

**PEEKFRTP<sup>®</sup>**

**JiangSu JunHua HPP Co., Ltd.**

**Continuous CF/PEEK  
Thermoplastic Prepreg, Laminate, etc.**

# COMPANY INTRODUCTION

Founded in 2007, Jiangsu Junhua is a company specialized in the development and production of PEEK (poly-etheretherketone) and other high-performance and engineering plastics. A complete industrial chain was formed including PEEK resin, modified granulation, injection molding, machining, and continuous extrusion such as PEEK rod, tube, sheet.

Changzhou Junhang High-Performance Composite Material Co., Ltd. is a wholly-owned subsidiary of Jiangsu Junhua, focusing on the research and manufacturing of continuous fiber-reinforced thermoplastic composites. PEEKFRTP® and JHFRTP® are the two newly launched series based on 17 years of manufacturing experience of PEEK. The main product is TPC in prepreg, laminate, and other types with different materials available such as CF/GF fiber and PEEK/PPS/PEI/PPSU thermoplastic.

We offer solutions and customized products according to customer needs. As a company specialized in the supporting development work in the advanced thermoplastic composite material market, we served industries such as aerospace, the military industry, medical technology, nuclear power, etc. We have reached long-term cooperative relations with various industrial units such as aerospace institutes, military units, and medical device companies.

## Company View



Office



Laboratory



Clean-workshop



Showroom

## Equipment



Unidirectional Tape  
Production Line



Molding Machine



Ultrasonic Detector



Automatic Cutting Machine





## Patent

No.	Patent No.	Date of Application	Description	Type	Status
1	ZL201910443696.8	2019/05/27	A continuous CF/PEEK thermoplastic composite and preparation method thereof	Invention	Authorized
2	ZL202010230653.4	2020/03/27	A thermally conductive, electromagnetic shielding, high-strength PEEK composite and preparation method thereof	Invention	Substantial examination
3	ZL202010420353.2	2020/05/18	CF/PEEK composite with excellent high wet mechanical properties and preparation method thereof	Invention	Authorized
4	ZL202022410490.6	2020/10/27	A machining equipment for horizontal aiming bracket of femoral intramedullary nail	Utility Model	Authorized
5	ZL202011514390.6	2020/12/21	A kind of high temperature resistant and wear resistant PEEK matrix composite material and preparation method thereof	Invention	Substantial examination
6	ZL202011546384.9	2020/12/24	Equipment and process technology for a kind of 3D printing filament made of continuous fiber reinforced thermoplastics	Invention	Authorized

## Certificate



# About Carbon Fiber Composite

Carbon fiber composite is a structural material made of carbon fiber and plastic resin. The advanced resin-based composite material which is made of carbon fiber and high-performance resin is the most used and most important structural composite.

The resin is a main base material of the composite and is classified into thermosetting resin and thermoplastic resin. The resin holds the fibers together tightly to form a new multi-phase material system. The role of resin and fiber is complementary. It is because of the consolidation and protection of the resin that the fiber can effectively carry the load and the resulting composite can be used as structures.

## Carbon Fiber Composite

### 01 THERMOSETTING

Although thermosetting resin-based composites dominate high-performance composite materials, they encounter many problems during application. The most prominent problems are:

Crosslinking between molecules leads to high brittleness, resistance to impact, easy cracking and delamination;

The thermosetting resin is not completely reacted, resulting in hydrolysis and water absorption, poor heat and humidity resistance, and poor chemical resistance;

Long processing cycle and low production efficiency make it difficult to achieve production automation.

### 02 THERMOPLASTIC

Continuous fiber reinforced thermoplastic resin matrix composites have become the application trend of resin matrix composites in recent years due to their good comprehensive properties and environmental friendly recyclability.

The polymerization has been completed before pre-impregnated, which means there's no limit for storage time.

There is no chemical reaction during the production process, and the molding cycle time is short, which is suitable for automatic production.

