

Modeling and Optimization

Many heavy users of more traditional processing techniques, like extrusion or injection molding, tend to want to utilize part designs transferred directly for those other technologies one to one within Additive Manufacturing. This does not usually work as desired, resulting in parts that are extremely non-optimized or that can easily fail within the desired application. Instead, Additive Manufacturing works most ideally when the part is designed specifically for printing and specifically for the application in mind. Unlike other processing technologies, AM has the flexibility of being able to produce these highly customized designs. Syensqo has both internally and externally investigated this and pursued optimization with our materials.

Internally, Virtual Engineering has performed significant work modeling our materials and predicting how best to optimize our materials with unfilled PEEK, carbon-filled PEEK, and PPSU. In order to aid in this optimization, a specific demonstrator was designed, printed, and then repetitively optimized according to the virtual engineering work. This work was highly successful, with several material laws created, and the results presented at the Digimat Conference (Bordeaux, Fr) and at AMUG (Chicago) in 2019. [A copy of this presentation can be found here.](#)

Externally, Syensqo has worked with [Digimat, a Hexagon modeling platform product](#), in order to implement these material laws into the software for customer use. Currently, Digimat includes laws for all three commercial Syensqo filament materials: unfilled PEEK, carbon-filled PEEK, and unfilled PPSU.

