

### Static Charge: Coils Embedment

Once placed under the pavement does the coil still behave like an inductor? The answer is probably not

#### Overview

The selection of a proper procedure for embedding the coils in the road pavement has faced significant technical issues. Unexpected phenomena have appeared during the first practical trial of embedding. Their comprehension and the identification of a feasible solution has demanded several weeks of work.

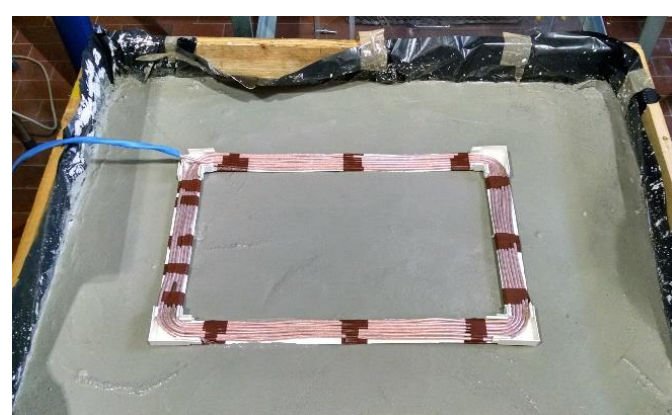
#### First trials and issues raised



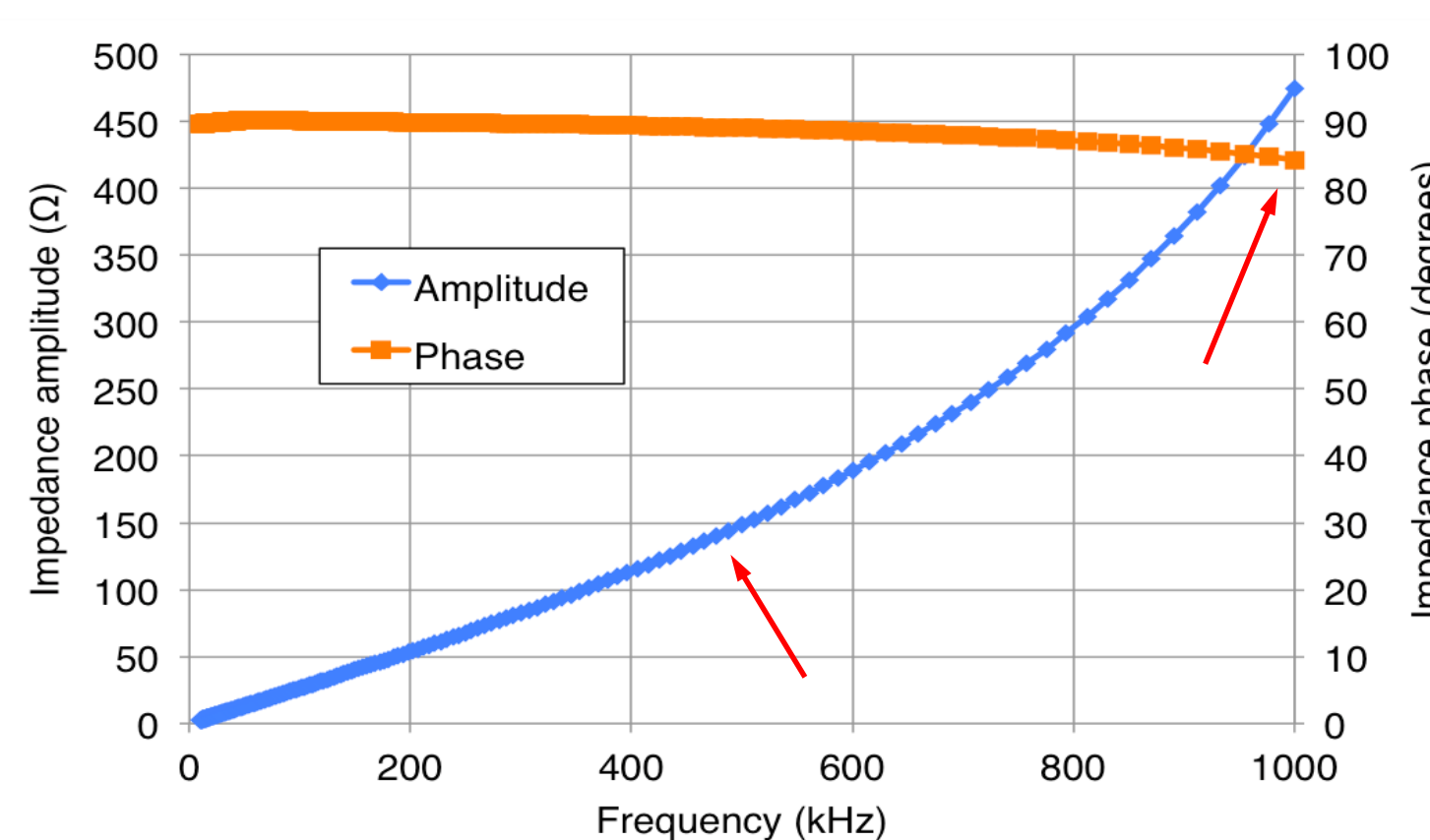
First embedding trial

