NASA TECH BRIEF

Development of Lightweight Cryogenic Tank Supports

A low-heat-leak, conical support for a liquid hydrogen tank has been designed and constructed. First, several materials and structural concepts were evaluated for optimal weight and thermal properties. Fiberglass honeycomb construction was determined to be the most efficient when the weight of both the support and the liquid hydrogen boil-off were considered.

Second, a 117-in.-diameter fiberglass honeycomb conical support with integral, tapered-laminate edge members was fabricated for a 105-in. liquid hydrogen tank.

Several manufacturing problems were resolved. Collapse of the low-density core was avoided by careful processing. Core edge pieces were split and bonded together to add rigidity. Inner skins and end buildups were laminated in one operation. The core was bonded to this assembly in another step, permitting reduced core bonding pressure.

When the quarter-segment assemblies were removed from the mold, some residual stress was shown by reduction in curvature. However, the assemblies could be restored to the contour of the mold with only a nominal bending stress incurred. Upper and lower corners of adjacent segments matched reasonably well when the support was assembled.

Note:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific and Technical Information
Springfield, Virginia 22151
Single document price $3.00
(or microfiche $0.65)

Reference:
NASA-CR-61309 (N70-11342), Design and Development of Techniques for Fabrication of Cryogenic Tank Support Structures for Long Term Storage in Space Flights

Patent status:

No patent action is contemplated by NASA.

Source: D. H. Barlett and J. C. McGinnis of
The Boeing Company
under contract to
Marshall Space Flight Center
(MFS-20726)

Category 07