

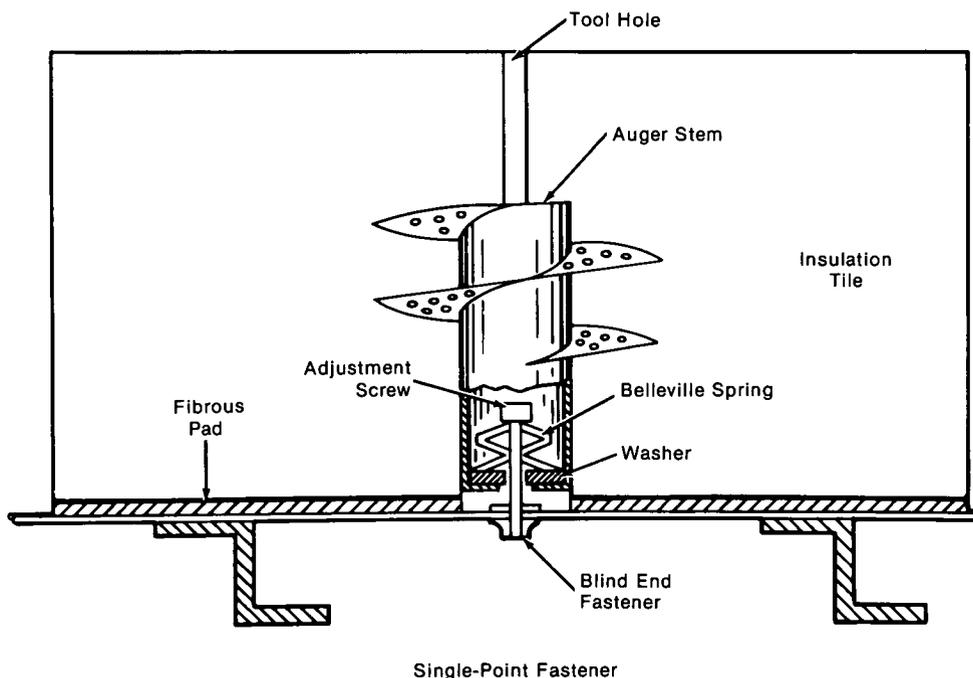
NASA TECH BRIEF

Lyndon B. Johnson Space Center



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New Insulation Attachment Method Eliminates Compatibility Bondline Stresses



Single-Point Fastener

The problem:

Adhesive bonding, rather than rivets or similar fasteners, is frequently used to mount insulation or other low-shear-strength materials. However, if adhesive bonding is used and the system is subjected to thermal and/or mechanical stresses, bond separation in the insulation may occur.

The solution:

An auger-shaped single-point fastener was developed to attach rigid surface insulation tiles to the orbiter shuttle spacecraft. This same method can be used in industry to bond a wide variety of materials, including insulation, elastomers, and fibrous materials.

How it's done:

The auger attachment fixture is shown in the illustration. Since the insulation is attached at only one point, the insulation and the structure are free to form without inducing bond separation, as might occur with adhesive bonding. The auger has a large shear and a large bearing area; thus, it may be used with relatively low-strength materials which could not be suitably attached by other means.

An attachment screw is fitted in the hollow stem of the auger. The screw is held in place by Belleville springs and an insulating washer. To mount an insulation tile, two holes are first drilled in it. One, the diameter of the auger stem, serves as a recess for the auger, and the second is a smaller-diameter tool hole.

(continued overleaf)

The auger is screwed into the insulation with a special tool that is secured by the attachment screw. After the auger is screwed into the tile, the tool may be removed by loosening the attachment screw via the tool hole. An attachment hole is then drilled in the surface of the structure to which the tile is to be attached.

A fibrous pad is placed over the surface of the structure and the tile is installed by inserting the adjusting screw through the hole in the surface of the structure. A blind end fastener is used to secure the tile. The auger is then tightened with the adjustment screw.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Johnson Space Center
Code AT3
Houston, Texas 77058
Reference: TSP74-10269

Patent status:

This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

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Johnson Space Center
Code AM
Houston, Texas 77058

Source: W. C. Schneider
Johnson Space Center
(MSC-12615)