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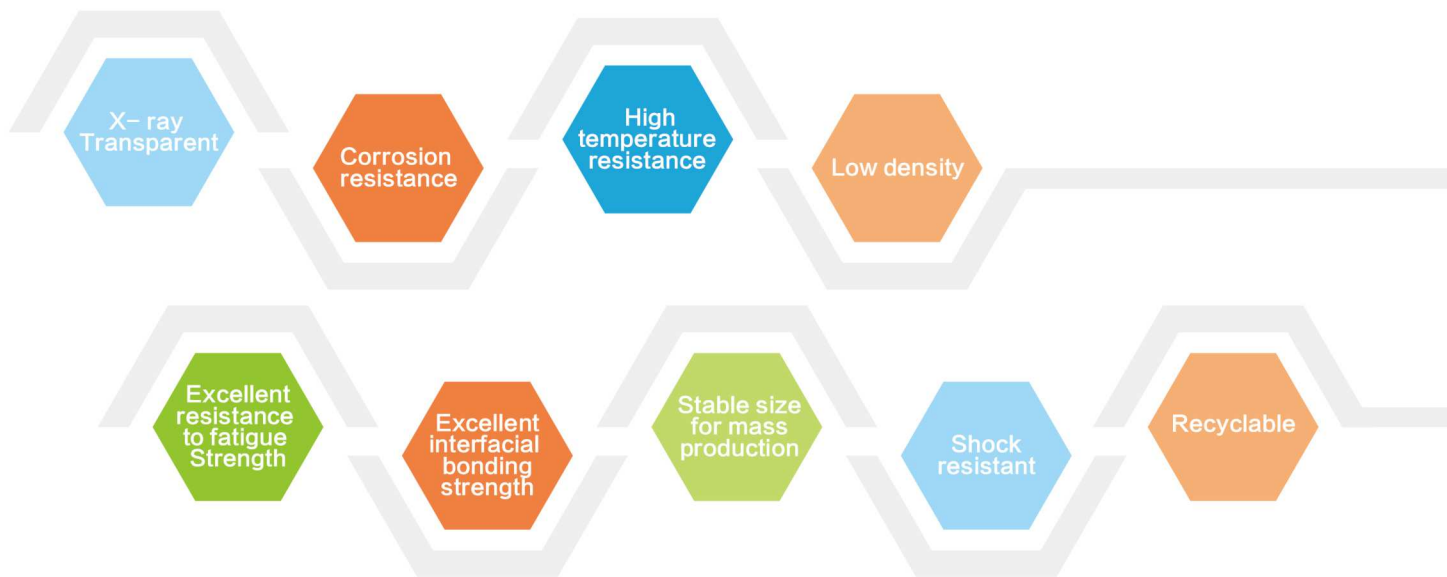
Low moisture absorption rate, good heat and humidity resistance, and good mechanical properties under high temperature and high humidity.

The certain degree of crystallinity enhances the chemical resistance and chemical compatibility of the material.

## Prepreg, Laminate and other products Made of Continuous CF/PEEK Thermoplastic Composite

As a typical high-performance thermoplastic resin, PEEK (polyetheretherketone) is the first of special engineering plastics with outstanding properties. It is compounded with continuous carbon fiber to effectively combine the properties of the two materials, and the overall performance is more excellent. Continuous CF/PEEK thermoplastic composites have been widely used in aerospace, military, medical, automotive and other fields because of their excellent properties.

### The Advantages of Continuous CF/PEEK TPC



### Prepreg and Laminate





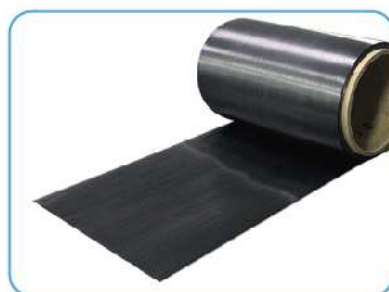
## Properties of Continuous CF/PEEK Prepreg

Items	Unit	UD Tape	Fabric Semi-preg
Fiber	/	T700 12k	3k 5HS
Weight per unit area of fiber	g/m <sup>2</sup>	145	280
Resin Content	%wt	34 ± 3	40 ± 3
Thickness Layer	mm	0.14	0.3
Tg (DSC)	°C	143	143

