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Effect of Remixing & Intermittent Curing Sequences on Strength of Pavement Quality Concrete

Vishal B Shinde, Rakesh Kumar

Abstract: The paper is concerned with determining the effect of remixing of two different grades of concrete proving blend ratio, time lag & intermittent curing sequence. Two mix designs (M40 & M50) selected and provide blend ratio (0 to infinity) at 0,30,60,90 & 120min time lag. In this research, the problem related to improper casting & curing sequence, which ultimate formation of the cold joint due to old and fresh concrete. Curing method applied with four sequences Air0 Water28, Air28 Water0, Air7 Water21, and Air21 Water7.Concrete samples were made and tested for their compressive strength, flexural strength, elastic modulus, and shrinkage properties in the laboratory. As compared to the strength of freshly prepared concretes to the hard in situ concrete tends to show a reduction in its various strengths due to improper curing & formation of cold joints. 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 hard in situ concrete.

Key word: Cold joint, intermittent curing, blend ratio, Time lag.

I. INTRODUCTION

Hydration process provides strength of concrete [20 & 23]. The hydration process is closely related to concrete microstructure development, proper curing measures are necessary to maintain satisfactory moisture and temperature condition [4 & 11]. Normally 28 days continuous curing on the laboratory gives a satisfactory result to achieve the required strength of concrete. But in practice that complete 28 days water curing is not possible due to various reasons [2]. The different types of curing (Air, water, steam etc.) and its effect on strength on concrete for various grades of concrete. Adequate curing is necessary with the proper method of its application for a newly placed concrete to achieve the enviable qualities and accepted durability of the hardened concrete [5 & 15]. Curing in the early ages of concrete is more important for concrete structures. Though the exact lab curing practice is not possible on the field, up to a certain extent the suggested methods can be applied in due consideration of site conditions[6]. Curing may be applied in several ways and the most appropriate means of curing may be dictated by the site or the construction method[3]. The curing condition i.e. standard curing, natural curing, water curing, and sealed curing, on the capillary absorption of normal concrete has an important influence on the compressive strength, ultrasonic pulse velocity, and porosity[10]. To improve the intermittent curing adverse effect selfing and crossing methodology was adapted. In this methodology reuse the preset concrete by adding fresh concrete to form a remix by considering their time lags, blend ratio and various curing sequences [1 & 2]. Sometime due to delay in the placing of concrete or some transportation problems or accidents happened on site, delay placing in formwork, the mix is often declared to be rejected. Cement is a costly ingredient in concrete so its wastage is to be avoided and try to reuse of wastage concrete, yes it is useful to investigate up to what magnitude the old concrete be made durable on producing it efficiently rather than fully rejected. In the selfing and crossing method, we used the improvement of preset concrete mixed by adding higher grade or same grade of fresh concrete considering time lag. In selfing and crossing method blending action of two grades of concrete mixes, one is relatively old concrete (Co) than the fresh concrete of same grade mix or higher grade mix concrete (Cf). The ratio of (Co) / (Cf) known as blend ratio (r). [1]. The strength of various curing period of alternate dry and wet curing of concrete three times a day is much more sufficient and it does not reduce the compressive strength after 28 days in comparison to full-time curing [7].

A.Effect of intermittent curing in the strength of PQC

Appropriate curing is most important in mass concreting to produce high-quality pavement concrete. In mass concreting mostly concentrate on the hydration process of cement, for that controlled water-cement ratio as well as maintain proper moisture & temperature condition. [8]. Internally cured concrete (ICC) used recently in pavement work they found ICC pavement achieved 28 days flexural strength within 7 days also ICC reduced the concrete early strength & escalate the ultimate strength.[9&17]. The early edge properties of concrete pavement (Like Temperature, moisture, hydration rate, etc.) are important in his durability life point of view, supplementary cementitious materials (SCMs) are being increasingly used in the concrete pavement due to its economic and environmental benefits, and improvements of concrete properties, such as workability, impermeability, ultimate strength and durability [11 & 12]. There are also some factors which cause the delaying process is that improper method of handling, work schedule, lack of site organization and the breakdown of equipment. To overcome such problems, the process of remixing concrete, if necessary, with the addition of just the required quantity of water is known as „retempering" of concrete1. Sometimes, a small quantity of extra cement is also added while retempering.[13&14].

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I. Experimental Programme

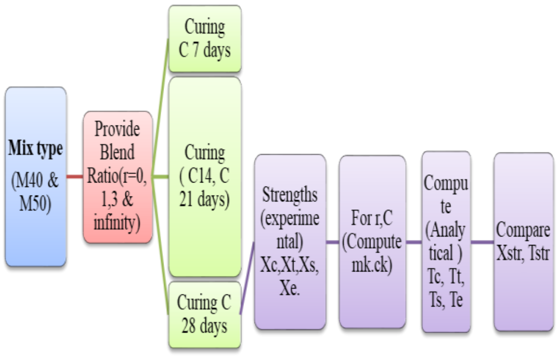

Fig 1. Flow Chart

Xc = Compressive strength (Experimental)

Xt = Tensile strength (Experimental)
Xs = Shear strength (Experimental)
Xe = Modulus of elasticity (Experimental)

C7,C14,C21 & C28 Curing are regular & irregular curing.

For verification of Selfing and Crossing concepts and to build up a database consisting of characteristic strength parameters, it is necessary to study the high strength concrete mixes of M40 & M50.

To study the effects of intermittent curing on strength of rigid pavement concrete slab cube specimen by considering parameters like water-cement ratio, mix type, different time lag and to a particular target strength either by Selfing it with a freshly prepared mix of known strength at any instant of time lag & against any improper curing sequence type. For compressive strength, cubes of dimension 150 x 150 x150 mm were cast and tested as per IS 516: 1959. & foe tensile strength Cylinder of dimension 150 mm diameter & 300mm height were cast & tested.

Concrete cubes & cylinder cast by providing different blend ratio, time lag and cured under different curing conditions. Considered the curing conditions are, A00W28, $A_{07}W_{21}$, $W_{14}A_{14}$, $A_{21}W_{07}$, $A_{28}W_{00}$, for various blend ratio viz., r = ∞, 3.00, 1.00 and 0 as well as time lag t (minute) 0.00. 30.00, 60.00, 90.00, 120.00 and 150.00 min is used for the test.All the specimens were demolded the next day and put to curing for 'the specified periods in water as per the various planned, improper curing sequences as mentioned above. The specimens to be cured for the specified partial water curing were taken out of water and stored outside in air for the designated period. The 28-day water cured specimens were, however, tested soon after taking out from water after or on swapping the water. Completely air-cured and partially water-cured specimens were, however, tested in dry condition. The cube and cylinder specimens were tested on 100 ton and 200 -ton- capacity machine after suitable calibration in each case.

