

How a foundry optimized the cooling of the molds

PNR Italia designs an effective and flexible system for cooling centrifugal casting molds



SCENARIO FOR THE SECTOR

The processes of centrifugal casting

The centrifugal casting process is an industrial production process done by fusion. The liquefied material (metal, plastic) is conveyed into a permanent tubular form, called "mold", with an externally induced pressure.

The centrifugal force, determined by the rotation on the vertical or horizontal axis of the mold, allows a uniform filling, making the casting material adhere to the internal walls of the mold. By dosing the material appropriately, the finished piece develops a cavity along the rotation axis of the mold.

The semi-finished product is removed from the mold after its solidification.

The molds used can be "disposable" (made in sand for the production of few pieces) or permanent (in steel, copper, graphite).

Some examples of products obtained by centrifugal casting are engine components, cylinder liners, piston segments, pipes and flanges, continuous casting rollers.

THE PROBLEM OF OUR CLIENT

The customer who contacted PNR Italia is a foundry that uses machines for centrifugal casting. They needed to cool the molds used in the bronze casting process efficiently.

The molds are made of steel and have an external diameter of up to 1200mm and thicknesses ranging from 50 to 80mm.

The average height of the molds is 1000mm.

Inside the molds bronze is poured, which has a casting temperature of 1180 °C. The external temperature of the mold reaches 300 °C.

2 HOURS *Average cooling time of the mold*

INDUSTRY
Metallurgy



APPLICATION OF PNR PRODUCTS
Cooling of a mold for centrifugal casting



PROBLEM OF OUR CLIENT
High temperature cooling



PNR SOLUTION
Manifolds system and high impact nozzles



PNR SOLUTION

The Technical Office of PNR Italia has developed a system of three-manifolds arranged at a regular distance one from the other and around the rotating mold.

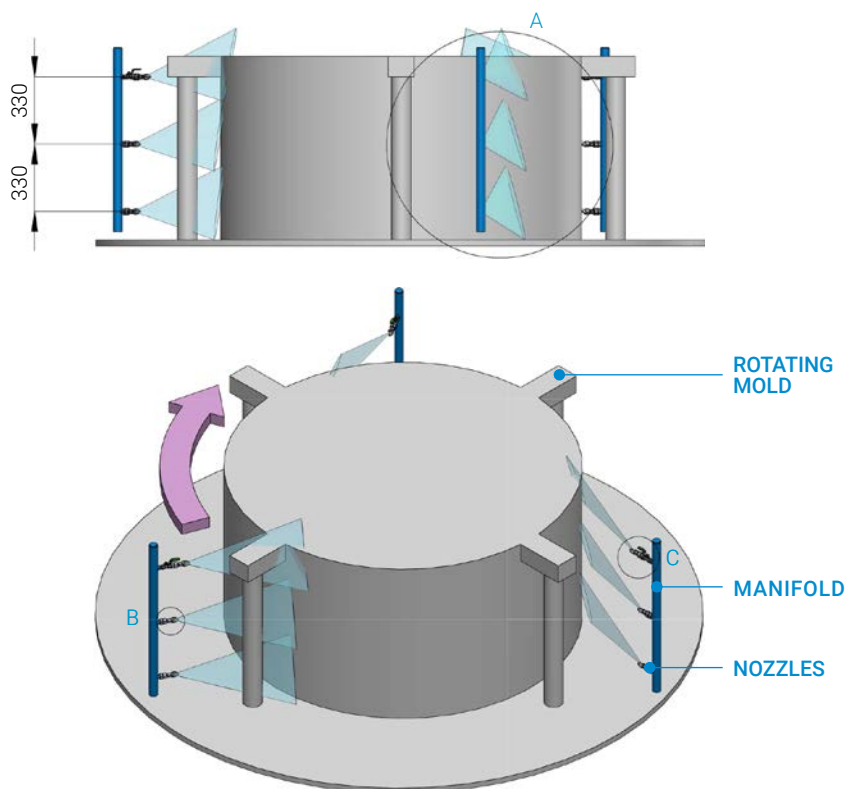
Each manifold is equipped with three high-impact nozzles K, activated as soon as the mold filling phase ends and the rotation phase begins.

The water jets produced by the nozzles impact the surface of the mold at an angle of 17° and allow the mold to cool in about 2 hours.

ADVANTAGES FOR OUR CLIENT

The solution proposed by PNR Italia makes the cooling system adaptable to every need.

Since the manifolds have to be positioned at a precise distance from the mold to ensure the cooling performances, it's possible to mount the manifolds on movable arms hinged to the pit where the mold is positioned. In this way, the system is adaptable to molds of different sizes.



FRONTAL VIEW AND ISOMETRY OF THE ROTATING MOLD AND THE COOLING SYSTEM
NOZZLES IN ACTION

FOCUS ON THE PRODUCT



K FLAT FAN NOZZLE
HIGH IMPACT

Compared to the standard cat-eye-shaped flat fan nozzle tips, K nozzles have a larger and free inner passage and are less subject to clogging, provide high performance cleaning efficiency and have an extended operating life.

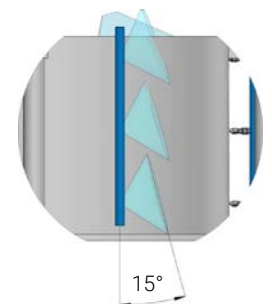
The liquid is concentrated and produce a narrow-angle flat fan spray with a high impact value.

PERFORMANCES

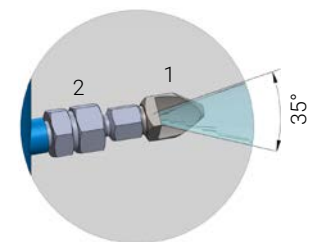
KQH 1980 B1

@PW= 3 BAR	UNIT OF MEASURE	THEORETICAL VALUE
SPRAY ANGLE	DEGREES	28°
FLOW RATE	LPM	9.80
SYSTEM FLOW RATE	9.80X11= 88,2 LPM @ 3BAR	

DETTAIL A
ANGLE OF INCLINATION OF THE JETS



DETTAIL B
1 | NOZZLE KHQ 1980 B1
2 | SWIVEL JOINT ZRA



DETTAGLIO C

A tap placed on the highest nozzle of the manifold prevents water waste. If the mold is lower than the manifold and does not need to be cooled at that point, the higher nozzle will then be temporarily closed.



PNR ITALIA

Via Gandini 2, 27058 Voghera (PV), Italy

Call or write us for customized solutions!

+39 0383 344 611 info@pnr.it