The importance of weight is becoming ever greater in today’s automotive industry. Whilst preserving vital performance factors, the employment of lighter building materials can significantly reduce the weight of a vehicle. Several more recent research projects focus on the material magnesium and its applications as a substitute for conventional sheet metals. Clearly, production of fine magnesium sheet can only commence once it is established that a large number of the steps in the production line are sufficiently stable and controllable enough to be incorporated into series production. At the Institute for Metal Forming and Casting (utg) it could be proved that a tool for the semi-warm forming of a convertible roof in magnesium can be successfully operated. The production of this relatively simple geometry was carried out using a heated deep drawing tool, which proved to be both straightforward to control and perfectly suited to this application. Furthermore, the fabrication of stiffening corrugations incurs only a relatively small stress for the material. It is therefore a process which could be within the capability of cold or mildly heated tools. A series of examinations of the stretch-forming of axisymmetric geometries at room temperature with AZ31 sheet was carried out at
utg. Based on the results of these, the forming limits of the current material generation could be identified. In addition, random sample tests were made with moderately heated active elements. After forming the part with deep drawing and stretch drawing processes, the part outline must be pressed into the magnesium sheet. A prototype blanking process for magnesium sheet with selectively heated active elements has therefore been implemented at utg. This innovative tool concept only uses heat in a small area around the active surfaces and in this way makes it possible to maintain a smaller tolerance in parameters such as the die clearance and the temperature distribution. As a last step the hemming process has been tested on sheets of the same quality using selectively heated tools. It was shown that this process could also successfully be implemented and a set of process parameters was found. With the steps forming, blanking and hemming, the process chain could be completed. Consequently, a solid basis for close-to-series-production processes has been established.

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