The cubes and cylinder specimens were tested for compressive strength and modulus of elasticity as per the method specified in IS: 516-1959 (Methods of test for strength of concrete and the cylinder specimens were tested for split tensile strength in accordance with the prescribed procedure in IS:5816-1970 (Methods of test for split tensile strength of concrete cylinders). The average value of the compressive strength and modulus of elasticity have been calculated by testing 3 cubes and 3 cylinder specimens respectively.

II. MATERIALS AND TEST SPECIMENS

Ordinary Portland cement conforming to Indian Standard .IS: 269 -1976 has been used for all the mixes. River-sand and crushed granite coarse aggregate in Metal have been used. For normal concrete mixes, the grading of fine and coarse aggregates conformed to the grading requirements specified in IS: 383-1910 (Specification for coarse and fine aggregates from natural sources _for concrete). For high strength concrete, a type grading curve has been used. The type grading curve was arrived at by carrying out a series of pilot tests in which the proportions of coarse to fine aggregates. Metal 1 and Metal 2, A/C ratios and W/C ratios were varied. The results obtained from the Pilot tests conducted are given in Table IV & Table V. The specific gravities and bulk densities of the fine and coarse aggregates used were determined as per 2386 (Part III) - 1963 (Methods of Test for Aggregate for Concrete) and found to be 2.62 and 2.63 and 1615 kg/m3 and 1587 kg/m3 respectively. The aggregates used were in a saturated surface dry condition. The control test specimens comprised of 150 mm standard cubes and 150 mm 300 mm cylinders for the determination of the compressive strength, split tensile strength And modulus of elasticity of all the concrete types cured under the following insufficient curing (cumulative curing) sequences. A0W28, A7W21, A21W7, A28W00 W28A00.

A.Cement

Cement is a binding material used in construction. It has property setting and hardening when mixed with water to attain strength cement is always used in the form of either grout or mortar or concrete, so we use cement of OPC 53 grade for concreting.

The initial and final setting time of cement have been observed, through standard Vicat needle apparatus as per IS:4031- 1968 (Method of physical tests tor hydraulic cement) and are as follows:

Initial setting time of cement =40 minute

Final setting time of cement= 280minute

The compressive strength values of the cement used observed at 3, 7 and 28 days-of complete water curing.

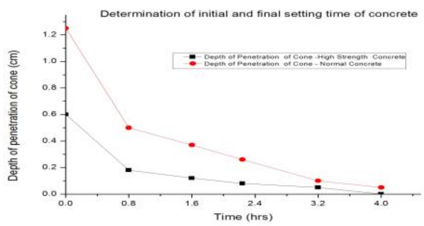

Fig 2 Determination of IST & FST.

B. Aggregate

Aggregates are the major ingredient of the concrete which occupies 70% to 80% of the volume of concrete. Aggregate provides strength to concrete and act as filler material to give a homogeneous mass of concrete along with cement paste.

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Table- I: Properties of Aggregate

Sr. No.	Properties	Normal Aggregate
1	Specific Gravity	2.78(CA) & 2.63(FA)
2	Bulk Density	1.487 kg/lit (CA)
3	Impact Value	17.64 % (CA)
4	Fineness Modulus	6.97(CA)
5	Water Absorption	1.2 % (CA)
6	Moisture Content	37 %

Table - II: Mix Proportion of concrete

Trial Mix Ratio				
Grade	W/C	Cement	Fine Aggregate	Coarse Aggregate
M 40	0.40	1	1.82	3.09
M 50	0.35	1	1.43	2.42

Table - III: Specimens details

Specimens	Conve-ntional BL0	Selfing BL_1	Selfing BL_3	Selfing $BL_{Infinity}$
Cube	15	75	75	75
Cyllinder	15	75	75	75

Table - IV: Pilot test results of compressive strength of concrete mix for different ratios of CA: FA and for A/C =3.0, W/C=0.30

Time lag for basic mix	Compressive strength in MPa*10 and Density in kg/m^3					
	70:30	Density	75:25	Density	80:20	Density
t_0	53.90	2653	56.80	2648	54.90	2660
t_i	57.70	2697	60.10	2699	58.00	2695
t_f	52.00	2589	49.55	2580	52.25	2593

Table V: Pilot test results of compressive strength of concrete mix for different ratios of CA: FA and for A/C =2.5, W/C=0.28

Time lag for basic mix	Compressive strength in MPa*10 and Density in kg/m^3					
	70:30	Density	75:25	Density	80:20	Density
t_0	58.50	2650	61.00	2650	59.60	2645
t_i	64.80	2710	63.00	2695	61.70	2688
t_f	53.00	2575	54.70	2590	53.90	2598

III. RESULTS AND DISCUSSIONS

The individual types considered within the scope of the present investigation are concreting of normal as well as higher grades each of these mix types again cured under various cumulative improper curing sequences. The computation for the prediction of the strengths analytically following various steps of calculation using proper analytical. procedure for any two appropriate combinations of the preset mix cases in blending by using repetitively the selfing equation is really an impossible task if intended to be carried out manually.

Table VI: Details of work for Cubes (Curing Sequences)

Sr.no	Blend ratio (r)	Time lag (t) Minute	Curing Sequences
1	0	0	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
1	1	30	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		60	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		90	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		120	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		150	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
2	3	30	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		60	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		90	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		120	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		150	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
4	infinity	30	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		60	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		90	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		120	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$
		150	$A_{00}W_{28}$, $A_{07}W_{21}$, A_{14} W_{14}, $A_{21}W_{07}$, $A_{28}W_{00}$

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Table VII: Comparison between the analytical and experimental values of Selfed strength of Mix M40 for different time lag parameters (Type of Curing A28W00).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm^2)			Tensile strength(N/mm^2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
$A_{28}W_{00}$	0	0	40.59	40.59	0.00	3.76	3.76	0.00	27.18	27.18	0.00
	0	30	41.39	41.29	-0.24	3.81	3.80	-0.08	27.35	27.33	-0.07
	0	60	41.29	41.18	-0.27	3.80	3.79	-0.11	27.33	27.29	-0.15
	0	90	40.89	40.81	-0.19	3.78	3.78	-0.13	27.24	27.23	-0.04
	0	120	40.59	40.55	-0.09	3.76	3.76	0.00	27.18	27.17	-0.04
	0	150	40.19	40.29	0.25	3.75	3.75	0.00	27.09	27.11	0.07
	1	0	40.59	40.59	0.00	3.76	3.76	0.00	27.18	27.18	0.00
	1	30	41.79	40.81	-2.40	3.82	3.82	-0.10	27.44	27.42	-0.07
	1	60	41.19	41.28	0.22	3.80	3.80	0.03	27.33	27.33	0.00
	1	90	40.59	40.63	0.10	3.78	3.75	-0.80	27.22	27.21	-0.04
	1	120	40.19	40.20	0.03	3.75	3.75	0.00	27.09	27.09	0.00
	1	150	30.69	30.69	0.00	3.72	3.72	0.00	26.97	26.97	0.00
	3	0	40.59	40.59	0.00	3.76	3.76	0.00	27.18	27.18	0.00
	3	30	42.29	42.13	-0.38	3.85	3.82	-0.63	27.55	27.51	-0.15
	3	60	41.19	41.44	0.60	3.80	3.80	0.16	27.42	27.37	-0.18
	3	90	40.39	40.63	0.59	3.75	3.77	0.53	27.35	27.18	-0.63
	3	120	39.69	39.79	0.25	3.73	3.73	0.19	26.99	27.01	0.07
	3	150	38.99	39.09	0.27	3.70	3.70	0.00	26.81	26.83	0.07
	∞	0	39.87	39.87	0.00	3.76	3.76	0.00	27.18	27.18	0.00
	∞	30	42.29	42.18	-0.26	3.84	3.84	0.00	27.55	27.53	-0.07
	∞	60	39.99	40.05	0.16	3.75	3.77	0.64	27.27	27.20	-0.26
	∞	90	38.39	39.22	2.12	3.68	3.70	0.59	26.89	26.88	-0.04
	∞	120	37.39	38.69	3.36	3.62	3.61	-0.30	26.58	26.55	-0.11
	∞	150	36.49	36.49	0.00	3.57	3.57	0.00	26.22	26.22	0.00

