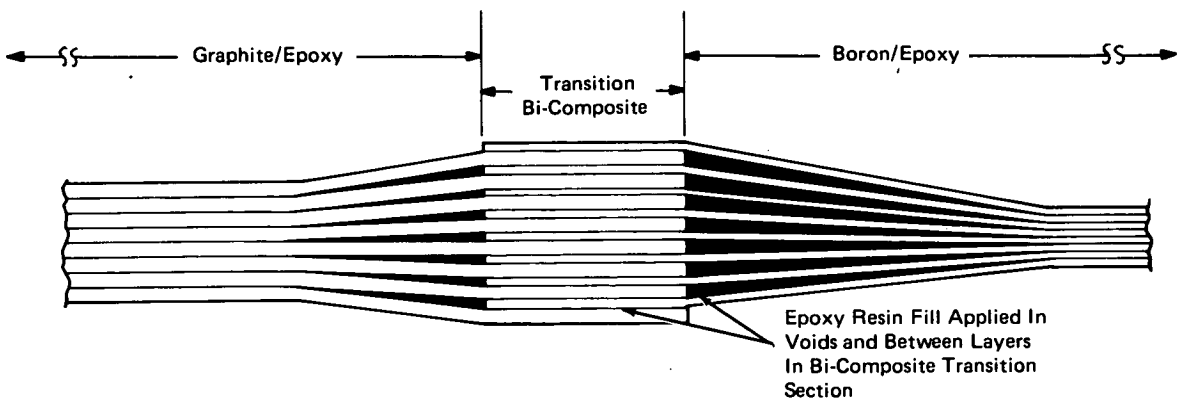
NASA TECH BRIEF

Marshall Space Flight Center

A New Concept for Joining Dissimilar Composites



Bi-Composite Joint

The problem:

Various parts of a structure fabricated from composite materials may have different uses or be subject to different stresses. If the structure is made from a combination of different composites, the best composite, chosen for its properties and for economy, may be used for each part of the structure. However, there has been no suitable way of joining unlike composites without introducing weaknesses or increasing the weight of the structure.

The solution:

A new method of joining different laminated composites without mechanical fasteners has been proposed. Structures of more than one kind of composite may be formed by interleaving the plies of one composite with the plies of another. In this way, the properties of each composite may be tailored to the requirements of a given structure.

How it's done:

This bi-composite joint serves as an interface between two dissimilar materials. Composites are normally fabricated by means of a tape layup in which plies of the materials are stacked in a definite orientation to provide the desired mechanical properties. A bi-composite joint is made by interleaving the plies of one composite with the plies of another. The method is illustrated in the figure.

The interleaving forms a transition area between the composites. Voids in this area are filled in with epoxy resin to form a strong, smooth transition between the two materials.

There are several advantages to this method:

1. Lower cost laminates can be used in parts of the structure where more expensive composites are not necessary.
2. More flexible fibers can be used where a structure has intricate contours.
3. Properties can be tailored to the structure. For instance, a low thermal conductivity composite may be used where heat insulation is required, and a high, thermal conducting fiber where heat conduction is desired.
4. Virtually any combination of composite materials can be joined.

(continued overleaf)

Notes:

No further information is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Code A&PS-TU
Marshall Space Flight Center, Alabama 35812
Reference: B73-10148

Patent status:

NASA has decided not to apply for a patent.

Source: K. C. Dullea and
J. A. Evangelista of
Rockwell International Corp.
under contract to
Marshall Space Flight Center
(MFS-24307)