As first embedding trial, the coil has been embedded inside a structure created with not reinforced concrete (i.e. concrete without any reinforcing bars) and then covered with a layer of 2cm of concrete and another layer of 3cm of cold asphalt. At the end of the embedment, the status of the coil was checked by measuring its values of self inductance and resistance.

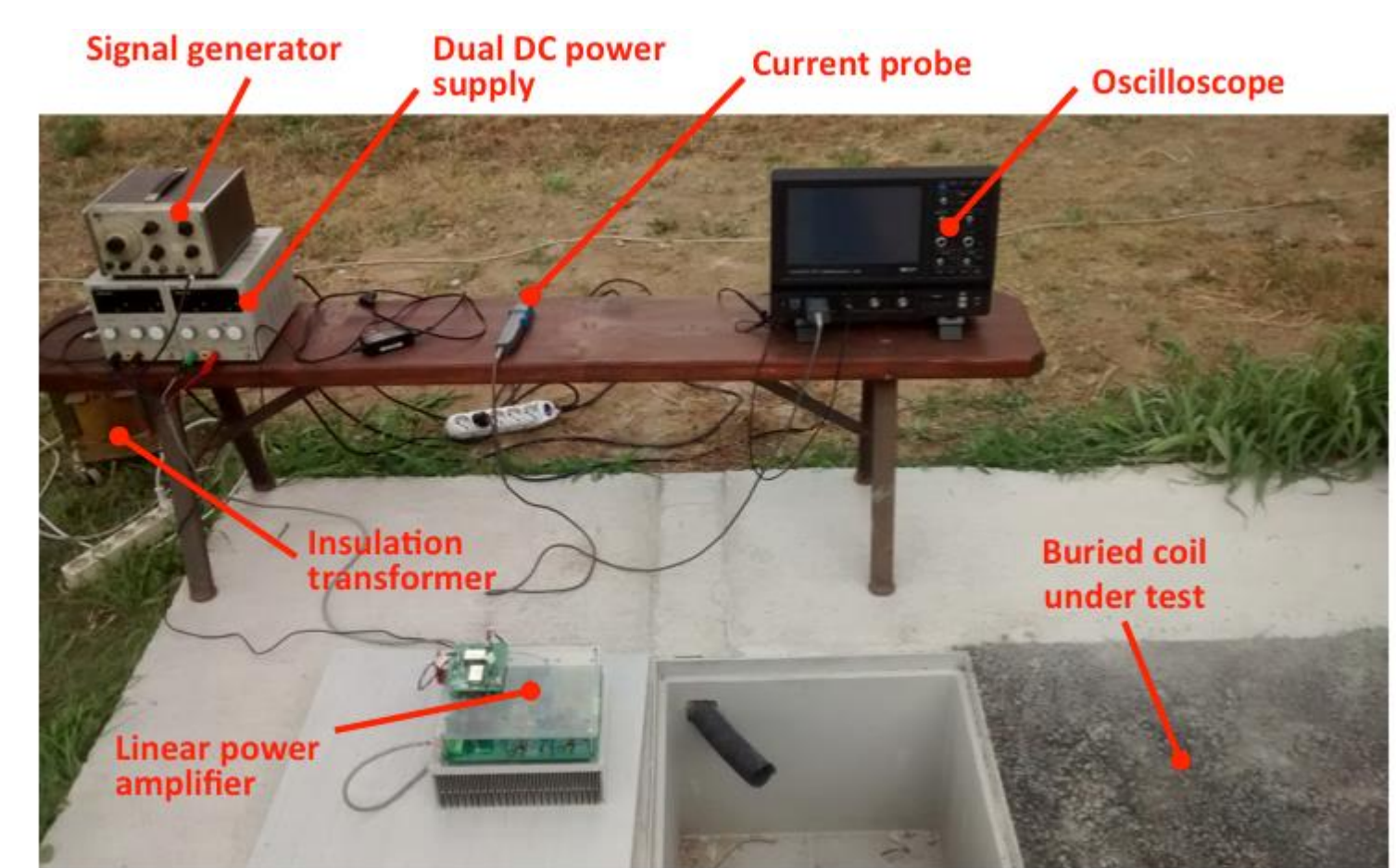
The resulting behaviour of the coil was far from the behaviour of an inductor, as it was preliminary measured in laboratory conditions. The same embedment conditions were replicated and tested in the laboratory.



