EFFECT OF REMIXING ON STRENGTH OF CONCRETE

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ABSTRACT. The paper is concerned with the methodology, related to reuse of old concrete by adding fresh concrete to form utilizable mix by considering their time lags, blend ratios and various curing sequences to be considered. As Compared to the strength of the freshly prepared concretes the preset concrete tend to show reduction in strength. This reduction is further possible to be minimized to a certain extent on blending some quantity of a relatively fresh mix to the existing quantity of the preset mix.

Keywords: Blend ratio, Remixed concrete, Intermittent curing, Preset mix

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INTRODUCTION

Once the process of setting in a concrete mix has previously started due to the delay in its placing in the formwork, the mix is often declared to be discarded. Al though cement no doubt, is costly and its wastage is to be avoided, yet it is worthwhile to investigate to what extent the preset mass be made reusable on making it serviceable instead of totally discarding it altogether The knowledge of the strength level of the preset mix at the instant of time lag under observation is of utmost necessity before such a decision for reuse or rejection is taken. This diminution is further possible to be minimized to a certain extent on blending some quantity of a somewhat fresh mix to the on hand quantity of the preset mix in a blend ratio r (= weight of the old to that of the fresh quantity).

Normal design practice is to take 28-day strength as the basis for design, since it is known that with continuous water curing at 28 days, strength to the extent of 80 percent of the maximum possible strength is obtained due to fast rate of hydration initially, which produces sufficient cementitious compounds. At construction sites, it is not possible to follow the prescribed curing condition strictly. The reason may be attributed to bad supervision, lack of knowledge, manual or mechanical errors, power failure, accidents, strikes, etc. Therefore the effect of improper curing , partly in water and the rest in air, or vice versa, need a thorough and careful study before the strength of such concretes at site conditions ,whose design has been done under idealized conditions is assessed and predicted.

A literature review carried out on remixed concrete based on various research papers on various properties of remixed concrete .The researchers are carried out work in related fields such as developing methodology for proper utilization of combination of delayed concrete along with fresh concrete. The researcher focused on effective utilization with proper composition of old and fresh concrete considering the different intermittent curing sequences such as developing methodology for proper utilization of A literature review carried out on remixed concrete based on various research papers on various properties of remixed concrete .The researchers are carried out work in related fields such as developing methodology for proper utilization of combination of delayed concrete along with fresh concrete. The researcher focused on effective utilization with the combination of delayed concrete along with fresh concrete, considering the various intermittent curing sequences.

MATERIALS AND METHODOLOGY

Control mix proportion for M20 & M25 grade concrete was obtained for two group of concrete in which first group consist of crossing i.e. blending of two different types of concretes mixes, one of which is a partially set one and the other is a relatively fresher one, and are blended in a certain weight ratio. Second group consist of selfing i.e. blending of two concrete mixes, which are identical in all respect, one of which is a partially set one, and the other is a relatively fresher one, and are blended in a certain weight ratio. Mix design was carried out manually conforming to IS 10262:2009.

The aim of present work is to study the effect of remixed concrete with combination of fresh concrete when subjected with time lag parameters and blended ratio. To study the effects of intermittent curing on strength of concrete by considering parameters like water cement ratio, mix type, different time lag.

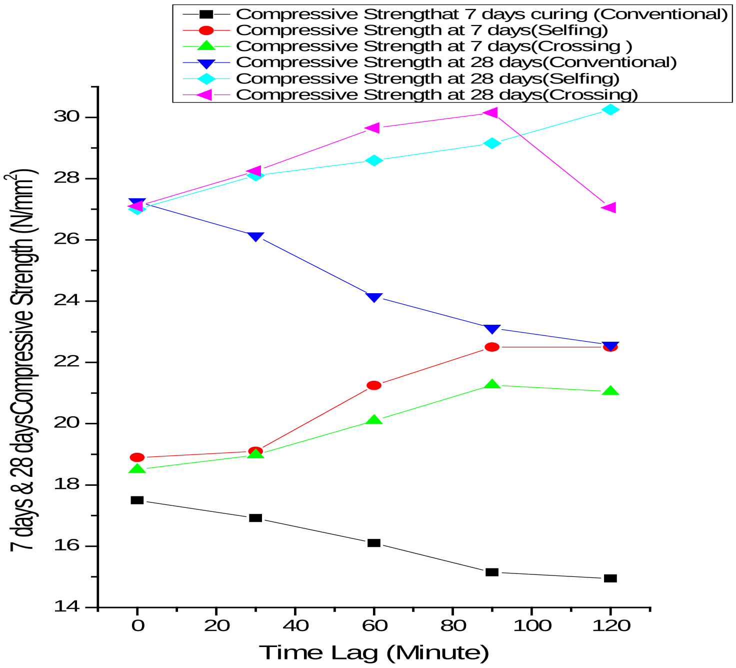

Figure 1 Comparison of 7 days & 28 days Compressive Strength for M20, Conventional, Selfing and Crossing Method

