DAN-BRO
Partner For Strength

Danbro Advanced Technologies Pvt Ltd.

Your Partner for

CARBON COMPOSITES

In Technical Collaboration with

HPTL CARBON GmbH
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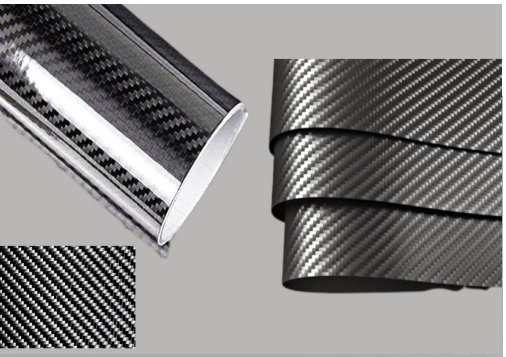
INTRODUCTION

DAN-BRO
Partner For Strength



Key Benefits

Carbon fibre-reinforced polymer (CFRP) composites are ideally suited for civil engineering structures due to their exceptional mechanical properties, high durability, and light weight.

There has been a significant increase in the use of CFRP composites in the construction of bridges, buildings, and other infrastructure projects over the past few decades

CFRP composites have a much higher strength-to-weight ratio than conventional construction materials such as concrete and steel. and can provide the same strength and durability as steel and concrete with less material, resulting in lighter and more efficient structures.

Key Drivers

The major driver for the IIndian composites market growth is 'Make in IIndia Iinitiative', the rise in demand of Composite Components is imminent for Renewable EEnergy, OOil &&Gas, Mass Transportation, electrical and Eelectronics, Chemical IIndustry, IInfrastructure, Bbuilding & Construction (smart cities development, etc.)

Another major driver is that the CFRP composites reduce the negative environmental effects of demolition and rebuild. Also reduces the amount of raw materials used for reconstruction, such as water, concrete, steel, timber etc.

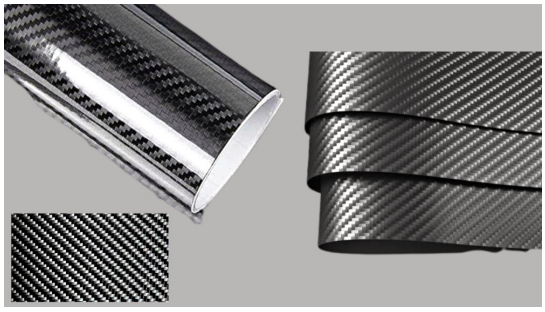
CFRP composites are the most cost-effective repair and strengthening methods & help Reduce Life-Cycle Costs.

Penetration of Carbon Fiber Composites and Emerging Trends in the Indian Repair & Retrofitting Market

Material	Strength-to-Weight	Corrosion Resistance	Weight	Installation Ease
CFRP	Excellent (5x steel)	Excellent	Light (1-2 lbs/sq ft)	High
Steel	Good	Poor (rusts)	Heavy (10-15 lbs/sq ft)	Moderate
Concrete	Moderate	Moderate	Very Heavy (20+ lbs/sq ft)	Low
Aluminum	Good	Good	Light (3-5 lbs/sq ft)	High

PRODUCTS & SERVICES OFFERED

- Carbon fiber Fabric
- Carbon fiber Laminates
- Resin and Hardner (Epoxy)
- Complete System / Solution for External CF Strengthening
- Engineering Design and Consultancy Services
- CFRP Testing Services
- Post Sales Support Services



THE BENEFITS OF DANBRO CFRP IN REPAIR & RETROFITTIG

Price

- The most cost-effective repair and strengthening method
- Reduces Life-Cycle Costs
- Light weight reduces transportation, equipment and labor costs
- Lower traffic disturbance due to quick installation
- Long-term durability, as well as a high resistance to chemicals, results in minimal maintenance

Sustainability

- Retrofitting CFRP reduces the negative environmental effects of demolition and rebuild
- Reduces the amount of raw materials used for reconstruction, such as water, concrete, steel, timber etc.
- Decreased energy use in transportation and installation due to its light weight
- Recyclable

