

PIEPER

FROM ORE TO STEEL

SMART SOLUTIONS FOR THE STEEL INDUSTRY

CONNECTED

THE CONVERTER

STEEL

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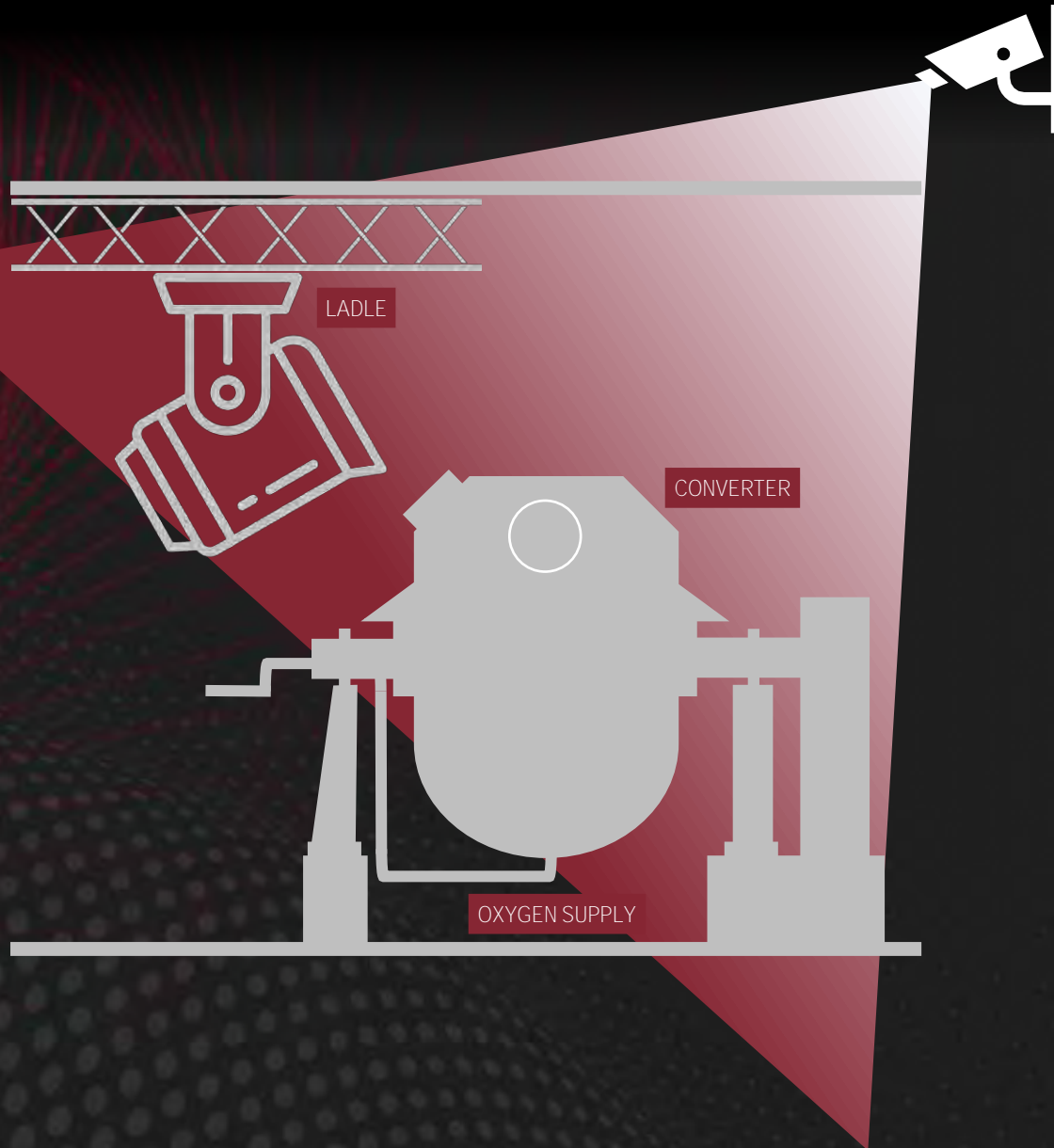


THE CONVERTER

In secondary metallurgy, up to 400 tons of crude steel can be cooked in a modern converter. In the first step – the refining – liquid pig iron, steel scrap and slag binder are added to the plant. The required steel quality is achieved in the further process by adding alloying elements, adjusting the carbon content and removing accompanying elements. When the crude steel is the poured into ladles, the resulting slag is retained and the steel is transported to the continuous casting plant.



