資料４

資料４　世界の水インフラ整備に資する日本の技術

国際会議配布資料

SANYU REC Co.,Ltd.

Company Profile

SANYU REC Co.,Ltd.
3-51 DOUCHO TAKATSUKI OSAKA JAPAN
President :Kiyoharu ONISHI

SANYU REC CO.,LTD.

（本社・工場）全景（航空写真） Headquarter and factory （in 2012）

SANYU REC CO.,LTD.

東京営業所 Tokyo Sales office

東京R＆D
Tokyo R&D

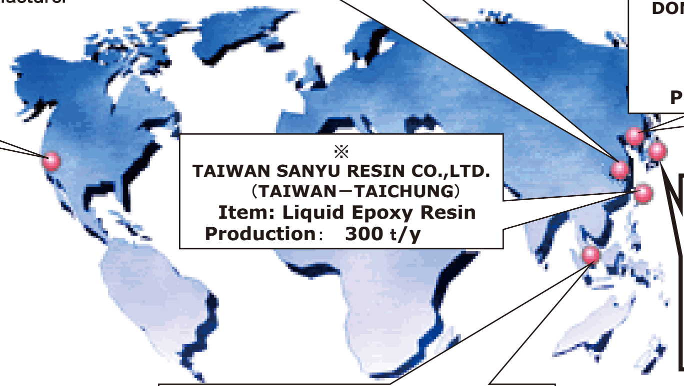
Production Base of SANYUREC

SHANGHAI SANYU RESIN CO.,LTD.
(CHINA−SHANGHAI)
SHANGHAI FORWARD HIGH-TECH ZONE DEVELOPMENT
Item : Urethane Resin
Production: 1500 t/y
ISO−9001・14001 approval

※The technical tie−up manufacturer

※
(USA−**LOS ANGELES**)
Item : Liquid Epoxy Resin

※
DONG NAM PETROLEUM IND CO.,LTD.
(KOREA−SEOUL)
Item: Urethane Resin
Liquid Epoxy Resin
Production: 3000 t/y



※
TAIWAN SANYU RESIN CO.,LTD.
(TAIWAN−TAICHUNG)
Item: Liquid Epoxy Resin
Production: 300 t/y

SANYUREC
(JAPAN−OSAKA)
Item : Urethane Resin
Liquid Epoxy Resin
Powder Epoxy Resin
UV Curing Resin
Production: 10000 t/y
ISO−9001・14001 approval

SANYU JUSHI SDN. BHD.
(MALAYSIA−SELEMBAN)
Senawang Industrial Park
Item : Liquid & Powder Epoxy Resin
Urethane Resin
UV Curing Resin
Production: 1600t/y
ISO−9001・14001 approval

JUNE 02. 2008

Liaison office of SANYU REC

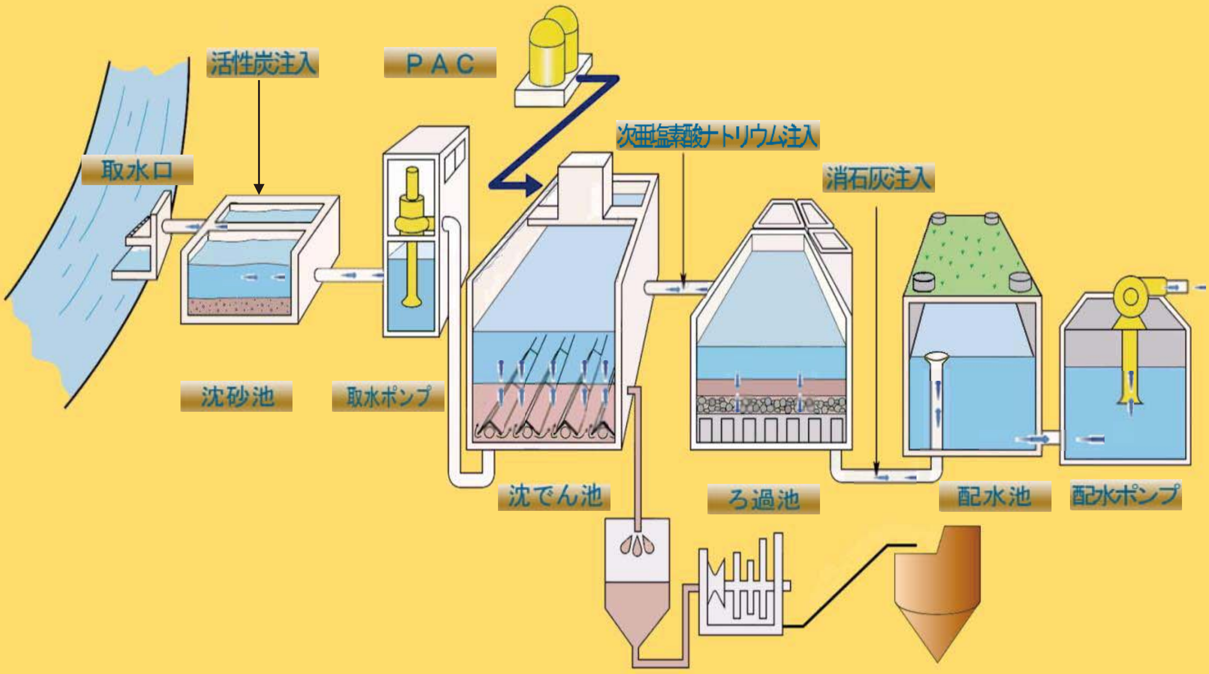
SANYU REC CO.,LTD INDIA LIAISON OFFICE (INDIA)

