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"FEM SIMULATION ON REINFORCED CONCRETE ROOF WITH DIFFERENT COVER SIZE BLOCK"

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ABSTRACT

Sufficient cover is required for the reinforcement in concrete structures for protection against corrosion. Though several codes of practices have specified minimum cover for various climatic conditions, it is often not maintained in practice. In this paper, the authors contend that the Indian Codal provisions relating to concrete cover have to be revised as they do not account for many factors related to minimum concrete cover. Also, some devices and methods to increase the quality of cover are discussed. The authors also stress that just an increase in concrete cover does not ensure durable structure. Here 30 mm, 35 mm and 40 mm size cover block have used so FEM study find out results stresses and deformation So 40mm size cover block is better then other size cover block. So it is safe and durable cover block.

Keyword: *Cover Block, Concrete, Stress, deformation, FEM*

I. INTRODUCTION

In developing countries, there is a breakwater or groin that employs a concrete cellular caisson filled with stones covered by concrete blocks as an economical type of structure. However, it is reported that those concrete blocks are moved by wave action. There are currently only a few studies that concern the stability of concrete blocks at the water surface level. In this study, a hydraulic experiment was carried out to know the different effects on the stability and mobility of the cover concrete blocks due to several factors. These include variations in water level and in the type and crown height of concrete blocks. As a result, the stability of the blocks decreased in the case where the crown height of the blocks was higher than the crown surface of the caisson. This was also evident when the water level was near the crown surface of the caisson. As a recommendation, the stability of the blocks can be improved either by making a block with a high hole rate or by making a sloped surface at the crown of the block.

The basic requirement of human being is shelter. In ancient time human starts living in caves below ground level, after that they started constructing walls from mud, they developed the techniques of burnt clay brick masonry for making the structure part of the shelter. Now days, hollow concrete blocks are being very popular in construction. These blocks are being mostly used in the construction of multi- storied buildings, factories and residential buildings. These concrete hollow blocks are commonly used in compound walls because of cheapness. These concrete hollow blocks are more useful due to its lightweight and the most important feature is ease of ventilation. The concrete hollow blocks are made out of mixture of cement, sand and stone chips. It reduces cement in masonry work and reduced the cost of construction. The hollow concrete blocks found out due to different advantages-

1. Sound control
2. Small dead load
3. Resistance to fire

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4. Adequate strength
5. Superior thermal insulation
6. Economy
7. Highly Environmentally Eco friendly
9. Reduction in mortar consumption
10. Fast and Easier construction system
11. Better Architectural features

The first Concrete block as a replacement for stone and wood in the building was used in the United States. The first concrete block house built up in 1837 on Staten Island in New York. Harmon S. Palmer, designed first hollow concrete block in 1890. Palmer patented the design of hollow block in 1900 after 10 years of experimental research. Palmer's blocks were 8-inch(20.3cm)×10-inch(25.4cm)×30-inch(76.2cm) and they were heavy in weight. These early hollow blocks were cast by hand and average output was about 10 blocks per hour. Now concrete blocks are manufacturing by automated process that can make up to 2000 blocks per hour. The Compressive strength of masonry is one of the most important property in the design of masonry structure. This strength depends upon several factors such as unit strength, mortar strength, grouting, grout strength, geometry of the blocks, bedding mortar, and the type of bonding and bedding arrangements adopted. In extreme hot or cold climate countries these concrete blocks possessing low thermal conductivity and also serve as a thermal insulation material which minimize the energy consumption by minimizing the dependence on electricity for air conditioning or heating. In all countries, the different conventional materials are replacing to the concrete hollow blocks because most conventional materials cost is increasing. In the review study we found that hollow blocks of double- H shape gives more strength with semi-grouted masonry and low strength with fully grouted masonry**.**

Fig.1 Cover block at site.

