

Providing environment-friendly products and services

We at Kubota develop various kinds of businesses regarding improving people's life and social infrastructure, providing environment-friendly products and services.

Industrial Infrastructure Businesses

Trenchless pipe renewal method of Ductile iron pipe

In Japan, it is becoming more important to renew aged water pipeline deliberately. Aged water pipe line is generally renewed by open cut method. However the number of trenchless method is increasing because of traffic congestion. We use generally "Pipe In Pipe (PIP) method", which we had developed before, as trenchless pipe renewal method. However, PIP method needs small diameter pipe compared with existing pipe. Therefore we, Kubota, developed new method, by which we can install same diameter pipe, called "PN-type jacking pipe". This method can reduce the volume of

industrial wastes such as digging soil, asphalt, compared with open cut method. Moreover, disruption of environment such as noise and vibration can be reduced.

1. Outline

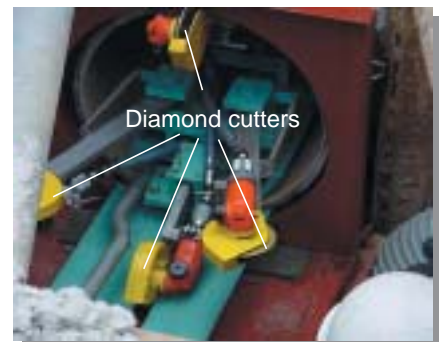
First, four points of grooving line is made inside of existing pipe by means of four diamond cutter, attached on grooving equipment. Then the existing pipes are broken and expanded by breaking blades and expanding blades which are attached on the edge of breaking head. After that, PN type jacking pipe is jacked and used as re-

newal pipe. The applicable nominal diameter ranges from 300mm to 700mm. This method can jack about one hundred meter at a time.

2. Features

- (1) The volume of digging soil is small. Industrial wastes can be reduced.
- (2) This method does not excavate except for vertical shaft. Both the time and traffic congestion can be reduced.
- (3) Disruption of environment such as noise and vibration can be reduced because of trenchless method.

