


The Innovative Carbon/Carbon Composite Manufacturer



Specialist C/C Composites For
Heat-Treatment and High temperature
environments

Advanced Carbon/Carbon Composites manufactured by Neftec.

- Next generation C/C Composites and products
- Exceptional material and manufacturing knowledge
- Class leading C/C composites helping reduced customer's overheads
- Delivering consistent high-quality products, services and support
- Broad-based solutions

Your Next Generation Material Partner

Next generation C/C Composites giving our customers the competitive edge

Neftec's experience and technological innovation in Carbon/Carbon Composites allows us to provide our customers with a range of solutions for their high-temperature applications.

Next generation thinking is Neftec's ethos and this can be seen in the Carbon/Carbon Composites we manufacture and our ground-breaking technology behind it. We pride ourselves not just on providing innovative and new Carbon/Carbon (C/C)

Composites. But also the way we work with our customers. Our priority is to supply solutions to our customers which help them excel in their specified field.

Working with Neftec can offer such advantages due to our diverse way of thinking and adaptable C/C composite technology.

A tried and tested combination that helps our customers productivity and growth.

Neftec has a long history in the research, development and manufacturing of short-fibre Carbon/Carbon composites. With our manufacturing facilities based in the heart of Japan, Neftec is striving to produce global leading short-fibre C/C composite materials and products that offer high performance while giving exceptional economical advantages to our customers.

Our history can be traced back to the early 1980s where Neftec's Chief Engineer and President worked with major petroleum companies developing C/C composites for various applications. While the development of Neftec's short-fibre composite originates from his work with friction applications for motorsport and aerospace industries.

Today Neftec's material have matured into a material that is adaptable for many industries. It is accepted globally for its high-quality, strength and durability. While Neftec is recognised as a company looking to lead the way with low cost, high performing C/C Composites.

- Neftec is accepted globally for its high-quality, strength and durable C/C.
- A dynamic ability to adapt and keep ahead of our target markets.
- Tailored solutions to our customers.

Advanced C/C Composites

Properties of Neftec's C/C Composites

Carbon fibre reinforced carbon composites are commonly referred to as either Carbon/Carbon Composites, CFC or C/C Composites. It is an advanced material that's made of thin carbon fibres and reinforced by a carbon matrix binder that creates a highly stable heat-resistant material.

Neftec's short-fibre C/C Composites has unique and superior properties compared to other C/C Composites. These include; high strength, lasting-durability, lightweight and exceptional heat resistance.

This makes them suitable for an array of fields including, vacuum heat-treatment, electronics production, energy and renewable, automotive and aerospace applications.

■ High Mechanical Strength And High Inter-Laminar Shear Strength

Neftec's short-fibre offers very high inter-laminar strength compared to standard 2D long-fibre C/C and graphites and is comparable to some 3D composites. High ILS strength is the a key point to overall strength in C/C and we believe should be a priority focus when choosing a C/C material.

Higher the ILSS, lower the chances are for de-lamination. The lead-

■ Superior Heat-resistance

When compared to 2D long-fibre composites Neftec's composites in the same environment the PC series can exhibit far greater resilience over prolonged periods of time. Our C/C Composites can withstand temperatures within a vacuum of up to 2400°C

