

Delamination Detection on a Concrete Bridge Deck Using Fast Scanning Impact Echo

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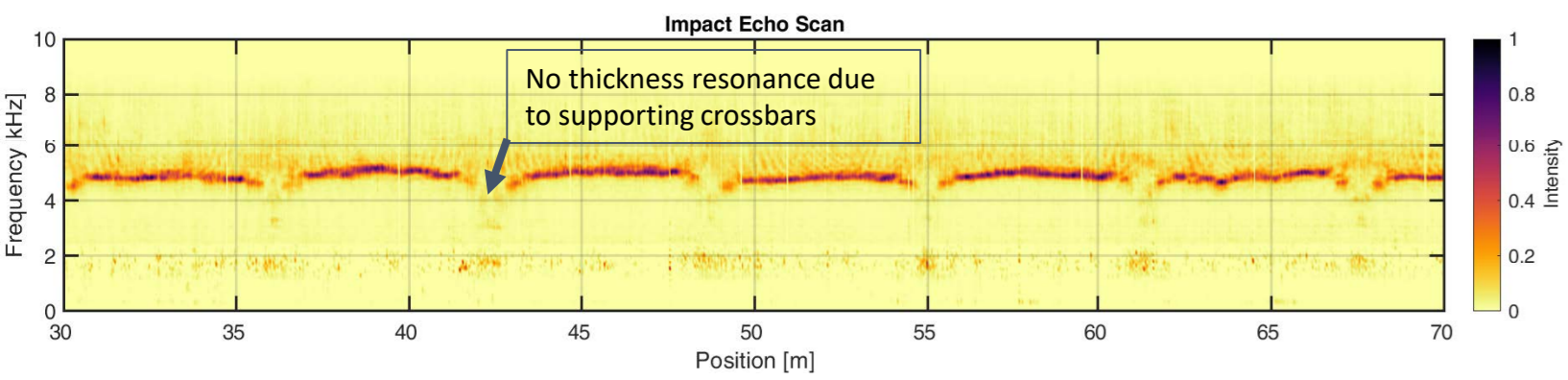