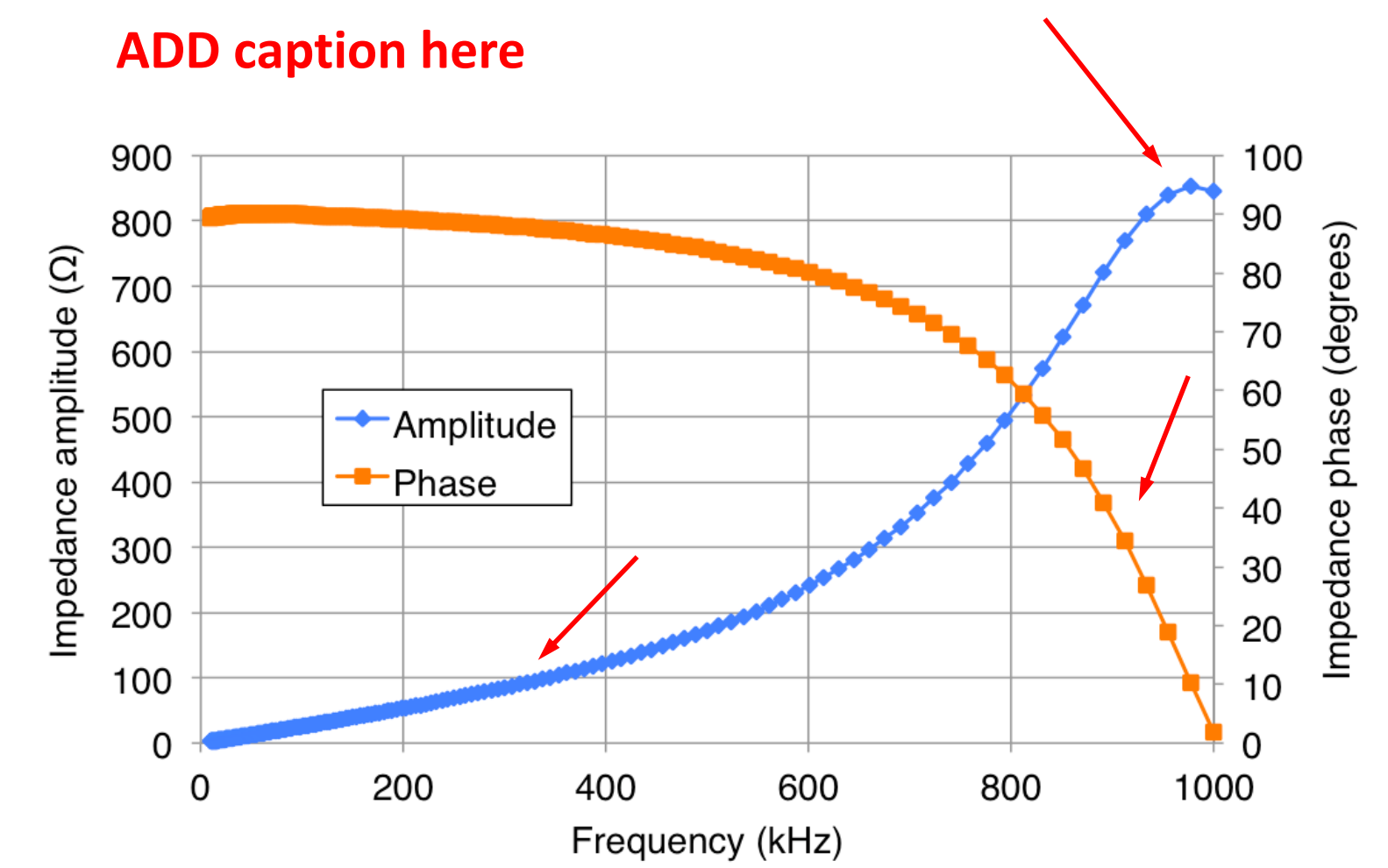
Laboratory replication of the embedment process



