

Wastewater and wastewater treatment in steel plants

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Steel plants use large amounts of water for cooling, dust suppression, cleaning, temperature control (heat treatment), transportation of waste materials (ash, sludge, scale, etc.) and other purposes. Water is an important component of a number of processes, such as the water content of coking coal, granulation of sinter mixes, green pellets in the production of iron ore pellets, steam production and power production, and granulation of blast furnace slag.

The use of large amounts of water also generates large amounts of wastewater, which may contain suspended matter and many dissolved substances and chemicals. The quality of the wastewater depends on the process in which the water is used and the purpose for which it is used.

If untreated wastewater from a steel mill is discharged into a receiving water body, the main environmental impacts are: (1) toxicity to aquatic organisms; (2) reduction of dissolved oxygen; (3) siltation due to suspended matter; (4) taste and odor problems; (5) temperature rise affecting dissolved oxygen; (6) impact on aquatic organisms; and (7) oil slick formation due to floating oil, etc.

The large volumes of process water that come into direct contact with raw materials, products and exhaust gases require treatment for water reuse, water recirculation, or removal of pollutants to regulatory levels prior to discharge.

The quality of wastewater can be controlled by using improved technologies developed today for different processes. Technologies are also now available to treat wastewater for recycling in the same process or in other processes. The treatment of wastewater also leads to the recovery of some solid wastes that can be recycled into the process or undergo some further treatment, thus contributing to the conservation of natural resources.

In order to protect water as a resource, there is a movement to not only prevent pollution from wastewater, but also to treat it and recycle it in a closed system to reduce fresh water consumption.

Treatment of wastewater

The main processes requiring wastewater treatment in integrated steel plants include coking, ironmaking, steelmaking, hot and cold rolling and other operations such as pickling, electrolytic tinning and other coating processes.

The most important parameters are suspended solids, grease, phenol, cyanide, ammonia and heavy metals such as lead, zinc, chromium and nickel, which are generally regulated by statutory bodies. In addition, several organic compounds used in coking and cold rolling operations are also regulated. The normal wastewater treatment processes used to effectively treat steel mill wastewater are described below (Figure 1).



Figure 1 Wastewater treatment process

Control of suspended matter

Removal of suspended matter from wastewater is practically necessary for all production plants in a steel mill, from coking to finishing. Solid particulate matter is suspended in the process water stream during flue and exhaust gas cleaning and cooling,

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