Fig. 1: Impact Echo plot of intact bridge section

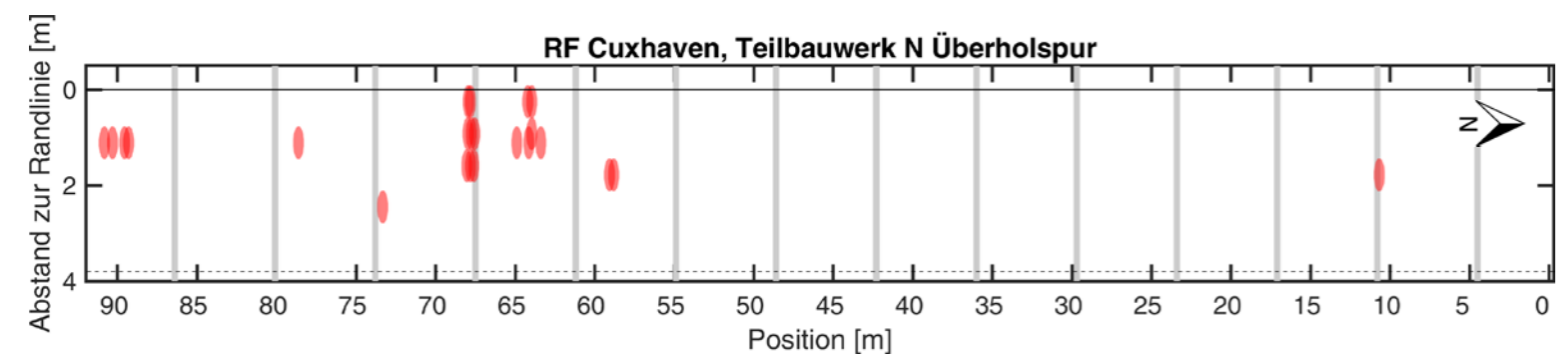


Fig. 2: Bridge section map with delaminations as red ellipses

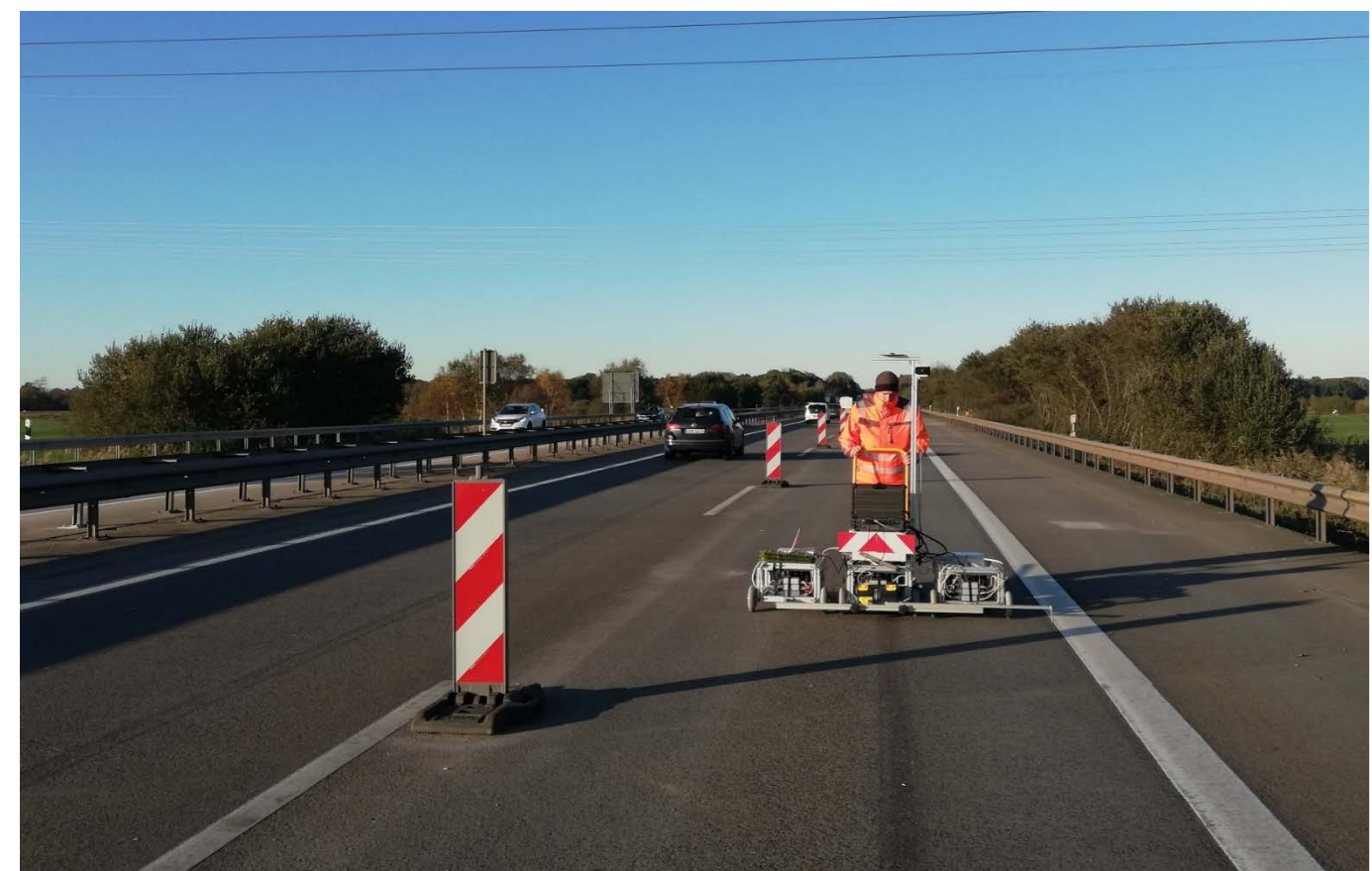


Fig. 3: Scanner being pushed on Moobrücke.



