

## TECHNOLOGY SOLUTION

### Mechanical and Fluid Systems

# Feedthrough for Severe Environments and Temperatures

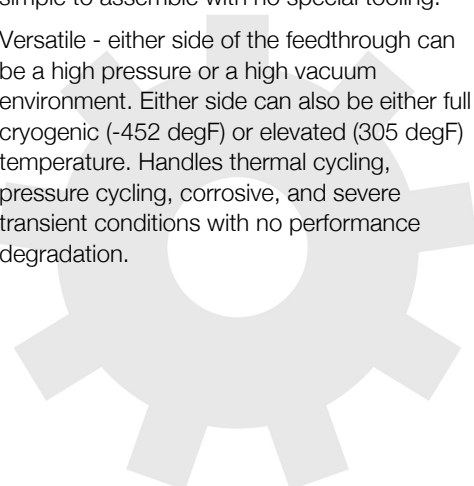
Unique design provides affordable hermetic seal for feedthrough  
of wires, tubes, or fibers

NASA Kennedy Space Center seeks partners interested in the commercial application of the Feedthrough for Severe Environments and Temperatures. NASA's Kennedy Space Center (KSC) is offering companies licensing or partnering opportunities in the development of this innovative technology.

KSC's new design provides a solution for the hermetically sealed feedthrough of wires, tubes, or fibers from one process side to another process side. Either process side for a particular application can be high pressure or high vacuum. Additionally, the temperature of either process side can be either extremely cold (-452 degF) or elevated (305 degF). The design is capable of handling thermal cycling, pressure cycling, corrosive environments, and severe transient conditions with no leakage or other problems.

#### BENEFITS

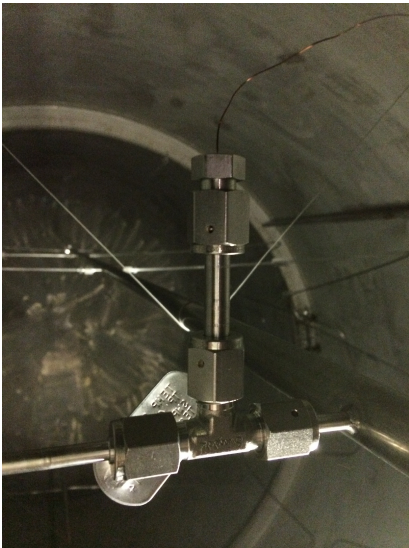
- Leakproof - leak testing of feedthroughs under extreme cryogenic and vacuum conditions resulted in no leakage.
- Reconfigurable- when constructed without potting, feedthroughs can be disassembled, reconfigured, and reused for a different application.
- Adaptable -can be used with capillary tubing, fiber optics, wiring, and many other types of applications. The number of feeds can be as many as the overall diameter permits. Any type of commercial connector can be adapted for the pressure seal.
- Scalable - feedthrough design can be scaled up for larger (2" diameter) or even very large (12" or more) sizes.
- Affordable - feedthrough is constructed using commercial off-the-shelf components and is simple to assemble with no special tooling.
- Versatile - either side of the feedthrough can be a high pressure or a high vacuum environment. Either side can also be either full cryogenic (-452 degF) or elevated (305 degF) temperature. Handles thermal cycling, pressure cycling, corrosive, and severe transient conditions with no performance degradation.



## THE TECHNOLOGY

Space and ground launch support related hardware often operate under extreme pressure, temperature, and corrosive conditions. When dealing with this type of equipment, it is frequently necessary to run wiring, tubes, or fibers through a barrier separating one process from another with one or both operating in extreme environments. Feedthroughs used to route the wiring, tubes, or fibers through these barriers must meet stringent sealing and leak tightness requirements.

This affordable NASA feedthrough meets or exceeds all sealing and leak requirements utilizing easy-to-assemble commercial-off-the-shelf hardware with no special tooling. The feedthrough is a fully reconfigurable design; however, it can also be produced as a permanent device. Thermal cycling and helium mass spectrometer leak testing under extreme conditions of full cryogenic temperatures and high vacuum have proven the sealing capability of this feedthrough with or without potting (epoxy fill) on the ends. Packing material disks used in the construction of the device can be replaced as needed for rebuilding a given feedthrough for another job or a different set of feeds if potting is not used for the original feedthrough build. (Potting on one or both sides of the sleeve provides double or triple leak sealing protection). Variable Compression Ratio (VCR) connectors were adapted for the pressure seal on the feedthrough; however, any commercial connector can be similarly adapted. The design can easily be scaled up to larger (2" diameter) and even very large (12" or more) sizes.



Feedthrough Installed In LH2 Tank



Completed Feedthrough Assembly

## APPLICATIONS

The technology has several potential applications:

- Medical
- Manufacturing
- Electronics
- Scientific Instruments
- Transportation
- Electrical Power Generation

## PUBLICATIONS

Patent No: 10,431,355