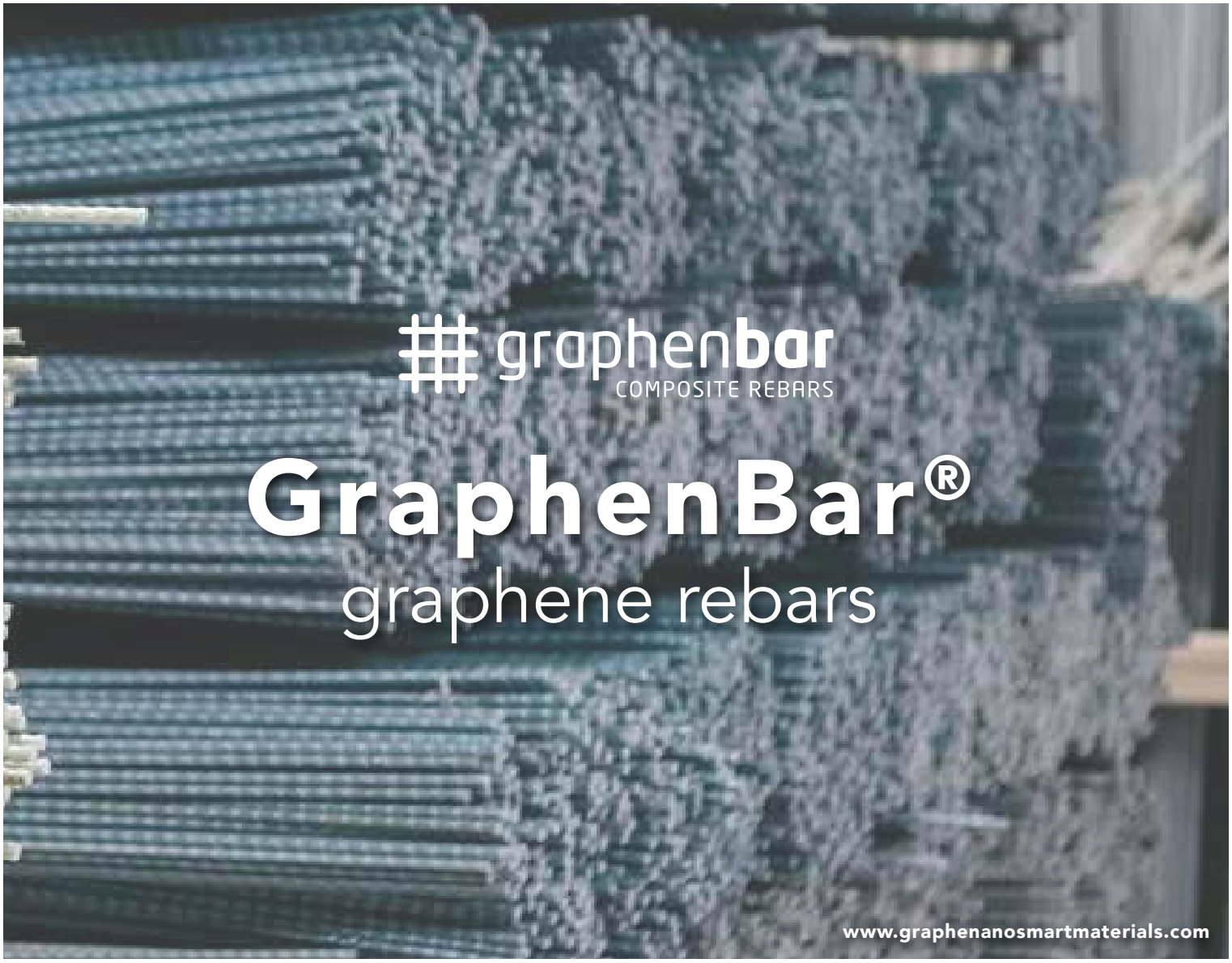


Graphenano
SMART MATERIALS

Lightweight, durable, and non-conductive reinforcement for reinforced concrete in demanding infrastructures.

Graphene Reinforcement Rebars

The **GraphenBar®** rebars are **epoxy resin reinforcements with graphene and fiberglass (GFRP)** designed to replace traditional steel in concrete applications, offering an alternative for residential and commercial projects.