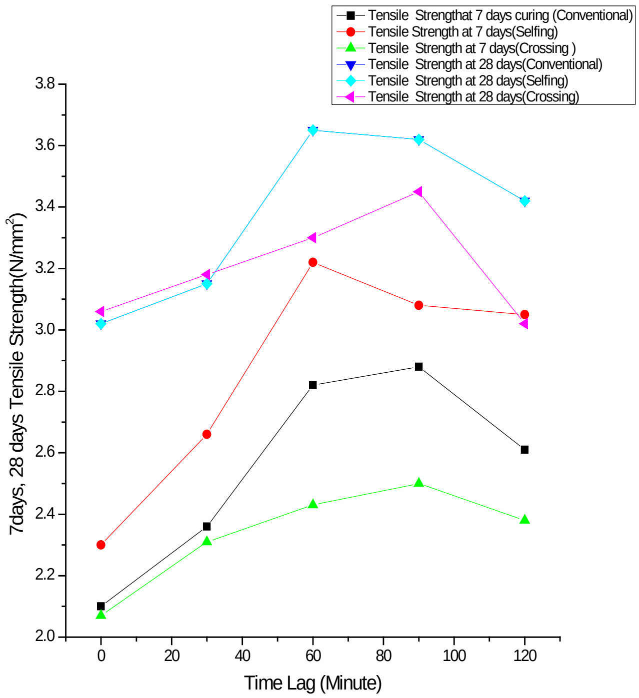

Figure 2 Comparison of 7days & 28 days Tensile Strength for M20 ,Conventional, Selfing and Crossing Method

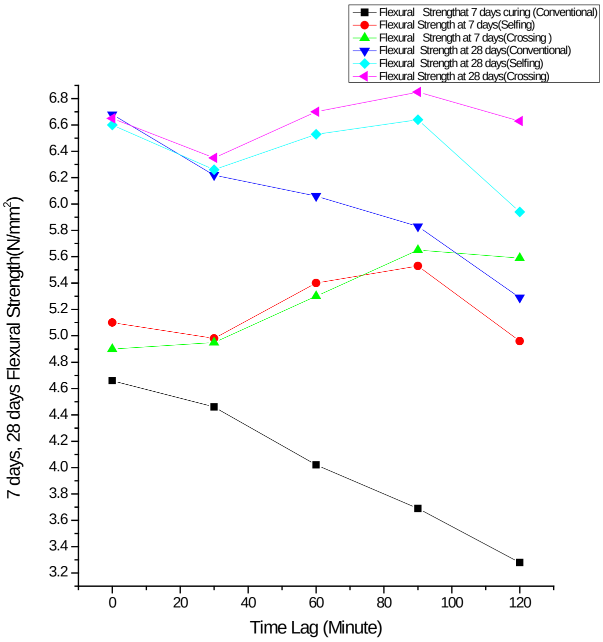

Figure 3 Comparison of 7days & 28 days Flexural Strength for M20 Conventional, Selfing and Crossing Method

Table 1 Readings for strain gauge on (Conventional Method RCC Beam B-1) : Specimen

SR. NO.	LOAD kN	UPLOADING DEFLECTION mV	DOWNLOADING DEFLECTION mV	UPLOADING STRAIN εl=(4*Vu*0.001)/(12*5)	DOWNLOADING STRAIN εd=(4*Vd*0.001)/(12*5)	UPLOAD STRESS DEVELOPED Sl=εl*Y (N/mm^2)	DOWNLOAD STRESS DEVELOPED Sl=εd*Y (N/mm^2)
1	0	128	42	0.008533	0.002800	273.07	89.6
2	5	128	48	0.008533	0.003200	273.07	102.4
3	10	129	59	0.008600	0.003933	275.2	125.87
4	20	130	101	0.008667	0.006733	277.33	215.47
5	30	142	78	0.009467	0.005200	302.93	166.4
6	40	164	89	0.010933	0.005933	349.87	189.87
7	60	179	126	0.011933	0.008400	381.87	268.8
8	70	188	113	0.012533	0.007533	401.07	241.07
9	95	198	124	0.013200	0.008267	422.4	264.53
10	115	204	184	0.013600	0.012267	435.2	392.53
11	125	215	216	0.014333	0.014400	458.67	460.8
12	135	239	279	0.015933	0.018600	509.87	595.2
13	145	278	281	0.018533	0.018733	593.07	599.47
14	153	298	292	0.019867	0.019467	635.73	622.93

No. 1

Load at Peak = 153 KN   Transverse Strength 21.142 N/mm^2 C. H. Travel at Peak = 6.030 mm

