



Aluminium Extrusion and Sustainability

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Introduction

INEX is the leading producer of aluminium extrusion in Australasia and has the capacity to produce in excess of 40,000 tonnes per annum.

As a market leader INEX strives to set new criteria in environmental management issues and is working to ensure sustainability for aluminium extrusion and its future.

INEX is the only extruder in Australasia to recycle its scrap back to a primary producing smelter to produce aluminium billet. This recycling process reduces the energy requirement in the manufacturing process without compromising the high quality requirement of the product. This partnership with New Zealand Aluminium Smelters Limited is an example of this sustainability quest.

We recognise that sustainability, both economically and environmentally, must be part of a long-term strategic approach.

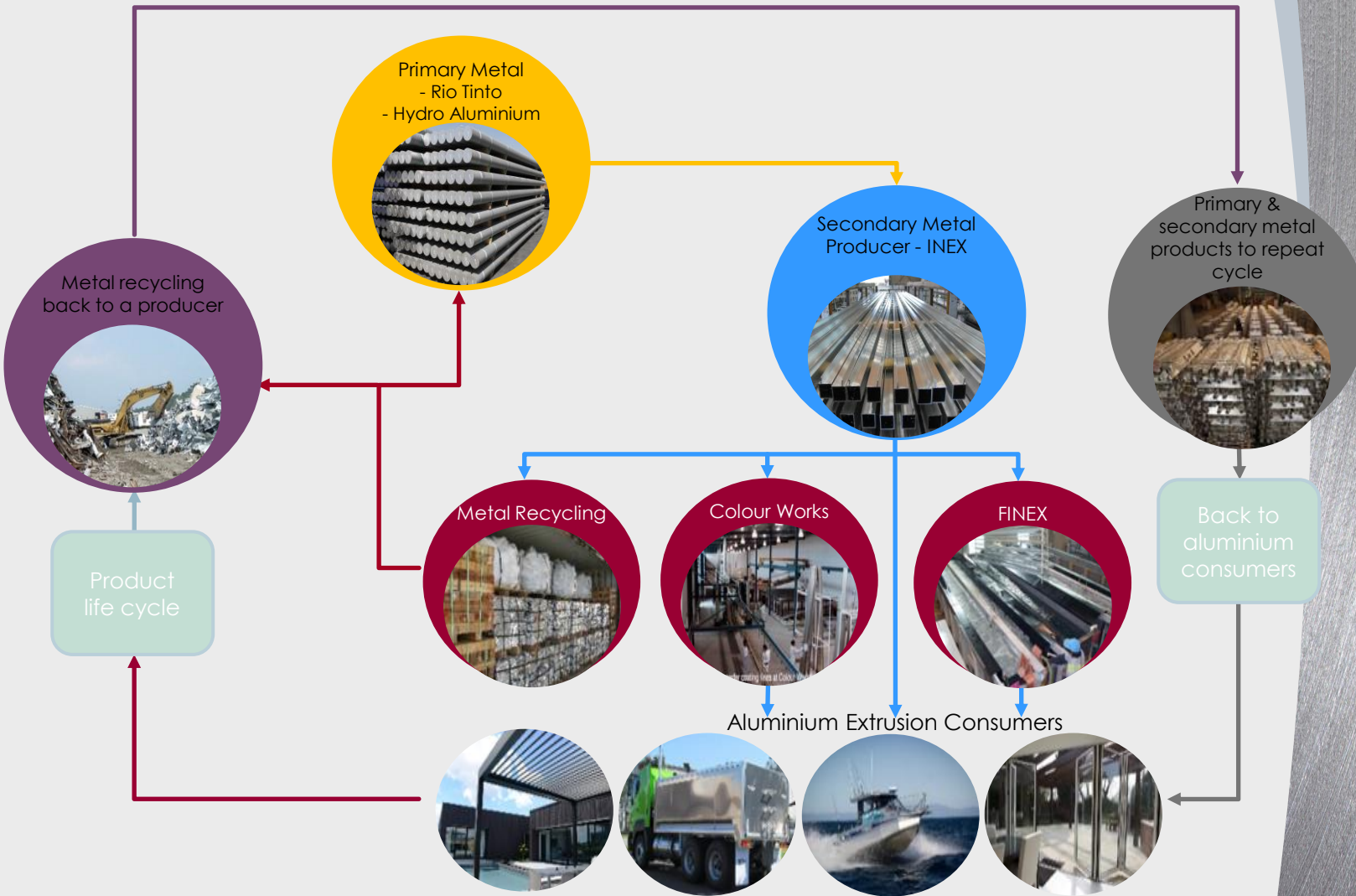


Aluminium: a sustainable future

- ▶ Aluminium is commercially produced from bauxite which consists mainly of the minerals gibbsite, boehmite and diaspore. It has traces of iron oxides, goethite and hematite together with clay mineral kaolinite and traces of anatase.
- ▶ Aluminium is the most common metal element in the earth's crust accounting for 7% of its mineral makeup. The current global estimate of aluminium reserves using today's consumption rate is several hundreds of years.
- ▶ Unlike timber, plastic, ceramics, fibrous plaster and many other products, aluminium can be recycled indefinitely due to its high intrinsic value. Aluminium is also the most cost-effective metal or material to be recycled, thus reducing landfill by 6-9% every year.
- ▶ Aluminium has been recycled since it was first commercially produced and today recycled aluminium accounts for about one-third of global consumption. Recycling is an essential part of the aluminium industry and makes good sense economically, technically and ecologically. All aluminium products retain value, even at the end of their useful life, which guarantees that it is possible to continue to create value by recycling them into new products.
- ▶ Over 75% of all aluminium produced is still in use today.



- The circular economy of aluminium and its associated packaged products.
