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Smart Steel Technologies wants to use the data available in steel plants and optimise them using artificial intelligence.

AI-start-up ventures big step towards CO₂ neutrality

The manufacturing process in the steel industry is characterised by complex electrical and automation systems. Equally complex and comprehensive is the multitude of data that accumulates in the production process. A Berlin-based start-up sees enormous potential for optimisation in this and a favourable prerequisite for both lowering energy costs and significantly reducing CO₂ emissions.

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Steelmakers worldwide are exposed to enormous competitive pressure. While overcapacity has an impact on prices – and thereby earnings – the quality requirements for steel products are continually increasing. The automotive industry, in particular, is considered a driving force in terms of its sophisticated digital technologies and innovations. At the same time, the processes in the steel industry are very energy intensive. Above all, as the European Commission has now officially decided, there is an urgent need to reduce CO₂ emissions.

Smart Steel Technologies (SST) from Berlin is well aware of the challenges facing the steel industry. They have made it their priority to optimise the industry's process chain using artificial intelligence. The start-up wants to introduce ready-to-use software to improve product quality, lower energy costs and significantly reduce CO₂ emissions. "The plants in the steel industry are highly automated and have highly developed instrumentation and measurement technology. There is already a mass of unused data available that can be processed by an AI application," explains Falk-Florian

Falk-Florian Henrich



“In steel plants, masses of unused data are already available and thus accessible to an artificial intelligence application.”

rian Henrich, founder and CEO of SST. The approach is based on observations from various projects that the mathematician and computer scientist has carried out since 2016 until the company was founded last year. According to Henrich, these have clearly shown that there is considerable potential for optimisation in steel plants, without the need to invest in new plant technology.

Expertise at all levels of electrics and automation

Henrich currently employs a team of AI specialists and experts in steel manufacturing processes, each with experience in processing level 1, 2 and 3 data. These refer to varying levels of electronics and automation in steel plants, which are considered in the development of SST's software. Level 1 covers basic automation with its operating stations, process, and drive control as well as the processing of measured data. Level 2 uses a steelworks computer system to calculate the input materials or alloying agents, among other things. The determination of the process sequence is also part of this level.

Finally, production is planned and controlled at level 3.

With the company's current technical status, this means that by running AI software 24/7, "the temperature control from the BOF or EAF to the casting machine can be optimised," Henrich says. He further explains that the optimisation of the continuous casting process can also permanently reduce the rate of shell defects. Rolling mills, for example, could potentially be equipped with live prediction modules and various systems to more precisely and reliably adjust surface inspection on hot strip mills, pickling lines or galvanising lines.

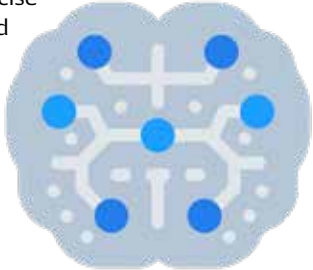
Digital process control

In contrast to conventional software and temperature control models, SST "processes all signals and status descriptions of the entire steel mill at any time," Henrich emphasises. Specifically, the company starts with temperature and sampling at the end of the main decarburisation phase for the BOF and the end of the flat bath phase for the EAF. Considering the planned further course of the process, the developers make forecasts of the actual temperatures for the melt at this point for the respective tapping, ladle furnace inlet and the final tundish temperature. SST also forecasts the target tapping temperature. The difference between the two values is used to display adjustment suggestions for the operator in the existing Human-Machine Interface (HMI) to aid in the adjustment of the corresponding setpoint in the level 2 system. The same proce-

Digitalising steelworks with artificial intelligence

Software developments from Smart Steel Technologies (SST)