Coil impedance before embedment



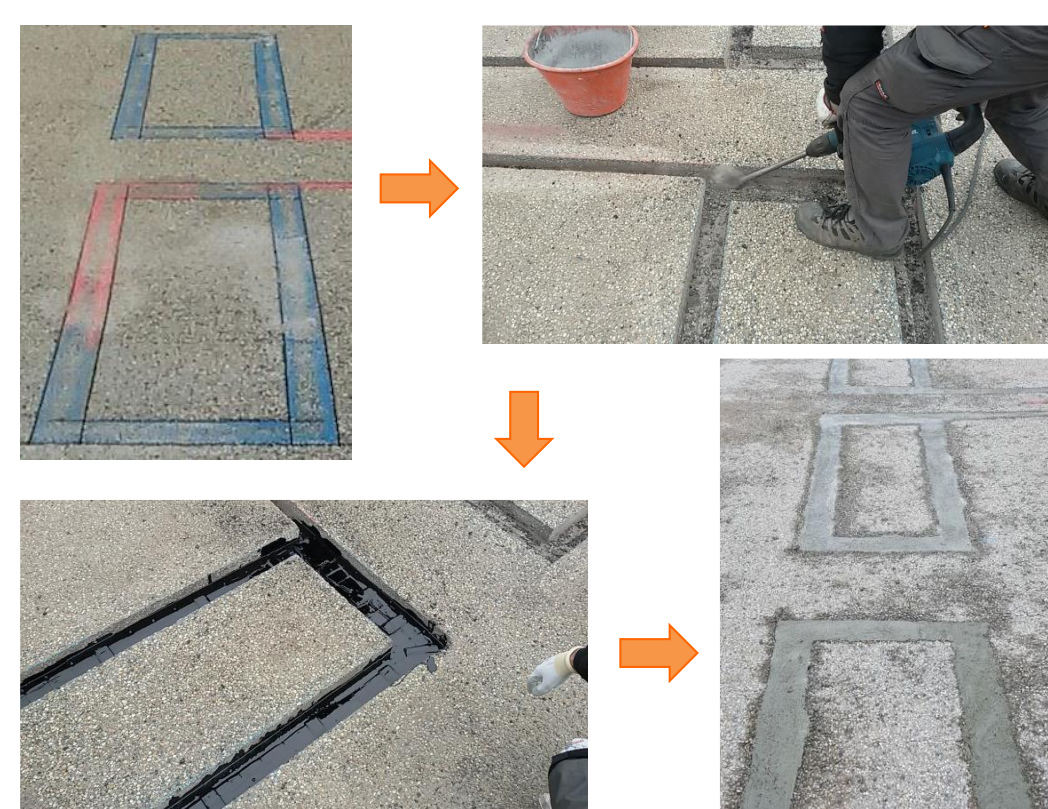
