

# PIEPER

FROM ORE TO STEEL

SMART SOLUTIONS FOR THE STEEL INDUSTRY

CONNECTED

THE BLAST FURNACE

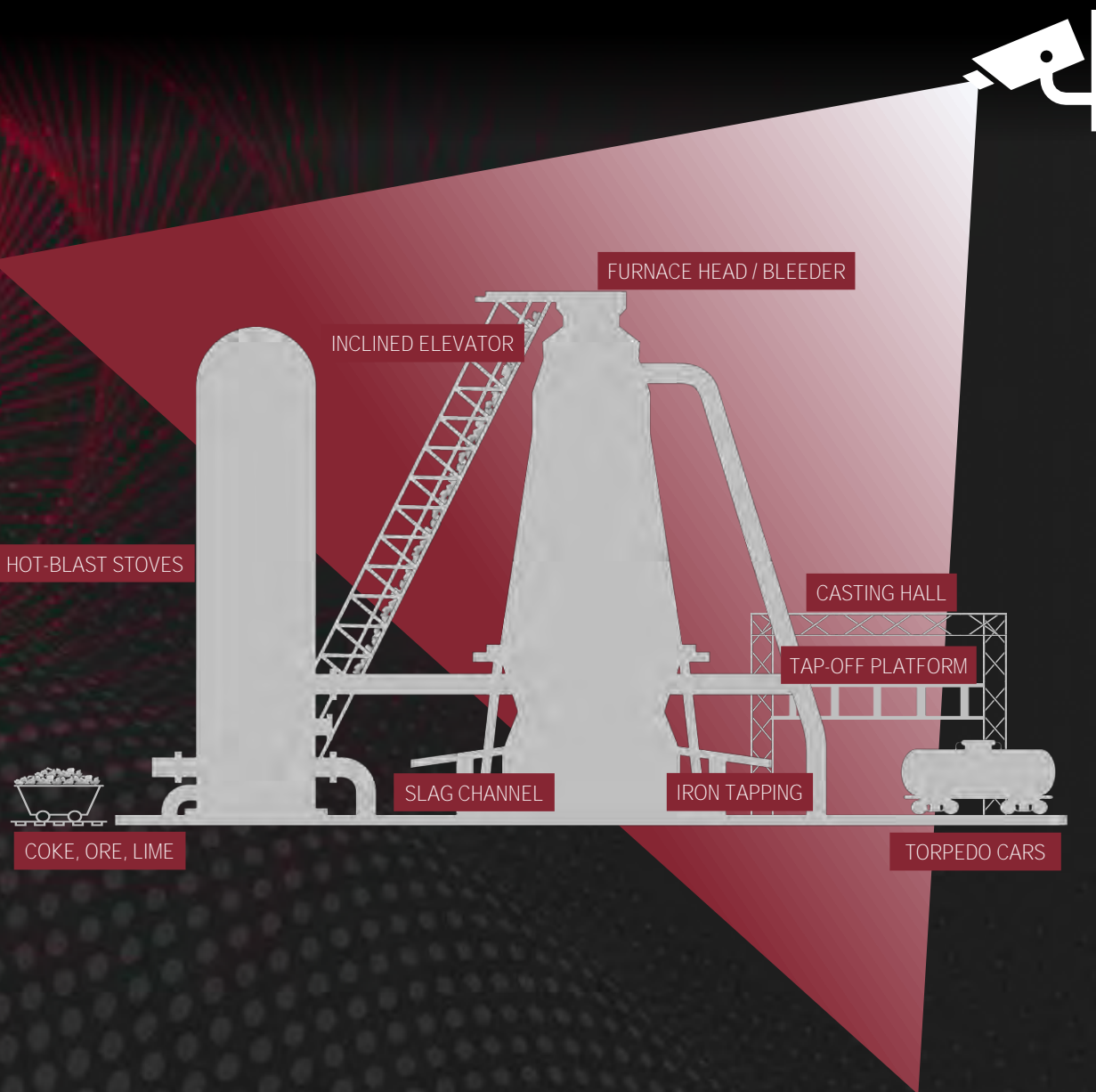
STEEL



## THE BLAST FURNACE

Iron Ore, lime and coke are the main ingredients for the production of pig iron and are melted in furnaces up to 75 meters high. To extract the pig iron, the furnaces, which are enclosed in steel shells and a cooling system, operate at temperatures of up to 2,000 °C. The raw materials are transported to the furnace head by an inclined elevator and fed into the firing chamber via the top cover. Every two to three hours, tapping takes place in the casting hall so that the pig iron and slag can flow off for further processing.

