

# Evaluation of Performance of Concrete Column Confined with Welded wire mesh using ANSYS software

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**ABSTRACT:** Columns in any Framed Structure are most important as they carry heavy loads of Slabs, Beams and various lateral load, and channelizes these loads evenly to the Foundation. So there is a need of special provisions in it. Also it is evident that concrete is weak in tension, so the column to resist lateral buckling needs extra reinforcement to maintain enough Ductility which can be achieved by providing Confinement Reinforcement. Accordingly, in this Paper we have experimentally analysed Rectangular column specimen with Welded Wire Mesh as confining Reinforcement. Total six specimens of Rectangular columns were made of which three with Nominal Reinforcement and remaining with Nominal as well as with Welded Wire Mesh (1inch Spacing). These specimens were tested for axial load and results were compared and validated by Modelling the column in ANSYS Software. Also a Model of column with Welded wire mesh (2inch spacing) was analysed in ANSYS. Column with Welded wire mesh of 1inch spacing proves efficient in terms of Load resisting capacity, Lateral deflection, Ductility.

**KEYWORDS:** Confinement, Lateral Buckling, Ductility, ANSYS.

## I. INTRODUCTION

### 1.1 Background

A concrete structure is designed taking various forces into consideration that are intended to resist safely throughout its life span and also taking economy into account. Residential building frames are designed on the basis of strong columns and weak beam theory. Considering this theory column needs some special provisions to be made. Columns contain longitudinal and lateral reinforcements. Column is the element in the structure that is meant to carry heavy loads as it has to support the slabs and the beams, and transfer this load to the foundation. Longitudinal reinforcement provided in the column is to resist bending which can be due to eccentric loads, Earthquake induced lateral loads etc., also to reduce the effect of creep and shrinkage. Whereas Lateral reinforcement in the column is provided to prevent the longitudinal reinforcement from buckling and to resist any type of shear force induced. But in some research's it is observed that this conventionally provided reinforcement is not sufficient to maintain the required amount of ductility. Ductility of the column can be maintained by confining the concrete into its core. Lateral ties provided in the column confine the concrete to some extent but in addition to that some steel should be imparted for its long life. This is why Confinement Reinforcement needs some research to be done. It is observed that a building collapses often due to Earthquake so it is important that the building frame is well resistant to this forces. Earthquake when occurs induces vibrations and hence the structure experiences extra forces that are to be redistributed through the structural elements without any failure. IS 13920 have provisions of confinement reinforcement detailing but are proven insufficient by various research.

Ductility is an important factor to be considered as it defines the capacity of the column to resist the heavy axial, eccentric and lateral loads. So the main focus is on the ductility requirement of the column. If the loads are within their limits then there should not be any requirement of extra lateral reinforcement. But when unpredictable vibrations due to Earthquake are considered then some research on the lateral reinforcement is required.

### 1.2 Confinement of Concrete

Confinement of column is to bound the concrete into its core so that the required amount of ductility is maintained. As it is evident that concrete is weak in tension and strong in compression. But concrete and the reinforcing steel as a unit is expected to resist both. In previous studies and experiments it is proven that when concrete column fails the spalling of unconfined concrete cover starts first. The concrete present in the core remains in place to some extent this is

because the Lateral ties present holds this material in place. So many studies have also suggested to increase the amount of lateral ties but that is not a good option practically as casting and continuity of the concrete is also important. Aim is to increase the confined core so that the energy absorption capacity is increased and the forces such as Axial, Eccentric, Lateral loads are channelized in a proper way and distributed to the foundation without failure. Confinement provided can be of two types it can External and Internal. In External type for confining purpose the various materials are provided to the outer surface on the structural element for ex. FRP jacketing, Steel jacketing, Concrete Jacketing, Ferrocement etc. whereas in Internal confinement materials are included while casting of the column for ex. Welded wire mesh, welding of conventional reinforcement, Welded steel Plates etc.

### **1.3 Methods adopted to confine Concrete (based on studies)**

**FRP (Fibre Reinforced Polymer):** FRP is a composite material that is made up of Polymer matrix which is reinforced with fibres. This material is used in the form of Jacketing to the structural column to increase capacity. FRP is a type of external confinement arrangement done to the column.

**Welded Wire Mesh:** These are meshing of thin wires that are welded together. Mostly they are of mild steel. They are provided around the conventional reinforcement and tied.

**Steel Jacketing:** Steel jackets are provided to the column with a definite spacing along its length. In this the concrete along the length of the column is removed in patch and steel jacket is provided in addition to epoxy material.

**Ferro cement:** According to the design and requirements, layers of Ferro cement coats are applied to the column. This provides extra strength to it.

**Lateral ties:** these lateral ties are already provided in the column but in confinement of the concrete point of view the amount can be increased for additional strength or strengthening of column.

**Welding of Conventional reinforcement:** In this the Longitudinal and Lateral reinforcement are welded together to provide strength

**Welded steel Plates:** At specified intervals steel plates are provided with welding to the conventional reinforcement.

### **1.4 Significance of Software Modelling**

When designing a specific concrete structure, it is very important to optimize the structures so that safety is achieved and also it is applicable on economic point of view. While suggesting a new theory it is significant to consider both these aspects. So after Experimental investigation we need to validate the model in a particular software to check whether the proposed model can work practically or no. various software such as STAAD Pro V8i, ETABS, SAFE, SAP2000, Revit Structure, RCDC, ANSYS Civil etc. are available. In this Paper the software used for modelling is ANSYS.

