CASE STORY

A compact, efficient pre-cooler for compressed air

Customer: Yielden Filtration, Penang, Malaysia

Yielden Filtration is a Malaysian leader in the air treatment industry, providing air and liquid filtration products that safeguard production lines and workers throughout Asia. With a vision to be an expert in compressed air solutions, Yielden is widely recognized for offering customers highly efficient, robust and sustainable systems based on state-of-the-art technologies from global suppliers.

End-users of compressed air systems have a number of requirements, and ensuring a high level of moisture separation is particularly critical for their operations. If not properly removed from the air, condensate can cause corrosion or freezing issues, damage the piping, or even create difficulties when using pneumatic tools. For these reasons, different types of dryers are a standard component when treating compressed air.

A challenge of climate

However, due to Malaysia's ambient heat, Yielden's customers can see compressed air discharged at temperatures as high as 50°C. These temperatures can create problems for the dryers as well as other downstream equipment such as filters and autodrains.

To solve this challenge, Yielden designs systems with a water-cooled pre-cooler prior to the drying phase. This makes it possible to bring the discharged compressed air down to 35°C – the ideal temperature for adsorption and refrigerant dryers – or even cooler. The pre-cooler has the added benefit of removing some of the moisture in the air before it enters the dryer, thus enabling a more efficient, smaller and more cost-effective solution for the end-user.

Shell-and-tube type heat exchangers have traditionally been the dominant pre-cooler solution for compressed air applications. While this technology is well proven for these duties, it comes with significant drawbacks. First, shell-and-tube designs are incredibly bulky, requiring substantial floor space and thereby driving up the price of installation. They also suffer from low thermal efficiency, which inevitably results in high operational costs over time.

Choosing an innovative alternative

Yielden was therefore looking for a smarter solution to their pre-cooling challenges. They found it in Alfa Laval's brazed gas-to-liquid plate heat exchangers. The Alfa Laval GL model features a compact design with a footprint that is approximately one fifth that of a comparable shell-and-tube unit. For Yielden's end-customer, this translates to huge savings in both floor space and lifetime costs.

The Alfa Laval GL reliably removes condensate from the air stream and lowers the temperature of the compressed air to the necessary 35°C or below. Thanks to a good built-in moisture separator and autodrain, it is often possible to eliminate the need for an additional standalone water separator. Furthermore, unlike shell-and-tubes built in carbon steel, the stainless-steel construction of Alfa Laval's plate heat exchanger design offers much higher thermal efficiency with additional robustness, enabling significantly greater operational sustainability and reliability over time.

For Yielden, the difference speaks for itself. By choosing the Alfa Laval gas-to-liquid design over traditional shell-and-tubes, they can offer their customers a, dependable solution with the lowest possible total cost of ownership, reduced floor space, and improved environmental impact.

Alfa Laval GL heat exchanger

Example specifications for Alfa Laval gas-to-liquid heat exchanger used in pre-cooling duties:

- Flow rate compressed air: 3400 Nm^3/h
- Pressure 7 bar(g)
- Capacity: 35 kW
- Condensation: 20 kg/h
- Condensing pre-cooler: GLH100-40