

Robot Assisted Polishing / RAP

High demands for Surface Finish

The surface quality of tools, molds, and machine components has a great impact on their performance and service life. Surface polishing of tools and components with low and moderate requirements to surface finish and geometrical tolerances can rather easily be obtained by hand or simple machines like extrude honing, sand blasting, dry or wet granulate polishing. However, tools and molds with high demands to the surface quality and parts with complex shapes and cavities require polishing by 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 polisher's competence and experience in high precision surface preparation.

Surface Polishing by Robotics

STRECON has developed a new type of robotic machine system for high-quality surface polishing. Our approach is RAP, which is an abbreviation for Robot Assisted Polishing. The better we understand the skills and profession of hand polishing, the better we manage to transfer the manual polishing work to the robotic machine system. In some cases, the RAP machine can perform the entire polishing process, while in other cases the operator would have to finish the polishing work manually.

Like other machines, the RAP machine needs to be programmed, set correctly, and monitored for obtaining the specified surface quality of the workpiece, and this responsibility remains with a skilled operator. However, once the polishing process has been confirmed and run-in for the part, the machine runs relatively automatic with limited assistance from the operator.

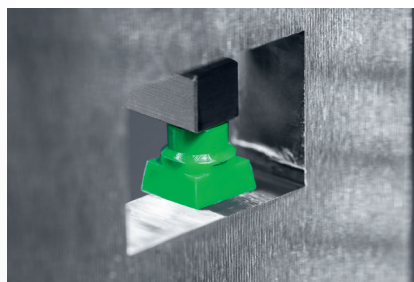
Surface Polishing by Various Processes

The RAP machine system has been developed for precision polishing of parts with 2D rotation-symmetric geometries, plane surface for example in cavities, and for 3D curved and free form surfaces. The machine can be equipped with classic polishing tools for oscillation, high-speed spindles, and steady sticks of for example brass, wood, or plastics. Furthermore, STRECON has developed a new oscillating 3D polishing process with a "nodding, ball-shaped" polishing head.

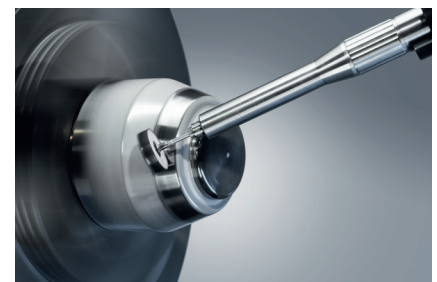
The RAP machine can be applied for precision polishing of tools and molds for various metal forming operations, injection molding of plastics and compound materials, and similar industrial applications. The RAP machine is also used for tribological work at universities and development centers as well as polishing of machine components. In short, the RAP equipment can fulfill the needs for high-precision surface polishing of a broad range of industrial workpieces, and it offers a controlled, repetitive, traceable, and quality consistent surface polishing process, and by that minimizes the impact of human variations.



3D polishing of double-curved surface



Inside cavity polishing



2D external polishing by rotating spindle