Responsiveness

- Fastest repair and strengthening method
- Resists shear, flexural and torsion forces
- Reduced dead load

Availability

1. Product – Carbon fiber is readily available and easily shipped anywhere

2. Labor – There are local contractors that install Danbro Carbon Composites products across India in commercial projects

Easy and fast installation

Excellent corrosion and fatigue properties

High strength to weight ratio

CFRP Fabric & LAMINATE

- · Weight: 200g/sqm,300g/sqm,600g/sqm
- · Thickness: 0.11mm,0.167mm,0.33mm
- · Density: 1.8g/cm3
- · Direction: unidirectional
- · Packing: 100 meters/roll
- · Width: 100mm, 200mm, 300mm, 500mm or to be customized.

1. Surface preparation

Remove surface layer: Use a grinder to remove the outer coating and any weak concrete from the surface.

Create profile: The concrete surface should be prepared with a rough profile using sandblasting or grinding. A concrete surface profile (CSP) of 3 to 5 is often recommended to create a strong mechanical bond.

Clean the surface: Use a solvent like acetone to clean the concrete and CFRP laminates, removing any dust, oil, or loose material. The surface should be cleaned thoroughly.

2. Adhesive application

Prepare the adhesive: Mix the epoxy adhesive according to the manufacturer's instructions.

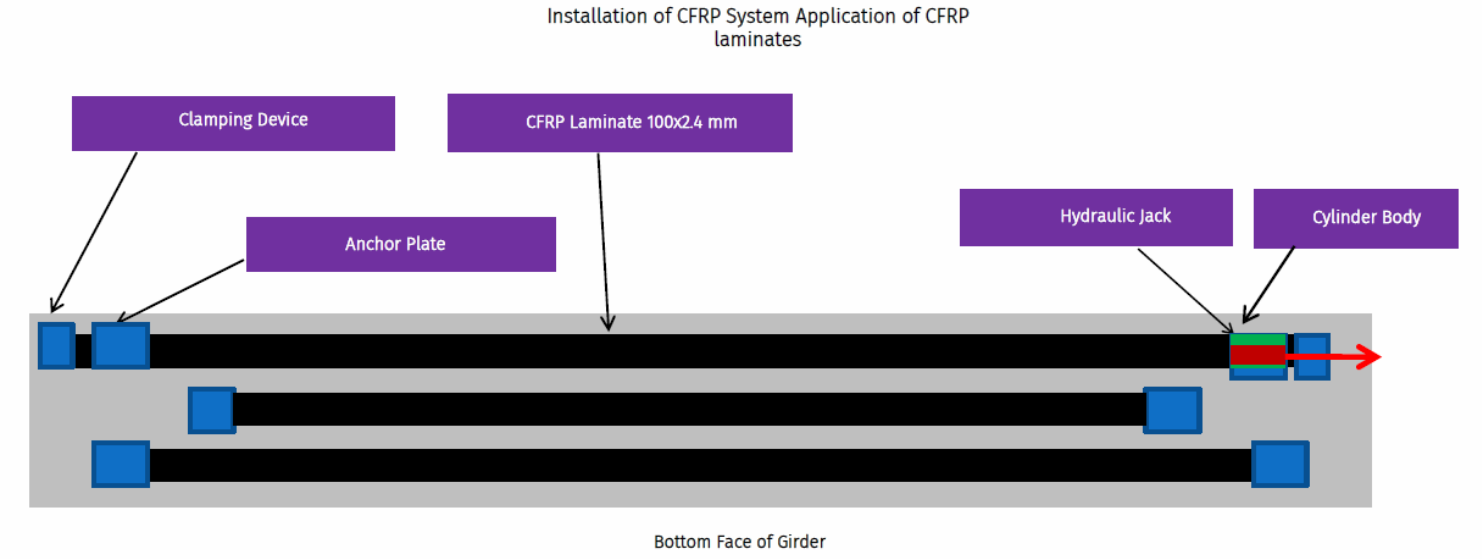
Apply the primer: Apply a primer coat to the prepared concrete surface. This should be done soon after cleaning to prevent oxidation.

