

Fish box trials

Seafish has carried out trials to investigate the thermal properties of four types of non-reusable fish boxes for comparison (six kg or one stone capacity).

These trials were carried out because it is important to keep fish as close to the temperature of melting ice as possible in order to maintain freshness quality. Fish boxes can help with temperature control as they help retain product integrity and offer some protection against changes in the ambient temperature.

Over time, fish box designs and materials have changed and new products have been developed. The distribution chain has also seen changes, including the use of gel-ice packs and improved temperature control.

This document summarises the results of those packaging trials, providing an overview of how the fish boxes perform under different conditions. This can help seafood businesses make informed choices about the type of packaging used.

Method

Four different types of fish box were tested in an environmental chamber, which was operated at two different time-temperature profiles, using two different methods of icing.

Fish box	Supplier	Icing methods
Expanded polystyrene (EPS)	Styropack	Flake ice Ice pack
Single walled fibreboard (SWF)	CRT Packaging	
Double walled fibreboard (DWF)	CRT Packaging	
Corrugated plastic (CP)	Tri-Pack	

The time-temperature profiles

Type of distribution chain	Duration	Ambient temperature	Fillet temperature when packed
Interrupted eg airfreight.	66 hours	Variable - average of 2.8°C	4°C
Refrigerated/controlled	72 hours	Constant 2°C	0°C

Each box was filled with 6kg of medium sized haddock fillets. Thermocouples recorded the fillet temperatures and ambient air temperature. An absorbent pad was placed in the bottom of each box to soak up any meltwater. To replicate common practice, either one gel-ice pack or 2kg of flake ice was placed directly on top of the fish and the boxes sealed. The absorbent pads and ice packs were supplied by Styropack.

Results

The average fillet temperatures for each time temperature profile and cooling method are shown separately in Figures 1 to 4.

Results of the trials with a variable ambient temperature for 66 hours

- All the fish boxes were affected to various degrees by changes in the ambient temperature, but the EPS box proved to have the best insulative properties.
- The next most effective type of box was CP, followed by DWF and then SWF. However, when using an ice pack, there is little difference in thermal performance between CP, DWF and SWF boxes, despite the CP box being more effective over the first 20 hours.

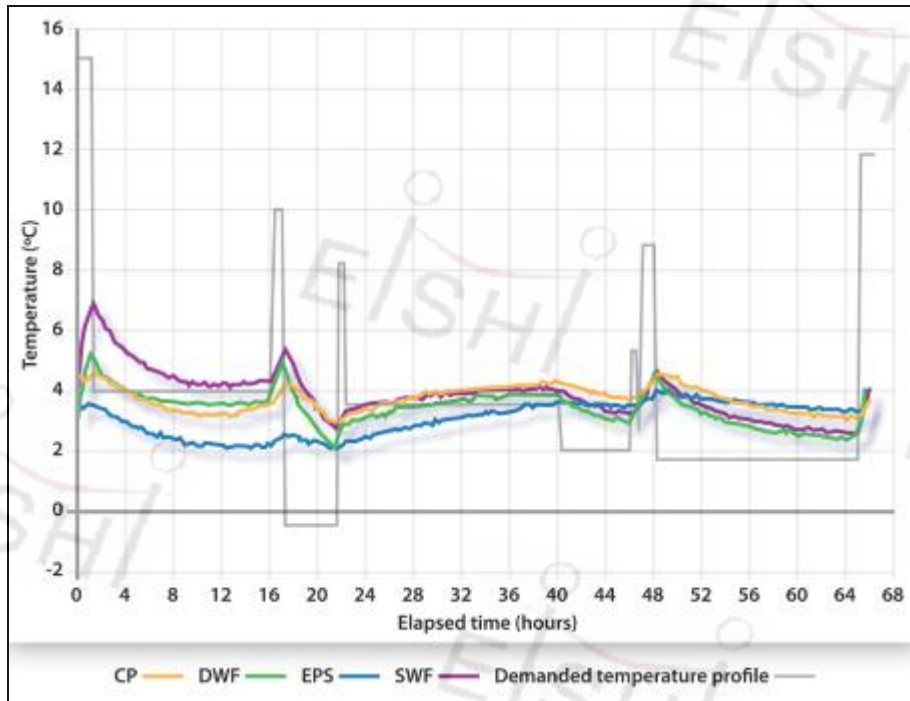


Figure 1 Comparison of fillet temperatures in boxes held in a variable ambient temperature for 66 hours (ice pack cooling)

