

MASTER RESEARCH PROJECT (M.Sc.)

Improvement and Deployment of the Optitek-II Platform for Modelling Wood Processing Operations

FRENCH LANGUAGE

Although most of our research team at the FORAC consortium are fluent in English and can facilitate your arrival at Université Laval, our students are expected to be able to communicate in French within the first year of their arrival in Quebec City.

Research domain:

Wood Engineering, Applied Computer Science and Software Development, Modeling and Simulation of Industrial Systems, Process Optimization

Prior education:

Computer sciences, software engineering, operation and decision systems

Research context:

The FORAC research consortium is a strong partnership between stakeholders in the forest products industry (businesses and governments). Based at Université Laval (Quebec City, Canada), we offer our partners world-class multidisciplinary research expertise. We bring together expertise in the fields of forest engineering, wood engineering, industrial engineering, mechanical engineering, administrative sciences and computer science.

Our mission is to support the forest products industry in the design and effective management *from the forest to the customer*. FORAC aims to be a Canadian and international reference in the field of integration and optimization of the value creation network. Researchers are developing decision support and decision support methods that leverage the potential of data to improve planning, coordination and control of operations across all business lines (forest operations, transport and logistics, processing plants, etc.).

The **Optitek-II software platform** is a state-of-the-art tool for the modelling, simulation, and analysis of the entire forest products value chain, from fibre supply and sawmilling operations to secondary wood processing. Through its numerous integrated modules, the platform enables evaluation of various operational scenarios and supports decision-making to optimize forest resource utilization, improve product quality, and enhance the competitiveness of the Canadian wood products industry.

Developed in close collaboration with FPInnovations and to be tested at Groupe Lebel's facilities, this master's research project is part of a major innovation effort aimed at enhancing and validating the platform's capabilities in a real-world industrial environment. Although several new modules have recently been developed, additional improvements, evaluation, and adaptation are required to facilitate their deployment and adoption within the wood products industry. Using real case studies covering the entire value chain, from forest operations to secondary wood processing, the student will contribute to improving the platform to analyze and address a variety of strategic challenges, including:

Project description:

- Optimal allocation of wood resources among manufacturing facilities to maximize material recovery and value creation;
- Assessment of opportunities for integrating new value-added products;
- Improvement of product quality and manufacturing process performance;
- Evaluation of supply chain, production, and industrial planning scenarios;
- Utilization and valorization of operational data to support decision-making.

The project will involve validating, enhancing, and optimizing the computational modules integrated into the platform. Particular emphasis will be placed on integrating artificial intelligence, combinatorial optimization, and machine learning techniques to accelerate data processing, reduce computation time, and improve the speed and quality of simulation results.

This project offers a unique opportunity to collaborate directly with leading industrial partners in the forestry sector, work on real industrial challenges with significant economic and environmental impacts and

contribute to the development of the next generation of decision-support tools for the wood products industry. It will also provide valuable opportunities to develop expertise at the intersection of **forestry**, **optimization**, **simulation**, and **artificial intelligence**, skills that are increasingly sought after by both industry and research organizations.

Expected Start date: as soon as possible

Financing:

Scholarship of \$ 22,900 scholarship per year for a length of 5 full-time sessions (i.e. one year and two semesters. This scholarship is indexed once a year. Participation bonuses of up to \$5,250 annually are available. Additional funds are available to cover the costs of participation in international conferences (with article) and travel expenses (collaboration with partners, industrial visits, field study).

To apply:

Interested candidates can apply by sending their application (*including: CVs, transcripts and motivation letter*) to the following email address: recrutement@forac.ulaval.ca or contact the professor to discuss the project directly: **Remi Georges**, remi.georges@sbfi.ulaval.ca, or **Michael Morin**, michael.morin@fsa.ulaval.ca