



High demands for Surface Polishing

Robot Assisted Polishing - RAP

The surface quality of tools and machine components has a great influence on their performance and service life. Surface polishing of parts and components with low to moderate requirements to the surface finish quality can rather easily be obtained by hand or simple machines, e.g. extrude honing, sand blasting, dry or wet granulate polishing. However, parts and components with high demands to the surface quality as well as parts with complex shapes and cavities require polishing by highly skilled individuals. For example, critical surfaces of tools for cold precision forging are often specified in the range of Ra 0,06 – 0,04 μm , and Rz below 1,0 μm . For a mold for plastic injection the surface finish would often be specified in the range of Ra 0,03 – 0,01 μm , and Rz 0,3 – 0,1 μm . Such surfaces have a mirror or mirror-like appearance and put high demands to the individual craftsman's competence and experience in surface preparation.

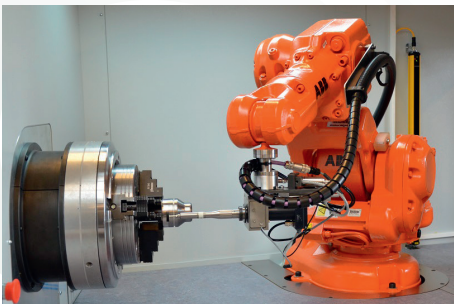
Surface Polishing by Robotics

STRECON has for several years been working on developing a machine system for high-quality surface polishing. Our approach is RAP, which is an abbreviation for Robot Assisted Polishing. The better we understand the skill and profession of hand polishing, the better we succeed in transferring the polishing work to the machine system. Our polishing machine system is based on an industrial robot as it can be compared to the arm, of a human being. By "assisted" we actually mean the aid, which the craftsman or operator gets from the polishing machine in "doing the work". The machine needs to be programmed, set correctly and monitored for obtaining the specified surface quality of the parts, and this responsibility remains with the skilled craftsman. However, once the polishing process has been confirmed and run-in for the individual parts, the machine runs relatively automatic with limited assistance from staff members.

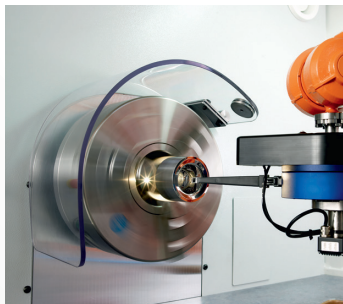
Surface Polishing by Oscillation or Rotation

The machine system has been developed for polishing by two methods. One method is polishing by oscillation (or pulsation), and the other method is by driven tools (or spindles). The contact force of the polishing tools to the part surface is servo-pneumatically controlled. For 2D part polishing these tools are mounted on the robot arm. For 3D polishing the tools could be stationary, and the robot will be carrying the part to be polished. The machine system has been developed for automatic tool change and a diamond paste dispenser.

The polishing machine has proved successful for surface polishing of different tools, molds and some machine components made of different materials, different hardness levels, different pre-machined surfaces, and different port sizes. Furthermore, the machine has proved to be very consistent over time including process stability and repeatability.



Robot polishing by rotation (high-speed spindles)



Robot polishing by oscillation (pulse module)



Examples of RAP polished tools