



ARCHITECTURAL
WINDOW SYSTEMS & THE
ENVIRONMENT
overview and current initiatives



OUR BRANDS

residential & commercial
systems



Architectural Window Systems (AWS) designs, extrudes and finishes the Vantage and Elevate™ Aluminium Systems ranges of high performance windows and doors. AWS designs window and door systems to meet the latest market demands, trends and standards and provide literature, services and support to enable our licensed manufacture network to consistently manufacture quality products that are compliant with Australian Standards.

AWS have recently released a new Thermally Broken range of Aluminium frames. The Designer Series ThermalHEART™ range offers up to 32% better thermal performance than standard double glazed aluminium frames and is the first suite of products of its kind designed specifically for the Australian climate.



ARCHITECTURAL WINDOW SYSTEMS & THE **ENVIRONMENT** overview and current initiatives

Architectural Window Systems is one of Australia's leading suppliers of aluminum window and door systems, offering an extensive range of locally designed window and door suites for residential and commercial applications. Our brands – including Elevate™ Aluminium Systems, Vantage Aluminum Joinery and ThermalHEART™ are prominent in the Australian construction industry and are manufactured throughout the country by a network of independent manufacturers. As a market leader in its product segment,

AWS recognises the importance of seeking to achieve 'best practice' status on a range of environmental management issues. The quest for excellence in practices that affect economic and environmental sustainability is a journey rather than a destination and the company recognises that green initiatives will be part of its strategy over the long term. This overview paper is intended as an initial description of the environmental context within which AWS operates – including reference to early stages of the product life cycle – as

well as a declaration of current initiatives underway at AWS and within its raw material suppliers and contractors. Fuller studies on aspects of its operations and life cycle will be published in the future as well as advice on the progress of new initiatives.

ALUMINIUM & SUSTAINABILITY

Aluminium is the most abundant metal in the earth's crust. It is derived commercially from bauxite, an abundant, naturally occurring mineral which is estimated to have minable global reserves measured in the hundreds of years. This compares with a possible 50-year supply remaining for fossil fuels, the raw material for plastics or vinyl windows, and contrasts with renewable supply circles for timber, the raw material for wooden windows.

The smelting of aluminum and the extruding of aluminum profiles require large amounts of electricity for electrolytic and heating purposes. This requirement gives aluminium windows a high 'embodied energy'. Offset against this is the favorable comparison between aluminium and alternative window materials for both recyclability and durability. Studies have indicated that aluminium and wood

windows typically last over 40 years, while PVC has an optimum life of 25 years. Aluminium is notable for its ability to be recycled indefinitely owing to its high intrinsic value and the widespread industrial infrastructure devoted to re-melt and re-purification of the metal. Recycled aluminium accounts for one third of global consumption but there is considerable scope for the recycled content of global production to be increased.

Aluminium windows have unique properties of strength, light weight, ductility & corrosion-resistance. Because of the balance that needs to be achieved between energy conservation and the ideal allocation of energy rich materials to appropriate end uses it has been stated that aluminium is best used in applications where its unique properties

are indispensable. The aluminium window and door industry maintains that its use in this sector is important and well justified. Aluminium windows have attributes of span, scale, strength functionality and aesthetic capability that alternative materials have difficulty in matching. Modern architectural trends and practices would be significantly impacted if exterior aluminium joinery was unavailable. Provided that maximum levels of recycle of scrap or demolition aluminium are achieved and other measures of environmental mitigation are implemented at all points in the production process, AWS believes that aluminium windows and doors offer an acceptable solution from the viewpoint of sustainability.



THE AWS **SUPPLY CHAIN**

The majority of aluminium billet used by AWS's extrusion company, INEX, in Dandenong, is sourced from Boyne Smelters Limited (BSL) located at Boyne Island (20 kilometers south of Gladstone). Boyne Smelters Limited is owned and operated by Rio Tinto.

RIO TINTO

Rio Tinto is a leading international mining group with its headquarters in London. With the recent acquisition of Alcan it is the world's largest producer of aluminium.

In September 2007 the company was admitted to a special UK stock exchange index, the FTSE4Good index, which measures the performance of companies that meet globally recognised standards of corporate responsibility. The index identifies and facilitates investment in such companies. The FTSE4Good policy committee sets stringent criteria for qualifying companies covering environmental impact and management, health and safety, community and employee responsibility and product stewardship. By meeting all these criteria in addition to other qualifications, Rio Tinto became eligible for admission to the index. Entry criteria are set by an independent committee of experts, including non-governmental organisations, governmental bodies, consultants, academics, the investment community and the corporate sector.

