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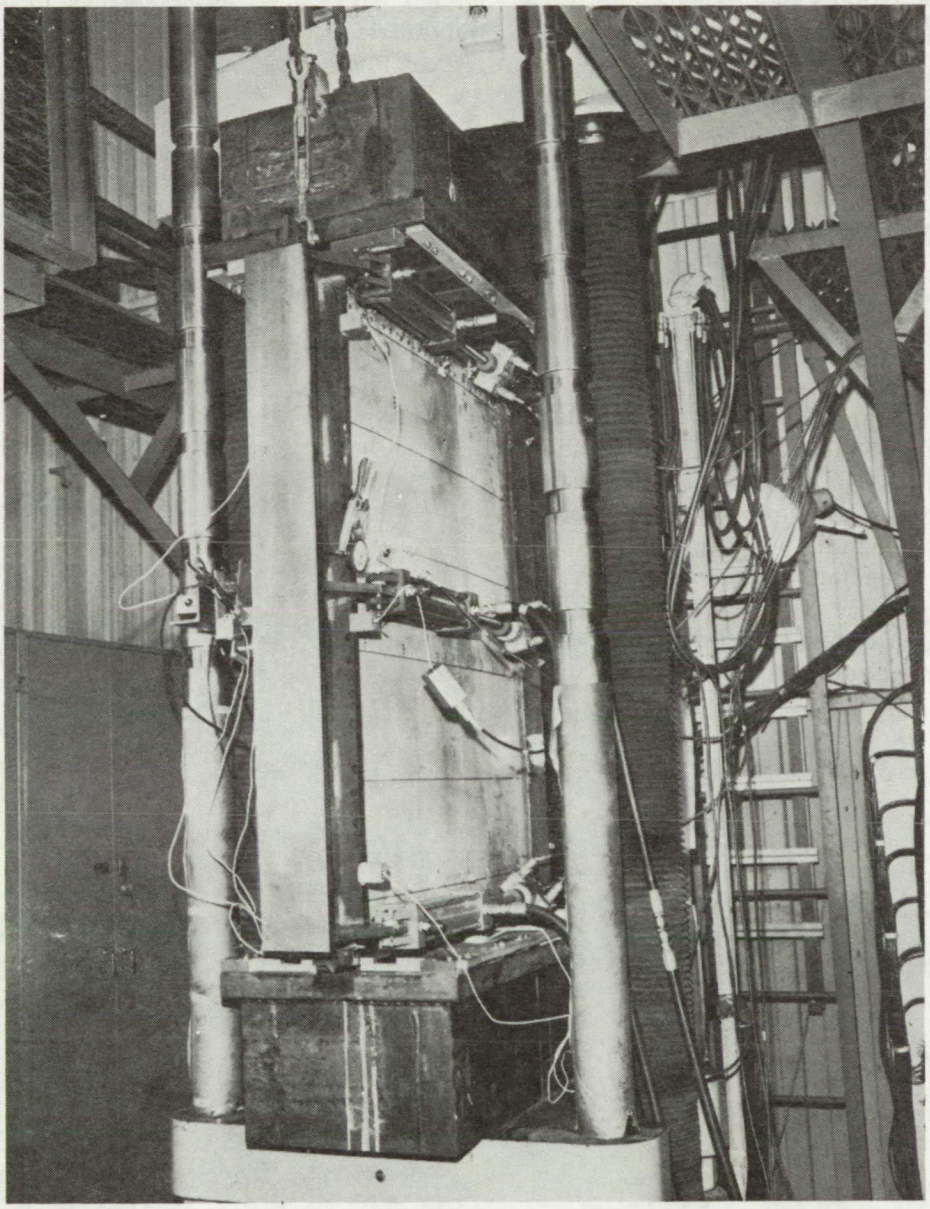
# NASA TECH BRIEF

*Lyndon B. Johnson Space Center*



## Biaxial Compression Test Technique



Compression Test Machine for Biaxial Compression Testing

(continued overleaf)

**The problem:**

Sheet aluminum alloy, when used as a load-bearing skin or panel, can be stiffened either with integrally machined risers or with risers separately attached. When such sheets are stiffened primarily in one direction, as is often the case, problems with biaxial stability result. Studies of biaxial stability (longitudinal versus transverse compression loading) also often ignore the problems of longitudinal strength degradation; sometimes correction factors are arbitrarily assigned with inadequate justification to the test procedure.

**The solution:**

A fixture and a technique have been developed for predicting the behavior of stiffened skin panels under biaxial compressive loading. The tester can load the test panel independently in the longitudinal and transverse directions. Independent data can be obtained in either test mode as well as in the combined mode. The effect of loading sequence can also easily be obtained. Provision is available to convert the specimen-simulated frames from a flat to a curved configuration.

**How it's done:**

A universal-type compression test machine, as shown, applies a longitudinal compression load simultaneously with a transverse load. This load is applied with a pair of rigid loading beams connected by hydraulic cylinders. A uniform loading is ensured at the ends by machining the specimen ends flat and parallel. The side loading beams are grooved to receive the specimen edge skin. Adjustable stops are provided to prevent excessive lateral deflection which would produce local bending of the edge skin.

A pin-end configuration is provided at the specimen ends via a steel adapter plate at each end with a knife-edge bearing on the machine heads. The adapter plate is segmented to accommodate a curved specimen. All bearing surfaces are liberally oiled during testing to minimize frictional resistance under combined loads.

Longitudinal loads are controlled through the test machine. The transverse loads are applied separately by means of a hydraulic pump and are controlled through load-cell readouts. Load distributions are monitored, using strain gage readouts, in both longitudinal and transverse directions. Deflections normal to the skin panel are obtained by a pattern of transducers and are recorded incrementally during all test conditions.

**Note:**

Requests for further information may be directed to:

Technology Utilization Officer
Johnson Space Center
Code AT3
Houston, Texas 77058
Reference: TSP75-10319

**Patent status:**

NASA has decided not to apply for a patent.

Source: E. T. Hansard of
General Dynamics Corp.
(MSC-14883)

Categories: 08 (Fabrication Technology)
07 (Machinery)
04 (Materials)