ADOPTICUM

TriSpector 1060 Gocator 2340 comparison

This document gives you a comparison of the TriSpector 1060 and the Gocator 2340. It is based on evaluation of the sensor performed by Stiftelsen Adopticum in a project financed by Kempestiftelserna. For more information about the sensor, please feel free to contact Adopticum.

Introduction

This is a document summarizing a comparison of the TriSpector 1060 and the Gocator 2340 laser triangulation smart sensors. The sensors have different specifications, which will not be discussed here. Instead, the point of this document is to evaluate when one sensor might be preferred over the other.

Equipment

The equipment used during testing was:

- TriSpector 1060 (to be evaluated), with power and connector cables from Sick AB.
- Adopticum's conveyor belt.
- Gocator 2340 (to be evaluated), with power and connector (rare/specific) cables from LMI Technologies (sent from Stemmer Imaging).
- Incremental encoder (attached to the conveyor belt). The conveyor belt moving distance and encoder ticks are related as: 0.015152 mm/ticks.
- Test objects for measurement accuracy testing:
    - Checkerboard:
        - Square_size: 23 mm x 23 mm
        - Number of square: 10*7
    - Lego shape (see Figure 1 below).
- Laptop with USB-LAN-port-cable.

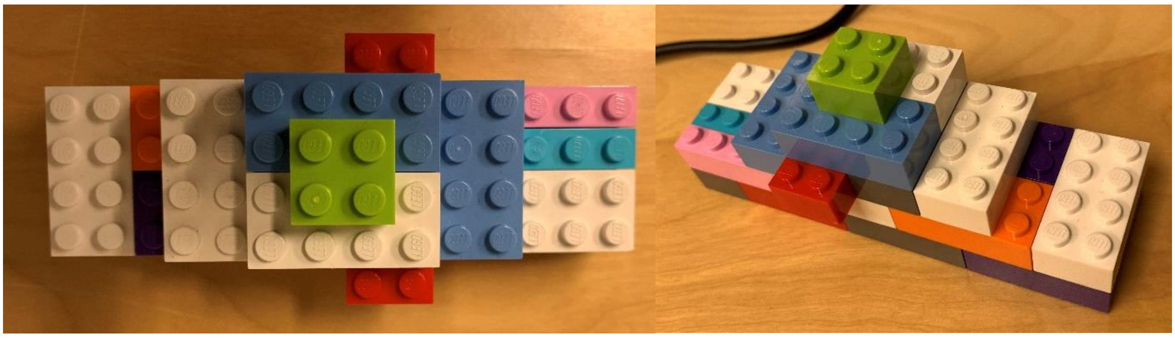

Figure 1: Lego shape used for creating a specific shape with building blocks with a set standardized size.

Comparison

The different models aren't directly comparable, since both have different versions made for different cases (larger field of view, higher accuracy, etc.). But Gocators tend to go more toward high precision and resolution, while TriSpectors looks like it is more suited for higher speeds. TriSpector 1060 can run at about 5000 profiles/second and during testing we could get close to that for the carrot measurement application. With the Gocator we got close to 1000 profiles/second in general, which depends heavily on the parameters that are set, particularly the region of interest.

