TAIHEIYO CEMENT
NEWS LETTER

July 30, 2024

Applying concrete sludge to "CARBOCATCH™" technology, and verifying to build a low carbon pavement
～Development of a portable system named "CARBOCATCH™MOBILE" to achieve diverse applications of this technology～

Taiheiyo Cement Corporation (Headquarters: Bunkyo-ku, Tokyo; President: Yoshifumi Taura) developed "CARBOCATCH™" that efficiently enabled to absorb carbon dioxide (CO_2) into cement slurry in 2023.
"CARBOCATCH™MOBILE" is a new portable system designed to verify products utilizing CARBOCATCH™ slurry technology. Currently, verification testing has been conducted on low carbon concrete pavement. The new system was installed at a ready-mix concrete plant, and waste concrete sludge from the plant was used as a raw material for the slurry.

CARBOCATCH™ is capable of absorbing CO_2 not only into cement slurry but also into waste slurry containing calcium, such as concrete sludge or precast concrete listing. Concrete sludge, in particular, is a significant concern, with approximately 3 million tons wasted annually in Japan. Its handling and effective utilization are the big issue of our field. On the other hand, this technology can be applied to waste materials, enhancing the effective usage of resources, and enabling the development of further low-carbon material.

CARBOCATCH™MOBILE is a portable system used to apply CARBOCATCH™ technology. This system is comprised of 3 devices: mixing device, CO2 absorbing device, and pump device. Each device can be loaded onto trucks using forklifts and delivered to concrete production sites. Slurry that is absorbing CO_2 (i.e., CARBOCATCH™ slurry) is produced using the mixing device and CO_2 absorbing device. Produced CARBOCATCH™ slurry can be transported to concrete mixers at ready-mix concrete plants by using the mixing device and pump device.

The operation of CARBOCATCH™MOBILE was verified at the headquarter plant of Tohoku Taiheiyo Ready Mix Concrete. CARBOCATCH™MOBILE was installed in the plant, and CARBOCATCH slurry was produced by absorbing CO_2 into a waste concrete sludge cake from the plant. Additionally, used CO_2 was separated and recovered from exhaust gas at Kumagaya plant; one of our cement plants. The amount of CO_2 absorbed in 1 ton of solid of concrete sludge was 208 kg[※2]. CO_2 emission intensity of solid from the produced CARBOCATCH™ slurry was estimated as -178kg/t[※3] under an assumption that CO_2 emission intensity of waste concrete sludge was 0 kg/t.

This CARBOCATCH™ slurry and its dried powder were used as raw materials to produce pavement concrete and soil stabilizing cement. Moreover, by using waste concrete that absorbed CO_2 as a part of the base course materials, all components; roadbed, base course, and pavement, were built using low carbon materials. Pavement concrete was produced at the ready-mix concrete plant, and the test construction was conducted at our Sendai service station without any trouble. No cracks were observed in the field survey after 2 months' service, and good pavement condition was confirmed. CO_2 emission intensity per square meter of this test construction derived from raw materials was estimated as a 15% decrease compared to that of conventional pavement concrete construction.

It was confirmed that concrete sludge can be improved by our original CO_2 absorbing technology, as well as, both circular economy and decarbonization can be achieved at the same time through this test. Additionally, making

CARBOCATCH™ technology portable enables it to be applied at other concrete production sites. We will continue to apply this technology to various applications and work towards operationalizing it to contribute to the establishment of a carbon neutral society.

※1：CARBOCATCH is a trademark by Taiheiyo Cement Corporation.

※2：Estimated from the result of weight loss (amount of decarboxylation) using thermogravimetric analysis(TG-DTA).

※3：CO_2 emission of CO_2 separation and recovering processes in the cement plant and production process of CARBOCATCH slurry is not counted.

【Reference; previous news release】

Successful Development of Manufacturing System "CARBOCATCH™" to Fix CO_2 into Fresh Concrete (March 15, 2023)
https://www.taiheiyo-cement.co.jp/english/summary/pdf/230315_2.pdf

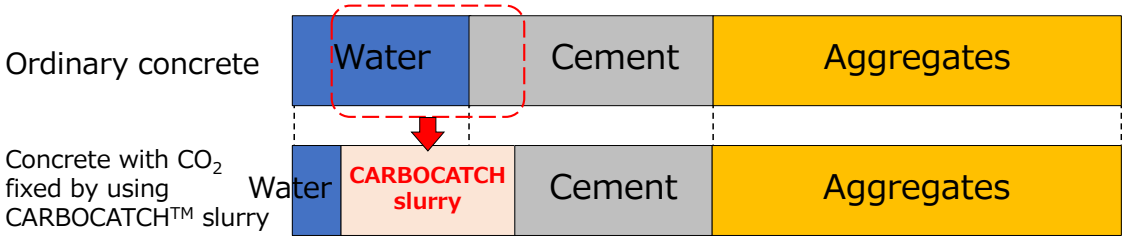

Figure 1. Schematic of concrete mix design using CARBOCATCH™ slurry

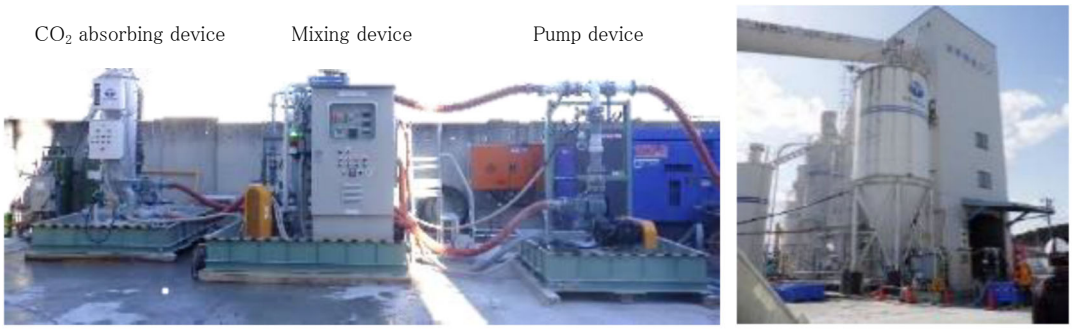

Figure 2. Overview of CARBOCATCH™MOBILE (left) and its installation (right)

✓CARBOCATCH™ slurry is produced using mixing device and CO_2 absorbing device.

✓CARBOCATCH™ slurry is transported to concrete mixers of ready mix concrete plants by using mixing device and pump device.

✓Each device can be loaded onto trucks, and delivered to concrete production sites.

Figure 3. Situations of construction and service of pavement concrete using CARBOCATCH™ slurry.

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