

Robotiz3d

STRICTLY HIGHWAYS 2026 · INNOVATIONS SHAPING THE SECTOR

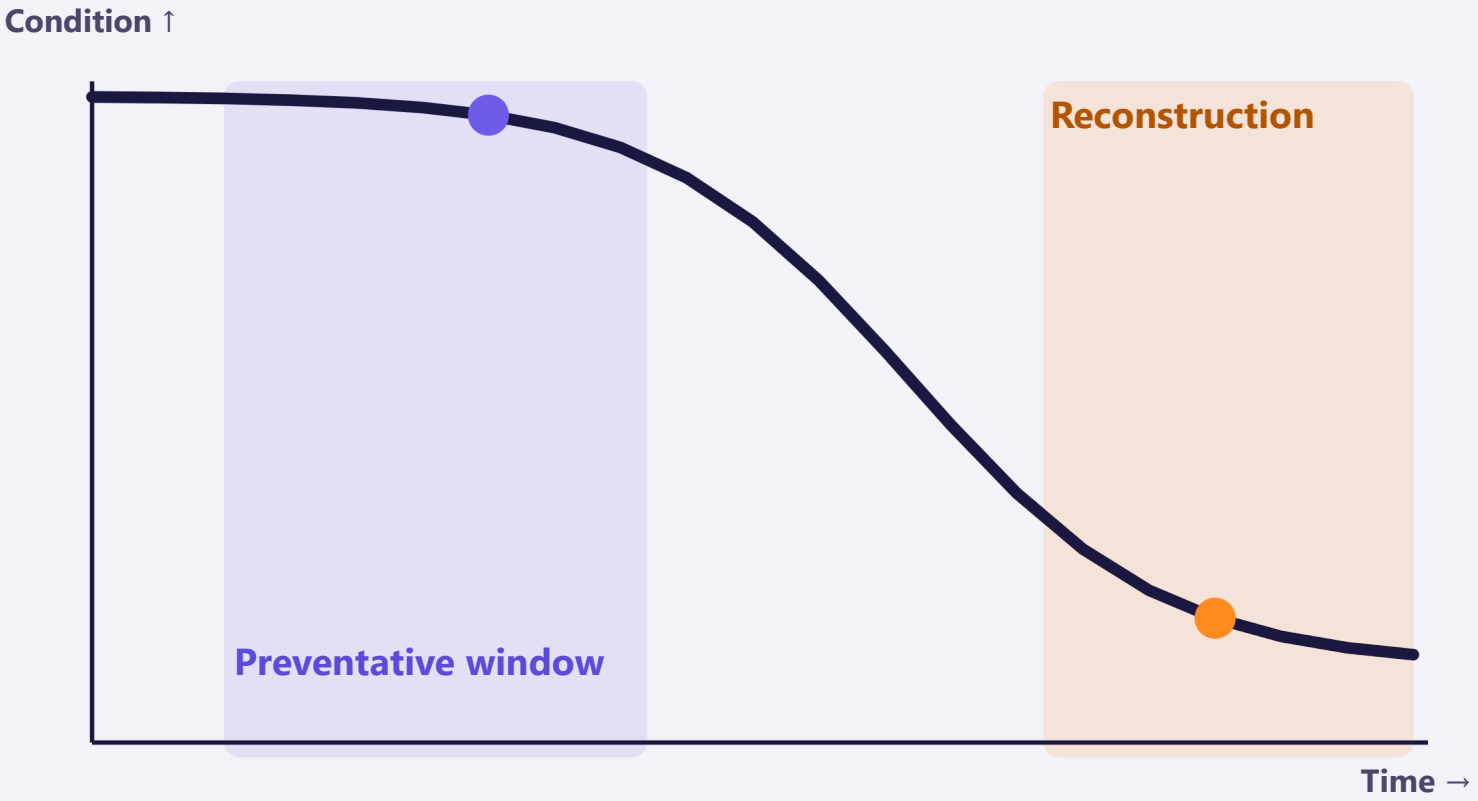
Building better deterioration curves

What high-resolution road data taught us, including what didn't work

Dr Sebastiano Fichera · Robotiz3d Technology Ltd & University of Liverpool · 8 October 2026

