

Laser Scanning—Registration Process: ReCap Pro® Vs Leica Cyclone®

Sliviu Stoian

Virtual Building Manager

Kelly Cone

Virtual Building Director

AUTODESK UNIVERSITY 2014

Join us on Twitter: #AU2014



Class summary

Registration and georeferencing are the most important aspects of a successful laser scanning project. No project enables you to capture the entire scope of work from a single vantage point; therefore, registration is one of the most critical steps in providing an accurate as-built to the client. There are several methods for capturing and registering point cloud data. This class performs a side-by-side registration comparison between ReCap Pro® software and Leica Cyclone®, one of the stronger point cloud processing software systems on the market. We will use the same data set to perform the cloud-to-cloud (C2C) registration. We will present the cloud to cloud registration workflows, compare registration results for various data sets, and rate the tools based on general and registration results criteria that we think are important.

AUTODESK UNIVERSITY 2014



Key learning objectives

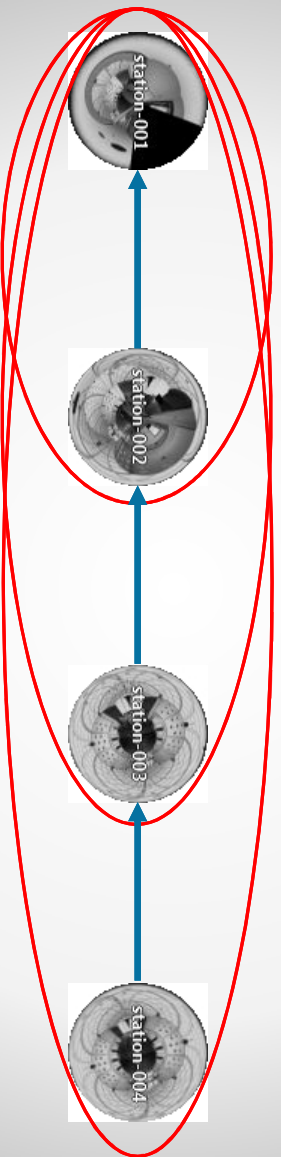
At the end of this class, you will be able to:

