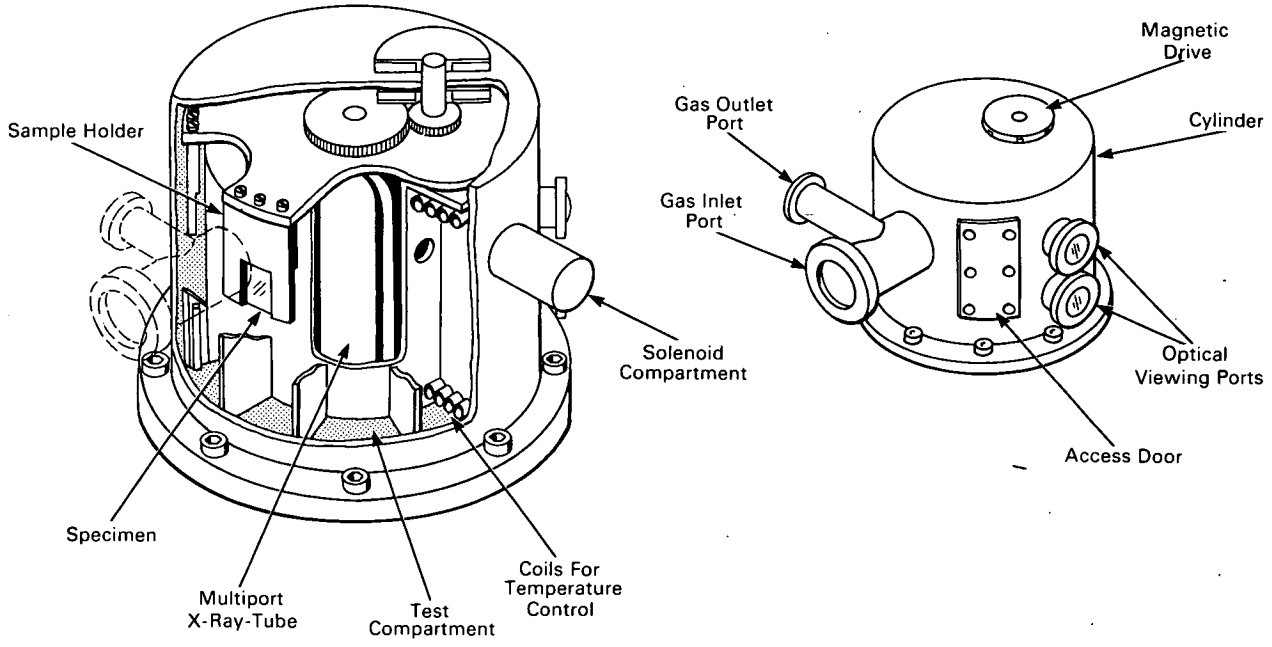
NASA TECH BRIEF

Multiple Test Chamber Exposes Materials to Various Environments



The problem: To design a test chamber in which several material specimens can be conveniently subjected to X-rays and other environmental conditions for prolonged times (up to more than a year). Periodic measurements of the progressive changes occurring in the specimens must be made without requiring their removal from the chamber. Previously, after exposing a number of specimens in an environmental chamber it was necessary to remove them at various times in order to test them for the effects of the exposure. Such a program was unduly time consuming, since it required intermittent shutdown of the chamber and removal of the specimens, and also resulted in loss of environmental integrity of the specimens.

The solution: A test chamber providing a central source of X-rays, controlled gaseous atmospheres, and other means of exposing the material specimens to prescribed environmental conditions. The specimens are individually mounted in chamber compartments which can be rotated to various positions where measurements are made through optical windows and other test devices to determine the progressive changes in the material properties.

How it's done: The test chamber incorporates an outer rotatable cylindrical container and an inner stationary cylindrical member. The specimen compartments are formed by radial segmented walls. One segment of each wall is fixed to the outer cylindrical

(continued overleaf)

container and is separated by a small gap from a second wall segment fixed to the inner cylindrical member. A specimen holder is mounted in each compartment segment attached to the outer container. This container is secured to an outer top plate on which a gear mechanism is integrally mounted. At the top of the chamber housing is a driving member for the gear mechanism to allow each of the specimen holders to be rotated to different compartments. Two sets of permanent magnets connected to the drive system provide for rotation of the specimen holders without the need of sealed bearings to prevent chamber leakage.

Beryllium windows are provided in the inner cylindrical member to allow an X-ray source mounted within this member to irradiate the specimens in alternate compartments. Optical windows are provided around the circumference of the chamber to enable measurements of the specimens with a spectrometer. Inlet and outlet ports allow introduction of various gases into the chamber and withdrawal for analysis. The specimens in the compartments may be heated or cooled to desired temperatures by circulating fluid in coils extending through the stationary side walls in each compartment. A solenoid compartment attached to the chamber opposite one of the internal compartments is used to deflect the samples by known amounts for mechanical tests. Deflections may be read on a cathetometer mounted on an appropriately positioned optical window.

Note: Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
P.O. Box 1537
Houston, Texas, 77001
Reference: B65-10268

Patent status: NASA encourages the immediate commercial use of this invention. It is owned by NASA, and a patent application has been filed. When patented, royalty-free non-exclusive licenses for its commercial use will be available. Inquiries concerning license rights should be made to NASA, Code AGP, Washington, D.C., 20546.

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