Address : Level 15, Concorde Tower, UB City, 1 Vittal Mallya Road, Bangalore 560001, India
Phone : +91-9611033966 FAX : +91-(80)40300-400
Managing Director: Akihiko Bessho(Mr.)
E-mail:bessho@sanyu-rec.jp

Raw Materials → “Formulator” Formulation (Mixing) → Products (Shipment)

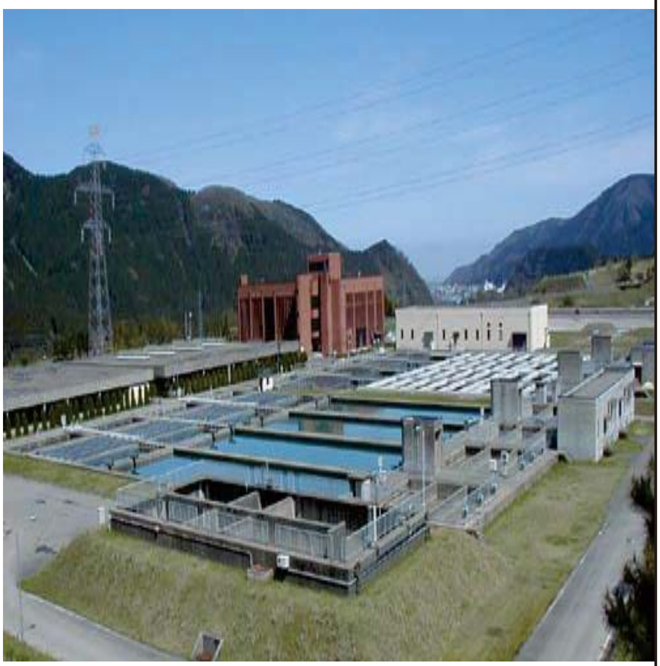
About concrete anticorrosion for water in Japan

Sanyu Rec Co.,Ltd
Naohiro Hara



System of Water Supply

Purification plant



Service reservoir

About the Standard of JWWA

JWWA K－143

Concrete water tank inner for tap.

Epoxy coating method by using coating material

- **Prehistory**
- **Standard**
- **Construction points**

Association of Water and Sewage works epoxy construction

Distinction between K－135 and K－143

	K−135	K−143
NAME	Epoxy coating method for tap water.	Concrete water tank inner Coating method
Coverage	Steel pipe for tap water.	Concrete water tank
Target coating	Epoxy based coatings	Non-solvent epoxy coatings. Water epoxy coatings
Materials	No limits	Has limit
Thickness of coating film	Over 0.3mm	Over 0.5mm
Leachate test piece condition	20℃(Humidity75%)× 7days+℃ ×24hours	20℃(Humidity 65%)×7days
Bonding strength	No provision	1.2 N/mm^2 (12.2 kgf/cm^2) Over

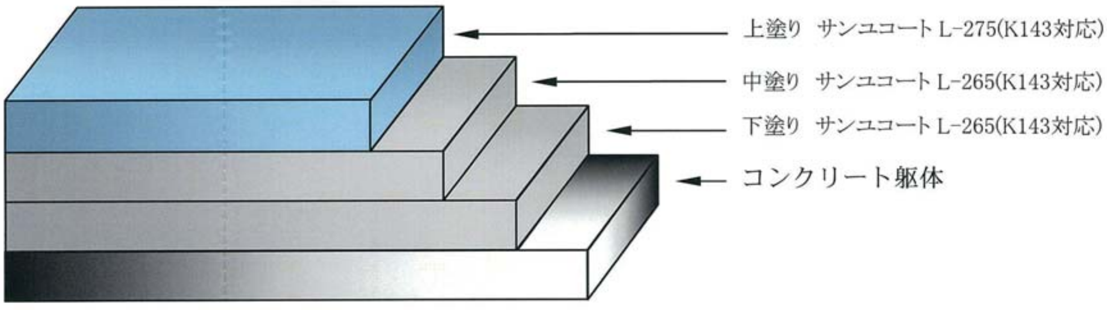
Sanyu Rec Corrosion Control System
for Tap Water

施工設計仕様

SC-2N工法

工程	材料名	標準使用 (kg/m²)	施工方法
下塗り	サンユコート　L-265 (K143対応)	0.4	金ゴテ等
中塗り	サンユコート　L-265 (K143対応)	0.4	金ゴテ等
上塗り	サンユコート　L-275 (K143対応)	0.4	ｺﾞﾑﾍﾗ・ﾛｰﾗｰ等
施工膜厚	0.5mm以上(硬化後厚さ)		

施工図



Service Reservoir
Repairing Construction
(built 35 years ago)