Table VIII: Comparison between the analytical and experimental values of Selfed strength of Mix M40 for different time lag parameters (Type of Curing A21W07).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm^2)			Tensile strength(N/mm^2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
$A_{21}W_{07}$	0	0	37.39	37.39	0.00	3.37	3.37	0.00	27.06	27.06	0.00
	0	30	41.39	41.44	0.12	3.55	3.55	0.00	27.99	28.01	0.07
	0	60	40.39	40.19	-0.51	3.50	3.49	-0.28	27.76	27.73	-0.11
	0	90	38.79	38.99	0.51	3.43	3.44	0.06	27.39	27.46	0.25
	0	120	37.39	37.74	0.93	3.38	3.39	0.21	27.30	27.40	0.36
	0	150	36.39	36.47	0.22	3.25	2.33	-39.20	26.84	26.92	0.30
	1	0	37.39	37.39	0.00	3.37	3.37	0.00	27.06	27.06	0.00
	1	30	42.09	42.09	0.00	3.57	3.57	0.00	28.15	28.15	0.00

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	1	60	39.89	39.89	0.00	3.48	3.52	1.25	27.56	27.70	0.51
	1	90	37.89	38.15	0.69	3.40	3.45	1.62	27.18	27.27	0.33
	1	120	36.09	36.45	0.98	3.32	3.35	1.16	26.74	26.85	0.41
	1	150	34.89	34.89	0.00	3.24	3.24	0.00	26.44	26.44	0.00
	3	0	37.39	37.39	0.00	3.37	3.37	0.00	27.06	27.06	0.00
	3	30	42.69	42.73	0.09	3.59	3.59	0.00	28.28	28.29	0.04
	3	60	38.79	39.78	2.49	3.44	3.47	0.84	27.60	27.67	0.25
	3	90	36.19	37.21	2.74	3.32	3.35	1.07	26.76	27.07	1.15
	3	120	34.29	34.95	1.90	3.22	3.50	7.86	26.29	26.50	0.79
	3	150	32.89	32.89	0.00	3.15	3.15	0.03	25.93	25.95	0.08
	∞	0	37.39	37.39	0.00	3.37	3.37	0.00	27.06	27.06	0.00
	∞	30	43.09	43.09	0.00	3.62	3.62	0.00	28.37	28.37	0.00
	∞	60	36.09	37.59	3.99	3.09	3.21	3.80	28.09	28.16	0.25
	∞	90	31.99	33.29	3.91	2.79	2.88	3.33	27.83	27.95	0.43
	∞	120	29.19	29.95	2.54	2.56	2.67	4.16	27.61	27.83	0.79
	∞	150	27.19	27.19	0.00	2.40	2.40	0.00	27.55	27.55	0.00

Table IX: Comparison between the analytical and experimental values of Selfed strength of Mix M40 for different time lag parameters (Type of Curing $A_{14}W_{14}$).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm2)			Tensile strength(N/mm2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
$A_{14}W_{14}$	0	0	39.23	39.23	0.00	3.39	3.39	0.00	26.86	26.86	0.00
	0	30	42.03	41.97	-0.14	3.51	3.51	0.00	27.49	27.48	-0.04
	0	60	40.63	40.93	0.73	3.46	3.47	0.17	27.36	27.26	-0.37
	0	90	39.43	39.93	1.25	3.41	3.47	1.81	27.14	27.04	-0.37
	0	120	38.63	38.99	0.92	3.39	3.38	-0.27	26.89	26.82	-0.26
	0	150	38.03	38.09	0.16	3.35	3.34	-0.30	26.58	26.61	0.11
	1	0	39.23	39.23	0.00	3.39	3.39	0.00	26.86	26.86	0.00
	1	30	43.23	43.23	0.00	3.56	3.56	0.00	27.75	27.75	0.00
	1	60	40.83	41.18	0.85	3.45	3.48	0.69	27.36	27.32	-0.15
	1	90	39.03	39.31	0.71	3.37	3.39	0.68	26.91	26.86	-0.19
	1	120	37.23	37.60	0.98	3.31	3.32	0.15	26.47	26.40	-0.27
	1	150	36.03	36.03	0.00	3.24	3.24	0.00	26.06	26.11	0.19
	3	0	39.23	39.23	0.00	3.39	3.39	0.00	26.86	26.86	0.00
	3	30	44.53	44.57	0.09	3.61	3.61	0.00	28.03	28.02	-0.04
	3	60	40.73	41.30	1.38	3.46	3.48	0.57	27.18	27.38	0.73

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	3	90	38.23	38.55	0.83	3.35	3.36	0.27	26.63	26.77	0.52
	3	120	35.73	36.13	1.11	3.28	3.25	-1.02	26.03	26.18	0.57
	3	150	33.93	33.99	0.18	3.14	3.14	0.00	25.59	25.62	0.12
	∞	0	39.23	39.23	0.00	3.39	3.39	0.00	26.86	26.86	0.00
	∞	30	46.03	46.03	0.00	3.67	3.67	0.00	28.35	28.35	0.00
	∞	60	38.43	40.19	4.38	3.37	3.44	2.12	27.05	27.39	1.24
	∞	90	34.93	35.65	2.02	3.17	3.24	2.19	26.20	26.50	1.13
	∞	120	31.33	32.01	2.12	3.02	3.06	1.34	25.37	25.66	1.13
	∞	150	29.03	29.03	0.00	2.90	2.90	0.00	24.87	24.87	0.00

