

PEEK GEARS AND APPLICATION SOLUTIONS



ENTERPRISE PROFILE

Junhua ChinaPEEK was established in 2007. Relying on the previous 18 years of PEEK R&D and production experience, it has become a company that also has the research and development, production and sales of PEEK resin raw material polymerization, PEEK plate, rod and segment continuous extrusion molding and finished parts. An integrated whole industry chain joint-stock company. There are production and sales subsidiaries in many cities in China, and the products are sold to foreign and domestic markets such as Europe, America, Southeast Asia and so on.

The main trends in the industry are: improving performance and efficiency, reducing weight and achieving miniaturization while reducing costs, gear applications need to find new materials to replace existing metal materials or perfect typical polymeric solutions to meet future systems High demands on performance.

PEEK gears are widely used because of their light weight, wear resistance, self-lubrication, low noise, corrosion resistance, high temperature resistance and other characteristics.

Junhua ChinaPEEK can provide customers with the determination and selection of gear raw materials, surveying and drawing, gear design, mold opening and injection molding, sample processing, and mass production, as well as application scenarios, working conditions and PEEK gear solutions.



ENTERPRISE HONOR



Certification

ISO9001,
IATF16949 certification,
AS9100D aerospace quality system certification,
FDA food grade certification,
Third-party certification such as RoHS testing,
Jiangsu High-performance Special Engineering Plastics Engineering Technology Research Center,
Jiangsu Industrial Design Center,
National joint innovation Center.

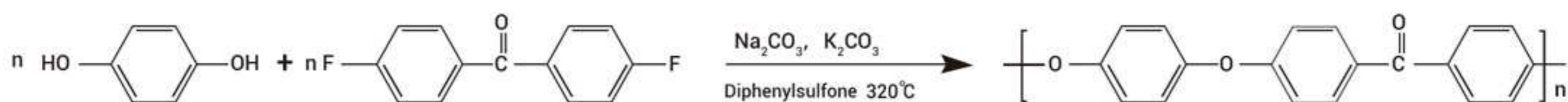
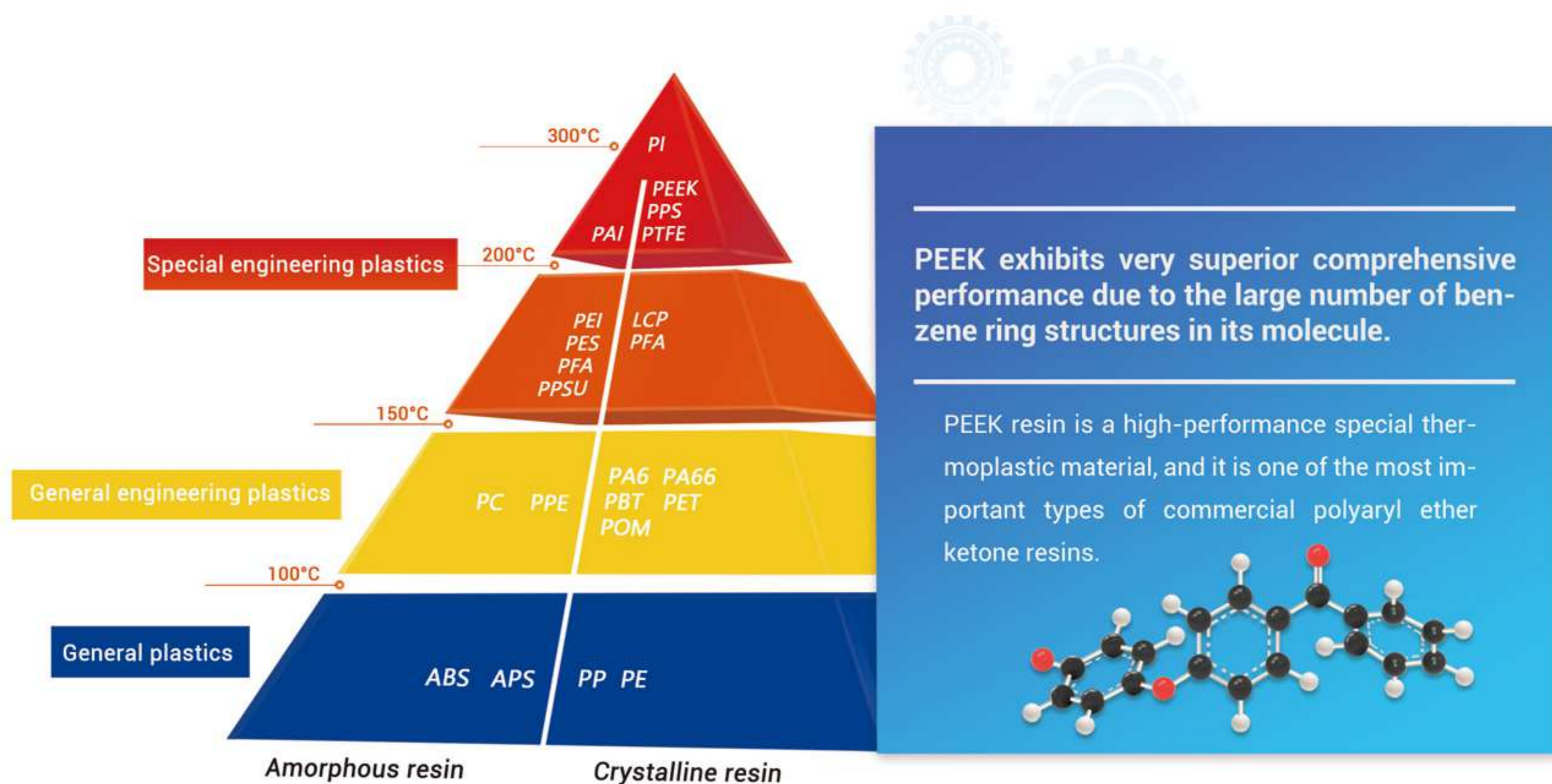


ABOUT US



- > 18 years of experience in R&D and industrial application development of polymer PEEK materials;
- > Tens of millions of imported profile extrusion equipment;
- > 15,000 square meters of standardized workshop, 100,000-level medical profile products extrusion clean workshop;
- > Formula design and compound modification of raw materials for special engineering plastics such as PEEK and PI;
- > PEEK, PI and other special engineering plastic mold design and manufacture, injection molding and machining;
- > According to the customer's sample physical mapping and drawing, three-dimensional design;
- > Professional testing instruments can provide testing services for PEEK gear hardness, mechanical properties, friction and wear and other performance indicators and issue testing reports.

