Welcome to the Forestry Seminar
Rockwell Automation on the Move 2018 - Vancouver
## Agenda

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<td>8:30 AM – 8:35 AM</td>
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<td>by Zohaib Tariq, End User Account Manager</td>
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<td><strong>Forest Product Industry Impacts and Challenges</strong></td>
<td>8:35 AM – 9:40 AM</td>
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<td>by Steve Howell, Pulp &amp; Paper Industry Manager</td>
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<td><strong>Break</strong></td>
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<td><strong>Automation Trends in the Sawmill Industry</strong></td>
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<td>by Bruce Clayton, General Manager – <strong>Western Integrated Systems</strong></td>
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Macroeconomic Outlook
Global Impacts and Opportunities for the Forest Product Industry

Stephen Howell: Industry Manager; North American Forest Products
The next source of breakout growth is not obvious as economies are converging ... and global growth overall has decelerated.
Worlds 25 Largest Economies in 2030

Led by China, Asia Pacific will account for 3 of the top 4 largest economies in 2030

Source: The Economist Intelligence Unit
McKinsey Global Forces Survey
The Great Rebalancing…

- The global **middle class will double** … adding **$8 trillion in consumer spend**.

- Roughly **40 percent of the world’s population** will have achieved middle-class status by global standards, up from less than 20 percent today.

- More than **70 million people annually** are crossing the threshold to the middle class, virtually all in emerging economies.

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**More people will exit poverty within the next decade than have in the entirety of human history**
More…

*Middle Class Consumers*

**Demand Side**
- The global car fleet will almost double, to 1.7 billion
- 80% rise in steel demand
- In India, calorie intake per person to rise by 20 percent during that period
- Per capita meat consumption in China could increase by 60 percent
- Fresh water consumption, 30% higher
- Demand for urban infrastructure will soar (transportation, heating / cooling, security, waste management,...)

**Supply Side**
- 100% increase in the average cost to bring a new oil well on line
- Land use expansion at a rate of 3X what it averaged over the last 20 years
- Real commodity prices increase 147% since the turn of the century
  - $1 trillion spent annually on resource subsidies
  - $1 trillion incremental investment needed to improve resource productivity
  - ~70% of productivity opportunities have a rate of return of more than 10%

How much the world has changed:

- In 2000 about (30 %) of people in developing countries lived in extreme poverty, compared with less than (15 %) today.

- In 2000 (12 %) of people owned a smartphone; now, more than (60 %) of global population do.

- In 2000 Facebook, which today has over 1.5 billion users, hadn’t launched.

- In 2000 Kmart was the third-largest US retailer, with $36 billion in sales; by 2016, its annual revenues had declined by three quarters.

- In 2000 Anheuser-Busch was the world’s largest brewer; today, it no longer operates as an independent company having been taken over by formerly smaller players.

- Since 2000 Amazon’s annual sales grew from $2.8B to $89B.
Five dominant forces will drive change in the consumer landscape over the next 15 years...

**Changing Face of the Consumer**
- Middle-class explosion
- Aging population
- Women in the workplace
- Urbanization
- Rich becoming richer
- Millennials taking over
- Shrinking household

*Middle-class spending will triple by 2030*

Source: McKinsey & Company

**Evolving Geopolitical Dynamics**
- Rising labor and commodity costs
- Economic power shifts
  - Economic interconnectedness
  - Climate change

*China’s real GDP could exceed US real GDP within 10 years*

Source: McKinsey & Company

**New patterns of Personal Consumption**
- Increase in convenience
- Focus on health and wellness
- Demand for personalization
- Shift in discretionary spending
- Sharing economy
- Customization

**Technological Advancements**
- Mobile world
- Big data for operations
- Advanced robotics
- Autonomous vehicles
- Social-media-driven consumption
- Artificial intelligence
- Virtual reality

**Structural industry shifts**
- Activist investors
- Direct-to-Consumer models (D2C)
- Continued industry consolidation
- Talent shift/drought

*More than 300 companies faced activist demands in 2016 alone.*

By 2030, ~3 out of 4 people globally will own a...
A Fixed Investment Super Cycle?

Global Fixed Investment as a % of Global GDP
(actual / projection from IHS Global Insight)

- Global Fixed Investment is projected to increase almost $2 Trillion from 2012-2020 (avg. of $200B per year)

Drivers
- Emerging Consumers
- Middle Class
- Expensive / Volatile Commodities
- Resource Productivity
- Regulatory Pressure
- Critical Infrastructure
- Mass Customization
- Industrialization
- Millennial Technologies
Here Today. Gone Yesterday. Why Digital alone Won’t Save You.

