

Filtering of environmental and operational effects for ultrasonics based monitoring of concrete infrastructure using embedded piezoelectric transducers



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CONTEXT



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Is monitoring of concrete infrastructure necessary ?

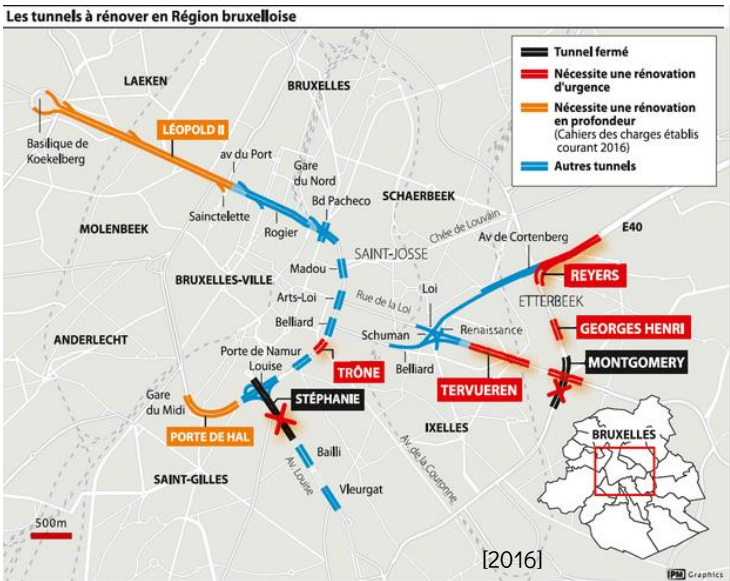


Genoa bridge collapse, August, 2018

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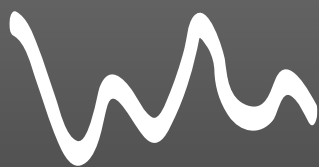
The crisis of the tunnels in Brussels



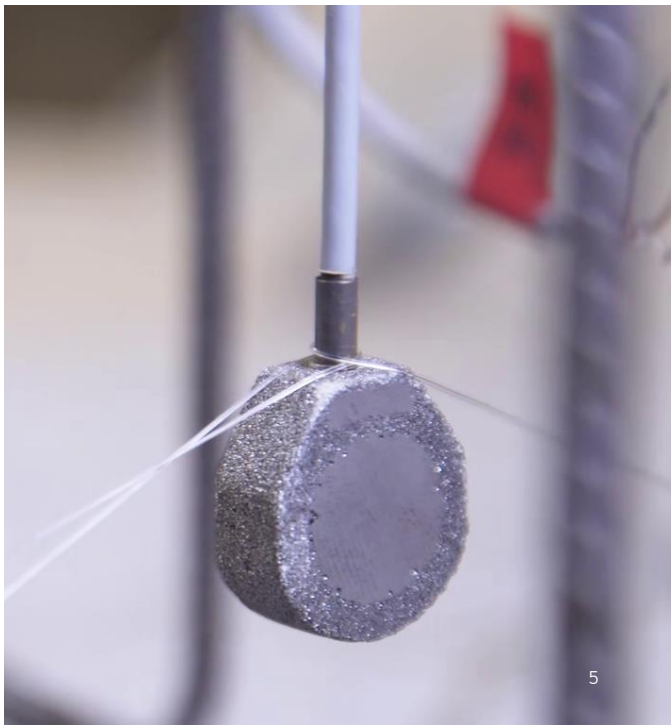
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MONITORING WITH EMBEDDED TRANSDUCERS

