



## An Overview of Effect of Delay in Concreting on Strength of Concrete

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**Abstract-** It is difficult to cast the whole structure monolithically if the concrete elements are large size; there are some limitations to the availability of formwork, concrete workers or supply of the fresh concrete. In such cases, it becomes necessary to perform structure elements in two or more stages, which leads to formation joints Cold joint is one of concreting problem due to delay of casting the second layer. Therefore, the target in this work is to study the effect of delay in time period when casting the second layer of concrete after 3, 6, 12 and 18 hour Experimental work was performed at laboratory to investigate the mechanical properties of concrete (compressive strength, splitting tensile strength and flexural strength, permeability test). The results were investigated and it indicates that, in case of delaying in the time period for casting the second layer, there is a great effect on the mechanical properties of concrete. This study gives strength data simulating such improper casting sequences. To scope this problem related to improper casting sequence, which ultimately results in formation of cold joints, we have used cement slurry and high grade concrete to prove this we conducted experiments. The study aims for identifying such a time lag after that the required target strength may be achieved even after delay in casting. To identify the meeting planes of two interface layers which has lesser effect on compressive strength. Use of Bonding Agent (SBR Latex) for improves executed construction joints provide limits for successive concrete placements, without adversely affecting on structure.

**Keywords-** Cold Joint, Delay in casting, Mechanical Properties, Time Lag, Construction Joints

### I. INTRODUCTION

Delay in concreting can result in cold joints. To avoid the cold joint, placing should be resumed substantially before the time of initial set. A Cold joint will result and suitable preparation measure should be applied .when in practices either casting cannot be completed in one go or the time lapse between mixing and placing the strength of final product is affected. If for any reason the concrete placement is stopped for longer than the setting time, the joint should be treated as cold joints. Cold joint need additional surface preparation, dowel action & bonding agents.

Concrete is one of the most widely used construction material having ingredients as cement, fine aggregate, coarse aggregate and water. It develops strength in the presence of water when added to the dry mixture of the ingredients. The development of strength in the said mass starts instant of the time when the water is just added to it up to a certain time preferably the initial setting time and the prepared mass remains plastic and can be moulded easily, after which the hardening process proceeds faster towards the final setting time and the mass becomes hard and solid which cannot be moulded at all. Delays in concreting are leading to partial setting of concrete which has suffered a long period of exposure in the open before actual casting in the mould. This concrete should not be utilized for strength purpose in practice, and is to be discarded, but still it contains a good portion of the active part of the reactive cement in that mass. These situations may affect the strength of final product. The strength also depends on the plane at the concrete joint made while casting. If blending of such partially set concrete with

richer mix to attain the target strength, can achieve economy and there will be no wastage of material. Much building waste is made up of materials such as concrete and mortar damaged or unused for various reasons during construction. Observational research has shown that this can be as high as 5 to 10% of the materials that go into a building a much higher percentage than the 2.5-5% usually assumed by quantity surveyors and the construction industry. Since considerable variability exists between construction sites, there is much opportunity for reducing this waste and by reusing the material natural resources and the environmental balance can be maintained and economy will be gained. The study aims for identifying such a time lag after that the required target strength may be achieved even after delay in casting. To identify the meeting planes of two interface layers which has lesser effect on compressive strength. Use of Bonding Agent (SBR Latex) for improves time lag and bonding strength of concrete.

## **II. LITERATURE REVIEW**

### **1) Evaluation of Bond Mechanism of hardened & plastic concrete**

Smeeth R Desai, "et al." (2018)<sup>(1)</sup> In these paper author concluded that Delay in concreting can result in cold joints. To avoid the cold joint, placing should be resumed substantially before the time of initial set. A Cold joint will result and suitable preparation measure should be applied .when in practices either casting cannot be completed in one go or the time lapse between mixing and placing the strength of final product is affected. If for any reason the concrete placement is stopped for longer than the setting time, the joint should be treated as cold joints. Cold joint need additional surface preparation, dowel action & bonding agents. The study was carried out to evaluated bond strength of old and fresh concrete. so as to try out the various dowel action along with the bonding agents .the surface preparation was done by chipping the main objective of work is to determine the bond strength of old and fresh concrete by using the slant shear strength and flexural test to evaluate the flexural strength .The study was carried out to evaluated which dowel action and bonding agents give better results. However the chipping of surface when combined with the dowel action generated by insertion of the corrugated PVC pipes gives more bond strength. The slant shear strength test values for all the combinations were found to be on par with the combination of corrugated PVC pipes with cement slurry, which proves the latter to be an economical option for achieving the required bond strength.