Michael Carroll
Vice President, Innovation
Georgia-Pacific
Competitiveness: Minimizing The Pain

Q: Could Your Company Survive a 25% Decrease in Productivity?

“…we’re too good to take a hit like that.”

“…we’ve decided to deploy technology!”

Only “Changed Behaviors” Will Give You a Fighting Chance
The First Law of Imagination:

Don’t let what you know
Become the enemy
Of what you might learn!
Change: Are we Prepared?

How many of you can draw?

How many of you can sing?
Ask a First Grade Class..

What has happened to you?
Risk Profile

What would Chip The Chimp do?

Choose:

Short-term Comfort
Risk Profile

Choose:

Short-term Comfort

Long-term Gain

What would Chip The Chimp do?
Speed: Our Unexpected Foe
Speed: Our Unexpected Foe
Why We Must Lead Differently

What’s in Your Core?

# Employees

Knowledge & Skill
Who Is “The New Core”? 

Who do we hire?

Skill is a Function of the product of Talent and Effort 
\[ \text{Skill} = f(x) \times (\text{Talent} \times \text{Effort}) \]

Accomplishment is a function of the product of Skill and Effort 
\[ \text{Accomplishment} = f(x) \times (\text{Skill} \times \text{Effort}) = f(x) \times (\text{Talent} \times \text{Effort}^2) \]

Effort \(^2\) = Grit 
or
Grit = Character/Virtues

References: Summary of Grit by Angela Duckworth. The Power of Passion and Perseverance
Dr. Angela Lee Duckworth is a professor of psychology at the University of Pennsylvania and a 2013 MacArthur Fellow.
Management Philosophies

What we think we know shapes our future.

If that is true, we must...

- **Unlearn** our behaviors.
  - Primarily, how business in the world works now – *yesterday is gone*.

- **Change** the previous *architecture* with one of organic fluidity.

- The *traditional model* of leadership is obsolete.
Management Philosophies

Our Biggest Impediment: Ourselves.

*Unlearn* our behaviors.  
*Create* organic fluidity.
Speed: The Accumulated Advantage

Are we Amateurs or Pros?

Born: August-September

Born: January-February
Can You Survive 25% Less Productivity?

A change in philosophy.

- Minimize becoming overwhelmed by the speed & complexity of change.
- Decision making will evolve through a shared consciousness.
- Transparency only works when it is eyes-on and hands-off.
  - Behaviors from “hands-on” destroy value from transparency.
- Real-time changes everything.
Speed, Complexity & Transparency

• **Technology** will be used to unite us, not oversee us.

• How will we **enable** the **connected worker**?

• The new center of **gravity** will be our shared consciousness.
Thank You.
Achieving Operational Excellence with a Connected Mill
Challenges
Forest Product Manufacturers

Operational Equipment Efficiency (OEE)
Access to Information
Rising Operating Costs
Production Targets
Unplanned Downtime
Workforce Skills Gaps
The Challenges You Face

- Changing Product Mix
- Import Competition
- Industry Consolidation
- Shortage of Skilled Workers
- Heightened Regulatory Demands

Newsprint production in U.S. & Canada:

57% from 2002 to 2015*  

*2016 Pulp & Paper News

HERE TO STAY:  
MACHINE CONVERSIONS
50B

NUMBER OF DEVICES ON THE INTERNET BY 2020

SAFE & COLLABORATIVE ROBOTS

AI & MACHINE LEARNING PREDICT FAILURES AND REDUCE DOWNTIME

WEARABLES & MOBILE DEVICES TRANSFORM WORK FLOWS

Evolution underway of converting components into intelligent devices
OUTCOMES-BASED
DIGITAL TRANSFORMATION OF THE PLANT FLOOR

PHASE 1
INTEROPERABLE LINE INTEGRATION
Improved OEE
Informed Decisions

PHASE 2
LINE DIGITIZATION
Smart Machines
Predictive Maintenance
Mobility

PHASE 3
DIGITAL PLANT
Visibility
Collaboration
Efficiency
Integrates Data from Multiple Sources.
Shares Information Across Your Enterprise

Connected Mill
One Integrated Architecture®
Process, Power, Machine Control & Safety

From the Log Yard
To the Lumber Yard

Condition Monitoring
AC Drives
Multidiscipline Control
Optimization systems
Secure Network Infrastructure
Mobile & Open Information Platform
Manufacturing Intelligence Software
How Do You Provide Reports Today

Information is gathered manually from various plant systems and reports are generated in excel spreadsheets then distributed in paper form.

