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Comparative study of manufactured mortar with Traditional mortar

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Abstract: Dry mix mortar is advance technology widely used in European countries and to a limited extent in India. Indian construction industry still relies on job site technology because cost of dry mix mortar is high as compared to job site mortar. But it is the fact that laboring its cost can be minimized and also overall quality can be achieved along with speed in construction by the use of dry mix mortar. Dry mix mortar manufactured with new technology has one of the biggest advantages that wastage of sand which is one of the major content of dry mix can be avoided in order to sustain Indian construction industry which is facing problem of availability of sand. Based on comparative study of dry mix manufacturing industries in Maharashtra (India), the attempt in this paper work is to study the dry mix manufacturing technology, different standards such as European, British, US, and market potentials. And also to specify the specifications for dry mix mortar as Indian specifications based on experimental study of the samples collected from working plants to attract the Indian engineers and builder community to use dry mix mortar to fulfill the needs of construction industry of executing the work speedily and in quality manner.

Keywords: dry mix mortar, quality standard, construction industry, advance technology, job site, market potential. And market potential of dry mix mortar, also to specify

I. INTRODUCTION

A manufactured mortar is a term for readily mixed raw materials in dry form which may Also have additives and polymers added for specific usage in construction. Dry mix products Provide excellent technical properties to meet the stringent performance requirements which are common in the current construction scenario. Dry-mixed mortar or dry mortar is made of Cement, sand, mineral, and functional additives, mixing together proportionally. Dry Mix Mortar products with well-defined properties & performance to meet specific requirement and Application can be produced. Today the Dry Mix Mortar is conquering the market by replacing the traditional job site mixing mortar because of its various advantages. Mortar is amongst the most versatile materials used in modern construction. It serve to lay bricks and other masonry blocks , coat buildings as renders and skin coats, fix tiles. Now a days with emerging demands of Indian and foreign construction industry for new building materials and technologies more and more factory mixed that is dry mix mortar is conquering the market and replacing the traditional job site mixing mortar by advanced dry mix mortar technology which is widely used in India for last 10 years.

From the literature study and visiting the dry mix manufacturing plants, it is observed that, there is a lot of variation from industry to industry and place to place regarding procurement of material, manufacturing processes and marketability for dry mix mortar in India. The variation may be because of not having the specific uniform standards specified as IS, ASTM, UBC, BRITISH etc. The standards given in ASTM, UBC, and BRITISH may not be applicable to every time everywhere for Indian conditions. Therefore this work includes studying the material management, manufacturing process, quality standards the specifications for dry mix mortar as Indian specifications based on experimental study of the samples collected from working plants.

II. OBJECTIVES

1. To improve strength of manufactured mortar using admixture.
2. To study strength comparison of traditional mortar and manufactured mortar.
3. To study that which mortar is more economic.
4. To give suggestions while manufacturing and while using manufactured mortar.

III. EXPERIMENTAL WORK

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3.1 CRUSHING TEST:

(Traditional mortar and dry mix Mortar cube details)

Size of cube mold 70.6 x 70.6 x 70.6 mm
Admixture used – plasticizes
Admixture details:
Brand name: - Dr. Fixit LW + Super
Usage: Enhance workability of mortar.

Procedure:

a. Take 200gm of cement and 600gm of sand ratio 1:3 by weight in a pan.
b. b. The standard sand will be of walnut, of light, gray or whitish variety and will be free of silt.
c. The sand grains will soon be angular, the shape of grains approximating into the spherical form, elongated and flattened grains being present only in very small quantities.
d. Standard sand will pass through 2 mm IS sieve and will be retained on 90 microns IS sieve using the following particle size distribution.
e. Mix the cement and sand in dry condition using a trowel to get one minute and then add water.
f. The quantity of water will be (p/4+3) % of the combined weight of cement and sand, where p is the % of the water required to produce a paste of standard consistency determined earlier.
g. Add water and mix it until the mixture is of uniform color.
h. The time of mixing shall not be < 3 minutes & not > 4 minutes.
i. Immediately after mixing the mortar, then place the mortar at the cube mold and prod with the help of the rod.
j. The mortar will be prodded 20 times in about 8 sec to ensure the elimination of entrained air.
k. After 24 hours, remove the cubes in the mould and immediately submerge in clean water till testing.