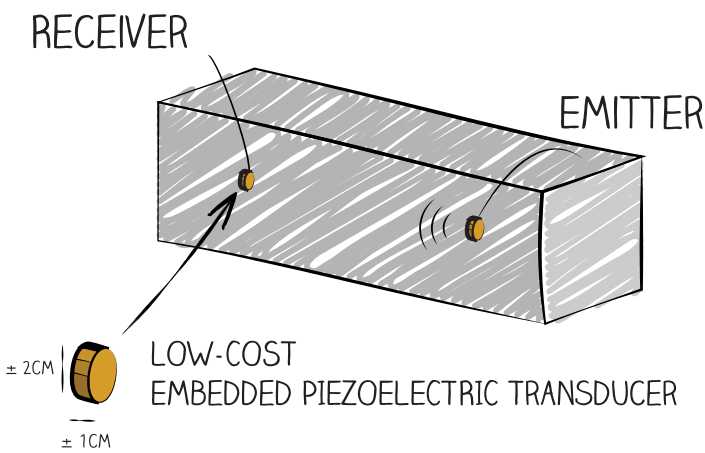


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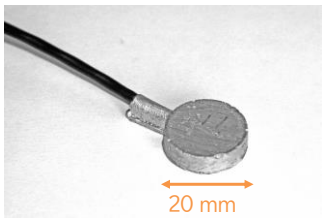
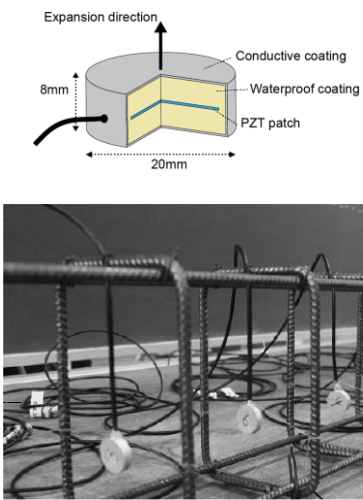
Embedded transducers



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Embedded transducers



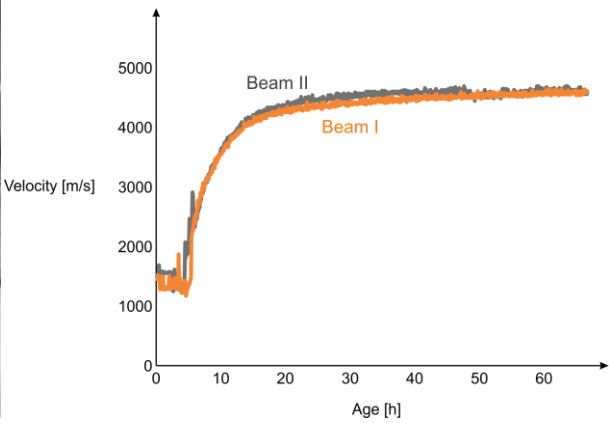
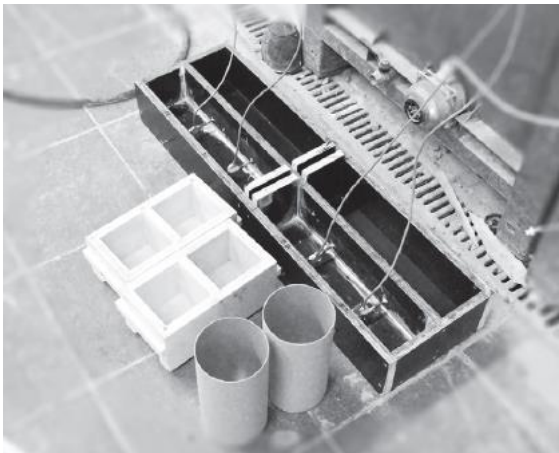
- Excellent coupling -> low-voltage
- Repeatability
- Low cost
- Internal measurements
- Protection from environment