## **II. LITERATURE REVIEW**

### **2.1 General**

A wide range of studies are done to find weather the confinement reinforcement provided in columns are efficient to be implemented on actual construction field. The main focus of such researches is to maintain ductility of the column which can be achieved if there is minimum spalling of cover of concrete and maximum concrete bounds to the structural element. For this purpose, provisions such as FRP (Fibre Reinforced Polymer), Ferro Cement Jacketing, providing extra lateral ties etc. are studied. The only aim is to bound the concrete within the structural element so that the energy induced due to vibrations(Earthquake) is dissipated without failure. Following are some literatures studied to get a brief idea of such provisions.

### **2.2 Literatures studied**

**2.2.1 Improved Confinement of reinforced concrete columns, Ahmed M. El-Kholy, Hany A. Dahish, 9<sup>th</sup> January 2015, Ain Shams Engineering journal (2015):** Lateral Reinforcement that is provided in the Columns to resist the lateral deflection is sometimes not sufficient to impart the required amount of ductility due to the restriction on the tie spacing and disturbance of concrete continuity. Hence this paper suggests internal confinement of the concrete which is achieved by providing EMM (Expanded Metal Mesh) around the nominal reinforcement provided. Sixteen columns

specimens were tested with categorization as 8 columns with varying quantity of lateral ties and slenderness ratio of 7.33 and remaining 8 columns with varying quantity of lateral ties and slenderness ratio to be 14. Columns casted were of square cross section of dimension 150 x 150 mm. Conclusions derived were, there was an increase in ultimate load capacity by 11.02% and 18.55% for columns with slenderness ratio of 7.33 and 14 respectively. Also it was derived that the Lateral reinforcement quantity required also can be reduced without any loss in the ultimate load carrying capacity of the column.

**2.2.2 Confinement Reinforcement for Concrete Columns, S. Watson, F. A. Zahn & R. Park, Journal of Structural Engineering Vol.120, No. 6, ASCE, 1994:** Lateral ties provided in the column imparts confinement to the column to avoid buckling of Longitudinal bars before it reaches its limiting energy absorption capacity. The design chart permits the enhanced flexural strength of confined column, also the quantities of transverse reinforcement required to achieve particular curvature ductility factors in the potential plastic hinge regions of reinforced concrete columns to be determined. This study gives refined design equations to determine the quantities of transverse reinforcement required for specified ductility levels are derived on the basis of the design charts. The equations are an improvement on the current provision of concrete design codes.

**2.2.3 Experimental Investigation on using Mesh as Confinement materials for High Strength Concrete Columns, H. Zhao & M. N. S. Hadi, 12<sup>th</sup> East Asia Pacific Conference on Structural Engineering & Construction, 2011:** High Strength Concrete Columns when subjected to heavy loads undergo spalling of the concrete which tends to reduce the ductility of the column and hence the efficiency of the column is considerably reduced. So this study suggests the use of a cheaper material to confine the concrete so as to maintain the ductility. Fibre Glass Fly mesh (FGFM) and Galvanized steel (S12.7WM) wire mesh is used as confining material. 12 specimens of columns are tested of cylindrical cross section. Columns are tested for concentric and eccentric loading. Further investigation suggests that the column with FGFM outperformed the column containing S12.7WM. As Column with S12.7WM showed significant improvement in Loading capacity but did not increase the ductility of the column.

**2.2.4 What do we know about confinement in Reinforced Concrete Columns? Koji Sakai & Shamim A. Sheikh, ACI Structural Journal, Technical Paper, March- April 1989:** This Technical Paper aims to define various properties of confined concrete and hence the future direction of work including revision of codal provisions accordingly. Various issues are discussed in this paper which include effects of different variables on the mechanism of confinement to the behaviour of a section and that of the column to the possibility of Plastic hinging in columns. Paper also suggests some revisions in the ACI code.

**2.2.5 Experimental study of reinforced concrete column strengthened with Ferro cement Jacket, Katsuki Takiguchi & Abdullah, 12<sup>th</sup> World Conference on Earthquake Engineering, 2000:** when building suffers Earthquake it is necessary that the structural elements of the building are enough ductile so that the Earthquake induced energy dissipated without failure. Hence in this experiment Ferro cement layers are used to strengthened the column and comparing results with a normal column. Therefore, five column specimens of square cross section are tested with a scale ratio of 1:6 into which two columns are casted with Nominal reinforcement, one column is strengthened with circular Ferro cement jacket. The specimens were tested both for axial load and also for Lateral Load on the Loading Frame. It is concluded that the circular Ferro cement jacket is an effective way to strengthen Columns to resist Earthquake Loads.

**2.2.6 Behaviour of RCC Columns Confined with Ferro cement, Jatinder Malhotra 2013:** In this Paper the confinement of column is achieved by Ferro cement in the form of thin wall structure which is applied externally to the column. Here the provision of the confinement used is an external confinement. In Experimental work, 27 column specimens with three different slenderness ratio were casted which were categorized as unconfined columns, columns confined with one layer of Ferro cement and columns confined with two layers of Ferro cement. After testing these columns, the conclusion derived was the load carrying capacity decreases as the slenderness ratio increases. Also the Ferro cement layers are effective up to one or two layers.

