



LEAN CLEAN AND GREEN SCHOOLS

When it comes to offsite school design and build, it is increasingly important to employ a sizeable slice of sustainable thinking as part of the overall prefab approach.

As Gordon Brown finally moved into 10 Downing Street and took on the mantle of Prime Minister, he announced that the Department for Education and Skills would be broken-up and its responsibilities divided between two new departments. The Department for Children, Schools and Families (DCSF) and the Department for Innovation, Universities and Skills (DIUS) hardly roll off the tongue but they pick up the baton to maintain and increase the levels of investment in building better educational establishments. And also to improve the quality of the construction.

The focus on modern educational buildings stretches far beyond the structure itself. The carbon footprint of all schools in England is equivalent to approximately 10 million tonnes of carbon dioxide. So, build smarter and build greener is the message. This means more design input, intelligent product selection and the use of better and innovative building systems. And this means that offsite is set to have a hugely positive impact on the school building footprint. For the majority of people reading this – or at least people of a certain age – the schools that

they cut their teeth in will almost certainly have been pretty dreary affairs. Either knocked up in the fifties and sixties or infamous Board Schools – dark stone remnants from the early twentieth century.

Certainly the schools will have to do better than some of those that have been delivered by the endlessly controversial PFI route. James Pickard of Cartwright Pickard Architects speaking at BRE's OFFSITE2007 event has found them, "on the whole, very disappointing, with very little integrated design thinking." The Government's architectural 'watchdog' CABE, has also been dismissive of some of the efforts produced in the first wave of schools built under the flagship Building Schools for the Future (BSF) programme. "The design quality of secondary schools completed over the last five years is not good enough to secure the Government's ambition to transform our children's education. While there are signs that design quality is improving, it is not doing so quickly enough. Too many mistakes of the past look like being repeated."



● IMAGE: Pendeen SureStart Centre, Cornwall

THE GREEN GAUGE

So where does that leave offsite providers? The Government through Partnerships for Schools, wants to see the BSF investment programme: "include significant reductions in capital cost and construction times year on year...this will be achieved by effective programme and project management, exploiting economies of scale, offsite pre-engineered construction of high quality facilities, exemplar designs, reusing experience and leveraging procurement expertise and buying power."

Indeed, the education sector – schools, colleges and universities – can learn a lot from the commercial sector, this includes better HVAC, acoustics design, shading and glare control, lighting, air quality and noise reduction. Ventilation and air quality is deemed crucial for future school design and building standards. Of course some of the key decisions and primary determiners are those that are actively involved on a day-to-day basis in being in a school or college. Ask the kids, the teachers and the school governors what they think a good school entails? Or, as one developer has said: "Suggest what the schools need and then get them to confirm it."

● IMAGE: The Re-Thinking school has raised the bar with its sustainable offsite building approach.



RE-THINKING SCHOOL DESIGN

A perfect example of what a school building of the future could look like was unveiled earlier in the year at OFFSITE2007. Willmott Dixon's specialist consultancy, Re-Thinking has teamed up with White Design, NG Bailey, Max Fordham and Eurban to design a 'mini-school' using the latest sustainable technology, in an attempt to inspire everybody's imagination to develop fresh ideas for future school design and improve pupil and teacher productivity and concentration.

"We aim to spark new thinking in low carbon school design, said Head of Re-Thinking Charles Tincknell. "We are bringing together all we have learnt over recent years in school design, adding to this, cutting-edge design ideas and sustainable features from other countries, and creating a unique concept in our demonstration school. It should be an eye-opener for everyone who visits."

The Eurban main structure is made from solid timber comprising cross-piled off-cuts that would otherwise go to waste. Arriving flat-packed, the structure has great flexibility in that it dispenses with roof trusses or other projections that normally inhibit future expansion of the school. The inherent thermal mass of the Eurban system – a new product in the UK – coupled with secure night ventilation also keeps internal temperatures constant in the summer. During colder weather, the highly insulated envelope will retain heat gained through passive solar gain.

The timber frame is part of a screw-fix piling solution that gives a swift build time with the minimum groundwork. Integral Structural Design, provided the interface between the superstructure and the screw-fix piling, and developed a bespoke steel ground beam solution, meaning the design and construction phase was completed in less than two weeks! According to Re-Thinking, they estimate that using offsite methods, they can reduce the onsite time for a standard two-form entry primary school, from around 42 weeks to 32 weeks. The building is also relocateable. So geographically the school can go anywhere and if the requirements and role of the building change, it can be demounted

and moved to another site. To prove the point, at the end of the schools' two-year stay at BRE's Watford Innovation Park, the building will be 'unplugged' and moved in its entirety to a new location.

GET READY TO MODULATE

Across the pond in the USA, the Early Childhood Development Centre at the Samuel Smith Elementary School in Burlington City, New Jersey, has been held up as a perfect example of what can be achieved with the use of modular construction.

The 17,000sq ft facility was built in a factory as two 'wings'. Representatives of the Burlington City School Board and local education authority had the opportunity to inspect the entire project complete with interior masonry walls, fitted plumbing and wiring, and concrete sub-floors. The structure was eventually separated into 32 steel-frame modules and shipped to the site.

"Modular technology enabled us to build offsite without disrupting the ongoing educational process at the adjoining elementary school," said Robert Brehm, PE, senior vice president at Kullman Industries, Inc, manufacturer of the factory-built modules. "This building is as sophisticated and well-designed as any conventionally constructed school. Our educational clients don't care whether their building is constructed on or offsite. However, they demand extremely rapid construction to dovetail with their academic calendars without sacrificing any of the design attributes associated with high quality onsite construction. Modular technology gives them the best of both worlds – sophisticated, high quality buildings completed in a matter of months, not years."

