The Effect of target intensity and target-instrument geometry on terrestrial laser scanner accuracy

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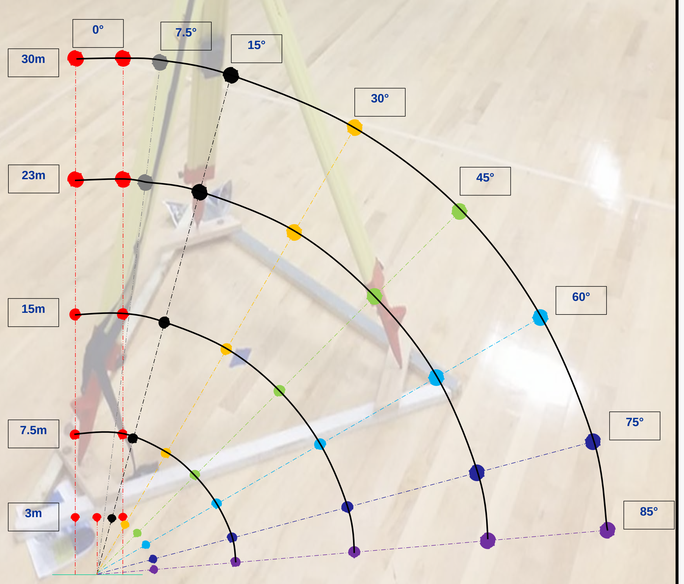
Purpose

- To understand how target color and target-instrument geometry effect noise levels

Methodology

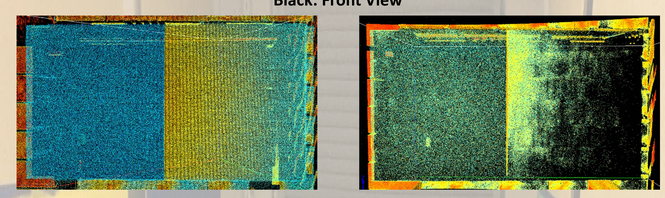
- All scans taken in the Penn State Wilkes Barre basketball court
- 43 scans taken from different distances and angles for each of the 8 pieces of plywood
- Each piece of plywood being a different color, and each color having been painted with two finishes (gloss and matte)
- Colors used: White, Grey, Black, Blue, Green, Yellow, Red, Brown



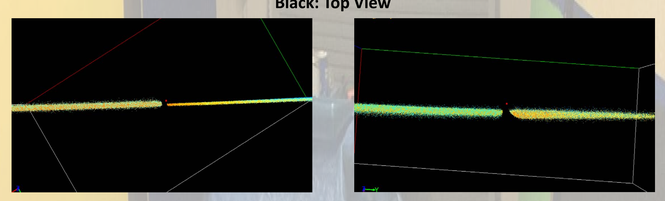
Point Clouds From Data Processing

15 meters 0 ° **3 meters 0°**

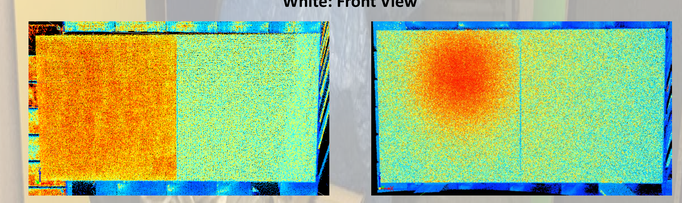
Black: Front View



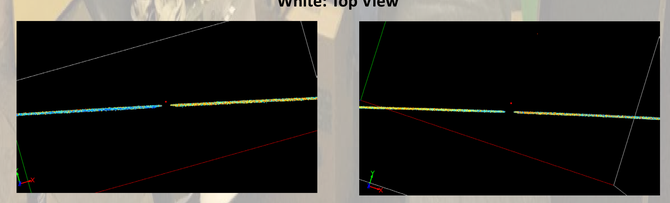
Black: Top View

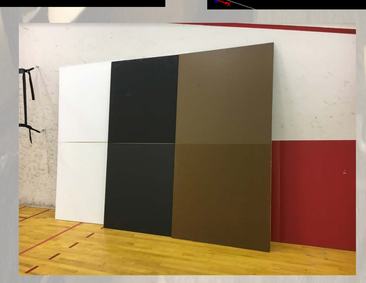


White: Front View



White: Top View





Conclusion

- Results show that the reflectivity of the target surface had a direct influence on the returned signal intensity
- Noise level is also affected by the color of the target as well as the target-instrument geometry

15m 0 degrees				
Board Color	Paint Type	Point Density (points/m^2)	STD Plane (m)	STD Quadratic (m)
White	Flat	106,316.88	0.0014	0.0013
	Gloss	106,777.18	0.0013	0.0013
Black	Flat	8,903.78	0.0073	0.0073
	Gloss	51,578.97	0.0017	0.0017

3m 0 degrees				
Board Color	Paint Type	Point Density (points/m^2)	STD Plane (m)	STD Quadratic (m)
White	Flat	2,709,297.18	0.0015	0.0015
	Gloss	2,140,214.78	0.0014	0.0014
Black	Flat	2,444.27	0.0074	0.0074
	Gloss	29,668.12	0.0019	0.0019

Continuing Work

- Process data collected from Leica P40 laser scanner and compare with data collected from Topcon GLS 1500

PennState Wilkes-Barre