# NASA TECH BRIEF

Lyndon B. Johnson Space Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

# Suspension System for Lightweight Cryogenic Tank

# The problem:

Conventional suspension systems used to support spherical cryogenic tanks are not suitable when weight is an important factor. The cryogenic tanks are normally suspended from thick rings that form an integral part of the tank structure. These rings add extra weight to the system.

# The solution:

A new tank-suspension system accepts lighter tanks built without the support rings.

#### How it's done:

The suspension system, shown in Figure 1, is made from three interwoven fiberglass bands that encircle the tank surface in a basket-weave configuration. The bands are made slightly larger than the tank diameter to allow for slight size variations in the spherical structure. Each band intersects the vertical tank axis at 30°, and a band intersects the equator (support) ring every  $60^{\circ}$ . The bands are connected to the support ring by tangential extensions that are part of the fiberglass structure.



Figure 1. General Arrangement of the Suspension System

This document was prepared under the sponsorship of the National Aeronautics and Space Administration. Neither the United States Government nor any person acting on behalf of the United States Government assumes any liability resulting from the use of the information contained in this document, or warrants that such use will be free from privately owned rights.



Figure 2. Section Through One Band

#### Note:

As shown in Figure 2, each band is tightened onto the tank surface by using four insulation pads. The pads are made from fiberglass and aluminum and are inserted between the bands and the tank surface. A shroud or a vacuum jacket surrounds the entire structure, insulating the tank from external heat. The entire assembly is held by the support ring which rests on four vertical legs (not shown).

The system has several features:

- a. One material (fiberglass) is used for the suspension.
- b. No machinery is required to fabricate the suspension system.
- c. The fiberglass support is lightweight with low thermal conductivity.
- d. A simple lightweight spherical tank is used.
- e. Very little tooling is needed to manufacture and assemble the entire system.

### D

Requests for further information may be directed to:

Technology Utilization Officer Johnson Space Center Code AT3 Houston, Texas 77058 Reference: TSP75-10270

# Patent status:

NASA has decided not to apply for a patent.

Source: J. Lester and D. A. Wendling of Beech Aircraft Corp. (MSC-14080)

Categories: 06 (Mechanics) 03 (Physical Sciences) 08 (Fabrication Technology)