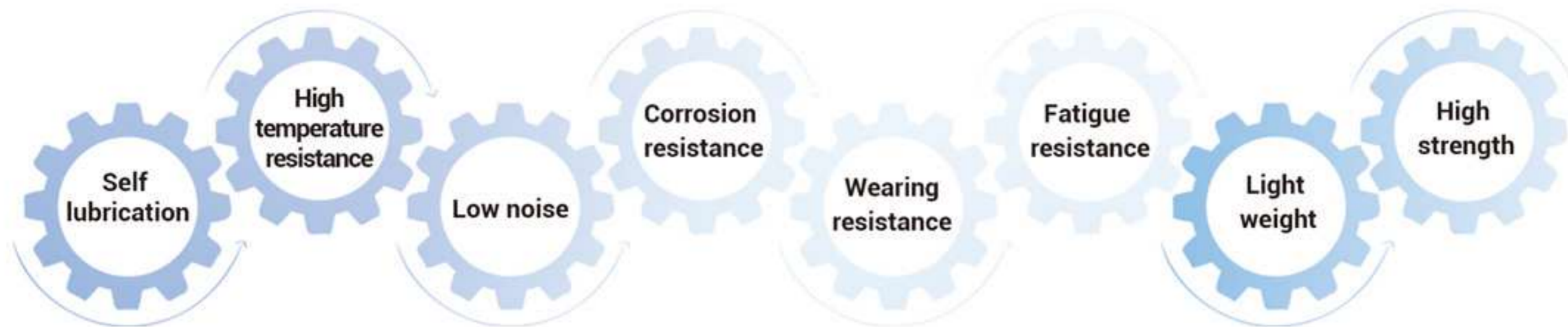
PEEK FEATURES AND BENEFITS



PEEK high polymer

PEEK is a special engineering plastic with excellent performance, which has the characteristics of high temperature resistance, excellent mechanical properties, stable insulation, chemical resistance, self-lubrication, peeling resistance, radiation resistance, hydrolysis resistance, flame retardant and easy processing. PEEK and its modified composite materials can replace steel, aluminum and other metal materials, and are widely used in aerospace, automobile manufacturing, analytical biochemistry, electrical and electronic, medical and food processing.





Mechanical Performance

Item	Test Standard Or Instrument	Unit	PEEK5600G	PEEK5600GF30	PEEK5600CF30	PEEK5600LF30	PEEK5600FE20
			100%PEEK	PEEK+30%GF	PEEK+30%CF	PEEK+ (CF+GR+PTFE)	PEEK+20%PTFE
Tensile Strength (23°C)	ISO 527	MPa	95	175	250	145	70
Tensile Modulus (23°C)	ISO 527	GPa	3.8	11	23	12.5	/
Elongation at Break (23°C)	ISO 527	%	35	2.0	1.5	2.2	/
Bending Strength (23°C)	ISO 178	MPa	155	235	350	220	118
Bending Modulus (23°C)	ISO 178	GPa	3.5	10	21	11	/
Charpy Impact Strength (unnotched)	ISO 179/1U	kJ/m ²	No break	55	45	32	No break
IZOD Impact Strength (notched)	ISO 180/A	kJ/m ²	4	6	6.5	4	6

Thermal Performance

Item	Test Standard Or Instrument	Unit	PEEK5600G	PEEK5600GF30	PEEK5600CF30	PEEK5600LF30	PEEK5600FE20
			100%PEEK	PEEK+30%GF	PEEK+30%CF	PEEK+ (CF+GR+PTFE)	PEEK+20%PTFE
Melting Point	ISO11357	°C	343	343	343	343	343
Glass Transition Temperature	ISO 11357	°C	143	143	143	143	143
Distortion Temperature	ISO 75A-f	1.8MPa、°C	152	315	315	293	150
Coefficient of Thermal Expansion	ASTM D696	ppm K-1	45	22	15	22	70
Thermal Conductivity	ISO /CD22007-4	W/ (m·K)	0.29	0.32	0.95	0.86	/

Electrical Performance

Item	Test Standard Or Instrument	Unit	PEEK5600G	PEEK5600GF30	PEEK5600CF30	PEEK5600LF30	PEEK5600FE20
			100%PEEK	PEEK+30%GF	PEEK+30%CF	PEEK+ (CF+GR+PTFE)	PEEK+20%PTFE
Dielectric Strength (2mm)	IEC 60243-1	kV/mm	20	19	/	/	19
Dielectric Constant	IEC 62631	-	3.0	3.3	/	/	2.7
Surface Resistivity	GB/T31838.3	Ω	10 ¹⁵	10 ¹⁴	/	/	10 ¹⁵
Volume Resistivity	IEC 62631	Ω·cm	10 ¹⁵	10 ¹⁵	10 ⁵	10 ⁶	/

Others

Item	Test Standard Or Instrument	Unit	PEEK5600G	PEEK5600GF30	PEEK5600CF30	PEEK5600LF30	PEEK5600FE20
			100%PEEK	PEEK+30%GF	PEEK+30%CF	PEEK+ (CF+GR+PTFE)	PEEK+20%PTFE
Colour	-	-	Natural	Natural	Black	Black	Natural
Melt Flow Rate (400°C、2.16kg)	ISO 1133	g/10min	6-10	2-5	1-3	2-5	/
Density	ISO 1183	g/cm ³	1.30±0.02	1.50±0.02	1.40±0.02	1.44±0.02	1.41±0.02
Water Absorption (23°C、24Hrs)	ISO 62-1	%	0.07	0.05	0.04	0.05	0.15
Molding Shrinkage	Parallel to Flow Direction	%	1.2	0.4	0.1	0.3	1.3
Molding Shrinkage	Perpendicular to Flow Direction	%	1.5	0.8	0.5	0.6	1.8
Rockwell Hardness	GB/T 3398.2	HRR	118	119	121	108	113
Flammability Rating	UL 94	/	V-0	V-0	V-0	V-0	/
Friction Coefficient	ASTM D3702	100N-120rpm	0.30-0.38	0.38-0.46	0.15-0.25	0.18-0.30	0.1-0.2

★ This parameter is a representative value, not a guaranteed value. If you need, please call our technical department for more detailed technical specifications!

