Redesigning the Optitek™ simulation tool

Eighth Montreal Industrial Problem Solving Workshop

August 7 - 11, 2017

Decision Support Tool for Smart Solid Wood Product Manufacturing

- ## Needs
  - Mill investment decision support (2020-2035)
  - Solid Wood manufacturing process optimization
  - Supply chain profitability

- ## Challenges
  - Each input is unique
  - Each sawmill is unique
  - Growing list of grading constraints and potential products from each log
  - Secondary processes often needed to generate the final products and complete supply chain analysis

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Optitek™: a partial solution?

- Precise sawmill production analysis
  - Detailed sawmill configuration simulation allowing for machine-center adjustments
  - Product yield and value of modified sawmill processes
  - Impact of a change in wood supply
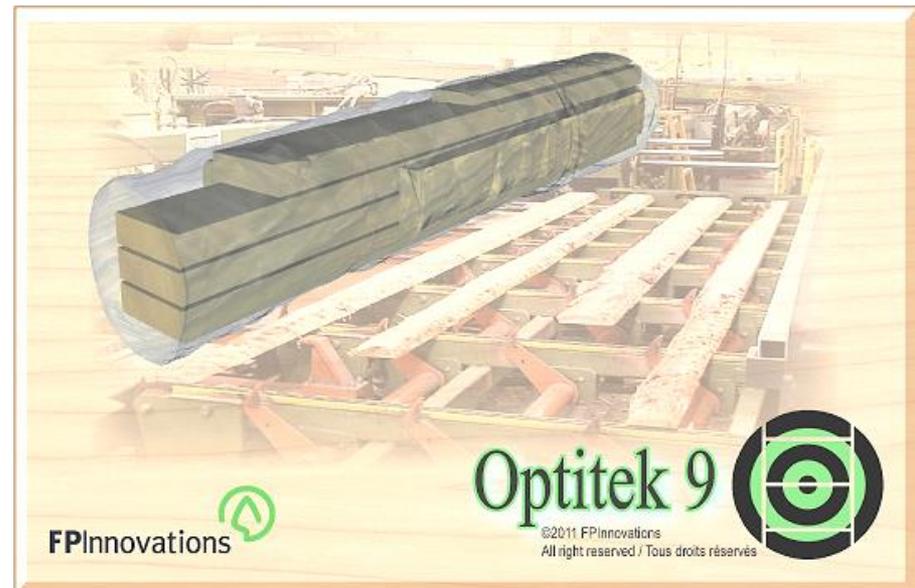
# Optitek™: Decision parameters


Resources
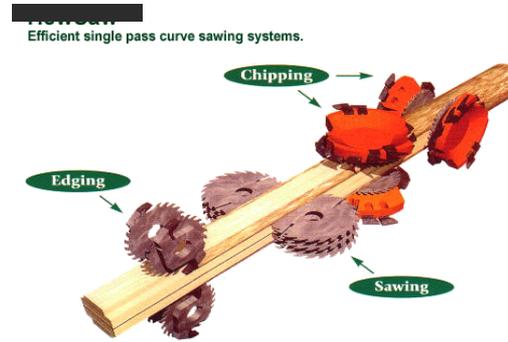
Technologies
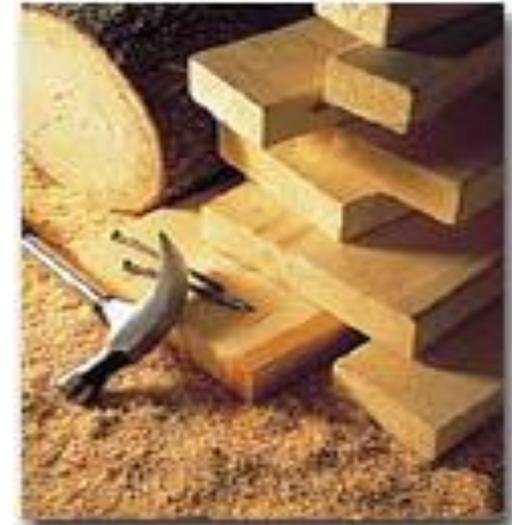
Markets

