



MEMS Packaging Techniques

Technology

Micromachining and microfabrication techniques that can be applied to microelectromechanical (MEMS) packaging.

Benefits

- Processes are already developed and proven
- Machining processes have little environmental impact
- A wide variety of metals, composites, and plastics can be machined

Commercial Applications

The difficulties involved with commercializing MEMS technology have been described as being 90-percent packaging and 10-percent chip design (Madou). Miniature MEMS housings, wire passages, and slots that use traditional machining processes (drilling, milling, and turning) along with electric discharge machining can enhance design capabilities for MEMS packaging.

Technology Description

This traditional machining approach is not to be confused with electrochemical micromachining. Traditional micromachining refers to the mechanical removal of material by conventional machining methods—only on a much smaller scale.

With precision equipment and specialized processes developed at Glenn, holes can be mechanically drilled as small as 0.0005 in.

Figure 1 shows a magnified (350×) view of a 0.007-in.-diameter carbon ball with a 0.0005-in. hole drilled into the center. This was done by hand, under a microscope, with a mechanical drill.

Traditional micromachining techniques can also produce mirrored surfaces from aluminum by utilizing a high-precision, air-bearing lathe. This machine can hold tolerances to the millionth-of-an-inch range. The quality of the finish cut is so precise that no polishing is necessary.

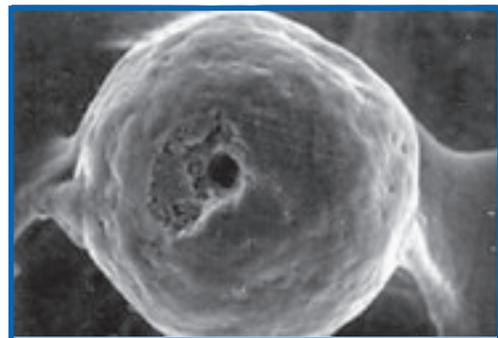


Figure 1.—0.0005-in.-diameter hole hand-drilled into a 0.0007-in.-diameter carbon ball.

Options for Commercialization

The Manufacturing Engineering Division has a Space Act Agreement in place with the Advanced Manufacturing Center. Together, both organizations are looking for commercial partners to explore traditional micromachining techniques and equipment so that this research can be applied to MEMS packaging technology.

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Key Words

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