Carbon Cube -Key facts:

Carbon Cube in the marketplace for 10 Years

Globally patented

Used in tens of thousands of refrigerators, worldwide

Proven, inexpensive, simple, effective, certified and safe

Users range: Fortune 1000 companies to local butcher/shop/pubs

Carbon Cube -Usage Goals

By controlling refrigeration based upon variances in 'Food' Temperature, rather than variances in Air Temperature, in a certified way:

To reduce energy consumption on a wide range of commercial refrigeration (Walk in's, Upright Fridges and freezers, Dairy/Multi Decks, Deli Bars etc).

Savings typically range between 12% and 45%

To reduce refrigeration maintenance overheads

To reduce 'down time' of commercial refrigeration

Patents and Certifications

Carbon Cube is patented under the following patents (others regional patents being sorted):

UK Patent: GB 2 356 454 A

US Patent US 6,976,368 BI

Carbon Cube is certified by the NSF(www.NSF.org) under their protocol P235. NSF is one of the world's leading standards bodies for Health & Safety, Food, Water and Environmental Issues.

Renowned UK refrigeration specialist consultants, CCFRA Technology Ltd report confirms both energy reductions & food safety

NSF Certification covers:

Temperature Change Rate

(2degrees F below and 5degrees F above wide range of control products -as at 10mm below surface of produce as demanded by HACCP standards) -well within HACCP guidelines

Based upon the Physical Characteristics (Design & construction, formulation of Simulant)

All physical products used in the Carbon Cube:

Certified and approved for use in Refrigeration and as Food Safe

Carbon Cube -How does it work?

Changes what is used as the refrigeration control for starting the compressor from Air Temperature to Product Temperature.

Product Temperature changes (up or down) far more slowly than Air Temperature.

This extreme Delta allows for a reduction in the number of compressor starts on the refrigeration (typically by 40% to 80%)

The compressor starts are the point at which the consumption of energy is at its highest (by far, the bulk of consumption of energy is at this point). Compressors also incur more damage as a result of more starts.

Carbon Cube: How does it do that (2)?

Carbon Cube is leveraging the certification that the wax simulant changes temperature at the same rate as food products.

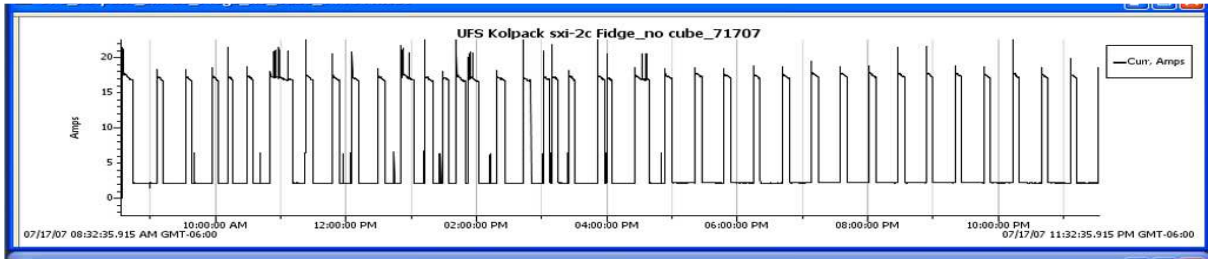
By inserting the thermostat probe (which controls the cycles of the refrigerator) so as to be embedded in the simulant -the probe now registers certified changes in 'Food' temperature not changes in Air temperature.

Since this change is far slower than air the compressor now comes on far less often.

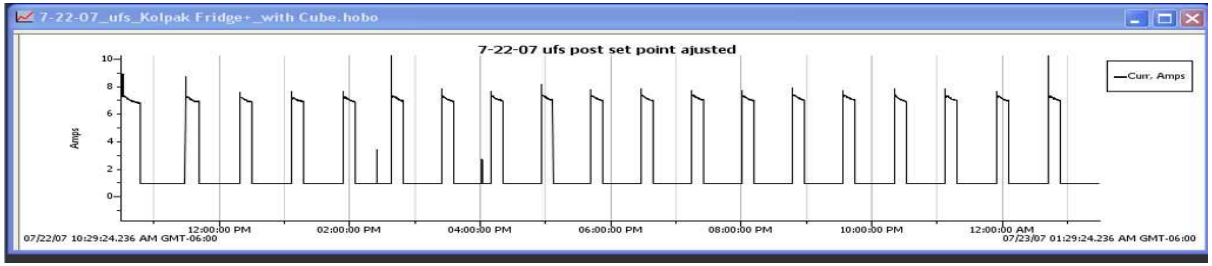
Since the 'starts' in compressor cycles are the moment of consumption of the majority of power used by the refrigerator the reduction in their frequency delivers significant power reductions.

Carbon Cube -The results:

Prior to a Carbon Cube being fitted, a refrigeration unit is controlled by fluctuating air temperatures which cause regular and random on/off cycles.