→ Patent has been submitted

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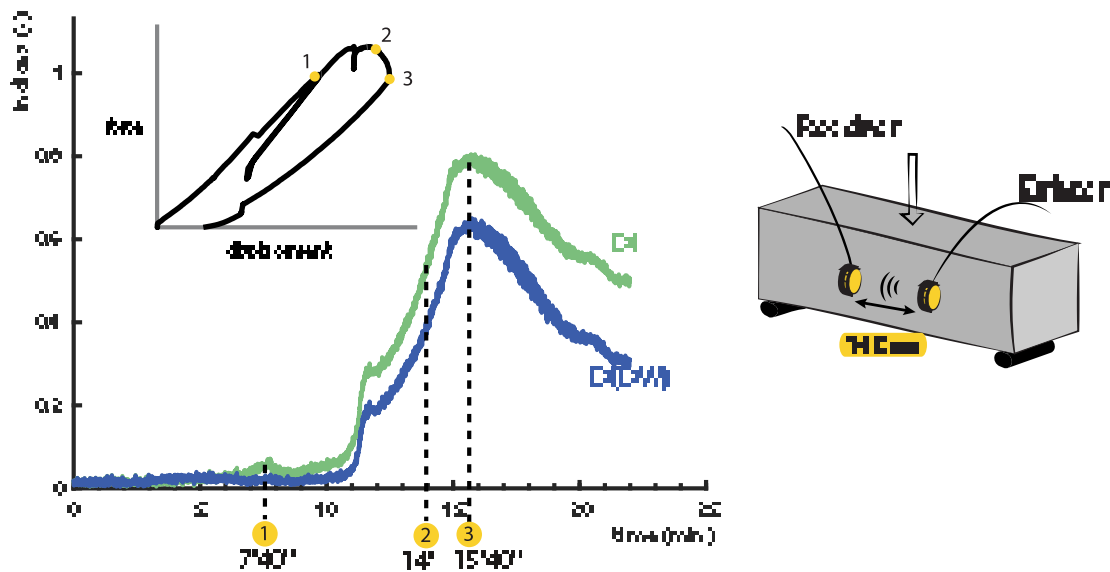
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Early age properties



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Crack monitoring



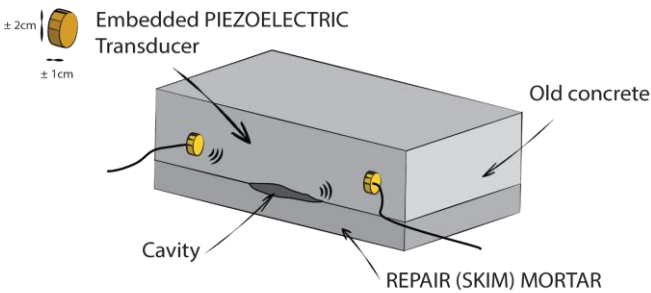
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Rogier tunnel



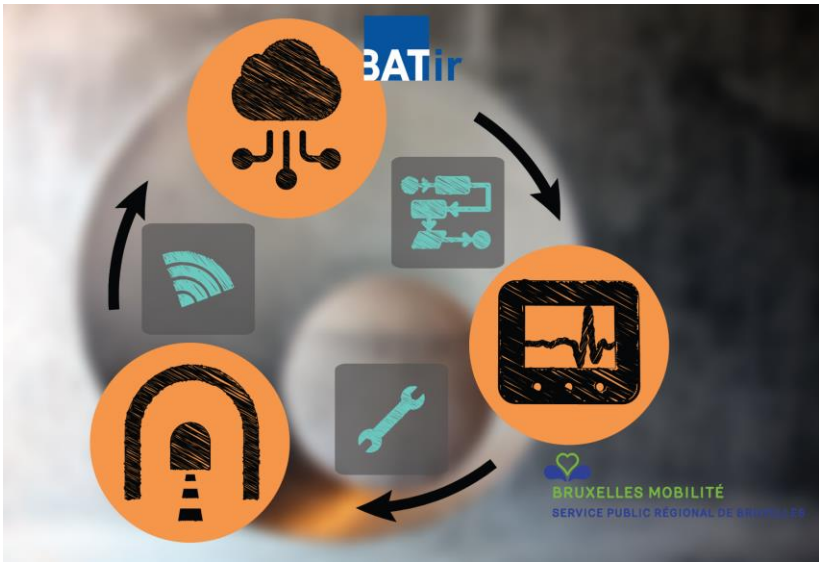
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Repair monitoring