Result of Mortar Cube Tests:

Compressive strength at 28 days = 17.5 N/mm2 (traditional mortar cube)
Compressive strength at 28 days = 19.2 N/mm2 (dry mix mortar cube)

Figure 4.1 hand mixing of mortar

Figure 4.2 demolding cube

4.2 ADHESIVE TEST: (traditional mortar)

Procedure:

➢ Two bricks are joined together with mortar to be tested as shown in above Fig. The upper brick is suspended from an overhead support.
➢ Two bricks are joined together with mortar to be tested as shown in above Fig. The upper brick is suspended from an overhead support. A board is hung from the lower brick. Then weights are added to the board till the bricks separate. The adhesive strength is the load divided by the area of contact.

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- **Bond strength of traditional mortar is 0.088 Mpa**
- **Bond strength of dry mix mortar is 0.91 Mpa.**

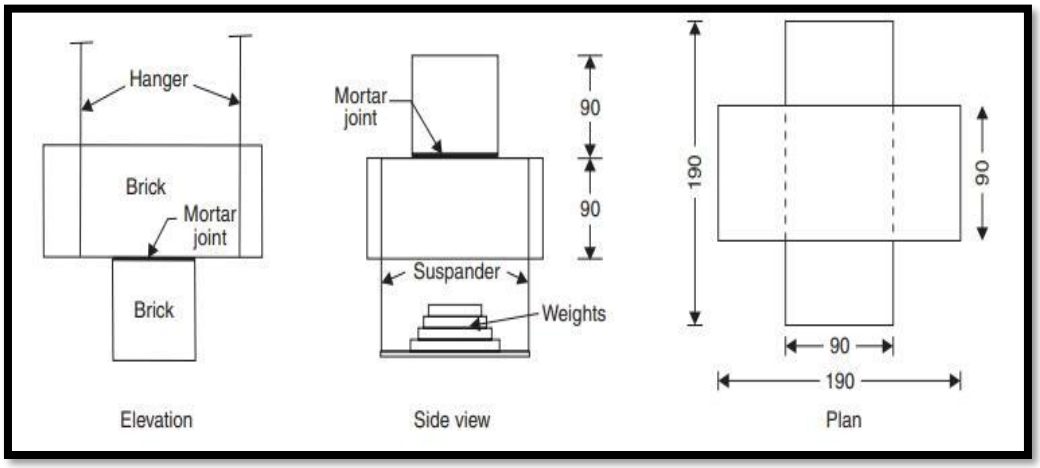

Figure 4.3 *Preparation* of adhesive test

4.3 Economic confederation of between traditional and dry mix mortar

- **Traditional mortar :-**

All the ingredients of these type of mortar is taken separately .So the cost of each item is take some changes to transporting charges and other things. Then the cost of traditional mortar making is as a expensive than dry mix mortar

- **Dry mix mortar:-**

All ingredient are arranged at manufacturing plant so the all material mixed in mortar taken in large quantity so cost of material is some have less. Then cost of dry mix mortar is less at same quantity of traditional mortar.
"The try mix mortar is more economic tan traditional mortar"

4.4 Manufacturing of dry mix mortar:-

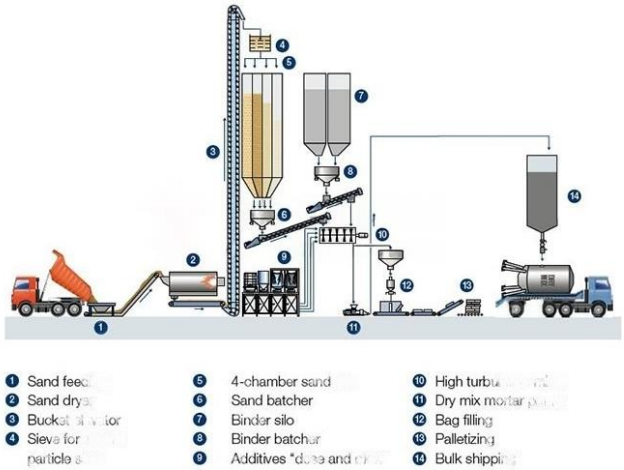

Figure 4.4 layout of dry mix mortar plant

Suggestion:-
While manufacturing

- All materials proportion should be standard
- Moisture content of sand should be kept low
- Cement should use optz not ppc