THE DETERIORATION CURVE

Preventive work pays, yet is rarely done



20×
cheaper: planned preventive work vs reactive repair

97 yrs
average gap between resurfacing a local road

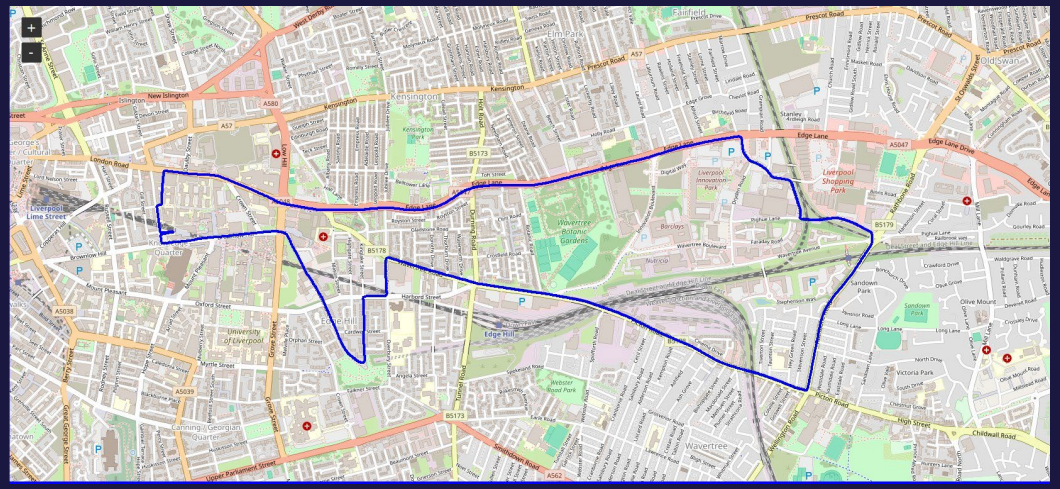
1.9m
potholes filled last year, at a cost of £149m

16%
of local roads have under 5 years of structural life left

Sources: DfT Potholes Review, via LGA (20×); ALARM survey 2026, Asphalt Industry Alliance. Curve illustrative.

OUR EXPERIMENT

We tracked the same defects, scan after scan



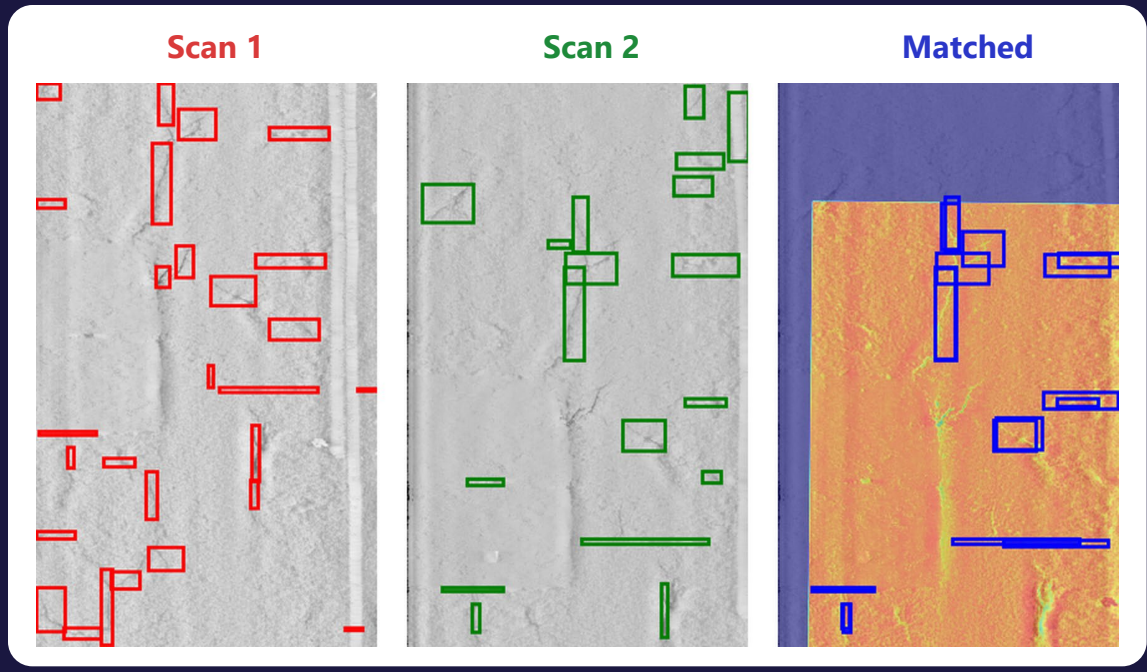
The 9 km route, scanned in the same lanes each time. Innovate UK BridgeAI feasibility study, Nov 2024 – Mar 2025.

