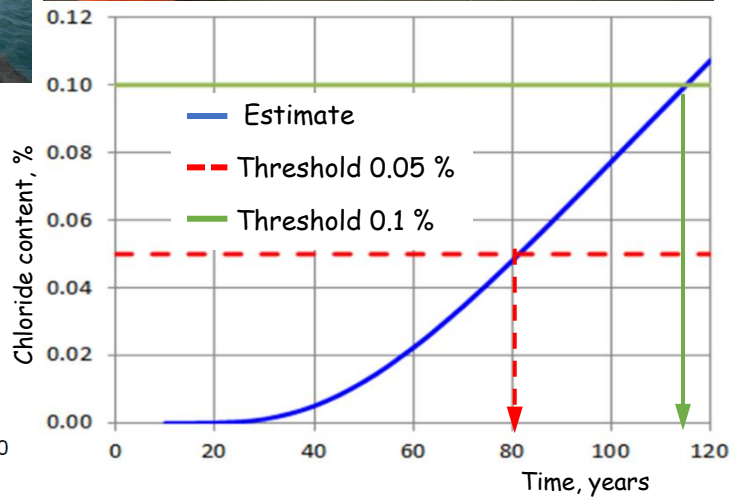
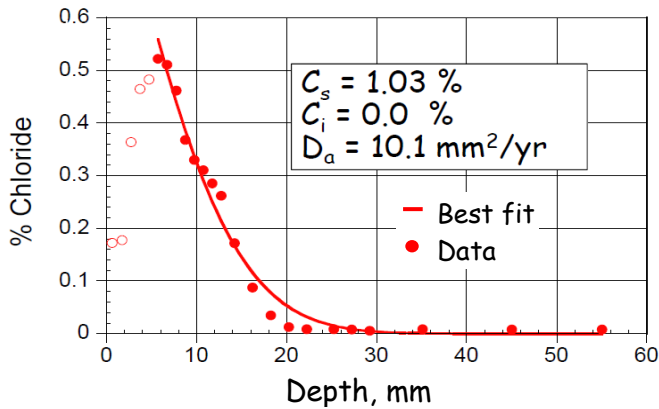


Case 1.1 Chloride Profiling and Service Life estimation of a Bridge in the Mediterranean Sea.



With the objective of estimating the remaining service life of the structure, testing for chlorides was done in a bridge in the Mediterranean Sea using the **Germain Instruments' RCT** (Rapid Chloride Test).

At the time of testing, the concrete under investigation had been exposed to the sea water for 5 years and the cover of the reinforcement was in average 80 mm.

Powder samples were collected by grinding the concrete at controlled depths towards the reinforcement in the splash zones by means of the portable **Profile Grinder** device. The acid soluble chloride content of each sample was determined directly in-situ with the RCT equipment and the chloride profile was plotted.

The solution for the Fick's second law of diffusion was applied to the chloride profile to obtain the apparent diffusion coefficient, D_a , by regression analysis. The low value of $D_a = 10.1 \text{ mm}^2/\text{year}$ is indication of a good quality concrete.

With the calculated parameters of the best fit line, the chloride content was extrapolated over time, assuming that the concrete is saturated and that the surface chloride content and D_a remain constant.

Depending of many variables, the threshold chloride content at the depth of the reinforcement to initiate active corrosion is normally in the range of 0.05% to 0.1% (by weight of concrete). For a content of 0.05%, the remaining service life was calculated to be about 80 years. For a threshold level of 0.1 %, which might be a more reasonable value for saturated concrete, active corrosion was estimated to start at a time of 115 years.

This is a good example of how a combination of good quality concrete, deep cover layer for the reinforcement and proper construction procedures that prevent anomalies in the quality of the concrete surface; provides a long service life to a structure subjected to challenging exposure conditions.

Testing shown is performed by **NDTitan Nicholas Zoides**