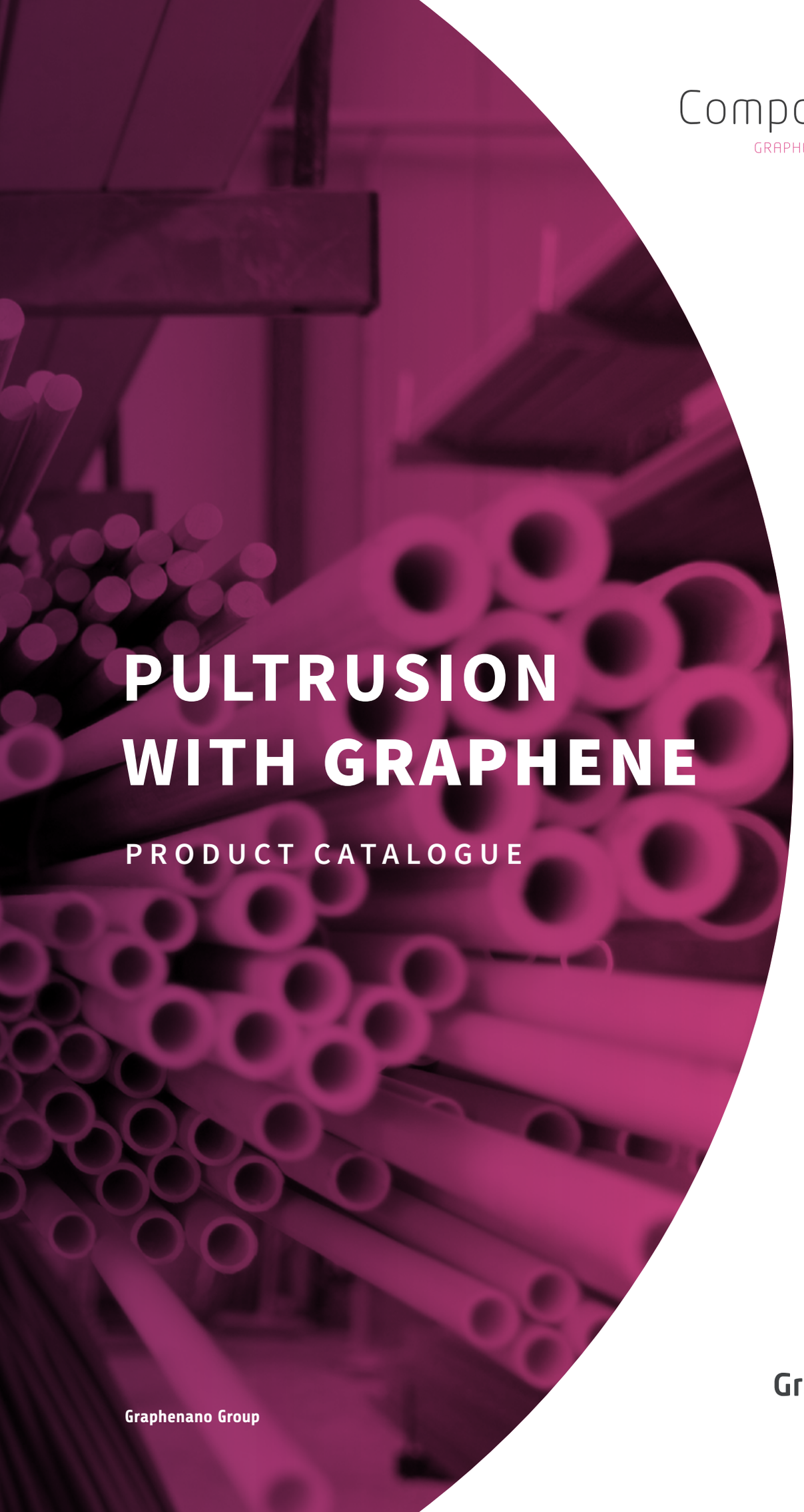
CompoSmart
GRAPHENE COMPOSITES

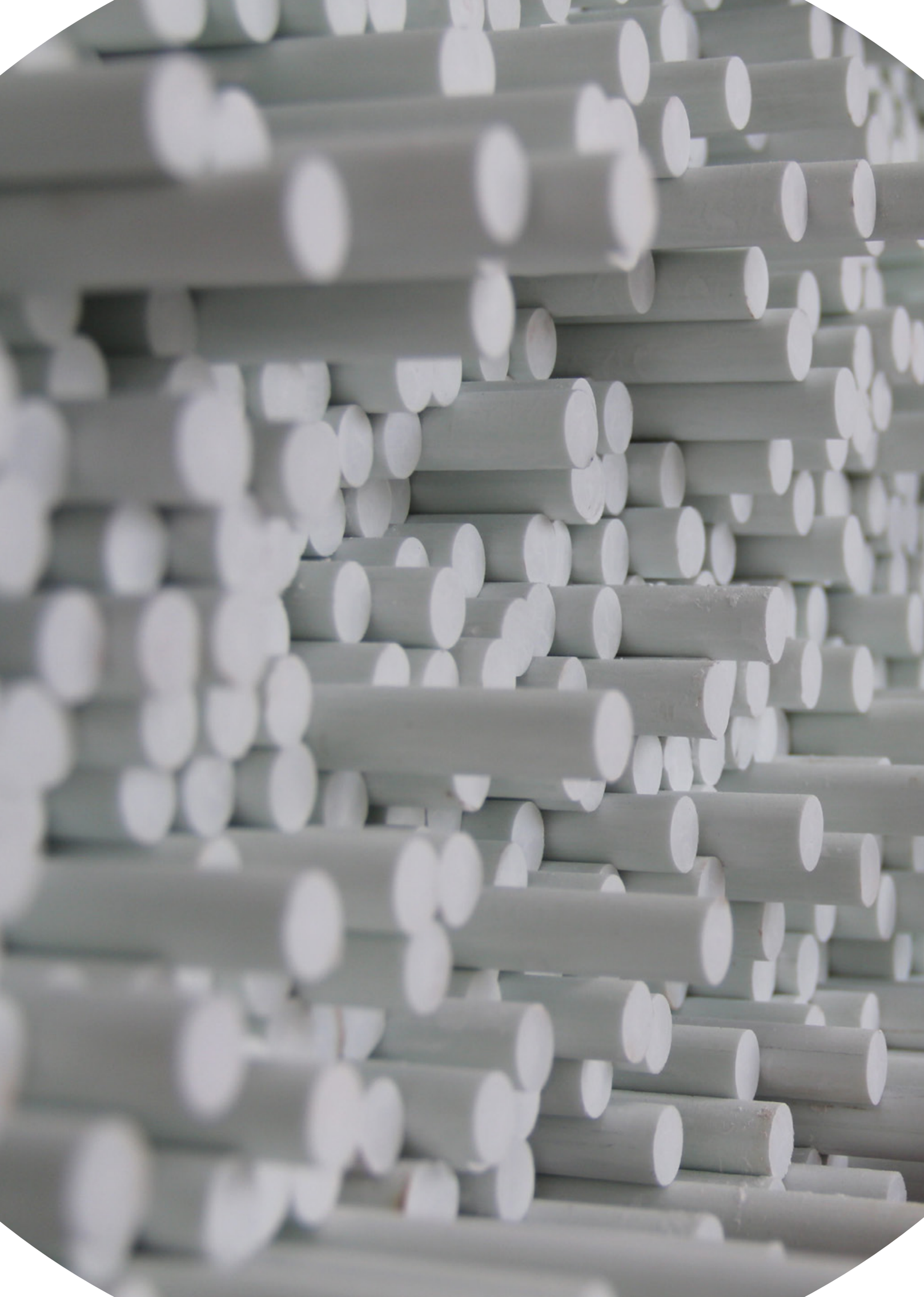


PULTRUSION WITH GRAPHENE

PRODUCT CATALOGUE

Graphenano Group

Graphenano
COMPOSITES



INDEX

CompoSmart
GRAPHENE COMPOSITES

CompoSmart

GRAPHENE COMPOSITES

THE COMPANY

Graphenano Composites is the industry leader in the development of **graphene composites** that improve traditional materials in terms of strength and resistance, lightness, flexibility, bactericide properties, waterproofing, insulation and durability. A new generation of composites that opens the doors to an era of applications (I+A).

