

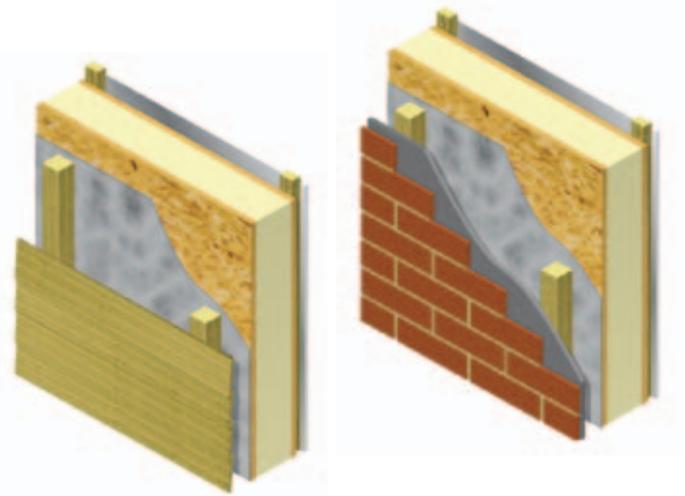
► Structurally Insulated Panels (SIPs)

Instead of using timber to form a frame, SIPs consist of timberbased boarding, such as oriented strand board (OSB) sandwiching sheets of a rigid foam insulation such as expanded polystyrene or polyurethane. The two materials are firmly bonded together so that they effectively act as a single structural component. The resulting panels are said to be 5 to 10- times stronger than conventional timber frame constructions. In Europe, they are used mainly for both internal and external walls, although they are being used increasingly to replace rafters, because they provide a clear roofspace that can be used for bedrooms.

Features of a Structural Insulated Panel (SIP) House

- No frame – a 'flat pack' house
- Very high levels of insulation possible with thin walls
- Clear roof space for use as accommodation
- Low leakage of air to the outside
- Wide range of cladding choices
- Cost advantage if standard designs used
- Little wastage of materials on site

The panels are mostly self-supporting, although occasionally timber posts may be required. A wide variety of different materials are used to make up the two components of SIPs including sheets that are not wood-based, using cement or gypsum alternatives. The vital bond between the core and the sheathing can be achieved either with adhesive or by using insulation materials that bond themselves to the board as they are created. The latter is more efficient and generally the preferred method in Europe. Widths of the panels available vary between 70 and 250mm. The walls take the same position as an open panel frame or a block inner leaf and the full range of external cladding materials can be used, although brick is not one of the most cost-effective options. For a



given thickness, insulation levels that can be achieved are high in comparison with other systems and masonry construction. In addition to this, the insulation and structure are effectively part of the same component so that the walls to SIP houses are relatively thin, freeing up more space for use in the rooms of the house – a factor that could be important on a small site.

The sheets are cut to size in the factory, with all necessary window, door and service openings formed before delivery. Lintels are only needed for wide openings, otherwise the panels are self-supporting. Services can be run either in preformed channels in the depth of the board, or in the gap between the SIP and the internal lining typically plasterboard on battens. Roof spaces can be kept clear and the sheets will span up to about 4.8m without the need for supporting purlins.

On site a crane is needed to manoeuvre the panels into place and the assembly on site is a job that is best left to specialists, who slot them together and seal the joints. The structure of an average sized house (e.g.150 sqm) can be assembled in two or three days in this way. As well as forming the entire structure of a house, the insulation level of SIPs is so good that they are sometimes used for the infill panels of oak framed houses. ►