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Advancing your Competitive Advantage using OpenAM: PEEK printing using the Stratasys Fortus 450mc or F900

New Possibilities for PEEK R&D and Industrial Production Using Stratasys OpenAM™

The Potential of PEEK: A High-Performance Thermoplastic

PEEK, a high-performance thermoplastic, has been in use for decades. Ongoing research is uncovering new opportunities and applications for this exceptional material. With significant mechanical properties such as high strength, PEEK can replace metal parts in lightweight vehicles and machines. Moreover, its high resistance to chemicals makes it a potential substitute for metal parts in the oil and gas industries. PEEK also boasts exceptional wear resistance and low water absorption. Additionally, its biocompatibility has led to its use in medical science for attachments and bone replacement implants.

Traditional Reductive Machining: Complexity and Waste

Despite its numerous advantages, PEEK is not as widely used as might be expected. The primary reasons for this are the high cost of manufacturing PEEK and the challenges involved in turning it into usable products. Various methods can be employed to manufacture PEEK parts, each with its own set of advantages and disadvantages:

CNC

PEEK produced through traditional reductive machining is complex due to its crystallinity, which makes it prone to splintering and cracking. This method also generates a significant amount of expensive waste during the removal process.

Molding

Injection molding or compression molding of PEEK can be successful, but it requires multiple additional steps, is labor-intensive, and necessitates expensive equipment setup.

FFF/FDM

Additive manufacturing offers several options for PEEK production. While SLA and SLS processes produce waste, FFF stands out for its minimal waste generation, accessibility, and minimal environmental and safety requirements. Moreover, FDM provides controls that can enhance the mechanical properties of PEEK parts.

Limitations of Previous Research on PEEK FFF

Printing PEEK with Stratasys FDM® technology enables the enhancement of its most valuable properties. However, previous research on PEEK FFF has been limited to non-industrial or custom-built printers with suboptimal performance capabilities. These printers lacked reliability and uptime, hindering the transition of findings into industrial production processes.

The introduction of OpenAM software now allows for the use of open market materials or new development materials on Stratasys' highest performing industrial FDM systems, the Fortus 450mc™ and F900® printers. OpenAM, operating on fully upgraded systems, provides advanced FDM capabilities for testing and developing PEEK applications on proven manufacturing FDM printers.
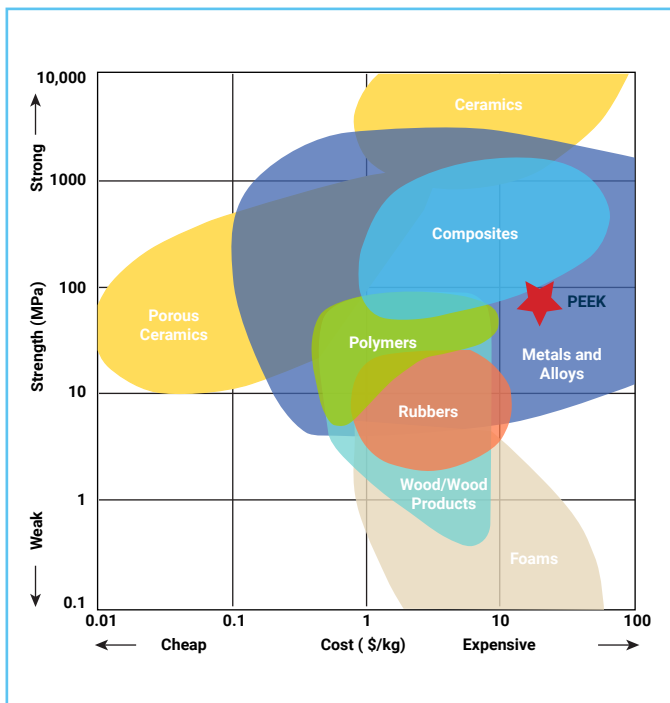
While PEEK is stronger than polymers and similar in strength to many metals, it also provides chemical resistance, high wear resistance and complete biocompatibility for the price.
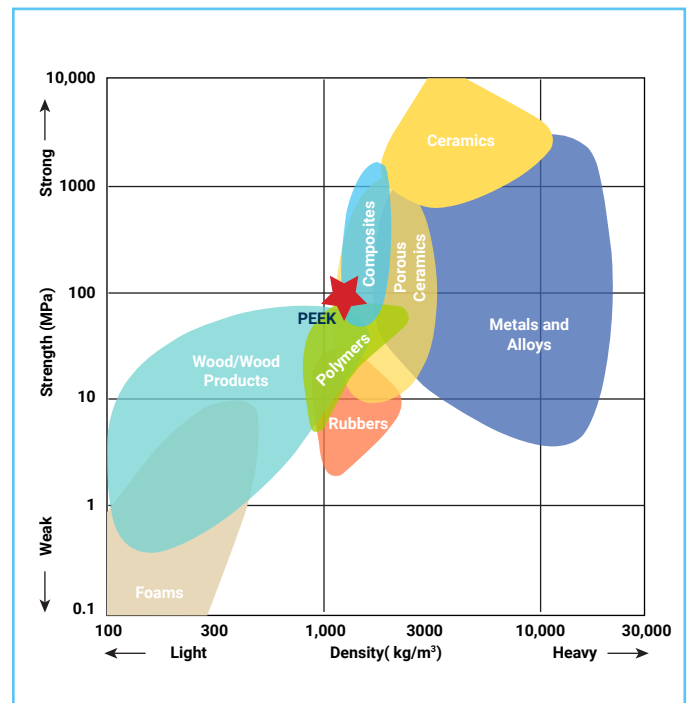
PEEK, while equal in strength to many metals, is also lower in density and lighter.

Key Factors in FFF using PEEK: Adjusting Processing Parameters

Research indicates that the key factors in FFF using PEEK involve adjusting processing parameters to optimize layer bonding by controlling temperature distribution. OpenAM software grants expert FDM engineers access to machine control process parameters allowing them to adjust time and temperature variables during printing, surpassing the capabilities of Insight™ or GrabCAD Print™. With OpenAM, users can intentionally control mechanical properties, crystallinity, and surface finish when working with PEEK and other high-requirement materials by adjusting nozzle temperature, oven temperature, print speed, and approximately 40 other parameters that integrate with Stratasys GrabCAD Print and Insight processing software.

Ensuring Repeatable and Reliable Results with OpenAM

By utilizing OpenAM, users can enhance PEEK FDM printing down to specific sections of a part, improving part performance and capabilities for various applications. Testing and developing with OpenAM on the Fortus 450mc or F900 ensures repeatable and reliable results that can be seamlessly transferred to industrial production within the OpenAM software ecosystem.

Connect with a Stratasys Representative for More Information

For more information on OpenAM and Stratasys Fortus 450mc or F900 printers using open market materials, click here to let us connect you to a Stratasys representative.

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APPLICATION BRIEF
FDM