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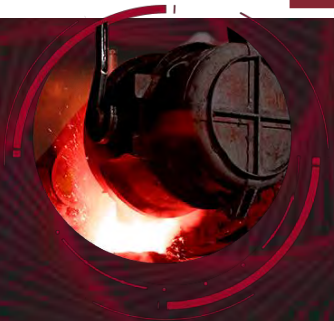


OVERVIEW CAMERAS

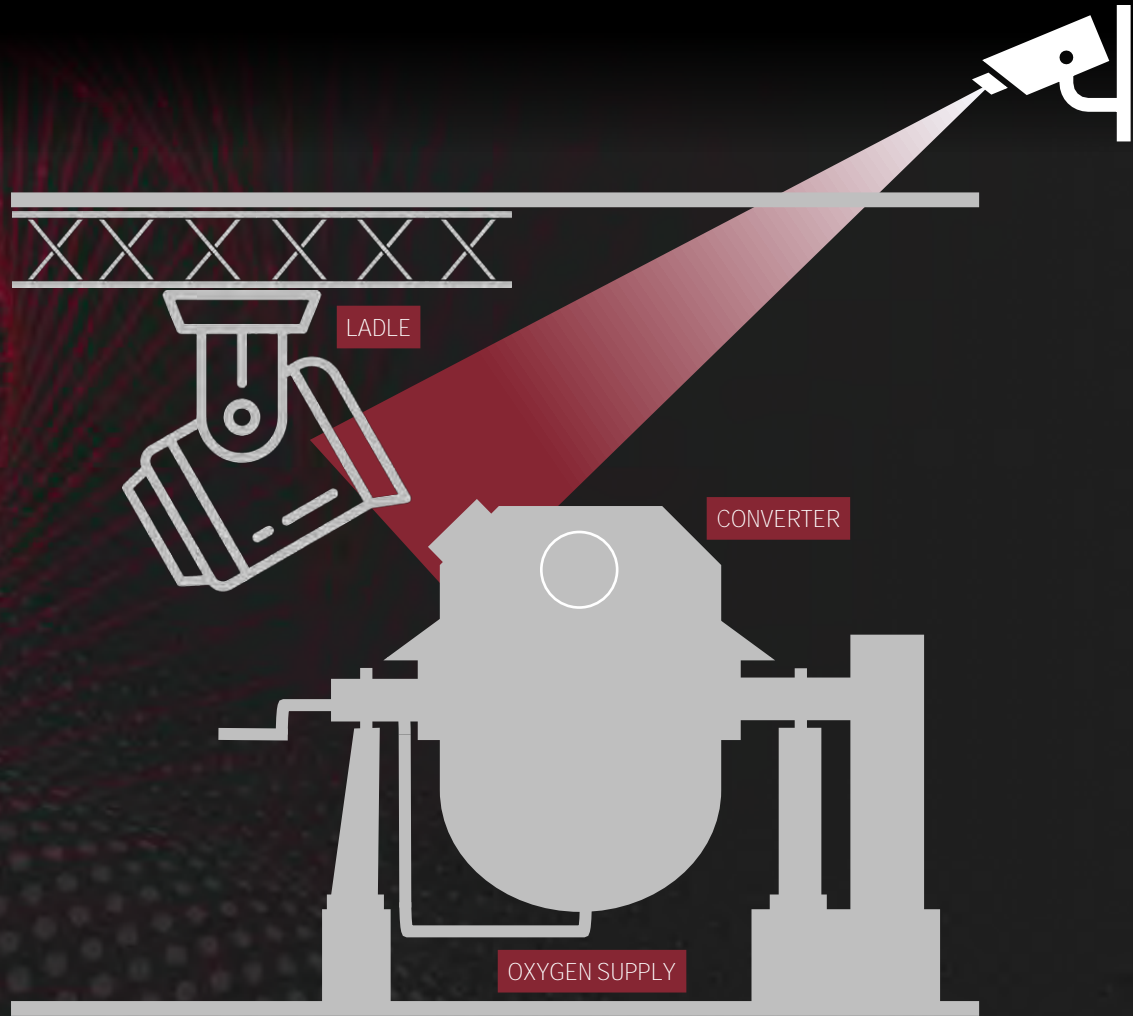
In **process monitoring**, which is geared towards detailed inspection and evaluation within a production chain, visual observation of the entire plant **shouldn't** be neglected. For this purpose, overview cameras are installed at strategic positions that they provide an **overall picture of the current production**. The images thus generated are transmitted live to the control center, so that any imminent malfunctions are detected at an early stage.

