3D point cloud model of Cambridge University's 'Moller Centre' created with Pointools software

MANAGING POINT CLOUDS AS A FUNDAMENTAL DATA TYPE

AS POINT CLOUDS PROCESSING BECOMES AN INTEGRAL PART OF INFRASTRUCTURE WORKFLOWS, FROM PLANNING AND DESIGN TO CONSTRUCTION AND OPERATIONS, RICHARD ZAMBUNI AND BENOIT FREDERICQUE REVIEW THE WAY IN WHICH SOFTWARE AND TECHNOLOGY TOOLS ARE ENABLING THE TRANSFORMATION

Advances in laser technology during the past decade, driven by the need for accurate 3D as-built information, have resulted in the impressive rise of a new data type: point clouds. These advances have led to a substantial reduction in the weight, size, and price of laser scanners while improving the quality of data generated.

In the meantime, positioning devices such as GPSs and IMUs (Inertial Measurement Units) have enabled the use of scanners on mobile platforms such as aircraft, cars, and even boats and bikes (for example, Google cars). This means that most infrastructure today can be surveyed with this type of sensor and, consequently, can be represented in a 3D point cloud.

Lifecycle relevance

Having access to reliable and accurate as-built records, especially in the field, is key to improving the sustainability of infrastructure. Indeed, while planning and designing, project teams need to understand the context perfectly (what is the terrain like, what other infrastructure is in the area, where precisely is it located, and so on). During the construction process it is also crucial to ensure consistency between what is built and what was designed. And last but not least, operating and maintaining assets requires the combination of rich asset information and accurate field information.

Surveying and beyond

Point clouds are leveraged in different ways across the infrastructure lifecycle. The first and most obvious usage is to employ point clouds as a fast, accurate, and secure mapping or land surveying technique. It is impressive to see the level of automation that can be achieved with aerial LiDAR data.

Figure 2 shows a point cloud acquired via an aerial platform with automatically extracted and textured 3D buildings. The automatic processing was performed using TerraScan and TerraPhoto products from Terrasolid. Both products run as extensions to Bentley's MicroStation V8i.

Surveying using point clouds can also be achieved at the terrestrial scale. Fig.3 shows how a coloured point cloud can be used to extract the edge of a sidewalk using the flashlight/dynamic sectioning tool in Bentley Descartes (patent pending.)

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In next month's issue we will be exploring other important uses for point clouds, as well as developments that are furthering their practical application.

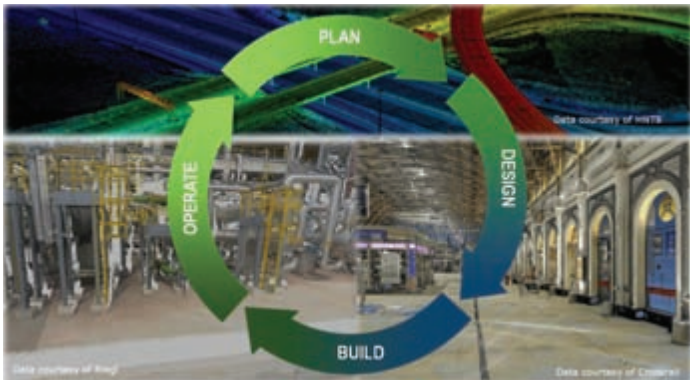

Fig.1: Point clouds assist infrastructure professionals in every step of the infrastructure lifecycle

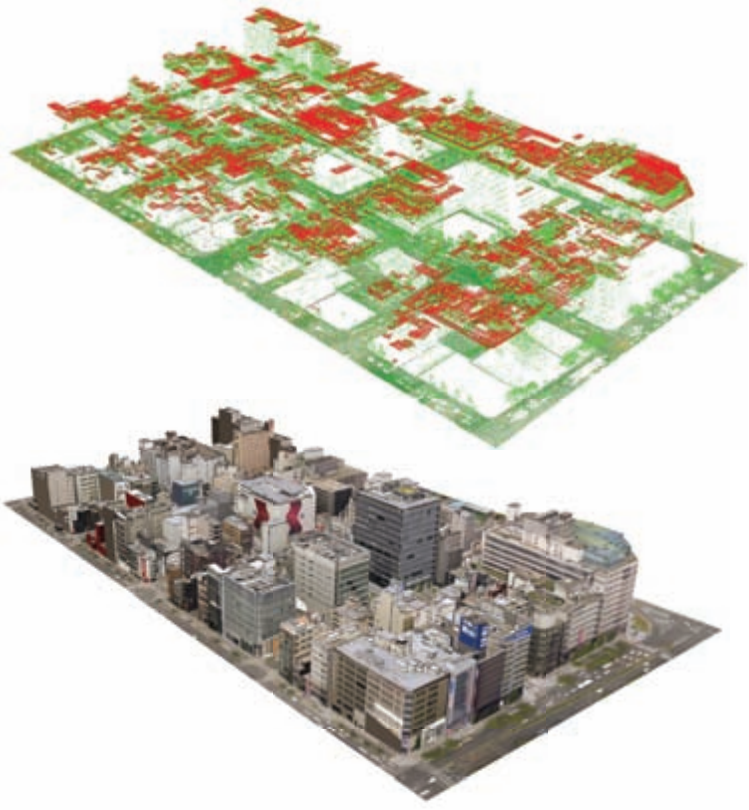

Fig.2: Automated extraction and texturing of 3D buildings using TerraScan and TerraPhoto (*data courtesy of Nakanihon Air Service*)

Fig.3: Dynamic sectioning in Bentley Descartes for land surveying (*data source www.libe57.org © 2010, McNiel Engineering*)