

Powder Coatings and Sustainability

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Recycled aluminium, which requires only 5% of the energy consumed in processing virgin aluminium, has impressive and widely recognised green credentials. Less well known is the fact that the use of powder coatings on aluminium can not only provide designers with a limitless range of colour options but also enhance the metal's green credentials. Powder coating users are also adopting greener technologies by installing more efficient processes.

Factory finish preferred

The US Whole Building Design Guide recommends "factory finishing rather than field-coating where possible... Powder coating is preferable to solvent-based coating application systems."¹

Powder coating of extruded aluminium is a very efficient process, especially carried out on modern vertical coating lines. Aluminium extrusions, up to 8m in length, are hung vertically and very close together before being pre-treated (today often with organic pre-treatments rather than the older chrome-based systems) using an efficient spray process. Powder is then spray applied in specially designed booths which when baked in an oven melts to form a tough durable coating.

All over-sprayed powder remaining in the

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spray booth is collected and re-sprayed. When the colour needs to be changed, the booth is sealed and pressurised air knives are used to drive any excess powder down to a recycling system for collection and later use. This ensures 99%-plus usage of the powder coating material.

Sun-reflective

Powder coating protects the aluminium substrate from the weather and thus from oxidation or filiform corrosion. But nowadays it also offers an added benefit – it can reflect solar radiation, helping to keep the metal, and thus the building, cooler. This is recognised by the US Green Building Council's p Leadership in Energy and Environmental

Design (LEED) programme, crediting it with both a reduction in heat-island effects and a beneficial impact on the energy efficiency of the building².

While the idea is novel applied to aluminium extrusions, this technique has been used in roofing for several years. The effect is achieved through the use of infrared (IR) reflecting pigments. IR reflection rates can be increased by up to six times, depending on the shade.

The longevity of modern powder coatings also makes them a green choice. Ultra-durable polyesters and fluorocarbon powders are now available with expected lifetimes on a building in excess of 30 years. AkzoNobel's Interpon D2000 product used on a California hospital (Mission Hospital, in Viejo, pictured) passed the 15-year milestone in 2006. Measurements of its gloss and colour showed they had hardly changed since installation in 1991, making re-painting or re-cladding a distant prospect.

Coating and recycling

A misconception about coated aluminium is that the coating affects its recyclability. In fact, the recycling process easily removes the organic coating with no detrimental effect on the aluminium so produced. It is true that painted aluminium attracts slightly lower prices from recyclers than uncoated aluminium, but when looking at the total environmental gains and energy savings from recycling the metal, this is negligible.

Around 90% of aluminium building

Bishop's Square, Spitalfields, London - powder coated in 2006



Viejo Hospital, Mission, California, coated with ultra-durable powder



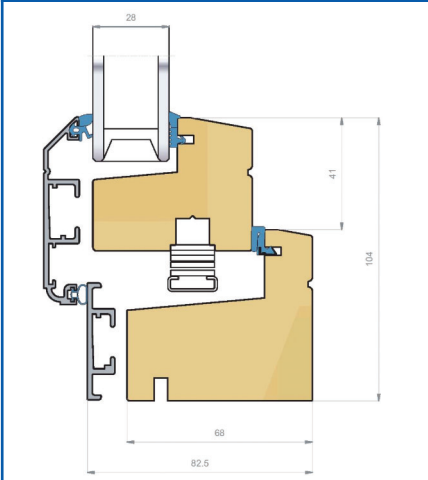
An example of the high rating given to powder coating as a green process is given by Metalliform, a UK-based manufacturer of classroom and stadium seating. The company attracted finance from the UK's Carbon Trust, a government body dedicated to reducing the use of fossil fuels, for the installation of more efficient powder coating equipment²

Interpon D2000 in 1991 and still looking good

SUB HEADING

Sub heading

Sketch of SAS Hybrid casement window profile



Leading powder supplier AkzoNobel is showing the way by reducing waste in the coating process with its “onLine” coating control system. This monitors the total coating process, alerting operators and remote AkzoNobel technicians instantly in the event of a problem so that interventions can be made to minimise waste and rejects.

Box 2

components are recycled at end-of-life and new building uses around 45% recycled aluminium – and this is rising⁵. In the USA, one leading window manufacturer, Keymark Corporation, uses “an aluminium billet consisting of a recycled content of 64% (41% pre-consumer and 23% post-consumer)”⁶ in its window profiles, and the company is now moving to a powder coating process from liquid paint to further enhance its green credentials.

Aluminium/wood hybrids

While it is widely believed that PVCu is a poor material for sustainable windows and doors, there is much debate about the relative merits of aluminium and wood. Wood costs very little in energy terms to process into the required shape and it is, of course, biodegradable at end-of-life. However, it takes a great deal of mainte-

SAS Hybrid window - an eco-efficient combination of real wood and aluminium



nance to protect it over while it is in use.

One way around this is to use aluminium on the exterior for strength and durability, with engineered wood on the inside for its warm feel and visual aesthetics. Such an approach is gaining ground, the only downside being that today the wood has to be coated with a liquid paint that is less environmentally friendly than powder coating. A suitable powder coating, already available for medium density fibreboard (MDF), is surely around the corner.

Colour and design

Specifiers are increasingly interested in colour, and the palette available from a powder coating is constantly increasing. Even 10 years ago, most powder coating suppliers offered solid colours only, yet today all have a range of metallic and other effects. This colour availability has led architects to begin specifying different colours inside and out, as in a recent library building in Otley, Yorkshire, UK⁴ where at the exterior the profiles are a metallic grey but at the interior they are white. The blue glass used on this project is accentuated by the grey powder coating, and the building exterior is lit at night by blue lighting to dramatic effect.

Such innovative ideas from architects

Designed to very high green credentials, the Time Warner building in New York uses powder-coated fins to retain heat from the sun in winter but block out the sun in summer. The colour of coating used was a metallic blue although not an IR-reflecting version – surely an oversight that would be remedied if the building were to be constructed today?

Box 3

force the supply chain – powder coating suppliers, applicators and fabricators – constantly to invest in new technology to satisfy their visions. The challenge is to create these new colours in a way that is not detrimental to the environment and, if possible, enhances it.

Specifiers also increasingly see aluminium as a sustainable choice for construction, and its use with a powder coating for decoration is supported by a raft of new standards and environmental rating agencies. As engineers and manufacturers continue to explore the shapes possible and the materials that aluminium can be combined with, the potential for aluminium in construction in the future will continue to expand. ■

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