## Properties of Continuous CF/PEEK TPC

Items	Standard	Unit	UD Tape 0°	UD Tape 0° /90°	Two way prepreg cloth
Carbon Fiber Mass Content	ASTM D3529	%	66	66	60
Density	ASTM D792	g/cm <sup>3</sup>	1.58	1.58	1.55
Hardness	ASTM D785	HRE	105	104	102
Tensile Strength	ASTM D3039	MPa	2200	880	700
Tensile Modulus	ASTM D3039	GPa	130	73	70
Flexural Strength	ASTM D7264	MPa	2000	1400	900
Flexural Modulus	ASTM D7264	GPa	116	65	73
Compressive Strength	ASTM D6641	MPa	1200	670	630
Compressive Modulus	ASTM D6641	GPa	120	60	56
Distortion temperature	ASTM D648	°C	332	332	332
Compression strength after impact	ASTM D7137	MPa	220	225	230
Type 1 interbedded fracture toughness	ASTM D5528	J/m <sup>2</sup>	1400	1410	1430
Short beam intensity	ASTM D2344	MPa	110	100	80
- 0.5%In- plane Shear Strength- 0.5%	ASTM D3518	MPa	130		110
- In- plane SHERA Modulus	ASTM D3518	GPa	5.2		5.2

PS: LU-CF/PEEK means UD tape laminate. LF-CF/PEEK means Fabric Prepreg laminate.

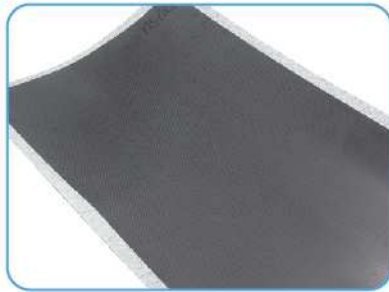


## JHF RTP® composite series is other resins matrix reinforced fiber composites

Mass production for continuous CF(GF)/PEEK and small amount production for CF(GF)/PPS, CF(GF)/PEI had been realized already.



2mm thickness CF/PEI  
composite sheet



CF/PEI  
composite sheet



GF/PEEK  
composite sheet

## Properties of JHF RTP® series

Items	Standard	Unit	LF-CF/PPS	LF-CF/PEI	LF-GF/PEEK	LF-GF/PPS	LF-GF/PEI
Density	ASTM D792	g/cm <sup>3</sup>	1.6	1.5	1.85	2.1	1.85
Tensile Strength	ASTM D3039	MPa	700	629	395	510	385
Tensile Strength	ASTM D3039	GPa	/	54.84	20.39	/	25.25
Flexural Strength	ASTM D7264	MPa	829	882	445	608	493
Flexural Modulus	ASTM D7264	GPa	66.43	46.08	20.73	33.85	22.3
Compressive Strength	ASTM D6641	MPa	510	550	510	/	510

## Properties of UD Tape (under researching)

Items	Standard	Unit	Data
Density	ASTM D792	g/cm <sup>3</sup>	1.52 – 1.55
Vol. Content of Fiber	ASTMD 3529	%	50
Weight Content of Fiber		%	55 – 60
Tensile Strength	ASTM D3039	MPa	1843
Tensile Modulus	ASTM D3039	GPa	109.08
Flexural Strength	ASTM D7264	MPa	1663
Flexural Modulus	ASTM D7264	GPa	118.5
Compressive Strength	ASTM D6641	MPa	1074
Compressive Modulus	ASTM D6641	GPa	106.28
Short Beam Strength	ASTM D2234	MPa	97

# Applications of Continuous CF/PEEK TPC in Aerospace, Military Nuclear Power

With the development of the aerospace industry, the high performance, high reliability and low cost of advanced aircraft, launch vehicles and missiles, and satellites are largely required due to the wide application of new materials and new processes. Advanced composite materials are an important part of aerospace high-tech products. Continuous CF/PEEK TPC has the advantages of extremely high heat resistance (heat deformation temperature up to 310°C), corrosion resistance, friction resistance and good biocompatibility. It can effectively reduce the structural weight of aircraft, launch vehicles, missiles and satellites, increase payload and range, and reduce costs.

With high mechanical properties and higher impact resistance than traditional thermoset composites, it can process aircraft landing gear skin components while reducing weight.

## Application in Military Aircraft

PEEK is favored by the aerospace industry for its excellent toughness, damage resistance, fatigue resistance, etc., especially on military aircraft.