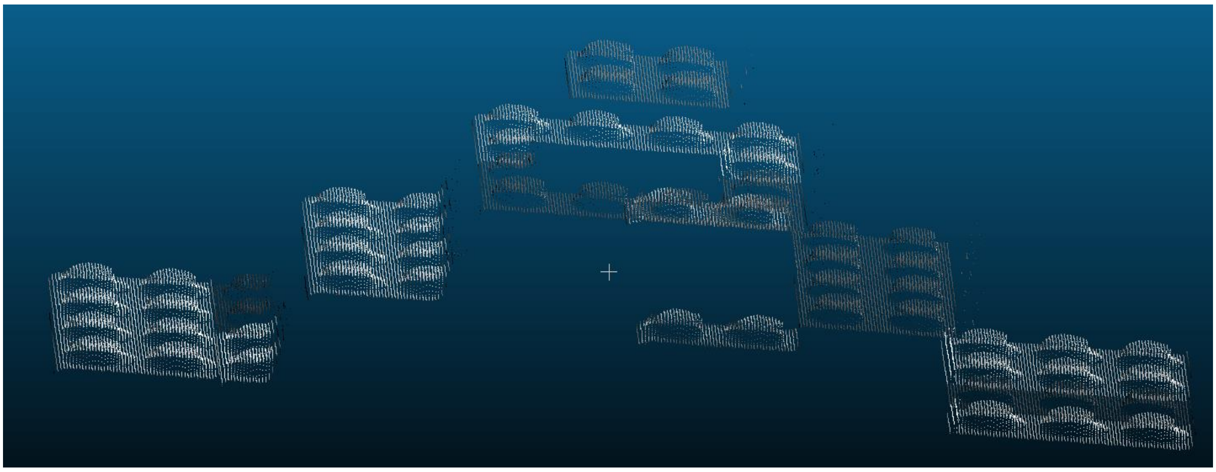

Figure 2: Lego object measured using a Gocator 2340.

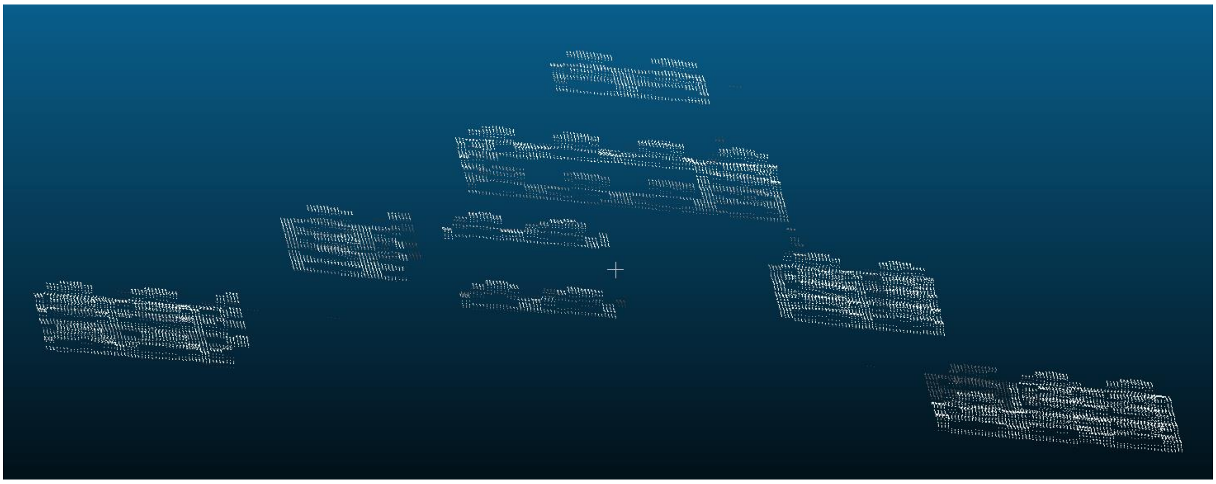

Figure 3: Lego object measured using a TriSpector 1060.

Toolset

The tools available for the Gocators can be used without programming experience to set up and test different tools and tailor a setup to your liking. For TriSpectors you might be able to find specific applications that you can buy from Sick AppSpace. Otherwise, you'd have to develop your own applications using the SDK available for the sensor. This SDK has a lot of data/image processing functionality available, but it requires that you can write (or learn to write) Lua scripts to make use of them, which can also be rather time consuming.

Transparency

Only the TriSpector was tested for measuring on transparent objects. It should be noted that there are Gocator models made specifically for measuring transparent objects, but this could not be tested with the available models at the testing time. Three examples of the data can be seen in Figure 5 - Figure 7 below. The sensor has three settings for choice of signal: Bottom, Top and Strongest. Using the different settings, the data for the disc can be acquired using a high enough exposure time. With Bottom signal the sensor measured parts of the conveyor belt under the disc, but not at all parts of the disc. Using Top signal gathers perhaps the most data on the surface of the disc, but it also results in more noise at the front of the disc that would need to be filtered. Using the Strongest signal gives measurement points across most of the disc, with some points missing, and with some nosie at the front of the disc, but noticeably less than when using the Top signal. Here the front of the disc means the part that is measured first when the disc passes the sensor's laser line, where reflections possibly cause the noise. During these tests the transparent surface always caused some problems that would have to be handled in a real measurement case, with either too few points or a lot of noise to handle.

