Work completed on Newmarket coldstore

One-stop coldstore & food plant designers, FJB Systems, has recently completed work on a new state-of-the-art coldstore for one of the UK's leading refrigerated storage companies, Turners (Soham) Ltd.

Turners (Soham) Ltd is a family owned company, founded in 1930, which has become one of the largest privately owned transport and refrigerated storage companies in the UK. Turners currently operate over 800 vehicles and employ over 1300 employees throughout the UK. Their flagship cold storage site near Newmarket, Suffolk, now boasts over approximately 14 million cubic feet of refrigerated volume. This site has been developed since 1992 incorporating five separate extensions in 1995, 1997, 2001 & 2006. FJB Systems worked directly for Turners on all of these builds providing turnkey design, planning and project management services.

IN AT THE VERY BEGINNING

When Turners first decided to go ahead with their latest extension to the Newmarket site, they first asked FJB Systems to assist them with the 'Process Layout'. This involved producing detailed drawings of the store including the internal racking layout to ensure maximum pallet storage was available to suit their operation, as well as coming up with an economical design that fitted the available land and utilities. Once an agreed layout had been formulated, FJB Systems prepared, submitted and handled the planning application, until acceptance.

As Turners wished to proceed with the building as soon as possible, FJB Systems prepared a total detailed design comprising drawings and specifications in order to tender the project competitively. To best achieve this, the project was separated into the five specialist disciplines common to all such projects, namely building, insulation panels, electrical, refrigeration and racking works. These documents were prepared and tendered out during the planning process and detailed technical phase. Following receipt of the tenders, commercial discussions were entered into with the various competing contractors. By the time the most suitable combination of contractors had been selected, the planning application had been granted and the contractors could commence on site.

INTEGRATED SOLUTION

FJB Systems then prepared all of the contract documentation, project manage the build (including monitoring health & safety), inspect the ongoing works to ensure that the quality of the works was acceptable and lastly to resolve any technical problems that arose. This latter part of the project also involved full cost accounting by means of an in-house Quantity Surveyor. This allowed Turners to benefit from a totally integrated project design, as FJB Systems had designed all aspects of the building from the refrigeration through to the electrical services. This differs significantly from many projects where separate structural, m & e, refrigeration and quantity surveying companies are employed by the client or 'novated' to the contractor – in such cases, responsibility is difficult to pinpoint and designs are carried out by each specialist trade independently to one another. This typically leads to a higher cost building, and a reduction in quality/performance.

TECHNICAL SPECIFICATION

Technically the store is equally impressive. The total store covers approximately 12,500m^2 of floor area with approximately 6 million cubic feet of refrigerated volume. Although the building has been designed as a stand-alone facility, the existing central refrigeration plant has been extended (as it was initially designed to do) and now services the new building via a pipebridge spanning the two buildings.

As Turners provide storage solutions to many different companies, the store has been designed with total flexibility in mind. The building comprises six separate chambers (14.0m internal height) as well as product picking & assembly areas, 24-hour carton blast freezers, employee amenities and offices. Similarly, the floors in all of the stores have been designed and built to allow mobile racking to be installed either initially or at a later date, allowing complete flexibility of use. A large number of the store walls have also been designed to be moveable and this enables the individual store sizes to be increased or decreased, according to customer requirements. Each of the storage areas has been designed as dual-temperature so that they can be operated down to either –25°C or up to +10°C, providing further flexibility depending on future customer requirements.

The existing refrigeration plant, which is a pumped ammonia system originally built in 2001, was extended as part of the project works. These works involved the addition of a new larger –32°C system to cater for the additional sub-zero duties, the extension of the existing –10°C system to cater for the additional chill duties and the addition of a new –40°C system to service two new 24-hour carton blast freezers. The three saturated suction pressures providing the most economic operating conditions for each of the three processes.

Sabroe SAB85 & 87 screw compressors were selected for the project due to their tried and tested performance in the field. These compressors were also able to offer roller bearings as standard on their main rotor shafts, thereby eliminating the problems of worn sleeve bearings, which is common to other compressors.

The system has been designed so that the –32°C screw compressors operate single stage from –32°C to condensing but with the –32°C vessel make-up receiving sub-cooled 10°C liquid. By adopting this approach, efficiencies greater than or equal to a conventional two stage compression system were achieved, but with much reduced plant capital cost. Two Grasso RC912E reciprocating compressors, which serviced the former building, were converted to operate between –40°C and -10°C on a two stage system in order to service the blast freezers.

FLEXIBLE, ENERGY EFFICIENT

The total refrigeration system can now operate both the buildings as either 100% chilled or 100% frozen or any combination between, thereby providing total flexibility. The total refrigeration design duty exceeds 2.5MW and the design has also allowed a 50m extension to the new building.

The project has focused on minimising energy usage from the refrigeration plant and other services. To this end, evaporative condensers have been utilised and the plant has been designed on the basis of a +22°C wet bulb with a maximum condensing temperature of +30°C. The plant also incorporates a de-superheater on the compressor discharge line in order to recover waste heat, which is used to heat the offices during winter.

The system has also been designed with oversized evaporators which enables the suction pressure to be increased to –28°C at times of reduced load, thereby reducing energy consumption.

The insulation envelope was also closely analysed during the design phase. Energy calculations and payback periods, resulting from installing increased insulation panel thicknesses were calculated and these were found to be of interest to Turners. To ensure a long lasting insulation envelope, FJB provided high quality vapour sealing details to the Insulation Contractor, which are not normal to the UK industry. This will ensure that moisture and vapour ingress is kept to a minimum throughout the life of the coldstore.

The store was completed in mid 2006 and has been operating successfully over the past months. By using a 'One-Stop' design consultancy for the total build, Turners ensured that they obtained an efficient, economical and well-built store which will last them for many years, whilst having a single point of responsibility for the project.