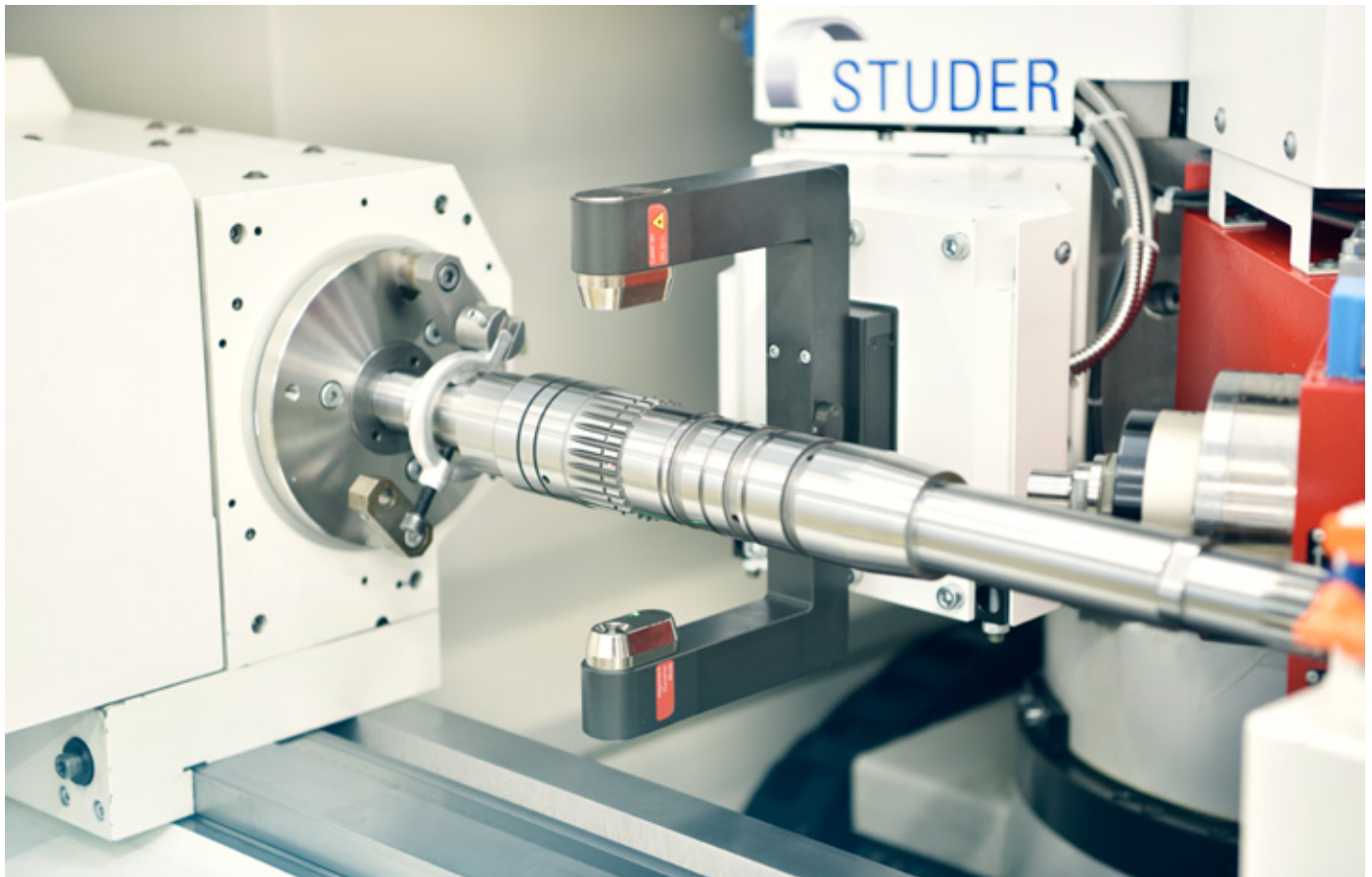


LASERCONTROL™

MACHINE-INTEGRATED LASER PROCESS MEASURING TECHNOLOGY



1 Machine-integrated laser process measuring technology in practice

Finishing processes on grinding machines often require demanding tolerances in dimensional, form and positional accuracy as well as high surface finishes. Companies often have experience in achieving these requirements. However, especially with small batch sizes, there is a desire for process control on the machine, as periodic measurements on external measuring machines and the corresponding corrections extend the processing time of the parts. Machine-integrated control measuring would considerably increase process reliability and productivity. Ideal and desirable are solutions that can be used flexibly for a wide range of workpieces. Especially the laser measuring technology now opens interesting fields of application.

STUDER can draw on several years of experience in the use of machine-integrated laser measuring technology, which was used for experimental purposes to measure grinding wheels or workpieces. This knowledge and experience are now implemented to meet the current needs. The system used in other industries for tool monitoring was further developed specifically for STUDER, based on the latest laser measuring technology, for measuring workpieces on grinding machines. This provides the user with a suitable method for non-contact measurement for machining precision workpieces.



Not only various large «non-interrupted» workpiece diameters can be precisely measured contact-free with the laser measuring, but also «interrupted» diameters such as shafts with splines or grooves, cutting edges of tools (see picture 2), tool flutes as well as the external diameters of gears. The STUDER-Software records the measured values after each measuring cycle.



2 The contact-free measurement of high accuracy tools

Selected information on the use of the laser measurement technology:

- Infeed of the laser system via the machine axis, mechanical fixation on the appropriate wheelheads, non-contact measuring
- Max. workpiece diameter 100 mm (3.94") (for example in picture 1, larger diameters on request)
- Measuring repeatability of the separate measuring system dependent on the system version: for example, 0.4 μm (0.000016 ") for system length 260 mm (10.25 ") or 0.3 μm (0.000012 ") for system length 200 mm (7.875 ") (Basis for achievable workpiece tolerances of < 3 μm (< 0.00012 "))
- Designed for use on machines with coolant, dirt screens and efficient purge air available.
- Possible coolants: water soluble coolants (solutions, emulsion) and grinding oils.
- Integrated air nozzles to blow-off the coolant (the time needed to blow-off the coolant can influence the measuring time and measuring value)
- Evaluation and correction calculations using the STUDER measuring cycles integrated into the control
- The measuring data can be recorded and printed, display also via the control screen
- Typical measuring cycles:
 - External workpiece diameter (also interrupted surfaces – see picture 1)
 - Tapers on workpieces
 - Length measurement of workpiece contours must be evaluated, case-by-case (high shoulders rather unsuitable, sharp-edged contours such as cutting-edge lengths of tools possible)
 - Specifically, for the largest and smallest cutting diameters of tools, as well as the flutes (Option)
- The integration of the laser measuring system is possible on the STUDER machines S41, S31, S33 und S22