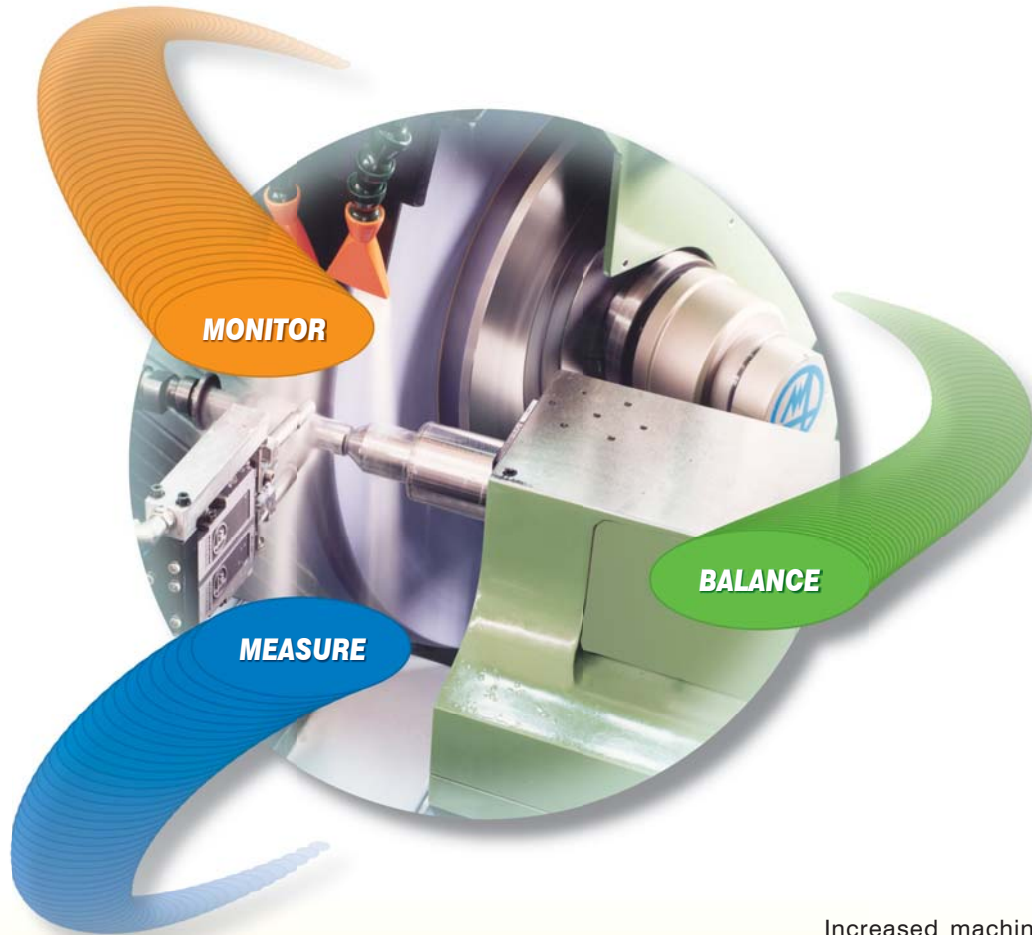


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Grinding Line

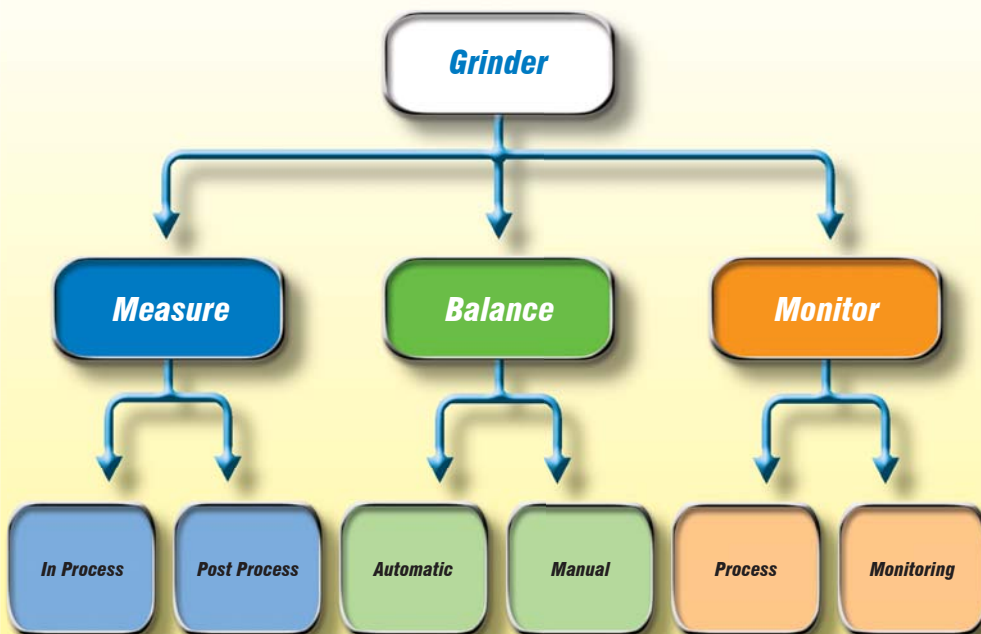
GAUGING AND CONTROL FOR GRINDING MACHINES