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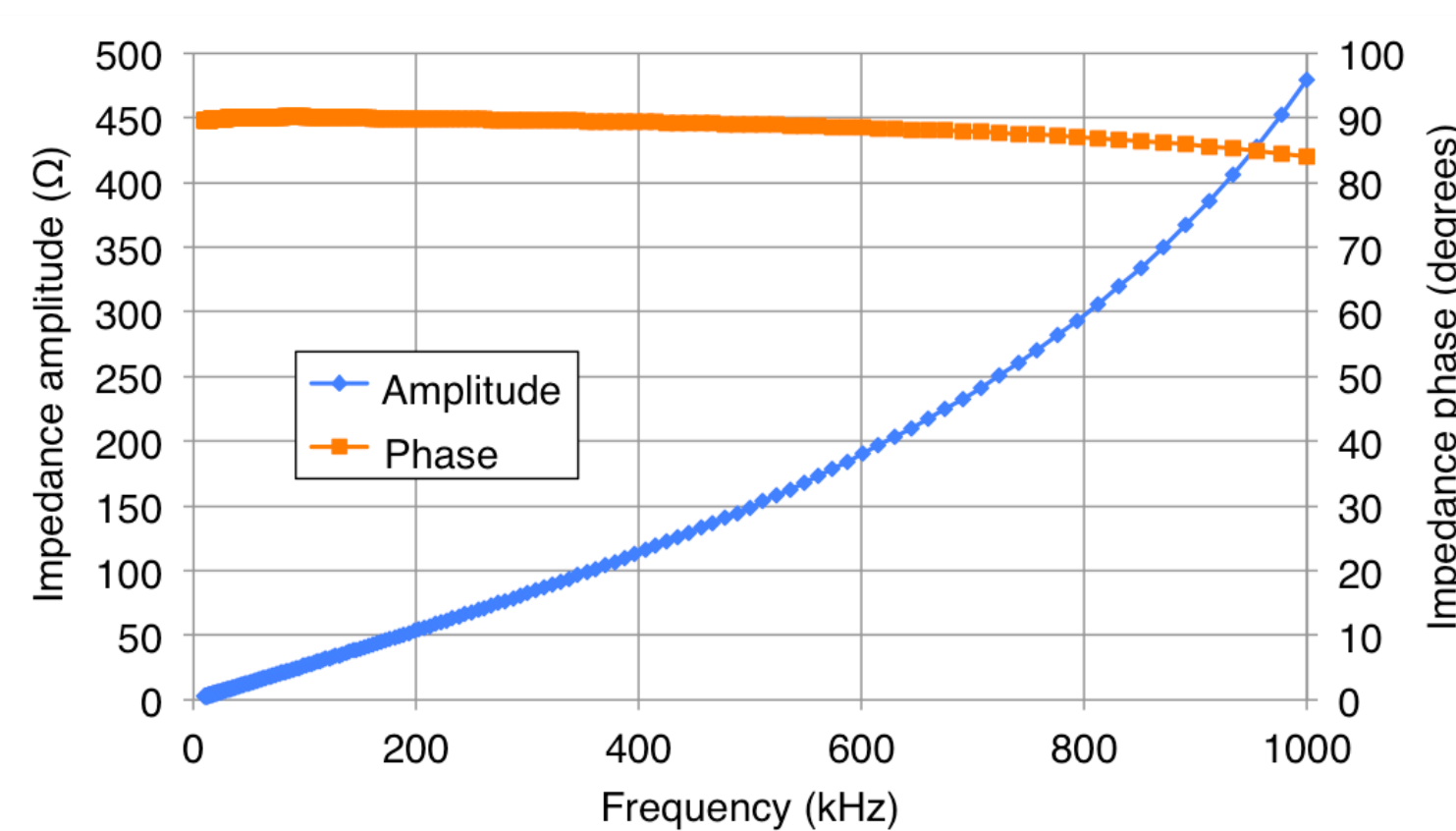
Coil impedance after embedment