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- Fineness of sand should be checked
- Polyethylene bag also Inside while making bag of dry mix mortar to resist moisture content

While storage and placing

1. Keep cement in dry, leak-proof and moisture-proof environment.
2. Doors and windows must be kept closed.
3. Bags must be stacked on a wooden plank or on a strong tarpaulin at 6 inch above the ground
4. Bags must be stacked at least one foot away from the walls.
5. Width of the stack must not be more than length of 4 bags or 3 meters.
6. Height of stack should not be more than 10 bags.
7. Bags must be kept close to each other to prevent circulation of air.
8. Cover the cement with tarpaulins or plastic sheets in monsoons or when it is required to be stored for longer time.
9. HDPE and paper bags must be stored separately.
10. Do not use hooks to lift cement bags.
11. Always use cement in first in, first out method

IV. CONCLUSION

Compressive strength test:

Compressive strength testing in accordance with ASTM C 270 is conducted on specimens of dry mix mortar in the testing laboratory. Compressive strength specimens 2 inch (51mm) mortar cubes was casted in nonabsorbent molds and cured in a water tank and tested after 28 days for compressive loading to calculate the value of compressive strength in N/mm2

Table No 5.1: Average compressive strength after 28 days in N/mm2

Sr.No.	Type of Dry mix mortar	Average compressive strength after 28 days in N/mm2		
			-	-
01	External plaster	17.05	17.29	31.88
02	Masonry	28.68	17.29	31.88

Bond test:-

Bond strength of traditional mortar is 0.088 Mpa

Bond strength of dry mix mortar is 0.91 Mpa.

- **Cost comparison of dry mix mortar and conventional mortar:**

Dry mix mortar is a new material and it is for replacing the job site mortar, therefore it is essential to know its cost comparison with the ob site mortar for the item.This helps tothe end users regarding its suitability in replacing the job site mortar. Cost comparison is carried out for 15mm thick plastering work for 1 brass (100sqft) quantity.

Table No5.2Cost of dry mix mortar

SR.NO.	PARTCULARS	QTY	RATE	COST in RS.
01	Dry mix mortar	5 no of bag	Rs, 315/bag	1575
Total cost of material Rs.				1575

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02	Labour			
	1. mason	0.19	400/day	76
	2. Helper.	0.19	300/day	57
Total cost of labour Rs.				133
Total cost of plaster work in brass(100sqft) Rs.				1708

Table No5.2Cost of dry mix mortar

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02	Labour			
	1. mason	0.19	400/day	76
	2. Helper.	0.19	300/day	57
Total cost of labour Rs.				133
Total cost of plaster work in brass(100sqft) Rs.				1708

Table No 5. 3 Cost of conventional mortar

SR.NO.	**PARTCULARS**	**QTY**	**RATE**	**COST IN RS.**
01	cement	1.5 bags	Rs, 300/bag	450
	sand	8.55 cuft	Rs. 50/cuft	428
Total cost of material				878
02	Labour			
	1. mason	.375	400/day	150
	2 helper.	.375	300/day	113
Total cost of labour				263
Total cost of plaster work per brass				1141

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This cost comparison indicates that the total cost of dry mix mortar is more by 49.69 % than conventional mix but cost of labor is less by 49.43 % than conventional mortar

- Dry mix mortar is more economic
- Brick jointing process is done rapidly
- Mortar mixing process is fast
- For rapid construction work dry mix mortar is preferred.
- Ir gives followers advantages

a) No sand stockpiles being blown away or contaminated
b) 30% reduced wastage of sand and cement
c) Reduced pilferage of cement
d) Can be transported simple container, stirred automatically, pumped and applied by machine
e) Improve industrial working conditions
f) Correct sand and cement mixing ratio

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