Increased machine productivity and reduced production costs are the key elements of the process. The optimum solution involves the real time control of machining variables and conditions. The control of deviations from the preset process allows optimisation of grinding productivity. Monitoring machine conditions allows the elimination of unforeseen machine stops causes and the planning of machine maintenance. Having these controls in a single data processing system is the solution with the best cost/performances ratio.

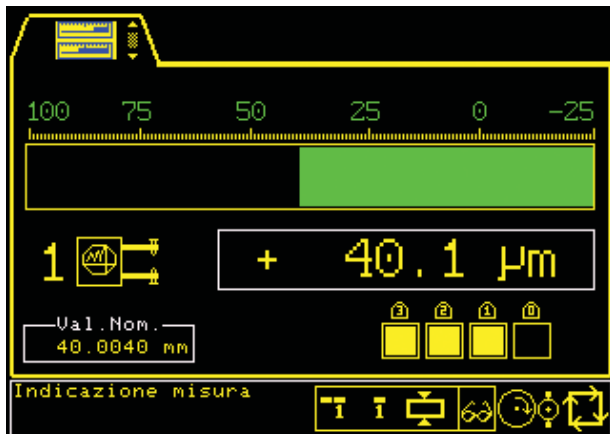
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makes available a package of solutions for gauging, monitor of acoustic emissions, vibrations and stock removal on all types of grinding machines. These solutions can satisfy the requirements of a single application up to the most complete integration.

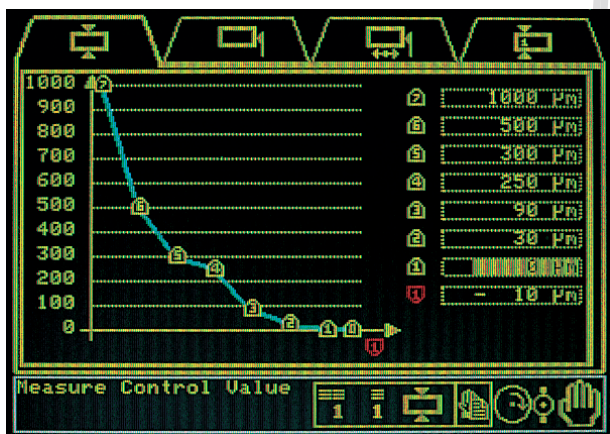


In-process gauging system

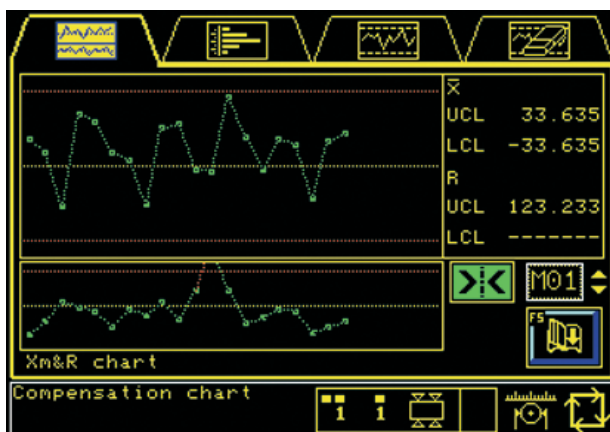
Part gauging during the grinding process allows optimisation of stock removal speeds and the production of parts with excellent surface finishes and size tolerances of less than one micron.



