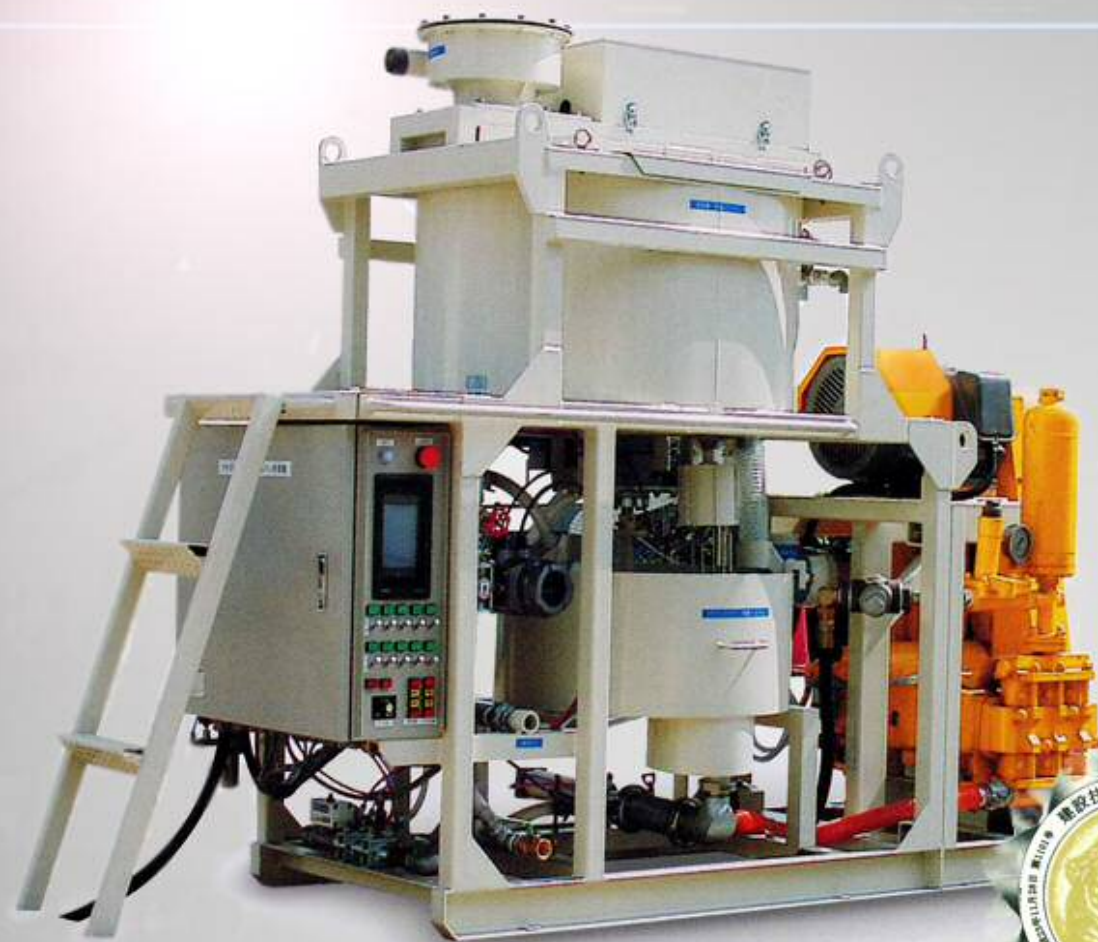


Automatic Grouting Control System on cement milk

NETIS registration number KK-050110-A

(NETIS: New Technology Information System in Japan)



Construction Technology Review and Certification
(Field of Dam Construction) in Japan Dam Engineering
Center

Automatic Grouting Control System Method society



Automatic Grouting Control System Method society

Regular member

THE GENERAL ENVIRONMENTAL TECHNOS Co.,Ltd. (KANSO TECHNOS)

<http://www.kanso.co.jp/eng/index.html>

JAPAN FOUNDATION ENGINEERING Co.,Ltd.

<http://www.jafec.co.jp/>

NITTOC CONSTRUCTION Co.,Ltd.

<http://www.nittoc.co.jp/e/>

SEIWA RENEWAL WORKS Co.,Ltd.

<http://www.seiwarw.co.jp/>

MIYAMA Co.,Ltd.

