The Firebridge Solution

Using the Six Delta™ Method to gain an optimised perspective, Firebridge identified several performance improvement opportunities. The Six Delta™ Method is a comprehensive approach through a systematic analysis which considers improvements over six interdependent focus areas. This method is data driven by metrics from each focus area which combine to drive a strong business case.

The Six Delta™ focus areas for this project are:

**Primary:** Energy Consumption – Product Quality – Process Production – GHGe Emissions

**Secondary:** Safety & Compliance – Equipment Reliability

The Diagnosis and Findings:

- The furnace was fired with the correct air/fuel ratio during high heat requirements (ramp up) but in order to maintain temperature uniformity had to be switched to full air/fuel only control for the soak part of the cycle.

- Flue sizing was inadequate resulting in positive furnace pressure causing furnace gases to escape to the corridors around the furnace shell.

- Furnace was poorly sealed and produced cold spots inside.

- Insufficient refractory on car bottom resulted in excessive heat loss and higher maintenance costs to maintain furnace cars.

"Investing in a study will give you the clarity and decision-making tools to save hundreds of thousands of dollars in annual energy!"

— Russ Chapman, President, Firebridge Inc., 2019
Improved results were found across all Six Delta™ focus areas.

**Safety & Compliance**
- Flue gas escaping into the corridors was eliminated

**Quality**
- Greater temperature uniformity, faster ramp up time, and still stay within specifications

**Productivity**
- Furnace can run zones at different temperatures resulting in multiple jobs running at the same time
- Total payback period **under 3 years**

**Energy Consumption**
- Converted firing controls to time modulated system (pulse fired)
- Fuel consumption was **reduced by 31%**

**Reliability**
- Increased insulation/refractory on car bottom
- Improved car and door seals using sand seals
- Additional car insulation **saved $44,000/year**

**Greenhouse Gas Emissions**
- CO2 emissions **reduced by 334 metric tonnes/year**

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