

The SinterCast Process - Pouring Furnace Production

The SinterCast Process

The process control technology for pouring furnaces is based on feedback control logic. The SinterCast thermal analysis measurement is obtained from the iron in the exit spout of the pouring furnace. The result of the thermal analysis is used to determine the amount of the magnesium addition for the next base treatment ladle. The thermal analysis result is also used to determine the inoculant addition for each new mould. The dynamic control of both the magnesium and inoculant additions minimises process variation and ensures that consistent iron is delivered to the moulding line. The pouring furnace control technology can be applied to furnaces that are heated, unheated, pressurised, or non-pressurised.

Process Flow

The process flow begins by base treating the iron with magnesium. Cored wire treatment is preferred as this allows the wirefeeder to be directly controlled by the System 3000, providing a fully automated process. The size of the treatment ladle is determined such that approximately four ladles are required to completely fill the furnace. This ensures that changes in the amount of magnesium added to each new ladle have sufficient 'weight' to influence the iron already in the furnace. The regular input of freshly treated iron, combined with a predictable magnesium fade rate inside the furnace, provides a stable platform for the process control. The magnesium treated iron in the pouring furnace is inoculated by injecting cored-wire into the pouring spout of the furnace during the time that the stopper rod is open to dispense the iron into the moulds.

The process control actions are determined by the results of the SinterCast thermal analysis measurement. The timing for each control sample is determined by the System 3000 to ensure that the thermal analysis result is available on time to determine the magnesium addition for the next base treatment. The System 3000 will also automatically request additional samples if the moulding line has been down for a pre-determined time or if any other process anomalies have occurred. Depending on the result of the SinterCast measurement, the amount of magnesium wire added to the next base treatment is automatically increased or decreased to either concentrate or dilute the magnesium content of the iron already in the furnace. Similarly, the speed of the inoculant wire injection is automatically increased or decreased to change the amount of inoculant added to the exit spout during the constant time that the stopper rod is open.

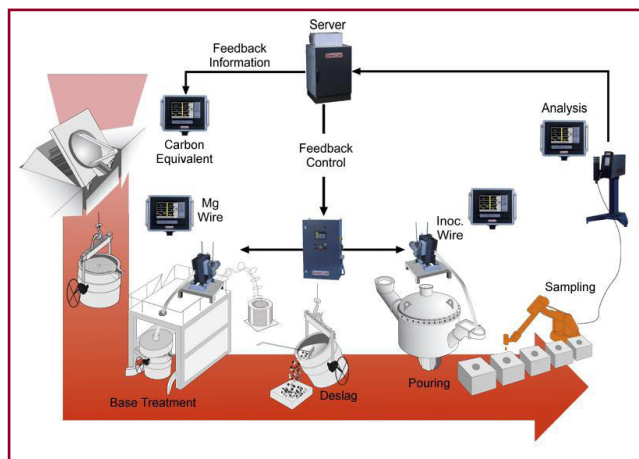


Figure 3: Process Control for Pouring furnaces

Process Automation

The System 3000 hardware and software configuration for pouring furnace production includes a peripheral data acquisition system to interface with the controls of the pouring furnace and the moulding line. The recorded information includes furnace weight and pressure, stopper actuation, moulding line indexing, shake-out time, base treatment ladle weight, temperature and sulphur content. Together with this data logging, the SinterCast thermal analysis result enable the System 3000 to determine the optimal timing for control measurements and also to alert the operators of any process anomalies. The process data logged by the System 3000, together with the full thermal analysis result history is available to the foundry engineers for traceability and quality control.