#### Solution identification: materials and embedment process

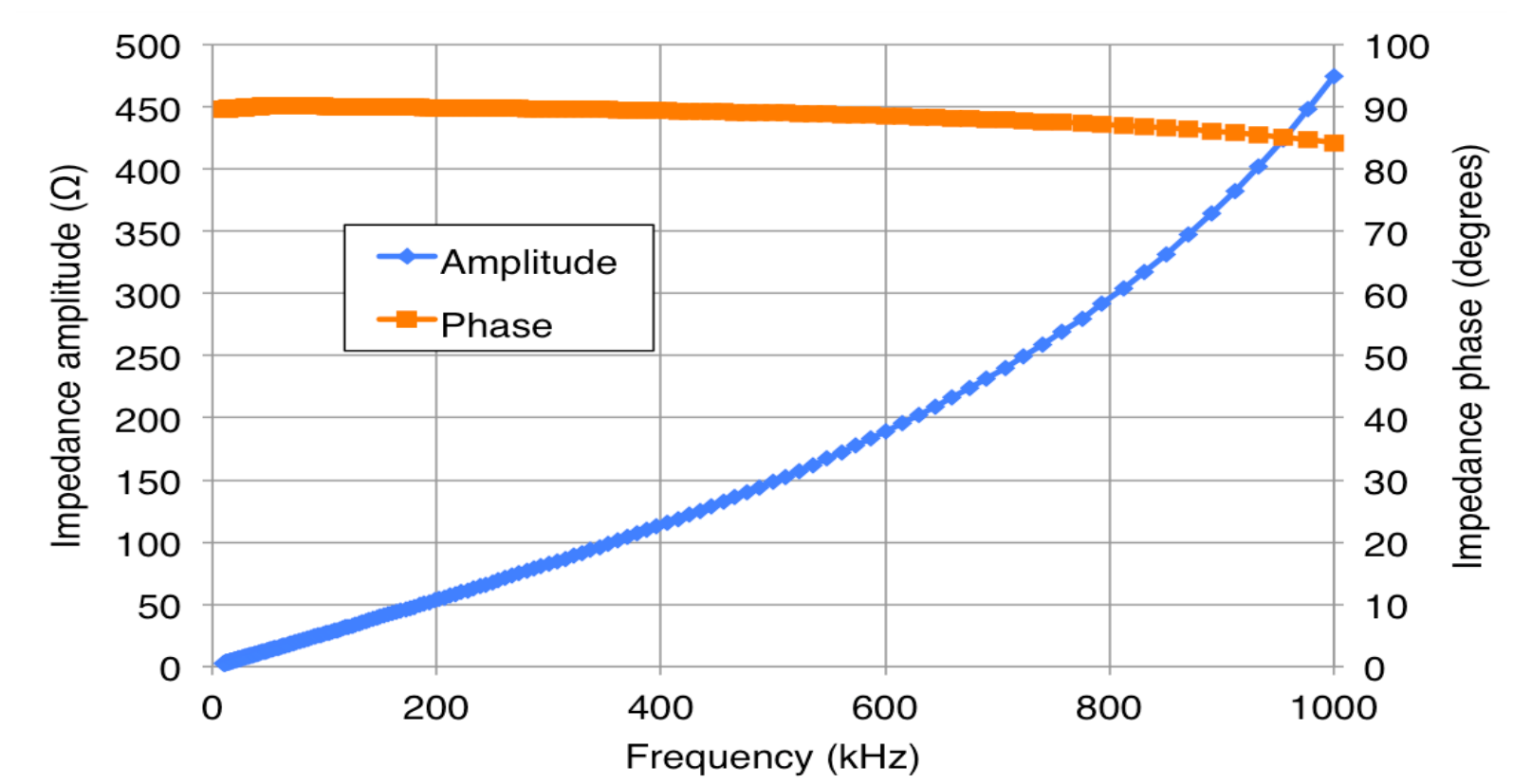
Seven different materials have been tested together with different procedures of embedding in laboratory environment and in the relevant environment of the test site. An ensemble of materials and embedment techniques resulted able to solve the problem: finally, the coil behaved like an inductor maintaining the same characteristics shown in the preliminary laboratory measurements.



Final embedment process



Coil impedance before embedment



Coil impedance after embedment WITH found out suitable materials and Embedment procedure

#### Achievements

The embedding of the transmitters in the road pavement has resulted a critical and challenging issue. The carried out tests have demonstrated that the embedded coil behavior can represent a bottleneck for the future integration of the IPT systems. This problem becomes strongly relevant for frequencies higher than 15-20 kHz adopted by the POLITO system as well as by current standards on WPT. The performed tests allowed to identify a proper set of materials and procedures that guarantees the preservation of the desired behavior.

#### Final Event & Demonstration | 21-22 June 2018 Italy

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##### Consortium



Supported by:



##### Project facts



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