

Environmental Engineering Consolidated Division

In-line-type hydraulic turbine for power generation "Line Power "

Saving energy measures are promoted in various fields recently to reduce the emission of green house gas. In drinking water and sewage facilities, when the surplus residual pressure remains in high energy density water, energy can be saved by recovering it. So we have developed in-line-type hydraulic turbine for power generation " Line Power " which is compact and simple.

Features

- (1) Low cost
Product and installation cost decreases because hydraulic turbine and generator are in one body.
- (2) Less space for installation
Space for installation is hardly necessary because it can be installed as part of pipe. It is easy to introduce it to the existing equipments.

- (3) Reduction of maintenance
The maintenance of it is easy because of less consumed parts. So the maintenance cost can be reduced.

Less-environmental-load structure

The structure of hydraulic turbine is the same as that of ordinary water pumps as shown in Fig. 1. Maintenance is easy and it decreases the load to environment because of the features written below.

- (1) Improved sealing
In case of the mechanical seal trouble, the bearings and the generator would not be soaked directly because there is space between the mechanical seal and bearings.
- (2) Grease oiling bearings and oil exchange at the mechanical seal are

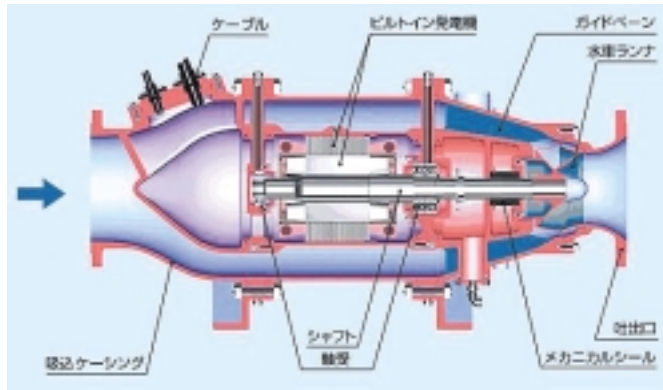


Fig. 1. Structure of hydraulic turbine

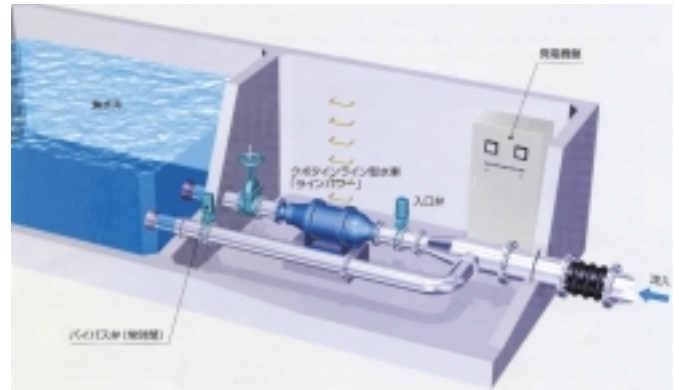
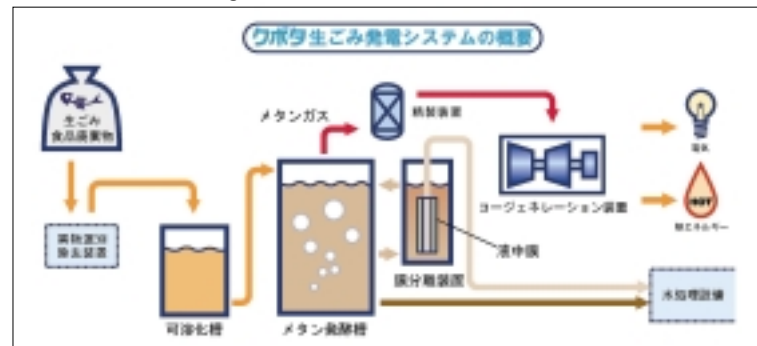


Fig. 2. An example of application

Power generation system using biogas from food waste (methane fermentation system with membrane)

We at Kubota have developed food waste power generation system. In this system we can generate methane gas (an ingredient of natural gas) from food waste and kitchen waste(organic fraction of the

municipal solid waste, MSW) using microbes. And electricity and heat can be obtained by cogeneration using said methane gas. At the same time, we can remarkably reduce high treatment cost of



Basic flow of Kubota's food waste power generation



Food waste power generation system

Pump Division

easy.
It is possible to oil and exchange oil periodically without disassembly of hydraulic turbine because oil intakes are located outside. Moreover oil hardly leaks into water.

