International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 09 | Sep 2020 www.irjet.net p-ISSN: 2395-0072

Experimental Study on Tensile Strength of Welded Mesh Concrete Beam

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ABSTRACT: *This project paper deals with the experimental investigation on concrete beams reinforced with welded mesh in tensile zone. The objective of study is to assess the feasibility and benefit of using welded mesh in concrete overlays. The experimental investigation consists of casting and testing four welded mesh concrete beams and one control beams subjected to two point loading. The two point loading test on welded mesh beams reveals that strength of welded mesh and number of layers plays a crucial role in enhancing load- deflection behavior and flexural strength. The cashed beam will be tested under loading frame and load deflection curve prepared and the results are compared with control concrete beam*.

WELDED MESH INTRODUCTION

Welded wire mesh, or welded wire fabric, or "weldmesh" is an electric fusion welded prefabricated joined grid consisting of a series of parallel longitudinal wires with accurate spacing welded to cross wires at the required spacing.

USES OF WELDED WIRE MESH: The welded wire mesh is a metal wire screen that is made up of low carbon steel wire or stainless steel wire. It is available in various sizes and shapes. It is widely used in agricultural, industrial, transportation, horticultural and food procuring sectors. It is also used in mines, gardening, machine protection and other decorations. Weld mesh is the term given to the kind of barrier fencing that is manufactured in square, rectangular or rhombus mesh from steel wire, welded at each intersection. Welded wire fabric is also sometimes used in reinforced concrete, notably for slabs.

TYPES:

Hot dipped galvanized welded mesh: This type of mesh wire is generally made up of plain steel wire. At the time of processing it goes through a hot zinc covering process. This type of welded mesh ware with square opening is ideal for animal cage structuring, fabricating the wire boxes, grilling, partition making, grating purposes and machine protection fencing**.**

PVC coated welded mesh: PVC coated welded mesh with plastic covering is constructed with galvanized iron wire of high quality. It has PVC powder covering that is processed by an automatic machine. The smooth plastic coating on this corrosion protective wire is attached with a strong adhesive which make increases durability of the wire. It is used in fencing residential and official properties like gardens, parks, building etc. The PVC coated welded mesh which is available as both rolls and panels, is also available in different colour like white, black, green etc.

Electro galvanized welded wire mesh with square opening: This type of welded wire mesh is designed for building fencing and in other infrastructural purposes. It is a corrosion resistant wire mesh that is largely used in structural building. It is also available in different forms like rolls and panels for industrial uses.

Welded stainless steel mesh: This kind of welded mesh wire is basically used in industrial fencing purposes. It is made up of stainless steel that has high strength and integrity. This corrosion resistance meshed wire is long

lasting and is widely used in transportation, agricultural, mining, horticulture, entertainment and other service sectors.

CONVENTIONAL BEAM DESIGN

The beams were of cross section 150mm x 200mm with a span of 2000mm and 6mm bars are provided as stirrups of 150 mm spacing. Two beam were made as above specification as conventional beam.