Fig. 4: MEMS microphone array from below

We use Impact Echo to detect damage on a concrete bridge deck: large scale, fast and reliable

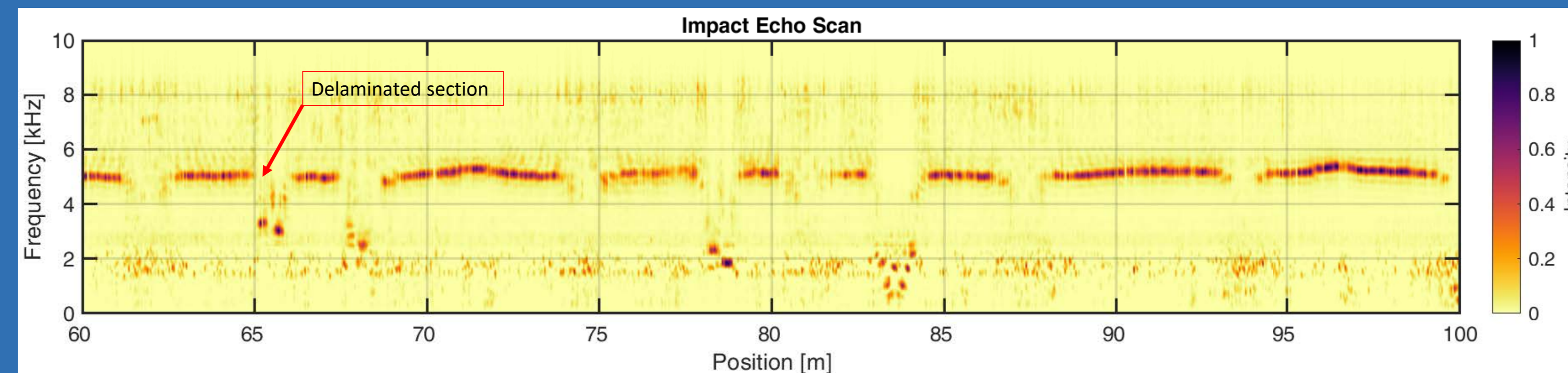


Fig. 5: Impact Echo plot of partial delaminated bridge section

Background:

- 1.5 km long Moorbrücke from 1970 carries the A 27 over marshland
- “Not fit for the future” due to deterioration
- Delaminations were found by manual sounding on bridge surface
- Replacement is planned in ten to 20 years but load carrying capacity must be sustained until then
- Overall damage must be assessed by NDT-techniques on large scale

Objectives:

1. Large scale damage assessment of concrete bridge deck
2. Assessing maintenance work: bonding of fresh and old concrete

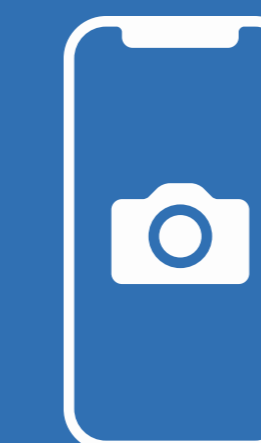
Method:

- Impact Echo: $f_{IE} = \frac{0,96 * v_P}{2 * d}$ f_{IE} = Thickness Resonance
 v_P = P-wave velocity
 d = plate thickness
- Mechanical impact by steel solenoids
- Air-coupled signal recording
- Processing: Stacking, Frequency-Filtering

Results:

- More than 17 000 m² scanned
- 932 Delaminations found
- Good bonding of fresh and old concrete can be verified
- Measurements are “fast” and reliable

Take a picture to stay in touch!



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