The catalogue contains the advantages of incorporating graphene into this material as well as a list of profiles and other products from the company, grouped under the name **CompoSmart Graphene Composites.**

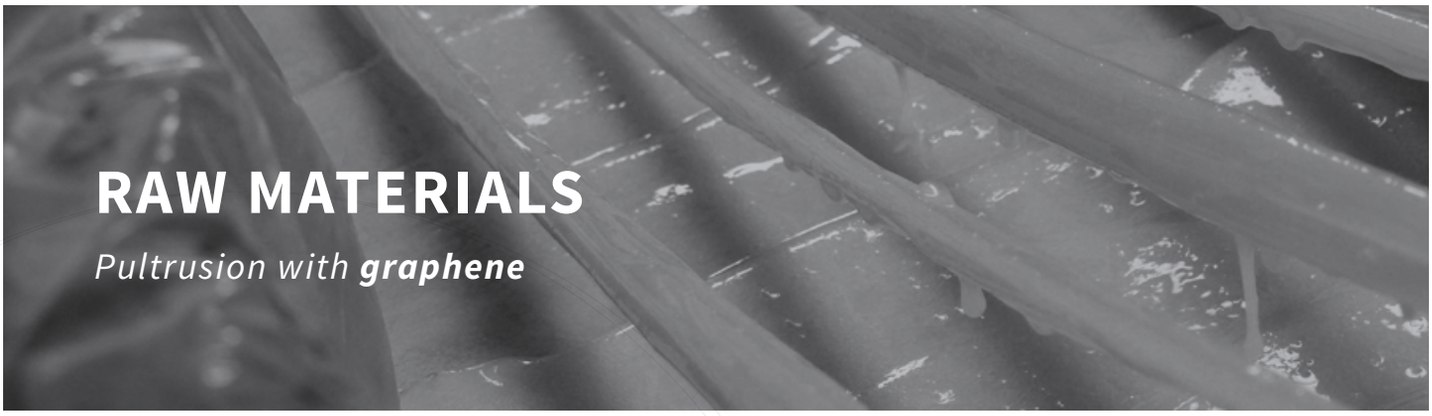
Graphenano Composites belongs to the **Graphenano Group** leader in the industrial-scale production of graphene.

Graphenano COMPOSITES

Graphenano nanotechnologies

OUR FACILITIES

Graphenano Composites is a constantly developing young company. The advancements in technology and the everdiversifying range of products favour the inclusion of new manufacturing lines within our facilities, which allows for the quick and efficient adaptation to all production demands. Furthermore, the facilities can grow to meet the storage and distribution needs of our clients.



RAW MATERIALS

*Pultrusion with **graphene***

FIBREGLASS

Fibreglass is a material that is made up of many polymer filaments based on extremely fine silica. It is made by pouring molten glass through a piece with tiny holes. The resulting filaments solidify and maintain sufficient flexibility to be used as a fibre.

One of its main characteristics is its good thermal insulation; it is inert to acid and can withstand high temperatures. These qualities, alongside the low cost of its raw materials have led to its popularity for many industrial uses.

RESINS

Resins are synthetic liquid substances that give consistency to fibres in the process of pultrusion. Graphenano Composites works with the following synthetic resins altered with graphene additives:

- Polyester (orthophthalic and isophthalic)
- Vinylester
- Epoxy

Each one gives a different characteristic to the final product, such as anticorrosive properties, rigidity or flexibility, insulation or flame-resistance and self-extinguishing properties, amongst others.

