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Self-Placing Concrete

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SELF-PLACING CONCRETE

THE NEED

Certain concrete pours have areas where the congestion of reinforcing bars make placement of concrete almost impossible. Using conventional placing and vibration techniques, the resulting concrete can have considerable honeycombing due to the development of voids. Not only is this undesirable but the labor cost of placing using traditional methods is high. Methods need to be developed to reduce labor costs, shorten construction time and produce a better finished product.

FIGURE 1 PREPACKED SHOTCRETE ADMIXTURE : SPRAY-CON WS

THE TECHNOLOGY

Self-placing concrete is a possible solution to the problem. Also known as self-compactable concrete, self-consolidating concrete, flowable concrete, and non-vibration concrete. These concretes eliminate the need for vibration in a placement process where the reinforcement makes proper vibration difficult or impossible. Perhaps, as important as the lack of needed vibration, is that the density is obtained without segregation.

Self-placing concrete is obtained by the use of various admixtures. The particular admixture for a mix is usually developed by individual companies where Japanese firms are currently leading the way. Generally, a conventional concrete mix is used with the addition of a water reducing agent. The water cement ratio is kept the same. This combination results in a "flowable" concrete with usually high compressive strengths.

A product with similar characteristics was developed by Meca Engineering Co., Ltd. in Korea. The product called MELFLOW is a high-range water reducing admixture based

on Sulfonated Melamine formaldehyde. This product prevents segregation by eliminating the electrostatic attraction between the positive and negative charges on the concrete particles. An electrostatic repellency is induced increasing the negative charge of each particle and releasing the flocculated cement.

THE BENEFITS

- The costs of self-placing concrete may be slightly higher but the payback of reduced labor required for placement and improved construction schedule must be considered to determine a benefit. Additional benefits include the ability to use conventional batching plants and ready-mix transit trucks which eliminates the need to invest in a new plant.
- MELFLOW is a superplasticizer that optimizes the water/cement ratio of concrete improving dramatically its workability without having to add more water. It is capable of reducing up to 30 to 40% the mixing with water. It also provides improvements in the following: strength, density, durability, volume stability, bond, and abrasion resistance.

STATUS

Several projects have been successfully completed in Japan since 1993 using self-placing concrete. These include a tunnel liner in Yokohama city, the main tower on the Kiba-Park Large Bridge, and a tubular column fill on the Landmark tower. Work needs to be done to further refine testing and quality control procedures. The MELFLOW product has been successfully used by Korean companies like Hyundai Construction in many large construction projects.

BARRIERS

Because of the limited use the costs are still high and limited to use only in severe conditions.

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REFERENCES

1. MECA Engineering Co., LTD. MEL-Series Catalog Information

REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

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PUBLISHER

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