PEEK prepreg has been used in automatic tail, fuselage belly panel, fuselage skin, front landing gear door, main landing gear door, wing panel, horizontal stabilizer leading edge, etc.



PEEK, PEKK, PES and other resins have better radar transmission and power-saving projection characteristics. When radar waves are projected onto these resin-based composites, creeping electromagnetic waves are not easily formed. Polyethersulfone (PES) has excellent transmittance to radar rays and is used in radome instead of epoxy. Utilizing excellent wave absorption performance, it can greatly attenuate the pulse frequency of 0.1MHz-50GHz. It has been applied to the fuselage and wings of the Advanced Fighter (ATF). With carbon fiber and PEEK multifilament hybrid yarn unidirectional reinforced grade, the material is suitable for making helicopter rotors and missile casings.



Nuclear power thrust block



Envelop of the aircraft landing gear



Bracket





## Application in Military Aircraft

Communication remote sensing satellites need to increase the optical aperture to improve the resolution of the remote sensor, including the mirrors (spherical and aspherical) of the main optical system of various space cameras and the scanning mirrors of optical-mechanical scanning space remote sensors. The Mirror and substrate is designed to be made of continuous CF/PEEK TPC, as the continuous CF/PEEK TPC is lighter than metal materials. In the 2.0–3.5 micron infrared spectrum can meet the requirements of reflectivity. The Infrared spectrum reflectivity is above the standard in the 2.0–3.5 micron and 96% in the 2-micron. The reflectivity of the 3.5-micron spectral band is 96.89%, which is in the research stage.

The material can also keep the rigidity of the satellite narrow-band when it is expanded. Low coefficient of thermal expansion keep the size of the material stable during thermal cycling.

## Application in the field of civil aircraft

The PPS TPC was applied to the wing leading edge, aircraft interior parts including seat frames, brackets, beams and intake ducts of Airbus A340/A380. PEEK TPC was applied to the doors, windows, link corner pieces. Applications for main mechanisms such as fuselage panels, wing boxes and stringers are still in the experimental stage.

01

### Application in the field of civil aircraft

The main challenges are high fuel costs and environmental protection

02

### Simplified production and faster assembly are critical

Simplified production and faster assembly are critical

03

### Longer service life and reliability needs

Minimize aircraft maintenance without sacrificing safety



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# Applications of Continuous CF/PEEK Composite in Medical Industry

Due to its excellent properties, the continuous CF/PEEK TPC (Thermoplastic Composite) have been widely used in the medical device industry. We can provide complete carbon fiber processing solutions while providing materials. Customers can get a complete process transfer from design to mass production and customer-made with the corresponding material foundry services provided by us.

## Advantages of Continuous CF/PEEK TPC

1. Good X-ray transmittance, can replace metal without forming artifacts.
2. High temperature resistance, and the deformation does not exceed 0.02mm for 100 times high-temperature retort sterilization tests.
3. 20 time higher fracture toughness than epoxy resin.
4. Higher mechanical properties than aluminum alloys.
5. Lighter weight.
6. Good interlayer strength.
7. High impact strength.
8. Good processing compatibility.
9. Corrosion resistance.
10. Biocompatibility.

## Applications in the medical device industry

External fixator, intramedullary nail aiming device, spinal distraction device, internal fixation plate, etc.





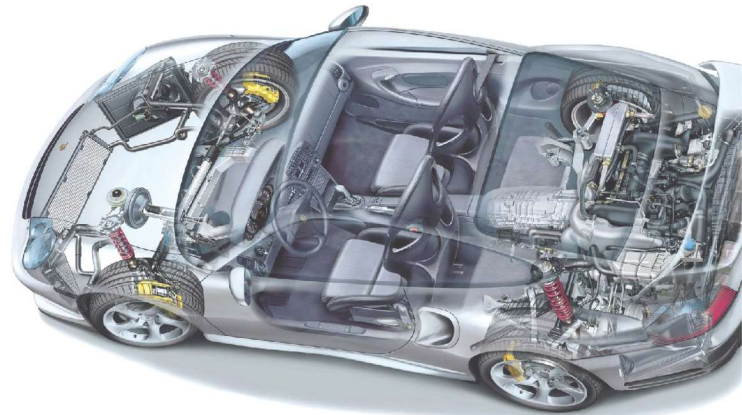
# Applications of CF/PEEK Composite in other fields

