

Corus Colors

The Eco-Factory Gateway development

Case study





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Baglan, Glamorgan

Architect: DRU, at the Welsh School of Architecture and Directorate of Property Services, Neath and Port Talbot Borough Council

Cladding contractor: Tilbury Douglas Construction

Subcontractor: Bremma Construction Ltd.

System manufacturer: Corus Panels and Profiles

System type: Composite panels (walls)/built-up (roof)

Profile type Micro-rib (walls)/trapezoidal (roof)

Colorcoat® product: Celestia® (walls) and HPS200® (roof)



Aquarius



Goosewing Grey



Background

From the early 1970s techniques have been developed to improve the energy efficiency of factory buildings in the UK. These developments in theoretical studies and eventually in built form have mainly focused on improvements in the thermal efficiency of the building envelope.

There are some notable examples in mainland Europe, built for bespoke clients, of low energy factories that demonstrate how form may be

manipulated to exploit other passive measures such as daylight and natural ventilation. Despite some interesting project proposals, few built examples exist in the UK. Furthermore, the UK industrial market continues to be dominated by the speculative 'shed' and little attention has been paid to the potential for passive design measures in this particular building type. The Eco-factory was subject to well-known passive design techniques combined with principles of design for flexibility and adaptability.

The brief

In February 1999 whilst BP were vacating their refinery site at Baglan, to the west of Port Talbot, Neath and Port Talbot Borough Council formulated the brief for a new factory. The Welsh Development Agency had prepared a 'masterplan' for a Low Energy Park and the local authority had won funding in the region of £2.5m for a 'Gateway' first factory on the site.

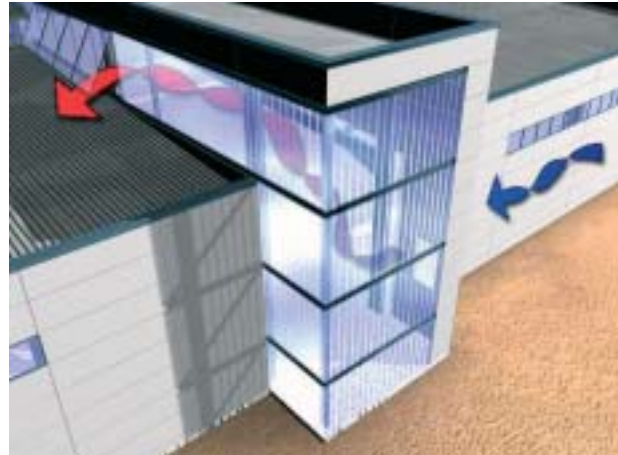
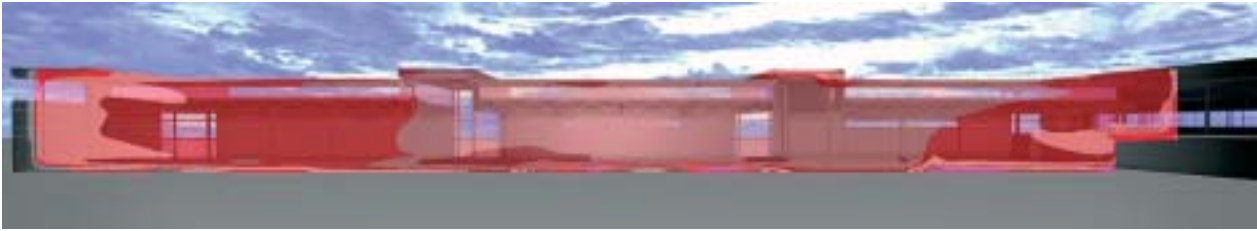
The brief included the following requirements: -

- The gross area of the building must be 4,645 m² (50,000 square feet).
- The budget of £2.5m including all fees must not be exceeded.
- The building must be completed within 12 months.
- The building must achieve a BREEAM 'excellent' rating.
- The building must provide the best possible example of good environmental design.

The site lies on reclaimed land about 800m from the banks of the Severn estuary. The M4 motorway runs parallel with the Estuary and between the low lying river levels and the dramatic valley and hill escarpments that take off, 800m to the north. The prospect to the south and the River Severn is dominated by the dramatic form of the Corus steelworks at Port Talbot. The new factory can be seen clearly from the motorway and the intention was that the activities in the factory would be partially revealed as ghostly images through the amethyst blue translucent glass. The initial concept was prepared from sketches that dealt with both principles of sustainability, low energy architecture and flexibility. These studies were based on research into the energy performance of industrial buildings in use over the past 20 years.

Further research on flexibility and adaptability informed the concepts for form and structure. At this early stage in the design process the sketches represented a set of explicit intentions that would provide for visual and thermal comfort through means of passive design.





Design

Working in close collaboration, Neath and Port Talbot Borough Council and the Design Research Unit at the Welsh School of Architecture developed and sketched out the character of the building. These displayed initial ideas about the materiality, passive design strategies and flexibility. The 'pop-ups' shown in the early drawings were crucial to the success of the environmental and spatial concepts. It was essential therefore to preserve these 'pop-ups' throughout the design process not only because of their contribution to the overall building performance but also the impact the building would have on the landscape and immediate context.

With the site visible from the steelworks the use of steel was considered to be most appropriate for both the structure and cladding, providing an economic, social and environmentally sustainable solution. The choice of *Colorcoat Celestia* for the wall cladding was driven by the joint considerations of appearance, sustainability and cost-effectiveness.





Innovation – sustainability

A number of design measures have been taken to promote design for sustainability with the Eco-Factory achieving a BREEAM rating of 'Excellent'. The use of pre-finished steel cladding for both the roof and walls itself gained points on the BREEAM scale since this construction is rated as 'A' in the BRE Green Guide.

The design principles rested and on the well known strategies for passive design:

- Daylight.
- Natural ventilation.
- Solar control.

Manipulation of the building form for day-lighting and natural ventilation was considered by members of DRU to have potential for improved performance through design. Consequently the ventilation of the factory was to be designed, rather than depending on natural air leakage, with day-lighting also considered to be an important factor. Although BREEAM only requires a relatively low standard, the

team considered that higher standards might be achievable within the constraints of the budget and programme that seem to plague this building type.

The ventilation design needed to respond to summer and winter conditions. The most appropriate solution was considered to be predominantly natural ventilation, operating in winter and summer. It can facilitate ventilation rates of 1.3 l/s per m² of floor area under calm summer conditions, with an average internal-external air temperature difference of 0.8°C.

A study was carried out to manipulate the form and envelope of the proposed design and measure daylight factors across the factory production floor space using scale models of the proposed design. The work was carried out using the Welsh School of Architecture's Sky Dome, with measurements made of daylight factors in the model under a simulated overcast sky. The best combination of daylight components was determined to be the Upstands, North and side pop-ups and high strip windows.

Details

As well as the passive design strategies above the achievement of 'BREEAM' excellence also rests on a high standard of thermal performance plus detailing to reduce air leakage (in accordance with the EEO/BRE design manual for energy efficiency in factories).

The external walls and roof are modularised to break down the scale of the building but also to assist with buildability and detailing.

Colorcoat Celestia in Aquarius helped to give an appropriate presence to the building with a high-quality metallic look, within the cost-orientated brief of the factory project.

Awards:

- 11th *Colorcoat* Building Awards – Winner best industrial building.
- RIBA Award for Architecture 2002
- Short-listed for RIBA 2002 special award/ Sterling prize
- Civic Trust Award