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## OVERVIEW CAMERAS

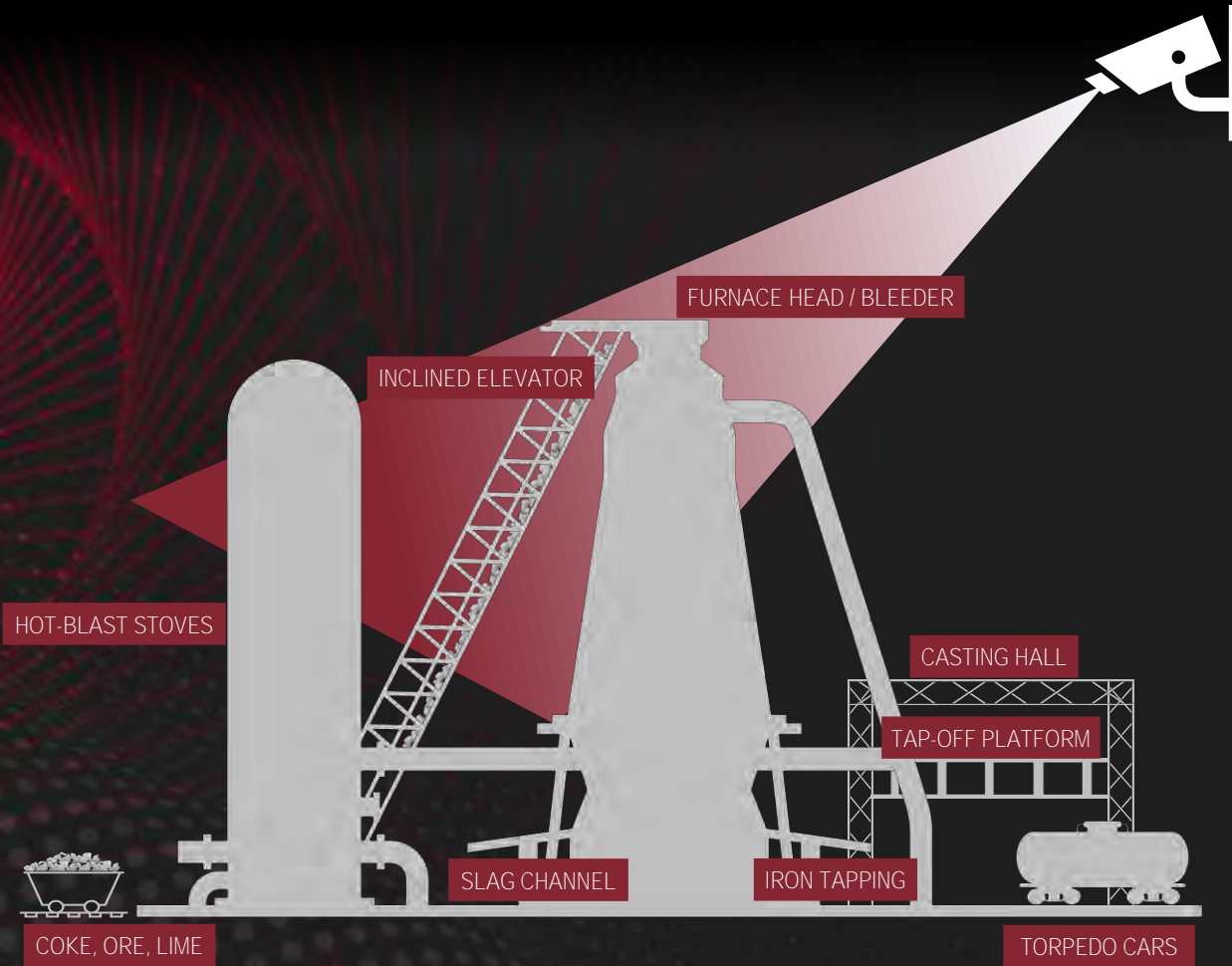
In **process monitoring**, which is geared towards detailed inspection and evaluation within a production chain, visual observation of the entire plant **shouldn't** be neglected. For this purpose, overview cameras are installed at strategic positions that they provide an **overall picture of the current 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**.

