UNIVERSITÉ DE SHERBROOKE

Modeling of Oil Control Ring Performance for an Orbiting Face-Sealing

Record number : OPR-546

Overview

RESEARCH DIRECTOR

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ADMINISTRATIVE UNIT(S)

Faculty of Engineering
Department of Mechanical Engineering
Interdisciplinary Institute for Technological Innovation

LEVEL(S)

Master's degree
Ph.D.

LOCATION(S)

3IT - Institut interdisciplinaire d'innovation technologique

Project Description

Project

As ground transportation is slowly but surely being electrified, the air transportation industry is looking for solutions to reduce its carbon footprint. Unfortunately, batteries are too heavy to be viable for commercial flight and cheap, widely available bio-jet-fuel is still eluding. The best solution remains to increase engine efficiency to reduce fuel consumption as much as possible. Large gas turbines have reached impressive efficiency levels, but small gas turbines remain relatively inefficient due to limited combustion temperatures combined to high viscous and tip losses. One of the prime candidates for cleaner propulsion are the non-reciprocating combustion engines types that combine high efficiencies of volumetric engines while being well-known for their high power density. Unfortunately, these engines are also well-known for their oil consumption that needs to be reduced before they are used for aerospace applications in order to meet customer perceptions, weight and forthcoming emission regulations. The objective of this project, in collaboration with Pratt & Whitney Canada (P&WC), is to model and validate experimentally oil transport mechanisms to develop solutions to minimize internal oil consumption.
In particular, the role of the PhD or master's student will be to model the performance of the oil control ring and validate their performance experimentally, in collaboration with another graduate student. The model will need to solve the position and deformation of the oil control ring around a full cycle by coupling a beam finite element model to a lubrication model. Like all the other projects at Createk, this project combines design, modeling, numerical simulation, prototyping and experiments.

Team and Environment

The project takes place at the 3IT within Createk Design Lab (www.createk.co), with 8 profs, 11 engineers, 1 technician and more than 50 students, all driven towards the development of novel technologies for tomorrow's machines. The student will work on a day-to-day basis with a master's student, a research engineer, and P&WC R&D team. All Createk team members have access to a workshop with CNC machines, metal 3D printers, laser cutting and all the other tools required to prototype and test new ideas.

Ideal Candidate

- Bachelor or Master's in mechanical engineering or aerospace engineering
- Creative, passionate, and action-oriented
- Interest in developing skills in energy conversion technology development
- Teamwork aptitudes
- Programming experience

Discipline(s) by sector

Natural Sciences and Engineering

Mechanical Engineering

Funding offered

Yes

$25 000

Partner(s)

Pratt & Whitney Canada

The last update was on 8 March 2021. The University reserves the right to modify its projects without notice.