

ABSTRAK

KAJIAN KETELITIAN HASIL PENGUKURAN LIDAR TLS100 PRODUKSI POTRETUDARA MENGGUNAKAN METODE *CLOUD TO CLOUD* DAN *TARGET TO TARGET* (STUDI KASUS : BANGUNAN KANTOR BAZNAS PROVINSI LAMPUNG)

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Teknologi *Terrestrial Laser Scanner* (TLS) berperan penting dalam survei dan pemodelan 3D bangunan. Salah satu inovasi lokal, TLS100 dari Potretudara, menawarkan keunggulan biaya dan portabilitas. Namun, akurasi pengukurannya perlu dikaji lebih lanjut. Penelitian ini bertujuan mengevaluasi ketelitian TLS100 dengan membandingkan dua metode registrasi *point cloud*: *Cloud to Cloud* (C2C) dan *Target to Target* (T2T). Sebagai pembanding, digunakan data referensi *Total Station* dengan lokasi studi di Gedung Kantor BAZNAS Provinsi Lampung.

Pengambilan data dilakukan pada 28 titik berdiri alat dengan jarak antar posisi 8 meter. Tahapan pemrosesan data meliputi kalibrasi, segmentasi, registrasi, dan analisis geometris. Evaluasi ketelitian mencakup lima parameter utama, yaitu kerapatan *point cloud*, uji *Root Mean Square* (RMS) registrasi, dan validasi posisi *Independent Check Points* (ICP). Selain itu, dilakukan pengujian volumetrik sesuai standar ASTM D6172-98 serta uji ketelitian peta mengacu pada SNI 8202:2019.

Hasil penelitian menunjukkan metode T2T lebih akurat dibandingkan C2C. Walaupun C2C menghasilkan kerapatan poin lebih tinggi, metode T2T lebih presisi dengan RMS registrasi 5,03 cm dan RMSE global 0,0908 m. Sebaliknya, metode C2C memiliki RMS 8,36 cm dan RMSE global 0,1304 m. Pada analisis volume, hanya T2T yang memenuhi toleransi ASTM (<2%) dengan deviasi 1,51%, sedangkan C2C mencapai 8,05%. Berdasarkan SNI 8202:2019, T2T juga unggul dengan ketelitian horizontal 0,13 m dan vertikal 0,06 m. Dengan demikian, metode T2T lebih direkomendasikan untuk pemodelan 3D menggunakan TLS100.

Kata kunci: TLS100, *Point cloud*, *Cloud to Cloud*, *Target to Target*, Registrasi,

ABSTRACT

AN ACCURACY STUDY OF TLS100 LIDAR MEASUREMENT RESULTS PRODUCED BY POTRETUDARA USING CLOUD TO CLOUD AND TARGET TO TARGET METHODS (CASE STUDY: BAZNAS PROVINCIAL OFFICE BUILDING, LAMPUNG)

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Terrestrial Laser Scanner (TLS) technology plays a pivotal role in surveying and 3D building modeling. A local innovation, the TLS100 by Potretudara, offers advantages in cost and portability; however, its measurement accuracy requires further assessment. This study aims to evaluate the accuracy of the TLS100 by comparing two point cloud registration methods: Cloud to Cloud (C2C) and Target to Target (T2T). Total Station data served as the reference for the case study conducted at the BAZNAS Office Building in Lampung Province. Data acquisition was performed at 28 scan stations with an 8-meter interval between positions. Data processing stages included calibration, segmentation, registration, and geometric analysis. The accuracy evaluation encompassed five key parameters: point cloud density, Root Mean Square (RMS) registration error, and position validation using Independent Check Points (ICP). Furthermore, volumetric testing was conducted in accordance with the ASTM D6172-98 standard, along with map accuracy testing referring to SNI 8202:2019. The results indicate that the T2T method is more accurate than C2C. Although C2C yielded a higher point density, the T2T method demonstrated greater precision with a registration RMS of 5.03 cm and a global RMSE of 0.0908 m. In contrast, the C2C method resulted in an RMS of 8.36 cm and a global RMSE of 0.1304 m. In the volumetric analysis, only T2T met the ASTM tolerance ($<2\%$) with a deviation of 1.51%, whereas C2C reached 8.05%. Based on SNI 8202:2019, T2T also demonstrated superior performance with a horizontal accuracy of 0.13 m and a vertical accuracy of 0.06 m. Consequently, the T2T method is recommended for 3D modeling using the TLS100.

Keywords: TLS100, Point cloud, Cloud to Cloud, Target to Target, Registration,