

LASER POLISHING OF FREEFORM SURFACES

Task

In industrial practice polishing of components with freeform surfaces is mostly done manually. The achieved quality depends on the skill of the polisher and is attended by a low processing rate. This results in a growing demand for an automated polishing solution for freeform surfaces. During laser polishing a thin surface layer is melted and through surface tension the roughness is reduced. Therefore the focus of the laser beam is guided in meanders along contour-aligned processing paths over the surface to be polished.

Method

What defines a laser polishing application are the material to be polished, its initial roughness and the required roughness. The first step is to define the process parameters for the given application. In order to apply the process strategies to the processing of real components, Fraunhofer ILT developed an end-to-end CAM-NC data chain. The first link in the data chain is a 3D CAD model of the component to be polished. Based on this model, a conventional computer-aided manufacturing (CAM) program for CNC milling is used to calculate processing path data.



Geometric data for these paths are fed into post-processing software (image 1) developed at Fraunhofer ILT. Building on this data, the software applies all the necessary process strategies and defines the machine movements. This data is then transferred to the 3D laser polishing system in the form of a machine-dependent NC code, which enables the system to process the component surface entirely automatically.

Results and Applications

Through the development of the post-processing software a continuous CAM-NC data chain for the laser polishing of freeform surfaces is created and accessible for end customers. The achieved surface quality and processing time depend on the application. The principle application areas for the laser polishing of freeform surfaces are in medical technology as well as tool and mold manufacture.

Our Services

- Determining the processing parameters for your laser polishing application
- Processing of prototypes and small series
- Adjusting the post-processing software to fit your CAM system
- Analysis of surfaces
- Setting up systems or system components for processing your components

Contact

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1 Post-processing software for laser polishing.

2 One half of a partly laser-polished mold (GGG40) used in glass production.