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Flow forming and heat-treatment of Inconel 718 cylinders

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Abstract

Flow forming is a metal processing technique that enables the fabrication of hollow axisymmetric parts with a good surface finish and high mechanical properties. Furthermore, the process enables flexible manufacturing of axisymmetric parts in one process step. In the last 20 years, the method has been significantly improved by CNC controls and stiffer constructions with advanced tooling. The technique seems very perspective from the viewpoint of the aviation industry due to its numerous advantages. The aim of the current study has been to analyze the mechanical properties of Inconel 718 after the flow forming process and heat treatment. Four hollow axisymmetric barrel shaped elements were manufactured using a SFC 800 V500 machine. The next step involved a standard aging heat treatment. That was followed by the materials being characterized for quality assessment. Mechanical tests and microstructure analysis were carried out before and after the heat treatment in order to achieve this. Additional profilometer scans were done to assess the surface finish of the obtained parts. The obtained material had