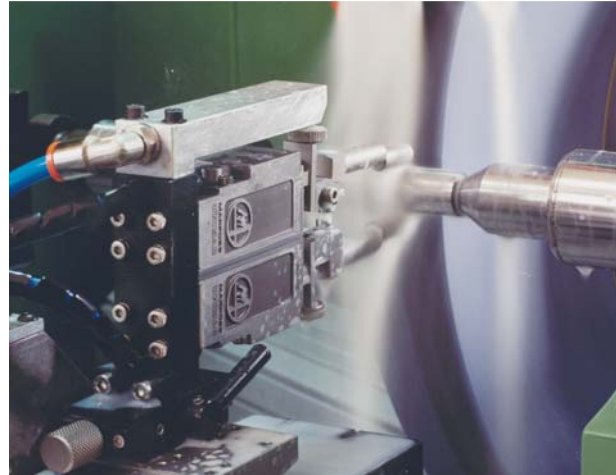
1 - Real time in-process measure



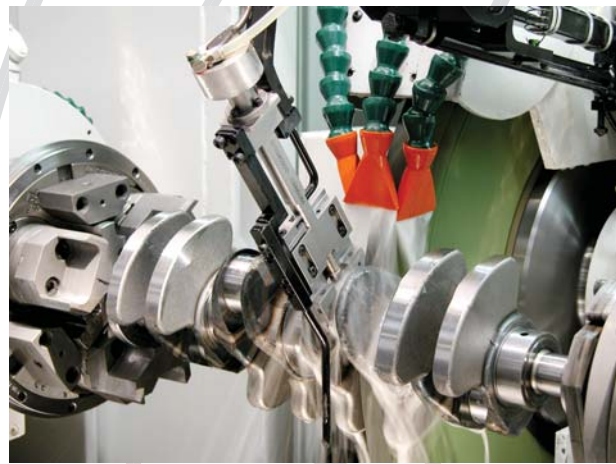
2 - Machining cycle programming



3 - Real time tool compensation control chart



4 - Outside diameter control application



5 - Crankpin and journal control application

Real time gauging allows control and optimisation of the following cycle:

- Part control at start of machining:
 - Check of correct part loading or excessive machining allowance to prevent collisions.
 - Definition of machining allowance value to increase machine productivity.
- Part control during machining:
 - Grinding wheel feed speed change when preset machining allowance values are reached, consequently reducing machining times.
 - Management of super finishing time relative to the actual part value and not to a preset time, to improve the surface of the part.
 - Management of the removal value to optimise grinding wheel feed and contain shape errors.
- Cycle stop at the nominal part dimension, increasing process quality and automatically compensating grinding wheel wear.

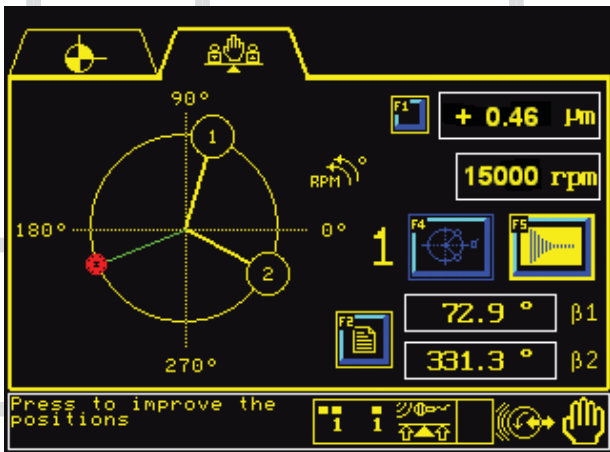
While gauging during the grinding process optimises the machining cycle, part measurement processing by a post processor system allows evaluation of the machine capacity and receipt of statistical indications for correct feedback on the process.

