

A HOUSEHOLD REVOLUTION

Ron Beattie has the confidence to make some pretty bold claims about what his invention can do – try this for starters: “It’s not just a cheap way of building... we can stop fuel poverty here!”



SUCH CONFIDENCE is not about to diminish, either: “We can cut CO₂ emissions by 80 per cent on every single new building and make it cheaper. This is a massive step forward,” he continues, gathering steam.

Beattie Passive is launching a patented building system that specialises in the delivery of innovative, energy efficient timber frame structures. Using sections built off site and shipped over, a three-bedroom house can be built quickly, cheaply and with impressive levels of heat reduction by a small number of people. A simple construction maybe, but it’s one built with incredible accuracy.

For Ron it marks the end of a two-year journey from concept to rolling out.

“What I wanted to do was come up with a system that had one trade involved in the whole build, structurally. It’s about a new building system that has never been done in the world – it’s about delivering a very high insulated building which we then test.

“I’m a property developer by trade and I knew that the estate that I was building I wanted to make as green as possible and get as high up in the code as possible. One of the things I learned from there was the way that we have been going forward and the way we have been building have been far too difficult. And far too expensive...

“What I wanted to do was to come up with a building scheme that would deliver a quality product every time. It had to be very simple so it’s a semi-skilled type erection

anybody can do with very simple building techniques. We have gone back to basics – not reinvented the wheel, but started from scratch again.”

Speaking to Ron it becomes apparent that, as well as being passionate, he obsesses with the concept of simplicity. Everything that is used can be made anywhere in the world and can be put together by less skilled workers.

“Everything is right for this now. This is going to make a real impact on social housing and affordable homes as it’s so semi-skilled. These houses can be manufactured in somewhere like Haiti, put together with a hammer and then it won’t fall down again. It’s phenomenally strong. Each one is a single element. I can send a page from my computer anywhere in the world and it would take one man with a machine that is available everywhere. It goes into a cutting rig which takes one man one day to turn out a three-bedroom house. It’s so simple.

“A three-bedroom, 84sq ft house will take 11 days from first on site to water tightness. All you need is one level and one hammer and you can erect any building shape.”

CONSTRUCTION METHODOLOGY

The term “passive house” (passivhaus) refers to a construction methodology for energy efficient buildings that require little energy for space heating or cooling. In fact, it requires 90 per cent less space heating

than a standard building and is designed to assure a comfortable indoor climate in summer, while requiring only nominal heating in winter without the need for a conventional heating system.

This is achieved by passive heat being delivered externally by solar irradiation through the windows and internally by the heat emissions of household appliances and the occupants. Combine this with efficient technologies and energy consumption is greatly reduced.

There are approximately 15,000 passive houses throughout the world but with new technologies entering the market this number should grow rapidly.

A passive house should be constructed with large windows orientated towards the sun for maximum solar gain. The key factor is the super-insulated, well sealed building fabric and good-quality, highly insulated but openable windows.

The annual heating demand calculated by the Passivhaus Planning Package should not be more than 15kWh/m² per year for heating and 15kWh/m² per year for cooling. The building should not leak more air than 0.6 times the house volume per hour at 50pa.

The thermal mass is important as this stores the heat during the day and releases it at night.

Explaining how this is possible, Ron says, "I looked into all sorts of mechanical offsite units that are actually made to a tolerance to, realistically, 0 and 1mm every single time. And that's what we did - we've got a system that delivers a continuous structural void around any building. It could be an office block, a house, a block of flats. It goes under the wall, up the wall then over the roof. That void, when pumped in installation, gives you a continuous seal.

"In all buildings we now have a standard foundation, a normal slab of some type and then we brick or we fix panels, so we get joints between the ground floor and the walls and the walls and the roof. That's where we get a



PROUD: This example of a Passivhaus was built for the Joseph Rowntree Housing Trust in York

weakness and structural strength. We get a weakness in airtightness because those points joining give us problems and then we get a weakness in thermability and bridging. All those points are the downfall of building, but also building is far too expensive and far too long in its delivery process because you have so many people involved.

"Then that gives you problems because one trade isn't able to follow the other one and all these things add on to the problems we get in the building trade."

