



Small and Perfectly Formed

AN AMBITIOUS PROJECT ON A TINY PLOT IN EAST LONDON, SHOWED AN INNOVATIVE APPROACH TO TACKLING LONDON'S HOUSING CRISIS BY MAXIMISING A LIMITED URBAN PLOT TO CREATE A GROUND-BREAKING HOME USING SIPS TECHNOLOGY.

The two-bedroom house – that was featured on TV's *Grand Designs* – showcases structural insulated panels (SIPS) engineering at its most complex and creative. JML Contracts, a well-established, NHBC-registered, family business was approached by Joe Stuart of Warehome Ltd., to support the SIPS build on a tiny 38sq m plot in East London. In his role as architect, developer, main contractor and future owner of the house, Joe designed a split-level home, built over six half-floors and engineered to maximise space.

The innovative design used every inch of the tiny plot, incorporating both a basement and a roof terrace over six half-floors.

The client was determined that the house achieve Passivhaus certification, therefore ensuring that the building was thermally efficient was a top priority. He chose SIPS for its exceptional thermal performance and U-values.

The very narrow site made this house especially challenging from an engineering perspective. After extensive research and discussions it was evidenced that SIPS could provide the best construction method to achieve both the low-energy ambitions and to ensure that the structure could be precisely engineered to maximise every bit of space on the limited site. JML Contracts engineered the whole house structure

and it was pre-built in the factory to demonstrate how it would work and to ensure that the design would fit perfectly when it was constructed on site.

The finished house is potentially the smallest two-bedroom house able to be built in London under the London SPG (Supplementary Planning Guide) and, crucially, has exceeded the requirements for Passivhaus status, having been engineered both to maximise thermal efficiency and to utilise every inch of the plot as well as incorporating cutting edge design. The narrow London city centre site was extremely tight, therefore every millimetre of space needed to be accounted

for. Specification testing for the project often came down to choosing a product that would give as little as 10mm of extra integral floor space.

Using SIPS allowed the wall sections to be kept as slim as possible, with no additional bulky cavity insulation required. The use of SIPS furthermore minimised thermal bridging within the building, offering a fully airtight structure while maximising the internal floor area. With an airtightness result twice as good as the required 0.6 AC/H (air changes per hour) the house has been confirmed to be a Passivhaus and is testament to the effectiveness of SIPS. The carbon footprint was assessed using SAP software at the design stage, which illustrated the anticipated carbon dioxide emissions expected from the running of the building. The initial design SAP was around 85. During the development stage, the SAP calculation was re-run along with the energy modelling using the Passivhaus Planning Package (PHPP). The optimisation of the energy performance, along with monitoring the SAP rating, increased the SAP rating to the mid-90s. Along with being Passivhaus compliant, when the installation of the solar PV is completed, the SAP rating will achieve 100; essentially a carbon neutral building.

The SIPS panels used by JML are BBA-certified and fully insulated, requiring a minimal timber sub-frame. This almost completely eliminates thermal bridging. The finished product consumes fewer materials than a conventionally built home, requires substantially less energy to maintain, emits less pollution and will result in a more comfortable living environment. An external timber-clad rain screen allowed the maximum external insulation while keeping the thinnest wall build-up possible to ensure the internal space was as large as possible.

Additional steps were taken to ensure neighbours were aware of the logistics and



continuous updates were provided. The building was engineered in such a way as to reduce the need for heating and cooling. This approach resulted in passive solar design through which the sun's energy has been harnessed, an insulated airtight construction method, and high-performance windows and doors. These elements were carefully engineered to ensure that the client's energy demands were met without compromising the look and design of the building. For this project, JML Contracts took a 'fabric first' approach: the client specified that they wanted to build using SIPS from the beginning, therefore the energy demands of the project could be considered from the outset. While the traditional expectation of an 'eco home' is often an array of solar panels on the roof or sustainable forms of insulation, modern sustainable building needs to look at the fabric of a building, focusing on the design and construction techniques.

The main component of the insulation is the core of the SIP which are also the primary structural loadbearing elements. These formed the external walls and the roof above ground level. Because the structural walls are SIPS and therefore incorporate insulation within the structural elements themselves, their thickness was less than would be needed to achieve the same thermal performance with other forms of construction. This maximised the usable floor area on a very tight site.



This project took an unsightly, rundown and structurally unsound coffin workshop that was a danger to local residents and replaced it with a sustainable and aesthetically pleasing family home. It featured on *Grand Designs* in October 2017 thanks to its innovative and trailblazing approach. It was the first time the programme filmed inside a SIPS factory and also the first time they had been given the opportunity to film in a house completely pre-constructed offsite. It has shown how very small plots in urban areas may be used for the highest quality of new sustainable dwellings and simultaneously help regenerate and enhance their surroundings.

For more information visit:
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IMAGES:

01. An unsightly old coffin workshop has been transformed into a SIPS Passivhaus
02. The home was engineered in a factory environment to guarantee quality
03. The project was featured on TV's *Grand Designs* where they filmed inside a SIPS factory for the first time