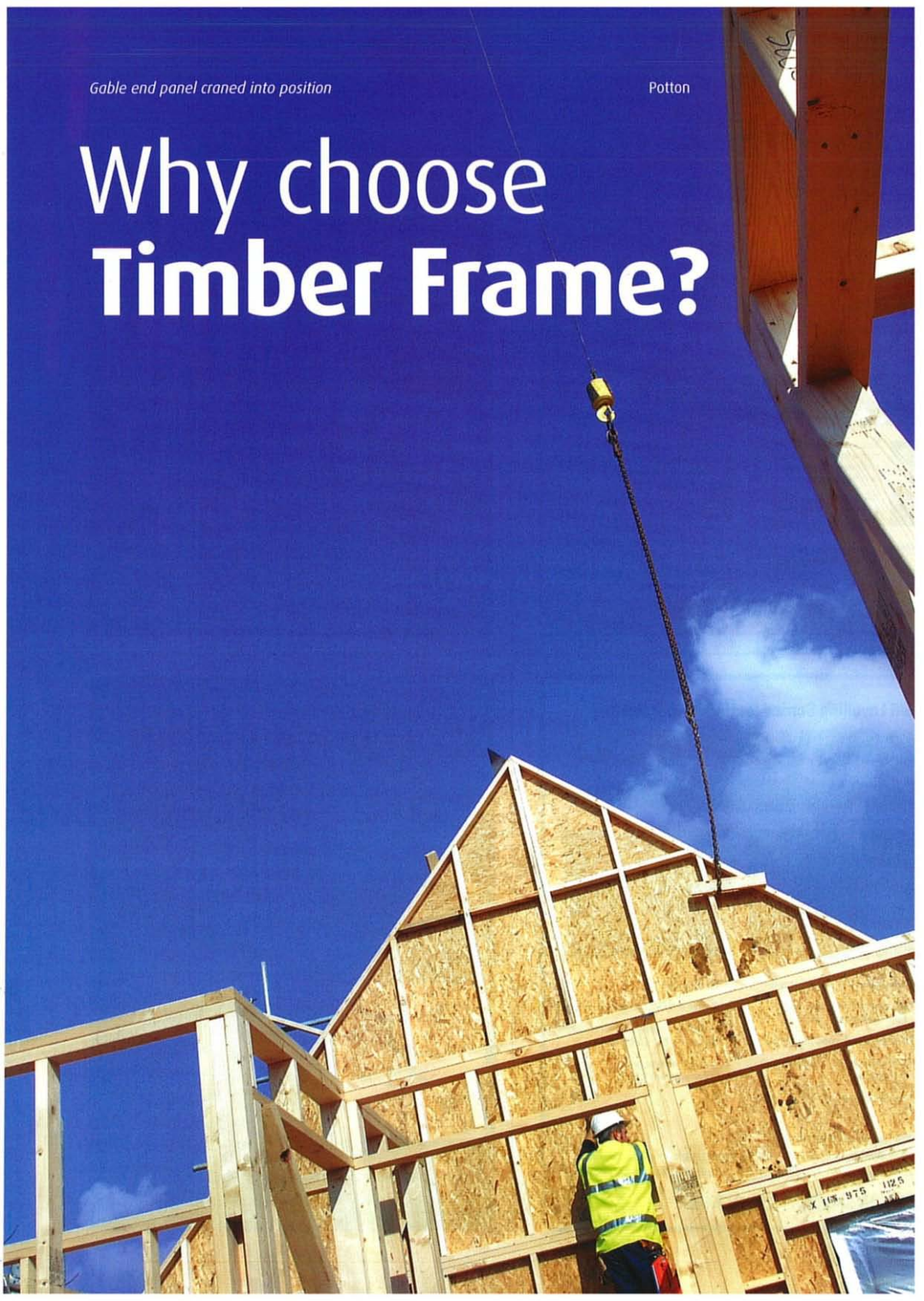


Gable end panel craned into position Potton

Why choose **Timber Frame?**

The usual comparison in Ireland is with brick and block or block and block construction. There are also many different types of timber frame as discussed in the previous article on this subject (Summer 2008) Generally speaking, no one system of construction is inherently better than another because it depends upon the requirements of the project and your own preferences, as well many other factors such as the location and constraints of the site as well as the experience and competence of the builder. Now that energy rating is upon us, don't forget that it is only with closed panel construction (as in a 'passive' house), that 'U' values calculated prior to the build are likely to be achieved.

Although many of the features discussed below apply equally to both, for simplicity I will take a typical brick-clad 'open panel' timber frame kit supplied and erected on site by a specialist company, and compare it with a typical masonry house.

Speed

One thing that most construction professionals agree on is that a prefabricated timber frame is quicker to build than a standard masonry one. This is because the timber frame is part built in a factory and usually erected on site by the supplier's own carpenters, in a matter of days rather than weeks. Seven to ten days is a typical time from arrival of the specialist construction team on site, to the frame being up and water tight.

