

## **Newcastle-under-Lyme College**

Newcastle-under-Lyme College was schemed by Consulting Engineer BDP as a post-tensioned flat slab for reasons of economy and performance. Not only is there significantly less material in a PT slab than an RC slab, in terms of rebar and concrete; but the deflection control is far superior. This was important because the spans were reasonably long at around 9 -10m, plus the loadings were unusually high being  $6.5\text{kN/m}^2$  live load,  $1.4\text{kN/m}^2$  superimposed dead load, with internal partition loads of  $12.8\text{kN/m}$  run.

The structure typically utilised a 300mm thick post-tensioned slab, which afforded superb acoustic and dynamic performance properties.

Structural Systems carried out the detailed design of the post-tensioning using the 406 bonded flat duct tendon system with 15.7mm strand, with four strands per anchor.

The college building is 99m long by 77m wide with a central courtyard. The structure is 4 storeys and features a raking façade to the front three teaching wings. Originally, the design allowed for increasing cantilevers on each floor level however, VE options resulted in a more cost beneficial, but never-the-less striking, racking columns arrangement to the elevation.

Thames Formwork displayed excellent workmanship throughout the frame construction, using an innovative solution of high flow self compacting concrete for the slabs. This proved to be quicker than traditional concrete, giving a flat surface and a denser finish. This was particularly helpful in providing a superior finish to the soffit, which was exposed in numerous places.

The use of post tensioning also meant that the deck was less congested than with a traditional reinforced concrete slab, as there was very little rebar to install. This helped speed up the construction process and allowed for a faster deck turn-around.

The College were very keen to produce a sustainable facility and worked closely with Staffordshire Wildlife Trust to protect the wildlife and local environment, ensuring an environmentally friendly new campus development.

The college is committed to the principle of a sustainable development and worked closely with the design team to ensure that the best practices were included in the new buildings and their surroundings. The use of post tensioning was crucial in this as it required significantly less reinforcement and concrete. This also provided the added environmental benefit of fewer vehicle movements and a reduction in  $\text{CO}_2$ .

The College development is designed to achieve a high BREEAM rating. This had a significant influence on the entire design process and will provide long term environmental performance throughout the entire life of the structure.

The main contractor is BAM Construction Ltd and the scheme is currently being fitted out.





















