Background
The mechanical performance of short fiber-reinforced polymer composites is highly influenced by the processing induced fiber orientation. Injection moulding is a popular manufacturing process of producing polymer product (see Fig. 1).

Approach
A direct relation between the parameters of the fiber orientation tensor and the parameters required for the micromechanical model is developed.

By using Digimat, 3D representative volume elements (RVEs) based on the fiber orientation tensor from CT scanning of a material with fiber weight fraction of 20% and 30% are created (see Fig. 2). The short glass fiber is described by an elastic model. The matrix is described as polycarbonate with the EGP model. The elastic modulus along loading direction is obtained by uniaxial tension tests (see Fig. 3).

Future work
Link between anisotropic properties and orientation distribution will be further studied.

References