Table 2 Readings for strain gauge on (Crossing Method RCC Beam B-2) : Specimen No. 2

SR. NO.	LOAD kN	UPLOADING DEFLECTION mV	DOWNLOADING DEFLECTION mV	UPLOADING STRAIN εl=(4*Vu*0.001)/(12*5)	DOWNLOADING STRAIN εd=(4*Vd*0.001)/(12*5)	UPLOAD STRESS DEVELOPED Sl=εl*Y (N/mm^2)	DOWNLOAD STRESS DEVELOPED Sl=εd*Y (N/mm^2)
1	0	118	48	0.007867	0.003200	251.73	102.4
2	5	118	52	0.007867	0.003467	251.73	110.93
3	10	122	65	0.008133	0.004333	260.27	138.67
4	25	128	89	0.008533	0.005933	273.07	189.87
5	35	134	82	0.008933	0.005467	285.87	174.93
6	40	162	105	0.010800	0.007000	345.6	224
7	60	175	114	0.011667	0.007600	373.33	243.2
8	75	184	134	0.012267	0.008933	392.53	285.87
9	90	195	138	0.013000	0.009200	416	294.4
10	110	225	186	0.015000	0.012400	480	396.8
11	130	230	205	0.015333	0.013667	490.67	437.33
12	145	245	225	0.016333	0.015000	522.67	480
13	155	275	270	0.018333	0.018000	586.67	576
14	165	285	285	0.019000	0.019000	608	608

Load at Peak = 165.038 KN Transverse Strength = 37.18 N/mm^2 C.H. Travel at Peak = 12.98 mm

Table 3 Readings for strain gauge on (Selfing Method RCC Beam B-3) : Specimen No. 3

SR NO	LOAD kN	UPLOADING DEFLECTION mV	DOWNLOADING DEFLECTION mV	UPLOADING STRAIN εl=(4*Vu*0.001)/(12*5)	DOWNLOADING STRAIN εd=(4*Vd*0.001)/(12*5)	UPLOAD STRESS DEVELOPED Sl=εl*Y (N/mm^2)	DOWNLOAD STRESS DEVELOPED Sl=εd*Y (N/mm^2)
1	0	150	40	0.010000	0.002667	320	85.33
2	10	120	49	0.008000	0.003267	256	104.53
3	20	128	59	0.008533	0.003933	273.07	125.87
4	25	124	64	0.008267	0.004267	264.53	136.53
5	40	126	73	0.008400	0.004867	268.8	155.73
6	50	120	83	0.008000	0.005533	256	177.07
7	60	124	101	0.008267	0.006733	264.53	215.47
8	80	131	128	0.008733	0.008533	279.47	273.07
9	90	133	160	0.008867	0.010667	283.73	341.33
10	110	134	162	0.008933	0.010800	285.87	345.6
11	165	159	152	0.010600	0.010133	339.2	324.27
12	180	178	148	0.011867	0.009867	379.73	315.73
13	190	187	164	0.012467	0.010933	398.93	349.87
14	225	205	201	0.013667	0.013400	437.33	428.8

Load at Peak = 225.123 kN Transverse Strength = 39.11 N/mm^2 C.H.Travel at Peak = 10.30mm

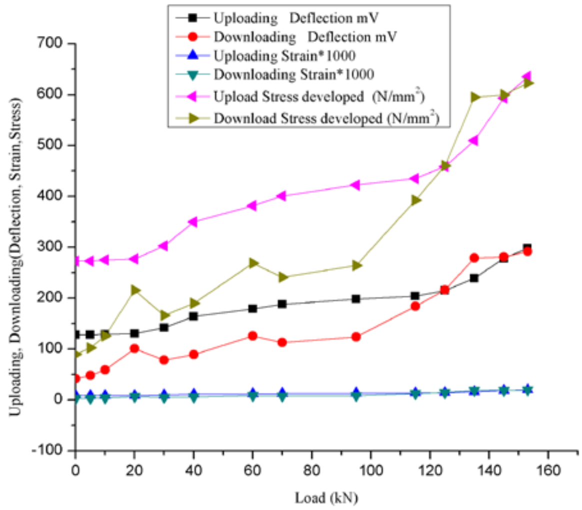

Figure 4 Readings for strain gauge on RCC Beam B-1 (Conventional Method)

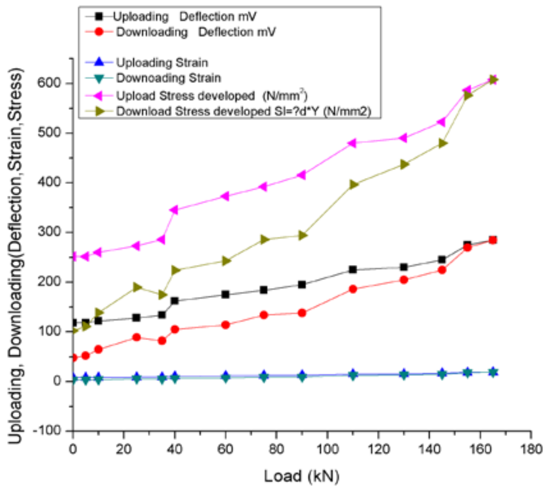

Figure 5 Readings for strain gauge on RCC Beam B-2 (Crossing Method)

