



ENERGY EFFICIENT REPLACEMENT CHILLER INCREASES COOLING CAPACITY BY 36% AND REDUCES ENERGY USAGE BY 4%



THE CHALLENGE

A manufacturer and bottler for some of the world's most prestigious beverage brands needed to replace an aging 650kW chiller due to a controller failure that subsequently caused the evaporator to rupture and freeze.

The chiller provided cooling to three pasteurising lines. Lines 1 and 2 can produce up to 24,000 ltr/hr of carbonated product and the third up to 11,000 ltr/hr.

To maintain production, the client was forced to install a rental chiller to provide temporary cooling which was less efficient and not a low-noise version.

THE SOLUTION

Site visit and cooling load calculation:

Thanks to a recommendation from the pasteurising line specifier, ICS Cool Energy were asked to visit the site and carry out a survey and consultation to determine their exact cooling requirements and address any operational needs.

Lines 1 & 2 were calculated to require 800kW (150kW more than the previous chiller provided) of cooling with a fluid supply temperature of 0°C. Line 3 had a cooling load calculated at 320kW with a fluid supply temperature of 5°C.

Lines 1 & 2 run for 24 hours a day, 7 days a week, whereas line 3 can operate for as little as 1 day per week, depending on production demands. The total cooling load required for maximum production on all three lines was calculated at 1,120kW.

To support the manufacturer's environmental policy, the consultation period considered several low GWP refrigerant options, including ammonia.

Chiller Specification:

To provide the manufacturer with options to make a reduction in energy consumption and meet potential budget restrictions, the ICS Cool Energy sales engineer proposed two cooling solutions.

The most energy-efficient solution included two chillers; one to provide chilled water at 0°C to lines 1 & 2 and a second chiller to provide chilled water at 5°C to line 3. This was supported by a detailed energy analysis audit which demonstrated that an energy saving of 3% per annum and a Co2 reduction of 48,950 tons per annum could be made in comparison to a single chiller serving all three lines.

To reduce the initial capital expenditure, the decision was made to phase the project. Phase one comprised of a single 800kW chiller, with phase two allowing for line 3 to be separated from the main hydraulic circuit and to be fitted with the second chiller unit.

The first of the two chillers specified was the Imperium RTAF 310 SE XLN unit which offers several benefits in comparison to the previous chiller:

- The unique patented evaporator design offers a reduction in refrigerant charge of 48%
- The 3 fixed speed stepless capacity-controlled screw compressors provide improved part load performance
- By utilising R513A refrigerant with a GWP of 631 compared to R134a with a GWP of 1430, the manufacturer's environmental policy on the use of low environmental impact refrigerants was met
- The extra low noise option including the use of EC fans with axitop meets the required sound power levels at the manufacturer's boundary without impacting on footprint



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THE RESULT

The extra cooling capacity offered from the Imperium RTAF 310 SE XLN (chiller 1) will allow lines 1 & 2 to operate at maximum capacity (an increase of 36%) which has never been achieved in the past.

Now only requiring a single pass through the pasteuriser to cool the product and with an increase in thermal output, the new chiller has provided a 40% increase in production.

As well as increasing their cooling capacity by 36% and production by 40%, the efficient Imperium RTAF 310 SE XLN unit will:

- Save them 4% on energy costs when compared to the incumbent unit
- Use 48% less refrigerant and the lower GWP, more environmentally friendly R513a
- Occupy a smaller footprint, which means less installation costs and production down time moving equipment to accommodate
- Meet sound power levels

The Aptus CGAF chiller installed in the second phase will supplement the cooling capacity further and enable production on line 3.

A secondary chiller also means that the manufacturer has a contingency plan if the main chiller was to fail and enables them to plan more thorough maintenance without halting production.



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