GRAPHENE

Graphene is the strongest nanometric material known mankind with a resistance two times than that of iron and that is harder than diamond and yet, its thickness oscillates between 1 and 10 carbon atoms. Due to it being so fine, it is considered a twodimensional material and the only one that is able to maintain its stability until the thickness of an atom.

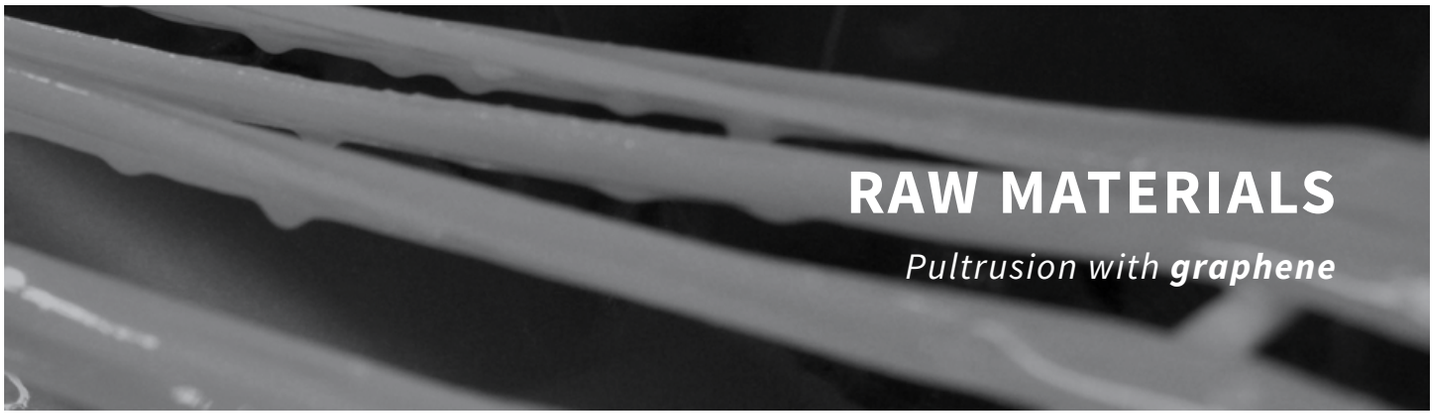
It is practically transparent, elastic, a good thermal and electric conductor, so dense that helium gas cannot pass through it and has many other qualities such as the high mobility of its electrons or its bactericidal characteristics.

Graphene has incredible mechanical, electrical, chemical, magnetic and optical qualities. Furthermore, since it is pure carbon, it is abundant in nature and ecological.

THE PULTRUSION PROCESS

Pultrusion is the continuous and automatic productive procedure of moulding thermostable plastic materials to obtain reinforced plastic moulds. It consists of dragging and standing the fibres impregnated with thermostable resins through a closed mould at a high temperature so that the polymerisation and the curing of the resin occurs inside. The internal geometry of the mould gives the final shape of the piece upon its exit.

Amongst its advantages, the ones that stand out are the high rigidity and consistency of results, its versatile forms, a high production speed and the possibility of obtaining great lengths, always with a great outside finish.



