



Water Conservation Improvements CertainTeed Roofing

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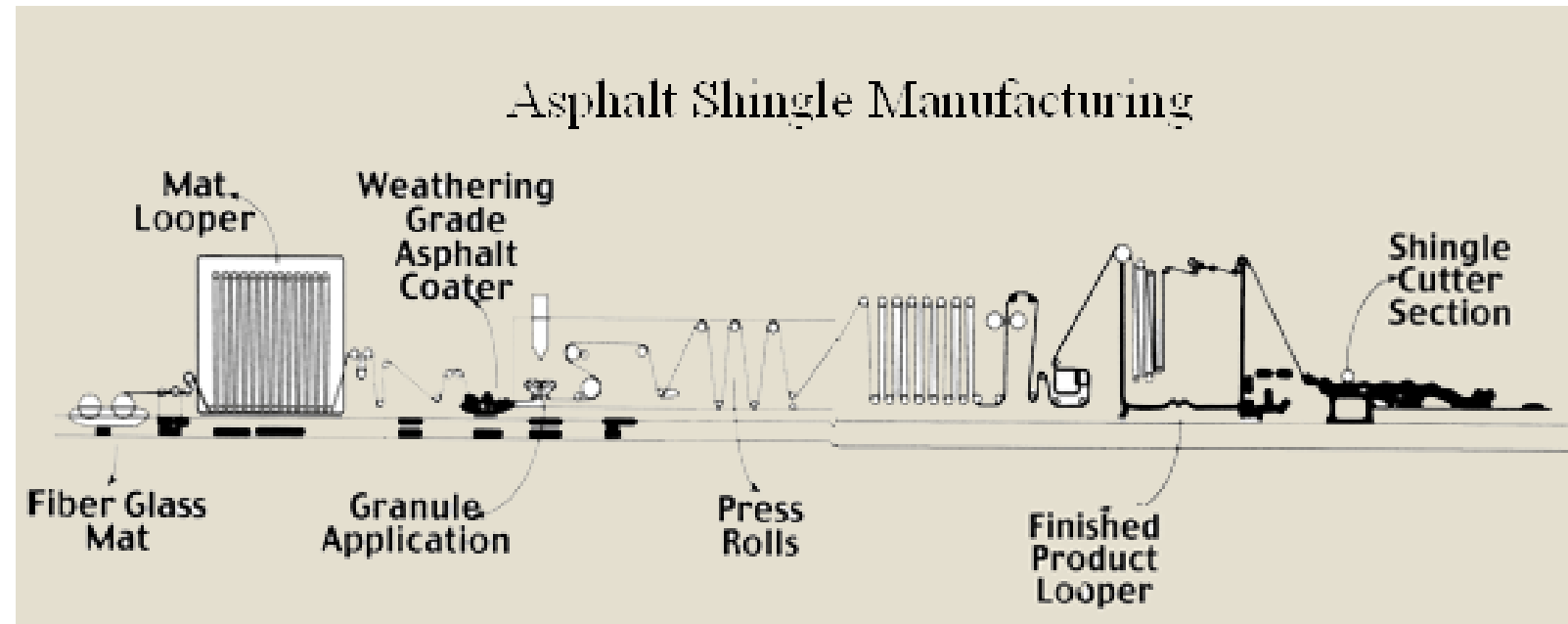
Company Background

- **Saint Gobain- Parent company for CertainTeed**
 - World wide company with 185,364 employees
 - CertainTeed-more than 5,700 employees and more than 60 manufacturing facilities
- **Shakopee facility**
 - Produces roofing and roofing materials.
 - It features three lines
 - This project features the third line only which is their main production line



How Shingles are Made

- Dry end fiberglass and looper
- Asphalt and granules
- Cooling
- Finished looper
- Cutter
- Reapplication
- Packaging



<http://www.inquiring-eye.com/anatomy/roof.htm>

Motivations For Change

- Environmental impact savings
- Water reduction
- Corporate sustainability goal
- Lost production



