Redesigning the Optitek™ simulation tool

submitted by FPInnovations

FPInnovations is one of the largest private research centres in the world. It catalyzes the transformation of the forest sector by gathering private sector companies, colleges, universities, and the provincial and federal governments. As a non-profit world leader, FPInnovations specializes in developing scientific solutions that support the competitiveness (across the world) of the Canadian forest sector and respond to the needs of its industrial members and government partners. The sawmilling industry is one of the Canadian manufacturing sectors supported by FPInnovations. This industry has remained competitive over the past decades thanks to investments made by private companies. To determine the best solutions, these companies use (among others) decision-making tools such as Optitek™.

The Optitek™ software simulates the sawing of logs in order to increase the profitability of this link in the transformation chain. The Optitek™ software was developed by FPInnovations to conduct precise production analysis, within several configurations or scenarios, for assessing the impact on product yield and value of modified sawmill processes. Besides quantifying the costs and benefits associated with each proposed change and the return on the investment, Optitek™ can help estimating the impact of a change in wood supplies, in forest management, or in silvicultural treatments on the economic value of sawings. Optitek™ is thus a powerful tool for improving the management of the forest resources.

Recent technological advances, in particular new configurations of machine centres, have made the sawmills more flexible and agile. Combined with an increase in the number of product types and the need to react to the internal defects and other characteristics of the wood supplies, these advances have had an impact on the performance of Optitek™ (in terms of its speed and accuracy). A simulation carried out by Optitek™ used to take one or two hours of computing time. Nowadays a simulation may last for several days in order to satisfy the requests of companies or researchers. FPInnovations must reconsider the methods for modelling the wood supplies, the machine centres, and the products; it must design algorithms that find optimal solutions more quickly than the current ones. Redesigning the software or developing a new platform is thus of the utmost importance for FPInnovations.

The goal of the project, following an evaluation of the current platform, is twofold: to recommend new models for the log breakdown; and to propose one or several mathematical methods for decreasing the time needed to find an optimal solution. These recommendations and methods will serve as the basis for the development of new decision-making tools.

At the beginning of the workshop Forwardsim (a partner of FPInnovations) will describe the features of Optitek™: program flow, architecture, modelling of stems and logs, modelling of machine centres, and optimization algorithms. Then FPInnovations will describe the current and expected needs that the new platform must meet: improving the performance (given that the machine centres are becoming more complex); taking more complex criteria (such as the internal structure of logs and other attributes) into

account; and including new products. The team working on this problem will recommend a model taking the technological advances into account; it will also propose several optimization methods. The recommendations and suggestions of the team will form the basis of the new version of Optitek™, with an emphasis on the modelling of machine centres, the software speed, the compatibility of the new tool with other tools, and the ability to incorporate new tools and functionalities into the software.