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A CASE STIDY OF DEFECTS IN RCC WORK, PLASTER AND IT'S PREVANTION USING EPOXY TECHNIQUE

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ABSTRACT

Cracking in structures is of common occurrence and Engineers are often required to look into their causes and to carryout suitable repairs and remedial measures. For repairs and remedies to be effective, it is essential that an engineer should have proper understanding of various causes of cracking. For investigating the cause, it is necessary to observe carefully the location, shape, size, depth, behaviour and other characteristics of the cracks. It is also necessary to collect the information about specifications of the job, time of construction and past history of the structure. It is also necessary for the Engineer to know when the crack first occurred and whether the cracks are structural or non-structural. The formation causes, prevention and treatment of cracks were studied. The different types of cracks, the various reasons for occurrence of cracks in RC structures were also studied. The preventive methods to avoid cracks and the different treatment methods available are also included in our study.

Keywords : Crack, treatment, grouting, stitching, epoxy, corrosion

INTRODUCTION

Concrete is an extremely adaptable material that may be precast or prestressed to provide any necessary strength, as well as put in place with or without reinforcing. It also necessitates a thorough comprehension of how its components behave and interact. Any carelessness in any of its design, manufacture, deployment, or maintenance phases would cause it to degrade and finally cease to serve its intended purpose. Concrete degradation and deterioration can be caused by a plethora of different factors. Construction mistakes, corrosion, design mistakes (poor structural design and poor construction detailing), erosion, and chemical reactions (acid attack, aggressive water attack, alkali-carbonate reaction, alkali silica reaction, sulphate attack, and other chemical attacks) are a few of them. shrinkage (plastic shrinkage and drying shrinkage), temperature changes, fire, and weathering are some more processes that can happen to materials. Only the design and construction flaws causing concrete to deteriorate and fail will be examined in this study.

BACKGROUND

Causes for Defects in Concrete Structures

Causes of defects in concrete structures can be broadly categorized as:

1. Structural deficiency resulting from errors in design, loading criteria, unexpected overloading, etc.
2. Structural deficiency due to construction defects.
3. Damage due to fire, floods, earthquakes, cyclones etc.
4. Damage due to chemical attack.
5. Damage due to marine environments.
6. Damage due to abrasion of granular materials.

Methods of Concrete Crack Repair

Epoxy is a type of polymer, a group of chemical compounds that consist of large molecules with repeating subunits. The molecular structure of polymers give them their toughness and elasticity, making polymers (both natural and manmade ones) ubiquitous in daily life. Wool, rubber, Styrofoam, and epoxy are just a few of the polymers that you likely already know.

Methods To Use Epoxy

1. Using epoxy as a layer on reinforcement bar

Epoxy Coated Rebar serves as a barrier system to stop moisture and chlorides from corroding the reinforcing bar's surface. It improves corrosion resistance. When reinforcements are exposed to accelerated corrosion, epoxy coated rebar is employed to offer additional protection. As concrete is used in a wider variety of applications in corrosion-prone areas, the use of these bars has significantly increased. The best defence against abrasion, turbulence, corrosive liquids, and severe temperatures is provided by epoxy coatings. Rebar that has an epoxy coating is not only strong but also resistant to a variety of corrosives.
Fusion Bond has been applied to these kinds of bars. When the temperature of the atmosphere is normal, these coatings take the form of dry powder. Applying the particles electrostatically to the surface of hot, thoroughly cleaned steel bars and, after going through various chemical processes, cured to form a shielding film. Due to the protective film, the epoxy-coated rebars survive longer and improve the construction's quality. A high pH environment must be adhered to, the coating must be consistent, and the epoxy coated TMT bar must be chemically stable.

Fig1. Using epoxy as a layer on reinforcement bar

2. Manufacturing of Epoxy Coated Rebar

- The process starts with rebars positioned into shakeout table or fluidization bed where it is spread out to a conveyor system
- The steel is visually inspected for oil, grease and other contaminants
- The steel is then moved towards a blast cleaner wherein the contaminants are removed
- The steel is now ready for proper coating
- Bars them pass through a powder spray booth where spray nozzles embed a dry epoxy powder

- Electrostatic charges are then pushed into the powder particles resulting incomplete and even coating
- As dry powder heats the hot steel it melts and flows into the peaks and valleys of the steel covering and conforming to the bars
- Following the powder application, the coating is allowed to cool for 30- 40 seconds
- The coating cures to a hardened state and develops most of its beneficial properties

Different test methods for checking the quality of Epoxy Coated Rebar

- Test Method for holiday detection
- Test Method for coating thickness
- Test Method for impact strength
- Test Method for bend-ability
- Test Method for bond strength
- Test Method for alkali resistance
- Test Method for corrosion resistance

Applications of Epoxy Coated Re-bar

- Underground buildings
- Bridges
- Pavements
- Offshore structures.



