

MAGNETIC NANOFUID ROTATING SEAL SYSTEMS FOR HIGH PERIPHERAL SPEEDS - HISPEED NANO MAG SEAL

Goal of the project

The project technical objective is to achieve at experimental model scale new leakage-free MNF sealing systems for high peripheral speeds (up to $30 - 70 \text{ m}\cdot\text{s}^{-1}$) in the sealing area, designed to equip gas turbo-compressors.

Short description of the project

The project proposes the development of seals with magnetic nanofluid (MNF), which has significant advantages compared to conventional mechanical seals: hermetic sealing, exceptionally long lasting operation without intervention (5 years), minimal wear (only viscous friction), virtually zero contamination, optimal torque transmission, wide operating range (10^{-8} mbar - 10 bar), relatively simple and cost efficient execution.

Project implemented by

- SC ROSEAL SA Odorheiu Secuiesc (Project coordinator)
- Romanian Academy – Timisoara Branch (Partner 1)
- National Institute of R&D for Izotopic and Molecular Technologies Cluj-Napoca, Politehnica University of Timisoara (Partner 2)
- Politehnica University of Timisoara (Partner 3)
- Romanina Research and Development Institute for Gas Turbines – COMOTI Bucharest (Partner 4)

Implementation period

July 1, 2014 – September 30, 2017

Main activities:

- laboratory and micropilot scale synthesis of magnetic nanofluids with carboxylic stabilizers and magnetizations between 400-1000 G
- conception, design and implementation of new experimental models of sealing systems with magnetic nanofluid for high peripheral speeds
- testing and performance evaluation of new experimental models sealing systems with magnetic nanofluid, designed for high peripheral speeds

Results

- methods for synthesis and characterization of high magnetization nanofluids with carboxylic stabilizers
- experimental models for new sealing systems
- experimental models for sealing systems – innovative version with magnetic nanofluids with carboxylic stabilization

Applicability and transferability of the results

The expected results will facilitate design and low cost industrial scale production of an original sealing system with stable MNF at high temperatures ($160 - 180 \text{ }^\circ\text{C}$), for high peripheral speeds (up to $30 - 70 \text{ m}\cdot\text{s}^{-1}$) in the sealing gap. They have some important advantages compared to conventional mechanical seals: hermetic sealing, high reliability, relatively simple construction, low execution cost. These performances indicate the market towards ROSEAL Co. is heading, namely the gas turbo-compressors in fertilizer and petroleum refining industry.

Financed through/by

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Research centre

Research Centre for Engineering of Systems with Complex Fluids – Laboratory of Rheology and Magnetometry, from Politehnica University of Timisoara.

URL: <http://mh.mec.upt.ro/ccisfc/>

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