

## Ladle Sanding System Upgrade

### Overview

#### Focus:

Upgrading of an aging system with a state-of-the-art system

#### Country:

Canada

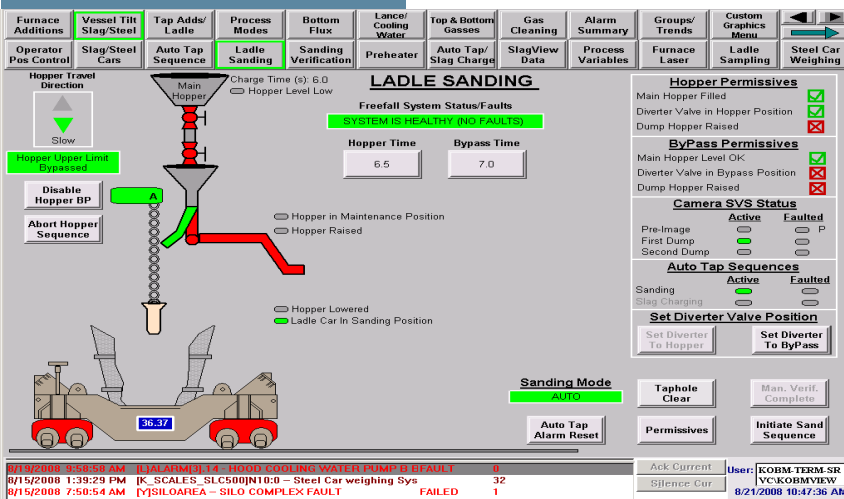
A major steel producer in Hamilton, Ontario had a steelmaking improvement program that consisted of over thirty (30) projects that were completed during a period of three (3) years between 2005 and 2008. These projects involved both steelmaking lines; the Basic Oxygen Furnace (BOF) line and the Electric Arc Furnace (EAF) line. The projects ranged in complexity, size, cost and duration.

The following is a description of the upgrade carried out on the BOF Ladle Sanding system.

Once a batch of molten steel has been produced in the BOF vessel, it must be poured (tapped) into a ladle so that the molten steel can be transported to other steelmaking processes, which eventually will result in the ladle itself being tapped of the molten steel with which it was used to transport.

Every ladle consists of a nozzle which is located on the bottom of the ladle, which is opened via a gate. Prior to the tapping of the BOF vessel into the ladle, the ladle's nozzle must be sanded. The sanding of the nozzle is to prevent the plugging or "freezing" of the nozzle which occurs if molten steel is allowed to sit within the nozzle and cool. Therefore, when a nozzle is properly sanded, the molten steel is kept out of the nozzle until the gate is open. Once the gate is open, the sand will immediately drain and will be immediately followed by the molten steel. When the sand and molten steel immediately being to drain from the ladle when the gate is open without any manual intervention, this is referred to as a "free-open".

However, if too much sand is used, the sand will affect the quality of steel being produced. In studies conducted, it was determined that twice the amount of sand was being used to fill the ladle's nozzle due to the sanding method being used. Therefore, upgrading the delivery system would result in both improved steel quality and a cost savings in sand consumption.



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Therefore, the purpose of the ladle sanding system upgrade project was to:

- a) Increase “free-open” performance of the BOF line
- b) Improve steel quality reducing the amount of sand being used to fill the ladle nozzle
- c) Provide a cost savings in reduced sand usage

JNE Automation’s scope of work for this project was as follows:

- Project management
- Commissioning management
- Engineering design of improved sand delivery system
- Engineering design of control system (AB ControlLogix platform)
- PLC programming (Rockwell RSLogix software)
- Network configuration design and commissioning (Rockwell RSNetWorx)
- HMI programming (Rockwell RSViewSE)
- Integration of a third-party Sanding Verification System
- Onsite installation support/supervision
- Onsite commissioning and operator training

