

NASA TECH BRIEF



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Nonwoven Glass Fiber Mat Reinforces Polyurethane Adhesive

The problem:

To prevent degradation of the adhesive properties of a polyurethane adhesive used to fasten hardware (such as aluminum clips for electrical conduits) to the exterior surfaces of large aluminum tanks for liquid oxygen or liquid hydrogen.

The solution:

A commercially available, lightweight, nonwoven glass fiber mat is embedded in the bond line of the uncured polyurethane adhesive applied to the tank wall. The uncured (viscous) adhesive wets all of the filaments of the nonwoven mat and provides an adhesive surface for attachment of the desired hardware component. The adhesive is then cured, using a catalytic promoter.

The nonwoven glass fiber mat ensures good control of the bond line and imparts increased peel strength to the adhesive. The combination also has a lower coefficient of linear expansion (closer to that of the aluminum adherend). Typical peel strengths in pounds per inch width of the polyurethane adhesive with and without the nonwoven glass fiber mat over a range of temperatures are tabulated below:

Temperature, °F	-320	-100	0	75	180
Adhesive with mat	97.3	145.0	118.8	61.9	38.7
Adhesive without mat	77.6	35.9	51.7	27.7	21.4

Notes:

1. Mats woven of multiple filaments are not effective as reinforcements because they do not become completely wet when placed in contact with the uncured polyurethane adhesive.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B67-10113

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Luther M. Roseland
of Douglas Aircraft Co.
under contract to
Marshall Space Flight Center
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