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The Investigation of Accuracy of 3 Dimensional Models Generated From Point Clouds with Terrestrial Laser Scanning

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In Terrestrial laser scanning (TLS) applications, it is necessary to take into consideration the conditions that affect the scanning process, especially the general characteristics of the laser scanner, geometric properties of the scanned object (shape, size, etc.), and its spatial location in the environment. Three dimensional models obtained with TLS, allow determining the geometric features and relevant magnitudes of the scanned object in an indirect way. In order to compare the spatial location and geometric accuracy of the 3-dimensional model created by Terrestrial laser scanning, it is necessary to use measurement tools that give more precise results than TLS. Geometric comparisons are performed by analyzing the differences between the distances, the angles between surfaces and the measured values taken from cross-sections between the data from the 3-dimensional model created with TLS and the values measured by other measurement devices

The performance of the scanners, the size and shape of the scanned objects are tested using reference objects the sizes of which are determined with high precision. In this study, the important points to consider when choosing reference objects were highlighted. The steps up to processing the point clouds collected by scanning, regularizing these points and modeling in 3 dimensions was presented visually. In order to test the geometric correctness of the models obtained by Terrestrial laser scanners, sample objects with simple geometric shapes such as cubes, rectangular prisms and cylinders that are made of concrete were used as reference models. Three dimensional models were generated by scanning these reference models with Trimble Mensi GS 100. The dimension of the 3D model that is created from point clouds was compared with the precisely measured dimensions of the reference objects. For this purpose, horizontal and vertical cross-sections were taken from the reference objects and generated 3D models and the proximity of these models to the real objects were determined by measuring the lengths of these cross-sections. As a result of the investigations, for each of reference objects, it was observed that the length values gathered from the reference objects and the models were consistent within the limits of the measurement accuracies of the used tools. According to the results obtained by this study, the values that are gathered through the model which is the end-product were fairly close to reality.