Optitek™: Resource detailed features

- Precise external profile
- Internal characteristics
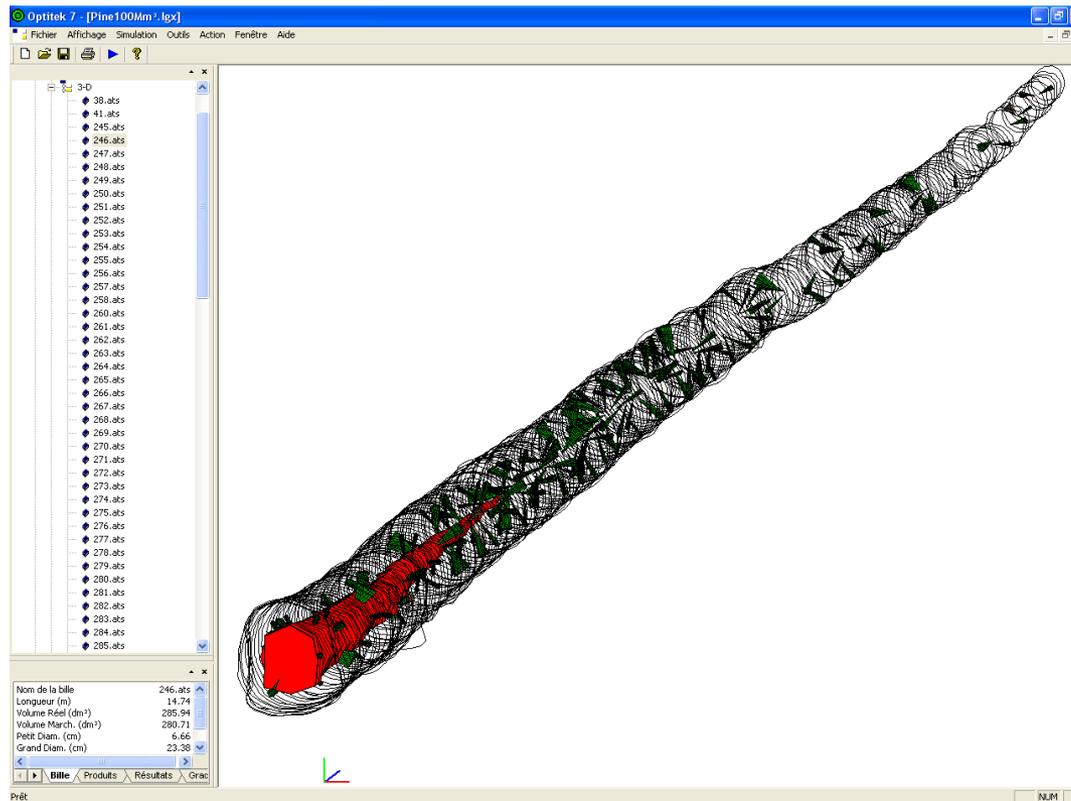
Optitek™: Sawmill configuration

