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Selective Laser Sintering of High Temperature Resistant Thermoplastic Polymers

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Nowadays rapid manufacturing (RM) demands fast production of parts with end-use properties. One method of fast production of parts with complex shapes is the selective laser sintering (SLS). With SLS theoretically all thermoplastic materials could be used as long as they exhibit the right absorption properties. SLS with CO₂-Lasers can only be used commercially for polyamide and polystyrene, since only these polymers absorb enough energy to be sintered.

In a new approach carbon black particles are added to the polymer. Since carbon is very sensitive to the wave length of Nd:YAG lasers, a SLS machine with this laser is used. Carbon can absorb enough energy to melt the polymer next to it. By this method every thermoplastic material can possibly be sintered.

This dispatch is focussed on high temperature resistant polymers. First parameter studies show the influence of the main parameters. These are hatch distance, laser speed, laser power and carbon black content. By analysing single layer specimens new insights in the actual melting process could be achieved.