Service reservoir Ceiling
Rebar exposure

Rebar Corrosion

Concrete deteriorated section removal

After Ultrahigh-pressure

Cross-section reparation Spraying on a wall

Cross-section reparation Construction Works

Epoxy putty type Base material accommodation

Epoxy Coating

Epoxy lining application complete

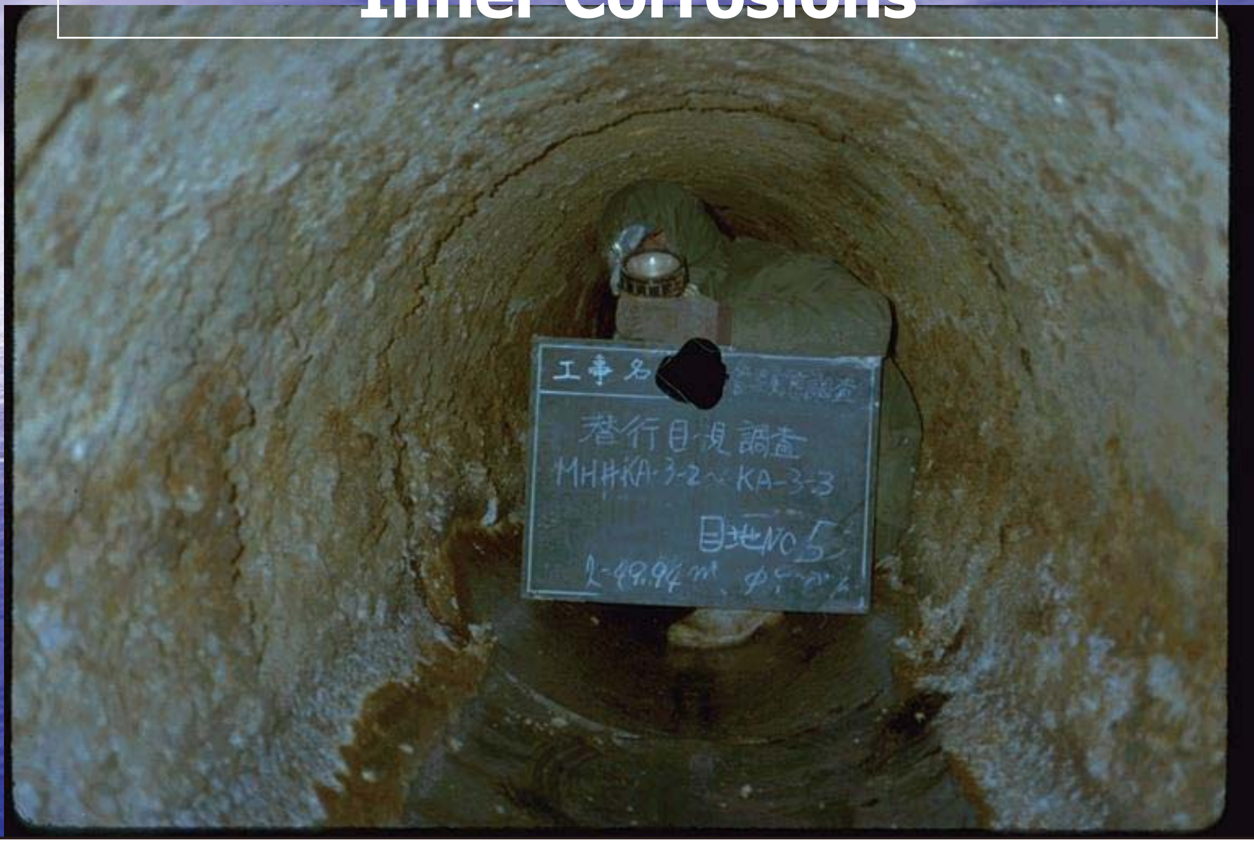
About concrete corrosion control of sewage water in Japan.

Sewer pipe corrosion condition

Street Collapsed and Indented after hume pipes Corroded.

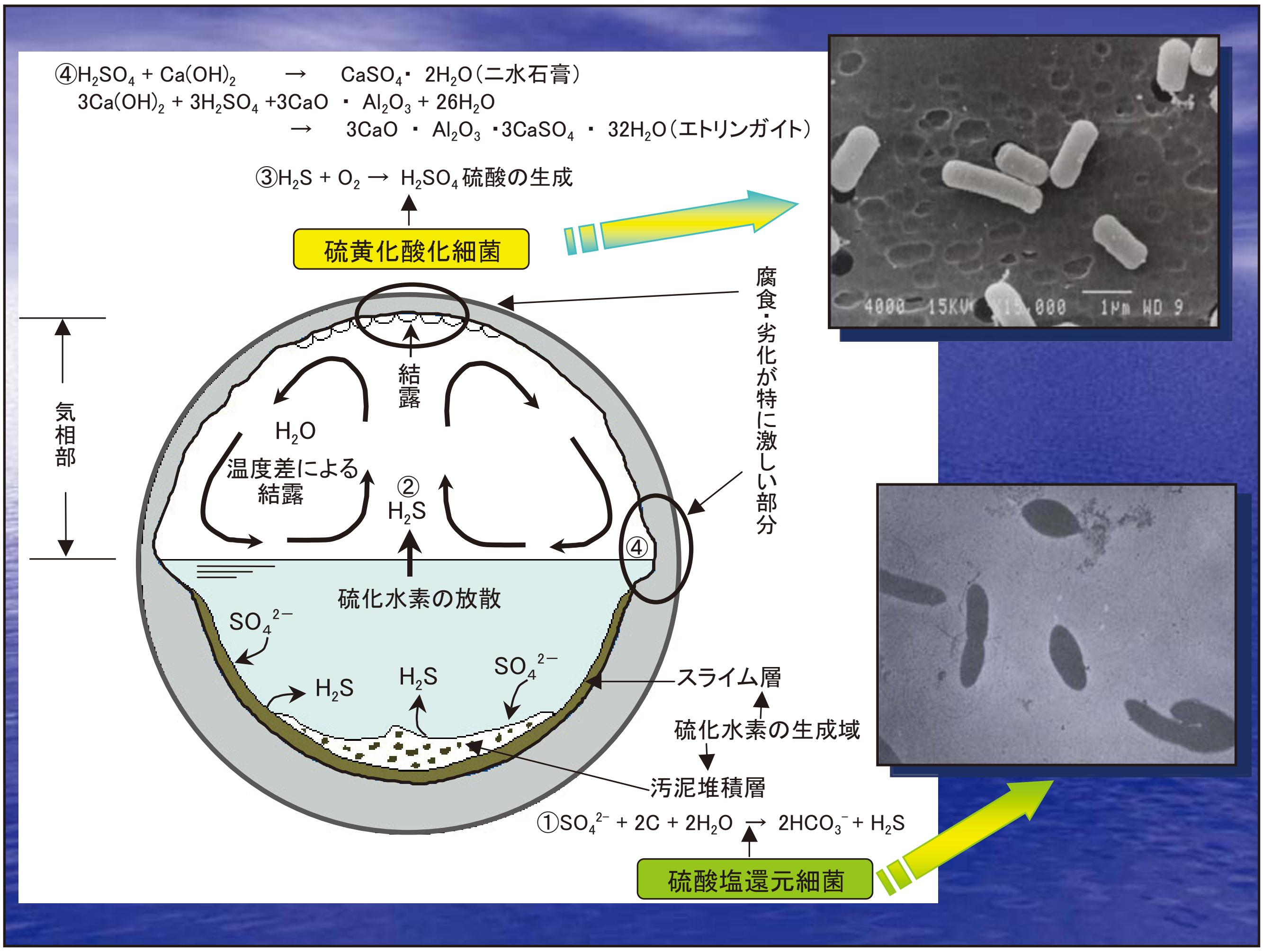
Total Corrosions of the Water Piping systems

