Hydromx® Pilot Project

KARACABEY Factory

Type of Process: compressor cooling process

Principle of the system;
The Heat generated by compressors was dissipated to the secondary circuit and primary circuit in cascade structure. Two, cascade, chilled water circuits were separated by single PHE.

Performance of Hydromx PG was tested in the secondary loop.

The object is, by the help of Hydromx®, to lower the amount of heat (Q) dissipated to the primary circuit, by keeping the oil temp same, under same heat load conditions.

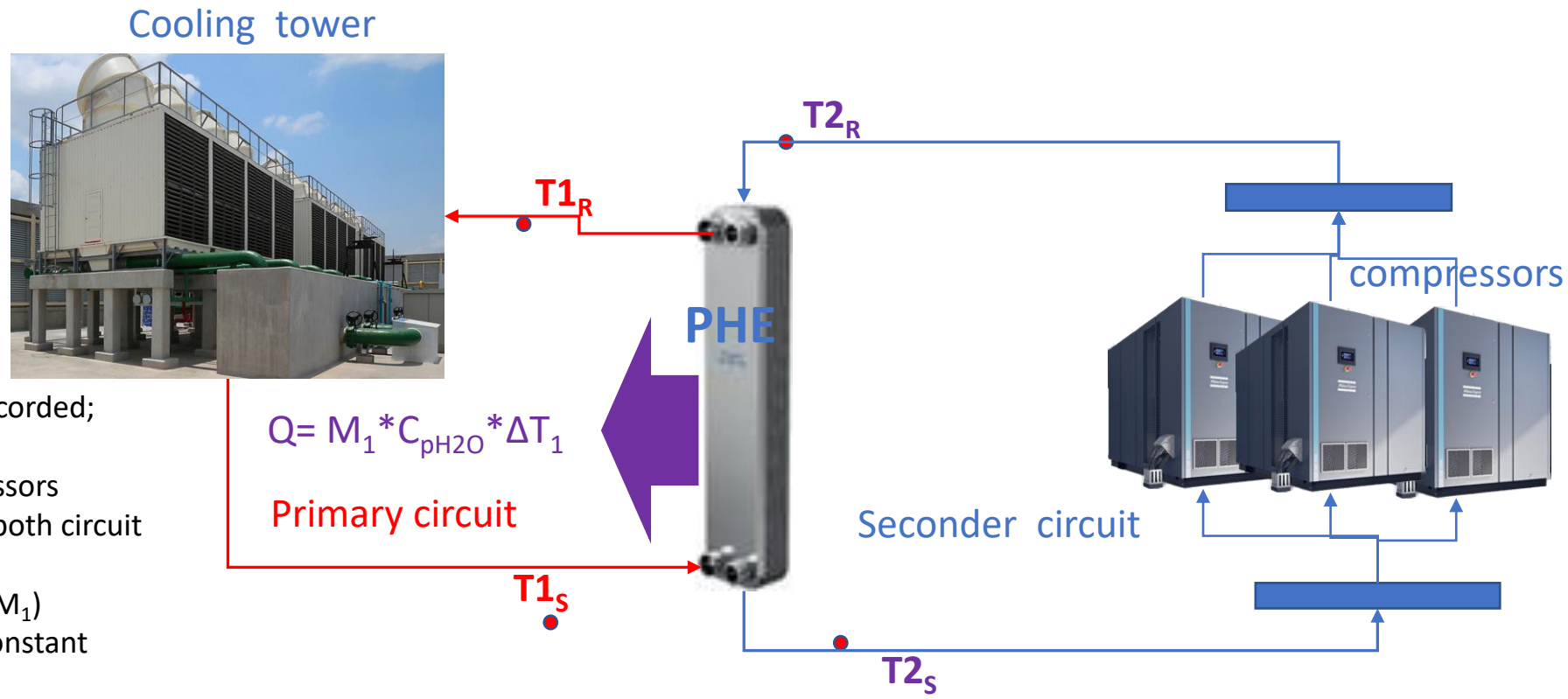
Cooling source:
- Chilled water by the cooling tower (Primary loop)
- Chilled water circulating ”the water cooled compressors” (Secondary loop)

Heat Loads: Variable and right proportional with KW consumption of the compressors.

Comfort condition: compressor’s oil temp.

