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Applicationbrief

Eclipse Product: ThermJet Burners

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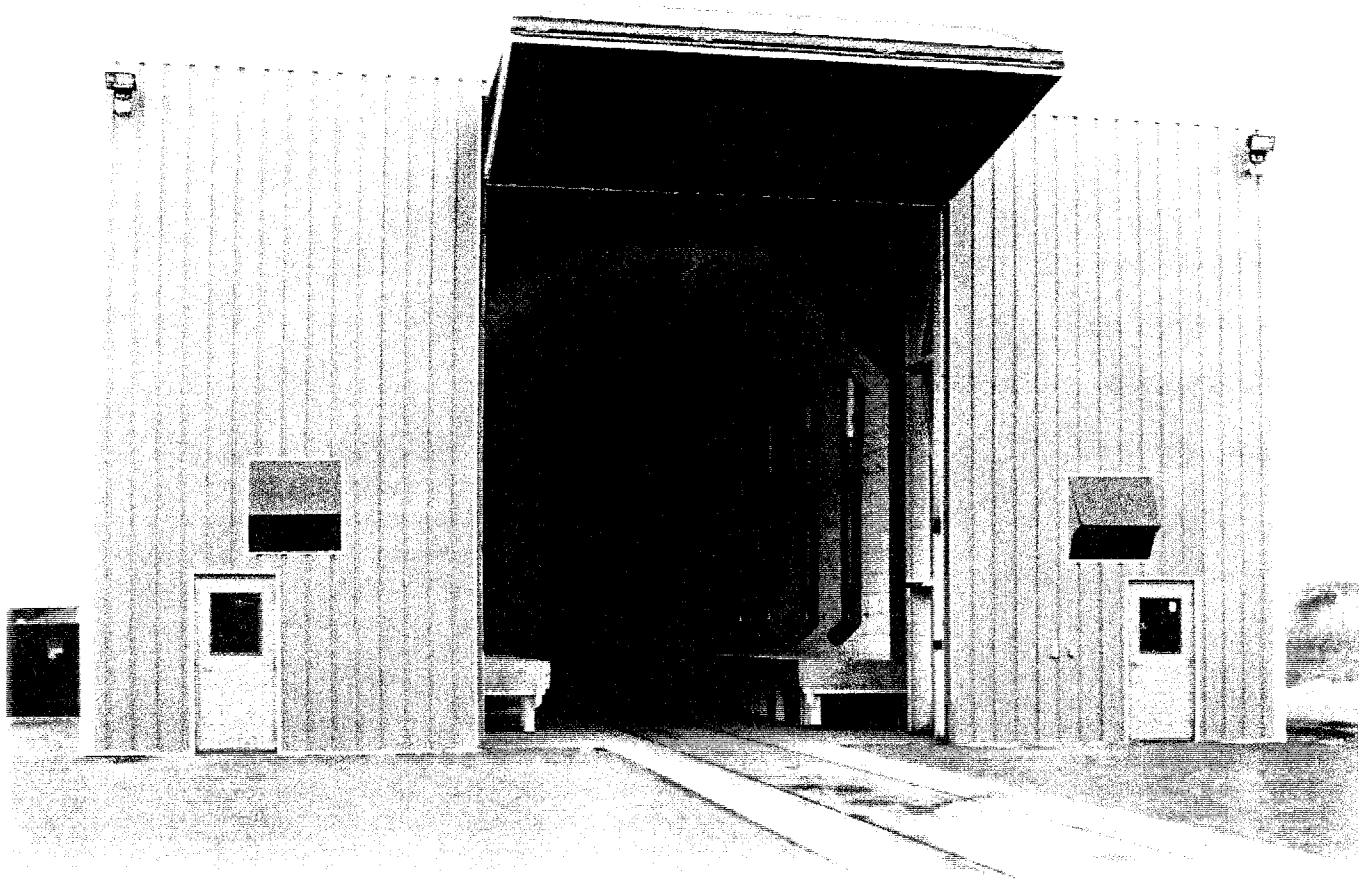
Application: Heat Treating