Figure 4: Transparent disc to be used as a measurement object.

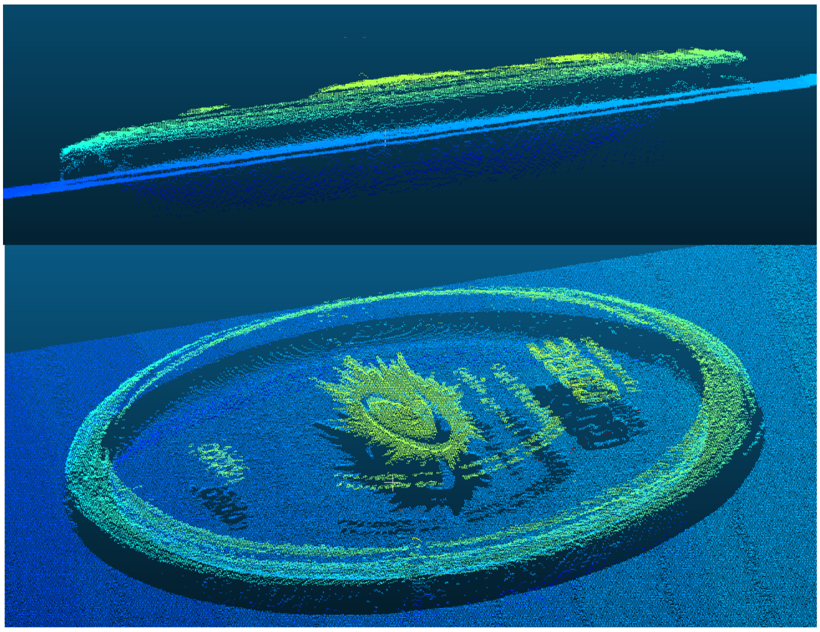

Figure 5: Transparent disc measured with a TriSpector 1060. Exposure time 920 µs. Bottom reflection used.

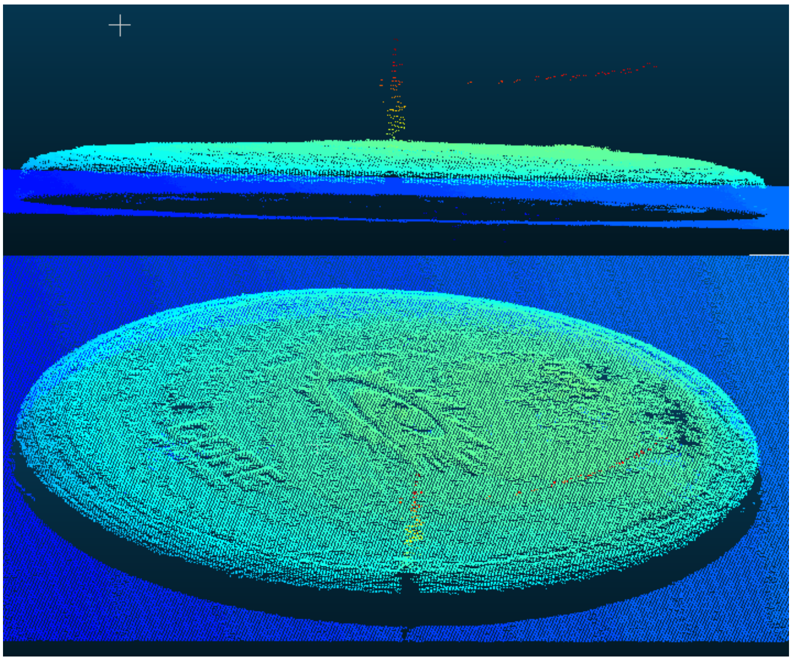

Figure 6: Transparent disc measured with a TriSpector 1060. Exposure time 920 µs. Strongest reflection used.