9 km
A, B and C roads

11
scans, every two weeks

2,000+
defects per scan

100+
tracked in every scan



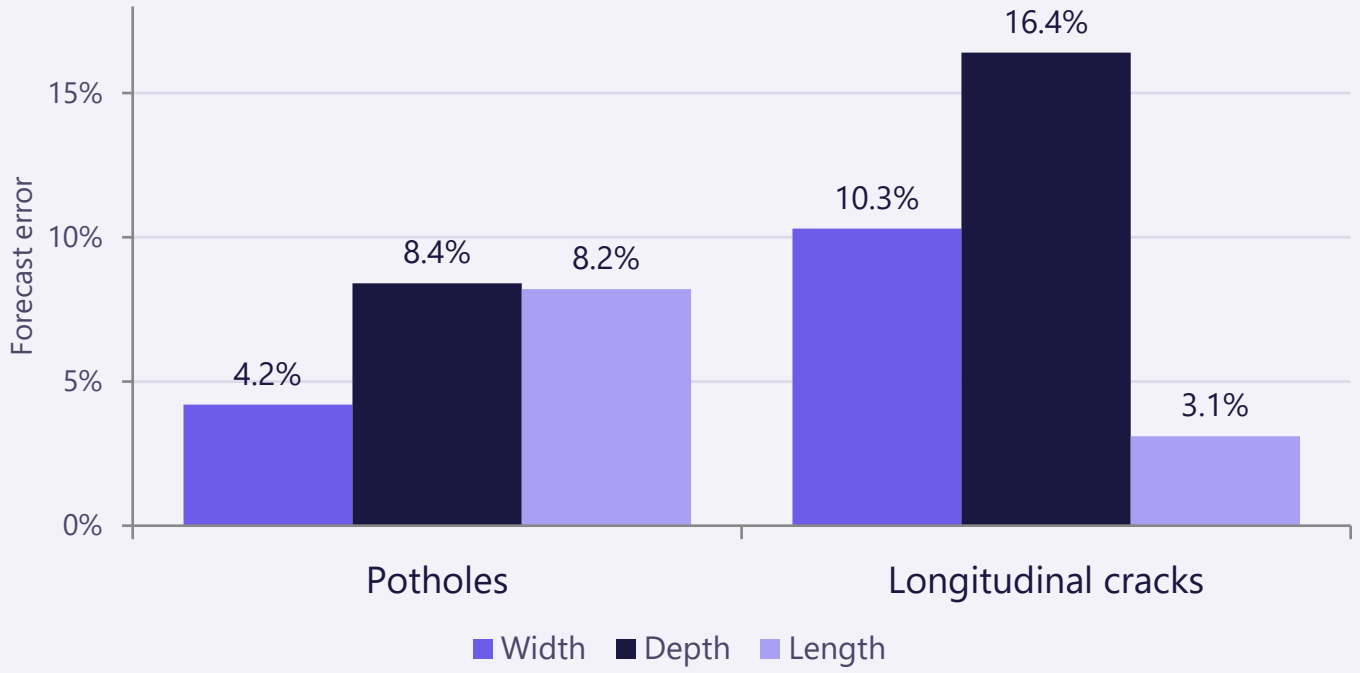
Same stretch, two scans: defects found in each, then matched once the scans are aligned. About 90 minutes per pair of scans, with no manual labelling.

WHAT DIDN'T WORK

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Single-defect forecasts missed by up to 16%

1. **Track** — 100+ defects, 11 scans
2. **Measure** — width, depth, length
3. **Train** — on first 80% of scans
4. **Test** — forecast the last 20%



Bar = typical forecast miss, as % of the defect's average size

Too noisy to plan an intervention on

WHY IT FAILED

Roads don’t heal. The data did.



Average width of tracked longitudinal cracks over 116 days: measured (●) and forecast (- -). Gridlines 21, 23, 25 mm.

