

**ODYSSEY: A STRUCTURAL SIZING OPTIMIZATION  
PROGRAM USING NASTRAN**

**By**

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**ABSTRACT**

The development of design sensitivity analysis in MSC/NASTRAN has allowed the implementation of efficient structural optimization programs which use MSC/NASTRAN as the analysis capability. The ODYSSEY (Optimum Dynamic and Static Structural Efficient Systems) program will find a minimum mass structure subject to constraints on stress, displacements, and frequencies. ODYSSEY has been developed from the standpoint of providing the engineer with a tool to build a design model of the proposed structure. A design element library has been created which includes several common beam cross sections where the design variables are associated with physical section dimensions. Appropriate intermediate variables are internally established to create high quality approximations for the optimization steps. A multiple boundary condition, multiple load condition format has been developed using DMAP alters which allows any combination of static, inertia relief and eigenvalue analysis to be run simultaneously. NASTRAN case control input streams are automatically generated from a simplified design model input which is needed to link the analysis types with the constraint information. The RIM relational data base program is used to interface the various modules which make the optimization data easily available for post processing. Several example problems are used to illustrate the capabilities of the program.