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Effect of Cut-Out Shape on the Stresses in Aircraft Wing Ribs under Aerodynamic Load

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Abstract

Ribs in aircraft wings maintain the airfoil shape of the wing under aerodynamic loads and also support the resulting bending and shear loads that act on the wing . Aircrafts are designed for least weight and hence the wings are made of hollow torsion box and the ribs are designed with cut-outs to reduce the weight of the aircraft structure. These cut-outs on the ribs will lead to higher stresses and stress concentration that can lead to failure of the aircraft structures. The stresses depend on the shape of the cut-outs in the ribs and thus in the present work, the commercial software ANSYS was used to evaluate the stresses on the ribs with different shapes of cut-outs. Four different shapes of cut-out were considered to study the effect of cut-out shape on the stresses in the ribs . It was found that the best shape for the cut-outs on the ribs of wings to reduce weight is elliptical.

Author keywords

ANSYS; Cut-outs; Simulation; Stress Analysis; Wing ribs

Metrics

Structural optimization of a light aircraft composite wing

Aung, P.W. , Tatarnikov, O. , Aung, N.L.
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