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Remote system with cloud

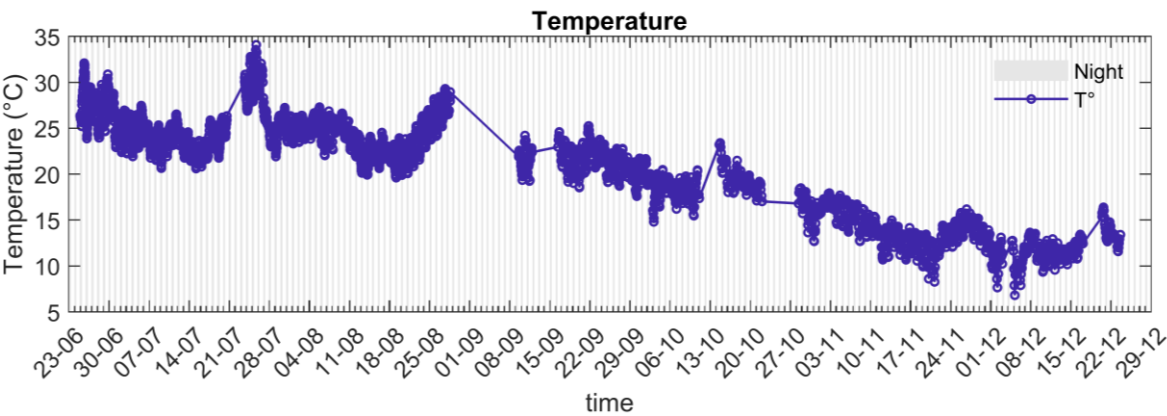


Installed in June 2019

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Temperature monitoring

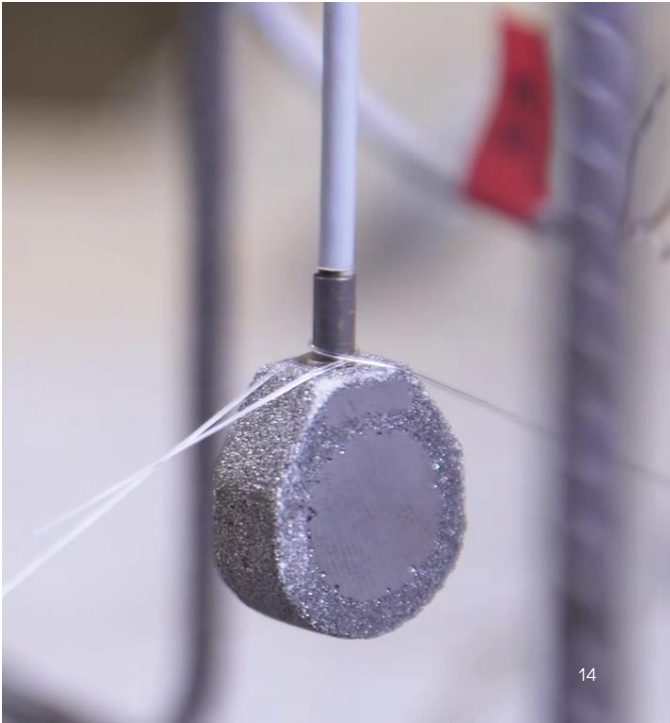
June 2019 – December 2019



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STATE-OF-THE-ART
TOPIC



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Sources of variability and damage

Small variability due to

- Temperature
- Humidity
- Stress level

Detect damage ?

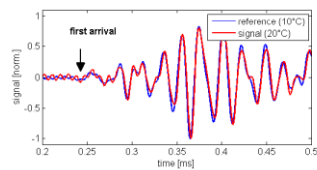


FIGURE 2. Early portion of time series.
No significant time shift.

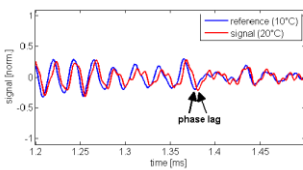


FIGURE 3. Late portion of time series.
Significant time shift.

[Niederleithinger 2012]

Orders of magnitude ?

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