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DESIGN, MANUFACTURE, AND TESTING OF A SEAMLESS MORPHING CONCEPT FOR A SMART AIRCRAFT WINGTIP

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Summary: This study is focused on the mechanical properties of an adaptive elastomeric part, developed for potential application in smart wings. Elastomer precursor was used to manufacture a bonded, deformable part, which is used to close the variable gap between a moving part and a non-moving part of a wing section. The basic functionality of the part is to take up the geometric gap change and to turn it into strain. In this way, a smooth transition between the connected surfaces can be obtained. An elastomeric material, which was optimized for the specific application, was investigated. The tests involve static loads, fatigue loads, and physical aging in the temperature range from -55°C to $+80^{\circ}\text{C}$. A constitutive material model was developed and subsequently used in order to predict the properties of the adaptive part. Finally, a prototype of the part was manufactured and tested.

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