



Project Description and Aims

This barn is over two hundred years old and was in very poor condition throughout. The client wished to restore it sympathetically by using traditional materials wherever possible, with the objective of providing a comfortable family residence with modern amenities. The design brief specified that the dwelling had to reach the highest environmental and performance standards.



NBT role in project

NBT provided technical support and calculations to the architect throughout the design stage of the project. Training in the use and application of NBT materials and systems was given to subcontractors as work progressed on site.

Performance

The walls were designed to a U-value of 0.20 W/m²K. This was achieved by using 60mm thick Pavatherm Plus Woodfibre board which was then battened and clad with timber boarding. Around the plinth, which had to be left as exposed stonework, 60mm Diffutherm board was used on the inside of the building to provide the insulation. The roof was designed to a U value of 0.21 W/m²K which was achieved by using 35mm Isolair Woodfibre board as sarking with 175mm of cellulose insulation between the rafters. All the wood fibre boards provide **air tightness**, being interlocking on all 4 sides. They also ensure a breathing construction being **vapour open** and also highly **hygroscopic**, drawing excess moisture out of the building. This is particularly important in the renovation of old timber frames which are suddenly exposed to large amounts of construction moisture and then living conditions. As well as thermal resistance, the Woodfibre board high density and specific heat capacity give excellent **thermal mass** to the building, preventing overheating and thermal movement of the structure. Their high density and air entrapment also mean they give excellent **acoustic insulation**.



Barn Conversion & Rebuild -Cheersley, Bucks.

Client: Private Client

Architect: Derek Rogers Associates

Contractor: Neil May Builders Ltd

Size of Contract: £100K

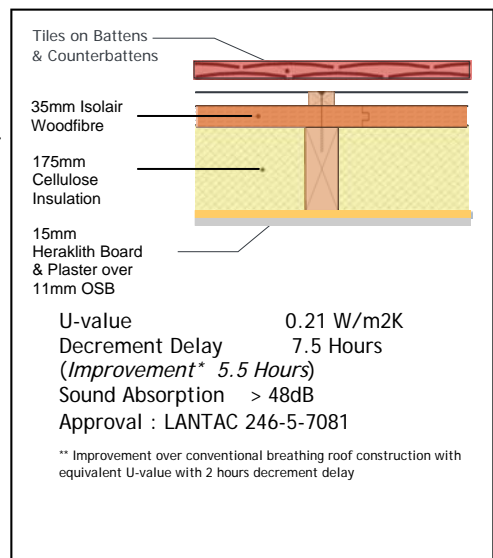
Pavatherm Plus Woodfibre Board with Timber Cladding for the walls and Isolair Sarking / Insulation Woodfibre Board with Cellulose Insulation Infill for the Roof

Buildability

Diffutherm, Pavatherm Plus and Isolair Boards are fully interlocking on all four sides and are quick and easy to install. They have excellent moisture regulating properties which eliminate the need for membranes and vapour checks, which is particularly important in an historic building such as this. The Isolair and Pavatherm Plus boards are impregnated with natural Latex and can be left exposed for up to three months without detriment.

Environmental

Diffutherm, Isolair and Pavatherm Plus Woodfibre boards consist almost entirely of waste pine wood. To provide protection during build, Diffutherm boards are impregnated with 0.5% natural paraffin and Isolair and Pavatherm Plus boards are impregnated with 5% latex. None of the boards contain any glues or resins and they will compost naturally eliminating the need for any special precautions to be taken on disposal. NBT Black Timber Paint which was used to decorate and protect the external timber contains natural asphalt, which is VOC free and extremely durable. Internally the client specified a lime plaster coated with NBT ecological emulsion and eggshell paints which are water based and contain no solvents and virtually zero VOCs. Heating was provided by under floor pipes connected to a geo-thermal heat source.



Design Issues

Architect: This was an interesting and unusual project on which NBT's expertise on the use and performance of ecological building materials proved to be extremely valuable.

Build Issues

Contractor: The project proved more challenging than expected due to unforeseen foundation and drainage problems. Once these were overcome the superstructure work was relatively straightforward. The Woodfibre boards in particular which were used on the walls and roofs proved to be very easy and quick to fix and eliminated the need for any membranes.

Cost

The additional and unexpected drainage and foundation work took the project over budget, however, the building superstructure came in on budget and there were no unexpected extra costs on this part of the project.

Performance Results

From a run down and dilapidated shell the building now performs considerably in excess of the current building standards. The client is monitoring energy use and will provide information on this in the future. Additionally NBT will seek information on how the building performs in terms of "comfort levels" at various times throughout the year.