<http://www.miyamak.co.jp/>

NEW JAPAN GROUT Co.,Ltd.

Secretariat

1-3-5 Azuchimachi, Chuo-ku, Osaka

541-0052 Japan

Phone:+81-6-6263 7306

Fax :+81-6-6263 7307

It is established by KANSO office

Supporting member

MEISHO division in KOKEN BORING MACHINE Co.,Ltd.

http://www.koken-boring.co.jp/meisho/e_toppage.htm

TOYO SHOJI Co.,Ltd.

<http://www.tovoshooi.com/>

System Overview

Structure of system equipments

The automatic grouting control unit can be operated automatically from the operation board of a control room. The management device of a flowmeter, the automatic grouting control unit, and operation board of the unit, are all connected in LAN by sharing data of injection to conduct grouting.

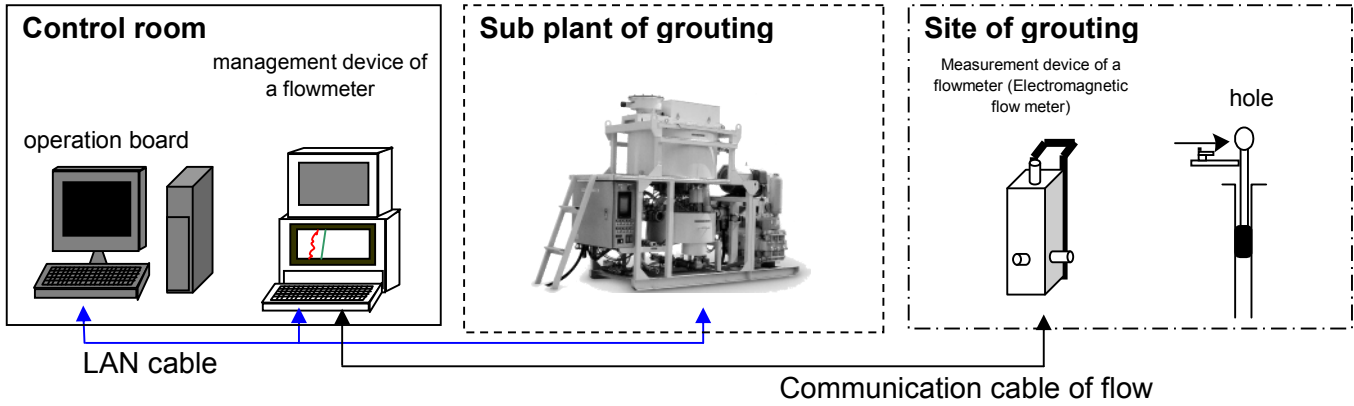
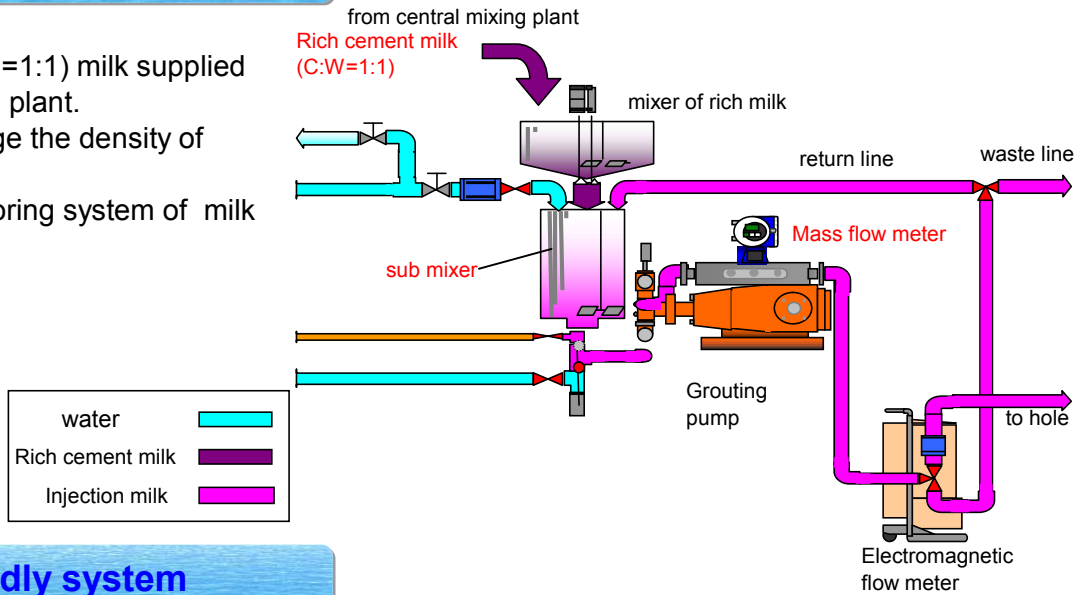


