

# Is Your Heating System Draining Your Operating Profits?

Hire the experts, improve your process, increase your efficiency, target your payback and profit!

Project and Baseline



## Fuel Consumption Greater Than Industry Average:

There was a concern that fuel consumption as a percentage of cost was higher than the industry average and that significant energy saving opportunities existed. Having one of the largest furnaces in North America at 82 ft long, the customer specializes in heat-treating very large or complex components. The furnace can operate up to 2000°F and has a maximum rated capacity of 400 tons.

## Baseline:

A natural gas consumption baseline was developed to benchmark current furnace operating efficiencies. Energy saving strategies and priorities were determined through a systematic analysis of the existing equipment. The framework which was used to identify energy saving opportunities was based on the following:

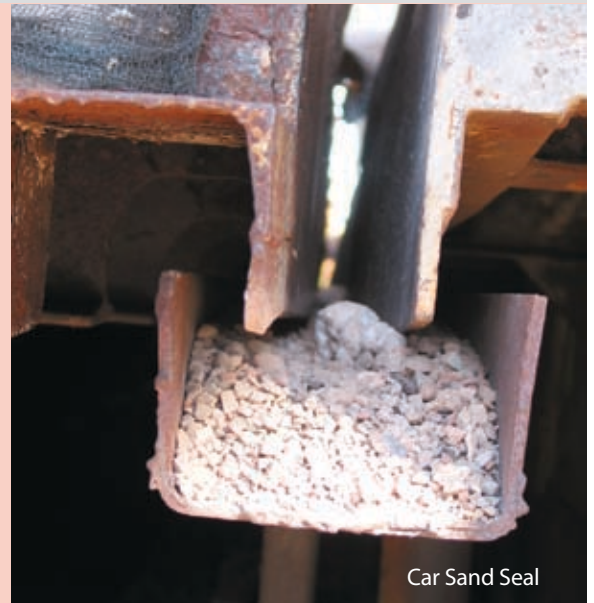
**Heat Generation – Heat Containment/Transfer – Heat Recovery**

Findings

## Diagnosis:

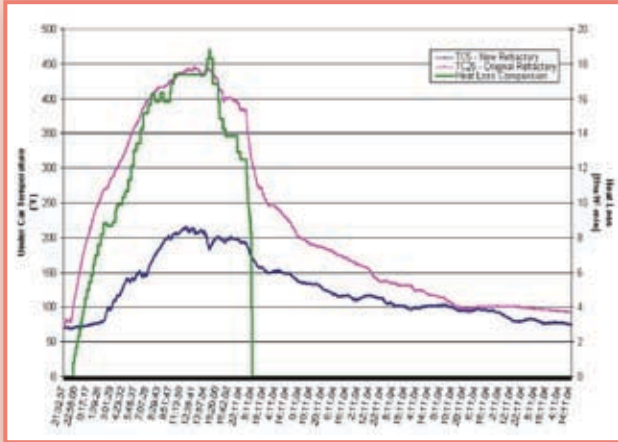
- The furnace was fired with the correct air/fuel ratio during high heat requirements (ramp up) but in order to maintain temperature uniformity had to be switched to full air/fuel only control for the soak part of the cycle.
- Flue sizing was inadequate resulting in positive furnace pressure causing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

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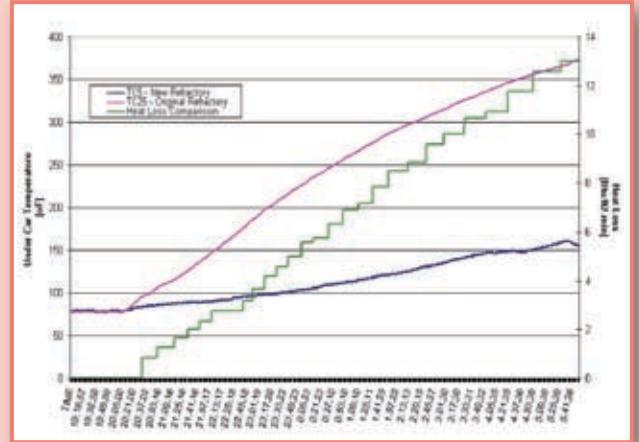


Car Sand Seal

### Comparison of temperatures under car



Under car Temperature Profile of Typical Heating Cycle



Under car Temperature Profile of Normalising Cycle



### Solutions Implemented:

- Temperature control system was converted to 'Cascade' type control with load thermocouples setting the zone temperatures
- Firebridge converted firing control system to time modulated system (pulse fired)
- Increased insulation/refractory on car bottom
- Firebridge improved car and door seals

### Improvements Achieved:

- ✓ Payback less than three years
- ✓ Fuel consumption was reduced by 31%
- ✓ CO2 emissions reduced by 334 metric tonnes/year
- ✓ Furnace can run zones at different temperatures resulting in multiple jobs running at the same time
- ✓ Flue gas escaping into the corridors was eliminated
- ✓ Greater temperature uniformity and ability to ramp up more quickly and still stay within specifications
- ✓ Additional car insulation saved \$44,000/year

