

Dowels speed post-tensioning

A lockable dowel system used for the first time in Europe saved significant time in Ipswich

A new six-storey university building on the Ipswich waterfront is the first project in Europe to use a new lockable dowel system from Ancon. Use of these dowels in the post-tensioned concrete frame has improved site access and accelerated the rate of construction by at least four weeks per storey.

University Quay is the second of three phases of development at University Campus Suffolk. This phase comprises a second academic teaching building, the Students' Union and student accommodation. Willmott Dixon expects to complete University Quay by the end of 2010.

Shrinkage considerations

A key design consideration in post-tensioning, where long uninterrupted spans can be achieved, is the accommodation of normal concrete shrinkage. Traditionally, this movement has been allowed for by leaving pour strips – a 1 m wide opening – at various locations on each floor. Once the concrete either side of the pour strip has stabilised, the contractor returns to fill the gap, providing continuity in the structure. This second wet pour normally occurs approximately four weeks after the initial pour.

Although a common design feature in post-tensioned concrete frames, pour strips are not ideal. They require the slabs to be propped throughout this four-week period, which restricts site access below and delays site progress above. Pour strips also



create unnecessary trip hazards for site workers, use additional formwork and leave the soffit face marked.

The use of lockable dowels on University Quay allowed neat temporary movement joints to be constructed, where pour strips would traditionally have been left. Although a new concept in Europe, these lockable dowels have been used in the Australian post-tensioning market since 2007.

Stainless steel dowel bars are an established means of transferring shear load across joints in concrete. They are used with a sleeve component where movement is to be accommodated.

The innovative dowel used on University Quay allows an initial phase of movement but is then locked in the sleeve. The locked

dowel continues to transfer load across the joint, but prevents further movement taking place.

The use of lockable dowels negated the need for 1 m gaps to be left in the slab; concrete was poured to both sides of the joint. Any need for the slabs to be propped was also eliminated, as shear load was transferred by the dowels both during and after movement had occurred.

Time savings

The lockable dowel range includes standard solutions for both slab-to-slab and slab-to-wall joints. Approximately 30 dowels were installed on each of the six storeys.

Matthew Consultants, a specialist in post-tensioned concrete design, specified the Ancon dowel system.

Ben Ume, a director at Matthew



Consultants, says: "By using these dowels we have saved at least four weeks per storey on a traditional post-tensioned build programme. This construction method is just more efficient. Wet trades finished sooner on site and the anticipated movement at the joints was achieved without any issues. It is a proven engineered solution which reduces onsite man hours.

Major savings

"Use of the dowels contributed to a huge saving in both materials and labour for the contractor involved. We had traditionally used pour strips, as other proprietary methods of using dowels had failed.

"We anticipate a huge increase in the use of these dowels in the numerous designs we carry out for our clients."

Each of the products used comprised a stainless steel dowel component, a box-section sleeve with an L-shaped void former, a locking plate and 1.5 litres of an Ancon two-part epoxy resin.

When movement in the concrete had stabilised and the joints had been filled, the dowel was locked with the plate and the resin inserted from the top of the slab. The void former was topped with cementitious material to complete the installation.

Ancon's products were supplied to University Quay by Anchor Bay Construction Products and installed by Foundation Developments. All three companies are members of the CONSTRUCT concrete structures group.

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