With every type of construction, many of the trades involved, such as electricians and plasterers, cannot start until the interior is protected from the weather. Timber frame is a mainly dry construction process, but because the panels are brought to and erected on site, the trades can begin earlier. If a brickwork outer skin is required, this is built up after the frame is watertight, at the same time as the internal areas are being fitted out. Houses with all-masonry walls require a longer period for plaster on the inside to dry out which can add several weeks to the build time.

The moisture content of the timber used for the structure has to stabilise after it is weathertight. Then the internal walls are usually clad in plasterboard.
The weather also affects the speed with which a standard blockwork wall can be built. If the temperature drops below 2 degC work has to stop, but a timber frame can be erected in very low temperatures if necessary.
If speed really is very important, then buying a timber frame from a book of plans should help to speed things up. These designs are often constructed to be acceptable to Planning authorities.

Kuhns Bros Log Homes

Quality and Ease of Construction

The easiest part on site is getting the frame up, but the quality that results from the protected and controlled conditions of a factory must be followed through. This is why virtually all suppliers of kits also erect the frame. Because the frame is constructed very accurately it will be erected quickly and easily, but a high level of site supervision is required to ensure that the exacting standard of construction necessary is achieved. With a timber frame there is very little room for error on the slab, masonry is more forgiving because the mortar joints allow more flexibility in the build.

Thermal performance

A clear advantage for timber frame construction is that the insulation is contained within the depth of the structure, so a typical timber wall can be thinner than its masonry equivalent, for example, by 50mm.

If a house is well insulated, the amount of heat lost as a result of air leakage becomes more significant. Timber frame structures, and especially closed panel systems, tend to perform well on this score because they are sealed to prevent moist air reaching the inside of the construction.
A further difference between masonry and timber walls is the response time to heating. Anyone who has lived in a masonry ▶

Second wall being placed with (in foreground) sole being fixed Greenhus Ltd.

house will be aware that the central heating has to be set to come on well in advance of getting up on a winter's morning to ensure a warm start to the day. This is because the masonry inner leaf of the house absorbs heat with the result that the room air temperature is slower to reach an acceptable level. Timber does not soak up heat in this way. Because of this, a room enclosed by insulated timber frame walls will heat up and cool down more quickly. Whether this matters or not may depend partly on your lifestyle and whether it has to be heated continuously or only in the evenings and weekends.

Noise and Sound Insulation

The easiest defence against loud noise is to put something solid and heavy between you and the source. Dense, heavy materials are able to absorb both airborne sound and reverberated. Masonry construction thus has an advantage over more lightweight timber. Remember though that many masonry houses also have timber floors and stud walls upstairs. However, you can achieve a good level of sound reduction in a timber frame by building two separate walls with a structural break between them. Part of the gap is filled with sound absorbent quilt, such as mineral wool. A similar blanket is placed in the floors, along with an absorbent layer laid immediately under the floorboards, over the floor joists. A simpler solution is to fill the wall voids around noise sources such as playrooms, bathrooms and WCs with sound absorbent quilt. In addition to this the plasterboard can be replaced with a heavier or different board, or used in a double layer. You can also use specialist flooring and joist systems to achieve both noise reduction and insulation.

Risk of Condensation

Condensation happens when warm moist air meets a cool surface and the vapour turns back into water. Moist air has a tendency to move to where the air is drier, usually from the inside to the outside. As moisture passes through the walls, the temperature of the air drops, its capacity to hold vapour reduces and eventually begins to condense. In winter this point may occur either on the internal surface of the walls or windows, or inside the construction if it lacks a vapour barrier, in which case there can be a risk of long-term damage.

A masonry cavity wall can suffer from condensation on the inside of the outer leaf at the point where the warm, inside ai has passed through most of the insulation. Fortunately moder insulation is rot proof and so there is limited harm. The outer brickwork leaf allows moisture to gradually pass through it an the inner face of the outer leaf is designed to allow water to r down and drain away. Condensation within a timber frame- wall cannot be treated so casually, and preventing it is a major responsibility for designers and builders.

The most effective method is to position a vapour check such polythene sheeting between the lining of the inside wall and t insulation, which virtually eliminates the possibility of vapour passing through it. Foil-backed plasterboard is often used for this role.

