

# Effects of Time Laps Affects the Compressive Strength of Cement

Ganesh V. Tapkire, Hemraj R. Kumavat

**Abstracts-** In regular Practice delay in Plastering due to various reasons like material availability, labour recess time, or unskilled labour workmanship due to other activity improper plastering sequence. For usually long delay during plastering the mortar should be kept alive by periodically it keep to mortar workable this study gives the strength data simulating such improper plastering sequence to scope this problem related to improper plastering sequence which ultimately result in formation of joints. And joint portion in regular plastering practice no any other treatment or method can used in ordinary construction method. For this study point of view we prepare the cement cube at laboratory in same manner as per the site condition. And conduct test from this result shows the effects of delay in workmanship and joint affects the strength of cement.

**Keywords:** - Time laps, Mortar Joint, Improper plastering sequence (cement slurry) compressive strength of cement.

## I. INTRODUCTION

In regular Practice it is very difficult to prepare the plaster layer in wall monolithically due to location of plastering surface and bad workmanship for this study we visit more than three sites. and observe the plastering task work. At site the labour prepare the material mixing for plastering in one time approximate at 11.00 am and use this material whole day till the end of day at 5.30 pm for this 5 to 6 hours use the same material. Plastering material consist of cement sand and water and we know the properties of cement as per IS Initial setting time and final setting time of cement and also compressive strength of cement for this experimental work we prepare the mortar cube in laboratory with one hour time interval. Here we prepare three type of cube of size 7.07x7.07x7.07 cm 1) Regular cement cube cast as per IS guide line 2) casting 50% Volume and remaining after one hour with cement slurry joint same material 3) casting the same material without joint. A plane or discontinuity formed joint a joint usually characterized by poor bond unless remedial measure are taken before applying mortar layer on it previously hardened surface for unusually delay during plastering the mortar should be kept alive periodically mixing it due to this delay and joints affects strength of final product. This paper basically focuses on the effects of time laps and joint affects the compressive strength of cement.

**Revised Manuscript Received on March 2015.**

**Prof. Ganesh Vijay Tapkire**, Department of Civil Engineering RCPIT Shirpur Tal. Shirpur Dist. Dhule, Maharashtra, India.

**Prof. Hemraj Ramdas Kumavat**, Department of Civil Engineering RCPIT Shirpur Tal. Shirpur Dist. Dhule, Maharashtra, India.

## II. EXPERIMENTAL PROGRAM

Material: - OPC 53 Grade cement following table shows the properties of cement

S. No	Test	Result
1	Standard Consistency	
2	Compressive strength N/mm <sup>2</sup>	
	3 days	15.5
	7 days	24.5
3	Setting Time	
	Initial setting time	52 minutes
	Final setting time	230 minutes
4	Fineness	7 %

Sand: - Used tapi River sand with proper sieving done. But this test IS Guide line mention the use of standard sand but it is not practically possible to use of standard sand for plastering work. Here we prepare the sand sample of 2mm IS sieve passing. The ordinary sand gives the 66% of standard sand result.

Water: - Potable water should be used in preparation of mortar.

## III. CASTING PROCEDURE

Take material as per

SIEVE ANALYSIS OF RIVER SAND				
Sample Weight : 1000 gm				
S.No.	Sieve size mm	Weight Retained In gm	%Weight Retained	Cumulative %
1	10	0	0	0
2	4.75	0	0	0
3	2.36	217	21.7	21.7
4	1.18	325	32.5	54.2
5	600	267	26.7	70.9
6	300	122	12.2	83.1
7	150	20	2	85.1
	Total	851	Total	315
			<b>F.M.</b>	<b>3.15</b>

Proportion (1:3 ) cement 1665gm and sand 4995 gm for 9 cube water content (P/4)+3% of combined weight of cement and sand i.e. 785 ml for 3 day cube and repeat again for 7 days cube. mix the material thoroughly until the mixture is of uniform colour. Before casting the cube apply oil polish on cube surface. At time water to add in mix start the stopwatch and count the time.



