

Engineering Analysis

Nestle Purina Team 2

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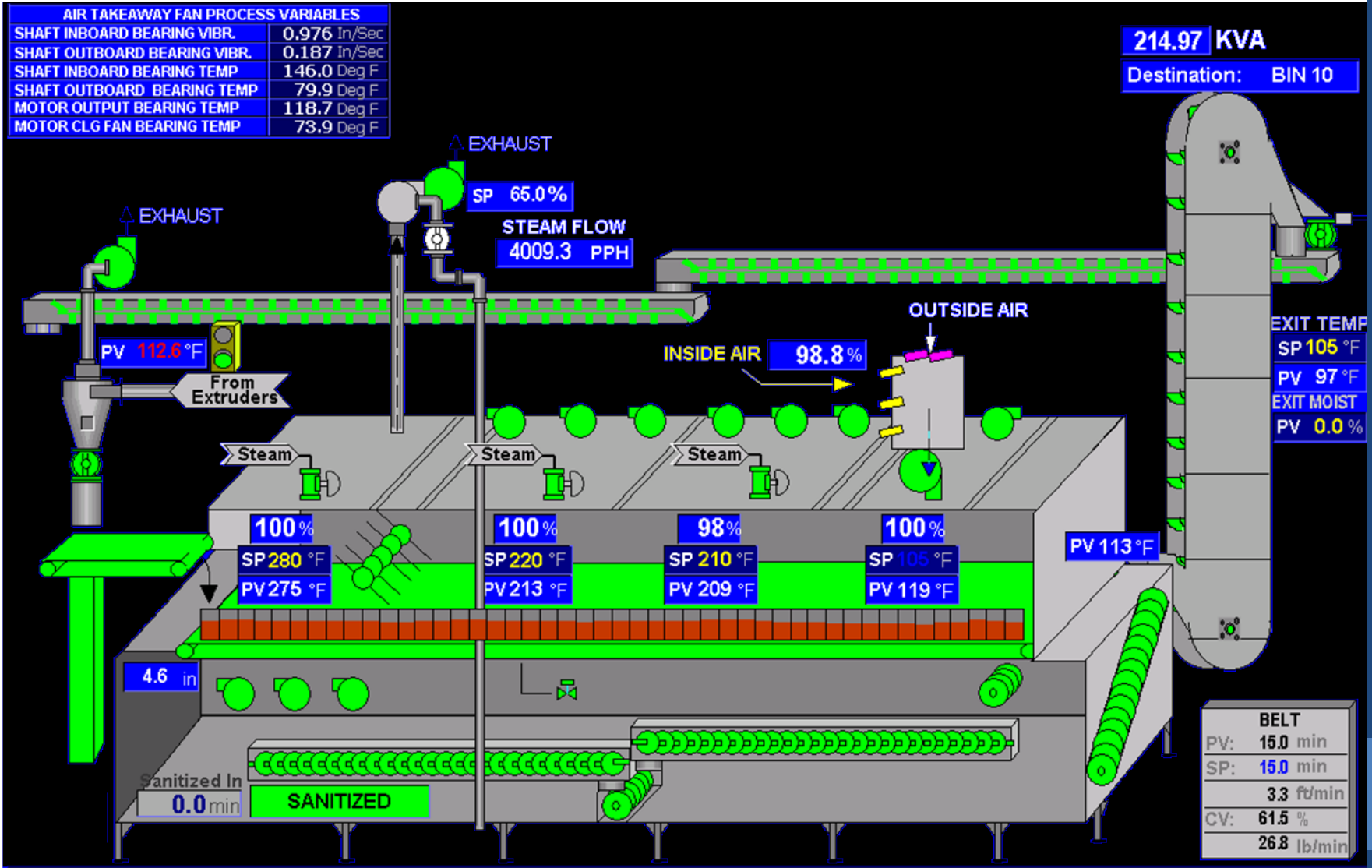
Overview of Presentation

- Problem Statement
- Natural Gas
- Steam/Air Analysis
- Change Boiler
- Updated Gantt Chart
- Conclusion
- References

Problem Statement

- Dryer 3 uses significantly more energy than the other four dryers to extract moisture from the product.

