

Article

Fiber Bragg Grating Sensor to Monitor Stress Kinetics in Drying Process of Commercial Latex Paints

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Abstract: In this paper, we report a study about the application of packaged fiber Bragg gratings used as strain sensors to monitor the stress kinetics during the drying process of commercial latex paints. Three stages of drying with distinct mechanical deformation and temporal behaviors were identified for the samples, with mechanical deformation from 15 μm to 21 μm in the longitudinal film dimension on time intervals from 370 to 600 minutes. Drying time tests based on human sense technique described by the Brazilian Technical Standards NBR 9558 were also done. The results obtained shows that human sense technique has a limited perception of the drying process and that the optical measurement system proposed can be used to characterize correctly the dry-through stage of paint. The influence of solvent (water) addition in the drying process was also investigated. The paint was diluted with four parts paint and one part water (80% paint), and one part paint and one part water (50% paint). It was observed that the increase of the water ratio mixed into the paint decreases both the mechanical deformation magnitude and the paint dry-through time. Contraction of 5.2 μm and 10.4 μm were measured for concentrations of 50% and 80% of paint in the mixture, respectively. For both diluted paints the dry-through time was approximately 170 minutes less than undiluted paint. The optical technique proposed in this work can contribute to the development of new standards to specify the drying time of paint coatings.