Summary

Introduction

The methodology and the relative instrumentations for the acquisition of metric information has been very slow changes in past centuries.

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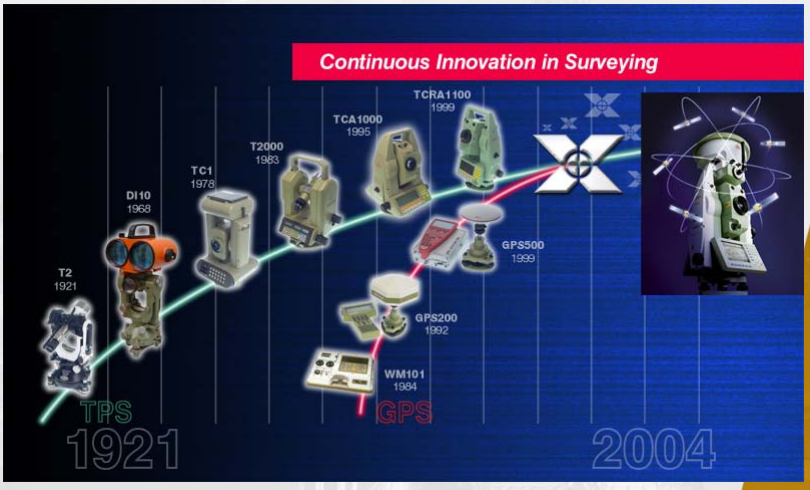
Developments technology applied to measuring instruments and data processing have led to significant changes and improvements in the topography over this century;

Introduction

- Total stations motorized
- Total stations robotic,
- Laser meters can measure long distances without prisms
- GPS receivers capable of measuring with millimetric precision

All this new technology, requires the punctual survey to measurement of entities materialized on the ground, with a long process of acquiring “point-by-point” to represent the objects.

Introduction



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Introduction

Development of equipment that uses 3D laser scanner sensors can measure thousands points per second, are a breakthrough for classic topography.

This new class of instruments is capable to release the survey of topographical detail by the single point measured, offering the possibility of obtaining in a few minutes a virtual reality linked to a classic three-dimensional reference system.

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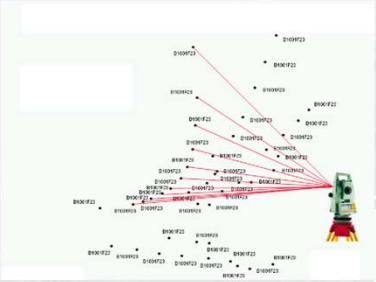
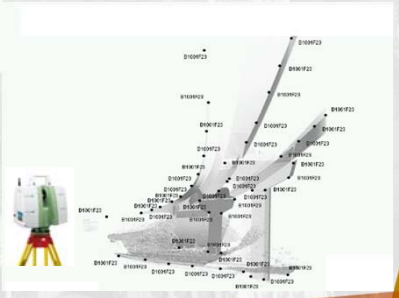
Introduction



Survey “point by point”



Survey with laser scanner 3D

Current methodology

Use of 3D laser scanner has certain practical problems:

- necessity to use targets for the registration of multiple stations;
- Mounting on topographical tripod
- The limited ground clearance that does not allow to acquire long-distance data
- necessity to integrate with traditional instrumentation for georeferenced survey

Project idea

The project idea, which originated from the previous analysis, is to combine two GNSS systems and 3D laser scanner installed on a vehicle.

- This system allows a rapid movement from one station to the next
- The goal of increasing as much as possible the scan range in the laser scanner 3D data
- complete the entire georeferenced survey
- precision in the positioning of the points detected by scanning in order to respect the centimeter tolerances of a good survey of topographic detail

Project idea

Carrying out

- first we have been installed the roof bars on a vehicle
- after we have mounted on a rear bars auto-leveling system designed specifically for this purpose
- on this systems system we have positioned the laser scanner 3D with fist GNSS receiver
- On front bars we have placed the laser scanner target with second GNSS receiver

Carrying out

Operation

For testing we have used:

- Laser scanner **Leica HDS C10**

this is a time of fly laser scanner
with dual axis compensator,
internal color camera, 300m of range

- GNSS **Leica GS15** with controller **Leica CS15**

Operation

- Using the auto-level systems that are mounted on roof bars, leveled laser scanner and the first GNSS receiver, and the target with the second GNSS receiver
- While the 3D laser scanning the area around the position, the receivers acquire measurements in "fast static" on GNSS satellite
- The time required for scanning of a single station is approximately 10-15 minutes

Operation

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Operation

At this point the vehicle is moved to the next position chosen for the second station of survey and proceed in the same way as the first, this procedure is repeated until completed of the survey (Stop & Go).

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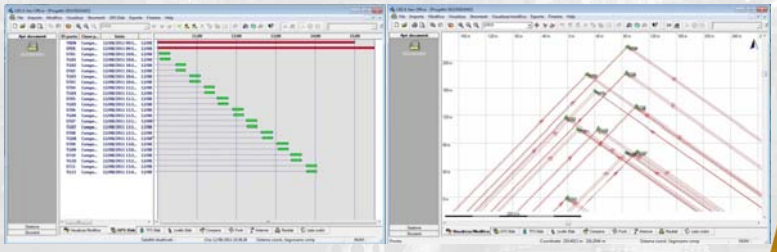
Post-processing

When back in the office we proceeded with development of GNSS observations with the Leica LGO software for 3D coordinates for all points of station (station laser scanners) and for all orientation target with sub centimeter precison.



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Post-processing

With software Leica Cyclone assign this coordinate at station and target in cloud point, and obtain global model without homologous points and without ground target.

