

Effect of Clay Addition in Hard Particulate Coatings

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Kaolin clays are used in paper coatings. Clay particle size and shape can significantly impact coating dispersion properties, as well as the appearance and physical properties of the coated products. The characteristics of kaolin clays and their relative size and content ratio to other pigments in the coating formulation may have considerable influence on the coating stress development and mechanical properties^{1,2}.

In this research, we studied aqueous coating systems containing ground calcium carbonate (GCC), latex and clay. Coating drying behavior, including weight loss and stress development, was monitored under controlled conditions (temperature and humidity). Drying stress was determined by substrate deflection method. SEM and cryo-SEM techniques were used to relate the coating stress development and cracking behavior to microstructure changes. The cracking behavior was studied by measuring the critical cracking thickness and mechanical properties (i.e., hardness, modulus and fracture toughness) using nanoindenter.

Increasing clay content in certain systems was found to increase the critical cracking thickness. The shape and size of the clay particles didn't change the final stress level significantly, but did influence the development and relaxation of the capillary-induced stress, which dominate the early stage of stress development in particulate coatings^{3,4}. In this presentation, the effect of clay on coating stress development and mechanical properties, which are responsible for coating performance, are discussed.

References:

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