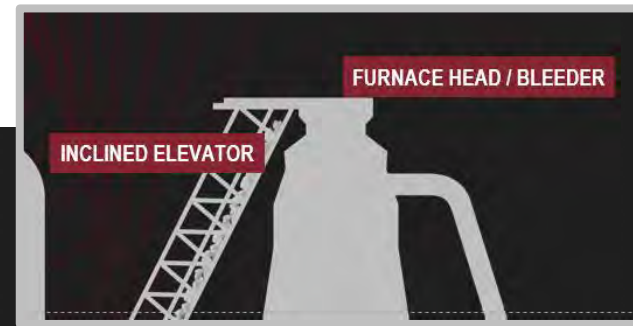


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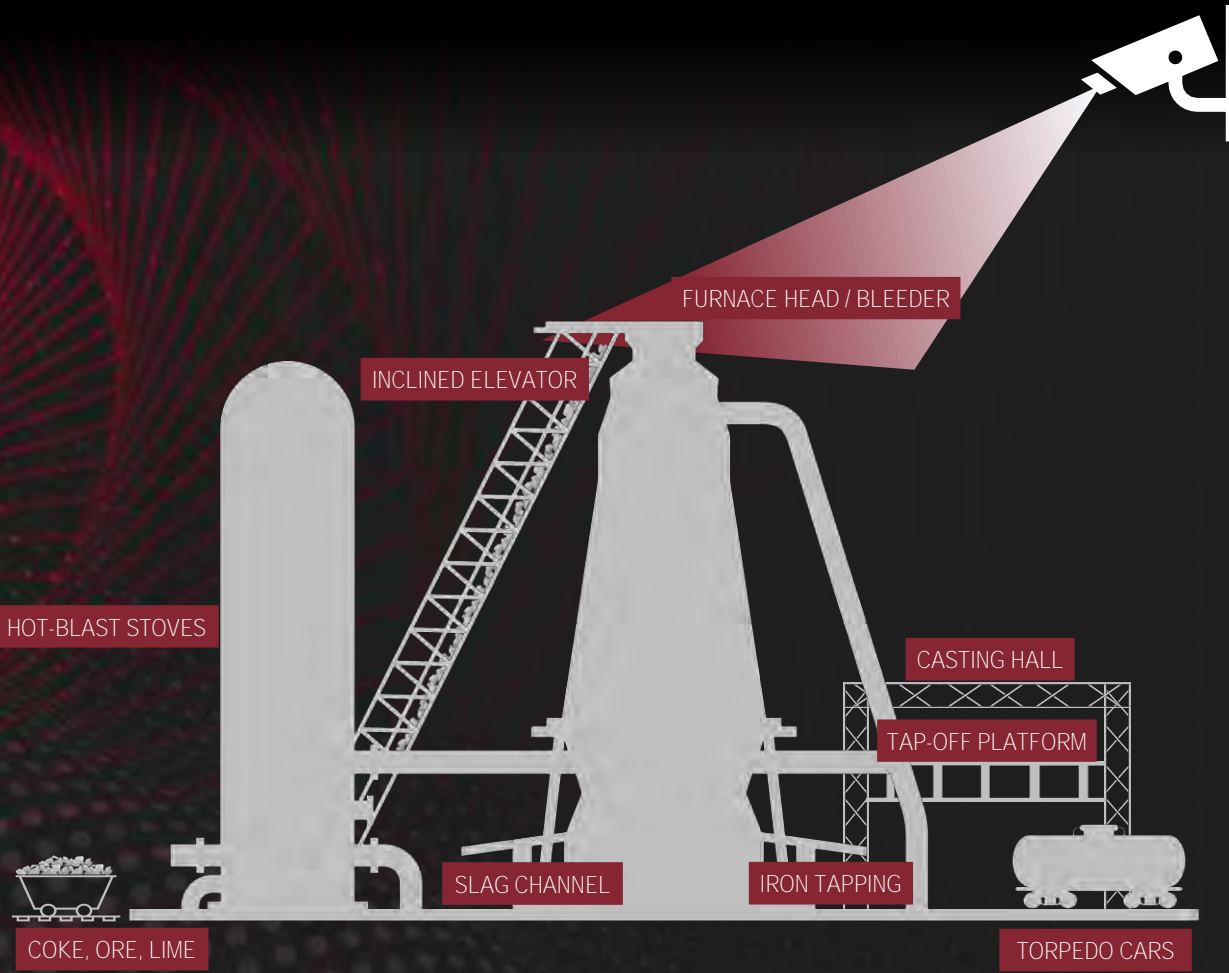


