

Control of Highway and Railway Construction and Repairs Using Terrestrial Laser Scanning

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In the course of the regular city highways construction and repair it is very important to control the quality of the work fulfilled by the contractors. Violation of construction techniques and economies in materials result in the rapid wear of the pavement and, thus, to the significant financial losses. The Siberian State Academy of Geodesy presents the techniques for the control of highways construction and repairs using terrestrial laser scanning. By far several kilometers of Novosibirsk streets have been surveyed by the given techniques.

For the purpose we use the car with the platform on its roof, which allows mounting a laser scanner on it. This results in the following:

1. The scanner is mounted high relative to the roadway to achieve better observability and reduce disturbances in scanning caused by the traffic.
2. The works are more efficient as the scanner may be moved from station to station by the car.

To transfer the scanning data into the unified system of coordinates the compilation survey of the site is conducted in the points to be saved for a long time. In cities the marks can be immured in buildings walls and foundations, the existing wall marks can be used as well.

As a result of the survey conducted by the specialists of SSGA the “points clouds” were produced for both the pavement and the surrounding objects (Fig. 1).

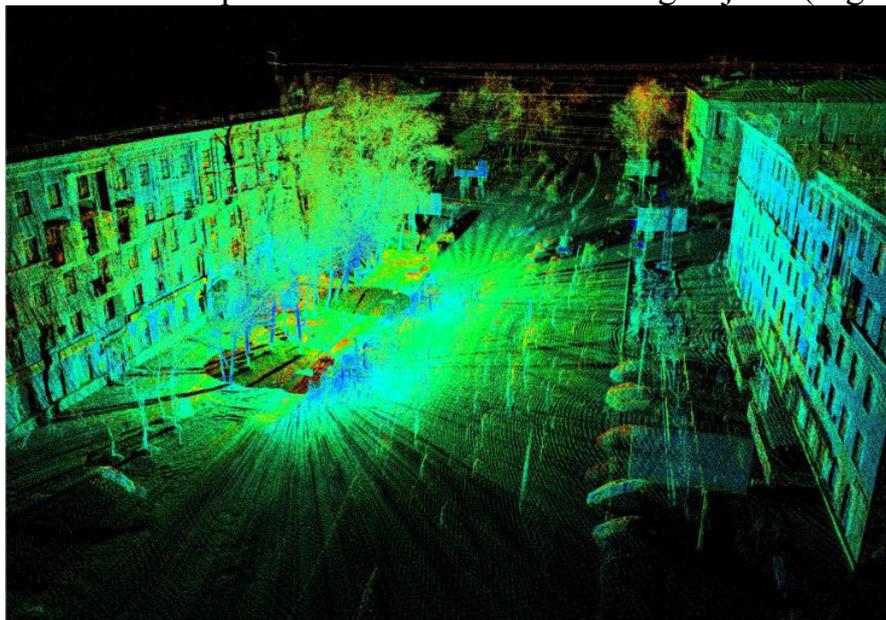


Figure 1: “The cloud of points” produced in the course of the roadway survey

The given clouds of points were then filtered to remove measurements of noise and those irrelevant to the pavement (Fig. 2).

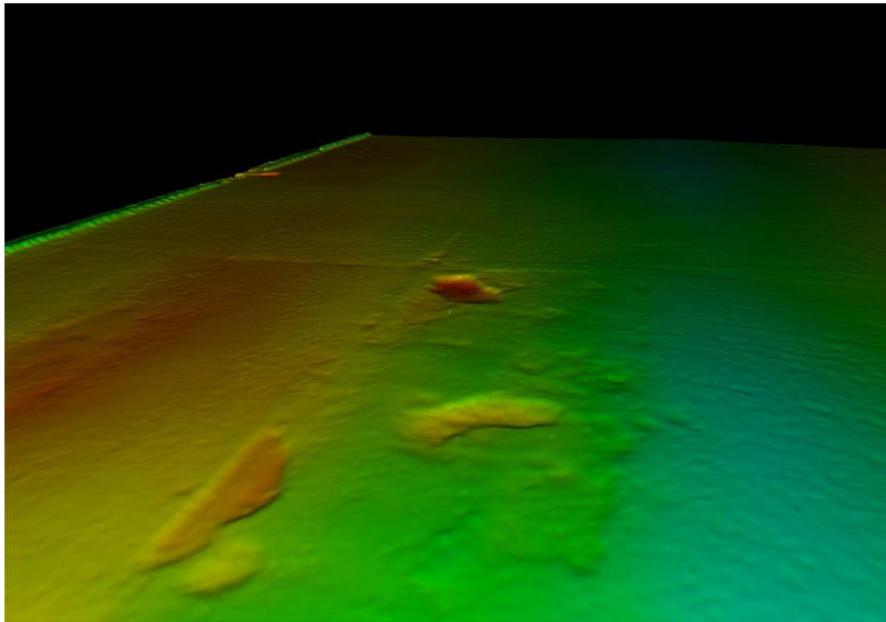


Figure 2: Model of the highway.

