

Title

Development of pump simulation model for cold operational conditions

Scope

Development of pump model in Amesim to simulate operations in cold operational (-40°C to 0°C) conditions which will help improve the Digital twin of the pump.

Activity Plan

Model development

- Study material & fluid properties to update the model
- Develop pump operational characteristics
- Evaluate motor performance characteristics, electronics thermal resistance and loss parameters
- Perform test with thermocouples to evaluate thermal conduction, convection and HTC parameters as per system model requirements
- Use the results to improve the model performance

Validation of model

- Assess simulation data by comparing it with the tests performed on the product.
- Validate the Key parameter indicators of the product for cold operational conditions.

Sensitivity Study

- Assess the sensitivity of oil temperature and ambient temperature on the hydraulic, electrical and thermal performance of the model

DOE & embedded model development

- Design DOEs (Design of experiment) to cover the operational conditions
- Develop ML model to embed the model in the pump

Recommended skills:

- MATLAB
- AMESIM
- Simulink
- Understanding of electrical components
- Multi-physics modelling
- Research Oriented

Skills to be acquired during Thesis work

- Modelling in AMESIM

- Testing methodologies
- Machine Learning
- Introduction to Cloud
- Target orientation