Machine Tool for Laser Polishing

Initial Situation and Process

State of the art for polishing in tool and mold making is manual polishing. For economical as well as time-related reasons there is a high demand for automated polishing techniques for complex shaped 3D surfaces. Therefore Maschinenfabrik Arnold, S&F Systemtechnik and Fraunhofer ILT developed a machine tool for laser polishing of metallic parts.

Polishing with laser radiation is based on remelting a thin surface layer of the workpiece and the subsequent smoothing of the surface roughness due to surface tension. The innovation of laser polishing results from the fundamentally different active principle (remelting) compared to conventional grinding and polishing (abrasion).

The Machine

The machine tool is based on a five-axis portal machine for positioning the work pieces and performing slow feed motions. This axis system is combined with a high dynamic three-axis laser scanner to achieve the needed process speeds of up to 1 m/s.

Due to the machine kinematics with 5+3 axes, special demands are made upon the CAM-NC data chain. Fraunhofer ILT is developing a solution which allows the operator to continue working with his known CAM system he already uses for milling also for the tool path generation for laser polishing.

Technical Data (Basic Version)

- Travel range: X: 500 mm; Y: 800 mm; Z: 400 mm; A: ± 95°; C: 360° endless
- Work piece weight max. 100 kg
- Diameter of machine table 450 mm, max. work piece height 350 mm
- Control unit: Siemens Sinumerik 840 D
- Laser: Rofin fiber laser FL x 50 with 500 W (cw)
- 3-axis-laserscanner (v up to 10 m/s, a up to 1000 m/s²)
- Utilization of one inert gas
- Machine dimensions 2350 x 3515 x 2400 mm³ plus laser and cooler

Options

- Measuring probe for work piece alignment
- Higher laser power (750 W or 1000 W)
- Multi-Inert-Gas-Version
- Versions for larger or smaller work pieces
- CAM-NC-Software

Process Testing

The machine tool is at your disposal for process testing at the Fraunhofer Institute for Laser Technology ILT in Aachen.

Contact

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