RAW MATERIALS

*Pultrusion with **graphene***

COMPARISON OF PROFILES FOR RAW MATERIALS

Comparison	Fibreglass graphene profiles (GFRP)	Steel A-42	Aluminium	Wood
Resistance to corrosion	Wide range of resistence to chemical agents.	Prone to oxidation attacks and corrosion.	Can suffer from corrosion.	Can suffer from decomposition when exposed to water or chemical agents.
Density	2.0 - 2.4 g/cm^3	7.85 g/cm^3	2.7 g/cm^3	0.51 g/cm^3
Electrical and thermic conductivity	Not an electrical conductor. Low thermic conductor.	Electric and Thermic Conductor.	Electric and Thermic Conductor.	Electric conductor when wet.
Resistance	High resistance/weight ratio.	High weight for equal resistance.	High weight for equal resistance.	Low resistance.
Impact resistant	Non-deformable. The glass material distributes the blow of the impact on the material.	Possible deformation upon impact blow.	Very deformable upon impact blow.	Clearly deformable under impact blow.
Wave transparency	Transparent to EMI/RFI transmissions.	Interferes with EMI/RFI transmissions.	Interferes with EMI/RFI transmissions.	Transparent to EMI/RFI transmissions.
Assembly	Lightweight for assembly and elevations.	Special assembly equipment.	Greater load than GFRP for assembly and elevations.	Lightweight for assembly and elevations.
Price	Low cost maintenance and installation.	Initial low cost. Additional maintenance cost greater than GFRP.	Material cost similar to GFRP. Maintenance costs higher.	Initial low cost. Additional maintenance cost greater than GFRP.

COMPOSMART PROPERTIES

*Pultrusion with **graphene***

COMPOSMART CONTAINS GRAPHENE

CompoSmart products are altered with the addition of Graphene, thanks to which the principal mechanical properties of the commercial thermostable resins are increased.

The addition of graphene works in for all the usual production procedures in the manufacture of composites (Hand Lay-Up, RTM, Infusion Filament Winding and Pultrusion).

With the addition of Graphene, CompoSmart guarantees the following properties in their products:

High mechanical resistance
The mechanical properties of the polyester resin with graphene are similar or greater than higher cost and higher technology resins (vinylester – epoxy bisphenol A).

Greater structural rigidity
The CompoSmart profiles have a higher elasticity modulus than standard materials.

Greater durability
Resins altered with graphene have a greater durability with the same design.

Protection against hydrolysis and bacteria
Graphene has positive properties against the effects of hydrolysis and bacteria.

Lower weight, lighter
Resin altered with graphene allows for a product with a reduced weight but the same mechanical characteristics without influencing its durability.

Greater productivity
Graphene favours polymerisation, which reduces the curing time. A lower cost per metre for production, promoted in regards to the environment.

Higher traction resistance
Thanks to graphene, the ultimate tensile strength is increased by more than 30% when compared with the standard GFRP profile.

Same density
The stoichiometric mix of polyester altered with graphene does not cause changes in density or viscosity.

In addition to the general characteristics of pultrusion:

Resistant to corrosion, chemical and atmospheric agents

Magnetically and electromagnetically transparent

Thermal and electric insulator

Minimal maintenance

Made to measure

Wide range of colours according the RAL colour standard, at the request of the customer.

COMPOSMART PROPERTIES

*Pultrusion with **graphene***

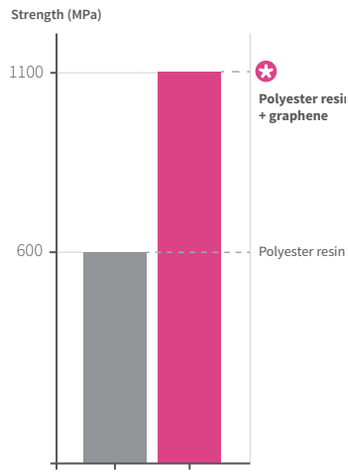
PROPERTIES OF COMPOSMART PRODUCTS

Our research team and commercial department ensure that the development of new products is carried out according to the demands of our collaborators and clients, always maintaining a commitment of efficiency and quality.