Water Piping Systems- Inner Corrosions



Water Piping Systems- Inner corrosions②

Concrete Corrosion Mechanism



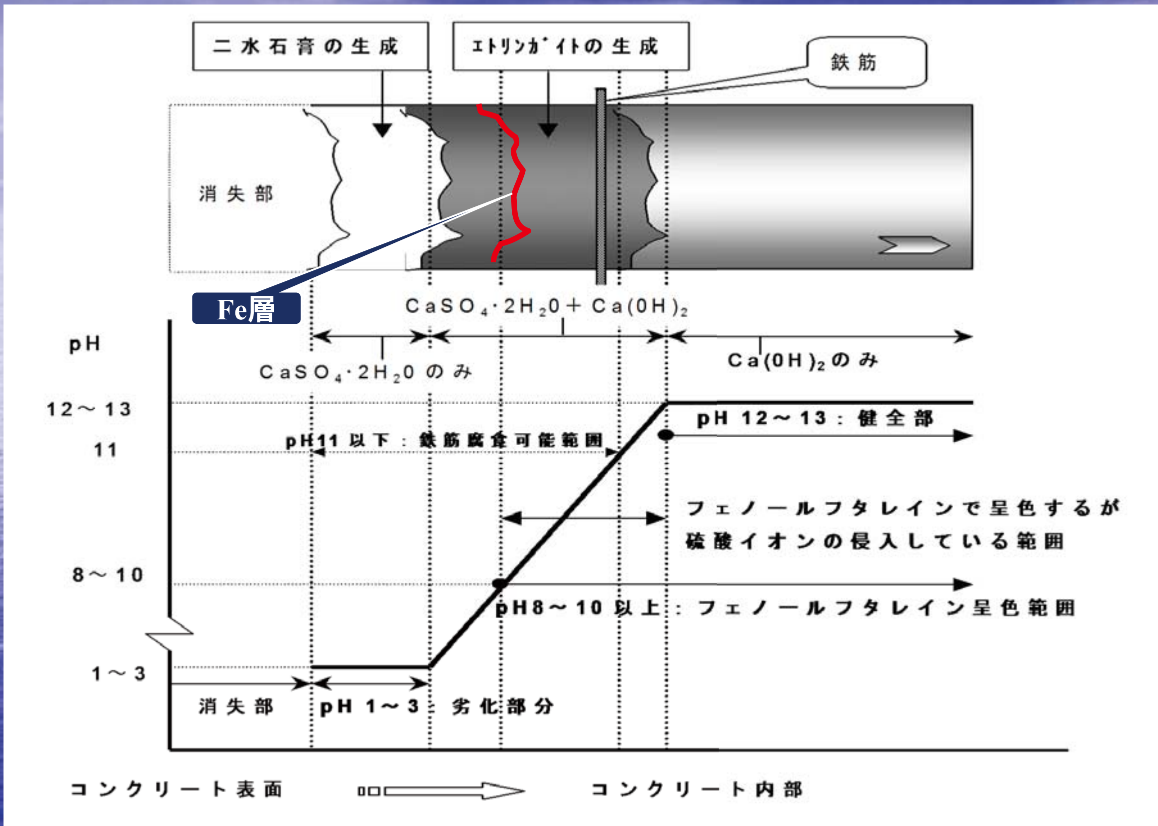
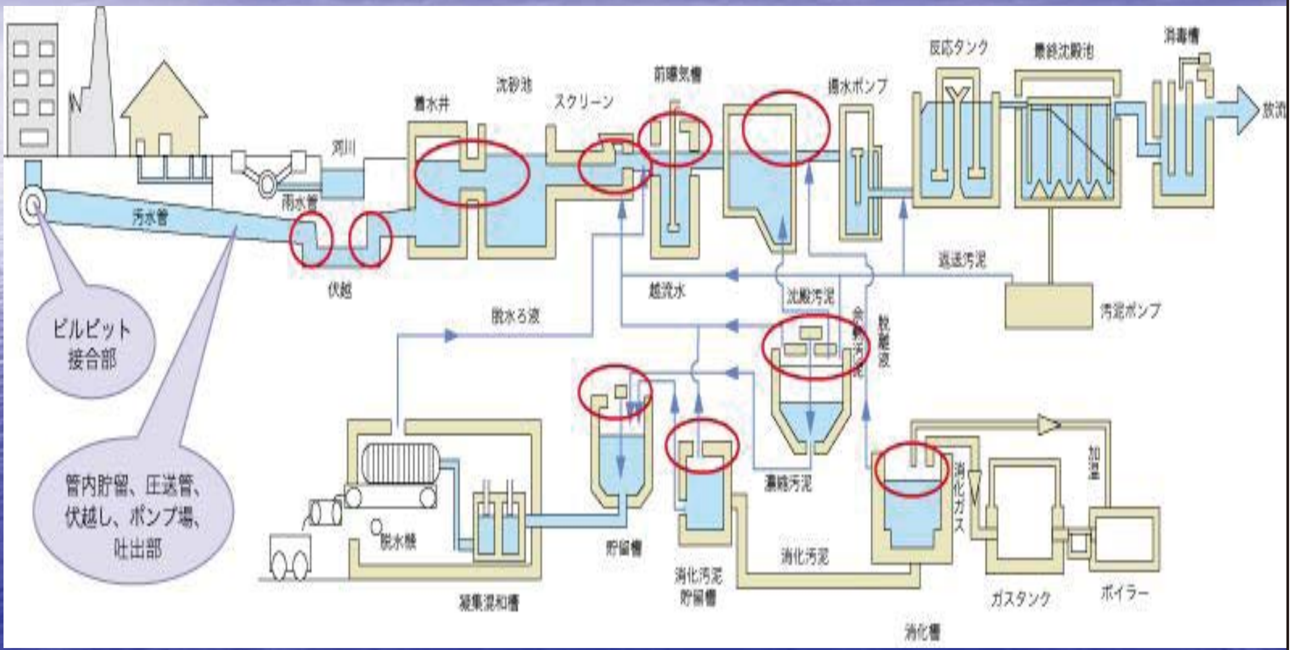


