



Volvo Construction Equipment

VOLVO INTELLIGENT COMPACTION: FAQ

DENSITY DIRECT



Revolutionizing the Paving Industry

Volvo is set to launch what has been referred to as the “holy grail” of asphalt paving — an intelligent compaction system that calculates density. In its Volvo Intelligent Compaction with Density Direct offering, Volvo is helping change the way road builders work — eliminating guesswork, improving quality, and increasing productivity with the ability to calculate density values over 100 percent of the mat.

Learn more about how Volvo IC with Density Direct is paving a new road in the industry.

► volvoce.com/densitydirect

VOLVO IC WITH DENSITY DIRECT

VOLVO INTELLIGENT COMPACTION OVERVIEW

Q: What is Volvo Intelligent Compaction?

A: Volvo Intelligent Compaction (Volvo IC) provides asphalt compactor operators with information on three main functions:

- Pass mapping
- Temperature mapping
- Density mapping (termed Density Direct, included on Volvo IC with Density Direct)

Volvo IC includes pass mapping and temperature mapping, while Volvo IC with Density Direct includes pass mapping, temperature mapping and density mapping — a function exclusively-licensed to Volvo.

All information gathered by Volvo IC is conveyed to the operator via an 8"x10" digital display system that is mounted within the cab.

Q: What components are included in the system?

A: The following components are included:

- Display
- Accelerometer
- Infrared mat temperature sensors (front and rear)
- GPS
- Base Station
- GPS Rover (optional)

Q: What is pass mapping?

A: Pass mapping is interchangeable nomenclature with pass counting. Using the digital display of Volvo IC or Volvo IC with Density Direct in the cab of the compactor, the pass mapping function shows how many times the asphalt compactor has rolled over a certain area of the mat. The operator can easily see each pass as it is given a different color designation on the display, showing roller passes and drum overlap, so the operator can make needed roller passes to achieve uniform coverage and compaction of the mat.

Q: What is temperature mapping?

A: Temperature mapping provides the operator with real-time mat temperatures ahead of the compactor, as well as a temperature 'map' which shows the path of the roller overlaid with the last temperature recorded.

DENSITY DIRECT OVERVIEW

Q: What is Density Direct?

A: Density Direct is a technology exclusively-licensed to Volvo that provides operators with real-time density calculations of the surface area being compacted, to within 1.5 percent accuracy of core sampling.

Q: How does Density Direct work?

A: Once fully calibrated with data specific to the application, the Volvo Intelligent Compaction with Density Direct system produces a density calculation that is accurate to within 1.5 percent of core sampling, providing a real-time reading of density values over 100 percent of the mat.

The result is a machine "calibration" that is stored for each "lift," or element of the job. These assigned calibrations can then be referred back to by the operator to increase efficiency and accuracy. For instance, if an operator is compacting a 4-inch binder on Monday, the calibration for this job could be "Lift One." On Tuesday, he is compacting a 2.5-inch wearing — this becomes "Lift Two." On Wednesday, he returns to the site he worked on Monday to complete the compaction binder, so he can easily switch the machine calibration back to "Lift One" without recalibrating.

As the operator makes rolling passes on the mat, he can see the density compaction results on the display.

Q: How is the density value communicated to the operator?

A: The screen displays a colored density map which depicts each roller pass and its calculated density in a different color. The map is a grid of approximately 1 sq. ft. tiles, and each is color-coded based on density. The density value is also displayed numerically on the right side of the screen.

VOLVO IC WITH DENSITY DIRECT

Q: Do contractors need to install Volvo IC on all asphalt compactors or just the breakdown roller?

A: Volvo IC and Volvo IC with Density Direct only needs to be equipped on the breakdown asphalt compactor. The data on compaction and density is set through the system on the breakdown compactor, and is also captured during the roller breakdown operation.

Q: What is the benefit of Density Direct?

A: Density Direct reduces the need for core sampling and improves productivity and quality, as operators now receive real-time density calculations covering 100 percent of the compacted mat, versus the traditional option of nuclear gauge testing which is more time consuming and only provides “spot-check” results.

Q: Who would benefit most from Density Direct?

A: Any contractor who is working on a project with a density specification and pay factor can benefit from the ability to get direct reporting on density values — in-process and final density data is an important quality control metric. In addition, specifications that include Percent Within Limits (PWL) incentivizes close control of final density. Pass mapping and documentation are of interest to project owners.

Q: What is the difference between Density Direct and other intelligent compaction systems?

A: The significant difference between Volvo IC with Density Direct and competitor systems is that the Volvo system provides a density value, where other systems provide a Compaction Measurement Value (CMV), which is based on material stiffness.

Q: Why is receiving a density value more valuable than a stiffness value?

A: Relative density is a universally accepted and understood metric on all compaction projects. All asphalt projects require a compaction value for relative density in the paving project specifications. Any measurement of stiffness and resulting data that is captured in the compaction operation is not universally accepted or understood, and can prove complicated for non-technical equipment personnel.

Q: Can't a contractor just correlate stiffness to final density?

A: Stiffness measures the rigidity of the asphalt surface, and provides an output in CMV. Experienced site foremen and operators can use nuclear gauge measurements and core samples throughout the course of a job to correlate the CMV to the relative density. Density Direct gives the operator relative density in real time.