PHYSICAL PROPERTIES WITH GRAPHENE		
Specific weight	**2,00 - 2,40**	kg/dm³
Glass content	**50 - 75**	%
Water absorption	**< 0.2 - 0.3**	% peso
Coefficient of linear expansion	**< 5 - 22**	10^{-6}/ºC

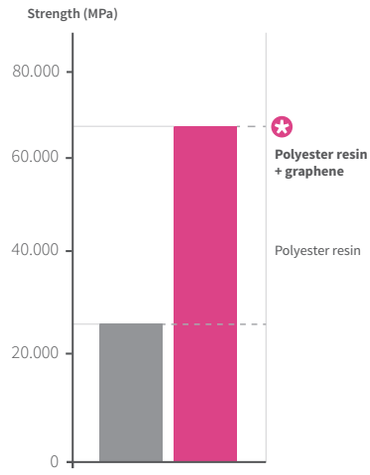
MECHANICAL PROPERTIES WITH GRAPHENE	Poligraph 70 plus	Poligraph 140 plus
Flexural modulus	**9124 MPa**	**10171 MPa**
Flexural strength	**72 MPa**	**60 MPa**
Maximum deflection dL	**0.83 mm**	**0.6 mm**
Tensile modulus	**5190 MPa**	**6280 MPa**
Tensile strength	**39 MPa**	**36 MPa**
Elongation at break	**0.84 %**	**0.57 %**

FLEXURAL STRENGTH
(PULTRUSION)



Tests according to
UNE-EN ISO 14125 regulation.

ELASTIC MODULUS
(PULTRUSION)



Tests according to
UNE-EN ISO 14125 regulation.

In the process of certification with TUV SUD Iberia mechanical properties.

COMPOSMART CHARACTERISTICS

*Pultrusion with **graphene***

DESIGN AND PAINTING

Pultrusion technology allows a lot of flexibility in manufacturing. CompoSmart profiles can be manufactured according to the needs of the client. The method of managing the glass and the selection of the resins are vital.

The standard colour is grey but it can also be manufactured in a wide range of colours from the RAL colour chart. These are embedded into the resin mix and therefore the appearance of the resulting profile is of the chosen colour (usually slightly lighter). If a uniform finish is necessary, manually painting the profile with a polyurethane based paint that gives the profiles a resistant and long lasting shine, is recommended.

USES

The uses of CompoSmart fibreglass profiles are numerous and versatile and correspond to different sectors:

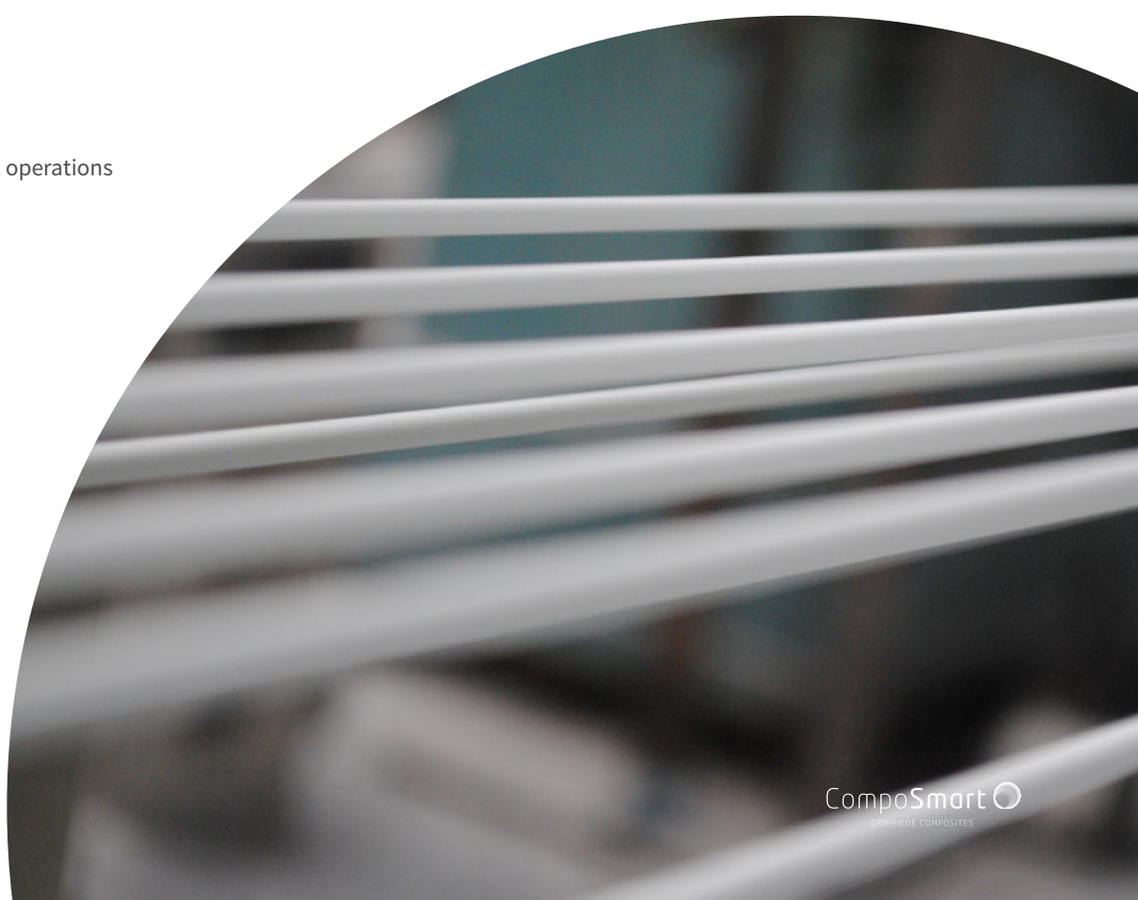
- Construction
- Transport
- Architecture
- Chemical Industry
- Medical Industry
- Naval Industry
- Agricultural and livestock operations
- Water treatments
- Telecommunications
- Electrical and electronics
- Alternative energies
- Leisure and recreation