Fig2. Application of epoxy Rebar

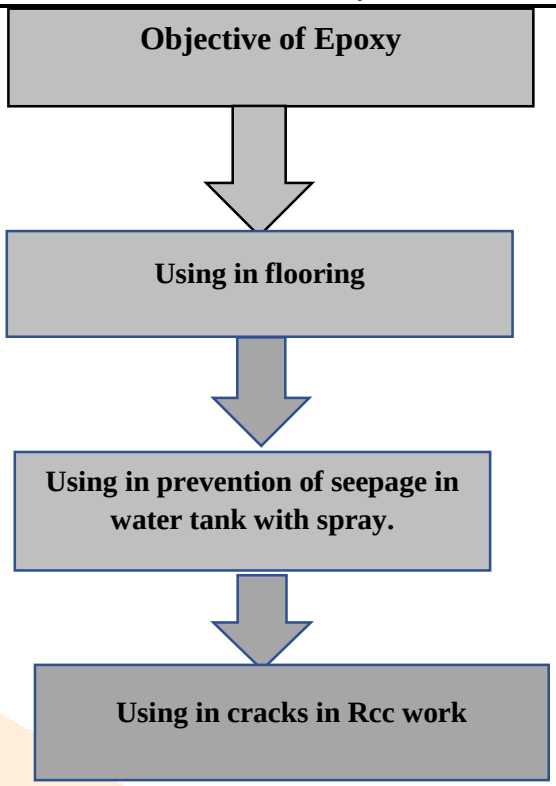

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Fig3. Epoxy used in water tank wall

Fig4. epoxy used in flooring

PLASTER

Introduction

Plaster is a building material used for coating, protecting and decorating internal walls and ceilings. It can also be used to create architectural mouldings such as ceiling roses, cornices, corbels, and so typically manufactured as a dry powder and then worked to form a stiff paste by mixing in water before application.

Types of plaster by application

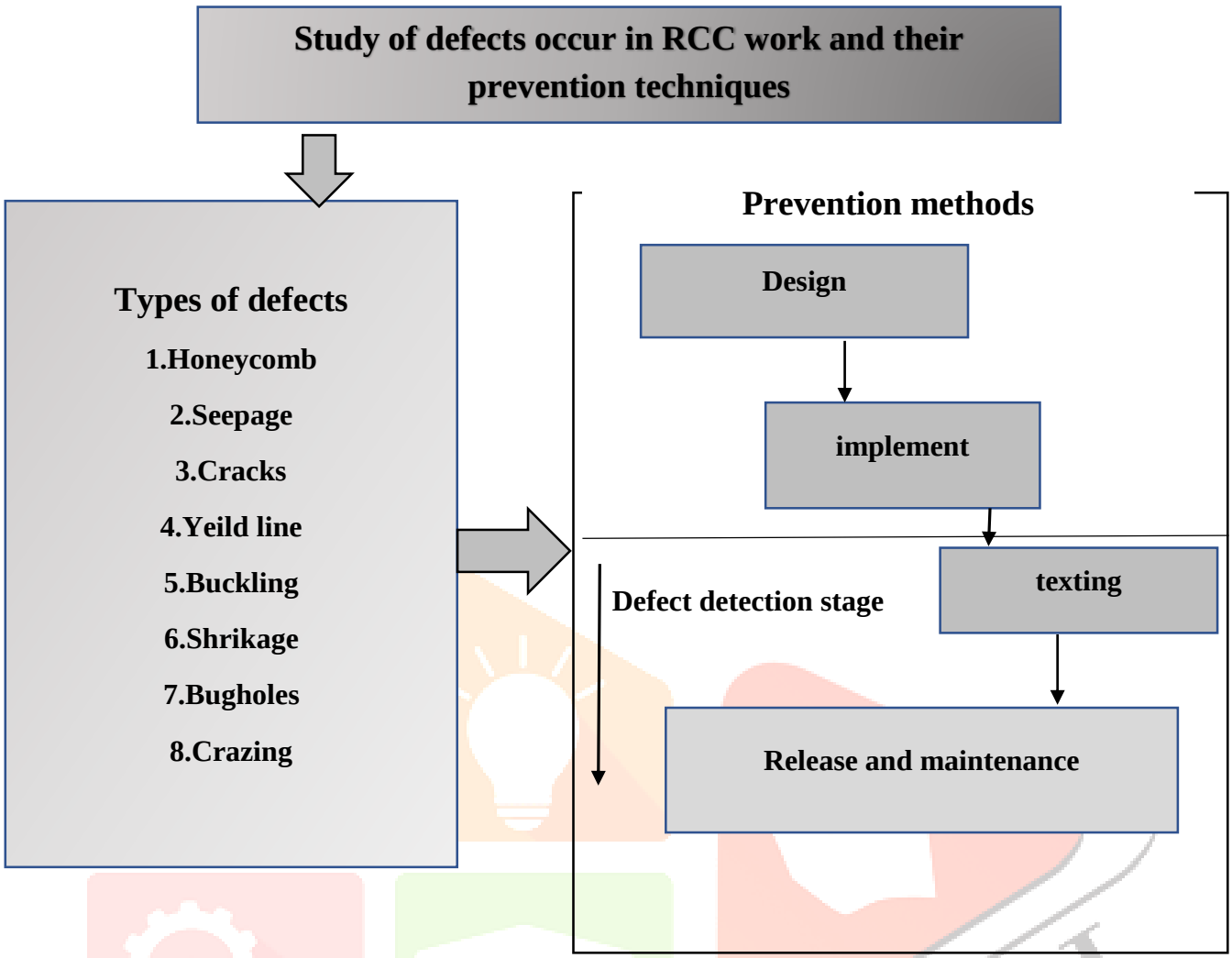
Plasters can also be categorised by application:

