DEDUSTING SYSTEMS
for blast furnaces and steel works

EFFICIENT EXHAUST GAS EXTRACTION
REDUCTION OF FILTER COSTS
ENERGY SAVINGS
ECO-FRIENDLY OPERATION

KÜTTNER
During hot metal production as well as in steel works and in foundries, emissions arise at very different locations. These emissions must be reliably captured and filtered.

Besides intensive filtering, the collection efficiency plays a key role. The emissions must be extracted with as little false air as possible. Moreover, the pressure loss in the duct system must be minimized.

Both the hoods and the air transport in the duct system of Köttners dusting plants are systematically optimized in terms of flow technology. This markedly reduces the operating costs of filter plants. With Köttners systems only the exhaust air that needs cleaning is captured – clean ambient air is not "unnecessarily" filtered. This improves the capturing efficiency, while maintaining the volumetric flow constant, or it reduces the volumetric flow, while maintaining the same level of cleaning efficiency.

Additional cleaning stage

In order to be in compliance with the latest emission standards in Germany, ThyssenKrupp Steel decided in 2011 to install an additional cleaning stage at its sinter plant in Duisburg behind the existing electrostatic precipitator (500,000 Nm³/h).

By this the emission of particles was reduced from 100 mg/Nm³ to well below 10 mg/Nm³. The addition of low amounts of hydrated lime (Ca(OH)₂) and activated carbon (HOK) reduced the emission of SOx below 300 mg/Nm³ and of Dioxin/Furan safely below 0.1 ng TEQ/Nm³ dry.
In Hot Metal Production
- Coke making plants
- Sinter plants
- Blast furnaces
  - Burden preparation
  - Coal grinding/drying/preparation
  - Cast house
- Shaft furnaces

In Steel Works
- Hot metal desulfurization
- Alloying plants
- Converters
- Ladle handling

In Foundries
- Induction furnace plants
- Pouring plants
- Sand preparation
- Moulding plants
- Shake-out and conveying equipment

Individually Tailored to Specific Conditions on Site
Küttner uses components optimally suited for each specific task. One example is the nozzle plate for efficient capturing of particles, being highly superior to conventional hoods.

Küttner also employs suction hoods working on the cyclone principle. Cyclone hoods are particularly suited for capturing turbulent, impulsive emission currents, such as thermal convection flows at the blast furnace tap hole above the iron runner.

The line-shaped cyclone thread forming inside the hoods causes uniform pressure distribution, enabling the hood to capture the exhaust air very smoothly also over longer distances with low energy input.
During the various phases of blast furnace operation, for example tapping, taphole drilling and plugging, emissions arise at the taphole, the air duct and the tilting runner. These emissions must be captured and filtered reliably. They mainly consist of particles from the chemical reaction between metal and oxygen in the ambient air and crystalline carbon sublimated from the melt.

The large surface of the iron stream at the taphole releases fairly intensive heat to the environment, forming a stable convective flow above the pouring stream. At this location Küttn er employs cyclone hoods which have proven to be particularly suitable for impulsive convective flows. They are arranged outside the swarming range of the drilling and plugging machines. At the skimmer and the tilting launder closed hoods are used.

The optimization of all components by CFD flow models ensures that released emissions are securely captured and extraction of false air is minimized. Also the effect of transverse flows is minimal. The exhaust ducts at the individual emission points are equipped with air control dampers. They are integrated into the process flow enabling the setting of optimal suction conditions in any operating situation.

Also the exhausting ducts, which convey the dust-laden air to the filters, are optimized and designed according to flow technological aspects. The reduced pressure losses in the duct system minimizes energy requirements.

The filter system is made up of a pre-separator, which removes coarse dust fractions, and a filter with filter bags that removes the fines. Exhaustors convey the cleaned exhaust air through the clean gas duct, a silencer and a stack, which releases it into the open air. Due to the low pressure losses in the overall system the fans can be downsized compared to conventional systems.

In the stack the volumetric flow and the dust content of the clean gas are measured continuously. In this way it is possible to check at any time that the emission values are within regulatory limits.
When the hot metal is poured into the converter, a great number of different emissions are released. The scrap charge might contain combustible constituents such as residues of plastics, oil, grease, lacquers or alike. Upon addition of the hot metal these substances immediately decompose (pyrolysis), mainly turning into gaseous hydrocarbons (CH₄ and other compounds), carbon monoxide and hydrogen.

Also metallic dusts, for example zinc, may vaporize and enter into the gaseous phase. Water adhering to the scrap may dissociate and release hydrogen.

These constituents combust inside and partly outside the converter. The arising flue gases are captured to the greatest possible extent by exhaust hoods of the cyclone type and conveyed to the filter plant through the duct system.

The flue gases have an average temperature of about 800 °C, with peak temperatures over 1,000 °C. By simultaneously extracting the flue gases of several hoods, the gases are mixed and cooled down at the duct walls to some 450 °C.

A mass heat accumulator cools the extracted fume gases down to the 110 °C inlet temperature. The accumulated heat is stored in steel plates and released back to the ambient air within 20 minutes from the completion of the converter charging operation. The ambient air in the converter house serves as cooling medium.

The coarse dust fractions are separated from the extracted fume gases already in the pre-separator. The fine particles are retained in the bag filters. From the filter bags the cleaned exhaust air is conveyed to the clean gas duct, from there via exhausters to a silencer and a stack, which releases it into the open air.
The engineering company, which was founded in 1949, has evolved into a group of companies active worldwide in engineering turn-key processes, melting and conveying plants for the metals producing and processing industry.

The “dedusting technology” division has evolved from the engineering of ancillary plants for “processing technology” applications. Through its intensive engagement with flow simulation issues, Küttner has become a highly competent partner also in the construction of large-scale dedusting facilities.

The service range comprises the planning, design, delivery, assembly as well as commissioning of plants complete with control and data processing systems.

The Küttner Group is represented in the international markets through a network of agents and affiliated companies.