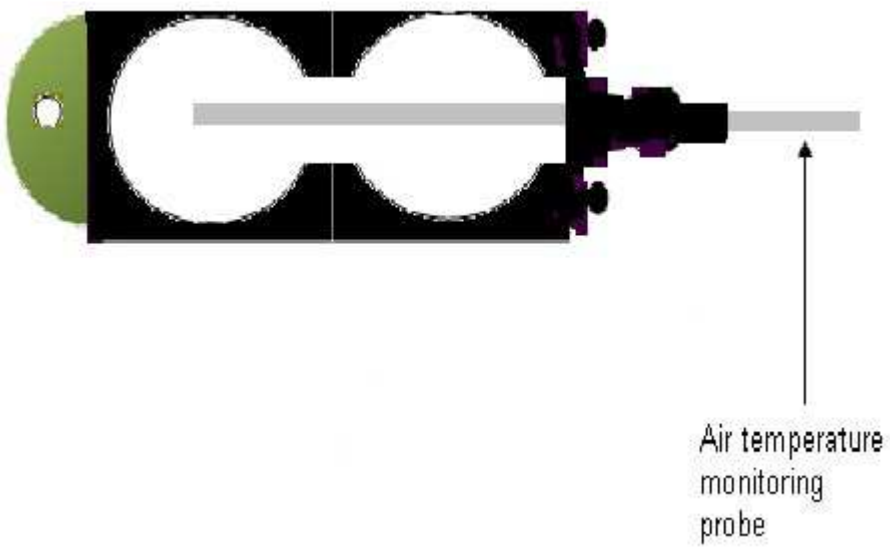


After fitting a Carbon Cube, the on/off cycles become longer and more even. This reduces starts typically by between 40% -80%.

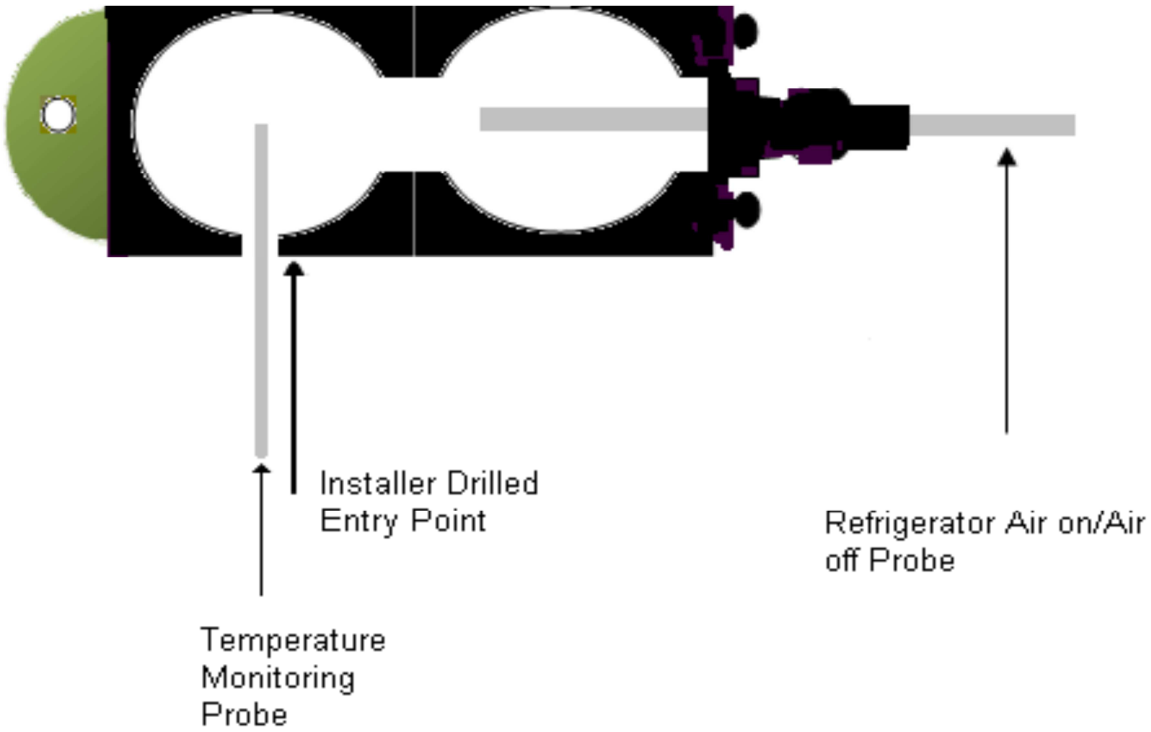


NB.... Note here how the range of produce temperature variance has reduced (from 20 down to -8 degrees F to 5 down to -3 degrees F..... This has positive implications on produce quality)

Carbon Cube: examples of usage:



Using the refrigeration Thermostat Probe to control against Produce temperature change (Not Air Temperature)



Using the Carbon Cube to both control the refrigeration by produce temperature and simultaneously monitor produce temperature within the refrigeration.

Carbon Cube contains a patented, high molecular weight, aliphatic hydrocarbon compound (Food simulant). The simulant is inert, non-toxic, and approved by the NSF for usage with any refrigerator or freezer. This substance is held within a specially designed container designed to achieve thermal transfer at the correct rate. The container is made from an 'AcrylonitrileButadiene Styrene' (ABS) plastic, which is also NSF approved for use within the refrigerated environment.