Thanks to their manufacturing by **pultrusion** with high-performance fiberglass and specialized resins, they offer high tensile strength, durability, and corrosion resistance.

Their light weight, physical and chemical properties simplify transport, handling, and installation, reducing labor costs and increasing productivity. Ideal for foundations, slabs, terraces, patios, prefabricated elements, etc.

GraphenBar® withstands all weather conditions for long-lasting performance and no need for maintenance.

Intended use

Glass Fiber Reinforced Polymer (GFRP) rebar GraphenBar is used to reinforce load and non-load bearing elements of monolithic and precast concrete structures. It is used primarily in those parts of buildings that are exposed to an increased risk of corrosion, in structures with requirements for protection against electromagnetic influences, and in structures in which cutting of the reinforced structure is considered.
Glass Fiber Reinforced Polymer (GFRP) rebar GraphenBar is intended to be used as reinforcement of construction works and elements made of reinforced concrete (beams, columns, panels, slabs and other structural elements). Bars are use in parts of concrete structures in which is full bond between reinforcement bar and concrete at whole length of a bar.

The provisions made in this European Technical Assessment are based on the assumed working life of 100 years, provided that the product is subject to appropriate installation, use and maintenance. These provisions are based upon the current state of the art and the available knowledge and experience. The assumed working life of the product cannot be taken as a guarantee given by the producer, but is to be used as a mean for selecting the appropriate product in relation to the expected economically reasonable working life of the works. Assumed intended working life means that it is expected that, when the working life has elapsed, the real working life may be, under normal use conditions, considerably longer without major degradation affecting the Basic requirements for construction works.

Made in Spain

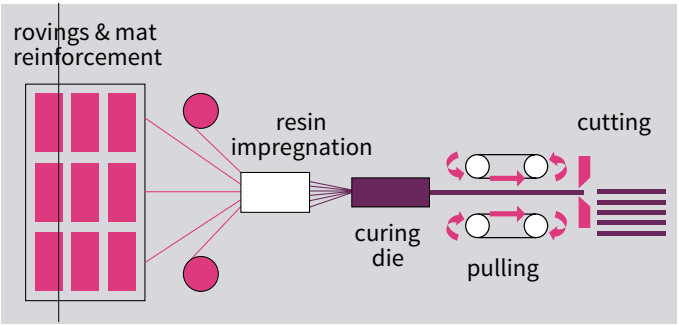
GRAPHENE technology
by graphenano smart materials

Graphenano
SMART MATERIALS

PULTRUSION PROCESS

Pultrusion is a continuous process for manufacturing composite profiles reinforced with graphene and with fiberglass. The process consists of pulling multiple fiberglass filaments through a resin bath with graphene and then into a temperature-controlled metal mold, in order to produce structural profiles of various shapes.

Pultruded profiles are used in **multiple applications**: industrial, energy, housing, and consumer goods . The global composites market for pultrusion exceeds 250,000 tons, with annual growth above 20%.



GRAPHENE PULTRUSION

Graphenano Composites works with **graphene, fiberglass, and epoxy resin.**

Our fiberglass is a good thermal insulator, capable of withstanding high temperatures. Meanwhile our resin infused with graphene provides more characteristics to the final composite, such as greater tensile and interlaminar strength, flexibility, and anti-corrosive properties.

In the **pultrusion process**, the fiberglass impregnated with our graphene resin undergoes low-temperature pulling operations, so that the polymerization process guarantees the best quality.

Among its **advantages** over other processes are:

- High stiffness compared to pultrusion without graphene.
- Versatility of shapes, depending on the geometry of the mold.
- Custom cutting of profiles. Possibility of obtaining large lengths.
- High speed and continuity of production.
- Good surface finish.

ADVANTAGES OF GRAPHENBAR PROFILES vs STEEL

In a comprehensive analysis of an industrial platform, it has been shown that GFRP parts have a lower environmental impact compared to the same parts made of steel:

- **Lower material weight**
- **Lower energy consumption** for transport
- **Lower environmental impact** across many categories, including global warming gases, air and water acidification, eutrophication, ozone layer depletion and smog formation.