The issues are:

- Gathering data is tedious and time consuming
- Data is “stale” at time of reporting
- Reports “live” in a specific person’s file—not shared
Do You Know the Answers?

- Do we have enough capacity?
- Where are bottlenecks?
- What are downtime causes?
- How can we reduce costs?
- What is my first pass quality?
- What is my equipment utilization?
Dashboarding & Reporting

Overview

CONNECT
- Premier Integration with Rockwell Data Sources
- 3rd Party Historians, 3rd Party Systems via OPC / OPC DA
- Database Connectivity (Oracle and SQL)

ORGANIZE
- Organize the data in a way that makes the most sense for your users
- Combine multiple data sources into one logical unit
- Reuse model content for increased productivity

VISUALIZE
- Ad Hoc / Self Service Tools: Excel, Trend, XY Plotter
- Enterprise Reporting Tools: SQL Server Reporting Services and Sharepoint Web Parts
- Mobile: Mobile First Design Model Browser and Display Creation
Electric Motor Current
Indicating Loading Conditions
Vibration Signature
Indicating Mechanical Unbalance
Torque Signature
Indicating Process Anomalies
Vibration Signature
Indicating Unbalance
ENHANCE AVAILABILITY, SAFETY & COMPLIANCE

...monitor critical applications from machine safety to utility systems

...anytime, anywhere
Journey to a Connected Mill

**Business Impact**

**EVALUATE**
- What are the most significant challenges in my organization?
- What KPI’s are used to measure performance?
- What data is needed, from which systems, and define how it could help improve KPI’s?
- Assess current infrastructure for readiness

**CONNECT**
- Modernize infrastructure
- Connect plant equipment & people
- Must be scalable and flexible
- Do it securely

**COLLECT**
- Data from assets and organize to improve business processes
- Leverage information from across the plant and enterprise

**PRESENT**
- Contextualize it against other data
- Make it actionable & to make smarter decisions
- Put it in terminology that’s right for the user

**OPTIMIZE**
- Correlation & qualitative analysis of the information for process improvement
- Maximize plant workflow in a coordinated way
- Make the plant integral to B2B partners
THE ROCKWELL AUTOMATION
Journey to a Connected Enterprise

Targeted Improvements

1

Quality
Inventory
Productivity
Customer Service
Capital Management
Supplier Performance

2

ERP Initiatives

3

Global Supply Chain Restructuring
20 PLANTS

UP TO 200 SKUs

AVG ORDER 20 YEARS

AVG PRODUCT LIFE

PRODUCT TYPES
• Stock + Configure to Order
• Engineered to Order

387,000 SKUs
THE LACK OF CONNECTION
Between the Business Systems & Plant floor

ISSUES CAUSED BY LACK OF CONNECTIVITY

DATA
• No Data
• Inconsistent/Bad Data
• Irrelevant Data

RESULTS
• Slow Decisions
• Inconsistent Analysis
• Wrong Conclusions
• Not Tied to Key Business KPIs
A SUCCESSFUL PROJECT
THE APPROACH AND PROGRESSION

FIRST 18 MONTHS

Global ERP Pilot
- Green Field ERP Pilot with Custom Stand Alone MES Plant System

Global Interface Pilot
- Connect ERP with Legacy MES, Seamless Integration

Global MES Pilot
- Green Field MES Pilot
- Validating MES Technology, Features and Solution

MULTI-YEAR ROLLOUT

Global ERP & MES Pilot
- Standardized Global Solution (ERP & MES)
- Connected Plants – Analytics to Compare KPI Across Plants
- 6 Months Cycle – Multiple Plants (up to 4) per Cycle

NEVER ENDING JOURNEY

Global E2E ERP/MES Supply Chain Optimization
- Global ERP & MES Optimization Across E2E Supply Chain
- Adaptive, Self-Healing, Continuous Improvement Cycle
- Quarterly MES New Feature Releases Prioritized by Global Process Owner and Council
Overall Impact of Connecting Our Enterprise

**PLANT BEHAVIOR**

- **Inventory**
  - 120 Days to 82 Days

- **CapEx**
  - 30% Per Year in Capital Avoidance

**SUPPLY CHAIN / LEAD TIMES**

- **Delivery**
  - Mid-80s to 96%

- **Lead Times**
  - Reduced 50%

**CUSTOMER SERVICE**

- **Time to Want**
  - 82% to 98%

- **Quality**
  - 50% Reduction in Preventative Maintenance
Automation Trends and Challenges for the Forestry Industry