Table X: Comparison between the analytical and experimental values of Selfed strength of Mix M40 for different time lag parameters (Type of Curing $A_{07}W_{21}$).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm2)			Tensile strength(N/mm2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
$A_{07}W_{21}$	0	0	42.74	42.74	0.00	3.62	3.62	0.00	28.05	28.05	0.00
	0	30	45.54	45.43	-0.24	3.72	3.72	0.00	28.61	28.60	-0.03
	0	60	44.44	44.51	0.16	3.68	3.68	0.05	28.52	28.40	-0.42
	0	90	43.34	43.62	0.64	3.62	3.64	0.47	28.31	28.21	-0.35
	0	120	42.74	42.77	0.06	3.60	3.62	0.64	28.07	28.02	-0.18
	0	150	42.74	42.77	0.06	3.60	3.62	0.64	28.07	28.02	-0.18
	1	0	42.94	42.94	0.00	3.62	3.62	0.00	28.05	28.05	0.00
	1	30	46.74	46.74	0.00	3.77	3.77	0.00	28.86	28.86	0.00
	1	60	43.94	44.91	2.16	3.70	3.64	-1.71	28.48	28.48	0.00
	1	90	42.64	43.13	1.14	3.63	3.67	1.31	28.08	28.11	0.11
	1	120	41.44	41.52	0.19	3.56	3.59	0.97	27.69	27.75	0.22
	1	150	40.04	40.04	0.00	3.49	3.49	0.00	27.40	27.40	0.00
	3	0	42.94	42.94	0.00	3.62	3.62	0.00	28.05	28.05	0.00
	3	30	48.14	47.94	-0.42	3.82	3.83	0.05	29.14	29.12	-0.07
	3	60	44.64	45.11	1.04	3.69	3.71	0.67	28.41	28.55	0.49
	3	90	41.74	42.52	1.83	3.56	3.61	1.39	27.79	28.00	0.75
	3	120	39.74	40.22	1.19	3.48	3.51	0.86	27.33	27.47	0.51
	3	150	38.14	38.15	0.03	3.42	3.41	-0.12	26.95	26.97	0.07
	∞	0	42.94	42.94	0.00	3.62	3.62	0.00	28.05	28.05	0.00
	∞	30	48.54	48.54	0.00	3.84	3.84	0.00	29.22	29.22	0.00
	∞	60	42.14	42.74	1.40	3.54	3.61	2.02	28.02	28.28	0.92
	∞	90	38.34	38.74	1.03	3.33	3.41	2.40	27.06	27.41	1.28

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	∞	120	35.74	36.52	2.14	3.19	3.23	1.30	26.37	26.58	0.79
	∞	150	33.74	33.74	0.00	3.07	3.07	0.00	25.80	25.80	0.00

Table XI: Comparison between the analytical and experimental values of Selfed strength of Mix M40 for different time lag parameters (Type of Curing A00W28).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm2)			Tensile strength(N/mm2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
	0	0	39.25	39.25	0.00	3.39	3.39	0.00	26.89	26.89	0.00
	0	30	42.05	41.99	-0.14	3.51	3.51	0.00	27.52	27.51	-0.04
	0	60	40.65	40.55	-0.25	3.55	3.55	0.00	27.39	27.29	-0.37
	0	90	39.45	39.95	1.25	3.41	3.42	0.38	27.17	27.07	-0.37
	0	120	38.65	39.01	0.92	3.39	3.38	-0.27	26.92	26.85	-0.26
	0	150	38.05	38.10	0.13	3.35	3.34	-0.30	26.61	26.64	0.11
	1	0	39.25	39.25	0.00	3.39	3.39	0.00	26.89	26.89	0.00
	1	30	43.25	43.25	0.00	3.56	3.56	0.00	27.78	27.80	0.07
	1	60	40.85	41.19	0.83	3.45	3.48	0.69	27.39	27.35	-0.15
	1	90	39.05	39.33	0.71	3.37	3.39	0.68	26.94	26.94	0.00
	1	120	37.25	37.62	0.98	3.31	3.32	0.15	26.50	26.53	0.11
$A_{00}W_{28}$	1	150	36.05	36.05	0.00	3.24	3.24	0.00	26.14	26.14	0.00
	3	0	39.25	39.25	0.00	3.39	3.39	0.00	26.89	26.89	0.00
	3	30	44.55	44.49	-0.13	3.61	3.61	0.00	27.96	28.05	0.32
	3	60	40.75	41.32	1.38	3.46	3.48	0.57	27.23	27.41	0.66
	3	90	38.25	38.57	0.83	3.35	3.36	0.27	26.66	26.80	0.52
	3	120	35.75	36.15	1.11	3.23	3.25	0.52	26.06	26.21	0.57
	3	150	34.01	34.01	0.00	3.15	3.14	-0.29	25.62	25.65	0.12
	∞	0	39.30	39.25	-0.13	3.39	3.39	0.00	26.89	26.89	0.00
	∞	30	46.05	46.05	0.00	3.67	3.67	0.00	28.38	28.38	0.00
	∞	60	38.45	39.06	1.56	3.37	3.40	0.88	26.70	27.15	1.66
	∞	90	34.95	35.01	0.17	3.17	3.20	0.94	26.20	26.53	1.24
	∞	120	31.35	31.65	0.94	3.02	3.06	1.34	26.00	25.69	-1.21
	∞	150	29.05	29.05	0.00	2.90	2.90	0.00	24.90	24.90	0.00

Table XII: Comparison between the analytical and experimental values of Selfed strength of Mix M50 for different time lag parameters (Type of Curing A28W00).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm2)			Tensile strength(N/mm2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
$A_{28}W_{00}$	0	0	46.75	46.75	0.00	4.04	4.04	0.00	26.82	26.82	0.00
	0	30	51.35	51.44	0.17	4.24	4.25	0.24	27.70	27.70	0.00
	0	60	49.75	50.22	0.93	4.18	4.20	0.45	27.38	27.48	0.36
	0	90	48.45	49.04	1.21	4.13	4.15	0.34	27.20	27.26	0.22
	0	120	47.75	47.92	0.36	4.09	4.10	0.24	27.01	27.05	0.15
	0	150	46.95	46.79	-0.34	4.05	4.05	0.00	26.86	26.86	0.00
	1	0	46.75	46.75	0.00	4.04	4.04	0.00	26.82	26.82	0.00
	1	30	52.45	52.45	0.00	4.28	4.28	0.00	27.87	27.87	0.00
	1	60	50.45	50.57	0.23	4.18	4.21	0.59	27.37	27.54	0.62
	1	90	48.25	48.82	1.16	4.10	4.13	0.92	27.11	27.23	0.44
	1	120	47.05	47.18	0.28	4.00	4.00	0.00	26.79	26.91	0.45
	1	150	45.65	45.65	0.00	4.04	4.04	0.00	26.61	26.61	0.00
	3	0	46.75	46.75	0.00	4.04	4.04	0.00	26.82	26.82	0.00
	3	30	53.25	53.44	0.36	4.31	4.32	0.09	28.05	28.04	-0.04
	3	60	50.35	50.88	1.03	4.18	4.22	0.95	27.53	27.61	0.29
	3	90	47.85	48.54	1.42	4.09	4.12	0.85	27.01	27.18	0.63
	3	120	45.95	46.41	0.99	4.02	4.03	0.37	26.74	26.77	0.11
	3	150	44.55	44.55	0.00	3.95	3.94	-0.05	26.39	26.38	-0.04
	∞	0	46.75	46.75	0.00	4.04	4.04	0.00	26.82	26.82	0.00
	∞	30	47.75	48.05	0.62	4.10	4.10	0.00	27.07	27.07	0.00
	∞	60	45.35	46.02	1.46	3.88	4.01	3.37	26.57	26.70	0.49
	∞	90	43.45	43.85	0.91	3.90	3.93	0.87	26.17	26.34	0.65
	∞	120	41.95	42.44	1.15	3.86	3.85	-0.13	26.47	25.98	-1.89
	∞	150	40.85	40.85	0.00	3.78	3.78	0.00	25.74	25.74	0.00

