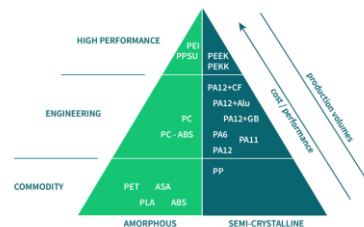


## Mechanical Properties of Technical Polymers: PEKK

Tensile tests on PEKK (Antero 800NA) at room temperature

### BACKGROUND

Additively manufactured high-performance polymers have been gradually opted to replace other materials due to their excellent heat, chemical and flame resistance. As represented in the figure, high-performance polymers are thermoplastics, either amorphous or semi-crystalline in their molecular structure, differ not only in the production volumes from engineering and commodity plastics due to higher cost of the materials but also, they are preferred when it comes to good mechanical performance.



### CONTACT

Manja Franke  
Head of Research

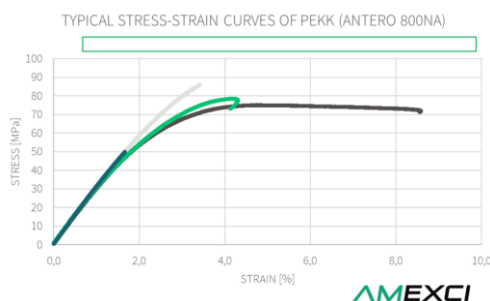
[manja.franke@amexci.com](mailto:manja.franke@amexci.com)

+46 72 241 1004

### SCOPE

In 2019, AMEXCI conducted a pre-study about “Advanced Polymers” aiming at providing an overview of different polymers available for Additive Manufacturing (AM) processes with a focus on engineering and high-performance polymers. Following the know-how attained from this pre-study about the overall introduction to AM thermoplastic materials and applicable AM processes, the company (OEM)-material compatibilities, and the comparison of mechanical properties of different available materials, in between spring and autumn 2020 AMEXCI conducted a follow-up project regarding mechanical properties of technical polymers initiated primarily with high-performance polymer, Polyether ketone ketone (PEKK), i.e., Antero 800 NA from Stratasys.

### INSIGHTS



Antero 800NA (PEKK) from Stratasys shows high strength, heat, and chemical resistance as well as low outgassing. While PEKK has higher tensile strength than ULTEM 1010, it has been mostly utilized for custom tooling, jigs, fixtures, oil/gas components and under-hood/fuel components.

The aim of this follow-up study was to understand capabilities of such high-performance polymer by printing tensile specimens and testing them to compare with the provided data sheet from Stratasys. Therefore, tensile specimens (ASTM D638, type I) of PEKK (Antero 800NA) in three different directions (XY, XZ and ZX) with single and (XY) direction with three contours were printed using Stratasys 450mc. Accordingly, tensile tests were performed at room temperature following ASTM D638. Other than sharing information of the data preparation and general overview of the FFF process, the attained test results were compared with the commonly used materials/processes such as Onyx (Markforged, FFF), HP3 (EOS-SLS), HT23 (EOS, SLS), AlSi10Mg (EOS, SLM), VICTREX PEEK 450G (Injection molding) and many more.

The full version is available for participants of this project within AMEXCI’s shareholder companies.