AUTODESK UNIVERSITY

[MSF21844]

How, When, and Where Can Handheld Scanners Be Used in Construction

David A. Stone
HITT Contracting

Learning Objectives

- Explore options that currently exist for reality capture
  - Differences between handheld scanners and other methods
- Proper workflow
- Understand the potential ROI…via case studies
- Budget for this scanning solution
- Learn how to make an educated decision about the needs of your company

Description

Should you consider adding this tool to your workflow? While there are some very powerful laser scanners that are accurate and fast for larger spaces, and photogrammetry is cost-effective but not as accurate, there is a growing number of more-affordable handheld scanners that can augment the as-built conditions. In some cases, they are more effective the other alternatives. We will discuss the current and forthcoming technology that may augment current scanning methods. This class will address the following questions: What is a reasonable expectation from a handheld scanner and return on investment? What is the workflow for maximizing the scanner's use for as-built and quality assurance / quality control uses? How can we best capitalize on scanning at this scale? When is the right time to consider handheld versus other scanning technology? Where can this scanning method be most effective? This session features ReCap and Navisworks Manage.

Your MSF Forum Expert(s)

David Stone is the director of virtual construction at HITT Contracting, bringing 19 years of experience in architecture and construction to inform forward-thinking industry solutions. In his role, David is responsible for developing the vision and strategy for the implementation of virtual construction at HITT, including streamlining processes and coordinating design compatibility issues via the use of industry specific technology tools. He collaborates with project teams to identify and resolve workflow issues and conflicts, coordinate BIM based shop drawings, create visualizations for proactive planning, and communicate project objectives. David is the driving force behind HITT's virtual construction initiatives, and is a registered architect and a DBIA design-build professional. He has presented at several A/E/C conferences on the topic of virtual design and construction, and has been a key contributor multiple national VDC awards including AIA BIM TAP, Synchro Pro, and CETI.

MSF Forum Section Heading
Explore options that currently exist for reality capture

There are several options for reality capture in the industry today and these options are continuously evolving and improving. We will discuss the benefits and drawbacks of four general approaches.

We will briefly discuss the following methods:
1. Laser scanners
2. Li-Dar scanners
3. Photogrammetry
4. Sensor / infrared scanners

