

Case Study Title: Holobuilder for the delivery of Lean Construction practices

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Healthcare and Retail. Linesight's specialist project teams, each with specific skills and experience, provide faster project delivery, greater cost efficiency and maximum value for money for their clients. Visit www.linesight.com for further details.

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Overview & Background to the Lean Initiative

This case study is an evaluation of the ability of the software application Holobuilder to aid in the delivery of lean construction practices. Linesight have used this application on several of their projects and have found benefit in doing so.

Holobuilder is a software platform that allows users to store all 360-degree site progress photographs captured and uploads them to a cloud based common data environment. Users can subsequently review site progress based on the frequency of site walks.

In the first instance the project team member will undertake a site walk and capture 360-degree photos at predetermined locations using the floor plan for reference. This process would be undertaken on a regular basis and the data captured through the photos will be uploaded to the Holobuilder application.

There are several other functions that Holobuilder provides including but not limited to:

- Creating mark ups.

- Raising issues (Health and safety, quality control etc.)
- Create reports providing a visual representation of site progress.
- Split screen view enabling users to review the same location on different dates.
- Review of BIM model against the site photographs using a Revit plugin.



Figure 1: Holobuilder split screen view

Lean Initiative Undertaken – Lean Thinking, Tools, Techniques

Holobuilder process

The capturing of information using Holobuilder is a straightforward process. The collection of data takes the form of any normal site walk. The 360 cameras can be mounted on devices such as selfie sticks or mounted directly to a hard hat. There are several different capture modes available to users within the Holobuilder application.

These are listed below:

- Classic mode: This mode allows the user to walk to any area without the need of predetermined locations being set and capture a photograph in the normal manner.
- Speed Mode: This mode is an extension of the classic mode

and allows users to utilise the locations that have been shot using classic capture mode or create predetermined locations to shoot photographs. These locations are set by using the desktop application. To use this mode, the floorplan must be scaled, and you must communicate your current position on the floor plate to the application. This is done by correlating a point on site with one on the uploaded floor plan. The system will then ask you to walk in a straight line for a distance, at which point users will mark the end position they have reached on the floor plan within the application. This will allow the application to scale and pinpoint the current location. The locations for shooting will be projected through the mobile device's internal camera in

an augmented reality scenario. With the use of the mobile device's camera, you will be guided to each of the locations and when standing over these locations it will automatically take a photograph.

- **Continuous mode:** Like speed mode above, you will need to communicate position and scale to the application. Once this is done, users can set a predetermined interval at which photographs will be shot. The site walk proceeds as normal, and photographs are taken continuously based on the set interval. This mode creates a continuous fly-through of your project, and if desired, this can be the bases of an initial site walk and the locations captured can subsequently be used in either of the other modes listed above.

Lean Analysis

The Lean Construction Institute outlines its six principals of Lean as follows:



Figure 2: Lean Construction Institute- Principals of Lean Construction

Respect for people: As an organisation, Linesight prides itself on its ability to work seamlessly with many different organisations and teams across several different regions. One of the main factors underpinning Linesight's adoption of digital technologies, is to ensure it provides workflow efficiencies, and ultimately better communication with all project stakeholders. Holobuilder allows for a digital repository of information to be created, which in turn can be accessed by all team members. This accurate representation of site progress should enhance respect and trust among all team members. The consistent capturing of data has enabled more open and transparent dialogue among the construction team and further enhances the collation and determination of issues that may arise on the construction project.

Optimize the Whole: One of the core principles of lean construction is to foster an environment of open and collaborative work practices. Optimising the whole is looking to encourage people

to not just optimise their aspect of the project but to put in place work practices that will aid the project overall. Utilising digital tools such as Holobuilder has allowed Linesight to engage in a more collaborative manner with all project members. Using photographic records, issues can be resolved in a timely fashion and works finished previously can be reviewed at various points in time to deescalate the issues that may arise such as variation for works that have been closed up.

