Application Note

Steel Manufacturing Process

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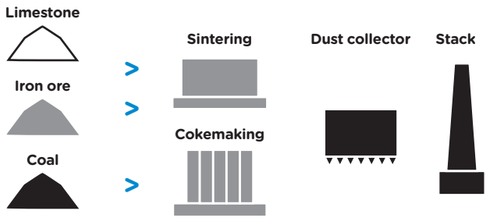
SINTROL
For Good Measure

At Sintrol, we are committed to implementing solutions for our customer's problems. Our products are based on our unique Inductive Electrification measurement system and developed using a flexible modular based platform that allows us to tailor our products for the customer. Having worked on hundreds of installations worldwide in the steel industry, Sintrol has been able understand and enhance the process for its customers, offering solutions for legislative requirements as well as optimizing the process. Using its global network of partners, Sintrol has been able to idenfity four main segments of the steel industry process that have typically provided the majority of its applications. The first step is identifying the areas in the process that require dust monitoring solutions. Once these are located, the correct solution can be implemented depending on the needs of the end user.

Steel Manufacturing Process

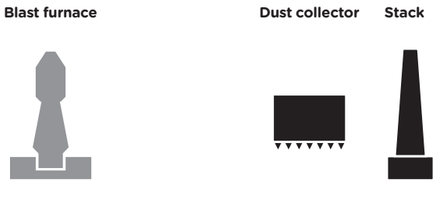
1. Cokemaking/Sintering

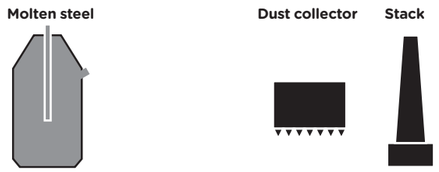
In the beginning stages of iron ore steel production, dust removal systems must be monitored in order to maintain the integrity of the filters. The gases that go through these filters will either go back into the process for heat or be released through emissions stacks. In both cases, dust monitoring will ensure that the plant operator is quickly notified if there are any breaches in the dust removal system. Otherwise, the process may be subject to equipment damage or the plant will be subject to regulatory infractions.



2. Blast/Electric Arc Furnace

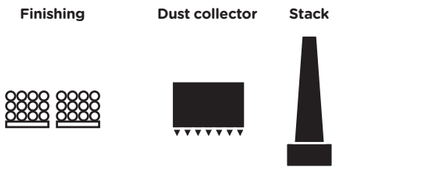
Depending on the construction of the plant, there could be different reasons for measurement in the furnace stage. Often times, the heat from the furnace flue gas is for other parts of the process. This requires dust removal systems to ensure the air is clean. In other instances, there is a turbine in the plant to create energy. In both cases, it is imperative that dust measurement systems are used with the filtration systems since air is recirculated into another process that requires there to be no dust.





3. Converter

To refine the iron produced in the furnace, a basic oxide furnace will use highly purified oxygen to convert the molten iron into steel. Dust measurement systems are used to ensure air is cleaned efficiently before reentering other areas of the process. Any breakages or leaks in the filtration system are quickly identified and reported to the control room to minimize downtime to the plant.



4. Finishing

During sheet formation and finishing, the steel is billeted or rolled into the desired shape of the plant, while the pollutant gases are filtered through some dust removal system. Filter leak detection gives the earliest possible warning to plant operators that the emissions amounts will be increasing. With tight environmental regulations in these plants, this early detection allows the plant to operate optimally and reduce the risk of plant shutdown.

Solutions

Filter Leak Detection

Sintrol Snifter Series monitors are the perfect solution to provide notification to the customer of deterioration or breakage of the filter bags. This provides early detection for the customer that excess particulate matter is in its process and releasing out of the stack. The Sintrol Snifters are largely maintenance free devices that can measure dust levels as low as 0.1mg/m³. This device also has an ATEX 22 version available

Trend Monitoring

The Sintrol S303 monitor is equipped with a 4–20 mA output and all the features necessary to provide the end user with a continuous output. With high temperature versions (up to 700°C) available, this is a solution for all areas of the plant with dust measurement needs. The Sintrol S303 monitor allows the customer to identify increasing trends in the dust levels and possibly identify sources of extra pollutants in its process.

For plants that use Electrostatic Precipitators (ESP), our Sintrol E-Spy is the industry's only probe based monitor allowing the end user to get a continuous trend measurement in 4–20 mA output after an ESP. The customer can learn about the efficiency of its ESP, optimize the hammering process, and make adjustments to maximize the efficiency of the filter system utilizing the Sintrol E-Spy.

Emissions Monitoring

For each stack in the plant, Sintrol's S304 and S305 monitors can be calibrated to provide readings in mg/m³ for actual emissions amounts. Sintrol's S305 monitor is a TÜV certified instrument, meeting the QAL1 standards for official emissions measurements in the European Union. These virtually maintenance free monitors are a less expensive and more reliable alternative to the traditional opacity monitors that have been used historically.

Application

A large European based steel company was seeking a solution for its problem with downtime in production. With recent decreases in the amount of dust emissions allowed due to regulations, the plant was forced to shut down between 3–5 times each month due to a breakage of bag filters that required maintenance. Otherwise, the plant would be subject to regulatory penalties. Additionally, each shut down would last approximately 2–3 hours to identify and then replace the correct bag(s). These 10-15 hours of downtime in the plant each month cost the company tens of thousands of Euros over the course of the year, if not more.

With our Sintrol Snifter monitors on each baghouse compartment, the plant was able to quickly identify broken filters to have them replaced and be notified of deteriorating bags that may tear shortly. By adding Sintrol S303 trend monitors in the outlets and combining the systems with our DustLog software, the plant was able to use the cleaning cycles in addition to our monitors to identify the location of the broken bag to minimize downtime for maintenance. These enhancements improved plant availability by several hours each month, leading to better productivity and profits.

Principle of Operation:

Sintrol dust monitors are based on a unique Inductive Electrification technology. The measurement is based on particles interacting with an isolated probe mounted into the duct or stack. When moving particles pass nearby or hit the probe a signal is induced. This signal is then processed through a series of Sintrol's advanced algorithms to filter out the noise and provide the most accurate dust measurement output.

Classic triboelectric technology is based on the DC signal, which is caused by particles making contact with the sensor to transfer charges. Compared to DC based measurements, the Inductive Electrification technology is more sensitive and minimizes the influence of sensor contamination, temperature drift and velocity changes. By using the Inductive Electrification technology it is possible to reach dust concentration measurement thresholds as low as 0.01 mg/m³.