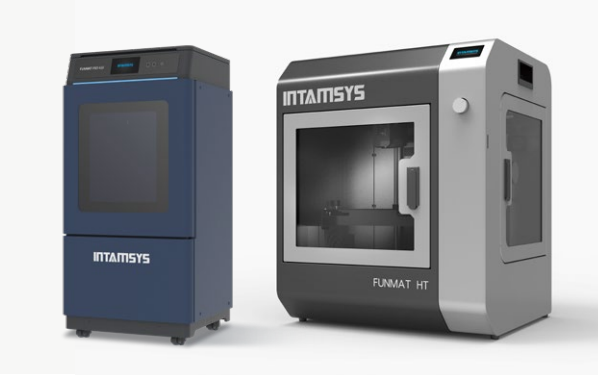
About INTAMSYS

INTAMSYS, headquartered in Shanghai, is a world-leading high-tech company providing high-performance material 3D printing and industrial direct additive manufacturing solutions. The company has established a complete global marketing and after-sales service system that focuses on aerospace, automotive, electronic, consumer goods, medical, scientific research and other industries. It provides complete additive manufacturing solutions for the whole process from the functional prototyping, jigs & fixtures to direct mass production of finished products.

FUNMAT HT

FUNMAT HT is a high-temperature material 3D printer equipped with an open system that allows customers to independently choose a suitable printing filament. At the same time, customers can obtain higher-quality printed products by presetting optimal printing configuration for different filament in the 3D printer. The printer can be used to print high-performance materials such as PEEK, ULTEM™ and PPSU as well as a variety of engineering plastics such as PA, PC and ABS.

FUNMAT HT adopts advanced thermal design, 450 °C high-temperature all-metal nozzle, 160 °C printing platform, and 90 °C constant temperature chamber. The print size can be up to 260*260*260 mm.



INTAMSYS and Evonik conducted a mechanical performance test of the high-performance material INFINAM® PEEK 9359F. Please refer to the attached table for the test results.

Please be aware of the printing tests are performed by using multiple INTAMSYS 3D printers, including intelligent multi-material industrial-grade 3D printing equipment FUNMAT PRO 410. FUNMAT PRO 410 is an industrial-grade intelligent dual-nozzle high-temperature 3D printing equipment, whose print size is up to 305*305*406 mm. It can be used to process a variety of complex structures and support printing a number of materials such as PEEK, PEEK-CF, PEKK, PC, PC-ABS and other high-performance materials.

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INTAMSYS

EVONIK
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Evonik & INTAMSYS

3D Printing of Industrial Grade PEEK Filament Integrated Solutions White Paper

INTAMSYS

EVONIK
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INFINAM® PEEK 9359 F

Evonik, one of the world leaders in specialty chemicals, has over 40 years of experience in the development and production of high-performance polymers. Its diversified product portfolio covers the solutions to almost all industrial applications. With its new 3D printing material brand INFINAM®, Evonik converges 20 years of experience, highest quality standards and innovation ability, so as to turn high-performance polymers and additives into ready-to-use 3D printing materials.

INFINAM® PEEK 9359 F is a high-performance, industrial grade PEEK filament that is easy to process in FFF (FDM) printers. Its unique properties make it suitable for fields of aerospace, transportation, oil and gas, etc. to manufacture lightweight and high-performance parts.

PEEK produced by Evonik is distinguished with the following properties:

- Excellent performance in heat resistance and chemical resistance
- Good warpage resistance
- Unnique crystallization which gives significantly improved adhesion between layers in the vertical direction
- Compared to 3D printed stainless-steel parts, it is 80% lighter in weight and 30% tougher with excellent fatigue resistance making it an ideal substitution to 3D printing metal
- Superior wear resistance and low sliding friction which makes it suitable for producing lightweight structural parts
- Long-term temperature resistance at 250 °C and short-term temperature resistance at or above 300 °C
- Resists most organic and inorganic chemicals and only dissolves in concentrated sulfuric acid and nitric acid
- Inherently flame retardant with low smoke and toxicity
- Resistant to gamma radiation, 250C steam and hydrolysis
- Excellent wave transmission performance than metal does

Test Data Summary (Filament: INFINAM® PEEK 9359F; Printer: INTAMSYS FUNMAT HT)

Performance	Testing Method	Unit	Test Results XY [1]		Test Results Z [1]	
			Directly Print	Post Heat Treatment (200 °C/4 hrs)	Directly Print	Post Heat Treatment (200 °C/4 hrs)
Thermal Properties						
Melting Point DSC, 2nd Heating	ISO 11357-1/-3	°C	340			
Glass Transition Temperature	ISO 11357-1/-2	°C	153			
Temp. of Deflection under Load A, 1.80 MPa	ISO 75-1/-2	°C	141	159	128	166
Temp. of Deflection under Load B, 0.45 MPa	ISO 75-1/-2	°C	136	203	139	182
Mechanical Properties						
Tensile Modulus	ISO 527-2/1A	MPa	2830	3280	/	/
Yield Stress	ISO 527-2/1A	MPa	73	89	/	/
Yield Strain	ISO 527-2/1A	%	4.5	5.2	/	/
Stress at Break	ISO 527-2/1A	MPa	59	86	/	/
Strain at Break	ISO 527-2/1A	%	9.1	6.6	/	/
Tensile Modulus	ISO 527-2/1BA	MPa	/	/	2070	2920
Yield Stress	ISO 527-2/1BA	MPa	/	/	44	52
Stress at Break	ISO 527-2/1BA	%	/	/	3.3	2.2
Flexual Modulus	ISO 178	MPa	2120	3180	2100	2670
Maximum Flexual Stress	ISO 178	MPa	91	137	72	96
Strain at Maximum flexual Stress	ISO 178	%	6.4	6.9	5.4	4.0
Charpy Notched Impact Strength, 23 °C	ISO 179/1eA	kJ/m^2	23C [2]	6.8C	2.8C	2.4C
Charpy Notched Impact Strength, -30 °C	ISO 179/1eA	kJ/m^2	11C	5.1C	2.9C	2.2C

1) Sample Printing Direction: XY axis
2) C=Completely Fractured