

# Experimental Study on Marine Salts Behavior Around Concrete Structures

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**Abstract-** The aim of the project is to investigate the effect of salt water on the compressive strength of concrete. The development of chloride penetration is essential for the assessment of service life of concrete structure. Chloride attacking in reinforced concrete structure through the crack is more dangerous than uncracked concrete. Several reinforced concrete structures that get deteriorated by rebar corrosion are retrofitted using carbon fiber reinforced polymer (CFRP). When rebar comes in direct contact with CFRP rebar may corrode as iron is more active than carbon. This study deals also with the macrocell and microcell corrosion of steel bars in cracked concrete exposed to an environment. Test items include electrochemical and physical evaluation of corrosion chloride ion content in concrete. The concrete cubes were cast using fresh water and salt water for design mix of M30

**Keywords-** Reinforced concrete, Rebar corrosion, Carbon fiber reinforced polymer (CFRP), M30, Chloride attack.

## I. INTRODUCTION

In Marine Environment the service life of reinforced concrete structures depends mainly on deterioration due to reinforcement corrosion. The difficulty in modelling mechanism and its effect on the structure led to the usual consideration of service life as the initiation period. Reinforced Concrete (RC) is commonly used as construction material. The major cause of RC failure is corrosion of reinforcing steel bars (Rebar). Continuous availability of oxygen, moisture, chlorides and atmospheric condition provide a favourable environment in accelerating corrosion. Corrosion is the result of an electrochemical process having several chemical reactions with flow of electrons. Anode, cathode and electrolyte are the essential parts of the corrosion process. The steel and concrete bond gets affected and in certain cases it may get completely lost also the bearing capacity of RC flexural member reduces. Using Fiber reinforced polymer composites in strengthening of damaged RC member is one of the common the method. It is worth using FRP in strengthening of RC can resist corrosion

effectively. The wrapping of CFRP sheets prevents the corrosion including elements thereby providing passive protection to rebar against corrosion. The corrosion of plain steel accelerates in contact with CFRP in de-icing solution and seawater. To investigate corrosion process of steel in contact with CFRP in chloride rich environment corrosion rate in steel rod attached to carbon epoxy was found to be 10 times that of bare steel rod. The corrosion of steel multiple of 24 in de-icing salt solution and 57 seawater when steel and carbon fibres coated with a thin film of epoxy are coupled together. The progression of rebar CFRP strengthened RC structures is monitored.

## II. OBJECTIVE

- To determine the strength of beam.
- To accelerate the corrosion and check the corrosion behavior between two beam.
- To compare the buckling strength of ordinary beam and CFRP used Beam.

## III. MATERIALS

Materials investigation is done to test the various materials that are used in making concrete cubes. According to these test results obtained we designed the mix ratios for the materials and prepared the concrete cubes and cylinders.

- Cement
- Fine aggregate
- Coarse aggregate
- Water
- CFRP

## IV. LITERATURE REVIEW

O.O.Akinkurolere, Cangru jiang had done research on THE INFLUENCE OF SALT WATER ON THE COMPRESSIVE STRENGTH OF CONCRETE in (2007). The concrete cube were cast using fresh water and salt water

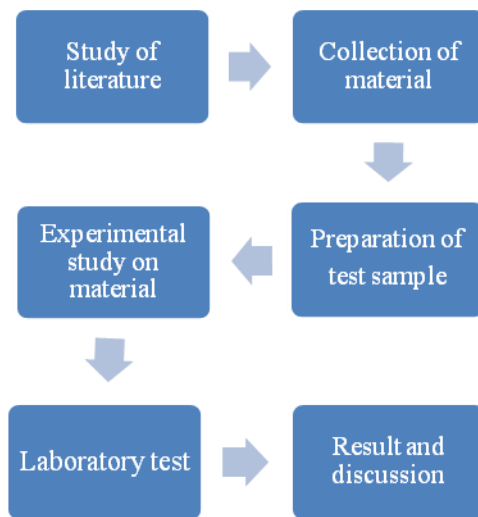
for design mix of M30. The presence of salt or ocean salt in the mixing and curing water the rate of strength is also affected. When the concrete is cast and cured with salt water. Mixing concrete with salt water increases the compressive strength. The strength which started to increase till 28 days.

C.SENTHIL KUMAR, V.NAVEENRAJ had research on ESTIMATION OF MARINE SALTS BEHAVIOR AROUND BRIDGE STRUCTURE in VOL,3,Nov(2014). This experiment study about the parameter used in the penetration model where calibrated to allow the prediction of chloride content in concrete. In marine environment thereinforced concrete structure is mainly depend on deterioration due to reinforcement corrosion and due to corrosion it is difficult to mould the concrete. The specimen which is used in the experiment to test are compression test 150x150x150mm, split tensile test 300x150mm, flexural test 100x100x500mm. From this study it has been found that the strength, durability and compressive strength of column structure element.

IN PRE CRACKED PLAIN AND FIBRE REINFORCED CONCRETE BEAMS IN March (2020).

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- [6] Haong quoc vu, Boonchai stitmannaitum and sugiyama takafumi had done the research on EXPERIMENT STUDY ON CHLORIDE PENETRATION DEPTH IN CRACKED REINFORCED CONCRETE Vol.2, in May (2013)

## V. METHODOLOGY



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