What's in the box?

Box Clever has added low carbon and acoustic plant enclosures to its range – and its material specification is surprising, says **Andrew Gaved**

Box Clever Engineering is a business that has built its reputation on finding smarter ways to house and protect refrigeration systems. In its relatively short life, the Kings Hill, Kent firm has made this, let's face it, pretty niche business area its own by modularising the structures themselves and pre-manufacturing the supporting structures within them as much as possible.

This saves a significant amount of time and effort by the contractor tasked with building the plant, cutting down the need for manufacturing ancillary components. "We want to move to building the plant into the box, rather than the traditional route of putting a framed plant into a housing," says Box Clever founder, former Tesco engineer Kevin Broughton.

Box Clever has proved this concept can work just as well with the bespoke industrial enclosure as it can with the standard retail plant housing, with the former offering the added benefit off cutting down expensive craneage. But over the last year, while the economic climate slowed down the volume coming for the conventional enclosures.

So Mr Broughton got busy on expanding the repertoire. As a serial innovator, Mr Broughton was unlikely to stand still, but even so the direction that the new developments have taken might be somewhat surprising. First, he came up with a concept that would satisfy even the most extreme environmentalist – a plant enclosure built from engineered timber. Second, perhaps more by accident than design, he has found himself starting to make serious progress in another niche area, that of acoustic engineering.

In so doing, Mr Broughton is challenging some of the territory previously dominated by the 'acoustic consultant' – and no doubt the fee books that go with it.

But first to the simplest idea – so simple that it seems almost a retrograde step in these days of steel, plastic and the like: to build an enclosure out of timber so as to reap the benefit of a very low embedded carbon life cycle.

Strength was obviously the major consideration when Mr Broughton was first alerted to the idea. "I hadn't realised that engineered timber could be as strong as steel, until I went and saw it at the SIG factory," says Mr Broughton. SIG is a company known for its engineered timber products – now much better known, thanks to its high-profile work on the external façade for the Olympic Velodrome. It is now supplying Box Clever with the product to its specification.

The fundamental appeal of a timber product is its carbon footprint against steel – sustainably sourced engineered timber offers 0.31 kg of CO_2 per kg, against steel's 1.47 kg of CO_2. "A significant difference" notes Mr Broughton.

But the equally compelling benefit is the low weight, 43 per cent lower than steel which brings clear cost advantages for transporting, as well as an equivalent reduction in CO_2 during transport. Perhaps surprisingly, the engineered timber product also claims a 60-year lifetime. But at end of life, timber offers a significant advantage, he notes. "It is just a case of chopping up or burning it, whereas with steel it is obviously a lot harder to dispose of

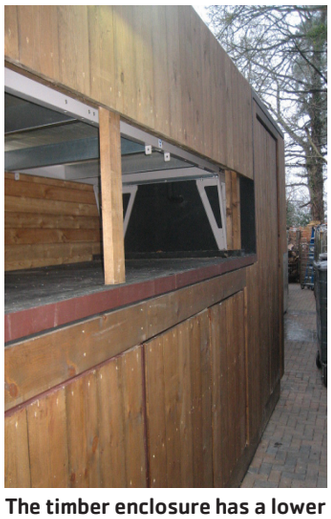
'We try to use our experience in refrigeration to build innovation into products'

An obvious initial concern for those considering specifying it was the fire rating. However, says Mr Broughton, with the use of retardant panels or coatings, it can easily be fire-rated to half an hour or an hour, or it can even be 'class O' rated.

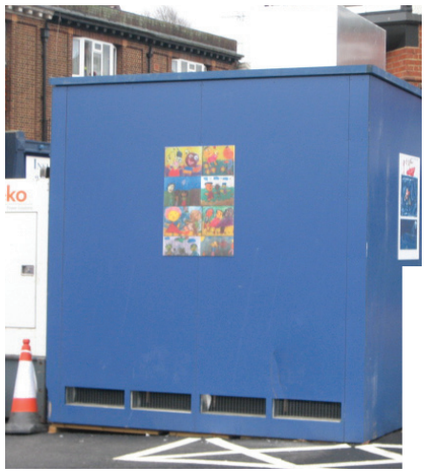
The idea of a low-carbon enclosure has caught the imagination of the more green-leaning retailers, with one intriguing possibility being to clad it in recycled plastic panels, which could re-use a store's plastic waste output. The other option for cladding is larch lap panels, which does have more of the look of the wheelie-bin shelter about it.

The timber version comes with a full structural certificate and offers a high acoustic performance. But perhaps the deciding factor will be the fact that it has cost parity with the steel version – and if the enclosure is to be roof-mounted, the timber unit requires less in the way of steelwork to support the roof.