PEEK GEAR CHARACTERISTICS

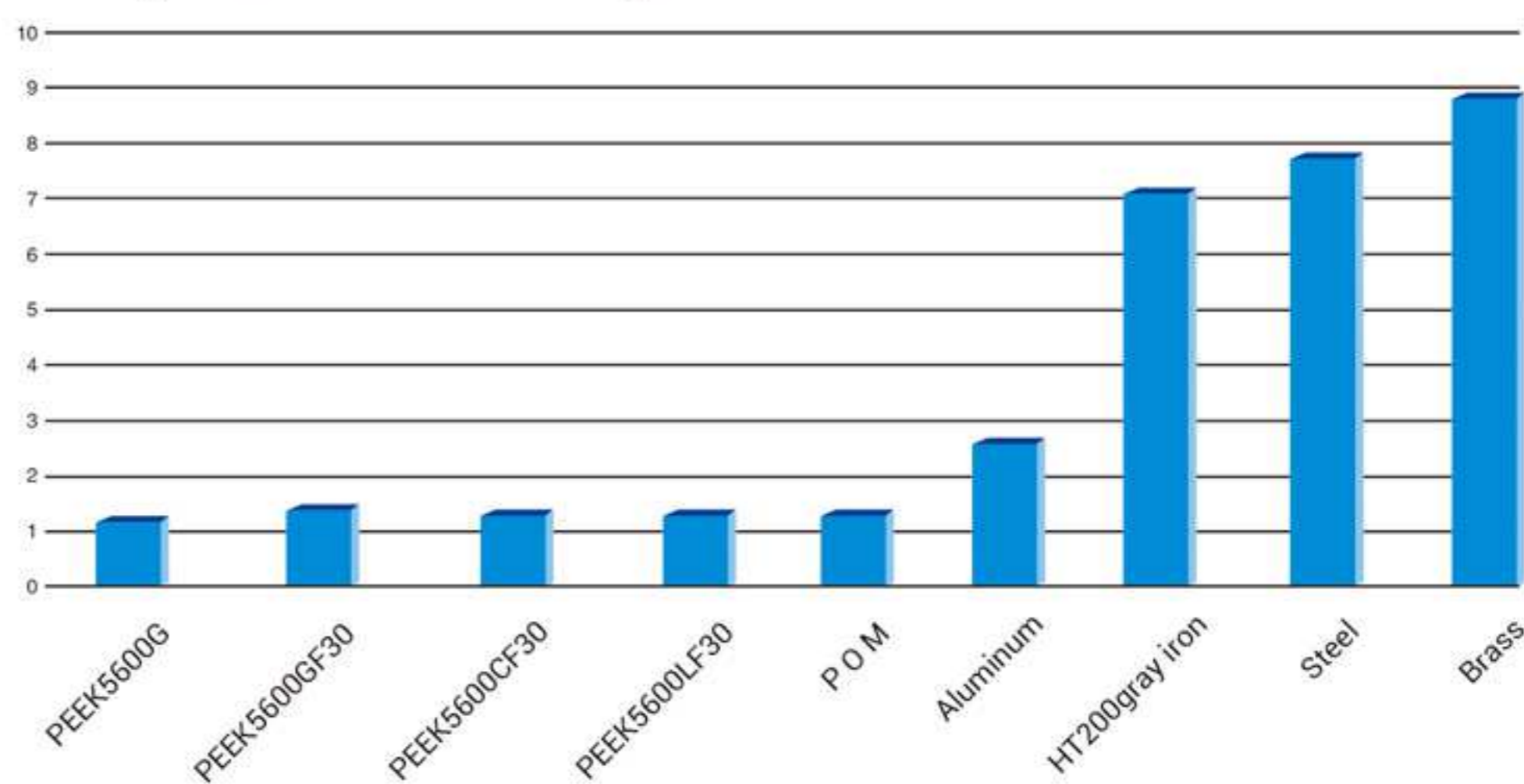


PEEK can replace traditional metal materials to achieve the goal of light-weight design of gears

Lightweight

Compared with traditional gear metal materials, PEEK can reduce the production cost and weight, effectively reduce the weight of the gear, reduce the moment of inertia, and improve the torque-to-weight ratio and torque-to-inertia ratio.