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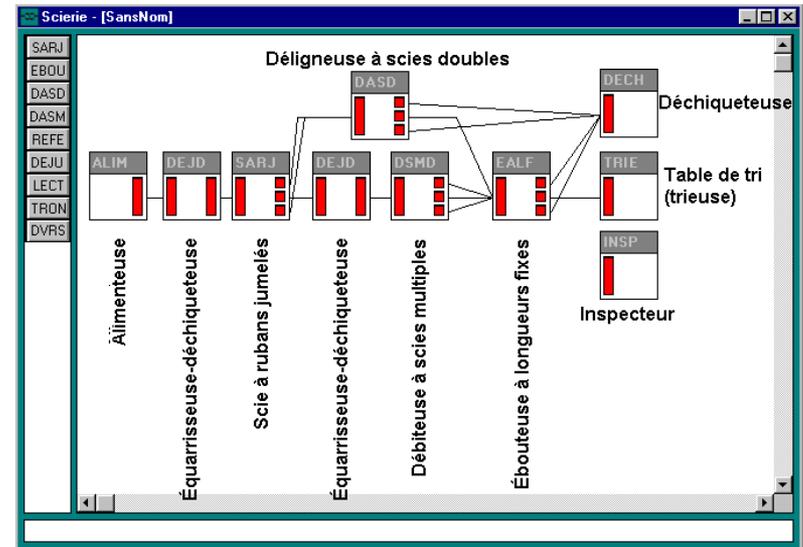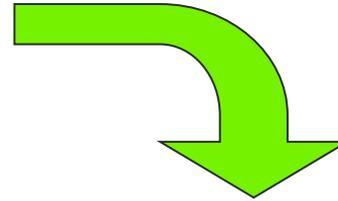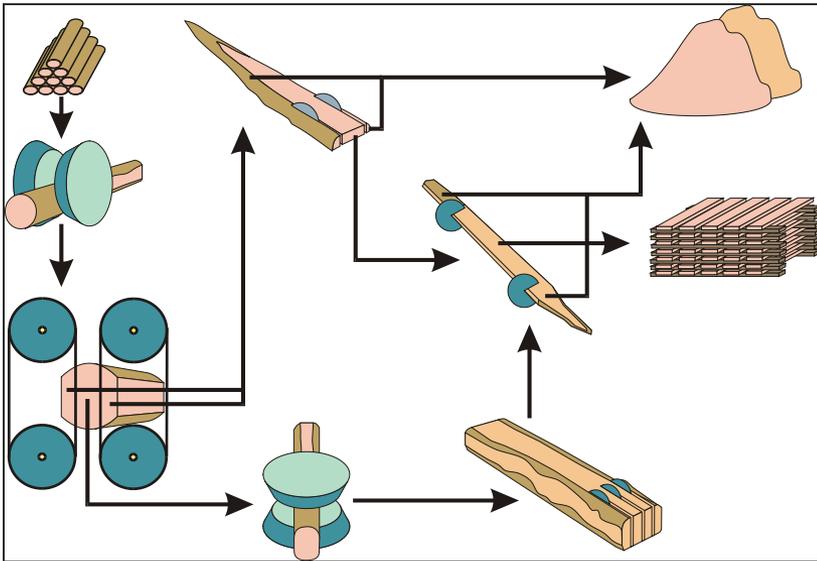
# Optitek™: Some configuration features

Log positioning adjustments
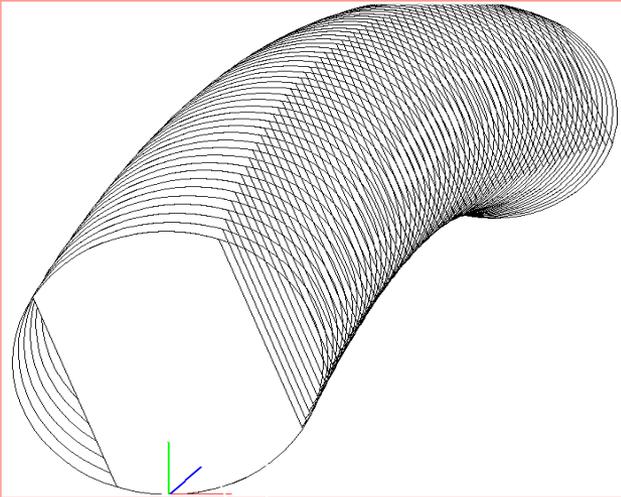
Log rotation   Offset   Skew

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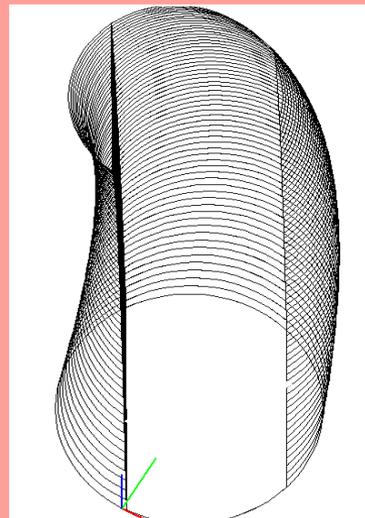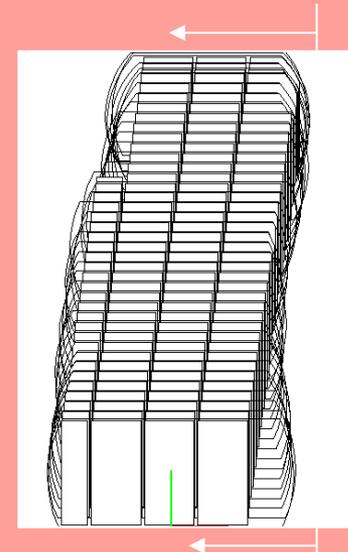
Optitek™: Some configuration features

