

Clean Steel with Electromagnetic Slag Detection

ESD 300 • ESD 400



Measure it. Control it.

AMEPA Slag Detection: Optimized technology for Clean Steel with Maximum Yield

Slag-free transfer of molten steel is a crucial profit or loss factor during production of high-quality steels. Be it converters, ladles or tundishes slag must not be transferred to the next vessel.

The ESD electromagnetic slag detector, located at the ladle bottom, sounds the alarm as soon as slag is transferred and issues a signal to close the gate automatically.

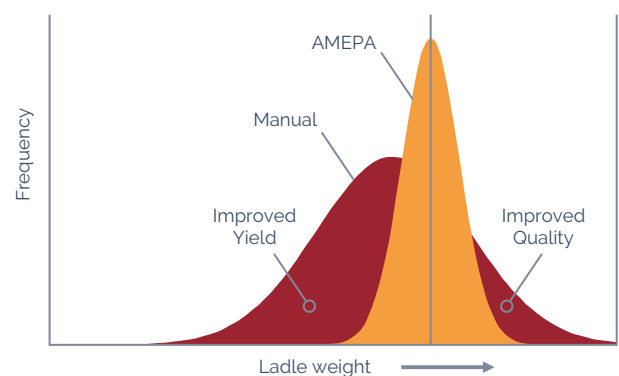
Our customers, who produce high-quality steels, have reported the following:

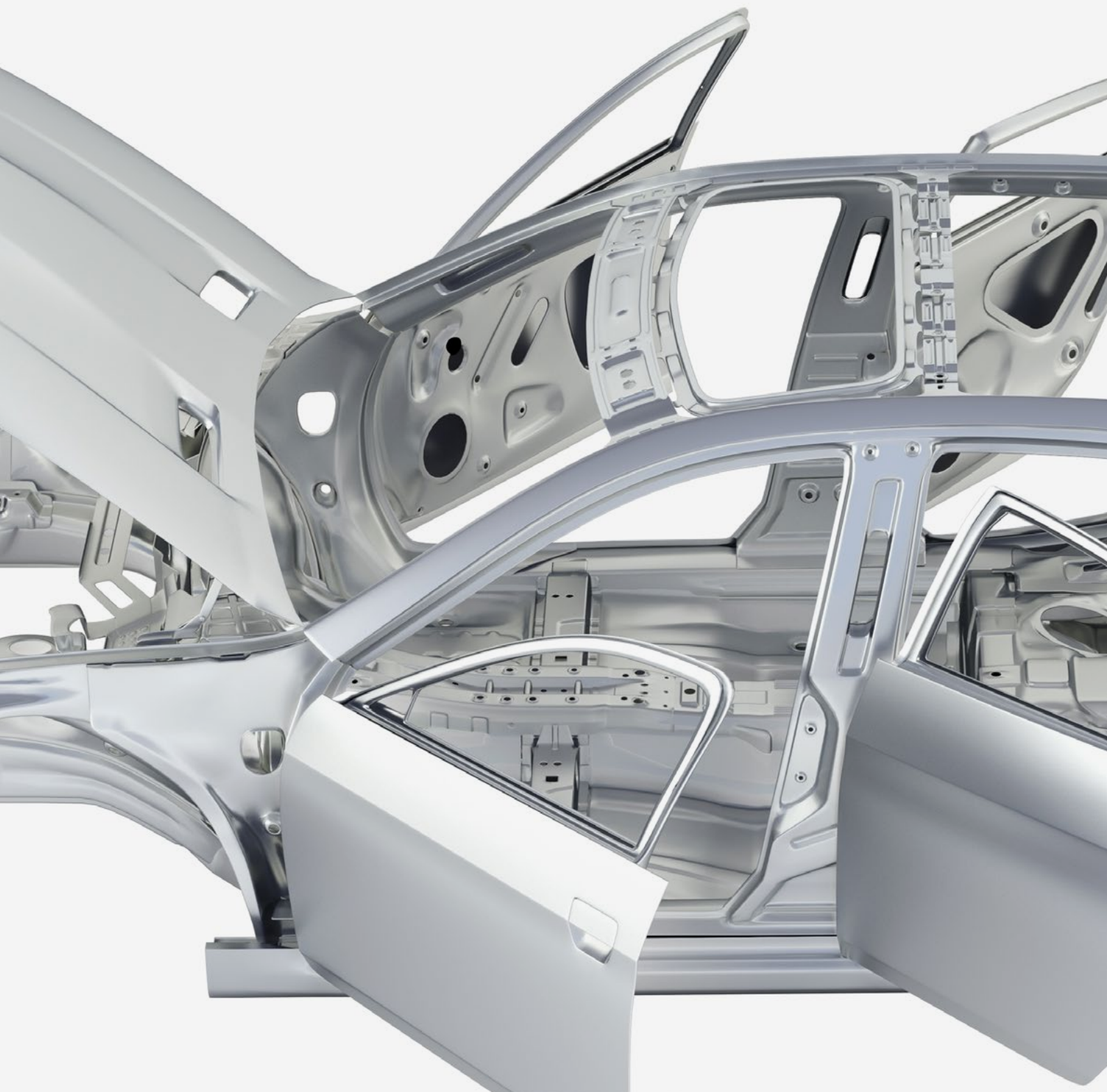
- **High purity of steel, even in transition zones**
- **Reduction of the amount of transferred slag by up to 90%**
- **Increase of yield by up to 1.0%**
- **Up to 50% longer sequences**
- **Up to 60% less clogging of the inner sleeve**
- **Longer life of the refractory material**