In addition to **avoiding cost-intensive production downtimes**, the **environment also benefits** here: a defective filter system can be detected more quickly, for example, as a change in the color of the exhaust gas often indicates a malfunction. The control center can thus take **immediate action and counteract dangers**.

At the same time, the use of surveillance cameras increases **work safety** for the specialist personnel directly working at the plants: The early detection of a malfunction, which the employee on site may not even be aware of, **reduces the risk of an accident to a minimum**.



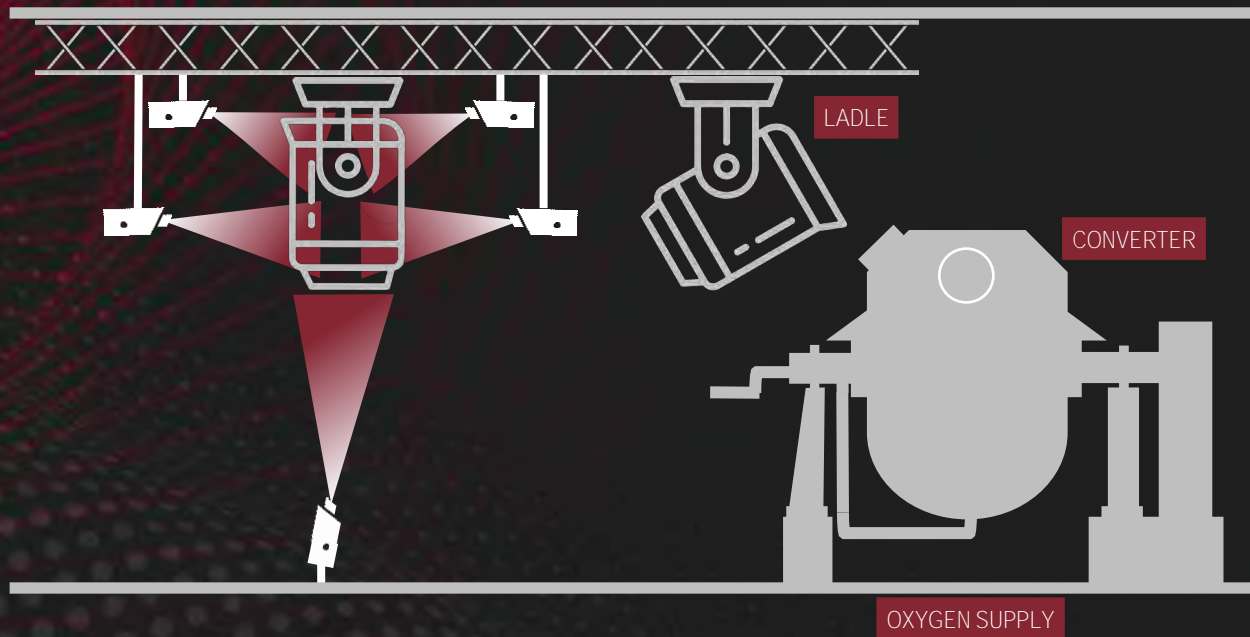
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LEVEL DETECTION / SLAG DETECTION

The demands on the degree of purity of steel are continuously increasing. The thermographic or visual monitoring of the transfer of pig iron into a converter significantly facilitates the detection of slag particles – thanks to the different radiation characteristics of slag and pig iron at the same temperature.



