Green Foundry Project 2002-01

Cupola Blast Air Dehumidification System

☒ Full Scale Implementation OR ☐ Pilot Scale/Study

1. Description of the project: What is the issue and how did you fix it?

High humidity in cupola blast air has detrimental effects on cupola efficiency, with well-known issues including: increased coke rate per unit of iron melted, reduced melt rate, reduced combustion temperatures, reduced carbon pickup and elevated thermal oil heat loads increasing exhaust volume to the emission system. The subject facility installed a blast-air dehumidification system to compensate for high humidity conditions at its cupola located in Tell City, IN. A desiccant wheel was installed in the blast air stream to remove water vapor from ambient air prior to blast pre-heating in the recuperator. Theoretical values of coke reduction and cupola efficiency increase have been verified since equipment installation, and annual savings of 2.5% of total annual coke use, or approximately 656 tons of coke, has been achieved.

2. Environmental Benefits: Conservation of raw materials or energy, reduction or elimination of emissions, wastes, toxics, water discharges, etc.

D Improve cupola melting efficiency by 3%

D Reduce Coke usage 2.5% (656 tons) per year

D Avoided 1,804 CO2-tons (1 %) of GHG emissions

D Reduced by 0.7% plant's total energy usage.

3. Other Benefits: Productivity, health and safety, employee morale, etc.

There is a high correlation between the melt rate decrease and the coke rate increase when injecting high humidity blast air. Thus, an increase in the melt rate per coke quantity utilized is expected as a result of dry blast air utilization.

4. Cost Savings: Capital cost, operating cost, ROI or other pertinent cost information.

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Offsetting the detrimental impact of high humidity in the melt process allows cupola-operating conditions to remain more stable through the year. This not only reduces coke usage, but also impacts the ratio of melt to coke productivity. The simple payback of this project was under 3 years.

5. Applicability to other foundries and additional Comments

The project is applicable to other foundries using cupola furnaces to melt iron. Some exclusions may apply related to local weather conditions, production volume, blast air hours, melt rate and coke usage, among others.

6. Applicable Environmental Categories and Foundry Processes. Select all that apply.

Environmental Categories

☒ Carbon (GHG) Emissions Measurement and Reduction

☒ Air Quality ☐ Water Use and Discharge ☐ Waste Management

☐ Beneficial Use ☐ Stormwater ☒ Material and Resource Conservation

☐ Community Engagement

Foundry Process(es) Impacted

☒ Melt ☐ Pour ☐ Mold ☐ Core ☐ sand system/reclaim

☐ Shakeout ☐ Heat Treat ☐ Quench ☐ Finishing ☐Shipping

☐ Maintenance ☐ Pattern Shop ☐ Casting Design

☐ Management Systems and Metrics

☐ Other, explain: Click or tap here to enter text.

7. Add photos to enhance your application, if applicable.