*Frequency distribution
of ladle weights when
closing the gate*

Developed with 30 years of experience, the new generation of AMEPA ESD 300 and ESD 400 Slag Detection sets a new standard:

- Digital transmission and evaluation of the measured data takes the sensitivity and reliability of slag detection to the next level.
- Start-of-Cast detection significantly increases process reliability when working with shroud manipulators.
- Rule-based data analysis now offers a tool for optimizing production processes and caster availability.
- Configurable reports can be automatically sent to user groups.
- AMEPA's remote maintenance access quickly allows expert knowledge to be made available.
- The ESD provides interfaces for all common industrial communication standards.
- Users can now choose between application- and quality-optimized systems operation.



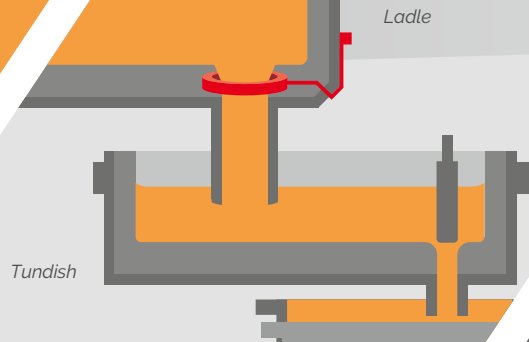


"Our systems, which have equipped more than 2,800 ladles, are recognized worldwide as the standard. With the new ESD 300 and ESD 400 generation, we are going one step further – in digital signal processing as well as in networking and analysis of measurement data."

Martin Fieweger, Managing Director AMEPA

Measurement principle:

The ESD 300/400 sensor consists of a primary and secondary coil. Both are arranged in an annular metal cassette which surrounds the inner sleeve of the casting channel concentrically. The primary coil is fed with an alternating current that induces eddy currents in the molten steel as it is casted. As slag is entrained into the casting channel the voltage on the secondary coil will change. This change is evaluated to determine the slag content.



ESD 300: Clean Steel – maximum yield at guaranteed quality

The ESD 300 detects the onset of continuous flow of slag. The threshold value for the automated gate closure can be customized within a wide range depending on the desired quality of steel.

The gate remains open until the system detects slag and then closes immediately, so that the contents of the ladle are used optimally, resulting in maximum steel yield at the desired quality.

*ESD 300:
Detects the onset
of the continuous
flow of slag.*

/01

Precise

Compared with a manual gate closure, which depends on subjective factors, the system alarms consistently at the right time and prevents slag flow.

