Research Project Brief

Report 26-R42: Effects of Reheating and Mixture Composition on Balanced Mix Design Test Results

VTRC Virginia Transportation Research Council

Background

Significant and practical differences in balanced mix design (BMD) test results have been reported in past VTRC research projects between samples or lots of the same mix or between districts and producers. These differences can be attributed to the variability in reheating practices and asphalt mixture composition during production. This study helped quantify the effects of reheating practices and variations in mixture composition on VDOT's BMD test results, supporting an efficient and yet responsible BMD implementation in Virginia.

Research Objectives

- Quantify the effects of reheating and mixture composition on VDOT's BMD test results.
- Identify the volumetrics and gradation parameters that significantly influence asphalt mixture performance.

Approach

- Literature review on the effects of reheating and mixture composition on asphalt mixture performance.
- Data compilation and statistical analysis of multi-year BMD datasets from VTRC and VDOT to evaluate the impact of reheating and mixture composition on BMD test results.
- Statewide survey to gather information regarding reheating practices for BMD specimen fabrication during production.
- Laboratory testing of plant-produced mixtures to verify the findings.

Outcomes

- Validated ratio in cracking tolerance ratio (CT_{Index}) performance criteria between reheated and non-reheated conditions.
- Proposed preliminary non-reheated performance criterion for Cantabro and indirect tensile at high temperature (IDT-HT) tests.
- Identified asphalt content, gradation parameters, aggregate bulk specific gravity, air voids, and absorbed asphalt content as significant factors.
- Developed framework to estimate CT_{Index} during production using volumetrics, gradation, and Cantabro results as input.

Research Benefits

- Additional confidence to VDOT on the adoption of the revised indirect tensile cracking test (IDT-CT) production thresholds.
- Identification of critical volumetrics and gradation parameters that influence BMD test results.
- Development of framework to support decision-making on when to request IDT-CT during production, offering guidance to districts when testing frequency is reduced.

Principal Investigator(s)

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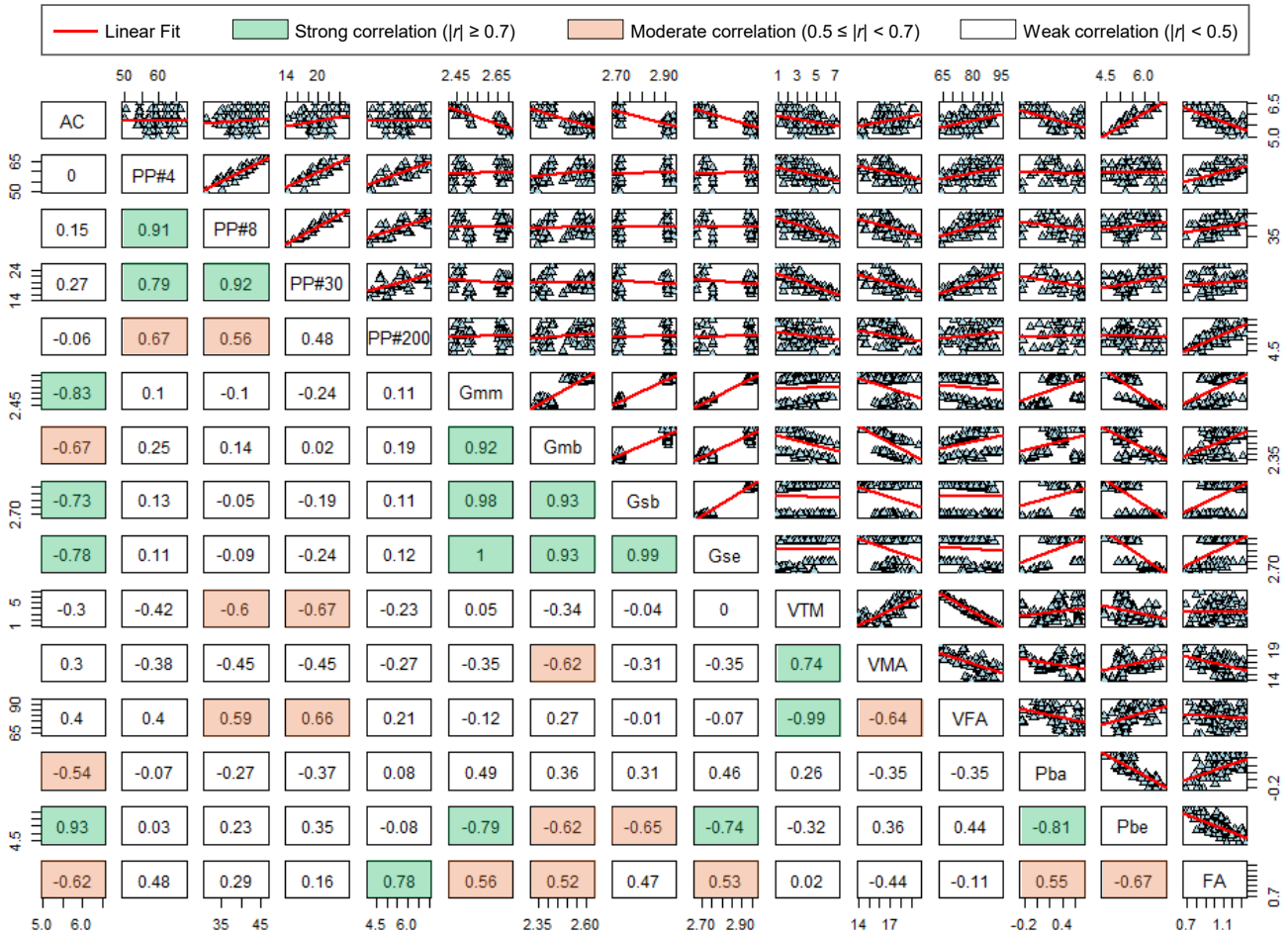
Research Findings



Effect of Mixture Composition

Preliminary non-reheated threshold of 5.0% maximum mass loss and minimum 85 kPa were proposed for Cantabro and IDT-HT tests, respectively.

Differences in BMD test results were insignificant for loose mixture storage times of 1 to 4 days, typically used in Virginia.

Effect of Mixture Composition

Asphalt content, gradation parameters (percent passing sieve No. 8, No. 30, No. 200), aggregate bulk specific gravity, air voids, and absorbed asphalt content significantly affected BMD results.

Cantabro mass loss provided substantial improvements in CT_{Index} predictions.