Systems for balancing grinding wheels

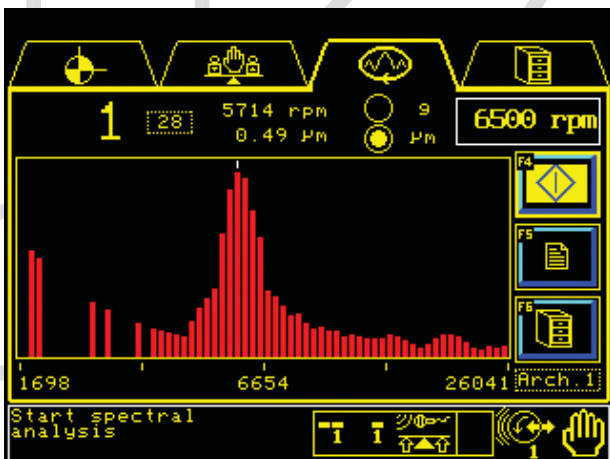
The quality of the surface of the part depends on machine vibrations. Despite increases in the use of pre-balanced grinding wheels and their cutting efficiency, the increase in the surface speed of the grinding wheel requires continual vibration control. Vibrations produce irregularities in the surface of the part, deterioration of the grinding wheel incompatible with the optimisation of process costs and, with time, breakage of spindle rolling parts.



6 - Dynamic balancing for twin grinding wheel applications



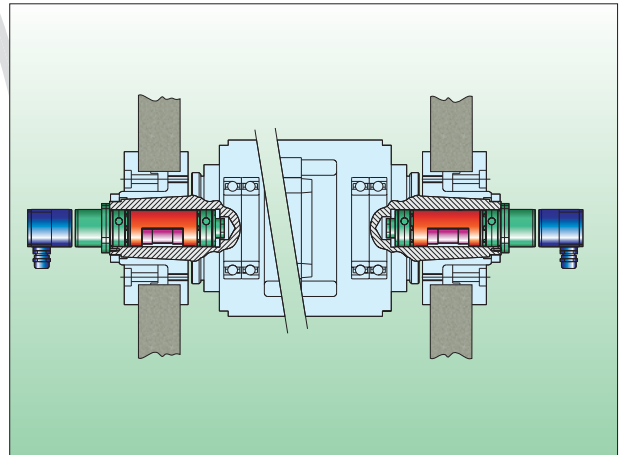
7 - External balancing head with infrared transmission



8 - FFT analysis



9 - External balancing head with infrared transmission



10 - Twin grinding wheel application with internal balancing heads and contactless transmission

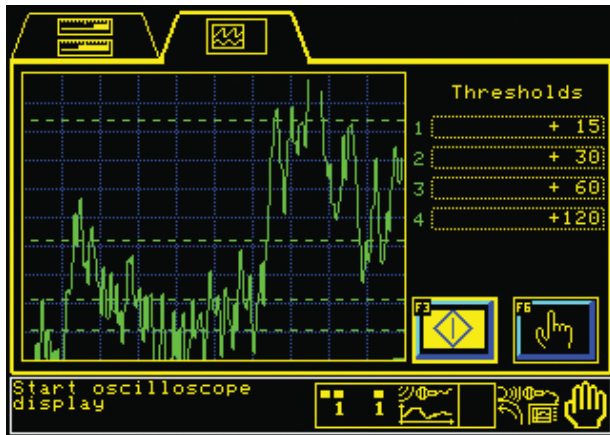
The solution is the use of sensors to detect vibrations, to process them using an electronic system and control automatic movement of grinding wheel imbalance compensation weights.

Marposs has a line of products for balancing grinding wheels, able to operate at the highest wheel rotation speeds:

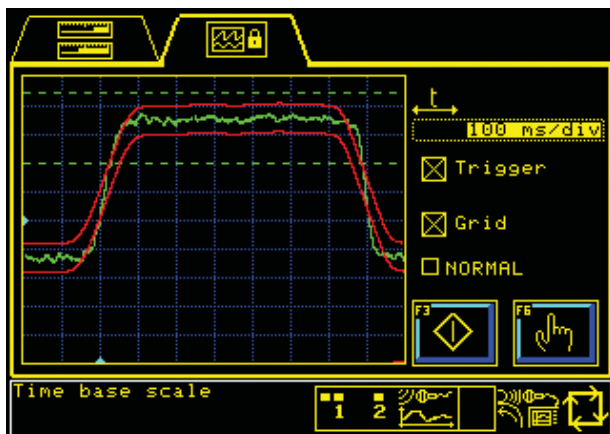
- Balancing heads outside or inside the spindle, with infrared signal transmission.
- Balancing signal transmission without electrical contacts, for maintenance-free systems.
- Balancing heads for machining with high surface speeds (> 200 m/sec.)
- Electronic processing unit for single or multiple grinding wheels with one or two balancing heads and compensation algorithm on one or two planes.
- Balancing system with integrated acoustic sensor for grinding wheel gap, crash and dressing control.
- Machine vibrations spectral processing (FFT) tool.
- Pre-balancing tool for small grinding wheels.