/02

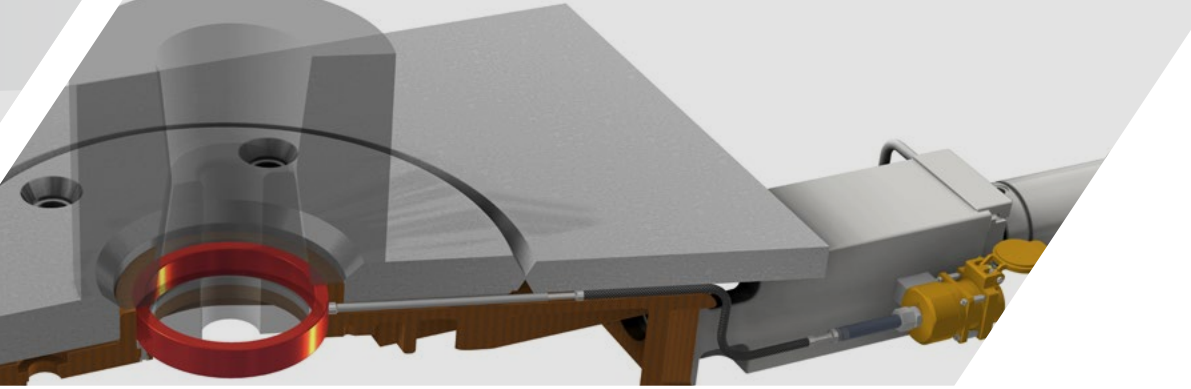
Simple

AMEPA systems function with just one sensor per ladle. For the operator, this means: less installation effort and wiring, as well as high availability. The sensor cassette can be integrated into all commercially available gates and is easy to replace.

/03

Reliable

The concentric arrangement of the transmitting and receiving coils, as well as customer-specific installation of each sensor cassette, guarantee optimum detection accuracy. Automatic drift compensation and self-calibration guarantee high stability long-term.

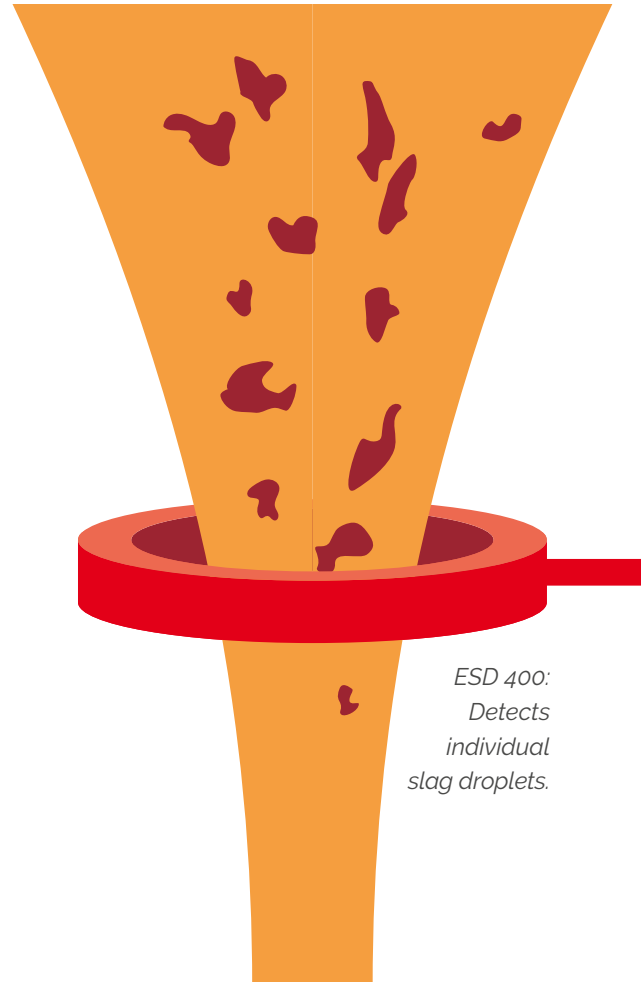


ESD 400: Ultra Clean Steel – optimum quality

As manufacturer of slag detection systems, AMEPA is the only one in the world supplying systems with dual-channel technology.

