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ALIGNMENT TOOL AIDS
IN
LARGE TANK FABRICATION

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Development of a two-piece mechanical alignment tool has solved a major problem for welding large, unusual contoured skin sections. Massive mechanical, pneumatic, or hydraulically-operated devices are no longer required for effective tank wall alignment.

The tool, a manually attached device, can be positioned along the weld line at any interval dictated by the material thickness or rigidity of the parent metals.

A one-inch wide (.005 inch thick) steel band connects the two aligning members of the tool. This steel band will serve as the medium by which the workpieces will be brought into alignment. The steel band is firmly secured to the clamp (with shearing mechanism), passed between the two workpieces at the weld line and attached to the takeup spool. This slotted spool attached to a takeup block, is used to remove the slack in the steel band. A shaft to which the takeup block is attached is used to apply sufficient force to align the workpieces. The steel band is secured to the clamp by threading it over and under two dowels in such a manner that when pressure from the spool is applied, the friction of the band itself will hold it firmly in place on the dowels.

A single thickness of the band will withstand a pull of 850 pounds and a double thickness will withstand approximately 1500 pounds. In order to realize proper tension on the band, a torque wrench is used. A detachable

adapter, which serves as the attaching point for the torque wrench, is mounted on the clamping lever.

Attaching the alignment tool to the workpieces can be accomplished more easily when two operators are used. One operator threads the steel band onto the dowels on the clamp to secure it. He then positions the clamp while passing the band between the workpieces. The operator on the opposite side of the workpiece receives the band, feeds the band into the slotted takeup spool, and turns the takeup spool until the two clamping members are brought into contact with the workpiece surfaces. Necessary power to force the workpieces into proper alignment is then applied through operating the clamping lever. An arm member or handle, designed in the clamp, serves as an instrument of instant disengagement. When this arm is depressed, it will actuate a shearing mechanism within the clamp, thereby cutting the steel band and releasing the entire tool from the workpiece. During the welding operation it is essential that the alignment tool be disengaged just ahead of the welder to eliminate interference with the seam tracking device.

In fabricating the large diameter tanks for the Saturn V Booster, horizontal, vertical, and circumferential welds must be performed on materials of varying thicknesses and contours. Since this tool applies its aligning force in a localized area and can be attached to the workpieces anywhere required, its application and use is not dictated by any size or contour. This tool is also used during welding of outlet fittings where large or bulky hold-down devices would make it virtually inaccessible for the welder to perform.

This alignment tool was designed by Mr. W. J. Franklin, Chief of Structures Engineering Branch, and Mr. N. C. Martin, Chief of Tool Engineering Section. These two organizations are part of the Manufacturing Engineering Division at NASA's George C. Marshall Space Flight Center, Huntsville, Alabama.

Clamping Tool

Aligns Odd-Shaped Sections for Welding

Margaret A. Maas, Southeastern Editor

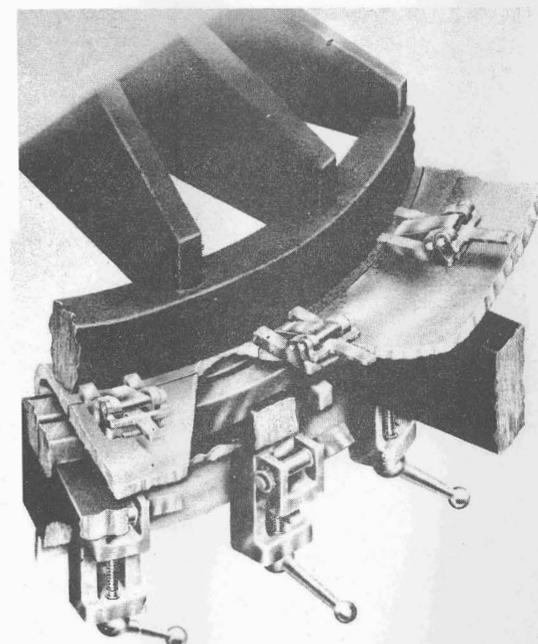
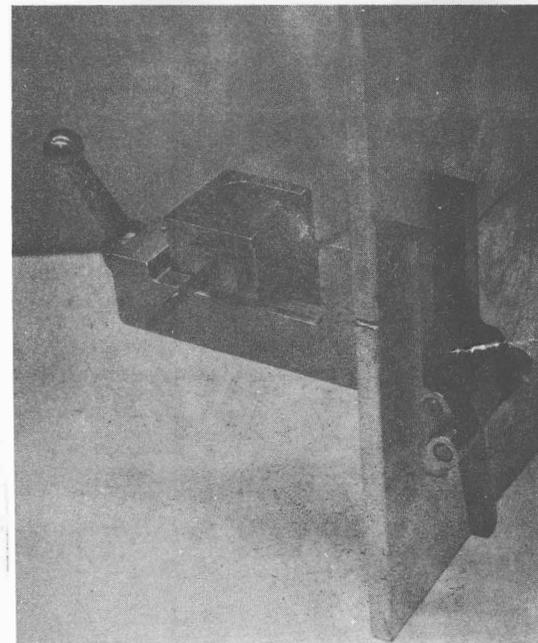
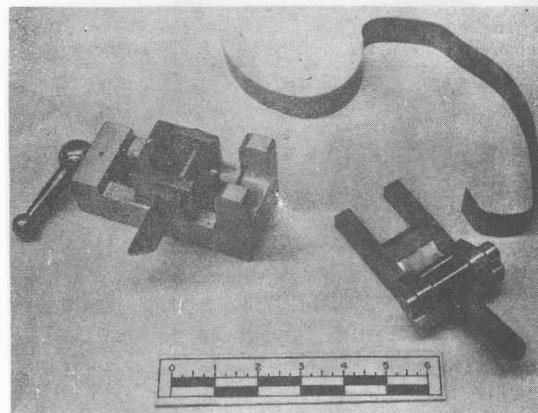
Alignment of large and unusually contoured sections for welding purposes can be achieved by a two-piece, manually operated tool.

The tool is a clamping device connected by a 1-inch-wide (0.005-inch-thick) steel band. The steel band is threaded over and under two dowels in such a manner that when tension is applied to the band, the friction of the band itself holds it in place. The band is passed between the sections being clamped and fed into a slotted takeup spool, which is turned until the two clamping members contact the work-

ing surfaces. A torque wrench used on a shaft mounted to the takeup spool block applies sufficient force to align the piece.

A single band will withstand a pull of 850 lb and a double-thickness band, 1500 lb. Band is sheared just ahead of welder by depressing a shear arm designed into the clamp.

The alignment tool was designed by W. J. Franklin and N. C. Martin of NASA's George C. Marshall Space Flight Center, Huntsville, Ala.



CLAMPING TOOL aligns outlet fitting for welding.

