NS Stud Welding Method — High-quality Welding Method for Deformed Bars

1. Introduction

The open caisson method using steel pipe pilings having lateral joints is widely employed for the construction of bridge piers; the method accounts for most of the construction work of this kind especially in river water or where the work site is restricted.

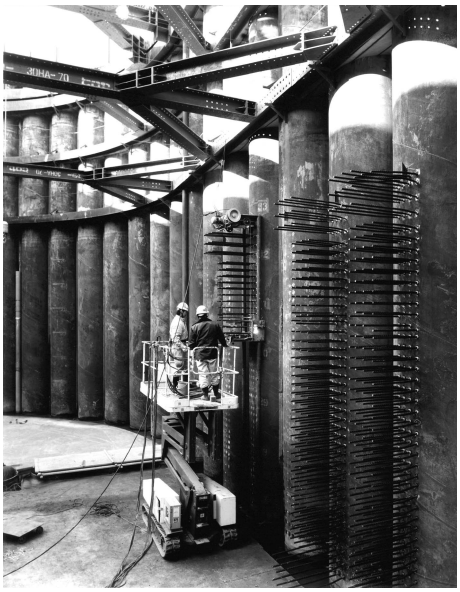
For the pile cap connection work of the open caisson method using the lateral-jointed steel pipe pilings, Nippon Steel Corporation developed the NS Stud Welding Method, and the method is widely applied to this type of work, replacing conventional methods such as the plate bracket method or pile-piercing bar method.

The NS Stud Welding Method outperforms the conventional methods in terms of welding quality, work cost and construction period, and as a result, it now accounts for about 70% of the pile cap connection work of bridge substructure construction. Nippon Steel Civil Construction Co., Ltd. is responsible for the field operation of the NS Stud Welding Method under license.

2. Characteristics of NS Stud Welding Method

(1) Quality control through monitoring

The voltage and current of the stud welding and the backward and forward strokes of stud positioning are controlled using a custom-made monitoring system; the system prevents welding defects and if one occurs, detects it easily. Therefore, perfect work quality is ensured by repairing only the defects thus detected.



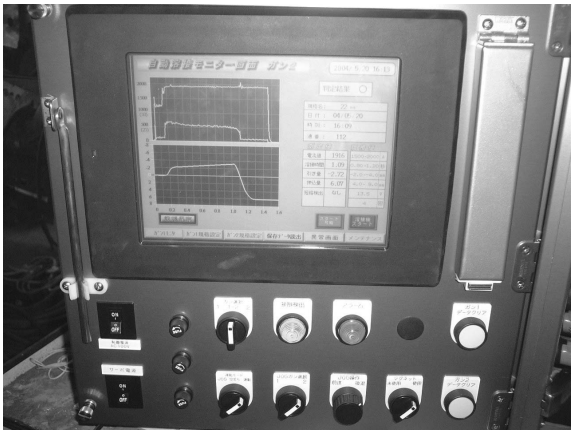
Pohoto 1 Field operation scene

One of the most significant advantages of the method is that the monitoring system oversees welding voltage and detects short circuiting (arc interruption). This prevents the occurrence of internal defects leading to insufficient welding between the stud bars and pipe pilings.

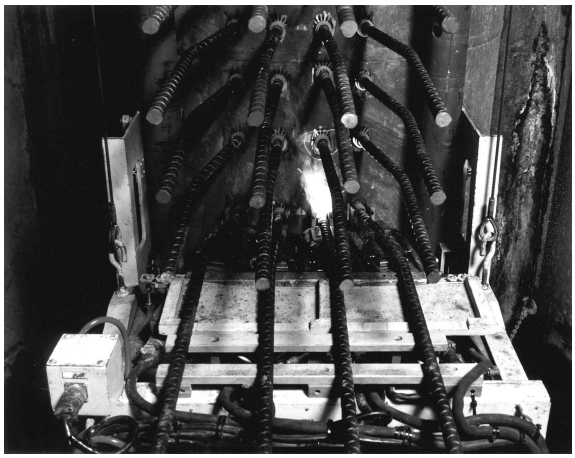
(2) Automatic welding using computer-controlled four-stud gun

After setting stud bars in position, all the voltage and current of welding and the backward and forward strokes of stud positioning are computer controlled, and by pressing a start button, the stud welding starts and finishes automatically.

A four-stud gun newly developed for the method realizes continuous operation and ensures high work efficiency and high quality of welded joints.



