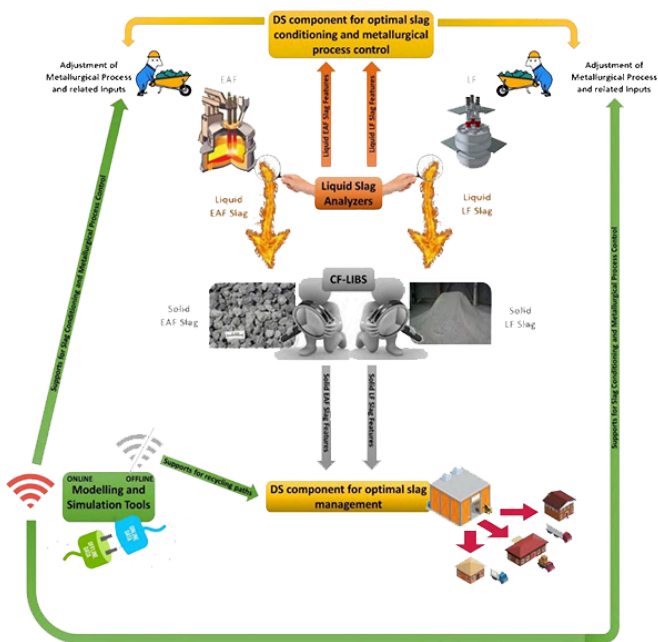# Main industrial Impact

- Smart systems for on-line characterization of slag at liquid and solid state

- Decision support concepts for liquid slag conditioning, improved metallurgical process control, slag handling and valorization.

Decrease the amount of landfilled slag and increase revenues deriving from slag valorization

The iSlag Project

The project aimed at developing novel digital solutions to improve valorization of the slag coming from the electric steelmaking process route, support good practices in the steelmaking process and explore new recycling paths by facilitating the implementation of a real "industrial symbiosis".

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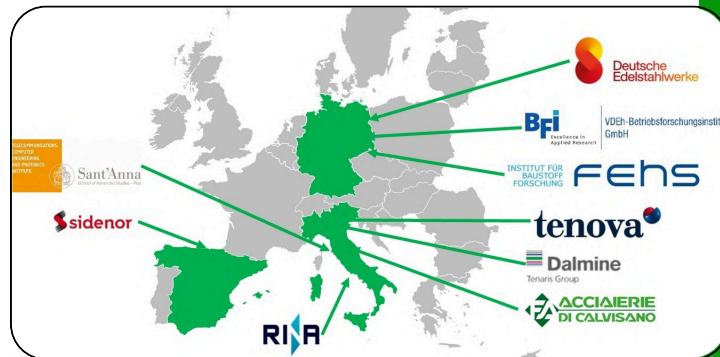
in **/company/islag/**

iSlag

Optimising slag reuse and recycling in electric steelmaking at optimum metallurgical performance through on-line characterization devices and intelligent decision support system
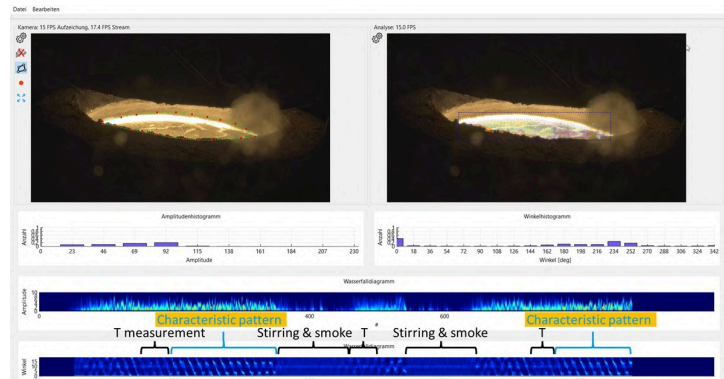
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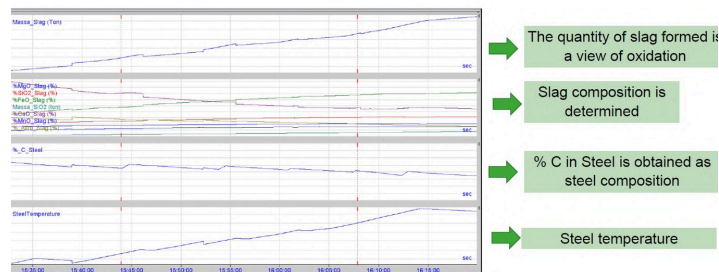
Liquid slag characterization and management

A newly conceived graphite impedance probe was tested and validated in an industrial Ladle Furnace.