### **2) Strength variation of blended mix by selfing & crossing Theory**

A.P .Nikam, U.S.Ansari (2016)<sup>(2)</sup> In these paper authors concluded that the compressive strength of partially set concrete goes On reducing as the time lag exceeds towards final setting time The effect of reduction of compressive strength of partially set concrete can be overcome by Blending with some grade (selfing) or higher grade (crossing) . Improvement in compressive strength of selfed concrete is due to improvement in fresh properties Of blended concrete Use of SBR-Latex should strength improvement up to delay of 12 Hrs. to 16Hrs When concrete is delayed for casting up to 16 Hrs. target compressive strength can be gained By using proper agent in proportion with cement (1:1).

### **3) Impact of Delay on strength of concrete**

Daniel Walacha (2016)<sup>(3)</sup> In these paper author point out that proper location and construction of construction joints has a great influence on deflection of beam member and their cracks. If there is a need to use construction joint in concrete work, select a location that is the least likely develop high stresses. One must ensure that the contact surface of the two concrete batches is prepared correctly. The use proper construction joint has a significant impact on beam properties.

### **4) Effect of Retampering on Delayed concrete**

Mr. Jitendra Singh, "et al." (2015)<sup>(4)</sup> In these paper authors studies the retampering of concrete done by making use of different material. Such as super plasticizer, water, cement, fly ash has been briefly

presented in this paper with regard to valuable results obtained after the experiments Addition of simply water gain the workability of a time lapsed concrete results in reduced strength Value but experiments carried with addition of super plasticizer, fly ash etc. have provided sufficient Measures and literature regarding the increase in slump value, compressive strength value and Flexural values. Different working condition or site conditions are the primary deciding factor in Adopting particular method.

#### **5) Effect of time lap and different joint**

Ganesh .V.Tapkire, Prof. Satish Parihar (2014)<sup>(5)</sup> The author shows that if there is a improper casting sequence which form cold joints , for these We use cement slurry which improve the compressive flexural and split tensile strength as compared to stained and fresh concrete. By experimental results author proves that delay in concrete joint Also affect strength of concrete the type of joint also affects strength of concrete. From observation we conclude that, use of retarding Agent in concrete joint to improve the strength of concrete in the joint portion.

#### **6) Effect of cold joint on strength of concrete**

V.R .Rathi , P.K.Kolase (2013)<sup>(6)</sup> In these paper authors concluded that the strength of concrete increases till initial setting time of Cement (75minutes) and later on for a time lag exceeding the initial setting time it decreases. Among the different failure planes the decrease in compression, flexure and split tensile strength was least in case of horizontal plane as compared to vertical and diagonal planes from experimental study, it is observed that after initial setting time also slump value is satisfactory after addition of retarding agent it will be helpful if there is delay in concreting.

#### **7) Mechanical properties of concrete**

H.A.mohomadien (2013) <sup>(7)</sup> In these paper author presented the mechanical properties of concrete contains cold joint treated With grout (4, 9, and 16 hours). By increasing the time of casting the second layer of concrete, the compressive, splitting tensile strength, and flexural strength will decrease the use of grout may increase the mechanical properties the mechanical properties of concrete grade 300 Kg/cm<sup>2</sup> are more influence than concrete grade 250 Kg/cm<sup>2</sup>. The effect of grout on mechanical properties of concrete appears at 16 hours and has low effect at 4 to 9 hours.

#### **8) Temperature effect on strength of concrete**

Ronald. G.Burg (1996)<sup>(8)</sup> Based on the results researcher conclude the following For most concrete cast and cured at 32 °C, 3 days compressive strength is approximately 70 % of 28 days of Compressive strength of cast and cured at 32 %. The effect of temperature on early edge strength are reverse after seven days when absolute strength Of concrete cast and cured at 32 °C is lower than concrete cast and cured at 23 °C.

#### **9) Use of superplasticizer in concrete**

R Sri ravindrarajah (1985)<sup>(9)</sup> In these paper author point out that delay in casting results in an increases in compressive strength For plain concrete with incremental addition of super plasticizer. A delay of 120 minute produced an increase of 25 % for plane concrete where as increases 13 to 17 % was noted for super plasticized Concrete with incremental addition after 90 minute of delay.

### **III. CONCLUSION AND DISCUSSION**

Literature survey related to the effect of delay in concreting on strength of concrete. The study of the mix proportion, design, content was also conducted. Technical article published in the proceeding and other journals, standard books have been referred to determine the content of work. It has been noted that many types of research and academician have work on the different proportion and joints and time lag. The gap between researches can be filled by following findings

- The research project primarily attention on the effect of delay in concreting on compressive strength of concrete.
- These researches also find the effect of delayed concreting on permeability of structure.
- The researches study the effect of delay in concreting after final setting of concrete.
- To determine the bond strength of old and fresh concrete
- Calculate effect of the delayed concreting on flexural and split tensile strength
- Try different construction joint for delayed concrete

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