

LIFE-365 SERVICE LIFE PREDICTION MODEL FOR CONCRETE STRUCTURES BASIC INPUT INSTRUCTIONS

LIFE-365 is a model that allows designers and specifiers to input values for various concrete mix designs, type of reinforcement used, CNI (calcium nitrite) and other additives, as well as for sealers and waterproofing agents, to obtain a service life prediction for their structure. Unfortunately, MCIs were not included as direct inputs in this first version of the model. However, the model does allow user defined inputs, and this is where you can insert values and show the benefits of using Cortec's MCI products. To use MCI admixtures in the model, you simply follow these instructions:

The parameters that you need to change in the Life-365 model are as follows:

- 1) First, go to "structure" and then "units".
- 2) Change units to SI or US units and products to generic or commercial names.
- 3) Then go to "structure" and "general define". Here is where you will input all data for your structure such as type (parking ramp, bridge or piling), thickness, clear cover, mix design and desired service life.
- 4) Run a "base case" input all mix design parameters and any other needed information, but do not add any admixtures or special reinforcement.
- 5) Write down the D_{28} value for the base case, as well as the total cost.
- 6) Go to "scenarios" and then "scenarios".
- 7) Under automatic definition, run any other scenarios you would like with the products listed here. You can add inputs for additives such as calcium nitrite and rheocrete, or different reinforcement types. Remember to change the cost of the mix design if you change the types of additives as the computer does not do this for you. (i.e. for calcium nitrite you would add x amount to the base case cost to input the cost of adding calcium nitrite to the mix design) The price here is done per cubic meter or cubic yard.
- 8) Run any other inputs you want under the automatic definition screen and click save changes.
- 9) Go into "scenarios", "scenarios", and then "user defined".
- 10) Type MCI-2005 (or MCI-2006) and hit "add".
- 11) Type in the total cost--add about \$16/yd³ for MCI 2005 or about \$17/yd³ for MCI 2006 to the base case cost and use this value for the total cost with MCI added.
- 12) Change the D_{28} to match the base case value.
- 13) Change m to match the base case value.
- 14) Change the C_1 to 0.18%.
- 15) Change the propagation period to 30 years if using MCI-2005. The model uses a default value of 6 years for the propagation period (time from initiation of corrosion to first repair). According to ASTM: G109 testing, MCI-2005 decreases the corrosion rate about 5 times compared to the control, so it would take 5 times longer from the time of initiation to your first repair, thus the 30 year propagation period. MCI-2006 decreases the corrosion rate 12-15 times

that of the control, so you would want to use 72-90 years for your propagation period.

- 16) Click "okay" and save the changes.
- 17) Go to "analysis" and click on "time to corrosion".
- 18) The computer will perform the analysis and show you a concentration printout for chlorides first. You can change the output to "tabular output" and this will show you a comparison of initial cost per square foot, time to initiation, propagation period, repair cost, and total life cycle cost per square foot.
- 19) You can play around with various scenarios and analyses to make comparisons.
- 20) You can print out and/or save any analysis that you would like to under "file".