Life cycle assessment studies available for pultruded profiles show advantages over steel and aluminum alternatives in strength/weight ratio. These are sector-level data, not a study specific to the GraphenBar product.

Lighter

Up to 70% weight reduction compared to steel

Resistant

High tensile strength

Inherent thermal and electrical insulators

Non conductivity

Cost effective

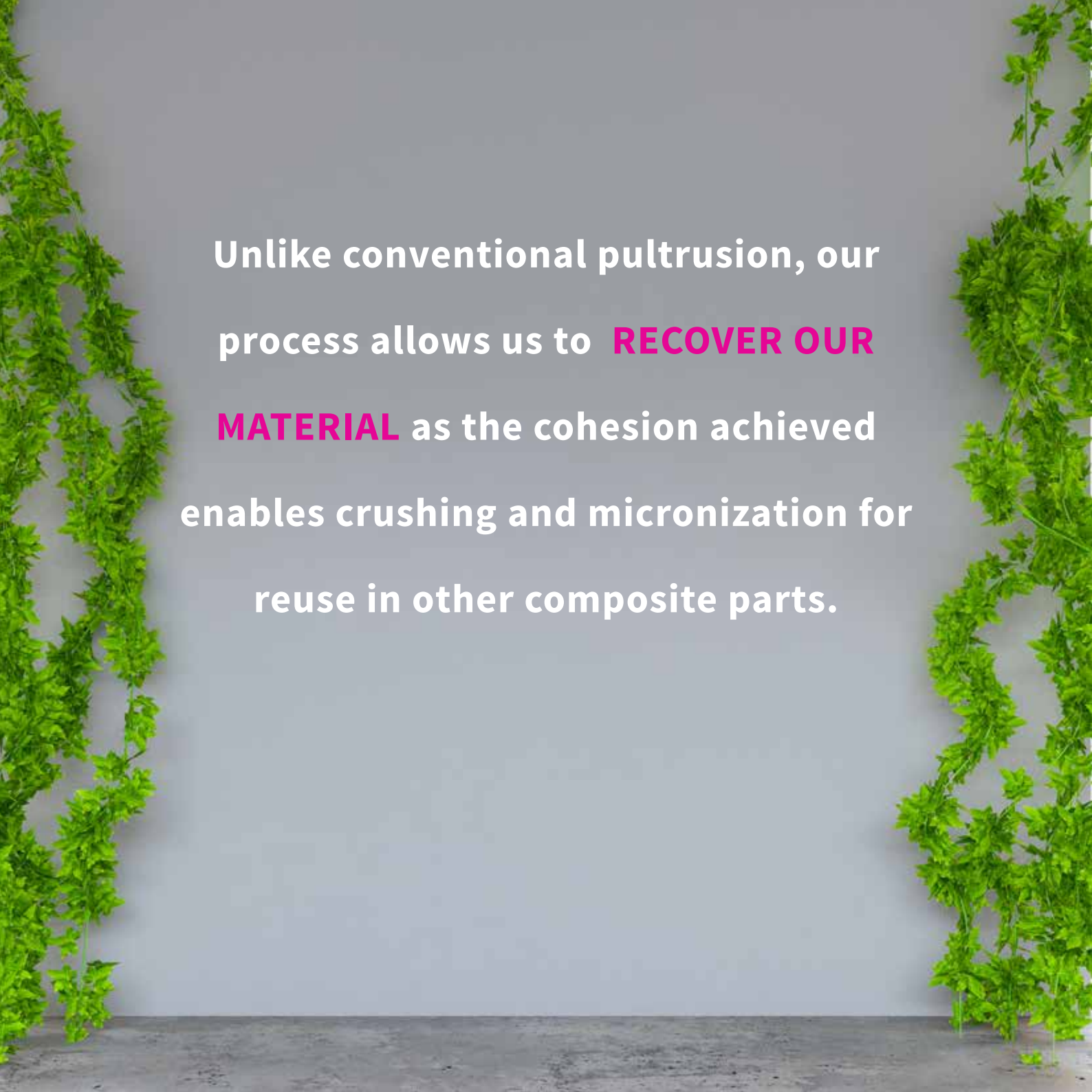
Lower cost thanks to its easy handling and lower weight

