



Implementation of Intelligent Compaction (IC) for Pavement Construction in Vermont

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Problem Statement

Intelligent Compaction (IC) is an innovative technology (Figure 1) that has the potential to overcome some of the issues associated with conventional compaction techniques (Kamali-Asl et al., 2016). However, to develop robust QA/QC specifications, the IC roller compaction measurement values (ICMV) need to be well interpreted and the relationship between these values and the density/stiffness of the compacted material should be investigated.

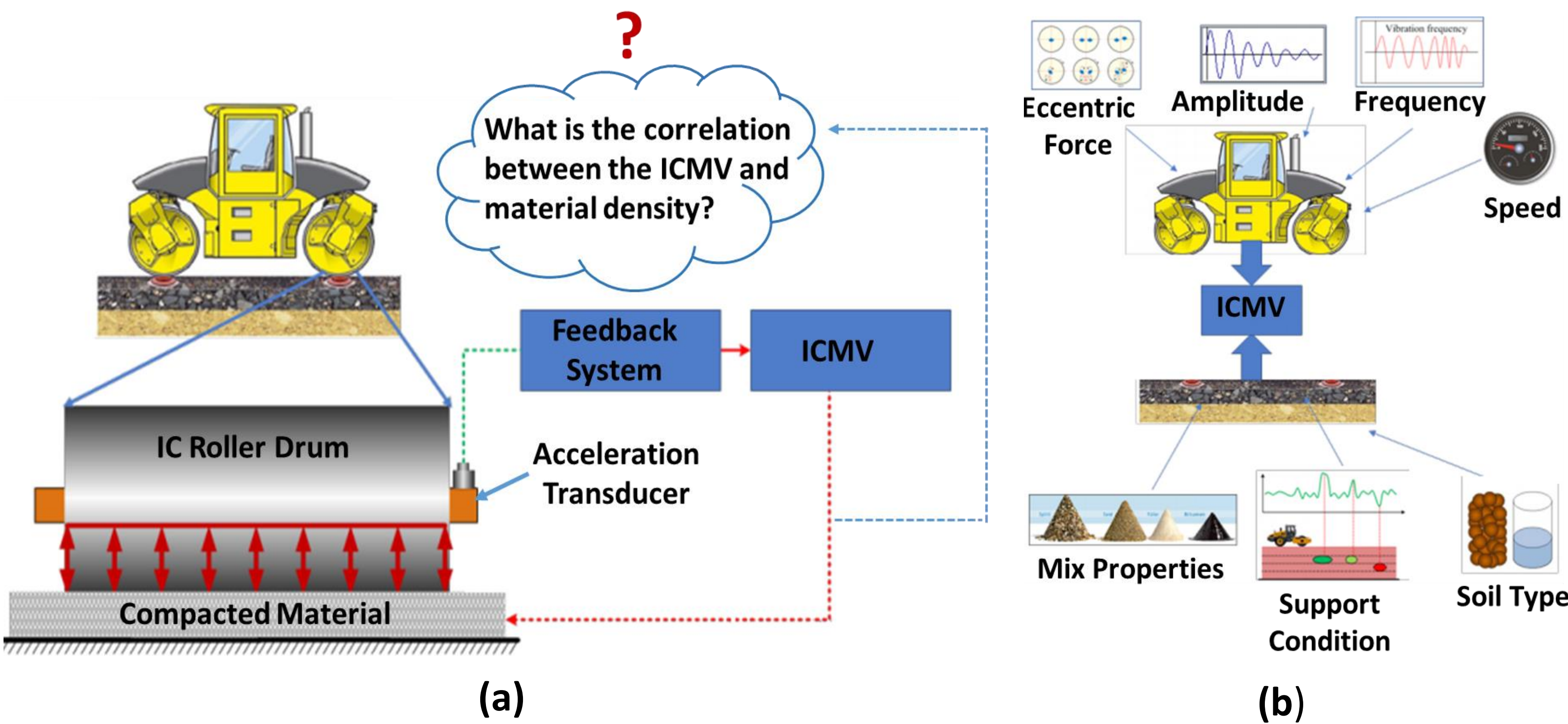


Figure 1. The details of IC roller (a) data collection system and (b) the factors affecting ICMVs (Chang et al., 2018)

Background and Introduction

Using the IC roller allows identifying the weak during compaction and reduce the maintenance and rehabilitation costs during the pavement life cycle (Mooney et al., 2010). On the other hand, if the ICMVs are not well-correlated to the conventional in-situ measurements, it would be difficult to implement IC as a QC tool.