<http://www.energyandcarbonmanagement.com/media/1058/list110.jpg>

Corporate Sustainability Goals

3 Year Goals 2017-2019

2016 Baseline



Energy consumption: - 5% (MWh/NSP)
Total CO₂ emissions: - 7% (MTCO₂/NSP)



Water Withdrawal: - 20% (M3/NSP)
Water Discharge: - 20% (M3/NSP)



Non-recovered waste: - 15% (Ton/NSP)

2025 Goals

2010 Baseline



Energy consumption: -15% (MWh/NSP)
Total CO₂ emissions: -20% (MTCO₂/NSP)



Water discharge: - 80% (M3/NSP)
Long-term: Zero industrial water discharge in liquid form



Non-recovered waste: - 50% (Ton/NSP)
Long-term: Zero non-recovered waste

Project Goals

Temperature goals

At the cutter it must be below 95 °
Goal is 80 °

Improving the Web Cooling/Drying
While Reducing Water and Energy
Usage



Project Overview

- **Reduce Water Use**

- Reduce waste
- Reduce usage
- Calculate current heat losses
- Test and research new options

- **Create Better Cooling**

- Make production faster
- Reduce maintenance
- Reduce operator error
- Create better product

Approach

- **Determine savings associated with final recommendations**
- **Review**
 - Water consumption
 - Amount of wasted product
 - Energy consumption
- **Create process flows and show options**

Possible Improvements

- Cooling tower overflow
- Nozzle overspray
- Maintenance of cooling system
- Better air exchange



<https://d3fgmcoixbear.cloudfront.net/s3fs-public/colors/308747-LM-MaxDefWeatheredWood.JPG>

Water Consumption

- The main resources that were dealt with in this waste reduction project is water
- Water costs \$.0027 per gallon and is the highest priority of resource for CertainTeed

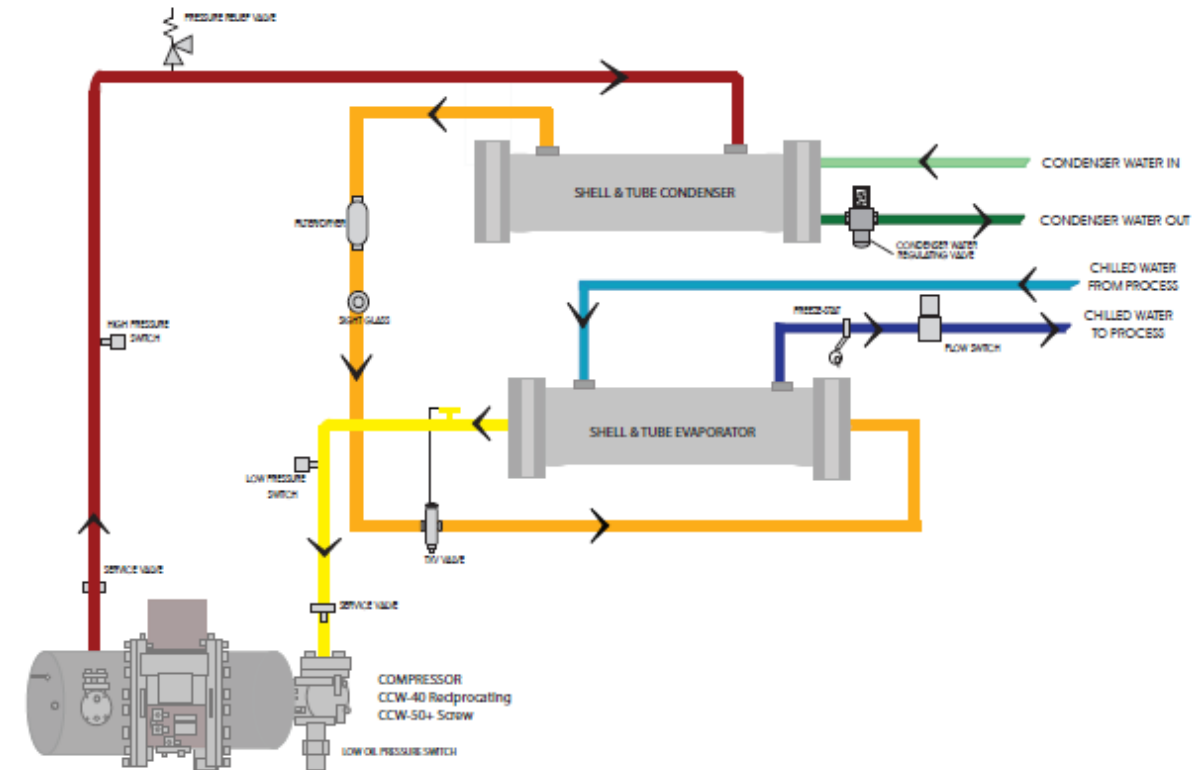
	Gallons	Dollars	Gallons	Dollars
Average Yearly Use	27,026,000	\$49,919	18,500,000	\$15,984
Total Cost	\$ per gallon .0027			

