PROVIDING AN EDUCATION IN BUILDING VALUE

Pupils and staff at Woodside High School in Wood Green, London, will be the first to benefit from a proven sustainable technology being trialled by one of the UK's leading property services providers.

Apollo Education has become the first major construction company in the UK to build a school using Nudura's Insulated Concrete Forms (ICFs). Specified for the company's £24.9m inclusive learning campus project at Woodside High School in Wood Green, London, the building envelope solution forms part of a project to amalgamate two special schools with the existing mainstream school.

The cutting-edge ICF system was chosen by Apollo for its ability to accelerate the build process and reduce risk; its design flexibility; and its contribution to energy-efficiency. For phase two of the project, the system is being used to construct the building envelope of a new two-storey teaching block and special needs unit.

As ICFs offer design flexibility over modular pre-cast concrete options, Apollo was able to accommodate a design which replicated the architectural features of Woodside's existing buildings.

Expert at working in occupied school environments, Apollo's use of Nudura formed part of a wider plan to cause minimal disruption to the school. The forms have enabled each building envelope to be made watertight earlier in the construction programme than if traditional methods had been used, and they have permitted fitting-out to commence some six to eight weeks sooner than with conventional blockwork. The system also reduced the risk of delays to the programme caused by freezing winter weather conditions. ICF can be installed using both trade and semiskilled labour.

Apollo Education's project manager, John Hill, comments: "Apollo is experienced in working in live school environments, and the Nudura system has given us additional assistance in successfully meeting a challenging schedule for our client and in meeting our sustainability goals. The system has the added benefit of flexibility of design."

Jean Marc Bouvier, technical manager for Nudura, says: "The builder-friendly aspects of the system made for an easy transition for Apollo, as this was its first experience with this type of building system."

Terry Smith, director of Clark Smith Partnership, which acted as structural engineer on the project, added that the project's design requirements were for good vertical load-bearing capacity and good lateral load (ie wind) resistance. Any system had to achieve robust construction to meet disproportionate collapse requirements stipulated by Requirement A3 of the Building Regulations. Durability and the ability to accommodate large openings were also key.

The school's superstructure offers the structural resistance necessary, with a 150mm-thick external Nudura wall construction using C32/40 concrete with in-situ concrete floors at 3.6m floor to floor. The Nudura system requires horizontal bars to be spaced at 457mm, placed alternately on either side of the centrel ine of the wall. Vertical bars are located centrally.
**What is Insulated Concrete Form (ICF) technology?**

- Insulated Concrete Forms consist of two panels of EPS (expanded polystyrene) foam
- Both layers of insulation are held together with cross ties or ‘webs’, creating a block or form unit
- These webs resist concrete pressures within the wall during concrete placement and vibration
- Resulting form units are stacked in a similar way to building blocks
- Concrete is then poured within the hollow cavity to create a solid, reinforced concrete wall with excellent thermal resistance and sound attenuation.

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in the wall itself to comply with Requirement A3, along with horizontal ties at every floor and wall junction.

Terry Smith comments: "The Nudura system is robust and very adaptable. It has been well thought through and the product fits together very well using the special corner pieces. The propping system with integral working platform leads to simplicity and efficiency."

Quality ICF systems are both simple to install and built to last. Some 1.115m² of the Nudura system can be fitted in one step. This reduces the number of pieces and seams and results in a robust and dependable wall, increased productivity and reduced labour requirements.

Blocks are typically installed to a lift height to suit requirements; Woodside was 3.3m/lf. Concrete is then poured into the forms. To ensure that no air remains within the void, the concrete is consolidated by means of a mechanical internal paver vibrator. As soon as the floor/roof is installed, wall building continues. The system arrives folded flat to reduce distribution costs and to allow for easy handling and onsite storage. A sturdy four-way reversible interlock enables the forms to lock together and waste is almost eliminated.

Apollo is constructing the Woodside inclusive learning campus with sustainability firmly in mind, and the Nudura system can contribute significantly towards achieving greater overall building energy-efficiency through good thermal insulation and air permeability. Typically, the air permeability achieved is better than that required of a zero carbon home — at 3m³/m²/hr. In 2010, Nudura was used to make Richarsville Elementary the first zero carbon school in the USA, where the average school emits some 47.4kg of CO₂/m²/yr – the Richarsville figure was calculated at 11.7kg.

The double foam insulated concrete core acts as a very effective sound barrier and dampens sound vibrations. The combination of EPS foam with reinforced concrete creates a synergy to form a structure that is extremely energy-efficient, airtight and moisture-resistant. Air quality is excellent, as the Nudura system has been laboratory tested, and walls do not support mould growth, so the building becomes a healthy, comfortable working environment that is easier for mechanical systems to heat, ventilate and cool.

An ICF building can, in theory, last for hundreds of years. Nudura is a member of the UK/US/Canadian Green Building Association and is proud to contribute to the BREEAM, CSH and LEED programmes.

Earlier this year, Nudura Corporation launched three thermal inserts that improve the thermal performance of the building envelope to meet and exceed Building Regulations and Passivhaus standards. Nudura forms are produced from recycled or recyclable material, using no ozone-depleting processes, producing little waste during construction and emitting no CFCs or HCFCs.

In comparing build cost, the Nudura system is typically marginally greater than timber frame but, because savings can be made on heating and ventilation systems, and pipework can simply be chased into the wall with a knife, construction actually becomes cheaper.