

MECHANICAL SEAL PERFORMANCE TEST & VALIDATION SYSTEM

SAP Parts Pvt. Ltd.

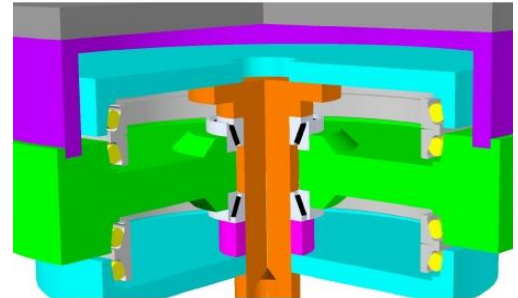
20/12/2016

Edition : 2

SEAL PERFORMANCE TEST & VALIDATION SYSTEM For Pressure Differential Applications

Introduction:

Sealing solutions provided by SAP Parts for differential pressure applications are validated for performance, on the specially designed test bench at its Seal Testing Technology & Research Center. Simulating the application conditions of various equipment which run in differential pressure environments, like Drum Cutters and Cutter roller for TBMs, at the most severe test cycles with clockwise and counter clock wise incremental ramp up and ramp down conditions of Pressure & RPM , which are thoroughly and continuously controlled by advance Testing and validation arrangements run by computerized systems.



Differential Pressure Sealing Test System

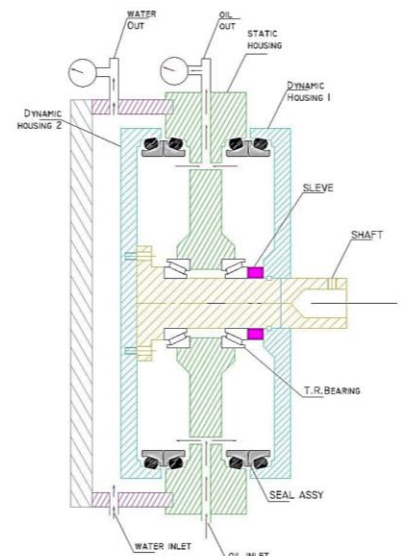


Construction:

Refer the alongside figure, a Special arrangement of test fixture consists of a static seal housing mounted on a rotating SHAFT capable to hold two Seals group assemblies on two Taper Roller Bearings axially apart from each other at a distance in dynamic seal housings. A Sleeve is placed to maintain a predetermined distance between static and dynamic housings. The static and dynamic housing are drilled internally to provide inlet & outlets for Oil and Water respectively flowing through the system and at the end Pressure gauges are mounted.

Function :

The Shaft drives the dynamic housings and the Seals connected with it, at variable RPM, which may set during the test, experience a starting torque which is read by a load cell connected to the static housing. . The Seals experience an internal pressure of Oil which may be variably controlled and monitored by the gauge installed online. Similarly water at high pressure is allowed to travel through the system from either side, as shown in the drawing , the pressure of which is controlled by a pump and monitored by gauge installed online in water circulation system.



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At the outlet of Oil and water temperature sensors are installed which records the respective temperature during the test. A definite test plan is run per below program, both clock wise and counter clock wise. The applied variables are monitored throughout the test and results are analyzed w.r.t. post-test profile, geometry & surface texture of the sealing elements as well as any consequential effects thereto during the test run if observed are recorded for further investigations and the root cause analysis can be carried out.

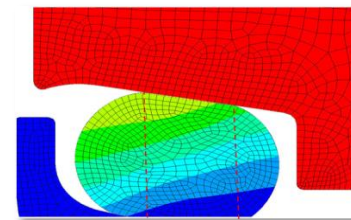
Test Cycle :

SAP Parts' Differential Pressure Sealing Test Cycle

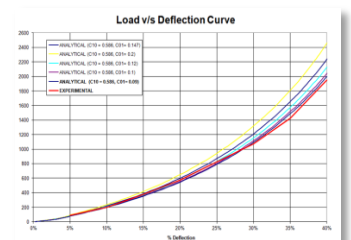
Sr.	Oil Pressure – Bar (Internal)	Ramp Up Direction	Water Pressure - Bar (External)	Test Duration Hrs
1	1	←	0	0.5
2	1	→	1	1.0
3	2	←	1	1.0
4	2	→	2	0.5
5	2	→	3	1.0
6	2	→	4	1.0
7	2	→	5	0.5
8	2	→	6	1.0
9	2	→	7	1.0
10	2	→	8	0.5
11	2	→	9	1.0
12	2	→	10	0.5

9.5 Hrs

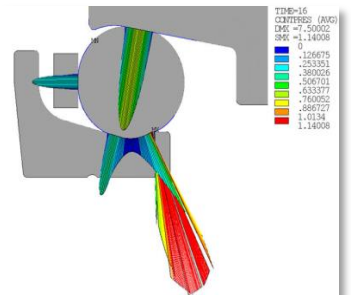
If no failure observed in above cycles , continue the test for another 16 Hrs.



Contact Forces, Contact Surface and Torque Analysis



O-ring Deformation and Contact Pressure deflection Curves



Non Liner Analysis of Rubber Compression & Stress Relaxation