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Improving Energy Efficiency in Friction Assisted Joining of metals and polymers

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Abstract

The influence of the clamping frame material in Friction Assisted Joining of polymer-metal sheets is investigated. An experimental campaign was conducted by varying the clamping frame material (steel and wood) and the heating time. The process was applied to join Al-Mg aluminum alloy and Polyvinyl Chloride sheets. Thermal analysis and energy measurements were conducted during the process. The morphology, fracture surface and strength of the joints were analyzed. The clamping frame made of wood enabled different advantages to be achieved, including reduction of the energy loss towards the clamping frame, faster heating of the materials being joined, and more uniform distribution of the temperature over the joining area, which resulted in increased mechanical strength. Under optimal conditions the joint efficiency approached 97%.

Keywords: Friction Assisted joining; direct-joining; joining; process efficiency; laser texturing; Thermal analysis; Energy analysis;

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