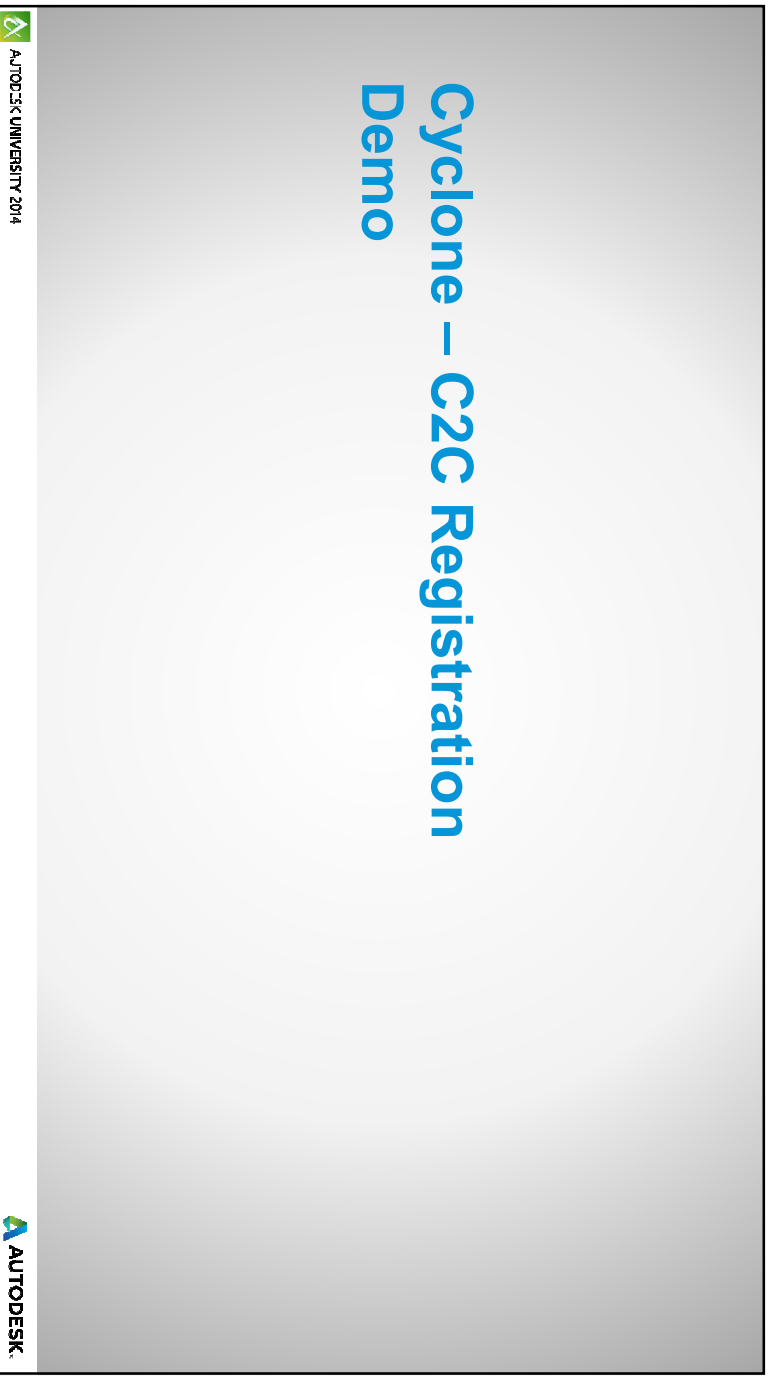
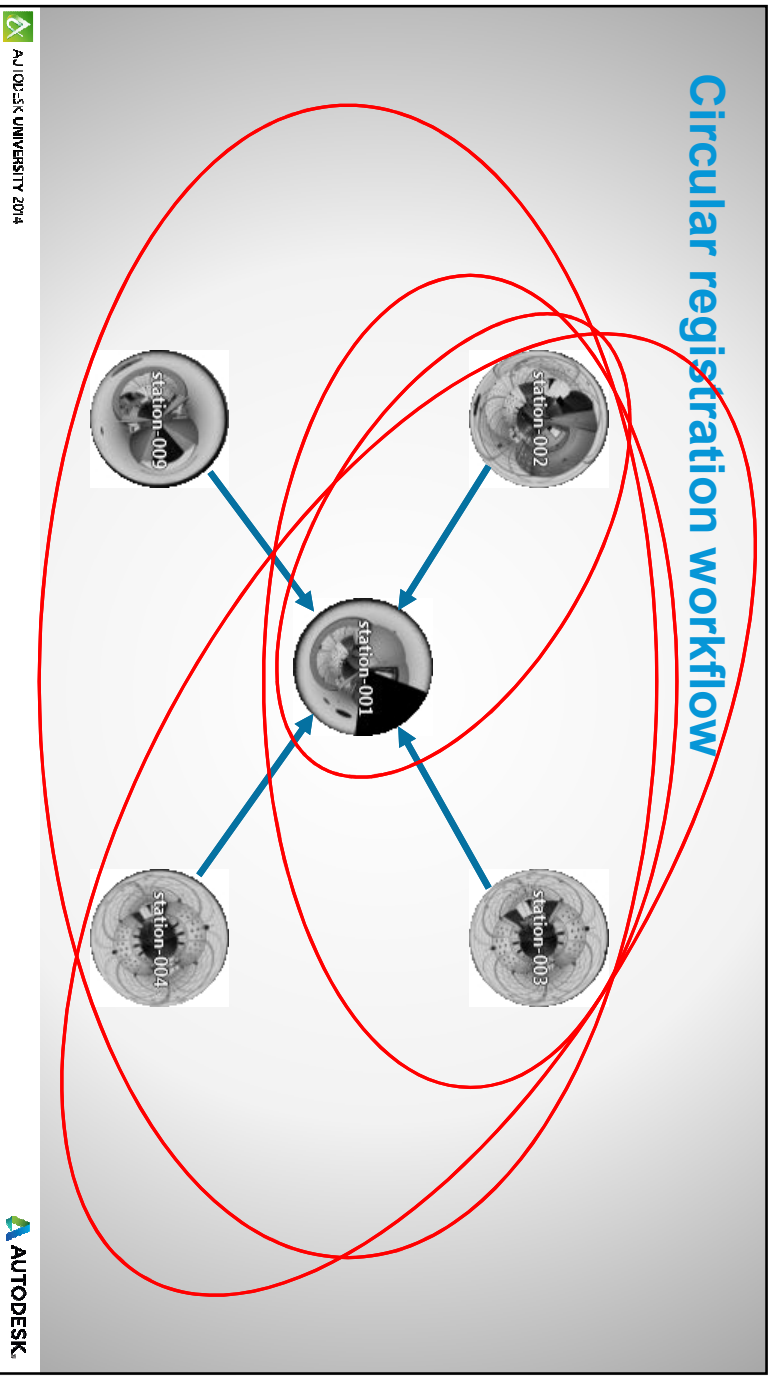
- Use ReCap Pro to C2C register scan data
- Use Cyclone to C2C register scan data
- Assess project registration results
- Determine which registration tool meets your project needs



ReCap Pro – C2C Registration Demo

Linear registration workflow





Registration Results

Data Sets – Project 1



Registration reports- Project 1

Status: VALID Registration

Mean Absolute Error:

