

Lightweight rollformed profiles

Development of novel lightweight rollformed profiles from flexible rolled Tailor Rolled Blanks (TRBs)

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Abstract

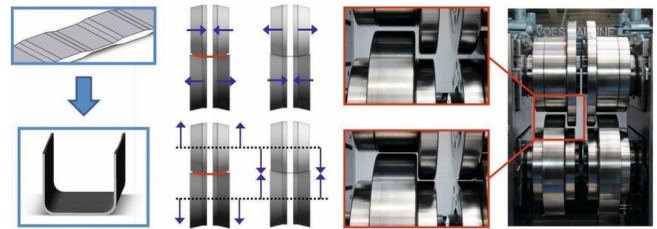
Innovative process chains which combine load-optimized semi-finished product production using roll forming promise major advances in the implementation of lightweight design strategies in the body and structural area. Load-optimized wall thickness distributions within the roll formed components allow great potential. To this end, this project investigated the development of new types of lightweight roll formed profiles, which are manufactured with the aid of a newly designed special framework, with regard to their forming concepts.

Project description

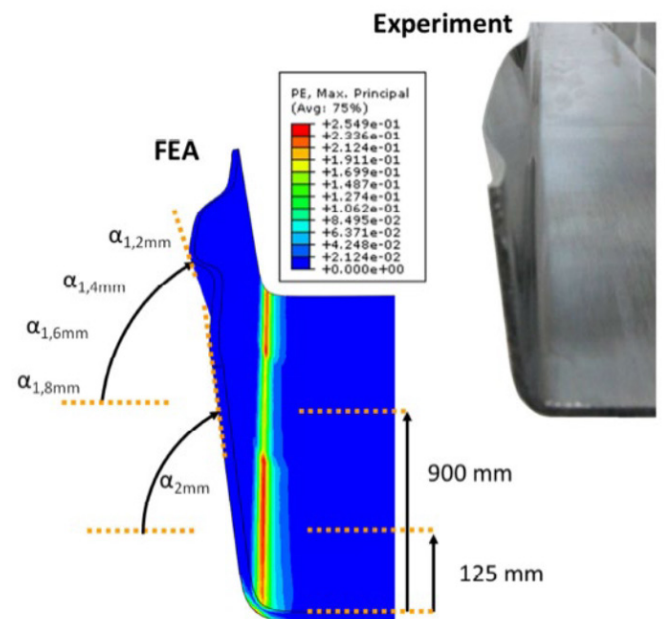
In this project, tailor rolled blanks - TRB for short -, which are sheets with a variable thickness profile in the rolling direction, were formed into bar-shaped structural components by the roll forming process. The investigations in roll forming of TRB were based on an analysis of the forming behaviour of the formed TRB and research in different tooling concepts. Finite element simulation was used to investigate both the properties of the forming-in process and different tooling concepts. The special framework designed and developed for the TRB has four overhung roller tools whose position is adjusted during the process depending on the sheet thickness (see Figure 1).

Results

The results achieved in this research project for the roll-formed production of new types of lightweight semi-finished products promise great progress in the economical production of load-optimized semi-finished products. At the same time, they require an adaptation of the known analytical design, a consistent consideration of the changed material conditions in the simulation and increased know-how in process control, which is illustrated by Fig. 2. With the process developed at PtU, profiles can be profiled in accordance with the tolerance specifications for profile width and bending radius from DIN EN 10162.



[1] Sheets with variable thickness in rolling direction (left) and TRB stand



[2] Representation of the typical defect pattern - strip edge ripple (numerical and experimental)

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