Filtration was made semiautomatically using special software. On the basis of the filtered “points cloud” the triangulation model of the road surface was developed. The model is used for:

1. Modelling the road surface and making sections (Fig. 3).
2. Estimating the volume of the conducted road repairs works (Fig. 4).

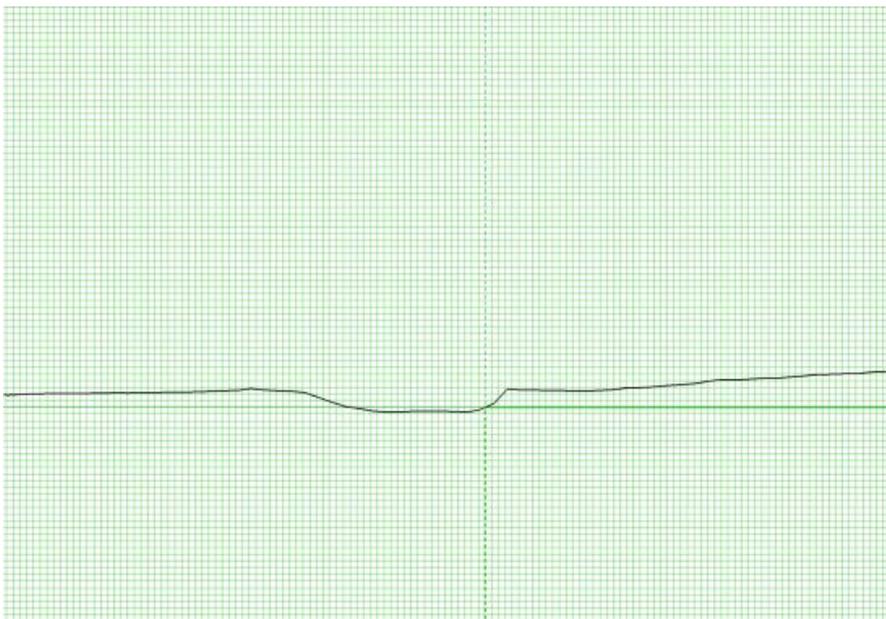


Figure 3: Road surface section

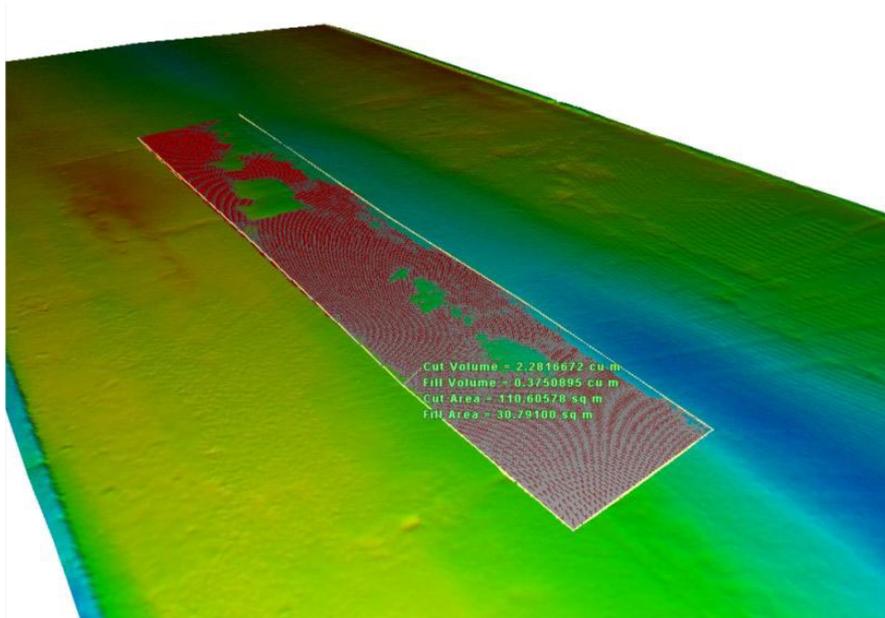


Figure 4: Estimation of the conducted road repairs volume

It should be noted that the road repairs volume may be estimated by several measurement cycles to be carried out at any stage of road building. Due to the advantages of laser scanning the presented techniques allow conducting accurate and prompt road improvement control (up to 1 – 4 km of road survey a day).

The above mentioned techniques may be applied to country roads and railways both for control and certification.

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