



## CASE STUDY



## The benefits of slag detection for a major uk steel producer

LAND, the leading specialist in infrared non-contact temperature measurements for the global steel industry, has supplied its SDS-640 slag detection system to Celsa Steel

UK, based in Cardiff, UK. The system remotely measures slag in the EAF pouring stream together with ladle freeboard level in order to improve yield during the tapping process.

**See degrees differently.**

# ABOUT THE CUSTOMER

This is an important project for both LAND and Celsa Steel UK, with the steel industry facing a decarbonisation challenge, driven by more stringent carbon emission regulations.

Slag detection in the molten steel tapping stream from the EAF to the transfer ladle reduces slag carry-over during the process. This increases the ratio of steel to slag in the transfer ladle, improving yield.

Reducing slag content in the ladle in turn reduces the amount of additions required during the refining stage, which results in a direct material cost-saving, and better-quality steel.

Freeboard level monitoring during tapping allows the operator to fill each ladle to its maximum allowable level, reducing overall tapping time and improving process efficiency. Preventing liquid metal spillage caused by overfilling reduces the risk of personal injury and saves unnecessary clear-up and repair costs.



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# THE CHALLENGE

Celsa Steel UK was experiencing slag carryover on a frequent basis, resulting in a loss of steel from tipping ladles and affecting the recovery process. A manual operator was tasked with monitoring the tapping process and reducing slag carryover.

To improve the situation and reduce the loss of yield due to slag carryover, the company wanted to install a camera system in its melt shop to measure ladle slag more accurately and reliably. This new system had to be accurate and user-friendly, with the capability to report into Celsa's level 2 system and provide an alarm for the programmable logic controller (PLC). It also had to make data analysis easy, and to fit within the company's budget.



## THE SOLUTION

After comparing three different slag detection solution manufacturers, Celsa chose LAND's SDS-640 slag detection system for this application. The key factors in the company's decision were price and current UK footprint.

The camera was installed at the tapping position, where it could see stream and freeboard in the ladle, and could connect to a control panel in the tapping pulpit with an extra display. The control PC was located in the furnace pulpit with a display.

Currently, the system is integrated with the process control system for manual control only; however, further automation is expected to be introduced in the future.

This installation is one of the first to combine LAND's new SDS-640 systems with Ladle Freeboard Level Detection.

Freeboard Level Detection works in tandem with slag detection to optimise ladle filling during tapping. While tapping occurs, the steel and slag level in the ladle is clearly displayed for the operator, enabling them to pause the tapping operation when the maximum level in the ladle is reached.

The tapping operation can be stopped automatically using alarm signals when slag is detected or the maximum level is reached in the ladle. This combination reduces tapping time and improves the rate of steel production.

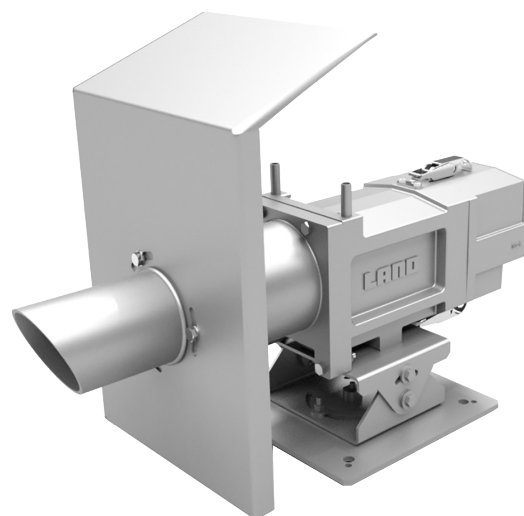
LAND's SDS-640 Slag Detection System is a proven solution for accurate and rapid detection of slag carry-over, allowing steel plants to improve product quality, reduce slag carry-over and improve operator safety.

Specifically designed to survive in challenging mill environments, it has a high-resolution thermal imaging camera that detects the transition between liquid metal and slag, using the 3.9  $\mu\text{m}$  wavelength to see through smoke, dust, and fumes.

Quick termination of the tap after an alarm has been triggered is necessary to prevent excessive levels of slag in the ladle. The camera's ImagePro-SDS application software presents data to operators in real-time, enabling them to make informed decisions about the tapping process, or to automatically control the tapping process.

As the tap commences, the application-dedicated software records it, using a stream identification algorithm, and produces a data log and graph for quality control. A stream tracking mechanism is included to ensure reliable operation in typical harsh environmental installation conditions.

When slag appears and exceeds an operator-defined amount, an alarm automatically triggers. The system is designed to ensure accurate detection of steel/slag that is independent of charge weight and operator intervention.



