



HIGH IQ FIVE

IMAGE: The IQFIVE development will give student accommodation a new lease of life.

As befitting the recipient of the Special Award for Innovation at our recent magazine awards, we thought we would have a closer look at the judges' category choice and see why it was a worthy winner - Henley Building Solutions and **IQFIVE**.

Imagine a build programme expected to take 162 weeks reduced onsite to just 60 weeks. Now imagine that the resulting building, on measurement, is within 4mm tolerance, over 12 floors. Add to that a structure that exceeds thermal and acoustic regulatory requirements. This building is IQFive – a new student accommodation unit set in the heart of Birmingham and constructed using a precision-engineered steel system with concrete floor cassettes. Student life at IQ is a decidedly cool option. A combination of studio apartments and cluster flats will accommodate 480 students over 12 floors. This functional attractive building stands on a site that started out as anything but attractive.

Set on a triangular footprint, the site is flanked on one side by a road, and on another by a canal. During the build, there was very little room for manoeuvre or storage, and deliveries to the site had to be rigorously planned. The advantage of a pre-engineered system was that buildings are delivered within tight, extremely difficult sites or on concrete podia over existing buildings, where traditional methods would be far more problematical to use.

With the frame erected, the concrete cassettes and steel wall elements that form each floor can be manoeuvred into position. The light gauge steel wall elements are installed and once in position are cross-braced to lock the wall into position. Bathroom pods

are lowered into place, before the next concrete cassette is lowered into place. This process allows a floor to be constructed and made watertight very quickly. The concrete floor cassettes are produced in Henley's own facility, where they are poured and allowed to cure to an exceptionally flat finish. All the apertures necessary for services are included in the cast for each concrete cassette, so no drilling on site is necessary.

Using a precision engineered system, it might be thought that it would be difficult to allow for flexibility in design. However, because Henley manufactures every element involved, it can rapidly incorporate design changes. At IQFive, the pointed South West corner feature of the building was not finalised ▶



The final finished rooms benefit from a high quality finish and the student 'digs' are amongst the most comfortable in the UK.

▶ until the build was in progress - and the panels for the top floor penthouse were produced and installed within two days of the design being finalised.

Because the construction proportions are so precise, it is easy for tradesmen to finish the building to a high standard. The metal stud walls are insulated and finished with plasterboard, before being flush jointed and completed with coats of paint. Window apertures at IQFive were pre-cut; Henley's next move is to bring the metal stud onto site with the window pods pre-installed. Because the finish on the concrete cassettes is so smooth, carpeting can be laid directly onto the floor. On the exterior, the render finish was completed in quick time and to an exceptional standard because none of the infilling of imperfections commonly associated with traditional building methods was necessary.

At the heart of the Henley Building Solutions method is the use of tailor-made, pre-engineered, high-accuracy components manufactured off-site under controlled conditions. Although there is nothing new about the materials used - tried and trusted steel and concrete - Henley's unique panelised, modular and floor cassette systems are produced using methods and design approaches that owe more to the aerospace and automotive industries than they do to the traditional building sector.

The accuracy of the components that go into Henley buildings means that the elements fit together perfectly on site - with no modifications or packing. This means they can therefore be erected within very tight schedules and are extremely cost effective.

To ensure the highest standards Henley maintains control of every step of the construction process. From the delivery of steel coil at its factory gate to the final phases on-site erection it uses specially developed processes and equipment that are designed to cut

waste, improve accuracy and reduce lead times.

Everything is manufactured under factory conditions by experienced production staff using bespoke forming lines, skilled metal joining processes and high-tech computer numerically controlled (CNC) fabricating equipment such as metal cutting lasers, punch presses and bending presses. The starting point for a typical wall panel or module is a formed steel profile. These are produced in-house from coiled steel strip on special roll-forming machines that have been developed by Henley and optimised to its specific manufacturing requirements.

The steel strip passes through a series of shaped rollers and is progressively formed into the required cross-section. The shape of the rolls and the transition from one roll to the next is a critical factor in achieving the desired final shape. It is the combination of bespoke manufacturing equipment and software that allows Henley to produce almost any profile - including its innovative 3-section.

Once the steel profiles are fully formed they are cut to the required length at a shearing station on the rolling machine and put together in batches for fabrication.

As well as the roll-formed sections, other components that go into the wall panel include light gauge galvanised components produced on CNC punching and bending equipment. A punching press uses shaped tools to cut out profiles and apertures in the sheet without damaging the galvanised layer - these flat blanks can then be formed into complex cross-section components on a CNC bending press.

Other panel components, as well as kits of parts for structures such as staircases, are produced on a CO2 laser-cutting machine. This uses an intense beam of infrared light and high-pressure gas to cut material such as hot rolled steel at thicknesses up to and beyond 10mm. The laser gives a very accurate

cut and can create profiles and apertures of any shape without the need for special tooling.

Once all the components that go into a panel have been produced, the next step is to lay them up in custom-made jigs that hold them in place for MIG brazing - a process developed for the automotive industry. The accuracy of the jigs determines the accuracy of the finished panel, so they are carefully produced for each job and designed to take into account any thermal expansion of the steel components during the joining process. The joining process does not damage the galvanised layer on the surface of the steel, so its corrosion protection is not compromised, and because there is a lower heat input to the component there is less likelihood of thermal distortion.

This combination of accurate jigs and a skilled, low-distortion joining process ensures that manufacturing tolerance of plus or minus 1mm can be maintained on all wall panels.

The production of Henley's licensed technology composite steel and concrete cassette floors starts off in a similar way. Fabricated light-gauge galvanised steel and structural hot rolled steel components are laid up in a precision jig and MIG brazed together to create a metal core. When this is complete special fire-resistant concrete is poured directly into the fabrication to complete the 'sandwich'. Once the concrete has set the floor unit is ready for delivery and installation.

The final element in Henley's manufacturing approach is a rigorous quality assurance regime. Every dimension is checked and re-checked, every process is constantly monitored - something that can only be done in a controlled offsite facility - so every component leaving the factory is accurate, fit for purpose and ready for rapid erection on site. ■