Dryer 3 Layout



Review of Final Ideas

- Convert to a natural gas dryer
- Analyze the existing system
 - Air
 - Steam
- Change the boiler

Natural Gas Conversion

- Aeroglide Dryers
 - Introduction
 - Operation
- Work with Clinton, IA plant
- High Efficiency

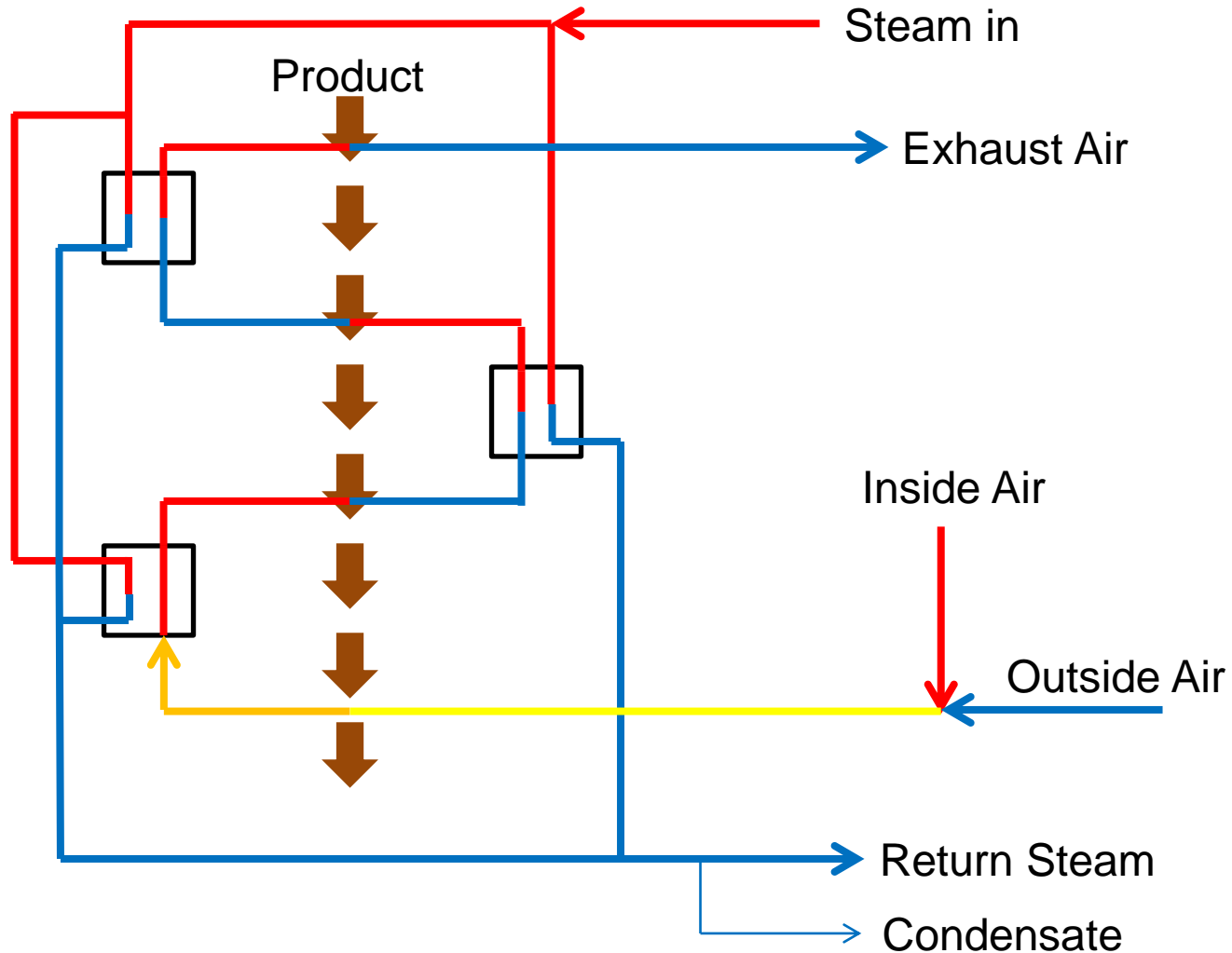


<http://www.aeroglide.com/snack-dryers-roasters-ovens.php>

Natural Gas Analysis

- Using thermodynamics
 - Efficiency
 - Flow rate
 - Relative humidity (moisture control)
 - Compare to current dryers
 - Throughput
 - Improvement of efficiency
- Heat Transfer
 - Estimate amount of heat transfer

Thermodynamic Model



Steam / Air Analysis

- Thermodynamics
 - Global/entire system
- Heat Transfer
 - Local components
- Fluid Dynamics
 - Pipe friction
 - losses

Boiler

- Work with Clinton, IA plant
- Much higher efficiency
 - Possibly many smaller ones

