CONTROL OF DUCTS EMBEDDED IN CONCRETE

AVOID DAMAGE DUE TO FREEZING AND ENSURE GOOD QUALITY
A typical crack in a column due to frozen water in the duct.

The use of prefab concrete elements is popular and new buildings have been built at high pace in recent years - and still are. The assembly of these concrete elements is very important for the statics of the building.

Embedded in prefab elements as e.g. columns one or more corrugated metal ducts are normally present. Reinforcement is placed inside the ducts with the purpose of transferring the shear forces between the individual floors. The casting of these ducts is normally done with a grout which is poured into the column through a hole in the side of the column and/or from the top using e.g. a water jug.

**Empty or water filled ducts**
The principle of grouting the ducts is simple, but experience has shown that errors do occur. Is the corrugated duct e.g. not properly sealed at the top prior to casting, there is a risk that water accumulates in the pipes in case of rain. An incorrect composition of the mortar - even the use of concrete with aggregates has been seen - can also cause voids in the pipes. Both types of errors can result in fully or partially empty or even water-filled ducts.
Cracks and spalling
On structures exposed to freezing, cracks or even spalling may be visible when the water in the pipes freezes and expands. However, the fact that no crack is visible is not a guarantee that the ducts are fully grouted. Air voids may still be present and hence the static assumptions are not met. If the columns are located inside a building and not exposed to freezing, there will be no visible signs of these flaws in the ducts.

Today, the normal procedure when cracks are discovered is to repair and inject the cracked columns. It is, however, no guarantee that the problem is resolved. A possible control is to examine the columns by drilling and check the ducts with endoscope. This method leaves, however, some doubt about the condition of the rest of the column and therefore doubt about the extent of a repair.

Scanning column for internal defects
An efficient control is the use of non-destructive methods (NDT) to scan the structure for internal defects such as empty ducts or a duct with minor voids. A column can be scanned and evaluated on site within minutes and give a much better overview of the actual condition of the structure. If voids are present, the data is also a valuable help in planning the location and extent of the injection or repair of the corrugated duct.

Does your building need a test?

CONTACT
Jesper Stærke Clausen
Concrete/NDT expert
Bridge and Tunnel Asset Management
+45 51616150
jtc@ramboll.dk

Morten de la Motte
Head of Department
Bridge and Tunnel Asset Management
+45 51616241
mdlm@ramboll.dk

Ramboll Danmark A/S
www.ramboll.com