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ACA members have designs on construction

The era when precasters were issued with the architect's and engineer's full designed and detailed scheme for cladding panels that included schedules for reinforcement and fixings, then simply expected to supply them to suit the main contractor's programme, without the opportunity for further involvement, is a fading memory. These days, each work package undertaken by members of the Architectural Cladding Association typically includes not just the manufacture of bespoke precast concrete cladding panels but also their detail design, delivery and fixing. In other words, a typical precaster has become a specialist contractor with a multi-disciplined, highly skilled organisation undertaking multi-faceted tasks and responsibilities. So, it is important to understand the role a precast specialist now plays in a construction project and the function undertaken.

While contractors and project managers concentrate on site activities, most of the precaster's work takes place off site. Hence the need – and this is something that can never be overstressed – for an adequate lead-time before work starts on site, particularly when considering design and detailing. The latter fall into two distinct phases: *external or contract* – executed in conjunction with the architect, engineer and interfacing trades; and *internal* – as required for the production and installation of the precast units.

External/contract design

The contract design and drawings will include key elevations, general arrangements and BWIC, plans, sections and large-scale details. These are produced from information and detail provided by the project professional team and in conjunction and co-ordinating with interfacing trades such as the structure and window/curtain walling contractors. If this element of design is to proceed successfully, accurate and complete architectural/engineering detail must be available and interfacing trades are appointed concurrently.

The first task is to agree with the architect and engineer the overall panelisation of the façade, size and configuration of units, joint positions, weights, bearing and restraint positions, and thickness of units. From this information, key elevations drawings are produced to show the agreed panelisation and individual unit references.

After approval of the key elevations, general arrangement drawings are prepared. These are larger-scale plan, elevation and section drawings of particular areas, showing the layout and relationship of individual units with the structure and other trades, such as curtain walling/glazing, bearing and restraint fixing configurations, panel weights and builders work detail. Finally, large-scale fixing and jointing details are produced.

A most important aspect is the design and detailing of builders work, usually in the form of slots or holes in steelwork or sockets or channels cast in in-situ concrete structures. These provisions are required for restraining panels back to the structure: their precise positioning is determined by the detailing procedure in the general arrangement process.

This aspect of detailing must be closely co-ordinated with the structure contractor. Problems arise when the framework contractor is appointed well before the precaster and work has begun on the structure before the detailing described above is completed. This leads to a structure with no provisions incorporated for the support and restraint for the cladding which, in turn, causes costly remedial action in forming slots in steelwork or drilling concrete for sockets

A similar situation applies if the precast cladding has to take any loads from the curtain walling/glazing or have any fixings cast in for the same. This detail must be derived in conjunction with the curtain wall/glazing contractor who must be appointed at the same time as the precaster for

this to happen.

Internal design

After completion of the external design and detailing, internal manufacturing details are prepared. These take the form of the following:

- Drawings showing precise details of each individual unit for both mould manufacturing and casting purposes.
- Reinforcement calculations, cage drawings and bar bending schedules for each unit.
- Design and scheduling of cast-in and loose fixing components.
- Preparation of manufacturing schedules.

Applied finishes

Precast cladding can either be self-finished – e.g. reconstructed stone, polished, exposed aggregate – or have a facing of brick, tile, granite and stone. In these instances, the processes described above have the additional tasks of the design and detailing of the individual facing material.

Finishes have to be determined with the supplier, bonding patterns agreed and incorporated into the key elevations and unit details, cutting schedules supplied to the quarry/ works/factory for manufacturing purposes, and appropriate delivery programmes agreed. Precasting cannot proceed without the required quantity of applied material, and there must be enough time within the overall programme for the design, detailing and procurement of such material.

Changes in design/variations

To keep lead-in times short, design overlaps production. Release of information for manufacturing, which starts with mould manufacture and steel fabrication, is a continual process that begins as early as possible and must not be left until the project design is completed. Changes in the design concept or variations are to be avoided. A change could come at a time when information has been released for manufacture which – in addition to higher design costs – could result in abortive manufacture costs or even complete lost production.

Architectural cladding in practice

As a direct result of its versatility and durability, consistent high quality and sharpness of detail, factory-produced architectural precast concrete is increasingly and deservedly being recognised as the cladding material of choice for many prestigious and high-profile new building projects. The following examples of ACA members' work illustrate the range of projects taking advantage of such components.