**2.2.7 Behaviour of FRP strengthened Concrete Column under eccentric compression loading, M.N.S Hadi, 15 July 2005:** In this paper also external confinement is used to compare results. Six samples of cylindrical columns were cast with half columns wrapped horizontally with CFRP (Carbon Fibre Reinforced Polymer) and half with GFRP. Three layers of confinement reinforcement were applied. Also nominal reinforcement was provided in the column. While testing the columns were subjected to eccentric loading with 50mm of eccentricity. Comparison of the results derived

the conclusions that the Column with CFRP as the confinement reinforcement outperformed both GFRP column and Column with only Steel Reinforcement.

**2.2.8 Influence of confinement reinforcement on the compression stress-strain grouted reinforced concrete block masonry boundary elements, Ahmad Abo El Ezz, Hany M. Seif Eldin, Khaled Galal, 2015:** Shear walls are widely used as an Earthquake resistant structure in High rise Building to provide Lateral stiffness, strength and energy dissipation capacity to the building. This paper suggest that evaluation of ductility capacity of shear walls is evaluating the compressive response of their boundary elements. Hence the main focus is to confine the boundary elements. Therefore, this paper presents an experimental and analytical investigation on the compression stress- strain behaviour of fully grouted unconfined and confined reinforced concrete block masonry. Full scale boundary elements were constructed and tested under concentric axial compression.

### III. OBJECTIVES

- Compare experimental results of Nominally Reinforced Column (NRC) and Confinement Reinforcement Column (CRC1, welded wire mesh of 1-inch spacing) in terms of Load carrying capacity & Lateral Deflection.
- ANSYS Modelling of both the Columns and validation of Experimental Results.
- Modelling of Column with Welded wire mesh of 2-inch spacing and suggest efficient wire mesh.

### IV. METHODOLOGY

#### 4.1 Problem Statement

Studying the literatures, it is evident that confining the column gives good results considering the performance while responding to earthquake and heavy axial loads. As it helps to maintain required amount of ductility and the column after the elastic limit. Many types and forms of confinement reinforcement are studied in previous literatures but while considering their practical use, economy and ease in construction also are to be considered. So there is a need of a comparatively cheap material. Use of welded wire mesh proves a better option considering all these aspects. So this paper is to study the performance of Rectangular Column with and without Welded wire mesh (1-inch spaced grid). And comparing there experimental and ANSYS Software based results to provide necessary validation. Further a column with Welded wire mesh of two-inch spaced grid is also modelled in ANSYS and its efficiency is checked by comparing the results to the previously tested column.

#### 4.2 Methodology

In this Paper it is intended to evaluate the performance of the Confinement reinforcement provided in the Rectangular column in terms of Load carrying capacity, Lateral & Vertical Deflection. For this purpose, stresses and strain induced in the columns are also very important. Accordingly, the Methodology is decided. Following are the Configuration of columns adopted to study the performance.

**NRC:** Nominally Reinforced Column

**CRC1:** Confinement Reinforcement Column; '1' indicates Welded Wire mesh of One-inch spacing.

**CRC2:** Confinement Reinforcement Column; '2' indicates Welded Wire mesh of Two-inch spacing.

From above configuration NRC & CRC are tested Experimentally and results are validated using ANSYS Software. And CRC2 in Modelled in ANSYS and various parameters are such as Load carrying capacity, Vertical deflection, stresses & strains are checked and compared with the results of NRC & CRC1.

Also to maintain accuracy in experimental results, three specimens are tested for NRC & CRC1. Accordingly, NRC1, NRC2, NRC3 are three specimen columns of Nominal Reinforcement and CRCa, CRCb, CRCc are specimens for Confined column with one inch spaced. Following table gives details of reinforcement provided in each column specimen.

	Specifications	Specimens		
		NRC1,NRC2,NRC3	CRC1a, CRC1b, CRC1c	CRC2
Column	Height	550 mm	550 mm	550 mm
	Breadth	230 mm	230 mm	230 mm
	Depth	150 mm	150 mm	150 mm
	Material	M20	M20	M20
	Concrete Cover	20 mm	20 mm	20 mm
Main Reinforcement	Diameter	12 mm	12 mm	12 mm
	Number of Bars	4 Nos	4 Nos	4 Nos
	Material	Fe500	Fe500	Fe500
Lateral Reinforcement	Diameter	6 mm	6 mm	6 mm
	Spacing	125 mm c/c	125 mm c/c	125 mm c/c
	Material	Fe500	Fe500	Fe500
Confinement Reinforcement	Welded wire mesh spacing.	Nil	1 inch (25.4 mm) spaced grid	2 inch (50.8 mm) spaced grid
	Material	Nil	Fe250	Fe250

Above mentioned columns were casted and cured under water for 28 days. To apply axial load and measure expected parameters these columns are tested on Universal Testing Machine (UTM). To measure Lateral buckling at the Mid height of the column Dial gauges are used and mounted on the stands on fours faces of the columns and manually the readings are noted down.

### V. EXPERIMENTAL WORK

#### 5.1 Experimental setup



Fig 1: Experimental Setup



Fig 2: Arrangement of Dial Gauges

Above figure shows the experimental setup for testing of Rectangular Column. It can be seen the arrangement of Dial Gauges to measure the Lateral deflection of four faces of the column mounted on midheight, midbreadth & middepth. UTM to apply vertical Axial Load.