Detection noise

The same defect outlined differently from scan to scan

Winter scanning

Uneven intervals, wet surfaces, repairs mid-series

No common start

Each defect caught at a different point in its life

WHAT WE LEARNED

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Forecast road sections, not individual cracks

Individual defects

Outlines vary from scan to scan

Each defect at a different life stage

Forecast error up to 16%

Road sections

One condition index averages many defects

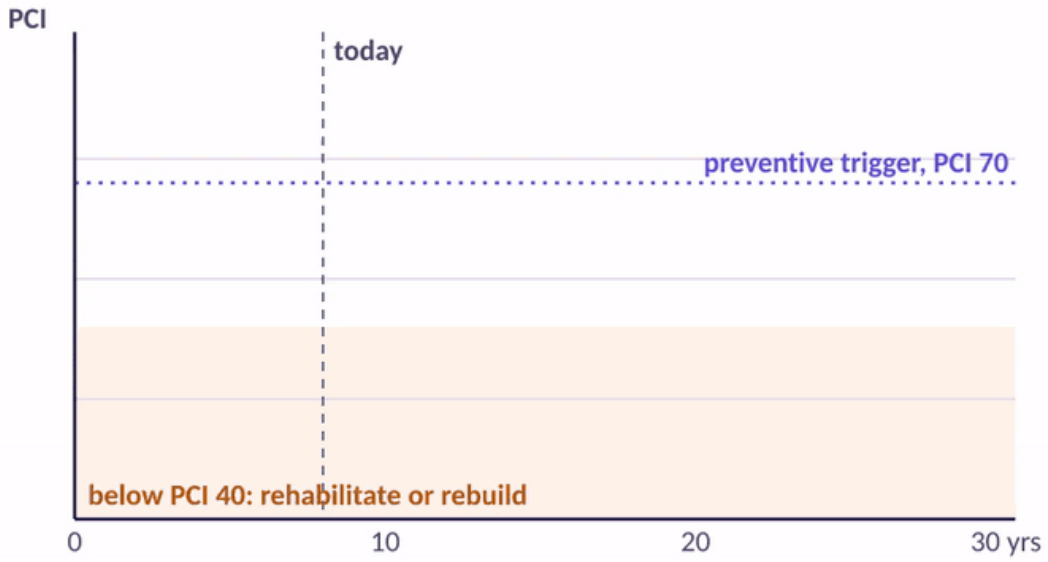
The unit you actually programme

Standard scores: PCI, PAS 2161

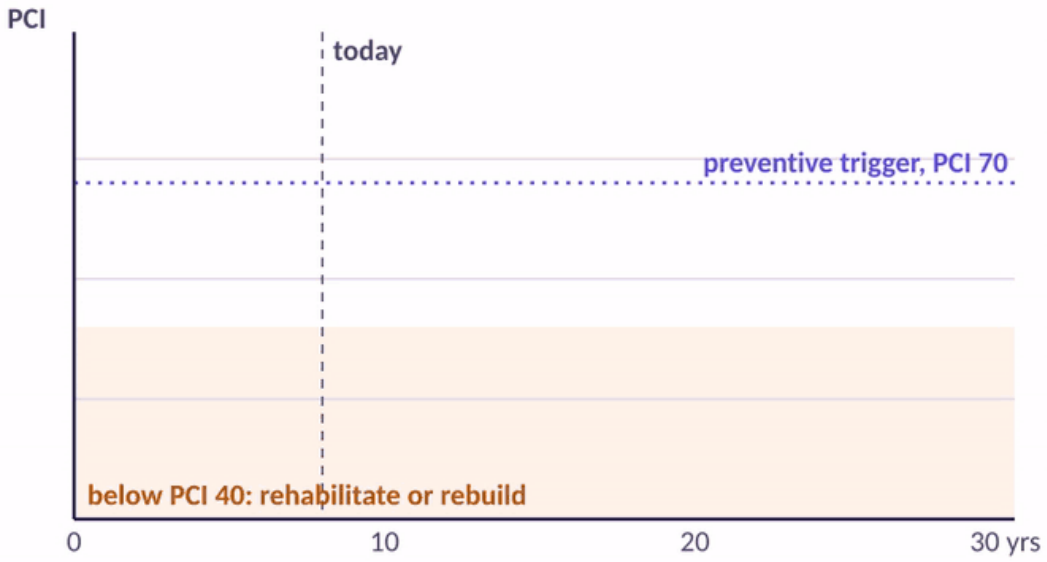
What makes a section curve trustworthy? Frequent data, and context.