An example of application

It could be installed at the place in which surplus residual pressure remains such as in the middle of pipe before a reception well of drinking water facilities (See Fig.2.). And it could be easily installed to a column, a gate and a sluice plate in the water because of hydraulic turbine structure. So the residual pressure and head energy of the water at works and of agricultural water could be recovered.

Water Environmental Engineering division

food waste by reducing the amount of it. So this system is economical.

Methane fermentation system with membrane is the key technology in this system, in which submerged membrane,

Kubota's original product, is adopted. In this system, we have realized very compact equipment. And we made it possible to generate methane gas stably from food waste, which was impossible before.

Recycle-promoting solid waste treatment facilities

Kubota's recycle-promoting solid waste treatment facilities have been changing into the system which can realize to maximize recycle rate of waste, waste being valuable resources. The solid waste treatment facilities of Environmental Center of Affairs Cooperative of Wide Area Municipalities of CHIKUSEI constructed by Kubota, was completed in February 2002, excluding ash melting furnace facilities. It can generate

up to 3800kW of electricity by steam turbine, turning heat energy into steam by boiler when burned. This electricity is equivalent to the amount of electricity consumption of more than ten thousand households.

Moreover incineration ash of waste turns into slag by the ash melting furnace which will be installed in the incineration facilities (The furnace will be completed in March 2003). The volume

Solid Waste engineering division

of slag becomes one-third of that of ash. The slag could be used effectively for construction materials because it is glass-state with stable properties.

And organic and inorganic wastewater, which are discharged from each part of the facilities, are treated separately. Treated water is used effectively for the purpose of decreasing the temperature of exhaust gas of combustion and so on.

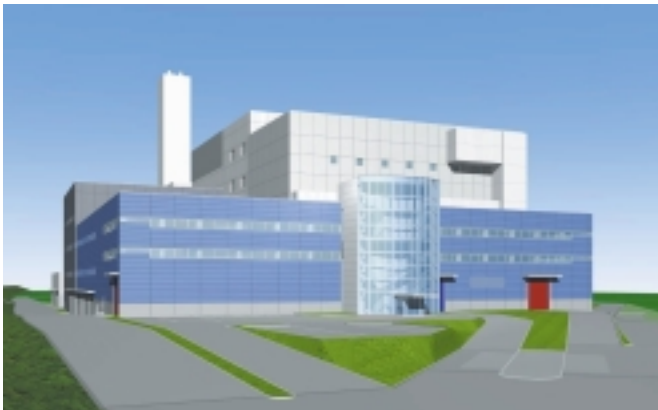


Illustration of the municipal solid waste treatment facilities of Environmental Center of Affairs Cooperative of Wide Area Municipalities of CHIKUSAI (Ibaraki)



Central control room

The development of carrier-added nitrogen removing system

Recently, the regulations regarding reducing eutrophication pollutants such as nitrogen and phosphorus in the rivers, lakes and the sea have been strict so as to prevent water pollution. So advanced treatment are increasingly adopted to remove those nutrient in the sewage treatment plants in which sewage are treated and discharged in the rivers.

However the size of the facilities is too large in conventional treatment, especially, it is impossible to acquire the land for the facilities in the urban area. We at Kubota have developed carrier-added nitrogen removing system to solve this problem. In this system, nitrifying bacteria could be fixed on the carriers made of polyvinylformal(PVF). And it is possible for this system to treat BOD and nitrogen simultaneously in the same space as that of conventional facilities. And no more civil engineering works are necessary. So facility construction cost and installation space could be saved.

Features of the facilities

It was impossible for conventional technologies to apply carrier-added system method for 10m depth reaction tank, because it was difficult to agitate carriers uniformly and to supply oxygen. We at Kubota developed with Osaka city the aerator for deep reaction tank (I -tube type aerator), and the performance of the aerator was confirmed in the demonstration facilities. In this aerator, air is supplied at the same depth as the conventional facilities. And the air is led to the bottom of the tank, and aeration is conducted at that part. So high oxygen dissolving efficiency, and powerful agitation were obtained at the bottom of the tank.



Carriers made of PVF (cubic with 4mm in a side)

Water and Sewage Plant Division