The first timber enclosure on a live site has just been installed by contractor DCI Refrigeration at the Co-operative Group's Chobham store



The timber enclosure has a lower carbon footprint than steel



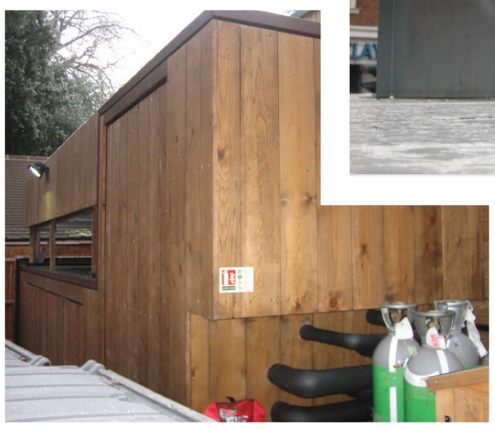
Acoustic benefits

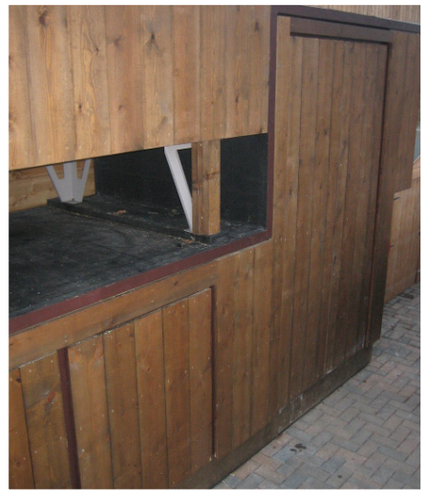
The second product innovation is the Box Clever acoustic enclosure, which uses a fair degree of engineering ingenuity to address the pragmatic goals of reducing the onsite noise of generators during installation and refits. It is also a timber product.

The prototype acoustic enclosure, which has done its stuff at a Tesco site in Croydon for generator supplier Aggreko, carries with it some impressive claims. For a start the 125 kVa generator housing was designed, manufactured and delivered within a two-week window. But the most impressive element is the fact that at a 35 dB(A) typical output you simply cannot hear the equipment noise outside the box, Mr Broughton says.

The success of the noise reduction has thrown up some challenges of its own, not least the fact that it hard to measure the exact sound output, because it is so quiet. "It is sufficiently quiet that you don't notice the plant noise until you are actually in the box. For the generator enclosure, we had a target to reduce it by 25 dB(A). We think the one in Croydon may actually be a 30 dB(A) output, but we can't get it measured accurately, because it is now lower than the background noise on site," he says.

The actual noise reduction is the result of paying attention to where





From left to right: the acoustic generator enclosure; the timber enclosure; close-up of the exhaust baffle; and another timber enclosure

a large element of the refrigeration noise comes from – the exhaust. The housing allows induction and cooling air to enter and exit through internal attenuation paths with the flow aided by supplementary fans. This unique design, coupled with the additional exhaust system, ensures an ultra-low noise operation with performance in excess of 35 dB(A).

It also means building on the benefits gained from pre-assembling his refrigeration enclosures, since for an acoustic enclosure; every hole drilled on site is a risk to the acoustic integrity. "We don't want anyone on site to be drilling holes into our product if we can help it," he stresses.

The claimed levels of sound attenuation in an equipment sector 'used' to a degree of reasonable degree of plant noise, have naturally attracted the interest of the generator suppliers – starting with Aggreko, who supplied the Croydon generator. This neatly opens a doorway into the wider construction sector, offering diversity away from refrigeration.

But that is not to say that the refrigeration customer base is not interested. Indeed the noise reduction aspect makes the Box Clever housing an attractive production for the burgeoning convenience store sector – anyone in any doubt about convenience store prospects should refer to Retail Question Time on p14 – where the often urban or residential location puts a premium on low noise.

Putting outdoor air conditioning or condensing units inside the unimposing wooden enclosures could also prove a unobtrusive option for high street convenience stores.

Further innovations

Lest anyone think that the Box Clever R&D strategy is wholly focused on timber these days, Mr Broughton reveals two more innovations.

The first is a modular industrial-type enclosure built for GEA's BluAstrum chillers. The high tech focus here is not the housing material – it is steel - but the fact that the operating refrigerant is ammonia. Hence the enclosure has to be built to an extremely high containment specification.

They are delivered flat-packed and are designed to be built tightly around the plant, with service access via doors, rather than the convention of being built with a metre's worth of walk around space internally. Obviously this provides serious savings in steel costs. It is also offered with a removable base, which can be specified after the plant has been assembled. "It is completely the opposite way round to the convention," notes Mr Broughton.

The second innovation looks at first like high-tech bubble wrap, but turns out to be a high performance watertight foam material for sound baffling. These lightweight panels branded Eco-Mollis (Eco-M) is an open celled foam which has sealed surfaces, making it waterproof. In the world of sound attenuation this is a big deal as the standard mineral wool panels are a) prone to degrading and b) get completely saturated if exposed to the elements.

"We try to use our experience as refrigeration engineers to build innovation into products to make the job easier and the product neater," says Mr Broughton in conclusion, at the same time coining what could be his new mission statement. rac

0.31 kg

CO2 emissions per kg of timber produced, compared with 1.47 kg per kg of steel