Living Glass Surfaces – Workshop TU-I

Examination of the electrical performance of a polishing machine for possible determination of quality characteristics

Michael F. Benisch[1], Christian Trum[1], Christine Wünsche[1], Werner Bogner[1], Edda Rädlein[2]

[1]: DIT – Deggendorf Institute of Technology

[2]: TU-I – Technische Universität Ilmenau

During the polishing of optical components, several chemical and mechanical influences interact. The polishing processes is the final step in surfacing a glass workpiece and defines the initial state for a coating step – so it is necessary to create a transparent, optical functional and defect-free surface.

For this study, a Stock RSP 40 synchrospeed polishing machine was used. Tool and workpiece are actively driven with the same rotation frequency. The power used on driving the tool and on driving the workpiece was measured over one polishing cycle with a resolution of 200 ms. Final process characteristics like local roughness and total material removal were compared to the measured power signals (spindle and pinole). A method was developed, applied, and continuously improved to reduce the entire power diagrams (Fig. 1) to few, simple parameters (see e. g. Fig. 2) which allow an inference to process parameters like roughness and material removal. These parameters are (among others) standard deviation of power, complete work, ratio between spindle power and pinole power.

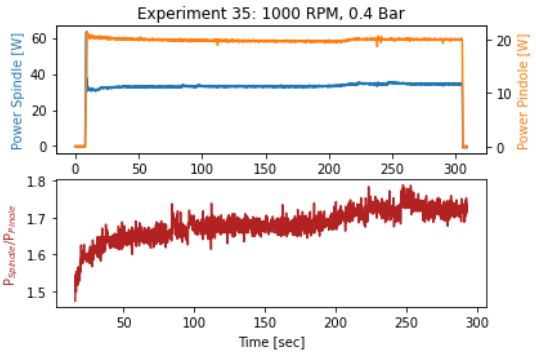

Figure 1: Spindle Power on workpiece and tool over time in s during a polishing experiment and ratio (orange line in upper diagram) between spindle and pinole power.

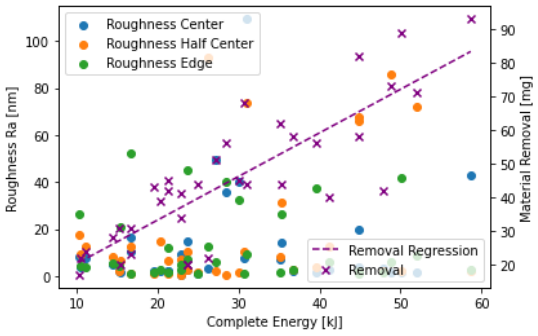

Figure 2: Evaluation of 36 polishing experiments regarding roughness and material removal over the complete power of the system.