- At INEX we work closely with our strategic alliance supply partners to ensure a sustainable future for industry and an improved environment.



The circular economy of aluminium

Supply chain management

- ▶ Rio Tinto - 18% overall reduction in greenhouse gas emissions between 2008-2015, exceeding Company goal of 10.6%.
- ▶ NZAS (337K tonnes) - RenewAl metal is externally certified to have smelting emissions of less than four tonnes of CO2 per tonne of aluminium. This guarantees that the aluminium is made from traceable raw materials and is produced with electricity from low carbon sources, using world class smelting processes.
- ▶ Boyne Smelters (570K tonnes).
- ▶ Hydro Aluminium – carbon neutral by 2020. 70% hydro powered.
- ▶ Qatalum (610K tonnes) – Atkins assessment of Qatalum is that impacts have been minimised.
- ▶ World best practices making “the super metal” - Aluminium



Independent Extrusions Ltd (INEX)

- ▶ Australasia's leading manufacturer of aluminium extrusions is continually improving processes and procedures to ensure a sustainable future.
- ▶ Aluminium is the most sustainable of all products, but we can't stop there.
- ▶ Due to the reciprocal billet/scrap arrangements with NZAS, INEX has eliminated the need for an aluminium re-melt plant that adds additional CO2 emissions to the original metal. INEX's recycled metal is used by NZAS as a latent coolant, requiring zero energy to melt and produces no CO2 emissions.
- ▶ Unlike imported "black aluminium" for extrusions or imported metal for re-melting, at 12-18mt CO2/t Al, INEX NZ can state it has the greenest aluminium extrusion produced in the Southern Hemisphere with "cradle-to-grave" at less than 4mt CO2/t Al of extrusion.
- ▶ Our partnership with Liberty One Steel allows INEX Australia to deliver our billet/scrap back to Hydro Aluminium re-melt to become high quality extrusion billet again. This process has less than 1 mt CO2/t Al and uses 5% of energy to make virgin metal.
- ▶ Recycling is a target strategy at INEX. The recyclability of all reusable components is paramount. Timber dunnage for packaging is collected and after grading the dunnage is fully recycled. All steel packaging straps are separated for metal recycling. Timber cases for packaging are repaired and constantly recycled. All die steel is separated and recycled.

