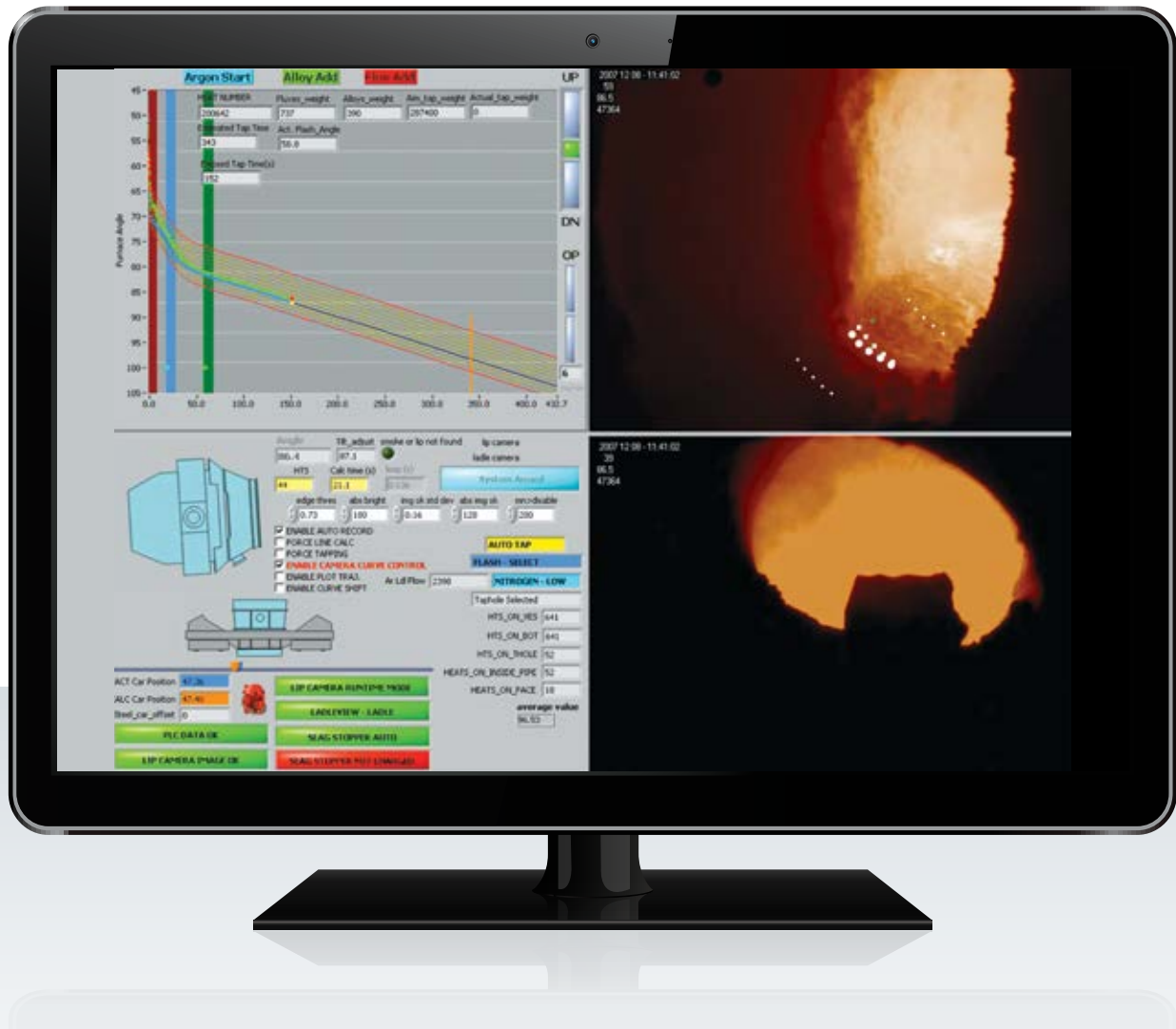


AutoTap

AUTOMATED FURNACE TAPPING



JNE Automation



Nupro Corporation

WHAT IS AUTOTAP?

