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CRACKS: ITS CAUSES AND PREVENTION

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ABSTRACT

In recent years we have developed very much and yet has to come but with development probems also arises. Pollution, global warming, natural clamities, earthquakes all are increasing day by day and due to this causing severe damage to buildings like one of the majors is cracks in buildings. Not only it is caused by the pollution or global warming but poor practices, poor construction materials also cause cracks in bulding.

In this paper I have discussed some of the causes for cracks in bulding and remedies to prevent these cracks. As these cracks are too much hazardous for a bulding or any structure, due to this a structure loses its strength and sooner deteriorates.By controlling theses cracks we can increases its service life.

INTRODUCTION

Cracking is in various engineering construction process has attracted more and more attention of builders and researchers, which also play an important role in disease research. Many scholars have done a lot of research on cracks in concrete structures. [5]

Cracks are the most common defect in concrete structures(beams or columns) or building structures. Cracks may develop during service life or after service life depends on the materials used , internal stresses, loads applied on the structures. When the value of stresses exceeds which are associated to the externals loads like dead, live etc the strength of the structures weakens..

These develop due to deterioration of concrete or corrosion or reinforcement bars due to poor construction or inappropriate selection of constituent material or by temperature and shrinkage effects.[1]

So, it is important to understand the types of cracks, crack patterns and their causes and the preventive measures to be taken to control the cracks.

LITERATURE REVIEW

1. **Pooja Nama** In their research paper they have discussed about poor constrution practices which leads to cracking of building and their remedies to control their cracks. They have taken different different case studies in their research paper for their anaysis.
2. **Chetan J. Chitte** Structural cracks are the one whose inherent cause lies in either in incorrect design, or faulty construction or overloading and are the one which can endanger the safety of a given structure. On the other hand, the non-structural cracks are the one which have the underlying origin due to moisture or thermal fluctuations, elastic deformation, creep, chemical reaction, or reason related to the foundationsoil such as it movement or settlement or unhindered vegetation.
3. **Snehal Abhyankar** Study of different types of cracks in plain and reinforced concrete subjected to environment full of chloride and carbon laden corrosion problems. RCC structures life can be enhanced by proper maintenance and repairs. Structures may cause matrix cracks, loading at variable speed due to non adherence of materials . Results studied were analyzed and rechecked by creating simulations of models. Increasing crack width and length lead to new study of infinite plate.
5. **Hong Pan, Ling Pi** Then a crack database is tried to establish to seek and summarize the relationship and laws between the types of cracks and the forms of crack distribution, so as to provide references and helps for quick inquiry, judgment and scientific prevention and control about cracks in engineering, and ultimately to improve the durability and service life of the structures.

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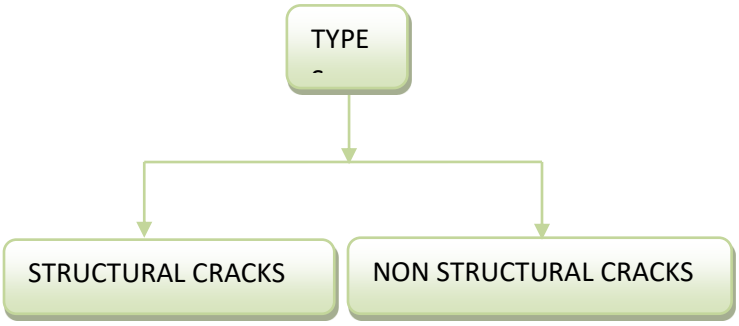
CLASSIFIATION OF CRACKS

Cracks in reinforced concrete can be classified into two groups:



Structural cracks: These cracks generally occur in breams, columns, slabs due to incorrect proportion of materials, overloading. Structural cracks generaly occur in beams, columns, slabs.