Curve sawing technologies
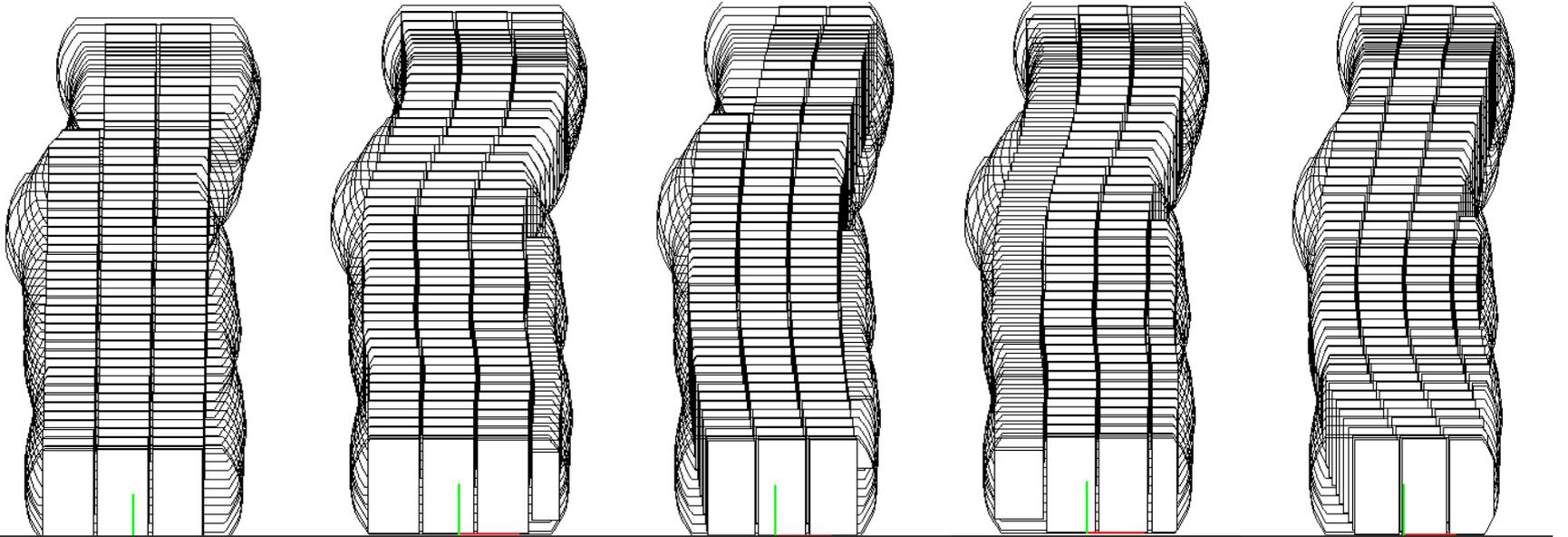
| Straight sawing | Natural curve Sawing | Curve Sawing Calculated | Polymonial | Hybrid Sawing |

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Optitek™: Optimization (market-based divergent process)

