



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 10, October 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com



Comparative Analysis of Curved Beam with different Types of Holes in Middle Section by use of Ansys Software

Abishek M S¹, Dr. C S Vijaya Kumar G²

Post Graduate Student (Structural Engineering), Department of Civil Engineering, Bapuji Institute of Engineering and Technology, Davangere, Karnataka, India¹

Professor and PG Coordinator, Department of Civil Engineering, Bapuji Institute of Engineering and Technology, Davangere, Karnataka, India²

ABSTRACT:- Reinforced concrete beam with transverse web opening is a facility that allows the services such as telephone lines air conditioning and ventilating ducts, to pass through the structure. Because of the change in the beam section the corners of the opening are subjected to large concentration of stress, possibly producing oblique cracks in the beam. The region nearby the openings are measured as the weaker part of the beam. Therefore, a decline in bearing capability and also a change in the load transport mechanism is experienced. This thesis investigates the analytical study on the influence of various opening shapes with constant area on shear behavior of RC beams without extra shear reinforcement around the opening. In this thesis nonlinear analysis using ANSYS 18.1 is used to analyze the beam. The RC beam with opening is a method that permits the services to move towards the construction. Due to rapid changes in the beams crosssection, the edges of the opening stimulate crosswise cracks and can be subjected to high stress concentrations. The reliability and constancy of the beam will then be considered compromised, and the regions nearby the opening is the weakest element of the beam. Therefore, a decline in the bearing capability and also a change in the load transport mechanism is experienced. If safety actions are not in use, preventable accidents are likely to ensue.

KEYWORDS:(Size 10 & Bold) Key word1, Key word2, Key word3, etc (Minimum 5 to 8 key words)...

I. INTRODUCTION

Sandwich beams are composite systems with horizontally curved, semi-circular, reinforced concrete beams that are utilised in a variety of applications, such as the building of Circular water tanks, balconies, domes that support ring beams, etc A reinforced concrete beam's behaviour is negatively impacted by the existence of a web opening, including decreased stiffness, significant cracking, significant deflection, and reduced strength. Furthermore, the abrupt change in the beam's cross-sectional size caused a concentration extremely strained corners of the aperture, which could result in cracking that is undesirable from an aesthetic and durability perspective. In addition, excessive deflection under service load may occur from the beam's lower stiffness, which will also cause a significant internal forces and moments in a continuous beam are redistributed.

1.1 Background

A technique that enables the services to move closer to the structure is the RC beam with opening. The edges of the hole can experience large stress concentrations and crosswise cracking because due to the fast variations in the cross-section of the beams. The beam's dependability and consistency will subsequently be deemed to be weakened, with the areas immediately surrounding the opening constituting the beam's weakest component. As a result, both a decrease in bearing capacity and a modification to the load transmission system are observed. Preventable incidents are likely to occur if safety precautions are not taken. Dimensions of each beam are 2000 mm long, 120 mm wide, and 300 mm deep and effective length 1800mm and depth 280mm. Athira Boselal and Archana Sukumaran (2018) They have investigated the behavior and performance of reinforced semicircular RC beam with openings. In the ANSYS, four reinforced concrete semi-circular curving beams with circular and rectangular openings were examined. Then, when compared to other types of laminates and to rectangular and circular opening

