AUTOMATED LASER DRILLING OF TOOL MOLDS

Task

Rotation sintering, also known as slush molding, is used to manufacture molded skins, such as cockpit or door trim for cars. At present, approx. 80 percent of molded skins are manufactured using electroforms due to the complex freeform surfaces, and surface structures such as leather graining. Depending on the level of complexity of the geometry and given the numerous process steps involved, the manufacture of these electroforms is time-consuming and expensive. The aim is to replace conventional electroforms with laser-drilled molds.

Method

The aim is to manufacture the holes using laser radiation in tool molds as part of an automated process. The system consists of a robot with a fiber-laser beam source. A CAx process chain has been developed for this purpose in which the CAD data of the tool molds are processed, drill hole fields generated, and a machine-specific NC program created. Process-specific fundamentals, such as suitable process windows and process control, have been devised to manufacture holes using fiber-laser radiation.

Result

The use of laser-drilled tool molds offers the following advantages over electroforms:

- New, e.g. sharp-edged tool mold geometries
- New surface structures
- Shorter market response time and time to market
- Lower costs per tool mold by reducing the required manufacturing steps by approx. 50 percent

Applications

The advantages of the new laser-drilled tool molds may result in the substitution of conventional electroforms, allowing old markets to be re-entered or additional markets created and targeted through new molds or lower costs.

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1 CAD model: tool mold for passenger car door trim.