



TUYERE STOCK SOLUTIONS FUTURE SUCCESS AND OPERATION

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KEY FEATURES

Tuyere Stock Energy

- Low-conductivity insulation and castable refractory layers reducing average skin temperatures
- Energy reduction equating to 10 °C blast temperature, generating potential fuel savings in the region of up to 1 kg /tHM

Tuyere Camera

- Continuous visualization in blast furnace control room, casthouse pulpit and administrative offices away from the high risk area of tuyere platform
- Potential for higher PCI rates with subsequent reduction in hot metal cost
- Early detection of adverse operating conditions prevent unplanned furnace downtime

THE CHALLENGE

The ironmaking industry is constantly challenged to reduce downtime in order to maintain higher productivity whilst satisfying the challenges posed by ever-tightening operating margins and stricter environmental controls.

The provision of intelligent visual sensors provide the operator with the means to safely observe the physical and chemical processes, investigate the health of the raceway and monitor the fuel lance and injection performance in real time.

Wind-distribution equipment is process-critical, and it's performance directly influences the availability and productivity of the furnace.

OUR SOLUTION

Primetals Technologies are dedicated to excellence in the field of blast furnace technology. Our experience, capability and resources allow us to provide tailor-made equipment solutions incorporating the latest automation developments to meet the exact needs of the customer.

Primetals Technologies tuyere stocks are a proven and trusted solution, with a global reference list.

Our innovative portfolio provides the key to the future success and longevity of furnace operational profitability. Primetals Technologies equipment:

- Withstands the highest of temperatures
- Compensates for the differential expansion of the blast furnace shell and bustle main
- Monitors performance of fuel injection
- Presents a window for indications of furnace performance
- Provides early detection and automatic alarm of blockages and leakages preventing major damage

TUYERE STOCKS

The Primetals Technologies tuyere stock varies uniquely from those of their competitors. Our stock features a down leg incorporating twin, multi-ply, multi-corrugation stainless steel bellows units, restrained by external tie-bars held in high-temperature spherical plain bearings. This design ensures that the stock acts as a true spherical joint to allow for differential thermal expansion.

Unlike the Primetals Technologies design our competitors solutions are unable to control down leg length during thermal expansion. In competitors designs the upper and lower have no overall restraint and therefore gaps at spherical joints are unable to tighten during thermal expansion.

MAIN BENEFITS

- Unique external tie-bar design controlling length during thermal expansion
- Freedom of movement at elevated temperatures, reducing the potential for 'hot spots'
- Increasing gas tightness in the hot condition

ENERGY SAVING

Energy consumption of equipment in the hot blast system of the blast furnace contributes significantly to hot blast costs. An important contribution to heat losses is due to the heat convection and radiation to the atmosphere typically seen from conventional tuyere stocks.

The development of a low energy designed stock offers the potential to significantly reduce the shell temperature thereby reducing heat losses and energy costs.



Primetals Technologies tuyere stock design



Primetals Technologies Tuyere Camera capture

TUYERE OPTICS

In order to maintain stable operation of the blast furnace it is essential during normal operation for the operators' to monitor the tuyere area on a regular basis. Primetals Technologies has developed an integrated tuyere monitoring system for the tuyeres and raceway area of blast furnaces incorporating the latest high definition digital cameras and image processing technology.

The tuyere monitoring system provides analytical methods based on the optical output of specific cameras, warning of potential failure propagations.

The state-of-the-art definition cameras are housed in a rugged enclosure protected from the blast furnace temperature and pressure without the need for independent cooling. For ease of removal in the event of furnace maintenance activities the units are designed with quick release couplings to fit any modern tuyere stock.

Camera combiners send the visual data back to a remote PC and data server for processing. The processed data can then be distributed via network interface to operator's workstation, blast furnace control room and manager's offices.

ALARMS

Whilst capturing real time visual data this product retains the traditional peep-sight facility to allow manual observation of the raceway by operating personnel without the need for camera removal.

This continuous remote monitoring of the tuyere area improves the blast furnace process stability and opens potential for higher PCI rates with, subsequently, reduced hot metal cost.

MAIN BENEFITS

- Real time continuous tuyere display
- Local and remote observation
- Improved operator safety
- Short and long term storage for review of events
- Tuyere and furnace condition monitoring with alarm display and digital signal output if required for the following:
 - Tuyere status
 - Fuel injection
 - Lance and tuyere distortion/leakage

TUYERE CHANGING MACHINE

The tuyere changing machine is a self-contained unit that mounts onto the fork of a fork lift truck, and is used to remove and replace the tuyeres, and or the tuyere cooler. It consists of a hydraulic ram mounted inside a pivoting and rotating turntable. The hydraulic ram is connected to a hand-pump, and when actuated provides the pulling force to remove the tuyere from its mounting, with the reaction taken by brackets on the machine which brace against the furnace shell.

MAIN BENEFITS

- The pivoting turntable makes it easier for the fork-lift to approach the tuyere, removing the need for the fork-lift to be accurately aligned to the furnace
- Minimized manual handling

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