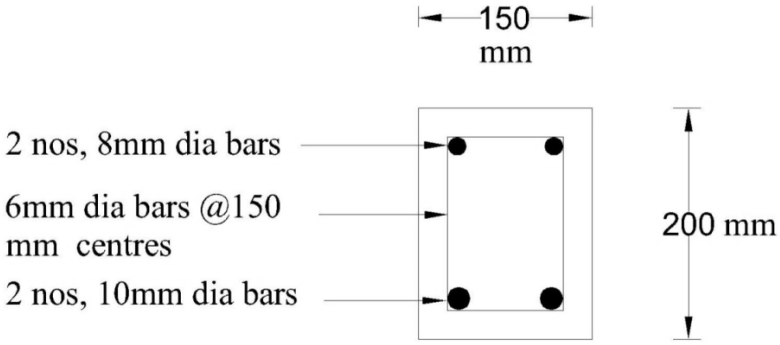


Figure 1 Details of cross section of beam

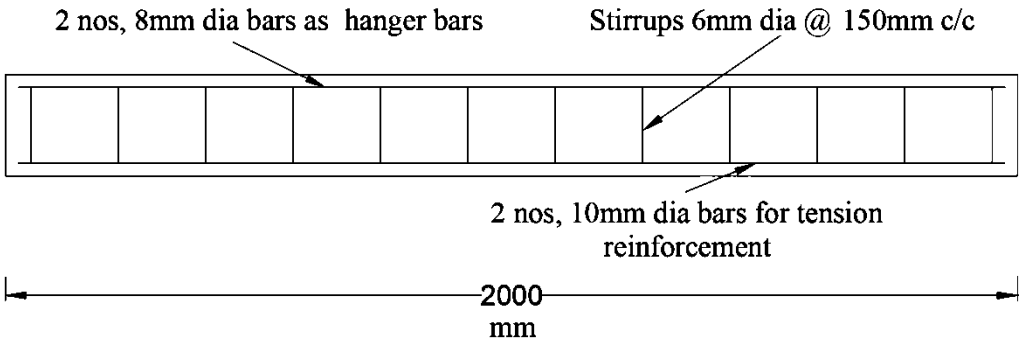


Figure 2 Longitudinal section for beam

WELDED MESHED BEAM DESIGN

The beams were of cross section 150mm x 200mm with a span of 2000mm and 6mm bars are provided as stirrups of 150 mm spacing. Two layers of welded mesh are provided in beam. Two beam were made as above specification as welded mesh beam.

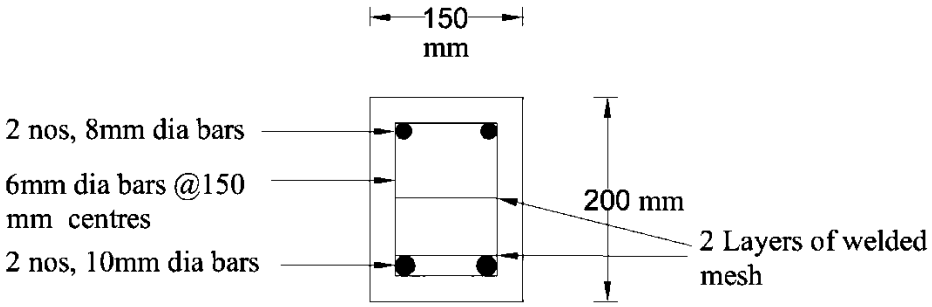


Figure 3 Details of cross sections of welded mesh beam

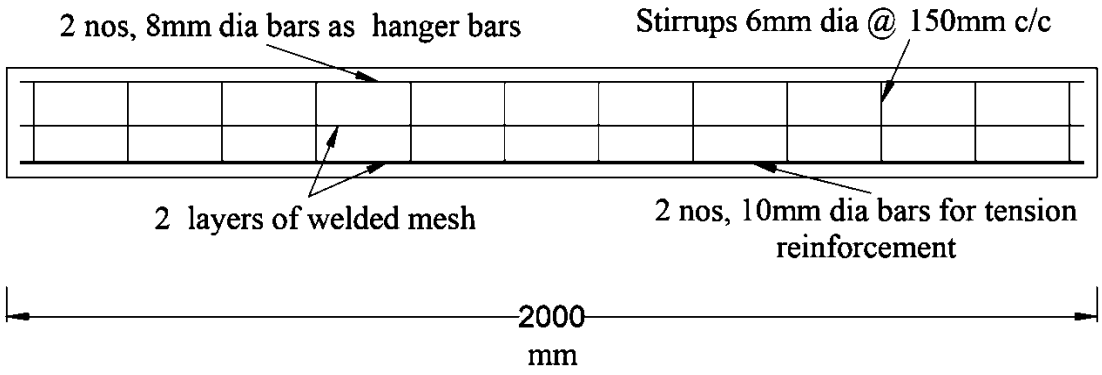


Figure 4 Longitudinal section for welded mesh beam

CASTING MOULD AND CONCRETING

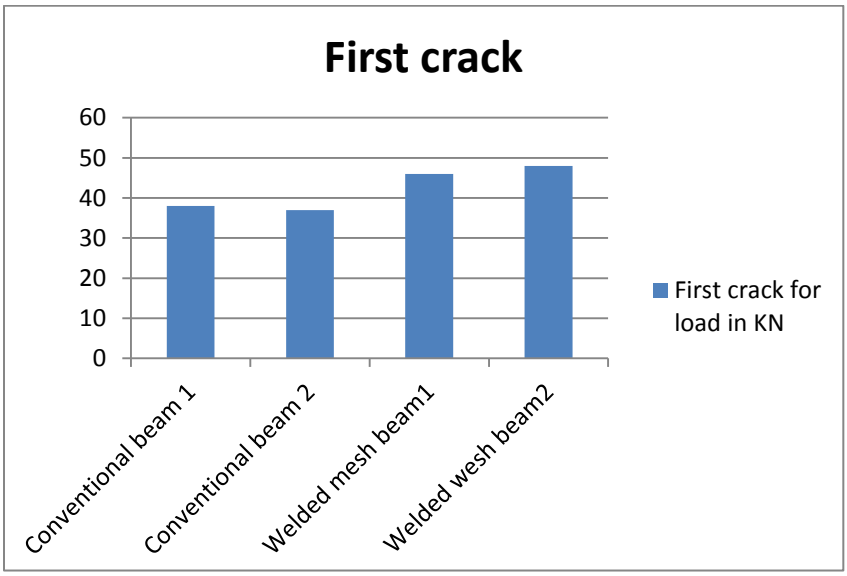
The mould should be properly prepared and apply oil inside the mould and reinforcement placed. The concrete were mixed of M20 grade of concrete by using drum mixer. The mixed concrete is put into mould with three consecutive layers each layer was well compacted by damping rod. The beams were demoulded after 24 hours and were submerged in portable water for 28 days of curing.

