Maximizing profit with proactive maintenance in the pulp and paper industry
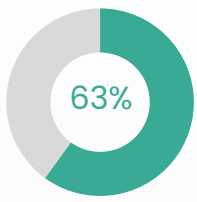
How condition monitoring creates a path to profit
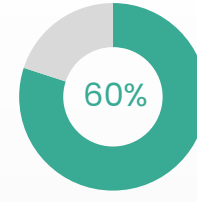
Bently Nevada
a Baker Hughes business

Reactive maintenance is expensive

63%

63% of unplanned downtime results in significant losses.

$10000-$12000
US dollars/hour

Downtime increases maintenance costs by $10,000-12,000 US dollars/hour
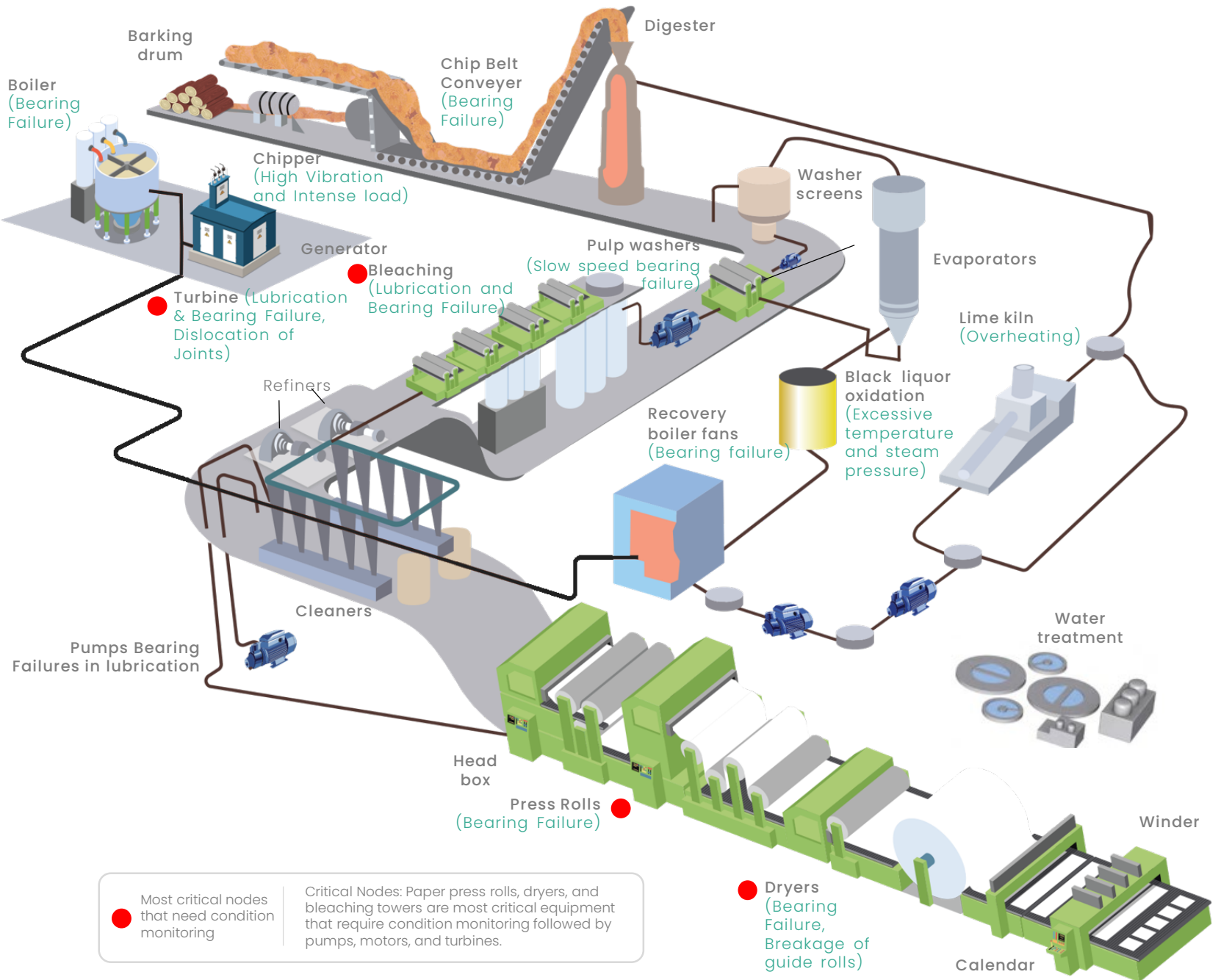
60%

60-80% of equipment malfunctions are due to incorrect or lack of maintenance

Proactive maintenance

Proactive maintenance via condition monitoring predicts potential failures, saving 15+% of maintenance costs.

