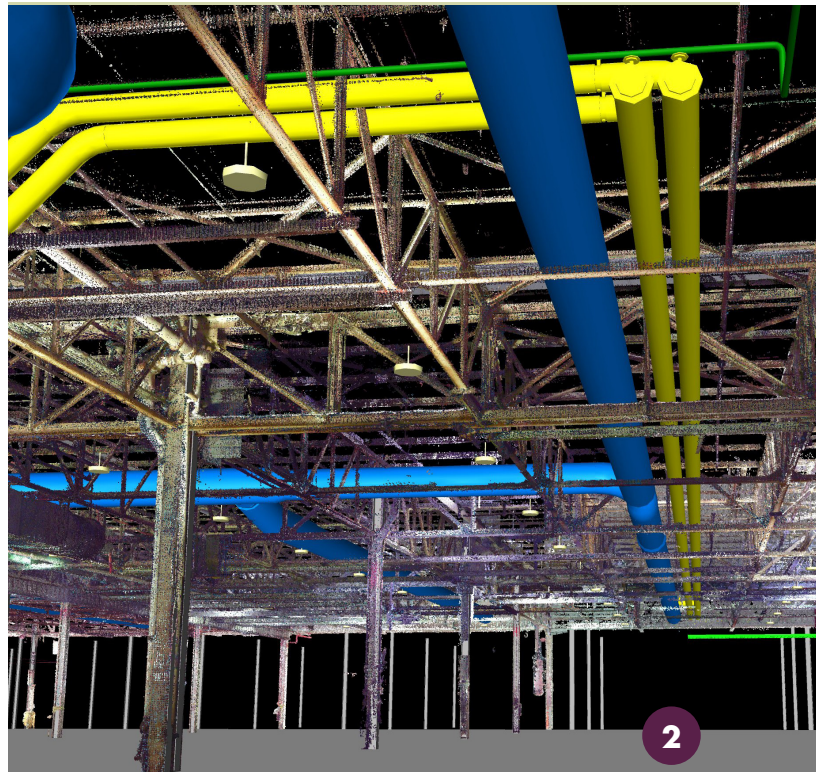


reality capture: laser scanning



1



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3D laser scanning is an alternative to the use of outdated as-builts, or manual updates through field visits.

Laser scanning is the fastest, most efficient method to capture existing conditions of many facilities or sites. It is a non-contact, non-destructive technology that digitally captures the shape of physical objects using a line of laser light. Replacing the time consuming and less accurate method of manually recorded field measurements, lasers scan an existing facility or site creating a “point cloud” that acts as a highly accurate “as-built” drawing. Laser scanning is extremely useful when there are no existing drawings or the information on the drawings is out of date for a project.

In addition to its accuracy, the main benefit is the point cloud can be referenced into a 3D model to avoid collisions with the proposed design and costly rework in the field—ultimately creating an incredibly realistic and detailed 3D model of an existing facility. While this process does require human decisions, this has the potential to help an owner digitize their facilities into other downstream uses like planning, constructability, asset management, or energy modeling. A topographical model of a site can also enhance the process of planning earthwork, construction stockpile, and staging.

TYPES OF SCANS

1. Short range: position relative, discipline-specific capture. Akin to camera and tape measure (hammer and nails vs. nail gun).

2. Long range: can be geo-synchronized to align point cloud with 3D design model; ideal for overall site (interior / exterior), construction progress, all disciplines, retrofits, and additions.

3. Aerial / drone: ideal for construction progress, topography, exterior site (roof, preliminary site).

laser scanning

Successful project characteristics

- 3D topographic laser scans of a site can be very valuable for sites that require a lot of earth movement to level them out. Combining the laser scan with 3D civil packages can optimize the earth leveling effort.
- Laser scans are incredibly useful when working in an existing facility, especially those with a lot of piping, ducts, etc. that need to be designed around.
- Dangerous or expansive facilities where sending workers into the field is time consuming or a safety risk.
- Projects with hard to reach areas and/or projects that will be utilizing 3D modeling for design.

Considerations in 3D laser scanning

- Special surface finishes such as specularity and translucency (and even the reflective properties of stainless steel equipment) can affect the scan, but can be addressed with various software and filters.
- Reflection from water or glass limits the use of laser scanning.
- Various levels of “noise” reduction may be offered by the vendor conducting the scan and may or may not be necessary (“noise” occurs when moving equipment, parts, or people may affect the result.)
- Many, but not all, technologies also record the color of the surface as the laser hits so it can provide a colored point cloud.
- It is important to verify that the scans are coordinated with Facility or State Plane Coordinate Systems (SPCS). If not, it may be difficult to align the point cloud to the 3D model.
- While point clouds are visually intuitive, they do not automatically convert into a 3D model and still need to be modeled by a designer.

