



Hanson EcoHouse™

Bringing together the latest developments in off-site masonry construction, thermal mass and natural ventilation

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The construction of the Hanson EcoHouse™ at the Building Research Establishment (BRE) in Garston, Watford, provides an outstanding concept dwelling. It brings together the latest developments in off-site masonry construction, thermal mass and natural ventilation in the context of the Government's voluntary code for sustainable housing introduced in April 2007. The code enables developers to demonstrate a dwelling's environmental performance by means of 'star' ratings, the ultimate objective being to obtain a zero carbon rating by 2016.

Designed as a three-bed detached dwelling, the Hanson EcoHouse™ shows all the benefits of off-site fabrication, that together with thermal mass and natural ventilation, assist in the development of a building system targeting the zero carbon houses of the future. In addition, it shows how quickly and easily 'liveable' and saleable properties can be constructed.

Constructed using masonry panels manufactured off-site in a controlled factory environment, it brings the benefits of high quality and speed of construction with little or no site wastage. The process is also less susceptible to weather delays compared to on-site construction.

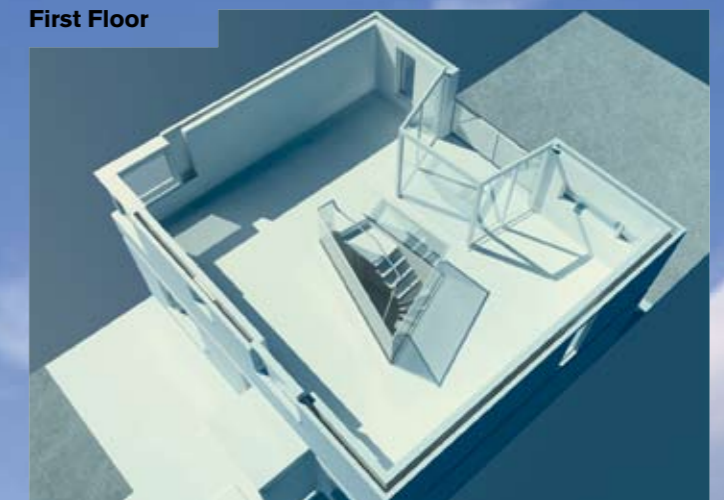


Addressing the key issues of climate change, carbon efficiency and sustainable masonry construction, the Hanson build process and systems ensure a flexible range of practical and environmental solutions.

Designed to meet the combined challenges of off-site construction and the impact of climate change, this concept house has been constructed using the unique Hanson QuickBuild™ walling system.

It provides housebuilders and developers with the advantages of quicker build times and consistent quality. In addition, homeowners benefit from a comfortable, flexible and controlled energy use environment, using zero carbon initiatives.

share our vision



Thermal Mass

Masonry construction has high thermal mass. This inherent feature enables the dwelling to store heat and remain cooler for longer than lightweight structures, meeting the needs of climate change and keeping buildings cool in an energy efficient environment.

Natural Ventilation

A ventilating roof lantern is used to give light and to enhance natural air currents, so maximising the energy conservation potential.

Flexible Design

Masonry panels manufactured off-site in a controlled factory environment provide total flexibility in the design of dwellings. The system has been designed to meet the needs of housebuilders and developers and is applicable across a wide range of housing options.



1. Hanson QuickBuild™ Walling System

This unique system provides factory-made brick and block walling panels, using tried and tested high performance bonding mortar to achieve:

- Rapid on-site build
- Consistent quality
- Superior air tightness
- No on-site wastage
- All weather construction

2. Jetfloor

Another example of Hanson's market leading innovation, Jetfloor is the first composite suspended system for ground floors incorporating polystyrene infill blocks to provide high levels of insulation.

3. Staircases

Individually designed and manufactured, precast concrete staircases combine the advantages of quality-controlled production with rapid construction and immediate access for follow-on trades. In addition to these qualities, the inherent properties of concrete provide greater levels of sound insulation eliminating noises such as squeaking stairs.

4. Partition Walls

Prefabricated dense aggregate blockwork panels offer advantages of strength, sound, insulation and fire resistance whilst benefiting from high thermal mass properties.

