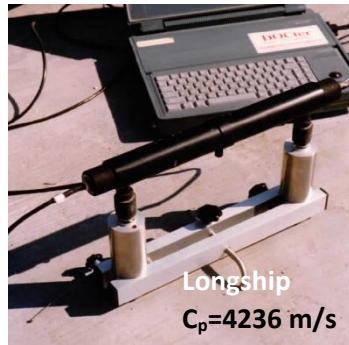
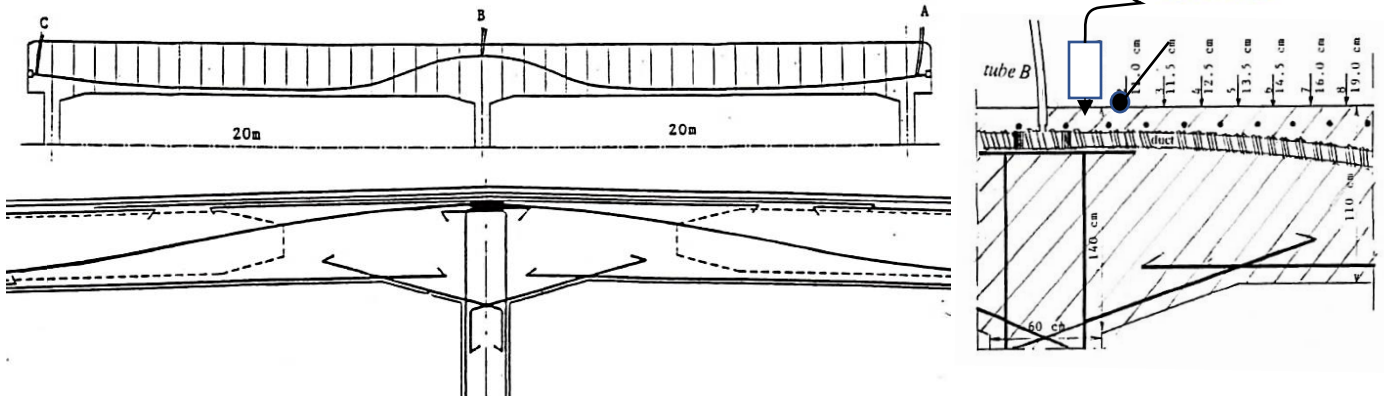


NDTitans in action



Case 8.1 Injection quality of new cable ducts with DOcter



In Eastern part of Denmark, a large bridge slab was constructed, the slab being 110 cm thick with 40 cable ducts installed in the 40 m span of the slab. After tensioning of the strands injection grouting was performed, partly by pressurizing the grout from tube “A” shown in the cross-section and partly by pressurizing from tube “B”.

Filling up of the mortar in the corrugated steel tube is quite important, not only because of stress transfer from the strands through the mortar to the slab, but also for protection of the strands from corrosion in the future.

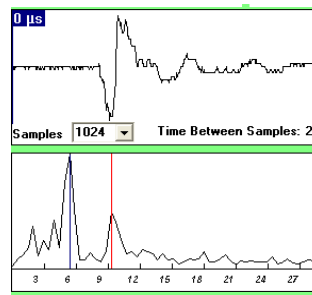
After injection, the “B” tubes were bend and secured with a steel wire. It was noticed that the grout, after injection, seeped out through the anchor ends, naturally causing a vacuum at the highest point in the cable duct, around the tube “B” inlet.

The DOcter impact-echo was used to test the injection quality after hardening, filled out or not filled out.

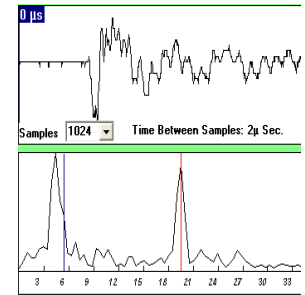
First, the wave speed C_p was estimated using the Longship illustrated above, the C_p was measured to be 4236 m/s.

Secondly, testing took place with the Mark IV impact-echo transducer in the line of the ducts, 4 m to each side from tube “B”, on all the cable ducts. The Viking software was used.

Typical signals are shown below, for a solid and for a voided duct



Unchanged solid frequency at 5.4 kHz. The P-wave runs right through the cable duct as it is also reflected at 9.3 kHz, the tendon strands at 9.3 KHz. **SOLID DUCT**



The solid frequency has dropped indicating the P-wave runs around a void. Strong 18.6 k frequency, related to 114 mm – the depth to the void in the **VOIDED DUCT**

After hardening of the grout all tubes were cut at the surface of the slab and inspection made through the “B” hole. Of the cable ducts investigated 25% were not injected, matching 100% the DOcter Impact-Echo findings. Re-injection was recommended to be done through the “B” tube hole.

Testing and reporting by **NDTitan Claus Germann Petersen**