## Effects of Time Laps Affects the Compressive Strength of Cement

The first type cube casting as per IS guide line with machine vibrator. Then second type cube cast 50% of their volume and remaining 50% of cube volume cast after the 1 hour. With cement slurry Then cast third group of cube same material of one hour time laps. At time of casting we observe that the due to time laps mortar get dried required extra quantity of water other than design quantity of water for the workable condition. After casting place the cube mould in cabin at temperature  $27\ 0^{\circ}\ +/-$  for 24 hours. Then remove the cube from mould and submerge them in clean water for curing at 3 day and 7 days curing. After curing take out of water with dry cloth.

### IV. SAMPLE OF CUBE CASTING

Sample 1) fresh mortar or traditional cube. Sample 2) 50% volume of cube cast in fresh mortar and reaming cube cast after 1 hours with joint cement slurry. Sample 3) cube cast after 1 hour fresh mortar.



Image No.1 Fresh mix Mortar



Image No.2 One Hour after Mixing Mortar

### V. TESTING OF CUBE

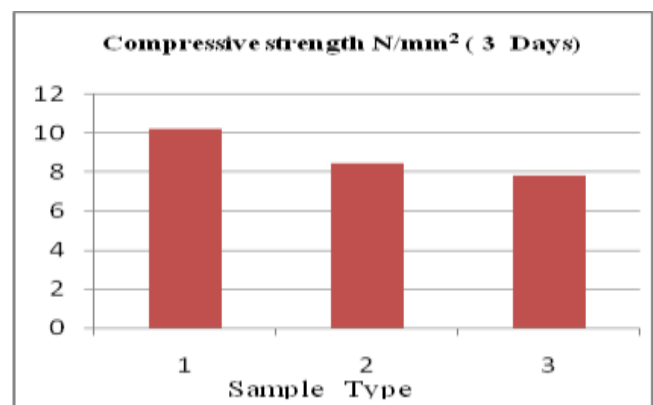
For testing we used the digital compression testing machine of capacity 2000 KN Load place the cube at proper position and then apply the load at uniformly rate  $35\ \text{N/mm}^2$  Note the load P at which the cube fails then calculate the strength of cube by using the formula load / area of cube repeat the procedure for remaining cube for 7 days testing. From the observation of testing we found that the strength of cube for

first type group get the result is 66% of standard result and second group decrease their strength due to joint the failure of cube at joint portion. And third group of cube can fails due to time laps it is not proper bonding of material.

### VI. TEST RESULT

3 Days			
S. no	Compressive Strength in $\text{N/mm}^2$		
	Sample 1	Sample 2	Sample 3
1	9.65	9.3	7
2	10.25	8.6	8.6
3	10.85	7.5	7.9
<b>Average</b>	<b>10.25</b>	<b>8.47</b>	<b>7.83</b>

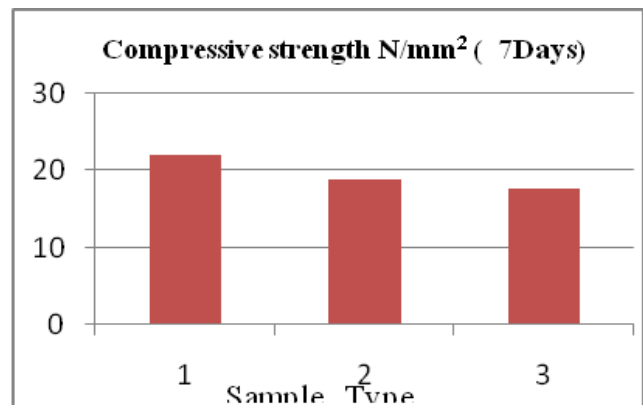
Table No. 1



Graph No.1

7 Days			
S. no	Compressive Strength in $\text{N/mm}^2$		
	Sample 1	Sample 2	Sample 3
1	20.9	18.9	17.5
2	23.3	19.4	18
3	22.7	18.5	17.8
<b>Average</b>	<b>22.30</b>	<b>18.93</b>	<b>17.77</b>

