

Inter-Laboratory Study (ILS) of Bituminous Concrete Balanced Mix Design (BMD) Tests for Use on VTrans Projects

PROJECT TITLE

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STUDY TIMELINE

July, 2022 – December, 2023

INVESTIGATORS

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Bituminous Concrete, Balanced Mix Design, Materials Testing

FUNDING

VTRC022-02
\$49,880

Problem Statement

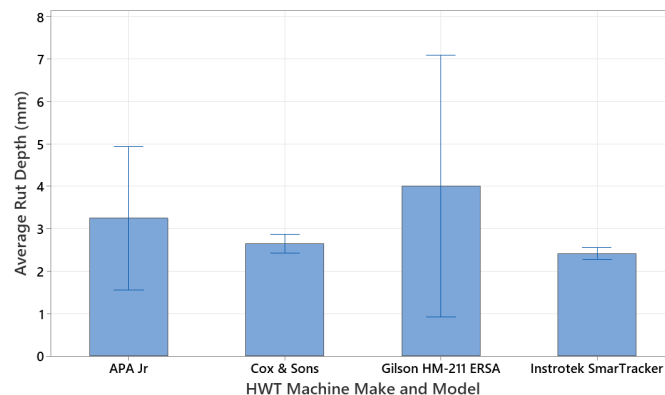
This study seeks to identify the variability of Balanced Mix Design Tests (Hamburg Wheel, Flexibility Index, and Indirect Cracking Test) between machine operators and devices only by isolating the specimen fabrication to a single lab from a single plant-produced source of material.



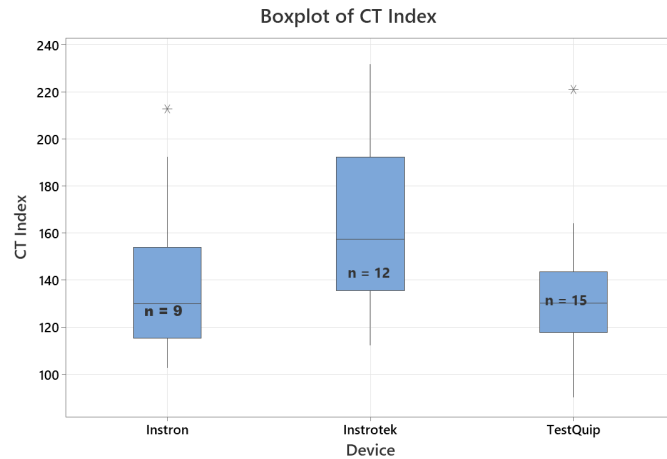
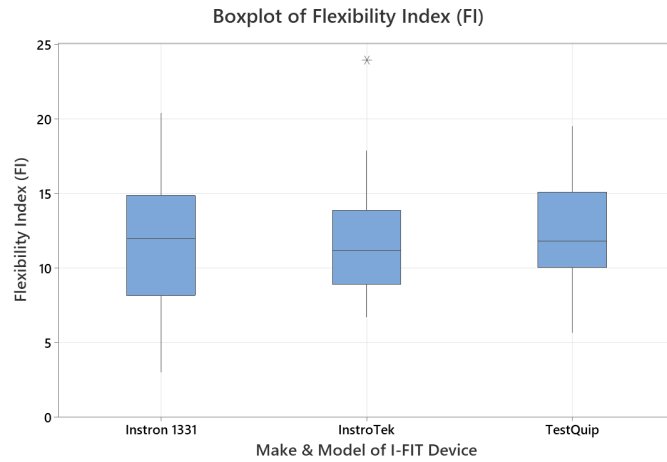
Methodology

Nearly 2,000 lbs of material was sampled from a bituminous concrete producer in VT. This material was brought back to the lab and then tested for uniformity and compacted into 500 samples to be tested across the 10 participating labs throughout the northeast. The tests performed included AASHTO T324, AASHTO T393, and ASTM 8225. Results were shared back to the CAP Lab for interpretation.

Interval Plot of Average Rut Depth (mm)
95% CI for the Mean



Individual standard deviations are used to calculate the intervals.



Conclusions

By isolating the fabrication of the samples, overall variability of the tests results was reduced to a percent coefficient of variation below that of other studies¹. The Hamburg Wheel Test (AASHTO T324) proved to be the most repeatable whereas the IDEAL-CT (ASTM 8225) had the greatest variability in results.

Potential Impacts and VTrans Benefits

As states (including Vermont) implement these and other Bituminous Concrete performance tests, it is critical to know what the baseline variability is when contract penalties, bonuses, and even stop-work orders are on the line during construction. Data from this research will inform future specifications and Mix Design Submittal policy for VTrans engineers.