

Homegrown housing solution

High performance affordable housing in a night

Coed Cymru, based in Newtown, Mid-Wales, has coordinated a team drawn from industry and academia which has developed a system of high performance affordable housing using new structures. Based on the properties of home-grown timber this is an adaptable manufacturing process ideal for the intermediate labour market or small enterprise.

The Countryside Council for Wales (CCW), now Natural Resources Wales, sponsored the original study by Coed Cymru, The Welsh School of Architecture and University of Wales Bangor to develop a system of high performance affordable housing capable of using spruce and other species of softwood grown in Wales. This original partnership grew as the system attracted interest from architects, manufacturers and developers.

Typical Tŷ Unnos structures are formed from one or two storey frames spanning up to approximately 6m between columns. These frames are typically at centres of



The new Tŷ Unnos system is a highly adaptable, additive, modular system which can create a range of house types and sizes. The system is a simplified and standardised kit, made up of component parts, which uses a 600mm basic layout grid and the locally sourced timber is used in standard, readily available lengths to create a simple housing system which is suitable for a self or an assisted build.



approximately 3m and can be arranged in a variety of configurations to give different building sizes and shapes. The Tŷ Unnos system is formed from two principal components; box beams and ladder beams. In addition to these standard timber joists, plywood or OSB (Oriented Strand Board) sheathing and connections are used.

The Tŷ Unnos box beam is a rectangular hollow section formed from four solid timber sections jointed with glued joints. These solid timber sections can be jointed in the length of the beam to create beams longer than standard timber sizes and the web pieces can also be jointed along the length of the beam to create deeper beams. The hollow section is very light and strong, comparing favourably with solid timber and glulam (glued laminated timber).

The name Tŷ Unnos, or house in a night, stems from an old Welsh tradition which has parallels in other folk traditions in other areas of the British Isles. Going

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“Welsh Grown softwood is a challenging raw material to work with but we do have a lot of it. By accepting that it is very different and working from the first principles of design the team has achieved all its original aspirations and much more. I am very grateful to all the team members and our sponsors.”

David Jenkins,
Director, Coed Cymru

back to the seventeenth century, it was believed by some that if a person could build a house on common land in one night then the land belonged to them as a freehold. Other variations on this tradition were that the test was to have a fire burning in the hearth by the following morning or that the squatter could extend the land around the building by the distance that they could throw an axe from the four corners of the house.

Wales has 150,000 hectares of coniferous plantations which produce around a million tonnes of softwood in the round per annum. Over 70% of current production is Sitka spruce, a native of the Pacific coast of North America which suits Wales' mild, wet climate and peaty upland soils.

In its native range, Sitka spruce grows slowly to a great age. Welsh spruce grows much faster producing timber of lower density with heavier branching and larger knots. It is seldom used in modern timber frame construction which normally utilises higher grades of imported C24 or TR26 softwood. Although Welsh spruce has poorer structural properties than imported softwoods, it is its tendency to twist during drying that timber frame manufacturers cite as their reason for not using it but this system overcomes that.

The Tŷ Unnos system has been tested, developed and refined through a series of real design projects which consider parameters such as economic and environmental performance. In all, thirty buildings have been completed and a number are in the pipeline. Initial interest in the Tŷ Unnos system yielded a number of challenging projects including an Environmental Research Classroom at Ebbw Vale, a Tŷ Unnos based on a traditional Welsh longhouse in Ebbw Vale and a studio at The Old Sawmill, Tregynon. The first commercial application was a group of four 3bed houses built by Elements Europe Ltd at Dolwyddelan in Snowdonia in 2010. These were delivered to site as fully fitted volumetric units. They were designed to meet the highest performance standards at the time but subsequent monitoring of energy and water use has shown that their actual performance far exceeds that design.



These projects provided a wide range of learning outcomes to aid in the development and refinement of this commercially applicable construction system. The portfolio of completed projects is varied and impressive though the engineers and architects working with the system have identified further capacity in the system to achieve longer spans.

Profile

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High performance affordable housing

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