CertainTeed

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Organization Background

CertainTeed was founded as the General Roofing Manufacturing Company in 1904, and became CertainTeed in 1917. The company is now a subsidiary of Saint-Gobain, a French company that is one of the largest and oldest building products companies in the world. The CertainTeed division produces roofing products, insulation, siding, drywall and a range of other products at other plants in North America. The Shakopee facility produces asphalt roofing materials, using three production lines.

"MnTAP gave me a valuable learning experience that brought together many different aspects of engineering, research and communication. The struggles of balancing different peoples goals and understanding what opinions and knowledge added complexity and challenge. That ending up helping to achieve an end goal where everyone was satisfied, helping me gain necessary qualities that will add value to me. I have gained valuable connections and experience I can apply to any industry that I choose." ~ AW

Project Background

Shingle manufacture starts with a fiberglass web substrate, coats the substrate with hot, liquid asphalt, then applies colored mineral granules for appearance and wear, then the continuous sheet is cut and assembled into shingle products, and finally packaged.

CertainTeed is projected to use 31 million gallons of water in 2017 for a range of purposes. During shingle manufacture, cooling the sheet is an important function so that the cutting, assembly and packaging processes can function reliably at high speed and produce a consistent, high quality product. There are many different heat transfer mechanisms involved in cooling the sheet, but the two most important mechanisms involve water. Sprayed, single pass water cools the sheet by evaporation and accounts for 60% of the cooling. Recirculated water cools the steel rolls that guide the sheet through the process. This further cools the sheet by direct contact, and accounts for 30% of the heat removal. The sprayed water is of particular interest both because of the volume used and because any water remaining on the sheet during the shingle assembly step makes quality processing more difficult.

Incentives To Change

St. Gobain / CertainTeed have corporate sustainability goals to reduce water consumption by 20% by 2019 and ultimately to eliminate the discharge of industrial water entirely. Line 3, the focus of this project, consumes close to 9 million gallons of water per year, at a cost of $22,000. Additionally, cooling becomes more difficult in hot, humid summer weather when evaporative cooling is less effective and the chance of having a wet sheet at shingle processing increases. When evaporative cooling has been throttled back to keep the sheet dry, production needs to be slowed. The value of lost production capacity due to this issue is estimated to be $159,000 per year.

"CertainTeed strives to minimize the impact of manufacturing operations on the environment. Water usage reduction is a critical component of achieving that goal. Having a highly skilled MnTAP intern working on this project has allowed us to re-focus our environment efforts by understanding the true water reduction potential of our manufacturing operations. Without the MnTAP program, CertainTeed would not have been able to study water usage in as much detail and with as much technical thought and analysis."

~ DJ Damberger, Plant Manager, CertainTeed

Solutions

Install a Chiller for Recirculating Water to the Cold Rolls

The primary recommendation is to install a chiller to lower temperature of the water used in the cold rolls from 80° F to 60° F. This reduction in recirculated water temperature doubles the heat removal capacity of the cold rolls, making the system much less affected by atmospheric temperature and humidity, likely eliminating lost production due to weather. By cooling the sheet faster, the chiller system will lower the effectiveness of evaporative cooling in the cooler portions of the sheet. If water to the two, least effective, spray headers is shut off, 840,000 gallons per year of water will be saved. If overspray from the remaining headers can be eliminated through flow adjustments and improved procedures, a reduction of an additional 3 million gallons per year of water is possible. This change would have a one-time capitol cost of $315,000, with an increase of $24,000 in operation costs, but would have a 2.3 year payback based on $159,000 per year in recovered production capacity and $2,500 or more in water savings.

Install a Larger HoldingTank and Reducing Overflow

A second recommendation is for the semi-closed-loop, roll cooling water circuit. Installing a second 8,000 gallon tank, and a dedicated pump for the air compressors; softening makeup water; and improving the level and pumping controls should eliminate the 5 million gallons per year that currently overflow to the sewer drain – the single largest water conservation opportunity in the plant. This change would cost $100,000, but would have a 2.7 year payback based on $36,600 per year in water savings.

Recommendation	Annual Reduction	Annual Savings	Status
Chiller for recirculating water to the cold rolls	841,000 gallons 250 hours labor	$2,500 $12,500 Production gain: $159,000	Recommended
Larger holding tank and reducing overflow	7,400,000 gallons	$13,600	Recommended

MnTAP Advisor: Karl DeWahl, Senior Engineer