

SASAKURA ROTARY THERMOSIPHON CHILL ROLL



Award
27th Promotion of Machine Industry Award
19th Invention Award/Chiba-Japan Distinguish
Service Award
3th Technical Encouragement Award of
Japan Associate for Heat Pipe

SASAKURA ENGINEERING CO.,LTD.

Solutions to Problems of the Conventional Roll (Spiral Type)

Equal Surface Temperature

Shell will not be affected temperature from the cooling water.

No Condensation in Operation

Both surface ends are maintained in higher temperature than cooling water.

No Condensation during Stopping

Cooling water temperature does not transfer to the inner shell.

High Cooling Capacity

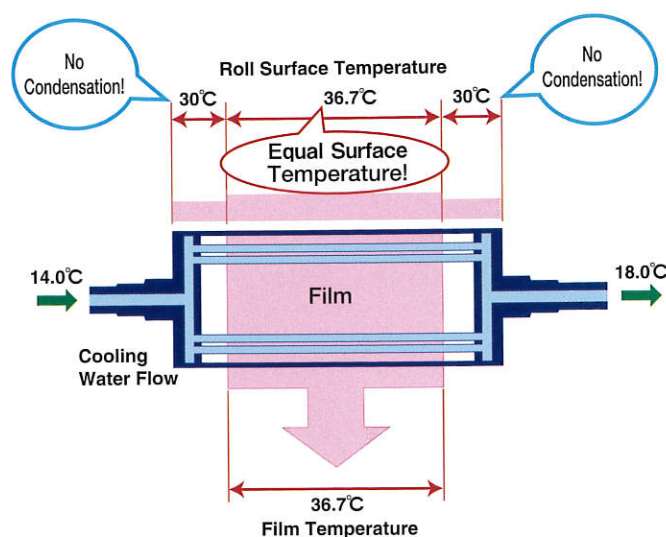
Line speed can speed up.

Comparison of cooling performance between Rotary Thermosiphon Chill Roll & Conventional Chill Roll (Spiral Type)

(Condition)

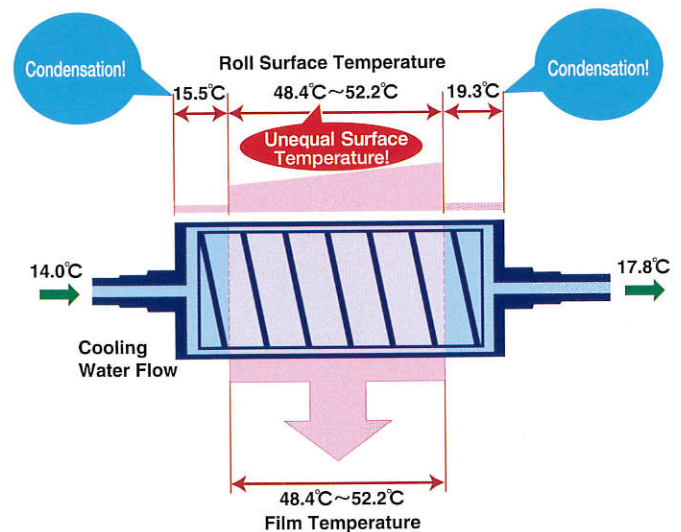
- Size of Chill Roll : $\Phi 600 \times L1400$
- Extrusion capacity of film : 450kg/h (LDPE: Width 1200mm / Thickness $30 \mu\text{m}$)
- Temperature before cooling : 320°C
- Line Speed : 230 m/min
- Cooling Water Flow Rate : 400 ℓ / min
- Air Temperature & Humidity(Extruder Area) : $38^\circ\text{C} / 60\%$

Rotary Thermosiphon Chill Roll



Heat dissipation : 95,000 kcal/h(110 kW)
Heat transfer coefficient : $2,030 \text{ kcal/m}^2 \cdot \text{h} \cdot ^\circ\text{C}$ ($2,360 \text{ W/m}^2 \cdot \text{K}$)

Conventional Chill Roll (Spiral Type)



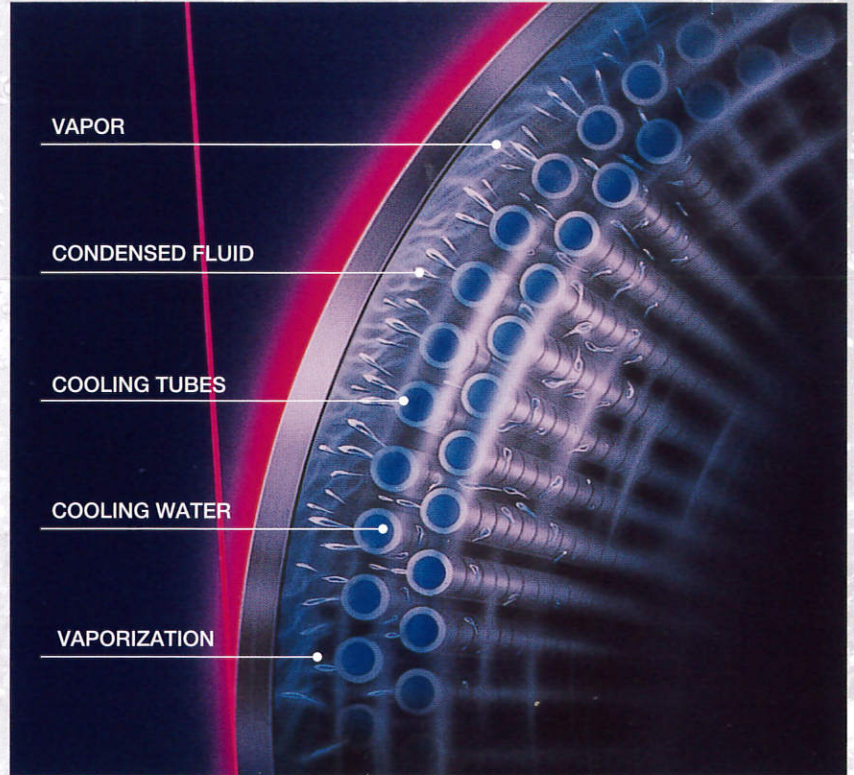
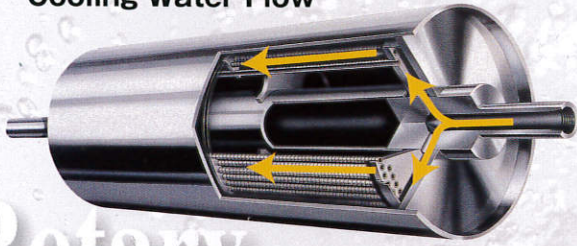
Heat dissipation : 90,400 kcal/h(105 kW)
Heat transfer coefficient : $1,160 \text{ kcal/m}^2 \cdot \text{h} \cdot ^\circ\text{C}$ ($1,350 \text{ W/m}^2 \cdot \text{K}$)