図２　硫酸によるコンクリート腐食の進行と硫酸の浸透状況の概念図[4)]

Water Purification & Treatment Plant Corrosion Examples

Water Treatment Process Flow



Treatment Plant—Corrosions at the ceilings

Water Treatment Plant— ceiling Corrosions②

JSWA Concrete anticorrosion technic manual

下水道コンクリート構造物の腐食抑制技術
及び防食技術マニュアル

平成 19 年 7 月

編著 日 本 下 水 道 事 業 団
発行 財団法人 下水道業務管理センター

Concrete Anticorrosion Materials Quality Standard

3．7　塗布型ライニング工法の品質規格

（1）塗布型ライニング工法の防食被覆層は、適用する工法規格（D_1種、C種、B種、A種）に応じて、表 3-11 の品質規格を満足しなければならない。

表 3-11　塗布型ライニング工法の品質規格

項目 ＼ 工法規格	A 種	B 種	C 種	D_1 種
被覆の外観	被覆にしわ、むら、はがれ、われのないこと。	同 左	同 左	同 左
コンクリートとの接着性	標準状態 1.5N/mm² 以上 吸水状態 1.2N/mm² 以上	同 左	同 左	同 左
耐酸性	pH3 の硫酸水溶液に 30 日間浸漬しても被覆にふくれ、われ、軟化、溶出がないこと。	pH1 の硫酸水溶液に 30 日間浸漬しても被覆にふくれ、われ、軟化、溶出がないこと。	10%の硫酸水溶液に 45 日間浸漬しても被覆にふくれ、われ、軟化、溶出がないこと。	10%の硫酸水溶液に 60 日間浸漬しても被覆にふくれ、われ、軟化、溶出がないこと。
硫黄侵入深さ	——	——	10%の硫酸水溶液に 120 日間浸漬した時の侵入深さが設計厚さに対して 10%以下であること、かつ、200μm 以下であること。	10%の硫酸水溶液に 120 日間浸漬した時の侵入深さが設計厚さに対して 5%以下であること、かつ、100μm 以下であること。
耐アルカリ性	水酸化カルシウム飽和水溶液に 30 日間浸漬しても被覆にふくれ、われ、軟化、溶出がないこと。	同 左	水酸化カルシウム飽和水溶液に 45 日間浸漬しても被覆にふくれ、われ、軟化、溶出がないこと。	水酸化カルシウム飽和水溶液に 60 日間浸漬しても被覆にふくれ、われ、軟化、溶出がないこと。
透水性	透水量が 0.30g 以下	透水量が 0.25g 以下	透水量が 0.20g 以下	透水量が 0.15g 以下

注）硫黄侵入深さにおける設計厚さは、各工法の防食被覆材料製造業者が規定する設計厚とする。

（2）防食被覆層は、公的機関における試験において、前項の品質規格に適合したものでなくてはならない。なお、試験方法は、「**付属資料 1　防食被覆層に関する品質試験方法**」による。

（3）塗布型ライニング工法に使用する材料は、前項の試験に使用した同一の材料であって、防食被覆材料製造業者が発行する品質証明書があるものを使用しなければならない。

Corrosion environment classification Designed corrosion environment classification