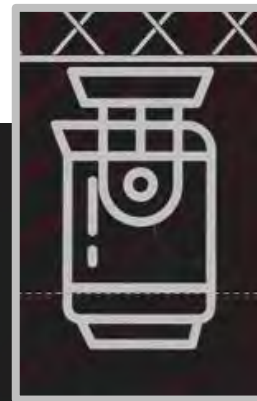


LADLE INSPECTION

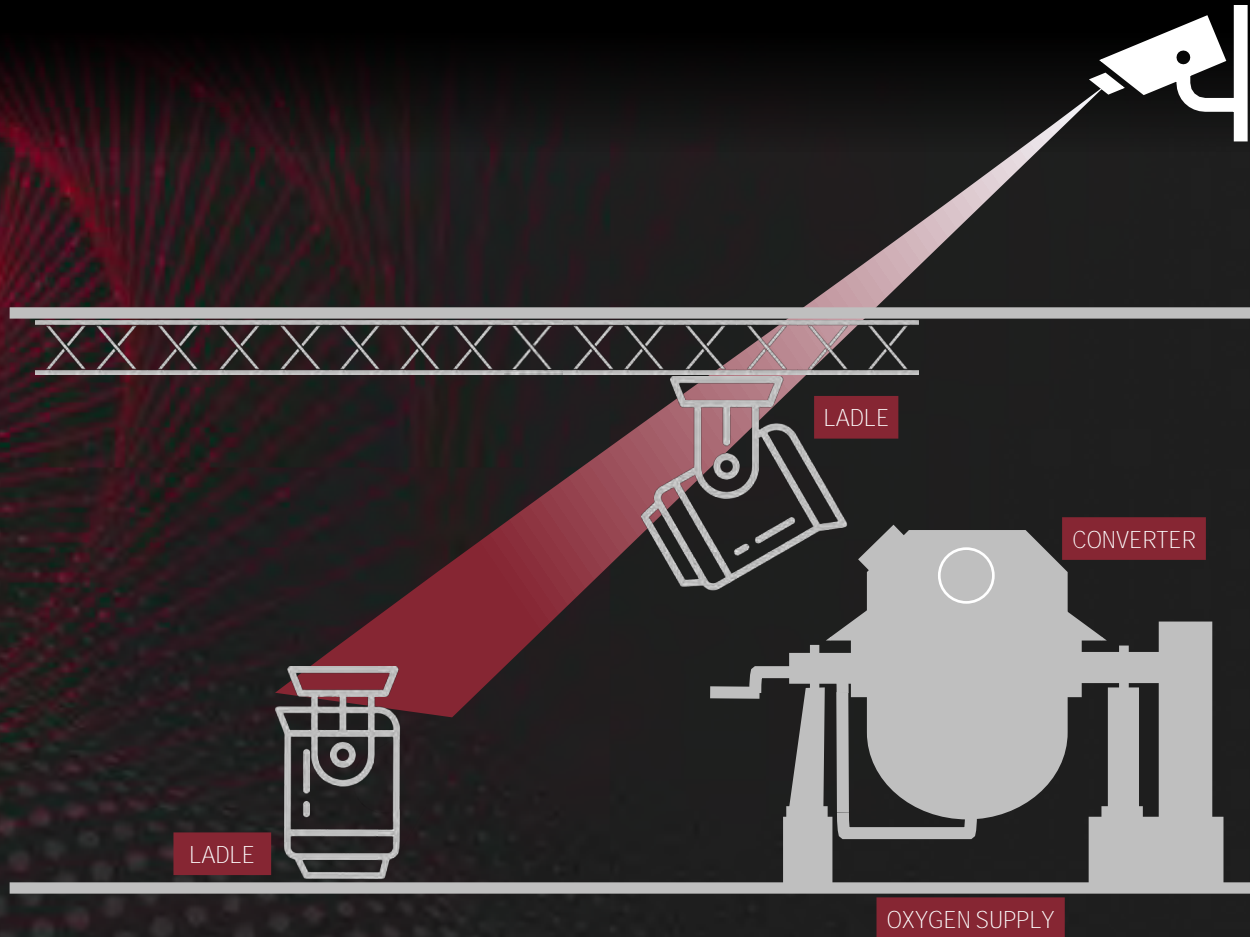
A ladle, which permanently transports liquid crude steel from the converter to the continuous casting furnace, is subject to high material requirements; it must be serviced and repaired frequently. Thermographic condition monitoring of the ladle helps the operator to determine maintenance intervals precisely.

In addition to strain and wear of the refractory lining, dangerous hot spots are also detected thermographically in time, before the ladle can break.

Without the support of cameras, the operator has to estimate the maintenance and repair interval and, in order to avoid accidents, take a ladle out of operation at appropriately short intervals, which leads to inefficient production times.