5. Roof Lantern

The design principle of the traditional brick kiln utilises the "stack effect" to ventilate the accommodation through a distinctive roof lantern.

6. Roof Structure

The unusual shape of the highly insulated roof is emphasised by vertically run zinc sheeting with stack-bonded brickwork completing the building's distinctive appearance.

7. Aquaflo's Sustainable Urban Drainage System (S.U.D.S)

The Hanson Formpave system allows rainwater to infiltrate through a permeable concrete block paved surface into a unique stone sub-base. The benefits of the Aquaflo system have allowed the installation of a water harvesting and geo thermal heating and cooling system.

8. Windows

Triple glazed, high performance timber windows with low emissivity Krypton gas and warm edge spacer bars have been installed.

9. Solar Collector

One of the most efficient solar collectors on the market today, the system comprises two short evacuated tubes with a unique flow return within the tubes constructed of glass. The collectors are then connected to a high efficiency thermal store, providing all hot water needs for the house.

10. Hollowcore

Hanson prestressed hollowcore units are ideal for all suspended floor applications, particularly where a clear spanning durable deck is required.

11. Underfloor Heating

The underfloor heating system installed is a wet system which is heated by a ground source heat pump producing an optimum 18 – 22°C room temperature and provides even heat output throughout the building.

12. Smart Technology

This house demonstrates how community based services can benefit from being integrated with well designed home based technology from a full portfolio of home based data services.

Construction of Hanson QuickBuild™ walling system



Ground floor installation of Jetfloor



Thermal Mass

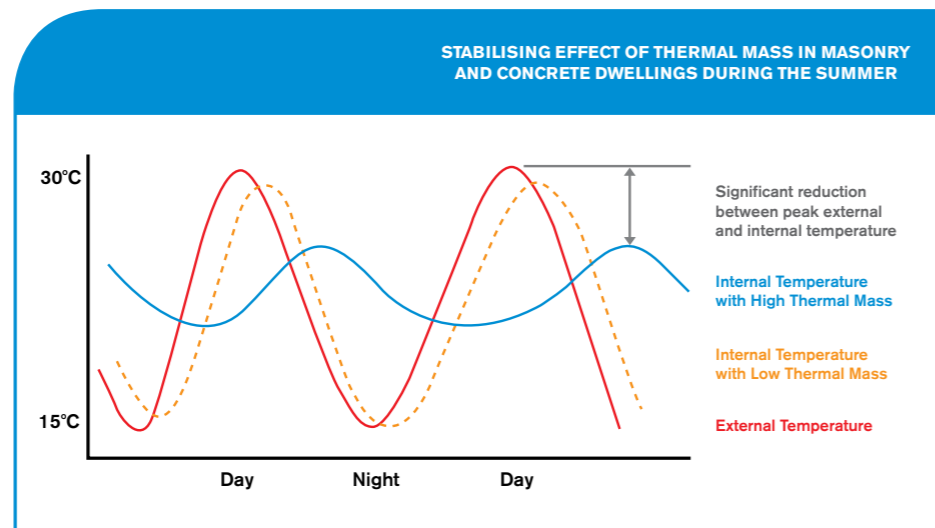
One of the biggest challenges in today's housebuilding is the need to respond to climate change, and the issue of keeping buildings cool in an energy efficient manner. The Hanson EcoHouse™ takes advantage of the natural phenomenon – thermal mass, with its concrete and masonry construction. The house has high thermal mass creating a structure to cope efficiently with extremes of temperature in both summer and winter.

Recent research has shown that conventional masonry houses with

inherent thermal mass can save significant amounts of energy compared to lightweight structures. These savings can offset the slightly higher level of embodied CO² in a masonry house in as little as ten years and ultimately lead to the lowest whole life CO² emissions. This is achieved by the thermal mass of a dwelling enabling it to store more heat and remain cooler than lightweight structures. The result is that the dwelling remains warmer for longer in the winter and stays cooler in the summer. Since it is calculated that some 50% of the UK's carbon emissions

are due to the energy used to heat, cool and light buildings, taking into account energy consumption during a building's lifecycle is, therefore, essential when evaluating construction materials.