The system can detect individual slag droplets before the start of continuous slag flows. Therefore, the gate closes automatically when the first slag droplets enter the well block area, guaranteeing maximum purity of the finished end products.

The alarm threshold can be adjusted individually for each channel. If lower quality is desired, the system can behave similarly to the ESD 300.



*ESD 400:
Detects
individual
slag droplets.*



/04

Innovative

Digital signal transmission ensures optimum protection against interference. Start-of-casting detection increases process reliability during concealed casting.

/05

Informative

Comprehensive reporting tools and rule-based data analysis make the process transparent for different user groups within networked systems.



Start-of-casting detection

Once the automatic manipulator has positioned the shroud under the ladle during concealed casting, it is not possible to see if steel is flowing after opening the gate. For example, if sintered sand clogs the casting channel, the module will report that the steel has not yet begun to flow.

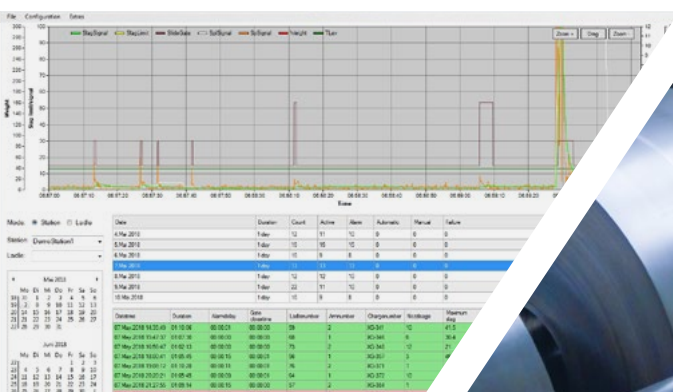
This means that the shroud can be removed immediately after opening the gate before the fill-level drops in the tundish, or worse, the steel is devalued. This represents significant gains in terms of time, process reliability and quality.

Steel penetration detection

Steel penetration between the nozzle brick and the inner sleeve can lead to a dangerous breakout. Therefore, early detection is important.

As an additional benefit, steel penetration can be detected by the ESD system and appropriate steps can be taken.

The ESD issues an automatic alarm, which is reported to the customer.



Extensive Reporting

The AMEPA REPORT software presents the user with measurement results and status messages in both tabular and graphical form. The results can also be sent via automated email to previously configured user groups at specific times, either by a shift or as a daily report.

By increasing cross-plant networking of processes, the system saves measured data and results in a database, and provides the users with detailed, up-to-date and historical data within their company network.

The contents of the database can be accessed within the customer network at any time using common web browsers. Therefore, AMEPA REPORT software ensures round-the-clock availability of slag transference data for different user groups in an appropriately adapted form.

