

## **Reactive Injection Moulding of Polyamide 6 - an innovative approach for the production of high performance composite parts**

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In order to respond to the marked needs regarding energy efficient and large volume capable processing technologies for the production of high performance composites, Fraunhofer ICT has developed an innovative reactive injection moulding process. The process has been developed to enable the production of continuous fiber reinforced high performance composite parts with the engineering thermoplastic matrix Polyamide 6. The developed processing technology is based on the well established and world wide available injection moulding technology. During the process development, various relevant machine components such as the configuration of the screw and the non return valve have been redesigned to enable the processing of low viscous thermoplastic polymer intermediates such as Caprolactam. Furthermore a special mixing nozzle and suitable mould technologies have been developed to enable an anionic in-situ polymerisation of Caprolactam to high molecular Polyamide 6 in the presence of continuous fiber reinforcements made of glass and carbon fibers to high performance composites. The developed processing technology enables the production of continuous fiber reinforced thermoplastic composite structures with a high fiber volume content in a cycle time of less than 5 min. The process development is aimed to enable an upgrade of suitable injection moulding machines world wide and will thereby enable companies specialized in injection moulding to also produce high performance thermoplastic composite parts with continuous fiber reinforcements. In this paper the process technology will be presented together with the evaluation of various produced parts. Furthermore the effect of different processing parameters and their influence on the material properties will be discussed.