

Hot stamping of titanium alloys

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Demand for low density and high strength materials in the aviation sector has expanded greatly due to ambitious carbon emission and fuel consumption targets. In order to meet these targets, manufacturers have focused on weight reduction via the use of lightweight materials [1]. In the aerospace sector, high strength structural components are made from titanium alloys. However, the forming of complex-shaped components from titanium alloys is time, energy and cost intensive. One promising solution to overcome these difficulties proposed in the literature is using the hot stamping process to form complex-shaped components from sheet metal with cold dies, and rapidly quenching the workpiece in the dies simultaneously. The hot stamping process promises to reduce the tool wear commonly found in conventional hot forming processes and be an overall more efficient and economical process when compared to conventionally used isothermal hot forming techniques [2]. A novel hot stamping process for titanium alloys using cold forming tools and a hot blank was studied systematically in this work. A complex shaped wing stiffener panel component was successfully formed from TC4 titanium alloy, demonstrating the great potential of investigated technology in forming complex shaped titanium alloys components. Finally, Fast light Alloys Stamping Technology (FAST) is proposed for titanium alloys, where fast heating to a two-phase titanium alloy sheet with equiaxed microstructure is employed [3].

References

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