Since the correlations between the ICMVs and the conventional stiffness-based or density-based compaction measurement tools such a dynamic cone penetration (DCP), and nuclear gauge (NG) might vary through different pavement layers (Mazzari et al., 2017), the roller parameters should be calibrated for different sections of each layer. Currently, to minimize the inaccuracy of the regression models between ICMVs and spot measurements the roller parameters are being calibrated at Rive Road (VT Route 117) project.

Data Collection and Results

Roller parameter calibration were performed on second reclaim phase. The preliminary results indicated a good correlation between ICMV data and NGD.



Figure 2. Different stages of construction and data collection

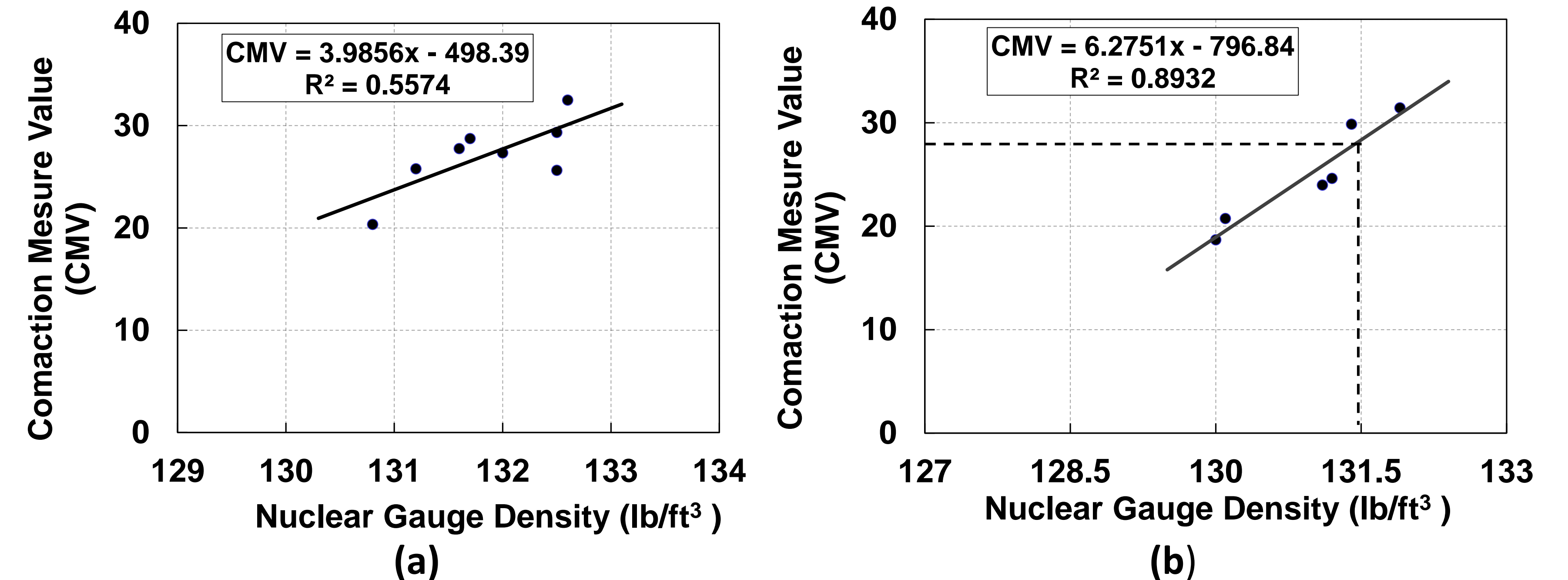


Figure 3. Determination of (a) target ICMV and (b) ICMV & NGD correlation

Conclusion

Calibration of roller parameters significantly improved the R-squared value of the regression models. The results from additional field tests indicated that IC can be potentially used as a QC tool during pavement compaction.

Acknowledgments

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