II. MODELING & SIMULATION

2.1 Modeling & Simulation

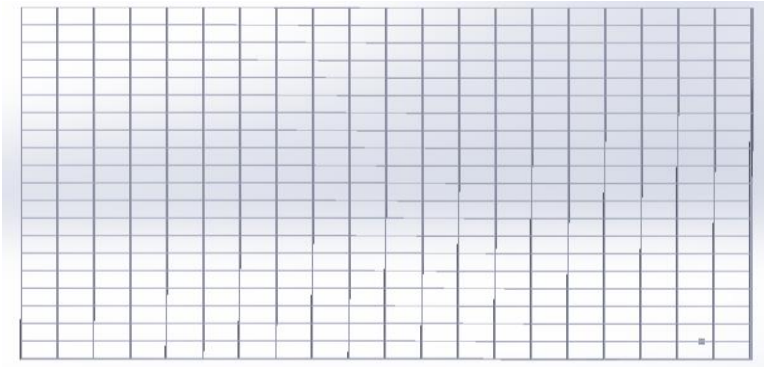

Fig. 2 Cover block 2D layout with wire frame in solidwork software

30 mm size cover block

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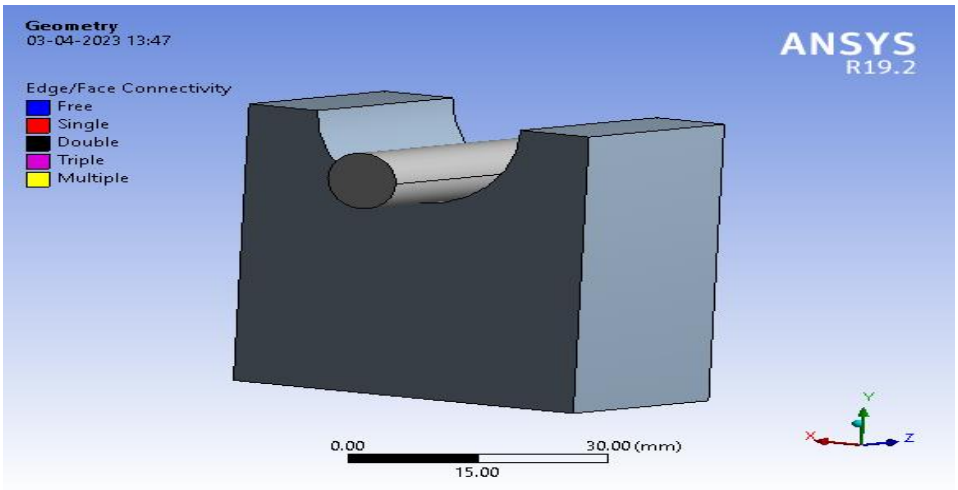

Fig.3 mm size cover block model import in ANSYS software

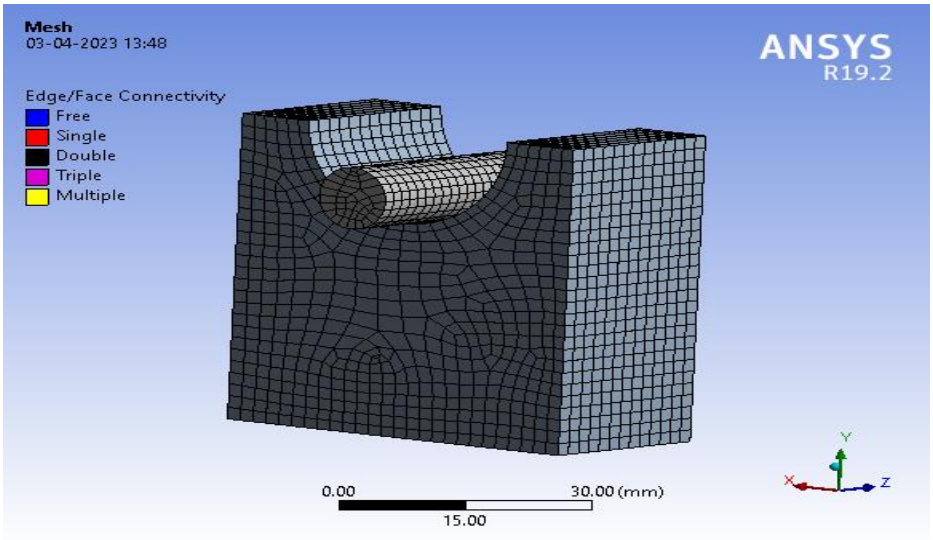

Fig.4 mm size cover block model meshing (Quad meshing)