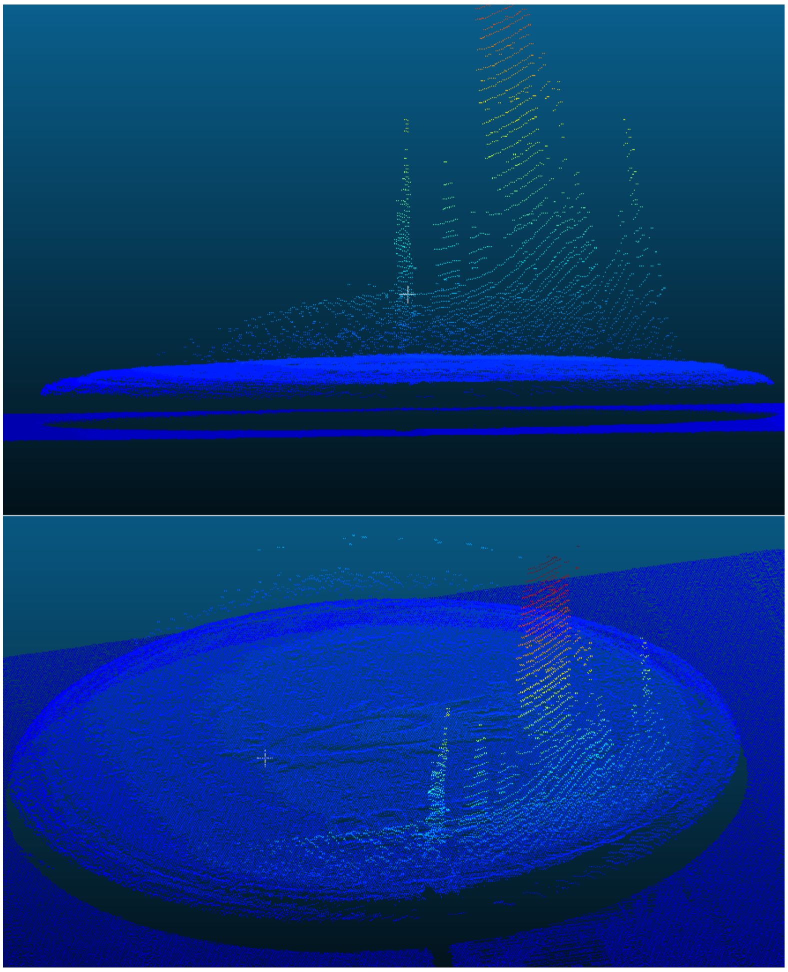

Figure 7: Transparent disc measured with a TriSpector 1060. Exposure time 920 µs. Top reflection used.

Summary

In general only two models of each sensor was used during this test period, meaning that there are other models of both suited for different measurement cases. But some points have been observed.

In general Gocator's accuracy seems to match the specification in the case that its precision is higher than the TriSpector. If precision and accuracy is the most important thing, choose a Gocator.

If speed is a concern, as in how many profiles per second the sensor can measure, then the TriSpector might be the best choice. It was easy to get fast profile rates (<5000) with a large field of view, while the Gocator needed to be configured properly to get between 1000-1500 profiles per second for a smaller field of view. The tools chosen will affect the analysis time for the images regardless of sensor choice so that is important to think about.

Only the TriSpector was used for measuring on transparent objects, the results show missing data points and noise being present. Perhaps it is possible to get better results with the right setup, but it would be interesting to test a Gocator model meant specifically for measuring transparent surfaces.

If the important thing is to get a solution working quickly, using profile or surface tools of the Gocator can be a good solution where the knowledge needed can be found in the manual for the sensor, available to anyone. For a TriSpector you might find an existing application that is plug and play, but otherwise you need to write Lua-scripts to make your own applications. This means that you get a lot of image processing functionality to tailor make an application as is seen fit, but it requires more experience and/or development time to do.

The price is comparable for both sensors: about 86 000 sek. However, the TriSpector needs an AppSpace license to use and/or develop applications for the sensor, resulting in a final pricetag of about 150 000 sek.

Other than taking these factors into consideration, the manuals and specifications for the sensors should be read before choosing the sensor for every measurement case.