

## **Technical Session BII – Engineering Sciences**

### **BII 01 Use of repair mortars for corrosion prevention of existing reinforced concrete structures**

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Sri Lanka has large number of Reinforced Concrete (RC) structures near to coastal belt. Corrosion of steel reinforcement bars in concrete causes the deterioration of RC structures. Corrosion loss consumes considerable portion of the budget of a country as either restoration measures or reconstruction. By using repair and retrofitting methods at right time, the financial expenditures can be reduced. Therefore, it is necessary to introduce new repair and retrofitting methods for RC structures in Sri Lanka. This study presents development of mortars to repair the structures corroded due to chloride ion. Repair mortars were developed with less permeability characteristics of chloride ions by adding Fly Ash (FA) and Silica Fume (SF) separately. RC beams were cast with concrete grade of G20, steel bars having diameter of 16 mm and clear cover of 10 mm. Size of the beams used in the study was of 380 mm x 80 mm x 130 mm. The corrosion process of beams was accelerated by using Accelerated Corrosion Test Method (ACTM). The repair mortars, thickness of 10 mm, were applied on corroded beams as a result the final clear cover became 20 mm. The efficiencies of the repair mortars on corroded RC structures were evaluated by using Rapid Chloride ion Permeability Test (RCPT), free and total chloride ion concentration measurement, rust production measurement and possible corrosion rate measurement. It was found that the repair mortar prepared with 75% of FA has the lowest permeability, and 15% of SF also contributes to reduce permeability but less than that with the FA. Repair mortars prepared by using 50% of FA and 10% of SF performed effectively in preventing corrosion compared to the control sample. It can be concluded that use of FA and SF based repair mortars prevents the further corrosion of steel reinforcement bars in concrete.

**Keywords:** corrosion, fly ash, RC structures, repair mortars, silica fume