INTISARI

MIF'AL BAGUS PRASETYO, 2025. *Evaluasi Akurasi Geometri Model Building Information Modeling Gedung Daruslan Berdasarkan Data Point Cloud* (Dibimbing oleh Ika Rahmawati Suyanto, S.T., M.Eng.)

Perkembangan teknologi konstruksi telah mendorong integrasi *Building Information Modeling* (*BIM*) dan *point cloud* sebagai metode representasi geometri bangunan secara presisi. Gedung Daruslan dipilih sebagai objek studi untuk mengevaluasi akurasi model *BIM* berbasis data *point cloud* sekunder. Penelitian ini bertujuan menilai sejauh mana model *BIM* dapat merepresentasikan kondisi fisik bangunan secara akurat melalui validasi statistik.

Penelitian ini menggunakan data *point cloud* sekunder hasil pemindaian *Terrestrial Laser Scanner* (*TLS*), serta data primer berupa pengukuran lapangan menggunakan distometer. Pemodelan dilakukan menggunakan Autodesk Revit, sedangkan analisis statistik dilakukan di Microsoft Excel. Evaluasi akurasi dilakukan dengan perhitungan *Root Mean Square Error* (*RMSE*) dan uji-*t* berpasangan terhadap 30 titik sampel yang dipilih melalui metode *stratified random sampling* berbasis spasial.

Hasil menunjukkan bahwa data *point cloud* memiliki presisi tinggi (*points < 6 mm* sebesar 98,7%; *balance* 49,8%) dengan nilai *RMSE* sebesar 4,42 mm. Model *BIM* yang dihasilkan memiliki akurasi geometri dengan *RMSE* sebesar 20,36 mm, yang sesuai dengan kriteria *Level of Accuracy* 20 (*LoA20*). Uji-*t* menunjukkan tidak terdapat perbedaan signifikan antara dimensi model, *point cloud*, dan pengukuran lapangan. Temuan ini membuktikan bahwa data sekunder dapat diandalkan untuk pemodelan *BIM* dan dokumentasi digital bangunan, serta mendukung pengembangan *digital twin* infrastruktur.

Kata Kunci: *Building Information, Modeling*, *point cloud*, validasi geometri, RMSE, uji statistik.

ABSTRACT

MIF'AL BAGUS PRASETYO, 2025. *Evaluation of Geometric Accuracy of Building Information Modeling Model of Daruslan Building Based on Point Cloud Data (Supervised by Ika Rahmawati Suyanto, S.T., M.Eng.)*

The advancement of construction technology has encouraged the integration of Building Information Modeling (BIM) and point cloud as a precise method for representing building geometry. The Daruslan Building was selected as the case study to evaluate the geometric accuracy of a BIM model generated from secondary point cloud data. This research aims to assess how accurately the BIM model reflects the physical condition of the building through statistical validation.

This study utilizes secondary point cloud data acquired using a Terrestrial Laser Scanner (TLS), along with primary data obtained through field measurements using a distometer. The BIM model was created using Autodesk Revit, while statistical analysis was conducted in Microsoft Excel. Accuracy evaluation involved calculating the Root Mean Square Error (RMSE) and conducting a paired t-test on 30 sample points selected using a spatially based stratified random sampling method.

The results indicate that the point cloud data has high spatial precision (points < 6 mm at 98.7%; balance at 49.8%) with an RMSE of 4.42 mm. The resulting BIM model achieved a geometric accuracy with an RMSE of 20,36 mm, corresponding to Level of Accuracy 20 (LoA20). The paired t-test showed no significant difference between the dimensions of the BIM model, point cloud, and field measurements. These findings confirm that secondary data can be reliably used for BIM modeling and digital building documentation, as well as for supporting infrastructure digital twin development.

***Keywords**: Building Information Modeling, point cloud, geometry validation, RMSE, statistical test*