



LASER-BASED DEBURRING AND POLISHING OF SHEETS AND THIN GLASS

Task

When metallic sheet metal parts as well as glass panes or thin glass are cut or separated, burr- and defect-free edges often cannot be achieved. Due to different requirements with regard to appearance, haptics and strength, the edges must be deburred or rounded in a subsequent process.

Method

The deburring and edge rounding of glass and metals with laser radiation is based on the absorption of the laser radiation in a thin surface layer of the workpiece so that a thin surface layer is melted. In the liquid state, the roughness can flow out due to the surface tension and is smoothed. By a suitable choice of the process parameters, a defined rounding of the edge can also be set.

Results and Applications

When CO₂ laser radiation is used for rounding the edges of glass, the melting process not only rounds off the edge, but also heals micro-cracks and sub-surface damage. Glass panes with thicknesses down to 50 µm can be processed in order to increase their strength. Thanks to contactless processing, which prevents new defects from emerging in the glass edge, processing speeds of up to 100 mm/s have been achieved.

In addition to some cover glass, many other kinds of glass and optical glass, such as fused silica or N-BK7, can be processed, e.g. for deburring blank-molded components.

When metals are polished with laser radiation, the radius of the edge rounding can be adjusted as defined, but, as with the polishing of glass, the roughness can also be reduced and micro-defects removed. For example, laser polishing has increased the fatigue strength of push link chains in CVT transmissions by up to 200 percent, allowing for higher torques or, alternatively, smaller gears. The previous investigations were carried out on sheets with thicknesses from 100 µm up to 1.5 mm. Depending on the material, processing speeds of a few 100 mm/s are possible. The laser-based edge polishing of metals is already being used in the automotive industry.

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- 2 Partially laser-rounded sheet edges made of stainless steel (sheet thickness 1.5 mm).
3 Initial state (left) and laser-rounded (right) thin glass (glass thickness 100 µm).