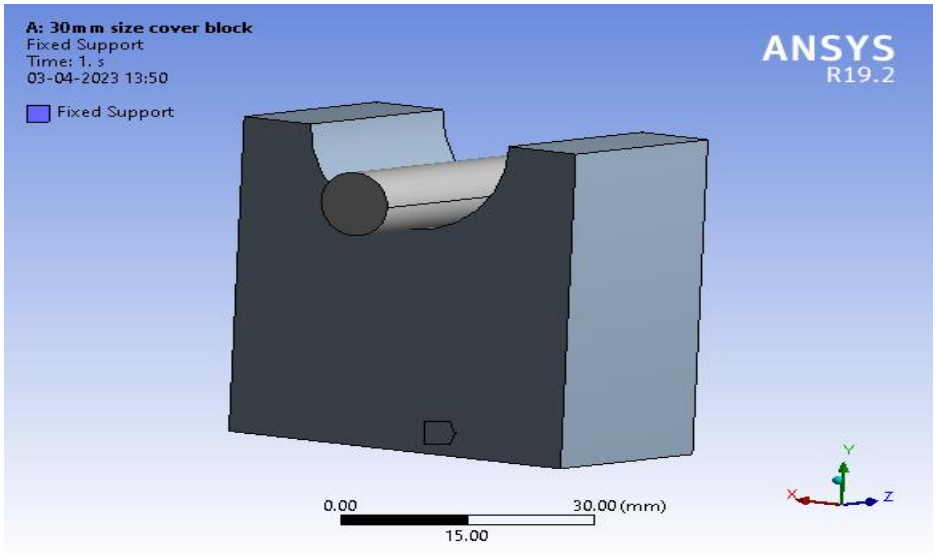

Fig.5 30 mm size cover block model fixed support boundary condition applied

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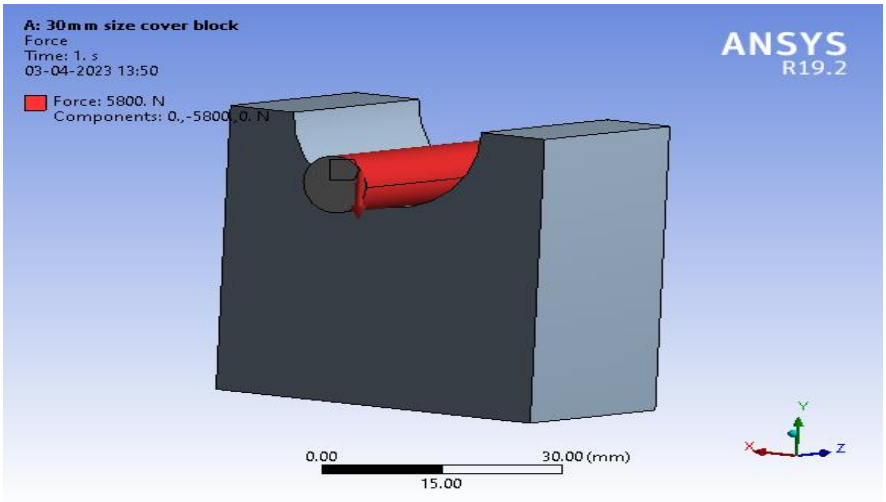