For Enabled Constraints = 0.000 m

For Disabled Constraints = 0.000 m

Date: 2014.12.03 17:55:50

Database name : FUMC

Constraints
 Cloud/Mesh 30 station-14
 Cloud/Mesh 5 station-003
 Cloud/Mesh 7 station-006
 Cloud/Mesh 11 station-002
 Cloud/Mesh 11 station-002
 Cloud/Mesh 13 station-002
 Cloud/Mesh 14 station-002
 Cloud/Mesh 16 station-002
 Cloud/Mesh 17 station-003
 Cloud/Mesh 18 station-003
 Cloud/Mesh 18 station-003
 Cloud/Mesh 20 station-004
 Cloud/Mesh 21 station-004
 Cloud/Mesh 23 station-004
 Cloud/Mesh 24 station-004
 Cloud/Mesh 25 station-005
 Cloud/Mesh 27 station-005
 Cloud/Mesh 29 station-006
 Cloud/Mesh 31 station-008
 Cloud/Mesh 33 station-009
 Cloud/Mesh 34 station-011
 Cloud/Mesh 36 station-012
 Cloud/Mesh 38 station-003
 Cloud/Mesh 40 station-005
 Cloud/Mesh 41 station-006
 Cloud/Mesh 43 station-009
 Cloud/Mesh 44 station-011
 Cloud/Mesh 57 station-016
 Cloud/Mesh 100 station-086.p
 Cloud/Mesh 112 station-084.p
 Cloud/Mesh 114 station-086.p
 Cloud/Mesh 115 station-088.p
 Cloud/Mesh 119 station-089.p

registration data				target data	
scan name	overlap	balance	points < 6mm	Error	Error Vector
station-001	0.0%	0.0%	0.0%	0.000 m	aligned (0.008 m)
station-002	38.4%	57.7%	99.8%	0.000 m	aligned (0.009 m)
station-003	53.8%	76.7%	99.5%	0.000 m	aligned (0.010 m)
station-004	70.3%	74.2%	99.6%	0.000 m	aligned (0.011 m)
station-005	59.0%	63.9%	99.7%	0.000 m	aligned (0.009 m)
station-006	68.6%	52.1%	99.2%	0.000 m	aligned (0.009 m)
station-007	62.8%	47.2%	99.7%	0.000 m	aligned (0.008 m)
station-008	73.2%	65.2%	99.4%	0.000 m	aligned (0.012 m)
station-009	71.7%	36.1%	99.7%	0.000 m	aligned (0.009 m)
station-010	27.0%	87.4%	99.5%	0.001 m	aligned (0.013 m)
station-011	62.9%	41.5%	99.8%	0.001 m	aligned (0.013 m)
station-012	53.1%	62.7%	99.8%	0.000 m	aligned (0.012 m)
station-013	59.7%	76.7%	99.7%	0.000 m	aligned (0.016 m)
station-014	57.9%	51.1%	99.6%	0.004 m	aligned (0.008 m)
station-015	48.3%	36.1%	94.5%	0.000 m	aligned (0.005 m)
station-016	46.3%	37.8%	99.7%	0.000 m	aligned (0.006 m)
station-017				0.000 m	aligned (0.005 m)

AUTODESK UNIVERSITY 2014



Registration reports- Project 1

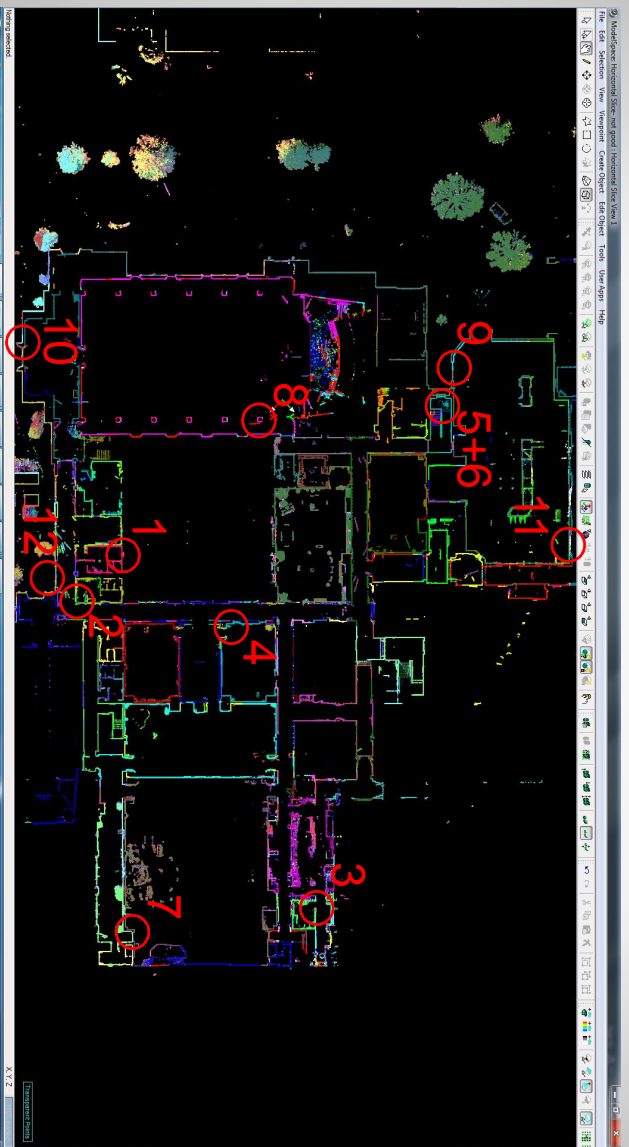
Cloud/Mesh...	Station-003	Cloud/Mesh - Cloud...	On	1.000	0.000 m
Cloud/Mesh...	Station-002	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-011	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-009	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-005	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-002	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-008	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-011	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-004	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-003	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-006	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-009	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-001	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-008	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-001	Cloud/Mesh - Cloud...	On	1.000	0.001 m
Cloud/Mesh...	Station-006	Cloud/Mesh - Cloud...	On	1.000	0.002 m
Cloud/Mesh...	Station-003	Cloud/Mesh - Cloud...	On	1.000	0.002 m
Cloud/Mesh...	Station-002	Cloud/Mesh - Cloud...	On	1.000	0.002 m
Cloud/Mesh...	Station-002	Cloud/Mesh - Cloud...	On	1.000	0.003 m
Cloud/Mesh...	Station-006	Cloud/Mesh - Cloud...	On	1.000	0.004 m
Cloud/Mesh...	Station-067	Cloud/Mesh - Cloud...	On	1.000	0.004 m
Cloud/Mesh...	Station-024	Cloud/Mesh - Cloud...	On	1.000	0.005 m
Cloud/Mesh...	Station-001	Cloud/Mesh - Cloud...	On	1.000	0.007 m
Cloud/Mesh...	Station-065	Cloud/Mesh - Cloud...	On	1.000	0.007 m