In order to gain maximum benefit from thermal mass and optimise the energy efficiency of the structure, the Hanson EcoHouse™ has been constructed with brick and block external wall panels, heavyweight blocks for internal partitions and precast concrete staircase and floors.



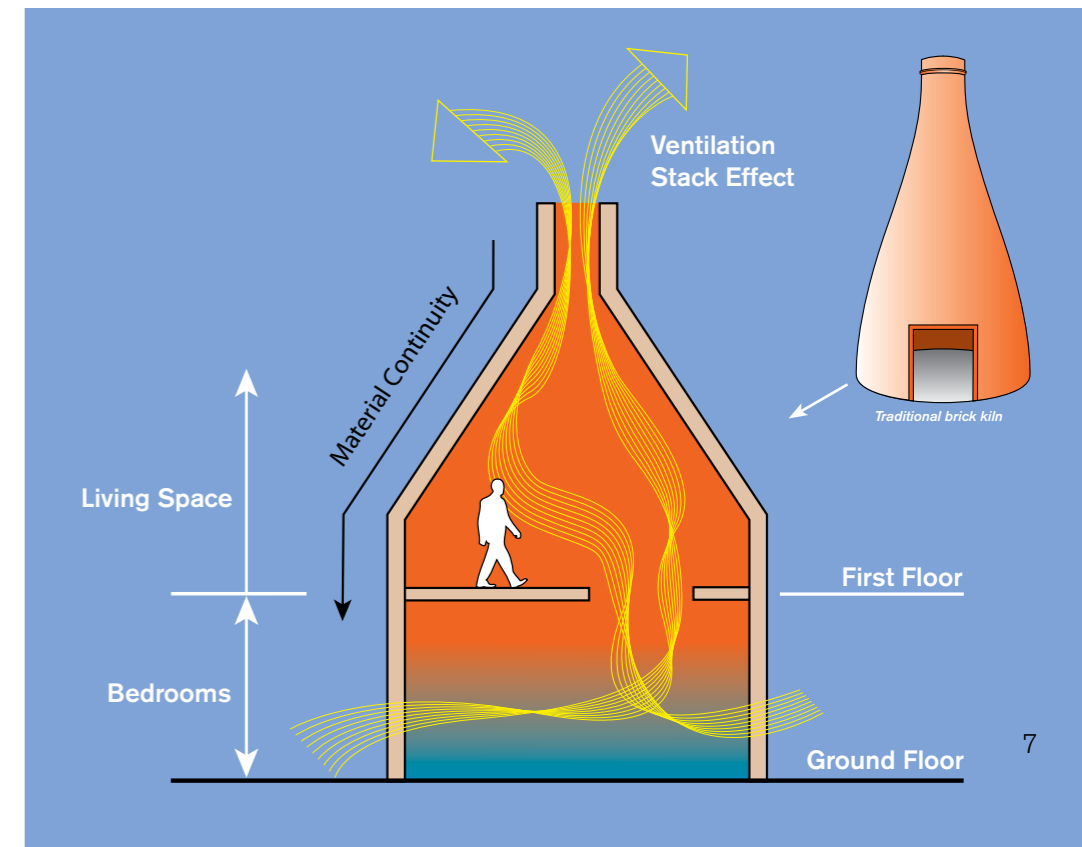
Natural Ventilation

The traditional brick kiln evolved to take advantage of the phenomenon that warm/hot air naturally rises, the kiln being designed to maximise the effect. Firing the kiln sends heated air up through the brick stacks and out through the chimney at the top, whilst drawing fresh air in at the lower level to provide a continuous flow. Once the flow is established, the design of the kiln produces a considerable 'draw' of air across the firing medium.

Utilising this effect, the design of the Hanson EcoHouse™ includes a ventilating roof lantern. This is used to enhance natural air currents by means of the 'stack' effect. To maximise the potential for energy conservation of the design, the living accommodation is reversed.

In this way, bedrooms generally kept at a lower temperature than other rooms, are provided on the slightly cooler ground floor, whilst

living room, dining room and kitchen are provided on the warmer first floor. The ventilating roof light automatically operates to open and close to meet the prevailing weather pattern and so regulate the internal air temperature.