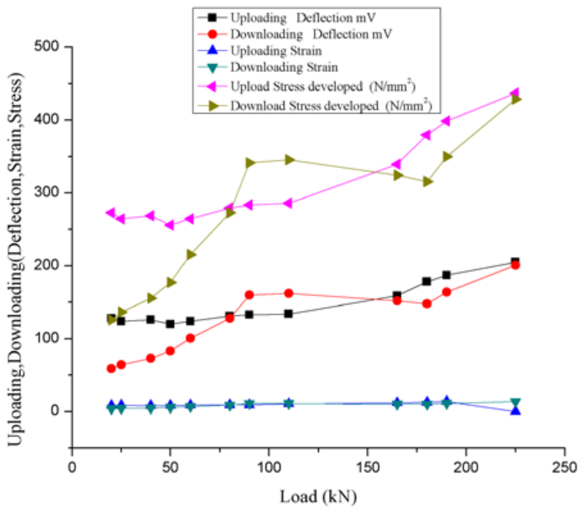

Figure 6 Readings for strain gauge on RCC Beam B-3 (Selfing Method)

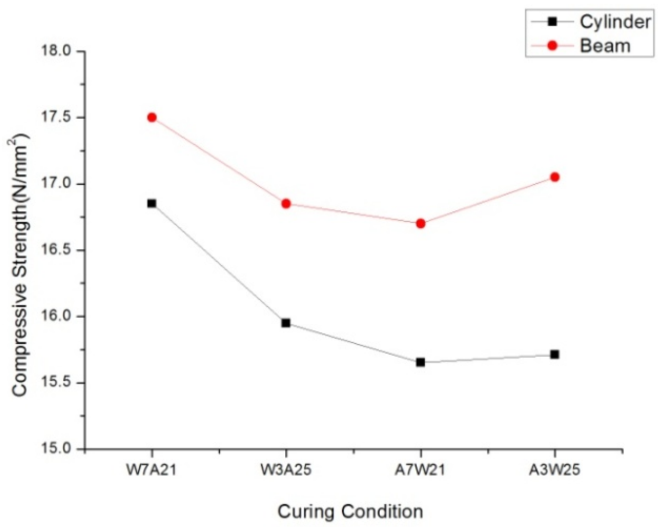

Figure 7 Comparison of Compressive Strength from Cylinder and beam tests for M20

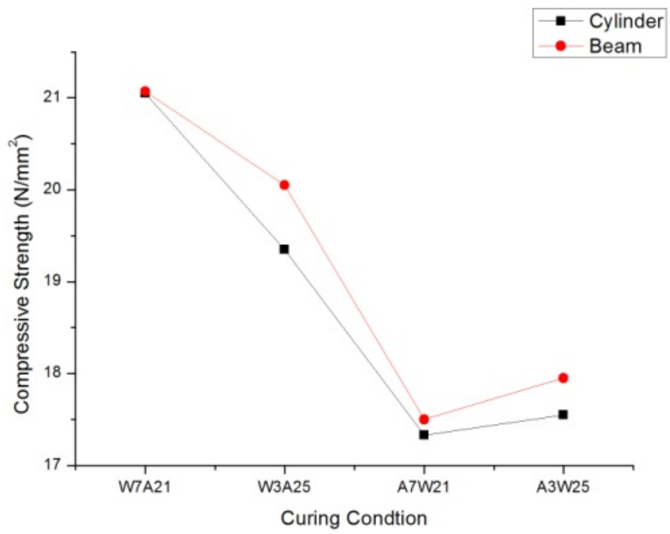

Figure 8 Comparison of Compressive Strength from Cylinder and beam tests for M25 Concrete

CONCLUDING REMARKS

Following conclusions can be drawn based on experimentations conducted on curing conditions and the methods application on strength of concrete.

The partially set concrete at various time lags shows an increment in strength of newly formed concrete as compared to old concrete after application of selfing. After adding a higher grade of fresh concrete to the old partially set concrete, strength increases as compared to addition of same grade of fresh concrete to the old partially set concrete. Delayed cured concrete shows a decreasing trend in the strength as compared to improper curing. Curing after delaying increased the compressive strength of concrete, but it did not recover the reduction in strength caused by the curing delay In the improper curing sequence, concrete attains additional strength during air cured state. The specimens of moist sand curing method gives highest compressive strength while air curing specimens the lowest.

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