

Effectiveness of MCI® Surface Protection System in Krk Bridge Preservation Project



Figure 1: Krk Bridge is reinforced concrete arch bridge connecting the Croatian island of Krk to the mainland and carrying over a million vehicles per year.

Krk Bridge is reinforced concrete arch bridge connecting the Croatian island of Krk to the mainland and carrying over a million vehicles per year (**Fig. 1**). The longer of the bridge's two arches is the longest concrete arch in the world outside of China. Krk Bridge requires constant monitoring and maintenance due to its sensitivity. The main problem of the bridge is strong wind causing it to close as well as salt that corrodes the structure. For this reason it needs to be constantly maintained so that can live up to 36 years of its expected service life. The entire reinforced concrete structure of the bridge is continuously monitored and maintained which is crucial. If only one year of maintenance is skipped it is later harder and more expensive to repair. Cost of regular and extra maintenance of Krk Bridge is around 1 million EUR annually.

Preservation Project

The improper maintenance and the environmental negative impacts, indicated negative results on supporting bridge structure. Because of strong wind the salt is accumulated on the surface of reinforced concrete structure and chlorides penetrate through the protective layer of concrete to attack the reinforcement (**Fig. 2**). Investigation carried out by competent institutions led to conclusion that continuation of this process could endanger the stability of the bridge and preservation project was initiated. The repair is continuously carried out in several phases during the time frame of 30 years.

During the project, several stages are predicted. The field investigation of the current status and the preservation project design was done by IGH, Institute for Civil Engineering in Zagreb. According to the results of the exploratory works, the concrete is mainly contaminated to the depth of the main reinforcement, so the existing concrete is removed to this depth.

After the removal of contaminated concrete layer the cleaned concrete surface is treated with MCI® 2020 – surface applied corrosion inhibitor designed to migrate through concrete structures and seek out the steel reinforcement bars in concrete.

Repair protection system using Migratory MCI® 2020 Corrosion Inhibitors

With the agreement of the investor, designer and contractor, it was decided that prior to beginning of the repair works an experimental study was carried with materials by five producers from Croatia and abroad. After additional field and laboratory tests, the investor selected Cortec's MCI®2020. The product met all the technical requirements of the project and in addition to its superior performance it is economical and easy to apply.

Unique feature of Migrating Corrosion Inhibitor (MCI®) is that if not in direct contact with metals, the inhibitor will migrate a considerable distance through concrete to provide protection.

Detailed visual inspection of the condition of concrete and reinforcement are performed first and cracks determined as well as reinforcement. The determined errors are eliminated by removing the concrete and cleaning the rebars. If the corrosion already started, MCI® 2020 is applied. Before applying the mortar, the surface must be well moistened to be saturated with water and excess water from the surface must be removed. It is important to emphasize that prepared repair mortar that is applied by spraying onto the surface treated with the MCI® 2020 inhibitor in a single layer shows excellent adhesion and no binding layer is required. Compatibility of repair mortar with migratory corrosion inhibitors Cortec® MCI® 2020 was tested and proven in laboratory in Italy.

For further information: www.cortecvci.com

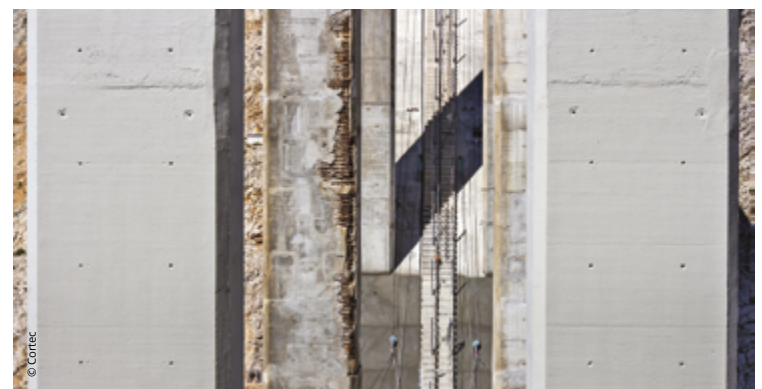


Figure 2: Because of strong wind the salt is accumulated on the surface of bridge's reinforced concrete structure and chlorides penetrate through the protective layer of concrete to attack the reinforcement.