Removal of Waste: In a lean construction sense, waste can be defined as anything that doesn't directly create value. Linesight engages with digital tools such as Holobuilder to aid in the minimisation of waste. From a practical point of view, the number of resources expended for the data collected was much less using these tools. Linesight found several benefits with introducing this technology including:

- Faster capture of project site walk photographs.
- Reduced photo retrieval and storage time.
- Reduction in site visits.
- Improved collaboration and issue tracking through integrations with other leading applications such as BIM 360.

Focus on Process and Flow: Linesight are constantly striving to improve workflows and processes. Any deviation from the standard processes and workflows will usually have a negative corresponding effect on other project stakeholders. By capturing the amount of information possible using Holobuilder in a thorough and efficient manner; Linesight are ensuring that their processes and procedures are underpinned by good solid data. This data can then be utilised as a knowledge base supplementing the accurate delivery of our process and workflows and thereby supporting the project workflows.

Generation of Value: Linesight recognises that for a lean project to be a success, the project team members must understand what value means, and failure to understand this will not enable them to add value to a project. Linesight believe value was added using Holobuilder; as it allowed for the capture and dissemination of a large volume of photographic reference data. This data was a significant help to provide all users a single point of reference to understand site progress as it moved through the phases. It also adds value to the project as it allows users to interact with this data, raising issues and creating reports, which should improve the project workflow.

Continuous Improvement: It is imperative that teams engaged in lean practices constantly monitor processes and procedures to ensure the most efficient work practices are being always implemented. Linesight have utilised Holobuilder to improve our site walk process. Traditionally, this process would have been done with a camera and some writing material. The recording and collating of this data would be time consuming and due to the manual operation, was more susceptible to errors. This digital workflow through Holobuilder speeds up the data capture, and the automatic upload of information to a cloud-based server negates the need for post collation of the information. The seamless integration with other applications such as Procore and BIM 360 ensures that all project team members can benefit from this information.

Lean Initiative Improvements & Impact

Digital tools such as Holobuilder offer several improvements to the onsite workflow. It automates the collection, collation, and

the reporting of key project data. It is an open and transparent platform to host photographic reference of a sites progress and

provides a single source of truth for both current state and other key stages of the project. The essence of lean construction is improved communication, removal of waste and ensuring the project needs come before the needs of the individual stakeholders. By implementing digital tools such as Holobuilder you can create a more open and transparent communication flow in a streamlined manner:

Through Holobuilder, it has become easier to track progress on site and the extended tools such as the mark up and measure tool allow for more meaningful interrogation of data. As it is all hosted in a web-based environment, it can be accessed by any team members around the globe. It was particularly useful during the recent Covid pandemic, where it allowed for a significant reduction of personnel

on site, while allowing for thorough capture of site progress data.

Project teams who were subject to lockdown restrictions were able to review site progress and interact with all project stakeholders. The quality of images and the all-encompassing nature of a 360 degree image meant that photographs were more interactive and user friendly when trying to resolve complex disputes or design issues.

Overall, the use of Holobuilder as a digital tool to enhance Linesight's site walks was a success. The easy setup and capture techniques meant that the application could be rolled out easily across the project teams and engagement was forthcoming, not just within Linesight as an organisation but other project team members as well.

Summary and Lessons Learned

The use of digital tools such as Holobuilder is becoming ever more popular. Greater implementation of BIM practices and workflows means that companies now more than ever need to adopt their practices to align to the more efficient streamlined industry we now currently work in. Lean construction values enshrine in the workflows of a modern construction site, the need to adopt these more efficient practices. Holobuilder and tools of this nature are an enabler to achieve this aim. It is a simple yet powerful process that if implemented correctly should foster an environment of open and collaborative work practices around areas such as site progress and

dispute resolution.

Holobuilder is one of several packages operating in this space and all stakeholders should keep an open mind assessing all the software programmes available before choosing the one that best suits the project requirements. Using these digital tools, Linesight have found they offer significant value to the administration of the project and our aim is to continue to trial and implement these digital tools to further enhance our service offering.