



[Volume XXXVIII-5/W12](#)

Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XXXVIII-5/W12, 283-288, 2011
www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XXXVIII-5-W12/283/2011/
doi: 10.5194/isprsarchives-XXXVIII-5-W12-283-2011
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AUTOMATIC RECOGNITION OF PIPING SYSTEM FROM LARGE-SCALE TERRESTRIAL LASER SCAN DATA

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Keywords: Laser scanning, Point clouds, As-built model, Piping system, Normal tensor, Connection relationship

Abstract. Recently, changes in plant equipment have been becoming more frequent because of the short lifetime of the products, and constructing 3D shape models of existing plants (as-built models) from large-scale laser scanned data is expected to make their rebuilding processes more efficient. However, the laser scanned data of the existing plant has massive points, captures tangled objects and includes a large amount of noises, so that the manual reconstruction of a 3D model is very time-consuming and costs a lot. Piping systems especially, account for the greatest proportion of plant equipment. Therefore, the purpose of this research was to propose an algorithm which can automatically recognize a piping system from terrestrial laser scan data of the plant equipment. The straight portion of pipes, connecting parts and connection relationship of the piping system can be recognized in this algorithm. Eigenvalue analysis of the point clouds and of the normal vectors allows for the recognition. Using only point clouds, the recognition algorithm can be applied to registered point clouds and can be performed in a fully automatic way. The preliminary results of the recognition for large-scale scanned data from an oil rig plant have shown the effectiveness of the algorithm.

[Conference Paper](#) (PDF, 1064 KB)

Citation: Kawashima, K., Kanai, S., and Date, H.: AUTOMATIC RECOGNITION OF PIPING SYSTEM FROM LARGE-SCALE TERRESTRIAL LASER SCAN DATA, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XXXVIII-5/W12, 283-288, doi: 10.5194/isprsarchives-XXXVIII-5-W12-283-2011, 2011.

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