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Chemical Reactions in Multi-Screw Extruders MSE

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The Multi-Screw Extruder MSE was invented by Berstorff as a high-performance extruder for sophisticated tasks in polymer processing. It is especially designed for residual devolatilisation down to extremely low monomer or solvent contents and for postcondensation of polycondensates.

Usually, the MSE is arranged directly behind the reactor, so it is fed with polymer melt and no melting zone is necessary. Characteristic for the processing zone of the MSE is a bundle of ten or more corotating closely intermeshing screws. Their geometry corresponds to that of co-rotating, closely intermeshing twin screw extruders. In the MSE, however, the screws not only rotate around their own axis. The whole bundle also rotates around a central cylindrical shaft. The motion of the screws bears analogy to a planetary roll extruder.

Because of its design and the kinematics of its screws, the Multi-Screw Extruder MSE offers important procedural advantages: long mean residence time at compact installation size, complete self-cleaning, narrow residence time distribution, good heat transfer and excellent mixing with low mechanical energy input. When the MSE is run partly filled, there is large free surface. Its fast renewal, because of the screw rotation, benefits the mass transfer during degassing processes.

In its original field of application, the MSE scored convincing results. It often outclasses traditional extruders. Theoretical studies provided properties that recommend the MSE also for the synthesis of polymers from monomers, where long mean residence time and good heat transfer are very important. Therefore, design and operational mode have to be adjusted to polymerisations so that the extruder is run fully filled. The object of further investigation is to verify the theoretical studies by experiments.