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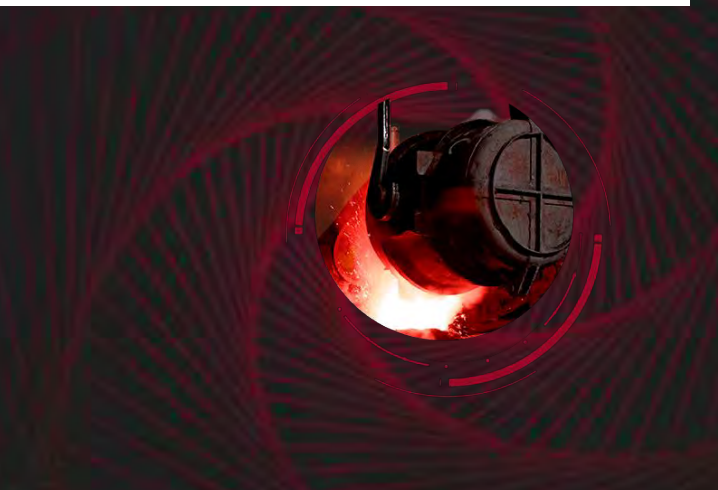


MAINTENANCE AND REPAIR OF LADLES

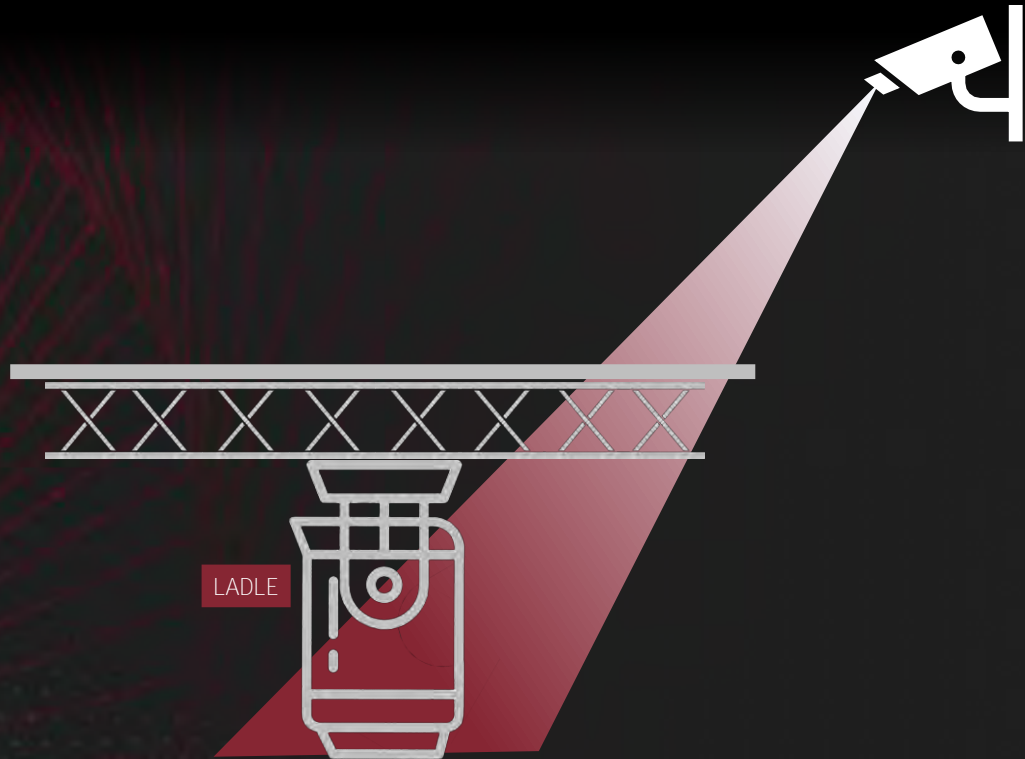
Due to the high heat load, casting ladles must be regularly maintained and repaired. Usually robots are used for this purpose, which ensure that the refractory lining is sprayed out evenly. For **quality assurance of the ladle condition**, a **furnace probe** is used to monitor the process in detail.

If repairs are necessary, the refractory lining must be replaced. In order to **reduce the potential danger** and **speed up the process**, spraying robots are now used to do this work.

Supported by **visual cameras** and an **external lightning** system that allows **360° vision**, the robot is controlled by an external operator. This way, the new lining can be applied evenly in a short time and the ladle can be used again more quickly.



