

The Complete Guide to 3D Technology for Concrete Construction Workflows

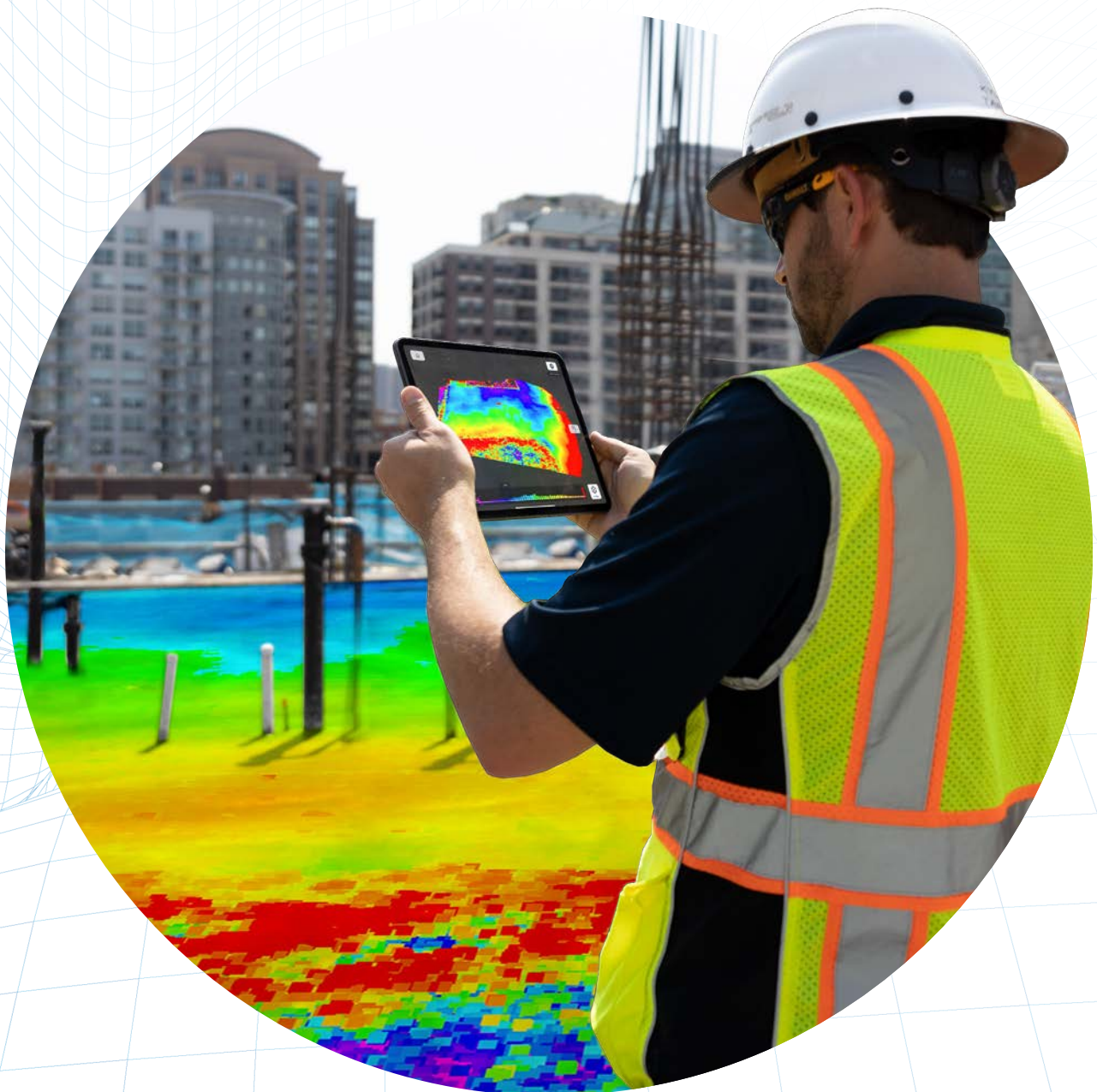




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What is the **Concrete Construction** Process?

It wasn't long ago that concrete contractors had to hire third parties to validate the accuracy of their pours. This process meant waiting until the concrete was sufficiently cured, waiting for the results of FF/FL measurements to be calculated, and then having to fix any issues – all this was once considered unavoidable.



Fortunately, technology has developed to the point where putting up with these inefficiencies is no longer necessary. With 3D laser scanning, contractors can identify any high or low points minutes after the concrete slab has been poured and screeded. In many cases, crews can then smooth over those areas while the concrete is still workable. When the rework is complete, the slab can be scanned again to ensure that specified FF/FL numbers have been achieved.

