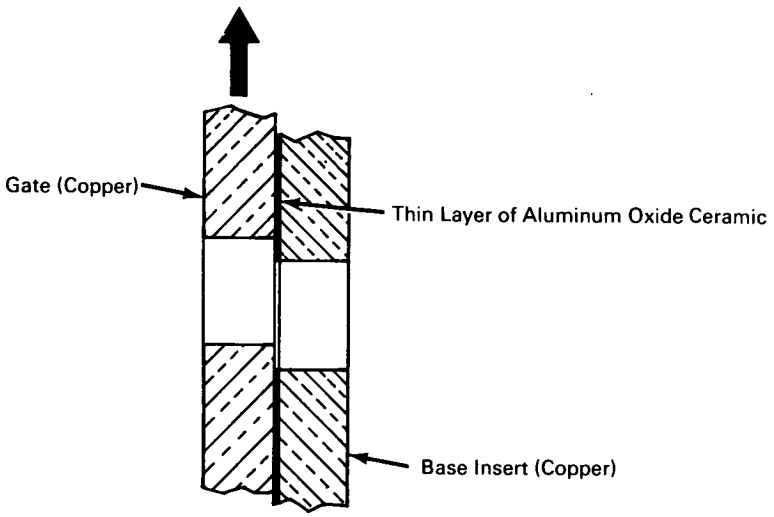
NASA TECH BRIEF

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

Gate Valve With Ceramic-Coated Base Operates at High Temperatures



The problem: To prevent frictional binding or welding between the gate and base surfaces of a gate valve that are subject to very rapid sliding action (approximately 5-millisecond duration) relative to one another in a high-temperature environment of 4,000° to 5,000° F. Conventional gate valves, which incorporate metal (e.g., brass, copper, stainless steel) gates and bases, require replacement after each closure.

The solution: A renewable base insert of copper coated with a thin layer of aluminum oxide ceramic on the surface that comes into contact with the gate.

How it's done: The base insert is coated by spraying with a preparation of alumina (activated, powdered, catalyst grade AL-0102 P—98 percent Al_2O_3) to a depth of approximately 0.008 inch. The coating is then ground down to 0.005 inch. This insert is positioned with the aluminum oxide surface facing the surface of a copper gate in the valve.

The thin film of aluminum oxide ceramic has a negligible effect on the heat-sink characteristics of the copper base and gate and prevents welding of the surfaces during sliding action in several 5-millisecond closures of the valve at air temperatures of 4,000° to 5,000° F. The thin ceramic coating is highly resistant to cracking and chipping and requires replacement only after it has deteriorated as the result of ablation. To replace the coating, the base insert is removed from the valve and resurfaced with aluminum oxide after grinding away the wornout surface.

Notes:

1. This coating can be advantageously applied to any metal surfaces which come into intimate sliding contact in high-temperature environments.

(continued overleaf)

2. For further information about this invention inquiries may be directed to:

Technology Utilization Officer
Ames Research Center
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Reference: B63-10562

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA Headquarters, Washington, D.C., 20546.

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