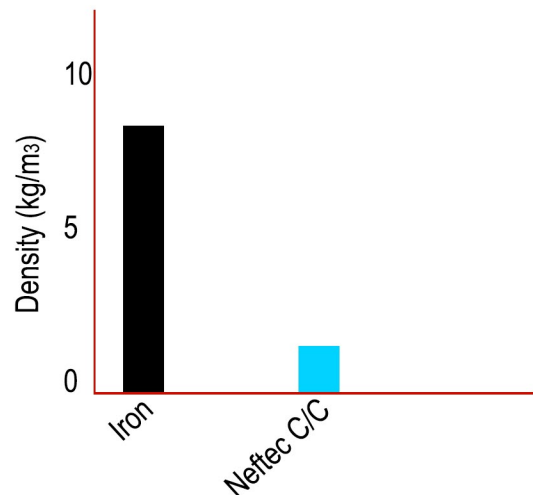
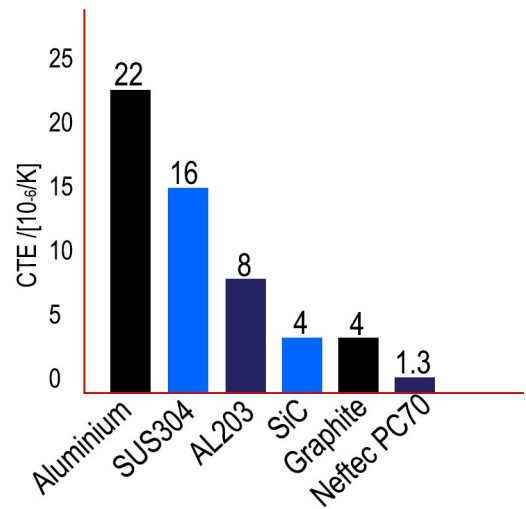
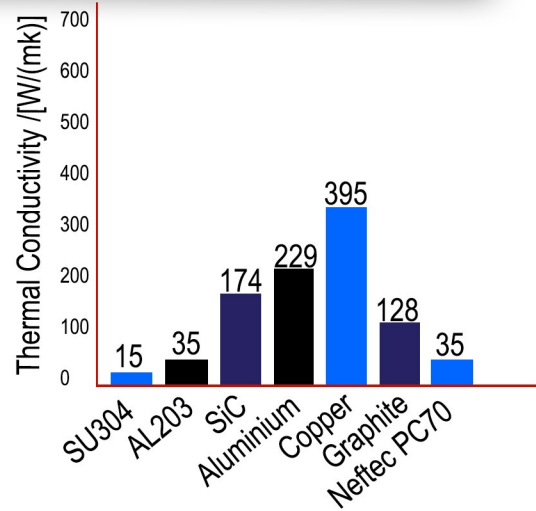
■ Light-weight And Long life

Our C/C exhibits exceptional low weight and an average density of 1.7 g/cm³. Making it ideal for easy handling, lightweight fixtures, furnace construction. All of which aids increased productivity.

The class leading density provides a long lasting life-span and excellent overall strength.

■ High Thermal Conductivity

Neftec's C/C offers excellent thermal conductivity characteristics, when partnered with excellent thermal expansion, this makes Neftec's C/C Composite much more resilient to thermal shocks and contributes to further energy savings to the user.



'PM' Method

Neftec has a long history in the research and development of C/C Composites and specialist knowledge in short-fibre composites. We have created a cutting-edge manufacturing technique is called the 'PM' method.

PM' manufacturing procedure allows Neftec to be more flexible, dynamic to produce a very high quality composite. But we are also able to reduce our production costs which are directly passed on to our customers.

- Quicker production times reduce customer's downtimes.
- Lower pre-production costs, lower costs to the user.
- Highly specialist production, providing higher quality C/C
- High strength C/C that is easy to handle and machine
- Bespoke designs and capabilities
- Bespoke plate and sheet sizes
- Reduces overall environmental impact.

The PM method also contributes to the exceptional quality and strength of Neftec's C/C composites. Seen in both our flag-ship short-fibre composites, like PC70.

PM provides the following advantages to our C/C:

- High mechanical strength
- High Inter-laminar strength
- Higher density
- Very precise machining properties
- High quality, longevity and prolonged performance

+ 'PM' Production Technology Details

Modern manufacturing procedures and standards developed by Neftec

The 'PM Method' is our manufacturing technology that has solely established and continuously developed by Neftec. Production can be described as having just 5 critical steps. Just one of the major advantages of these reduce number of production steps is the decrease in C/C production from start to finish. The key is the pre-production and highly developed Impregnation and heating cycles. Due to technical advancements we can reduce the number of cycles in this process. And just because there are few steps does not mean there is a decrease in quality. In fact it is the opposite. PM produces an exceptional high-strength composite, with improved quality and life span. The lower number of cycles also have a positive effect on pre-production costs and energy consumption, it helps lower our environmental impact while lowering the C/C costs to our customers.

PM Production → Lamination → Moulding and Impregnation → Graphitization → C/C Composite