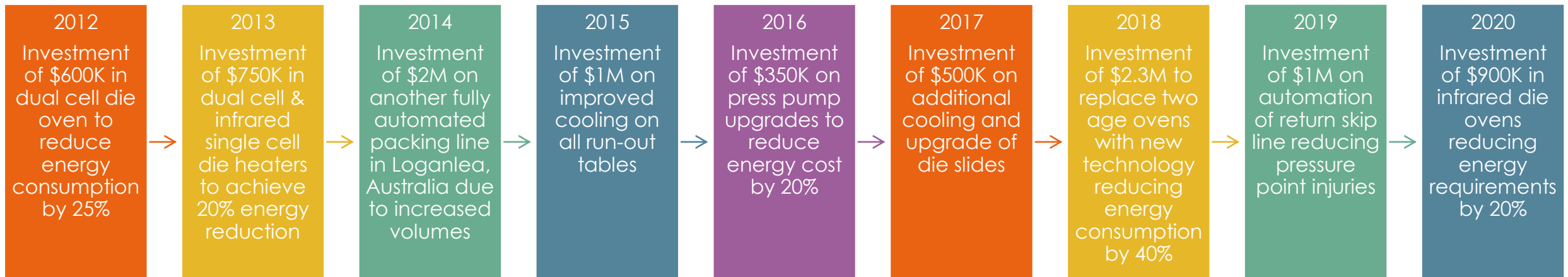


INEX

INEX conducts regular energy audits to ensure full utilisation of power and gas. Having induction billet heating on all presses, as opposed to gas, eliminates any CO2 emissions.

At INEX we are committed to continuous improvement and the ongoing investment to support it. We have achieved several milestones in our quest for sustainability and many objectives have been achieved by targeted projects designed to reduce our energy requirements, improve productivity or increase efficiencies.

We have a commitment to “ensure a sustainable future” and this commitment is part of our company ethos.



INEX : Key Facts



300 employees



4 extrusion presses



3 strategic locations



154k tonnes of extrusion profiles sold 2013-2018 period



Lowest CO2 emissions in Australasia



Continuous improvement ethos



World class process for sustainability from cradle-to-grave manufacturing

Colour Works

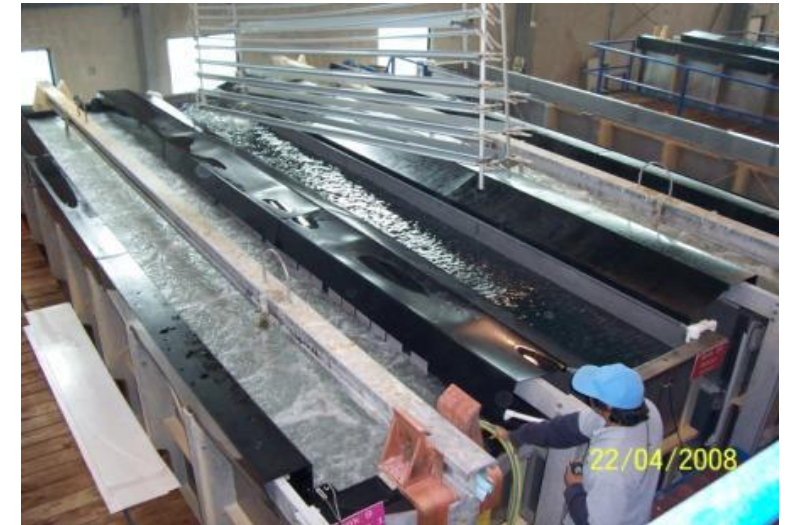
- ▶ Colour Works is an associated company of INEX that powder coats aluminium extrusions. Powder coating is a method of coating products with a powdered resin which is applied to the aluminium profile. Electrostatically charged powder is sprayed on to extrusions which then pass into an oven to gel the powder and cure it. The result is a uniform, high quality and durable finish.
- ▶ In April 2016 Colour Works achieved a major reduction in environmental footprint by installing a vertical powder coating plant, using a chromium-free pre-treatment process. This more benign process greatly simplifies on-site effluent treatment and disposal. The throughput for the vertical powder coater accounts for approximately 70% of our powder coating. The installation of this new technology is believed to be a first for the New Zealand window industry.
- ▶ In January 2018 Colour Works installed a new pre-treatment system for its horizontal line, which consisted a fully automated upgrade with new tanks, dosing and recovery systems. The main point of difference is the move to a non-chromate-based conversion chemical. This change now means Colourworks no longer has any chrome-based systems or chemicals outlined on the Red List. With environmental consideration in mind, 75% of all water used is recycled through its state-of-the-art D.I plant and any waste is pH neutralised and discharged.

