Market leadership in converter dry-dedusting

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Integrated technological environmental solutions have become a key challenge, particularly for the iron and steel industry. "End of pipe" thinking, or the approach to solve all emission-related problems solely by ex-process cleaning systems, is neither a long-term economic solution nor a satisfactory environmental answer. Much more, dealing with the problem of emissions must be redirected to its source of generation. This means that optimized technologies and systems must be increasingly employed which not only maximize production and product quality, but which also minimize environmental emissions.

Increased environmental awareness in the public sector and the more stringent demands for sound environmental technologies are currently major requirements for companies.

Furthermore, recycling and by-product recovery/treatment/disposal options are also assessed with consideration to prevailing economical and ecological criteria. Effective implementation of environmental solutions are achieved through "total view strategies" which take into account the entire production process route, right up to the treatment of waste.

In the production of converter steelmaking plants, effective filtering and recycling has been a major technical challenge in the past. With the modern Siemens VAI DDS (Dry Dedusting System) Technology, efficient and economical solutions to these problems are now available, easily meeting the most stringent environmental regulations of the iron & steel industry.

Main Process Steps of Siemens VAI DDS Technology

1. Gas cooling.
   Offgases are cooled in the cooling stack by absorbing radiation and convection heat.
2. Evaporation cooling and first cleaning stage.
   In this step the offgases are cooled by water injection and partly saturated. The coarse dust is separated in this stage on a dry condition.
3. Second cleaning stage by electrical precipitation.
   This is the fine cleaning stage for the fine dust particles which are separated from the offgas stream.
4. Gas recovery.
   The gases containing increased CO will be recovered to the gasholder.
5. Dust recycling.
   The coarse and fine dust will be collected and treated, and briquettes or other agglomerates can be generated for recycling.
6. Zinc separation.
   The fine dust with high zinc content can be separated for zinc recovery.

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Superior Off gas Cleaning

The reaction inside the converter between oxygen and carbon content of the hot metal generates offgas containing approx. 90% CO.

The offgas exhausted from the converter vessel passes through the skirt with a post-combustion factor of 0.1, and then from the cooling stack to the evaporation cooler. The released thermal energy is used to generate steam for various applications throughout the steelworks. At the evaporation cooler it is quenched from max. 1000 °C to approx. 210 °C. The coarse dust is removed from the offgas stream during this stage. Final dedusting then takes place in a dry-type electrostatic precipitator which features a dedusting efficiency of 99.9%. The modularly designed electrostatic precipitator features a cylindrical construction which optimizes the characteristically low pressure losses of this type of system and further reduces the specific energy cost.

Integrated CO Gas Recovery

Following dedusting, the clean gas passes to the automatic switch-over station, where, depending on the CO gas content, it is either directed to the gasholder or flared. The gas passing to the gasholder is first cooled in order to reduce the total gas volume, which allows the required gasholder size to be kept to a minimum.

Dust Recycling

Coarse dust from the evaporation cooler and fine dust from the electrostatic precipitator are conveyed to the briquetting plant where they are treated and mixed upstream of the briquetting press. Briquetting is carried out by a roller press followed by a screen for the separation of small grain sizes. The briquettes are recycled to the steelmaking process, reducing the required quantities of scrap and ore

Waste Gas Cooling and Heat Recovery

The waste gas cooling system consists of a low and high-pressure cooling water circuit. In order to save energy, the cooling stack is connected to the natural circulation high-pressure cooling water circuit.

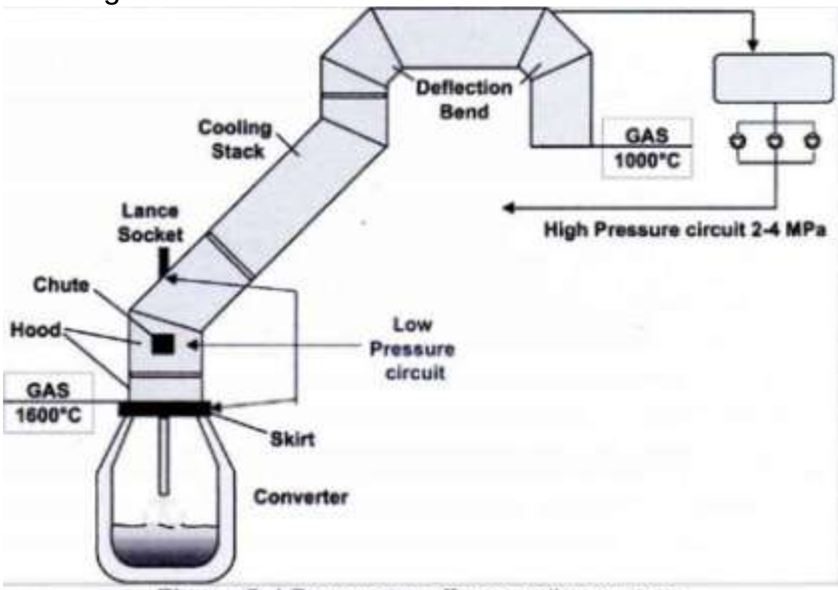

Figure 5: LDconverter offgas cooling system

The primary gases escaping from the converter are partially burnt in the waste cooling stack according to the corresponding air factor and then cooled down. The waste gas cooling system consists of a low and high-pressure cooling water circuit.

The skirt, sublance socket, lance socket and flux chutes are connected in the low-pressure cooling water circuit. The heated water from these sections is conveyed via pipings to the heat exchangers and then further to the expansion tank. The cooling water circulation pumps supply the cooled water back to the above- mentioned sections.

The stationary and moveable hood, deflection bend and inspection cover will be connected to the forced high-pressure cooling water circuit. The cooling stack is connected to the natural circulation high-pressure cooling water circuit.

The water from the steam drum enters the heating surfaces. In the membrane tube a partial evaporation takes place and the steam is separated in the steam drum and further conveyed to the steam accumulator. According to the pressure situation, the produced steam is fed into the steam network. The waste gas cooling stack is followed by an evaporation cooler.