January 1975 B74-10273

NASA TECH BRIEF

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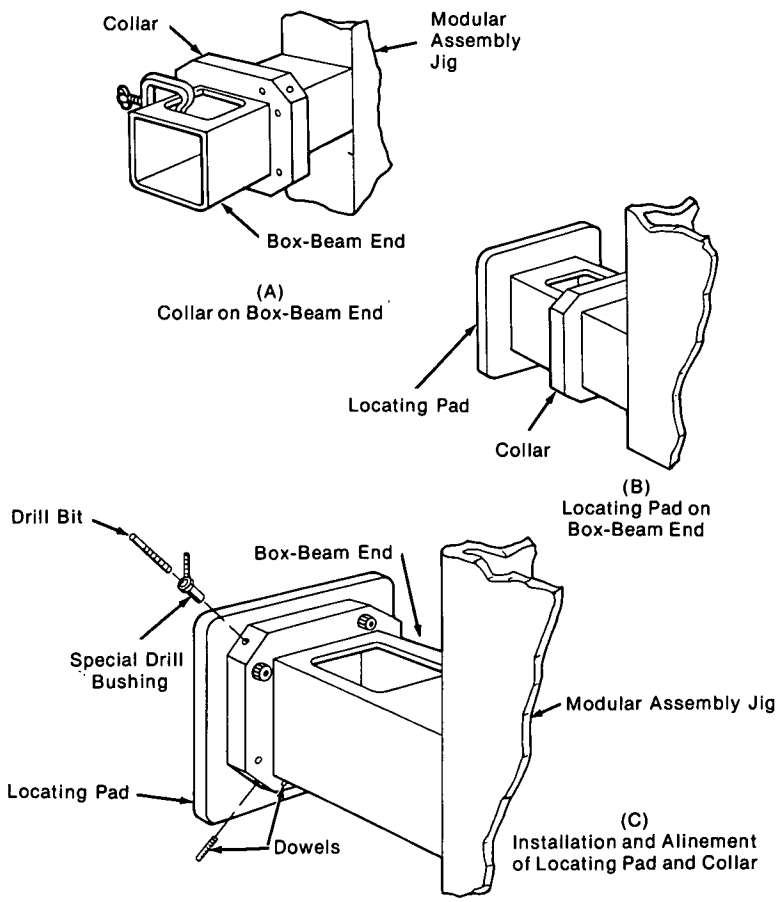
Flange Design for Large-Scale Modular Assembly Jigs

The problem:

In previous large-scale modular assembly jigs, the mounting and interconnecting flanges have been attached by welding. Such all-welded structures have the usual disadvantages associated with welding, e.g., the lack of accurate dimensioning, coplanarity, and parallelism. Thus during the assembly of such modules special alinement of the flanged joints is necessary.

The solution:

A new technique incorporates a weld-free method for securing flanges to the projecting ends of an unmachined box-beam framework in such a way that the flanged structure may be reused without modification. One such framework may be readily assembled to another by simply matching the flanges together and passing connecting members between preformed holes in the structures.



Weld-Free Installation of Load-Bearing Flanges

(continued overleaf)

How it' done:

The technique consists of alining and doweling sets of precision-machined locating pads and collars to the unmachined square box-beam ends of the modular assembly jig to provide distortion-free load-bearing flanges (see figure). The floating pad-and-collar design permits the lateral alinement of the pad centers relative to master grid-plate centers. At the pad centers are tooling holes 3/4 in. (1.9 cm) in diameter. These holes are alined on 70.00-in. (177.80-cm) grid centers, which are accurately located with respect to each other within ±0.005 in. (±0.013 cm).

The collar is connected to the pad by a set of machine screws, passing through slightly oversize holes in the collar and into tapped holes in the pad, and by a pair of dowel pins driven through registering holes in both members. The attachment collars then permit movement for exact length and perpendicularity alinement, prior to being attached by dowels to the box-beam ends. By this means, the combined planar deviation relative to the master tooling grid-plate can be held to ±0.015 in. (±0.038 cm). Because the tooling is held to close tolerance while being fabricated, special alinement during the buildup of several modules is not necessary.

Note:

Requests for further information may be directed to:

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Reference: TSP74-10273

Patent status:

This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

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Source: M. M. Gilman of
Rockwell International Corp.
under contract to
Johnson Space Center
(MSC-19372)

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