

AVOIDANCE OF MOLTEN METAL BREAKOUTS LADLE MONITORING

THE TASK

MONITORING REFRACTORY CONDITION

The use of refractory lined vessels (ladles) to transport molten iron and steel is commonplace in steel plants worldwide. Over time, the refractory condition degrades until it must be re-lined.

Traditionally, the timing of this re-lining has been based on previous experience and best-practice information from the plant's refractory manager. However, the mechanism can be unreliable, and breakouts have occurred, causing severe damage to plant, injuries to personnel, and lost revenue due to production delays.

The maintenance of the refractory linings contributed significantly to steel production costs. By monitoring the external temperature pattern of ladles, the extent and distribution of wear can be assessed and the information used to determine the re-lining strategy, thus avoiding excessive lining damage breakouts.

THE SOLUTION

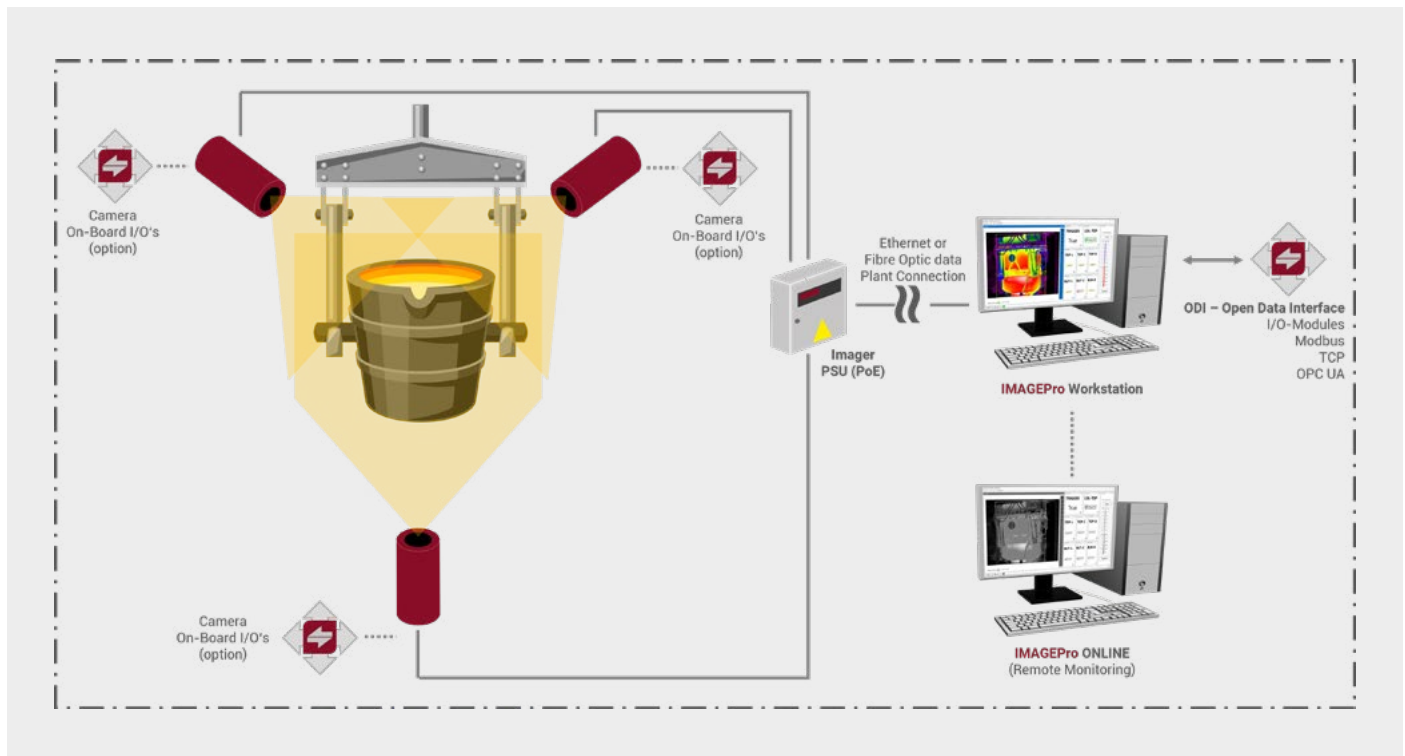
THERMAL IMAGERS

Advanced thermal imagers provide the optimal solution to monitor the external shell temperature of passing ladles as they move through the inspection field of view, transferring steel to the next production stage.

Each measurement station can comprise from one to typically five cameras, mounted in industrial protection housings, to give full coverage of the exterior of a ladle, the bottom and outlet, depending on customer needs.

The thermal images, temperature data and hot-spot alarms are clearly monitored and stored within the fast response time of the cameras (7.5 or 60 Hz), enabling engineers to identify the repair and renewal of linings.

SYSTEM DIAGRAM – 3-5 IMAGER SOLUTION



SYSTEM COMPONENTS

SMART THERMAL IMAGING CAMERA

- » **High Spatial & Thermal Resolution**
640 x 480 pixels & 40 mK NETD
- » **Smart Functionalities**
Integrated web server & autonomous operation
- » **Remote Control**
Motorized focus & one-cable PoE interfacing
- » **Multiple I/O Options**
On-board analog/digital I/O's, accessible by web server
- » **Industry Ready**
IP65/NEMA4 sealing - heavy industrial housing
- » **High Reading Accuracy & Reliability**
Unmatched image quality & homogeneity
- » **Extensive Accessories**
For heavy industrial environmental conditions

SYSTEM BENEFITS

KEY FEATURES AND ADVANTAGES

- » **Improved Safety**
minimized risk of damage to the plant
- » **Prevention of break-outs**
improves the safety of steel plant personnel
- » **Extended lifetime of ladle refractories**
effectively improves the usable lifetime of the ladle
- » **Detection of problematic areas**
early repairs can be carried out on identified areas
- » **Cast refractory uniformity**
varying thicknesses can be seen by non-uniform external temperatures
- » **Evaluation of different refractories**
assessment of effectiveness of different refractories

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