

COLDSTORE DESIGN

a case study

*by FJB Systems LLP
www.fjb.co.uk*

In 1992, FJB Systems LLP were contacted by Turners (Soham) Ltd., a large UK haulier who were in the process of entering the cold storage sector. Turners were half-way through building a new refrigerated storage and vehicle workshop facility near Newmarket when the local 'turnkey' Design & Build Contractor employed on the project encountered a number of design problems whilst constructing the new facility. Turners therefore decided that they required independent specialist advice in order to resolve these problems in order to enable the project to be successfully completed.

FJB Systems LLP

FJB Systems LLP are a specialist consultancy providing design & project management services to the food and temperature controlled storage industries. Their expertise ranges from initial business planning for prospective new businesses through to detailed design and tendering of projects and their management. FJB Systems are a multi-disciplined organisation handling, in-house, all aspects of a project ranging from Planning Applications and Architectural Services through to detailed Process Layouts, Building, Electrical, Refrigeration, Mechanical & Insulation design. This breadth of expertise allows 'fully integrated' designs to be accomplished, which results in both more efficient working designs for the end-user and capital cost savings.

The Project

The first step was to carry out a detailed inspection of the construction site and meet with the various contractors to discuss and review the designs. Following this, FJB Systems then discussed the findings at depth with Turners and put forward a strategy to resolve the situation. These included supplementing the steel frame with support columns in order to strengthen it sufficiently to accommodate the refrigeration evaporators and pipework (a common design error with such buildings), recommending and then designing carton blast freezers to complement the building's cold store. Detailed tender specifications and drawings were then produced for the refrigeration system, which were competitively tendered. FJB Systems then proceeded to monitor the project works on a weekly basis and hold site meetings with the various contractors to ensure that the project proceeded on time and was built to the correct standards. The facility was commissioned in 1993 and product soon flowed in.

Phase II

In 1995, Turners decided that they could procure further cold storage business and decided to expand their site. They immediately contacted FJB Systems who drew up a variety of 'process layouts' for discussion utilising a combination of static and mobile racking. Once an agreed layout had been determined, Turners employed FJB Systems to apply for Planning Permission

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Phase IV Building

on their behalf as well as to prepare full tender drawings and specifications for the whole project. The tenders were split into four separate disciplines; building works, electrical works, refrigeration works & insulation panel works and three tenders were invited from both small and large contractors alike for each element. This resulted in a total of twelve separate tenders and following detailed analysis, discussion and negotiation with the various firms, four specialist companies were selected to carry out the various specialist aspects of the project. FJB Systems prepared the contracts and then proceeded to manage the project through to final commissioning.

Phases III, IV & V

Since 1995, Turners have expanded a further three times; in 1997, 2001 and 2005 with each subsequent coldstore being larger than the previous. Each time, Turners have asked FJB Systems to undertake the full design and project management of the store which has led to a business relationship lasting over 13 years. The Newmarket site now boasts just under 14 million ft³ of refrigerated storage space and holds approximately 60,000 pallets using a combination of static and mobile racking. The site also contains seven carton air blast freezers designed to freeze bulk pack cartoned meat from +10°C to a core temperature of -12°C within 24 hours. A bespoke vehicle maintenance building is located at the centre of the site in order to overhaul, service and repair the Turners road fleet. This facility, which has also been twice extended, also contains a vehicle wash as well as a dedicated refrigeration repair area.

Specifications

Technically the site is equally as impressive. Geographically the site is now split into two 'mirrored' sets of buildings. Each side has its own centralised refrigeration plant utilising ammonia as the refrigerant. Ammonia was selected due to its high efficiency and its environmental benefits. Due to the significant size of the loads, each plant operates with three evaporating conditions; -10°C for chill stores, -32°C for cold stores and -40°C for the blast freezers. This allows the plant to operate more efficiently whilst allowing the blast freezers to 'turn around' product within 24 hours. In order to provide maximum flexibility of the cold stores, most chambers have been designed for use as either frozen (-25°C) or chill (0°C) operation. Plant sizing and control was specified to allow maximum plant efficiency and condenser waste heat recovery has been used to provide heating to the office areas in winter.

The projects all utilised composite insulation panels to form the refrigerated 'envelope'. In each phase the optimum thicknesses were selected in order to provide the best balance between first time cost and long term energy consumption – nowadays an essential calculation given the increases in utility costs. Similarly,

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Product Picking Area



Phase V under Construction



FJB Systems insisted that all panel vapour sealing and connection details were effected according to FJB's own specific designs, which have been constantly improved over the years. These standards far exceed the typical UK insulation contractor's details and enabled Turners to be confident that their buildings would stand the test of time without vapour seal breakdown and the resultant ice build-up within panels.

Conclusion

The Turners site currently represents one of the UK's largest single site cold storage complexes. FJB Systems have been delighted to be involved over the past five builds and believe that their input has allowed Turners to realise well-designed solutions with optimum operating efficiencies, which enable them to remain strong competitors in the UK cold storage industry. The design and competitive tendering process has also allowed the construction costs of these coldstores to be kept to a minimum and FJB Systems believe that these represent the lowest total coldstore build costs per cubic foot anywhere in the UK.

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Typical Mobile Racked Store

