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Flexible Rolling of Aluminium Alloy Sheet – Process Optimization and Control of Materials Properties

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Abstract

Continuously increasing demands for consumption-optimized automotive concepts require steady development of weight-saving potentials. In the area of steel lightweight design, flexible rolling of tailor-rolled blanks, TRB, is a well-established technology applied worldwide in all automotive categories. In the future, with the current tendency towards an increased application of aluminium sheets in the car body and chassis, flexible rolling of aluminium will become more and more attractive.

In the present paper, the status of the process and materials development of Al-TRB is presented and the prospective of the future development is outlined. First, the possible development directions are addressed, followed by an outline of the process chain for the Al-TRB fabrication together with several application examples. Considering work-hardening AA 5xxx series and age-hardening AA 6xxx series alloys for automotive applications, lab-scale experiments have been conducted in order to elucidate the range of properties which can be realized through flexible rolling while maintaining reproducible constant materials properties according to specification. Large-scale trials were performed to demonstrate that the manufacturing of Al-TRBs is feasible, in that these alloys can be processed in industrial scale to provide homogeneous materials properties over the relevant thickness range for automotive applications.

Keywords: Flexible rolling; TRB; Al alloys; Automotive; Lightweight

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