

Thermal Efficiency = Dollars + Sense

With the growing emphasis on sustainable business practices, energy efficiency is a real concern - More so in the Cold Storage industries. This is why, when upgrading or building new facilities, the attention to detail is paramount.

Convection currents, drafts and wind currents need to be controlled, minimising incoming heat and moisture, reducing water and ice build-up inside the facility and stopping condensers icing up. Long term maintenance costs need to be considered when arriving at a solution.

So, are you looking for a return on capital expenditure – Or to plug a slow leak?

1. Cold Store Efficiency

For cold storage facilities to operate efficiently, one area of major concern must be energy efficiency. Disproportionate to their size, the entrance to the freezers can bare large energy costs through poorly insulated doors, air flow through strip curtains, or even air gaps around dock doors and loading docks all cause significant amounts of undesirable heat to enter the facility.

Research has shown, an average cool store will lose about 50% of its energy through the door (Ref: Professor Cleland, Massey University, NZ). This makes the door an important area of focus that cannot be overlooked.

The door fabric, seals, speed of operation, airlock system - if applicable - used in conjunction with a thermally insulated dock door, temperature differentials, drafts, all play a part in accessing the best possible choice. By having control over the ELA (external load-out area) environment with airlock systems can reduce the temperature differential and save energy.

2. EBS Thermal Efficiency

The following information is based on calculations by Mr. J. Thomas – Tutor at Massey University, Auckland N.Z., who researched methods for calculating thermal loads on cold stores - Supervised by Professor G. Wake and Professor R. McKibbin.

Based on a door size of 10m², a given humidity of 80% and a still air temperature differential of 20°C, **PVC Strip Curtains** allow up to 100,000 cubic metres of outside air through per day, containing as much as 1044 kg of water - The **EBS THERMOspeed**, an **energy efficient rapid roll door**, will allow less than 10 kg of water.

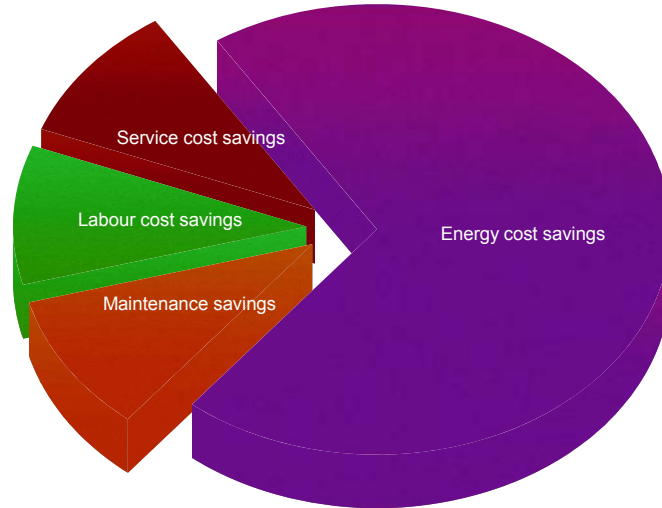
The above figures could almost double at installations with temperature differentials of 40°C, as evident with a freezer at -25°C and ambient (Based on Tamm's equation).

2.1 Graph Assumptions

The savings to the bill-payer are broken down in the following graph. The energy which dissipates through **PVC strip curtains** - when purchased at current market prices - would **cost \$286 per day**. Energy costs incurred with the **THERMOspeed** would be **\$13.00** during an operational day or as little as **\$0.83 per day** when closed on a non-operational day. Further savings in maintenance, labour, and service have all been deduced in comparison to known figures based on a strip curtain system.

- Maintenance savings ■ Labour cost savings
- Service cost savings ■ Energy cost savings