Options

- **Water reduction**
 - Chiller
 - Extending rolled cooling
 - Larger tank
 - Reuse of warm wastewater for use in evaporative cooling
- **Increased Cooling**
 - Maintenance of parts
 - Creating an air plenum
 - Makeup air
 - Air flow Curtains

Recommendation: Chiller

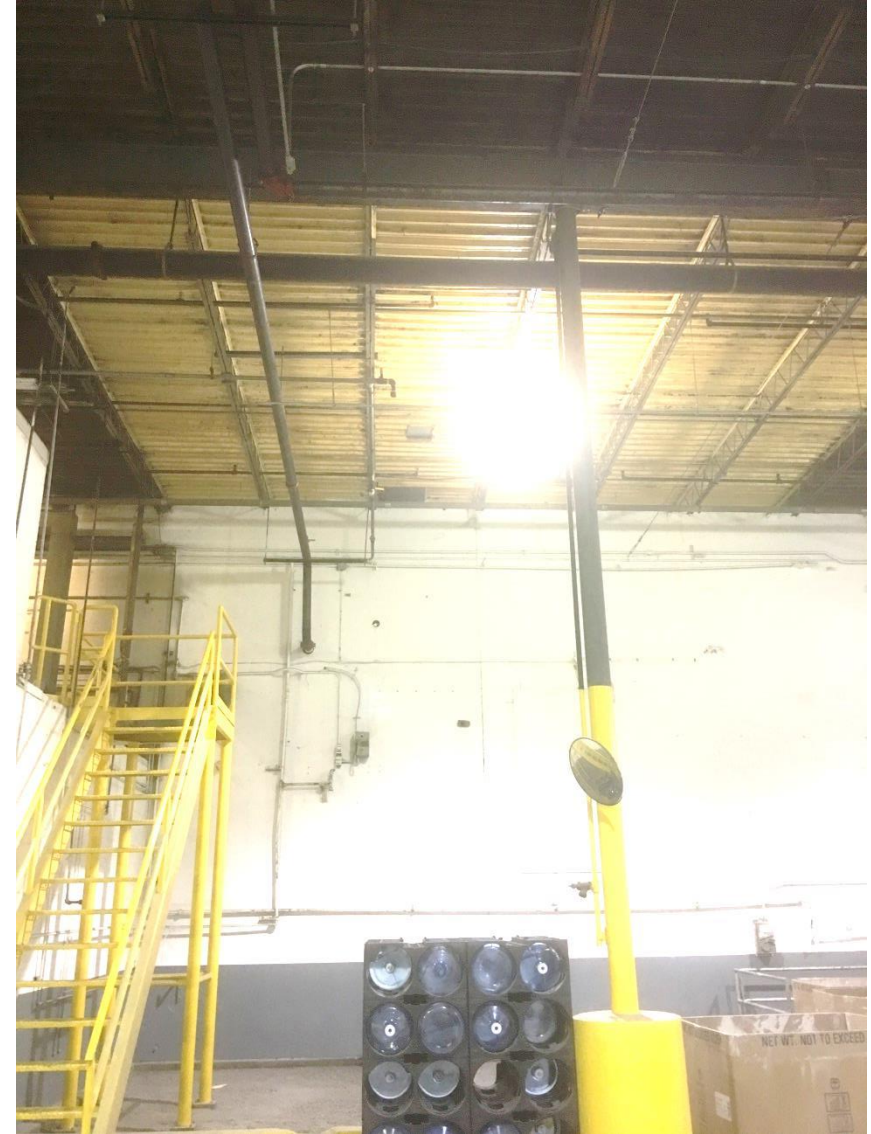
- Best way that limits water use in cooling section
- Run cost \$24,200
- Purchase cost \$161,400
- Install cost \$153,600
- Benefits:
 - Drops water usage 1.8 GPM or 21 degree temp drop
 - Gains back lost production up to \$159,000



