

CASE STUDY

T&C Ice Company, Mississippi, USA

Overview

T & C Ice Company is a commercial ice manufacturing and distribution facility in a moderately soft water area. They were experiencing scale build up particularly in the condensers/heat exchangers and ice machine tubes. This was being dealt with by taking the machines out of operation periodically to manually descale and clean the systems. The company was interested in an alternative method of scale removal and prevention in order to increase production time.

Key Problems

After discussion with the owner, the key problem areas identified were:

1. Condensers/heat exchangers had to be taken off-line on a regular basis for descaling. High head pressure and increasing temperatures indicated the condensers had to be descaled.
2. Hard water scale decreased ice production and would degrade the equipment if not taken care of promptly.
3. Ice machine tubes and related equipment were scaling over time, resulting in slower freezing times and ice sticking to the tubes, potentially damaging the long ice tubes due to the ice expanding.
4. Increased head pressure resulting in a reduction in ice production of up to 20%.
5. Failure of the o-rings in the recirculating pumps due to the use of descaling chemicals.

Water Analysis

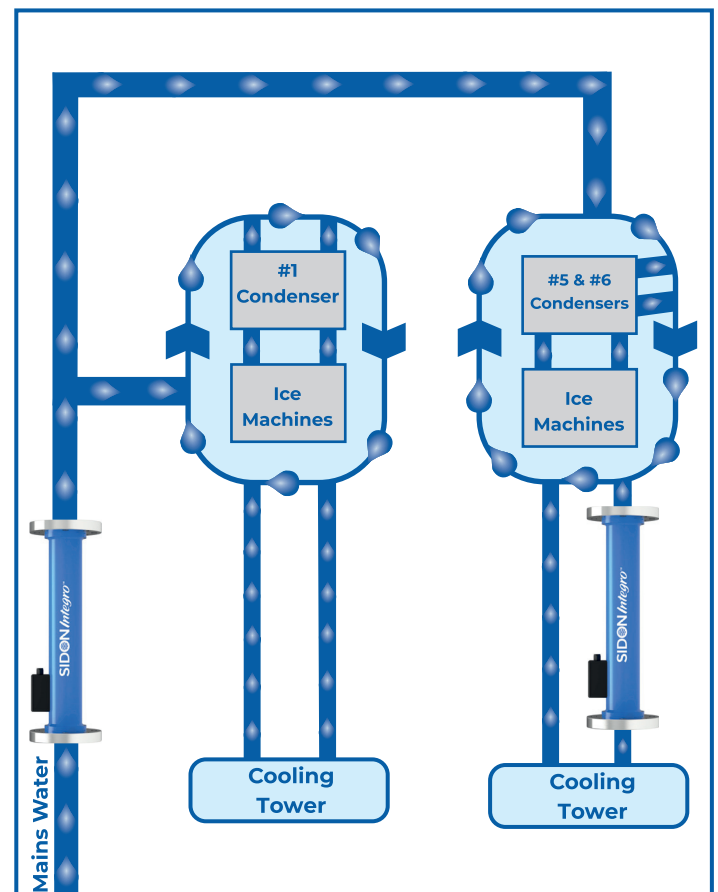
A water analysis was taken from the site and gave a water hardness CaCO_3 level of 58.9mg/l.

Detailed Results

| Determinand | Value | Units | Determinand | Value | Units |
|-----------------------------|-------|-------|------------------------------|--------|-------|
| pH | 7.6 | | Conductivity | 1308 | uS/cm |
| Nitrate-N | < 0.1 | mg/l | Ammonia-N | < 0.1 | mg/l |
| Chloride | 362.5 | mg/l | Sulphate as SO_4 | < 1 | mg/l |
| Phosphorus as P | 0.3 | mg/l | Boron | 0.23 | mg/l |
| Potassium | 4.1 | mg/l | Copper | < 0.01 | mg/l |
| Magnesium | 2.44 | mg/l | Manganese | < 0.01 | mg/l |
| Calcium | 19.6 | mg/l | Zinc | < 0.01 | mg/l |
| Sodium | 273.3 | mg/l | Iron | 0.03 | mg/l |
| Carbonate | < 10 | mg/l | Alkalinity as HCO_3 | 148 | mg/l |
| Hardness as CaCO_3 | 58.9 | mg/l | Dissolved Silicon | 8.0 | mg/l |

Our Solution

One Integro 2 v3 system was installed on the main water line coming into the building covering seven ice machines as well as the #1 condenser. Additionally, after a few months, it was decided to install another Integro 2 v3 system on the closed loop serving condensers #5 and #6. This provided a comparison between the #1 condenser and associated Ice machines which only receive one pass of water through the Integro system from the main water line compared with condensers #5 and #6 which are continuously circulating water through the Integro System via the closed loop water circuit. The closed loop is topped up with water from the mainline from time-to-time.



