workpieces that deviate.

Continuous evaluation instead of occasional spot checks

ARGUS enables the quality of all machined parts to be checked during the grinding process itself instead of evaluating it afterward by using spot checks or random samples. In addition to measuring whether the part does not attain or exceeds certain limits, ARGUS also checks on NVH-related behavior (Noise,

Vibration, and Harshness). It detects potentially noise-critical gears before the gearbox assembly is conducted. Furthermore, ARGUS can analyze the entire grinding process and the condition of machine components.



The ARGUS monitoring system consists of hardware components, machine-side software (modules), and digital products (features) available to users connected to the Reishauer Cloud. The functionalities of the modules focus on analyzing and evaluating all machining processes taking place on the grinding machine. Here, the aim is to enhance process stability and productivity through

consistent dressing and grinding quality. The features available on the Cloud produce a precise picture of all grinding machines connected to it, including their complete history, in real-time. The highly innovative NVH-related feature brings the production of gears and transmissions closer together.

ARGUS...

- is the monitoring system that helps prevent costly disassembly and unplanned downtime
- detects faulty dressing during the process
- is essential to optimize the workpiece-specific grinding process
- enables data-driven workpiece evaluation by using complex algorithms to remove faulty gears at an early stage
- is self-diagnostic, thus simplifying the coordination of service and maintenance planning
- is a database-supported tool that maps OEE as well as tracing other key data
- can be retrofitted on existing RZ x60 machines to a certain extent!

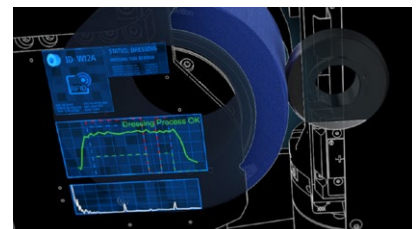
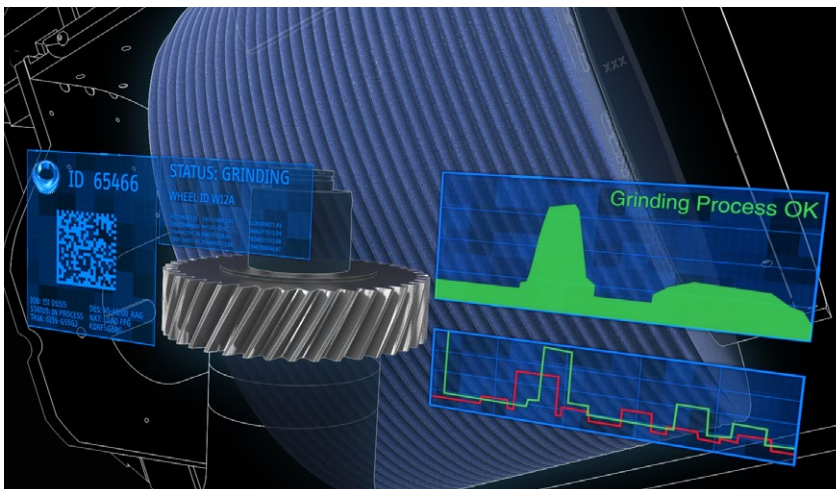
ARGUS – Machine //

Efficient production

To use ARGUS, the basic requirement is to install specific hardware components. Delivery also includes two software modules entitled «Dressing Monitoring» and «Grinding Monitoring» both enabling extensive optimization to be conducted already during the grinding process.

ARGUS Hardware

- Sensor technology (including triaxial sensors, among others); further extensions are available on request
- Electronics for measurement & control
- Balance interface



Dressing monitoring module (included)

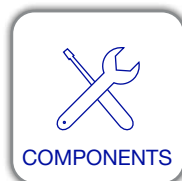
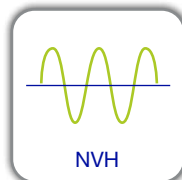
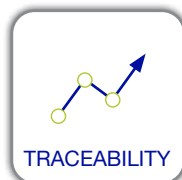
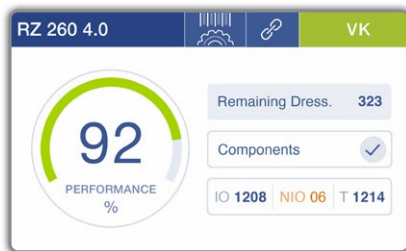
- Increases productivity by ensuring constant dressing quality along the entire width of the grinding wheel
- Optimizes dressing cycles and therefore increases the potential for cross-process reduction of tool costs
- Increases process stability through automatic grinding wheel validation after dressing
- Transmits all dressing indicators to the Reishauer Cloud (when activated)

Grinding monitoring module (included)

- Tests and evaluates the roughing and finishing processes, based on static and dynamic criteria, during the machining of gears
- Reduces dismantling costs in gearbox production by weeding out defective and potentially noise-critical gears automatically (NVH)
- Transmits all dressing, static, and dynamic grinding indicators to the Reishauer Cloud (when activated)

ARGUS – Features //

Digital Added Value



Reishauer provides cloud-based features such as optional functionality extensions in the form of Software-as-a-Service (SaaS), which expands the scope of the grinding machines using database-supported monitoring, analysis, and diagnostic functions. Only in this way can the enormous potential of ARGUS be fully exploited.

