Application Literature
Application Note

WPHE Condensate Sub-Cooler Relieves Turbine Backpressure For Full Output During Hot Weather

Tranter compact heat exchangers as condensate sub-coolers enable summertime cooling tower water to condense flash steam.

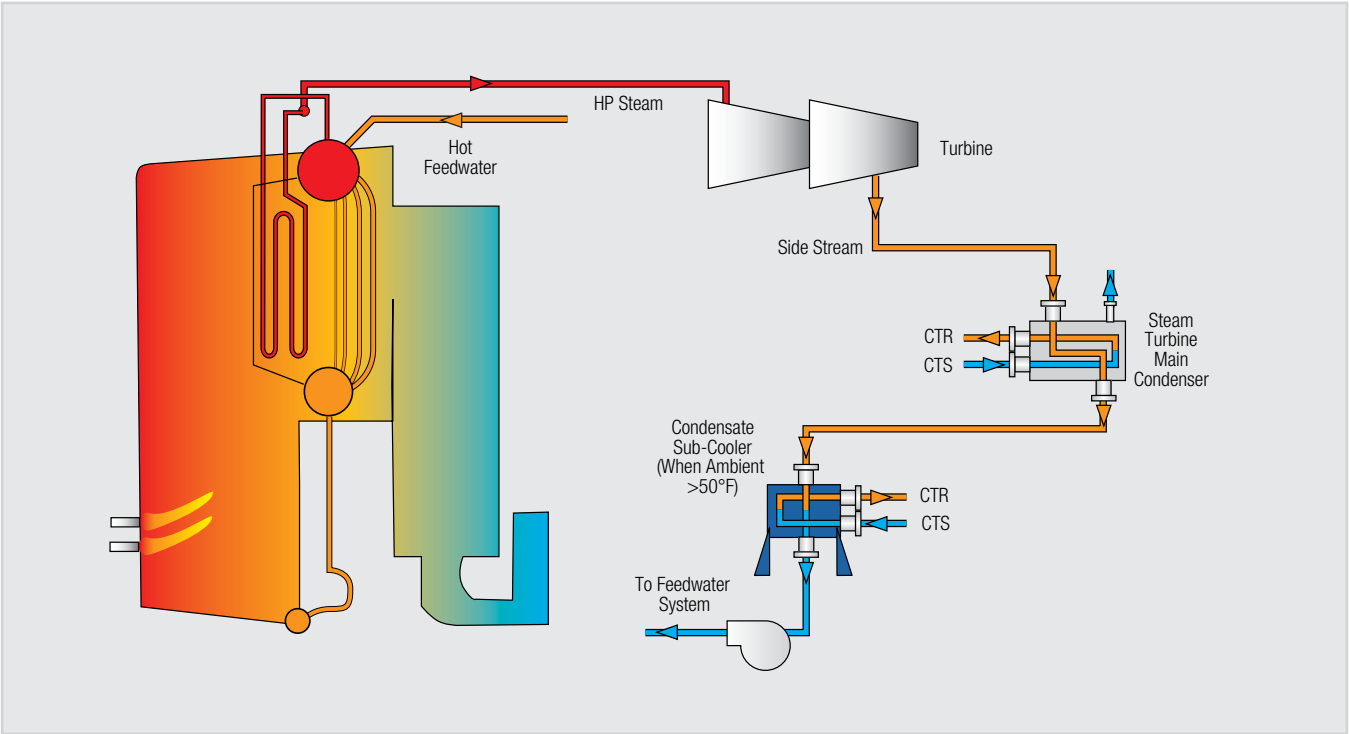
In summer many power plants lack the cooling capacity to condense adequately the steam outflow from the steam turbine. This results in steam flashing from the condensate and applying backpressure back through the turbine steam outlet. This backpressure can reduce turbine output by 20% or more, degrading the overall thermal efficiency of the power plant. Fuel consumption rises, along with carbon footprint.

Flashing the steam to relieve backpressure is wasteful in terms of energy and boiler treatment chemicals to replace this specially treated, high-purity feedwater. Reduced output is expensive for the utility, often making necessary the purchase of power from competitors to meet load requirements. The revenue opportunity is lost forever under these conditions.

Extra condensate cooling during hot months

Utilities are finding that replacing shell & tube exchangers with Tranter Welded Plate Heat Exchangers (WPHEs) installed downstream of the condenser eliminates the flashing and backpressure during the hot season. The exchanger's efficient plate technology results in a small footprint than traditional shell & tubes. The increased turbulence of plate technology promotes

Tranter plate HE technology, represented by the SUPERCHANGER® Plate & Frame and the SUPERMAX® Shell & Plate units, makes space-efficient use of low-grade cooling streams in condensate sub-cooling service.



Tranter WPHEs can reduce backpressure at the steam turbine outlet in seasonal condensate sub-cooling service.

higher heat transfer rates than with tubes, enabling the exchanger to make better use of lower grade cooling streams than is possible with shell & tube units.

Tranter WPHEs meet pressure and temperature challenges up to 100 barg (1450 psig) with lower hold-up volume, less weight and a significantly smaller footprint (usually 80% less area) than the S&T exchangers.

Impressive savings

In one recent installation, a Tranter WPHE condensate sub-cooler enabled the generating station to run at full output during the hot months, a performance rarely attained during the previous 35 years of operation. As a result, the customer achieved payback for the unit and its installation within the first year of operation.

Tranter WPHE Condensate Sub-Cooler Operating Conditions

Property	Hot Side	Cold Side
Fluid Name	Condensate	Cooling Water
Flow Rate, litres/min (GPM)	4540 (1200)	1515 (400)
Inlet Temperature[1], °C (°F)	49 (120)	18 (65)
Outlet Temperature, °C (°F)	39 (102)	48 (118)
Total Heat Exchanged, kJ/hr (Btu/h)	955 (10,492,905)	
Design/Test Pressure, barg (psig)	31/40 (450/585)	
Design Temperature, °C (°F)	149 (300)	
Total Installation Space Required, m^2 (ft^2)	<1.5 (<16)	

[1]Unit brought on line when ambient temperature exceeds 10°C (50°F) and condenser outlet temperature exceeds 49°C (120°F).

Note: Tranter is not a process system design company. Accordingly, Tranter is not liable for heat exchangers that fail when employed in substandard system designs. Buyers should consult professional process design engineers.

Tranter reserves the right to change technical specifications for its equipment at any time.

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