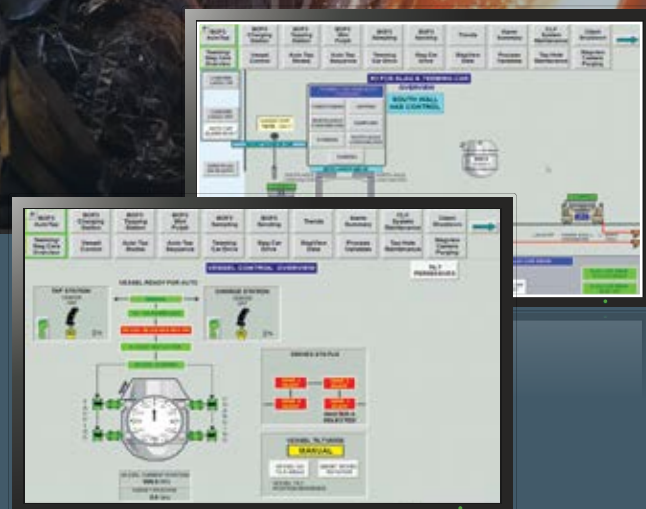
ADVANCED AUTOMATION FOR OPTIMIZED FURNACE TAPPING

Automated Tapping for BOF & EAF

Historically, to tap the molten steel out of the Basic Oxygen Furnace or Electric Arc Furnace (more commonly referred to as the BOF or EAF), an operator would control the rotation of the BOF and, at the same time, control the position of the ladle on the Steel Car. This process involves using manual joystick controls; one in the right hand of the operator and one in the left hand. One joystick is used to move the steel car holding the ladle back and forth, while the second joystick controls the rotation of the BOF vessel to tap the steel into the ladle below.

The JNE Automation and Nupro solution automates the tapping process, removing the need for manual operator control.

With the use of advanced drive controls, modern instrumentation and “near infra-red” process cameras, a control strategy has been designed that allows for fully automated control of the vessel rotation and steel car positioning. Vessel position accuracy has been achieved down to ½ degree of requested position and the car position has been reproduced down to 1 inch (25mm) over a span of 300 feet (100 meters).



AutoTap Process

The operator initiates the beginning of an AutoTap. From that point onwards, the BOF is rotated down on a pre-programmed curve. As the vessel rotates, the steel ladle is automatically positioned below to catch the steel stream. While it is pouring, a camera monitors the lip of the BOF to determine how far away the slag is from the mouth of the furnace. If the slag is too far away, the furnace is rotated to bring the slag to the edge. If the slag nears or reaches the lip, the vessel is rotated back slightly.

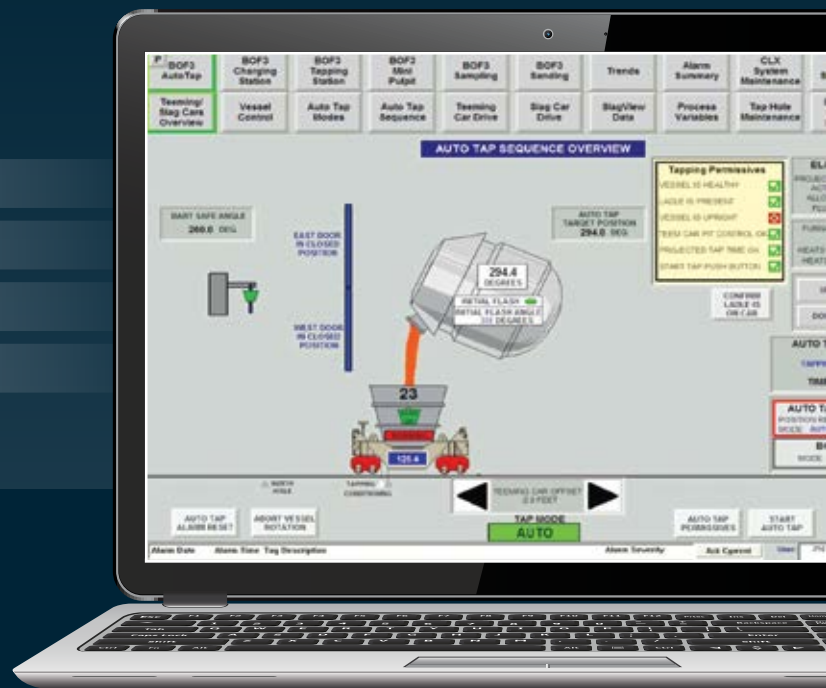
When the tapping is complete, the vessel is rotated back to an upright position and the steel car is automatically moved out to a temperature and steel sampling station.