Installation of Hanson QuickBuild™
walling system at ground floor level



Helping to shape the developments of the future

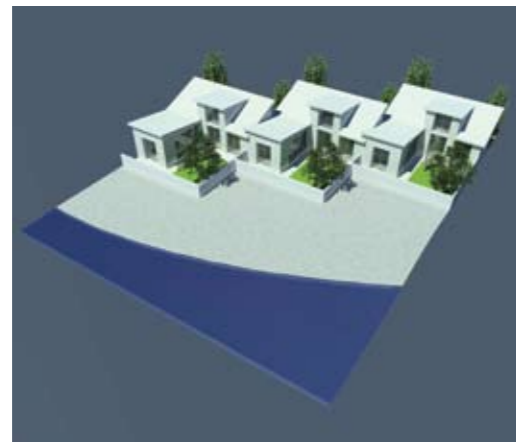
The Hanson EcoHouse™ is just one example of a house design that can be constructed using the Hanson QuickBuild™ walling system, where the architect has incorporated a number of other high performing products and systems.

The Hanson QuickBuild™ walling system is so flexible, it can be adapted to suit any house design on a small or large scale development, allowing for any combination of Hanson clay facing bricks, insulated cavity and Hanson aggregate or Thermalite aircrete blocks.

This innovative technique uses tried and tested, familiar materials, but provides all the benefits of off-site prefabrication - speed of construction, quality of build and being unaffected by inclement weather conditions.

The Hanson QuickBuild™ walling system offers a complete walling solution - masonry superstructure and external facade in one rapid installation.

For further information please contact the Building Systems Department on 01773 600270.





Precast Staircase craned into position



Completion of first floor with prestressed Hollowcore flooring



Unique prefabricated brick and block cavity walling

Hanson QuickBuild™ Walling System

The Hanson EcoHouse™ has been constructed with the Hanson QuickBuild™ walling system – an innovative, factory fabricated brick and block cavity wall, utilising high performance bonding mortar. The system provides panels up to 9 metres long that are ready to be craned into place on site.

The Hanson EcoHouse™ is a two-storey dwelling with walls 2.4 metres high. Panels comprise 100mm outer leaf of stack-bonded Hanson clay facing brickwork, 100mm Thermalite aircrete blockwork inner leaf and a partial fill cavity of 100mm rigid insulation with a 50mm airspace. The panels can be manufactured either plain or with openings for doors and windows. The cavity walls and internal partition walls for each floor were installed in less than a day.



Major advantages of the system include:

- Rapid on-site build
- Consistent quality in controlled factory conditions
- Superior air tightness
- No on-site wastage
- All weather construction
- Any combination of brick and blocks and any brickwork bond
- Higher resistance to rain penetration
- High flexural strength for brick and block – up to twice the strength of traditional masonry
- Immediate finished envelope and facade
- Strong enough for concrete upper floors
- Excellent sound insulation and fire resistance





At the forefront of innovation

Sustainable Urban Drainage System (S.U.D.S), Water Harvesting and Geothermal Heating and Cooling

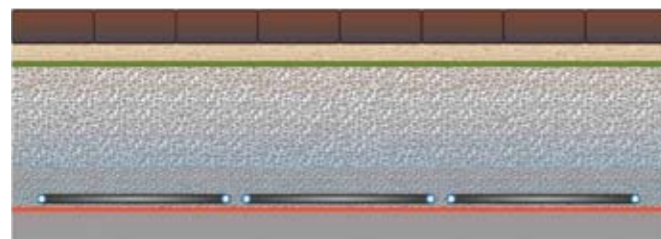
The Hanson Formpave Aquaflow Sustainable Urban Drainage System (S.U.D.S.) allows heavy rain to infiltrate through a permeable concrete block paved surface into a unique sub-base and collect in a tanked area that combines with a layer of flexible piping connected to a ground source heat pump to provide space heating and domestic hot water.

The water in the Formpave system is cleaned by filtration and microbial action and is also suitable for secondary non-potable uses such as flushing toilets and watering soft landscaping.

Infiltration is achieved by a thermally-bonded, non-woven geotextile, specifically developed to optimise the cleansing of water entering the system. The various characteristics have been combined to create a unique geotextile that aids the development of the naturally occurring microbes, and offers them refuge during periods of drought. The system is underlain by an impervious plastic membrane to collect the water.