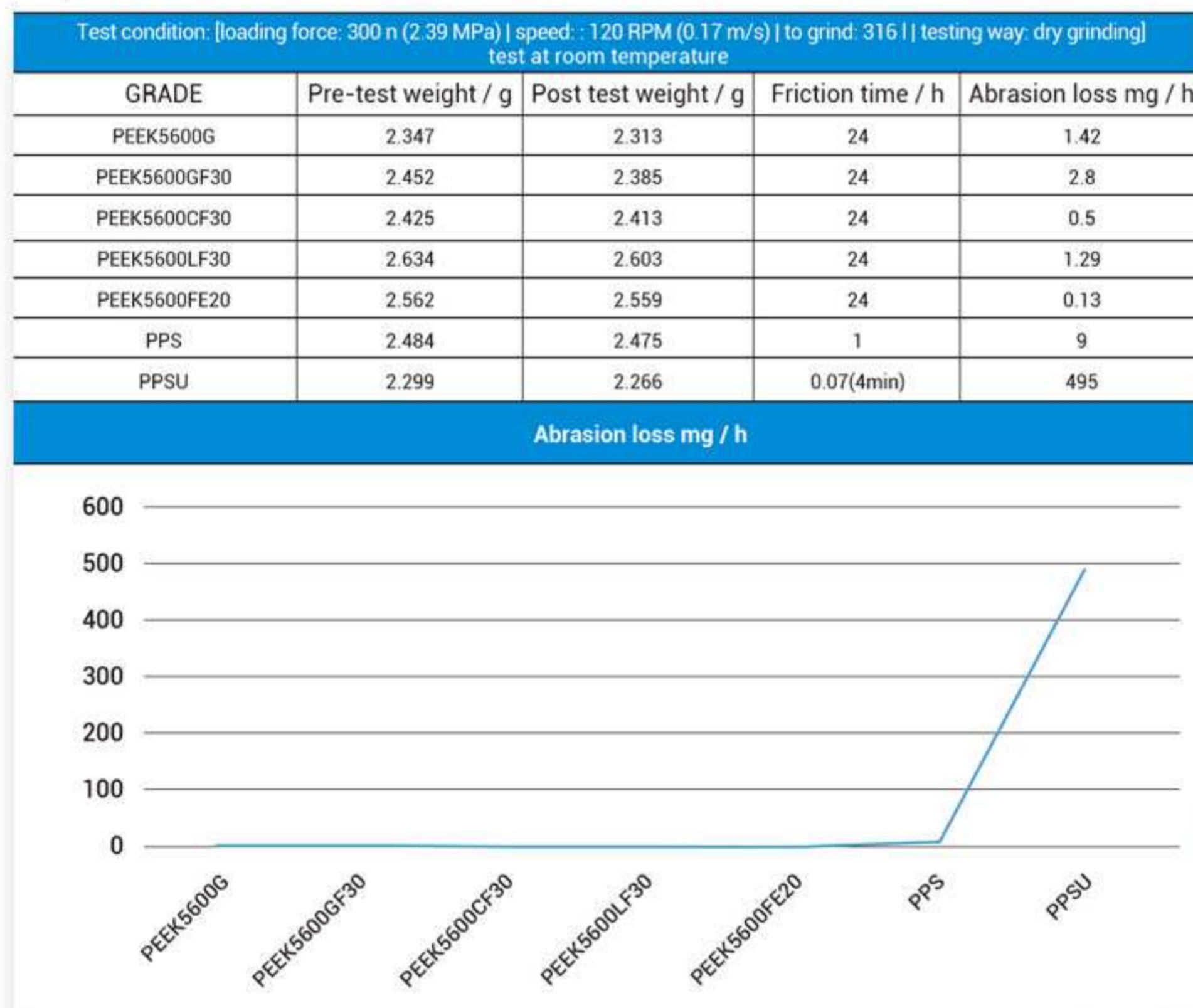
Density values of conventional gear materials:



Because different types of loads always occur at the same time, gears need to meet multiple complex operating conditions. The normal operation of gears depends on good friction performance and mechanical properties, and should have corrosion resistance, high temperature resistance, dimensional stability, etc. PEEK material combines the design freedom of injection molding process, suitable for replacing metal gears and improving conventional engineering plastic gears.

Durable

PEEK has a low coefficient of friction and excellent wear resistance, outperforming metal in many harsh environments, no need to worry rust and metal chip issues.



Self-lubricating

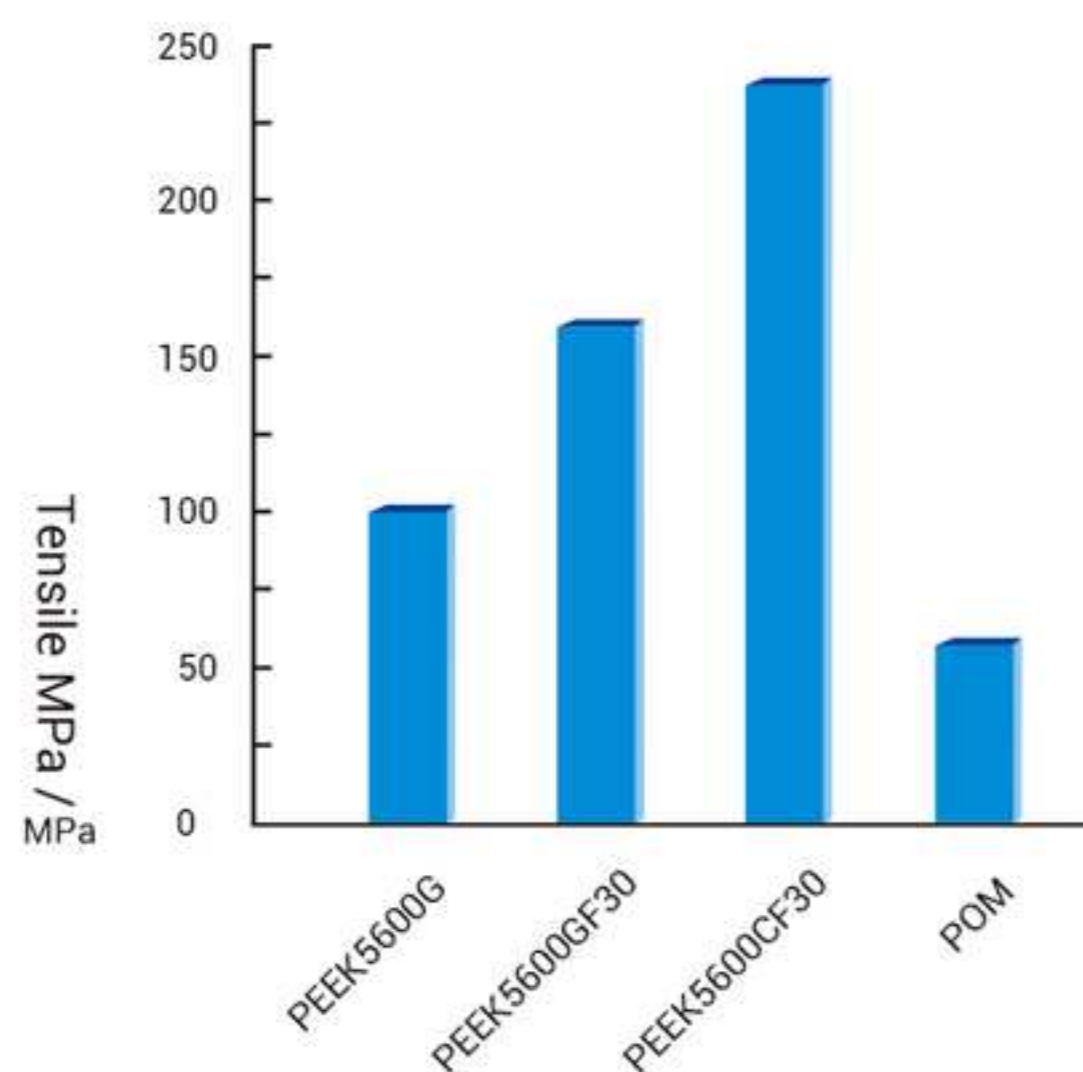
When the PEEK gear rubs against the pair gear, a transfer film is generated instantly. When the transfer film shifts to a stable friction state, a stable transfer film can also be formed, resulting in a very stable friction coefficient and a very low wear rate, which is comparable to traditional metal gears. Quieter than effective noise reduction.

