NASA TECH BRIEF

Lyndon B. Johnson Space Center

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°. The bands are connected to the support ring by tangential extensions that are part of the fiberglass structure.

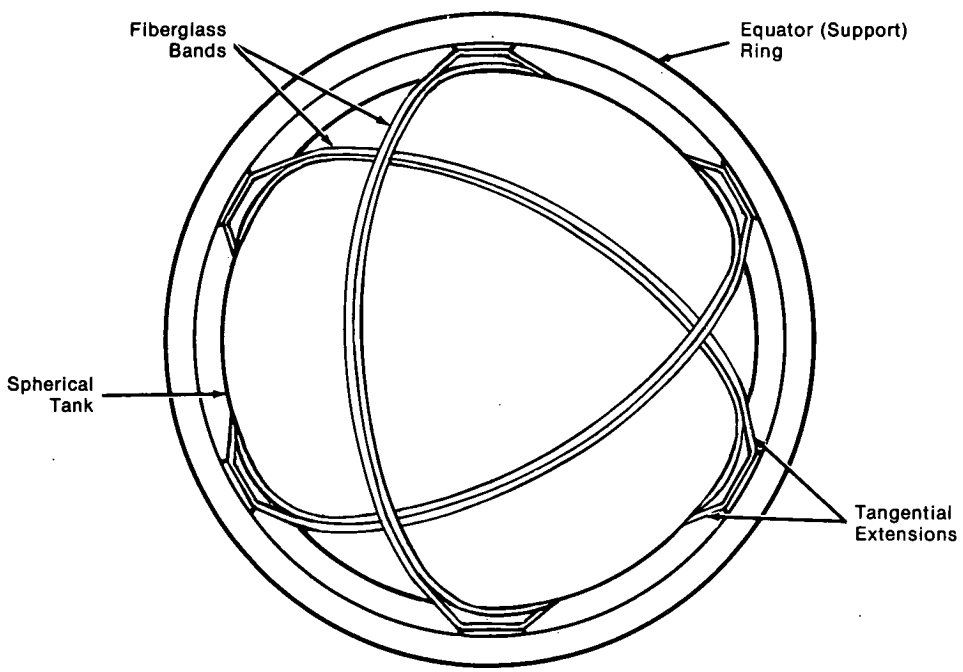

Figure 1. General Arrangement of the Suspension System

(continued overleaf)

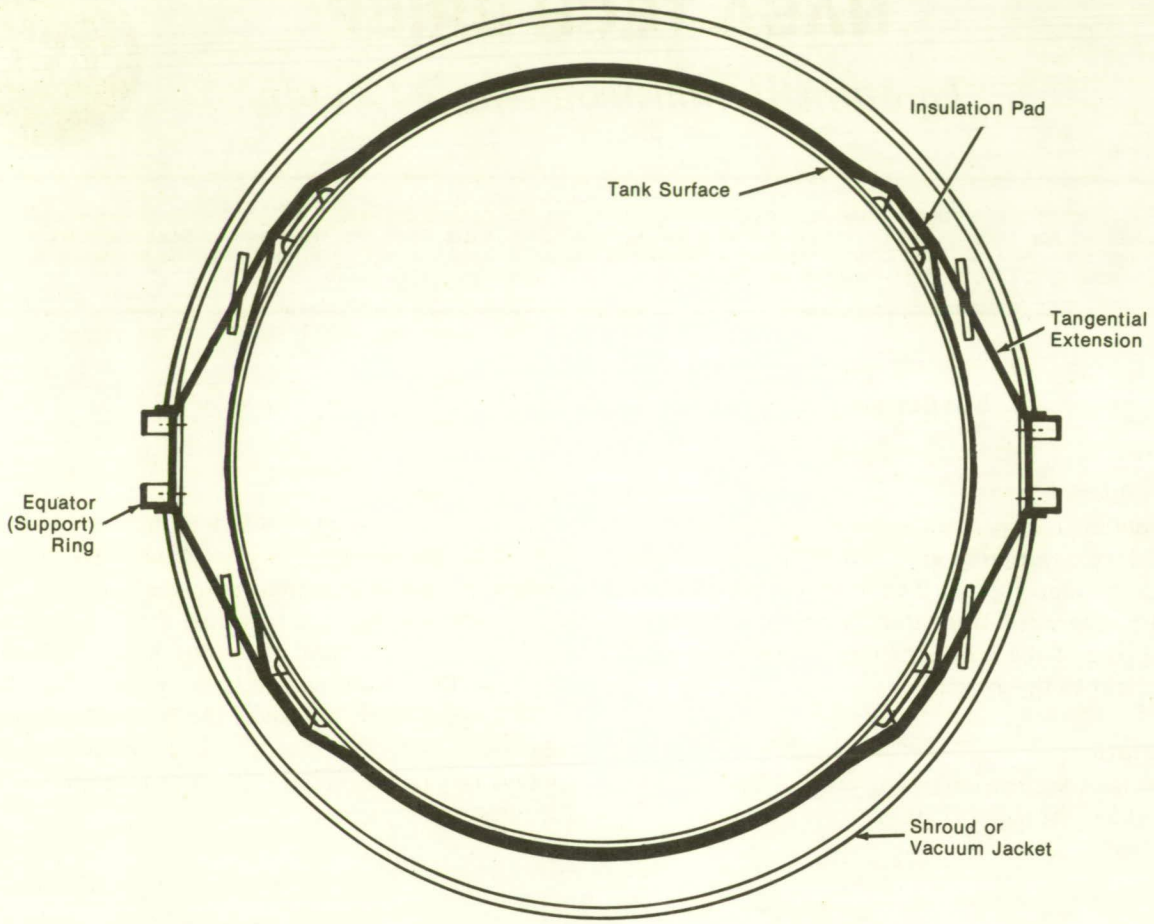

Figure 2. Section Through One Band

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.

Note:

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)