More surveys, tighter uncertainty

Few surveys, spread out (every 4 years)

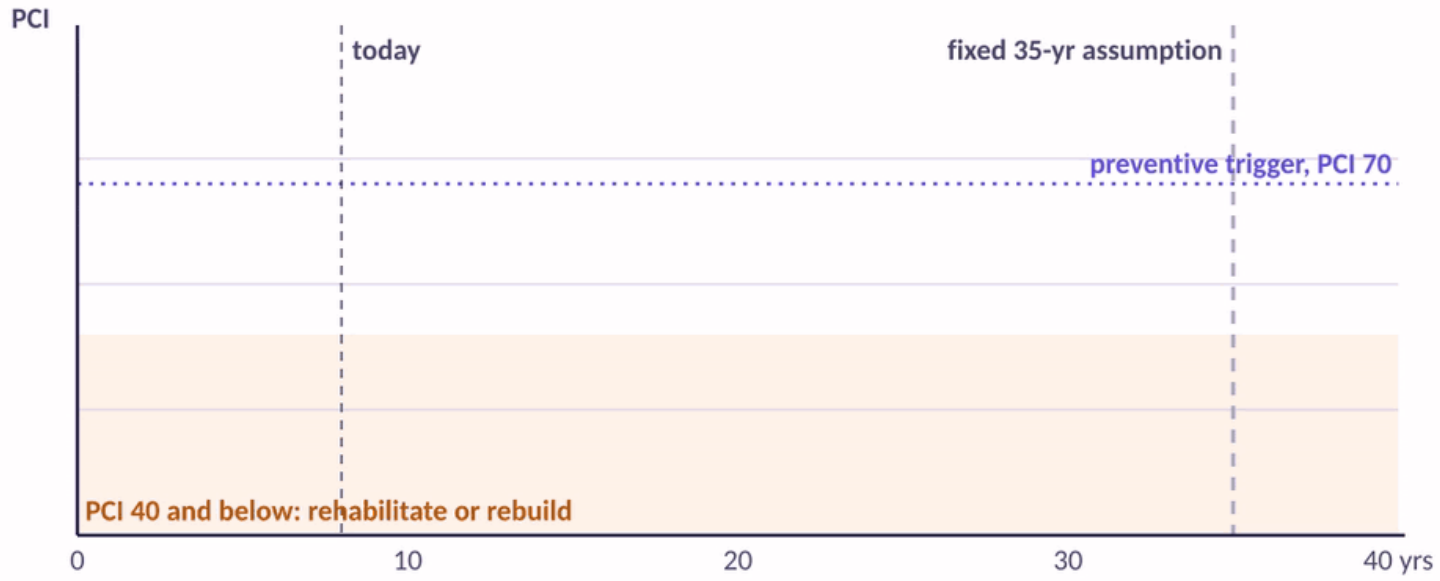


Frequent surveys (every 3 months)



ADDING CONTEXT

Context tightens the forecast



Condition data only
life 16–25 yrs · best 19.3

+ Traffic
life 16–21 yrs · best 17.5

+ Weather
life 16–19 yrs · best 16.6

+ Materials & construction
life 16–18 yrs · best 16.4

Then repeat for every life-extending treatment. Crack sealing, surface dressing, micro-surfacing and resurfacing each change the curve differently, so each needs its own model.

WHY IT MATTERS

Time and workload saved, not only money

Budget

Treat in the preventative window, where planned work costs a fraction of reactive repair

Time

Traffic-speed surveys instead of slow walked inspections and repeat site visits

Workload

Engineers review objective evidence, rather than re-inspect and debate judgement calls

Disruption

Fewer reactive call-outs and emergency closures for road users and crews

THREE THINGS TO TAKE HOME

Ask these of any condition data

1. **Is it consistent from one survey to the next, and checked on live roads?**
2. **Is it frequent enough to see the curve turn?**
3. **Do the curves predict life span as well as shape, using context, not PCI alone?**

Have data, or a hypothesis to test? Let's build these curves together.

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