### 5.2 Reinforcement Arrangement



Fig 3: Reinforcement in NRC



Fig 4: Reinforcement in CRC1(Welded wire mesh 1-inch spacing)

### 5.3 Materials

The materials required for casting the columns such as Cement, Sand, Aggregate were proportioned by doing concrete mix design according to IS 10262:2009. The proportion of Concrete for M20 grade is to be **1:1.60: 3.2**. considering these proportions of Cement, Sand and Aggregate, Three Cube specimens of dimension 150mm x 150mm x150mm were casted and cured for 28 days and tested for Compression which gave compressive strength of 24.6 N/mm<sup>2</sup>. Also the Steel reinforced used in of Fe500 HYSD bars and Material of welded wire mesh is Fe250 that is mild steel.

## VI. RESULTS & DISCUSSION

### 6.1 Experimental Results for NRC & CRC1

As mentioned in the Methodology of this paper the columns casted are to be tested for Axial Compression on the UTM and the Lateral bulge or buckling is measured with the help of Dial Gauges mounted at midheight of the column. Hence the observations recorded are Vertical Deflections, Axial Load and Lateral Buckling. Observation are recorded until the column fails hence we get the ultimate load resisted by the column. Further Stresses and Strains induced are calculated to evaluate and compare the performance of Column Specimens.

### 6.2 Experimental Data for Column Specimen NRC (Nominally Reinforced Column)

Specification of Material and Reinforcement for this Column specimen are mentioned in the section 4.2 of this Paper



Fig5: NRC1 column Failure



Fig6: NRC2 column Failure



Fig7: NRC3 column Failure



6.2.1 Results for NRC1

	Vertical Deflection (mm)	Axial Load (kN)	Avg Lateral Buckling (mm)	Stress (N/mm <sup>2</sup> )	Strain
At Initial crack	6.50	324.50	1.45	9.406	0.011818
At Ultimate point	11.70	369.30	1.71	10.704	0.021455

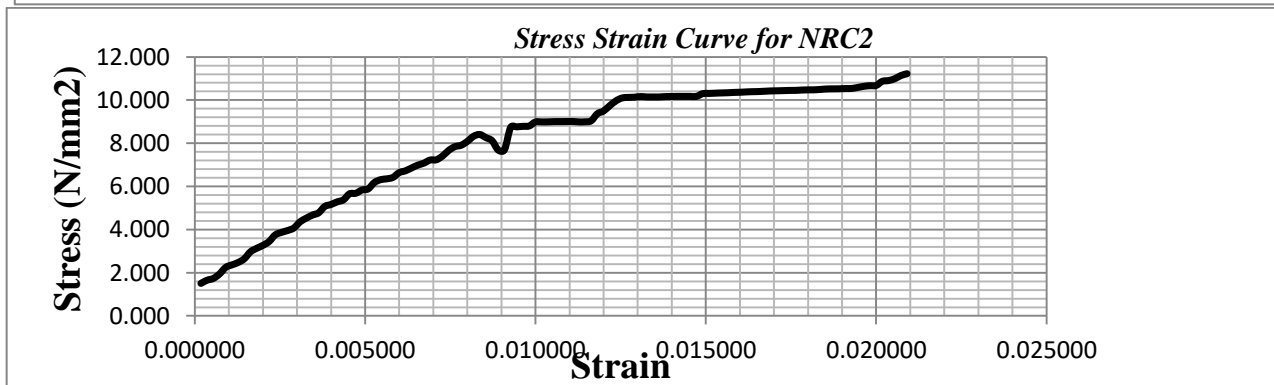
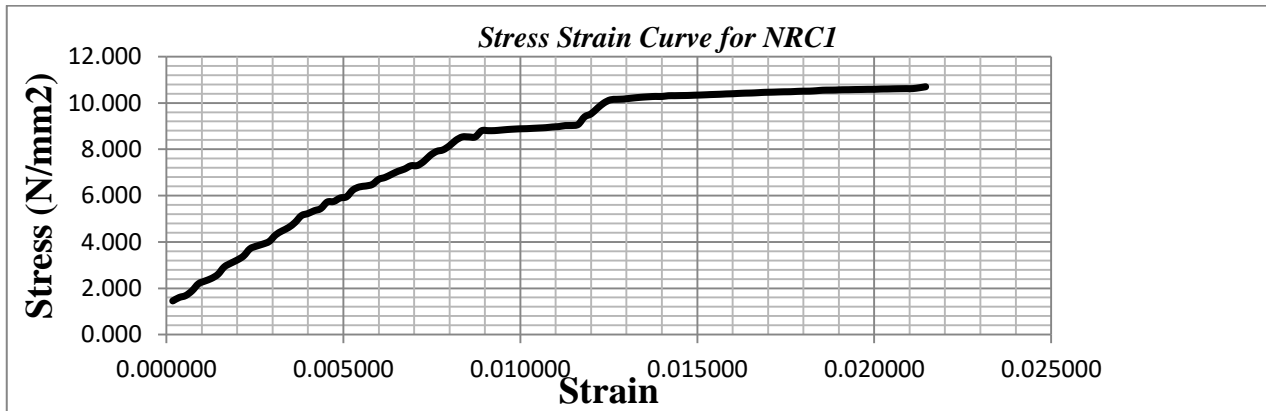
6.2.2 Results for NRC2

