APPLICATION SHEET

Ladle monitoring in steel plants

THE TASK

Monitoring refractory condition

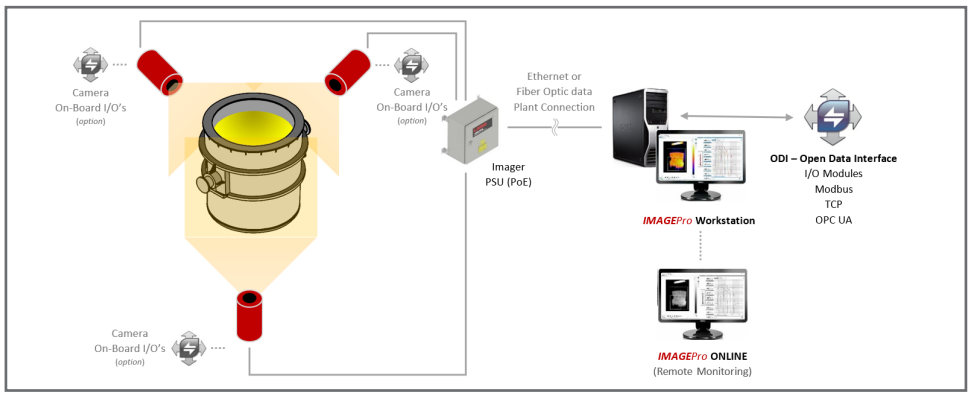
The use of refractory-lined vessels (ladles) to transport molten iron and steel is commonplace in steel plants worldwide. Over time, the refractory condition degrades until it must be re-lined. Traditionally, the timing of this re-lining has been based on previous experience and best-practice information from the plant's Refractory Manager. However, this 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 these refractory linings contributes 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 and breakouts.

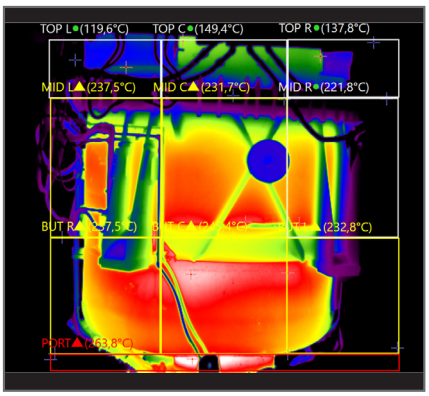
THE SOLUTION

LWIR-640 thermal imagers

AMETEK Land provides the advanced **LWIR-640 thermal imagers** 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 enclosures, 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 hot-spot trends and make decisions about the repair and renewal of linings.



System Diagram



Typical Image with Alarm ROIs

BENEFITS

Advantages for the end user

- **Improved Safety**
  minimised 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 based on non-uniform external temperatures
- **Evaluation of different refractories**
  assessment of the effectiveness of different refractories

LWIR-640
Smart thermal imager
-20 to 1000 °C / -4 to 1832 °F

LWIR-640 in an industrial enclosure

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