PRIMA
Advanced Materials Moving Forward

A **SUCCESS** STORY

INJECTION MOLDING PROCESS OPTIMIZATION FOR **METAL POWDERS**

Low Pressure Injection Molding (LPIM) technology for the manufacturing of metal parts comes with many advantages but is still poorly understood; its use is still largely based on trial and error. Little is known about the properties of the injected mixtures and the characteristics of their interaction with the moulds into which they are injected. This problem has hindered the development of new mixtures and the optimization of existing ones while reducing the production potential for new parts made from this process.

Pratt & Whitney Canada teamed up with **Prof. Nicole Demarquette** of the **École de technologie supérieure** (ÉTS) to develop tools that could accurately quantify the impact of various factors and identify optimal mixture injection conditions. The team first developed a rheological characterization procedure (a study of the deformation and flow of material subjected to stress) for metal powder and polymeric binder mixtures used in the LPIM process. It was able to characterize the powder/binder mixtures used by P&WC using a moldability index. The model helps predict the mixture's potential for injection.

This project will enable P&WC to maintain its position as the world leader in aircraft engine manufacturing by developing its ability to manufacture increasingly complex parts. The ÉTS has strengthened its partnership with P&WC, along with its expertise in rheology, injection moulding and advanced manufacturing for parts with complex shapes. The work that was achieved in this research project will have a positive impact on the Quebec and Canadian aerospace industry.

> ***The PRIMA project with the ÉTS went well, with recurring meetings and good coherence between the research and the industrial needs involved. The student completed part of his project in a company and was able to familiarize himself with industrial requirements. We are satisfied with the support that PRIMA provided to set up and achieve this project. I did not know about this program before and I am very satisfied.***
>
> - **Thomas Georges**,
> Pratt & Whitney Canada

SECTORS
Composites
Manufacturing process optimization
Material characterization

APPLICATION
Aerospace
Transport
Infrastructure

TRL
4-6

DURATION
12 months
(2017-2018)

Pratt & Whitney Canada
Une société de United Technologies / A United Technologies Company

ÉTS
Le génie pour l'industrie