Twin-flow Cement Slurry Jet Mixing Method

FTJ (F Twin Jet) Method

NETIS Registration No. QS-040034

F Twin Jet Method

Shortening of construction duration and cost reduction is realized by the expansion of improvement dimensions and faster implementation!!

By reflecting the recent trend of seismic retrofit and renewal of existing structures, the foundations that have the composition of subsurface structure and ground improvement are frequently applied.

The representative subsurface structures are earth retaining walls which consist of steel sheet piles or continuous diaphragm walls, whereas the representative ground improvement methods are Cement Deep Soil Mixing method which is subdivided into horizontal rotating mixing blade type (CDM Method, DJM Method, etc.) and trencher shaped mixing blade type (TRD, etc.).

And for the interface between the substructure and the ground improvement, another ground improvement which has an adhesive function such as single-tube jet grouting method is generally allocated. However, the conventional single-tube jet grouting method has issues of insufficient dimensions of grouted section and lower productivity.

F Twin Jet method has been developed to overcome these issues. This method has a mixing mechanism of soils by the combination of mechanical mixing and slurry jet mixing. High-pressure cement slurry is discharged from each end of two horizontal mixing blades. By this combined mixing with twin jets, we can create larger improvement section in shorter time, and high productivity has accomplished shortening of construction duration and cost reduction.

Twin High-Pressure Cement Slurry Jets Rapidly Creates Improved Body with Large Diameter

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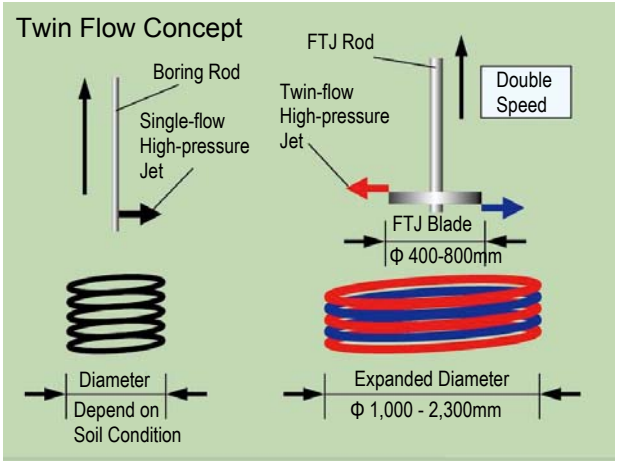
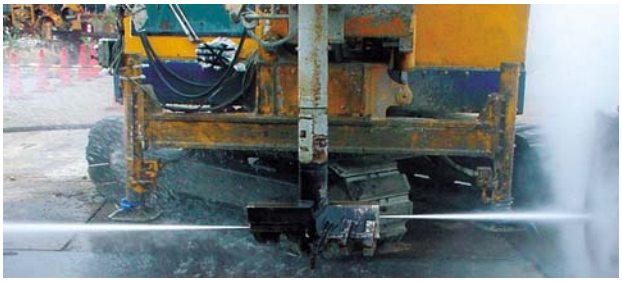
■ Advantages





■ Large Diameter, High Speed

Twin-flow high-pressure jet achieves larger diameter and higher productivity in comparison with conventional single-flow method.

■ Reliable QA/QC System

Sophisticated QA/QC system is applied and depth - jetting flow rate are measured and recorded to create improvement columns precisely (N-type & L-type equipment). This QA/QC system has never used in the past jet grouting method.

■ Wide Range of Applications

FTJ has a wide range of application. In addition to the interface between earth retaining wall and ground improvement, we can apply FTJ to the regular ground improvement work.

■ Wide Range of Applicable Soils

We can apply FTG at loose sandy layer and soft clayey layer that are generally considered targets for the ground improvement.

■ Construction Specifications

■ Applicable Soil Range

Sandy Soil : N ≦ 20

Clayey Soil : Cohesion Cu ≦ 70 kN/m^2

■ Strength of Improved Body

As same as the application of CDM method, strength of FTJ improvement body can be adjustable depending on the required design strength.

