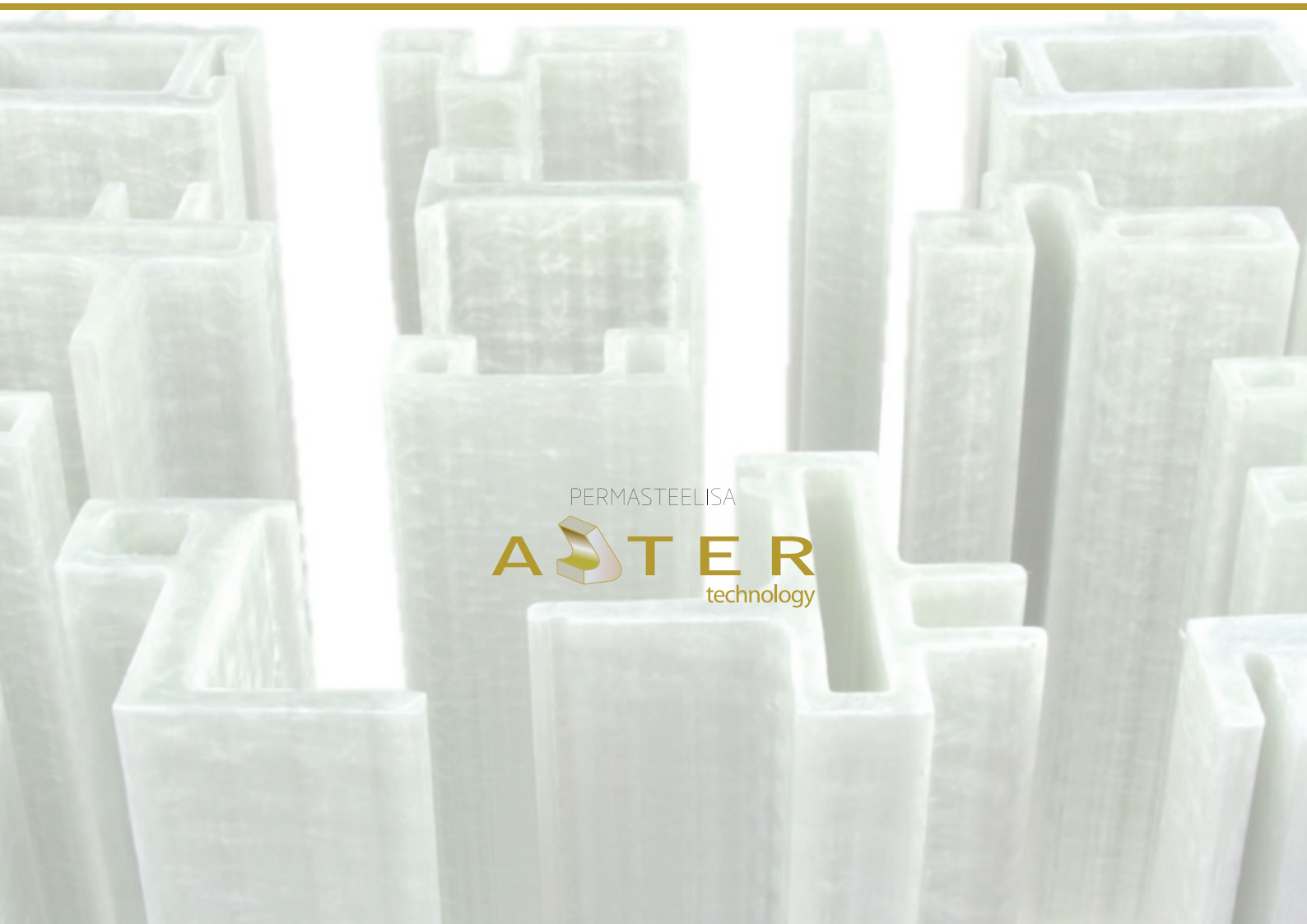




**PERMASTEELISA
GROUP**

GFRP Components for Façades



PERMASTEELISA

A T E R
technology

Composite Façades

Composites in the Building Industry

The use of composites in the building industry, in particular for façades, is growing rapidly as it gives the architect a new level of architectural freedom which cannot easily be achieved by the use of traditional materials like steel, aluminum and glass. Composite façades bring into the industry alternative materials which are very durable, environmentally friendly and contribute to benefits in terms of environmental assessment and sustainability ratings.

Aesthetic Appeal

Permasteelisa Group knowledge of composite façade components enables the creation of unique façade elements in an almost unlimited variety of shapes. The visual appearance of the façade can be further influenced by the choice of the production technology as well as of the surface finishes.

Green buildings, eco-friendliness

Composite façades contain less embodied energy compared to similar façades created from extruded aluminum profiles; the environmental impact of the production phase is also reduced due to the minimal amount of residual material to be scrapped.

The composite façades are long lasting and require reduced maintenance compared to non-composite facades; they are dirt repellent, easy to clean and corrosion free.

Production Technologies

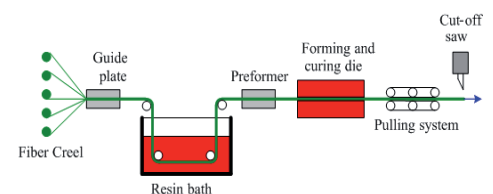
Depending on the architectural specifics of the elements to be created, Permasteelisa Group has chosen to master various production technologies for their composite façade solutions:

- the pultrusion technology
- the open mould technology
- the closed mould technology

The proper technology to be used shall be jointly selected by all the relevant parties during the early stages of the design development.

