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Experimental Study of the Rubber Mixing Process Using a Corotating Twin Screw Extruder

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Traditionally the production of rubber mixtures using very viscous polymers, reinforcing fillers and further additives, like antioxidants and curing chemicals takes place in the internal mixer in a discontinuous way as a function of time. In the continuous mixing process with a twin screw extruder the different mixing processes of the incorporation, the dispersion of the fillers and the distribution of the other additives are accomplished simultaneously on an axial scale. In the experimental work the influence of the processing parameters, i. e. screw configuration, screw speed and throughput on the compound and product properties are analysed by using Rubber Filler Composites (RFC) based on natural rubber (NR) and emulsion styrene butadiene rubber (E-SBR) for two filler types carbon black and silica. It is shown that with the help of a continuous mixing process rubber mixtures can be manufactured with similar properties as those when mixed in a discontinuous process. The continuous mixing process shows lower energy consumption in comparison to the discontinuous process.