The result is faster quality verification, reduced time on site, project costs kept to a minimum, and the team has documentation and images proving that the slab complies with FF/FL standards. Simply put: 3D laser scanning streamlines concrete workflows in ways that traditional methods cannot, including, same-day assessment, greater speed, improved accuracy, independent data testing and investigation, and less rework.

About This Guide

This guide is designed to walk readers through the steps they need to take to ensure that throughout the concrete pour process, they are successful at implementing the latest hardware, software, cloud, and app-based solutions (like the award-winning FARO Flatness Check™ App) related to 3D reality capture technology.



Because the real world reality is that traditional methods for concrete workflows add hours, if not days, to a concrete project. Not only that, but there is a high probability that delays will occur as traditional FF/FL assessments take longer to complete and add an extra step to the process. In today's increasingly competitive/tech-enabled construction landscape, extra steps and unwanted inefficiencies add up. They cost time and money. And in worst-case scenarios, could result in lost business.

With the construction labor shortage reaching "crisis level" proportions, bold action and innovation is required. 3D laser technology, an easy-to-implement, affordable, suite of related products, is the solution concrete pourers are turning to with accelerated interest.

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Multiple tests have shown a 1% difference only between traditional dip-stick measurements and scan analysis. But the answer is available now within minutes instead of hours.

Thomas Rogers

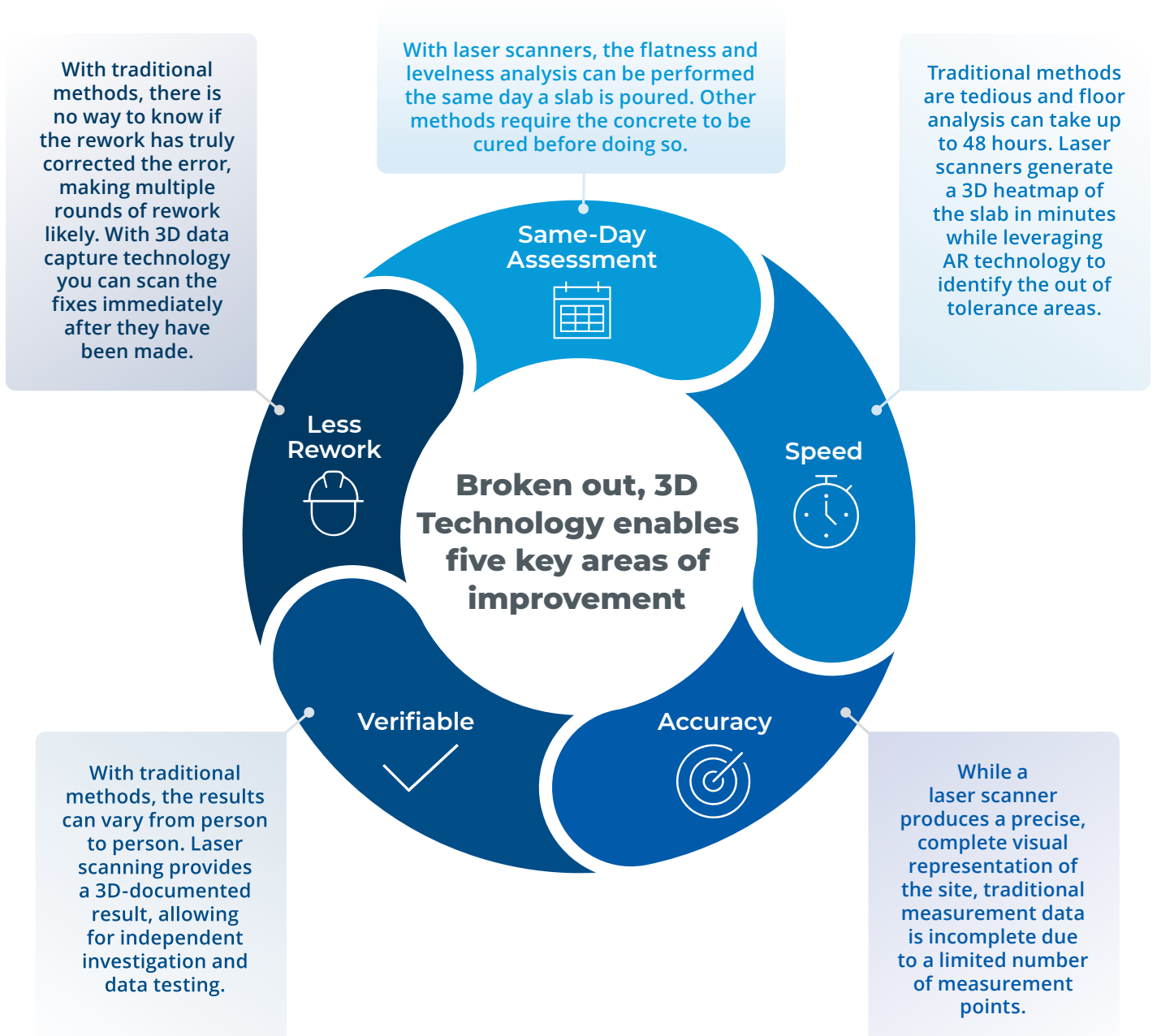
VDC Field Manager, McCarthy Building Companies, USA