Key facts relating to environmental performance and initiatives at Colourworks include:

- Colour Works' main powder coating line, the new vertical powder coater, has a chromium-free pre-treatment regime for a more benign environmental impact
- Colour Works' existing horizontal powder coat lines have also been changed to a chrome-free process
- 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 booths is sucked back into a collection system and recycled through the application process.
- Colour Works' main powder supplier, Dulux Powder Coating, has obtained Enviro-Mark Gold certification, an internally recognised environmental management system. Its powders are manufactured free of volatile organic compounds (VOC), triglycidyl isocyanurate (TGIC), PVC or PVC derivatives, formaldehyde, lead and cadmium.

FINEX

- ▶ FINEX is INEX's on site anodising plant, which was built in 2004. It is New Zealand's most modern anodising plant designed with the latest effluent treatment technology.
- ▶ An extensive underground storage and treatment system was included in the plant's construction and is unique in New Zealand for the comprehensive and integrated design approach that was taken. In addition, failsafe bunding was incorporated to ensure the containment of any accidental chemical spills.
- ▶ The anodising process itself is a complex, multi-stage operation that typically involves an aluminium extrusion in 15 separate tank immersions in order to achieve the lustrous anodised surface finish that is so popular in the building industry. The process requires the aluminium to be cleaned and etched before being subject to electrolysis to create an enhanced protective oxide coating. Colouring may then be carried out (except for a natural anodised finish) and then sealing takes place.
- ▶ The contents of the 20 process tanks include a detergent, rinse water, demineralised rinse water, a caustic solution, and other dilute solutions including nitric acid and ferrous sulphates, sulphuric acid, a sulphuric acid and stannous sulphate mix, as well as nickel acetate. Some tanks are heated.



Key facts relating to environmental performance and initiatives at FINEX include:

- Natural heat generated by the caustic tank is transferred to assist heating of other process tanks. All other heating is by a natural gas burner which heats closed-circuit oil lines
- Rinse tank flows are counter-cycled to reuse clean water and reduce water consumption
- Waste rinse water, waste acid and caustic solutions have metals and solids removed by flocculation
- This precipitate is gathered as a sediment and is then compacted through a filter press before being disposed of at a landfill as a dry cake
- Waste water streams are neutralised before discharge to the trade waste system
- Effluent discharges are to standards applied by the local authority and are sampled and monitored on a regular basis.