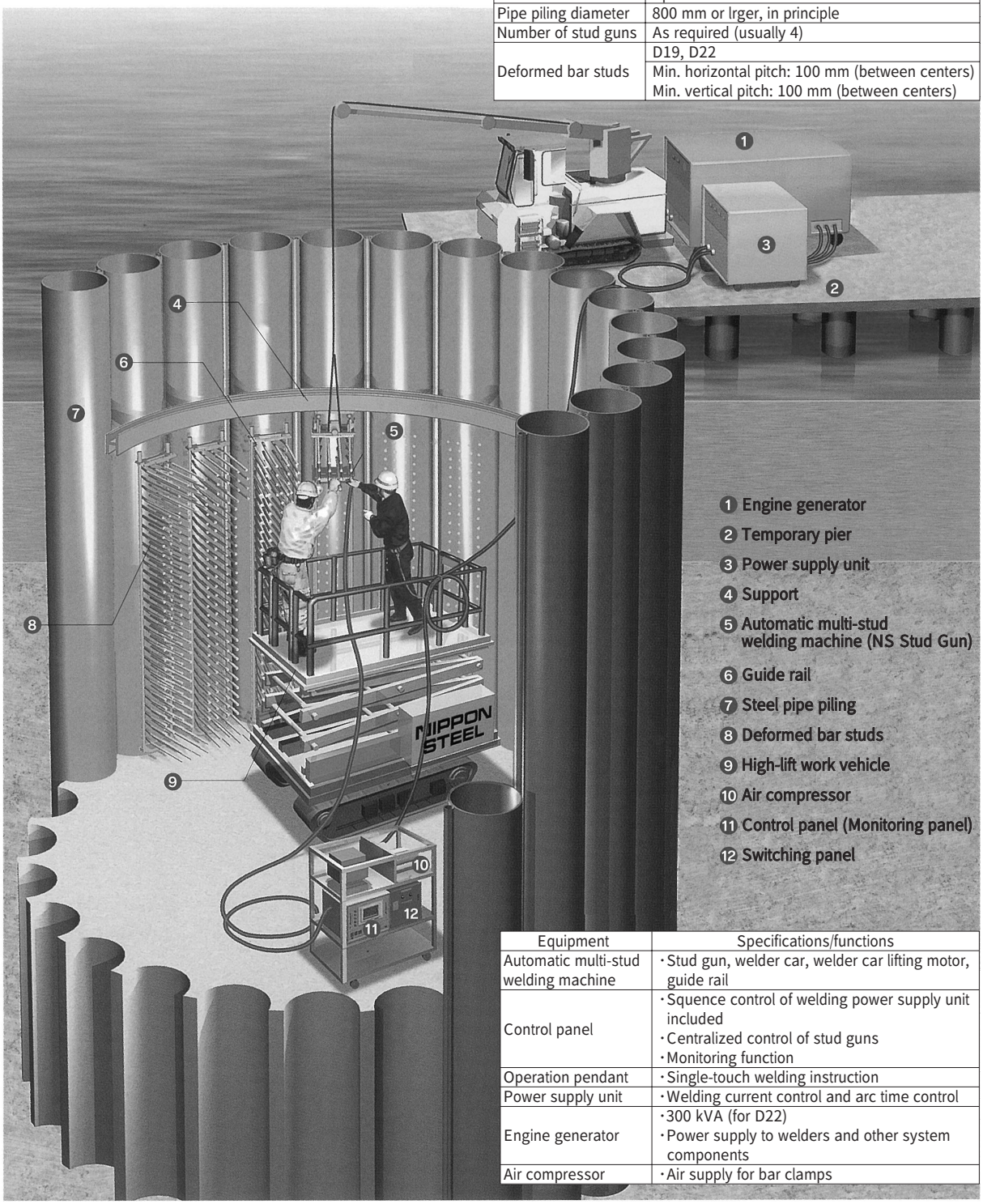
Pohoto 2 Monitoring screen



Pohoto 3 Automatic multi-stud welding machine (NS Stud Gun)

3. Site Work of NS Stud Method

Item	Specifications
Pipe piling diameter	800 mm or lrger, in principle
Number of stud guns	As required (usually 4)
Deformed bar studs	D19, D22
	Min. horizontal pitch: 100 mm (between centers) Min. vertical pitch: 100 mm (between centers)



Equipment	Specifications/functions
Automatic multi-stud welding machine	・Stud gun, welder car, welder car lifting motor, guide rail
Control panel	・Squence control of welding power supply unit included ・Centralized control of stud guns ・Monitoring function
Operation pendant	・Single-touch welding instruction
Power supply unit	・Welding current control and arc time control
Engine generator	・300 kVA (for D22) ・Power supply to welders and other system components
Air compressor	・Air supply for bar clamps

Fig. 1 Example of pile cap connection work of pipe piling foundation

For further information, contact
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