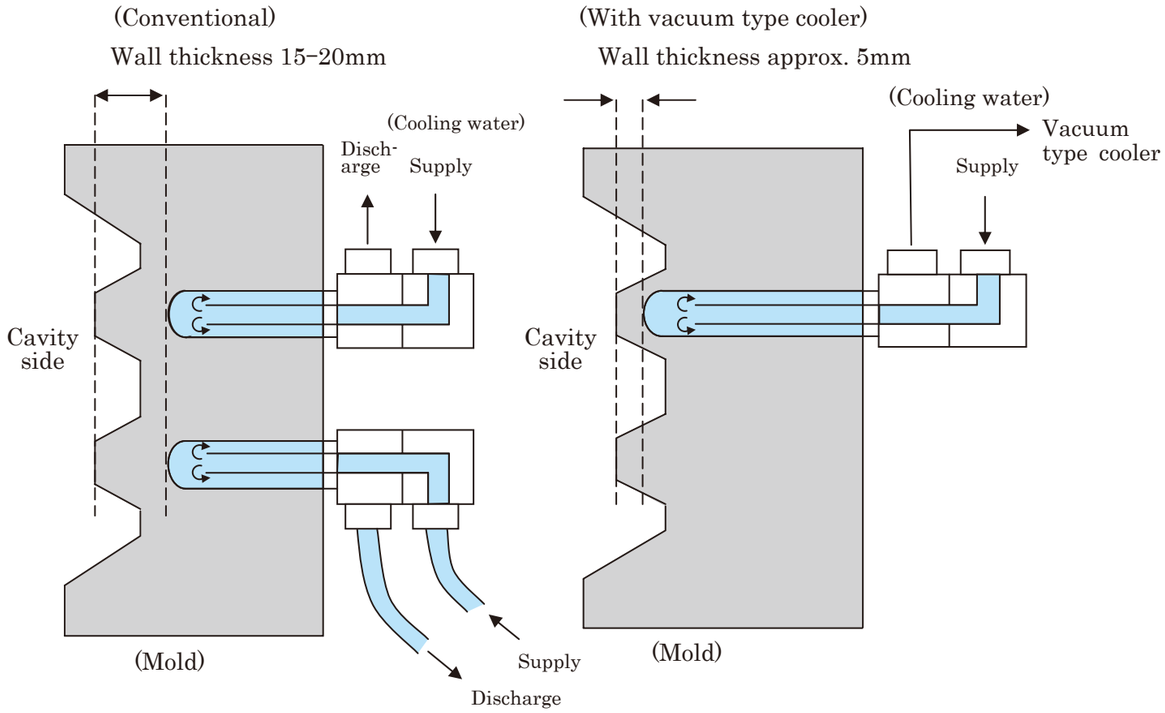
Sample of cooling design for a die-casting mold



(No need to consider about possible heat crack at the cooled area and enable to enjoy increased cooling effect.)

With employing vacuum type Super Cool you can enjoy greater degree of Freedom in designing mold cooling system.

Outline specification of vacuum type Super Cool V

Description	Type: SCV-200	Type: SCV-380
Cooling agent	City water	-ditto-
Coolant volume(max) -Suction	100 lit/min.	190lit/min.
Coolant volume(max) -Suction+Boost	140lit/min. at 20KPa	240Lit/Min. at 20KPa
Vacuum Pump	2.2kw 200V	3.7kw 200V
Vacuum	90–92KPa	-ditto-
Reservoir (SUS)	100 Lit	250 Lit
Refil to reservoir	Automatic with 20A ball tap	-ditto-
Outline dimensions	500×1300×1300	500×1900×1400
Die Cast M/c applied	less than 1250 ton	1250–3500 ton

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Japanese Patent No. 3999235
International Patpend

Japan Foundry Technology

SUPER COOL V SYSTEM

(Vacuum <negative pressure> Type Mold Cooling System)

JFT Co., Ltd.

NEW SUPER COOL SYSTEM-V(Vacuum)

(A Die Cooling at Reduced Pressure)

Newly developed Super Cool System “SCV (Vacuum)” is engineered to run the cooling water through the cooling pipe system in a mold, where is kept uniformly at a reduced pressure <negative pressure>.
This offers;

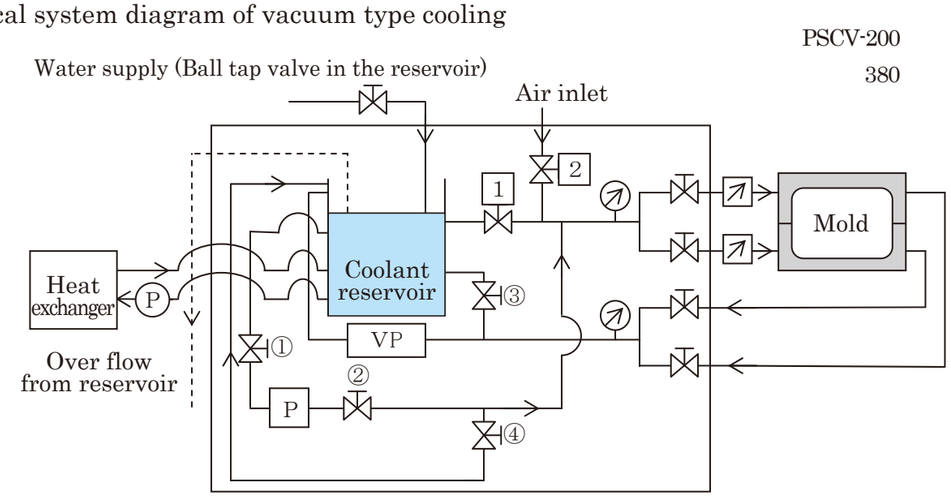
- To prevent cooling water leakage from sealed portion(s) and crack(s)
- To reduce dissolved oxygen level in cooling water which prevents sticking of foreign materials and rust to inside wall of the cooling pipe, and increases cooling effect considerably.