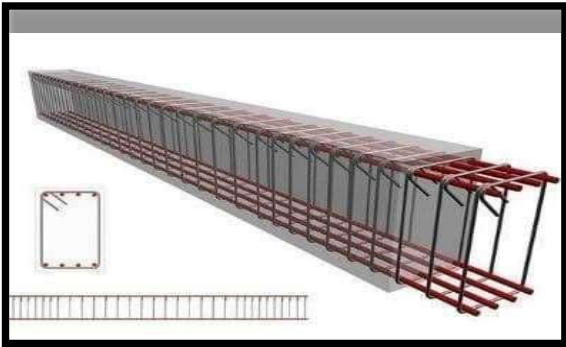


Fig.1.1: Straight beam

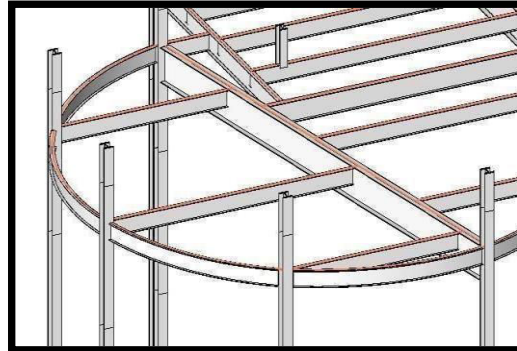


Fig.1.2: Curved beam

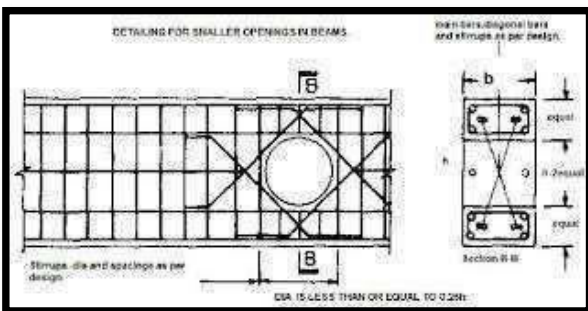


Fig.1.3: Beam With circular

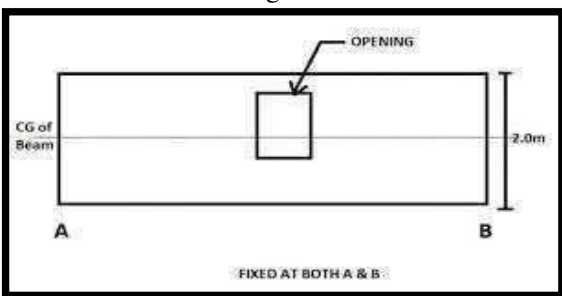


Fig.1.4: Beam with square opening

II. RELATED WORK

Subhajit Mondal, Bandyapadhyaya J.N., and Chandra Pal Gautam's(2011)

The usage of glass fibre reinforced polymer for strengthening and rehabilitation is explored in this research. In this project, ten beams are taken into consideration; one beam is used as a reference beam without an opening, and the other nine beams are tested after being strengthened and rehabilitated.

S.C. Chin, N. Shafiq, and M. F. Nuruddin(2012) A 2D nonlinear F.E. analysis is offered in this study to compare the results of the laboratory experiments on six RC beams. All beams were loaded using a four-point load and had identical rectangular cross sections. The wrapping, CFRP exterior wrapping produced better results.



Swathy S. Pillai and Alice Johny (2018)

In this study, the shear behaviour of RC beams without additional shear reinforcement around the aperture is examined in relation to various opening configurations with constant area. They were regarded as solid elements, and beam testing involving point loading under a simply supported state was conducted. Increase application load by 10kN increments. They have been put through testing with rectangular apertures, and the maximum load they can support is 115kN, which is 21 percent less than a beam without openings.

Dr. Luay Mohammed Shather, Eng. Salam Naji Hussein, and Laith Falah Hasan's(2018)

In this paper analyzing the deep beams made of reinforced concrete (RC) with web circular Openings by steel plates. They thirteen deep beams were tested in size 1m long and cross sectional area is 100mm x 400mm. and subjected to two point loads 0.41m from the support. The nearness of unstrengthened openings diminished the mid-span deflection by 8% for experimental test specimen, as compared with ABAQUS result

III. OBJECTIVES

- To verify ANSYS software, first.
- To examine the actions of Straight beam, semicircular beam and half hexagonal shaped beam without openings.
- 3. To investigate the behaviour of Straight beam, semi-circular beam and half hexagonal shaped beam with square openings.
- To investigate the behaviour of Straight beam, semi-circular beam and half hexagonal shaped beam with rectangular openings.
- To investigate the behaviour of Straight beam, semi-circular beam and half hexagonal shaped beam with circular openings.

