

The background image shows a brick building with large windows and a glass entrance. A concrete ramp with a metal handrail leads to the entrance. Several large, leafy trees are in the foreground and background. The sky is overcast. The text 'In-Line Rinse Water Reduction Project' is overlaid on the left side of the image in a white, sans-serif font. A thin white vertical line is positioned to the right of the text.

# In-Line Rinse Water Reduction Project

- At Allegion, we help keep people safe and secure where we live, work and visit. With more than 25 brands sold in almost 130 countries across the globe, we specialize in security around the doorway and beyond; everything from residential and commercial locks, door closers and exit devices, steel doors and frames to access control and workforce productivity systems.
- This specific project was executed within our LCN brand. LCN manufactures door closers and related hardware.
- Location: Princeton, IL
- Employee Population: 350 employees
- Four Generations working together



# Project Details

- Door cylinders and other related parts are placed on a closed-loop conveyor system running through a powder coat booth and cure oven to apply finish of the customer's choice.
- Clean hooks are required in order for new powder to electrostatically adhere to the door closer parts.
- Powder coat is removed by running the conveyor line and hooks through a molten caustic salt bath set at 900 degrees.
- Corrosive salt must then be removed from the hooks by passing through the in-line rinse water tank immediately following the caustic salt bath.
- The entire process emits a corrosive exhaust which is created from the molten caustic salt bath.
- The corrosive exhaust is captured and cleansed through an air scrubber.
- This is accomplished when water flows over a series of balls, cleansing the air before released.

Molten Caustic Salt Bath



# Setting the Stage

- Employees reporting mild skin irritation – testing confirmed pH level within our in-line rinse tank were registering at 13%
- Employees were immediately placed in a nitrile gloves while the team worked on a permanent solution to both lower and stabilize the pH level in the in-line rinse tank

## Potential Solutions

- Adding sulfuric acid – additional risk to employee with addition and additional cost for chemical
- Increase the water auto fill to a constant overflow – additional water use and cost
- Increase the frequency of draining the bath – additional water use and cost

We knew we could better than the options originally discussed.

Air Scrubber



# Air Scrubber

- Air scrubber is designed to remove carbon dioxide and corrosives by forcing the exhaust through a series of scrubber balls showering the air with water
- Manufacture recommends an overflow rate of .9 – 1.5 gpm to maintain the bath pH at or near incoming city water pH
- Normal operation – 1.5 gpm would result in 2,160 gallons of overflow water daily
- Discovered the scrubber was actually over flowing at a rate of 3.0 gpm resulting in 4,320 gallons / daily
- All scrubber water is treated by on-site waste water treatment
- Immediately scaled back the overflow rate to the manufacture recommendation and pH monitored

The question was raised.... Could we use this water for the in-line rinse tank?

- Sent sample out to laboratory for testing – was it safe for human contact?
- Results were favorable! The team immediately re-directed the water to the in-line rinse tank vs. Waste Water Treatment
- Water flow was set to 1.5 gpm resulting in a 2,160 gallon flow rate daily
  - Results – 776,600 water reduction annually
  - Water reduction in the rinse tank – auto fill was no longer needed
  - Avoided the use of sulfuric acid risk and associated cost
  - Eliminated the need of additional PPE

# Additional Improvements

- Heat exchanger built in-house  
'Tube within a Tube'
- Hot water overflowing from the  
rinse tank travels down the  
center, warming up incoming  
scrubber water prior  
to entering the rinse tank



- Coil made in house to  
utilize the heat from the  
equipment to assist the  
scrubber water prior to  
entering  
the rinse tank



# QUESTIONS ?