## FEEDING

Iron ore, coke and lime are transported via conveyor belts to the head of the blast furnace and alternately fed into the combustion chamber. In order to be able to monitor and control the process in all times, one or more visual cameras are used here, which continuously send live images to the control center.



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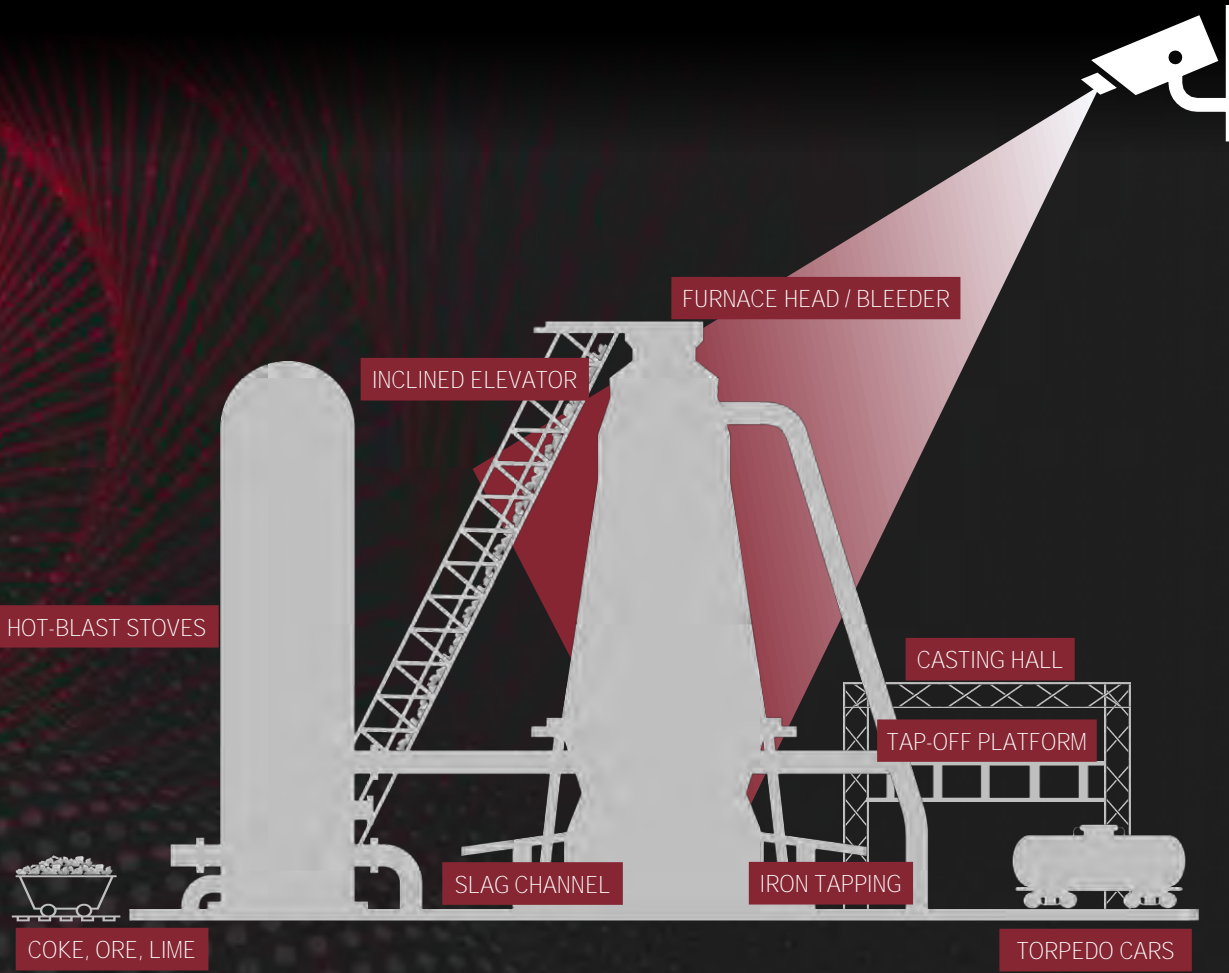


