

## ▶ HallScrew compressors reduce cold store energy bills

A UK-wide storage and distribution company has cut its cold store energy bills by more than 20 per cent and reduced its carbon footprint considerably after introducing a new refrigeration system designed and built by J & E Hall. Three J & E Hall compressor packs are at the heart of the ammonia-based plant at the Norish distribution centre in Brierley Hill, Dudley, West Midlands. Norish is a multi-temperature warehousing and logistics business operating from eight locations across the country.

The 100,000sqft cold store at the vast Brierley Hill distribution centre handles food products from across the world. Largely meat, this needs to be kept at a storage temperature of  $-21^{\circ}\text{C}$ . The centre has the capacity to freeze between 700 and 800 pallets a week. The products are then transported to food producers or retailers at home and abroad – with some products travelling as far as China.

The previous refrigeration plant in the cold store needed updating. The old system had been using R22 refrigerant and was not equipped to deal with the demands of the F-Gas regulations. Norish was looking for a new system, which would be more energy efficient and have the right green credentials to match.

Norish had worked with J & E Hall design and contracts team in the past. Due to this, Halls were invited to put together a plan for the new system with the firm's design and contracts manager Will Harrison taking charge of the project.

He suggested an ammonia-based system supported by three HallScrew compressors. Norish liked the idea too.

The HallScrew compressor has been a market leader in the refrigeration industry across the world since it was first manufactured in 1978 and has been installed in applications in more than 80 countries worldwide. Key to its international success is its long life and outstanding reliability. Only three basic moving parts are involved – a main rotor and two diametrically opposed star wheels, meshing together. This results in balanced compression with no power loss between the rotor and stars – and minimum bearing loads.

A combination of energy efficiency, green thinking and good design was key to the success of the project, as Will Harrison explains: “Norish had expressed a preference to operate the system to run at a positive pressure. This fitted with our philosophies of offering an efficient system running with low temperature differences.



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We also wanted to utilise variable speed drives where possible to take advantage of the part load efficiencies they offer. The new ammonia plant operates with frequency invertors on both the condensers and compressors; this provides part load efficiency gains and delivers accurate system control.”

Applying these technologies and design philosophies has given the system a very good Co-efficient of Performance (COP) compared to the original R22 operation. There are also huge maintenance savings too. Formerly, the system operated with 16 cylinder reciprocating compressors. There are now just two screw compressors – plus one on standby. This also means that the plant has a much smaller footprint.

Will Harrison added: “Ammonia is an outstanding refrigerant. It’s inexpensive, efficient and natural too. Another benefit is ammonia’s pungent nature which means leaks are readily located and thus you will rarely have to charge an ammonia plant. So the running costs in this way are also very good.”



There were other energy savings. Waste heat from the refrigeration system is put to good use by providing energy to pre-heat the boiler for the distribution centre.

Will Harrison said: “We used the superheated vapour from the compressor discharges to do this. We ran it through a heat exchanger. It provides 40 to 45°C of free heat for the boiler. Excess heat from the refrigeration system is also used to warm the distribution centre’s glycol-based underfloor heating system – another considerable energy saving.”

Norish chief engineer Stuart Lloyd said that an ammonia-based plant was chosen because it provided the best long-term solution: “Ammonia will be around for the foreseeable future. It helps reduce our carbon footprint. Our job spec was for efficiency, reliability and economy of use. We had an R22 plant running in the same area we were building a new ammonia plant. We had to maintain temperature for the cold store while the new plant was being built. There were lots of cross-over points. Halls handled those challenges beautifully.”

The installation also met with the approval of Norish managing director Norman Hatcliff: “I am absolutely delighted with the new cold store plant. It is delivering the efficiencies that we hoped it would. One of the benefits of moving from an old R22 system to an ammonia system is that we gain the economies of a more efficient gas, the benefits of a natural refrigerant and a new refrigeration plant. Having the right refrigeration system is absolutely essential to meet the demands of our customers. The task Halls have undertaken to install a new refrigeration plant while our operation continued has been a fantastic engineering feat.”



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