

# Advanced Technology in Waterworks<sup>†</sup>

## 1. Introduction

Japan has already achieved a high population served by water supply as 96.7% at total population (end of Mar. 2003). Reflecting a shift from quantitative expansion to qualitative improvement, the revised waterworks law took effect in Apr. 2002, and the water quality standards for drinking water were revised in Apr. 2004. In response to these changes, innovation in the corresponding technologies is also required to JFE Engineering.

This report briefly introduces JFE Engineering's membrane filtration technologies, which provide new processes for water purification suited to the needs of the times, and various lining renovation methods for existing concrete service reservoirs used to store purified drinking water.

## 2. Membrane Filtration Technology for Waterworks

JFE Engineering has actively participated in various national projects carried out on a continuing basis since 1991, including the MAC 21 Project, ACT 21 Project, and *e-Water* Project, and has developed and marketed a variety of membrane filtration technologies as new processes replacing the conventional method of coagulation/sedimentation + sand filtration.

**Table 1** shows an outline of JFE Engineering's membrane filtration devices. JFE Engineering's membrane filtration technologies include a various product line

suitable for all needs from turbidity removal and cryptosporidium removal to advanced treatment. They are "Approval Membrane Filtration Systems for Drinking Water" based on Water Purification Technology Support of Japan Water Research Center and have won an excellent reputation as high-reliability technologies.

## 3. Restoration of Concrete Service Reservoirs

### 3.1 Outline

JFE Engineering has developed a variety of lining renovation methods for existing concrete service reservoirs which effectively repair leaks due to deterioration of the concrete while strengthening the reservoir itself with a stainless steel lining. JFE Engineering's lining method and their features are described below.

The pin shoot and fillet welding method (P&F method) and hole anchor in beam method (HAI beam method) are techniques which ensure complete watertight and maintenance-free performance by using stainless steel plates as an inner waterproof lining.

The hybrid method realizes complete watertight and maintenance-free performance combined with rational strengthening by integrating stainless steel plates with the existing reinforced concrete.

### 3.2 Example of Application

**Photo 1** shows the appearance of the completed stainless steel lining in inner/outer repairs of an RC ser-

Table 1 JFE Engineering's membrane filtration technologies

Brand name	JFE-MEMCOR	JFE-UF80000	JFE-Advanced Treatment Membrane Filtration System	JFE-Micropolisher	JFE-CeraMACS
Membrane type	Microfiltration membrane (MF membrane)	Ultrafiltration membrane (UF membrane)	Microfiltration membrane (MF membrane)	Microfiltration membrane (MF membrane)	Microfiltration membrane (MF membrane)
Membrane material	Polypropylene	Polyacrylonitrile	Polyvinylidene fluoride	Hydrophilic polysulfone	Ceramic
Nominal pore size	0.2 μm	80 000 (Molecular weight cutoff: MWCO)	0.1 μm	2 μm	0.1 μm
Filtration method	Dead end	Cross-flow filtration	Dead end	Dead end	Dead end
Filtration mode	External pressure type	External pressure type	External pressure type	External pressure type	Internal pressure type

<sup>†</sup> Originally published in *JFE GIHO* No. 3 (Mar. 2004), p. 64



Photo 1 Pin shoot and fillet welding

vice reservoir with a capacity of 7 000 m<sup>3</sup>.

#### 4. Summary

JFE Engineering has actively developed new membrane filtration technologies for high flux type membrane filtration systems which meet a wide range of

customer demand. The company has also developed lining renovation techniques for concrete service reservoirs which conform to the needs of the times, and are expected to enjoy wide use in the future.

#### **For Further Information on Membrane Filtration Systems, Please Contact to:**

Waterworks Plant Gr., Planning Dept.,  
Water and Waste Water Engineering Div.,  
JFE Engineering  
Phone: (81) 45-505-7779

#### **On Lining Renovation Method for Service Reservoirs:**

Gr. No. 2, Administrative Sec., Waterworks Technology Dept.,  
Water and Waste Water Engineering Div.,  
JFE Engineering  
Phone: (81) 45-505-7890