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Polymer Modified Mortar & Microconcrete

Comparison Between Repair Methodology of Rcc Structures

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Abstract—The detail investigation between repair methodologies i.e polymer modified mortar and microconcrete helps in understanding the feasibility of each method,such as strength gain, cost comparision,durabilty,extention of life of member etc.it also helps us to identify and recommend suitable repair to damaged concrete member i.e columns,beams,slabs.while polymer modified mortar is most commonly used method,Nowadays microconcrete is also gaining polpularity among repair engineers.In an aggressive environment like Mumbai polymer modified concrete is very much suitable for repair and rehabilitation of damaged RCC structures because of its excellent moisture resistance properties & high early strength .Not only it strengthens the RCC structural members but also makes a highly durable repair. Though FRP has become more effective for retrofitting but polymer modified concrete is being widely used for cost effective. This paper focuses on some of the important properties and step by step approach for structural strengthening of damaged concrete structures with polymer modified concrete.

Keyword- *concrete, rcc , polymer mortar etc*.

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I. INTRODUCTION

The repair and rehabilitation of damaged concrete structures is quite often in a highly aggressive environment like Mumbai associated with high level of pollution, high humidity throughout the year, high rainfall along with higher level of chloride contents in the atmosphere. Ageing of the structure and persistent use after the design life of the structure also leads to deterioration of the structures. There are various products available for repair and rehabilitation but Microconcrete is most cost effective for improving the high early compressive strength, tensile and flexural strength and reducing the brittle nature. While Polymer Modified mortar is useful for waterproofing and patch repair of minor cracks of the structure.

Micro concrete particularly latex modified concrete such as styrene-butadiene, acrylic latex, polyvinyl acetate, and ethylene vinyl acetate have been widely used for structural repair and strengthening. Repair to damaged reinforced concrete elements like beams, columns, wall etc., where access is restricted and compaction is not possible and for structural strengthening by Jacketing of R.C.C. columns to increase load carrying capacity are areas of application of micro concrete.

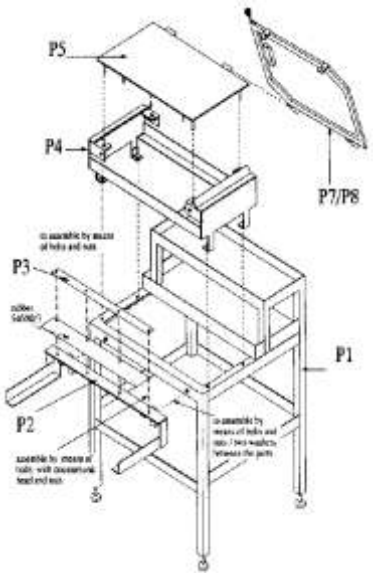

Fig No.1

II METHODOLOGY

1 Repair Methodology

The step by step approach for repair is given as follows:

3.1 Supports: The R C members should be properly supported before chipping the spalled / loose concrete. The props provided shall be adequate to provide sufficient structural support to the load carrying members.

3.2 Surface Preparation of concrete: All the spalled split concrete or some other pre-connected mortar might be expelled by chipping to uncover the fortifying bars. The solid might be chipped to a base profundity of 10mm behind the strengthening bars. The regions to be repaired might be profiled to get rectangular or square shape with an internal decreasing edg+Surface readiness of support :The uncovered strengthening bars ought to be cleaned completely to expel all hints of rust, scales, and so on., by utilizing wire brush, emery paper and so forth. The sidelong ties/stirrups might likewise be cleaned similarly. After expulsion of eroded part, the measurement of the fortification might be checked and contrasted and the drawings.

3.3 Provision of additional reinforcement: As the distance across of strengthening bars is decreased considerably (say >20%) extra bars should be given according to the outline. This extra support might be legitimately secured to the current cement by giving sufficient shear connectors. Weld cross section may likewise be given if discovered vital.

3.4 Provision of shear connectors: Shear connectors of 8mm diameter shall be provided in holes of 14mm diameter and 75 mm deep. These shall be provided at every 500 mm c/c on all the faces of the beams in staggered form. The holes shall be cleaned with compressed air or water jet to remove all the dust etc. and then the shear connectors shall be fixed in the holes using polyester resin anchor grout.

3.5 Priming of reinforcement bars: The uncovered and cleaned fortifying bar should be given a layer of Epoxy Zinc Primer such that the covered film will have a dry film thickness of 40 microns. The film should be ceaseless particularly in the districts where setting, flaws and so forth., are available on the surface of the bars. It is critical that the back segment of the bars ought not be left without covering. A second coat if necessary might be given to accomplish a uniform and constant film. The extra fortification gave furthermore the shear connectors should be covered with Epoxy Zinc Primer. The weld network if gave should likewise be covered with Epoxy Zinc Primer.

3.6 Provision of Epoxy based bonding agent: The base and hardener component of epoxy resin based bonding agent must be mixed well to get a uniform grey coloured mix. Apply the material to properly cleaned and dry concrete substrate using stiff nylon brush by scrubbing it well into the substrate. The coat should be uniform and well spread on the

ire surface area of the repair patch. The mixed material must be applied before the elapse of its pot life and the new repair mortar must be applied before the elapse of overlay time. As a fully dried epoxy resin coat acts as debonding layer, the repair material should be applied whilst the bonding coat is tacky. In case the applied epoxy bond coat gets dry, an extra coat should be applied before application of repair mortar.

