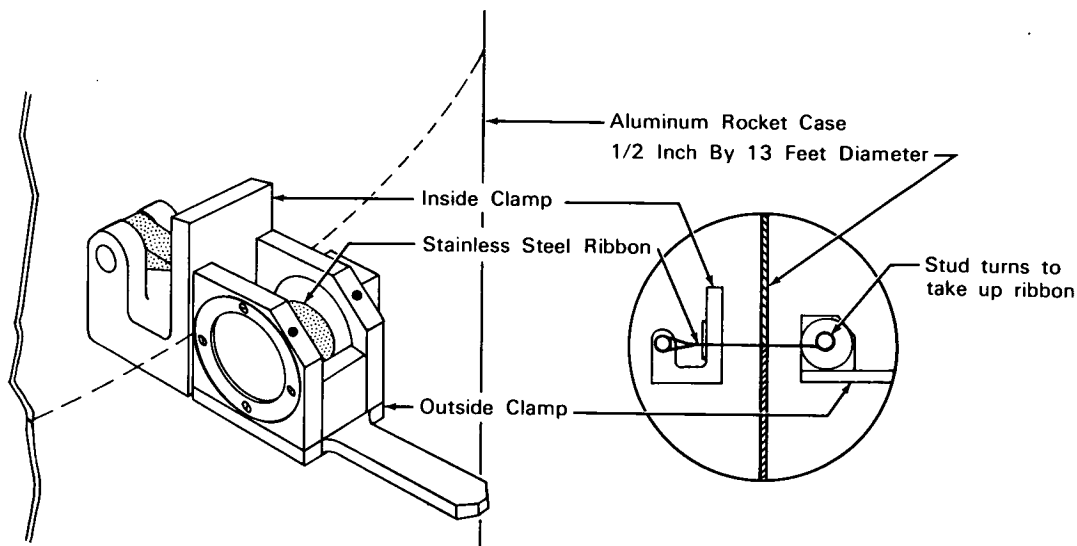


# NASA TECH BRIEF



This NASA Technical Brief is issued by the Office of Technology Utilization to acquaint industry with the technical content of an innovation derived from the NASA space program.

## Novel Clamps Align Large Rocket Cases, Eliminate Back-Up Bars



**The problem:** Proper alignment, without the use of back-up bars, of large aluminum rocket cases during tungsten inert-gas welding.

**The solution:** Novel welding clamps are fabricated and used in pairs, one on the inside of the rocket case and the other on the outside. Clamps are two metal blocks connected by a 0.005-inch thick stainless steel band, one inch wide. A pin in the inside clamp holds the band and there is a take-up spool in the outside clamp.

**How it's done:** Prior to welding, 0.015-inch slots are cut in the top edge of the bottom cylinder or case on six-inch centers. One case section is then stacked on the other. The stainless steel band is attached to

the inside clamp, passed through the slot and on to the take-up spool of the outside clamp. Turning the take-up spool brings the edges of the two cylinders into proper alignment. Clamps are released about six inches in front of the weld during welding.

A circumferential, two-pass weld can be made with these clamps on 160-inch diameter, 1/2-inch thick 2219/T87 aluminum. Offset after welding was generally 1/32-inch maximum, except for longitudinal welds. Longitudinal welds were offset from 3/32 to 1/8-inch. Back-up bars are completely eliminated. Joint geometry was a double-vee joint, 45 degrees on one side, 20 degrees on the other side and with a 1/8-inch root face.

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**Note:**

Since back-up bars are not needed, these tools should lower the cost of this type of welding. They are designed for the manufacture of the Saturn C-5 Booster Stage S-1C but would prove useful in the welding of other large, curved metal structures.

**Patent status:** NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA Headquarters, Washington, D.C., 20546.

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