Elements to consider

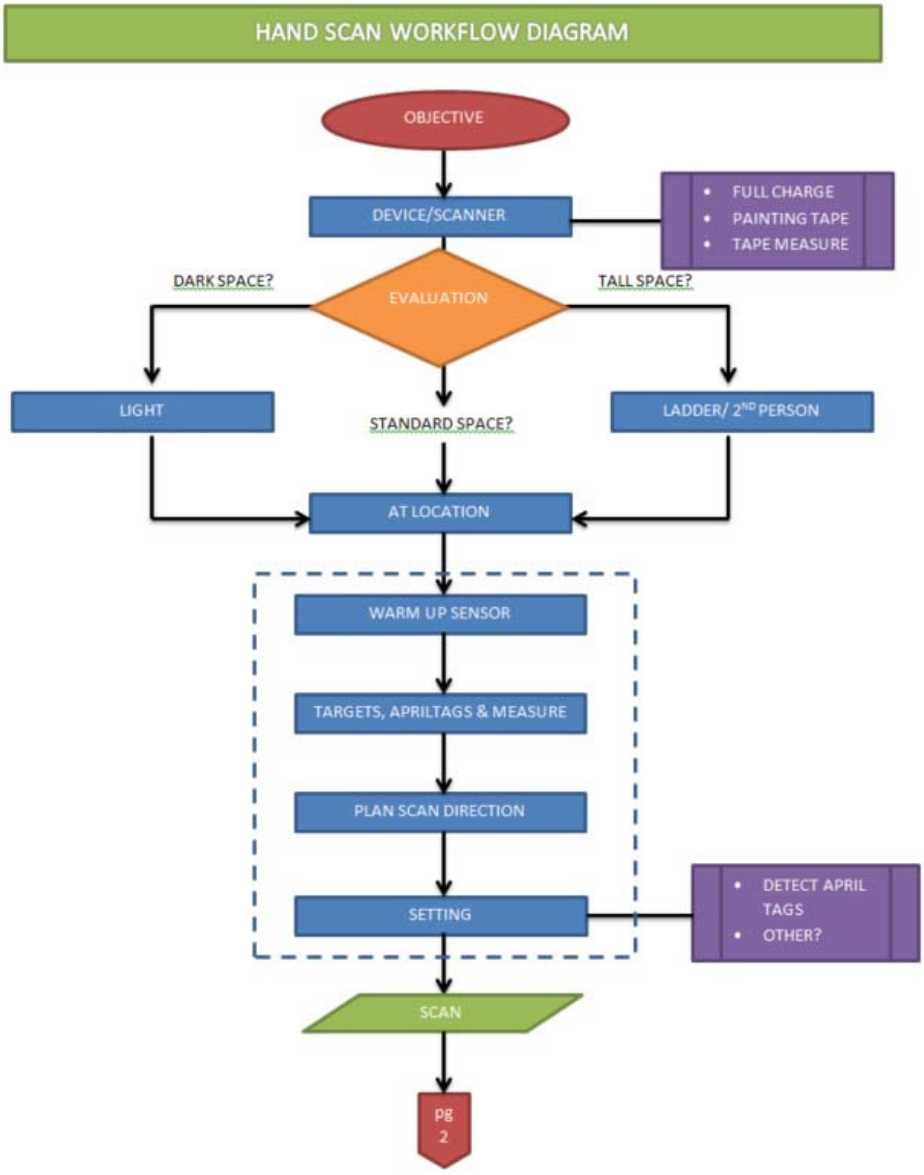
When selecting a scanning option, you should consider the main objective, which will be different for everyone, so it is important to know the differences. Considerations include accuracy, cost, speed, mobility, range, learning curve, environment, etc.

	Infrared scanner	Laser scanner	Li-Dar	Drone photogram.
Accuracy	Medium	High	High	Low
Range	Short	Long	Medium	Short / Long
Cost	$	$$$$	$$$	$$
Learning curve	↗	↗↗↗	↗↗	↗↗↗↗
Mobile / flexible	✔	✔ ✔	✔ ✔	✔ ✔ ✔
Potential use				
Small projects	✔ ✔ ✔	✔	✔ ✔	✘
Large projects	✘	✔	⛴	✔
Interior / exterior	Interior	Both	Both	Exterior

