

## CUSTOM SHAFT SEAL TESTING

ESP International specializes in sealing applications with a focus on radial shaft seal technology and testing. We offer customize radial shaft seal testing.

ESP Engineering's advanced shaft seal test facility utilizes shaft seal test machines that perform tests like Hot Oil tests, Dust and Slurry tests, Torque Testing, Pump Rate Testing, Lip Opening Force and Shaft Lead.



CUSTOM SEAL TESTING

Oil Testing Machine.

Seal testing machines allow different tests.

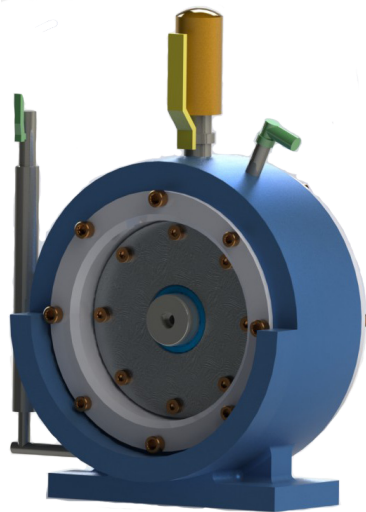
## HOT OIL

ESP's test machines can simulate a shaft seal application by running a duty cycle similar to the actual application. Modification of the sealing parameters are possible during the running of test.

It is common to run varying shaft speeds over a set period of time. The table below shows a list of the parameters that can be modified:

PARAMETERS THAT CAN BE CHANGED	
Shaft speed	0-10,000 RPM
Fluid temperature	Ambient - 200°C
Fluid type	Customer specifications
Shaft run-out	0 - 0.5 mm
Shaft to bore misalignment	0 - 5 mm
Oil fill level	Half shaft, full shaft
Oil pressure	0 - 200 bar

### CUSTOM SEAL TESTING



#### Hot Oil Testing Machine.

ESP's test machines can simulate a shaft seal application.

## TORQUE TESTING

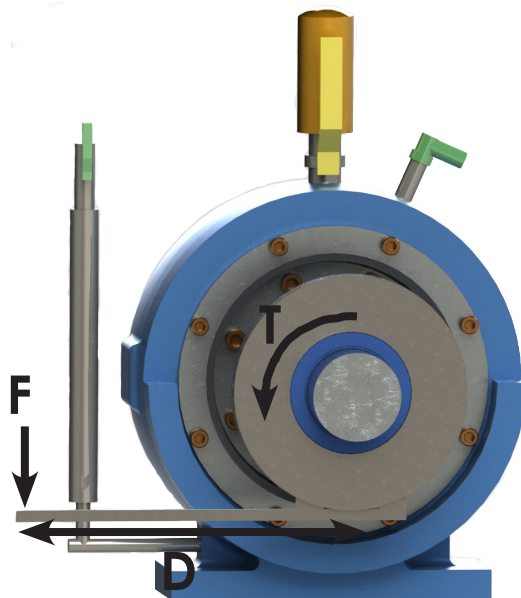
All shaft seals create some friction on the rotating shaft. That friction results in some power loss to the vehicle and in situations where maintaining vehicle power is important the selection of shaft seal becomes important as well.

Our seal power consumption test equipment can determine the amount of power drawn from various seal designs, giving you the proper information you need when selecting a shaft seal design.

### PARAMETERS THAT CAN BE CHANGED

Shaft speed	200-10,000 RPM
Fluid temperature	Ambient
Fluid type	Customer specifications
Shaft run-out	0-0.5 mm
Shaft to bore misalignment	0-5 mm
Oil fill level	Half shaft, full shaft

### CUSTOM SEAL TESTING



#### Torque Testing.

Our seal power consumption test equipment can determine the amount of power drawn from various seal designs.

