High-Temperature Metal-to-Metal Seal Development

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Invention of the Crush Gasket

• The JASC line of metal crush seal products began with the Three-Way Purge Valve (c. 1996).
• The copper crush gasket was developed to provide zero leakage in a high-temperature, fuel-compatible environment between the fuel and purge air housings.
• The product has been proven successful and since used on all 3WPVs in the field.
The 3WPV Flange Crush Gasket

- JASC has more recently introduced the 101307-01 Copper Crush Gasket, which was designed to replace the rubber O-ring found on the bottom of the 3WPV main Flange.
- This Gasket is allowed to be field-replaceable by the Customer.
- Testing was performed between 2008 and 2011 in excess of $700^\circ$F, 1800 psi and after 12 make-and-breaks using the same seal, all without reported leakage.
- This product is now being implemented on turbines in JASC aftermarket and at GE-supervised sites.
Retrofittable Metal-to-Metal Fitting Seals

- With technology borrowed from the 3WPV crush seal, JASC is now developing a series of crush gaskets that can replace O-rings found in (SAE J1926) port fittings.
- The -8, -12, and -16 sizes have been manufactured and are undergoing temperature and leakage tests.
- These seals are designed to be retrofittable in the field with multiple make-and-breaks.
- An application which integrates the majority of crush gaskets is the 101651-1 SAE Tee assembly.
Retrofittable Metal-to-Metal Fitting Seals

• Note the developed gaskets and fittings of the Tee also readily adapt to the JASC Water-Cooled Liquid Fuel Check Valve (WCFLCV).
High-Temperature Seal on the Water Injection Flow Proportioning Valve

• JASC is also developing enhancements to the 101365 WIPFV for high-temperature environments.
• Internal components will possess crush seal technology. The seat design will be bubble-tight metal-to-metal.
• Development testing is underway.
• The 101365 will also employ the -12 and -16 SAE crush seal Gaskets, with proposed adapters to Swagelok fittings.
Conclusion

- Using a heritage of proven crush gasket products used in high-temperature environments, JASC is now developing SAE J1926 compatible gaskets that can also be used in the field.
- Male-based fittings are being designed and tested at JASC to be able to adapt and be retrofittable to existing turbine hardware.
- The goal of this program is to produce and ensure reliable operation of the new gaskets to $1000^\circ F$ at $2000 \text{ psi}$, with bubble-tight leakage that exceeds the requirements specified by ANSI Class 6.