The Hanson Formpave Aquaflow is available with a full technical advice and design service.

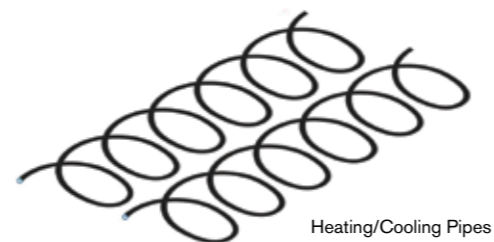
Storm water geothermal Standard Tanked System



- mm
- 80 Aquaflo blocks
- 50 5mm clean stone
- ← Inbitex permeable membrane
- 250 Formpave sub-base
- 100 6mm pipe bedding stone
- ← Impermeable membrane
- Subgrade

● Heating/Cooling Pipes

Formpave



Heating/Cooling Pipes

Precast Products

Jetfloor

Another example of Hanson market-leading innovation, Jetfloor is the first composite suspended system for ground floors incorporating polystyrene infill blocks to provide high levels of insulation, achieving U-values as low as 0.20 W/m²K.

The integrated insulation effectively reduces the overall floor zone by obviating the need for sheet insulation overlay, thereby reducing construction heights. In this way, Jetfloor actually reduces construction costs. Contractors also benefit from the system's speed and simplicity of use that makes for rapid and easy installation. This enables floors to be finished early in the construction process, allowing for earlier drying out and faster follow-on for other trades.



Hollowcore

Hanson prestressed hollowcore units are ideal for all suspended floor applications, particularly where a clear spanning durable deck is required. With clear, unpropped spans of up to 13 metres, they can be used on masonry, steel or concrete structures, offering benefits of fast erection and the provision of an immediate working platform.

The Hanson range, now the most extensive in the UK, increases the versatility of the product enabling flooring solutions to be tailored to projects. Units have excellent sound and fire resistant properties, and can be supplied with preformed service holes and notches.



Staircases

Individually designed and manufactured, precast concrete staircases combine the advantages of quality-controlled production with rapid construction and immediate access for follow-on trades.

The Hanson range now includes both straight flight and winding staircases in both standard and bespoke arrangements. Suitable for virtually any situation in most masonry, concrete and steel structures, they require no propping or formwork and are inherently fire resistant. Where a standard mould is not suitable, a comprehensive design and manufacturing service is available.



Hanson also produces the unique Uniflight winding staircase, designed to emulate traditional timber staircases with winders radiating round the newel post. Uniflight offers a reduced plan area over alternatives, together with excellent sound insulation and a high quality ex-mould soffit, suitable for direct decoration.

Construction of roof structure



The Hanson EcoHouse™ nearing completion



Building for sustainability

Hanson is one of the founder members of the UK Green Building Council (UKGBC), along with builders, architects, engineers and other material suppliers. Launched at Ecobuild in February 2007, the UKGBC is part of a worldwide network of GBC's whose aim is to drastically improve the sustainability of the built environment by radically transforming the way it is planned, designed, constructed, maintained and operated.

Hanson is committed to making sustainability a key consideration in the way it operates, by continuously improving its extraction activities and manufacturing processes and by providing products which contribute to sustainable construction.

We strongly believe in the credentials of brick and precast concrete products as sustainable building materials. A significant number contain materials recycled from both Hanson's and other companies' manufacturing process.

Extraction activities are planned and managed to ensure compliance with planning permissions and regulatory consents. Particular attention is paid to the restoration of quarry areas following extraction, often improving the biodiversity of a quarry following its "return to nature".





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Hanson Plc - A Global Business

Hanson is one of the world's largest suppliers of heavy building materials to the construction industry, with a turnover in 2006 of £4.1bn. Our products fall into two categories: Aggregates (crushed rock, sand and gravel, ready-mix concrete, asphalt and cement related products) and Building Products (clay bricks, pre-cast products and concrete pavers, blocks, tiles and pipes). We employ 26,000 people, operating primarily in North America, the UK and Australia with further operations in Asia Pacific and Continental Europe. Hanson Building Products UK incorporates London Brick, Thermalite, Red Bank, Cradley and Formpave.