



SHORTENING  
PROJECT DELIVERY

# INTELLIGENT COMPACTION

**Compaction is one of the most important processes in roadway construction. This process is needed to achieve high quality and uniformity of pavement materials, which in turn ensures longer-lasting support, stability and strength. Conventional compaction equipment and processes can result in inadequate or inconsistent material density, which can contribute to premature deterioration and shorter embankment and/or pavement service life.**



Deploying new compaction rollers with Intelligent Compaction (IC) capabilities can result in more uniform material density and improved operations efficiency by reducing the

number of passes needed to obtain specification density. In addition, implementing IC technology aids Quality Control/Quality Assurance (QC/QA) by providing a visual record of material stiffness values at 100 percent of the roadway locations recorded during compaction.

Many international and local demonstration studies have shown that using IC technology can dramatically improve compaction<sup>1</sup>.

## INNOVATION DESCRIPTION

Intelligent compaction technologies can greatly improve the uniformity and compaction of road-building materials today. It is defined as the process of mechanically tamping road materials (e.g., soils, aggregate bases or asphalt surfacing materials) and using modern vibratory rollers equipped with an integrated measurement system, an onboard computer reporting system, Global Positioning System (GPS) based mapping and optional feedback control. Intelligent Compaction rollers facilitate real-time compaction monitoring and timely adjustments to the compaction process by integrating measurement, documentation and control systems. The rollers also

## REASONS TO EMPLOY INTELLIGENT COMPACTION:

- ▶ Mature technology
- ▶ Equipment is available (Eight companies in the U.S. manufacturing the machines)
- ▶ Pooled Fund Study on IC with 12 states participating
- ▶ National Workshops on IC
- ▶ IC improves quality—more evenly-rolled product
- ▶ Provides a more consistent product

maintain a continuous record of color-coded plots, allowing the user to view plots of the precise location of the roller, the number of roller passes and material stiffness measurements.

## BENEFITS

Benefits of IC technologies include:

- ▶ **Improved in-place density of pavement materials as well as reduced variability of measured density** as has been documented by projects in Europe, Asia and the United States.
- ▶ **Improved efficiency of compaction** leading to:
  - Better levels of density in less time and with fewer roller passes than are typically required.
  - Improved productivity and a larger amount of roadway material constructed in a typical day.

<sup>1</sup> The Federal Highway Administration (FHWA)/Transportation Pooled Fund (TPF) project, TPF-5(128), "Accelerated Implementation of Intelligent Compaction Technology for Embankment Subgrade Soils, Aggregate Base, and Asphalt Pavement Materials"



- Minimized occurrence of spot failures and lower costs for paving contractors, State Departments of Transportation (DOTs) and the traveling public.
  - Longer pavement service life and reduced highway repair and maintenance costs.
- ▶ Ability to map and identify **weak support** areas for corrective actions prior to the compaction of the upper layers.
- ▶ Maintaining **consistent rolling patterns** under **lower visibility conditions** such as night paving operations.

## CURRENT STATE OF THE PRACTICE

Since 2008, State DOTs, commercial entities and the Federal Highway Administration (FHWA) have collaborated to demonstrate the impacts of IC technologies through numerous field demonstration projects, open house activities and training sessions (Figure 1).

## SUPPORT AND AVAILABLE TOOLS

To learn more about the Federal Highway Administration's IC Initiative, please visit: <http://www.intelligentcompaction.com>.

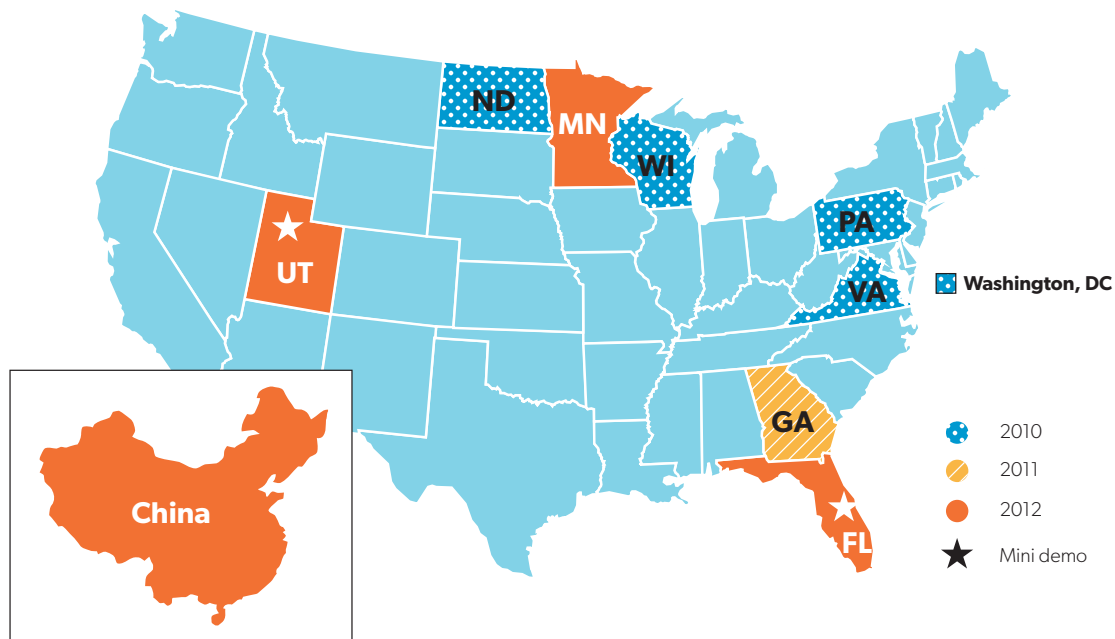


FIGURE 1: IC field demonstration and workshops by year

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Every Day Counts (EDC), a State-based initiative of FHWA's Center for Accelerating Innovation, works with State, local and private sector partners to encourage the adoption of proven technologies and innovations aimed at shortening and enhancing project delivery

U.S. Department of Transportation  
Federal Highway Administration