Machine status (basic package features)

- Fast and efficient monitoring of all gear grinding machines via the machine status display of the ARGUS WebApp
- Notification of the user about changes in the status of the gear grinding machine through intuitive “color messaging”

Real-time process monitoring & analysis (basic package features)

- Efficient tool to optimize dressing and grinding parameters, based on process indicators
- Representation of key figures & statistics of both dressing and grinding processes, including analysis and evaluation of historical dressing and grinding indicators
- Optimization of dressing and grinding tools by comparing process indicators under real operating conditions

OEE & traceability

- Real-time assessment of Overall Equipment Effectiveness (OEE), including a detailed breakdown of the main productive and non-productive times of all gear grinding machines
- Extension of continuous traceability by the assignment of process and component states present during production

NVH diagnosis (similar to EoL order analysis)

- Time-saving error detection by correlating common malfunctions of the «end-of-line» test bench to the process and component states already during the machining of the respective gear wheels
- Analysis of the dynamic behavior of processes and machines

Automatic Component Diagnostics (AKD)

- Ability to detect wear effects on the machine's components before they have a quality-reducing effect on the gears
- Time and cost savings through better planning of service and maintenance intervals
- Fast, in-depth analysis of component status in real-time
- Autonomous monitoring and evaluation of component states by AI-based algorithms

The Reishauer Cloud and the ARGUS WebApp

The Reishauer Cloud is not only a platform on which the innovative ARGUS features run, but it also collects the data that provides the basis for optimizing production process. If several of the Reishauer machines are equipped with ARGUS systems, they are linked together in the Reishauer Cloud, always giving you a complete overview.

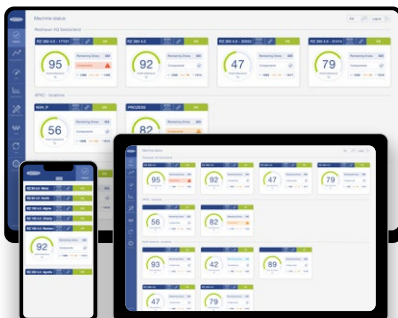


Reishauer Cloud data security & technology updates

- Customer-side data sovereignty through specially developed Reishauer Cloud IT architecture
- Access protection of the Reishauer Cloud by two-factor authentication (2FA) of authorized users
- The highest degree of data security and availability by using a leading global IT service & cloud provider
- Immediate access to Reishauer Cloud technology updates
- Storage and backup of data history for two years; longer on request

ARGUS web app

- The Reishauer Cloud gives access to the ARGUS WebApp. Via a graphical interface, there is always a complete overview of all the machines.
- Access via desktop, tablet or mobile
- Complete overview of all machines integrated in the Reishauer Cloud, including mapping of machine status and component states
- Possibility to set up user groups with specific rights to machine-related data
- Faster and more efficient access to newly developed Cloud features



The Reishauer Circle of Competence

The Reishauer Circle of Competence describes the entirety of our offering. Reishauer offers products and services around the grinding process completely from one source and thus guarantees a long service life of the machine system at low life cycle costs.

Machine

A broad portfolio, future-oriented controls, and interface concepts, and state-of-the-art grinding technologies – for decades, our machines have guaranteed the highest possible output with maximum precision, consistent quality, and unmatched machine availability.

Automation

Automation "Made by Reishauer". Our automation solutions are perfectly matched to our machines and keep pace with their high output. Modular in design, they can be flexibly tailored to your production needs.

Tooling

Perfectly matched, consistent in quality, and with guaranteed availability: Together with the machine, Reishauer tooling forms the backbone for your successful grinding processes.

Technology

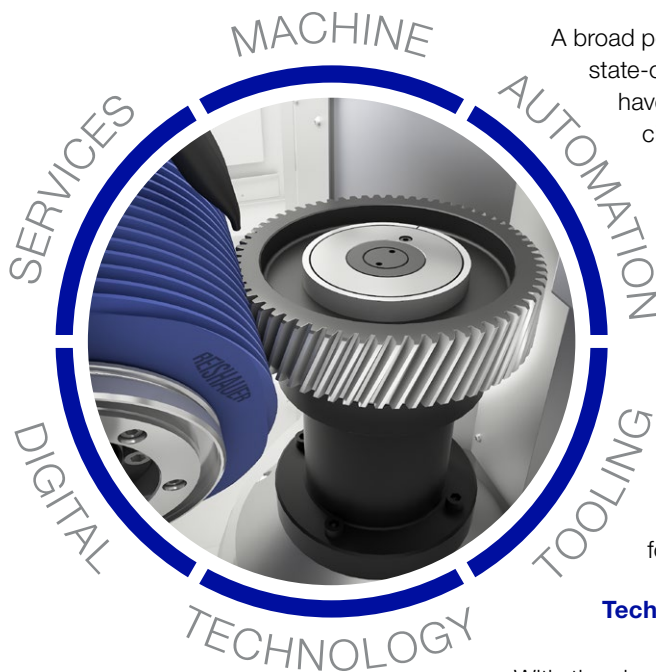
With the development of powerful e-drives, the requirements for quality, surface finishes, and efficient gear geometries have increased significantly. Reishauer grinding technologies enable you to meet your customers' most demanding requirements and help you remain competitive. Our technology experts are at your side with advice and support.

Digital

System integration, in-depth process analyses, predictive maintenance – the requirements for Industry 4.0 solutions are extremely complex and diverse. Reishauer offers you a constantly growing portfolio of digital services to maximize the potential of your machine.

Services

The reliability of our machines, and thus machine availability, is of central importance for your competitiveness. Shortest reaction time, a worldwide extended network of service engineers, and decentralized spare parts stores guarantee you maximum availability.



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