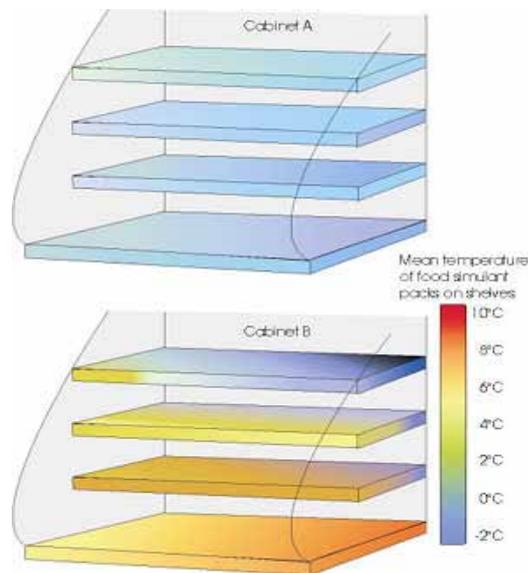




frperc direct confidential consultancy case study

Award winning refrigerated cabinet testing for Somerfield

Project outline



When Somerfield wanted to identify the best retail display cabinets for their stores, they identified frperc as their ideal partner.

At the beginning of the project, frperc already had 20 years of experience of testing and developing refrigerated cabinets and a reputation as the leading UK retail display test facility.

frperc regularly use a number of tools such as mathematical modelling (mainly computational fluid dynamics), smoke tracer analysis, structural analysis and refrigeration system optimisation to help manufacturers design and optimise their retail display cabinets.

Not only did Somerfield need to know that refrigerated cabinets they bought could keep food at the correct temperature, they were becoming increasingly concerned about the long term cost of energy. Retail display cabinets use 40-50% of the energy consumed in supermarkets, so any reductions in energy consumption have the potential to make huge savings over a large supermarket chain. After discussions with frperc, Somerfield decided that they would like to compare the performance of a typical chiller and a freezer and that they would compare performance of cabinets from ten different manufacturers.

Project results

Customer confidentiality precludes presentation of full details of the trials, however, some summary details can be shown.

Prime examples of the differences between cabinets that appear to have identical function but have very different performance are shown in the figure.

Cabinet A was probably one of the best multi-deck cabinets on the market at the time of testing. In the tests, using standard packs of food simulant, it maintained a good uniformity of temperature on all shelves and kept the product between 0 and 4°C with ease.

Cabinet B is very different, with temperatures ranging from -3 to 8°C. Large quantities of product were frozen at the rear of the cabinet whilst product at the front was far warmer than ideal.

Often it is suggested that temperature control in refrigerated cabinets comes at a price; and that this is increased energy consumption. In the tests carried out this was sometimes true, but in certain cases, such as in cabinet A, the cabinet could maintain food temperatures whilst still consuming less energy.

Both the direct energy (the energy used by lights, fans, trim heaters etc.) and the energy extracted by the evaporator were lower in cabinet A than in cabinet B. The direct energy was 45% lower in cabinet A than in cabinet B, showing much better design.

So, why was the cabinet so efficient? Superficially there were few differences between the two cabinets. However, under closer scrutiny it was clear that cabinet A had far more efficient air flow, with little loss of cold air from the front of the cabinet. The air was transferred to all areas of the cabinet by means of highly efficient fans. Airflow in the cabinet was optimised to ensure that the ends of the cabinet (where air flow is usually lowest and where heat transfer through the side walls is greatest) received as much air as the centre and that there were no obstructions to smooth flow of the air around the cabinet. The evaporator, contained in the base of the cabinet, had also been selected to be as large as possible and to reach as close to the cabinet walls as was practical. This allowed maximum heat transfer over the whole width of the cabinet and a low temperature difference across the evaporator.

Project outcome

Carrying out these tests allowed Somerfield to clearly identify the cabinets that were not only efficient but also would maintain food at the correct temperature. This allowed them to make informed purchasing decisions based on quantifiable data. Supermarkets have huge buying power and tests such as these are likely to lead cabinet manufacturers to produce lower energy cabinets in response to the needs of supermarkets.

Awards

This work led to Somerfield receiving the 'Green End User of the Year' prize at the Refrigeration and Air Conditioning Cooling Industry Awards. To find more information on the award, use the following link to the frperc news item.

Further work

Since completion of the trials another supermarket has commissioned similar research at frperc and the work has led to further work with retail display manufacturers and supermarkets, which has further raised frperc's profile as experts in cabinet design and optimisation

Contacts

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