Fig.6 30 mm size cover block model applied force 5800 N

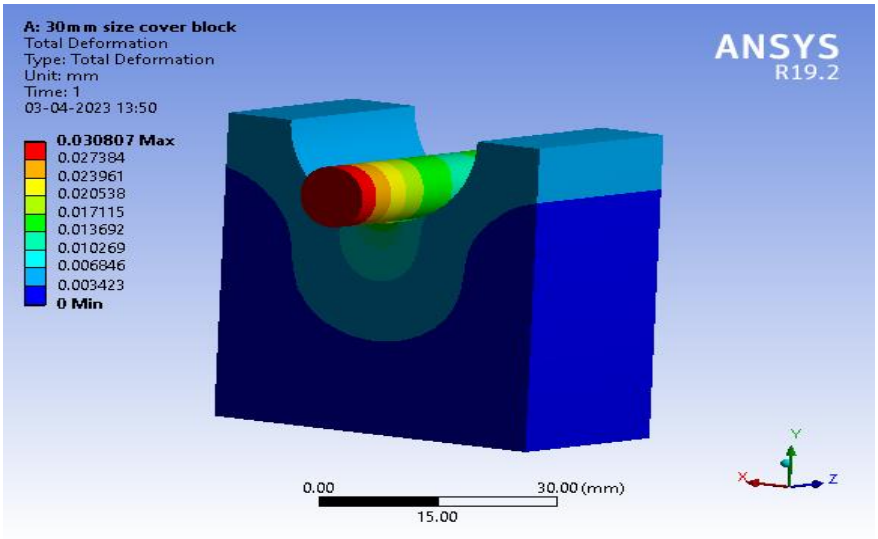

Fig.7 30 mm size cover block model deformation results

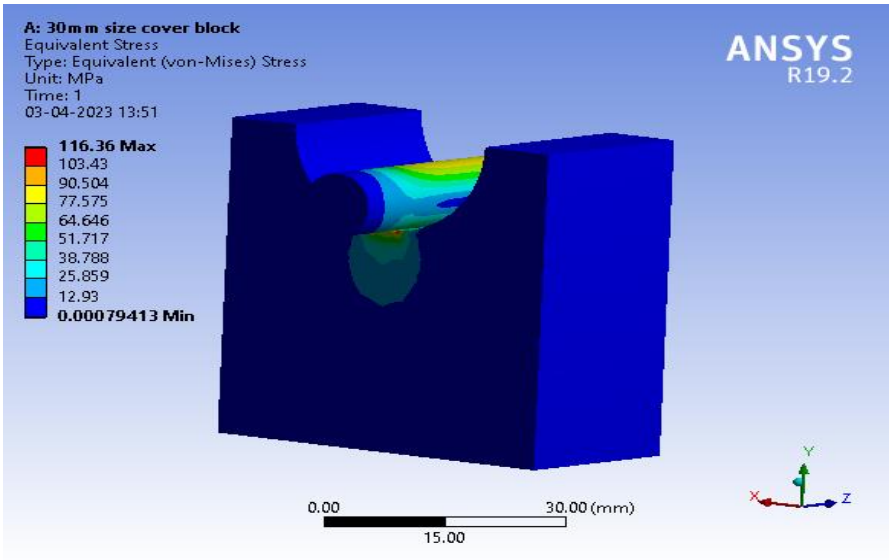

Fig.8 30 mm size cover block model von misses results

