The Use of X-ray Computed Tomography in Quantifying Air Voids in Asphalt Compacted Specimens

H. Saleh
WJE Associate Inc., NDE Validation Center

E. Masad
Department of Civil and Environmental Engineering,
Washington State University, Pullman

This study describes experimental and analytical methods to quantify the internal structure of air voids in asphalt mixes. An x-ray computed tomography system along with image analysis techniques were used to measure air void sizes at different depths within asphalt mix specimens. The statistical analyses performed validated the applicability of the Weibull model for describing air void distribution. Consequently, the Weibull model was used to quantify the effect of the compaction effort, method of compaction and aggregate size distribution on air voids.

The air void size distribution in Superpave gyratory compacted specimens was found to exhibit a "bath-tub" shape where larger voids were present at the top and bottom parts of a specimen. This shape was more pronounced at higher compaction efforts. The method of compaction was significant in influencing the air void size distribution. Specimens prepared using the Superpave gyratory compactor with different aggregate sizes were found to have noticeably different air void sizes. Specifically, larger air voids were present in specimens that consisted of smaller aggregate particles.

R. E. Green Jr. et al. (eds.), *Nondestructive Characterization of Materials XI*