To determine the effectiveness of reinforcing openings with CFRP laminates different beams

IV. METHODOLOGY

- A CATIA V5 CATIA was first made available in 1977 by Dassault Systems, who are still in charge of maintaining and expanding the programme. The Dassault Mirage fighter plane was the initial target of CATIA's development. CATIA has evolved over time to become much more than a CAD (Computer Aided Design) software suite. These days, it is a software suite that includes CAD and CAM capabilities.
- According to Jim Cashman, president and chief executive officer of ANSYS, "global organisations previously recognised ANSYS as the industry standard for engineering simulation, high performance computation, and a unified modelling environment." "ANSYS 16.0 adds even more paradigm-shifting features to its 45- year history. Enterprises can launch their goods more quickly by minimising or doing away with the need for physical prototypes by utilising these new capabilities. And they may realise the potential of their products by fully utilising the features of this new release."

4. STEPS INVOLVED

1. Modelling

- a. Modelling is done using CATIA software.

2. Dimensional Details

3. Material Properties

4. Meshing and Loading

5. Analysis of Beams

- a. Analysis will do using ANSYS software

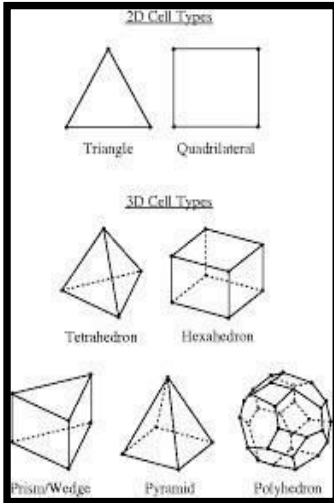
6. MATERIAL PROPERTIES

CONCRETE M45: Concrete is a building material that is made by mixing cement, fine aggregates (sand), and coarse aggregates with water. Portland cement is the most popular form of cement used to make concrete. Concrete technology is concerned with examining the properties of concrete and its practical uses. Building foundations, columns, beams, slabs, and other loadbearing components are all made of concrete. **FE550:Fe 550 CRS bars** provide a yield of 550 N/mm² and an ultimate tensile strength of 585 N/mm². It is explicit that their high tensile strength accounts for consumption of lesser number of Fe-550 CRS TMT bars to hold the structure when compared to Fe-500



CRS. The high tensile strength also makes Moira Fe 550 CRS TMT bars and concrete a perfectly complimenting combination in construction.

TYEPS OF MESHING IN ANSYS



1. Two-dimensional
2. Triangle
3. Quadrilatera
4. Three-dimensional
5. Pyramid
6. Tetrahedron
7. Three-sided prism
8. Hexahedron
9. Modern Cells (Polyhedron)

Table 4.3: Distance size

Sizing	
Use Advanced Si...	On: Proximity and Curvature
Relevance Center	Medium
Initial Size Seed	Active Assembly
Smoothing	High
Transition	Fast
Span Angle Center	Coarse
<input type="checkbox"/> Curvature Nor...	Default (70.3950 °)
<input type="checkbox"/> Num Cells Acr...	Default (3)
Proximity Size Fu...	Faces and Edges
<input type="checkbox"/> Min Size	Default (0.837950 mm)
<input type="checkbox"/> Proximity Min ...	Default (0.837950 mm)
<input type="checkbox"/> Max Face Size	Default (83.7950 mm)
<input type="checkbox"/> Max Size	Default (167.590 mm)
<input type="checkbox"/> Growth Rate	Default (1.850)
Minimum Edge L...	5.0 mm

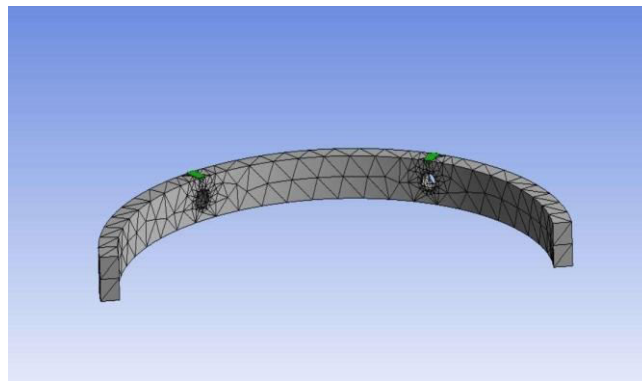
8.MESHING PROPERTIES TAKEN INTO ACCOUNT A versatile, intelligent, automated, high-performance product is meshing. It creates the best mesh possible for precise, effective Multiphysics solutions. For any component of a model, a With just one mouse click, the mesh that is ideal for a given study can be produced. Full control over the options used to generate the mesh is offered to the expert user who wants to customise it. Your delay for mesh generation is cut short automatically by taking advantage of parallel processing's power.



