Overview

• Energy Savings in Wood Processing
• Kiln Energy Saving
• Energy & Demand Management
• Compressors Savings
• Lighting Savings
Energy Savings in Wood Processing

Cersosimo Lumber Company Success:

– Utility Relationship
– Capital Improvements
  • Sub-metering
  • VFDs & controls (pumps & fans)
  • Compressors
  • LEDs
– Operational Improvements

Energy Savings in Wood Processing

Project Resume of success:
Kiln Energy Savings

• Electrical Energy
  – Fan speed control
    • Drying rate
    • Fan efficiency
    • Baffling
  – Future motor efficiency opportunity?
  – Compressor Energy (Dehumidification Kilns)

• Thermal Energy
  – Roof and wall insulation
  – Moisture barriers
  – Pre-drying
  – Steam system

Fan Speed Control: Drying Rate

• Air velocity adjustments using fan speed controls

Fan Energy Savings

**Affinity laws**

**LAW I: With Impeller Diameter held Constant**

\[
\text{FLOW: } \frac{Q_1}{Q_2} = \left( \frac{N_1}{N_2} \right)^{2/3} \\
\text{HEAD: } \frac{H_1}{H_2} = \left( \frac{N_1}{N_2} \right)^2 \\
\text{POWER: } \frac{P_1}{P_2} = \left( \frac{N_1}{N_2} \right)^3
\]

**LAW II: With Shaft Speed held Constant**

\[
\text{FLOW: } \frac{Q_1}{Q_2} = \left( \frac{D_1}{D_2} \right)^{2/3} \\
\text{HEAD: } \frac{H_1}{H_2} = \left( \frac{D_1}{D_2} \right)^2 \\
\text{POWER: } \frac{P_1}{P_2} = \left( \frac{D_1}{D_2} \right)^3
\]

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Fan Speed Control

- **Time Control (Drying Schedule)**
- **Weight Sensing Control**
- **Moisture Content Sensing**
- **Temperature Drop Across Load (TDAL)**
  - Dry bulb temperature measured at inlet and outlet side of packets
  - Temperature difference decreases as wood dries
  - Can be used (with reference to saturation temperature) to guide fan speed
Fan Control System

Energy & Demand Management

“*You can’t manage what you can’t measure*”

- Electric Utility Meters
  - Advanced Metering Infrastructure (AMI)
  - Pulse Counter
- Revenue-grade permanent sub-metering
  - Building Automation and Control Network (BACnet)
  - Equipment metering (power meters)
- Monitor Larger loads
- Continuous Commissioning
- Demand Management
Fan Control System

Dry Kiln

VF
D
PL
C
PC
Utility
Meter

Kiln Operator

Demand Management Example
Compressed Air System Savings

- **Supply side savings**
  - Modulating vs. variable speed air compressor
  - Compressor staging
  - Air drying technology
  - No-loss drains
  - Storage tanks

- **Demand side savings**
  - Leak remediation
  - Pressure reduction
  - Inappropriate uses

- **Energy management**

Compressed Air Dryer Energy

- Heatless Desiccant Dryers
- Heated Blower Purge Desiccant Dryer
- Refrigerated Dryer

Increasing Energy Use
LED Lighting Savings

• Lighting is typically modern fluorescent, incandescent and metal halide fixtures

• LEDs are 30-80% more energy efficient and longer lasting

• LED market is mature

• 100% LED

Summary of Measures

• Kiln Energy Saving
  – VFDs for fan speed control

• Compressors Savings
  – Repair leaks; manage pressure
  – System review for comprehensive savings
  – Variable speed compressors
  – Refrigerated Dryers

• Lighting Savings
  – LEDs!

• Power Monitoring
  – Partner w. utilities & electrician/controls contractor
Thank You!

Questions?

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