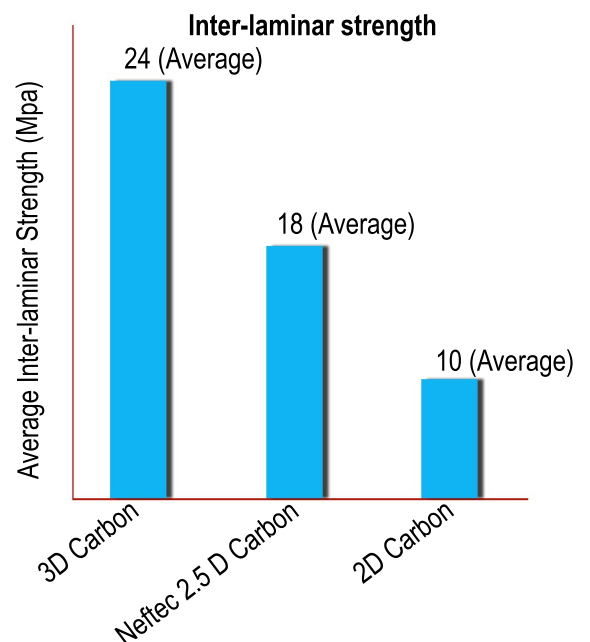
Focusing on Inter-Laminar Shear Strength

A key part of the structural strength of C/C composites is the inter-laminar shear strength or ILSS. ILSS in its basic term, it describes the shear strength between a laminate plane. The matrix will govern the ILSS as well as fibres bridging each laminate plane. Typically a low inter-laminar shear strength leads to a greater risk of delamination, this is the point where each laminate of C/C effectively shears apart. And a leading factor to C/C failure.

Neftec is keen to emphasise the importance of ILSS values as being a top consideration when choosing a C/C composite, but often overlooked. Values like Tensile strength are typically focused on, while important they are not always directly related for a C/C composite failure.

Neftec Short-Fibre classification

Neftec's C/C is classed as 2.5D Composite due to the higher than average ILSS. This sits it between expensive 3D composites and more commonly used 2D. 2D C/C typical has a lower ILS, while specialist 3D C/C has a very high ILS but at a higher cost. Our C/C has ILSS strength close to 3D while at a cost of 2D. Provides all the advantages with none of the disadvantages.



+ Core Industries

Carbon/Carbon Composites supporting modern industries.

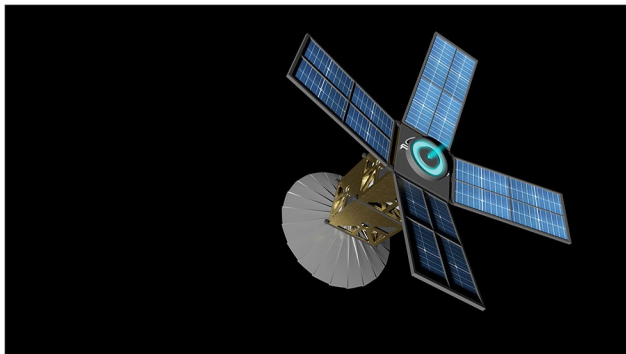
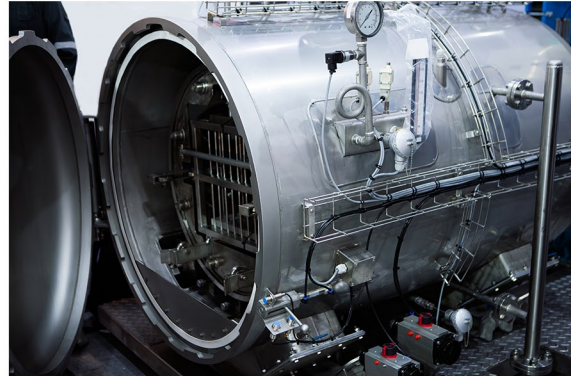
Carbon/Carbon composites are becoming ever increasingly part of many modern Heat-treatment industries. Rapidly replacing traditional materials like Graphites and High-temperature alloys due to the end user understanding the benefits of C/C Composites and what they offer.

Industries switching to C/C composites see a significant increase production output and further reduction to their overheads. Our continued efforts to push the technological boundaries of our materials allows us to offer multi-functional C/C products that are suited for variety of customers and specialist fields.

High-Temperature Heat-Treatment

Industries that work in High-Temperature and Heat-Treatment require minimum downtime and maximum output. You can trust Neftec to supply C/C components for the field of high temperature applications, whether it be in the glass industry or furnace construction.