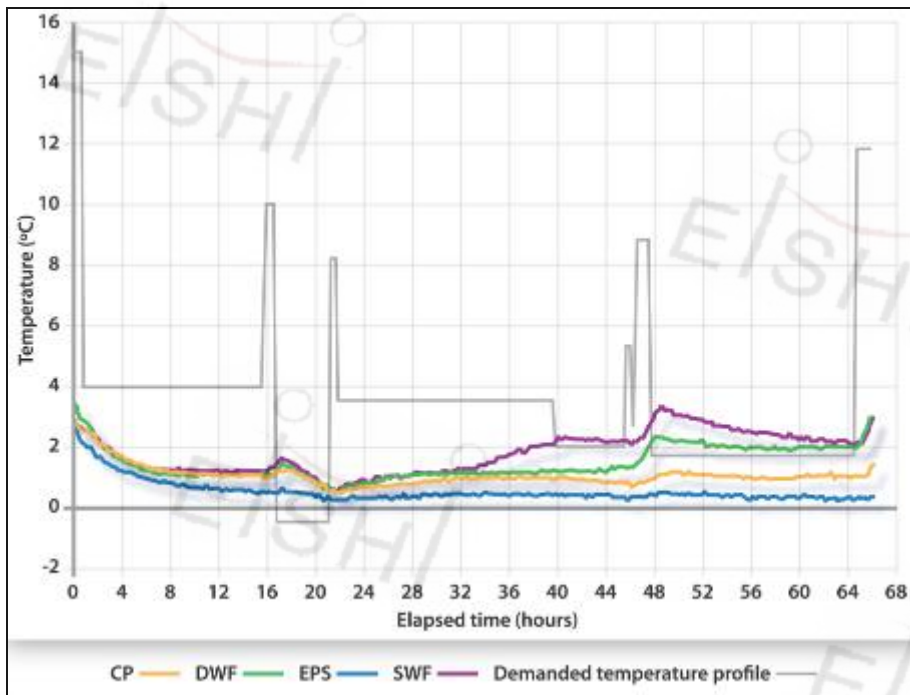


Figure 2 Comparison of fillet temperatures in boxes held in a variable ambient temperature for 66 hours (flake-ice cooling).

Results of the trials with a constant ambient temperature of 2°C for 72 hours

- The EPS box was most effective at maintaining a low average fillet temperature for both cooling methods, followed by CP, DWF and SWF boxes, respectively.
- All boxes performed satisfactorily in holding fish temperature close to 0°C, particularly when using ice. It may be beneficial to have less insulation in some circumstances to allow the chill temperatures to influence product temperatures.

