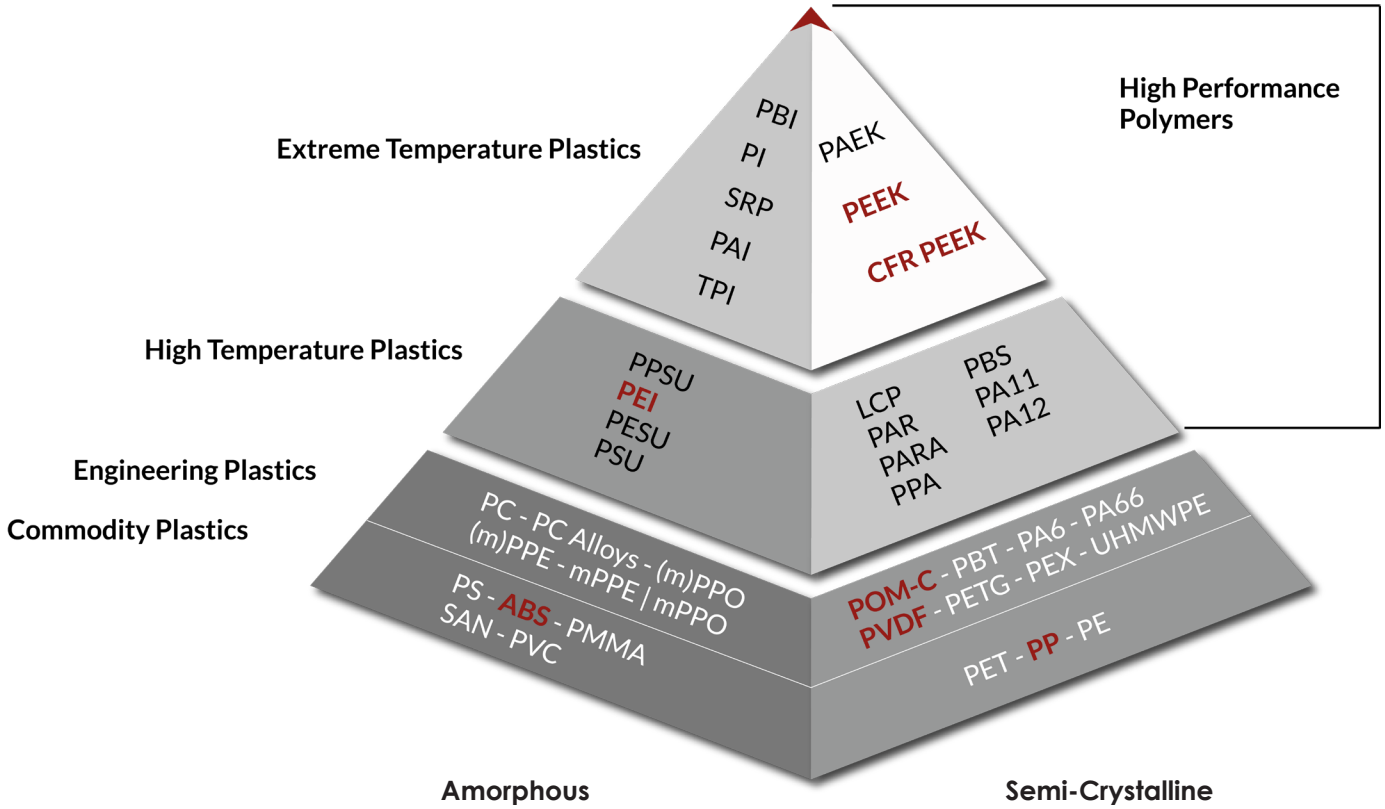
Apium
Additive Technologies GmbH

MEDICAL GRADE MATERIALS

Apium Filaments - Medical PEEK



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Medical PEEK - Material Properties

Semi-Crystallinity of PEEK

PEEK is a semi-crystalline material. Semi-crystalline materials have distinct characteristics compared to amorphous materials. Semi-crystalline materials have well-defined melting point, good chemical, fatigue and wear resistance. Proper attention must be paid to the temperature control during printing to ensure it is regulated well to produce parts of consistent crystallinity with good properties.

Apium P220 Series 3D printers allow the printing of PEEK parts with 29-32% crystallinity, the closest ratio in the 3D printing industry to 35% crystallinity of injection moulded PEEK parts.

PEEK Filament - High Performance Semi-Crystalline Material

Characteristics of 3D Printed Semi-Crystalline PEEK

The professional PEEK 3D printers of Apium are capable of processing medical grade PEEK filaments with the highest quality in 3D printing industry.

Characteristics of 3D printed PEEK with Apium`s technology:

- Mechanical properties similar to human bone
- Biocompatible
- Radiolucent
- Low heat conductivity
- Good chemical resistance
- High temperature resistance
- Lightweight
- Excellent wear resistance
- Good fatigue resistance

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Medical PEEK - Mechanical Tests

MECHANICAL PROPERTIES	CONDITIONS	TEST METHOD	VALUE
Tensile Strength XY	23 °C, 48% Humidity	DIN EN ISO 527	77,2 MPa
Tensile Strength YZ	23 °C, 48% Humidity	DIN EN ISO 527	85,4 MPa
Tensile Strength Z	23 °C, 48% Humidity	DIN EN ISO 527	20,5 MPa
Tensile Elongation XY	23 °C, 48% Humidity	DIN EN ISO 527	3 %
Tensile Elongation YZ	23 °C, 48% Humidity	DIN EN ISO 527	2,6 %
Tensile Elongation Z	23 °C, 48% Humidity	DIN EN ISO 527	0,6 %
Tensile Modulus XY	23 °C, 48% Humidity	DIN EN ISO 527	3 GPa
Tensile Modulus YZ	23 °C, 48% Humidity	DIN EN ISO 527	3,8 GPa
Tensile Modulus Z	23 °C, 48% Humidity	DIN EN ISO 527	3,2 GPa
Flexural Strength XY	23 °C, 48% Humidity	DIN EN ISO 527	31 MPa
Flexural Strength YZ	23 °C, 48% Humidity	DIN EN ISO 527	75,6 MPa
Flexural Strength Z	23 °C, 48% Humidity	DIN EN ISO 527	43,6 MPa
Flexural Modulus XY	23 °C, 48% Humidity	DIN EN ISO 527	5,6 GPa
Flexural Modulus YZ	23 °C, 48% Humidity	DIN EN ISO 527	7,7 GPa
Flexural Modulus Z	23 °C, 48% Humidity	DIN EN ISO 527	10,6 GPa
Charpy Impact Strength XY	23 °C, 48% Humidity	DIN EN ISO 179	34,88 kJ/m²
Charpy Impact Strength YZ	23 °C, 48% Humidity	DIN EN ISO 179	9,62 kJ/m²
Charpy Impact Strength Z	23 °C, 48% Humidity	DIN EN ISO 179	2,94 kJ/m²

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Medical PEEK - Applications

Part Design:
Sanjay Pathak, Global Health Care, New Delhi

Medical

PEEK offers optimum properties for in-vivo applications in many aspects. In comparison to a titanium based implant, a PEEK implant is appreciably similar to the human bone in mechanical stiffness and elasticity thus can easily mechanically conform as the bone exercises internal motion. Since this material is radiolucent, it is suitable for radiological diagnostics and therapeutic radiation technology. Thanks to its insulating properties, the material is also less susceptible to temperature effects than its metal substitute materials.

In addition, the technology can be applied to the manufacture of surgical tools that come in any contact with the patient and therefore require medical certification.

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