

Statistical Investigations on Friction Stir Welded Aluminum Tailored Blanks for a Robust Process Window

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Keywords: aluminum, statistical, welding

Abstract. The multifarious applications of aluminum alloys in different industrial domains are based on the mechanical properties as well as the light weight characteristics, which allow energy saving for the products in use. Nevertheless aluminum alloys are considered to be difficult to weld by conventional welding processes.

This paper deals with cost-effective friction stir welding of thin sheet aluminum alloys in thicknesses of about 1 mm to widen the possible range of applications. Based on former studies results will be shown how an optimized tool geometry increases the mechanical properties of friction stir welded parts. The characteristics of these friction stir welded thin sheets will be analysed in a statistical evaluation in order to detect the interactions and dependencies of the process parameters. By highlighting the main process parameters and their significances a process window for friction stir welded blanks of AA5182 and AA6016 is presented.