Apply the adhesive: Apply the mixed adhesive uniformly to the prepared concrete surface where the laminate will be placed. You may also need to apply a layer to the CFRP laminate itself.

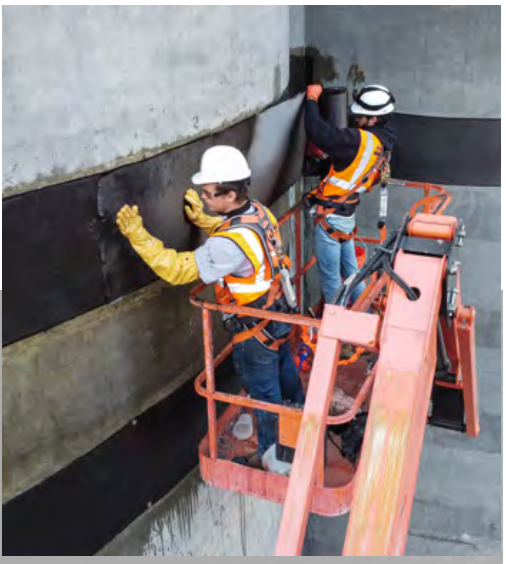
3. Laminate installation

Position the laminate: Carefully place the CFRP laminate onto the wet adhesive.

Roll out trapped air: Use a roller to press the laminate down, removing any trapped air between the laminate and the concrete. The adhesive should be forced out from the sides, ensuring a complete bond.



DEMOLITON AND REBUILD VERSUS REPAIRING WITH CFRP

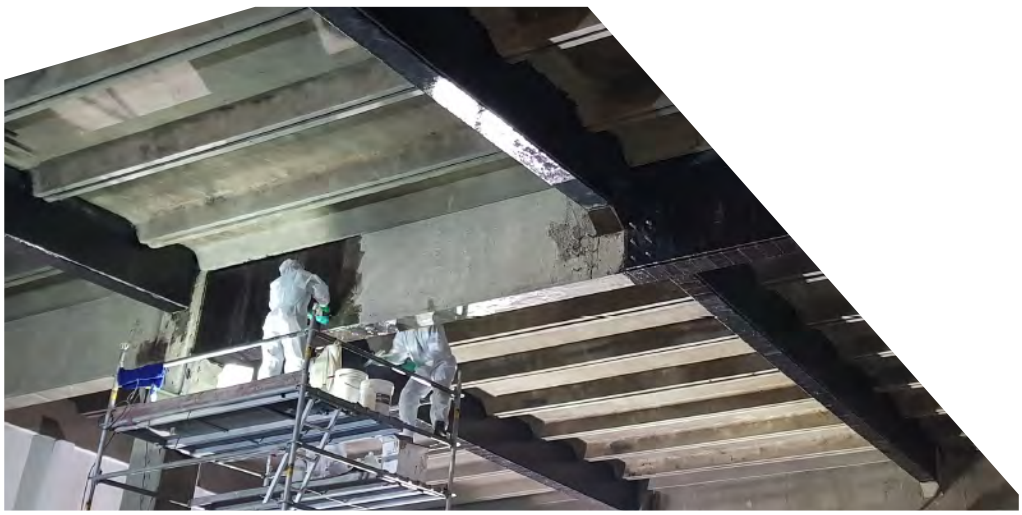


A large portion of old structures all over India, specifically bridges, require immediate repair or demolition due to aging. The deterioration of bridges occurs due to environmental conditions, climate, location and usage and over 30% of bridges have been characterized as structurally deficient and therefore,need to be repaired and strengthened or demolished and replaced with new ones.

Demolishing existing bridges and building new ones will be very expensive and time consuming and will not be a viable option, not to mention the negative impact on the environment. However, it is possible to use long-lasting methods of repairing and strengthening which result in low maintenance bridges at a reasonable lifecycle cost .

