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A review of mechanical seals tribology and condition monitoring

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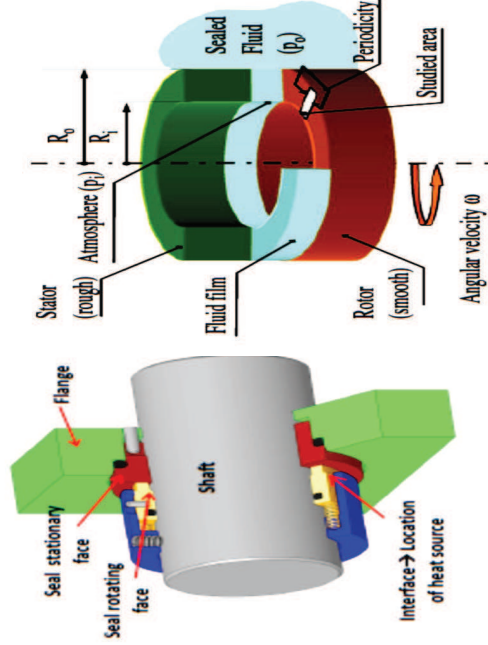


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Introduction

Mechanical seals are leakage control devices, which are found on rotating equipment such as pumps to prevent, or reduce to a minimum acceptable level leak of gas or liquid from between component surfaces. The seal is made between the very smooth, very flat faces of two rings, one is attached to and rotates with the shaft, and the other is attached to the housing and is stationary.

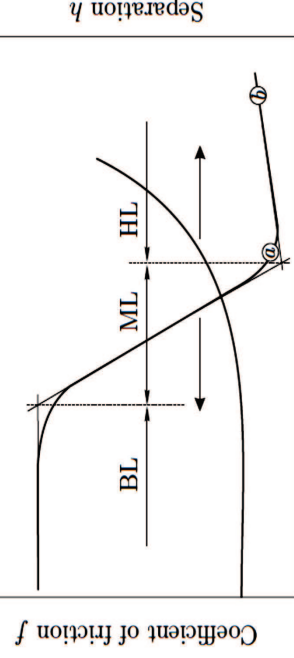
primary parts of a mechanical seal



Previous researches

- Tribological behavior of mechanical seals
- Finite Element Method (FEM) analysis
- Condition monitoring (CM) of seals.

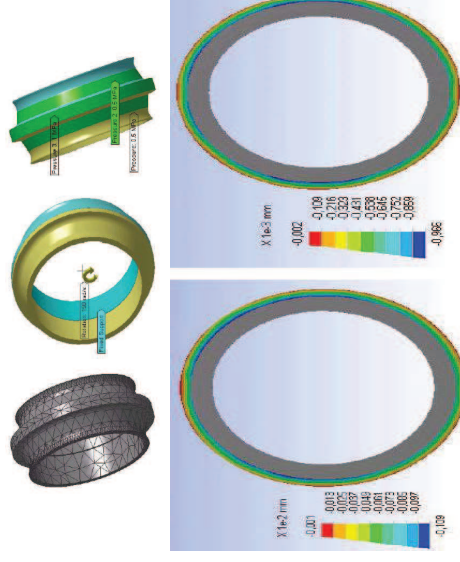
Tribological behavior of seals



Lubrication parameter (log)

An optimum operational region would be around the transition from HL to ML (position a). In this region a low coefficient of friction is accompanied by a low wear rate and a low leakage.

Finite Element Method (FEM) analysis



The maximum penetration occurs at the inner side of the contact region at high temperatures.

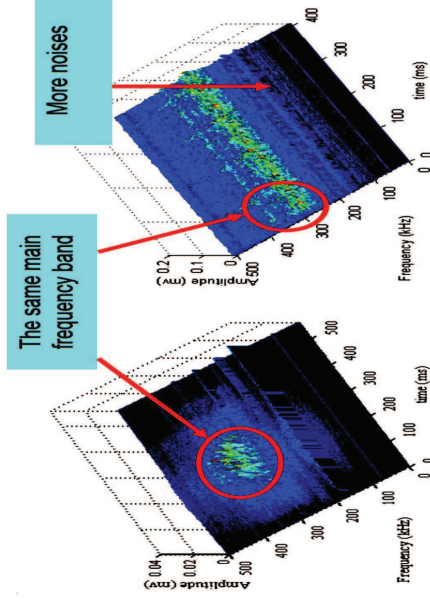
(Carmen Sticlaru 2004)

Condition monitoring of seal faces

- Several attempts have been made to monitor the condition of mechanical seals using Acoustic Emission (AE) technique.
- Some researchers applied advanced signal processing methods to reduce the effect of background noises.

Static test

Running test



Fan, Y (2006)

Future Works(research objectives)

- Modelling the AE of frictional wear in seal faces.
- CFD analysis of working condition.
- Application of advanced signal processing techniques to AE raw signals.