An On-site batcher plant that automatically controls concrete mixing temperature Smart Batcher Plant[R]

Koki KUMAGAI ▶ TOBISHIMA CORPORATION
Masumi TAKINAMI ▶ TOBISHIMA CORPORATION

■ Summary

Smart Batching Plant[R] is an on-site batching plant that can automatically control the concrete mixing temperature and produce concrete at a stable and optimal temperature even in cold climates where the minimum temperature reaches 20° C below zero. This allows the plant to maximize the performance of shotcrete and achieve stable adhesion and strength development throughout the year.

■ Main Features

Figure 1 shows an overview of the system.
The automatic control of mixing temperature consists of three functions.
Function I: Heating of water, fine aggregate (sand), and coarse aggregate (crushed stone)
Function II: Accurate temperature measurement before mixing and continuous temperature measurement during mixing.
Function III : Control function that automatically adjusts the ratio of raw water (cold water) to hot water according to the target mixing temperature.
The greatest features of this function are Functions II and III. It measures the temperature of water (raw water and hot water), aggregate, cement, and concrete during mixing, calculates the heat capacity required for the target mixing temperature based on the measured values, and automatically adjusts the amount of hot water and raw water to be added.

■ Application Example in Cold Climates

Figure 2 shows the results of application in a cold region where the minimum temperature reaches 20° C below zero. Regardless of changes in ambient temperature, the target kneading temperature of 25° C was achieved. By eliminating the use of excessive addition of a quenching agent, shotcrete with good strength development and high quality with little rebound was achieved.
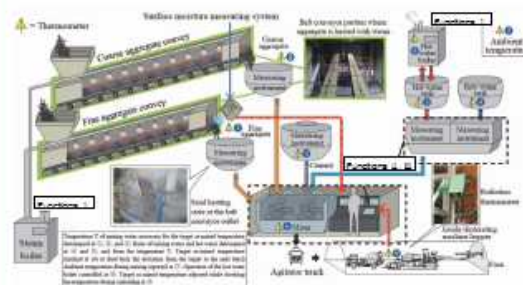

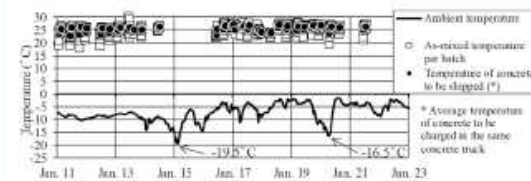Fig. 1   Outline of the Smart Batcher Plant system

Fig.2   Changes in concrete as-mixed and ambient temperatures over time