P2 SUCCESS STORY

NorTex
Metal Finishing

P2

TMAC
NorTex Metal Finishing offers quality surface protection, durability and functionality for its customers prepared at their Garland, Texas metal finishing facility. NorTex offers a wide variety of services to its customers on aluminum and steel parts. They service a wide variety of industries, including automotive, robotics, telecom, defense, and construction.
• Onsite Assessment identifies sales tax overpayment
• Predominate Utility Usage Study refund of $3150
Uninsulated Etch Tanks

- Energy, environmental and cost reduction opportunities
- Identified floating balls (UFOs) to insulate tank.
- Quantify savings with before and after measurements
Major Machine Monitoring Components

• Major system components of TMAC-designed system:
  • Software
    – Azure IoT Hub, data collection and processing
    – Power BI, data visualization
    – Python script on Moxa UC-3111, edge computing
  • Software
    – Moxa UC-3111, Wireless Gateway
    – Moxa IOLOGIK E1242, IO module
    – Moxa IOLOGIK E1262, thermocouple inputs
    – Thermocouple, J type from McMaster Carr
    – Current Transducer, Allied Electronics CCT40-102
General Arrangement

Location of J type thermocouple (obscured by pump motor)

(6) Heaters being monitored

Monitoring system controls

Current sensor monitoring (1) 120V leg to (1) 4000 W heater

Electrical box containing power wires for tank heaters
Current Sensor Installation

(1) 120V leg to (1) 4000 W heater

Signal Wires to Monitoring Equipment

Current Sensor
Thermocouple Installation

Lights programmed with the following logic:
- Tank temp > 140 °F, Red
- Tank temp < 110°F, Amber
- 110 °F ≤ Tank temp ≤ 140°F, Green
Program logic runs in the Moxa UC-3111
UFO installation

Polypropylene UFO's Installed in Black Dye Tank

Polypropylene UFO Info
Typical Data Visualization

- Time series visualization from Power BI of tank temperature (gold) and heater power (blue) from 02/25 - 03/22.
Typical Data Visualization

**Before**
- **Time To Reach Upper Limit Temperature**
- **Availability**
  - Tank Upper Limit Temp (F): 130.00
  - Avg Heating Rate: 7.19
  - Avg Cooling Rate (ABS): 2.95

**After**
- **Time To Reach Upper Limit Temperature**
- **Availability**
  - Tank Upper Limit Temp (F): 130.00
  - Avg Heating Rate: 8.38
  - Avg Cooling Rate (ABS): 2.57

**Notes:**
- Avg Tank Heater Cost per Day ($): *$0.07 kWh
- Avg Tank Availability (%): **24.47%**
- Avg Tank Heater Cost per Day ($): *$0.07 kWh
- Avg Tank Availability (%): **55.36%**

* PPT = 7.5 Hrs
** PPT = 7.5 Hrs
(Planned Production Time)
Results – Estimated Savings

### Values from Data Acquisition

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Before Insulation - 02/25/21-03/04/21</td>
<td>7.19</td>
<td>2.95</td>
<td>24.47</td>
<td>$ 12.97</td>
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<tr>
<td>After Insulation - 03/05/21-03/12/21</td>
<td>8.38</td>
<td>2.57</td>
<td>55.36</td>
<td>$ 8.62</td>
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### % Changes and Estimated Savings

<table>
<thead>
<tr>
<th>Time Period</th>
<th>% Heating Rate Increase</th>
<th>% Cooling Rate Decrease</th>
<th>% Availability Increase</th>
<th>$ Tank Heater Cost per Day Decrease</th>
<th>$ Decrease in Tank Heater Cost per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>After Insulation - 03/05/21-03/12/21</td>
<td>16.55</td>
<td>12.88</td>
<td>30.89</td>
<td>$ 4.35</td>
<td>$ 1,135.35</td>
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### Assumptions

* Estimated Working Business Days in 2021: 261
* Assumed $0.07 kWh
* Assumed Planned Production Time = 7.5 hrs per day
“It was really great working with TMAC to bring another set of well-trained eyes into our facility. Their ability to provide onsite data collection helped us validate our actions to generate real savings for NorTex.”

Shelby Wolters
Owner and CEO
NorTex Metal Finishing
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