Figure of the system block

Fixed density (C:W=1:1) milk supplied from central mixing plant.
 Add water to change the density of cement milk.
 Continuous monitoring system of milk density.



Eco-friendly system

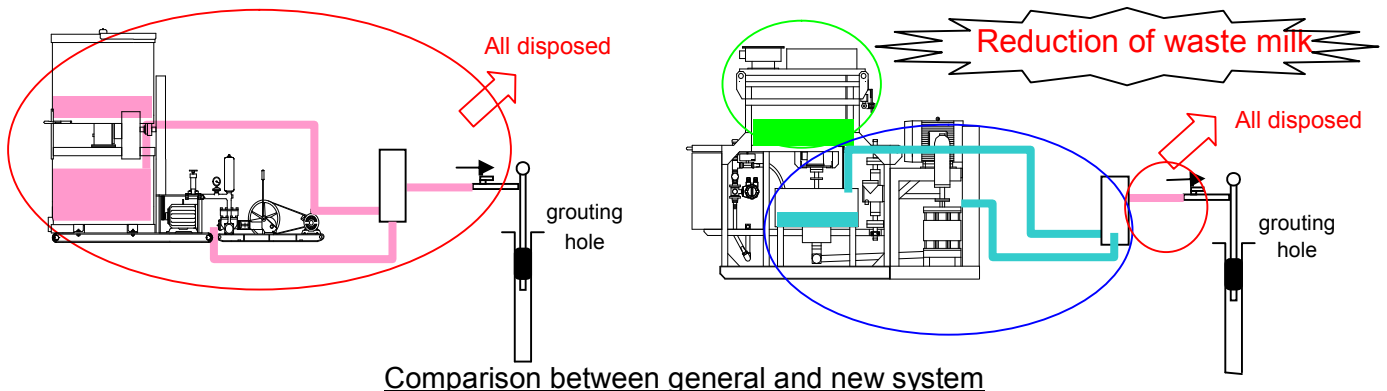
Disposal of milk can be reduced in this system which contributes to reduction of cost and creation of low carbon society

General method
 (change in a step-by-step milk ratio)

Dispose all remained milk in the system after injection

New system

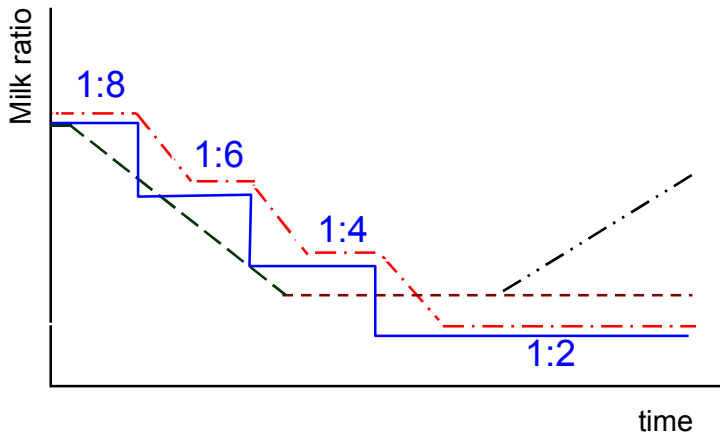
Rich milk : **Returnable**
 Hose of return and supply, Sub mixer : **Reuse after density adjustment**