3.7 Formwork and shuttering: Slurry tight and solid structure work might be given. The covering for encasement should be kept prepared such that the formwork might be set in position and altered such that the miniaturized scale cement can be filled the formwork inside the overlay time of the holding operator (5 hours). Satisfactory backings should be accommodated the formwork. Consideration ought to be taken to guarantee sealed covering. Under no condition the slurry ought to stream out of the covering amid pouring of smaller scale concrete.

3.8 Mixing of micro concrete: It should be mixed using the appropriate water powder ratio as mentioned in the product data sheet. The mixing shall be done mechanically and under no circumstance hand mixing shall be done. Mixing shall be carried out for 3 to 5minutes to ensure that homogeneous mix is obtained without any bleeding or segregation. In hot climate ice cooled water shall be used to maintain the temperature of mixed material. If the encasing thickness is more than 100 mm, add stone aggregates up to 50 % by weight of micro concrete to the mixed micro concrete directly into the mixer hopper. The stone aggregates must be 12 mm and down and shall be clean, washed and dried. The mixing should be done for 3 minutes in mixer and then pre weighed stone aggregates into the mixer. Mix further for 2 minutes till lump free mix is obtained

III PROCESS

1. POLYMER MODIFIED MORTAR

1.1 SUBSTRATE PREPARATION

1. It is essential that the substrate to be repaired is sound, clean and free of all contamination.
2. The damaged areas of concrete to be removed should be clearly identified. The perimeter of the area should be saw cut to a depth of 10 mm and the edges cut as neatly as possible keeping the sides squares. Feather edging is not permitted and a minimum thickness of 10mm must be maintained over the whole repair area.
3. If reinforcement is exposed in the repair area, it should be cleaned to remove all the rust particles by mechanical means like metal wire brush or abrasive blasting.
4. Cathodic protection to the reinforcement steel can be provided by applying Epoxy Zinc Primer to the cleaned steel bar uniformly. Severely corroded reinforcement may require replacement and the engineer must be consulted.

1.2 PRE-WETTING THE SUBSTRATE

The concrete substrate must be saturated with water till saturated surface dry condition is achieved. Any excess water may be removed by cloth or oil free compressed air.

1.3 MIXING

1. Polymer Mortar must be mixed mechanically. For this, heavy-duty slow speed drill with spiral mixing paddle or forced action mixer can be used.
2. Add 3.5 litres of water into the mixer. Start the mixer and add the Polymer Mortar HB powder rapidly and continuously. Mix for 3 minutes until mortar is homogeneous and lump free along with it.
3. Add water, if necessary, to get the desired consistency. Mix for a further 1 to 2 minutes. Under no circumstances should excess water be added. Little extra water may be required in hot climatic conditions.
4. If ambient temperature is more than 300C, use chilled water for mixing and store unused product in shed. For better results maintain the mixed temperature of product at 350C.

2. **MICROCONCRETE**

SURFACE PREPARATION:

1. Clean the surface and remove loose concrete, dust, oil, paint, grease, waterproof coating, etc.
2. Expose fully any corroded steel in the repair area and remove all scale and corrosion deposits. Light shot blasting is highly recommended. Apply Dr. Fixit Rust Remover for rust free bars.
3. Apply Dr. Fixit Epoxy Zinc Primer over the cleaned re-bars and allow it to dry before pouring of Dr. Fixit Micro Concrete.
4. .Saturate the substrate with water to prevent absorption of water from the mixed material.
5. For a dry substrate, it should be primed by applying one coat of Epoxy Bonding Agent. Allow the bonding agent to reach tacky condition before pouring of Micro Concrete.

2.1 MIXING:

1. Use PAN Mixer for mixing of Micro Concrete.
2. Charge 85-90 % of clean & potable mixing water (3.75 to 4 liters per 25 kg bag) to a PAN Mixer. }

Start addition of Micro Concrete powder slowly under continuous mixing. Keep mixing for 2 minutes. Add balance quantity 10 – 15 % of mixing water & again mix for another 2-3 minutes to form a homogeneous, free flowing, uniform & lump-free mix.

IV.APPLICATION

4.1 Applications of Micro concrete

1. **Column jacketing:** Column Jacketing requires high strength concrete mix which effectively fills recesses of broken members and penetrate behind reinforcements due to its fluidity.
2. **Soffit of beams:** After repairing/replacing/treatment of reinforcement, super fluid micro concrete is poured to bond with reinforcement.

4.2 Application Polymer Mortar

1. When applying by hand Polymer Mortar must be forced tightly into the substrate to ensure complete contact with the pre-wetted substrate. In situations where reinforcement steel is countered, the mixed material should be placed behind the bars tightly and then subsequent thickness should be build.

2. Leveling and initial finishing should be carried using a wooden or plastic float. Final finishing should be carried out using steel float.

V. CONCLUSION

Hence in this project, we compared Advantages, properties, procedure and application of repair methodologies of Polymer Modified Mortar and Micro concrete, we had following conclusions.

Polymer modified mortar is a cheaper method, but its Strength gain is less as compared to Micro concrete. Micro concrete is mainly useful for core structural repairs such as Column Jacketing, Repair of soffit of beams etc. Polymer modified mortar is used in variety of applications such as waterproofing , patch repair etc.

VI. REFERENCE

[1] Research paper; Rehabilitation and Retrofitting of Structures; Author - Suresh Pattanaik.
[2] Book; Handbook of Polymer-Modified Concrete and Mortars; Author - Yoshihiko Ohama.
[3] Building Repairs;Dr.fixit pvt. limited.