ELECTRIC POWER RESEARCH INSTITUTE

CASE STUDY

THE RIGHT FIT: ELECTRIC INFRARED CURING SOLUTION AT TYLER UNION FOUNDRY

CHALLENGE

Tyler Union Foundry is an iron melting and pipe fitting manufacturing plant located in Anniston, Ala. One of its production lines, which relied on an industrial oven that used convection heat fueled by natural gas, was experiencing maintenance and emissions problems and a resulting decrease in productivity. The foundry approached Alabama Power for an alternative process-heating solution.

OLD WAY

The affected production line finishes pipe fittings with a coating and curing process, which, by industry convention begins with parts to be painted being loaded on an overhead conveyor line. The conveyor carries the parts through a dip tank filled with paint or special coating followed by an 'S'-shaped natural gas-fired tunnel oven. The gas burner is located at the bottom of the S shape (near a fan) before the tunnel oven turns upward. The paint coating cures as the parts move from one end of the oven to the other. Blower fans inside the oven help maintain uniform temperature. The finished parts are then unloaded from the conveyor outside the oven.

The conventional method of using natural gas burners and blowers affected process speed at the foundry. The main problem was burner maintenance; the gas filters and gas burners required cleaning every seven to ten days, taking production off-line. Additionally, the plant's ventilation system was insufficient for removing smoke and gases emitted during the process.

NEW WAY

Tyler Union Foundry's maintenance manager, David Bannister, approached Alabama Power's Technology Application Center for a solution to keep the production up and running. After visiting the site, Alabama Power saw an opportunity to replace the gas burners with electric infrared (IR) heaters. Four IR heaters were placed on each side of the wall in the curing tunnel (Figure 1). Each IR heater had a medium-wave IR emitter rated at 12.75kW which brought the total IR capacity to 102kW.

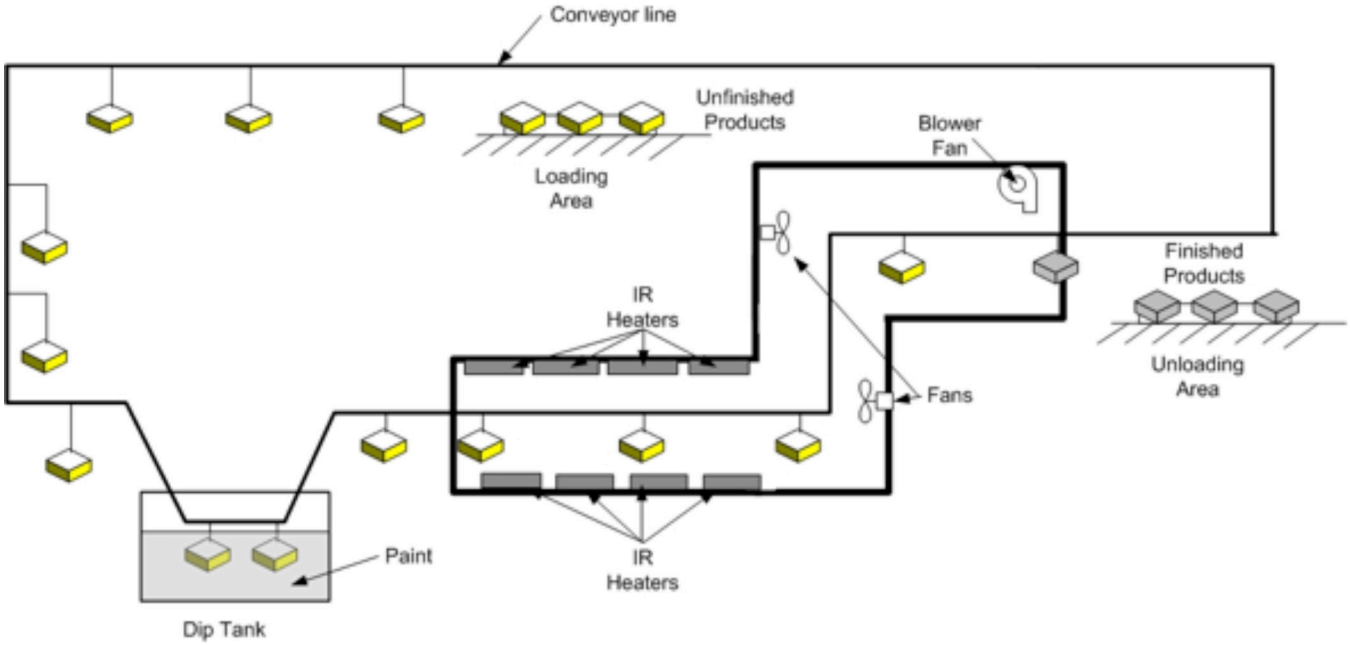

Figure 1 – Schematic of new finishing line at Tyler Union Foundry.

Figure 2 – A painted pipe fitting approaches the IR heaters in the oven (left). A finished part exits the oven (right).

RESULTS

The oven modification resulted in quick resumption of production at a modest cost. Each IR heater cost approximately $1,000. The total cost of installation for the eight IR heaters and controls was approximately $10,000.

The maintenance crew soon noticed that they did not have to clean or replace gas filters or burners every week. Not having to stop regularly to clean or replace burners resulted in reduced downtime of the production line.

The maintenance manager also noticed the absence of emissions or fumes because the oven used electric IR heaters. With fewer components in the IR heater compared to the natural gas burners, less maintenance was required. Furthermore, the oven came up to operating temperature in just a few minutes with the IR heaters, compared to nearly 30 minutes with the natural gas burners.

OSHA regulations required constant monitoring of carbon monoxide (CO) levels when the natural gas burner and blower system was used. The absence of combustible gases and CO improved safety for personnel and reduced the environmental impact of plant operation. Overall, the plant was able to consistently meet the production requirements without the downtime caused by the natural gas burner and blower system. Infrared heating was the right, permanent fit for Tyler Union Foundry.

BOTTOM LINE

This IR system had an estimated simple payback of less than a year, when the non-energy benefits such as improved productivity, reduced on-site emissions, reduction in maintenance and labor costs, and improved worker health and safety were taken into consideration.

FOR MORE INFORMATION

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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