

## ALUMINIUM IN BUILDING AND CONSTRUCTION



Today:  
Extensive aluminium use  
in the building sector (see  
last page)



1995:  
1000 tonnes in the European  
Parliament facades in  
Brussels



1989:  
Utilised in the Pyramide du  
Louvre in Paris



1931:  
New-York's Empire State  
Building first to use anodised  
aluminium components



1898:  
Dome of San Gioacchino's Church  
in Rome clad in aluminium sheets



1893:  
Cast Aluminium statue of Eros  
erected in London's Piccadilly  
Circus

### THE HISTORY

In 1893, the famous winged statue of Eros was erected in London's Piccadilly Circus. Made of elegant cast aluminium, it became an iconic symbol of the city and is now one of its best loved attractions. In 1898, the dome of San Gioacchino's Church in Rome was clad in aluminium sheets, which are still in pristine condition today, more than 100 years later. The stunning Art Deco-inspired Empire State Building in New York was the first building to use anodised aluminium components back in 1931. More recently, aluminium was used in the construction of the Pyramide du Louvre in Paris (1989) and for the facades of the European Parliament in Brussels (1995), which contain around 1000 tonnes of aluminium.

Aluminium is now utilised for a host of applications in building and construction and is the material of choice for curtain walling, window frames and other glazed structures. It is extensively used for rolling blinds, doors, exterior cladding and roofing, suspended ceilings, wall panels and partitions, heating and ventilation equipment, solar shading devices and complete prefabricated buildings. Structures like offshore living quarters, helicopter decks, balustrades, scaffolding and ladders, are also commonly made of aluminium.

## THE MARKET

In 2008, the building sector in Western Europe absorbed an estimated 3.0 million tonnes of aluminium as part of an ongoing upward trend. Around 1.7 million tonnes was used for profiles, making this sector by far the largest market for extruded products, accounting for about 51% of all such shipments. A more modest, but still substantial, 1.1 million tonnes found its way into rolled products, representing approximately 24% of all rolled aluminium shipments. Finally, in the region of 0.2 million tonnes of aluminium was used in castings for a range of building applications, representing approximately 8% of all casting aluminium shipments.

## ALUMINIUM PERFORMANCE PROPERTIES

- **Durability:** Aluminium building products are made from alloys, which are weather-proof, corrosion-resistant and immune to the harmful effects of UV rays, ensuring optimal performance over a very long serviceable lifetime.
- **Design flexibility:** The extrusion process offers an almost infinite range of forms and sections, allowing designers to integrate numerous functions into one profile. Rolled products may be manufactured flat, curved, shaped into cassettes, or sandwiched with other materials. In addition, aluminium can be sawed, drilled, riveted, screwed, bent, welded and soldered in the workshop or on the building site.
- **High strength-to-weight ratio:** This unique property allows architects to meet required performance specifications, while minimising the dead load on a building's supporting structure. Thanks to the metal's inherent sturdiness, aluminium window and curtain wall frames can be very narrow, maximising solar gains for given outer dimensions. Moreover, the material's light weight makes it easier to transport and handle on site, reducing the risk of work-related injury.
- **Hundreds of surface finishes:** Aluminium can be anodised or painted in any colour, to any optical effect, using any number of surface touches, in order to meet a designer's decorative needs. Such processes also serve to enhance the material's durability and corrosion resistance, as well as providing an easy-to-clean surface.
- **High reflectivity:** This characteristic feature makes aluminium a very efficient material for light management. Aluminium solar collectors can be installed to lower energy consumption for artificial lighting and heating in winter, while aluminium shading devices can be used to reduce the need for air conditioning in summer.
- **Heat conductivity:** Aluminium is a good conductor of heat, which may be a disadvantage in some applications. However, this property can easily be overcome by the profile design and the use of thermal breaks made of low conductivity materials.
- **Fire safety:** Aluminium does not burn and is therefore classed as a non-combustible construction material (European fire class A1). Aluminium alloys will nevertheless melt at around 650°C, but without releasing harmful gases. Industrial roofs and external walls are increasingly made of thin aluminium cladding panels, intended to melt during a major fire, allowing heat and smoke to escape and thereby minimising damage.
- **Optimal security:** Where high security is required, specially designed, strengthened aluminium frames can be used. While the glass for such applications may well be heavy, the overall weight of the structure remains manageable thanks to the light weight of the aluminium frame.
- **Low maintenance:** Besides routine cleaning for aesthetic reasons, neither bare nor painted aluminium requires any maintenance, which translates into a major cost advantage over the lifetime of a product.

## ALUMINIUM RECYCLING

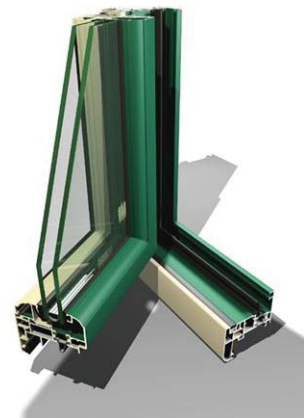
The high intrinsic value of aluminium is a major economic incentive for its recycling. Indeed, aluminium scrap can be repeatedly recycled without any loss of value or properties. Furthermore, the energy required is a mere fraction of that needed for primary production, often as little as 5%, yielding obvious ecological benefits. A study by Delft University of Technology recently revealed aluminium's considerable recycling potential in the building sector. Aluminium collection rates from a cross-section of commercial and residential buildings in 6 European countries were found to be in excess of 92%, demonstrating the industry's commitment to sustainable development.

