Technology Strategy Board
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Innovation **results**

AN R&D CASE STUDY #018

Making homes greener with Modcell

As the drive for energy efficiency heats up, the construction industry is under pressure to ensure new developments are doing their bit. The ModCell project was set up to examine the potential for using straw bale panels in mainstream construction, and it seems the future is bright.

The need

Times may be tough for the construction industry but there is no let up in the demand for carbon-neutral, environmentally friendly products and practices.

New advances are constantly being sought and the innovative use of natural materials is a key factor in ensuring new developments are as environmentally responsible as possible.

On top of this, they must be marketable and competitive – as the economy struggles companies cannot afford to ignore their bottom lines.

The ModCell project was set up in order to research the future potential for the straw-bale filled panels, to see whether they could provide a viable alternative to traditional brick and block construction.

The results

Under the ModCell project partners including the University of Bath and Bristol-based ModCell were able to continue researching the ModCell panels, which comprise of timber frames filled with straw bale insulation, and not only expand the range of applications but reduce their production cost.

The panels developed by White Design were already on the market and have previously been used to provide cladding for low rise buildings such as offices in York and Somerset and an eco-development in South Wales.

However, they had not been tested for further uses. They were not load-bearing and because research had not been carried out were being used in conservative ways, which in turn meant that they were being outpriced by the more traditional materials.

The project sought to address these issues by carrying out extensive testing of the panels, providing technical information for clients to illustrate that they are fit for purpose, and by exploring their future potential as load-bearing construction materials.

The panels were tested under wind and rain simulation conditions to ensure durability. Experts came up with methods for making the product breathable, so that any water which does get in can escape before causing problems.

Rendering materials were also reviewed as part of the ModCell project and the product was developed so that the panels can be manufactured offsite in a factory and delivered on site as a fully finished product, ensuring that there is no risk of the interior of the panels being damaged on site.

The environmental advantages of the panels were also explored – straw is a natural by-product of cereal production and while it is not environmentally neutral it has several benefits.

The thickness of the panels and the materials used – including the locally-sourced straw - aid thermal insulation and improve energy efficiency, keeping the building cool in the summer and warm at winter.

As a result of the research, experts were able to take the product forward and improve its design to make it lighter and more cost-effective. They discovered that the panels can act as load-bearing construction materials – effectively, that they are suitable for building homes with.

And by adjusting the design of the panels and reducing high value content, they have they have succeeded in reducing prices, making them 30% cheaper than they were at the start of the ModCell project.

The market

To date the uptake of the ModCell panels has largely been in the public and environmental sectors.

While there has been a great deal of interest in the product, which has been exhibited at EcoBuild for the last four years and won two green awards, there was a need to increase confidence and reduce the cost for the commercial sector.

These issues have been addressed by the ModCell project, and it is hoped that future markets will include housing developers, particularly those involved in the construction of social housing.

What's next

A follow-up project, BaleHaus, also part-funded by the Technology Strategy Board, has been set up as a result of Modcell's work to look at the further development and marketability of the panels.

The research team has constructed a full-size two-storey house on the University of Bath's campus in order to test the panels over a period of time in varying weather conditions.

It is hoped that this further work will establish Modcell's value as a competitive building material suitable for the mainstream construction industry.

'This is an exciting product which has far wider parameters than first realised and could become a key feature in future construction developments. The Modcell project enabled us to maximise upon its potential.'

PETER WALKER, PROFESSOR OF INNOVATIVE CONSTRUCTION MATERIALS AT THE UNIVERSITY OF BATH.

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