3．4　腐食環境分類及び設計腐食環境分類

防食設計における腐食環境は、H_2S ガスの発生程度に基づき、表 3-7 のとおり分類する。

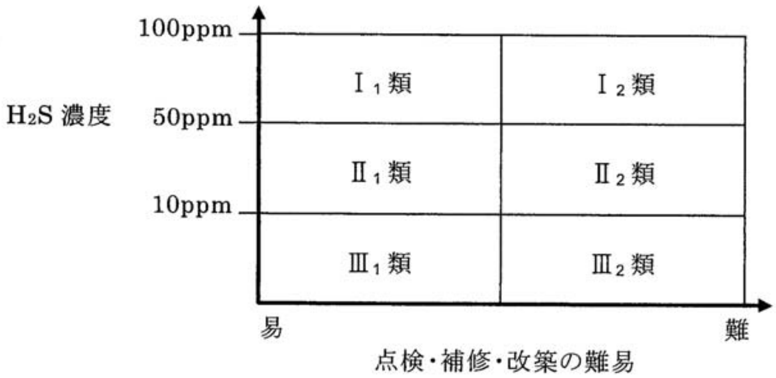
また、検討対象施設の設計腐食環境は、腐食環境分類に施設の点検、補修及び改築の難易を考慮して、表 3-8 に示すとおりとする。

表 3-7　腐食環境分類

分 類	腐 食 環 境
Ⅰ 類	年間平均 H_2S ガス濃度が 50ppm 以上で、硫酸によるコンクリート腐食が極度に見られる腐食環境
Ⅱ 類	年間平均 H_2S ガス濃度が 10ppm 以上 50ppm 未満で、硫酸によるコンクリート腐食が顕著に見られる腐食環境
Ⅲ 類	年間平均 H_2S ガス濃度が 10ppm 未満ではあるが、硫酸によるコンクリート腐食が明らかに見られる腐食環境
Ⅳ 類	硫酸による腐食はほとんど生じないが、コンクリートに接する液相が酸性状態になりえる腐食環境

表 3-8　設計腐食環境分類

年間平均 H_2S ガス濃度	点検・補修・改築の難易	
	易	難
50ppm 以上	$Ⅰ_1$ 類	$Ⅰ_2$ 類
10ppm 以上 50ppm 未満	$Ⅱ_1$ 類	$Ⅱ_2$ 類
10ppm 未満	$Ⅲ_1$ 類	$Ⅲ_2$ 類



防食設計の判断基準（点検・補修・改築の難易）

易	難
・代替施設があり、更新時に休止できる。 ・仮施設が建設でき、総合的に経済的である。 ・日常点検・定期点検が可能である。	・構築後、狭いため人が入りにくい。 ・代替施設がないので休止期間を長期間とれない。 ・代替施設を建設するのが、総合的に不経済である。 ・腐食環境の改善が困難である。 ・日常点検・定期点検が困難である。

図 3-6　下水道施設における設計腐食環境の概念図
（硫酸によるコンクリート腐食を対象）

Example of corrosion environment classification at treatment plant

表 3-9　処理場における腐食環境の分類例

設　計　対　象　施　設	腐食環境
1．ポンプ施設	
(1) 流入マンホール	Ⅱ類
(2) ゲート室	Ⅱ類
(3) 沈砂池・スクリーン水路	Ⅱ類
(4) ポンプ井	Ⅱ類
(5) 汚水調整槽	Ⅱ類
(6) 分配槽	Ⅱ類
(7) 着水井・吐出井	Ⅱ類
2．水処理施設	
(1) 導水きょ　（吐出井～初沈流入水路の開水路区間）	Ⅱ類
(2) プリエアレーションタンク	Ⅱ類
(3) 最初沈殿池流入水路	Ⅱ類
(4) 最初沈殿池	Ⅱ類
(5) 返送汚泥水路	Ⅱ類
(6) 最初沈殿池流出水路、反応タンク流入水路	Ⅱ類
(7) 付帯する施設	
1) 初沈流出トラフ	Ⅱ類
2) 初沈スカムピット及びスカム水路	Ⅰ類
3) 終沈スカムピット及びスカム水路	Ⅰ類
3．汚泥処理施設	
(1) 汚泥濃縮槽	Ⅰ類
(2) 汚泥消化槽（気相部）	Ⅰ類
(3) 汚泥消化槽（液相部）※	Ⅳ類
(4) 汚泥洗浄タンク	Ⅰ類
(5) 汚泥貯留槽	Ⅰ類
(6) 脱離液、分離液ピット	Ⅰ類
(7) 受泥槽	Ⅰ類
(8) 返流水槽、返流水管マンホール	Ⅰ類
(9) 脱水汚泥ピット	Ⅲ類
(10) コンポスト発酵槽	Ⅱ類

About Sewerage repair method

Removal of the Corroded Section with High Pressure Water Jet.

Concrete Surface after the deteriorated section removed.

Repair Work on Cut Surface by Spraying Methods.

Completed

Epoxy Resin Lining Process.

Epoxy Resin Lining Process.

the Lining completed.

Manhole Repair Work

Ceramic Coatings

Manhole Coated with Ceramic Coatings.

Anticorrosion hume pipe (SANGUARD PIPE)

- Suitable for sewer pipe, storm sewer, industrial waste pipe etc.
- With a smaller roughness coefficient, able to make one size smaller pipe. = Cost reducing!
- Inner cladding is Polyurethane resin which is flexible with cracks made by transformation etc. Water can not leak outside.

Sunguard Pipe Coating Processes.

Sunguard Pipe-production Processes.