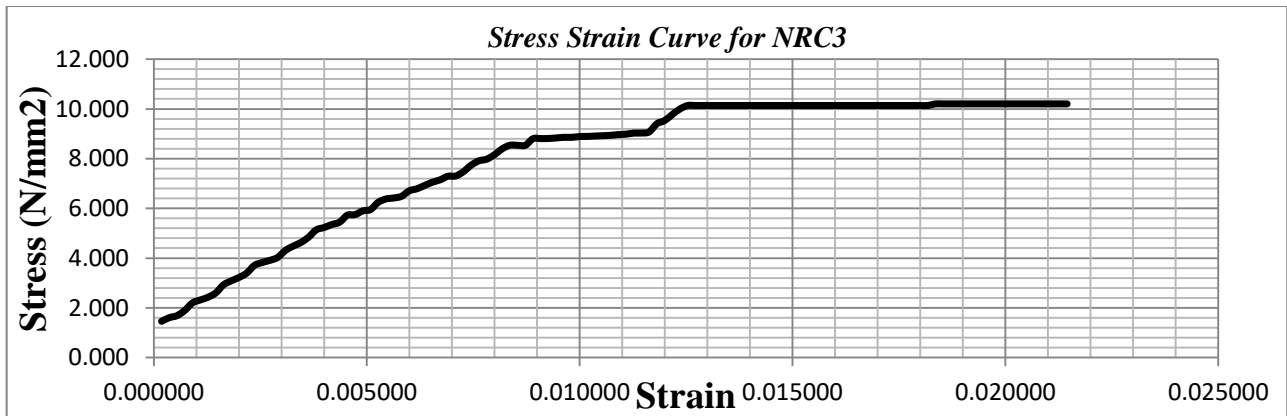
	Vertical Deflection (mm)	Axial Load (kN)	Avg Lateral Buckling (mm)	Stress (N/mm <sup>2</sup> )	Strain
At Initial crack	6.80	343.74	0.99	9.963	0.012364
At Ultimate point	11.50	387.20	1.54	11.223	0.020909

6.2.3 Results for NRC3

	Vertical Deflection (mm)	Axial Load (kN)	Avg Lateral Buckling (mm)	Stress (N/mm <sup>2</sup> )	Strain
At Initial crack	5.3	333.61	1.03	8.502	0.011223
At Ultimate point	10.5	378.23	1.62	10.133	0.019556

6.2.4 Stress vs Strain curves for NRC specimens





**6.3 Experimental Data for Column Specimen CRC1 (Confinement Reinforcement Column with Inch spaced welded wire mesh)**

Specification of Materials and Reinforcement for this Column specimen are mentioned in the section 4.2 of this Paper



Fig8: CRC1a Column Failure



Fig9: CRC1b Column Failure



Fig10: CRC1c Column Failure

Above figures Shows the confined core of the Concrete.

**6.3.1 Results for CRC1a**

	Vertical Deflection (mm)	Axial Load (kN)	Avg Lateral Buckling (mm)	Stress (N/mm <sup>2</sup> )	Strain
At Initial crack	4.9	460.10	0.11	13.336	0.008909
At Ultimate point	10.8	652.65	1.25	18.917	0.019636

**6.3.2 Results for CRC1b**

	Vertical Deflection (mm)	Axial Load (kN)	Avg Lateral Buckling (mm)	Stress (N/mm <sup>2</sup> )	Strain
At Initial crack	4.7	420.00	0.15	12.174	0.008545
At Ultimate point	8.6	649.20	1.37	18.817	0.015636

