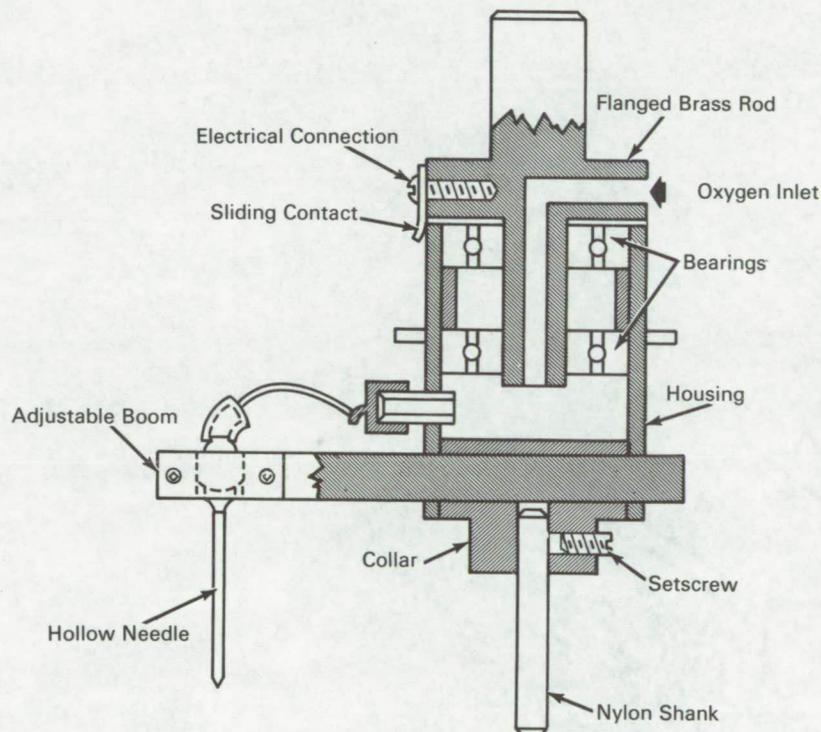


NASA TECH BRIEF



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Hollow Needle Used to Cut Metal Honeycomb Structures



The problem:

To cut metal honeycomb structures accurately without damaging adjacent material. Present electrostatic tools cut holes that are out of tolerance and cause damage to adjacent material.

The solution:

A tool that uses a hollow needle to combine an electrostatic discharge and a stream of oxygen at a common point to effect rapid, accurate metal cutting.

How it's done:

A passage is drilled out in a flanged brass rod and the rod is pressed into the inner races of two ball bearings that are mounted inside a circular brass housing. An adjustable boom is attached to the bottom of the housing and a hypodermic needle is attached to its outboard end. Rubber tubing connects the hypodermic needle to a fitting in the hollow base of the housing that is fed from an oxygen source through

(continued overleaf)

the drilled brass rod. A nylon shank is clamped in a collar pressed into the bottom of the housing and serves as a pilot for centering the tool in the work.

In operation, an electrostatic discharge source is attached to a contact on the tool and the entire tool, except the nylon shank, acts as a conductor. The boom is adjusted to the proper cutting radius and the nylon rod is inserted into a pilot hole in the workpiece. Oxygen flowing through the needle point contacts the electrostatically heated material and effects rapid metal removal. The housing is rotated about the nylon shank and a clean, accurate hole is rapidly cut in the honeycomb workpiece. The ball bearings permit the rotation of the housing while the oxygen source connection remains stationary. A sliding contact (slip ring) maintains electrical continuity between flange and housing.

Notes:

1. The tool design can be varied to use the hollow needle principle for cutting a variety of shapes.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas, 77058
Reference: B66-10244

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: E. A. Gregg
of North American Aviation, Inc.
under contract to
Manned Spacecraft Center
(MSC-486)