Table No.2



Graph No.2

## VII. CONCLUSION

- [1] From Experimental study it is observed that, ordinary sand get the result about 66% of standard result as per IS 269-1967 .
- [2] Due to joint in specimen cube reduces the strength of cube by 17% for 3 days testing
- [3] Due to joint in specimen cube reduces the strength of cube by 15 % for 7 days testing
- [4] After one hour time laps cube reduces the strength of cement by 23% for 3 day testing
- [5] After one hour time laps cube reduces the strength of cement by 20% for 7 day testing
- [6] Delay in casting and bad workmanship reduces the strength of material.
- [7] For joint portion used appropriate cementing material and avoid the delay or time laps used retarder or admixture in mortar.

## REFERENCES

1. Bazid Khan and Bulent Bardan "The effect of sugar on setting time of various type of cement "science vision Vol.89(1) July september 2002 pp 71-78.
2. Grant T.Halverson Randall W.Poston "Joint in concrete construction " American Concrete Institute ACI 224.3R, August 1, 1995.
3. Bazid Khan and Muhammad Ullah "Effects of retarding Admixture on the setting time of cement pastes in hot water" JKAU Eng Sci. Vol.15 no.1 2004 pp 63-79.
4. Amish N.R., Prof. H.S.Vidyadhara, and Prof. C. Sashidhar, "Effect of improper casting sequence on compressive strength", Indian concrete journal, January 2012, pp 30-40.
5. N.L. Thomas and J.D. Bricchall, "The retarding action of sugars on cement hydration, Cement and concrete research", Vol. 13, 12 April 1983, pp. 830-840.
6. Min-Cheol han, Cheon-Goo Han "Use of maturity methods to estimate the setting time of concrete containing super retarding agents" 20 November 2009, Elsevier, pp 164-172.
7. Alou Elijah Alabama, "Effects of Sugar on Physical Properties of Ordinary Portland Cement Paste and Concrete", Vol AU J.T. 14(3), January 2011, pp 225-228.
8. David M. Suchorski and James A. Farny, "Chemical admixtures for concrete" ACI Education Bulletin E4-03, American Concrete Institute, Prepared under the direction and supervision of ACI Committee E-701, 2003, E4-96.
9. Amish N.R., Prof. H.S.Vidyadhara, and Prof. C. Sashidhar, "Effect of improper casting sequence on compressive strength", Indian concrete journal, January 2012, pp 30-40

## AUTHOR PROFILE



**Ganesh V. Tapkire**, Completed B.E. in civil Engineering 2008 and M-Tech appear in Building Construction Technology in RGPV University Bhopal (MP). Presented and Publish paper 04 Research paper in National conference and 01 International Journal along with publication author had attained 05 workshop sponsored by ISTE. Also he has associate member of LMISTE Have two years site experience in NH-3 Pimpalgaon-Dhule BOT Project. From Last 3.6 year assistant professor in civil Engineering Department in R.C. Patel. Institute of Technology Shirpur. Dist. Dhule (MS)



**Hemraj Ramdas Kumavat**, completed B.E. in Civil Engineering in 2003 and M.E. in Building Science and Technology in 2009 from North Maharashtra University, Jalgaon (MS). Published 10 research papers in international journal and presented 10 papers in international conference, 01 paper in national conference. Along with the publication author had attended 10 workshops sponsored by ISTE. Also he has associate member of IEI & LMISTE Have 2.5 year industrial experience of construction of various civil engineering projects like Building, Roads and Canals. From last 9 years he is working as Assistant Professor in Civil Engineering Department in R.C. Patel Institute of Technology, Shirpur, Dist Dhule (MS).