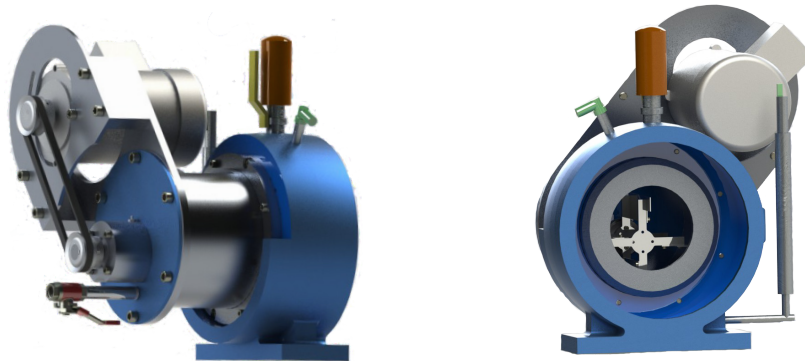
## DUST AND SLURRY SOLUTION

This is a bolt on option to our hot oil test machines. It allows you to introduce media to the excluding features of the seal. Mixtures of ISO 12103-1 test dust with bentonite clay and water are standard but it is possible to run any media such as belt dust, volcanic ash or water.

The sump and dust chamber are monitored daily for ingress of debris and failure of the seal. Comparison of seal designs is common with this type of test.

PARAMETERS THAT CAN BE CHANGED	
Shaft speed	0-10,000 RPM
Fluid temperature	Ambient - 200°C
Fluid type	Customer specifications
Shaft run-out	0 - 0.5 mm
Shaft to bore misalignment	0 - 5 mm
Oil fill level	Half shaft, full shaft
Oil pressure	0 - 200 bar
Media on chamfer	Slurry, dust, water or other substance

### CUSTOM SEAL TESTING



#### Slurry Chamber Assembly.

This is a bolt on option to our hot oil test machine.

## PUMP RATE TESTING

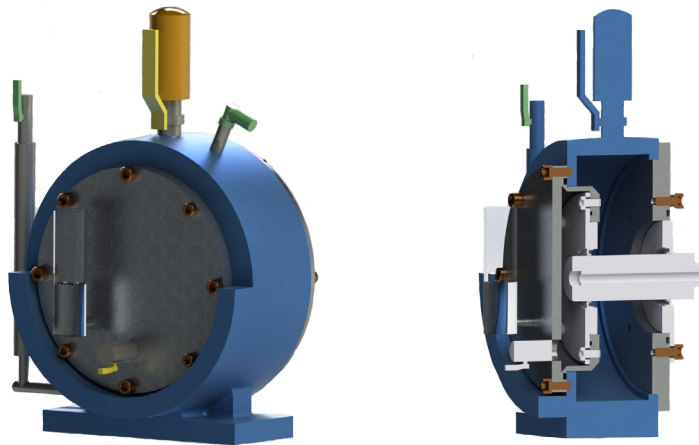
Shaft seals work by the generation of a fluid pumping action under the seal lip.

The amount of oil pumped through the seal can be measured by placing another chamber on the front of the seal and introducing oil into that chamber. This effectively places oil on the air side of the seal and allows measurement of the amount of oil that transfers from the air side to the oil side, giving you the pump rate of the seal lip.

### PARAMETERS THAT CAN BE CHANGED

Shaft speed	200-10,000 RPM
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### CUSTOM SEAL TESTING



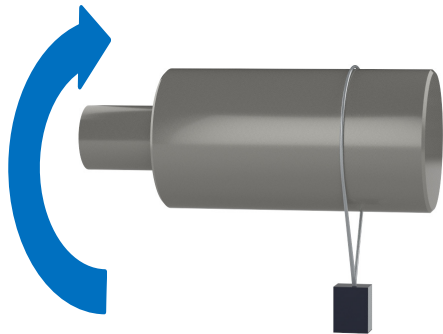
#### Pump Rate Testing.

Our pump rate testing equipment can determine the amount of oil that is pumped through the seal.

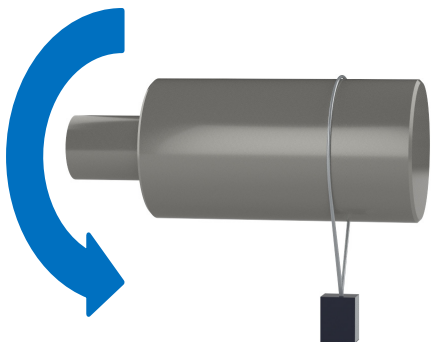
## SHAFT LEAD TESTING

The surface of a shaft is normally formed from a machining process called lathe turning. This is where a cutting tool is along the surface of a spinning workpiece or shaft and material is removed until the desired size is achieved. The one issue with lathe turned surfaces in radial shaft seals is the process creates a spiral groove on the shaft surface, or machining lead. That spiral groove acts to pump oil underneath the seal lip. Depending on the direction of lead and direction of rotation machining lead can improve sealability of a radial shaft seal or cause it to leak very quickly.