Despite being a cheaper option the plan is to be able to check every erected building for high quality. By being able to build the sections off site and put them together simply, the number of faults has been reduced.

Once it's up, the u values are incredible as well. If the standard is 0.12

this goes down to 0.08 and it's cheaper to build than standard construction by quite a way. You don't need a full foundation or a ground floor slab - the materials will drop in price gradually. The company is working with KIA and Lindon Homes.

FULL HISTORY

"Every building is then tested by us to check it gets to its airtightness and that it is sound," Ron adds. "We are able to give a full history of where material came from, who put it up, who tested it - people know who built the house and who tested it.

"We've been able to cut down the number of faults in post completion, so once it's built you could have the roof and windows in and it would look completely finished if you wanted it to.

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"AFTER A COUPLE OF HOURS WITH THE NORWICH BUILDING CONTROL TEAM THEY SAID I MIGHT BE ONTO SOMETHING"

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Internally the inspectors for the Building Control officer or for the warranty supplier can see every single structural element and every joint of that building so that there is not one part structurally that you can’t see, inspect or check.

“There is the same joint in the ground, in the roof, in the floor, everywhere, which makes it all very simple. It’s making building methodical, simpler, easier to inspect, better for sound... we have been able to pick our materials so the buildings are better for sound, better for fire, better for insulation, with a better technique for airtightness.”

Ron says that the new system is only 10 per cent brick and block courses, “with the added benefit of getting a code-level six envelope every time, and if you went up against six panel you would be 30 per cent cheaper while up against timber frame you are going to be 15 per cent cheaper”.

Beattie has plenty of passion for what he has achieved. Now a property developer, he was originally a carpenter by trade, went into a property development company and then on to design his own houses.

“I’ve always been interested in the building blocks of how we build. If you don’t get the servability of the building right and the structure of that building right first time, you are plugging holes in an already sinking ship. You’ve got to make the structure right.

“People have been looking at add-ons to other buildings but not to the real problem – and that’s the actual cost of building itself. We’ve got to get the cost down and get the quality up. We’ve got to get safety better, get better fire proof, better sound proof between buildings and houses that don’t require heating. If we can do all that and cut CO² emission, we’ve cracked it.”

Since coming up with the idea, throughout its development Beattie Passive has been working with LABC to get a Registered System. Through a nine-month process the team worked with the firm to make sure everything was in place before moving on. During that time the then government also fast-tracked the British patent.

“When I first came up with this idea I didn’t go to any professionals, I did all the drawings and all the technical stuff myself,” Ron recalls. “I went to my local Building

Control team, the LABC in Norwich, and I spoke to Alan Osborne, their chief technical director. I said to him, “Alan, I’ve come up with this idea – what do you think?” “It sounds good but be realistic,” he replied.

“I got a couple of hours of their time and after that he said that he thought I might be onto something...”

“Then it went to the CNC Building Control, a member of LABC made up of South Norfolk District and Broadland DC and Norwich City Councils and their head of business support Richard Gawthorpe, who’s worked with us continually for the last year on this as consultant, as part of LABC. They came on board and did a nine-month consultation, going through everything.

“And then we met with Lorna Stimpson and Gareth Barnbrook of LABC. They came down to have a look, thought it was very exciting, and then we met with their technical team in London.

“They spent time looking at it; we’d built a test house in Teddington – got our system registered, so that we can build everywhere. This is very much a partnership – we are looking to support them and they do support us a lot.”

HIGH STANDARDS WITH A SPECIALIST TOUCH

This thorough approach applies to more than just the construction; the high standards come with a specialist touch. Using computer technology, the firm is able to give a 3D model, so you can take a tour before a single piece of timber is cut.

“We plan to fundamentally lift the standards of building,” Ron insists. “It’s really important this is done slowly, over a period of time and it is not just ‘everybody wants one’, because we can’t deliver that yet.

“With every single house delivered you get a 3D model. You can look at every single part of that building so that, prior to it being built, you can see how it all fits together. For complicated buildings like schools or hospitals you can see everything at once.”

With the first house already built and the company now spreading its wings, it finally looks like the revolution that the visionary Mr Beattie was always looking for is finally about to begin. 