

# Insulated Concrete Formwork Development in Portarlinton

Portarlinton Co. Offaly is home to Ireland's first major development of Insulated Concrete Formwork (ICF) houses and apartments. Innovative in terms of construction technique and highly thermally efficient due to a combination of high levels of insulation and extremely low air filtration, the 'Riverside Estate' is one of the few new developments to qualify for sponsorship under Sustainable Energy Ireland's (SEI) 'House of Tomorrow' scheme. The SEI scheme is designed to accelerate improvements in the quality of energy features in Irish Housing by supporting projects researching, developing and demonstrating more sustainable energy practices.

The Riverside Estate is the brainchild of local builder and entrepreneur Jimmy Clancy and his partner Gerrard F. May, a well known figure in the Roofing and Cladding industry. Following a prolonged period of research into ICF's, which took them across Europe and the United States, the partners eventually opted for the Italian 'M2 Emmedue System', securing the sole agency for both Britain & Ireland. Based on the positive experience to date and his complete satisfaction in relation to the efficiencies and benefits of the system, Clancy has recently turned the sod on a 70,000 sq. ft. factory to manufacture a full range of ICF components for the Irish Market. The facility, which has the enthusiastic support of local politician and Minister for Finance, Brian Cowan, will cost and estimated €13 million to complete and promises to create 200 new jobs when fully commissioned.

Interest in ICF systems has heightened in recent years due mainly to the high level of demand for prefabricated construction techniques. A total of nine new suppliers are now active in the Irish market, six as manufacturers agents, importing from Europe and the United States. The remaining three are now actively engaged in planning and constructing factories for manufacturing components on the Island of Ireland. This development promises to change the whole dynamic for the ICF's in Ireland, since reducing the high level of transport charges will make the system very competitive. Transport charges, on average currently accounts for approximately 25% of the panel cost.

First invented in Austria, ICF's have been successfully used in central Europe for over 30 years. Germany, Switzerland and France are the biggest markets for ICF's, although other European countries including, Spain, Portugal, Italy, The Netherlands, Norway,

**Insulated Concrete Formwork - Homes**



**Insulated Concrete Formwork - Floors**



Russia and Poland are now growing markets for the product. Approximately 60% of completions are houses while the remaining 40% are used to construct a range of building types including Hotels, Schools, Apartments, Sports buildings as well as Manufacturing and storage facilities.

## The M2 Formwork System

The 'M2 Emmedue' system is technically advanced and has some unique design features. M2 panels can be employed as a single leaf system with sprayed concrete ('shotcrete') on both sides, or as a double leaf panel with concrete poured into the



cavity in the conventional manner. Single leaf panels are suitable for use as external load bearing walls on buildings up to and including 4 storeys high and as internal partition walls. The double leaf panel is suitable for use as an external or internal load bearing wall, for buildings up to 40 storeys high and as a party wall between adjoining properties. The system forms a complete concrete envelope and as a result has excellent fire, sound, thermal and durability properties. A 4 hour fire rating can be readily achieved with standard single leaf panel and double leaf panel constructions.

One of the unique features of the M2 double leaf panel is that it arrives on site with an external mesh and an internal reinforcing mesh in place. To maximise structural efficiency, the internal reinforcing mesh is factory installed from a selection of 12 mesh sizes. Factory installation is automated and this facilitates both precision and uniformity in the placement of reinforcing bars. Another feature of the system is that panel sizes can be varied to suit the project requirements. The manufacturing process also allows for the production of bespoke panels.

Both single leaf and double leaf M2 panels have an integrated steel facing mesh. The mesh has a double function, firstly as a grounds for sprayed concrete ('shotcrete') or conventional sand and cement or acrylic plasters and secondly as a spacer to separate the panel leaves. The facing meshes are electrowelded into position during the manufacturing process.

The system features a range of construction components, including flooring and staircase panels. Perimeter and external beams are easily constructed and

reinforcing placed in the beams, flooring and wall units connect to provide a 'fully tied-in solution'.

#### **Health & Safety Benefits**

The M2 system also has many advantages in terms of Health & Safety. The components are extremely lightweight and even the largest components can be man handled into position. Flooring panels form an immediate 'safe working platform' and a polystyrene element which inadvertently falls or is blown from above, is far less unlikely to cause seriously injury to those working below. Flooring panels are generally temporarily propped during the pouring process.

#### **Riverside Housing & Apartment Development**

The double panel system was employed in the construction of the housing element of

the 'Riverside' development which consists of 52 houses and 90 apartments / duplexes. The double leaf panel has 63mm thick internal and external polystyrene leaves and a 160mm cavity into which 30N readymix concrete is poured. The readymix concrete is compacted into the formwork by external vibration - i.e. through the polystyrene leaf. The external leaf received a two coat render, firstly with a conventional waterproof scratch coat, followed by a coloured waterproof render supplied by CPI Ltd, based in Lucan Co. Dublin. The internal leaf of polystyrene formwork is faced with plasterboard and skimmed.

The apartment / duplex element of the Riverside development employs the M2 single leaf system which consists of a 160mm polystyrene panel (density 15kg/m<sup>3</sup>) with an integral internal and external facing mesh. Shotcrete (sprayed concrete) is applied to a thickness of 50mm both internally and externally. The shotcrete is comprised of 30 N readymix concrete with polyester fibres for enhanced strength and fire performance. The panel is rendered externally with a waterproof scratch coat followed by a coloured waterproof render. The internal face of walls are plastered.

Care has been taken in the construction of the Riverside development to avoid flooding. This involved raising ground floor levels above the 100 year flooding level - a feature which will undoubtedly be appreciated by the occupants in years to come. Raising the floor levels was facilitated by the use of the M2 double leaf formwork which allowed for the speedy construction of a retaining wall into which gravel could be introduced to raise the floor level to the required height.