This can to register individual scans that do not have points in common, and drastically reducing the processing time for obtain REGISTER cloud data

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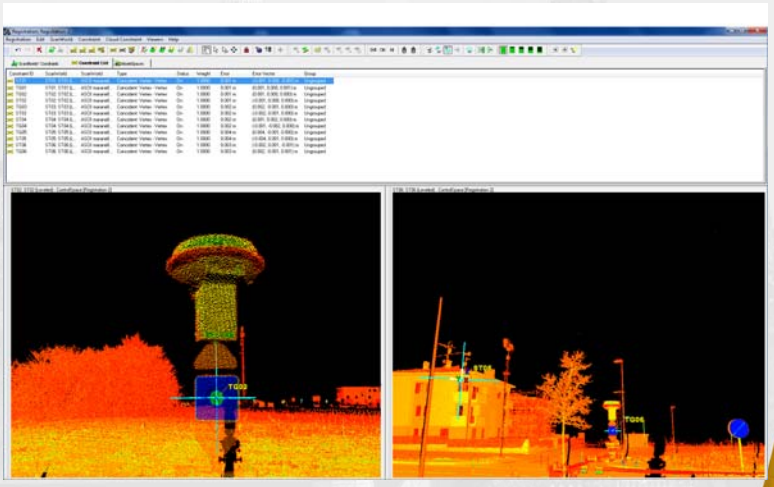
Post-processing



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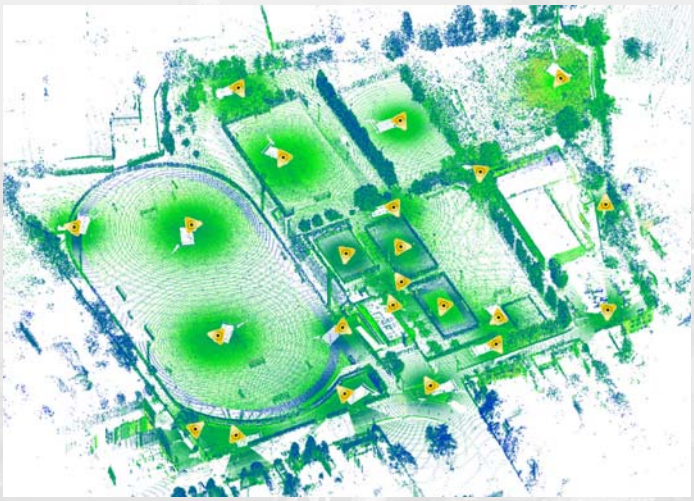
Post-processing



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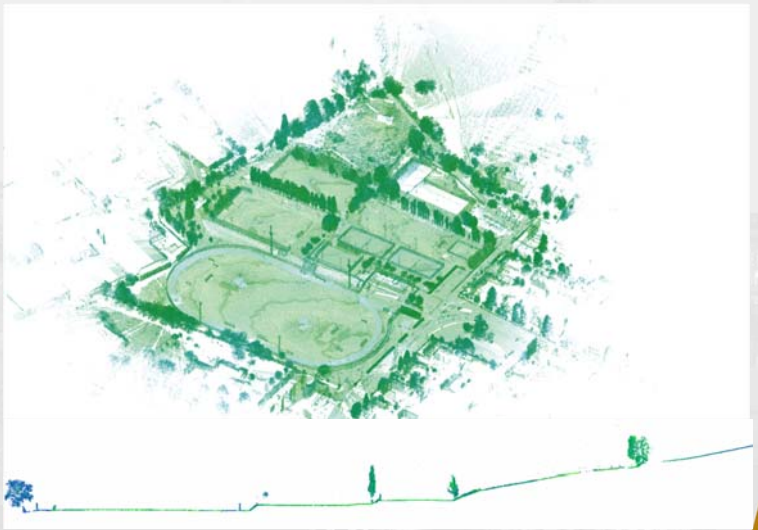
Conclusion

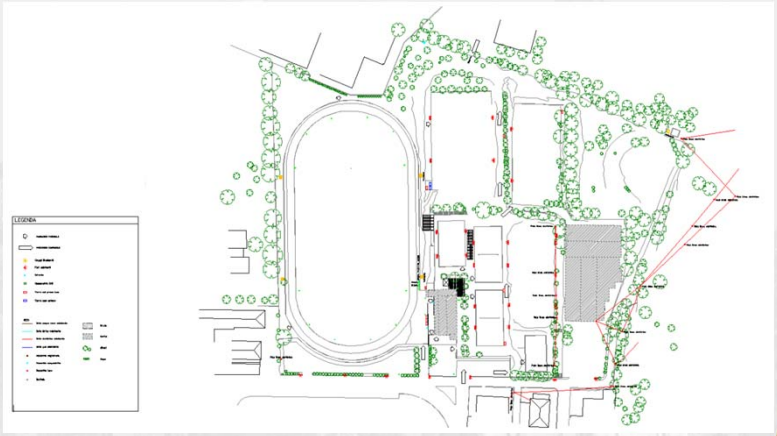
This new method of surveying the details, involves to significant benefits such as:

- Survey non-invasive, it is not necessary to physically reach the objects to be measured
- Completeness of information, the instrument detects everything is visible
- Time of survey extremely reduced and executed by a single person
- Timing to delivery reduced by to automatic georeferencing point clouds by integrating the GNSS sensors
- Mobility fast and easy thanks to the system is mounted on a vehicle

Conclusion



Conclusion



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Thank you for your attention.

For any further question, do not hesitate to contact us:

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