
Case History

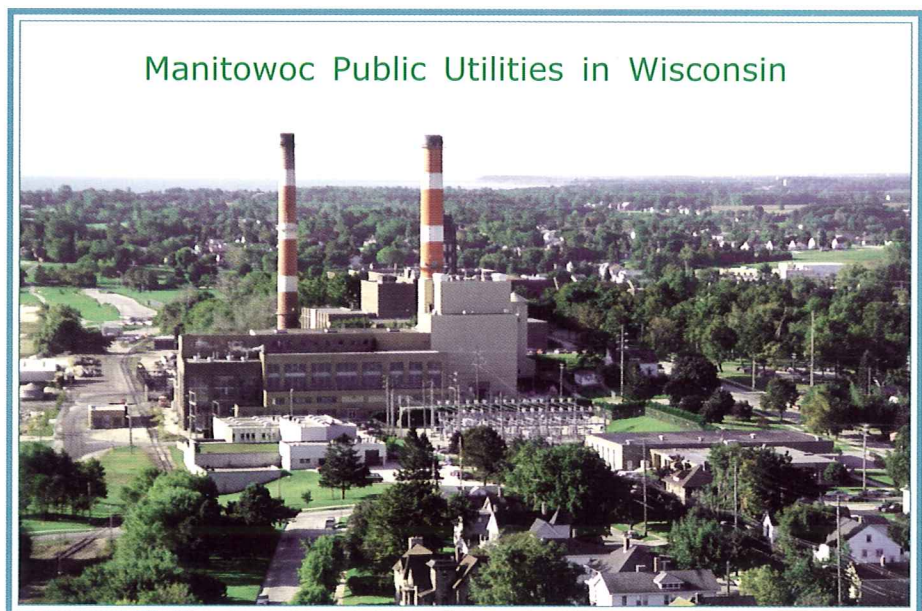
New Detroit®
Underthrow Feeder
overcomes the
challenge of firing
low quality coal

Manitowoc Public Utilities needed to extend the life of its existing facility and improve operating efficiency and flexibility — all in the midst of deregulation.

Manitowoc Public Utilities (MPU) is Wisconsin's largest municipally-owned generating utility. Located on the western shore of Lake Michigan, it provides electricity and water to the city of Manitowoc and provides low pressure steam to local customers. The total generating capacity of the plant is about 89 MWe.

Background

Manitowoc, like other utilities, has found itself in the midst of deregulation. This competitive environment has made it even more important to provide customers with the least cost power supply. MPU has



completed a number of projects to extend the life of the existing plant and improve its operating efficiency and flexibility. One of these initiatives involved fuel switching to reduce operating costs.

Problem

To reduce operating costs, the plant needed to utilize less expensive run-of-mine and/or western coals. The problem with lower cost fuels is the large percentage of fines in the coal. This can cause uneven distribution of fuel front to back with conventional feeders and result in elevated grate temperatures in the rear because of intermittent ash cover and will eventually result in reduced life of the stoker firing equipment.

"We have had Detroit® Underthrow Feeders operating at Manitowoc Public Utilities since June 1997. Consequently, we have been able to switch from expensive eastern stoker coal to run-of-mine fuel with fines in excess of 60%. This has resulted in an appreciable fuel cost savings for MPU. The fuel and efficiency savings have provided us the flexibility necessary to compete in the emerging deregulated "power choice" market. The coal feeders successful performance and operation have led to our purchase of six additional feeders for another boiler unit at our facility."

**Ray Sturzl - MPU
Electric Production
Manager.**



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Solution

MPU operates three Detroit RotoGrate® stokers at the facility and approached Detroit Stoker to come up with a solution. As a result, Detroit designed and manufactured a new feeder design for handling lower quality coals that are typically friable and produce a lot of fines. Feeder problems of material bridging, binding and poor front to rear fuel distribution in the stoker are minimized with this new design that combines air assist with an underthrow rotor mechanism. The new feeder design has fewer moving parts and affords more protection from overheating problems associated with other feeder designs.

Detroit provided six new feeders for boiler unit No.6. The feeders were designed to fit into the existing 18" opening with no modifications required to the stoker front plate or the boiler pressure parts. The feeders are capable of delivering more fuel than the old style reciprocating feeders so steam boiler



Detroit Underthrow Fuel Distributors

capacity was never an issue. Four feeders would have been adequate, but it was more economical to place new feeders in the existing spaces than closing off two of the boiler openings.

The feeder design combines air assist with an underthrow rotor mechanism. This unique design discharges the fuel in the underside of the rotor, enabling the blades to contact the coal for a longer period of time. This design feature, in conjunction with the pneumatic distributor plate, facilitates a more horizontal trajectory of the fuel which distributes the fine particles more consistently onto the bed area. This promotes better combustion efficiency and reduces L.O.I.

Results

Many utilities are switching to western fuels from the Powder River Basin (PRB) area. The potential to stoker fire PRB coal can lower a plant's fuel costs by an estimated 50% over eastern compliance coals. The Detroit Underthrow Feeder makes this a reality for many plants and provides the operating flexibility to fire a wide range of fuels with higher percentages of fines and moisture. The underthrow fuel distributor is the ideal choice for spreader stoker applications which require lower operating costs necessary to compete in today's competitive energy market. For more information on the Detroit Underthrow Feeder contact Detroit Stoker Company at 1-800-STOKER4.