

3D print - FFF (VE)

Numerical material laws for our three FFF materials (PEEK, PPSU, PEEK CF10) have been derived taking into account their intrinsic anisotropic behavior. The identification of the parameters, including those of a failure model, was performed using the Additive Manufacturing module available in Digimat® (from MSC Software).

In order to assess the mechanical performances of our FFF materials and the reliability of the material laws, a demonstrator was designed and printed with these three materials. Some parts were also machined from stock shapes which allow us to get a reference in terms of mechanical performances (for the unreinforced polymers). All the printed and machined parts were submitted to a quasi-static test until failure, followed by a high-speed camera. The prediction of the mechanical behavior was performed using both an isotropic and full anisotropic approaches, this last one taking explicitly the toolpath and build orientation into account

A topology optimization was performed as well. The new part, lighter by almost 20% has been printed in PEEK and their performances were compared to the original design.

This [work](#) was presented at the Digimat Conference (Bordeaux, Fr) and at AMUG (Chicago) in 2019.