-45°   0°   45°

0-3-0   0-4-0   0-3-0   0-4-0   0-3-0   0-4-0
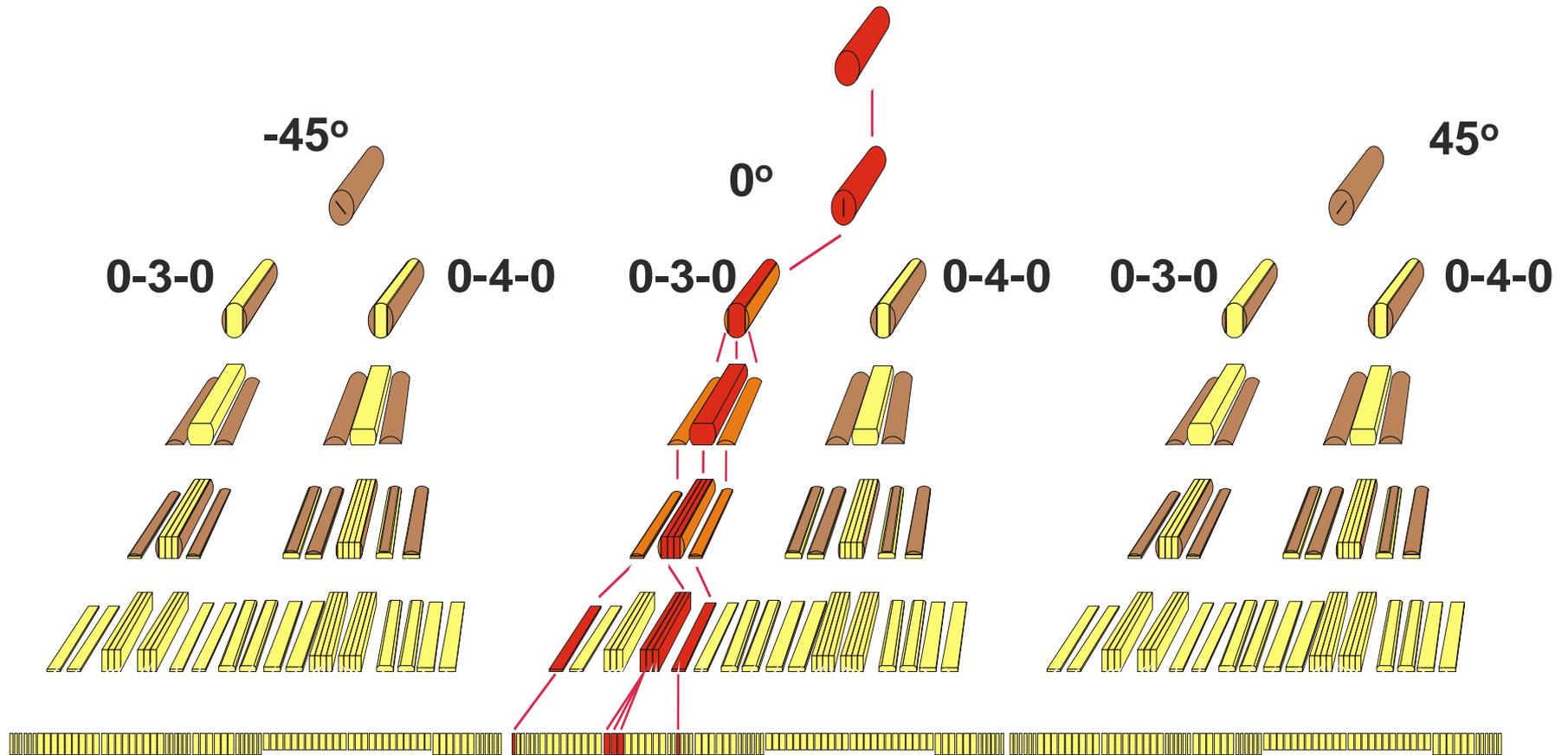
Price list and grading constraints