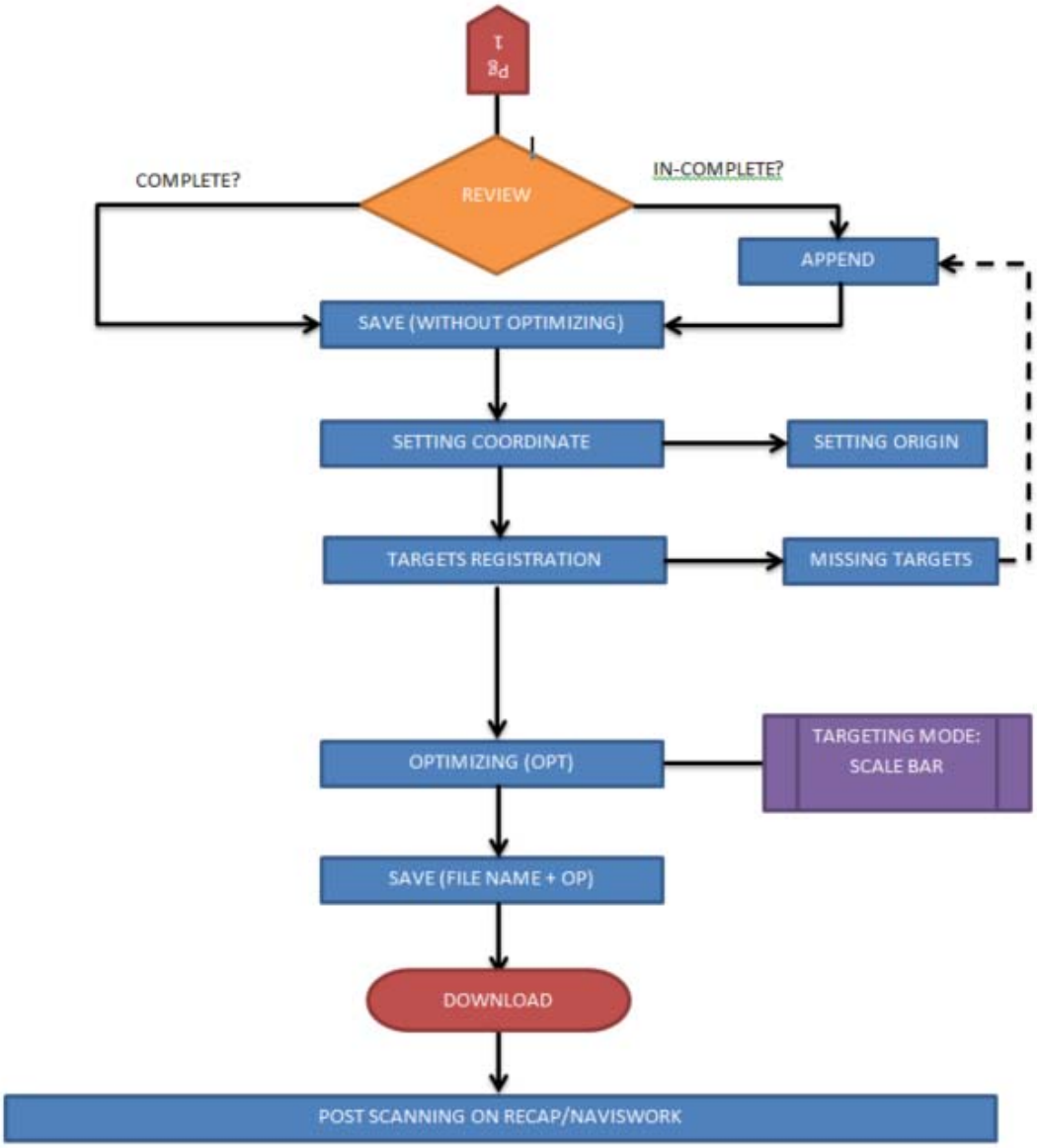
MSF Forum Section Heading
Proper workflow

Every reality capture solution will have a different approach and workflow based on the technology and the objective. The following workflow is based on an infrared handheld scanner and takes into account several variables shown in the workflow diagram below.