Acoustic sensors

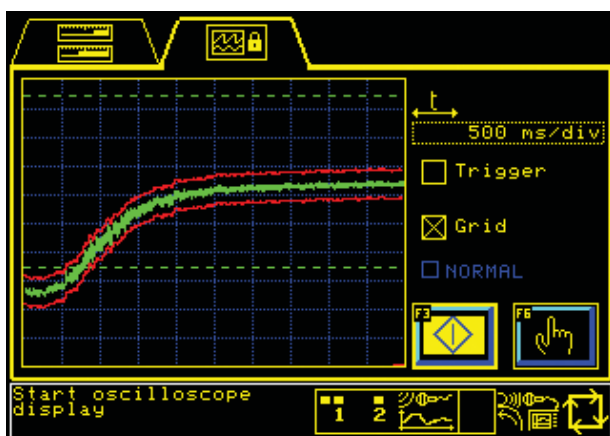
Acoustic sensors can be used to detect minimal sound vibrations produced by the machining and dressing process.



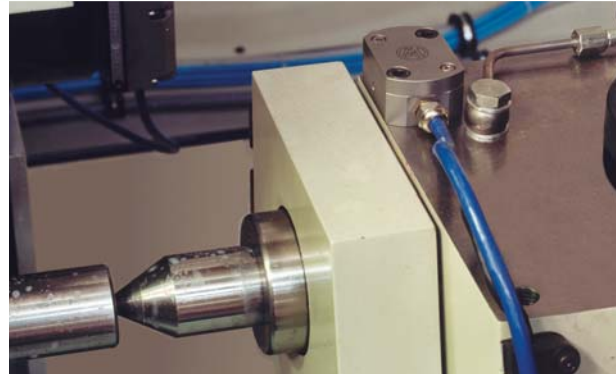
11 - Gap control



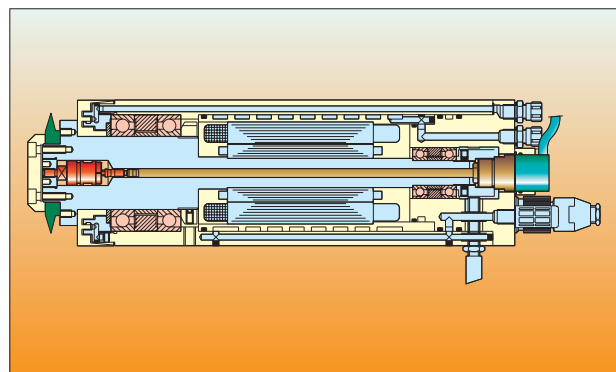
12 - Dressing cycle control



13 - Profiling control



14 - Acoustic sensor on tailstock



15 - Dressing spindle sensor application

Acoustic sensors are particularly useful for preventing collisions, detecting machine faults, splintering or imperfections of the grinding wheel surface and dressing device defects.

Acoustic sensors are easily integrated in the machine for:


- Grinding wheel crash control: the acoustic sensor detects approaching obstacles, preventing grinding wheel breakage and machine stops not programmed, thus reducing maintenance costs.
- Air gap control: the acoustic sensor detects the distance between the grinding wheel and the part. Approaching the part or dresser at top speed reduces machining times, the times without shavings being proportional to the change in material to be removed.
- Dressing control: acoustic sensors allow dressing to be optimised. This results in only the removal necessary to uncover the grains and increase grinding wheel efficiency.
- Size and positioning controls: sensors located at the points of major sound signal emission allow rotating parts to be positioned and sized: grinding wheels, diamond disks, parts being machined, with the aim of reducing unproductive grinding times.



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For a full list of address locations, please consult the Marposs official website

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Marposs has an integrated system to manage the Company quality, the environment and safety, attested by ISO 9001, ISO 14001 and OHSAS 18001 certifications. Marposs has further been qualified EAQF 94 and has obtained the Q1-Award.

