

- Eclipse Product:** ThermJet Self-Recuperative Burners
- Submitted by:** Mark Nelson and Ron Oeltjen, Marshall W. Nelson and Associates
- Application:** Car Bottom Furnace for Heat Treating Castings
- Description:** Maynard Steel, Milwaukee, WI, produces large castings for use in a variety of heavy industrial applications such as mining, construction, and earth moving equipment. Throughout the years, Eclipse has provided Maynard Steel with leading technology for furnace applications. When their East car bottom furnace burner system came to the end of its useful life after nearly 20 years, Bob Wabiszewski, Manager of Special Projects, sought out a new design. After a detailed review of available technologies, Bob elected to utilize Eclipse TJSR0100 self-recuperative burners. “We, of course, looked at all the known brands and settled on Eclipse. We were very impressed by the operation in Rockford with the level of professionalism and quality control we

saw. Eclipse has been around for a long time,” said Bob. His research confirmed that TJSRv5 burners offer numerous advantages over the other combustion system designs they were considering:

- The self-contained recuperative design delivers a high degree of heat exchange for fuel efficiency.
- Burner installation does not require flue openings in the furnace wall, which reduces piping costs.
- The open recuperator design is less prone to plugging from debris, and the burner can be easily disassembled for cleaning, which is important in a foundry setting.
- TJSRv5 can operate with combustion air piping at ambient temperatures.
- The burner can operate with lower levels of excess air to achieve the uniformity requirements they need, while reducing oxidation.
- TJSRv5 offers simplified maintenance and control features, with fewer components than competitive products.

Twelve TJSR0100 burners were installed in the furnace. Six upper burners were mounted on one side, and six lower burners were mounted on the opposite side in order to promote flue gas recirculation.



View of the lower mounted TJSRv5 burner section.

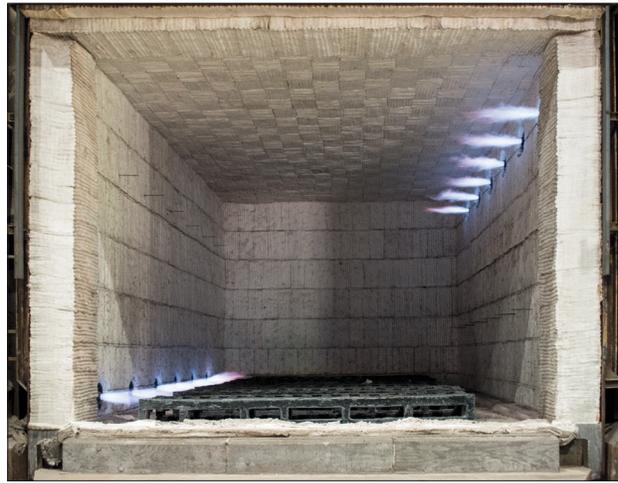
The controls included an Allen Bradley CompactLogix PLC, combustion air VFD's, and 12 integrated flame safeguards. An HMI touch screen provides a view of the furnace operating conditions, as well as, the ability to control burners on an individual basis. The controls also display the status of motors, individual burner diagnostic information, temperature readouts for each burner, electronic balance and control of burner air flow valves, thermocouple calibration screens, monitoring of all safety components, and an alarm display with history logs.

Multiple segment controls allow the operator to control ramp rates and ensure that required soak times are completed. In addition, the furnace controls were designed to provide data logging with load specific information, and the ability to interface with plant personnel at multiple locations for integration with the system.

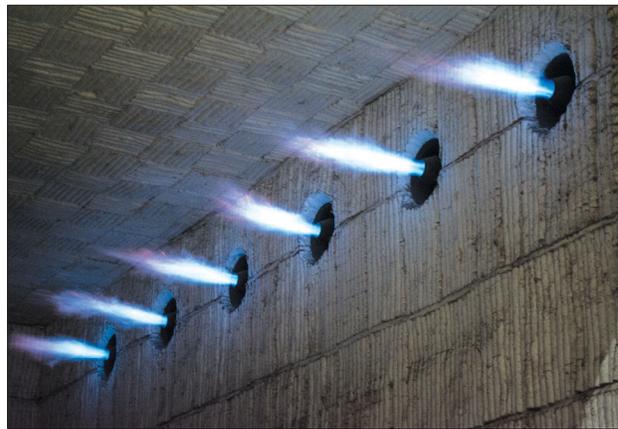
The automated burner control system allows the furnace to operate at low temperatures by sequencing the startup and shutdown of individual burners. The system is programmed to operate the burners automatically in order to maintain the required +/- 20°F temperature uniformity throughout the furnace. Bob states, "What we are doing is pulsing the system. We are going to either high, low, or somewhere in between on any given burner, and turning them off if low fire is not low enough." Operators can also start or stop individual burners with the touch of a button for maintenance.

A Successful Conversion

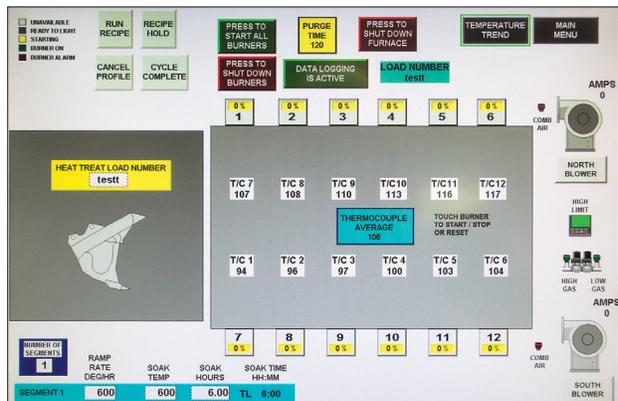
The joint effort between Eclipse, Marshall W. Nelson and Associates, and Maynard Steel made it possible to implement this furnace burner and control conversion successfully, according to the tight specifications and needs of the customer. Maynard Steel was able to accomplish their goals for the conversion by obtaining the expected energy savings, increased production, and reduced maintenance. At the conclusion of the conversion project, Bob Wabiszewski stated, "In the future, if we decide to either install new ovens or rebuild old ovens, we are certainly going to be looking at Eclipse and Marshall Nelson to help us with those projects."



Upper and lower burner arrangement promotes recirculation.



Staged modulation delivers +/- 20°F temperature uniformity.



Automated control system provides precise sequencing.