CCW - Water Cooled Central Chiller
 COOLING
TECHNOLOGY INC.

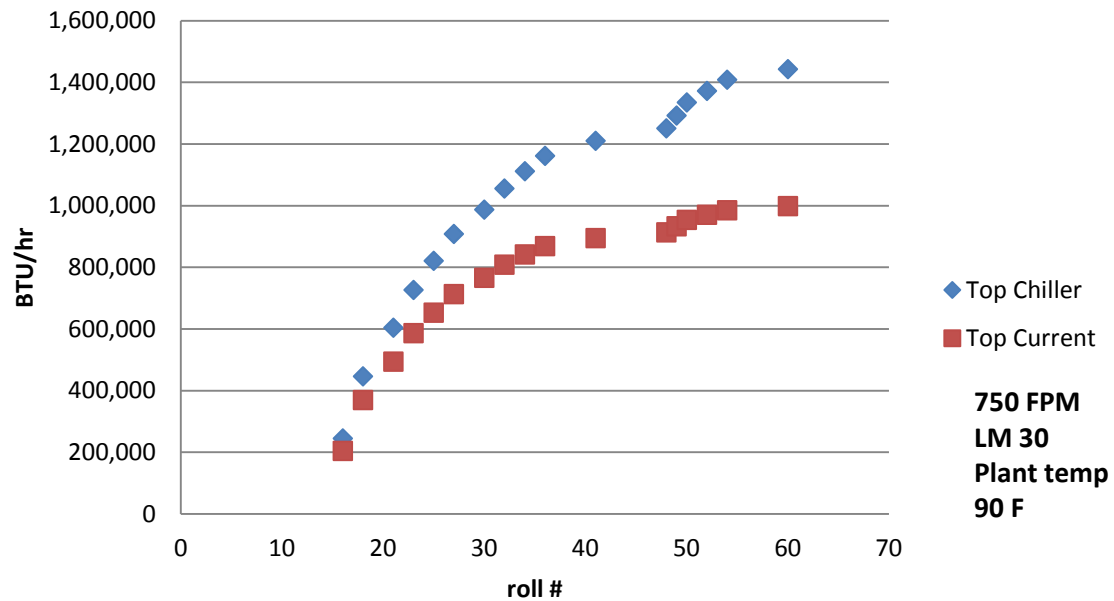
Chiller

- Sizing 205 tons of cooling will cover all of the cooling for line 3
- Water cooled condenser cooled off of current cooling tower.
- 60 degree average cool water temp, possibly lower
- Works best when combined with additional rolls
- Best location next to quality room