Table XIII: Comparison between the analytical and experimental values of Selfed strength of Mix M50 for different time lag parameters (Type of Curing A21W07).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm2)			Tensile strength(N/mm2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
$A_{21}W_{07}$	0	0	55.67	55.67	0.00	4.41	4.41	0.00	31.62	31.62	0.00
	0	30	56.67	56.60	-0.12	4.45	4.45	-0.07	31.82	31.81	-0.03

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	0	60	56.57	56.20	-0.65	4.44	4.43	-0.25	31.80	31.73	-0.22
	0	90	55.67	55.67	0.00	4.43	4.41	-0.39	31.72	31.64	-0.25
	0	120	55.42	55.47	0.09	4.34	4.36	0.44	31.66	31.92	0.81
	0	150	54.87	54.77	-0.18	4.27	4.27	0.00	31.47	31.47	0.00
	1	0	55.67	55.67	0.00	4.41	4.41	0.00	31.62	31.62	0.00
	1	30	57.67	57.54	-0.22	4.49	4.48	-0.11	32.01	31.99	-0.06
	1	60	56.77	56.66	-0.18	4.45	4.45	-0.09	31.84	31.82	-0.06
	1	90	55.37	55.63	0.47	4.42	4.41	-0.23	31.66	31.62	-0.13
	1	120	54.87	54.63	-0.43	4.38	4.37	-0.23	31.47	31.42	-0.16
	1	150	53.67	53.67	0.00	4.83	4.33	-11.56	31.23	31.23	0.00
	3	0	55.67	55.67	0.00	4.41	4.41	0.00	31.62	31.62	0.00
	3	30	57.67	58.37	1.20	4.52	4.56	0.92	2.20	32.16	93.16
	3	60	56.37	56.91	0.95	4.44	4.46	0.49	31.95	31.91	-0.13
	3	90	54.87	55.50	1.15	4.39	4.40	0.25	31.66	31.60	-0.19
	3	120	53.87	54.00	0.24	4.33	4.34	0.41	31.33	31.31	-0.06
	3	150	52.67	52.57	-0.18	4.29	4.29	0.00	31.03	31.02	-0.03
	∞	0	55.67	55.67	0.00	4.41	4.41	0.00	31.62	31.62	0.00
	∞	30	58.97	58.75	-0.37	4.54	4.53	-0.18	32.25	32.21	-0.12
	∞	60	55.67	56.15	0.86	4.40	4.43	0.77	31.56	31.74	0.57
	∞	90	52.47	53.41	1.77	4.29	4.32	0.72	31.19	31.21	0.06
	∞	120	50.37	50.93	1.11	4.20	4.22	0.55	30.56	30.70	0.46
	∞	150	48.67	48.67	0.00	4.12	4.12	0.00	30.21	30.21	0.00

Table XIV: Comparison between the analytical and experimental values of Selfed strength of Mix M50 for different time lag parameters (Type of Curing A14W14).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm2)			Tensile strength(N/mm2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
$A_{14}W_{14}$	0	0	57.95	57.95	0.00	4.43	4.43	0.00	31.84	31.84	0.00
	0	30	58.55	58.60	0.09	4.46	4.46	-0.04	31.95	31.96	0.03
	0	60	58.75	58.57	-0.31	4.47	4.46	-0.16	31.98	31.95	-0.09
	0	90	58.85	58.50	-0.60	4.47	4.46	-0.34	32.00	31.94	-0.19
	0	120	57.65	58.42	1.32	4.46	4.45	-0.04	31.95	31.92	-0.09
	0	150	58.35	58.35	0.00	4.43	4.43	0	31.90	31.90	0.00
	1	0	57.95	57.95	0.00	4.43	4.43	0.00	31.84	31.84	0.00
	1	30	59.35	59.29	-0.10	4.49	4.48	-0.07	32.10	32.07	-0.09

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	1	60	58.75	58.71	-0.07	4.47	4.46	-0.09	31.98	31.98	0.00
	1	90	58.15	58.04	-0.19	4.44	4.44	-0.11	31.87	31.85	-0.06
	1	120	57.75	57.39	-0.63	4.42	4.41	-0.23	31.80	31.71	-0.28
	1	150	56.75	56.75	0.00	4.39	4.39	0.00	31.60	31.60	0.00
	3	0	57.95	57.95	0.00	4.46	4.43	-0.74	31.84	31.84	0.00
	3	30	59.95	59.91	-0.07	4.51	4.51	-0.11	32.21	32.20	-0.03
	3	60	58.45	58.91	0.78	4.47	4.46	-0.16	32.02	32.00	-0.06
	3	90	57.35	57.54	0.33	4.43	4.42	-0.34	31.84	31.77	-0.22
	3	120	56.05	56.32	0.48	4.38	4.37	-0.30	32.57	32.53	-0.12
	3	150	55.15	55.16	0.02	44.60	44.60	0.00	31.30	31.30	0.00
	∞	0	57.95	57.95	0.00	4.43	4.43	0.00	31.84	31.84	0.00
	∞	30	60.85	60.66	-0.31	4.54	4.53	-0.15	32.37	32.34	-0.09
	∞	60	58.15	58.83	1.16	4.48	4.47	-0.20	32.06	32.01	-0.16
	∞	90	55.95	56.81	1.51	4.38	4.39	0.23	30.75	31.64	2.81
	∞	120	54.55	54.92	0.67	4.32	4.32	0.02	31.26	31.27	0.03
	∞	150	53.15	53.15	0.00	4.25	4.25	0.00	30.91	30.91	0.00