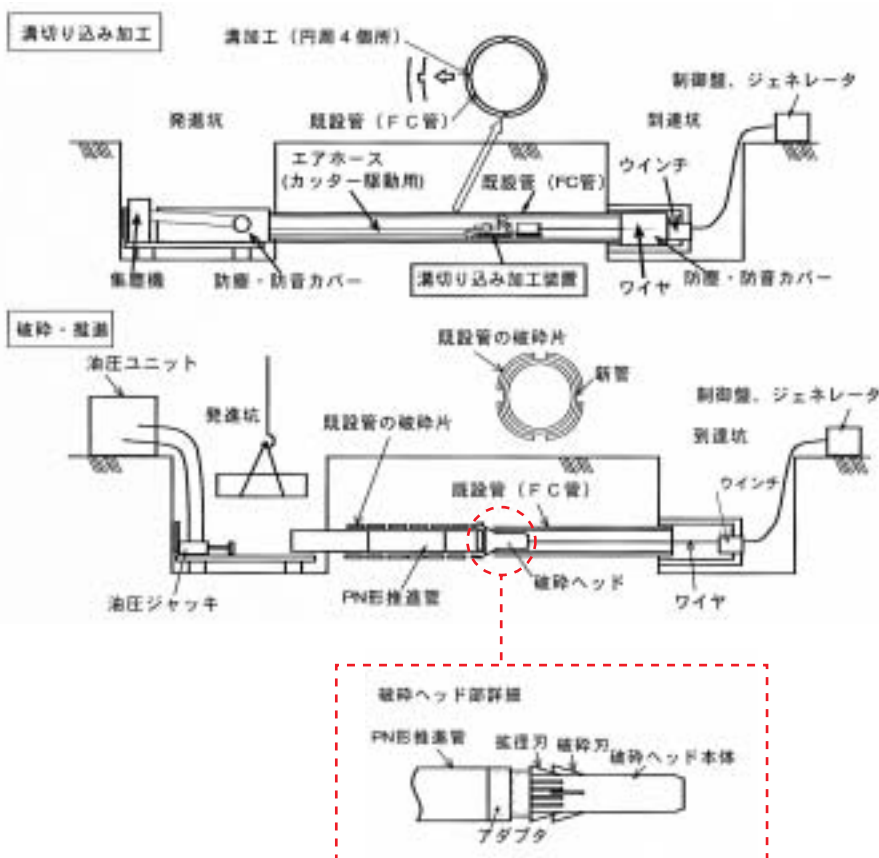
Outline of the method



Grooving equipment



The construction of PN-type propulsive pipes is under way



Renovation of sewage pipelines (EX method and DANBY method)

The sewage facilities including pipelines have become an essential part of the infrastructure. The total length of sewage pipelines is more than 350 thousand kilometers as of the end of fiscal 2002. In this situation, the sewage pipelines which exceeds the life and requires renovation or replacement is increasing in its number mainly in urban area.

We at Kubota have developed the low environmental load methods in which we can reduce influence to the residents near the construction site, and renew the old pipes in a short period of time without open-cutting, contributing to an environment-friendly social development.

1. EX method and DANBY method

In those methods, we construct a new polyvinyl chloride pipe in an old pipe, inserting renewal material through an existing manhole.

In the EX method, we insert a continuous pipe into an existing pipe and expand it by steam. In the DANBY method, we construct a new pipe in an old one by winding spirally a plate-like material called strip. And mortar is filled up between an existing pipe and a new pipe.



Schematic illustration of EXPAND method



Schematic illustration of DANBY method

2. Features

- (1) Construction process is simple. Construction can be done in short period of time.
- (2) Since an open-cut method is not adopted, an influence to the residents near the site can be minimized during construction.
- (3) Since an organic solvent is not used, odor doesn't occur, so it is an environment-friendly method.
- (4) The performance after the construction doesn't largely depend on the construction conditions and the workers' skill.
- (5) The new pipes can endure a wide range of earth pressure and traffic load condition.

Before renovation



After renovation



Large rectangular ductile segment for shield tunneling method

A segment is a construction material used as a structural member to keep a cross sectional shape of a tunnel right against earth pressure and hydraulic pressure from the outside of the tunnel, in the tunnels of subway and so on which are constructed using a tunneling method called a shield tunneling method. There are two kinds of seg-

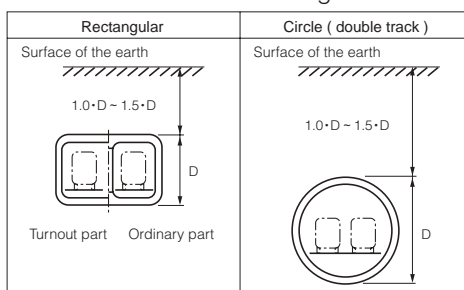
ments in shield tunneling method, namely a reinforced concrete segment and a steel segment.

Regarding Kubota's segment, large rectangular cross sectional segments were used in a ordinary route (Length is 691 meters.) between Rokujizo and Daigo of Kyoto Municipal Tozai Line in 2003.



Large rectangular ductile segment

A cross sectional shape of a tunnel constructed using



A comparison between a rectangular cross sectional tunnel and a circular cross sectional tunnel

shield tunneling method was mainly a circle. When a cross sectional shape of a tunnel is rectangular, we can use its space efficiently, and a cross sectional area which must be excavated by a shield machine is small. Moreover, since we can construct a tunnel at a shallow part from the surface of the earth, the facilities constructed using cut and cover excavation such as station and so on can be also constructed

at a shallow part from the surface of the earth. As a result, we can reduce the amount of surplus soil, industrial waste, by about 20%, and we can also contribute to reduce environmental load in tunnel construction.