Sunguard Pipe-Anti corrosion type

Adobe Acrobat Document

LCC (Life Cycle Cost) Reducing

- Water treatment facilities need a huge cost when repairing if operated with bare cement at construction time.
- With concrete corrosion control as appropriate in advance, concrete can extend their lives.
- Also, LCC reducing is possible with optimal preventive maintenance rather than repairing after gotten deterioration.

Thank you for the attention!

TORISHIMA

Solution of Water Infra Business

Operation & Maintenance
ReDu
Water Transmission

Fourth Meeting of "the PPP Council for Overseas Water Infrastructure"
1st February 2013
Tokyo, Japan

NISHIMURA Munenori
TGT Infrastructure Business Department
TORISHIMA PUMP MFG.CO, LTD.

TORISHIMA

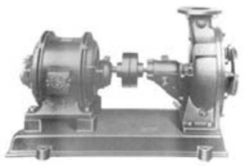
Contents

TORISHIMA

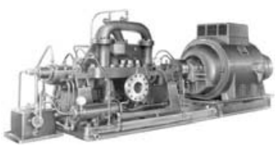
TORISHIMA PUMP MFG.CO, LTD.
Since 1919

Since 1919

TORISHIMA Pumps have been developed, modified to customer's needs



Single-stage, single-suction turbine pump

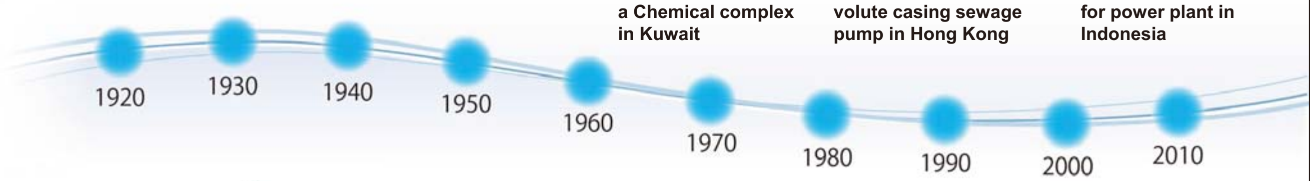


VM type boiler feed water pump

Pumping station for a Chemical complex in Kuwait

Vertical mixed-flow volute casing sewage pump in Hong Kong

Boiler feed pump for power plant in Indonesia



CSX type single-suction volute pump

Pumping equipment for drainage station

Circulating water pump for industrial complex in Saudi Arabia

High pressure seawater supply pump for RO desalination in Australia

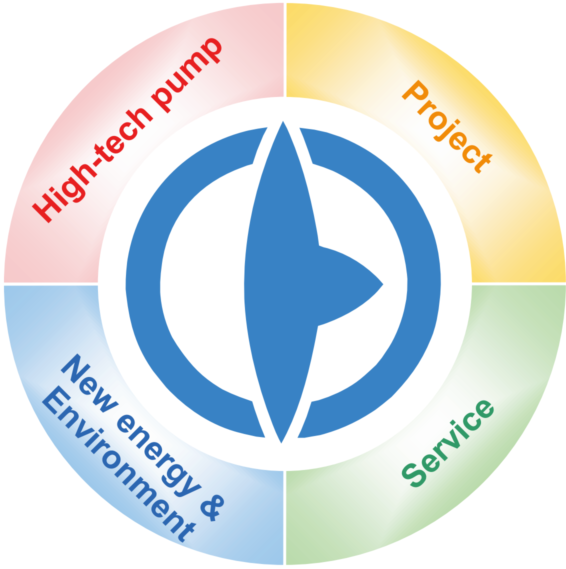
> Business Domain

- **High-Tech Pump**

  High-value-added pump available for various needs

  (Power generation plant, Desalination plant, Petro-chemical plant, etc.)

- **Wind power generation**
- **Mini & Micro hydro generation**
- **Bio gas & mass co-generation**
- **Water treatment & Resource recycle**



- **EPC Projects**

  Full turn-key construction water works / transmission, Drainage, Irrigation Balance of Plant etc.

- **Operation & Maintenance**
- **Solution provider**

  Spare parts, repair facilities, Service, Maintenance, Up-Grade, REDU (Re Engineering and Design Up)

  Total plant maintenance solutions

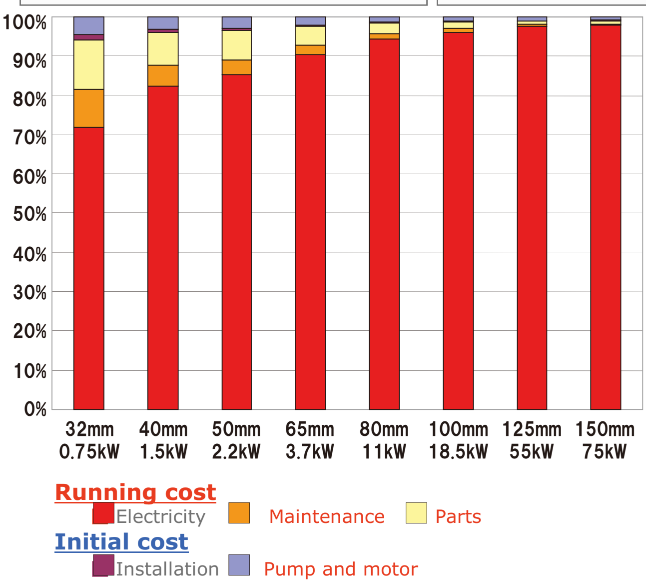
Reduction of Energy and CO_2 Emission

Over 90% of the life cycle costs (LCC) for pumps are electricity bill for operation