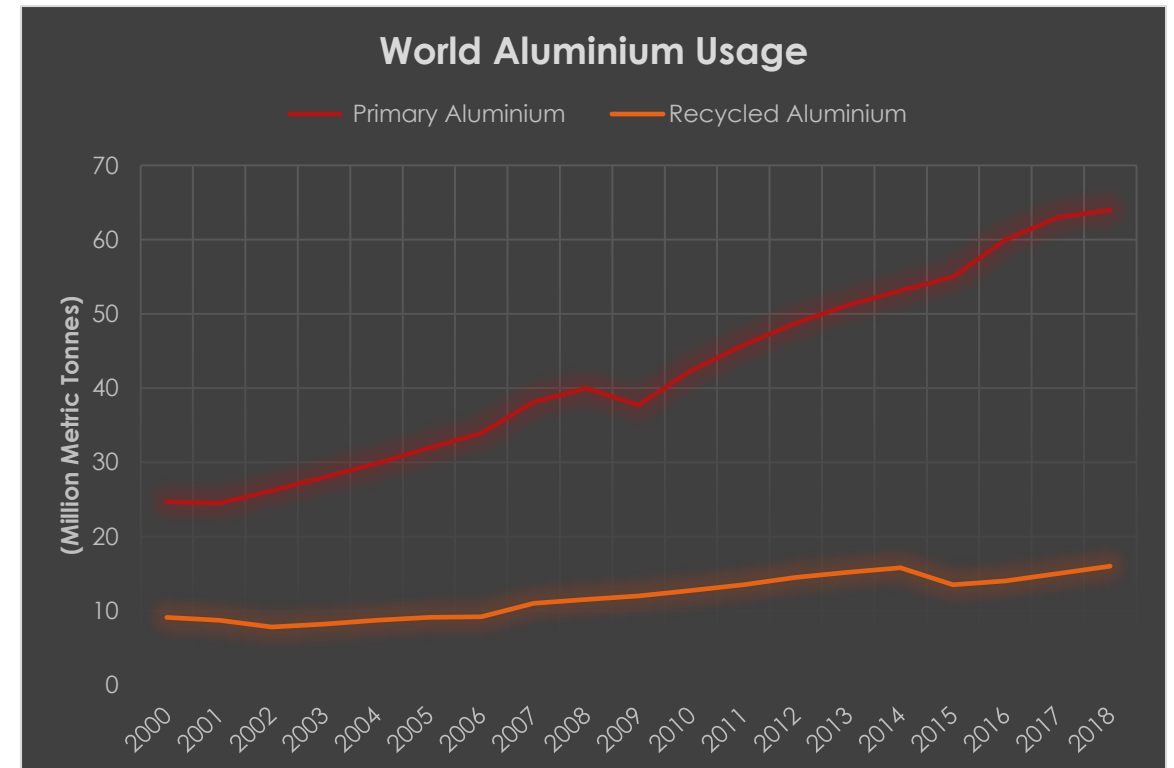
APL Direct

- ▶ APL Direct is INEX's distribution partner. It has 17 delivery trucks, most of which have Euro 5-compliant engines conforming to the strictest standards applicable in the European Union in regard to diesel emissions of nitrogen oxides and soot. APL Direct operates from a new logistics centre to service its nationwide customer base. The new logistics arrangement includes several 'green' initiatives:
 - ▶ APL Direct is believed to have achieved the highest fleet proportion in New Zealand of Euro 5 trucks at an early stage after the emission standard came into force in late 2009. Of the 17 trucks currently in the fleet, 13 have Euro 5 engines and two have Euro 3 engines. Euro 5 trucks are also more fuel efficient
 - ▶ The APL Direct service plan has cut past servicing requirements by half through the use of fully synthetic engine oil. The reduction in oil changes has resulted in a halving of oil disposal and recycling requirements
 - ▶ The APL Direct logistics centre includes a rainwater collection system from the roof which supplies the truck wash station and toilets
 - ▶ The centre has a repair and recycling unit to ensure that empty freight bases returned from manufacturers are made ready for reuse
 - ▶ The APL Direct tyre plan utilises a virgin case tyres which can be recapped and placed on tag axles of the truck fleet, thus doubling the life of company tyre cases.



Sustainable facts about aluminium recycling

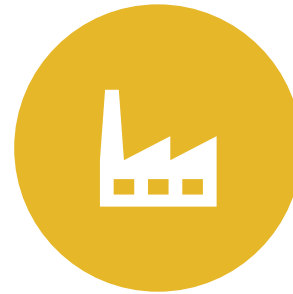
- ▶ Recycling 1kg of aluminium saves up to 6kgs of bauxite, 4kgs of chemical products and 14kWh of electricity because it only requires 5% of the energy compared to primary product.
- ▶ Worldwide aluminium consumption is increasing and forecast to be at 97 million tonnes with around 31 million tonnes being recycled by 2020. The environmental effect of using aluminium as a preferred material will be severely lessened relative to using less durable products that have little or no recycling value.
- ▶ In all areas of transport, aluminium is reducing fuel consumption by reducing vehicle weight. Every kg of aluminium used to replace heavier materials in a motor vehicle can reduce CO2 emissions by 20kgs over the life of the vehicle.
- ▶ In the transport industry it is estimated that the increased use of aluminium has potentially saved enough fuel to offset all of the greenhouse gases produced by the aluminium industry globally.
- ▶ Over 75% of all aluminium produced is still in use today.
- ▶ The most durable, diverse product is also the lowest cost-effective material for recycling.



The Future of Aluminium



Alcoa and Rio Tinto announce world's first carbon-free aluminium smelting process



A revolutionary process to make aluminium produces oxygen and replaces all direct greenhouse gas emissions from the traditional aluminium smelting process



Alcoa and Rio Tinto launch new joint venture, Elysis, for larger scale development and commercialisation of the process, with a technology package planned for sale beginning in 2024



Alcoa, Rio Tinto, the Government of Canada, the Government of Quebec and Apple agree to provide a combined investment of \$188 million (CAD)