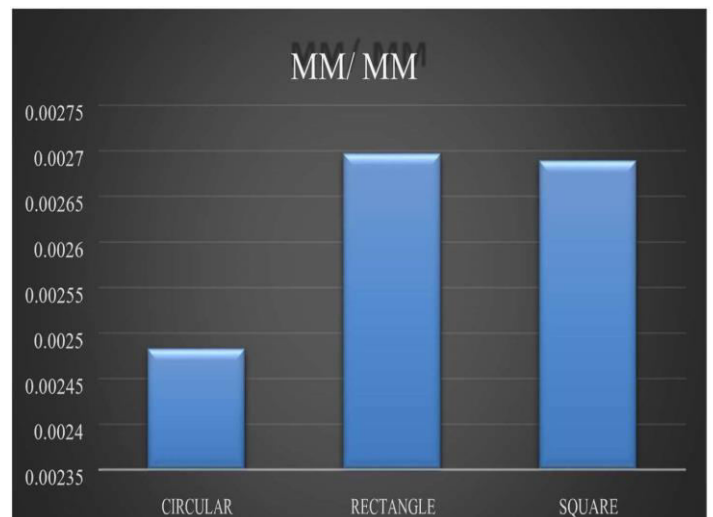
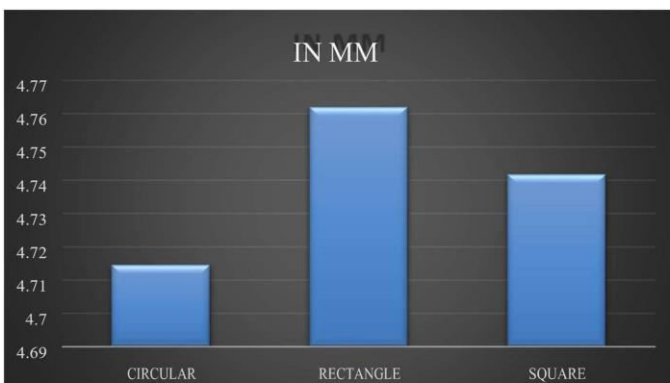
1. Angles between adjacent mesh elements' normals (curvature-type size functions)
2. The quantity of mesh components used to fill the spaces between two geometric entities (proximity-type size function)
3. Gradation based on a predetermined growth rate between minimum and maximum sizes (all size functions)

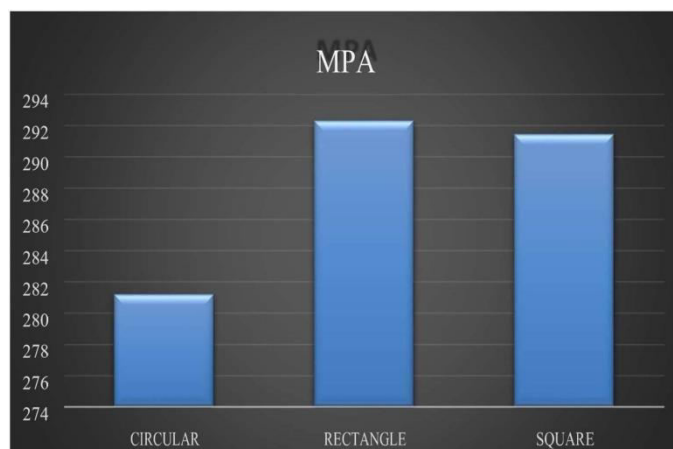
Size Function of the Curvature

In order to ensure that the size of the element does not exceed the curvature normal angle or the maximum size, which are either automatically determined by the masher or defined by the user, the curvature size function analyses the curvature on faces and edges. Distance Size FunctionThe proximity size function allows you to choose the minimum number of element layers to build in "gaps" in the model. For the purpose of defining a proximity size function, a "gap" is defined in one of two ways: Internal volumetric space separating two faces and space between two of a face's boundary edges that are in opposition.



