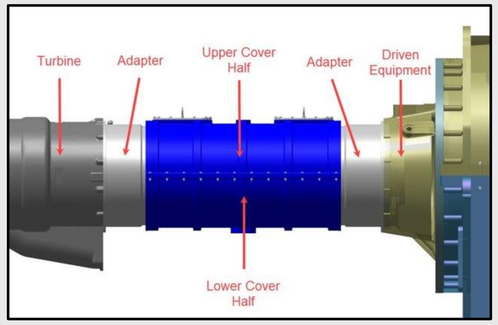
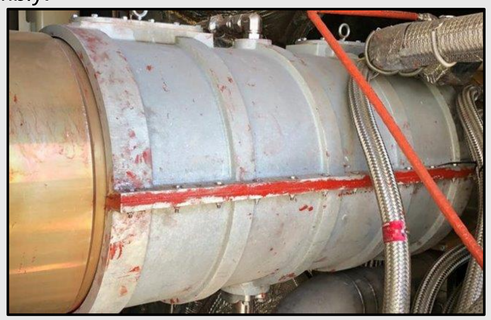
Gas Turbine Driveshaft Covers

The Problem

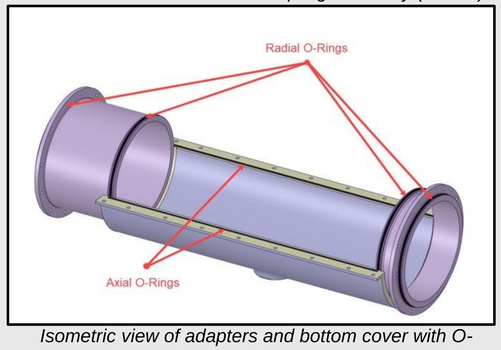
- Solar Turbines is a global leader in providing energy solutions. The turbine packages they produce consist of a turbine engine, driven equipment and a coupling assembly to transfer power from the engine to the driven equipment.
- The coupling cover is used to protect the driveshaft while sealing lubrication oil inside. Leaks cause unwanted downtime and fires. The short term fix uses RTV to seal the assembly.



Side-view of Solar Turbines coupling assembly (in blue)



Coupling Covers with RTV sealant

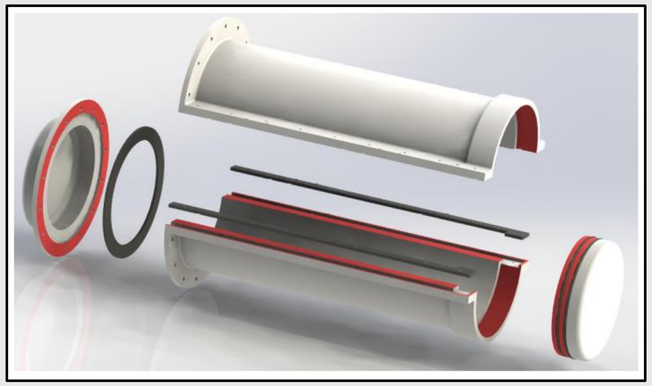


Isometric view of adapters and bottom cover with O-rings

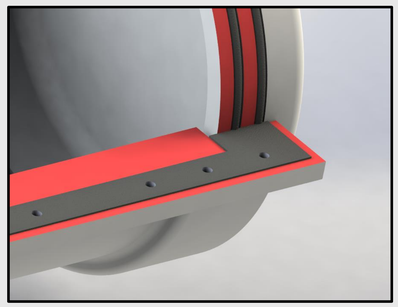
Our Solution

We redesigned the sealing geometry for the assembly and introduced gaskets into the assembly.

- Our design uses a flange connection on the left side and a “floating” connection on the right. The term floating refers to the adapters ability to slide laterally to mitigate the effects of thermal expansion and allow for easy installation.
- The gaskets are custom designed to compensate for manufacturing tolerances and repeated assemblies.
- The “floating” adapter seal is achieved by a tight tolerance connection with the cover halves. When compressed, the axial gasket expands toward the “floating” adapter and seals the joint.



Exploded view of Titan Seals Coupling Cover Design

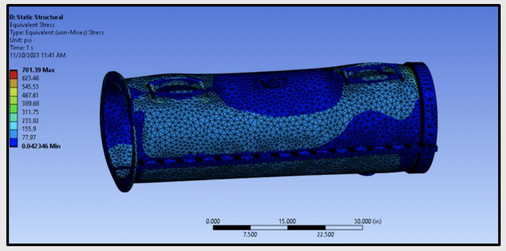


View of “floating” end connection

Our Process

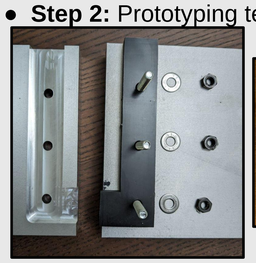
We have been tasked with designing a coupling cover assembly to seal oil without the use of an RTV sealant.

- **Step 1:** Design and engineering analysis

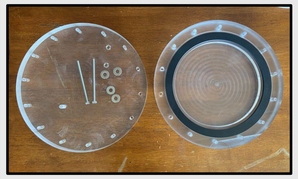


FEA of fiberglass covers, showing tolerable stress under pressure

- **Step 2:** Prototyping tests



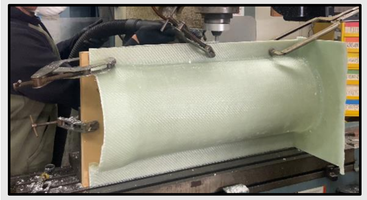
Axial Gasket Test Rig



Radial Gasket Test Rig

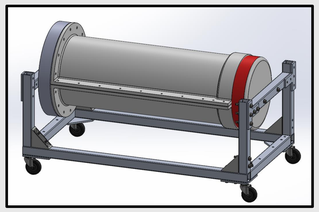
- **Step 3:** Manufacturing the new design

Fiberglass Layup



Machining Intricate Cover Geometry

- **Step 4:** Testing the new design



CAD Model Test Rig & Cover Assembly

Completed Cover Halves

Key Details

- Fiberglass cover halves reduce weight while maintaining structural integrity. The reduced weight makes installation safer for field mechanics.
- Viton gaskets and O-rings are chemical resistant and will maintain a long-term seal for reliable operation.
- Prototype testing showed ⅜ inch gaskets meet the compression requirements for manufacturing tolerances.
- The aluminum test rig replicates the field assembly procedure and allows for pressurization of the coupling assembly to test for leaks.

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