01 New energy vehicles

03 Nuclear power

02 Petrochemical

04 Mechanical wear



High pressure  
hydrogen gas cylinder



Thrust plate (Petrochemical)



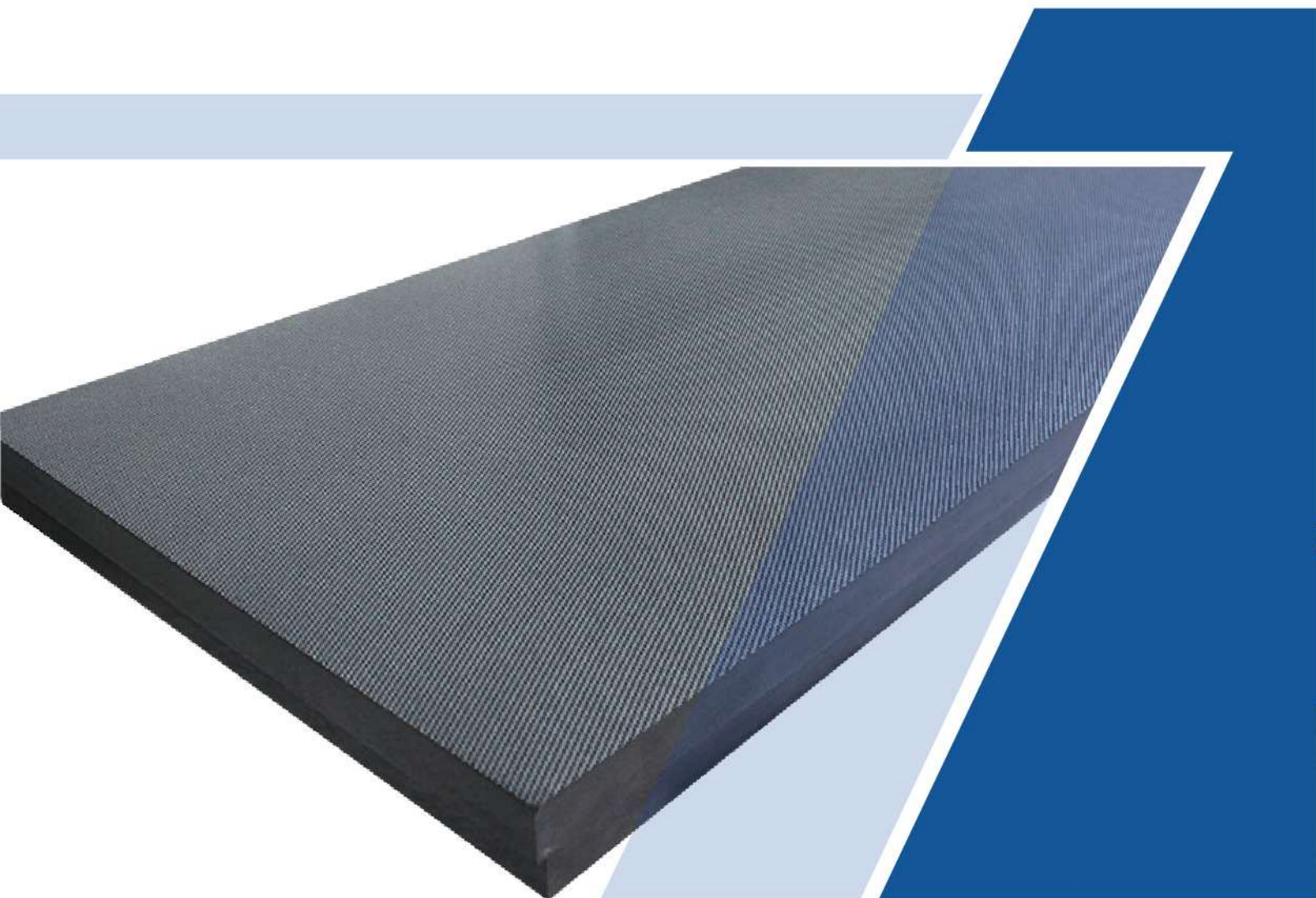
Bearing and Sleeve



Star wheel



Insert injection



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