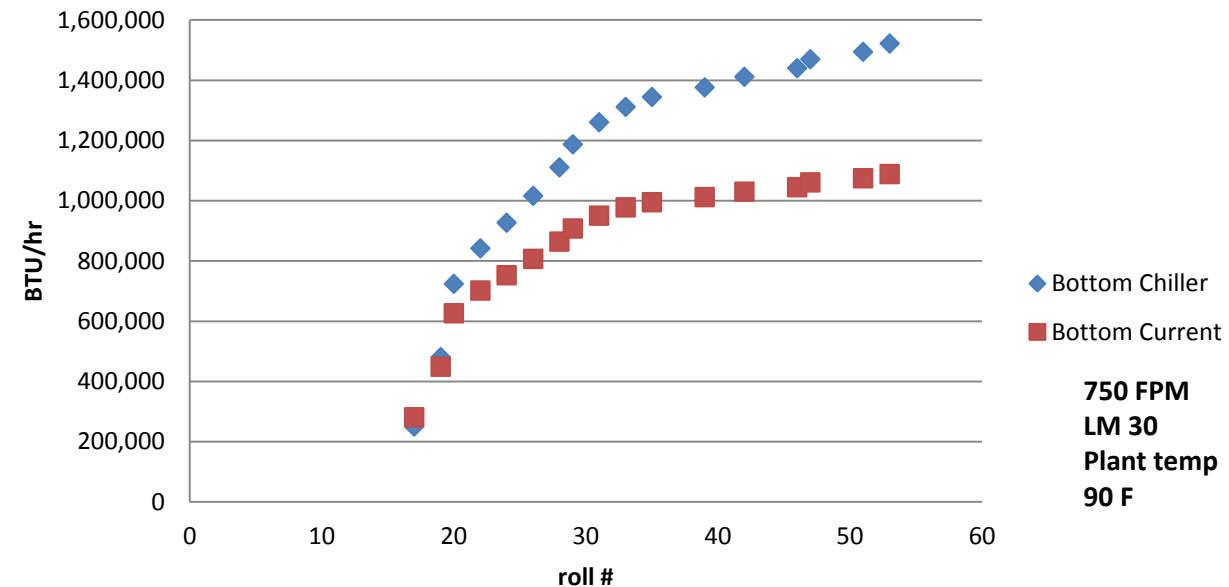
Additional heat loss

Q chiller compared to Current
Cumulative Top



Btu/hr current	Btu/hr chiller
2,098,566	2,962,947

Q chiller compared to Current
Cumulative Bottom



possible water saved	GPM	temp drop degrees F
chiller	2	21

Additional rolls

- Is the chiller enough?
- Additional cooling enables better product
- Higher cost vs saving water
- Lowers run cost of chiller



Additional rolls

- Add 18 rolls
- Further eliminates water use

	Btu/hr	Water saved GPM	Temp drop degrees F
Heat removed with chiller new rolls	195,000	.7	8



Tank Control

- **Overflow**
 - Water over flows pit at around 14 GPM constantly during production
 - Pump schedule
- **Air compressors**
 - Dump water from single pass
 - Doesn't return all water
- **Solution**
 - Put a return water control system on the pit level and send all water back to the compressors to eliminate overflow and only refill pit sump pit as makeup as necessary



Larger Tank

- A second option- larger tank extension
- Addresses the pumping schedule problems
- Allows for the tank to deal with pumping schedules
- Doesn't address air compressor overflow.
- Still will overflow in cases



Options table

Waste Reduction Option	Waste Reduced (per year)	Implementation Cost	Cost Savings (per year)	Payback Period	Status
Water Reduction					
Chiller for recirculating water to the cold rolls	946,000 gal water	\$ 315,000	Water \$2500 Production Gain Up to \$159,000	2.3 Years	Recommended
More rolls for cooling with chiller	(Amount dependent on chiller temp) 367,920 gal water	\$ 162,000 for rolls + 162,000 install	Water (dependent on chiller temp) \$678 Production Gain Up to \$159,000	4.3 years	Further investigation needed
Larger holding Tank and reducing overflow	7,400,000 + gal water	\$100,000	\$13,600	7.3 Years	Recommend

Personal gains

- How to meet with professionals
- How to scope bid and design projects
- Exposure to Industrial equipment
- Data collection
- Seeing real life calculations
- Communicating between multiple people



<http://www.wolfcreekcompany.com/wp-content/uploads/2017/04/customer-service.jpg>