PEEK's self-lubricating properties have become an ideal gear material for low-load operating machinery. It can still run stably under oil-free conditions, avoiding the pollution of lubricating oil, and has been maturely used in the food filling industry.

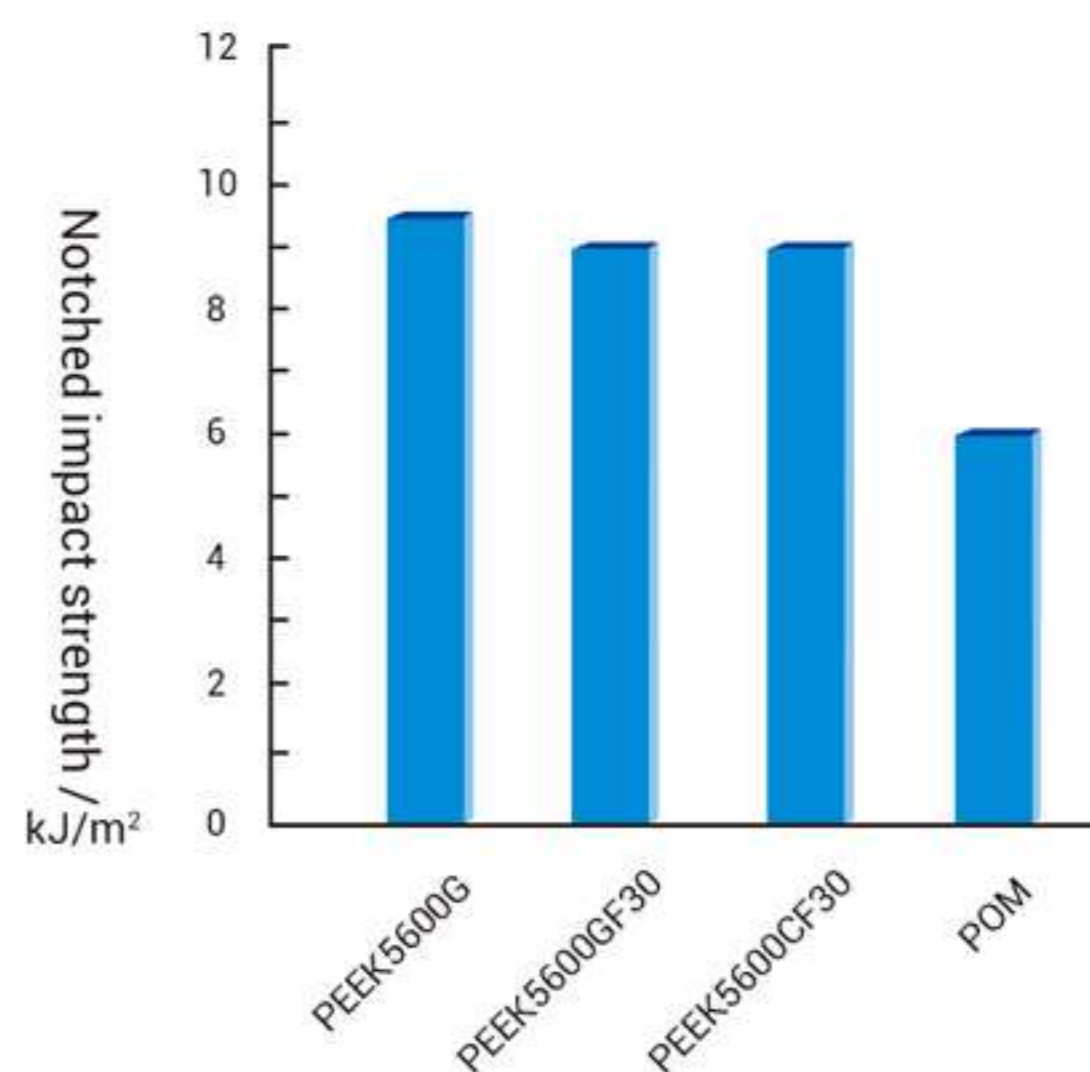


High strength

Compared with POM, PEEK5600G (pure PEEK) has higher strength and better toughness, which is mainly based on the fact that PEEK has both a flexible group-ether bond and a rigid group-benzene ring on its molecular main chain, which is a strong and tough material. After fiber reinforcement, the strength is greatly increased, such as PEEK5600CF30 (30% carbon fiber reinforced PEEK), the tensile strength reaches 230MPa, which is twice that of pure PEEK.



Aterial Type	Tensile MPa	Notched impact Strength
PEEK5600G	103 MPa	9.5 kJ/m ²
PEEK5600GF30	170 MPa	9 kJ/m ²
PEEK5600CF30	230 MPa	9 kJ/m ²
POM	64 MPa	6 kJ/m ²



Corrosion Resistance

PEEK maintains excellent resistance to various chemicals over a wide temperature range, maintains excellent mechanical properties, rarely fades or expands under normal circumstances, and has excellent chemical resistance. At the same time, the water absorption rate of PEEK is very small, and the saturated water absorption rate of 23 is only 0.5%. Moreover, PEEK has good heat resistance and can be used in pressurized hot water or steam at 300 ° C.

