

## Strain Gauge Filament for Extrusion Based Additive Manufacturing

F.G. Madsen<sup>1</sup>, D.B. Pedersen<sup>1</sup>, A.E. Daugaard<sup>2</sup>

<sup>1</sup>DTU Mechanical Engineering, Denmark

<sup>2</sup>DTU Chemical Engineering, Denmark

[FGM@Bjorn-Thorsen.com](mailto:FGM@Bjorn-Thorsen.com)

### Abstract

Material Extrusion Based Additive Manufacturing (MEBAM) process that has the widest range of possibilities regarding material functionality. Because the MEBAM process uses a prepared material filament, instead of curing or sintering, the possibility of creating uniquely customized functionality on a macro-scale is possible. The experiment was to investigate the possibility of using phase-separation and selective filler placement to create conductive filaments and still maintain a good printing process. The flexible conductive filament was used to print functional flexural mechanisms that could be used for pressure/torque sensors, switches and touch buttons. Flexural parts were designed using compliant mechanisms to induced strain in the material that could be measured through a change in resistance of the part. Stiffness and conductance were controlled by utilizing the MEBAM process through the amount of infill, wall thickness and printing speed. Thus making it is possible to tailor the printed parts to the intended application with a single type of material.