MODELING, SIMULATION AND EXPERIMENTAL RESEARCH ON TECHNICAL AND BIOLOGICAL SYSTEMS

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Abstract

In order to optimize the functional design of a MFS one must take into account the antagonistic conditions: minimal or zero leakage and reduced friction and wear implying appropriate tribological conditions in the interface.
It is important for the operating conditions of a machine that the appropriate conditions of a machine that the appropriate sealing solution is chosen as well as the imposed conditions of the design and working are summarizing the contribution made by the author in the thesis are:

- the comparison of the limitative parameters which facilitates the chosen of the optimal solution of sealing
- the defining of the intensity of the power loss through friction in the contact area of the MFS, that can give a quantitive appreciation of the operating limits of a MFS.
- the analytical assessment of the flow-friction depending under a hydrostatic or hydrodynamic regime.
- modeling of the surface dynamic contact in the primary seal of a MFS
- the establishment of the theoretical relations of the thermo hydrodynamics of a MFS in a steady non-isothermal regime finite element analysis
- identifying the factors that influence the performance of a MFS
- mechanical and thermal modeling through computer simulations (with axially symmetric elements) of two types of MFS (EF and EF-S 103x45.4x13.3 19) manufactured by SC ROSEAL, taking into account 15 different pairs of friction materials for the primary seal of the MFS.
- the results allow the determination of other parameters (heat transfer coefficient, correction rate, etc.) that are not found in literature.
- the hypothesis of linearity of the heat flow (literature data are not confirmed)
- the effect of heat circulation in both rings simultaneously
- development of the relationship: temperature distribution-rotating rings-heat flux in the gap-geometry of the gap.

The results of modeling and computer simulation, effective in terms of input / output, being faithful to the experimental, have advanced the accuracy of modeling and their application to other pairs of materials can be considered as valid for assessment / optimization and selection of the optimal solution of a MFS.

◊ experimental design and test equipment and establishing the experimental program;

◊ attempt under research three different seals Front (EFS 103-S; 19 x 45.4 x 13.3 EF, EF 15 x 25.7 x 12.8) and three fluids to be sealed (water at 80° C detergent, industrial water at 80° C, water with antifreeze) that confirm the results of analytical modeling research.

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The full abstract at:
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