

INFLUENCE OF TRANSVERSE HOLE ON FLEXURAL STRENGTH OF RC BEAM

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ABSTRACT

Height limitations are not uncommon in multi-storey buildings due to economic requirements and esthetical considerations. Substantial spaces are normally required to enable the passage of large pipes and ducts beneath RC beams leading to uneconomic floor heights. The most adopted solution for this issue is the use of RC beam with openings to provide the required space for services. These openings could lead to a significant decrease in the beam load carrying capacity depending on the adopted openings shape, and location. These aspects motivated the present study based on FE simulations calibrated against numerical results. In this study, a solid RC beam, beam with a circular hole and beam with a square hole, totally 3 beams were considered. The modeling & analysis is carried by using ANSYS software. The models are compared for their flexural strength to find out the best suitable shape of the opening and also the optimum position of the opening.

An study shows that the beam with a circular opening having more flexural strength than a beam with a square opening. This is because of smooth stress flow around the circular opening and stress flow lines at sharp edges of the square opening are crowded, leads to an increase in stress concentration and decrease in flexure strength. The opening should be placed nearer to the supports to have the more flexural strength than at the middle of the beam. The flexural strength of a beam with a circular opening is same as that of the solid beam if we increase the depth of beam by 6%.

KEYWORDS: ANSYS, A Circular Opening, Four Point Loading, RC Beam and Square Opening

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