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35 mm size cover block

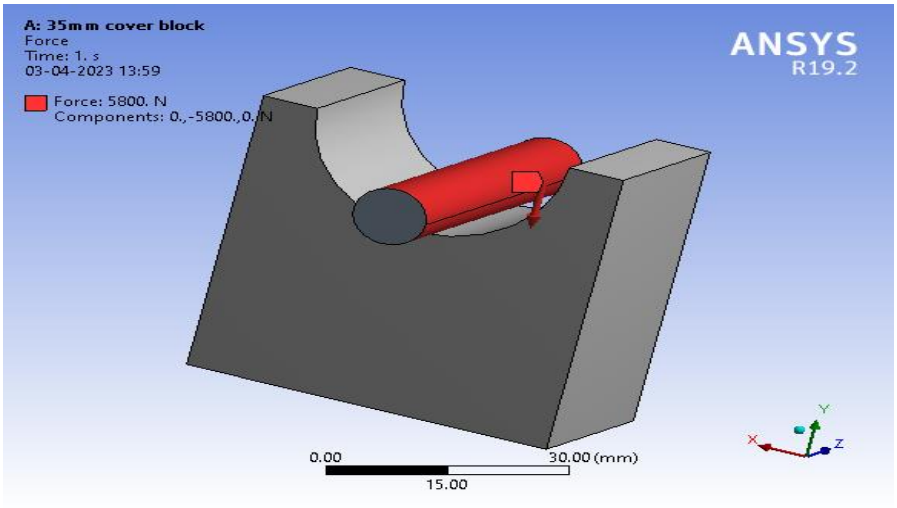

Fig.9 35 mm size cover block model applied force 5800 N

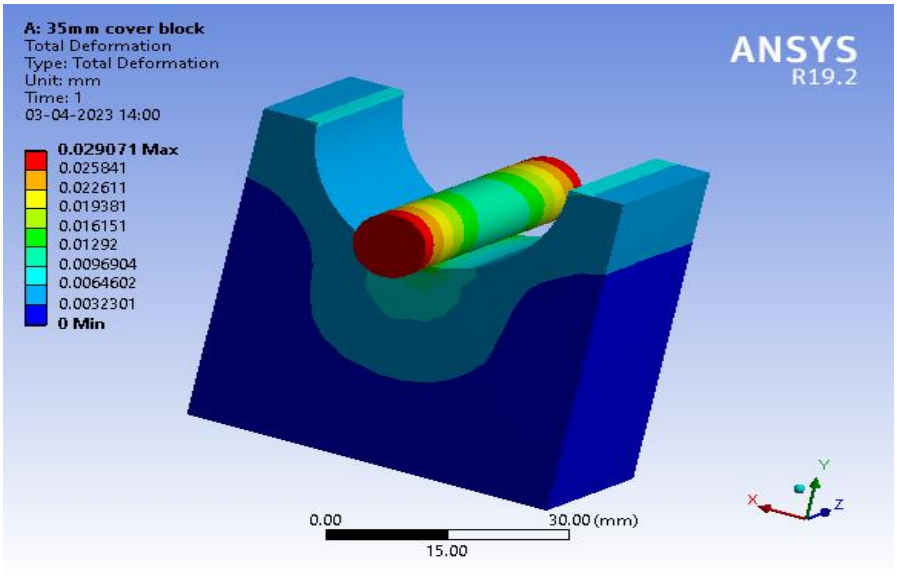

