

## The Principle of CDM Method

CDM is a soft soil stabilization method which mixes cement slurry with soft soil in situ to attain a required strength. Soft soil is stabilized by the 2-phase chemical reaction. A hydration reaction occurs and an ettringite

of capillary crystals is generated when the cement mixes with water. Then a pozzolanic reaction follows, as the age grows, where the hydration product reacts with the clay minerals in the soil.

## Features of CDM Method

### 1 In Situ Soil Mixing Technology

CDM method is a soft soil stabilization method which mixes soft soil in situ with cement slurry to produce soil-cement with higher strength and lower compressibility than the native soil.

### 2 Proven Technology

Since its development in 1975 by the Port and Harbor Research Institute of Japanese Ministry of Transportation, more than 1,500 projects have been completed. The total volume of soil-cement produced exceeds 20 million cubic meters. It is also proven to be effective for liquefaction prevention.

### 3 Reliable in Strength Gain

Required strength can be obtained reliably by setting a proper cement dosage according to the conditions of soil to be treated.

### 4 Minimum Impact to Environment

The drilling and mixing operation is low noise and low vibration, and does not generate dust.

### 5 Reduction in Construction Period

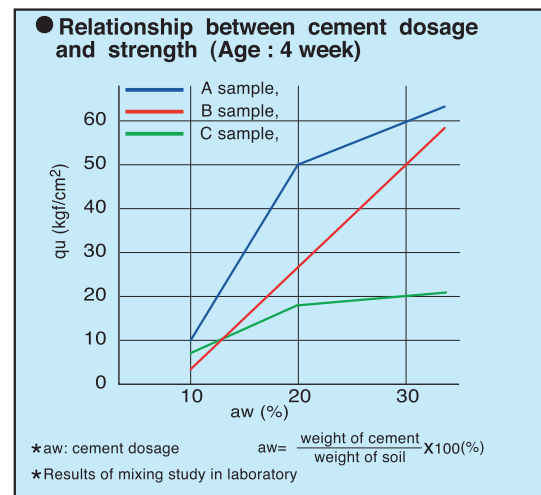
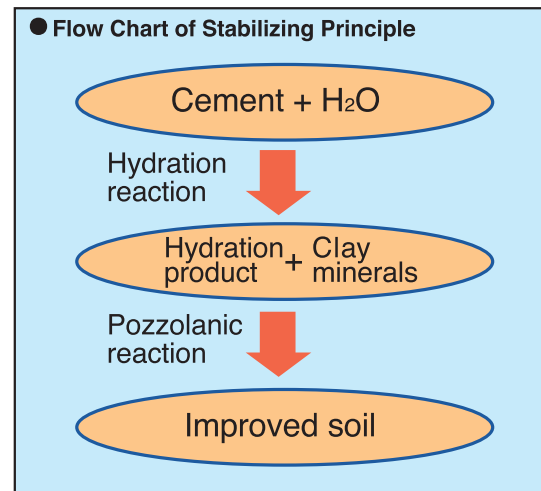
Soil-cement gains strength and reduces compressibility faster than conventional soil improvement methods and shortens the construction period.

### 6 Computerized Operation System

The computerized operation system controls, monitors, and records the drilling rate, mixing depth, auger rotational speed, and grout injection rate. This operation system minimizes human errors and provides reliable soil-cement product as the design intended.

### 7 Efficient Operation

The mixing machine used is mobile and can be easily relocated to the next soil mixing location at site. The grout production and supply are automatic which saves labor while maintaining efficiency.



**Case study**

**Ground Improvement for Tank foundation, Kagoshima, Japan**

Project Owner	Tozai Oil Terminal Co., Ltd.
Method Used	Cement Deep Mixing
Objective	Ground improvement for tank foundation
Project Location	Taniyama Port, Kagoshima, Japan
Constuction Period	April - July, 1997

Two new oil storage tanks were planned to construct at the Kagoshima Oil Terminal owned by Tozai Oil Terminal Co.,Ltd. to supply more petroleum product to meet increasing demand for energy in Japan. A low noise and low vibration method were required because other tanks should be in operation during construction. Moreover the ground improvement for tank foundation should be designed to conform the guideline prepared by the Fire Defence Agency. As a result, Cement Deep Mixing Method (CDM Method) was adopted in order to prevent liquefaction and other eathquake damages.