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POSITION MONITORING „SAND FILLING“

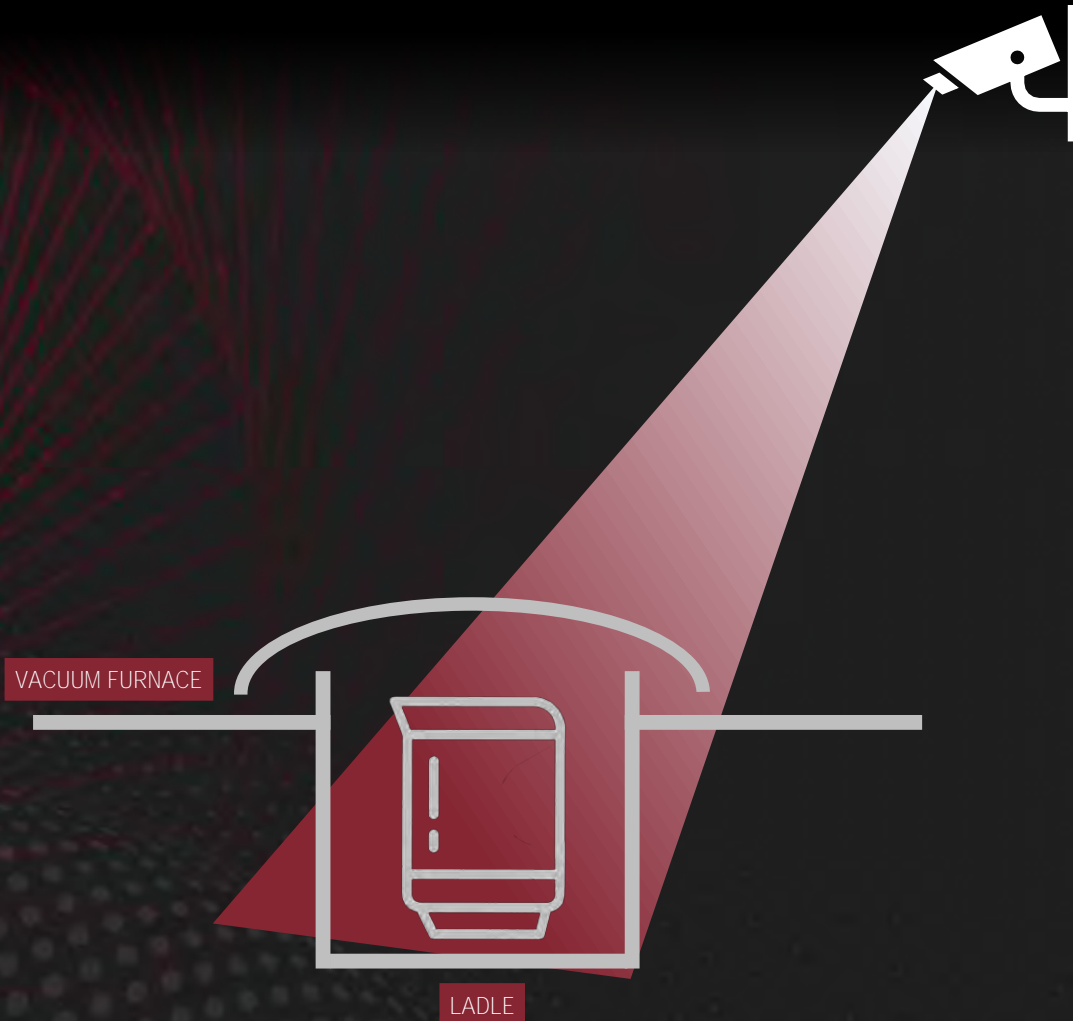
Stopper ladles are often used in steel casting, which have a slide on the underside to discharge liquid crude steel into the continuous casting furnace. These ladles have to be filled with a certain amount of sand again and again before filling to prevent the slider from sticking to the lower part of the ladle due to the crude steel and making it impossible to open it.

However, if too much sand is used, it solidifies and the slide valve must be opened manually. This not only causes delays, but also poses a great risk of accidents when working on a hot, filled ladle.

By using a **furnace probe** to monitor the level of sand, delays are reduced and potential hazards are minimized.



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VACUUM FURNACE

After the crude steel leaves the converter, it can optionally be further treated in a vacuum furnace to increase the material quality. In this process, gases present in the crude steel, such as sulfur and phosphorus, are dissolved or alloys are added.

Depending on the procedure used, cameras or furnace probes are used at the filling openings to give an overview.



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modular

supervising

Netzwerklösungen

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development

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full systems

Thermalkameras

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