Great chemical resistance

Resistant to chemicals and immune to corrosion

No interference electrical

Non magnetic

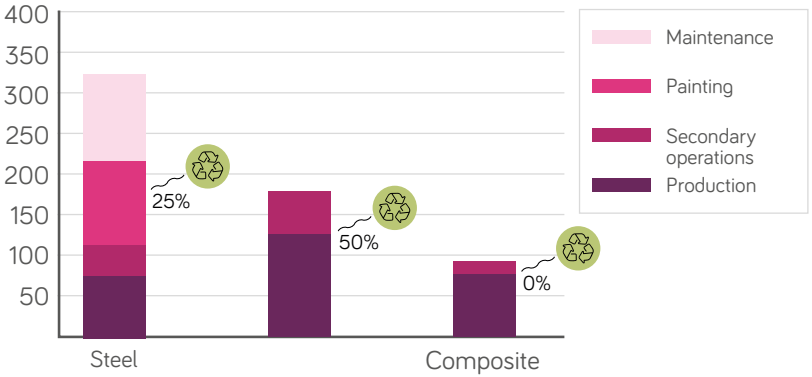

Unlike conventional pultrusion, our process allows us to RECOVER OUR MATERIAL as the cohesion achieved enables crushing and micronization for reuse in other composite parts.

SUSTAINABILITY

The following results come from a preliminary sector-level life cycle assessment (LCA) of generic pultruded parts. They do not constitute an LCA of the GraphenBar product.

In both case studies, the data are based on the aggregation of various types of pultruded structural components for outdoor applications, such as decks and platforms.

Composites have a lower energy impact even without recycled content.



