



LOCAL REINFORCEMENT OF SHEET COMPONENTS THROUGH ADDITIVE MANUFACTURING

Task

Today, load-adapted sheet metal components are often made out of tailored blanks. For smaller series, a freely configurable, additive applied reinforcement, which has a full metallurgical connection to the base plate, provides an alternative. The combination of sheet metal forming and additive manufacturing makes it possible to produce load-adapted variants based on serial components without modification or new production of forming tools. The method can be used before or after the forming. In cooperation with the Chair of Design and Production of the Brandenburg University of Technology Cottbus-Senftenberg, Fraunhofer ILT has been developing process foundations for the local reinforcement of thin metal sheets.

Method

The optimal shape of a reinforcement structure (patch) can be determined by simulation of the load case. Laser material deposition (LMD) is then followed by local production or application of the patch on the same or similar material. The process is adjusted for high order rates and minimal distortion. The patches are examined for mechanical properties and

formability. The materials to be investigated are steel (ZE630) and aluminum (Al6016) with sheet thicknesses of 2 and 1 mm, respectively.

Results

When the sheets are cooled and clamped, the distortion can be minimized. Post processing the applied patches is not required for the forming. On simple specimens, the stiffness increase can be proven. The transferability to real components has been checked, based on demonstrator components (steel gearbox housing and aluminum collar flange).

Applications

The findings gained from the project can be used for future applications in the automotive industry, but also in the aerospace industry.

The R&D project underlying this report was commissioned by the Federal Ministry for Economic Affairs and Energy BMWi at the AiF under grant number 1929BG.

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1 Reinforcement of an aluminum collar flange using LMD.

2 Reinforced collar flange before forming.