

Aggregate particle arrangement and its relationship to macro-material performance

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Background

Aggregate particle arrangement is to be related to the mechanical properties of materials in the pavement layers. Well packed particles can have a strong resistance to deformation under the traffic loading, which will improve the underlying layers' durability and increase pavement life.

Aims

- Study the relationship between the aggregate packing and the mechanical response to the loading of the granular material that those particles form.
- Study the influence of different compaction on aggregate particle arrangement.
- Investigate the effect of shape, size of aggregate and particle strength on the packing.
- Compare the interactions of aggregate before and after mechanical test.
- Relate these particle packing to the pavement performance.

Methodology

- Using limestone, gravel and granite materials to make different specimens

- Using Slab, Gyrotory, Vibratory, Marshall and Proctor compaction method to generate different particle assemblages
- 3D X-ray Computed Tomography will be used to scan and determine the internal arrangement
- Using an image analysis program to investigate packing parameters such as distribution of the coordination number
- Compare the particle packing of compacted specimen with that after it has been subjected to a repeated load test

Current Progress

Build up a background of aggregate packing and study the aggregate particle shape characterization

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