

# Innovative concrete construction offers traditional benefits

The UK shortage of social housing underlines the need for fast and efficient construction. However, this speed must not be at the expense of quality and long-term performance, writes Guy Thompson, Head of Architecture and Housing, The Concrete Centre



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**T**he new homes must be structurally robust, provide comfortable living space and have the flexibility to adapt to future needs.

Limited land availability means that the homes often have to be built at high densities, so good fire resistance and sound insulation are important considerations. A further priority is to ensure that these homes work with – rather than against – the environment by negating the need for air conditioning and reducing the need for heating.

The concrete industry is developing a range of construction methods that whilst being innovative and fast, offer the traditional, high performance, inherent benefits of heavyweight construction.

One such method is tunnel form. This is a formwork system that allows the on-site casting of walls and slabs in one operation on a daily cycle. During the tunnel form process, a structural tunnel is created by pouring concrete into high quality formwork to make the floor and walls. The space formed can span from 2.4 to 6.6m and can be easily sub-divided to create smaller rooms.

Where longer spans of up to 11m are required, the tunnel form is extended using a mid-span section. After 24 hours, the formwork is moved horizontally so that another identical tunnel can be formed. When the storey has been completed, the process is repeated on the next floor.

The system creates an efficient load-bearing structure that is particularly well suited for repetitive cellular

construction such as residential apartment blocks. The solid monolithic structure can be used for small blocks of six apartments or for residential towers of 40 or more storeys high and the accuracy of the system suits the installation of prefabricated elements such as cladding panels and bathroom pods.

Another concrete system well suited to cellular construction is crosswall. Crosswall off-site construction offers the benefits of an efficient frame with structural downstands, resulting in a structural zone of 150-200mm.

One of the main advantages of crosswall is the provision of an early 'dry box' construction that allows subsequent trades access to achieve a fast-build programme using the minimum of wet trades.

Load-bearing walls in the transverse direction are designed as the means of primary support, with longitudinal stability achieved by external wall panels or diaphragm action back to the lift cores or staircases.

The system provides a structurally efficient building with main division walls offering a high degree of sound insulation between dwellings. Using vertical casting, internal walls can be manufactured to a high standard of finish thereby avoiding the need for plastering or other finishes.

Twinwall construction is a hybrid combination of precast and in-situ concrete. Each wall panel consists of two skins of precast reinforced concrete which are

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temporarily held in position by lattice girder reinforcement. The concrete skins are effectively permanent formwork, with the benefit that they are used structurally in the finished building. The weight of a twinwall panel the same size as a fully precast panel is reduced this permits the use of larger panels or smaller cranes.

The wall panels are placed into position using similar methods to the crosswall elements. For the floors, lattice girder slabs are used. These have a thin precast concrete soffit, often called the 'biscuit', which includes the bottom reinforcement and acts as permanent formwork.

Once the walls and floor units are in position, reinforcement for the slab and to tie the walls and slabs together, is fixed. In-situ concrete is then poured into the void in the twinwall panels and on top of the biscuit of the lattice girder slabs.

The use of these and other concrete solutions can do much to help meet the demand for social housings both in terms of fast, cost efficient construction and long-term performance.

