Laser Scanning for an As-Built Structure

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ABSTRACT

The paper reviews the change of traditional routines to new technologies, by way of Laser Scanning, to allow Naval Architects, Engineers and Shipyards the ability to safely, efficiently and cost-effectively capture spaces within an As-Built structure and modify, update or change said structure. Downtime and budgetary concerns, human error, along with safety, are the driving forces for modifications to vessels throughout the Oil and Gas industry, with these advancements, jobs can be completed with these factors in mind and exceed expectations.

Traditionally, site surveys must be conducted onboard a vessel to measure and capture specific areas of modification. This creates a toll to surveyor and company – over and above the equipment that a surveyor brings with them, scaffolding, harnesses and Safety support personnel, to name a few, must also be introduced, instantly increasing the overall cost of a project, reducing manpower onboard and slowing down work flow. Subsequently, the surveyor is only capturing details of a specific area with 2-dimensional photos, sketches and basic measurements. In the following days, weeks and months, these notes are the only information available to recreate and discuss for the project. This paper reviews the current workflow for site survey and project development and shows proof how Laser Scanning reduces and minimizes human-error, safety, timelines and budgetary concerns.

This paper explores the advantages to Site Survey through traditional means and Laser Scanning; focusing on minimizing safety, timeline and budgetary concerns. A comparison of traditional means using measuring tapes, scaffolding and manpower and the FARO S150 Terrestrial Laser Scanner and a 1-man operator.

This paper seeks to answer the question: What will the effective cost savings, safety practices and efficiency be when using Laser Scanning, and subsequent 3-dimensional model, have on a project?

It is hoped this analysis and study will inform Naval Architects, Engineers, Shipyards and more about the usefulness, ease, efficiency and cost savings gained by using Laser Scanning on a project for the modification of an As-Built Structure.

Keywords: OJME, 8th Offshore Jack Up Middle East, Conference, Laser Scanning, FARO, LIDAR, Terrestrial, Oil and Gas, LNG, Modification, Site Survey, Safety

INTRODUCTION

The purpose of this article will be to conclude and justify that Laser Scanning is the preferred solution for modifications on an As-Built structure. Ensuring safer practices, less downtime, cost effectiveness and overall efficiency, Laser Scanning will better serve Naval Architects, Engineers and Shipyards.

1. Laser Scanning is a safer and more cost-effective tool for a Site Survey
2. Laser Scanning allows for less change of human-error in measuring, sketches and note-taking
3. Drawings, renderings and models are all deliverables from Laser Scanning
4. Laser Scanning allows for a 'reference point in time' to be placed for future comparison

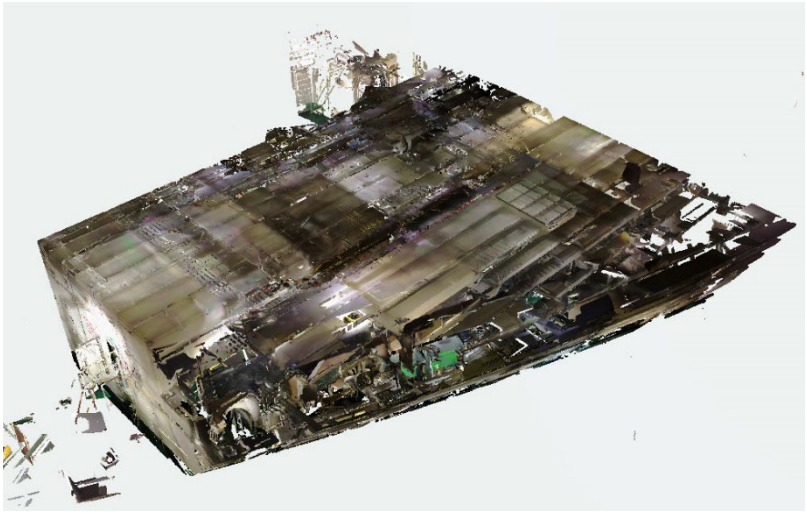

Figure 1: Point Cloud of LNG Vessel

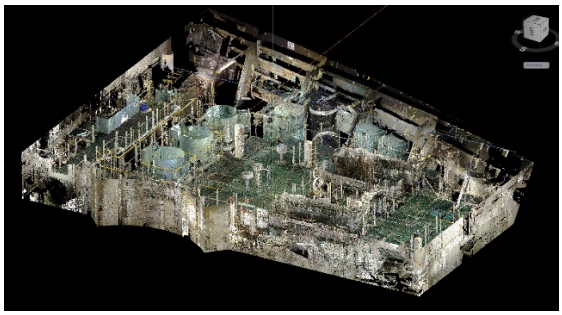

Figure 2: LNG Space – Rerouting Piping Systems

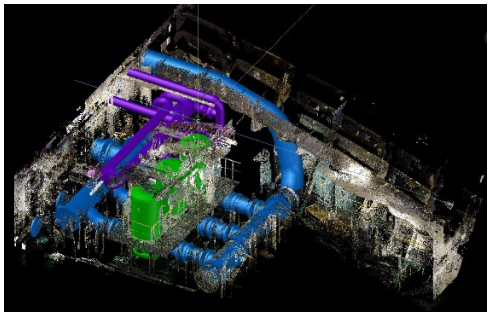

Figure 3: LNG Space – With Intelligent Piping

METHODOLOGY

Analysis of current practices of Site Surveying versus Laser Scanning practices for Site Survey, with the added caveat of sketches versus 3-D point cloud with modeling capability.

RESULTS

Laser Scanning offered a considerable cost savings to the Project. Safety concerns with traditional surveys required more personnel, equipment and secondary structures. Laser Scanning also allowed for more data capture with less

time required on site. Also, the transfer of data from point cloud to CAD software allowed for better and more accurate measurements and ease in creating 3-dimensional models. Lastly, the ability to use the 3-D Point Cloud and continue to take measurements and conclude new findings for future projects, proved that revisiting the site was unnecessary.

CONCLUSION

Laser Scanning is the new technologies that have proven cost effectiveness, safety and efficiency. This allows for faster preparation, faster planning, faster production and faster conclusion to projects, at a cost savings and for safety of personnel.