



Precision Machined PEEK Components

 **POLY FLUORO LTD**

About Poly Fluoro

Since establishment in 1985 Poly Fluoro Ltd. has been at the forefront of thermoplastic innovation, pioneering the manufacture and application of engineered plastics in India.

We are an accredited ISO 9001-2008 system, based in a modern 20,000-sq-ft plant, offering complete design, prototype and production services. This incorporates the capacity to mould, extrude, cast and machine both virgin and formulated polymer components from sizes ranging from 1mm to in excess of 500mm diameters.

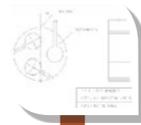
Allying a traditional engineering background with in-house material production and innovative new techniques, we have developed a unique range of products which are tailored to suit numerous applications.

To many, Poly Fluoro Ltd. and its extensive range of formulated polymer specialty components is synonymous with the finest, most dependable engineering plastic for OE fitment. Over 100 OEMs regularly source their polymer requirements from us with an increasing number of these being import substitutes.

Precision-machined PEEK components

Integrated service

Poly Fluoro Ltd is one of only a handful of companies in India with the ability to mould and machine PEEK components to suit any application. Our in-house moulding allows us to control the wastage and minimise development lead time, while our state-of-the-art CNC machining division converts the moulded parts into machined components matching global levels of tolerance.



1

Drawing received from customer



2

Design Department creates 3D model of the piece



3

Part is CNC machined to the precise specifications of the customer

Specialised service

Among the array of products offered by Poly Fluoro Ltd. are engineering and design assistance and unusual fabrication techniques. Poly Fluoro has CNC capabilities and a dedicated team of machining experts who review each product and recommend the design and material most suitable for the application. We can also help in refinement of existing designs.

Selection of material, design and tolerances are vital factors in achieving the optimum combination of performance in service and economies in production. We have had experience with a wide range of shapes and sizes.

Our team is constantly in touch with specialists and resin manufacturers around the world to incorporate the latest processing techniques in PEEK and continually augment our understanding of the material and its applications. This know-how is available to our clients to allow them to make more informed decisions regarding their component requirements and serviceability of the end product.



Why convert to parts made of PEEK?

Durability

- Wear characteristics
- Frictional concerns
- Stress

Regulatory Requirements

- FDA
- USDA
- ASTM

Usage conditions

- Chemical environment
- UV requirements
- Temperature

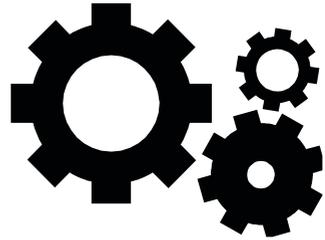
Why machining by Poly Fluoro is most suitable

PEEK requires special skills in machining to obtain accurate dimensions. The relative hardness, stresses within the moulded part and generally high rate of wear on the tool dictates the need for careful handling. Poly Fluoro combines special tooling and machining techniques with a wealth of experience to achieve the correct dimensions every time. Careful attention is given to control minor variations in manufacturing procedures or conditions which can seriously affect the quality and serviceability of the end product.

Poly Fluoro Ltd. has been a leader in the machining of polymer components for more than a decade. Equipments and techniques have been carefully studied and continually modified and refined during this period. Thus we have been able to improve the efficiency and speed with which close tolerance machined components are produced.

If you need parts machined from PEEK – Poly Fluoro Ltd. has the experience and expertise to fulfil your requirements.

Key challenges in PEEK machining



Important to maintain optimum crystallinity to avoid chipping during machining

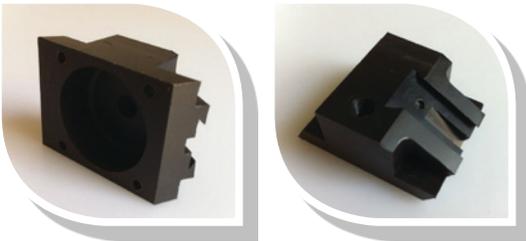
Deformation due to heating of tool and material during turning

Significant wear out of tool; to be monitored constantly to ensure dimensional stability