Fig..10 35 mm size cover block model deformation results

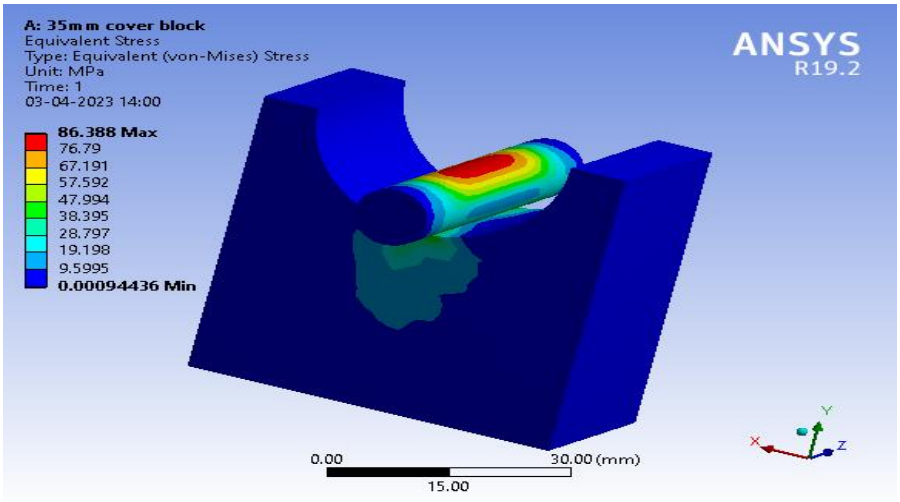

Fig.11 35 mm size cover block model von misses results**40 mm size cover block**

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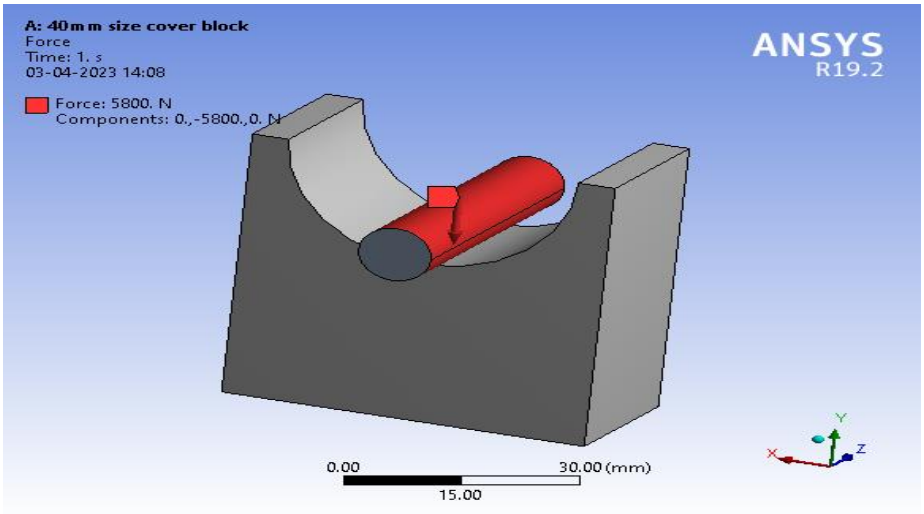