CFRP strengthening is the more cost and environmentally effective alternative when compared to demolition/rebuild. CFRP-strengthening is also more economical than other retrofitting methods such as welded steel jackets, internal strand splices, external post-tensioning and replacement of damaged girders. These other techniques are heavy in weight, labor-intensive and vulnerable to future corrosion and traffic disruption which increases the LCC in comparison to CFRP.

Using CFRP to repair and strengthen existing structures and/or to build new structures is the most cost-effective, fastest and environmentally friendly technique. It is easier to achieve the desired strengthening of a structure using CFRP.

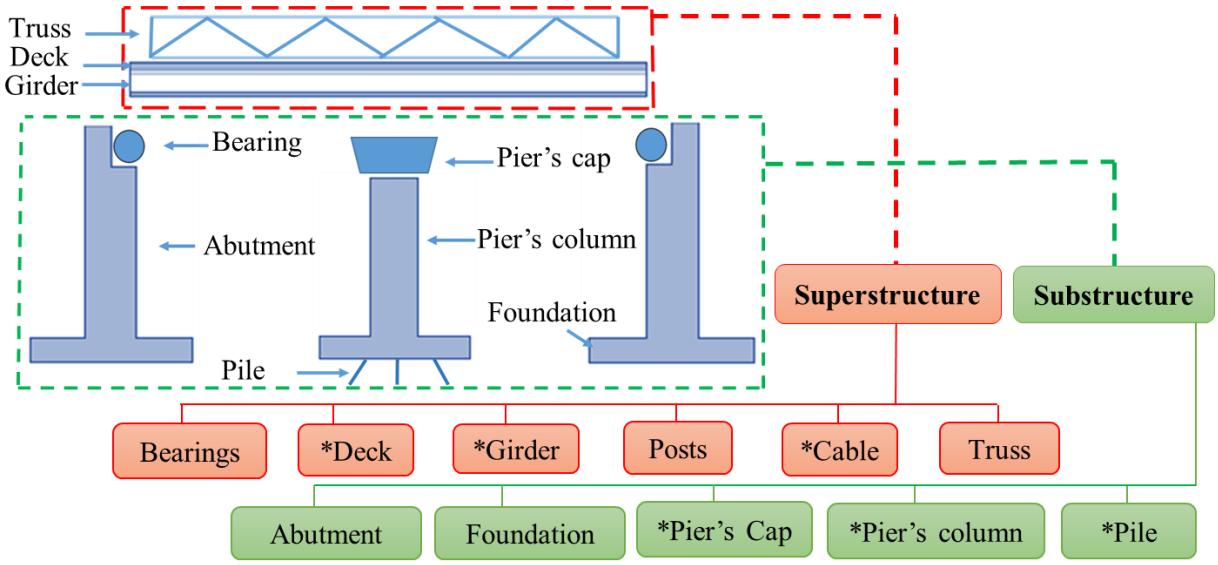


SEISMIC STRENGTHENING AND DAMAGE REPAIR (WALLS, DECKS, ACCESS OPENINGS AND SLABS)

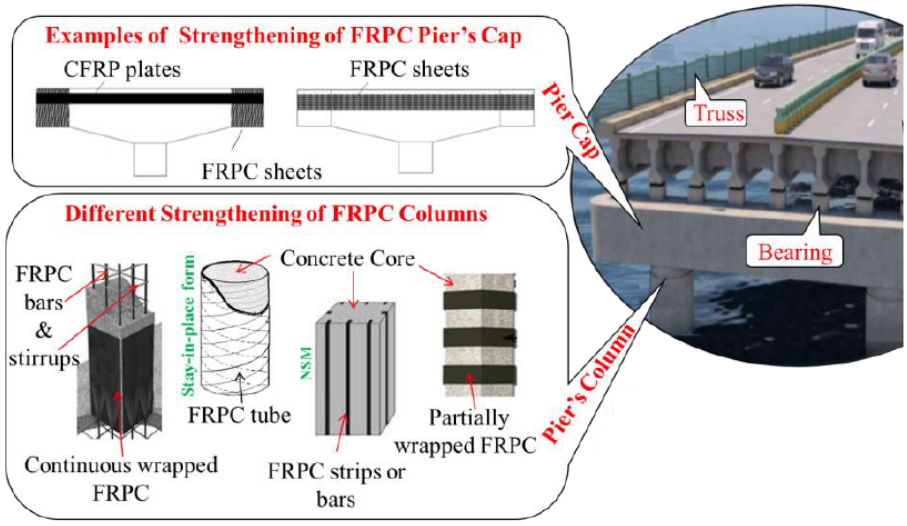
There are a variety of structures that are seismically vulnerable, and many are in danger of failure. Several seismic strengthening methods are available, however, CFRP is the preferred strengthening solution due to its remarkable gains which prevent premature failure during seismic activity or blasts.