Rio Tinto has also maintained membership of the Dow Jones Sustainability World

Index, since its inception in 1999 and has for a long time been an active member of the World Business Council for Sustainable Development and the International Council on Mining and Metals, whose members endeavour to maintain superior business practices in sustainable development.

Rio Tinto chief executive, Tom Albanese, stated in September 2007 that operating sustainability was at the heart of the company's philosophy. "At Rio Tinto our approach to sustainable development is embedded through all levels of our organisation and, at all our operations, we try to minimise the adverse effects of our activities and strive constantly to improve every aspect of our performance. Wherever we operate, we hold the health and safety of our employees and the environment as a core value."

Rio Tinto Alcan operates in 61 countries including Australasia. Rio Tinto owns the Weipa bauxite mine, in Queensland, that supplies the bauxite feedstock for the smelter

Rio Tinto Alcan is committed to driving continuous improvement in regards to greenhouse gas reductions and improved energy efficiency across all its sites, including at its Australasian assets. In Australia and New Zealand the company had adopted a portfolio approach to address the greenhouse issue. This strategy includes:

- A focus on operational excellence.
- Engagement in the policy debate, which

mainly focuses on emissions trading scheme design in both countries.

- Involvement in the development of new, more efficient smelter technology and low emission electricity generation technologies.
- The investigation of offsets.
- Life cycle analysis of aluminium products.
- In regard to offsets, one of Rio Tinto's climate change initiatives in Australia in 2006 was a partnership with Carbon Pool Pty Ltd in which Rio Tinto purchased carbon credits arising from the protection of Queensland forest earmarked for possible land clearance. The company's cornerstone purchase of carbon credits saved over 12,000 hectares of native vegetation - which is protected for 120 years - and generated around one million tonnes of fully verified emission abatement.



THE AWS **SUPPLY CHAIN**



BOYNE SMELTERS LIMITED (BSL)

Boyne Smelters Limited (BSL) is Australia's largest aluminium smelter. The smelter produces more than half a million tonnes of aluminium each year from its three reduction lines. Production activities at the smelter include manufacturing of carbon anodes, aluminium production (smelting) in reduction lines, and casting of molten metal into aluminium products.

The Smelting Process

- Bauxite is mined by Rio Tinto Aluminium at Weipa in Cape York and shipped to Queensland Alumina Limited (QAL) and the Rio Tinto Aluminium Yarwun alumina refinery, both at Gladstone, where it is refined into alumina. Alumina is transported by a ten kilometer conveyor from QAL to BSL for the third stage of the aluminium production process – smelting.
- BSL uses the Hall-Heroult process to turn alumina into aluminium metal. This process requires alumina, electricity and carbon. The alumina is fed into individual reduction cells and dissolved in a bath of molten cryolite (sodium aluminium fluoride). The

electric current required for chemical reduction of alumina (230,000 amps for Lines 1 and 2 and 345,000 amps for Line 3) flows into the bath through carbon blocks called anodes. This initiates a reaction that reduces the alumina to molten aluminium and carbon dioxide.

- Molten aluminium settles on the carbon cathodes and is siphoned at the base of the cell. A proportion of the accumulated metal is siphoned out of the cell every 36 hours. Gases generated during the reduction process are collected and cleaned to better than 99 per cent efficiency before being released into the atmosphere.
- Crucible transport vehicles transfer the molten aluminium from the reduction lines to the Metal Products Casthouse, where the metal is formed into either ingot, t-bar or billet products.

INEX

INEX Australia purchases the bulk of its aluminium billet from BSL and is the exclusive supplier to AWS for the brands Vantage and AWS Commercial. INEX has three extrusion presses, two located in New Zealand and one at its plant in Dandenong Victoria.

Key facts relating to environmental performance and initiatives at INEX include the following:

INEX is the only extrusion plant in Australasia to recycle its scrap directly with an aluminium smelter. The net effect of recycling in this manner through billet preparation furnaces rather than through a 'remelt' plant is that there is a dramatic reduction in the energy input for the recycled content (as it acts as an efficient coolant in the hot metal that is cooled before casting).

