

Application**brief**

- Eclipse Product:** SER v5 800 Self-Recuperative Single-Ended Radiant Tube Burners
- Submitted by:** Graham Munson and Ron Oeltjen, Marshall W. Nelson and Associates
- Application:** Burner Conversion on Continuous Furnace for Bright Annealing Tubes
- Description:** Metal-Matic Inc., a carbon steel tube manufacturer based in Minneapolis, Minn., recognized the need for better efficiency in its local facility, and that increased furnace maintenance in their Bedford Park, Ill., facility was hurting productivity. That's when they contacted Marshall W. Nelson and Associates to explore ways to upgrade their furnace capabilities.

There were several issues surrounding the existing tube firing burners and 6" U tubes in Bedford Park, including higher temperatures due to exposed sections of the radiate tube and glow pilot. There were also leakage issues between the burner and recuperator, causing a short U tube life. In addition, the burners were heavy and difficult to handle during maintenance.



Furnace before conversion with tube firing burners and U tubes.

The goal of the furnace upgrade was to minimize maintenance, increase operating efficiency and run time, improve tube life, upgrade the electrical controls and improve the operator interface.

The Eclipse team reviewed the site and discovered that the existing tube firing burners and U tubes could be replaced with the same number of Eclipse SER v5 800 Self-Recuperative Single-Ended Radiant Tube Burners. The customer requested that a limited scope test in the Minneapolis plant be completed before moving ahead with the full furnace conversion.



Furnace after conversion with Eclipse 8" SER v5 burners.

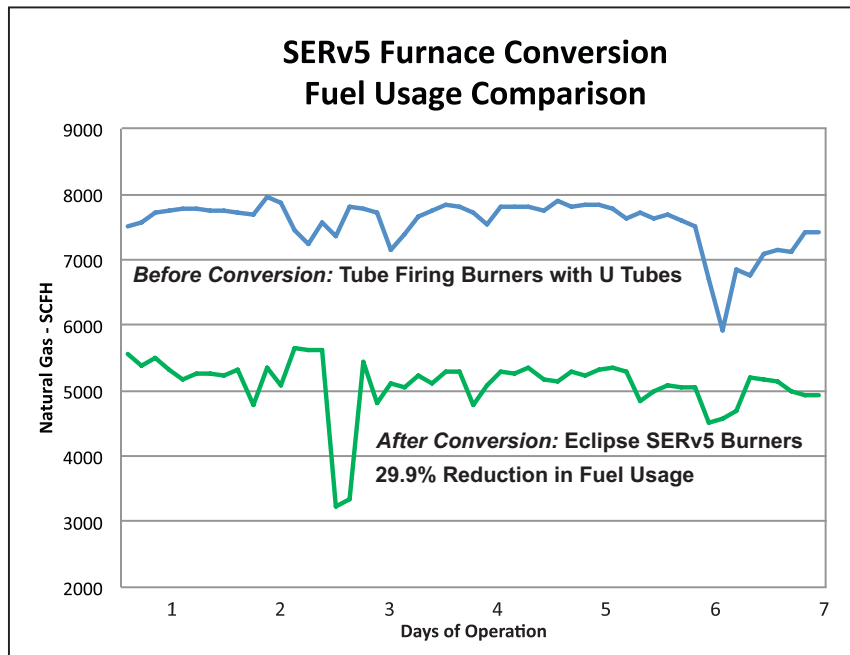
The test conversion in the Minneapolis facility was performed on the first furnace zone. Twelve burners and U tubes were converted to new Eclipse SER v5 burners. The test conversion was a success, resulting in improved fuel efficiency and less downtime, which helped justify the cost of the full conversion at the Bedford Park furnace.

The full conversion in the Bedford Park furnace included replacing (35) tube firing burners and U tubes with Eclipse SER v5 burners. Gas piping and manifolds were updated and electrical wires were pulled from most

components. Changes were made to the furnace brickwork for the new single-ended radiant tubes that replaced the U tubes, and one-third of the furnace was relined.

The controls included an Allen Bradley CompactLogix PLC and 37 Honeywell Flame safeguards. The touch screen provides a view of the furnace operating conditions, and the flame safeties can be reset through the operator interface, which eliminates the need to open the control panel door. The controls display the status of motors, conveyor speed display, zone temperature readouts and adjustment screens, electronic control of zone air flow valves, thermocouple calibration screens, monitoring of all safety components, and an alarm display with history logs.

Automated burner startup and shutdown sequencing allows the operator to start or stop the furnace with the touch of a button. Burner on/off controls allow each burner to shut down for maintenance without stopping the entire zone. A startup ramp cycle for curing refractory was added to the control system. To help document the furnace modification, a rotary gas meter with pressure and temperature compensation was used to record the fuel usage before and after the conversion.



Measurable Improvements

Fuel usage and production volumes were measured before and after the conversion. Documented improvements to the furnace were significant. The new Eclipse SER v5 burners and controls delivered a 29.9 percent reduction in fuel usage and provided higher heat flux capacity. Furnace production was increased by 18.3 percent over the same period.

The joint effort between Eclipse, Marshall W. Nelson and Associates and Metal-Matic made it possible to implement this furnace burner and control conversion in less than 15 days, with virtually no equipment issues during installation or startup. Metal-Matic realized all their goals for the conversion with significant energy savings, increased production, reduced maintenance costs and a more user-friendly system.