Table XV: Comparison between the analytical and experimental values of Selfed strength of Mix M50 for different time lag parameters (Type of Curing A07W21).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm2)			Tensile strength(N/mm2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
$A_{07}W_{21}$	0	0	57.01	57.01	0.00	4.49	4.49	0.00	31.94	31.94	0.00
	0	30	58.01	57.96	-0.09	4.53	4.52	-0.04	32.13	32.12	-0.03
	0	60	58.37	58.01	-0.62	4.54	4.53	-0.33	32.20	32.13	-0.22
	0	90	58.41	58.03	-0.65	4.55	4.53	-0.44	32.24	32.13	-0.34
	0	120	58.31	58.05	-0.45	4.54	4.53	-0.33	32.20	32.13	-0.22
	0	150	57.01	57.01	0.00	4.49	4.49	0.00	31.94	31.94	0.00
	1	0	57.51	58.41	1.54	4.55	4.54	-0.09	32.22	32.22	0.00
	1	30	57.61	57.89	0.48	4.54	4.52	-0.29	32.18	32.11	-0.22
	1	60	56.81	57.26	0.78	4.52	4.50	-0.38	32.07	31.99	-0.25
	1	90	56.61	56.63	0.03	4.49	4.47	-0.36	31.04	31.87	2.60
	1	120	56.01	56.01	0.00	4.45	4.45	0.00	31.75	31.75	0.00
	1	150	57.01	57.01	0.00	4.49	4.49	0.00	31.94	31.94	0.00
	3	0	59.01	58.97	-0.07	4.57	4.56	-0.11	32.31	32.28	-0.09
	3	30	57.41	57.74	0.57	4.50	4.52	0.40	2.10	2.08	-0.96
	3	60	56.21	56.45	0.42	4.46	4.47	0.34	31.78	31.84	0.19

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	3	90	54.51	55.20	1.25	4.34	4.42	1.85	31.65	31.60	-0.16
	3	120	54.01	54.01	0.00	4.38	4.38	0.02	31.36	31.37	0.03
	3	150	57.01	57.01	0.00	4.49	4.49	0.00	31.94	31.94	0.00
	∞	0	60.11	59.88	-0.38	4.61	4.60	-0.17	32.51	32.47	-0.12
	∞	30	56.51	57.21	1.22	4.45	4.50	1.27	31.82	32.02	0.62
	∞	60	53.61	54.57	1.76	4.36	4.40	0.84	31.27	31.50	0.73
	∞	90	51.51	52.08	1.09	4.27	4.30	0.61	31.06	31.02	-0.13
	∞	120	49.81	49.81	0.00	4.20	4.20	0.00	30.52	30.52	0.00
	∞	150	49.81	49.81	0.00	4.20	4.20	0.00	30.52	30.52	0.00

Table XVI: Comparison between the analytical and experimental values of Selfed strength of Mix M50 for different time lag parameters (Type of Curing A00W28).

Type of Curing	Blend Ratio (r)	Time Lag (Min.) t	Compressive strength (N/mm2)			Tensile strength(N/mm2)			Modulus of Elasticity in Gpa)		
			XC(t)	AC(t)	% Error	XT(t)	AT(t)	% Error	XE(t)	AE(t)	% Error
	0	0	55.91	55.91	0.00	3.67	3.67	0.00	31.42	31.42	0.00
	0	30	56.61	56.62	0.02	3.70	3.70	-0.05	31.55	31.55	0.00
	0	60	56.91	55.61	-2.34	3.70	3.70	-0.14	31.61	31.55	-0.19
	0	90	57.01	56.56	-0.79	3.72	3.70	-0.54	31.63	31.54	-0.29
	0	120	57.01	56.53	-0.85	3.71	3.70	-0.27	31.61	31.53	-0.25
	0	150	56.61	56.61	0.00	3.70	3.70	0.00	31.55	31.52	-0.10
	1	0	55.91	55.91	0.00	3.67	3.67	0.00	31.42	31.42	0.00
	1	30	57.41	57.31	-0.17	3.78	3.78	-0.05	31.70	31.68	-0.06
	1	60	56.61	56.79	0.32	3.64	3.68	1.17	31.65	31.59	-0.19
	1	90	55.81	56.15	0.61	3.54	3.57	0.95	31.55	31.47	-0.25
$A_{00}W_{28}$	1	120	55.31	55.52	0.38	3.46	3.47	0.20	31.50	31.35	-0.48
	1	150	54.91	54.91	0.00	3.37	3.37	0.00	31.21	31.23	0.06
	3	0	55.91	55.91	0.00	3.67	3.67	0.00	31.42	31.42	0.00
	3	30	58.11	58.01	-0.17	3.75	3.74	-0.13	31.79	31.82	0.09
	3	60	56.11	56.95	1.47	3.72	3.71	-0.46	31.65	31.63	-0.06
	3	90	55.21	55.27	0.11	3.65	3.66	0.27	31.28	31.39	0.35
	3	120	54.51	54.55	0.07	3.63	3.53	-2.78	31.61	31.17	-1.41
	3	150	53.61	53.42	-0.36	3.48	3.48	0.00	31.47	30.94	-1.71
	∞	0	55.91	55.91	0.00	3.67	3.67	0.00	31.42	31.42	0.00
	∞	30	58.91	58.71	-0.34	3.78	3.78	-0.19	31.98	31.94	-0.13
	∞	60	55.11	56.01	1.61	3.64	3.68	1.11	31.26	31.47	0.67
	∞	90	52.41	53.36	1.78	3.54	3.57	0.95	30.76	30.95	0.61