Because INEX recycles its scrap through its billet supplier it is, in effect, using virgin billet that may have up to 8% of INEX recycled metal content.

INEX recycles all reusable components - timber dunnage, case timber and steel strapping.

As INEX is a large energy user it conducts regular audits to ensure full utilisation of power and gas.

POWDER COATING

AWS powder coats aluminium extrusions for supply to the AWS fabricator network throughout Australia. Powder coating is a method of coating products with a powdered resin which is applied to the aluminium profile. Electrically charged powder is sprayed on to extrusions which then pass into an oven to gel the powder and cure it. The result is a uniform, high quality durable finish.

Prior to this process the aluminium profiles go through a preparation phase comprising the following: immersion in a pre-cleaning tank containing detergent, rinsing, immersion in acid etch solution (a dilute mixture of sulphuric acid and hydrofluoric acid), rinsing, then immersion in a chromate solution (a dilute mixture of acids with chromic acid being the main ingredient), followed by rinsing in demineralised water and drying.

Key facts relating to environmental performance and initiatives at the AWS Powder coat facility include the following:

- Overflow from the pre-treatment tank using chromium 6 is treated with a reducing agent prior to waste disposal. This reducing process converts the compound to chromium 3¹, which is dramatically less toxic than the hexavalent version.

¹ Chromium 3 is an essential nutrient in the diet of humans and animals in small amounts but is toxic at high levels

- Chromium in the waste stream is settled out by flocculation, gathered as a sediment and is then compacted through a filter press before being disposed at a landfill as a dry cake. The chromate tank is emptied annually by a trade waste contractor and the contents are treated before disposal.
- The pre-cleaning tank is emptied for maintenance purposes once a year and the contents are neutralised prior to discharge to trade waste.
- Acid etch tank discharge and acidic rinse water are neutralised with a caustic solution to meet trade waste requirements.
- Rinse tank flows are counter-cycled to reuse clean water and reduce water consumption.
- A significant proportion of the waste powder in the spray booth is sucked back into a collection system and recycled through the application process. Waste powder that cannot be recycled is currently collected and taken to landfill. However, our supplier, Orica Powder Coating, is investigating ways of reusing this powder, possibly in a patented board product with similar qualities to MDF.
- Orica Powder Coating has obtained Enviro-Mark Gold certification, an internationally recognized environmental management system. Its powders are manufactured free of

VOC (volatile organic compounds), TGIC (triglycidyl isocyanurate), PVC or PVC derivatives, formaldehyde, lead and cadmium. The environmental impact of waste powder taken to landfill is rated as low.

WAREHOUSING

Within the warehousing, distribution and office activities of AWS a number of environmental initiatives are in place or under investigation:

- Damaged or reject aluminium extrusions are recycled back through a remelt contractor.
- All cardboard cartons and packaging identified as refuse are sent to a recycler.
- AWS's Prestons warehouse recycle or reuse all packaging materials - polystyrene packers, wooden cleats, cardboard and steel strapping.





ENERGY EFFICIENCY AND PRODUCT DEVELOPMENT

To coincide with the new Government initiatives on energy efficiency in homes, AWS launched its new thermally efficient range of windows and doors in August 2008.

The Designer Series ThermalHEART™ range of 'thermally broken' windows and doors, has a nylon insulator incorporated in every aluminium profile which provides a highly effective barrier for minimising the transmission of cold and the development of condensation. When combined with double glazing the new profiles offer homeowners and designers major advantages in meeting new energy efficiency provisions.

The new window and door range, which offers 32% better thermal efficiency than standard double glazed windows and doors and will provide architects with extra latitude to achieve code compliance in house designs that include extensive glazing.



ThermalHEART™ systems are recognised and listed by Eco-specifier as products which will contribute to the improved environmental performance of the building envelope.

FUTURE SUSTAINABILITY INITIATIVES

quest for better environmental stewardship of the resources it uses will be reflected in further initiatives. The company recognises that environmental sustainability must rank alongside economic sustainability in its business plan. This 'position paper' on AWS's sustainability initiatives has focused on highly practical measures being taken at operational level. A recent move has been made by AWS's owners to address the company's 'carbon footprint' at a broader, macro level.

For more information and the latest updates regarding sustainability and initiatives by AWS visit our website www.awsaustralia.com.au