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A New Online Measurement Technique for the Evaluation of the Degree of Dispersion

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Polymers need to be modified as the properties of the raw material right after the synthesis in polymer reactors usually do not fulfil the demands of the customers. The compounding step includes all processes needed to adapt the properties of the raw polymer to the customer requirements. Most of these processes involve the addition of fillers, pigments and specialised additives.
The properties of the produced compound depend on the dispersion of the solid additives in the polymer matrix. Thus the evaluation of the degree of dispersion achieved in the process is crucial for both the process design and the production monitoring. So far a number of different test methods were developed to perform this task. Basically there are offline tests which usually are quite simple and thus can be applied for continuous production monitoring. Inline and online tests usually are more complicated so that e.g. NIR and RAMAN measurement techniques that give some very interesting results require specialised operators. Thus they are not common in the compounding industry.
Within the presentation we will introduce a new testing unit for the evaluation of the degree of dispersion of fillers and pigments in polymers. The device is based on the commercially available pressure filter test commonly applied for the quality control of masterbatches. We modified these tests units in a way that they can be used for online tests taking continuously material samples at predefined locations along a co-rotating twin screw extruder. This setup makes it possible to evaluate the degree of dispersion at different screw locations and - more important - to evaluate different mixing sections with respect to the dispersing efficiency.