

**A GRADIENT-BASED STRATEGY FOR THE OPTIMIZATION OF STIFFENED COMPOSITE STRUCTURES
SUBJECT TO MULTIPLE LOAD CASES AND MULTIPLE FAILURE CRITERIA**

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Abstract: This work aims at investigating the applicability of the level-set based thickness optimization method, earlier proposed by the authors, to a realistic structure. The design has to have sufficient stiffness and strength while the structural mass is minimized. The concerned composite structure is subjected to multiple load cases. The proposed method guarantees the fulfillment of the design guidelines, namely symmetry, covering ply, disorientation, percentage rule, balance, and contiguity of the layup. The stiffeners divide a composite structure into several smaller panels. The manufacturability of a resulting design is guaranteed as plies are continuous among adjacent panels (the design is blended). The proposed method is successfully applied to the mass minimization problem of the stiffened top and bottom skin of a wing torsion box. The structure, subject to two load cases, is optimized where local buckling and allowable strain are the constraints of the problem.