Operational Cost Savings using THERMOspeed

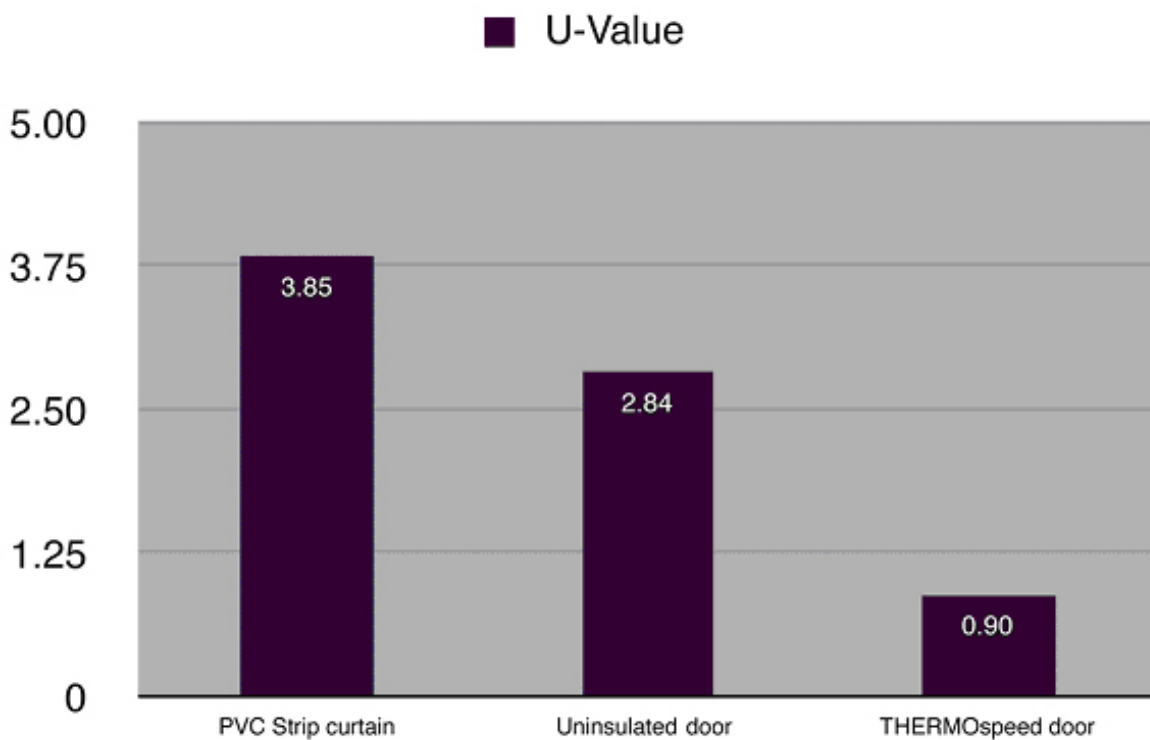


3. Control or Elimination

Stopping the energy loss is a simple matter of installing THERMOspeed doors incorporating an airlock system to manage the activation of the doors if possible or integrate with ISOtherm Dock door. This closed environment will remain cooler and drier, reducing energy consumption and maintenance costs.

3.1 Comparison

A direct comparison can be made between door types and fabrics based on their U-Value and the resulting heat gain through the door. The graph below illustrates the huge differences between door materials.



The **PVC strip curtain** not only has low insulation properties but is also responsible for air infiltration of 20%, causing icing up of evaporators and reducing operational efficiency - See *photo*.

A rapid roll **PVC door** is an improvement as it will cut down the air infiltration, but it offers no thermal quality. Therefore it will still lose energy through the curtain, as can be seen with the ice build-up in the photo below.



Clear PVC Strip curtains



Conventional Un-Insulated PVC Door



EBS THERMOspeed

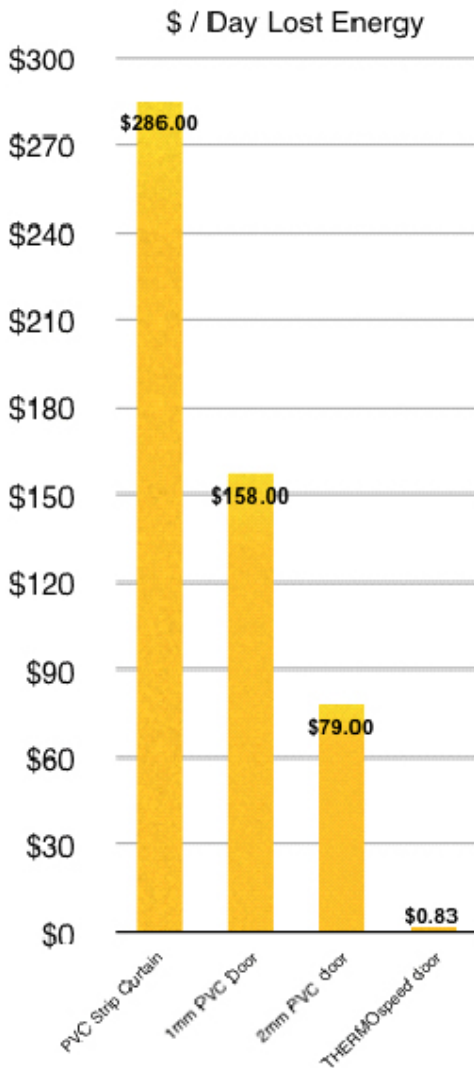
The EBS THERMOspeed offers a rapid roll thermal door at a competitive price, that is thermally efficient, easy to maintain and can self-repair in case of collision.

Can be mounted inside or outside the freezer without the need of an igloo, saving valuable floor space and has a quick payback period with low running costs.

How does this translate into Dollars \$\$\$?

3.2 Dollars and Sense

The graph below shows the savings achieved by installing an EBS rapid roll system as opposed to just strip curtains, 1 or 2mm PVC rapid roll doors.



3.3 Cost Saving

The installation of EBS THERMOspeed Rapid Roll doors will address several issues. The 30mm PE closed cell foam has insulation U value of 0.9 W/m²K and operational speeds of up to 2.8 m/s.

This will:

- 1) Reduce Energy Loss 24/7
- 2) Cut down air infiltration into freezers
- 3) Reduce maintenance issues
- 4) Stop wind currents carrying moist air, which cause ice build-up on walls and floor;
 - Ice increases maintenance issues
 - Ice on floor cause safety issues

3.4 Cost/Payback

Given the THERMOspeed's energy cost \$0.83 per day; the installation of the door system can save the bill-payer as much as:

- \$285.17 per day (per door) compared to **Strip curtains**,
- \$157.17 per day, per **1mm PVC door** and
- \$78.17 per day, per **2mm PVC door**.

A total payback period for the THERMOspeed is less than 6 months in the above example.

Once the door investment has been recovered, it will then be realised as an operational cost saver.

The best way to illustrate the thermal efficiency is to purchase \$300.00 worth of cold air;

When air is secured with an EBS door it will last	1 year
Behind a 2mm thick PVC door	3.8 days
Behind a 1mm thick PVC door less than	2 days
Behind PVC strip curtains	1 day

4. Summary

To obtain cold store efficiency and real dollar savings, control of the energy loss through the door is essential. For example, a door that costs \$2000 less when purchased, could cost you \$20,000 more in energy by the end of the year. By installing the THERMOspeed rapid roll doors with an air-lock system (when required), the costs of energy and maintenance will be reduced.

A 100% return on investment is achieved in only a matter of months; then the real returns begin through reduced running costs.