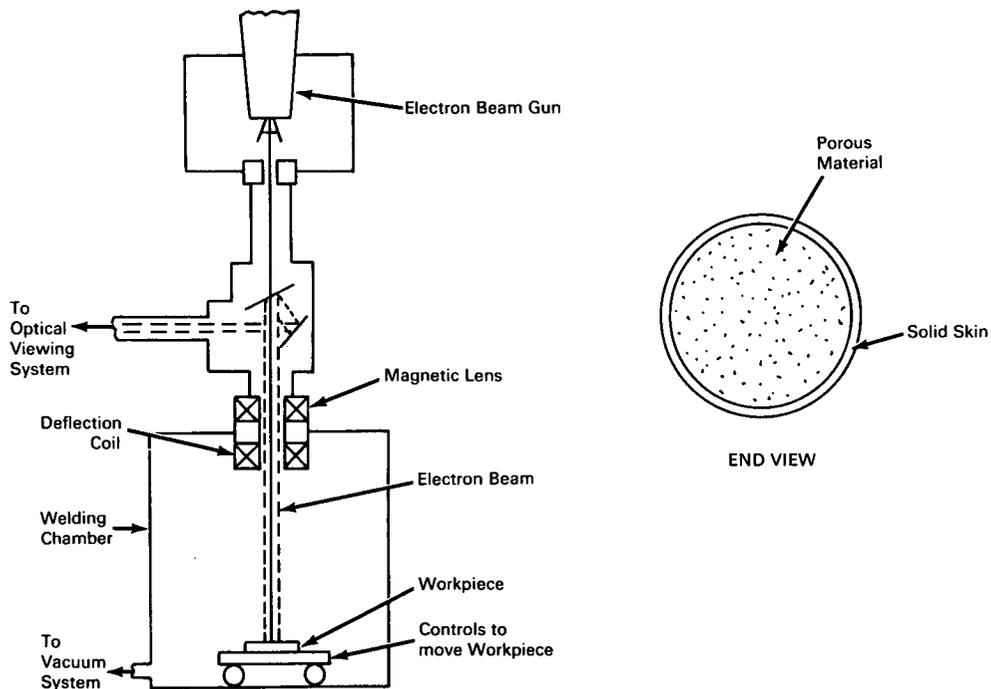


NASA TECH BRIEF



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Electron Beam Seals Outer Surfaces of Porous Bodies



The problem:

To provide an even air flow for frictionless bearings used in air bearing supported gyros. Multiple passages in the bearing seat must be designed to precisely diffuse the entering air and restrict its rate of flow. Any lateral flow rather than direct flow through the passage exits results in a nonuniform layer of air between bearing and seat and cannot be tolerated.

The solution:

Porous tungsten plugs having their outer cylindrical surface sealed by an electron beam process to

ensure unidirectional air flow through their exit ends. The plugs are used as the air passages in the air bearing seat body.

How it's done:

Tungsten powder is compacted into rod form by the application of pressure, cut into plugs and then sintered and machined. Each plug is then placed in an electron beam welder and the beam is oscillated at an appropriate frequency as the workpiece is rotated and passed beneath the beam. The electron beam causes the high points of the tungsten surface to melt and

(continued overleaf)

the movement of the workpiece is such that a solid skin surface approximately 0.001 inch thick is achieved.

Notes:

1. In the process outlined, voltages of about 105 to 110 kv and currents of about 1.5 ma are used. Workpieces are rotated at 20 rpm and linear movement is at 1 inch per minute. Source to specimen distance of from 5 to 8 inches is satisfactory.
2. This invention would be useful in the areas of fluid and gas filters and metering devices.

Patent status:

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457 (f)), to the Kulite Tungsten Company, 1040 Hoyt Avenue, Ridgefield, New Jersey.

Source: Ronald A. Kurtz, Anthony D. Kurtz, and William H. Herz of Kulite Tungsten Company under contract to Marshall Space

Flight Center
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