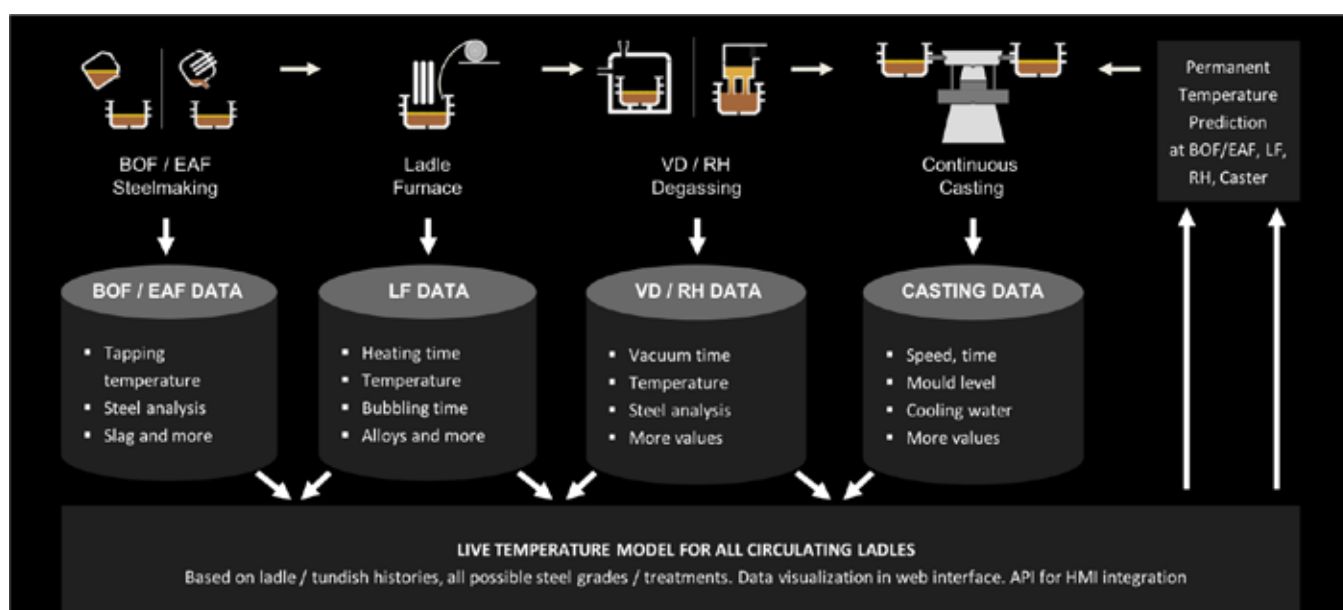
- **SST Temperature Optimisation AI** emits warnings as soon as the molten steel cools down too much for effective casting.
- **SST Casting Optimization AI** displays precise assignments to downstream processes and allows production results to be checked visually.
- **SST Surface Inspection AI** centralises existing surface inspection data and thus offers a cross-process perspective on the manifestation of defects.



cedure applies to the values on the ladle furnace. The casting machine operator is provided with continuously updated forecasts of the actual final tundish temperature for the current melt and the upcoming ladle in the HMI. The operator can also access the forecast of the actual discharge temperature of the ladle currently being treated. "This way, the operator of the casting system is informed much earlier, more accurately and more reliably about the temperatures of the coming ladles," says Henrich. ArcelorMittal, for example, recently commissioned the start-up to equip its plant in Bremen, Germany, with solutions to optimise its continuous casting process and surface inspection.

Steep growth planned

At the end of the last year, SST concluded a financing round with technology investors from Lea Partners, a venture capital and private equity firm from Germany. The result: 2.1 million euros are to flow into the growth of SST in the future, marking the first time that the company has received support from an investor. The capital is to flow primarily into the further development of software products and the development of further steelworks customers in Europe. Furthermore, a development site is to be opened at one of the leading clusters for artificial intelligence in Germany, Karlsruhe, and expansion in the USA is to be driven forward. ■



SST Temperature Optimisation AI: Live prediction of expected cooling behaviour during casting