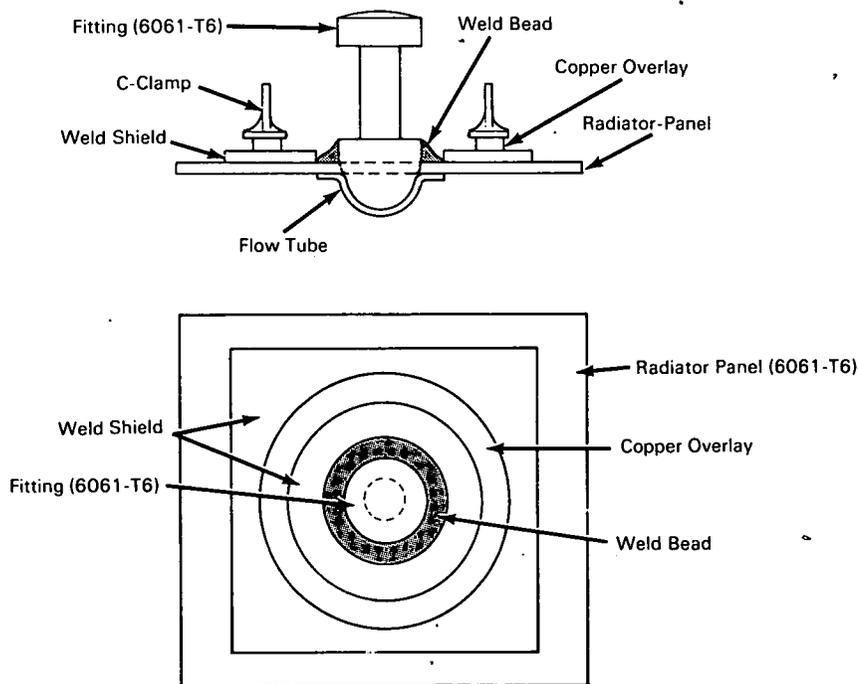


NASA TECH BRIEF



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Mechanical Shielding Reduces Weld Surface Cracking in 6061 T6 Aluminum



The problem:

In welding 6061-T6 aluminum pieces with high frequency ac tungsten arc equipment, a common fault has been heat check cracks occurring in the heat-affected zone of the parent metal about the weld puddle. This causes weld rejection by inspection and subsequent rework by production facilities, all of which is quite costly.

The solution:

A mechanical shield of high melting point material, held in place about the weld bead area, protects

the parent metal from the effects of the arc, thus eliminating heat check cracks.

How it's done:

The shielding material, of proper thickness to handle the anticipated heat load, is center drilled with an aperture sufficient to cover the weld bead while shielding the parent metal about it. A copper overlay with a somewhat larger center aperture is placed over the shield and the assembled components are held in place by conventional metal C-clamps.

(continued overleaf)

Notes:

1. Use of a 0.020-inch tungsten plate eliminated, almost completely, heat check cracking around the periphery of the weld bead. However, to overcome inherent problems associated with the properties of tungsten, other metals and ceramics with a melting point higher than 4500° F were evaluated as shields. Results of these investigations reveal that Columbium #752, one of the metals tested, effectively eliminated heat cracking around the weld area, while exhibiting excellent properties as a shielding material. Etching and dye-penetrant inspection indicated no cracking around the weld area when this shielding technique was used.

2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B68-10022

Patent status:

No patent action is contemplated by NASA.

Source: Jesse E. Hill
of North American Aviation, Inc.
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