Advantages of Strengthening with CFRP:

- CFRP-strengthened walls increase in ultimate strength by 15-60% in one-way RC walls and 5-40% in two-way RC walls, depending on the CFRP layout
- CFRP applied 45-degree angles to the corners of wall openings is highly effective in reducing principal stress
- Increased lateral resistance of masonry walls strengthened with diagonal CFRP strips is 115%, while this amount for masonry walls strengthened with steel strips is 58% (displacement ductility is 1.97 times higher than unreinforced walls)
- It is possible to increase the average load-bearing capacity of RC slabs by about 40%
- The flexural capacity of CFRP-strengthened two-way slabs increases by about 30%
- The ultimate load-bearing capacity of CFRP-strengthened one-way slabs with an opening increases by about 25-90%
- Defection in one-way slabs is reduced 40-50% at service load and 40-60% at ultimate load
- Crack widths in one-way slabs are reduced 45-75% at service load and 85-95% at ultimate load
- Strengthening RC slabs with CFRP increases their punching shear capacity by up to 30%



Main parts of a bridge (* the most common CFRP components uses in repair)



WHY CHOOSE DAN BRO

Our commitment to innovation ensures that we stay ahead of industry trends, utilizing state-of-the-art materials and techniques that enhance the strength, durability, and longevity of structures. This forward-thinking approach allows us to tackle even the most complex projects with confidence and precision.

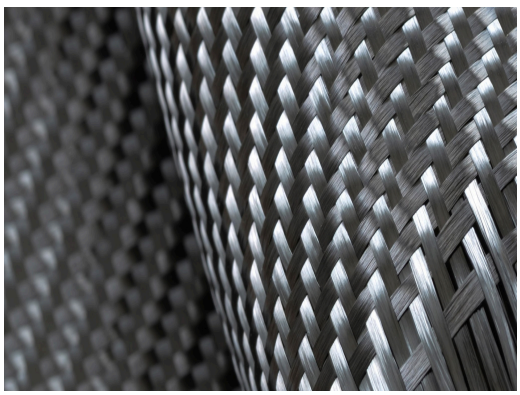
We strive to build lasting relationships with our clients through reliability, and unmatched service excellence. we are committed to providing exceptional support and communication, ensuring that our clients are fully satisfied with our services.

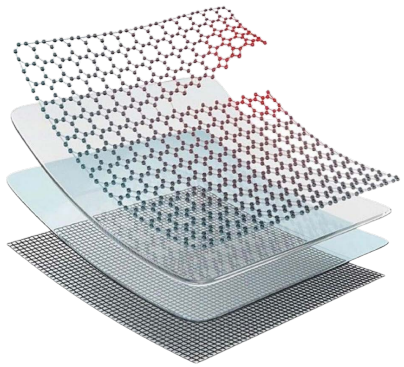
We understand that each project is unique, requiring a customized approach to meet specific needs and challenges. Our team of experts works closely with clients to develop tailored solutions that address the distinct requirements of their structures.