PHE: that was separating the primary & secondary loops

Hydromx® Pilot Project

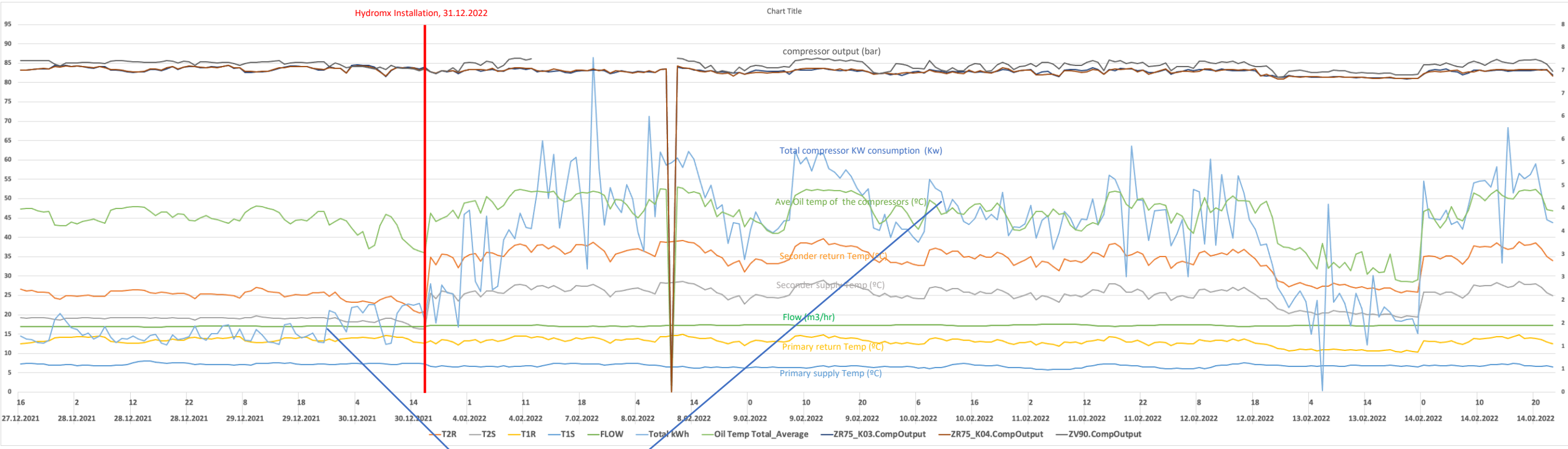


In this study , variable parameters were recorded;

- KW consumption (Heat load)
- Oil temperatures of the compressors
- Supply and return Temp of the both circuit (primary & secondary)
- Flowrate of the primary circuit (M_1)

The flowrate of the secondary loop was constant

Overall Averages



Averages	Oil Temp	Total compressor (kW)	T2R	T2S	ΔT T2	T1R	T1S	ΔT T1	FLOW
Baseline	42,21	17,29	24,96	18,92	6,04	13,63	7,30	6,33	17,00
Hydromx	45,82	43,80	34,56	25,35	9,20	13,04	6,73	6,31	17,26
Difference	3,62	153,4%	38,4%	34,0%	52,3%	-4,3%	-7,8%	-0,3%	1,6%

Water period: There was only one single compressor running. The heat generation was moderate.

Hydromx period: Three compressors were running. The KW was 2,5 times higher, hence the heat generation.

Comparison: Heat load is higher 2,5 times, but the consumption is same(ΔT1). Since the flow is constant, ΔT1 represent the Q dissipated to the primary loop. Hydromx was capable to keep the oil temp cool just 3,6ºC higher, under 2,5 times higher heat load

Similar Heat Loads Averages

Averages	Oil Temp (ºC)	Total kWh	T2R	T2S	ΔT T2	T1R	T1S	ΔT T1	FLOW
Baseline 30 Dec	41,03	19,79	23,19	18,10	5,09	13,84	7,35	6,49	17,01
Hydromx 13 Feb	32,92	21,40	27,03	20,26	6,77	10,80	6,78	4,02	17,21
Difference	-8,11	8,1%	16,6%	12,0%	33,0%	-22,0%	-7,7%	-38,1%	1,2%

Comparison:
Heat load is slightly higher at Hydromx period but assumed that they are same for the sake of comparison.
The total cooling power consumed through primary circuit was 38% less then water periods.
On top of that oil temp is cooler than water period 8,11ºC..

Hydromx® Pilot Project

KARACABEY Factory

Conclusion;

Both loops had no thermostatic control. The load and capacity were designed and set to run in a temperature range.
Hydromx PG (50%) was installed into the secondary loop that circulates through the compressors.
The object was to lower the amount of cooling demand by min 20% through the primary circuit under the same heat load conditions.

The comparison was conducted for 2 different conditions. Hydromx PG performance is significantly better than the water performance for both conditions.

a. At similar conditions

Compressor power consumption was almost the same for both periods.
The system that was running with Hydromx was 8,11ºC cooler and consumed 38% less cooling power that's driven by the primary circuit.

b. Overall averages

The Heat load was 2,5 times higher during Hydromx period and cooling power consumption was the same. Where Ave. Oil temp was 3ºC higher only.