Automatic extraction of poles from terrestrial laser scanning data of electrical substation sites

Mostafa Arastounia¹, Derek D. Lichti¹

¹Department of Geomatics Engineering, University of Calgary

According to the US Department of Energy, the electricity distribution system nowadays is approximately 98% reliable. However, power outages and interruptions still take place and last from seconds to hours. Power outages are very expensive as, for instance, they cost the USA Government $150 billion annually. According to a survey carried out in the USA in the 1990s, wildlife is the third primary reason of the power outages after natural disasters and human factor. This can be avoided by insulating the conductive elements of electrical substations with non-conductive covers. To manufacture such custom-built covers, the precise dimensions of the electrical components are required, which require a 3D as-built model of the sites. This research is aimed at developing automated methods to recognize objects from electrical substation point clouds in support of 3D model generation. This paper proposes a novel methodology to automatically extract poles in electrical substations. Poles are recognized based on their physical shape and their cross sectional patterns. Two datasets acquired at an electrical substation site located in Airdrie, north of Calgary, Canada, were utilized in this paper. They were acquired with different instruments: a Leica HDS 6100 and a Faro Focus 3D. The two point clouds have the same configuration, but different point sampling (58 million and 4 million points for the Leica and Faro scanner, respectively) so that the performance of the developed algorithm is assessed for both well- and poorly-sampled datasets. The achieved results indicate that all poles in two datasets are successfully recognized.