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Heavy-Gage Bonded Honeycomb Sandwich as Primary Load-Bearing Structure

An extensive program was conducted to determine the technical feasibility of developing heavy-gage bonded honeycomb sandwich for use as a primary load-bearing structural material in large-diameter boosters. The program included (1) theoretical investigations based on "small deflection theory" to formulate and develop an analytical approach for prediction of stress fields and buckling loads and (2) structural testing. The main attraction of heavy sandwich lies in the potential weight savings for compression load-critical components.

Emphasis was placed on shear lag, sandwich and cylinder behavior, and bonded joints. Analytical and experimental evaluations were made of the effects of initial imperfections on the face wrinkling characteristics of heavy-gage sandwich. Sufficient experimental data were obtained from various types of bonded overlap joints to indicate that tensile and compressive tests of identical double-overlap joints yield significantly different results. A digital computer

procedure which uses a stiffness matrix approach to the stress and buckling analysis was developed. This procedure uses the internal loads distribution and the structural geometry to develop a correction to the stiffness matrix.

Note:

Inquiries concerning this investigation may be directed to:

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Patent status:

No patent action is contemplated by NASA.

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