Unfilled PEEK strips were immersed in chemical reagents at constant temperature for at least 7 days (concentrated, unless otherwise stated). Chemical compatibility was assessed by preserving mechanical properties, supplemented by weight or dimensional changes. Compatibility is classified as A, B or C, as explained below;

A - does not work. Materials can be used in applications exposed to these agents. However, it is still recommended that the actual application needs to be verified.

B - Slight effect. Materials can be used in certain situations where they are exposed to these agents. It is necessary to evaluate the performance criteria applied in these specific applications.

C - Serious effect. Materials are considered to be permitted to come into contact with such chemicals under certain circumstances.

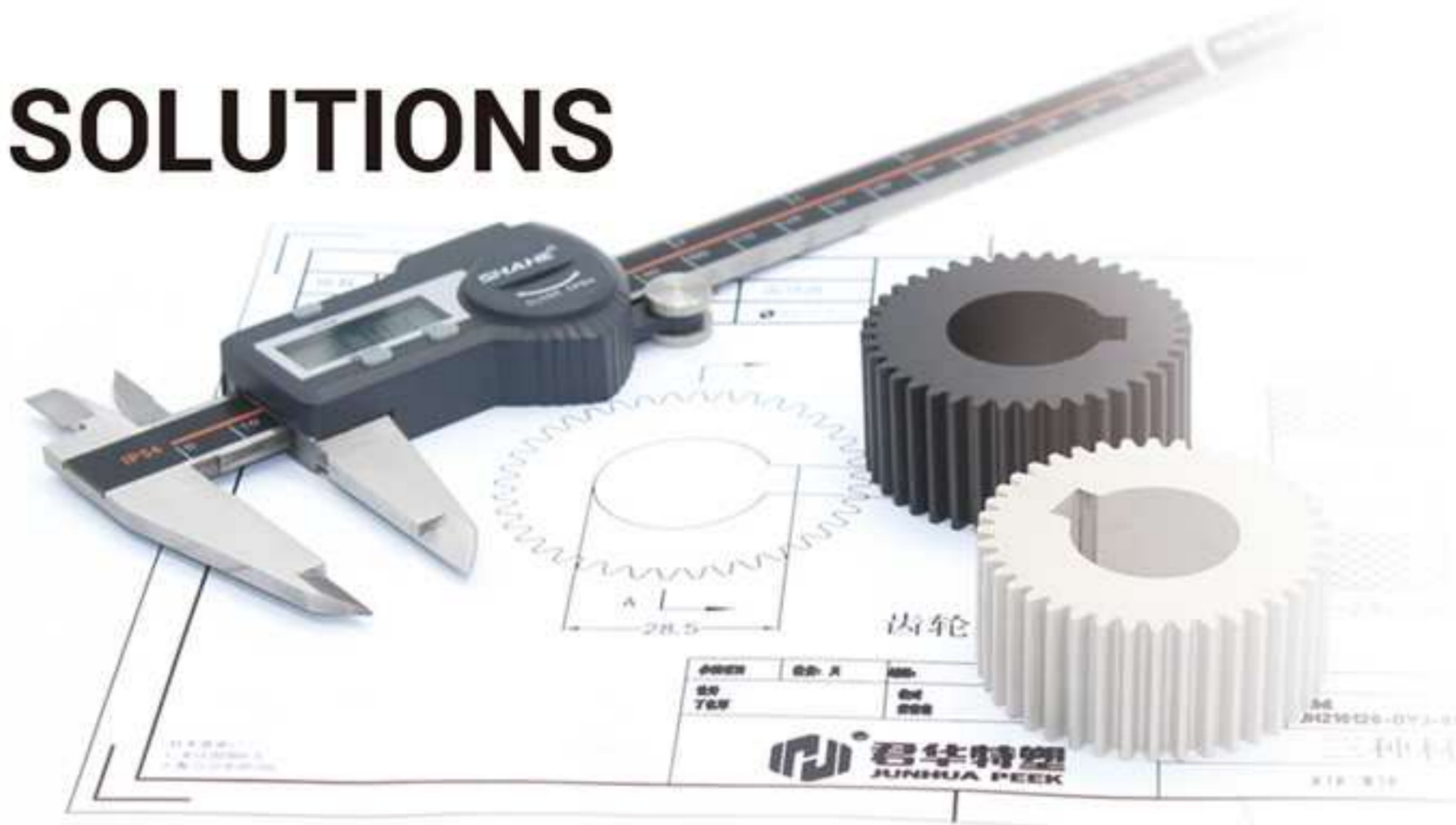
ACIDS	酸 类	23°C	100°C	200°C
Hydrochloric Acid, Conc.	浓盐酸	A	B	
Aqua regia	王水	C	C	C
Carbonic Acid	碳酸	A	A	
Chromic Acid, 40% Conc.	40%铬酸溶液	A		
Chromic Acid, Conc.	浓铬酸	C	C	C
Citric Acid	柠檬酸	A	A	
Nitric Acid, 10% Conc.	10%硝酸溶液	A	A	
Nitric Acid, Conc.	浓硝酸	C	C	C
Nitrous Acid, 10% Conc.	10%亚硝酸溶液	A		
Sulfuric Acid, > 40% Conc	>40%硫酸溶液	C	C	C
Oxalic Acid.	草酸	A	A	
ALCOHOLS	醇 类	23°C	100°C	200°C
Butanol	丁醇	A		
Ethanol	乙醇; 酒精	A	A	A
Glycerol	甘油; 丙三醇	A		
Methanol	甲醇	A	A	
BASES	碱, 金属氢氧化物	23°C	100°C	200°C
Ammonia 880	饱和浓氨水	A		
Ammonia liquid	液氨	A	A	A
Ammonium Hydroxide, 10% Conc.	10%氢氧化铵溶液	A		
Calcium Hydroxide	氢氧化钙	A		
Potassium Hydroxide, 10% Conc	10%氢氧化钾溶液	A		
Sodium Hydroxide, Conc.	浓度氢氧化钠	A		

For more PEEK feature parameters, please contact us!



