



National Aeronautics and
Space Administration



TECHNOLOGY SOLUTION

Mechanical and Fluid Systems

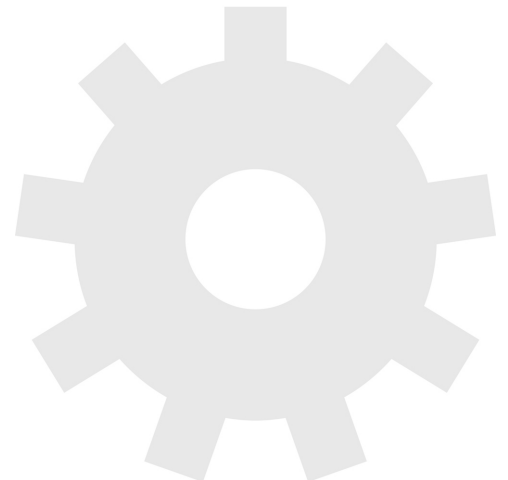
Nitinol-Actuated Normally Open Valve Assembly (NOVA)

Unique Shape Memory Alloy Actuator Improves Performance and
Safety of Zero Leak Valves

NASA Goddard Space Flight Center has developed the NOVA zero leak, permanent isolation valve that helps prevent leaks in space propulsion systems. The actuator is made from nitinol, a heat activated non-explosive shape memory alloy, and the result is a valve that is much safer than the currently used pyrovalve. NOVA is actuated by heating a compressed piece of nitinol, which causes it to recover or elongate. This applies a force to the actuator tube which fractures it, initiating a spring that closes the valve. NOVA is designed in such a way that the pressurized propellant upstream provides positive pressure on the valves seal.

BENEFITS

- Non-explosive Actuator is safer
- Fabrication is simple
- Drop in replacement for a pyrovalve



THE TECHNOLOGY

The nitinol-actuated Normally Open Valve Assembly (NOVA) is a type of zero-leak permanent isolation valve designed for liquid propellant service on in-space propulsion systems with operating pressures less than or equal to 500 psia. The NOVA is a drop-in replacement for the currently used pyrovalve. Prior to actuation, the valve allows propellant flow with a pressure drop of < 3 psi at a flow rate of 0.15 kg/s. A compressed piece of nitinol inside the valve is heated once actuation is desired, causing the nitinol to recover to its origin shape. This recovery closes the valve, creating a leak-tight seal. The valve is compatible with all storable propellants.

APPLICATIONS

The technology has several potential applications:

- Satellite Launches
- Military Rocket Launches
- Commercial Rocket launches

PUBLICATIONS

Patent No: 9,677,681

More Information

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Agency Licensing Concierge

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