Non-Destructive Evaluation of Curing Processes in Seismic and Soundproofing Building Materials Using Ultrasonic Testing

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The production of seismic and soundproof building materials often involves the injection of silicone rubber, recognized for its shock-absorbing capabilities, into the interlayers to achieve seismic isolation and soundproofing. However, challenges such as inadequate curing time or inconsistent mixing of hardeners during the production of large materials can lead to incomplete curing or even filler overflow. In this study, non-destructive ultrasonic testing (UT) is utilized to monitor the curing process without compromising the material's surface integrity. As the curing duration extends, the UT signal strength demonstrates a corresponding increase. Nevertheless, once the curing process surpasses 80%, the signal strength increment starts to level off, eventually stabilizing upon complete curing. Investigation of three distinct filler hardness levels (Shore A 10, 15, and 20) reveals variations in strength changes during the curing process. Experimental data suggests that a higher filler hardness level correlates with a more pronounced fluctuation in curing signal strength. These insights hold the potential to refine the filling process for seismic and soundproof materials, ensuring their optimal curing and performance. Additionally, the observed variations in strength during curing can aid in accurately identifying the specific type of filler utilized in the building materials. Such advancements contribute to the efficient production of resilient and acoustically efficient construction materials.