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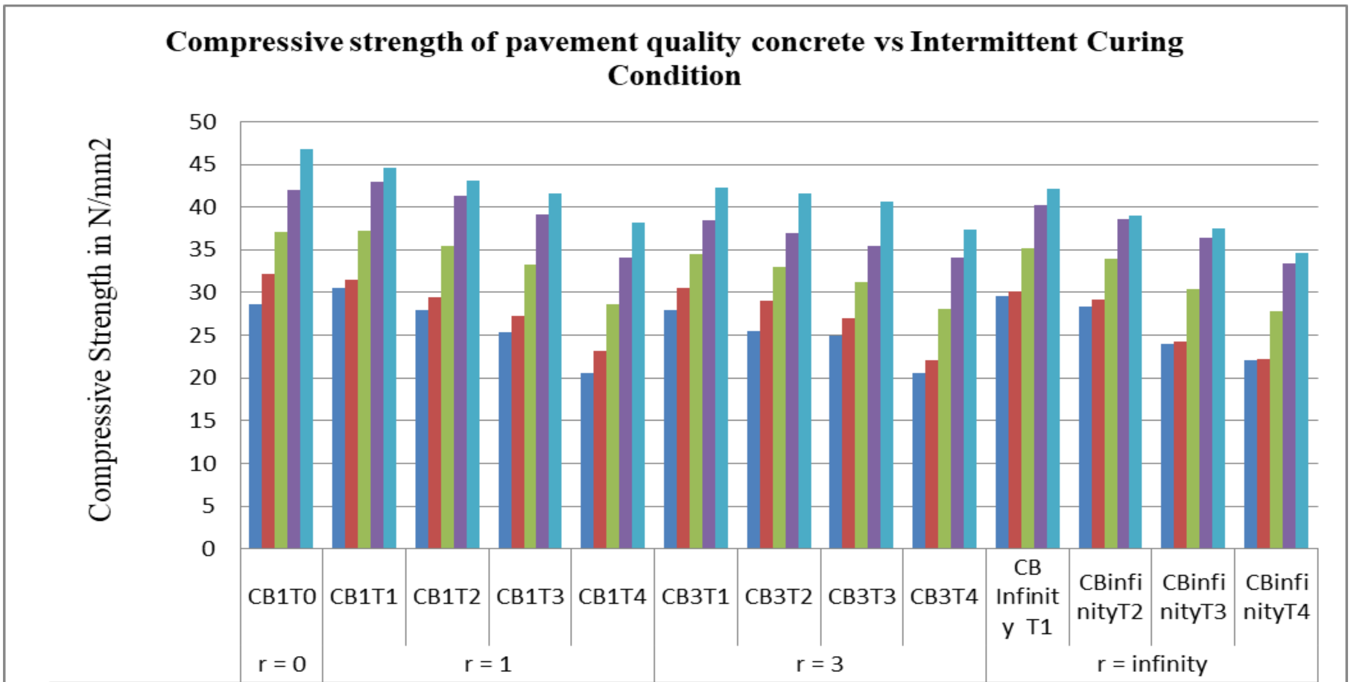
	∞	120	50.51	50.87	0.71	3.44	3.47	0.78	30.35	30.44	0.30
	∞	150	48.61	48.61	0.00	3.37	3.37	0.00	29.95	29.95	0.00

Table XVII: Intermittent curing effect (Grade M40)

Sr.no./curing condition	Blend ratio (r)	Cube Specification	Air_{21} $Water_{7}$	Air_{7} $Water_{21}$	Air_{28} $Water_{0}$	Air_{0} $Water_{28}$
1	r = 0	CB_1T_0	28.65	32.2	41.96	46.8
2	r = 1	CB_1T_1	30.51	31.56	42.89	44.56
3		CB_1T_2	27.89	29.48	41.32	43.15
4		CB_1T_3	25.32	27.31	39.15	41.57
5		CB_1T_4	20.57	23.18	34.15	38.15
6	r = 3	CB_3T_1	27.98	30.56	38.5	42.32
7		CB_3T_2	25.47	29.02	36.89	41.62
8		CB_3T_3	24.98	26.96	35.46	40.65
9		CB_3T_4	20.57	22.1	34.15	37.34
10	r = Infinity	$CB_{Infinity}$ T_1	29.56	30.12	40.16	42.12
11		$CB_{infinity}T_2$	28.34	29.15	38.65	39.05
12		$CB_{infinity}T_3$	24	24.31	36.41	37.52
13		$CB_{infinity}T_4$	22.05	22.15	33.42	34.62



	CB1T0	CB1T1	CB1T2	CB1T3	CB1T4	CB3T1	CB3T2	CB3T3	CB3T4	CB Infinity T1	CBinfinityT2	CBinfinityT3	CBinfinityT4
Air21 Water7	28.65	30.51	27.89	25.32	20.57	27.98	25.47	24.98	20.57	29.56	28.34	24	22.05
Air7 Water21	32.2	31.56	29.48	27.31	23.18	30.56	29.02	26.96	22.1	30.12	29.15	24.31	22.15
Air14Water14	37.08	37.225	35.4	33.23	28.665	34.53	32.955	31.21	28.125	35.14	33.9	30.36	27.785
Air28 Water0	41.96	42.89	41.32	39.15	34.15	38.5	36.89	35.46	34.15	40.16	38.65	36.41	33.42
Air0 Water28	46.8	44.56	43.15	41.57	38.15	42.32	41.62	40.65	37.34	42.12	39.05	37.52	34.62

Fig 3 . Compressive strength of pavement quality concrete vs Intermittent Curing Condition & Blend ratio

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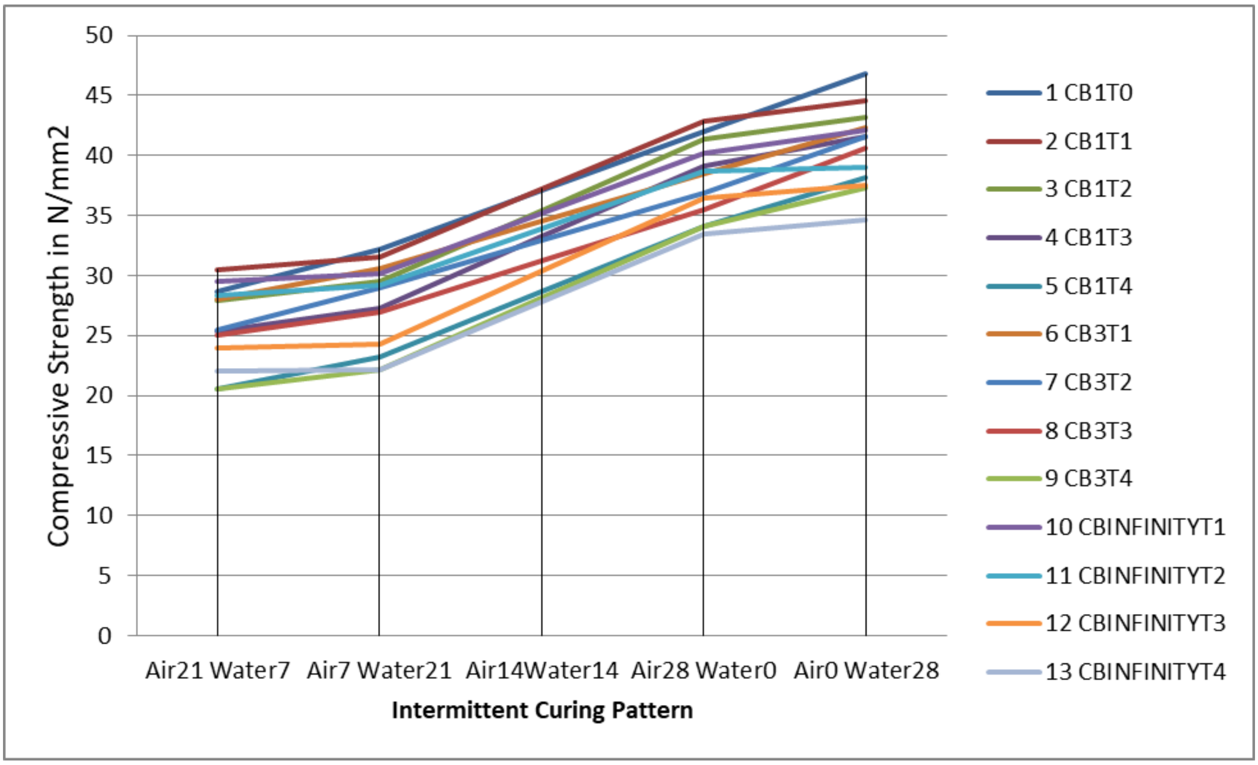