Rot and Beetles

It is very rare for a modern timber frame to suffer from rot. External timber elements, such as cladding and fascia boards are prone to rot if not well maintained, but the actual frame itself is well-protected. Because of our climate, the main threat to timb buildings comes from fungal decay. Wet rot is the commonest, d rot can also occur. In order for either of these to survive, the tin must have a very high moisture content, usually at least 20%. In modern heated house the moisture content will usually settle d at about 12%. If it is denied its principal requirements of warmt and dampness, rot will never be able to establish itself.
Infestation of the frame by insects is similarly unlikely. Many of potentially damaging species only affect hardwood, or newly-fe timber. Provided the moisture content of the timber is below 2 a timber frame will not be attacked. The ubiquitous woodworn furniture beetle can infest drier timber, but is deterred by the w ventilated, warm dry timber found in modern timber construct A well-built and maintained timber frame will never produce conditions that are suitable for fungi or beetles. ▶

Two storey timber frame under construction F

Fire

Quite obviously, timber can burn, whilst masonry and steel do not, although they will eventually crumble and disintegrate if subjected to sustained high temperatures. To conclude that timber buildings are not as safe in the event of a fire as a brick and block built house is a false conclusion, the real picture is not so simple. The progress and level of destruction of most house fires and the likelihood of death or injury are mainly determined by factors such as whether there are smoke alarms fitted, the habits and behaviour of the occupants (for example whether they smoke), and the flammability and toxicity of the contents of the house. Interestingly, there is some evidence to suggest that if the frame is not built correctly, it is more difficult to put out the fire and consequently more damage to the structure. It also seems that timber frame houses are more vulnerable to fire damage during construction, before all the fire protection has been built over the frame. As for personal risk, the crucial factor in survival is how quickly you can escape. If anyone is trapped, how long the construction of the house will protect them from flames and smoke until they can be rescued becomes important.

If asked to choose which is more vulnerable to fire, a steel beam or a timber one, most people will say timber. This is a natural response, because steel doesn't burn, but the answer isn't as straightforward. When steel reaches a critical temperature, it will distort, catastrophically affecting the whole structure. A timber beam in a fire burns on the outside immediately, as you would expect, but this turns into charcoal which does not burn and instead actually protects the inner timber from burning. There is thus a significant delay before the beam actually fails and collapses.

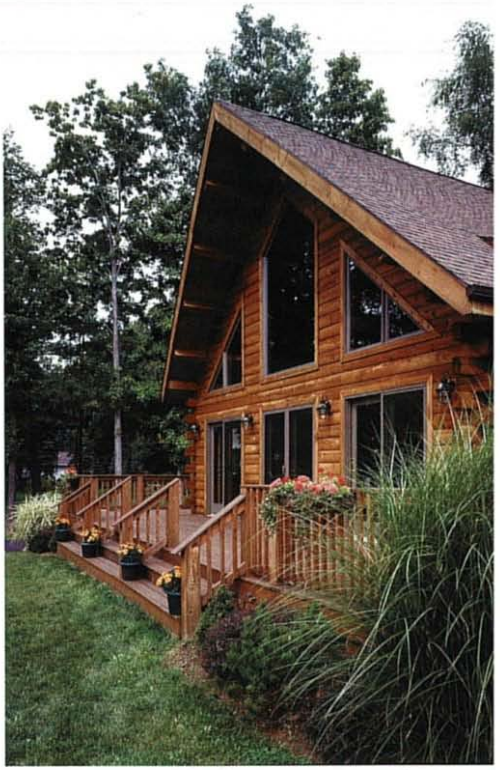
The studs that make up the structural walls in a typical timber frame are lightweight, due to cost and practicality. However the frame is clad in materials that resist heat and flames, usually plasterboard or sheets of similar material and there are barriers built into cavities in the building to prevent flames from spreading.

Provided that it has been designed and built by people who understand the technology, the risks from fire in a typical timber frame house do not seem to be any different from those that are faced by the occupants of a masonry equivalent.

Structure And Robustness

Timber has proved to be a strong and durable material. If built well, timber frame buildings will last for hundreds of years The exercise of building in timber requires more precision and planning than a brick and block property. For economy, the elements of a timber frame are carefully designed and calculated to use as little material as possible for the strength required. As a result, it is not straightforward to alter or extend the frame of an existing house and demolition of walls should not be undertaken without seeking structural advice.

If anything substantial is to be fixed to a timber stud wall, such as a heavy bookshelf, the fixings must be made into the frame, not the plasterboard wall covering which will not be able to support the load.



Using wood to create unusual angles Kuhns Bros Log H

Green Construction

Timber has many environmental benefits not found in other building materials. Trees lock CO2 in their wood, which is retained throughout the existence of the timber. The use of timber as a building material encourages the growth and expansion of the forests that provide the supply, which absorb CO2 and therefore help to reduce the level of global warmin

Timber is said to be 'renewable' because, in order to replace it another tree is planted. Provided that a similar tree is planted for every one that is felled, the supply is infinite. This is in sta contrast to bricks, blocks and concrete, all of which rely on th extraction of raw materials from the earth, which ultimately run out.

Apart from the ability of trees to absorb and store CO2, creat the wood for the frame requires less CO2-producing activitie To make steel for example, raw materials have to be mined, transported and then processed in factories which also produ waste. In contrast, there is almost no waste in timber producti even the sawdust is used for chipboard or paper production, heat the factory.

Cost

Cost comparisons are difficult to make between timber fram and other construction materials. Actual construction costs ar probably a few percentage points higher for a typical timber frame over masonry. ▶