## INTELLIGENT BUILDINGS

Intelligent facades incorporating aluminium systems can decrease energy consumption in buildings by up to 50%. The key feature of these intelligent buildings is their constructive interaction with the exterior, markedly reducing heating, cooling, ventilation and lighting energy demands. This is achieved through numerous techniques and processes including photovoltaics, optimised ventilation mechanisms and appropriate light and shade management.



Aluminium veranda, windows and blinds



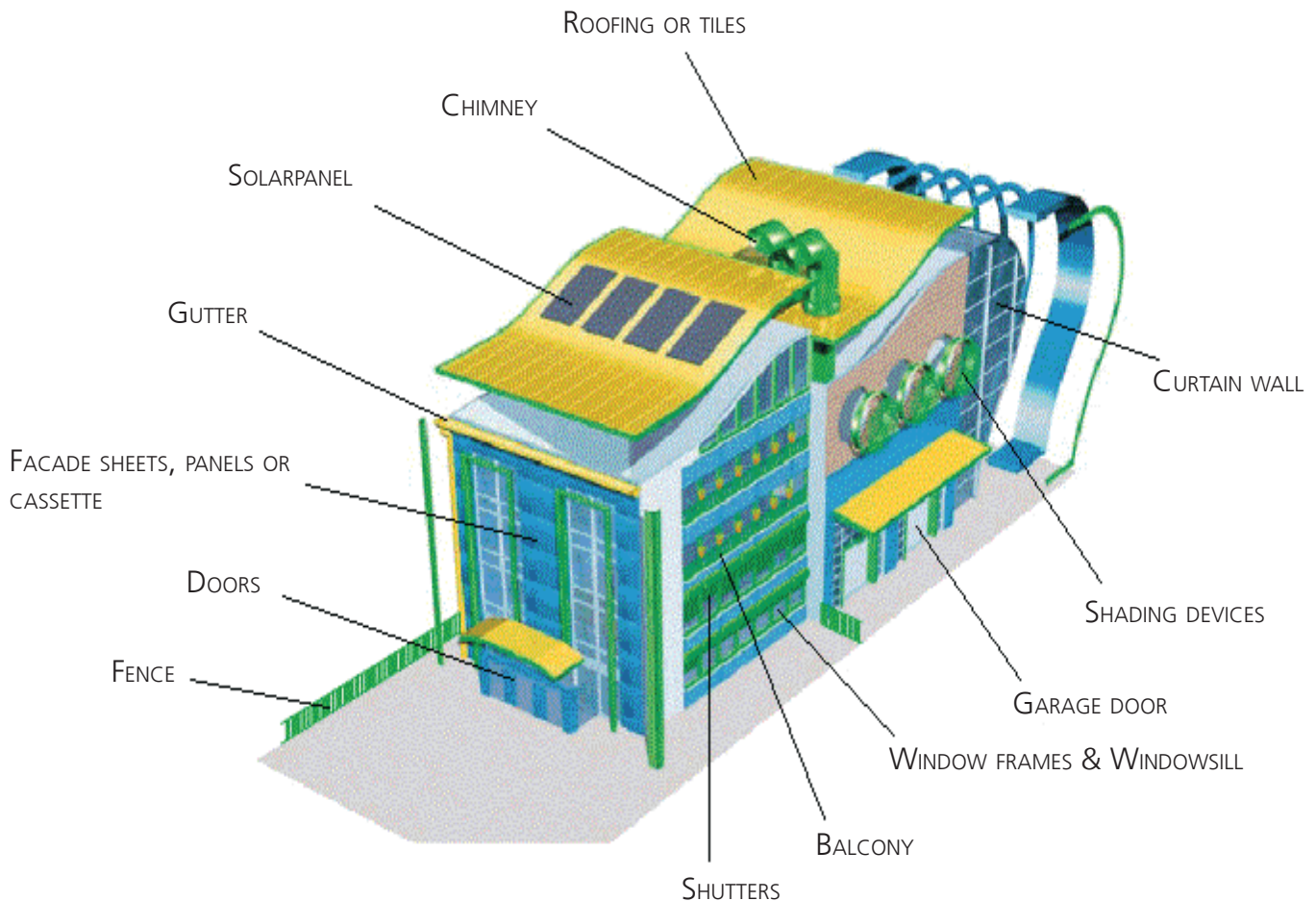
Thermally-broken & bi-colour aluminium window.

## SUSTAINABLE CONSTRUCTION

With the building sector coming under increased pressure to provide environmental performance data, the European Aluminium Association has launched its Sustainable Construction Project and is developing Environmental Product Declarations (EPDs) for aluminium building products in line with international standards. An EPD is the most comprehensive and transparent type of environmental labelling, destined for business-to-business communication. It takes into account the whole product life cycle and computes a vast quantity of environmental information into a set of internationally recognised indicators, such as "use of primary energy", "water consumption", etc. It is, moreover, verified by an independent third party.

## SOME APPLICATIONS

### EXTERNAL:



### INTERNAL:

CEILING SYSTEM  
DOORS  
ELEVATOR CAB  
FLOOR  
FURNITURE  
PARTITION WALLS  
SIGNS  
VENETIAN BLINDS

For further information, please contact us or go to our website:

Email: [eea@eea.be](mailto:eea@eea.be)

Website: [www.aluminium.org](http://www.aluminium.org)

Thanks to its unique properties, aluminium is able to provide intelligent solutions for present and future generations. It is lightweight yet strong, durable and corrosion-resistant, formable, highly conductive, aesthetically pleasing and, above all, recyclable. The European Aluminium Association, founded in 1981, represents the European aluminium industry, from alumina and primary production, to manufacture of semi-finished and end-use products, right through to recycling. This industry currently employs around 255 000 people in Western Europe.