198–202 Piccadilly

The overriding requirement for this project in the heart of London was for a landmark design that did justice to its premier location. The building adjoins a Wren church on one side and the old Simpson's building on the other. This mixed retail and commercial development contains over 6500m^2 of office space and nearly 2800m^2 of shops. The main impact of the eight-storey building lies in the Portland and Savonniers limestone facings coupled with cast bronze column capitals Large granite-crested dormer windows and turned limestone urns 3m high create a dramatic silhouette against a sloping roof.

The building used stone-faced precast concrete cladding panels from The Marble Mosaic Company

in Weston-super-Mare. Indeed, through main contractor Sir Robert McAlpine, the company was responsible for detail design, manufacture, delivery and installation of the panels in a contract worth in excess of £3m. As well as the limestone facings, Chinese Constellation Grey and Sanhe Red and Kashmir Gold granite facings were used, along with three types of stock brick facings. In addition, some units were designed to act as structural elements supporting other cladding materials Complete panels weighed up to 10 tonnes.

Wembley Park station

For over a century, the original Wembley Park station was the main rail link to sporting events at Wembley National Stadium, Exhibition and Conference Centre. However, it was clearly unsuitable to cope with the increased passenger demand of the new National Stadium. Advantage was therefore taken of the stadium closure to provide a significant new extension, while maintaining a fully operational commuter station for the 18-month construction of the station works. Decomo UK Ltd, working for Taylor Woodrow Construction Ltd, designed, supplied and installed the architectural concrete elements

The new works employ a palette of materials dominated by precast concrete panelling. Terracotta coloured polished concrete cladding was used for the walls to the six platforms, the auxiliary concourse, and the stair tower and end elevations of the staff accommodation building. The latter's main elevation features full-height columns with balconies spanning between these at intermediate floor levels. At ground floor, flat panels replace balconies and at roof level parapet panels incorporate an integral coping section. All units were manufactured in a white acid-etched concrete. A similar arrangement of columns and balconies/panels was adopted for the rear elevation of the stair tower with the curved panels above and below its glazing also in the white acid-etched concrete.

Clarence Dock, Leeds

Close to the centre of Leeds and adjacent to the Royal Armouries Museum is an area of regeneration known as Clarence Dock. The compact development consists mainly of medium- and high-rise apartment buildings with various approaches to the treatment of façades, the high quality of which complements that of the surrounding infrastructure

Tower Block D features prominently, largely because of the sweeping curves of the elevation and the whiteness of the precast cladding supplied by Techrete. The 20-storey building, which steps to 15 storeys, incorporates 433 cladding panels typically 3m×5.5m: apart from the end elevations, they are all curved on plan. Most of the panels arrived on site factory-preglazed by the window trade contractor.

The Techrete mix fulfils the demand for a panel finish as white and as sharp as possible and adding a high degree of panel-to-panel uniformity soon after casting. Panels were individually attached to the frame with projecting corbels transferring the load onto the floor slab adjacent to the columns and restrained at four points with a system of galvanised steel brackets and plates, etc. Maximum panel weight was a little over 11 tonnes. To circumnavigate the projecting falsework at roof level, a 'C' hook was used extensively for the erection operation, enabling the panels to be landed onto the floor slab in a safe single operation. Overall, an efficient scaffold-free system was provided in a competitively short period.

Centre for Contemporary Arts, Nottingham

Stunning lace designs that helped establish a world-famous industry in the heart of Nottingham have been set in concrete as part of an iconic arts centre. The major challenge for Trent Concrete was to reproduce a unique lace pattern in the reconstructed stone cladding being manufactured for the £13m Centre for Contemporary Arts Nottingham (CCAN). The design is based on a sample of Victorian lace found in a time capsule, unearthed when a new supermarket was being built in the

city. Designed by Caruso St John Architects, the centre, featuring 1300m^2 of gallery space, education rooms, a café and bar, is due to open in the autumn of 2008. CCAN has received substantial support from Arts Council England and the development is being led by Nottingham City Council, in partnership with Nottingham Trent University and the University of Nottingham – who will set up a charity to operate the site.

In total, 1100m^2 of green scalloped wall panels 4–11m high were required, the heaviest of the 93 individual units being 11.5 tonnes. The company is also providing a 200m^2 black polished concrete plinth of varying heights to surround the base of the building.

Summary

The precaster's design obligation is a process that requires complete and adequate information from the professional team at the outset: this must interface and co-ordinate with other trades and culminate in information sufficient for factory production and site installation. Depending on the type of finish, this may include quarrying and manufacture of natural stone products, brick, tile and the like.