

T. GAO, B. AKINCI, S. ERGAN, J. GARRETT. **Constructing as-is BIMs from progressive scan data.** *Gerontechnology* 2012;11(2):75; doi:10.4017/gt.2012.11.02.500.00 **Purpose** Building Information Models (BIMs) have the potential to support various engineering applications (e.g., building energy analysis, renovation and retrofit planning, and facility management) in the facility operation phase. It is important to keep the information stored in as-is BIMs, accurate and up-to-date. Laser-scanning technology is able to capture the as-is geometric condition of a facility in a timely manner. Hence, the laser scan data can be used as the reference to construct an as-is BIM¹. However, due to the occlusions caused by furniture, machinery, and building components, a single laser scan might only capture a partial view of a facility, which limits the value of laser scan data in the construction of as-is BIMs. **Method** In order to overcome this limitation, we propose to perform multiple laser scans of a facility during the construction, renovation or retrofit processes, and fuse the laser scan data captured at different times to create as-is BIMs. The purpose of this paper is to develop a formal approach to evaluate and compare the progressive laser scan data, and identify the value of using progressive laser scan data to create an accurate (i.e., the as-is BIM represents the actual as-is geometric condition of the facility) and complete (i.e., the as-is BIM contains all the components required to be modeled for the facility) as-is BIM. **Results & Discussion** We conducted a case study to present the process of creating an as-is BIM from progressive laser scan data, and identified the tasks that could be automated. We selected a research lab that was recently renovated as the testbed. In the case study, we performed multiple laser scans during the renovation process of the research lab to capture the geometric information of the lab at different phases of the renovation process. Figure 1 shows examples of the progressive laser scan data of the research lab. We formally assessed the progressive laser scan data in terms of their geometric accuracy and the represented components. The results showed that the progressive laser scan data can be used to eliminate static occlusions introduced during the construction, renovation or retrofit processes, and can be used to generate a complete view of the facility that covers all visible (e.g., walls, ceilings, floors) and invisible (e.g., airducts, water pipes that are hidden behind the finished surfaces) components with accurate geometries.

References

1. Tang P, Anil EB, Akinci B, Huber D. Efficient and Effective Quality Assessment of As-is Building Information Models and 3D Laser-scanned Data. Proceedings of the 2011 ASCE International Workshop on Computing in Civil Engineering; 2011; doi:10.1061/41182(416)60

Keywords: information technology, progressive laser scanning, as-is BIM

Affiliation: Carnegie Mellon University, Pittsburgh, PA, USA; E: tgao@andrew.cmu.edu

Full paper: doi:10.4017/gt.2012.11.02.500.685



Figure 1a. Laser scan data captured in May



Figure 1b. Laser scan data captured in June



Figure 1c. Laser scan data captured in July



Figure 1d. Laser scan data captured in August

Figure 1. The progressive laser scan data of the research lab