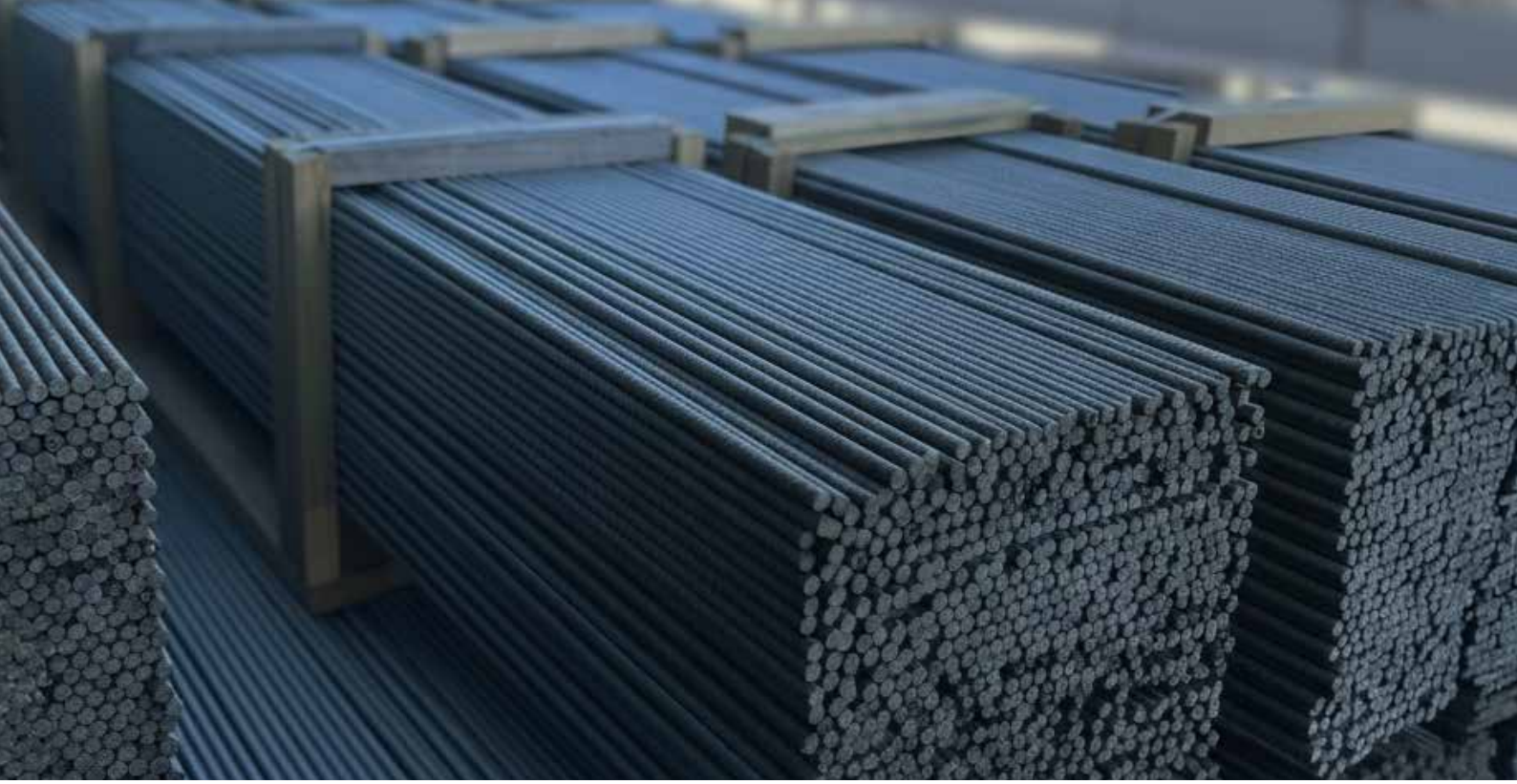
CASE STUDY NO. 1: STEEL VS. COMPOSITE

The steel grid is 3.5 times heavier than the composite grid.

Energy used in Steel parts		
	MJ / Kg	Criteria
Primary Steel Production	262	5% recycled
Secondary operation	4 to 6	Hot/cold section roll
On-site installation	0 to 35	Blasting and painting
"Use" maintenance phase	30 to 35	Blasting and painting
Totals 90 to 106		

Energy used in Composite parts		
	MJ / Kg	Criteria
Primary raw material	0-74	Glass and resin min.
Secondary operation	to 6	Comp. Part Mfg
On-site installation	0	Blasting and painting
"Use" maintenance phase	0	Blasting and painting
Totals 74 to 80		

The higher specific strength of composite materials allows for more efficient energy use per component.



graphenbar
COMPOSITE REBARS

The graphene, epoxy resin, and fiberglass reinforcement rods from **Graphenano Smart Materials** offer a superior alternative to traditional steel for a multitude of projects. Designed with high tensile strength, durability, and corrosion resistance, **GraphenBar®** redefines concrete reinforcement. Its lightweight, rustproof design simplifies transport, storage, handling, and installation, reducing labor costs and increasing productivity. Ideal for foundations, driveways, pool decks, patios, concrete slabs, precast elements, etc., **GraphenBar®** withstands all weather conditions ensuring long-lasting, maintenance-free performance.

Choose GraphenBar® for projects that require strength, ease of use, and durability

Reliable performance designed for professionals

GraphenBar® offers professionals an alternative to steel without rust or corrosion, guaranteeing full performance in any climate with no risk of material deterioration, especially in saline environments. Lightweight yet robust, it allows for faster and safer installations, reducing labor time and effort. Designed to meet the demands of the most challenging and hard-to-access worksites, **GraphenBar®** provides a durable and long-lasting solution.

Assessment and production control

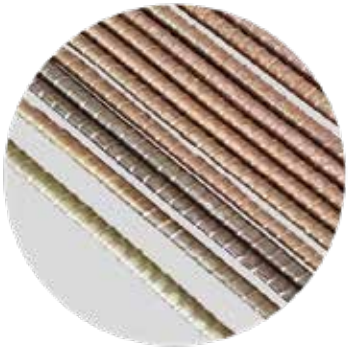
GraphenBar® is manufactured under factory production control (FPC) and assessed in accordance with EAD 260023-00-0301, the European Assessment Document applicable to GFRP bars for concrete reinforcement. The declared performances of the product are set out in **its technic**al documentation and can be verified by the specifier.

