



EXPERIMENTAL STUDY ON COMPARISON OF BOND STRENGTH OF RC CUBES AND ALSO WITH SLOTTED ANGLE

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ABSTRACT:

Concrete is a heterogeneous material which has high compressive strength but frail in tensile strength, TMT rods are homogenous material having capacity to carry tensile strength. These two materials have enormous variations in their properties. Reinforced concrete is one in which TMT rods are implanted into the concrete, so that failure does not occur in high tensile strength. Hence reinforced concrete is stable against both compressive and tensile strength. Though it has many advantages, they are hard to recycle, expensive and convert as a landfill. The aim of this project is to analyse the behaviour of RC beam replaced with slotted angle in the place of HYSD bar. Slotted angle due to its perforation has great interlocking towards concrete and so the bond strength of slotted angle is much higher than TMT bars. Pull out test has been carried out to test the bond strength of slotted angle with concrete according to the codal provision **IS : 2770 (Part I) 1967**. Results obtained for slotted angle are greater than TMT rods. Hence slotted angle has capability to carry great load than TMT bars. Therefore, in day to day practice slotted angle can be used as a substitute in construction of beams as a replacement for main rod.

thin walled section. In this project we are going to analyse the behaviour of RC beam.

1.1 GENERAL

Beam is a load bearing unit that can be used to carry vertical and horizontal loads. Normally TMT rods are used as reinforcement in beams. TMT rods have their development from MS rods and now only TMT rods are used because of their advantage over MS rods. And for further development these TMT rods are replaced with

1.2 THIN WALLED SECTION

In steel construction, two main types of structural steel are used. They are hot-rolled and cold-formed steel. Hot rolled steel is more popular and has many applications in the construction industry. However, demand for cold-formed steel structures especially for



residential, industrial and commercial buildings has increased significantly during the last decade. There are two major types of cold-formed structural member. They are primary load bearing members such as beams in floor assemblies, columns in wall assemblies, individual beams and columns, and truss members, and non-load bearing members in partition walls. [3] proposed a system, this fully automatic vehicle is equipped by micro controller, motor driving mechanism and battery. The power stored in the battery is used to drive the DC motor that causes the movement to AGV. The speed of rotation of DC motor i.e., velocity of AGV is controlled by the microprocessor controller. This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

1.3. ADVANTAGES OF COLD FORMING

1. The cold forming process enables material cost savings up to 70% by avoiding the production of scrap from the machining process.
2. Product performance is improved over other manufacturing processes as the cold forming process rearranges the grain structure to follow the part

configuration. This favorable characteristic eliminates the potential for porosity fatigues, increases over-all strength performance (shear strength, etc.) and reduces risk of other types of material integrity.

3. Surface finish is improved versus machined surfaces.
4. Critical and close tolerances can be held versus more expensive machining processes and more important, these tolerances are maintained consistently throughout the production process.

1.4 SLOTTED ANGLE

Slotted angle (also sometimes referred to as Slotted angle iron) is a system of reusable metal strips used to construct shelving, frames, work benches, equipment stands and other structures. The name derives, first, from the use of elongated slots punched into the metal at uniform intervals to enable assembly of structures fixed with nuts and bolts, and second, from the longitudinal folding of the metal strips to form a right angle.

2.1. LITERATURE REVIEW

There is only replacement of reinforcement with other materials such as polyethylin fibre and bamboo etc., . But until now there is no replacement of reinforcement with other steel sections. This



is for the first time we are replacing reinforcement with slotted angle.

measured is the force required to pull a steel rod, embedded in fresh concrete.

3.1 DETERMINATION OF MIX DESIGN

Using pycnometer specific gravity was determined for both fine aggregate and coarse aggregate. For fine aggregate the value obtained is 2.59 and for coarse aggregate the value is 2.73. Both these values are used to determine the mix proportion and it is derived by using Indian standard method. The grade of concrete adopted is M25.

3.2 FABRICATION OF SPECIMENS

For carrying out pull out test cubes embedded with TMT, MS and slotted angle are casted of dimension 100 x 100 x 100 mm. PCC cubes are casted to check the target mean strength. The list of cubes casted are

Number of PCC cubes casted – 6

Number of cubes embedded with MS rod – 3

Number of cubes embedded with TMT rod – 3

Number of cubes embedded with slotted angle rod – 3

Total number of cube casted - 15

4.1. PULL OUT TEST

The above casted specimens are tested using universal testing machine. The value



Fig. 4.1. Pull out test in UTM

5.1. RESULTS AND DISCUSSION

Results obtained from pull out test for cubes embedded with MS rod, TMT rod and slotted angle are tabulated below

Table 5.1. Results of pull out test



SPECIM EN NO	BOND STRENG TH OF MS ROD (N/mm ²)	BOND STRENG TH OF TMT ROD (N/mm ²)	BOND STRENG TH OF SLOTTE D ANGLE (N/mm ²)
1.	0.92	1.5	1.58
2.	1.475	1.65	1.55
3.	1.37	1.55	1.9
AVG	1.255	1.57	1.676

From the results obtained it is clearly inferred that the bond strength of slotted angle is greater than both TMT and MS rods.

6.1. CONCLUSION

The conclusions accomplished from theoretical and analytical study are presented below,

- The fabricated specimen are tested experimentally to find out the bond strength between slotted angle and concrete by using pull out test. And the bond strength obtained is greater than MS rod.

7.1. REFERENCES

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