V. EXPERIMENTAL RESULTS





From the above Results we can Clearly see that under Total Deformation the Performance for Curved Beam with Circular openings show better performance when compared with Rectangle and Square. The value for Circular shows that it leads to less amount of Deformation and leads to good life span of the Structure. As in another point of view the Square holed curved Beams also shows very less amount of deformation and the Rectangular model has very large amount of Deformation nearly twice the remaining Models.

From the above Results we can Clearly see that under Stress Analysis Results the Performance for Curved Beam with Circular openings show better performance when compared with Rectangle and Square. The value for Circular shows that it leads to less amount of stress at supports under loading of 20KN and rectangular model very large amount of stress nearly twice the Circular Model. Hence, we can Consider this has an one of the Better Model when compared with Remaining models.

VI. CONCLUSION

We have implemented an automatic text detection technique from an image for Inpainting. Our algorithm successfully detects the text region from the image which consists of mixed text-picture-graphic regions. We have applied our algorithm on many images and found that it successfully detect the text region.

REFERENCES

- [1] M. Bertalmio, G. Sapiro, V. Caselles, and C. Ballester, "Image inpainting", in Proc. SIGGRAPH, pp. 417–424, 2000.
- [2] A. Criminisi, P. Perez, and K. Toyama, "Region filling and object removal by exemplar-based image inpainting.", IEEE Transactions on Image Processing, vol. 13, no.9, pp. 1200–1212, 2004.
- [3] Marcelo Bertalmio, Luminita Vese, Guillermo Sapiro, Stanley Osher, "Simultaneous Structure and Texture Image Inpainting", IEEE Transactions On Image Processing, vol. 12, No. 8, 2003.
- [4] Yassin M. Y. Hasan and Lina J. Karam, "Morphological Text Extraction from Images", IEEE Transactions On Image Processing, vol. 9, No. 11, 2000
- [5] Eftychios A. Pnevmatikakis, Petros Maragos "An Inpainting System For Automatic Image Structure-Texture Restoration With Text Removal", IEEE trans. 978-1-4244-1764, 2008
- [6] S. Bhuvaneswari, T.S. Subashini, "Automatic Detection and Inpainting of Text Images", International Journal of Computer Applications (0975 – 8887) Volume 61– No.7, 2013
- [7] Aria Pezeshk and Richard L. Tutwiler, "Automatic Feature Extraction and Text Recognition from Scanned Topographic Maps", IEEE Transactions on geosciences and remote sensing, VOL. 49, NO. 12, 2011
- [8] Xiaoqing Liu and Jagath Samarabandu, "Multiscale Edge-Based Text Extraction From Complex Images", IEEE Trans., 1424403677, 2006
- [9] Nobuo Ezaki, Marius Bulacu Lambert, Schomaker, "Text Detection from Natural Scene Images: Towards a System for Visually Impaired Persons", Proc. of 17th Int. Conf. on Pattern Recognition (ICPR), IEEE Computer Society, pp. 683-686, vol. II, 2004
- [10] Mr. Rajesh H. Davda, Mr. Noor Mohammed, "Text Detection, Removal and Region Filling Using Image Inpainting", International Journal of Futuristic Science Engineering and Technology, vol. 1 Issue 2, ISSN 2320 – 4486, 2013



- [11] Uday Modha, Preeti Dave, “ Image Inpainting-Automatic Detection and Removal of Text From Images”, International Journal of Engineering Research and Applications (IJERA), ISSN: 2248-9622 Vol. 2, Issue 2, 2012
- [12] Muthukumar S, Dr.Krishnan .N, Pasupathi.P, Deepa. S, “Analysis of Image Inpainting Techniques with Exemplar, Poisson, Successive Elimination and 8 Pixel Neighborhood Methods”, International Journal of Computer Applications (0975 – 8887), Volume 9, No.11, 2010



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details