Applications

- Driveways
- Sidewalks
- Pool decks
- Basements
- Basement walls
- Footings
- Concrete masonry
- ICF construction
- Warehouse floors
- Agricultural slabs
- Loading docks
- Architectural
- Prefabricated
- Truck platforms
- Stair openings
- Elevator shafts
- Step crack repair
- Existing masonry rehabilitation
- Exterior walls
- Parking slabs
- Pillars, pilings, etc.
-

Reduces labor time and effort

Does not rust and has high strength



GRAPHENBAR® FIBERGLASS EPOXY

Product description:

Graphene reinforcement bars with fiberglass (GFRP) and epoxy resin, designed to replace steel in reinforced concrete structures. They combine high mechanical strength, lightness, and dielectric stability, suitable for building, precast elements and slabs, in aggressive environments, in structures near sensitive equipment, and in works where quick installation and long service life are desired.

Diameters:

6, 8, 10, 12, 14, 16, 18 and 20 mm.

Other sizes available upon request, not covered by the European Technical Assessment. Equivalency table p. 14

Use of our graphene composite rods

Our structural graphene composite rods ***are manufactured under factory production control and assessed in accordance with EAD 260023-0***0-0301, the European Assessment Document applicable to GFRP bars for concrete reinforcement. Structural design is the responsibility of the project engineer, who must apply the codes and guidelines in force for this material.

The performances of the product are those declared in Declaration of Performance GRB001, based on European Technical Assessment ETA 26/0130. Its use on each project must be agreed with the design supervisor.

The bars carry CE marking under Regulation (EU) 305/2011, based on ETA 26/0130 (3/11/2026), the TSÚS certificate of constancy of performance 1301-CPR-2719 (system 1+) and Declaration of Performance GRB001 (5/11/2026).

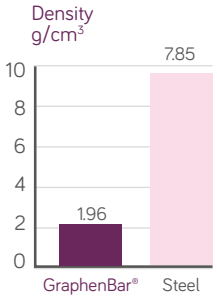
In summary:

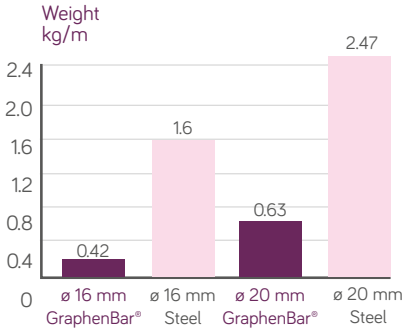
- Manufactured under factory production control (FPC).
  CE marking: ETA 26/0130 under EAD 260023-00-0301 and DoP GRB001.
  Performances verifiable in the product technical documentation.

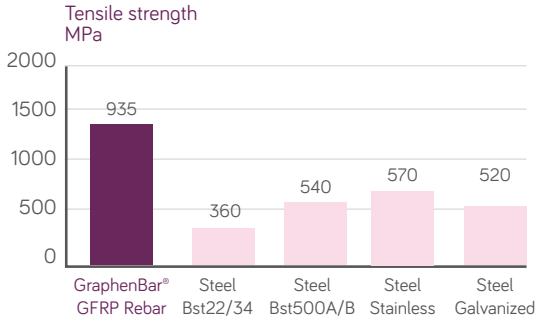
#graphenbar
COMPOSITE REBARS
Interlaminar shear strength compared to rods of 49.2 to 54.7 MPa (declared mean value)

#graphenbar
COMPOSITE REBARS
Lightness, strength, and sustainability,
The only smart alternative
to steel

Technical data bars GraphenBar®







GFRP reinforcement **Graphenbar®** have only about 27% of the weight of steel reinforcement bars. This allows for lighter structures with maximum stability and lower dead weight, as well as much easier handling at construction sites.

GFRP Graphenbar® bar**s have a ch**aracteristic tensile strength higher than that of conventional reinforcement bars made of unalloyed steel and stainless steel.

METRIC		#6	#8	#10	#12	#14	#16	#18	#20
Characteristic Tensile Load	**kN**	27,3	48,8	74,3	102,0	142,3	176,8	223,2	252,6
Effective Cross Sectional Area (Aeff)	**mm²**	30,29	52,14	88,17	121,09	173,38	220,83	268,14	326,80
Mass	**kg/m**	0,058	0,102	0,167	0,237	0,337	0,424	0,526	0,625