Secure analysis – fast knowledge

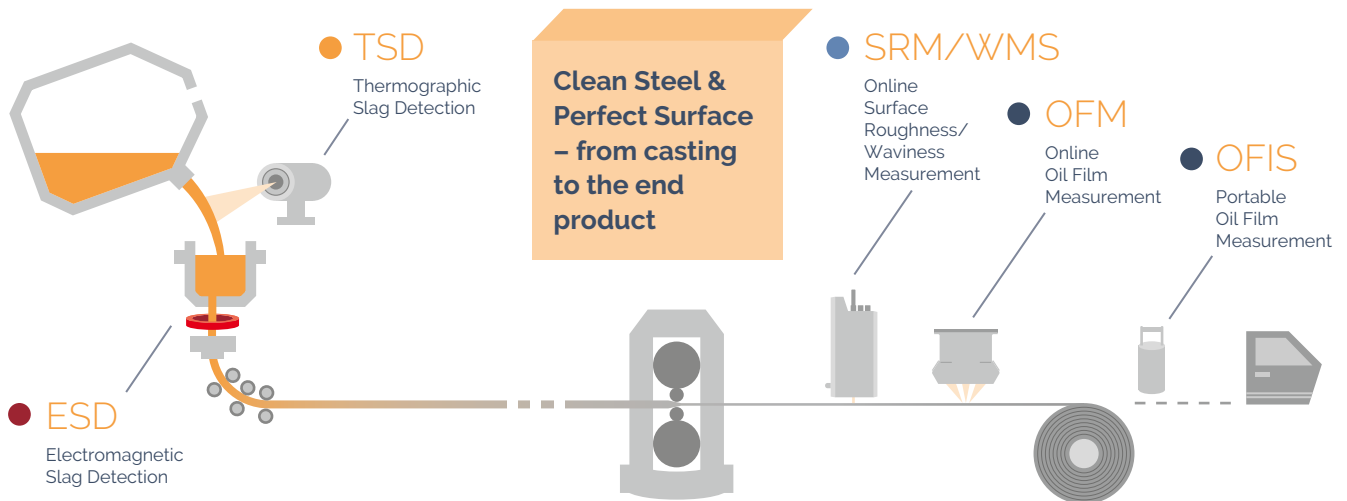
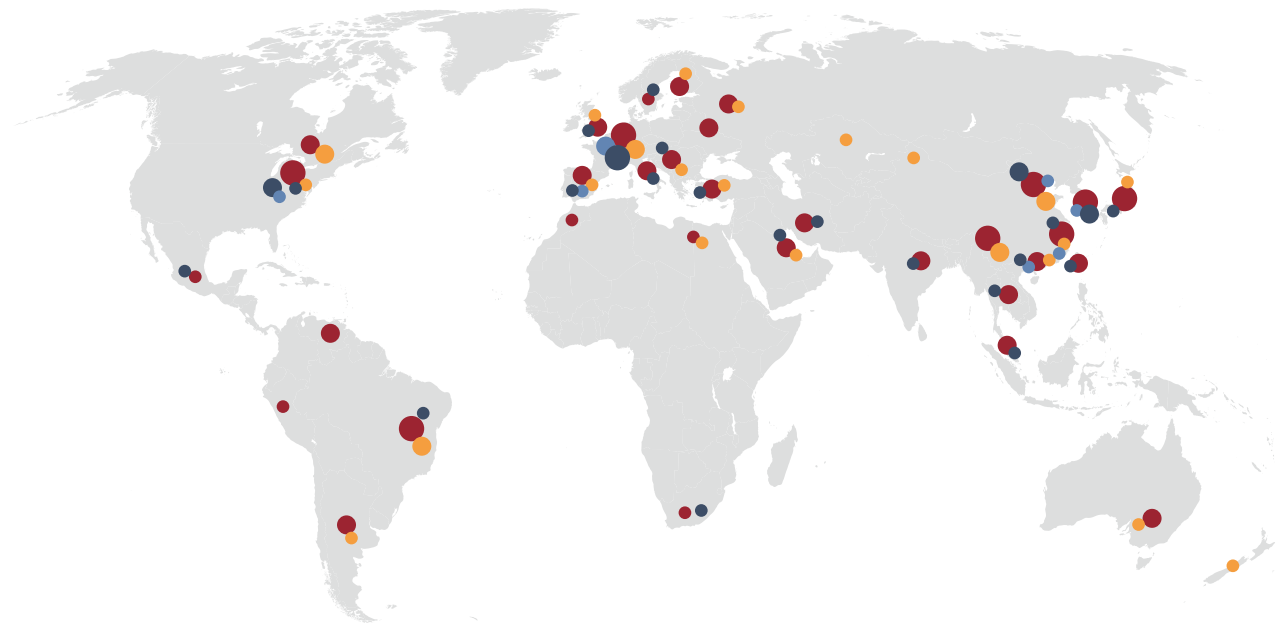
The AMEPA SMART ANALYSIS module analyzes the measured sensor data and automatically performs a rules-based evaluation.

The module quickly detects abnormalities, such as deviations in the measured data, without the need to track individual measurement curves over a long period of time.

The evaluation indicates whether maintenance is due or not.



Worldwide successful



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