

Hypermarket Refrigeration Systems

Design, project management, commissioning and remote performance management

Project Background

Hypermarkets require large quantities of refrigerated fixtures and areas to store, prepare and display perishable products. Most modern hypermarket chains do not have internal refrigeration engineering expertise so rely on project designs from equipment suppliers. These designs often minimise initial cost but they do not minimise full lifecycle costs. In addition, refrigeration system installations are often burdensome for internal project staff to implement, and are then problematic to maintain and manage.



Baseline's Role

Baseline's first hypermarket customer initially sought Baseline's assistance at one store with chronic refrigeration problems that routinely resulted in product loss on hot days. Baseline's engineering review of the existing system identified the root causes of these issues and the most economic fixes. Once the project was successfully completed, the client found that the total project cost, including Baseline's fees, was 25% below the budget of the refrigeration contractor's proposed solution.

Based on these results, Baseline was then contracted by the hypermarket chain to provide full refrigeration design, project management, commissioning and remote management for all of its new and retrofit store projects.

Baseline's objectives for these projects were to:

- Minimise full life-cycle costs and maximise energy efficiency;
- Achieve reliable performance across the complete range of operating conditions;
- Reduce maintenance requirements and system breakdowns.

Baseline's Services To Meet Those Goals

1. Develop new technical specifications to meet the client's objectives;
2. Complete detailed refrigeration designs for each project;
3. Execute and manage the bid process, prepare life-cycle cost analysis reports and recommend bid awards;
4. Project-manage the supply and installation of the equipment at the job sites;
5. Supervise and verify system tests;
6. Perform system commissioning;
7. Provide on-going remote energy and alarm management services.

Main Technologies and New Approaches Applied

- Optimise capacity staging through the use of uneven compressor sizes;
- Optimise condenser and evaporator selection for maximum energy efficiency;
- Electronic expansion valves and individual case controller control architecture;
- Implementation of advanced refrigeration control strategies such as floating suction setpoint, floating TD-based condenser control and night control mode;
- Redesign of food preparation areas for better temperature and energy performance;
- Liquid level detection in liquid receivers to allow early leak detection;
- Relocation of liquid receivers to roof-top condenser decks;
- Optimization of liquid sub-coolers;
- Closed type glass-door frozen-food showcase in place of open-type cases.

Summary

Baseline China has designed, project-managed and commissioned more than 50 new and retrofit refrigeration projects for a major hypermarket chain.

Baseline helped the client implement advanced design principals and thorough installation and commissioning processes to significantly lower the full life-cycle cost of the refrigeration systems used in its stores.

Compared to the systems implemented before Baseline took on this role, the hypermarket chain's refrigeration systems now use 24% less energy. At the same time, Baseline helped reduce the initial investment required for those refrigeration systems by more than 10%.



Project Results and Benefits

- 24% decrease in energy expense compared to the owner's other systems.
- 10.6% average initial cost saving compared to previously purchased systems.
- Decreases in initial and operating environmental impact and carbon emissions.
- Compliance with product temperature standards.
- Transparency in operating and energy efficiency performance via remote performance management.
- Improvements in equipment reliability and reductions in equipment downtime.