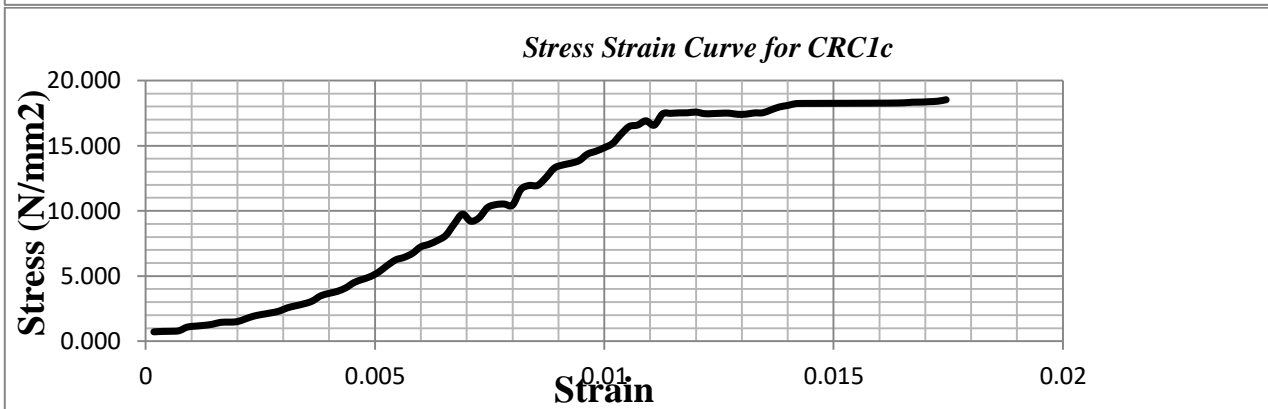
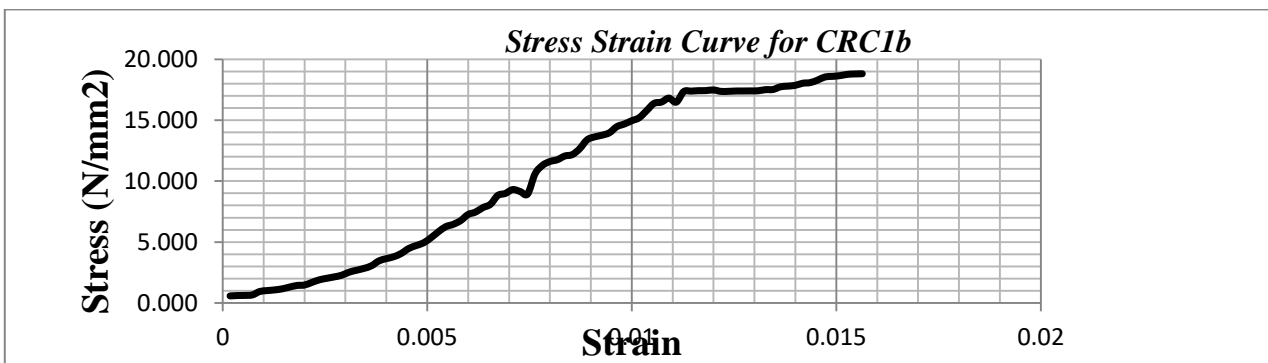
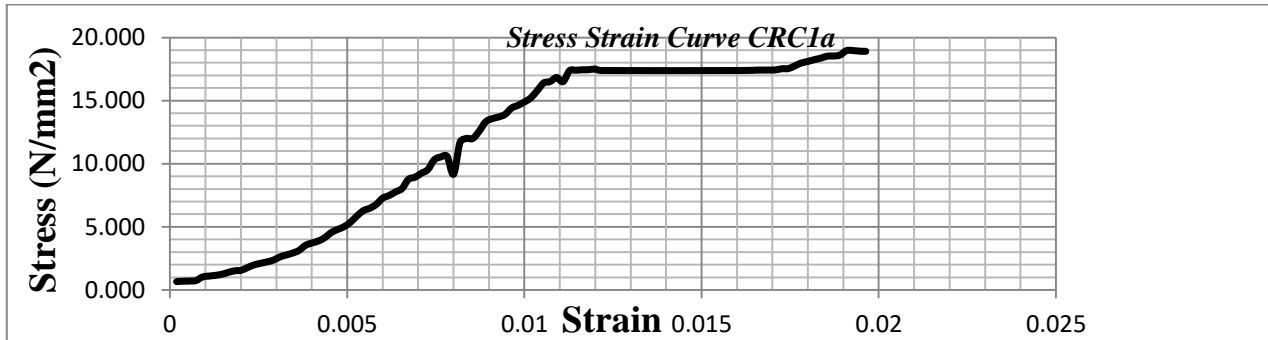




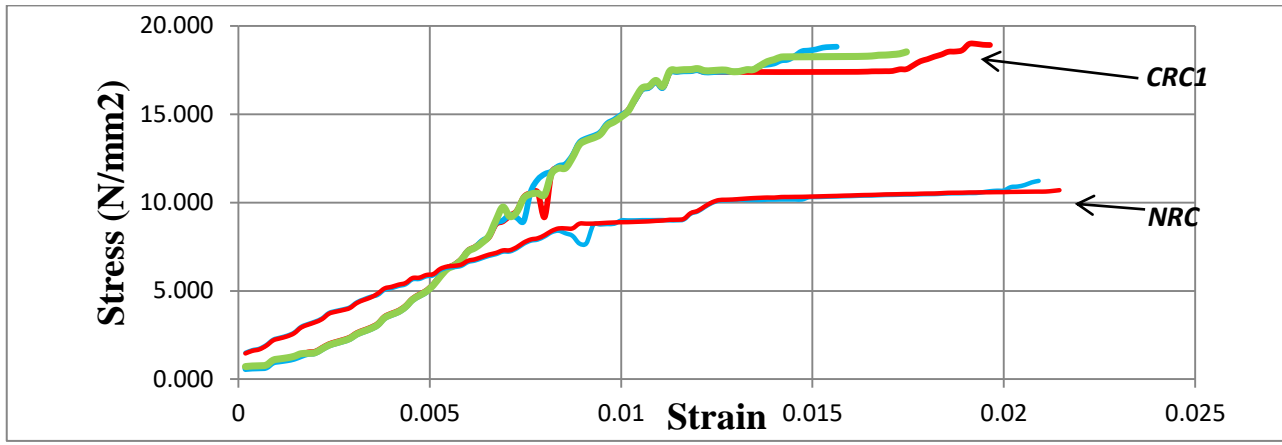
6.3.3 Results for CRC1c

	Vertical Deflection (mm)	Axial Load (kN)	Avg Lateral Buckling (mm)	Stress (N/mm <sup>2</sup> )	Strain
At Initial crack	4.9	457.99	0.71	13.275	0.008909
At Ultimate point	9.6	639.00	1.34	18.522	0.017455

