

Technology gathers pace on CO₂

The jury is still out on CO₂, but progress is being made on several fronts

■ CUTTING TESCO'S FOOTPRINT

Project management company Project First was set the challenge of reducing the HFC refrigerant charge for Tesco's eco-store in Wick, Scotland, by 50 per cent.

It was asked to use natural refrigerants wherever possible, and deliver a heat recovery system that did not compromise the efficiency of the refrigeration system.

The cold rooms at the store were designed to operate with a transcritical CO₂ condensing units, connected to conventional evaporators.

Project First achieved the reduction in the percentage HFC by providing a direct expansion water-cooled system that consists of a number of slim-line refrigeration pods placed on top of each display case and cold room. Each Pod has a hermetically sealed horizontal scroll compressor, water-cooled by a plate heat exchanger. The display cases and cold rooms are connected to two independent water-cooling systems, which consist of a dual pump and roof mounted dry air coolers.

The new system has led to the eco store's refrigerant charge being 55 per cent lower than if a conventional DX system had been used.

Overall Tesco Wick's carbon footprint is heading towards 50 per cent of an equivalent store using technology that will be repeatable in future stores.

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The Wick Store breaks new ground in environmental technology

■ ASDA GETS STAR TREATMENT

Star Refrigeration has installed an energy efficient refrigeration plant at Asda's Central Distribution Centre in Lutterworth, near Leicester.

The project is the latest cooling solution designed by Star to ensure the efficiency of Asda's frozen and chilled operation.

The £3m, 10-month, project formed part of a major refurbishment and extension to the chilled facility at Lutterworth. The installation comprised an ammonia and CO₂ cascade plant. The refrigeration plant is highly energy efficient, reliable and robust, operates on natural refrigerants and avoids the use of ammonia in populated work areas.

The cascade plant provides cooling for a frozen food cold store, operating at -25degC and three large chill rooms, operating from 1degC to 13degC.

The plant is located in a purpose built energy centre adjacent to the main building, providing overall cooling capacity of 3.2MW.

The cascade plant operates with ammonia refrigerant



The Lutterworth site includes an ammonia and CO₂ plant

in the high temperature stage and CO₂ in the low temperature stage. CO₂ is used as the low temperature fluid in a standard vapour compression cycle, rejecting its heat to the ammonia system. CO₂ is then used as a high temperature volatile secondary refrigerant for chill areas and general air conditioning.

The low stage CO₂ plant has a cooling capacity of 820kW. It supplies low temperature liquid CO₂ to six air coolers in the cold store. The high stage ammonia plant operates with a minimal charge. The plant serves 20 air coolers in three chill areas and has a capacity of 2.4MW.

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■ DEVELOPMENTS SHOW DIVERSITY OF CO₂

Star Refrigeration is currently involved in the development of CO₂ cooling applications across a range of market sectors.

"Our current CO₂ projects demonstrate that the technology can work across a whole range of market sectors – freezing, cold storage, IT cooling, food retail, building services and process cooling" says Star's sales director Rob Lamb.

"The technology is yet to take off on a grand scale on the industrial side but the signs are encouraging. We are somewhat restricted at present by compressor technology, but one of our key aims is to scale up transcritical CO₂ systems for effective applications in the industrial arena," says Mr Lamb.

The company's current CO₂ projects include:

- Envitherm – a transcritical CO₂ heat pump solution for simultaneous generation of hot and chilled water, aimed at the building services and food processing markets. The 50kW unit is capable of raising mains water temperature to over 70degC.
- Working with a leading food retailer on CO₂ installations at three UK stores.
- Developing an online training module via its elearning-training.com website. The new course will provide CO₂ training material for refrigeration engineers across the globe.
- Continuing its association with Trox on applications of an award-winning blade server cooling system.
- The development, in association with Trox, of a new CO₂ system to provide desk cooling. Targeting major organisations with busy trading floors, the under desk system will provide computer cooling and increased comfort for workers.
- Working with a leading cold store operator in Northern Ireland on a CO₂/ammonia cascade system, which also provides blast freezing.

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