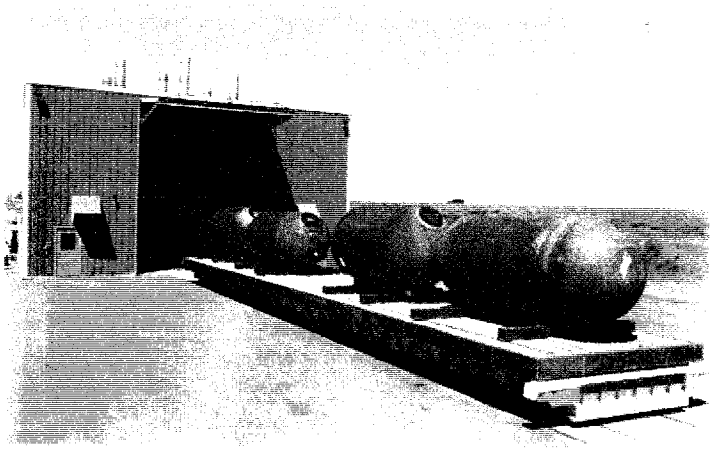
Description: Arrow Tank designed and built a rail car bottom heat treating furnace. The furnace was designed to treat parts up to 70' in length and 20' in diameter. Parts were to be loaded on an insulated rail car and heat treated at a temperature range of 1100° F - 1900° F with a temperature uniformity of +/- 10° F during the heating cycle. The burners were to fire vertically up along the sides of the furnace bottom. The burners were also to be operated on ratio or with excess air depending upon the temperature required for the specific part. They would also need to operate on natural gas or raw propane vapor and, if possible, switch fuels during the process. Batch processes must ramp up and down within customer heating and cooling rate specifications.

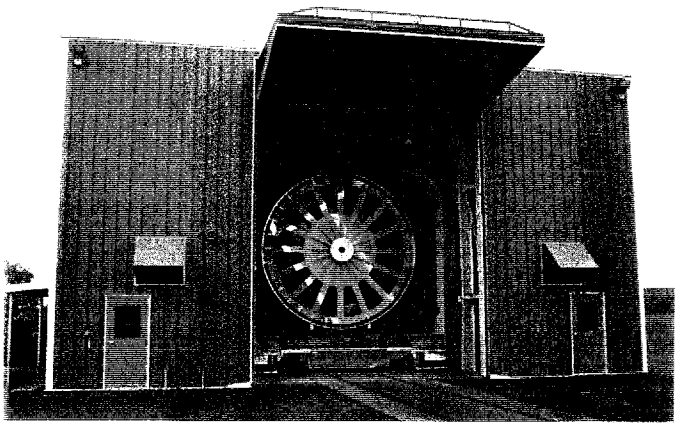
For this application, we used 32 ThermJet TJ100 burners with alloy tubes (the tubes were of a special length to accommodate the 12" soft wall insulation thickness). The burners were divided into 4 zones of control with 8 burners in each zone. A separate 8 burner Multi-flame was provided for each control zone. The 8 burners are direct spark ignited and operated from one common valve train for both propane and natural gas with individual bypass valves for fuel selection at each burner. The entire system is controlled with a custom PLC based control system designed and built by Marshall W. Nelson and Associates. This control system allows for the automatic start up and control of the entire heating process. The operator simply enters the desired temperatures, ramp rates, and hold times into a P.C. recipe file, and loads the part into the furnace. The PLC control system has given the customer the ability to operate the system with little or no operator involvement required after the product is loaded and the system is started. The control system allows for the fuel source to be changed from natural gas to propane vapor "on the fly" and continuous monitoring and logging of up to 64 thermocouple points as the customer requires. With this control system, we were able to achieve control of temperatures as low as 350° F. Our temperature uniformity with the high velocity combustion tubes is better than +/- 5° F in most applications allowing Arrow Tank to process aluminum for the aerospace industry. (See photos on page 2.)

This project is a tremendous testimony to the versatility of the ThermJet burner.



Arrow Tank's Heat Treatment Furnace uses natural gas as its primary fuel and propane as a standby fuel.





- Handles up to 200 tons of load at 1700° F
- State-of-the-art PLC Controls
- Independent, 4 zone temperature control
- Temperature uniformity of +/- 25 ° F
- Accommodates up to 52 thermocouples (expandable)
- 32 million BTUH heating capacity

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