Bruce Clayton, P.Eng.
General Manager

www.westernintegrated.ca
Introduction

- Welcome to RAOTM Vancouver
- A new sawmill installation required, and was engineered with a priority on personnel safety, machine optimization, reduced start up time and increased productivity.
The Company

- Leaders in Educating the Public on the Benefits of Sustainable Forestry
- Manage Timberlands to Support Operations and Provide Financial Flexibility and Strength
- Core Values:
  - Ethics – Exemplify the Highest Level of Integrity
  - People – Hire & Develop Top Quality People while expecting & recognizing Superior Performance
  - Safety – Operate Safely or Don’t Operate At All
Project Design Goals

- Build it According to Industry Leading Best Practices
- Engineered & Designed with Safety for Personnel as Priority 1
  - Environmental
  - Mechanical
  - Electrical
- Optimal Uptime and Productivity
Focus on Safety

- Environmental
  - Class II Division 2
  - Exceptional Air Quality
  - Minimize Human Handling of Product
  - Bright Throughout
  - Electrical Room and Cabinet Design
  - Multiple Access & Egress Points
- Mechanical
  - Guarding
  - Eliminate Hazards
Environment - Dust Mitigation

- Class II Division 2 – NFPA Pub 70
- Class II
  - Locations in which combustible dust may be found.
- Division 2
  - Locations In Which Ignitable Concentrations of Hazards are Handled, Processed or Used, But Which Are Normally in Closed Containers or Closed Systems From Which They Can Only Escape Through Accidental Rupture or Breakdown of Such Containers or Systems.
Early Building Design
Before – No Electrical Rooms

Type 1A Enclosures or MCC’s on Machine Floor
Present – Dedicated MCC Rooms
Before – Type 1 Resistors on Machine Floor
Present – Type 3R Brake Resistors
Present – Type 12 Enclosure
Present – Type 12 Enclosures
Present – Type 12 Enclosures
Past – Type 1A Fans and Filters
Dust Mitigation

- Exceptional air quality.
- Clean, dedicated electrical rooms.
- Type 12 Enclosures instead of Type 1A.
- Type 3R resistors for mounting outdoors or to protect resistors indoors from sprinkler systems.
Project Design Goals - Electrical

- Build it According to Industry Leading Best Practices
- Engineered & Designed with Safety for Personnel as Priority 1
- Connected Load – 10,000Hp
- Arc Flash Mitigation
  - New Power Structure from the Utility
  - Limit Power Distribution Centre (PDC) Sizes
- Arc Flash Containment
  - Type 2 Electrical
  - Protect personnel from Front, Back & Sides
Arc Flash Mitigation

- NFPA Pub 70E and CSA Z462
- Arc Flash Containment
  - Type 2 Electrical
    - Protect personnel from front, back and sides.
  - Requires power system analysis to determine available fault current at location of electrical equipment.
- Panels must be labelled to clearly define approach boundaries and PPE requirements.
- Electrical panels or MCC’s must be rated to interrupt the available fault current.
Arc Shield MCC’s
Arc Shield – Baffled Filters
Lock Out/Tag Out Procedures

- Lock out at motor?
- Individual lock out at MCC/Panel?
- Main Switch lockout?
Individual Lock Out
Single Point Lock Out Tag Out
Future Trends?

- Control Reliable Safety
- Regenerative VFD’s
- Enhanced Communications
Challenges

- Risk assessment?
- Functional specification?
- Build to Cat 3 with provision for Cat 4
- Validation
Basic Process

1. Education & Inclusion
2. Risk Assessment (Machine Safeguarding Report)
3. Functional Specification & Safety System Design
4. Integration & Installation
5. Validation Reporting
6. Change Anything?
   - Repeat Above Steps as Necessary.
Basic Process
Regeneration Techniques – Active Front End

Diode Front End

Active Converter

Input Current Waveform

Input Current Waveform
Why Regeneration?

• Provides a more energy efficient solution than resistive braking.
• Reduce energy expenses and return energy back to incoming power supply.
• Reduce the need for braking resistors and associated equipment.
  ▪ Reduce maintenance costs.
  ▪ Reduce potential fire hazard due to dust collection and overheating.
• Active front end technology results in lower harmonics being generated on the power system.
Enhanced Communications

- Ethernet connectivity to all motor control components.
- Ethernet Starters.
- Managed Switches.
- Remote access for diagnostics.
- OT vs IT.
Discussion and Questions

200 – 8155 North Fraser Way
Burnaby, B.C.
V5J 5M8

(604) 430-1202
(604) 430-5636