- Furnace construction
- Fixtures
- Commercial Heat-treatment, brazing, sintering
- Tool and Die
- Automotive
- Aerospace



Aerospace

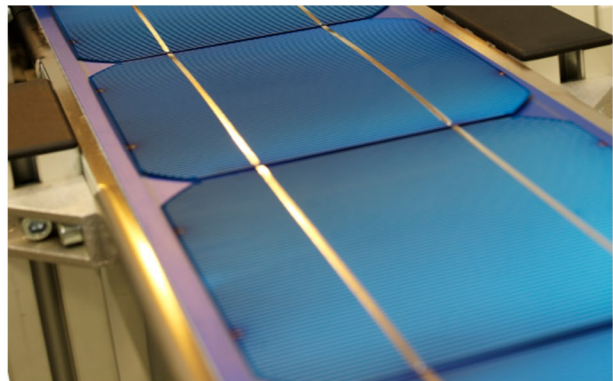
Supplying all areas of Aerospace, from heat-treatment of turbine blades to Electrical propulsion systems for example Hall Effect drives. Neftec trusted partner of many leading aerospace companies.

- Satellite electric propulsion drives
- Heat-Treatment

Renewable Energy Technology

Clean energy sources are a key focus in today's modern world and providing clean energy that is affordable and accessible is of high importance. At Neftec we are driven to helping to reduce costs and increase performance for a wide range of energy industries.

- Solar Cell production
- Silicon crystalline growing
- PECVD
- Nuclear industry



Specialist Technology

There are industries that require high-temperature materials that are very specific to their needs. We offer unique services from fully bespoke Carbon/Carbon composites to thermal coatings.

- Robotics
- Oil and Gas
- Magnetic production
- Medical
- Electronics
- Fuel Cells

+ Premium Carbon Series

High strength, defined quality, efficient.

Neftec understands the needs of our customers and the industries we supply. And this is why we offer several different types of C/C composites in order to cover a large area of heat-treatment and high temperature applications.

Customers needs can also change or require something more specific to an application. And with this in mind we can offer a bespoke composites based on the present grades we offer.

■ Technical Properties

Material Grade			PC70	PC70H	PC30	PC40
Fiber Direction / Length			Short/Random Pan Fibre	Short/Random Pan Fibre	Short/Random Pan Fibre	Short/Random Pitch Fibre
Bulk Density		g/cm ³	1.65	1.7+	1.65	1.65
Flexural Strength		MPa	200	220	180	180
Tensile Strength		MPa	120	145	120	160
Youngs Modulus		Gpa	45	50	45	75
Compressive Strength		MPa	120	200+	110	190
Interlaminar Shear Strength		MPa	18	19+	16	16
(RT-1300C) Coefficient of Thermal Expansion		10 ⁻⁶ /°C	1.0	1.0	1.0	0.3
	⊥		10.4	10.4	10.4	10.6
Thermal Conductivity	(X/Y Axis)	W/m · K	35	35	100	130
	⊥ (Z Axis)		12	12	20	29
Specific Heat		20C J/Kg · K	720	720	720	740
Electrical Resistivity		μΩcm	2000	1800	1400	1200
Charpy Impact Strength		KJ/m ²	20	20	20	20
Shore Hardness			75	75	70	75
Temperature rating		°C	2000	2000	2400	2400

Note: Information provided is average value only and not guaranteed.

■ Available sizes

Sizes		PC70	PC70H	PC30	PC40
Standard production dimensions	Standard Stocked Thicknesses	Grade size and thickness availability			
500 x 2000 or 500 x 1000	31mm to 100 mm	Yes	Yes	Yes	NA
1000 x 1000	1.2mm to 41mm	Yes	Yes	Yes	Yes
1220 x 1220	1.2 mm to 30mm	Yes	Yes	Yes	NA
2000 x 1220	1.2 mm to 30mm	Yes	Yes	Yes	NA
2000 x 1120	1.2mm to 41mm	Yes	Yes	Yes	NA
2000 x 1000	1.2mm to 41mm	Yes	Yes	No	Yes
Special order sizes					
2000 x 1000 * Outside dim reduced by 10mm by every 5t increment. For example 46t - 1990 x 990	41mm to 100MM	Yes	Yes	Yes	Yes
2000 x 1120 * Outside dim reduced by 10mm by every 5t increment. For example 46t - 1990 x 1110	41mm to 100MM	Yes	Yes	Yes	NA
2000 x 1300* These plates are subject to additional grinding charges	1.2mm to 20mm	Yes	Yes	Yes	NA
2000 x 1500* These plates are subject to additional grinding charges	5mm to 41mm	Yes	Yes	Yes	NA
2000 x 2000* These plates are subject to additional grinding charges	2mm - 30mm	Yes	Yes	Yes	NA

*Please note that material property data is accurate at the time of testing but is not guaranteed. Data measured is taken from batches and the property data is from the overall average. The properties could vary.

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