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Strengthening RC-Beam Column Joint Case Study

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Abstract - The beam column joint is the crucial zone in a reinforced concrete moment resisting frame. It is subjected to large forces during severe ground shaking and its behavior has a significant influence on the response of the structure. The assumption of joint being rigid fails to consider the effects of high shear forces developed within the joint. The shear failure is always brittle in nature which is not an acceptable structural performance especially in seismic conditions..

***Key Words*:** Deflection, Flexure, Fiber Reinforced Polymers, Strengthening of RC-Beam Columns Joint, Epoxy Resin Etc

1. Introduction

Many civil engineering structures are no longer safe due to increased load specifications in the design codes. Such structure must be strengthened in order to maintain their serviceability. Strengthening refers to the reconstruction or renewal of any part of an existing building to provide better structural capacity like higher strength and ductility than the original building.

In RC buildings, beam-column joints are subjected to large forces during severe ground shaking and its behavior has a significance influence on the response of the structure. Hence beam-column joint is the crucial zone in a reinforced concrete moment resisting frame.

2. Body of Paper

In this paper two type of material used.

A. Carbon fibre Reinforced Polymer (CFRP):
Each carbon filament thread is a bundle of many thousand carbon filaments. A single such filament is a thin tube with a diameter of 5–8 micrometers and consists almost exclusively of carbon. The earliest generation of carbon fibers (e.g. T300, and AS4) had diameters of 7–8 micrometers. Later fibers (e.g. IM6) have diameters that are approximately 5 micrometers. Carbon fiber is an extremely lightweight reinforcing fiber derived from the element carbon..

Fig. 1: CFRP

B. Glass Fibre Reinforced Polymer (GFRP):
Fiberglass or GFRP, is a fibre reinforced polymer made of a plastic matrix reinforced by fine fibers of glass. Fiberglass is a lightweight, extremely strong, and robust materials. The plastic matrix may be epoxy, thermosetting plastic.

Fig. 2: GFRP

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Application Procedure of GFRP & CFRP Wrapping:

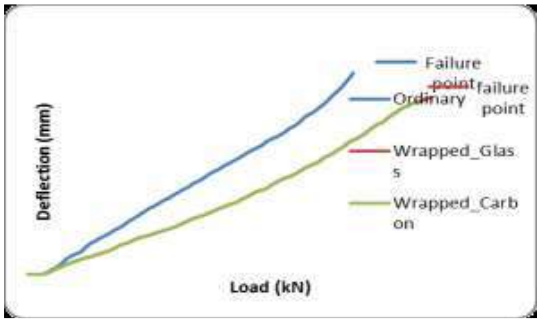
1)Grinding the surface from joint up to 150 mm and to get an even surface. All projections are grounded off.
2) Apply embraced Primer to be prepared concrete surface area. Work site must be thoroughly ventilated during the application of chemicals.
3) Mix the two packed MBrace Saturant two packs and apply to the primed concrete specimen using brush.
4) The fibre sheet must be cut before application of MBrace Saturant into prescribed sizes using scissors or cutters.
5) On the saturant fix the sized glass fibre carbon fibre sheets and roll in the beam longitudinal direction .

3. Results And Tables

Fig. 3: Test setup ordinary specimen.

4. Load Study

With reference to the test results, the loads on ordinary specimens at first crack stage are compared to the load on carbon fiber specimens at first crack stage. It is observed that the load carrying capacity of carbon fiber specimens are increased when compared to the ordinary specimens.



Comparative Study of Load
Ordinary, CF-Specimen & GF-Specimen

5. CONCLUSIONS

Based on the experimental investigations carried out on the ordinary and strengthened beam-column joint specimens using GFRP and CFRP wrapping, the following conclusions were drawn.

1) The strengthening technique using wrapping system for the damaged R.C.C interior beam – column joints have proved to be effective.

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