

## **Building Overview**

The new teaching block has evolved throughout the process with environmental credentials at the forefront of the design, construction and in use operational life cycle of the facility. The approach was one of simplicity and consideration to the environment in terms of raw materials, manufacturing, installation, and in use operation and maintenance for the building over its entire lifespan.

We have achieved this by employing a number of technologies and components to demonstrate the environmental credentials of the building throughout its designed lifespan. The main ones are summarised below.

## **Design and Construction Features**

### **Structural Frame**

The Building is constructed from an In-situ structural cast Concrete Frame which has excellent thermal mass credentials. Essentially this retains thermal gain and releases the embodied heat through the day in winter, thus reducing heating costs. In the summer heat is absorbed based on relative outside temperatures and released during the evenings thus effectively cooling the building down. Additional benefits are also gained by reduction in heating costs and a reduction in wasted energy.

### **External Curtain Wall Glazing and Frames**

All Curtain Walling is glazed with high performance low emissivity glazing in the screens and rooflights throughout with solar control glass and argon gas filled cavity to reflect solar gain in summer and retain warmth during the cooler months. This provides an equilibrium within the building itself inherently improving energy consumption, reducing costs and reducing waste.

Aluminium Frames are made from recycled content bauxite mineral (Aluminium Ore) and are thermally broken with non-oil based thermal breaks for reduced CO<sub>2</sub> during the manufacturing process and life cycle of the products.

### **Self- clean glazing and glass**

In addition to the high thermal and comfort performance of the glass, all glazing units have a self-cleaning glass surface to the outer pane to facilitate the reduction in additional water based glass cleaning technology during the in-use phase/lifespan of the building. This treatment has been applied to the full atria roof-light construction and all external glass panes and panels.

### **Solar Shading**

Brisse Soliel solar horizontal shading shelving units have been designed and installed on the South West facing elevation to minimise solar gain and shade the façade and inner rooms. This promotes natural and passive methods in terms of building performance and enhances natural comfort levels within the building.

### **Efficient Hot Water Heating and Storage**

Solar Panel (1 number) on Roof (Solar Thermal) in relation to heating of hot water and supply thus reducing Electrical consumption along with extremely efficient Megaflo Eco Solar direct storage cylinder equipment. Reduction of electrical consumption costs of around 30% on standard systems.

### **LED Lighting Systems within the Building and externally in landscaping and security lighting**

LED Lighting throughout the building thus reducing lighting costs in electricity by around 20% in relation to standard lighting schemes. All lighting has additional PIR to reduce energy costs (Passive Infra-Red) motion sensor detection as well as traditional switched and mains power supply feed.

### **Highly efficient HVAC System installation with a reduced CO<sub>2</sub> output in relation to traditional Gas Fired Boiler and Wet Pipe radiator systems**

The system designed and installed which is an AC and Heat Recovery Ventilation System also recovers 75% of the heat from the air being changed in the building and pre-heats the fresh air being changed in the building and pre-heats the

fresh air introduced into the building which accounts for the low running costs. The resultant saving in energy costs equates to a 53% reduction compared to a traditional Gas Fired Boiler and wet pipe Radiators/Underfloor heating systems.

#### **Low point of use toilet and sanitary cisterns utilising minimal flush technology and water consumption reductions**

Toilet and welfare areas sanitary-ware and cisterns minimal flush technology ensuring that low volume of mains water is used throughout all welfare facilities within the building. This technology reduces point of use water consumption by around 30% per each use/flush of each WC.

#### **Recycled aggregates and materials used in the hard and soft landscaping schemes**

All aggregates used within the hard and soft landscaping zones are of recycled material and have been sourced from approved crush recycled processing plants, making use of recycled and crushed hardcore, concrete and aggregates.

This greatly reduces the energy required during the manufacturing process and promotes the ecological aspect of the project by using significant volumes of recycled materials.

#### **Passive fresh air intake on roof top atria kit**

The upper most roof atria adopts sensor fresh air intake louvres at the perimeter with CO2 Sensors employed to ensure if levels of Carbon Dioxide within oxygen levels reach the upper limits of acceptability then the horizontal louvres will automatically open providing improved comfort levels to the occupants by drawing in fresh air cycling in the building.

#### **FSC timber sourcing throughout the scheme**

All timber used in the project has been sourced and identified via the Forest Stewardship Council products scheme. All products are either 100% from renewable sources, FSC Mixture of sources and FSC Recycled products such as Chipboard, OSB Board and Medium Density Fibreboard products.

#### **Recycled steel products in reinforcement bars**

All mild steel products used in concrete reinforcement bars and cages has been sourced from recycled steel from previous uses such as car manufacturing, commercial furniture manufacture etc., thus significantly reducing wastage and promoting recycling on an ongoing basis.

#### **Water based paints and stains used throughout the scheme**

Throughout the entire project all emulsion paints, satinwood, eggshell and specialist staining products are low odour, low toxins and are water based products with no tangible VOC Content (Volatile Organic Compounds). These are less harmful to the environment do not pose a risk during or after application. There are no associated risks with these products during their life cycle.

#### **Soft Landscaping Soils and Fertilisers**

Filtered and screened top-soils and planting base utilising organic fertilisers and products naturally produced from a variety of composted waste materials have been specified and used within the soft landscaping scheme.

#### **Soft Landscaping Planting**

All plants have been cultivated from seeds or cuttings from already established plants at reputable plantation nurseries. Extensive planting has been utilised within the landscaping scheme promoting the environment, attracting pollination and photosynthesis encouraging a balanced ecological environment.

#### **External Benching and border retainer edgings**

All seating, benching and retainer edgings in the landscape scheme are specified and manufactured from recycled mild steel products. Recycled steel being taken from a variety of sources such as car manufacturing, furniture re-cycling etc.

## **Manufacturing of products and In-Use Maintenance of the Building**

### **Life Cycle Costing and Strategies**

1. The whole design and building has been designed with Life Cycle at the forefront of the process. This embodies all processes, incorporating raw materials, manufacture, installation, in use, maintenance and finally recycling.
2. Low carbon manufacturing technologies have been used on items such as the Atria Rooflight designed and manufactured in Germany with recycled aluminium framing products. Steel external benching, reinforcement and aggregates in the landscaping scheme.
3. Local supply chains have used throughout in terms of contractors/suppliers/manufacturers and installers to minimise the carbon footprint in project delivery and manufacturing of components etc.
4. Low energy technologies used throughout minimizing future maintenance demands during in use for example self-cleaning glazing, insurance backed guarantees on roof coverings and low maintenance Mechanical and Electrical infrastructure equipment.

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