Comparison between general and new system

Change to various mix proportion

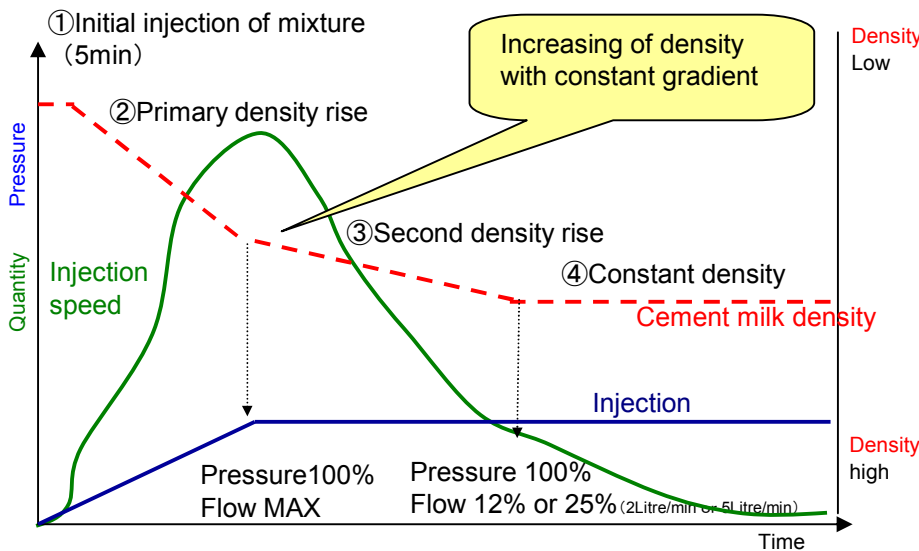
As for the change of milk ratio, various changes are possible.



- Increase, decrease and maintain milk density by control
- Flow rate and pressure can be controlled
- Step by step method is also available

Designing of changes of mixture <example>

This system carries out ratio changing that take in speed at the time of injection and pressure as changing point of a cement milk density rise. It carries out smooth ratio changing and it prevents immediate confinement and realizes the most suitable injection.



- ① It hold the density in initial ratio from an injection start for five minutes.
- ② It raises density in 0.005 kg/L/min to maximum pressure.
- ③ The density is raised in 0.002kg/L/min after having reached maximum pressure.
When flow quantity falls to a certain value, this operation is finished
- ④ The density is not changed to completion

High quality and rational execution

Comparing with general method, new system performs injection efficiently (quantity of injected cement per minute is the same and injection time is shortened). In addition, the Lugeon value is as same as that of general method.

Quantity of injected cement per min is same as general method

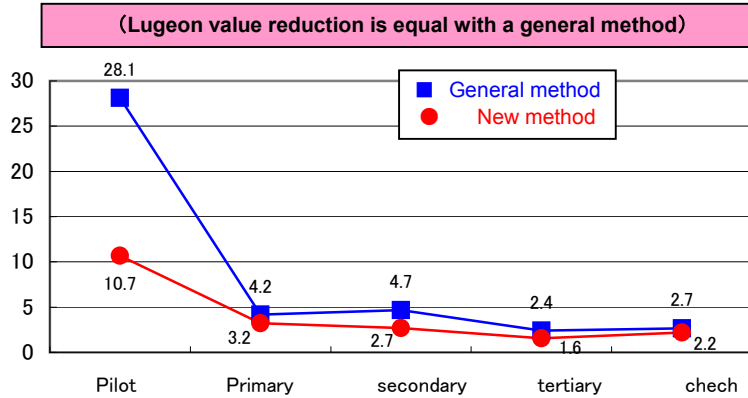
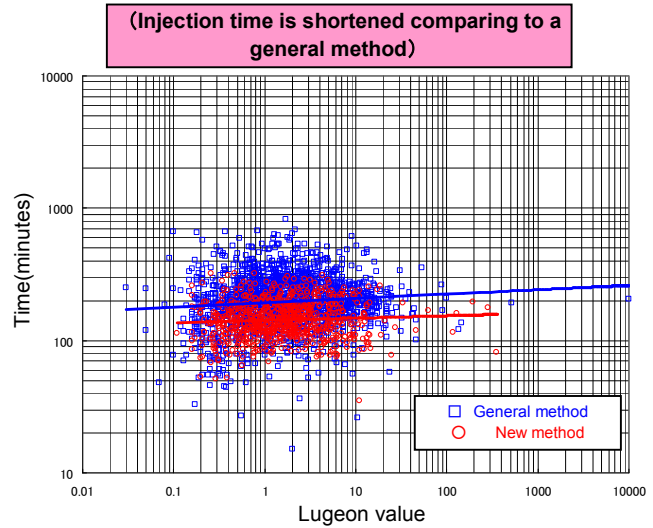
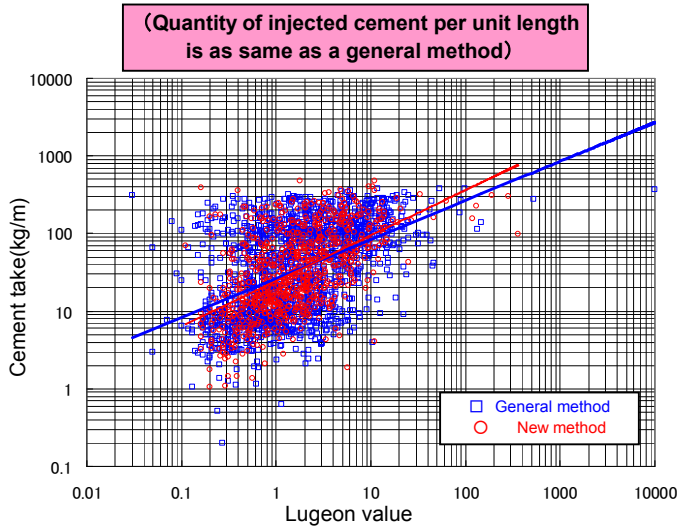
Shorter injection time than general method