How 3D Technology Brings Value to your Business

A new laser scanner might seem like a capital expense you aren't sure you can justify right now. But 3D scan data isn't just for building concrete slabs. The scanner, app, and software solution are applicable to any construction project where you need better data to make faster decisions. From verifying the accuracy of construction to documenting existing conditions and even creating Digital Twins for project closeout, laser scanning is a versatile technology for your construction projects.

For examples, let's say you're a contractor that completes two projects per month. By performing a single scan and analyzing the results while the concrete is still wet, you can save 90% of the rework costs associated with waiting until the concrete cures and fixing problem areas identified with a 3rd party.

And that's for a small- to medium-sized business. Large construction firms might complete 10 (or more) times the number of building projects in a month. And the more frequently you use the laser scanner, the greater the value you have from a better understanding of the quality of work, timeliness of information, and reduced rework costs.



Precision Measurement Step by Step

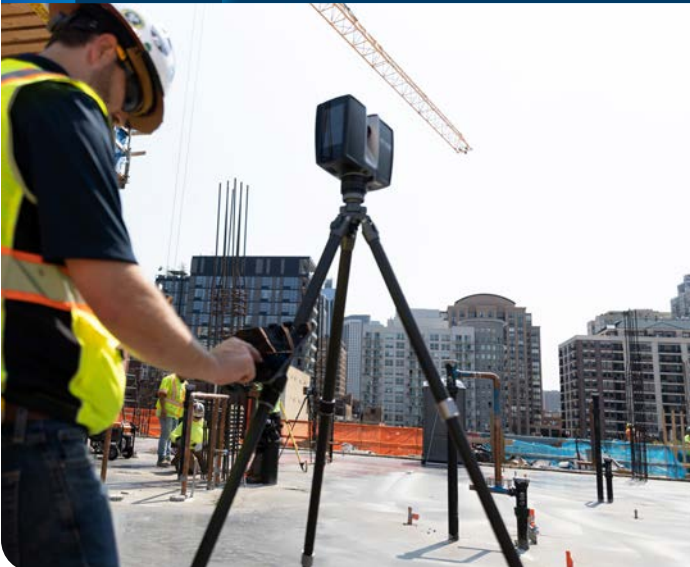
What follows is a step-by-step breakdown of how 3D technology, including hardware, software, cloud and app-based solutions work together in a seamless manner to drive a variety of concrete pour efficiencies and new business opportunities.

Step 1 Pour the Concrete



As the field crew prepares the job site and readies the concrete, those operating a laser scanner can determine where, and how many times, they will need to scan the slab. These pre-scan tasks can be performed before the concrete is poured, or while pouring/smoothing work is in progress.

Step 2 Scan the Concrete Slab



Set up the FARO Focus Premium Laser Scanner at the determined position. This can be accomplished manually or by driving the scanner via the Flatness Check™ App on iOS tablets, preferably a LiDAR-enabled tablet. (*Note: Flatness Check™ App still works with other iOS tablets) Select the appropriate resolution depending on the device's distance from the slab and perform the scan.

