

- Eclipse Product:** Self-Recuperative ThermJet Burner (TJSR)
- Submitted by:** Andy Wilder, Senior Sales Rep, Eclipse Detroit Office
- Application:** Normalizing, Annealing and Stress Relief Furnaces
- Customer Profile:** Major U.S. Commercial Heat Treater Since 1955

*New direct fired, self-recuperative burner technology from Eclipse gives local heat treater a competitive edge.*

**Description:** A major U.S. commercial heat treater wanted to begin replacing their inefficient, older style furnaces with modern, energy efficient technology to increase production and reduce fuel consumption. They contracted J.L. Becker, a quality furnace manufacturer located in Plymouth, Michigan to design a furnace that would improve production while reducing gas usage. The furnace operating parameters given included a temperature range of 1100° F. to 1950° F. , with a temperature uniformity of +/- 25° F. and a heat-up rate of 3000 pounds of steel per hour. Furnace operation was to be six days a week, on a 16 hour/day production schedule.

**Furnace Design:** In order to meet the customer specifications, J.L. Becker designed a 100" wide by 60" deep by 60" high box furnace with four burners with two lower burners and two upper burners on opposite sides to provide optimum furnace circulation and maximum heat penetration into the load. The design included cast alloy I-beam load supports with high temperature ceramic fiber insulating modules. In order to provide the furnace package with the most energy efficient burners available, J.L. Becker contacted Eclipse, Inc.

**Eclipse Solution:** After reviewing Becker's furnace drawings, Eclipse's product engineers selected the newly released TJSR line of direct fired self-recuperative burners based on the industry proven ThermJet burner technology. The TJSR uses an eductor to draw furnace exhaust through the integral metallic or ceramic recuperator, preheating the incoming combustion air to improve furnace operating efficiency. Four TJSR burners were chosen to meet the 1.6 mbtu/hr gross input requirement. With this burner design, furnace pressure control can be modified by adjusting the integral flue educators which also provide the suction necessary to preheat the incoming combustion air. The integral recuperator eliminates the need for hot air duct work required by external recuperators. ThermJet Self-Recuperative burners come in two lengths: 400 mm or 550 mm. These different lengths accommodate different furnace constructions, and longer lengths provide higher preheated combustion air temperatures.



TJSR Burner

**Note: See page 2 for additional information**

Working with Becker's engineers, Eclipse additionally provided a custom designed 1.5" NFPA valve train complete with Safety Shut-Off Valves, Veri-Flame flame monitors and a ratio-regulator.

Burner performance was verified through thorough testing and pre-shipment firing at the J.L. Becker production facility. After the furnace was installed on the job site, Eclipse field service crews assured that the anticipated fuel efficiency and improved heating performance were achieved.

### **Customer Benefits:**

The end user estimates a 40% reduction in energy usage with improved furnace heat up. Enough fuel savings will be achieved from this project over the next two years to finance the retrofitting or replacing of other furnaces.



*Front view of the furnace showing the location of the upper TJSR burners.*



*Side view showing lower TJSR Burners with eductor extensions*