PEEK GEAR APPLICATION SOLUTIONS

Flexible use of highly professional technology and manufacturing experience to provide customers with non-standard customized gears to meet the diverse needs of customers.



Junhua ChinaPEEK relies on 18 years of PEEK proprietary technology, production capacity and multiple advantages,

Provide customers with high-quality industry application solutions and full technical support.

PEEK GEAR PROCESSING EQUIPMENT

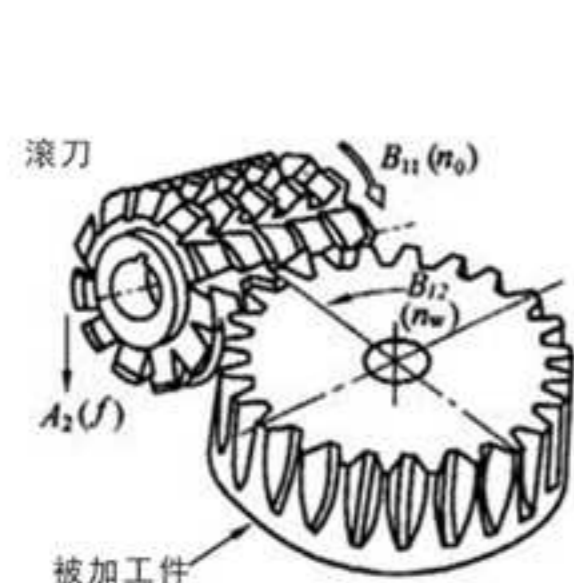
PEEK gears processed by machining and injection molding process are widely used because of their many characteristics and advantages. In order to better meet the needs of customers for PEEK gear products, our company has purchased several CNC gear hobbing machines. The specific processing range is as follows:

Maximum machining modulus	4 mold
Over range processing can be achieved	5 mold
Maximum machined gear length	150mm
Minimum machining module	0.5 mold
Maximum workpiece diameter	200mm
Maximum hob diameter	110mm
Maximum machining screw Angle	45 degrees
Suitable to use	PEEK Pland other plastic gear

At present, it can process spur gears and helical gears with a module between 0.5-5.08, a diameter of 200mm and a height of 155mm. It can process PEEK spur gears, PEEK helical gears, PEEK sprockets, PEEK worm gears, PEEK flowers Key gears, etc. and PEEK products with toothed grooves on the circumference, when the processed gears are used to transport liquids, the flow rate can be within plus or minus 0.025L/min.

Processing principle of PEEK gear hobbing

Gear hobbing is equivalent to the spatial meshing of a pair of staggered shaft helical cylindrical gears. The hob is equivalent to a helical cylindrical gear with a large helix angle and has cutting ability. The workpiece is spatially meshed under a certain speed ratio relationship. Press Envelope (generating) principle to complete involute, spline cycloid arc and other tooth shape processing.



PEEK GEAR INSPECTION EQUIPMENT

PEEK GEAR INSPECTION CENTER



Check the gear tooth profile, helix angle, pitch and other parameters, automatically evaluate the gear grade and issue a test report. The automatic evaluation standard for the grade of the tested gear is GB/T10095.1-2008 and ISO1328-1:1997, which meets the current domestic and international gear grade evaluation requirements, and can be used for the surveying and mapping of gear samples provided by customers.

DETECTABLE ITEMS:

- Gear Shaper
- Unknown gear measurement
- Linear Worm Gear
- Gear Hob
- Linear Worm Measurement
- Involute Cylindrical Inner and Outer Gears

unit: mm

Measurable gear modulus	0.5-15
Maximum outer diameter of gear can be measured	300
Top and bottom center distance	15-500
Distance from probe to lower center	-5-390
Helical Angle range can be measured	0-90°
Maximum weight of workpiece can be set	150kg



PEEK GEAR PUMP PERFORMANCE TEST BENCH

Verify the machining accuracy of gears for conveying liquids, test flow, outlet pressure and inlet pressure, and generate parametric curves.



GEAR TRANSMISSION TESTER

Detect gear torque, noise, speed, wear resistance and other properties.



DEVIATOR

It is used to measure the radial runout error of shaft parts.



GEAR MACHINING ACCURACY GRADE

There are 13 precision grades of gears in my country, which are represented by Arabic numerals 0, 1,.... The accuracy grades of the two gears in the gear pair are generally taken to be the same grade, and different grades are also allowed. At this time, the accuracy grade of the gear pair should be determined according to the one with the lower precision.

Among the 13 precision levels, the current pro-cessing technology and measurement methods of 0, 1, and 2 precision are still difficult to achieve and need to be developed. Grades 3-5 are high-precision grades, grades 6-8 are medium-accuracy grades, and grades 9-12 are low-precision grades. Among them, level 6 is the basic level which is also a commonly used level in design. It is the level that can be achieved by common pro-cessing methods such as gear hobbing and gear shaping under normal conditions, and can be measured with general measuring instruments. The higher the gear precision, the higher the machining cost.

Comparison table of gear precision in various countries

Gauge	Precision grade												
JIS(Japan) JIS-B1702-02(New)	N0	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
PRC(China) GB10095-1009	0	1	2	3	4	5	6	7	8	9	10	11	12
ISO(international standards)	0	1	2	3	4	5	6	7	8	9	10	11	12
JGMA(Japan)					1	2	3	4	5	6	7	8	9
JIS(Japan) JIS-B1702-(old)					0	1	2	3	4	5	6	7	8
DIN(Germany) 3960-3967		1	2	3	4	5	6	7	8	9	10	11	12
AGNA(UK)			16	15	14-13	12	10	10	8				

Processing method of gear grade

Using high-precision hob, it can process spur gears and helical gears with 7-level precision ($m < 1.5\text{mm}$) and the tooth surface roughness R_a can reach $1.6\mu\text{m}$.

The worm gear is machined with a high-precision hob, and the accuracy comparable to that of a spur gear can be achieved. Generally, PEEK gear hobbing can reach 8-9 grades of precision.