Fig.12 40 mm size cover block model applied force 5800 N

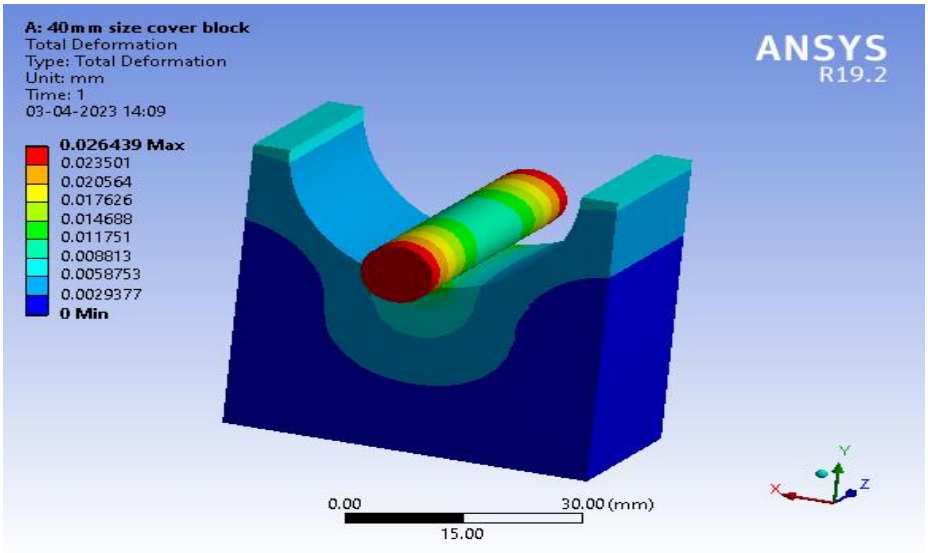

Fig.13 40 mm size cover block model deformation results

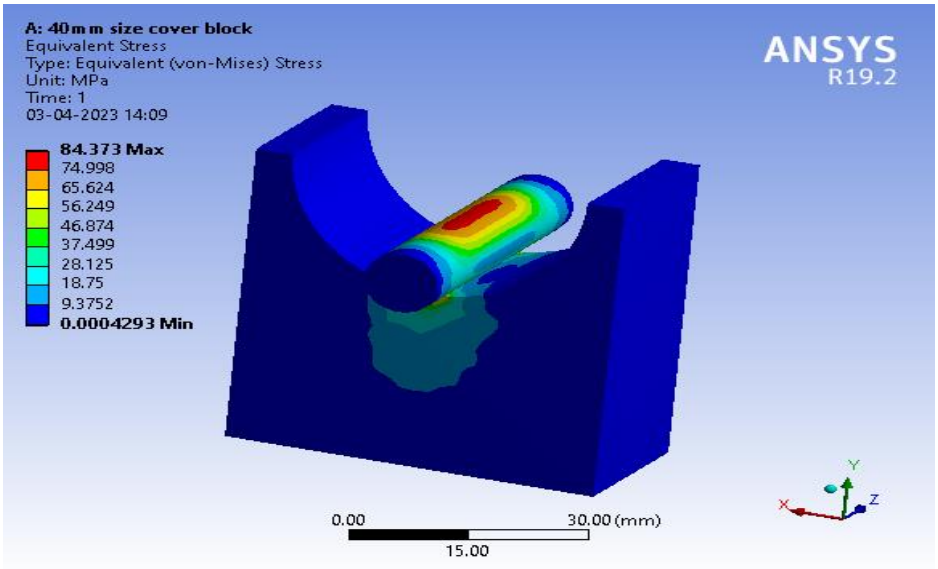

Fig.14 40 mm size cover block model von misses results

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III. RESULTS & DISCUSSION

Here 30 mm, 35 mm and 40 mm size cover block have used so FEM study find out results stresses and deformation So 40mm size cover block is better then other size cover block. So it is safe and durable cover block.