Unconfined Compressive Strength:

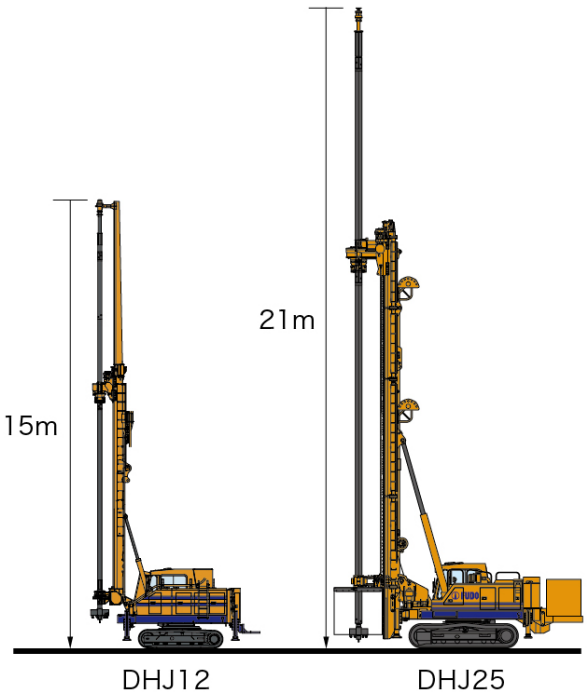
quck = 0.2 to 1.0 MN/m^2

■ Applicable Depth

Equipment Type	# of Axes	Standard Depth	Maximum Depth
N-type DHJ12 (12t)	1	10 m	15 m
N-type DHJ25 (20t)	1	17 m	21 m
S-type	1	20 m	
L-type (60t)	2	30 m	

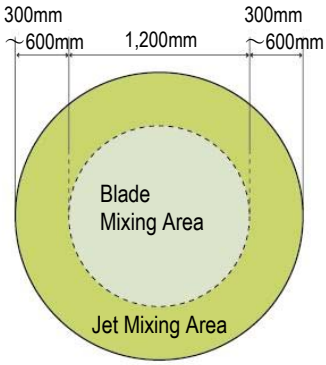
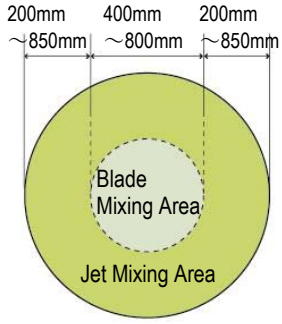
※ Offshore work is viable by fixing the equipment on the barge.

■ N-type Equipment



Design Specifications

Typical design specifications for FTJ method are indicated below. We can select the most appropriate equipment from the following three types of equipment depending on the conditions including requirement of lower displacement of the surrounding ground and structures.

	L-type Equipment	N-type Equipment	S-type Equipment
Dimensions			
※ Column Diameter (mm)	without air: 1,800～2,200 (with air: 2,000～2,400)	without air: 1,000～2,300 (with air: 1,400～2,000)	determined depending on the soil conditions
Jetting Distance (mm)	without air: 300～500 (with air: 400～600)	without air: 200～850 (with air: 400～700)	determined depending on the soil condition
Diameter of FTJ Blade (mm)	1,200	400～800	—
Slurry Ejection	during withdrawal	during withdrawal	during withdrawal
Withdrawal Time (T)	2.0 min/m ≦ T	2.0 min/m ≦ T	2.0 min/m ≦ T

※ Dimensions of column are adjustable to meet required conditions.

Off-shore Equipment Assembly

Adhesion to structure

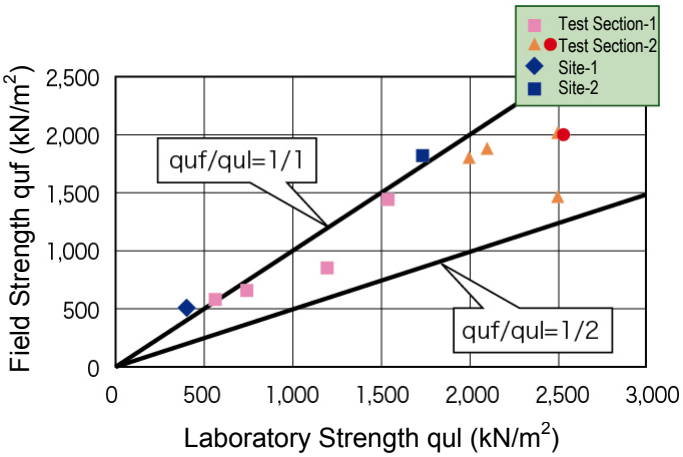
High-pressure jet mixing achieves adhesion of FTJ body to existing subsurface structures such as steel sheet piles

Exposed FTJ column

Exposed FTJ column by N-type equipment (1.4m in diameter)

Strength of FTJ column

The field strength by FTJ is one-half of the laboratory strength. This ratio of strength is higher than the conventional method.



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