INFLUENCE ON PROPERTIES OF HIGHLY REACTIVE POWDER COATINGS OF EXTRUSION PARAMETERS DETERMINED BY INFRARED SPECTROSCOPY

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In polymer extrusion, compounding is a continuous mixing and/or blending process that is also used to produce highly reactive powder coatings. A premixed batch of powder coating is added to the feeding section and extruded, preferably by a co-rotating twin-screw extruder. One essential parameter in the processing of highly reactive materials is the melt temperature: If it is too high, pre-reactions occur during the extrusion process, which may cause high rejection rates. We studied the melt temperature of an epoxy/carboxyl-based powder coating using a retractable thermocouple at 3 different axial positions along the barrel of a ZSK34 co-rotating twin-screw extruder. The influence of different processing conditions on the reactivity of a highly reactive powder coating was examined by infrared spectroscopy and differential scanning calorimetry. Furthermore, the specific energy input and the color change in the finished powder coating at different processing points were investigated. Multivariate data analysis was used to correlate mid-infrared spectra, melt temperatures, specific energy inputs, enthalpies of reaction and changes in color. With a special screw-configuration with increased elongational flow, the melt temperature profile could be improved.

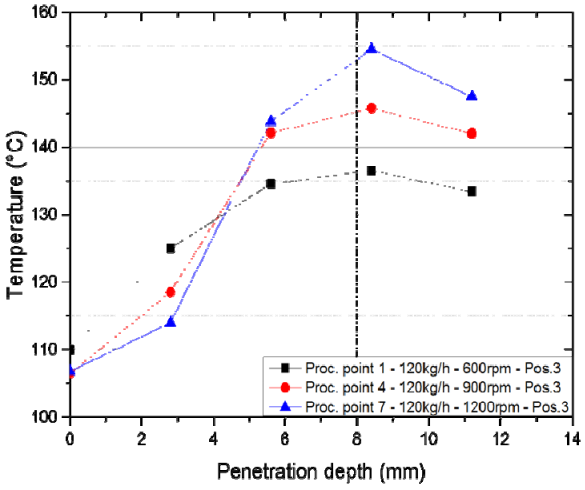

Figure 1 Polymer melt temperatures profile in a co-rotating twin screw extruder.