The Results

The Integro™ systems removed historical scale build up in the condensers, which the owner observed when he opened the condenser plates on December 20, 2020, March 1, 2021 and December 30, 2021. Further observational findings were:

- ☉ Ice machines had not required manual descaling since Integro™ installation
- ☉ Increase in ice production
- ☉ Scale build up on the condensers was visibly reduced (see photos below) and no rodding out of condenser tubes has been required since installation of the Sidon Integro™ units
- ☉ Running temperature of the condensers improved significantly
- ☉ Head pressure on the condensers has been kept within the normal operating range



Image of #1 Condenser prior to installation



Scaled tubes in #1 condenser prior to Integro™ installation



*December 2020 - **Scale build-up reduced***



*March 2021 showing **scale removed***



*December 2021 - Condenser tubes remain **scale free***

Summary

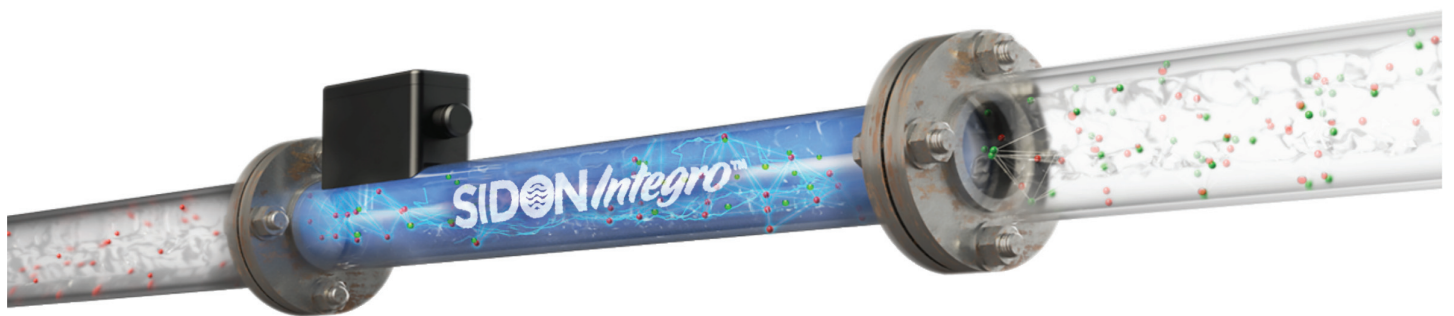
Since the two Integro™ 2 v3 systems were installed, there has been a significant reduction in the scale build up inside the condensers/heat exchanger tubes with no new scale formation. The condensers have been operating at a normal operating pressure & temperature and have not had to be taken down due to the head pressure increasing, as was the case in the past. None of the condensers have needed to be 'rodded out' since installation of the technology. Additionally, the seven ice machines have all been operating efficiently with no scale build up inside the ice tubes. The machines have not been running 'hot' so ice production time has been consistent and the compressors are not having to work as hard.

Installation of the Integro™ technology has improved operating efficiency, reduced down time, decreased scheduled maintenance and improved production output.

What the Owners had to say

“Head pressure on the condensers is down. It has stayed consistent. Never got near having to take it down. So going on since 9/20/20 and no need to rod any out in 2020, 2021 or 2022. Something is working if the head pressure is not going sky high, because the water I've got [is very hard and] has a good bit of scale in it. Since the compressors are not running as hard, I am making more ice on the machines. If the head pressure goes up, it can cut my production 10% to 20% easy because it will slow you down. Normally, I was cleaning my ice machines twice a year. I haven't done it at all since installing the Integro systems. I haven't even cleaned them out due to scale in over a year. Additionally, I haven't lost a pump since installing the Integro whereas before the descaler would start killing the O-rings.”

Glen Pate, Owner, T & C Ice Company, Mississippi, USA



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