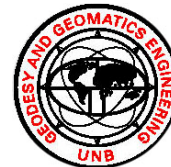


Terrestrial Laser Scanners – A First Look

98th Annual Conference
of the Canadian
Institute of Geomatics.
Ottawa, 2005

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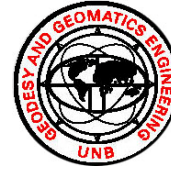


Purpose of Research

- Investigate
 - Usefulness
 - Potential Uses
- Test scans
- Data analysis
- Conclusions/recomendations

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History

- Theodore Maiman (1960) Hughes Research Laboratories

- 1st LASER made to operate

Light Amplification by Stimulated Emission of Radiation

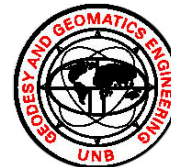


Modern Lasers:

"diode pumped lasers" or *"pulsed lasers"* emit focused light.

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3D Laser Scanner

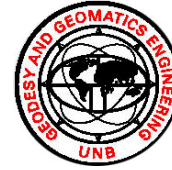
TRIMBLE MENSİ GS200



Motorized through 360° horizontal and 60° vertical
200 m optimized range
350 m OverScan™ capability
700 m addressability
Real time true-colour acquisition
Collect up to 5000 points per second.
Laser spot size 3 mm at 50 m.

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3D Laser Scanner

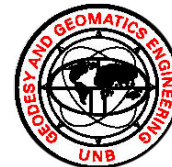
MENSI GS200

Standard deviation

Range (meters)	5	25	50	100	150	200
Typical values (millimeters)	1.4	1.4	1.4	2.5	3.6	6.5
Max. limit (mm)	3	3	3	4	6	10

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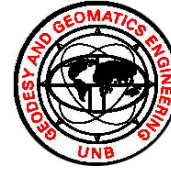


Scans Completed

- Apartment Building
- Military vehicle
- Christ Cathedral
- Dept laboratory

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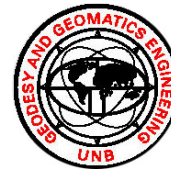


Apartment Block



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Dimensions

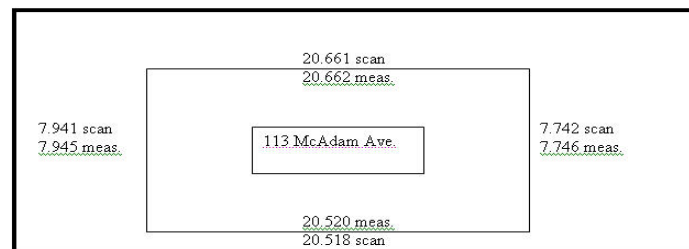
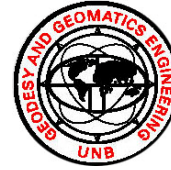


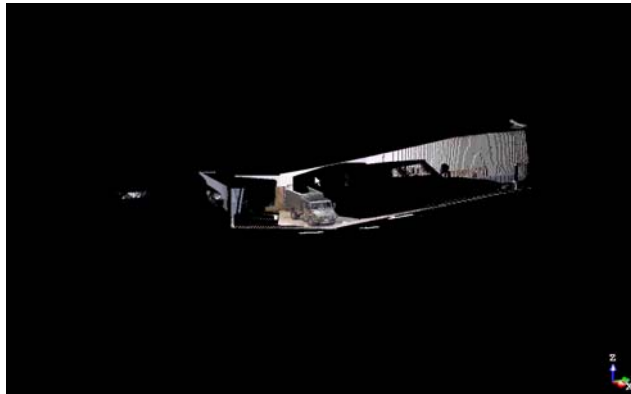
Figure 5.9
Apartment Dimensions

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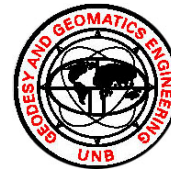


