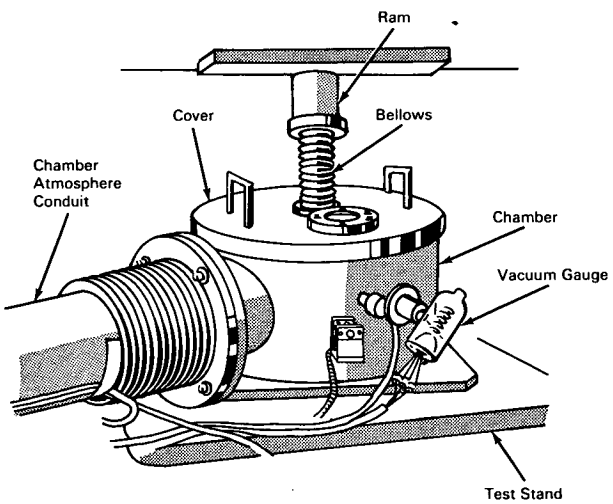
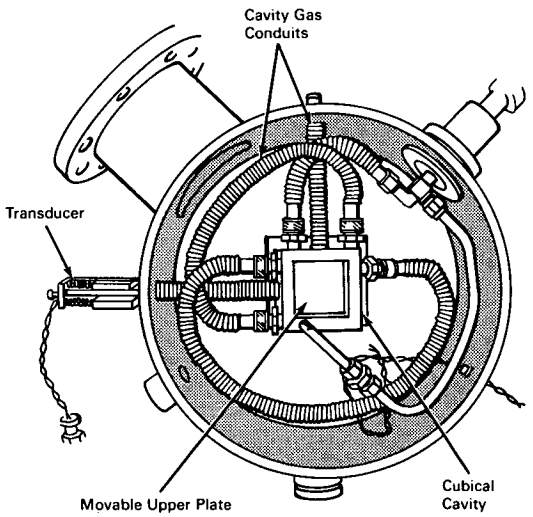
NASA TECH BRIEF

NASA Tech Briefs are issued to summarize specific innovations derived from the U. S. space program and to encourage their commercial application. Copies are available to the public from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Materials Physically Tested in Variable-Environment Chamber





The problem:

To physically test crushable materials through a wide range of environments within a single test chamber to determine their energy absorbing capacity. Presently available environmental chambers give data on specimen or assembly behavior due to environmental change but not on physical tests performed through a range of changing environment.

The solution:

A controlled environment chamber that encloses both the test specimen and the devices used to perform the physical tests. The chamber may be stepped through a range of pressures, temperatures, humidities, and chemical atmospheres.

How it's done:

The chamber is firmly mounted on a static test stand so that external forces or movements will not affect it. A ram attached to appropriate force-registering instrumentation is mounted directly above the chamber and enters it through a collapsible, sealing bellows to engage the upper plate of a cubical cavity that contains the specimen under test. The cavity is made up of fixed and movable plates in such a configuration that the ram, pressing on the upper movable plate, will cause deformation of the specimen through lateral expansion. The movable plates, contiguous with the crushable specimen, are spring loaded to maintain intimate contact with the specimen while permitting its deformation under pressure. The chamber is equipped with conduits to introduce heating or cooling gas to the cavity, to raise or lower the pressure within the chamber, or to introduce atmospheres of differing chemical makeup into the chamber.

Instrumentation includes a transducer to measure specimen deformation, thermocouples to monitor

(continued overleaf)

This document was prepared under the sponsorship of the National Aeronautics and Space Administration. Neither the United States Government nor any person acting on behalf of the United States Government assumes any liability resulting from the use of the information contained in this document, or warrants that such use will be free from privately owned rights.

temperature of specimen and cavity, and a vacuum gauge to monitor chamber pressure.

Notes:

1. Minimal modification would permit other physical tests, such as tensile strength of materials, to be performed as humidity, temperature, cycling, or atmospheres of specific chemical composition and pressure are controlled.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, California, 91103
   Reference: B66-10130

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: Albert C. Knoell
(JPL-789)