## BLEEDER (PRESSURE RELIEF VALVES)

The bleeder is located at the furnace head, which ensures that if the pressure in the blast furnace builds up too much, it can escape via the flaps. Since an overpressure **shouldn't** occur in the normal course of events, the dampers are monitored by visual cameras for documentation purposes and are available for recording in case of an incident.



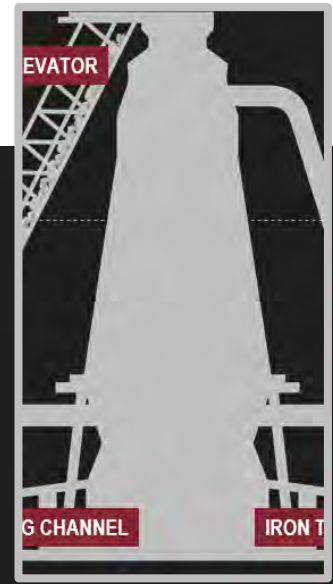
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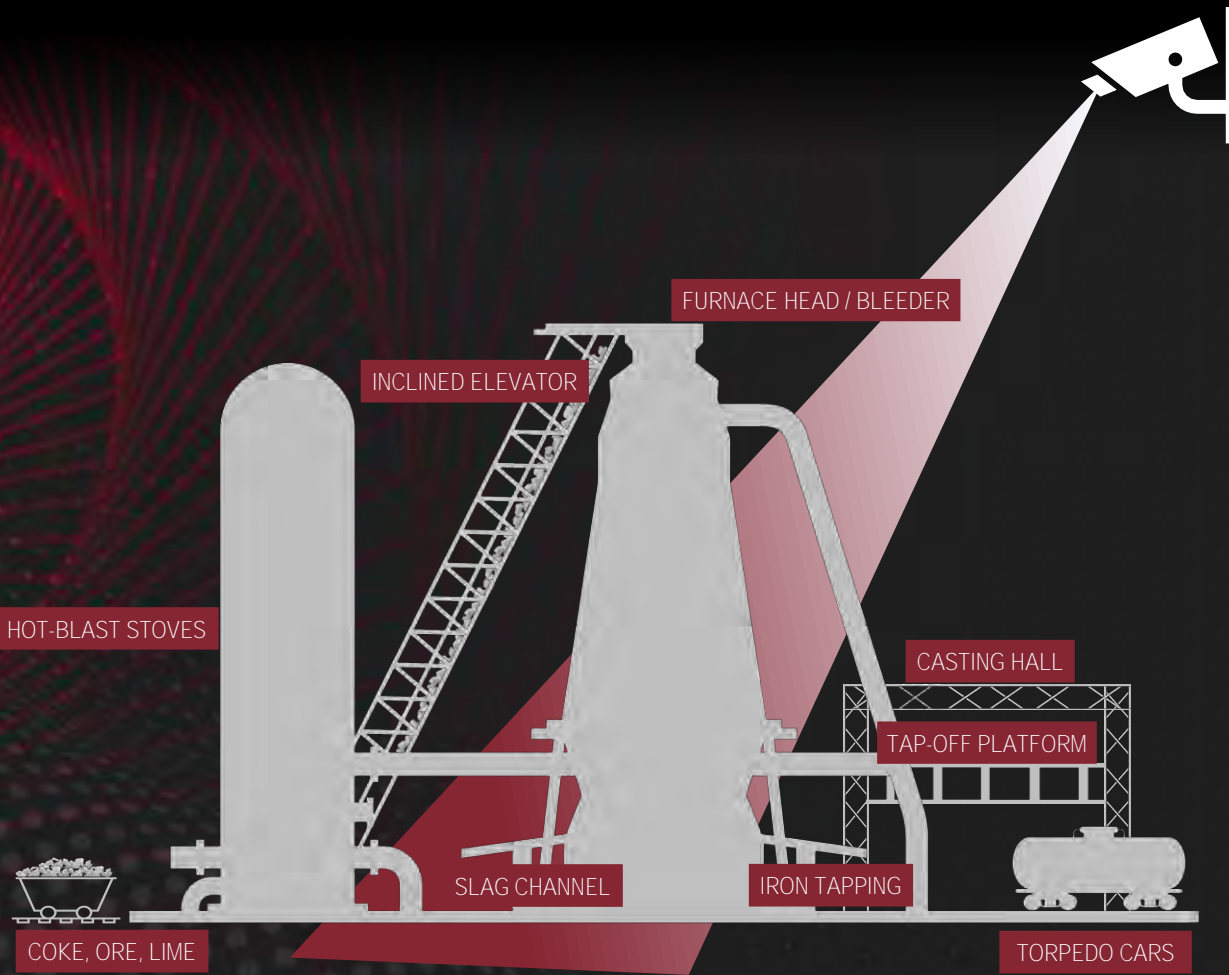
## REFRACTORY LINING – REPAIR & MAINTENANCE

