# Investigation of Martensite-Transformation and Forming Properties of Additively Reinforced 22MnB5 Sheet Metals

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**Abstract.** Especially in crash relevant parts, local reinforcements of sheet metal parts can combine high crash performance and lightweight design. Patchwork blanks (PB) can be used to manufacture locally reinforced hot stampings. However, PBs have some disadvantages like corrosion in the gap between patch and base material or low formability of the joining zone and low shear strength at the spot welds. Additively generated local patches with metallurgical bonding to the substrate material are a promising alternative. The patches are generated by Laser Metal Deposition (LMD), where metal powder is melted together with the surface of the substrate to build a metallurgical bond. This new approach has already been tested with steel and aluminum alloys. For hot stamping of 22MnB5 steel, the hardenability of the additively manufactured material is of key importance. With quenching experiments, a similar hardening behavior of additively manufactured 22MnB5 compared to conventional sheet material can be shown. Based on this, a component with additive reinforcements was manufactured by hot stamping. For this purpose, rolled 22MnB5 sheets were locally reinforced by LMD and subsequently formed in a hot stamping process. The formability of locally reinforced sheets and the hardenability of the additively generated 22MnB5 patches are analyzed and compared with quenching experiments. Additionally, the hardenability and martensite/bainite transformation of additively generated 22MnB5 is investigated using dilatometer experiments and compared to conventional 22MnB5.