registration data				target data	
scan name	overlap	balance	points < 6mm	Error	Error Vector
station-164	16.6%	32.2%	99.7%	0.000 m	aligned (0.008 m)
station-044	16.9%	62.0%	99.6%	0.000 m	aligned (0.009 m)
station-021	17.5%	1.3%	99.3%	0.000 m	aligned (0.010 m)
station-170	17.7%	32.8%	100.0%	0.000 m	aligned (0.011 m)
station-113	18.7%	59.1%	99.9%	0.000 m	aligned (0.012 m)
station-095	18.9%	16.6%	99.7%	0.000 m	aligned (0.013 m)
station-035	19.5%	0.0%	100.0%	0.000 m	aligned (0.014 m)
exterior-024	20.7%	34.9%	99.6%	0.000 m	aligned (0.015 m)
exterior-128	20.8%	81.3%	99.8%	0.000 m	aligned (0.016 m)
exterior-013	20.8%	5.0%	99.7%	0.000 m	aligned (0.017 m)
station-038	20.9%	70.3%	99.7%	0.000 m	aligned (0.018 m)
station-027	22.0%	9.6%	99.7%	0.000 m	aligned (0.019 m)
station-053	22.7%	60.3%	98.3%	0.000 m	aligned (0.020 m)
station-081	23.9%	5.0%	98.6%	0.000 m	aligned (0.021 m)
exterior-011	25.6%	22.3%	99.9%	0.000 m	aligned (0.022 m)
station-140	25.9%	45.0%	99.4%	0.000 m	aligned (0.023 m)
station-146	27.0%	30.9%	99.0%	0.000 m	aligned (0.024 m)

AUTODESK UNIVERSITY 2014



Visual validation - Project 1



AUTODESK UNIVERSITY 2014

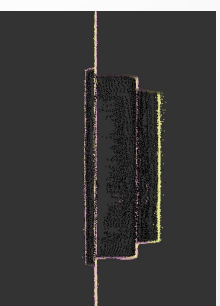
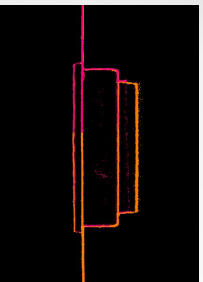


Visual validation – Tight Spaces (1+2)

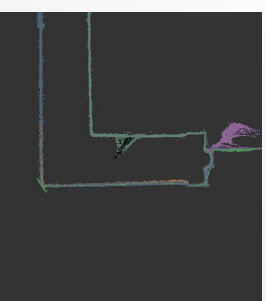
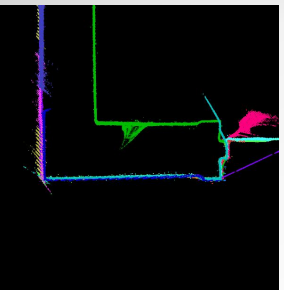
Cyclone

ReCap Pro

1.



2.



AUTODESK UNIVERSITY 2014

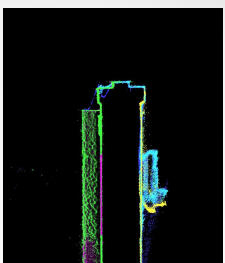


Visual validation – Room to Room Transfer (3+4)

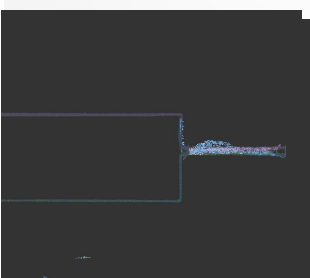
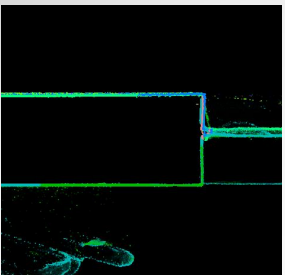
Cyclone

ReCap Pro

3.



4.