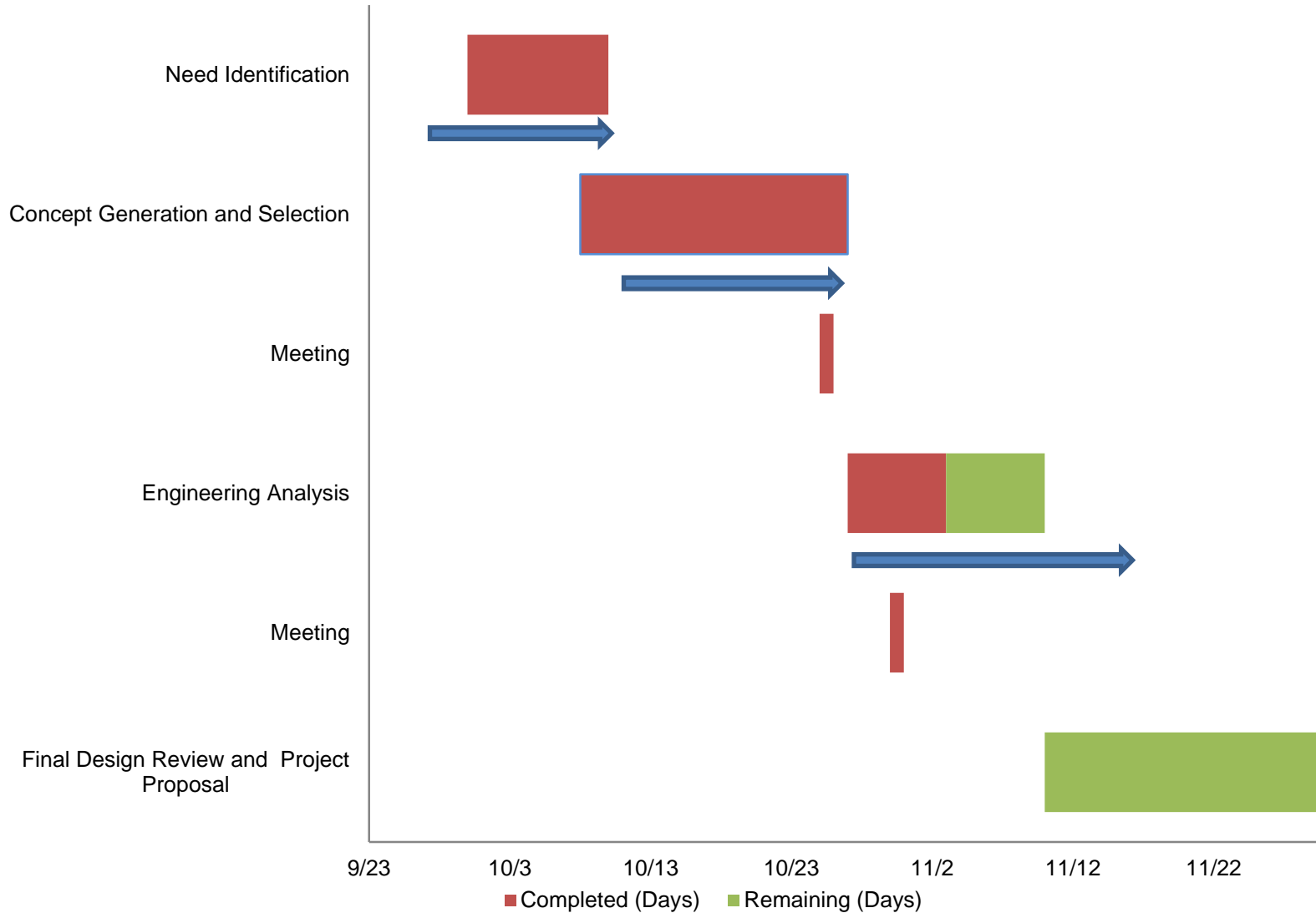
Boiler Analysis

- Thermodynamics
 - Properties of water / steam
- Heat transfer
 - Transfer heat into pipes
- Mechanics of materials
 - Piping
- Chemistry
 - Reaction

Cost Analysis

- Natural Gas Conversion
 - Initial investments
 - Gas usage
 - Payback period
 - Efficiency
- Steam / Air
 - Modification costs
 - Steam traps, insulation, piping
- Boiler
 - Efficiency (steam production / fuel costs)

Updated Gantt Chart



Conclusion

- Review of problem statement
- Review of final ideas
- Planned analysis for each idea
- Cost analysis / economics

References

- **Clint Chadwick**
 - Environmental Coordinator
 - Nestle Purina Pet Care, Flagstaff, AZ

- **Chad Girvin**
 - Processing Maintenance Team Leader
 - Nestle Purina Pet Care, Flagstaff, AZ

- **Buhler Aeroglide Natural Gas Dryer**
 - <http://www.aeroglide.com/snack-dryers-roasters-ovens.php>