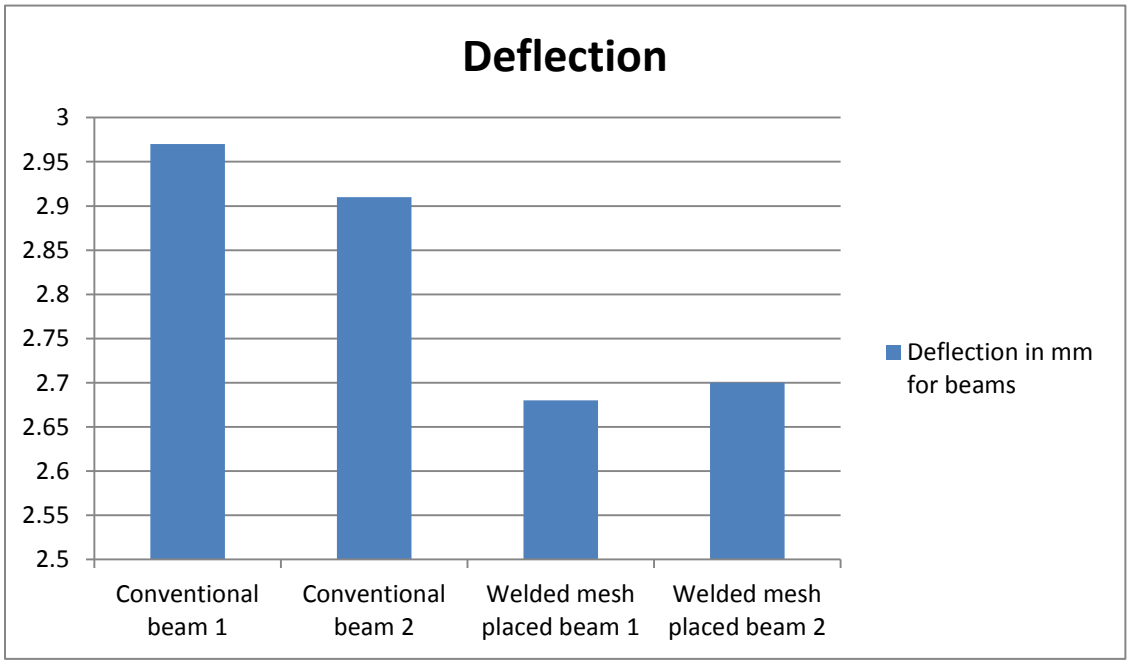



TESTING OF BEAM AND RESULT

A 100 tonne capacity reaction frame mounted over strong floor is used to test the beam specimens. Loading is applied by means of 30 tonne hydraulic jack. The load applied by the jack is measured using a proving ring of 30 tonne capacity. Dial gauges of sensitivity 0.01 mm are used to measure the deflection of beams. The load is applied in increments of 2kN.The deflections are measured for each load increment at mid span. It has been observed that hairline cracks develop at the lower part of the beam and as loading continues, cracks widen and extend towards the neutral axis. At each load increased, cracks were marked in the beam and deflections were measured. The recorded first crack loads and ultimate loads of welded mesh beams and conventional beams are given in Table

	First crack load in KN	Deflection in mm 60 KN
Conventional Beam 1	38	2.97
Conventional Beam 2	37	2.99
Welded Mesh Beam 1	46	2.72
Welded Mesh Beam 2	48	2.68





CONCLUSIONS

- An experimental investigation has been carried out to study the behaviour of reinforced concrete beams with welded mesh.
- From tests it has been found out the following conclusion welded mesh also carry tensile forces when they are kept in tension zone of reinforced concrete beams.
- The first crack load carrying capacity of welded mesh beams were found to be increase.

- The ultimate load carrying capacity of welded mesh beams were found to be increase.
- All the beams are failure due to formation of flexural cracks when compared to conventional beam welded mesh beams appears fewer cracks because the ductility property can have improved due to layer of welded mesh.
- Based on the test results it could be concluded that the welded mesh can be comfortably adopt in structural members having thin concrete layers.
- Welded mesh is also used as additional reinforcing material in RC beam where requirement of more strength and less deflection.

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