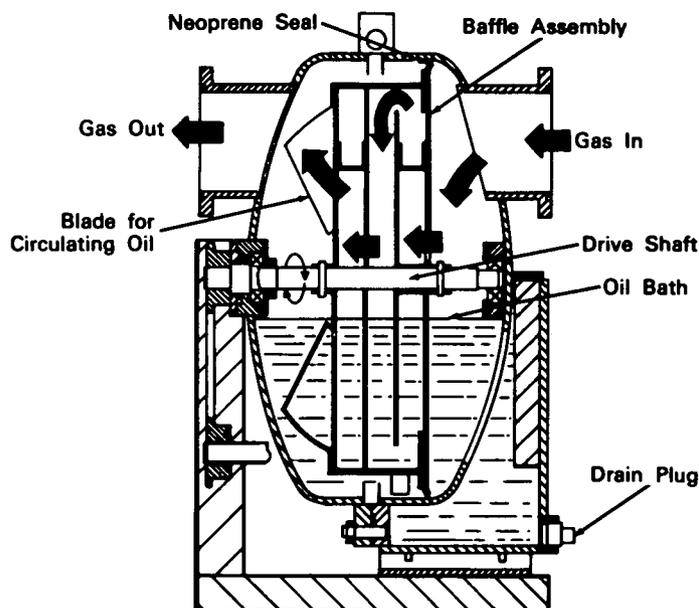


NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the NASA space program.

Fine-Particle Filter Prevents Damage to Vacuum Pumps



The problem: Mechanical vacuum pumps are commonly used in powder metallurgy to produce a vacuum or an inert-gas atmosphere required in the processing of the powders, which generally have a particle size of less than 2 microinches. During the initial evacuation of the processing system some of these fine particles are carried by the gas stream to the moving parts of the mechanical pump, where severe damage may result in two or three evacuation cycles. Commercially available filters that retain particles of this size offer a large impedance to the gas flow and require frequent cleaning.

The solution: A specially designed filter system incorporating a low-impedance metal-baffle assembly

that is continuously coated with a film of nonvolatile oil.

How it's done: Approximately one-half of the baffle assembly rotates in a circulating oil bath to produce the oil film that traps the destructive particles. A series of blades extending from one of the baffle plates in the rotating assembly aids in circulating the oil. In one design of the filter system, a motor is geared to rotate the baffle assembly at 10 rpm. The inlet and outlet pipes are both 2 inches in inside diameter. The filter, which incorporates an oil sump to provide for sludge settlement, has an overall size of 2-1/2 feet square by 2 feet in height. In operation, the pressure drop through the filter is approximately 10 mm of mercury.

(continued overleaf)

Note:

Although this filter was designed to prevent damage to mechanical vacuum pumps, it can be effectively used in gas-flow systems where the permissible pressure drop across the filter is low and high-rate filtering of small particles is required. Other advantages of this filter include relatively low cost, small size,

and simplicity of operation. The filter is serviceable for long periods before it needs to be removed from the system for cleaning.

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

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