

8(b). what is effect of time and temperature on workability?

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Ans = Time and temperature can have a significant effect on the workability of concrete, which refers to its ability to be easily mixed, placed, compacted, and finished without segregation or excessive resistance. Here's how time and temperature can impact workability:

1. Time:

- **Setting Time:** As the concrete's setting time progresses, its workability decreases. Initially, freshly mixed concrete has a high workability, allowing for easy placement and finishing. However, as the hydration process takes place and the concrete starts to set, it becomes stiffer and more difficult to work with.
- **Slump Loss:** Over time, concrete can experience slump loss, which refers to a decrease in the concrete's slump value (a measure of its fluidity) due to water evaporation or the absorption of water by aggregates. Slump loss can lead to a reduction in workability and may require additional water or admixtures to restore the desired consistency.
- **Evaporation:** In hot and dry conditions, the extended time taken to transport and place concrete can result in increased evaporation of water from the mix. This rapid moisture loss can cause the concrete to become less workable and challenging to handle.

2. Temperature:

- Heat Effects: Higher temperatures accelerate the setting time of concrete, causing it to stiffen more quickly. This can reduce workability, making it challenging to place, compact, and finish the concrete before it becomes too rigid.

- Slump Retention: Elevated temperatures can also lead to slump loss and reduced workability. The increased heat causes the water in the mix to evaporate more rapidly, potentially resulting in a decrease in slump and increased difficulty in handling the concrete.

- Cold Weather Effects: In cold weather, low temperatures can cause the water in the mix to freeze, leading to reduced workability. Additionally, cold weather can slow down the setting time of concrete, prolonging the period of workability and making it more challenging to achieve proper finishing.

To mitigate the effects of time and temperature on workability, several measures can be taken:

- Adjusting Mix Proportions: The concrete mix can be designed to account for anticipated time and temperature conditions. This may involve adjusting the water-cement ratio, using admixtures (such as water reducers or retarders), or employing other additives to improve workability and control setting time.

- Adding Admixtures: Admixtures, such as plasticizers or superplasticizers, can enhance workability by improving the fluidity and flow of the concrete mix. They can help offset the effects of time and temperature

variations.

- **Controlling Moisture:** In hot weather, measures can be taken to reduce water evaporation, such as using windbreaks, shading, or fogging/misting the surface. In cold weather, protecting the concrete from freezing and ensuring proper curing conditions are essential to maintain workability.
- **Proper Timing:** Careful planning and coordination of concrete placement, considering factors such as transportation time, waiting time, and setting time, can help optimize workability and ensure efficient handling and finishing of the concrete.

By understanding and managing the effects of time and temperature on workability, construction teams can optimize the handling and placement of concrete, resulting in better-quality structures.

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