6.3.4 Stress vs Strain curves for NRC specimens



6.4 Comparison of Stress Strain curve of NRC and CRC1 Column Specimens



6.5 Discussion

From the above Experimental results and Curves plotted for respective stresses and strains it is evident that CRC1 column Specimens shows improved results in comparison with NRC column specimens. Referring the values stresses for NRC columns are 10.704 N/mm<sup>2</sup>, 11.223 N/mm<sup>2</sup>, 10.822 N/mm<sup>2</sup> respectively. And stresses for CRC1 Column shows considerably higher values they are 18.917 N/mm<sup>2</sup>, 18.817N/mm<sup>2</sup>, 18.522N/mm<sup>2</sup>. Also the Ultimate load shows increment for CRC1 specimen in comparison with NRC specimen. Section 6.4 shows a comparison graph of both NRC and CRC1 in which we can see the total energy absorbed that is the area under the curve is larger for CRC1 than NRC. All these results and comparison proves that CRC1 is more efficient than NRC.

VII. ANSYS SOFTWARE MODELLING

As specified in the Methodology, Software validation of the Experimental results is very important in such studies because to implement such material it needs some basic parameters so that confinement reinforcement can be designed for any structural element. For this paper the NRC and CRC1 column specimens are Modelled and the stresses induced due to the Axial loading is compared for validation of the Experimental results. Further CRC2 i.e. Confinement Reinforcement Column with 2-inch spaced Welded wire mesh is Modelled in ANSYS and results are compared with CRC1 so as to check that which welded wire mesh is efficient to use. Following section shows ANSYS Modelling data.

7.1 NRC specimen Modelling in ANSYS

A: original  
Static Structural  
Time: 1. s  
A Fixed Support  
B Force: 3.2e+005 N

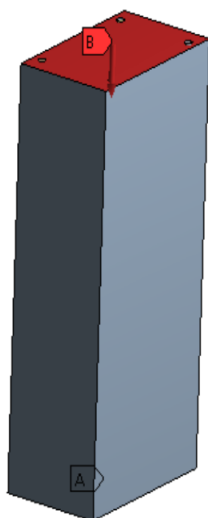


Fig 11: NRC Column Model

A: original  
Total Deformation  
Type: Total Deformation  
Unit: mm  
Time: 1  
Custom  
Max: 0.14866  
Min: 0

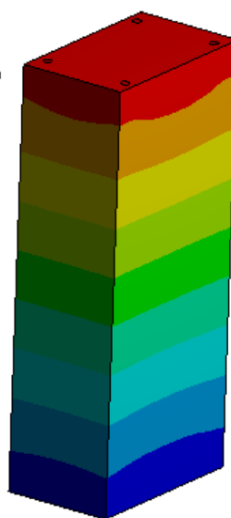


Fig 12: NRC Strain Model

A: original  
Equivalent Stress  
Type: Equivalent (von-Mises) Stress  
Unit: MPa  
Time: 1  
Custom Obsolete  
Max: 69.301  
Min: 1.6695

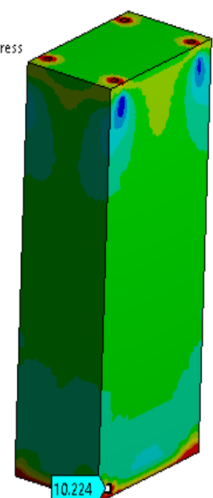


Fig 13: NRC Stress Model

7.1.1 Stress Strain values obtained in ANSYS for NRC compared with Experimental Values. (At Ultimate Point)

	Stress N/mm <sup>2</sup>	Strain
Experimental (Average of three NRC specimens)	10.96	0.021182
ANSYS Software	10.22	0.030777

Considering above Experimental and Software values it can be concluded that NRC specimen values are validated. As both the values are almost within the range.

7.2 CRC1 specimen Modelling in ANSYS

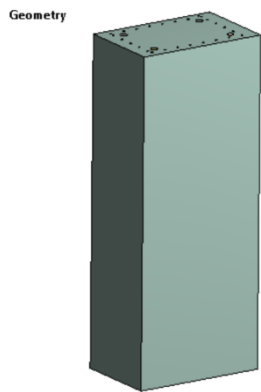


Fig 14: CRC1 Column Model

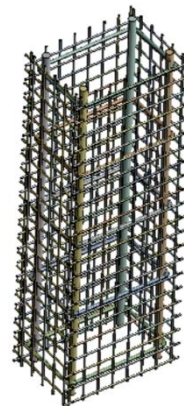


Fig 15: CRC1 Reinforcement Model

B: 1 inch spacing  
Static Structural  
Time: 1. s  
A Fixed Support  
B Force: 6.7411e+005 N

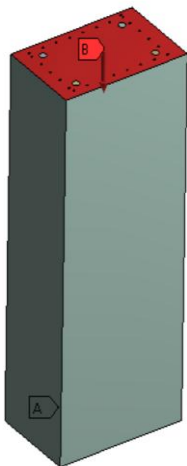


Fig 16: CRC1 Model

B: 1 inch spacing  
Total Deformation  
Type: Total Deformation  
Unit: mm  
Time: 1

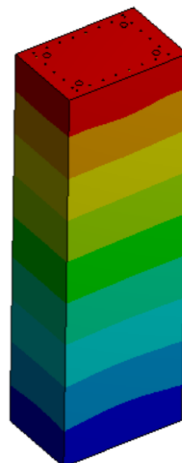
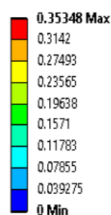