Workflow diagram – Part 1 of 2



Workflow diagram – Part 2 of 2

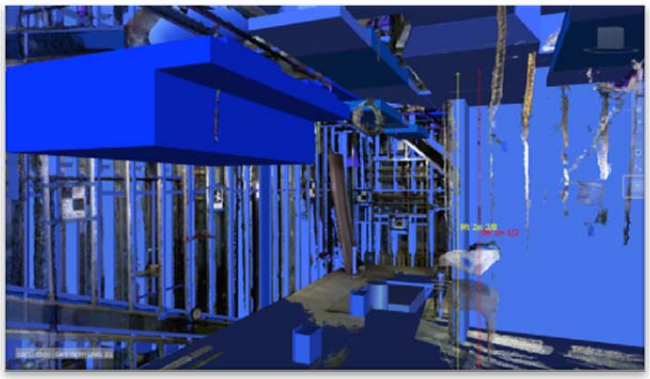


MSF Forum Section Heading
Understand the potential ROI… via case studies

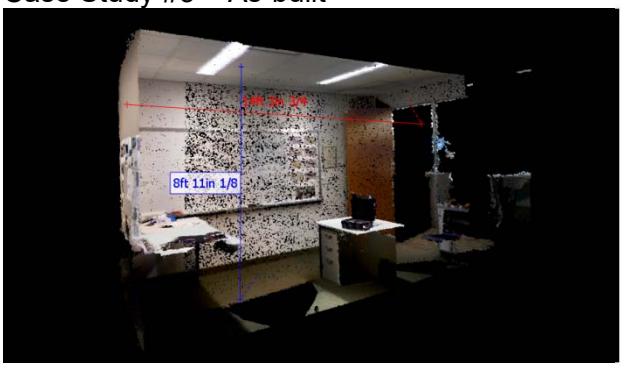
ROI (returns on investment) can be very clear and easy to evaluate; some inform you or help recognize some less tangible benefits. For this purpose, we created four short case studies—two focused on MEP coordination and two focused on as-builts, concluding with some metrics.

Case Study #1 – MEP coordination

Case Study #2 – MEP coordination



Case Study #3 – As-built



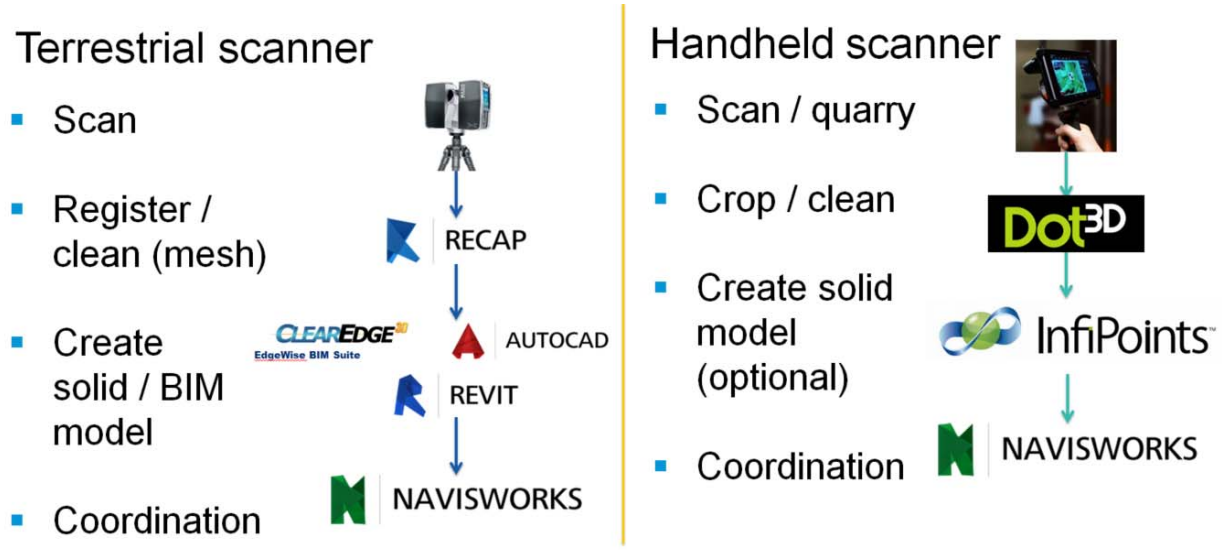
Case Study #4 – As-built

Metrics

In the presentation we will discuss the following: time savings, QA/QC benefits, accuracy, and overall communication benefits.

MSF Forum Section Heading
Budget for this scanning solution

Budgeting will be discussed in reference to workflow and intent of the scanning or reality capture objective. Are you scanning for basis of design, verify existing conditions, or creating as-builts?



MSF Forum Section Heading
Learn how to make an educated decision about the needs of your company

This presentation provides you a better understanding of multiple reality capture solutions and the infrared handheld scanner used for this case study. In this context we will summarize:

- Best practices / lessons learned
- Conclusions / takeaways from using a handheld scanner

References links

- DotProduct and DPI-8 scanning
- Autodesk Recap
- ClearEdge3D
- InfiniPoints (Elysium) and DotProduct workflow article