AUTODESK UNIVERSITY 2014

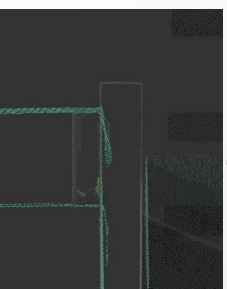
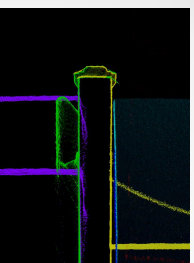


Visual validation – Level to Level Transfer (5+6)

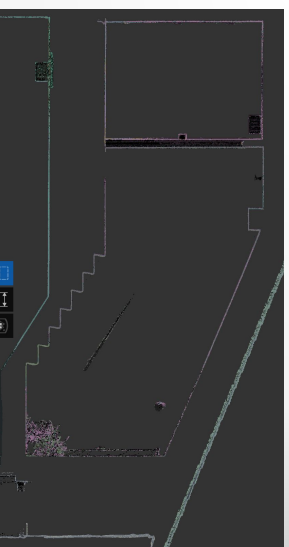
Cyclone

ReCap Pro

5.



6.

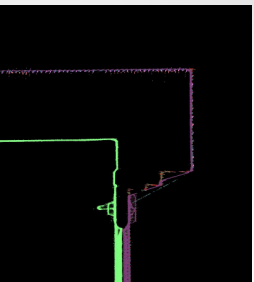


AUTODESK UNIVERSITY 2014



Visual validation – Interior Open Spaces (7+8)

Cyclone

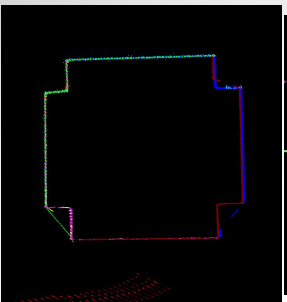


7.

ReCap Pro

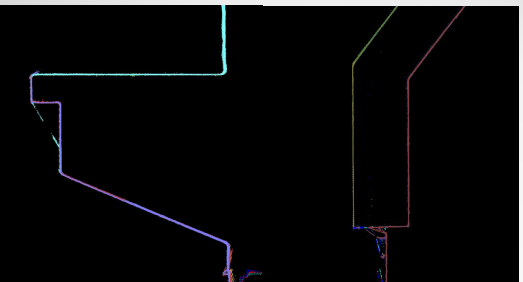


8.



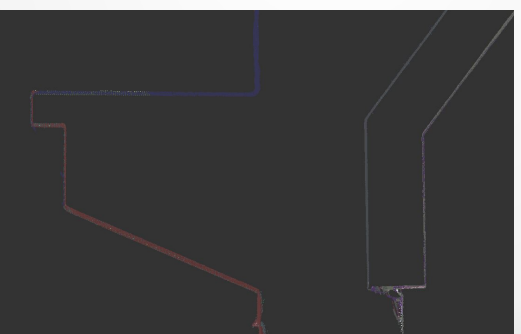
Visual validation – Exterior Spaces (9+10)

Cyclone



9.

ReCap Pro

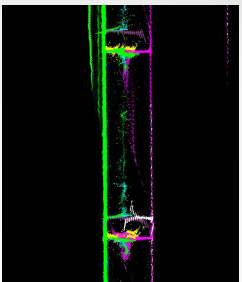


10.

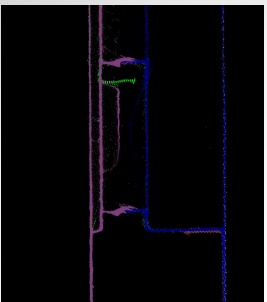
Visual validation – Int to Ext Transfer (11+12)

Cyclone

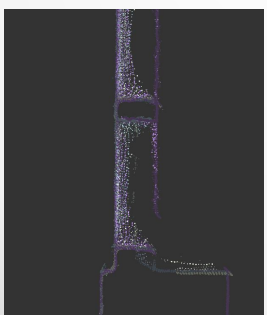
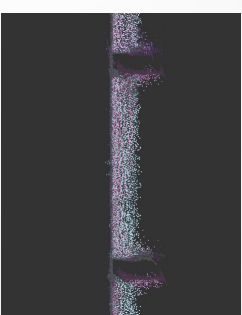
11.



12.



