

## **SIMULATION OF FORMING, WELDING AND HEAT TREATMENT OF AN ALLOY 718 COMPONENT**

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Manufacturing of components in aero engines requires attention to residual stress and final shape of the product in order to meet high quality product standards which set very high demands on involved manufacturing steps. In this study a V-shaped leading edge of a vane made of Alloy718, which is a nickel based heat resistant material commonly used in aerospace components. The manufacturing process chain consists of forming, welding and heat treatment.

Initially a forming simulation is carried out to establish the V-shape geometry and resulting stresses and strains. Welding simulations where two V-formed parts are welded together, here two cases are studied. The full forming history is simulated and its residual state is taken as initial state for the subsequent simulations. The other model starts with the nominal geometry after forming as start of the simulation of welding and heat treatment. The differences in obtained final shapes and residual stresses for the two approaches are compared.

The results indicate a necessity of including all manufacturing process steps due to substantial residual stresses from the different process steps. The design process and decision making is further enhanced including this manufacturing process chain. Furthermore manufacturing uncertainties are avoided. This is also supported by [1], [2] and [3].

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