DanWR300C

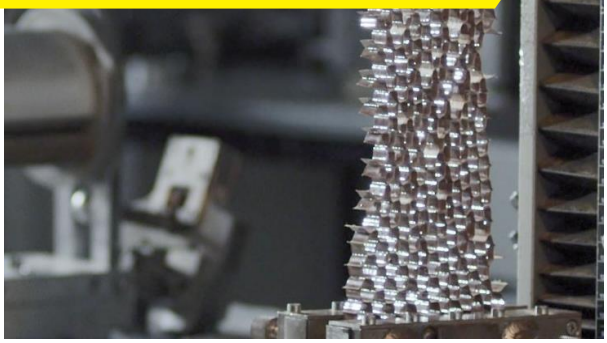
PRODUCT DETAILS

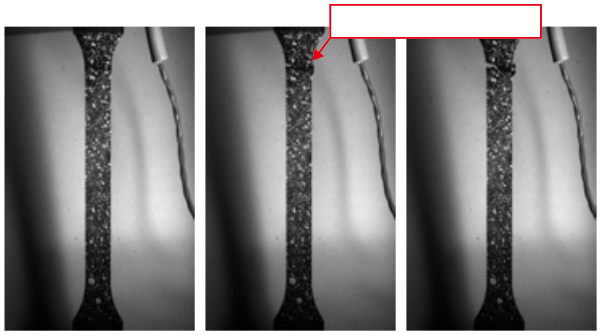
GRADE	A				B			
Fiber Type	12K	12K	12K	24K	12K	12K	12K	24K
Tensile Strength of Carbon Fiber	4900Mpa	4900Mpa	4900Mpa	4900Mpa	4500Mpa	4500Mpa	4500Mpa	4500Mpa
Weight	200GSM	300GSM	400GSM	500GSM	200GSM	300GSM	400GSM	500GSM
Tensile Strength of Carbon Fabirc	≥3400Mpa	≥3400Mpa	≥3400Mpa	≥3400Mpa	≥3000Mpa	≥3000Mpa	≥3000Mpa	≥3000Mpa
Thickness	0.111mm	0.167mm	0.222mm	0.333mm	0.111mm	0.167mm	0.222mm	0.333mm
Elastic Modulus	≥2.3*105Mpa	≥2.3*105Mpa	≥2.3*105Mpa	≥2.3*105Mpa	≥2.0*105Mpa	≥2.0*105Mpa	≥2.0*105Mpa	≥2.0*105Mpa
Elongation	≥1.7%	≥1.7%	≥1.7%	≥1.7%	≥1.5%	≥1.5%	≥1.5%	≥1.5%
Width	100-1500mm	100-1500mm	100-1500mm	100-1500mm	100-1500mm	100-1500mm	100-1500mm	100-1500mm
Length	100 Meters per Roll	100 Meters per Roll	100 Meters per Roll	50 Meters per Roll	100 Meters per Roll	100 Meters per Roll	100 Meters per Roll	50 Meters per Roll





CFRP Testing @ DAN BRO





High-Speed Fracture Observations -

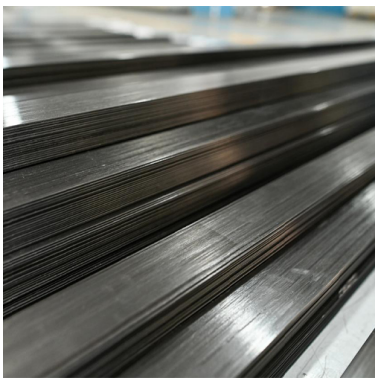
- Universal testing machine (2.5 kN, 50 kN und 100 kN)
- Climate chambers
- Differential scanning calorimetry (DSC)
- Coordinate measurement machines (CMM)
- NDT: Woodpecker, tap hammer, ultrasonic
- NDT: X-Ray unit (6000 x 2500 x 1200 mm)

CFRP LAMINATES

DAN BRO Pultruded Carbon fiber plates are mainly used in construction reinforcement.

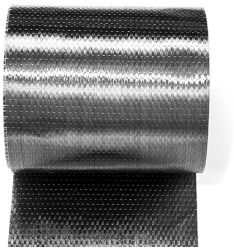
Good quality carbon filaments are used to manufacture them, which steadily ensures the plate is with high tensile strength and modulus all the time.

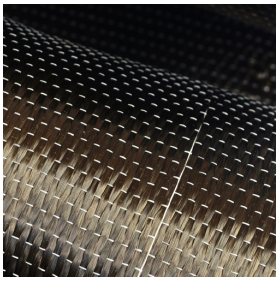
The tensile strength can reach 2400MPa & tensile modulus can reach 160GPa.