Because of the latter it is important to limit the amount of machining lead present in a shaft surface. If you ever have a seal with a leak it's important to understand the presence of this condition on the suspect shaft. ESP's radial shaft seal lab can provide support by inspecting shafts for machining lead problems and help identify a possible root cause for a seal leak issue.



CW Rotation and weight stays stationary



CCW Rotation and weight stays stationary

**CUSTOM SEAL TESTING**

### Shaft Lead Testing.

The shaft surface may have spiral grooves that create lead on the shaft, potentially causing the seal to leak.

## LIP OPENING FORCE TEST

Radial shaft seal use a spring to keep the lip pressed onto the shaft. After the seal has run for some time and the lip material has swelled and softened, the spring increases the ability of the lip to follow the shaft's dynamics.

The radial sealing force, also call load, that the lip exerts in the shaft affects the life of the seal. If the load is too high, it will wear out the lip faster causing it to fail. And if the load is not strong enough it will not generated enough force on the lip to seal when it swells. This load can be measure with ESP's LOF Machine.

### PARAMETERS THAT CAN BE CHANGED

ID	10 - 150 mm
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### CUSTOM SEAL TESTING



#### Lip Opening Force.

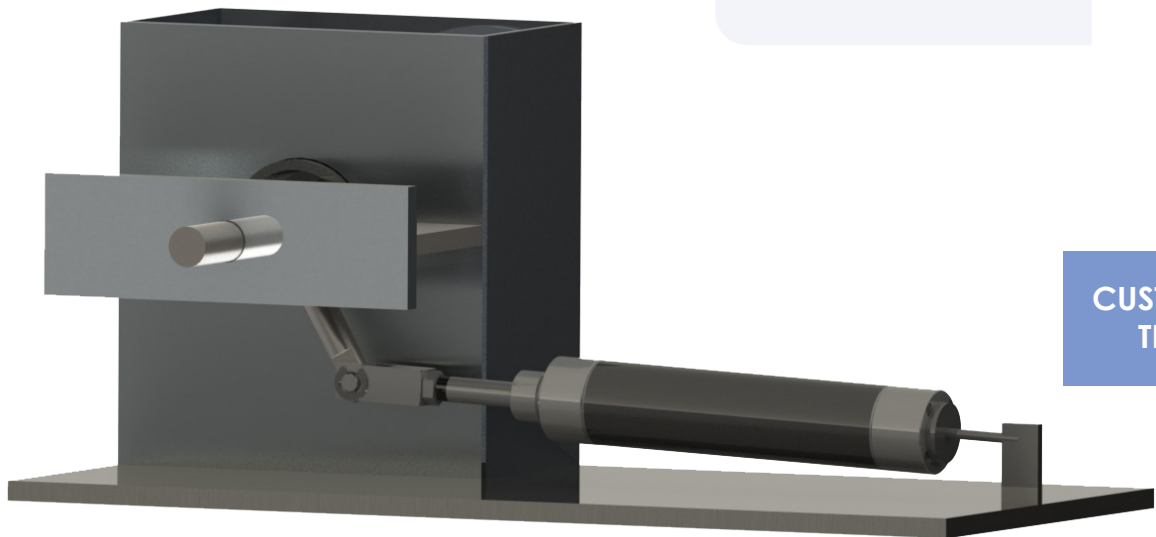
Our LOF tester can determine the load that the lip exerts on the shaft.

## CUSTOM TEST

ESP specializes in custom seal, which might need a custom testing machine. This is an example of one machine that was design and build in ESP International to test the FL series.

### Flod Seal Testing.

ESP International design and build the testing machine to test a custom made seal.



**CUSTOM SEAL  
TESTING**