Columns	Beams	Slabs
Horizontal Cracks	Fleural Cracks	Shrinkage Cracks
Diagonal Cracks	Shear Cracks	Fleural Cracks
Corrosion Cracks	Torsional Cracks	Corrosion Cracks
	Tension Craks	
	Corrosion Cracks	

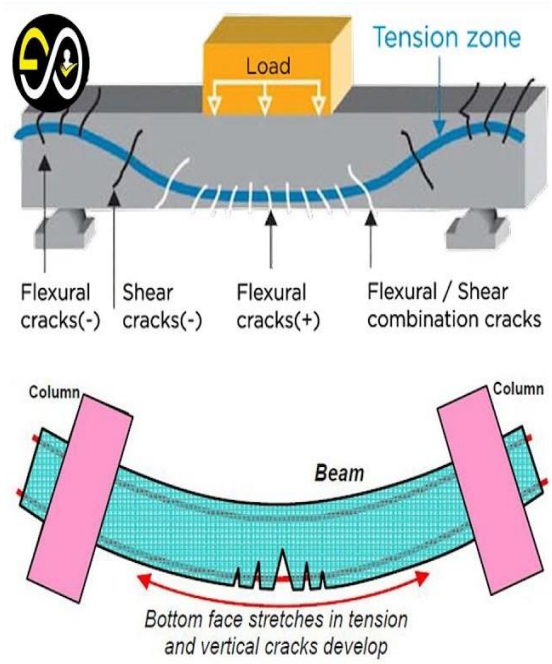


Fig. 1 Structural Cracks in Beams

Fig. 2 Non Strctural Crack

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Non Structural Cracks : These cracks develop due to iternal forces changing continuously due to the change in moisture, variation in temperature. These vary in width from very fine to very thick. Based on their width these are classified as:

Classification	Width of crack(mm)
Thin	< 1
Medium	1-2
Wide	>2

CAUSES OF CRACKS

1. **Moisture change**
   Materials used in buiding while construction absorb moisture from the atmosphere leads to expansion and after drying due to shrinkage cracks develop.

Fig. 3 Crack due to moisture change

2. **Thermal Movement**
   These types of cracks develop due to the changes in temperature. Some of the materials used in construction are sensitive to temperture. So, in winter season(temperature decreases) they get contracted while in summer(temperature increases) which leads to expansion of mateials. This regular expansion and contraction causes cracks in buildings.

3. **Due To Vegetation**
   Existence of vegetation, such as fast growing trees in the vicinity of compound walls can sometimes cause cracks in walls due to expansive action of roots growing under the foundation. Roots of a tree generally spread horizontally on all sides to the extent of height of the tree above the ground and when trees are located close to a wall; these should always be viewed with suspicion.[2]

Fig. 4 Crack due to thermal movement

4. **Natural Calamities**
   Mostly destruction in buildings/construction takes palce due to earthquake. During earthquake the lower layer of the earth shifts suddenly due to this the earth crust collapses.

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Fig. 5 Cracks due to vegetation

Fig. 6 Crack due to earthquak

5. Construction Practices

It is seen in many cases that the contractor uses bad quality materials in their construction only just to save money resulting in cracking of structure. Negligence, carelessness, ignorance are also the factors responsible for the cause of cracking.

PREVENTION FROM CRACKS

1. Use materials which have low heat of hydration like fly ash, slag, portland cement to reduce thermal movement.
2. For overcoming moisture soil should be compacted properly and proper ventilation from rain water should be done.
3. Epoxy Injections can also be used to fill cracks but the only condition is that the crack should be dry.
4. Tree should be planted far from the structure, if any new contruction to be done remove trees from the place.
5. Construct the foundation of buildings on firm ground while doing construction. Tie up the building with connecting beams at foundation level, door level and roof level.[6]

CONCLUSION

Through this we have learnt different types of cracks which leads to destruction of the` structure, their causes and their prevention methods. It is not easy to overcome this problem but atleast we should try some practices which can reduce their affect. If we use proper materials and follow proper method or technique then it can be cracks can be controlled.

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