# THE RESULTS

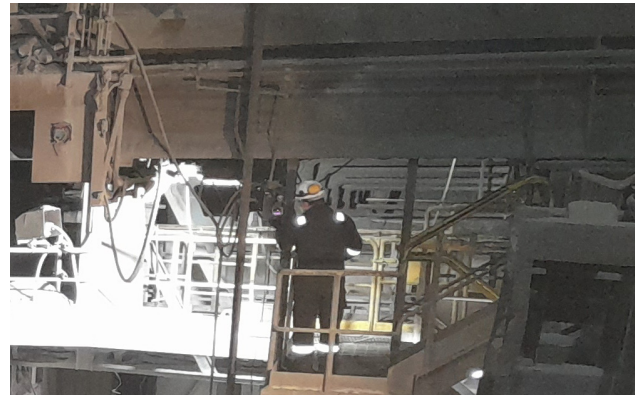
Scott Evans, Process Manager at Celsa Steel UK, said: “The system is working as we expected, and is delivering quantifiable cost benefits. It has led to a reduction in ladle tips – decreasing delays – an increase of ferro alloy recovery, and better control of the hot heel.

“Although it is still too early to give an exact return on investment, the process is now more productive and efficient and the SDS-640’s core function – measuring the slag – is particularly beneficial in achieving this.”

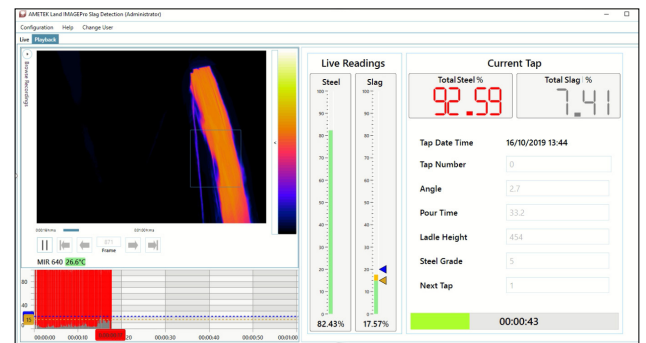
The SDS-640 is a proven solution that has been shown to improve operator response time and consistency at the end of each tap in typical installations. This results in a reduction in slag depths of up to 25%, compared with traditional methods of tapping stream monitoring.

Combining SDS-640 slag detection with Freeboard Level monitoring enables more efficient liquid metal tapping by reducing slag carryover and maximising fill level in each ladle.

Celsa Steel UK has already identified benefits from the new system, which meets all of their requirements for slag detection and control system integration, improving productivity and efficiency in a cost-effective, easy-to-use way.



An engineer inspecting the installation



Monitoring slag carryover with ImagePro

SDS – Slag Detection System	
Specification	
Measurement range	800 – 1800 °C / 1472 – 3272 °F
Image resolution	640 x 480 pixels
Spectral response	3.9 µm



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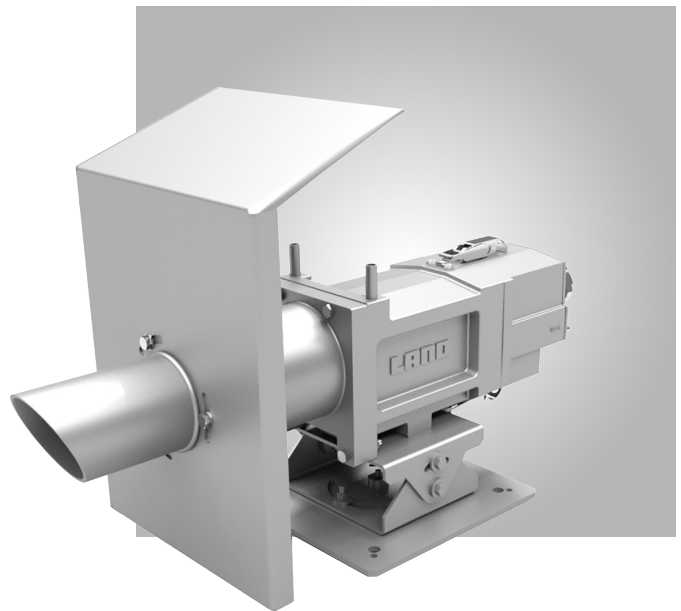
Our global service centres provide after-sales services to ensure you get the best performance from your system. This includes technical support, certification, calibration, commissioning, repairs, servicing, preventative maintenance and training. Our highly trained technicians/engineers can also attend your site to cover planned maintenance schedules and repair emergency breakdowns.

## SLAG DETECTION SYSTEM (SDS)

### Temperature Range

500 - 1800 °C / 932 - 3272 °F

The Slag Detection System (SDS) delivers improved yields, higher-quality steel and reduces costly downstream processing.



### CONTACT US

WEB: [www.ametek-land.com](http://www.ametek-land.com)

EMAIL: [land.enquiry@ametech.com](mailto:land.enquiry@ametech.com)

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