Stress in material has to be removed through annealing to avoid cracking

Difficult to obtain tolerances less than 25µm

Choice of tool and important factor in achieving dimensions



Typical Properties⁽¹⁾ of PEEK

Property		Test Method	Units	Values
MECHANICAL				
Tensile strength	50 mm/min	ASTM D638	MPa	95
	50 mm/min	ISO 527-2/1A	MPa	96
Tensile modulus	50 mm/min	ASTM D638	GPa	3.50
Tensile elongation at yield	1 mm/min	ISO 527-2/1A	GPa	3.83
	50 mm/min	ASTM D638	%	5.2
	50 mm/min	ISO 527-2/1A	%	4.9
Tensile elongation at break	50 mm/min	ASTM D638	%	20-30
Flexural strength	50 mm/min	ISO 527-2/1A	%	20-30
		ASTM D790	MPa	146
		ISO 178	MPa	121
Flexural modulus		ASTM D790	GPa	3.70
Compressive strength		ISO 178	GPa	3.70
		ASTM D695	MPa	118
Izod impact, notched		ASTM D256	J/m	91
Izod impact, unnotched		ISO 180	kJ/m ²	9.2
		ASTM D4812	J/m	NB ⁽²⁾
		ISO 180	kJ/m ²	NB ⁽²⁾
Shear strength		ASTM D732	MPa	84
Poisson's ratio		ASTM E132		0.33
THERMAL				
Heat deflection temperature annealed ⁽³⁾	1.82 MPa	ASTM D648	°C	157
Glass transition temperature		ASTM D3418	°C	150
Melting point		ASTM D3418	°C	340
CLTE, flow direction	-50 C to 50 C	ASTM E831	ppm/°C	43
Thermal conductivity		ASTM E1530	W/m-K	0.24
Specific heat capacity	50°C	DSC	kJ/kg-°C	1.56
Flammability	200°C	DSC	kJ/kg-°C	2.15
	1.6 mm	UL 94		V-0
	0.8 mm	UL 94		V-1
Oxygen index		ASTM D2863	%	36.8
GENERAL				
Specific gravity		ASTM D792		1.30
Water absorption	24 Hours	ASTM D570	%	0.1
Rockwell hardness	M Scale	ASTM D785		97
Melt flow	400°C, 2.16 kg	ASTM D1238	g/10 min	3
Melt viscosity	400°C, 1000 s ⁻¹	ASTM D3835	kPa-s	0.44
Mold shrinkage, as molded flow direction	3.2 x 12.7 x 127 mm	ASTM D955	%	1.1-1.3
Mold Shrinkage, As Molded Transverse Direction	3.2 x 12.7 x 127 mm	ASTM D955	%	1.3-1.5

⁽¹⁾ Actual properties of individual batches will vary within specification limits ⁽²⁾ NB = no break

⁽³⁾ HDT Measured on annealed specimens 3.2 mm thick, 2 hours at 200°C



Other products from Poly Fluoro Ltd.



FluoroTube™ PTFE Tubing

FluoroTube marks the entry of Poly Fluoro into the PTFE tubing segment. The grades and sizes available make FluoroTube™ ideal for applications such as medical, chemical and automotive.

FluoroTube comes in sizes ranging from 1mm to 25mm diameters and is unique in many ways when compared to conventional polymer tubing:

- Highly resistant to corrosive chemicals
- Working temperature range of -200°C to +220°C
- Chemically inert - making it ideal for medical applications
- Extremely low coefficient of friction

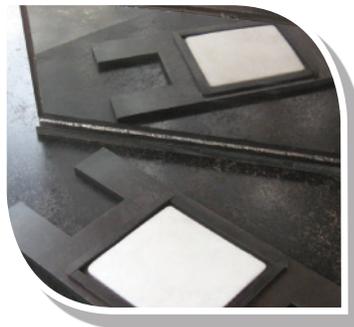
Lubring™



Lubring Slideways (a proprietary PTFE formulation) is a superior bearing material developed specially for machine tool ways, gibs and other sliding applications. It is widely used by leading machine tool manufacturers, re-builders and in-plant personnel to restore existing equipment to like-new precision.

Lubring exhibits superior performance when compared to other slideway bearings:

- Excellent vibration dampening – dampens cutting tool vibration from migrating throughout the machine tool
- Chemical resistance – resists aggressive coolants and lubricants
- High wear resistance – ensures long service life
- Low wear in the event of dry operation – protects mechanical components in cases of poor or failed lubrication
- Impervious to moisture



Bridge Bearings

Poly Fluoro combines its expertise in PTFE skived sheets with know-how on PTFE bonding techniques to produce high quality sliding bearings and PTFE-POT bearings. Our bearings usually employ PTFE with a 25% glass filling as this gives us superior creep properties. Fillers of bronze and carbon are also available.

We are equipped with facilities for testing the testing tensile properties, deformation and shore hardness of our sheets before we employ them in bridge bearings.

Our bridge bearings exhibit the following characteristics:

- Coefficient of friction as low as 0.03-0.05 – near rolling friction
- Load bearing capacity in the range of 40MPa
- PV values in excess of 10,000

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