

## Pipe and Fluid Systems Engineering Consolidated Division

At Pipe and Fluid Systems Engineering Consolidated Division, we contribute to the construction of social infrastructure by the manufacturing and sales of iron pipes, steel pipes, plastic pipes, pumps and valves.

We are going to provide environment-friendly technologies and products from now on.

And in our division, we acquired ISO14001 certificates in every plant by January 2000, as a result of promotion of environmental management activities.

Based on the concept of Kubota Global Environmental Charter, we promote our environment-friendly corporate activities such as energy consumption reduction in the field of manu-



Executive Managing Director and General Manager of Pipe and Fluid Systems Engineering Consolidated Division

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facturing iron pipes (environmental load reduction), earth removing free, low noise and low vibration technology in the field of steel pipe piles (environmental conservation), recycling of PVC products and the development of the converting-waste-plastics-into-oil technology (recycling), and electric power generation equipment using pump with reverse rotation impeller by dam effluent or small- and medium-sized rivers (use of unutilized energy).

### Recycling of FW pipes

At Kubota, we developed practical recycling technology to reuse the waste FW pipes (reinforced plastic compound pipes) which are used as agricultural water pipes and buried sewage pipes, for the first time in the industry.

Figure 1. shows the structure of FW pipe. The pipe is compound pipe consists of FRP layer and mortar layer. That compound structure is useful for buried pipes. However it was difficult to recycle those pipes, because the raw material such as sand, glass fiber, and plastics should be separated each other. After the various investigations,

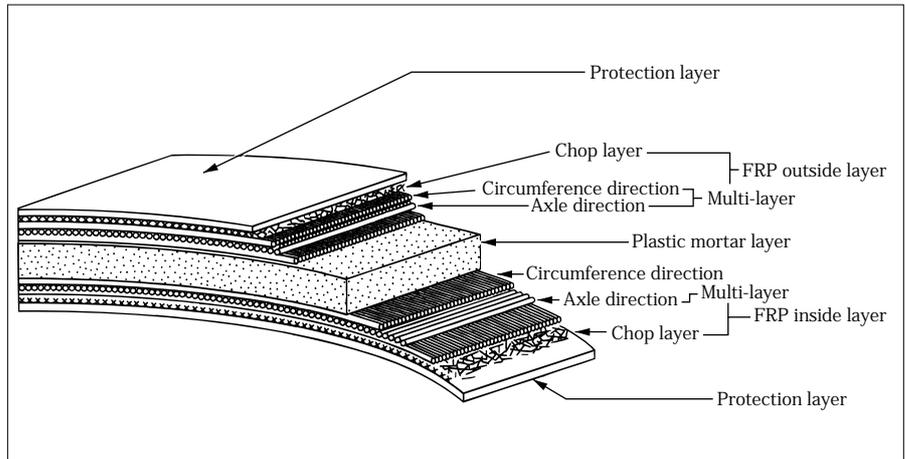


Figure 1. Structure of FW pipe

we have developed the material recycling technology as shown in Fig. 2. First of all, the waste FW pipes are crushed by the crusher, then separated into FRP layer and mortar layer by the separator. It is confirmed that the quality of recycled FW pipes is the same as

the quality of new pipes as shown in Fig. 3. At Kubota, we continue our endeavor to achieve so-called zero emission, utilizing the waste material by this technology.



Photo 1. Crusher

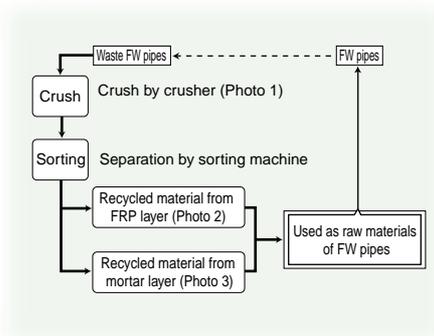


Figure 2. Flow chart of material recycling of FW pipes

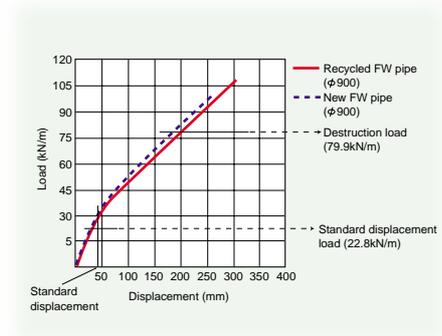


Figure 3. Characteristic curve of FW pipe

### Plant converting waste plastics into oil (completion of Dohoh oil converting center)

### Electric power generation equipment using pump with reverse rotation impeller



Photo 2. Recycled material from FW pipes (FRP layer)



Photo 3. Recycled material from FW pipes (mortar layer)

Dohoh oil converting center was completed at the end of 1999.

That center is the plant converting municipal waste plastics into oil constructed in Mikasa city in Hokkaido. That project was funded by Japan Regional Development Corporation, Mikasa city and five private companies including Kubota.

The treatment capacity of this center is 6,000 metric tons per year. This plant convert the waste plastics excluding PET bottles, which are collected separately based on the Law for Promotion of Sorting and Recycling of Containers and Packaging, in expanded area including Mikasa city, into oil.

In this plant, accepted waste plastics are crashed at the preliminary treatment stage, then impurities such as metals, stones, sand and others are separated from that, and the residue is sent to oil converting process, finally fuel oil such as A crude oil fraction can be obtained by thermal cracking and catalytic cracking process.

The production capacity of this fuel oil is about 3,000 kℓ per year.

That fuel oil is on sale outside, and a part of it is used as fuel in the plant.

Among the environmental conservation awareness, the plant attract the attention of people, as the proper treatment and recycling of waste plastics simultaneously.



Dohoh oil converting center

Pump is the machine to pump up water using impeller rotated by motor.

It is possible to generate electric power by generator rotated by pump, in which the impeller rotates reversely because of influent water from outlet.

This equipment is called the pump with reverse rotation impeller.

This equipment attract the attention of people as a small-sized hydraulic electric power generation system, as it is economical, simple in structure, and easy in maintenance, using standard pump as impeller.

We are newly developing a underwater axial type equipment as a small-sized hydraulic electric power generation system, using dam effluent.

We are also developing a high power and high efficiency pump with reverse rotation impeller.

We contribute to the electrification in the rural area of the developing countries.

It is also expected that the equipment can use unutilized water such as small- and medium-sized rivers, irrigation water, and sewage water.



Pump with reverse rotation impeller