Avert these potential pulp and paper equipment failures

- Boiler (Bearing Failure)
- Barking drum
- Chip Belt Conveyer (Bearing Failure)
- Digester
- Chipper (High Vibration and intense load)
- Washer screens
- Generator
- Turbine (Lubrication & Bearing Failure, Dislocation of Joints)
- Bleaching (Lubrication and Bearing Failure)
- Pulp washers (Slow speed bearing failure)
- Evaporators
- Lime kiln (Overheating)
- Refiners
- Recovery boiler fans (Bearing failure)
- Black liquor oxidation (Excessive temperature and steam pressure)
- Cleaners
- Pumps Bearing Failures in lubrication
- Water treatment
- Head box
- Press Rolls (Bearing Failure)
- Dryers (Bearing Failure, Breakage of guide rolls)
- Winder
- Calendar

Most critical nodes that need condition monitoring

Critical Nodes: Paper press rolls, dryers, and bleaching towers are most critical equipment that require condition monitoring followed by pumps, motors, and turbines.

Boiler (Bearing Failure) Boilers are prone to lubrication and bearing failure.	**Lime kiln** (Overheating) Plastic deformation due to overheating of the casing.
Chipper (High Vibration and Intense load) High vibration and continuous loads can cause breaking of chipper blades.	**Chip Belt Conveyer** (Bearing Failure) can occur due to low lube oil supply and excessive load on the bearing.
Turbine (Lubrication & Bearing Failure, Dislocation of Joints) Bearing failures due to structural misalignments and lubrication oil defects. While in operations, the turbine casing bolts may get loosen causing dislocation of joints.	**Bleaching** (Lubrication and Bearing Failure) Bleaching towers: Common problems occur in rotating parts and gear boxes due to bearing and lube oil failures.
Press Rolls (Bearing Failure) Paper press rolls have many moving and rotating parts prone to bearing failure that can be reduced with the help of vibration and laser.	**Recovery boiler fans** (Overheating) Explosion of water tubes due to overheating in the boiler section.

Dryers (Bearing Failure, Breakage of guide rolls)
Non-optimum temperature and sudden expansion and contraction due to temperature fluctuations can cause dryer walls to develop cracks. Breakage of guide rolls and other rotating equipment can bring the entire machine to a halt.

Remaining challenges

Employee safety
Harsh operations

Machine accessibility
Challenging

Skill loss
High retirement rates

Pulp and paper conditions
Customized workflows, algorithms & bearing diagnostics needed

How Bently Nevada's extensive portfolio of products and services can help you reach your productivity goals

- User-driven condition monitoring and diagnostic workflows
- High resolution trend, alarm, and startup/shutdown data
- Modern and intuitive interface and continuous user involvement
- Remote portable data transfer
- Best-in-class rolling element and hydrodynamic bearing diagnostics

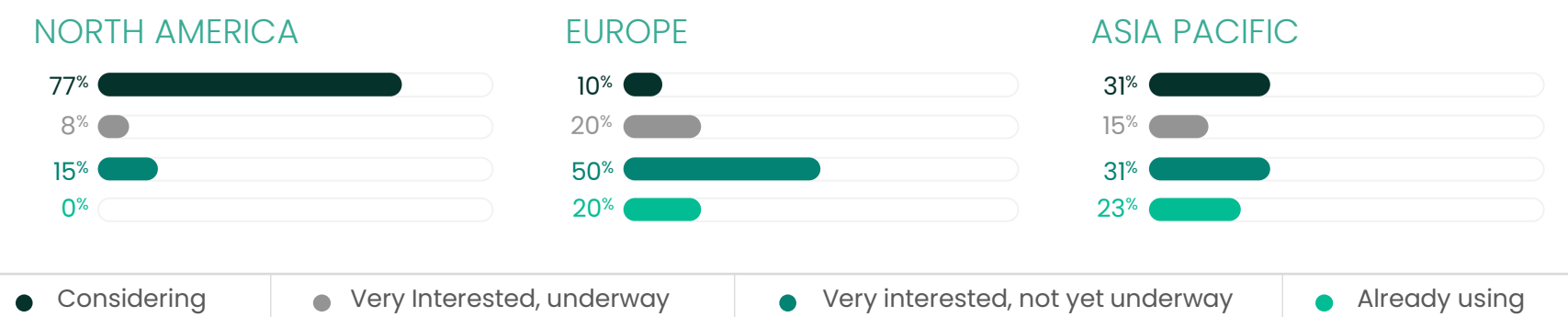## Adoption of Artificial Intelligence (AI) / Machine Learning (ML)

33% Of the pulp and paper manufacturers have implemented AI/ML into their condition monitoring system.

Condition Monitoring systems can help reduce maintenance costs by
10-15% annually

The rising adoption of cloud-based condition monitoring enables use of the latest technologies, such as the Industrial Internet of Things (IIoT) and advanced analytics, to make pulp and paper processing safer and more efficient. Having equipment interconnected through the cloud and other communication technologies allows for cloud-based predictive maintenance. A recent trend is to transform operations into 'smart plants', where maintenance is data-driven, with sophisticated sensor infrastructure deployed to keep equipment condition the prime focus.

Incorporation of AI/ML (with AI/ML Vs without AI/ML)

NORTH AMERICA	EUROPE	ASIA PACIFIC
77%	10%	31%
8%	20%	15%
15%	50%	31%
0%	20%	23%

● Considering ● Very Interested, underway ● Very interested, not yet underway ● Already using

Implementing Bently Nevada condition monitoring systems can prevent production losses of up to hundreds of thousands of dollars per day

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