Causes and Remedies on Concrete Cracks-A Review

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ABSTRACT
Nowadays the appearance of a building has been given more importance, though this is a good thing equal importance should be given to the safety measures of the concrete buildings. As it takes lot of manpower to work on construction it is necessary to look into the safety of the concrete. Cracks on the concrete structure occur due to various reasons. Engineers on the other hand are working on its remedies especially for the longevity of concrete structure. Apart from conventional and manual remedies self healing crack phenomenon has also been discovered using bio materials.

Keywords--- Cracks, RCC, Bio materials

I. INTRODUCTION
Concrete cracks which are unavoidable have been taken into account considering the safety of the modern buildings. When the luxurious modern architecture seems authentic and unique its structure has to be maintained internally and externally from sources that cause damage to the concrete structures. Despite proper treatment cracks occur on the concrete, therefore proper remedies should be done on considering various factors such as size, shape, and location and type of the concrete.

SYED MOHD MEHNDI et al., experimented on the causes of cracks on the concrete structures and how to figure out crack size. To repair the cracks, it depends upon the size and position of the cracks on the concrete. Good crack repairing methods depends upon the causes of the cracks otherwise the repair may not last long. Structural cracks should be taken seriously as it may lead to unsafe structure. Concrete develops certain types of cracks at its pre hardening stage and some other types of cracks at its post hardening stage. These cracks when they get older pave way for moisture and harmful gases which will lead to degradation of structure. Cracks are normal in a structure but too many cracks may lead to serious issues and failure of structure. Hence cracks can be treated as a cancer in RCC structure, as cancer which in its primary stage is curable to a certain extent but becomes danger to life later in stage; same happens with cracks”. Repairing of cracks can be done by crack compactor and ultrasonic testing. Crack compacting is efficient for measuring small cracks whereas ultrasonic testing is used for slightly bigger cracks.

POOJA NAMA et al., this paper has focused on the problem of cracking and the preventive measures. Cracking is unavoidable. A crack is defined as a complete or incomplete separation of concrete by fracturing. Concrete has been in use since 19th century due to low quality of cement. It started developing faster in production, experimental work, computational theory and improvement of construction technique and now it has become one of the most widely used building materials in the modern construction. Cracks are considered as a universal problem of construction because it affects the integrity of the wall, structural safety and durability. Cracks occur due to the deterioration of concrete or corrosion. Cracks can be classified into structural cracks and non structural cracks. Structural cracks occur due to incorrect design faulty construction or overloading which endangers the safety of the building.

KISHORE KUNAL et al., this paper has focused on the occurrence and remedies of cracks. For the longevity of the structure the engineers are often required to check cracks and treat them with suitable remedies. While investigating the causes of the cracks, it is necessary to look after the shape, size, depth, location, behavior and other characteristics of cracks. Nowadays modern structures are comparatively tall and slender with thin walls. Therefore these buildings due to thin walls are easily prone to cracks. A building develops cracks when the stress exceeds its strength. Stress occurs due to external forces such as wind, seismic forces and it is disturbed internally due to thermal variations, moisture changes, chemical actions etc. crack may vary in width size from a size of a hair crack to a gap width of 5mm or more.

H.M JONKERS focused on the causes and prevention of crack formation. Formation of cracks can hardly be avoided. As regular manual maintenance and
repair of concrete is costly, discovery of self healing repair mechanism is very effective and beneficial. Crack healing capacity of a specific bio-chemical additive, consisting of a mixture of dormant bacteria and organic compounds packed in porous expanded clay particles, was created. The microscopic techniques and permeability test reveals complete healing in bacterial concrete. The mechanism of self healing bacterial concrete is conversion of calcium lactate to calcium carbonate which results in crack sealing. It works well in sub millimeter sized cracks. Thus further development of this type of self healing cracks results in a more durable and sustainable concrete that are well suited in wet environments.

TAE-HO AHN and TOSHIHARU KISHI focused on the self healing concrete and longevity of the concrete structure. This is also considered as maintenance free method. It is also very cost effective. The serviceability limit of the concrete structures is governed by the extent of damage. This limit can be overcome by crack control methods. When the life of concrete is increased it would decrease the demand for cost maintenance. The self healing technologies are very useful especially in repairing the cracks found in underground tunnels. The self healing concrete phenomenon is done using geo materials. For experimenting, a self healing concrete was used in a ready mixed car in a ready mixed car and used for artificial construction of water retaining structures and actual tunnel structures. The result showed that the crack was healed up to 28 days of re curing. The size of the width reduced from 0.22 mm to 0.16 mm, the phenomenon is mainly due to the swelling effect, expansion and re-crystallization. Finally it is concluded that appropriate dosages of geo materials has a high potential for repairing concrete under the water leakage of underground civil infrastructure such as tunnels.

KAZEM REZA KASHYZADEH focused on the types of cracks and its remedies. Cracks are classified as structural cracks and non structural cracks. Cracks are mostly due to shrinkage, due to drying during the curing, due to reinforcement corrosion. Shrinkage occurs because of the evaporation of the moisture on the surface of the concrete in ambient air. Reinforcement corrosion is due to the corrosive environment that is due to the influence of chloride ions and other materials such as ferric and ferrous oxidation of steel. Cracks during curing are caused due to the impact on load carrying capacity. To control these causes monitoring of the cracks from an early stage to avoid complications. These can be done during data collection, research and maintenance operation.

E. SCHLANGEN et al., focused on the self healing cracks in cement based materials and asphalt concrete. When discussed about bacterial concrete, it is done by mixing bacterial in concrete, it then can precipitate calcite in a crack and with that it makes the concrete water tight and enhances durability. For curing asphalt concrete he uses micro capsules or steel fiber as self healing tool. After experimenting he concludes that self healing is not just a miracle but can be designed for it.

II. CONCLUSION

This paper which focused on the remedies and self healing cracks concludes that causes and characteristic features of the cracks should be considered before going for the remedy for an effective and long lasting concrete. It is said that a building develops when the stress caused due to external factors exceeds its strength. Cracks occur mainly due to shrinkage, curing and corrosion. Cracks can also be cured using self healing phenomenon such as using bacterial concrete where it converts the calcium lactate to calcium carbonate which results in crack healing.

REFERENCES