Rotary Thermosiphon Chill Roll made by SASAKURA'S heat transfer technology

Cooling Principle

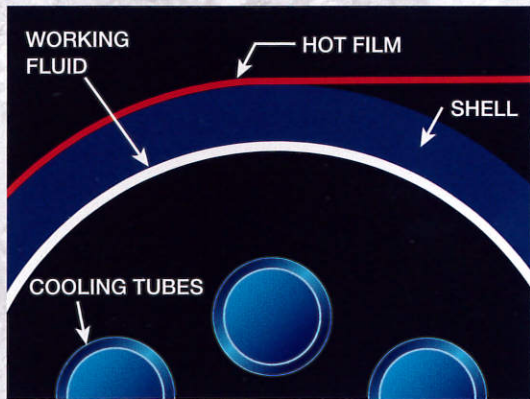
Working fluid is sealed inside of the shell under vacuum condition. The working fluid is moved by the centrifugal force of the rotation.

Cooling Water Flow



Rotary Thermosiphon Chill Roll

① Hot film come into contact with Chill-Roll



② The heat transfers from the hot film to inside of shell. Then, fluid is evaporated by the heat.



④ The condensed fluid is returned to inside of shell by centrifugal force.



③ The evaporated fluid is condensed around cooling tubes



Through repetition of the above cycle, the Chill-Roll can constantly cool the film.

● Performance calculation available by filling in below data.

PERFORMANCE SHEET

COMPANY NAME : _____ DIVISION/SECTION : _____

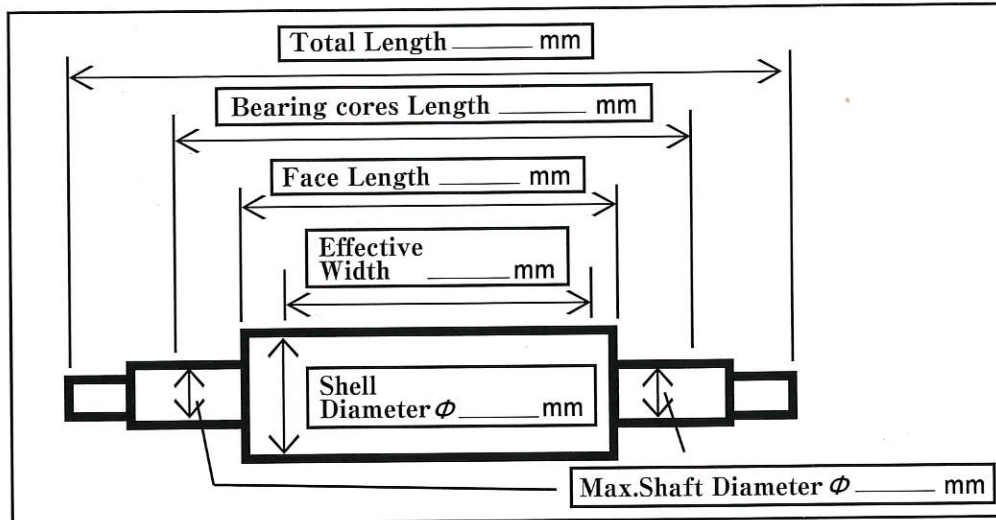
YOUR NAME : _____

TEL : _____ FAX : _____

Roll Specification

1. Application: Extrusion Laminating, Casting, Coater, Gravure Printing
 Embossing, Dry Laminating, Others()

2. Size of Roll:



3. Number of Unit: _____ Unit

4. NIP Load _____ kg/cm (Nip Roll, Air Knife, Tensioning Only)

5. Line Speed (Rotation Speed): _____ (m/min, rpm)

Film Specification

6. Temperature before cooling: _____ °C, Requested product Temperature: _____ °C

7. Material: PE, PET, PP, PS, Others ()

(Specific heat: _____ (kcal/kg·°C, kJ/kg·K)

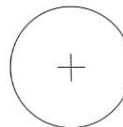
Thermal Conductivity: _____ (kcal/m·h·°C, W/m·K) Density: _____ kg/m³)

8. Film Thickness: _____ mm, Film Width: _____ mm, Extrusion capacity of film _____ kg/h

9. Cooling Water: Temperature _____ °C, Flow Rate _____ (ℓ /min, m³/h)

10. Wrap Angle: _____ deg.

Please draw contact angle against Roll



11. Install area condition: Air Temperature _____ °C, Humidity _____ %

12. Type of using cooling roll: Drum type, Double-tube type, Spiral type



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