Registration QA report

QA self-test site

Produced by	OmniBlick (self-test)
Project	QA self-test site
Source data	selftest_tmp/qa (generated)
Coordinate system	not stated - the project is expressed in the frame of its first scan
Accuracy	Worst adjusted station 18.19 mm at 95 %, against a stated tolerance of 20.0 mm. Within tolerance.
Frame	local - no coordinate reference system is stated, so grid and ground are the same thing here
Tolerance	20.0 mm (custom)
Scans / edges	4 / 4
Outlier test	Baarda w-test at alpha = 0.001, beta = 0.20

1. What needs a decision

Everything below was found by the software; nothing else in this project needs to be reviewed. Each row names what was tested, what the test said and the numbers behind it. Rows marked 'blocker' are why this project does not currently meet its stated tolerance.

Exceptions

Se...	Subject	Finding	Evidence
wa...	scan0 -...	the network cannot che...	redundancy 0.000 — a blunder in it would never be detected; close a lo...

An exception with an action ("reject this edge") can be applied in the application, which re-adjusts the whole network from the registrations already computed.

2. Verdict

PASS. 4 scans, 4 edges: within 20.0 mm at 95 % (worst station 18.2 mm).

Property	Value
Stated tolerance (95 %)	20.0 mm [custom]
Worst station (95 %)	18.19 mm [scan1]
Scans	4
Edges registered	4
Loop closures	1
Degrees of freedom	6
Variance factor	0.1031
Global model test	passed

The tolerance is a 95 % positional tolerance on an adjusted scan station. It is the only number the operator stated; every parameter in section 6 was derived from it and from the data.

3. Adjusted scan stations

Each station's position and orientation after the least-squares adjustment, with the semi-axes of its 95 % error ellipsoid. A station with no ellipsoid is the datum: the project is expressed in its frame, so it has no uncertainty relative to itself. This project carries no survey control, so the datum is a scan and not a coordinate system.

Stations

Station	X	Y	Z	95 % a	95 % b	95 % c
scan0	0.0000	0.0000	0.0000	datum	datum	datum
scan1	30.0011	-7.9984	0.5013	18.19 mm	9.66 mm	1.60 mm
scan2	-13.9997	21.0002	0.1999	14.19 mm	8.32 mm	1.57 mm
scan3	6.0007	41.0004	-0.2997	17.47 mm	9.03 mm	1.08 mm

Semi-axes a >= b >= c, at 95 % confidence, in the project's own units (metres).

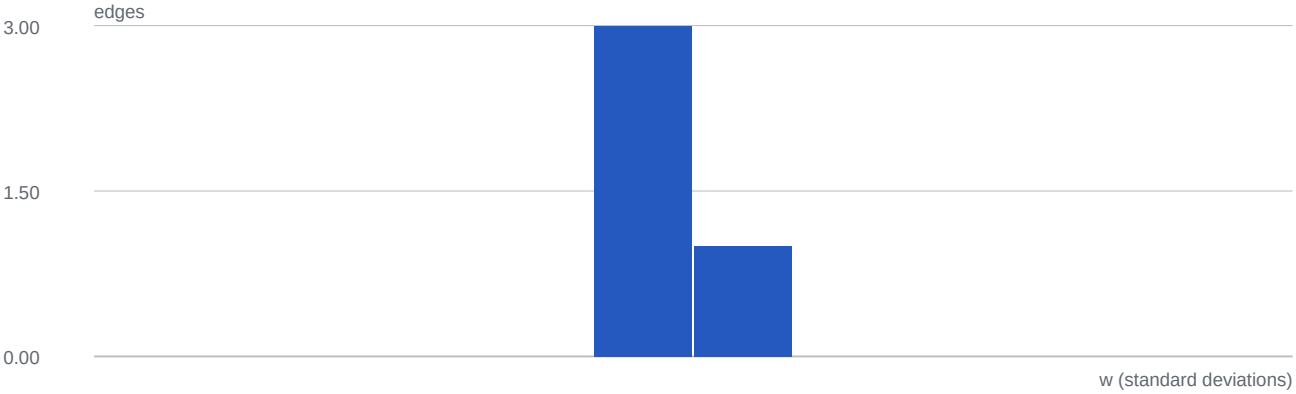
4. Observations and reliability

One row per registration edge. The redundancy number is the share of an observation the network is able to CHECK: at zero, a blunder in that edge could never be found, however good the residual looks. The minimal detectable bias is the smallest error in the edge that the test would still catch four times out of five. These two columns are what say whether the network is strong enough, and no residual can answer that.