Automated tapping of the BOF improves operator safety by removing the operators from the vicinity of the molten steel stream during the tapping process. The same equipment and process control modifications can also be applied to Electric Arc Furnaces (EAFs).

A state-of-the-art oxygen steelmaking process should achieve these objectives:

- › Safe and environmentally-friendly operation
- › 100% direct tap with excellent turn down performance
- › Lowest cost
- › Shortest process time

JNE Automation and Nupro can help you achieve these objectives based on a proven design with several successful installations that have been in operation for up to 10 years.



The Benefits of AutoTap

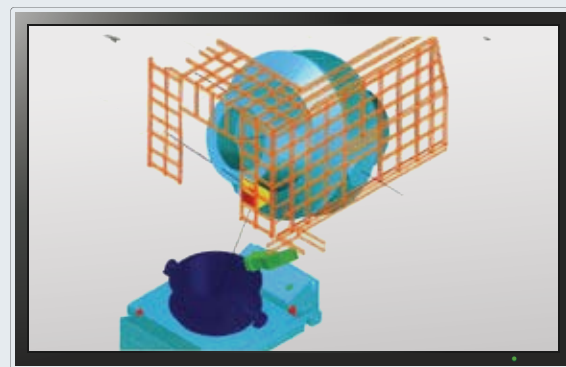
The successful development and implementation of an AutoTap system achieves the following:

- › **Improved product quality**
 - Controlling the slag carry-over to the steel ladle achieves better Ladle Metallurgical performance and lowers the flux and ladle reheating costs
- › **Increased steelmaking productivity**
 - Slag raking at the Ladle Metallurgical station is minimized
- › **Enhanced operator safety**
 - Operator is removed from the vicinity of the molten steel stream during tapping
- › **Reduced downstream processing cost**
 - Carrying out tapping metallurgy (the addition of alloys and fluxes to the steel ladle during the tap) reduces the Ladle Metallurgical station refining time

By following pre-determined customized tapping curves for each BOF, reduced tapping times are achieved and there are less unplanned delays due to inconsistent operation. Reduced tapping times can allow for more heats per day, thereby increasing throughput, leading to increased productivity. These features result in consistent and repeatable metallurgical specification and production rates.

System Implementation

Together with Nupro Corporation, JNE Automation has provided the design services, equipment supply, control system integration and site support during start-up to major steel companies for AutoTap.



WE USE 3D MODELING TO DETERMINE THE OPTIMUM LOCATIONS FOR NEAR INFRA-RED PROCESS CAMERAS

We have installed four separate AutoTap systems in North America since 2007. Our experience in this area will provide for a successful installation and start-up at your plant.





JNE Automation is a division of The JNE Group of Companies.
For further information, please visit JNE.ca

CONTACT

Our years of experience will help your bottom line.

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JNE is a mid-sized, full-service, multi-disciplinary engineering services firm headquartered in Hamilton, ON, and Pittsburgh, PA. JNE's staff is comprised of engineers, designers and project engineering managers with a wealth of experience in the steel industry, from iron production to finishing. We provide full-service engineering, encompassing all the major design disciplines, including; mechanical, piping, electrical, instrumentation, controls, process automation, civil and structural design.

The key to our success is the outstanding team we bring to the table. Our personnel are highly skilled, experienced, and innovative. The JNE company structure is designed specifically to ensure that our team is flexible, responsive, specialized, and always driving toward success. For our clients it means having it all — a true partner, competitive rates, experienced and specialized teams.

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Nupro are world leaders in the design of innovative technology to solve problems unique to the metallurgical industry. Nupro has developed novel products and technologies to tackle tasks that have not been mastered with existing tools. Regardless of the level of interaction, our team oriented approach ensures success.

Use our highly effective seminars to inform and educate all levels of staff in your company about new technologies and practices. We specify, supply and implement the latest in technology. In cases where the technology does not exist, we design it and construct custom equipment to fulfill your needs. This approach keeps you competitive and up to date.