Carbon Cube: Why such an elegant solution?

- No moving parts or electronics
- Easy to fit -then just forget
- No change to the overall approach of managing refrigeration - simply fit and manage as normal (typically using Set point controls)
- Certified -using a certified base control of the refrigeration on - rather than uncertified or messy approaches (gels or oils) or the comparatively expensive (in terms of energy) approach of using Air temperature.
- No servicing or maintenance of Carbon Cube required
- Proven (10's of 1000's installed -No problems, just benefits)

Carbon Cube: The benefits go on and on and on:

By reducing the cycles it is obvious you are saving on:

- Power
- Emissions
- Therefore Cost

However, since the refrigeration works 'less hard' then you will also save on:

- Maintenance
- Wastage of staff time effecting repairs
- Product loss
- Loss of business (due to refrigeration facilities being down)

Since the Carbon Cube also lowers the spikes in the 'food temperature' feedback is often that food lasts longer and even ‘tastes better' than when using Air temperature as the control.

Some common questions answered:

Don't different products change temperature at different rates?

- Yes, but most products change within a perfectly acceptable range, Carbon Cube is certified to change at the same rate as Meats, Poultry, Dairy & Juices of different sizes, quantities and in different states (eg. Minced). Although Carbon Cube is not 'officially' certified with fruits and veg it has often been used very successfully, in managing the refrigeration of these products as well.

What about Air temperature?

- Once the Carbon Cube is installed Air temperature WILL fluctuate more than before (significantly more)... But, unless you really care about the Air temperature (and are prepared to pay heavily for it), product temperature SHOULD be your key concern and that is covered, in a certified way, by Carbon Cube.

Does this effect the warranty on my refrigeration?

- We have had a couple of incidents where a manufacturer did try to state this. However, when the client pointed out to him that nothing was really being changed apart from the temperature their equipment was measuring, they were compelled to agree there was clearly no justification for not allowing installation to go ahead. (Manufacturers can see a loss of revenue since the Carbon Cube reduces (considerably) compressor failure rates).

What about larger refrigerators, where food changes temperature across the refrigeration at different rates?

- Using Air temperature or product temperature it is sometimes necessary to control at different points in larger refrigeration units. Where this is the case you might need two (or more cubes: typically one for each pre existing control probe). There is no real difference in this situation compared to use of Air temperature as the control.

How easy are they to fit?

- They are very easy to fit. It should take less than 15 mins to fit one. However this work, as with any other work on refrigeration, must be done by a qualified refrigeration engineer since Food Safety is always the primary concern

Have there ever been any problems with the Carbon Cube?

- Since Carbon Cube deals in food safety we carry a significant manufacturer's liability insurance. In ten years of selling the Carbon Cube there has never been the remotest question of having to use this insurance. When the Carbon Cube is properly fitted there should be no adverse side effects whatsoever. With 10's of 1000's of Carbon Cubes installed we are unaware of any problems attributable to the Carbon Cube.

Clients

Some users and some testimonials


A small sample of users of the Carbon Cube, Some use a few, some hundreds and some thousands.....
MORRISONS
ARAMARK
baxterstorey
BHS
RAMADA JARVIS
WEMBLEY STADIUM
Health Protection Agency
sodexo
COMPASS GROUP
MINISTRY OF DEFENCE
Swiss Re
Holiday Inn HOTELS - RESORTS
TOYOTA
HONDA
THE UNIVERSITY OF TAMPA
Coca-Cola
Marriott
npower
P&G
Carluccio's
SPAR
Essex Water a YTL company
ALDI
BOSCH
Park Plaza Riverbank LONDON
Johnson & Johnson
Lloyd's Register
Radisson SAS HOTELS & RESORTS
The Scottish Government
Gillette
HSBC
Environment Agency
HM PRISON SERVICE Public Sector Prisons

Savings and ROI

These factors mean measuring the savings of an Carbon Cube is analogous to the savings of Double Glazing -common sense tells you it is a good idea but:

- Savings are dependent on the house construction (Does it have insulation, is the build quality good etc)
- Savings are impacted by the comings and goings in the house - number of door openings / Are windows left open etc
- Savings are impacted by ambient outside temperatures
- Savings are impacted by whether an oven is used indoors/ the type of heating system installed etc.

Refrigerators differ in size, quality and condition, just like houses, they operate in different places, just like houses and they are used by people who use them differently (Just like houses are)...

Comparing apples with apples....

Where these factors are properly controlled and compared fairly we see energy consumption savings normally ranging between 12% and 45% on all types of commercial refrigeration.

Taking a low average for these figures (20%) they normally translate into the following typical ROI periods:

- Walk in's –3 months to 6 months
- Dairy Decks, larger commercial refrigeration –sub 1 yr
- Smaller commercial refrigeration -12months to 2 yrs

These ROI figures do not take any account of:

- Maintenance savings
- Time costs savings (Time taken effecting repairs)
- Loss of business savings (as lowered refrigeration failure rates)
- Produce quality savings (longer produce lifespans & better taste)