Modular buildings are proving a popular option for smaller institutions. Three new SureStart Children's Centres built in Cornwall used a modular build option. In fact, Darren Willcocks, who oversaw the development for Truro-based project management company Ward Williams Associates, said modular build was the "only option".

Carl Britton, the Children's Centres & Extended Schools' Development Manager for Education Walsall, felt much the same way: "The development ▶

of these facilities is always required within very tight deadlines and I have found that modular construction gives us this quality and flexibility, as well as the opportunity to satisfy environmental issues in terms of sustainability. Modular build gave me the time and cost factors that I required, as well as the flexibility to change the design of the building's interior even as the project was being prepared in the factory.

The speed at which the centre was erected was outstanding and presented the minimum disruption to the adjacent primary school". A £2.5M contract for Worcestershire County Council to build new teaching facilities at Bewdley High School has also

adopted a modular approach. The scheme is believed to be the first modular building to be heated using wood fuel.

Dermot Galvin, Project Architect at Worcestershire County Council, said, "The primary driver for the decision to use offsite construction for this project was time." The building will be manufactured using Yorkon's steel-framed building system, which allows clear internal spans of up to 12m and reduces time onsite by up to 50 per cent. Sixty modules will be craned into position over seven days, complete with doors, windows, electrics and partitions pre-installed in the factory. The two-storey school building will include laboratories, a

drama and activity studio and office accommodation. Design features include central heating powered by an environmentally friendly biomass boiler, passive ventilation to provide fresh air throughout, timber cladding, a highly glazed activity studio flooded with natural light and a striking bespoke roof structure.

Alongside the construction stalwarts of cost, build time and delivery, it is becoming increasingly clear (as in most aspects of modern life) that sustainability is at the core of newbuild school design. The beauty of offsite is that many of the building systems are naturally geared towards producing schools that are lean, clean and green. ■

CASESTUDY: Vision On - Northampton School for Boys

A collision of prefabrication, sustainability and fine design, has seen one school in Northampton showcase some of the latest construction and design techniques available.

Can architecture really contribute to raising achievement within a school environment? How can a teacher effectively communicate when distracted by a classroom that is too hot, too cold, or too dark to see and read?

Following Northamptonshire County Council's decision to close its middle schools, Northampton School for Boys (NSB) was faced with the prospect of accommodating an additional 450 students into an already highly successful but over-subscribed school. The Governing body sought to provide an exceptional new building that presented a forward-looking modern outlook, whilst acknowledging the historic context of the main school building.

The new building needed to address the existing buildings' problems of congestion, lack of accessibility, and dilapidation of an old 1964 refectory, as well as providing new classrooms and other facilities. NSB did not fall under the Northampton Review PFI programme and were facing the prospect of stiff competition from two proposed PFI schools in the local area. It wished to maintain and build upon the high academic, music and sporting achievements of the school and the excellent track record it has enjoyed for the last 465 years. Eventually NSB was successful, with half of the £9.4M project funded by Northamptonshire County Council, and the remainder by a private benefactor; a former student at NSB.

The existing school had developed ad-hoc, with no clear masterplan. Each existing block was diverse from the other in age, style and materials. The new building had to act as a cohesive unit that made sense of these disparate elements. The Concourse & Teaching Block project was conceived as a whole school learning environment, providing 16 new classrooms, a refectory/performance/conference/assembly space, team-base offices (secondary subject-related staff rooms), sixth form accommodation, a shop and toilets. Located at the heart of the school, it links four other buildings and even responds to the curve of the sacred cricket pitch adjacent.

The school has always stressed the importance of selecting materials and finishes for its buildings. No matter how well students behave, a school environment is a harsh test of materials and their durability.

The decision was made to use Red Oak as the unifying element to tie the project together: cladding to the pods, stairs, door sets, architraves, skirtings, shop fitting, the Deputy Head Master's storage wall,

classroom coat and bag racks, balcony cappings and the DNA pattern to the balcony fronts, in honour of NSB former student Francis Crick - the discoverer of DNA. Having made this decision, pHp then needed to give each of the 'events' a personality of their own through detail.

The team-base pod is like a seed-pod that has segments and scales. The sixth form pod is ship-lapped horizontally in a way that causes the panels to step-out and form a boat-like hull overhanging the atrium. The "orange peel stair" twists and moves from straight to curved with vertical slats like a paper doily case, whilst the shop is more refined.

During the tender stage there was some concern from potential sub-contractors regarding the buildability of the pods, in particular. They were complex geometrically and required a high degree of skill and co-operation to be realised. The team at Architectural Joinery Services (AJS) worked closely with pHp and the geometry became not only achievable, but further refined, to suit both the program and an offsite production process.

The timber sub-structure fins were reproduced in plywood at AJS's factory in

York and shipped to site where the timber carcass could be site-measured, leaving the high quality veneered panels to be installed once the building had progressed enough to safely receive them with little danger of damage.

Mark Pennington of pHp explains, "AJS utilised a sophisticated CAD joinery package that enabled the three dimensional surface of the pods to be 'flattened' to enable each panel to be cut from a flat sheet. The sheet was then gently eased across the ply fin formers on site to reproduce the curved profile with the minimum of site cutting or modification. The resultant finished elements are more like high quality pieces of furniture than building construction. AJS exercised incredible skill and care to realise the project on site to such a high standard. We clearly had the right people for the job".

When the building was first opened in the spring term this year, both staff and students were - and still are - drawn to stroke the pods. It seems that the tactile quality of the Red Oak exerts a subconscious power that encourages everyone to handle it in a way that that people don't with any other material.



IMAGE: One of the school's major prefabricated pods. Photo©Dennis Gilbert