- Tensile strength
  772.8 to 935.2 MPa
  112 to 136 ksi
- Modulus of Elasticity (Young's Modulus)
  39.5 to 43.7 GPa
  5,733 to 6,340 ksi
- Ultimate deformation
  1.8 to 2.2 %
- Transverse shear strength
  166.6 to 214.1 MPa
  24.2 to 31.1 ksi
- Bond Strength to Concrete
  7.6 to 12.4 MPa
  1,102 to 1,798 Psi
-
-
-
- Glass transition temperature (Tg)
  109.1 ºC (bar, Ø12)

Packing, handling and storage

GraphenBar® is weather resistant, although exposure to UV rays may cause discoloration, fading, or surface chalking. These effects are purely aesthetic and do not affect its performance. For prolonged exposure to sunlight, it is recommended to use a protective cover. **The product can be ordered with a UV protection additive at an additional cost.**
When handling and installing, use a fine-toothed saw, a carbide-grit blade saw, a grinder, or a diamond blade to cut; it is not necessary to seal the ends. Place the spacers properly for adequate concrete coverage and use standard tying methods.

Concrete cover and reinforcement layout are defined by the project engineer in accordance with the structural design of each project and the technical documentation of the product.

FRP Ø (mm)	STEEL Ø (mm)	kg/m FRP	kg/m steel	FRP truck (20t)	steel truck (20t)
#6	8	,058	0,395	344.828	50.686
#8	12	0,102	0,888	196.078	22.527
#10	14	0,167	1,208	119.760	16.551
#12	16	0,237	1,578	84.388	12.672
#14	20	0,337	2,466	59.347	8.110
#16	22	0,424	2,984	47.170	6.702
#18	24	0,526	3,551	38.023	5.632
#20	26	0,625	4,168	32.000	4.799

Indicative equivalences: replacement of steel reinforcement must be verified by the project engineer.

A single GraphenBar® truck
equals six steel trucks

graphenbar
COMPOSITE REBARS
Does not rust
Guaranteed structural safety
Graphenano
High-Quality GFRP Rebar
Production Line

graphenbar

COMPOSITE REBARS

Frequently Asked Questions

Performance

How does the strength of GraphenBar® compare to steel?
GraphenBar® has a characteristic tensile strength of 772.8 to 935.2 MPa (112 to 136 ksi) **depending** on the diameter, higher than that of conventional steel reinforcement bars. The capacity of a given element depends on the structural design and the reinforcement provided.

How does the modulus of elasticity of GraphenBar® compare to steel?
GraphenBar® has a modulus of elasticity of 39.5 to 43.7 GPa (5,733 to 6,340 ksi) depending on the diameter. Being lower than that of steel, the bar is more flexible, which the project engineer must consider when calculating deflections.

How does the strain of GraphenBar® compare to steel?
GraphenBar® has an ultimate tensile strain of 1.8 to 2.2 % depending on the diameter.

What is the resistance of GraphenBar® to alkaline environments?
GraphenBar® has been tested according to ISO and ASTM standards for durability criteria, retain between 72.0 % and 90.5 % of the tensile capacity, depending on the diameter, after 3,000 hours of

direct exposure to an alkali solution with a pH level of 13 at 60 degrees Celsius, compared to steel, GFRP rebar is much more resistant than the highest grade of stainless steel.

What is the maximum operating temperature of GraphenBar®?
The declared glass transition temperature of the bar is 109.1 °C and the declared maximum service temperature is 70.5 to 86.9 °C depending on the diameter. Behaviour in fire is not an assessed characteristic of the product.

What is the minimum operating temperature of GraphenBar®?
Behaviour at sub-zero temperatures is not among the assessed characteristics. Please consult our technical department.

Operation

What sizes of graphene fiberglass rods are available?
Graphene fiberglass rods are available in standard sizes from 6mm to 20mm. We have other sizes available upon request.

How are graphene fiberglass rods cut on site?
Use a fine-toothed saw, a high-speed grinder, and a carborundum or diamond disc

Is it necessary to use a respirator when cutting the rod?
No, but it is recommended to use a dust mask. Please refer to our Safe Use Instruction Sheet for more information

Is it possible to get splinters when handling graphene fiberglass rods?
It is recommended to use protective gloves as a safety measure to avoid cuts and scrapes, especially on the cut ends.