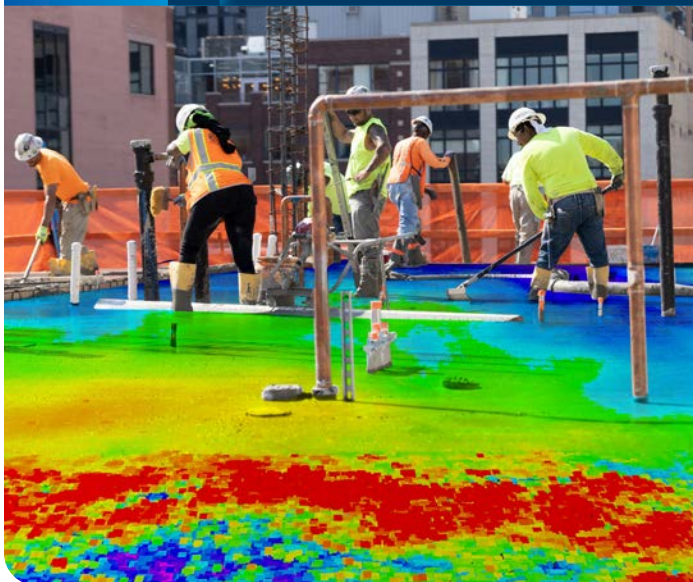
Repeat this process as often as needed to ensure sufficient coverage of the poured slab, but often only one scan is needed. It is possible to reduce the number of scan positions needed by raising the height of the scanner above the slab. Collecting data from a higher elevation will improve the quality of data at the other end of the slab from the scanner. The scanner is controlled remotely by tablet if it is elevated beyond reach using the built-in Wi-Fi.

Step 3 Compile Scan Data into 3D Model



Scans are immediately transferred into the app where one or multiple scans can be analyzed. The app then takes the user through the required steps with results that can be visualized using the iPad's AR capabilities and overlaying to reality. The process takes 5 to 15 minutes depending on slab size and number of scans.

Step 4 Adjust the Workable Concrete



Thanks to the Flatness Check™ App, operators can easily identify – with pinpoint accuracy – any swells and dips in the concrete slab. Armed with this data, the team can perform the following tasks:

- Direct the finishing crew to patch up bulges and swells in the still-workable concrete (only applicable of slabs of certain sizes)
- For larger slabs, the scan data helps ensure that future rework gets done right the first time
- For slabs of all sizes, the concrete can be re-scanned, re-worked, and repeated until specified F numbers are reached

This level of scanning proficiency is a significant confidence boost in the measurements you take; reassurances that potentially save you time and labor costs, reduced waste, and allows post-slab construction work to begin sooner.

Hardware and Application Specs

Focus Premium Laser Scanner



Creates accurate, complete and photorealistic 3D representations of any environment or object in just a few minutes. Focus Premium is easy to operate and offers built-in protection from dirt, dust, fog, rain and heat/cold. And, for best on-site data capture, Focus Premium connects with the new FARO Stream App, bridging FARO hardware to the FARO Sphere cloud environment, which includes FARO Flatness Check™ App. Combined with FARO's companion products — Sphere and Stream — Focus Premium delivers better data faster while enabling reduced time to decision, streamlining efficiencies to meet the demands of today's increasingly remote, digital workforce.

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Our teams have confidence in the new technology ... Better yet, they know immediately they've delivered a high-quality slab that will pass any third-party review. We have F-number documentation to prove it.

Thomas Rogers

VDC Field Manager, McCarthy Building Companies, USA

Flatness Check™ App



Flatness Check is an iOS-compatible application intended for iPads designed to work with the FARO Focus Premium and FARO Focus S-Series Laser Scanners. The app controls and manages the 3D scanning, digital documentation, and data analysis of scans taken for the purpose of measuring floor flatness and floor levelness of concrete slabs for the concrete industry. And it does so via a superior user interface in a seamless, easy-to-use on-screen environment. Accessible through Sphere, FARO's new cloud-based digital ecosystem, the app delivers a speedy way to verify that a concrete slab is in or out of tolerance and the degree of those alignments or departures.

Ideal for superintendents and foremen just entering the exciting field of app-based 3D laser scanning, Flatness Check™ App users will be able to see a list of scans, create new scans or view an analysis of previous projects. At 2.5 minutes per scan, Flatness Check™ App instructs the scanner to create less data intensive point clouds by ignoring data much above the floor.

These reduced data point clouds can be scanned faster and for concrete pour applications, focus on the data that matters most. Floor flatness and floor levelness analysis is presented in colorized heat map format and an augmented reality mode allows app/scanner operators to see these heat maps superimposed over an actual slab — all in real-time. Within 10 minutes, users are now able to see an analysis where high and low areas are and can easily guide the crew to these problematic spots.

Award-Winning and Industry Recognized: FARO Flatness Check™ App received both the 2023 Expert's Choice Award for Sustainable Innovations and also the Industry's Choice Award for Slab Tools, Equipment & Materials from ConstructioNext, in collaboration with the World of Concrete.



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