ReCap Pro



Data Sets – Project 2



Registration reports- Project 2

Status: VALID Registration

Mean Absolute Error: **0.004 m**

For Disabled Constraints = 0.004 m

Date: 2014.12.03 12:49:16

Database name : EIK Grove

constraint	ID	Scamworld	ID	Type	Status	Weight	Error	Error Vector
Cloud/Mesh 1	res-034: SW-036 (levelled)	Cloud/Mesh 1	res-037: SW-039 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.002	a1aligned (0.010)
Cloud/Mesh 2	res-035: SW-037 (levelled)	Cloud/Mesh 2	res-038: SW-040 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.003	a1aligned (0.012)
Cloud/Mesh 3	res-036: SW-040 (levelled)	Cloud/Mesh 3	res-040: SW-041 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.003	a1aligned (0.010)
Cloud/Mesh 4	res-041: SW-041 (levelled)	Cloud/Mesh 4	res-041: SW-042 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.011	a1aligned (0.010)
Cloud/Mesh 5	res-042: SW-042 (levelled)	Cloud/Mesh 5	res-042: SW-052 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.010)
Cloud/Mesh 6	res-043: SW-043 (levelled)	Cloud/Mesh 6	res-043: SW-053 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.008	a1aligned (0.010)
Cloud/Mesh 7	res-044: SW-044 (levelled)	Cloud/Mesh 7	res-044: SW-054 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.002	a1aligned (0.009)
Cloud/Mesh 8	res-045: SW-045 (levelled)	Cloud/Mesh 8	res-045: SW-055 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.005	a1aligned (0.009)
Cloud/Mesh 9	res-046: SW-046 (levelled)	Cloud/Mesh 9	res-046: SW-056 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.002	a1aligned (0.009)
Cloud/Mesh 10	res-047: SW-047 (levelled)	Cloud/Mesh 10	res-047: SW-057 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.007	a1aligned (0.009)
Cloud/Mesh 11	res-048: SW-048 (levelled)	Cloud/Mesh 11	res-048: SW-058 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.008	a1aligned (0.009)
Cloud/Mesh 12	res-049: SW-049 (levelled)	Cloud/Mesh 12	res-049: SW-059 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.001	a1aligned (0.011)
Cloud/Mesh 13	res-050: SW-050 (levelled)	Cloud/Mesh 13	res-050: SW-060 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.002	a1aligned (0.011)
Cloud/Mesh 14	res-051: SW-051 (levelled)	Cloud/Mesh 14	res-051: SW-061 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.002	a1aligned (0.010)
Cloud/Mesh 15	res-052: SW-052 (levelled)	Cloud/Mesh 15	res-052: SW-062 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.000	a1aligned (0.010)
Cloud/Mesh 16	res-053: SW-053 (levelled)	Cloud/Mesh 16	res-053: SW-063 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.001	a1aligned (0.011)
Cloud/Mesh 17	res-054: SW-054 (levelled)	Cloud/Mesh 17	res-054: SW-064 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.010)
Cloud/Mesh 18	res-055: SW-055 (levelled)	Cloud/Mesh 18	res-055: SW-065 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.011)
Cloud/Mesh 19	res-056: SW-056 (levelled)	Cloud/Mesh 19	res-056: SW-066 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.003	a1aligned (0.010)
Cloud/Mesh 20	res-057: SW-057 (levelled)	Cloud/Mesh 20	res-057: SW-067 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.007	a1aligned (0.010)
Cloud/Mesh 21	res-058: SW-058 (levelled)	Cloud/Mesh 21	res-058: SW-068 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.010)
Cloud/Mesh 22	res-059: SW-059 (levelled)	Cloud/Mesh 22	res-059: SW-069 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.010)
Cloud/Mesh 23	res-060: SW-060 (levelled)	Cloud/Mesh 23	res-060: SW-070 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.009)
Cloud/Mesh 24	res-061: SW-061 (levelled)	Cloud/Mesh 24	res-061: SW-071 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.009)
Cloud/Mesh 25	res-062: SW-062 (levelled)	Cloud/Mesh 25	res-062: SW-072 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.009)
Cloud/Mesh 26	res-063: SW-063 (levelled)	Cloud/Mesh 26	res-063: SW-073 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.009)
Cloud/Mesh 27	res-064: SW-064 (levelled)	Cloud/Mesh 27	res-064: SW-074 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.010)
Cloud/Mesh 28	res-065: SW-065 (levelled)	Cloud/Mesh 28	res-065: SW-075 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.010)
Cloud/Mesh 29	res-066: SW-066 (levelled)	Cloud/Mesh 29	res-066: SW-076 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.010)
Cloud/Mesh 30	res-067: SW-067 (levelled)	Cloud/Mesh 30	res-067: SW-077 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.004	a1aligned (0.010)
Cloud/Mesh 31	res-068: SW-068 (levelled)	Cloud/Mesh 31	res-068: SW-078 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.005	a1aligned (0.010)
Cloud/Mesh 32	res-069: SW-069 (levelled)	Cloud/Mesh 32	res-069: SW-079 (levelled)	Cloud: Cloud/Mesh	On	1.0000	0.001	a1aligned (0.007)