- Board finish plaster is used on plasterboard.
- Bonding plaster is used as an undercoat, applied to new walls.
- Browning plaster is used as an undercoat for particularly absorbent surfaces.
- Dry-coat plaster offers moisture resistance for walls that have had a damp proof course (DPC) inserted or injected.
- Hard wall plaster is similar to browning plaster, but is faster drying and has better impact resistance.

LITERATURE REVIEW

S.no	Year	Authors	Focus on the Paper	Key points In Coverage	Techniques Used
1.	**2015**	ZHOU Jing-Cheng, LI Xing	Focus on the formation of cracks from external factors, such as cracks caused by temperature, external.	Concrete crack. defect of concrete-structure, prevention and repairing measures of cracks.	
2.	**2016**	Rajveer Singh Narwaria and Archana Tiwari	Cracks in the building as beams, column	using adequate material and technique of construction	technique of construction and considering design criteria
3.	**2018**	Jing Xu, Xianzhi Wang, Junqing Zuo and Xiaoyan Liu	Building cracks, structural and non-structural parts of the building	Causes of cracking and preventive measures	Techniques for treatment of cracks
4.	**2018**	Cheta J. Chitte and Yogesh N. Sonawane	Protective carrier is essential for the self-healing of concrete cracks by microbial induced $CaCO_3$ precipitation, owing to the harsh conditions in concrete	Heat treatment and NaOH soaking are first employed to improve the loading content of the ceramist.	Porous ceramist particles are used as microbial carrier

METHODOLOGY



OBJECTIVE

- After preventing such problems in RCC work using plastering, it will increase its life span.
- It will be more economical to find out the defects and preventing them using plastering or epoxy in comparison to reconstruct the whole structure.
- It will show more resistivity to weather various forms like temperature changes and in rainy season or in high velocity of wind.
- It will give ease to extend the construction of any present structure with the use of epoxy rearing.
- By preventing defects we can prevent water wastage through seepage.
- By avoiding defects we can avoid the delay in time and proceed the site work more easily and comfortably.

EXPERIMENTS

CHAPTER 1

FINDING OF DEFECTS IN NEAR BY LOACALTIES

1.CRACKS

3.SPAILING

2.BLISTERING AND CRAZING

CHAPTER 2

MAKING OF MORTAR

SPECIFICATIONS OF MATERIALS USED

CEMENT:

Grade:43

Cement used:1.5 kg

SAND :

Fine coarse sand

Size: 125 micron

Sand used: 4.2 kg

WATER MORTAR RATIO:

45%(2.5 KG approx)

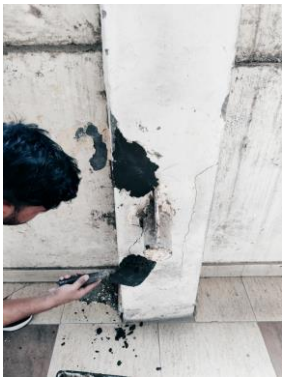

4.REFINING SAND WITH SIEVES




5. PROPER MIXING OF CEMENT SAND MORTAR WITH 40% OF WATER`

CHAPTER 3

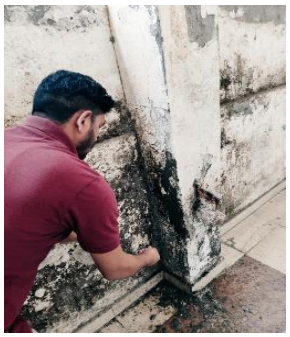
APPLICATION OF MORTAR AS PLASTER ON THE DEFECTS FOUND :



6.APPLICATION OF PLASTER ON CRACKS AND SPAILING

CHAPTER 4

CURING


7.CURING OF THE MORTAR PLASTERED ON THE DEFE

CONCLUSIONS

- Different methods involved in the repair of cracks are obtained and it is learnt to know the suitability of repairing methods for various cracks.
- A treatment is given for cracks on the roof of residential building to control the permeability and to make the joints water tight.
- The versatile diagnostic devices, clearly indicating the specific problems in the concerned RC members, in addition, they also indicate the degree of seriousness of the problem.
- Prevention of cracks for the buildings is also suggested such as design the members to handle all anticipated loads, protect and cure concrete properly
- The formation of cracks can be prevented if proper care and supervision is taken and if the cracks are still formed then the suitable measures can be taken to treat them.

FUTURE SCOPE:

To avoid such defects for future in concrete we can take many things into considerations:

Like:

FOR CRACKING :

- Make sure that your mix isn't too wet.
- Use the least amount of mix water necessary to keep your concrete workable.
- Minimize your mix water content by maximizing the size and amount of coarse aggregate you use.
- Use low-shrinkage aggregate.

AUTHORS

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