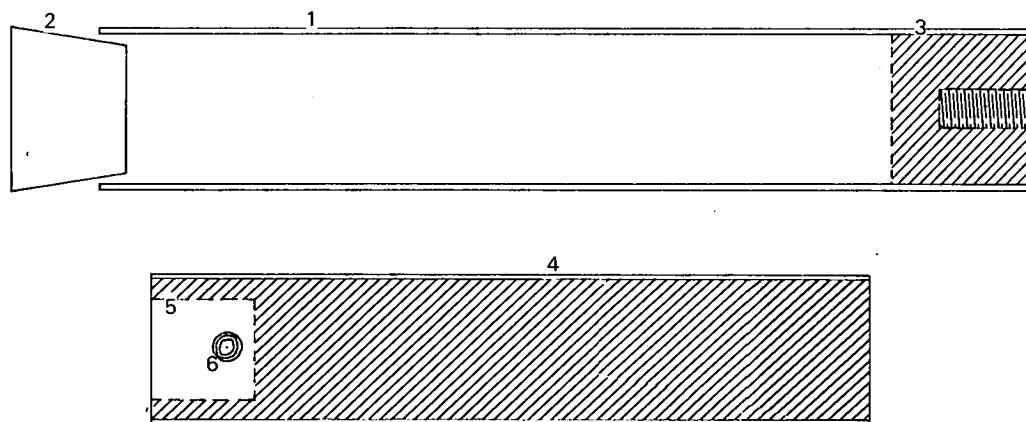


NASA TECH BRIEF



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X-Ray Film Holder Permits Single Continuous Picture of Tubing Joint



A technique has been developed, for X-raying welded and brazed tubing joints, which produces a clear continuous picture of each joint on a single film with one exposure. Conventional techniques require multiple films and exposures to obtain a clear and complete picture of a single joint.

This technique employs a stationary X-ray source located in the plane of the joint to be inspected, a means of rotating the tube, and a unique internal film holder and positioning fixture.

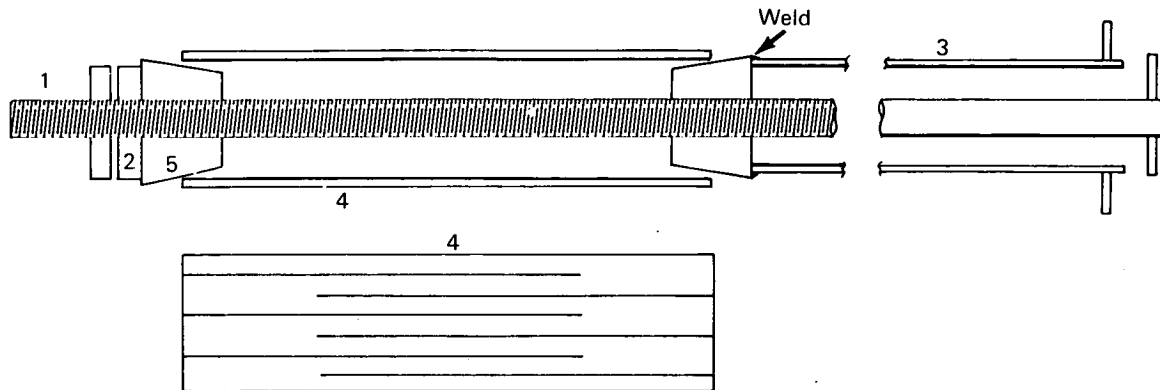
The film holder, shown above, consists essentially of two concentric aluminum tubes (1) and (4). The outer tube (1) has a removable rubber plug (2) at one end, and a drilled and tapped aluminum plug (3) at the other end. The inner tube (4) is filled with lead and drilled and tapped (5 and 6) for attachment of a pulling tool. The inner surface of the outer tube (1) and the outer surface of the inner tube (4) are polished. The X-ray film in a protective plastic envelope is wrapped around the inner tube in a darkroom. This tube and film are then inserted into the outer tube,

and the outer tube plugged to protect the film from light.

The positioning fixture, shown overleaf, consists of a threaded rod (1) to which the film holder can be attached, plus an expandable tube. The expandable tube consists of a slotted tube (4) and two tapered plugs (5). One tapered plug is locked in position by two nuts (2) and the other is welded to a pipe handle (3). By holding the threaded rod stationary and rotating the pipe handle, the tapered plugs are forced together and the slotted tube expanded.

In operation, the loaded film holder is attached to the positioning fixture at (1), (illustration overleaf), and inserted into the tubing until it is located at the joint to be inspected. The expandable tube on the positioning fixture is expanded to lock the film holder in place longitudinally and radially, and to insure that it will rotate with the tube without slipping or wobbling. This insures a sharp picture. The X-ray source is activated and the tubing rotated one complete revolution. When the exposure is completed, the

(continued overleaf)



apparatus is withdrawn and the film removed and processed.

Notes:

1. A lead shield with a 0.020-inch slit was placed in front of the X-ray source to focus the X-rays on the joint.
2. The technique has been used to inspect 5/8-inch tubing. The apparatus can be made in sizes and of materials appropriate to a variety of other inspection situations and is also adaptable to inspection of other configurations of welded, forged, or cast workpieces. It would also seem to be applicable to medical X-rays.
3. A means of rotating the X-ray source around the exterior of the tube joint could be used instead of rotating the tube, where this would be advantageous.

4. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
 Lewis Research Center
 21000 Brookpark Road
 Cleveland, Ohio 44135
 Reference: B68-10343

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: John W. Diamond, Vernon Hunt,
 and Charles Mikesell
 of Aerojet General Corporation
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 Lewis Research Center
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