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MACHINE FOR AUTOMATED LASER POLISHING OF COMPONENTS UP TO 1 KG

Task

To date, the available laser polishing machines are dimensioned for larger component parts such as dies and mold inserts. To polish smaller components such as implants for medical technology, these machines are over-dimensioned and, thus, unnecessarily expensive. And up to now, no component could be laser polished completely automatically while maintaining the required protective gas atmosphere when a tool or mold insert is changed.

Method

The goal is to set up a machine for automated laser polishing of small components weighing up to 1 kg. The protective gas atmosphere in the process chamber should remain when the component tray is inserted and removed so that continuous polishing is made possible.

Result

The laser polishing machine is built according to the glove-box principle, which uses a structure out of granite on a base frame out of steel. The optical system is placed in a box above the process chamber, and the required process control is housed in the base frame. The component parts can be inserted in the process chamber through an antechamber.

For this laser polishing machine, a six-axis robot is used as an axis system, which transports the component part as well as guides the component during polishing. As a laser beam source, a pulsed rod laser from Fraunhofer ILT is currently being used, having pulse durations in the range of 100 - 500 ns, whereby the integration of laser beam sources with other specifications is possible. Since a laser protection window is used as a viewing window, the machine constitutes a laser device of Class 1 such that no additional protective measures are necessary at the location it is installed.

Applications

The laser polishing machine can be used for the automated laser polishing of small components out of different materials. These parts can range from, for example, implants for medical technology to components for precision mechanics or mechatronics. Thanks to the modular basic principle of the machine, it is possible to adapt it to other laser material treatment processes.

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Contact

Dipl.-Ing. Christian Nüsser
Telephone +49 241 8906-669
christian.nuesser@ilt.fraunhofer.de

Dr. Edgar Willenborg
Telephone +49 241 8906-213
edgar.willenborg@ilt.fraunhofer.de

1 General view of the laser polishing machine.

2 Process chamber (view without front door).