Such high vacuum <negative pressure> environment inside the cooling pipe system is generated by our newly developed vacuum pump installed at discharging point of the cooling water pipe system in a mold, and enables to flow more volume of cooling water through the system than other conventional vacuum cooling systems.

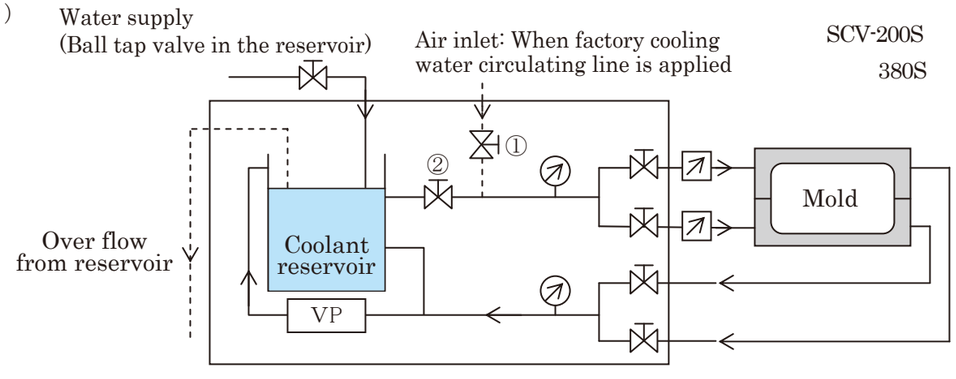
Applications : Diecasting (HPD), Low Pressure Casting (LPD)
Gravity Casting (GDC), etc.

Typical system diagram of vacuum type cooling

(1)



(2)

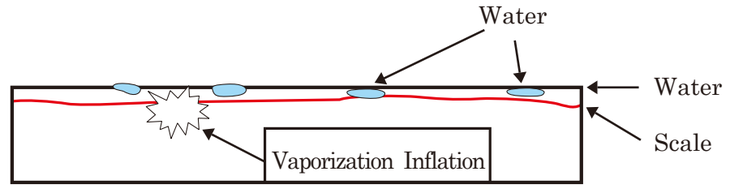


VP Vacuum suction pump　P Booster pump　1 2 Electric powered ball valve
①②③④ Manually operated ball valve　Compound pressure gauge　Flow meter (option)

Outline features of the SUPER COOL V SYSTEM

1. Considerably increased cooling capability with introducing negative pressure environment through out the cooling pipe system.

   Scales sticking to the inner wall of the cooling pipe being removed by vaporization of cooling water which increases cooling efficiency.

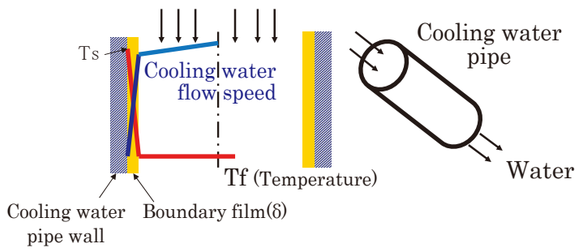


2. Prevents water leakage, currently which is the most critical trouble for mold cooling by water.

   Negative pressure environment inside cooling pipe prevents cooling water leakage into cavity through crack(s).

Such offers better quality and productivity through proper improvement in mold cooling system designing.

3. Status of heat transfer to cooling water



Boundary film?
Static water layer stayed on cooling pipe wall which is caused by viscosity of cooling water and /or adhered scales.
Thermal transmission in static water depends on water thermal conductivity and is about 1/100 of that iron, namely the conductivity is very bad.

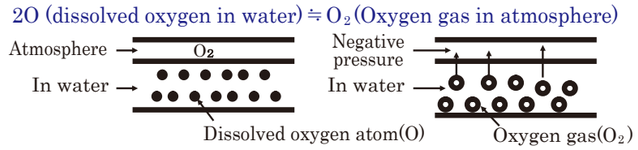
Film heat transfer coefficient (h)?
Heat transferred; $Q = h A(Ts-Tf)$; $h=K/\delta$;
K; Heat conductivity of water δ; Thickness of the film

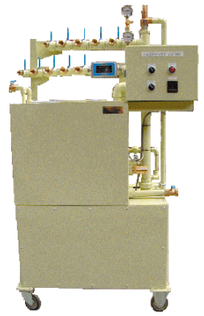
How to increase heat transmission?
Minimize film thickness, increase film heat transmission.

4. Expected effect of negative pressure environment to reduce film thickness

① Prevent build-up of scale and water stain
Reduce dissolved oxygen in cooling water

2O (dissolved oxygen in water) ≒ O_2 (Oxygen gas in atmosphere)




SCV-200S

Oxygen atom in water exists in equilibrium with oxygen gas in atmosphere. When atmosphere pressure reduces, oxygen atom in water change to oxygen gas and transfer to atmosphere, which reduce concentration of oxygen atom in water.

② Reduced film thickness under negative pressure environment
Vaporization of water agitates cooling water which effects to reduce film thickness.

Negative pressure environment enables to increase efficiency of heat transfer.

Comparison of water flow