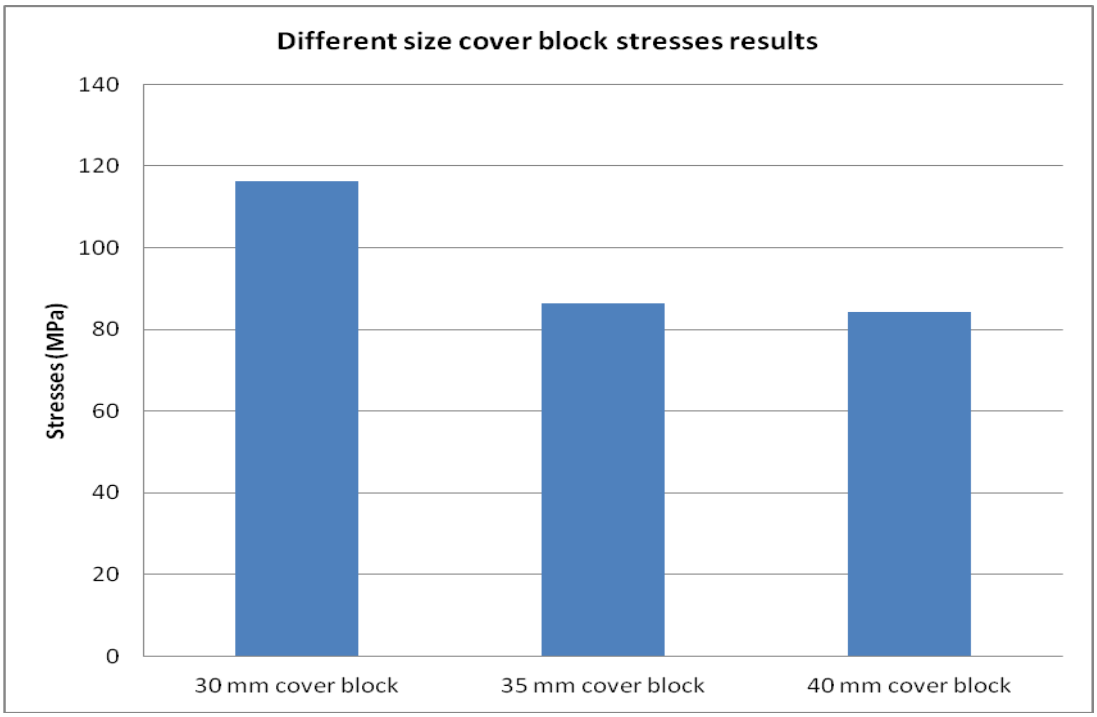

Fig.15 Different size cover block stresses results (MPa)

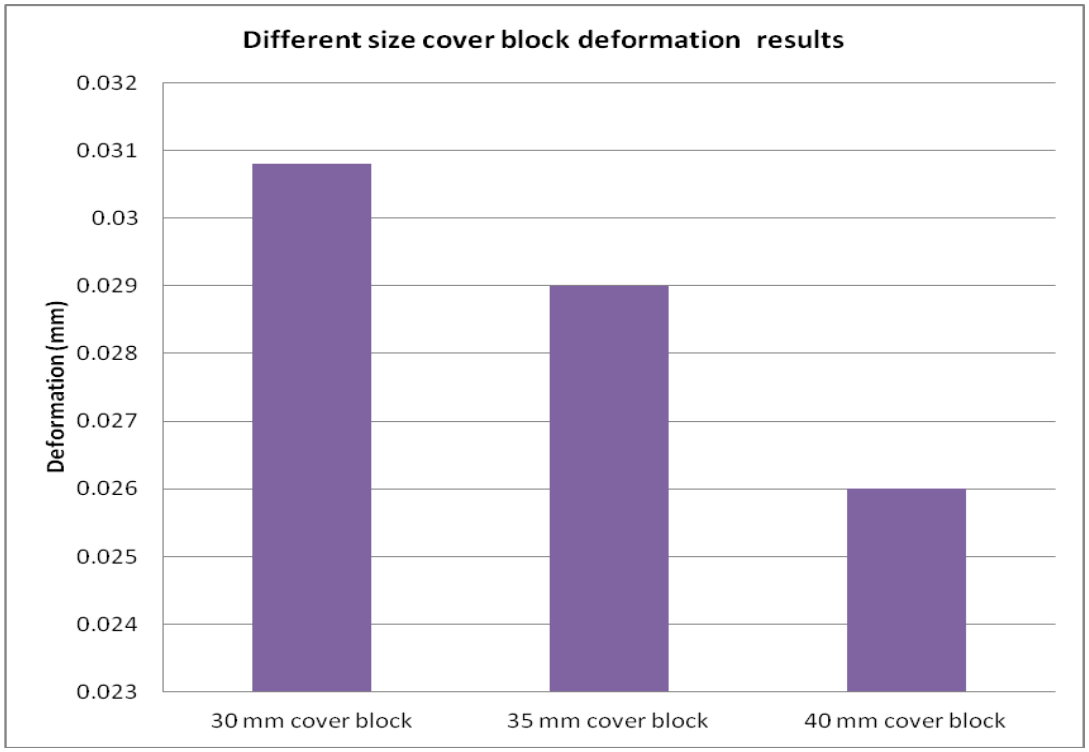

Fig.16 Different size cover block deformation results (MPa)

III. CONCLUSION

A "cover block" could be a term used in the context of concrete construction. In construction, cover blocks are small concrete elements placed between the reinforcement and the formwork in reinforced concrete structures. They help maintain a specified distance between the reinforcing bars and the surface of the concrete, ensuring proper cover and protection for the reinforcement. Sufficient cover is required for the reinforcement in concrete structures for protection against corrosion. Though several codes of practices have specified minimum cover for various climatic conditions, it is often not maintained in practice. Here 30 mm, 35 mm and 40 mm size cover block have used so FEM study find out that 40mm size cover block is better then other size cover block. So it is safe and durable cover block.

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