

The Clayton Advantage Installed A Case Study: Mittal Steel

Steam Generator Operates On Waste Gas

Mittal Steel's Warren, OH plant produces Metallurgical Coke which is used in blast furnaces for the smelting of iron. Coke is obtained by the destructive distillation of coking coals which is basically, heating the coal between 1650° F and 2000° F in a controlled atmosphere. A by-product of this process is Coke Oven Gas. COG is a low BTU (500 – 600 BTU's/cu. Ft.) gas with considerable impurities, including sulphur and tar. This coke oven gas is typically "flared" off as a waste product.

Since any boiler large enough to burn this by-product gas as a fuel to provide the amount steam used by the plant would require full time licensed operators in Ohio, the Warren, OH plant does not have steam boilers. They purchase their steam from a steel mill next door at considerable expense.

Plant Engineer, Joe Magni decided to find out what equipment options were available. One company he spoke with was Clayton Industries. Clayton Steam Generators are forced circulation vertical water tube boilers. Due to their unique design, they do not fall under the Ohio Boiler Operator requirements and can be operated un-attended, eliminating the high cost of dedicated boiler operators. They are available up to 700 bhp and pressures up to 2,500 psig. Clayton had successfully fired this type of



Clayton 250 BHP Steam Generator equipment on coke oven gas in Europe, but did not have installation in the US. With the operator issue out of the way, Joe Magni could concentrate on the combustion issue. Clayton Senior Sales Engineer, Mike Sabol provided Joe with drawings of the Clayton cog burner used in Europe. Since the design used large opening and high velocities the potential for fouling is minimized.

Mittal Steel USA placed on order for two (2) Clayton Model SEG-254-2.5 Steam Generators and feedwater treatment equipment to support them. These are 250 bhp, 250 psig design units, each capable of producing up to 7,500 lbs of steam per hour at 175 psig to the plants steam system. Each steam generator was equipped with dual gas trains, one for natural gas, and the other for coke oven gas. The COG train is SST and uses Maxon, pneumatic assisted valves to insure safe shutoff, even if dirty. The COG train is designed for easy removal

to clean while the steam generator continues to operate on natural gas. The Clayton Steam Generators are PLC based controls and utilize a variable speed feed water pump.

Installed and placed into operation in Dec, 2007, the Clayton units have performed very well. They burn the cog cleanly and efficiently. The equipment runs 24/7 and provides approximately 15,000 lbs of steam per hour at 175 psig to the plants steam system. The steam generators have been in operation over three months and a recent inspection showed no sooting or tar buildup on the burners or boiler tubes.

Since the fuel is a by-product of their process, the Mittal plant has realized a project payback of less than three (3) months. Also, burning the COG in the steam generators, under controlled conditions, is more environmentally friendly than flaring the gas off to the atmosphere.



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