What tie wire should I use for graphene fiberglass rods?
Use standard steel wire or plastic-coated wire for traditional rod tying methods. In non-magnetic applications, nylon ties prevent any electrical interference.

How do you tie GFRP rebar?
Tie the GFRP rebar with stainless steel or nylon wire, you can also use a cable tie, and also fiberglass reinforced tapes. If corrosion or electromagnetic fields are not a concern, you can also use wires.

Can we bend Graphenbar in the workshop or on site?
GraphenBar® is manufactured with an epoxy thermoset matrix, it cannot be bent **GraphenBar®** after the curing cycle, bent bars are not among the assessed performances of the product; please consult availability with our technical department. Minor adjustments to bends are possible due to the inherent flexibility of the bar

Frequently Asked Questions

Environment

Can we store GraphenBar® under exposure to sunlight?
Yes, but it is not recommended if it is more than 3 months. **GraphenBar®** is made of a very high-quality thermoset matrix that withstands UV radiation, due to cost competitiveness. UV protection can be requested as an extra.

Can we store GraphenBar® under rain and snow?
Absolutely, **GraphenBar®** can be stored under rain and snow without any problem, as the material does not corrode and its water absorption is very low, controlled batch by batch.

What is the end of life of GraphenBar® like?
GraphenBar® is made of fiberglass that is 100% recyclable and epoxy resin with graphene, when it is in concrete, the material can be crushed with the concrete and become part of recycled concrete. The assumed working life is 100 years according to the technical assessment; it does not constitute a manufacturer warranty.

Can you cure concrete with seawater?
Yes, if **GraphenBar®** is being used, the concrete can be cured with seawater due to its non-corrosive nature. This could lead to the preservation of huge amounts of fresh water.

Price

How does the price of GraphenBar® compare to steel rebar and stainless steel rebar?
GraphenBar® is much lower than the cost of stainless steel. The price of **GraphenBar®**is lower than steel rebar, and if you consider all the savings due to labor costs, corrosion protection additives, cover concrete, and transportation, the cost is much lower than that of steel rebar.

Why does using GraphenBar® reduce the project cost?
Engineers are always taking into account all the associated costs of the project and its long-term maintenance. Some of these factors can be eliminated or reduced when considering the use of **GraphenBar®.**
· Installation time
· Transport
· Handling and cutting
· corrosion inhibitors
· Absence of short, medium, and long-term maintenance.

Engineering

Can we replace the GRP rebar in a ONE to ONE ratio with steel rebar?
GraphenBar® has a characteristic tensile strength higher than that of conventional steel reinforcement and a lower modulus of elasticity. It behaves in a linearly elastic manner up to failure, which means there is no yield point to determine, but the material can withstand significantly higher loads. Engineers must follow the codes and standards for GFRP rebar, not for steel.
In most cases where serviceability does not govern the design and it is based on the Ultimate Limit State (ULS), you can simply substitute steel with high modulus **GraphenBar®**.

If serviceability governs the design, then it is recommended to carry out proper engineering to ensure that all deflections are controlled. We recommend redesign of parts using Graphenbar® specifications, to reduce material usage by optimizing the properties of graphene.

Can we use Graphenbar rebar in active seismic regions (earthquakes)?
Seismic behaviour is not an assessed characteristic of the product, so its use in seismic regions must be **justified** by the project engineer. Bridges and structures reinforced with GFRP bars exist in seismic regions; that experience refers to GFRP bars in general and not to the GraphenBar® product in particular.

Transversely solid
Interlaminar shear strength of 49.2 to 54.7 MPa, declared mean value
#graphenbar
COMPOSITE REBARS

graphenbar
COMPOSITE REBARS

GRAPHENBAR DIFFERENCES and other FRP BARS

Declared interlaminar strength

49.2 to 54.7 MPa interlaminar shear strength

The FRP rod without graphene exhibits an irregular break, with multiple fractured filaments and unstable deformation that compromises its integrity and durability. In contrast, **GraphenBar® FiberGlass Epoxy** breaks in a clean and controlled manner, with aligned fibers and a more cohesive structure, ensuring safer and more predictable behavior.

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Made in Spain

HIS WAY AT WORK

GRAPHENE technology
by graphenano smart materials

EUROPEAN REBAR COUNCIL

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SMART MATERIALS

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