Accuracy Class	5 Micron Order	6 High precision classified	7 Relatively high precision level	8 Medium accuracy	9 Low accuracy level
Manufacturing Method	It is machined on precision gear machine with very small periodic error.	It is processed on high precision gear machine tool.	It is processed on high precision gear machine tool.	Processing with the method of forming or copying.	Process with care.
Tooth Surface Finishing	Precision grinding, large gears are ground or shaved after precision hobbing.	Precision grinding or shaving	Non-hardened gears are recommended to be cut with high-precision cutting tools. hardened gears need finishing (grinding, shaving, grinding, dif-fractive)	Don't grind teeth shaving or grinding if necessary	No finishing is required
Gear Surface Roughness	0.8	0.8-1.6	1.6	1.6-3.2	3.2
Gear Root Roughness	0.8-3.2	1.6-3.2	3.2	3.2	6.4

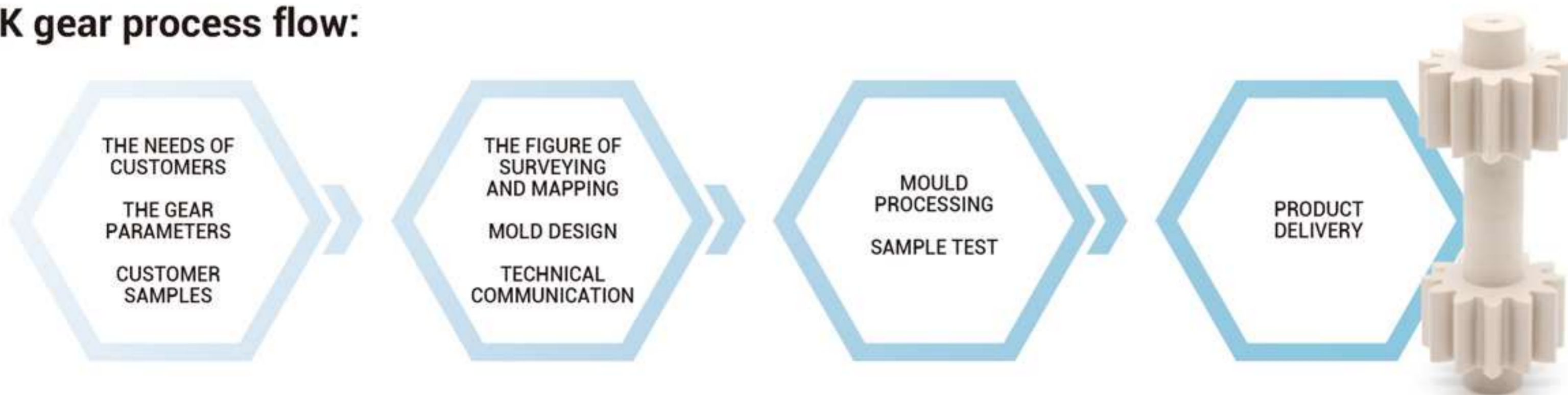


PEEK GEAR PROCESSING TECHNOLOGY

With the rapid development of microfabrication technology, PEEK has been widely used in many fields such as national defense, science and technology, and national economy. Compared with gears made of traditional materials, PEEK gears are more suitable for complex working conditions such as strong acid, strong alkali and high pressure, replacing metal gears and general plastic gears with poor comprehensive performance, selecting higher service life and reliability, Excellent alternative to material gears, PEEK modified materials can improve the strength and wear resistance of PEEK, and improve the processing characteristics of composite materials, so as to meet the requirements of oil pump gears.



PEEK gear process flow:



» OPEN MOLD DIRECT INJECTION MOLDING

LARGE BATCHES OF PRODUCTS CAN REDUCE COSTS AND IMPROVE PRODUCTION EFFICIENCY THROUGH OPEN-MOLD INJECTION MOLDING.

» GEAR HOBBIING AFTER INJECTION MOLDING

THE BLANK IS FIRST INJECTED AND THEN MACHINED.

» POST-MACHINING OF EXTRUDED SHEET RODS AND MOULDED SHEETS

FOR PRODUCTS WITH SMALL QUANTITIES AND RELATIVELY LARGE SPECIFICATIONS, EXTRUDED PEEK SHEETS AND RODS OR MOLDED PEEK SHEETS CAN BE DIRECTLY MACHINED, WHICH NOT ONLY SHORTENS THE DELIVERY CYCLE, BUT ALSO REDUCES THE COST OF MANUFACTURING MOLDS.

PEEK GEAR APPLICATION CASE

PEEK gears can be injection molded, so they offer many advantages in design, processing and performance compared to traditional materials. The inherent design freedom of PEEK molding ensures more efficient gear manufacturing. PEEK can be used to form internal gears, gear sets, worm gears and other products, PEEK gears have broader application prospects than traditional gears. Therefore, PEEK materials promote the development of gears to withstand higher loads and transmit greater power.

Gears for conveying liquids

Wear-resistant gears for miniature gear pumps
Grade: PEEK5600G



Degassing pump gear for hemodialysis machine
Grade: PEEK5600CF30



Flowmeter Gear
Grade: PEEK5600CF30



Wear-resistant gears for chemical pumps
Grade: PEEK5600CF30



Coding machine gear
Grade: Ceramic+PEEK5600CF30



Fructose machine gear
Grade: 316L+PEEK5600CF30



Inkjet gear
Grade: PEEK5600G



Inkjet gear
Grade: PEEK5600CF30



Gear or urea pumps
Grade: PEEK5600CF30



Transmission gear

Gear for large filling machine
Grade: PEEK5600G



PEEK wear resistant gear
Grade: PEEK5600G/PEEK5600CF30



Gears for soldering machines
Grade: PEEK5600CF30



Inlaid gears for new energy vehicles
Grade: PEEK5600CF30



System gears for robots
Grade: PEEK5600G



PEEK double gear
Grade: PEEK5600G



PEEK transmission gear ring
Grade: PEEK5600G



PEEK counter gear
Grade: PEEK5600G



PEEK worm gear
Grade: PEEK5600G






JUNHUAPEEK



Transmit Power and Assist Future Intelligent Manufacturing

Lightweight precise, low-noise
self-lubricating and wear-resistant
PEEK gears



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