NASA TECH BRIEF

Improved Method Facilitates Debulking and Curing of Phenolic Impregnated Asbestos

The problem:

To devise an improved method to debulk and cure phenolic impregnated asbestos wrapped parts under controlled pressures, heat, and atmosphere. Prior art consisted of placing the asbestos wrapped workpiece in a hermetically sealed bag and subjecting it to simultaneous internal vacuum and external compression while undergoing specific heat cycles in an autoclave. Any failure of the hermetic seal or mechanical pump vacuum or pressure during the long cure and debulking cycle required complete removal of the asbestos tape by machining and then retaping before preparing for the autoclave again. These failures sometimes caused complete loss of the part.

The solution:

Cover the workpiece with asbestos tape, wrap the asbestos tape area with a specified thickness of nylon yarn under tension, and cure the workpiece in a standard oven.

How it's done:

The workpiece is prepared by covering it with phenolic impregnated asbestos tape and then wrapping the taped areas with nylon yarn. The thickness, number of layers, and wrapping tension of the nylon yarn must be calculated so that the cured asbestos will exhibit properties similar to the material cured in the autoclave. The prepared workpiece is then placed in a standard oven and cured while under specific heat cycles. The heat causes the nylon yarn to shrink, providing a predetermined pressure on the workpiece during the curing cycle. This method has shortened the curing time by 1 1/2 hours.

Notes:

1. This improved method has been successfully used in the fabrication of ablative chambers for the Gemini and Apollo attitude control engines.
2. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas 77058
   Reference: B66-10459

Patent status:

No patent action is contemplated by NASA.

Source: P. Gaines
of North American Aviation, Inc.,
under contract to
Manned Spacecraft Center
(MSC-949)

Category 05