Refractory linings of furnaces have to be replaced from time to time due to the very high continuous loads. 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 furnace can be started up again more quickly.

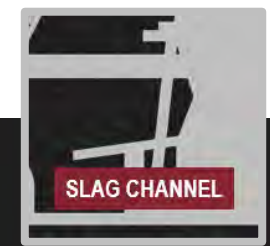


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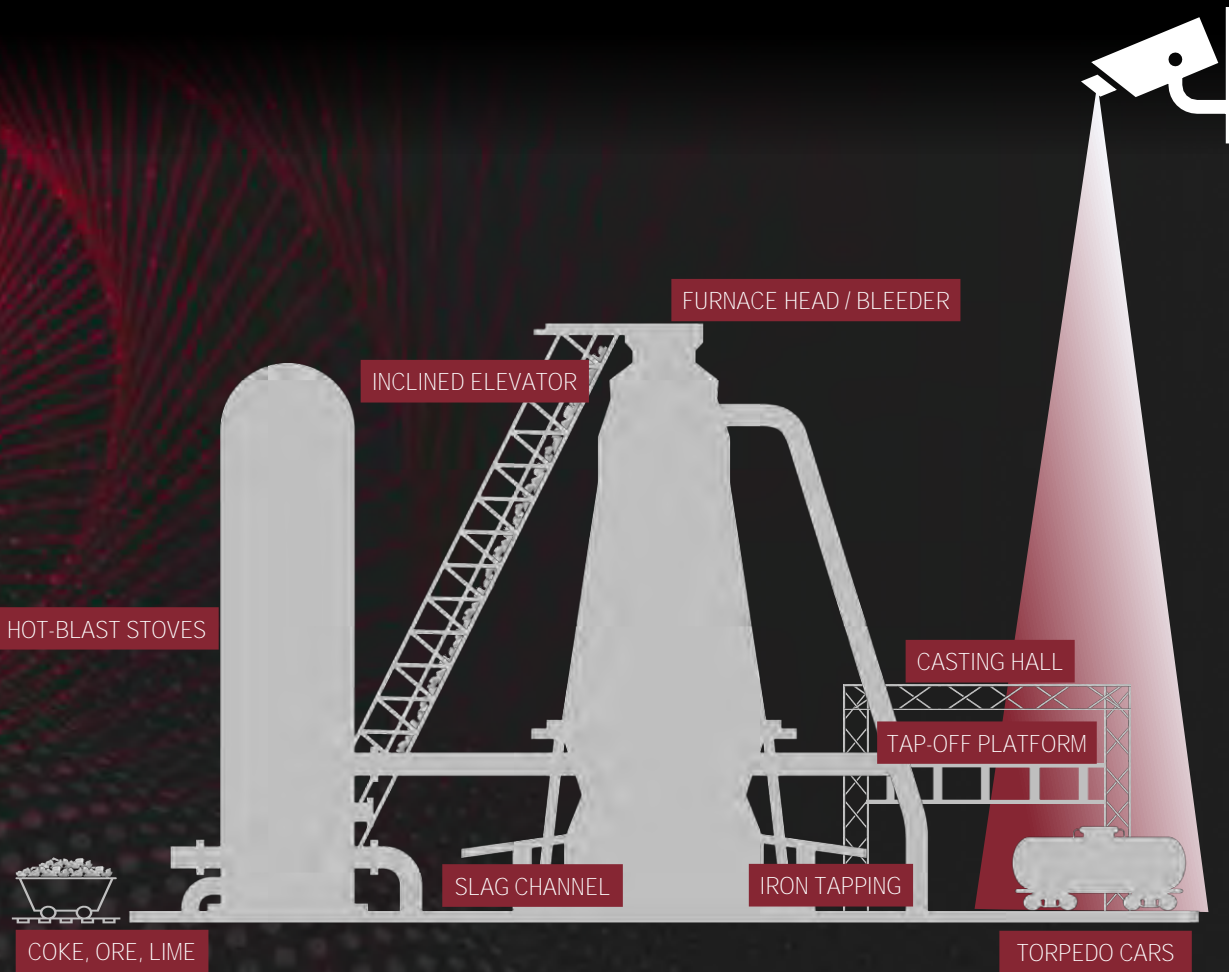