Lugeon value is equal with general method

High quality and economic operation

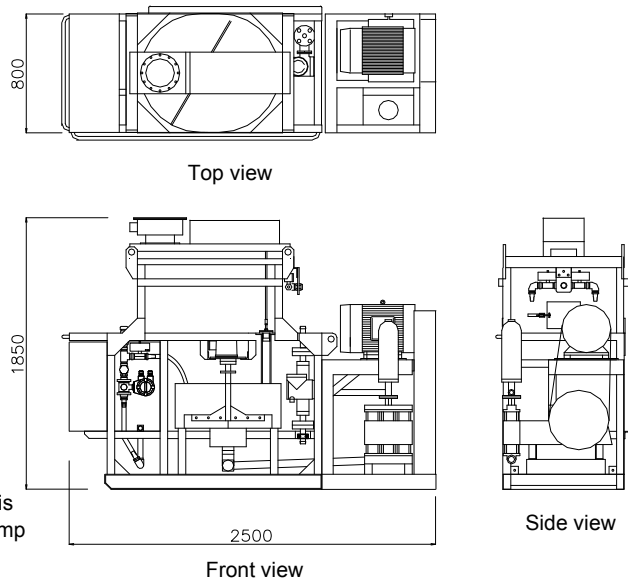
Construction results in the existing dams

According to the result of the comparison of the injection efficiency between general method and new system, new system performed injection efficiently (As for the cement, same amount was injected and the time of injection was shortened). In addition, the Lugeon value reduction was same with general method.



System specifications

Specifications of machinery	
Mixer of rich milk	Maximum capacity 250L
Sub mixer	Maximum capacity 100L
Mass flow meter	Density measurement precision 0.002
Grouting pump	Discharge 13~300L/min
Height	1,850mm
Width	2,500mm
Depth	800mm
Weight	1,000kg (including grouting pump)



The figure is shown when it is equipped with a grouting pump

Proven technology and working results

The system which acquired technical examination proof

「Automatic Grouting Control System on cement milk density」

Approved number 1101



This technique is certified by Japan Dam Engineering Center Foundation through technical examination. Japan Dam Engineering Center Foundation is a member of a construction technology examination proof meeting.

October, 2001 Acquire proof

October, 2006 Update proof

October, 2011 Update proof

After certificated, we have accumulated experiences in dam construction and are confident to meet your expectation by this new grouting technique.

On-site operation situation



Takizawa Dam



Mikumari Dam



Oyama Dam



Control room



Installation status

The main achievements

The completion time of construction	Name of dam	Place	Type	Remarks
Mar-06	Takizawa Dam	Saitama pref. Japan	Gravity	Cartain grouting and consolidation grouting
Apr-11	Oyama dam	Oita pref. Japan	Gravity	Cartain grouting