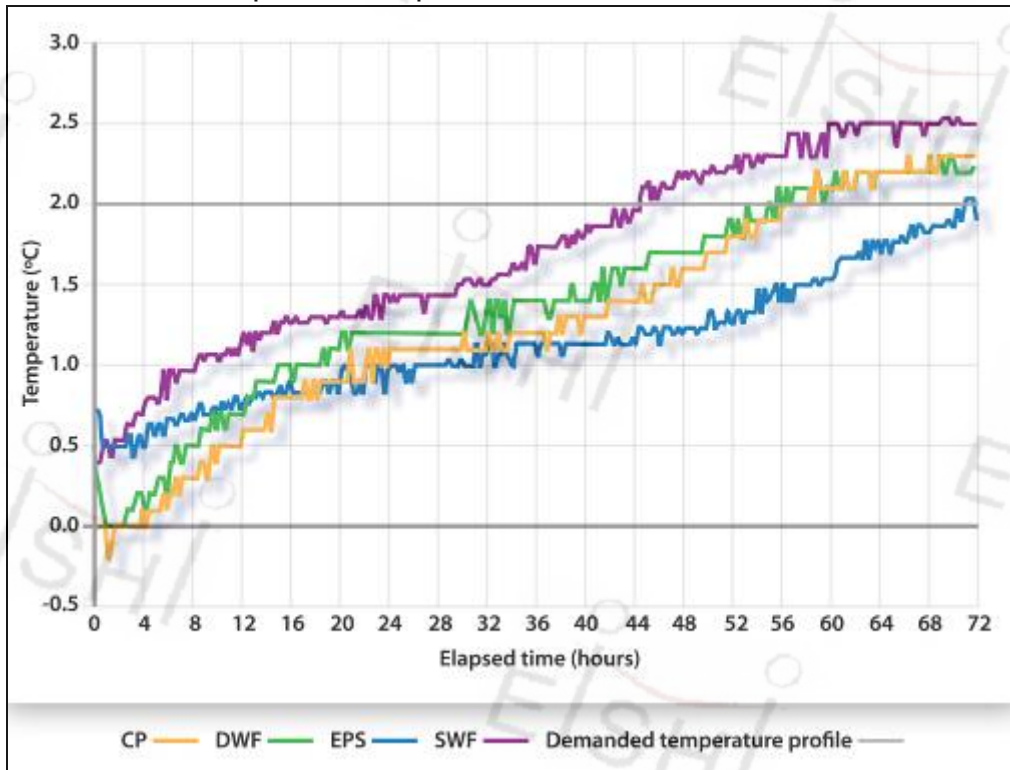


Figure 3 Comparison of fillet temperatures in boxes held in a fixed ambient temperature (2°C) for 72 hours (ice pack cooling).

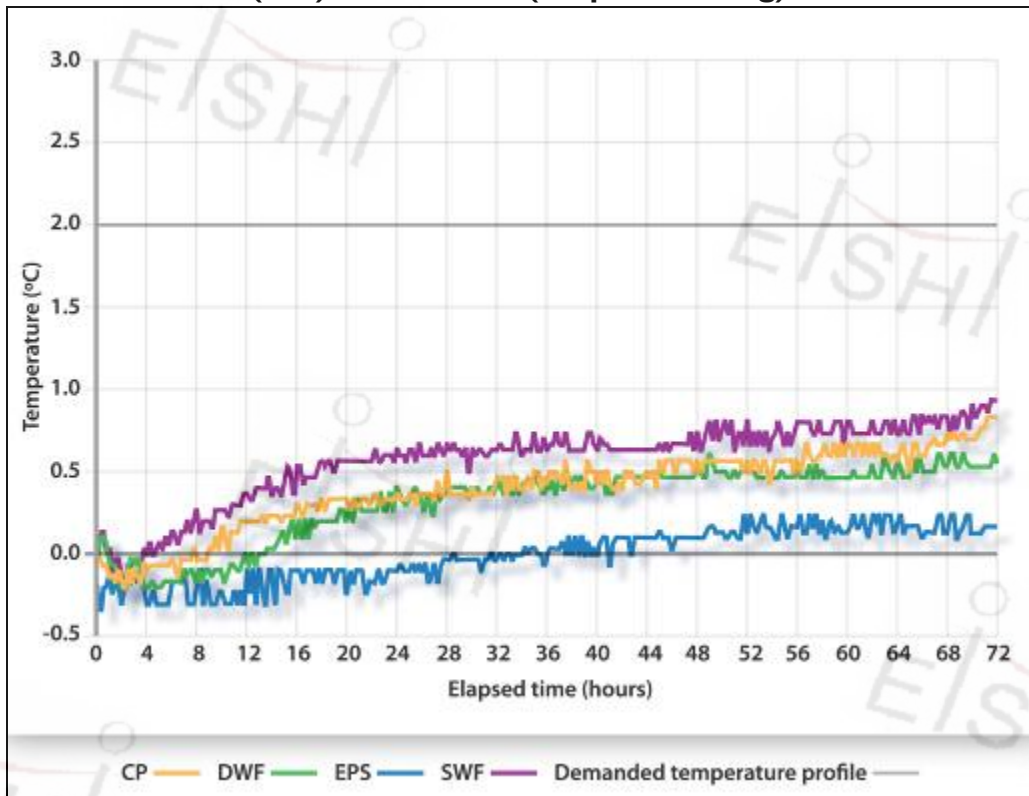


Figure 4 Comparison of fillet temperatures in boxes held in a fixed ambient temperature (2°C) for 72 hours (flake-ice cooling).