HANDLING AND TRANSPORT

The fibreglass profiles, due their weight, that is ¼ of that of steel, do not require special equipment to be transported, stored and assembled unlike steel and aluminium. This carries lower transportation and handling costs, therefore providing an important economic saving for the customer.

QUALITY

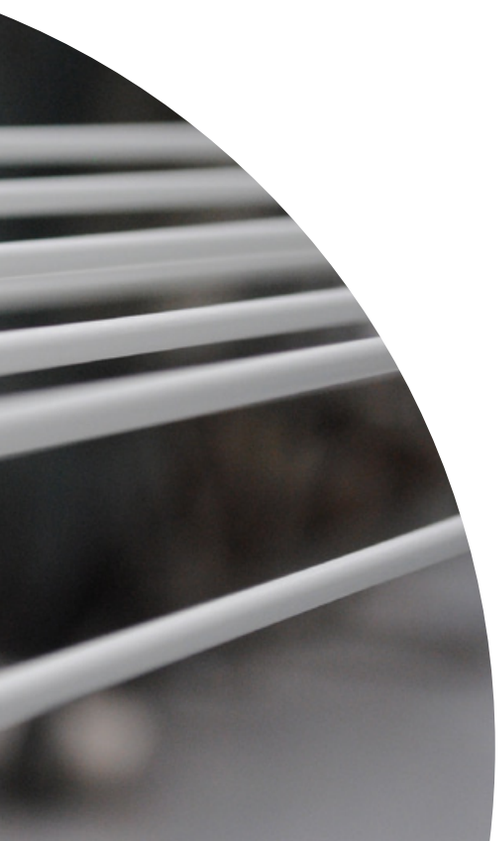
Our success is based on Quality. Our work philosophy is built on the satisfaction of our clients. In the same way, we understand that quality cannot be achieved without the constant training of our employees.



CompoSmart GRAPHENE COMPOSITES

CompoSmart

GRAPHENE COMPOSITES



CompoSmart

GRAPHENE COMPOSITES

Graphenano
COMPOSITES

Graphenano Composites
info@graphenano.com

Calle Pablo Casals, 13.
30510 · Yecla, Murcia (Spain)
t. (+34) 965 108 102

www.graphenanocomposites.com

Graphenano Group:

graphenano
nanotechnologies

GRAPHENE
INSIDE