

HE-Grinding of Injector Orifice Components



General view

Brief Description

The automatic HE (= hydro erosive)-Grinding module is used for flow calibration of two orifices within each work piece. The machine is based on a rotary table concept: 2 x grinding station, 2 x washing station, 2 x measuring station and 1 x blow out station

HE-Grinding

The HE-Grinding process calibrates the static flow of diesel fuel injector bore holes by using a special fluid grinding method. An abrasive liquid is pumped under high pressure through the respective bore hole intersections. A specially designed and patented cylinder pump (**Active Flow Meter method**) generates a constant flow and supplies the work piece with grinding fluid. The bore hole intersections, being initially too lean, generate an inlet pressure higher than the nominal pressure. Due to the abrasive fluid the edges of the intersections are being radiused and the inlet pressure decreases. The process is stopped when the pressure measured upstream has reached the nominal pressure. It is also possible to generate constant pressure and to stop the process after having reached a defined target flow. Variable flow increase is possible.

Washing

After HE-Grinding the work pieces are cleaned from residues of grinding media.

Flow test

To verify the correlation between HE-grinding process and flow test with ISO 4113 fluid.

Highlights

- Robot handling with automatic on- and offload
- Ratio grinding for a defined flow relationship between the control orifices
- Flow tolerances $< \pm 2\%$ with $Cpk \geq 1.67$
- Precise temperature ($\pm 0.3^\circ\text{C}$) and pressure regulation (± 0.2 bar)
- HE-Grinding and flow test with counter pressure is possible
- Automatic mastering
- Two separate grinding circuits for two different types of grinding fluid
- Automatic data storage
- Comfortable individually adjusted user software in Windows XP
- Operation via touch screen
- Quick changeable wear parts

Technical Data

- Cycle time: app. 45 sec for orifice component with 2 throttles
- Grinding pressure: max. 120 bar
- Purge hydraulics: max. 10 bar
- Flow test hydraulics: max. 140 bar



Rotary table



Robot automation

Sonplas