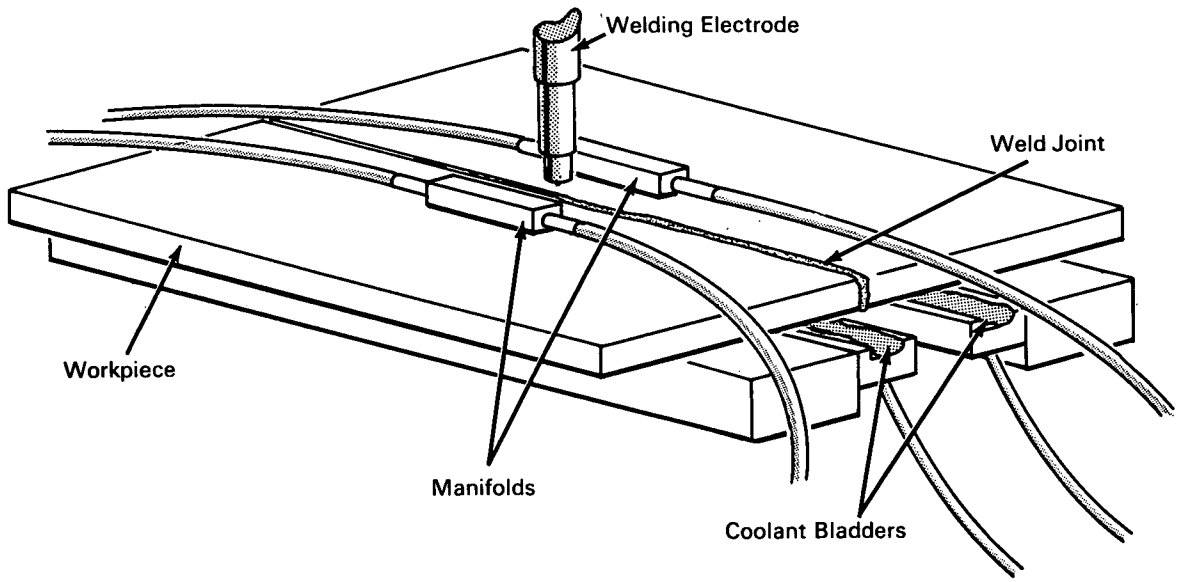
NASA TECH BRIEF

Welds Chilled by Liquid Coolant Manifold



The problem:

To provide uniform cooling to material adjacent to weld areas on long or contoured butt welds. Metal backup bars and holddown fingers normally used provide only intermittent metal-to-metal contact along the weld length, resulting in nonuniform weld bead contour and lack of weld joint penetration. Additionally, metal tooling for contoured weldment surfaces is quite expensive.

The solution:

A liquid coolant chill tool that provides uniform coolant contact along the weld length for both flat and contoured material. The tool incorporates a manifold that clamps to each side of the weld joint by vacuum and circulates liquid in direct contact with the material adjacent to the joint.

How it's done:

The manifold is made from a long bar of metal for flat welds, and from a long piece of semirigid material for contoured weld surfaces. A cavity is cut into the manifold surface the length of the weld, and a shallow channel is cut around the perimeter of the cavity for the insertion of a flexible tubular coolant seal. A vacuum plate is attached to the manifold. A tubular fitting is led into the cavity and a water hose is connected to the fitting.

(continued overleaf)

One manifold is placed on each side of the weld joint. The vacuum plates are activated to force the manifolds and their seals securely against the material. Water is then introduced into the cavities through the fittings to provide coolant contact along the weld length.

Notes:

1. The manifolds may be connected in series for long weld joint lengths and can be fabricated for any configuration of weld joint likely to be encountered in production welding.
2. Four manifolds may be used on a single weld job: two on the upper surface and two on the lower.
3. An alternate method incorporates a steel channel or flexible channel member placed along each side of the weld with a thin-walled coolant bladder contained within the channel. Water under pressure is circulated through the bladder, absorbing weld heat through the bladder wall.
4. Conventional metal tooling may be used with the manifold or bladder.
5. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B66-10354

Patent status:

No patent action is contemplated by NASA.

Source: E. E. Whiffen and M. E. O'Dor
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