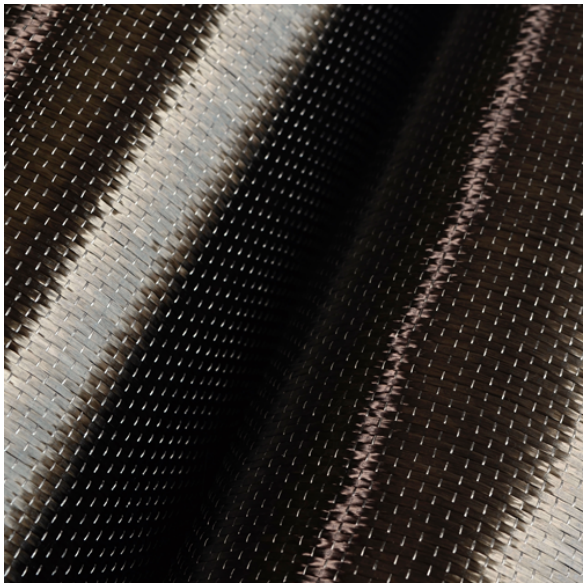


CFRP UD FABRICS

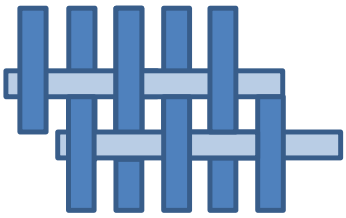
UD Carbon Fiber Fabric is made of carbon fiber by woven unidirectional weaving style. The carbon fibers used contain high strength-to-weight and stiffness-to-weight ratios. Carbon fabrics are thermally and electrically conductive and exhibit excellent fatigue resistance. When properly engineered, carbon fabric composites can achieve the strength and stiffness of metals at significant weight savings. Carbon fabrics are compatible with various resin systems including epoxy, polyester and vinyl ester resins.



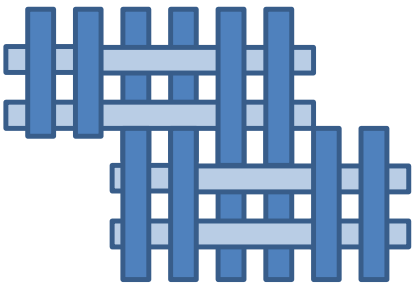




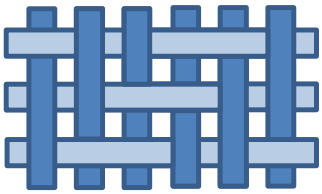
The other types of weaves we undertake apart from UD are as indicated here below



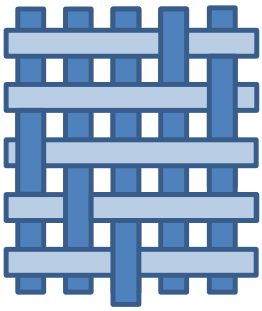
Plain weave



Basket weave



Twill weave



Satin weave

ABOUT DAN BRO ADVANCED TECHNOLOGIES PVT LTD.

Recent years have seen numerous heavy rains, earthquakes, volcanic eruptions, tsunamis, droughts and other natural disasters around the world. Typhoons, heavy rains, and the subsequent flooding are becoming more frequent and more severe, and damage from earthquakes is unending.

In addition to the harm they inflict in terms of human life, the economic toll of such disasters is a major barrier to the realization of a sustainable society. Natural disasters significantly impact highly developed countries and, in countries where infrastructure is underdeveloped, can wreak even greater harm.

As bridges, expressways, tunnels and other such infrastructure components age, their safety becomes harder to ensure; incidents involving collapsing or failing infrastructure in India have been occurring one after another. Furthermore, the decreased utility of aging structures and the expense of repairing and strengthening them are major social issues.

Dan Bro wishes to provide a range of products and services that aid in addressing the critical state of infrastructure and contribute to enhancing their useful life.

For more information on entire product range, TDS, contact us at

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