AUTODESK UNIVERSITY 2014

AUTODESK

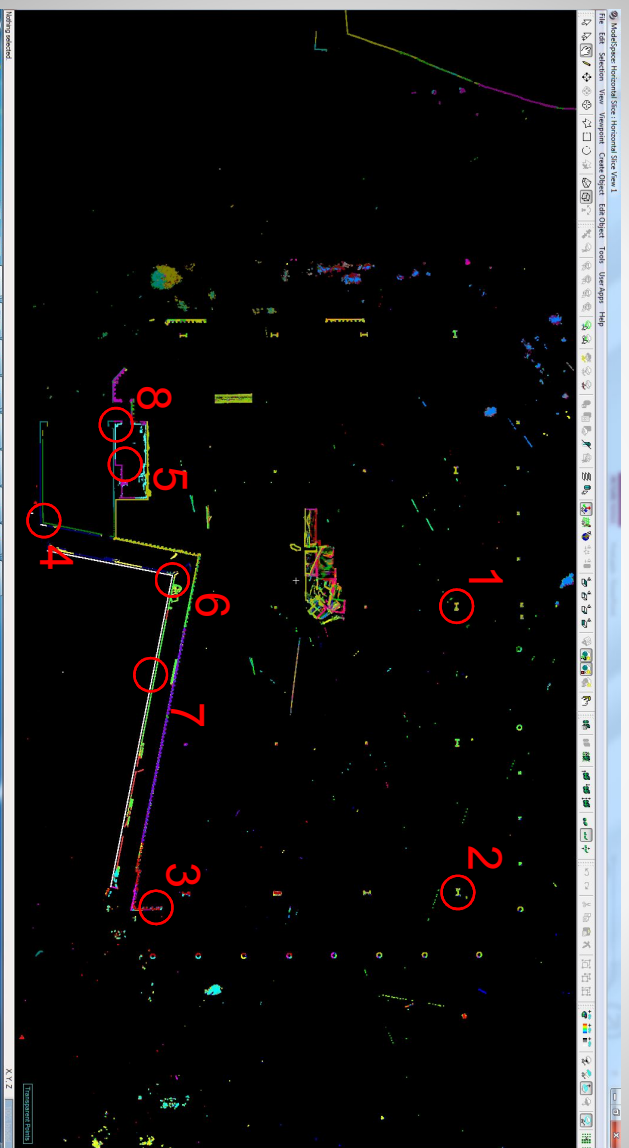
Registration reports- Project 2

Constraint ID	ScamWorld	ScamWorld	Type	Status	Weight	Error	scan name	overlap	balance	points < 6mm
Cloud/Mesh...	Station-290: SW-290 (Level...	Station-291: SW-291 (Level...	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.000 m				
Cloud/Mesh...	res-063: SW-062 (Levelled)	res-064: SW-063 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.000 m	res-37	0.0%	0.0%	0.0%
Cloud/Mesh...	Station-287: SW-287 (Level...	Station-288: SW-288 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.000 m	res-64	1.4%	1.2%	98.3%
Cloud/Mesh...	Station-285: SW-285 (Level...	Station-287: SW-287 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.001 m	station-289	12.8%	52.0%	97.8%
Cloud/Mesh...	Station-279: SW-279 (Level...	Station-280: SW-280 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.001 m	station-291	14.5%	19.7%	99.5%
Cloud/Mesh...	Station-288: SW-288 (Level...	Station-289: SW-289 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.001 m	res-58	15.0%	5.7%	99.5%
Cloud/Mesh...	Station-291: SW-291 (Level...	Station-292: SW-292 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.001 m	res-56	16.0%	21.0%	99.5%
Cloud/Mesh...	res-060: SW-059 (Levelled)	res-061: SW-060 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.002 m	station-292	17.2%	20.0%	95.1%
Cloud/Mesh...	res-061: SW-060 (Levelled)	res-062: SW-061 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.002 m	res-38	19.4%	9.7%	98.1%
Cloud/Mesh...	res-062: SW-061 (Levelled)	res-063: SW-062 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.003 m	station-284	23.0%	24.5%	98.9%
Cloud/Mesh...	res-063: SW-062 (Levelled)	res-064: SW-063 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.003 m	res-34	25.6%	6.8%	93.2%
Cloud/Mesh...	Station-284: SW-284 (Levelled)	Station-285: SW-285 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.003 m	res-63	26.9%	5.4%	98.3%
Cloud/Mesh...	res-037: SW-039 (Levelled)	res-038: SW-040 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.004 m	res-53	28.0%	0.1%	98.4%
Cloud/Mesh...	res-041: SW-042 (Levelled)	res-042: SW-043 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.004 m	res-62	30.1%	19.6%	98.5%
Cloud/Mesh...	Station-281: SW-281 (Levelled)	Station-282: SW-282 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.004 m	res-60	31.3%	1.2%	99.3%
Cloud/Mesh...	Station-285: SW-285 (Levelled)	Station-286: SW-286 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.004 m	station-281	32.3%	12.6%	99.5%
Cloud/Mesh...	res-055: SW-055 (Levelled)	res-056: SW-056 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.004 m	station-286	33.0%	18.6%	99.3%
Cloud/Mesh...	res-056: SW-056 (Levelled)	res-057: SW-057 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.004 m	station-290	33.4%	15.8%	99.2%
Cloud/Mesh...	res-057: SW-057 (Levelled)	res-058: SW-058 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.004 m	station-292	34.1%	18.2%	99.7%
Cloud/Mesh...	res-058: SW-058 (Levelled)	res-059: SW-059 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.004 m	res-55	35.0%	4.7%	97.3%
Cloud/Mesh...	res-059: SW-059 (Levelled)	res-060: SW-060 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.010 m	aligned (0.010m)			
Cloud/Mesh...	res-060: SW-060 (Levelled)	res-061: SW-061 (Levelled)	Cloud: Cloud/Mesh: Cloud...	On	1.0000	0.010 m	aligned (0.010m)			

AUTODESK UNIVERSITY 2014

AUTODESK

Visual validation - Project 2



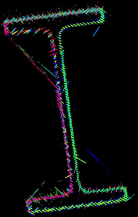
AUTODESK UNIVERSITY 2014

AUTODESK

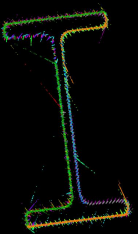
Visual validation – Interior Open Spaces (1+2)

Cyclone

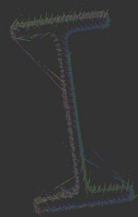
1.