Fig.4 Compressive strength of pavement quality concrete vs Intermittent Curing Condition

Notation:

CB_1T_0 : CB_1 = Casting of Cubes for blend ratio r =1, & T_0= Time lag is 0 Minute
CB_1T_1 : CB_1 = Casting of Cubes for blend ratio r =1, & T_1= Time lag is 30 Minute
CB_1T_2 : CB_1 = Casting of Cubes for blend ratio r =1, & T_2= Time lag is 60 Minute
CB_1T_3 : CB_1 = Casting of Cubes for blend ratio r =1, & T_3= Time lag is 90 Minute
CB_1T_4 : CB_1 = Casting of Cubes for blend ratio r =1, & T_4= Time lag is 120 Minute
Similarly
CB_3T_1 : CB_3 = Casting of Cubes for blend ratio r =3, & T_1= Time lag is 30 Minute

The observations of the workability parameters such as slump, Vee Bee time and compaction factor recorded at initial as well as final setting times for the basic as well as pure selfed mixes for the various blend ratios, viz., r =∞, 3.00, 1.00 and 0 are presented in Table XVII. The compressive strength, tensile strength, and modulus of elasticity values calculated from the experimental observations and the effect of improper curing sequences are presented in tables VII to XVI. In tables those tables the experimental values and analytical values of the strengths viz., compressive strength XC, AC, tensile strength XT, AT and modulus of elasticity XE, AE for all the different mix cases (M40 & M50), each observed at different time lags t (hr) (viz., 0.00. 30.00, 60.00, 90.00, 120.00 and 150.00 min) for each blend ratio r (=∞, 3, 1 and 0) cured under different improper curing sequences **WI AII.** (Viz., A0W28, A7W21, A21W7, A28W00 W28A00) have been presented.

IV. CONCLUSION

1 The strength of concrete which undergoes intermittent curing is less than that of strength due to cumulative curing after 28 days of curing.
2 The maximum compressive strength of concrete achieved by using A00W28 Curing Condition.
3 The strength of blended concrete gives better result up to r = 0, 1, & in-between 1 & 3. This strength gives satisfactory results up to time lag 90 minutes.
4 Blend Concrete with r = 3 and infinity gives poor strength so in practice old concrete was not suitable for reuse. As time lag is increased after IST, the concrete becomes dry and set, hence it is preferred to use the concrete before final setting the time.

REFERENCES

1 Bairagi, N. K., A. S. Goyal, and P. A. Joshi. "Strength of Composite Mixes Using General Crossing Theory." Indian Concrete Journal 63, no. 12 (1989), pp 600-605.
2 N.K.Bairagi,A.S.Goyal&P.A.Joshi"Strength of composite mixes under cumulative curing using selfing and crossing theory " The Indian Concrete Journal Vol.64 (11) (1990), pp 527-538.
3 Fathollah, Sajedi, Hashim, Abdul Razak, "Effects of curing regimes and cement fineness on the compressive strength of ordinary Portland cement mortars." Construction and Building Materials, Vol.25(2011), pp 2036–2045.
4 Zain M.F.M "Effect of different curing methods on the Properties of micro silica concrete". Australian Journal of Basic and Applied Science, Vol.1 (2) (2007),pp 87 –95.
5 N. R. El-Sakhawy, H. S. El-Dien "Influence of curing on durability performance of concrete", Magazine of Concrete Research, Vol.51(1999), pp 309-318.
6 Akeem Ayinde Raheem,and Aliu Adebayo Soyingb, "Effect of curing on density and compressive strength of concrete", International Journal of Applied Science And Technology, Vol.3(2013), pp 56-64.
7 Suresh B Piplewar, Narendra M Kanhe and Devendra Pandey "Intermittent curing of M20 concrete", International Journal of Structure and Civil Engginering, Vol. 2(2013),pp 165-171.

8 Wang, Kejin, James K. Cable, and Zhi Ge. "Evaluation of pavement curing effectiveness and curing effects on concrete properties." Journal of Materials in Civil Engineering 18.3 (2006),pp 377-389.

9 Bentz, Dale P., and W. Jason Weiss. Internal curing: a 2010 state-of-the-art review. Gaithersburg: US Department of Commerce, National Institute of Standards and Technology, 2011.

10 Villarreal, Victor H., and David A. Crocker. "Better pavements through internal hydration." Concrete international 29.2 (2007), pp 32-36.

11 Ge, Zhi, Kejin Wang, and Zhili Gao. "Properties and early-age cracking potential of blended cement concrete." In Material Design, Construction, Maintenance, and Testing of Pavements: Selected Papers from the 2009 GeoHunan International Conference,(2009), pp. 163-170

12 Strategic Development Council "Roadmap 2030: The U.S. concrete industry technology roadmap. "Strategic Development Council, (2002).

13 Somesh Yendole, Prachi Rathod,Chinmay Mahaja, And Dipak Rathod "Review Paper On Retempring Unconcern And Their Effect, International Journal Of Research In Advent Technology,(2017), Pp 293-296.

14 Kiran M. Mane And Dr. D. K. Kulkarni,"Effect Of Retempring With Retarding Admixes On Property Of Concrete Subjected To Prolonged Mixing" , Innovative Systems Design And Engineering, (2011) , Pp 26-33.

15 Bingöl, A. Ferhat, and İlhan Tohumcu. "Effects of different curing regimes on the compressive strength properties of self compacting concrete incorporating fly ash and silica fume." Materials & Design 51 (2013), pp 12-18.

16 Osei, Daniel Yaw, Zakari Mustapha, and Mohammed DH Zebilila. "Compressive Strength of Concrete Using Different Curing Methods." Journal of Social and Development Sciences 10.3 (S) (2019), pp 30-38.

17 Kim, Kukjoo, Thanachart Subgranon, Mang Tia, and Michael Bergin. "Internally cured concrete for use in concrete pavement using accelerated pavement testing and finite-element analysis." Journal of Materials in Civil Engineering 28, no. 6 (2016): 04016011.

18 IS 10262:2009 Indian Standard Concrete mix proportioning – guidelines.

19 IS 456: 2000 Plain and reinforced concrete code of practice.

20 IS 516: 1959 Method of tests for strength of concrete.

21 IRC: 44. (2017). Tentative guidelines for cement concrete mix design for pavements. New Delhi:Indian Road Congress.

22 IRC: 15. (2017). Code of practice for construction of jointed plain concrete pavements. New Delhi Indian Road Congress.

23 IRC 58. (2017). Guidelines for the design of plain jointed rigid pavements for highways. New Delhi: Indian Road Congress.

24 IS 456: 2000 Plain and reinforced concrete code of practice.

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