Per-edge statistics

Edge	Redundancy	Normalised residual	Critical	MDB (position)	External reliability	Status
scan1 -> scan2	1.194	-0.46	15.35	17.18 mm	8.29	ok
scan0 -> scan3	0.000	0.00	15.35	unbounded	inf	ok
scan2 -> scan3	1.883	-0.09	15.35	unbounded	6.11	ok
scan1 -> scan3	2.923	-0.67	15.35	31.93 mm	4.24	ok

Normalised residuals



5. What the precision rests on

Every edge's covariance was derived from a per-point stochastic model rather than from the fit's own residuals, so the numbers in section 3 descend from where each scanner stood, how far the surface was and what it faced. Two terms make up a keypoint's positional uncertainty and they answer different questions: the INSTRUMENT term is the scanner's own error model evaluated at that point, and the SAMPLING term is the fact that a keypoint is the centroid of a grid cell, which two scans fill independently. Where a scan carries no station, the instrument term is an assumed isotropic figure and the quality column says so - which is the difference between a number and a claim.

Per-edge stochastic model

Edge	Instrument	Sampling	Combined	Quality	Edge variance factor
scan1 -> scan2	21.34 mm	30.18 mm	21.34 mm	modelled	4.543
scan0 -> scan3	18.49 mm	30.18 mm	18.49 mm	modelled	3.529
scan2 -> scan3	21.34 mm	30.18 mm	21.34 mm	modelled	8.677
scan1 -> scan3	19.00 mm	30.18 mm	19.00 mm	modelled	7.458

The edge variance factor compares that edge's own residuals with the model above it. It is reported and deliberately not applied: scaling a covariance by its own residuals hides exactly the signal the variance component estimation in section 2 exists to find.

6. Registration

Which scans overlap was inferred from surface descriptors and then verified by registering each candidate pair - no pairing was drawn by hand. Each edge was aligned globally by maximal-clique consensus, which needs no initial guess, and then refined by voxelised generalised ICP. The certificate columns are the evidence for the global stage: the consensus of the winning hypothesis against the runner-up, and how well the edge's own inliers determine its rotation.

Per-edge registration

Edge	Keypoin...	Matches	Inliers	Best / runner-...	Eigen g...	Global R...	Fine cell	Fine shift

Edge	Keypoin...	Matches	Inliers	Best / runner-...	Eigen g...	Global R...	Fine cell	Fine shift
scan1 -> scan...	700 / 700	88	19	19 / 19	0.46291	140.1 mm	0.209 m	115.07 ...
scan0 -> scan...	700 / 700	92	17	17 / 16	0.48189	132.9 mm	0.211 m	91.64 mm
scan2 -> scan...	700 / 700	91	17	16 / 16	0.20482	132.8 mm	0.211 m	224.64 ...
scan1 -> scan...	700 / 700	77	12	12 / 12	0.28944	115.1 mm	0.211 m	147.49 ...

* the fine stage's correspondence search is not direction-symmetric (docs/GEO_EXECUTION.md §8, 2026-08-05); this edge is reported as asked (a -> b), but the transform came from registering it the other way and inverting the result, because that direction reached higher coverage.

Parameters, all derived

Parameter	Va...	Where it came from
Scan extent	26....	the median scan's own raw bounding-box diagonal
Tolerance	20....	stated by the operator (custom)
Keypoint grid	0.1...	site diagonal / 200
Compatibility...	0.2...	two keypoint cells
Fine cell (ceil...	0.2...	network-wide reference from the scan extent above; each edge runs its own, sized from its o...
Fine search r...	0.8...	the same network-wide reference, for the same reason
Fine iterations	32	the tolerance's effort band

The operator stated a tolerance and nothing else. Every row here was chosen by the software from that tolerance and from the data, and is printed because a parameter the software chose and did not disclose is worse than one the user had to type.