While stiffness can have a correlation to pavement core density values, measuring rolling effectiveness by using a stiffness measurement is not a scientific method and it's open to interpretation. During the development of Density Direct, test results proved the superiority of calculating density levels over any rolling data related to stiffness.

Q: Do other manufacturers offer density mapping as part of their intelligent compaction systems?

A: Volvo is the only manufacturer currently offering an intelligent compaction system with the ability to calculate density in real time over 100 percent of the mat.

Q: Is this a patented technology?

A: Yes. The density algorithm and its use on the compaction of flexible pavement is patented by the University of Oklahoma. Volvo Construction Equipment partnered with the university on its research and has exclusive rights to commercialize the technology.

Q: Do contractors need to ask respective agencies to adopt Density Direct?

A: Many agencies (state DOT and FHWA) have intelligent compaction specifications. Density Direct was developed to meet all current intelligent compaction specifications. As with any new technology, however, Density Direct will require approval by either the resident engineer or state engineer on the project. While the technology is in its early roll-out, contractors will need to request approval for use of the technology until wide-spread approval is received.

VOLVO IC WITH DENSITY DIRECT

Q: If an agency requires an intelligent compaction system, does Volvo IC qualify, or is Volvo IC with Density Direct required?

A: If the agency's (state DOT or FHWA) requirement is for data collection and storage (e.g., pass counting and temperature mapping), Volvo IC satisfies these needs. If there is a requirement for a Compaction Measurement Value (CMV), Volvo IC with Density Direct is required.

Q: Can Volvo IC or Volvo IC with Density Direct be "swapped out" among compactors or is it "locked in" to the particular model in which it was installed?

A: At this point, Volvo IC and Volvo IC with Density Direct may not be switched out among machines.

SYSTEM DATA AND STORAGE

Q: Where is the data gathered from Volvo IC and Volvo IC with Density Direct stored?

A: The display system has approximately 14GB of hard drive storage space. If using a 5-day work week, Density Direct can log about seven months of data. A log file is connected to a specific lift on a specific job. When a lift or job is deleted in the Graphical User Interface, the corresponding log files will be deleted. When memory is low, users will be prompted to delete old jobs (they will not be automatically deleted). The data can be saved on a USB drive for future documentation reference. State DOTs typically recommend daily data downloads.

As memory gets full, the data may be exported in VEDA file format to a USB drive for storage and future reference. (VEDA is an IC data management and analysis software accepted by the Federal Highway Administration for Intelligent Compaction applications).

In 2016, the data will also be available for storage on the Cloud through Volvo CareTrack® — the Volvo telematics system.

INTELLIGENT COMPACTION AVAILABILITY, PRICING AND COMPETITOR COMPATIBILITY

Q: How does the price of Volvo IC compare to other intelligent compaction systems?

A: Volvo IC is available as an option on select compactors. Volvo IC including pass mapping and temperature mapping is priced comparably to other manufacturers' offerings. Volvo IC with Density Direct is available at an additional cost as it provides the added benefits of reduced core sampling and more consistent data gathering.

Q: On what machines is Volvo IC available?

A: Initially, Volvo IC and Volvo IC with Density Direct will be available on the DD110B, DD120B, and DD140B in North America.

Q: When will Volvo IC be available for purchase?

A: The system will be available for purchase in fall 2015, and will be sold, installed and supported by the Volvo Construction Equipment dealer network.

Q: Is Density Direct available as an aftermarket option?

A: Aftermarket availability for Volvo asphalt compactors will follow in the future, exclusively through Volvo Construction Equipment dealers.

VOLVO IC WITH DENSITY DIRECT

Q: Can Density Direct be used on other manufacturers' compactors?

A: No. Density Direct has been designed and tested for exclusive compatibility only with Volvo asphalt compactors.

Q: Can Density Direct be used in soil compaction or is it specific to asphalt?

A: Density Direct has been designed specifically for use on asphalt paving mixes.

Q: Which manufacturers offer intelligent compaction?

A: Manufacturers offering intelligent compaction systems that include pass mapping and temperature mapping are Ammann/Case, Bomag, Caterpillar, Dynapac, Hamm and Sakai. Third-party suppliers include Trimble, Topcon and MOBA. There are no other manufacturers currently offering tools that calculate real time density through an intelligent compaction system.

INTELLIGENT COMPACTION HISTORY / MANUFACTURER AVAILABILITY

Q: How long have intelligent compaction systems been around?

A: Intelligent compaction guidelines were established in Europe in the early 1990s. Dramatic improvements have been made to hardware, but the principle of intelligent compaction remains unchanged. In the United States, the United States Federal Highway Administration and Transportation Pooled Fund initiatives began in 2008, and continued until 2012. Currently, the FHWA initiative titled Every Day Counts includes an intelligent compaction component.

Q: Why did Volvo wait so long to introduce an intelligent compaction system?

A: There has been a long-standing gap within intelligent compaction in the areas of developing technology, and end-user acceptance and adoption. Contractors are paid on meeting density percentages, but intelligent compaction systems continued to address material stiffness. The Volvo initiative was to develop a comprehensive solution that is now being made available to address this gap.