

#3 Blast Furnace Control System Modernization

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Summary

This paper describes the efforts leading to the installation of a new control system for the #3 Blast Furnace of AK Steel's Middletown Works. The various old systems used for blast furnace control are reviewed, then the technical and economic justification for the new system is discussed. The new system was developed and installed in a two-phased project. The various project phases were implemented during planned outages and unplanned downturns without affecting the production of the blast furnace. The paper gives a detailed description of the new system. Finally, the benefits of the chosen implementation approach and the system itself are discussed.

Introduction

The #3 Blast Furnace at AK Steel's Middletown Works has operated reliably for years. It is the only source of hot metal for Middletown Works, and a matter of high importance to keep it running – downtime is valued at substantial amounts. The goal of the project was to provide improved reliability, maintainability and increased utilization of the # 3 Blast Furnace Control System. The availability of information to evaluate operating conditions, troubleshoot problems, and consequently improve operation is a key factor in the profitability of the operation.

While the importance of the facility to the operations of AK was not in question, the continued support of its aging control systems certainly was. The primary control of the charging system, origin of most process control information, and the communication to the rest of the mill was a Westinghouse 2500 computer system, installed in 1980. Over time, the system had been continually changed, with the end-result being a virtual history of automation over the last 20 years.

Recognizing that the current systems were clearly at the end of their useful life, AK management and engineering resources began a project to replace the complete control and information infrastructure of the blast furnace facility in the last quarter of 1995. Phase 1 engineering was completed mid-1997, with Phase 2 implementation completed in the summer of 1999. Most importantly, the entire system installation and commissioning was completed during outages and downturns based on operation and maintenance requirements, not the control system.

This effort, culminating in the successful project completion, is the result of close teamwork and cooperation by the dedicated men and women involved in this project. While maintaining production and engineering were always important, safety was the #1 priority for the duration of this project.

Original System Conditions

The #3 Blast Furnace proper was built in 1953 (Figure 1). It has a two-bell top, modified with a revolving distributor and gas seal valves. Burden distribution is controlled by moveable throat armor. The cooling system includes copper plates and below-hearth air