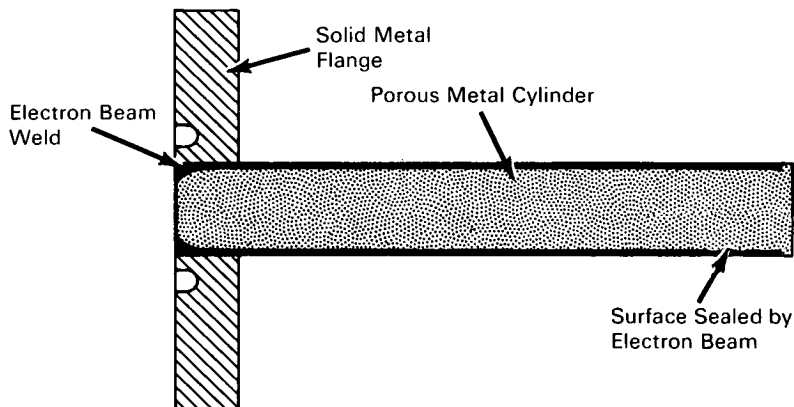


# NASA TECH BRIEF



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## Electron Beam Selectively Seals Porous Metal Filters



An electron beam welding method has been developed for selectively sealing the outer surfaces of porous metal filters and impedances used in fluid flow systems. These devices, used in liquid or gaseous systems, often require considerable length in proportion to diameter to provide adequate filtering or impedance. A typical configuration is illustrated, in which the fluid must flow through the entire length for maximum effectiveness. Since porosity in the cylindrical surface would permit the fluid to follow a shorter path, the outer surface must be effectively sealed to force the fluid to flow the full length.

The outer surface can be sealed by melting a thin outer layer of the porous material with an electron beam so that the melted material fills all surface pores. With the aid of beam deflection, the entire surface is scanned by the beam to form an impervious surface. The cylinder may then be welded to a conventional flange of compatible material. Thickness of the coating may be made as thin as one mil or up to 50 mils by varying electron beam power.

### Notes:

1. Previous methods of sealing the outer surface have not been satisfactory. Sintering the metal powder in a metal tube could not be controlled to produce uniform porosity throughout. Epoxy sealant materials frequently proved incompatible with the flowing fluid. Sintering a slurry coating of the same metal resulted in poor bond strength due to sintering temperature limitations.
2. The use of an electron beam to seal porous metal surfaces was developed by Mr. George Tulisiak at the NASA-Lewis Research Center. Fabrication of impedances in the form shown above was developed by the Hughes Aircraft Company.
3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Lewis Research Center  
21000 Brookpark Road  
Cleveland, Ohio 44135  
Reference: B68-10331

(continued overleaf)

**Patent status:**

No patent action is contemplated by NASA.

Source: John A. Snyder  
of Hughes Aircraft Company  
under contract to  
NASA-Lewis Research Center  
and George Tulisiak,  
NASA-Lewis Research Center  
(LEW-10162)