The versatility of off-site manufacturing with concrete cladding

There's little in construction that is more conducive to the building of high-rise structures than the off-site manufacturing and the installation of precast concrete cladding. For many developers, designers and contractors, precast is the obvious choice for high-rise, due to its unique versatility and overall cost-effectiveness. ***Sandra Doran*** *of* ***Techrete*** *reports.*

The ability to erect panels to the lower levels while the structure and frame of the upper levels is still being constructed, without the need for scaffolding, is vital in terms of adhering to the high-rise build programme and minimising disruption to the public spaces and local community surrounding the site.

Panels – in some cases are three-storeys high, some with preinstalled windows, all manufactured off-site – result in a reduced number of lifts and crane time, and safer installation of high-rise façades. With a smart, pre-planned approach, weather tightness can be achieved rapidly and for high-rise structures, concrete also provides the added benefit of being an inherent fire-resistant building material.

Techrete has designed, manufactured and installed the façades of many high-rise buildings and broken several height records along the way.

Duncan House.

Consisting of two towers (40 and 50 storeys), Mill Harbour in London, at the time of construction, was the tallest residential building in the UK. Techrete manufactured and installed over 2500 double-storey panels of reconstructed stone to the building.

Completed in 2005, Bridgewater Place in Leeds at 32 storeys currently remains the tallest building in Yorkshire. The staircase cores protrude beyond the main façade and are clad with complex three-sided panels, cast in two stages. Once finished, the installation works for Hume House, which is due to complete this year, will supersede Bridgewater Place as the tallest building in Yorkshire.

Clarence Dock is a 17-storey residential tower in Leeds. Windows were incorporated into approximately 320 reconstructed stone panels, each weighing up to 10 tonnes. A 'C' hook was used to install the panels to circumnavigate the projecting formwork at roof level.

Urbanest, London

Urbanest is a 26-storey student accommodation that dominates the Kings Cross skyline. Techrete designed, manufactured and installed 1000 precast panels, covering 8000m^2 of the façade. The lower levels, which are finished in a dark, acid-etched grey, are complemented by the Portland look-a-like panels, with two varying depths of a grit-blasted finish to the panels at the upper levels. The installation of the precast took only 34 weeks. The overall construction time was reduced as the installation of the panels, using a telescopic crawler crane, allowed for an earlier on-site start date, while the reinforced concrete frame was still under construction.

Mill Harbour.

The downgrading of craneage due to the proximity of the Channel Tunnel Railway Line (CTRL) on the northern boundary of the site was an added constraint for the project. A monorail was required for the installation of the panels on the north elevation immediately adjacent to the boundary fence of the CTRL. This was also undertaken while the frame was being constructed above.

Southbank Place, London

The redevelopment of Southbank Place in central London, which was completed in 2019, comprises eight new buildings surrounding the quarter's centrepiece, the Shell Centre Tower. The overall redevelopment is home to a mixture of offices, residences and retail space, and integrates with open public areas and pedestrian routes. Techrete was engaged by Canary Wharf Group to design, manufacture and install the precast concrete panels for three of the buildings within the quarter: Building 1, Building 4A and Building 4B.

Building 1 appears to step backwards in three blocks from the ground floor to storey five, from level six to level nine and finally, from level ten to level 14. The building features two- and three-storey panels, which

Bridgwater Place.

Urbanest.

were 11m long. A major feature of the panels was their extra deep returns on the legs, to create a solar shade and visually achieve the architect's design.

Self-compacting concrete, using Techrete's C190 mix for a warm off-white colour, was finished with acid etching to lightly expose the aggregate, giving the panels a soft, slightly textured appearance and granite plinths with a grey finish were used to complete the process.

On Buildings 4A and 4B, C190 reconstructed stone mix was also used with an acid-etched finish. Two-storey panels were manufactured with a vertical indentation in the panels up to level ten, elongating the structures and creating an elegant ribbed effect.

3D modelling was vital for all three buildings as the extensive steel work of the frames had to be co-ordinated throughout the building. The two bridges on levels four and eight, which link Buildings 1 and 2, the interfacing canopy and the interfacing handrails all added complexity to the design work.

The canopy projecting from the west elevation of Building 1 created a semi-enclosed space linking Buildings 1 and 2. The canopy interfaces with the steel work; this interface, plus the over-head areas of the public colonnades on Buildings 4A and 4B were developed with glass-fibre-reinforced concrete. The open structures on the roofs of Buildings 4A and 4B were tricky as there were four-sided-columns and beams to negotiate and additionally, the steel frames were being built overhead as the mid-levels were clad, which required a high level of co-ordination and the use of a Bomecon counter-balance rig. In total, 1706 reconstructed stone panels were placed during the development of the 21,905m^2 Southbank Place.

Duncan House, London

Completed in July 2019 and designed by Hodder and Partners and with Watkin Jones as the main contractor, Duncan House in Stratford, London, a mixed-use development, offers residential apartments, student bedrooms and academic space, and has a roof garden and sky lounge.

The nine-storey podium block defines the street edge and responds to the lower-rise buildings surrounding the site. The podium's right-angle arrangement allows a significant piece of public realm to be formed at street level. The composition of the tower with its fins creates a striking silhouette against the sky.

Techrete was engaged to design, manufacture and install the 1487 panels, covering the 18,500m^2 of cladding that makes up the façade of Duncan House. A C280 reconstructed stone mix with a light pigment and an acid-etched finish was chosen for the project.

The structural precast columns to the first floor create a right-angle public colonnade. Approximately 2500 windows were fitted to the panels at the Techrete factory and the combination of these, together with the concrete infill, as well as louvres – which were also factory fitted – make up the façade of the structure.

Creating the moulds for the 1487 panels with high repetition was a challenge. Steel moulds were developed to facilitate the process and bespoke steel cassettes were used to speed up the process of casting the window panels.

Three teams installed the panels using three tower cranes and due to the high-rise nature of the building, the Bomecon counter-balance rig was used to assist with the installation while the core structure was still under construction overhead. ■