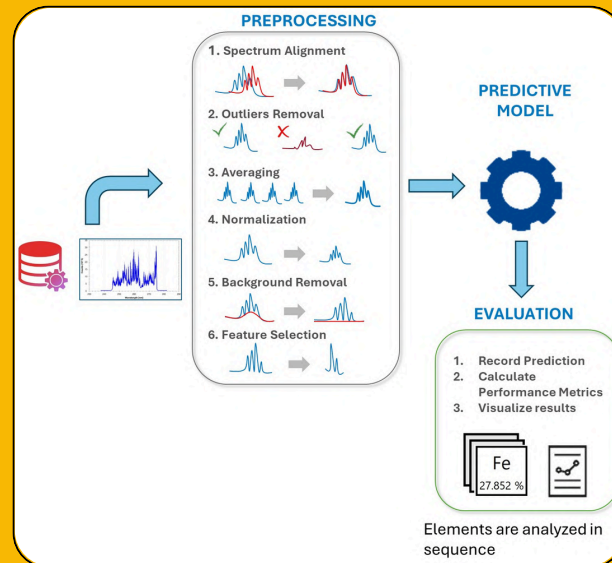A solution based on image processing for LF slag viscosity estimation was developed and field validated.

A tool to support EAF slag management at optimum metallurgical performance was implemented at CALVISANO.

The quantity of slag formed is a view of oxidation

Slag composition is determined

% C in Steel is obtained as steel composition

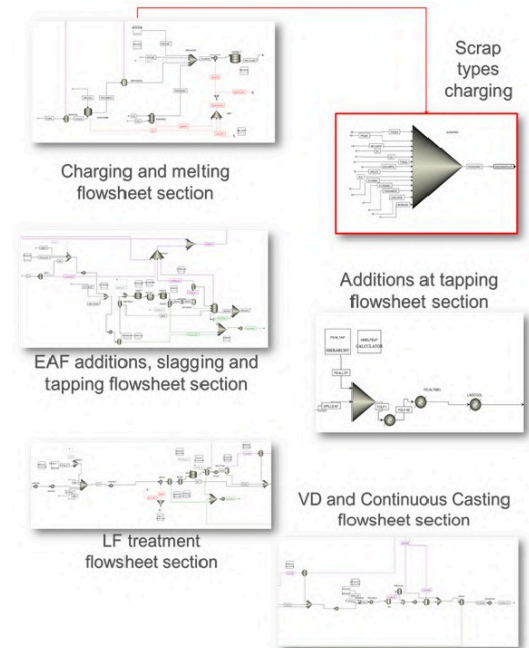Steel temperature

Solid Slag characterization

A novel LIBS system for fast solid slag characterization was developed and field tested. It provides elemental concentration measurements thanks to an advanced software analysis of the generated spectrum. The system does not require any sample preparation or prior calibration procedure.

PREPROCESSING

1. Spectrum Alignment
2. Outliers Removal
3. Averaging
4. Normalization
5. Background Removal
6. Feature Selection

PREDICTIVE MODEL

EVALUATION

1. Record Prediction
2. Calculate Performance Metrics
3. Visualize results

Fe 27.852 %

Elements are analyzed in sequence

LIBS allows fast characterization of steel and slag samples with the same device.

Modelling and simulation

Offline and online models were developed to characterize EAF and LF slag based on raw materials input and process parameters.

Charging and melting flowsheet section

Scrap types charging

EAF additions, slagging and tapping flowsheet section

Additions at tapping flowsheet section

LF treatment flowsheet section

VD and Continuous Casting flowsheet section

Decision support concepts were elaborated to support operators in liquid slag management at optimal metallurgical performance and solid slag handling and valorization.