2.



ReCap Pro

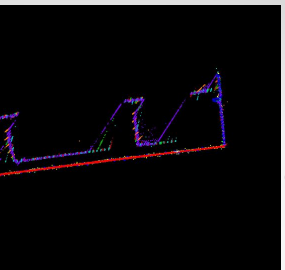


AUTODESK UNIVERSITY 2014

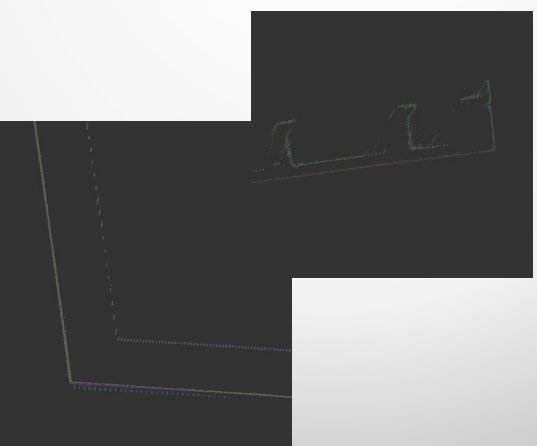
AUTODESK

Visual validation – Exterior Spaces (3+4)

Cyclone



ReCap Pro

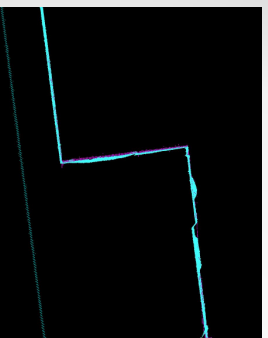


3.

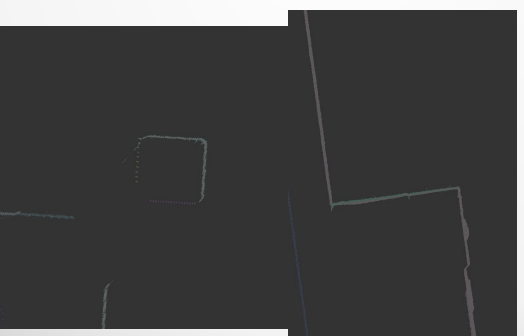
4.

Visual validation – Room to Room Transfer (6+7)

Cyclone



ReCap Pro



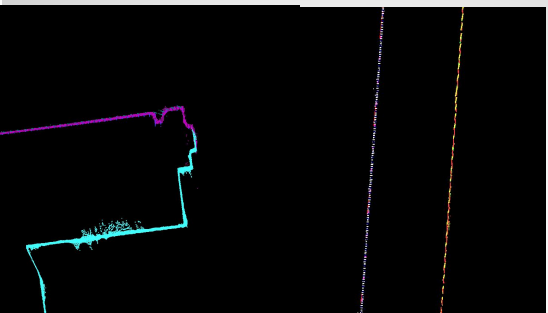
5.

6.

Visual validation – Tight Spaces (7+8)

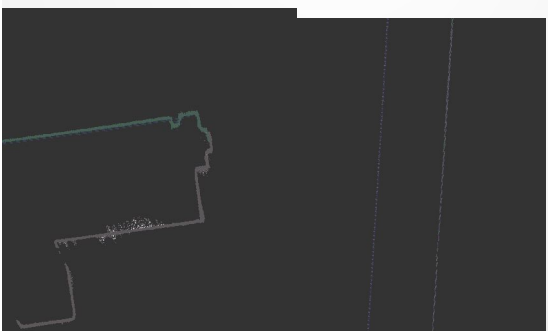
Cyclone

7.



ReCap Pro

8.



Comparison

Comparison Sheet

Criteria	ReCap Pro®		Cyclone®	
	Project 1	Project 2	Project 1	Project 2
User Interface	5	5	3	3
Registration Time	3	3	5	5
Ease of Use/learn	5	5	3	3
Workflow	5	5	4	4
Data organization	3	3	5	5
QA/QC	3	3	5	5
Tight Spaces – Report	4	4	5	4
Tight Spaces – Visual	5	5	5	5
Room to Room Transfer - Report	3	3	5	5
Room to Room Transfer - Visual	5	5	5	5
Floor to Floor Transfer - Report	2	n/a	5	n/a
Floor to Floor Transfer - Visual	5	n/a	5	n/a
Open Interior Spaces - Report	5	5	3	3
Open Interior Spaces - Visual	5	5	4	5
Exterior Spaces - Report	5	3	5	4
Exterior Spaces - Visual	5	4	5	5
Interior to Exterior Transfer - Report	5	n/a	4	n/a
Interior to Exterior Transfer - Visual	5	n/a	5	n/a

AUTODESK UNIVERSITY 2014



Q&A

AUTODESK UNIVERSITY 2014