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Optitek™: Sawmill productivity
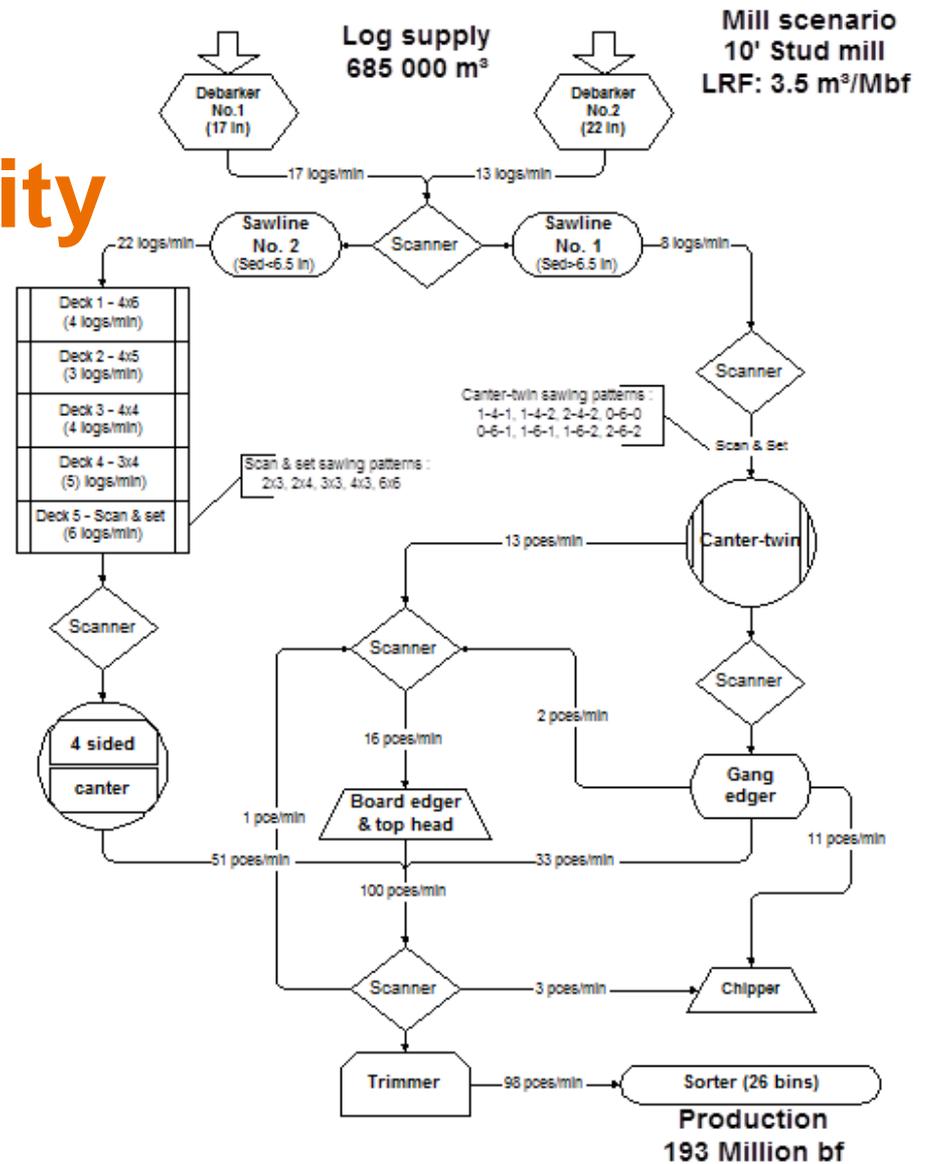
Decision Support Tool for Smart Solid Wood Product Manufacturing

- Needs
  - Mill investment decision support (2020-2035)
    - Designed for current mill configurations
    - Difficulty of modifying configurations makes it static rather than flexible and agile design
    - Need to be adapted to Industry 4.0 paradigms (mass market customization)
  - Solid Wood manufacturing process optimization
    - Optimization process ill-suited for exploding combinations generated from growing product list and internal defects/features
  - Supply chain profitability
    - Production complex including secondary transformation to be analyzed (profit-based with sensitivity analysis at each supply chain component level)

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Decision Support Tool for Smart Solid Wood Product Manufacturing

- **Challenges**
  - Each input is unique
    - … and many features need to be taking into account for best decision
  - Each sawmill is unique
    - Mill configuration difficulty
  - Growing list of grading constraints and potential products from each log
    - Streamlined potential combinations to be analyzed
  - Secondary processes often needed to generate the final products and complete supply chain analysis
    - Convergent process for 2nd transformation?

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Decision Support Tool for Smart Solid Wood Product Manufacturing

- Goals
  - Recommend new models for the log breakdown combinations
  - Propose mathematical methods for decreasing the time needed to find an optimal solution
- The recommendations with an emphasis on:
  - modelling of machine centres
  - software speed
  - ability to incorporate new tools and functionalities into the software platform

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How will we handle Radial sawing?

Radial 60 — Large Log Backsawn

Wedge — Profiled Quartersawn

Radial 90 — Medium Log Backsawn

Radial 45/60 — Premium Quartersawn

Radial 45 — High Stability Backsawn

Radial 120 — Wide Board Backsawn

http://radialtimber.com/technology.html

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Other potential features

- Detailed vs light approaches
- New product analysis rather than equipment
  - Product customization
  - Multiple production facilities for a given end-product (including value-added)
- Analysis based on orders and inventory time
- Impact of wood attributes

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Thank you

Suivez-nous

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