Military vehicle

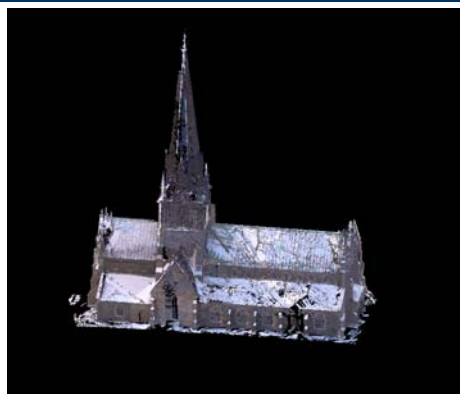


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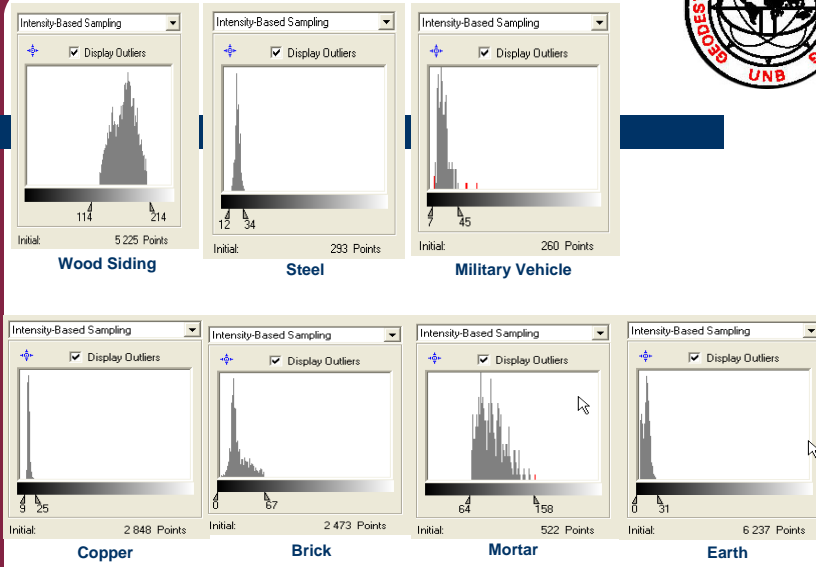
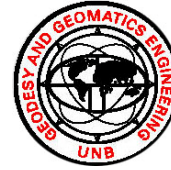
Christ Cathedral



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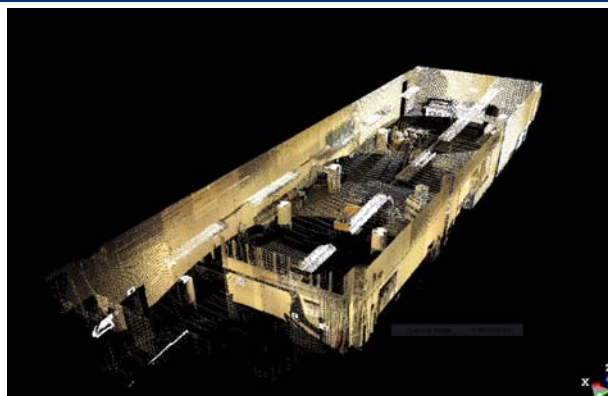
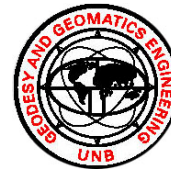
Histograms



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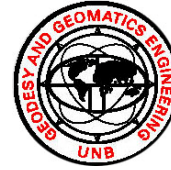
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Dept laboratory, A17



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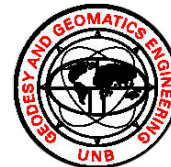


Horizontal Distance

Distance Compared To Coordinated Values					
Scan	P1 ->P2	P2 ->P3	Pillar to Pillar P3 ->P4	P4 ->P5	P5 ->P7
Station 1	5.013693302	3.505672735	4.279313077	5.892089601	12.08736226
Station 2	5.014972479	3.512350201	4.283147643	5.882086449	12.08581736
Station 3	5.013822656	3.504862842	4.278632871		
Station 4	5.013026685	3.505819111	4.277504324	5.887694168	12.08182174
Station 5	5.01933617	3.50738103	4.276707632	5.88005545	12.07390997
Mean	5.015 ± 0.003	3.507 ± 0.003	4.279 ± 0.002	5.885 ± 0.005	12.082 ± 0.006
4022	5.013 ± 0.000	3.504 ± 0.000	4.276 ± 0.000		
Diff	0.002	0.003	0.003		

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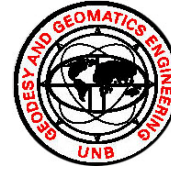


Repeatability

Target Repeatability							
Scan	T1 -> T2	Diff	T2 -> T3	Diff	T1 -> T3	Diff	
Station 1	10.768	-0.002	8.719	-0.001	18.423	-0.002	
Station 2	10.764	0.003	8.718	0	18.419	-0.002	
Station 4	10.769	-0.003	8.719	-0.001	18.423	-0.002	
Station 5	10.764	0.002	8.717	0.001	18.418	0.003	
Mean	10.766 ± 0.003		8.718 ± 0.001		18.421 ± 0.003		

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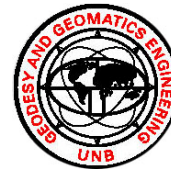


Range Test



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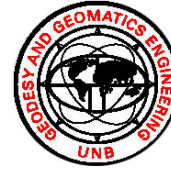


Conclusions

- Precision of 3 mm at 50 m within specifications
- Accuracy of 3 mm at 50 m
- Power is biggest problem
- On difficult surfaces, night-work provides better returns
- Ability to differentiate between materials

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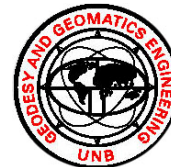


Potential

- Intensity Modeling
 - Material Identification
- Automated Surveys
 - As-Builts
- Kinematic Surveys
- Rapid mapping/database creation

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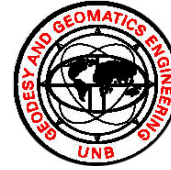


Thanks to:

- Trimble Corporation
- Cansel
- Leica Geosystems
- CIG New Brunswick Branch
- and...

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...to you for your time and attention.

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