Fig 17: CRC1 Strain Model

B: 1 inch spacing  
Equivalent Stress  
Type: Equivalent (von-Mises) Stress  
Unit: MPa  
Time: 1  
Custom Obsolete

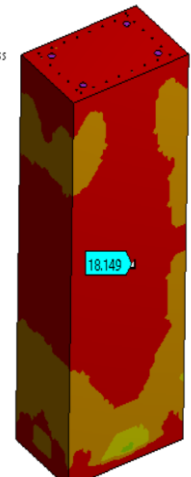
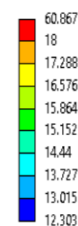


Fig 18: CRC1 Stress Model

7.2.1 Stress Strain values obtained in ANSYS for CRC1 compared with Experimental Values. (At Ultimate Point)

	Stress N/mm <sup>2</sup>	Strain
Experimental (Average of three CRC1 specimens)	18.752	0.017576
ANSYS Software	18.149	0.039222

Considering above Experimental and Software values it can be concluded that CRC1 specimen values are validated.

7.3 CRC2(Column with Welded Wire Mesh of 2-inch spacing) specimen Modelling in ANSYS

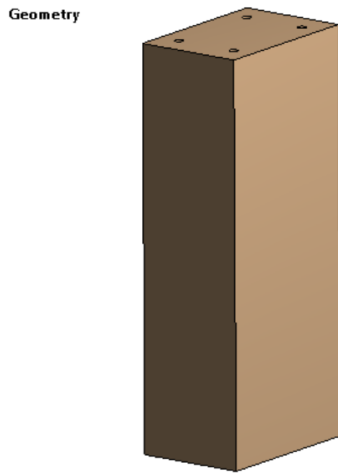


Fig 19: CRC2 Column Model



Fig 20: CRC2 Reinforcement Model

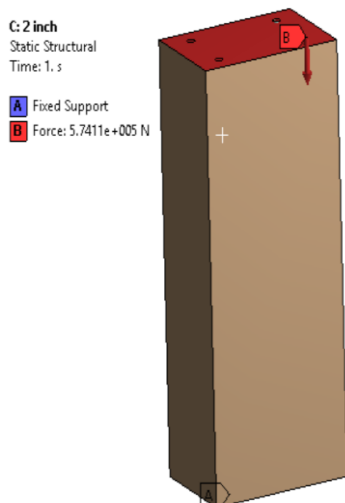


Fig 21: CRC2 Model

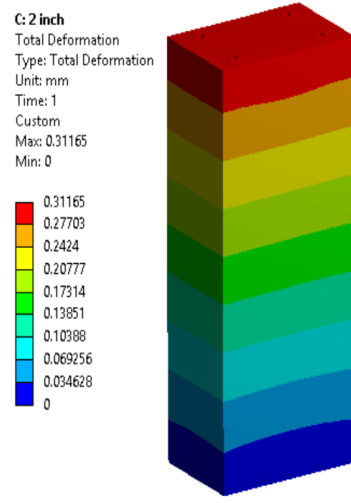


Fig 22: CRC2 Strain Model

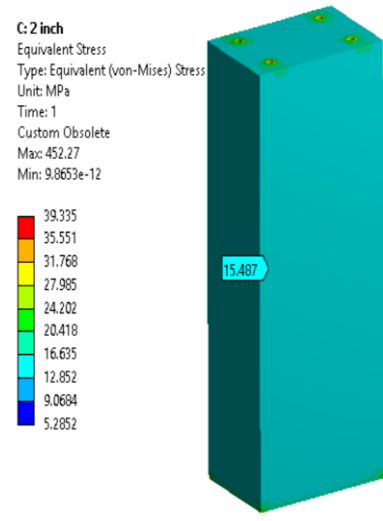


Fig 23: CRC2 Stress Model

7.3.1 Comparison of Parameters for CRC1 and CRC2

	CRC1		CRC2
	Expt	ANSYS	ANSYS
Stress (N/mm <sup>2</sup> )	18.752	18.149	15.487
Strain	0.017576	0.039222	0.03462
Ultimate Load (kN)	646.95	674.11	574.11

From the above comparison of result, it can be concluded that CRC2 give lesser results that CRC1. So it can be said that CRC1 is more efficient among the both

VIII. CONCLUSION

After comparisons of experimental and software results following conclusions are derived.

- Comparing the experimental results, it can be concluded that use of Welded wire mesh increases the Load carrying Capacity of the Column and also reduces the vertical and Lateral deflections.

- In Fig5 and Fig 8 of the NRC & CRC1a column failure respectively we can see the confined cover that is remained after failure. It is important as this confined core indicates the column is well ductile and hence resists more load than NRC
- Referring the Experimental results of NRC and CRC1 it is seen that Load carrying capacity is increased by 41.53 %
- Also the stress observed in NRC was  $10.68 \text{ N/mm}^2$  and in CRC1 it was  $18.752 \text{ N/mm}^2$  which indicates that CRC1 can resist more stress than NRC without failure.
- ANSYS Modelling is also done for NRC, CRC1 and CRC2 which concludes that welded wire mesh of one-inch spacing is more efficient than welded wire mesh of two-inch spacing in terms of Stress, Strain and Ultimate Load resistance.

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