

WHAT IS FOUNDRY SAND?

Foundry sand is clean, uniformly sized, high quality silica sand, used in foundry casting processes. The sand is bonded to form molds or patterns used for ferrous (iron and steel) and non-ferrous (copper, aluminum, brass) metal castings. Shake-out sand from completed metal casting are often reclaimed back into the foundry sand process.

Casting methods

Green Sand is silica sand with minor ingredient additives such as bentonite clay, water, and sea coal. In general, the type of metal being cast determines the minor ingredient portions as well as the gradation of the sand required. The green sand is reclaimed by a thermal process that requires cooling the sand before it can be reintroduced into the casting process. The majority of foundries use green sand casting in their process method.

No bake casting is another popular method used to produce “core molds” or smaller volumes of complex castings for both ferrous and non-ferrous metals. This method applies a chemical binder/catalyst to the sand just before filling the mold which undergoes a chemical reaction to harden the sand and maintain the mold’s shape. As this reaction is sensitive to temperature, it is very important to maintain a consistent and uniform temperature of the sand to optimize the cast product quality.

Why does the temperature of sand vary in foundry processes?

The sand temperature can be influenced by variations in the way foundries dry and cool their reclaimed green sand, or store and distribute their no bake sand. As foundry sand is an integral part of the casting process, using sand that is too hot or too cold leads to reduced casting quality, with lasting negative affects along the entire production line. When the molten metal is poured into a mold with green sand that is too hot, it can result in higher scrap

rates as well as more consumption of bentonite. No bake sand that is too hot or too cold creates inconsistencies in set time, and consumption of catalyst/binders.

What type of technology can be used to control the temperature of the sand?

Rotary cooling drums are the most popular technology to cool the temperature of the shakeout foundry sand. The sand is fed into one end of an inclined, rotating drum, with air entering the drum. The sand moves slowly downwards through the drum achieving cooling from direct contact with the air. Vibrating fluid bed coolers are also a popular cooling technology for foundry sands. The sand is conveyed on a vibrating and perforated deck. Pressurized air flows upwards through the deck to fluidize and cool the sand from direct contact as it is conveyed from one end to the other. However, both of these cooling technologies do not allow uniform cooling for all sand particles, require air permits, and are very inefficient in terms of process cost per ton of sand.

A more effective and efficient cooling technology is the indirect heat exchanger which can guarantee an even, stable and accurate final temperature for the sand. The foundry sand flows downwards, in a slow and controlled movement through the indirect heat exchanger, running between hollow, stainless steel plates. Cold water flows countercurrent within the plates to cool the sand to the desired end temperature by conduction. Neither water nor air comes in contact with the foundry sand. The slow, controlled, downward movement of the sand guarantees that all particles, regardless of inconsistent particle size are evenly cooled, eliminating variances in output temperatures of the foundry sand.

To learn more about indirect cooling technology, visit: <http://solexthermal.com/products-solutions/cooling/>