## SLAG TAPPING

During the firing process in the blast furnace, slag is produced as a by-product in addition to iron. Since both products are needed separately for further processing, their different physical characteristics are taken advantage of. Slag, which “floats” on the iron due to its lower density, is tapped at regular intervals. A visual or thermographic camera is attached to the tapping platform in order to observe the discharge behavior. In this way, it is possible to monitor the process from a safe distance and without the constant presence of an employee in the immediate vicinity when the blast furnace needs to be sealed again.



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## TORPEDO CARS

The thermographic control of the refractory lining of a torpedo car allows a reliable compliance with the plant safety. This way, the risks of a breakout of molten metal is reduced to a minimum and the service life of the lining is significantly increased.

With the support of thermographic monitoring, cost-intensive maintenance work is only necessary at longer intervals. The system designed for continuous operation can provide information on the condition of a torpedo car at any time.





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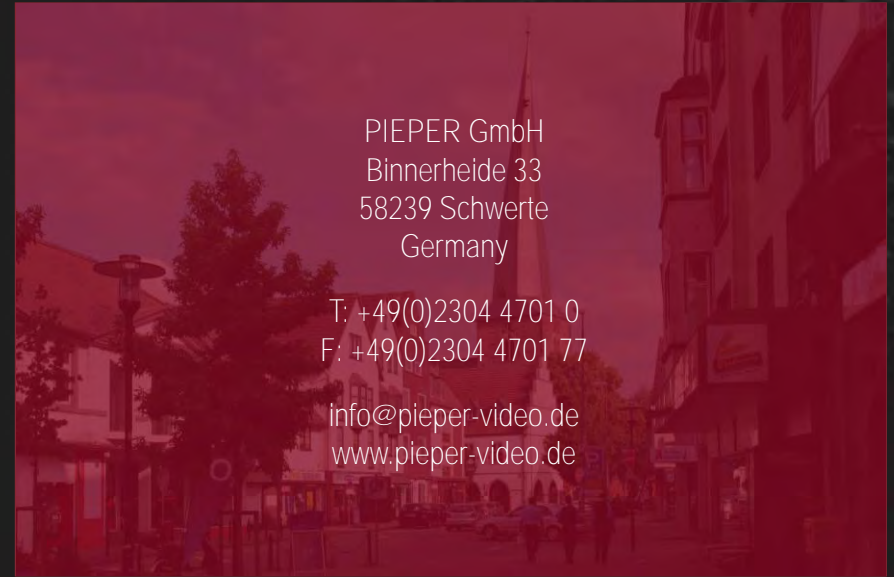
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