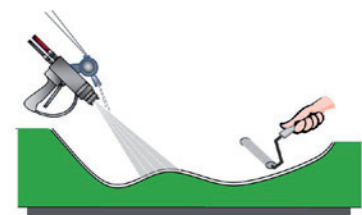
- **Pultrusion technology**

The pultrusion technology is used to create very strong lightweight profiles that can be used in both traditional stick system or unitised curtain wall façade elements. It is recommended when high-volume and quick production is required.



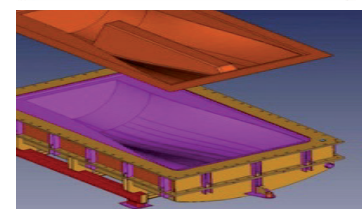
- **Open mould technology**

The open mould technology is used in low-volume production of large and unique monolithic façade elements to fit into the most complex shapes. The manual process allows production with one-sided finishes. The tooling and moulding processes are simpler and cheaper than in the close mould technology.



- **Closed mould technology**

The closed mould technology allows to create oversized monolithic 3D façade elements. The high fibre content and the two-sided finishes in the industrialized process allow the serial production with a very high quality and very precise tolerance control.



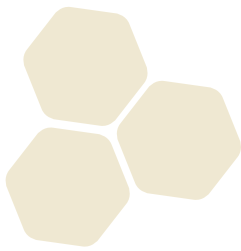
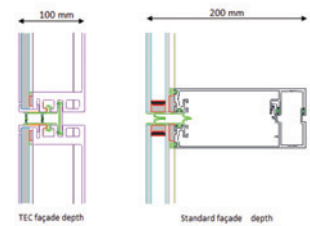
TEC: Thin Environmental Cladding

The TEC façade, based on pultrusion technology, is a unitised curtain wall made of composite profiles and glass. A holistic design and engineering approach utilize the unique material properties providing excellent overall façade performances in combination with a reduced wall thickness as well as unique aesthetic effects.



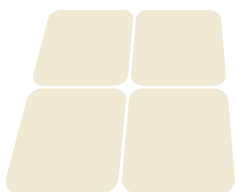
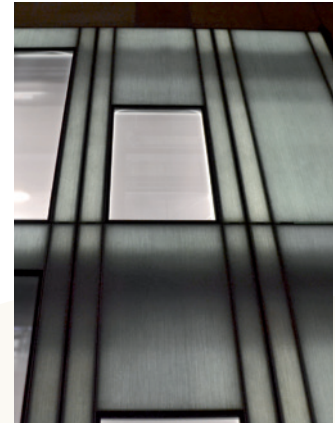
Floor surface gain

The overall TEC façade depth is only 100 mm, while traditional façades are generally at least 200 mm thick. This results in a direct economic advantage, due to the increased gross floor area of the building.



Physical Performances

The use of composite pultruded profiles is already well established in various applications due to their efficient structural behaviour and good environmental performance. TEC combines the features of both glass and composites, giving the building envelope high structural and safety performance as well as thermal and acoustic insulation.



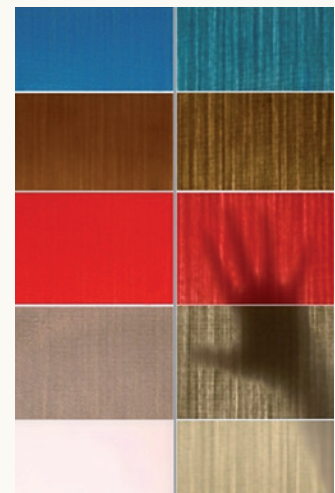
Unique visual appearance

The TEC system can be produced from translucent up to opaque, resulting in a high-tech look of the building. The variation of the fibre reinforcement patterns and colours results in unique visual effects. The indoor artificial lighting may bring the illumination effect of the building envelope at night, whilst during the day the TEC permits glare free daylight transmission from the outside into the building in a unique aesthetic appearance.



Eco-Friendliness

The production of pultruded composite profiles requires lower energy consumption compared with, for instance, similar extruded aluminum profiles, particularly aluminum profiles not extruded from recycled material. When considering **Life-Cycle Analysis (LCA)**, Glass Fibre Reinforced Polymers (GFRP's) offer the better eco-friendly option due to the superior balance of façade performances and applications.



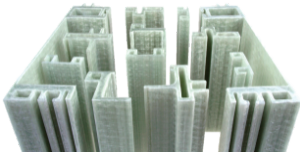

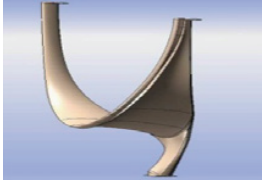
Composite Façades

Customers' Benefits

- Design flexibility / architectural freedom
- High flexibility in panel shapes (free form) and dimensions
- Very durable
- Eco friendly, corrosion resistant, low maintenance required
- Very high strength-to-weight ratio
- Very high thermal resistance, very low thermal transmittance (U-value)
- One stop solution: engineering / production / installation / maintenance
- Compliant with the latest building regulations
- Cost effective solution

Architectural Freedom

Depending on shape, size and complexity of the element design, Permasteelisa Group will select the appropriate production method, cost effective and best suited for the required quality. Early design input will result in higher architectural freedom and overall optimization.

Production Method			
Parameter:	Pultrusion System	Closed Mould System	Open Mould Systems
			
Architectural freedom	2D	3D	2D / 3D
Pre engineering	standard	detailed	detailed
Tooling costs	low-medium	high	low
Production serie	very large volumes	large volumes	small volumes
Production process	industrialized	industrialized	manual
Glass fibre content	very high fibre volumes	high fibre volumes	reduced & variable
Surface finish	single or two-sided	two-sided	single
Durability	++++	++++	++++
Impact resistant	++++	++++	++++
Corrosion resistant	++++	++++	++++

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