Big reduction of LCC and CO_2 emission by Eco Pump

＜ Operating condition＞ 8, 760hours/year、15years（131,400hours）

■ PUMP：CAL SIZE 32～150mm ■ Prerequisite ：60Hz-4P ■ Electric cost：10yen/kWh	■ Main replacement parts（The number of times of exchange） CASING（1）、IMPELLER（2）、SHAFT（2）、WEAR RING（2）、BEARING（7）、 GASKET（7）、COUPLING（1）、COUPLING RUBBER（7）、MECHANICAL SEAL（7）



＜ Electric cost and Return of Investment ＞

Pump size150mm Motor capacity75kW			
Eff. Improvement	5%	10%	15%
Power Reduction	3.75kW	7.5kW	11.25kW
Annual Power Reduction	32,850kWh	65,700kWh	98,550kWh
Cost Saving	¥4.92mil	¥9.85mil	¥14.78mil
Return of investment	4.6years	2.3years	1.5years
Annual CO2 Reduction	14t-CO_2	28t-CO_2	42t-CO_2

※Cost Saving＝Power Reduction×131,400hours×¥10

※RoI＝¥1.50mil÷（Annual Power Reduction×¥10）

※CO_2emission factor is based on TEPCO figure in 2007 0.000425（t-CO_2/kWh）

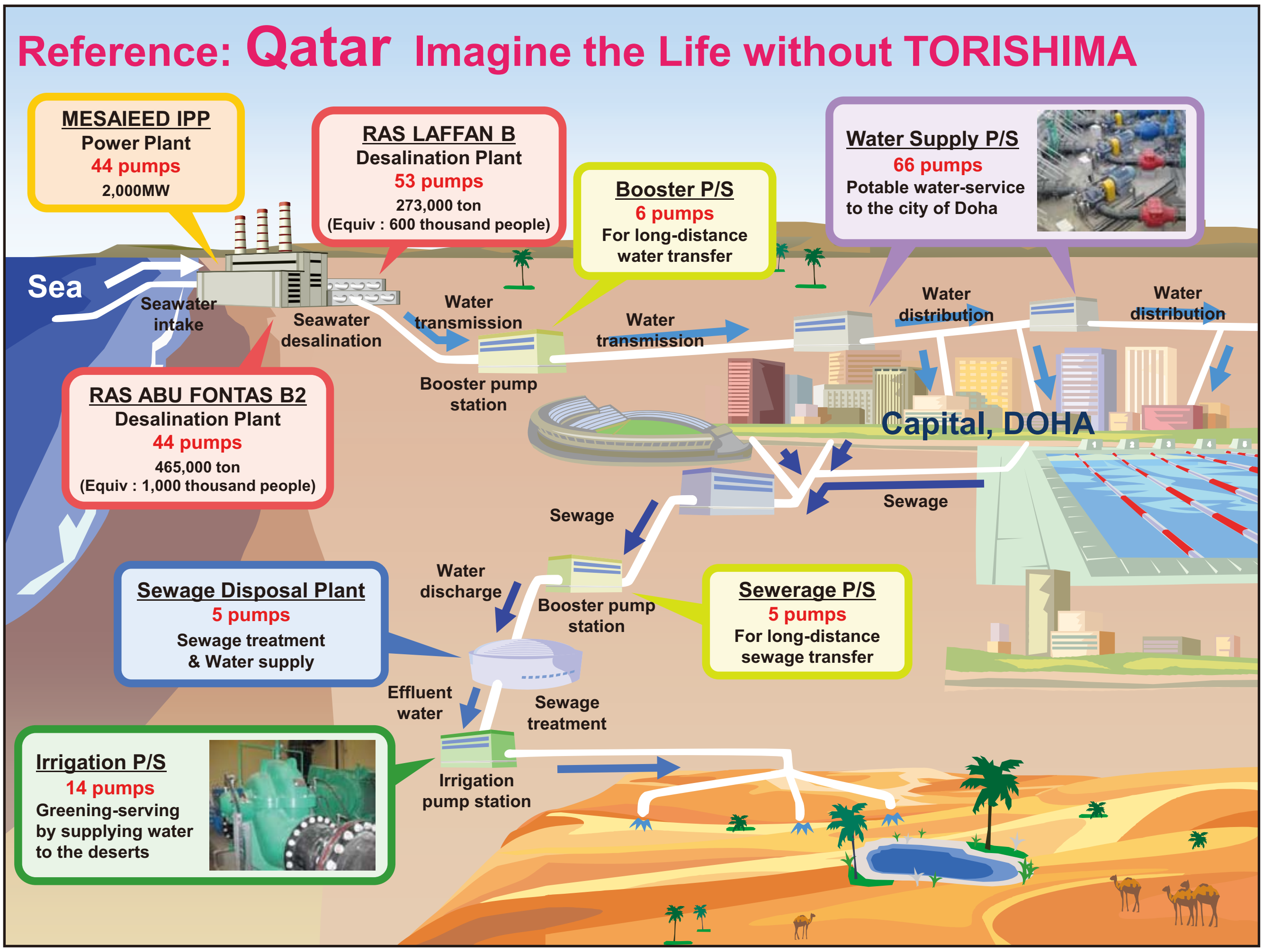
PUMP

- Pump is most energy consumed item in the Water System.
- Over 90% is Energy cost in LCC.

No Pump in Ideal Water System

But Impossible.
Imagine the Life without Pump

High Efficiency Pump
Ideal Pumping System

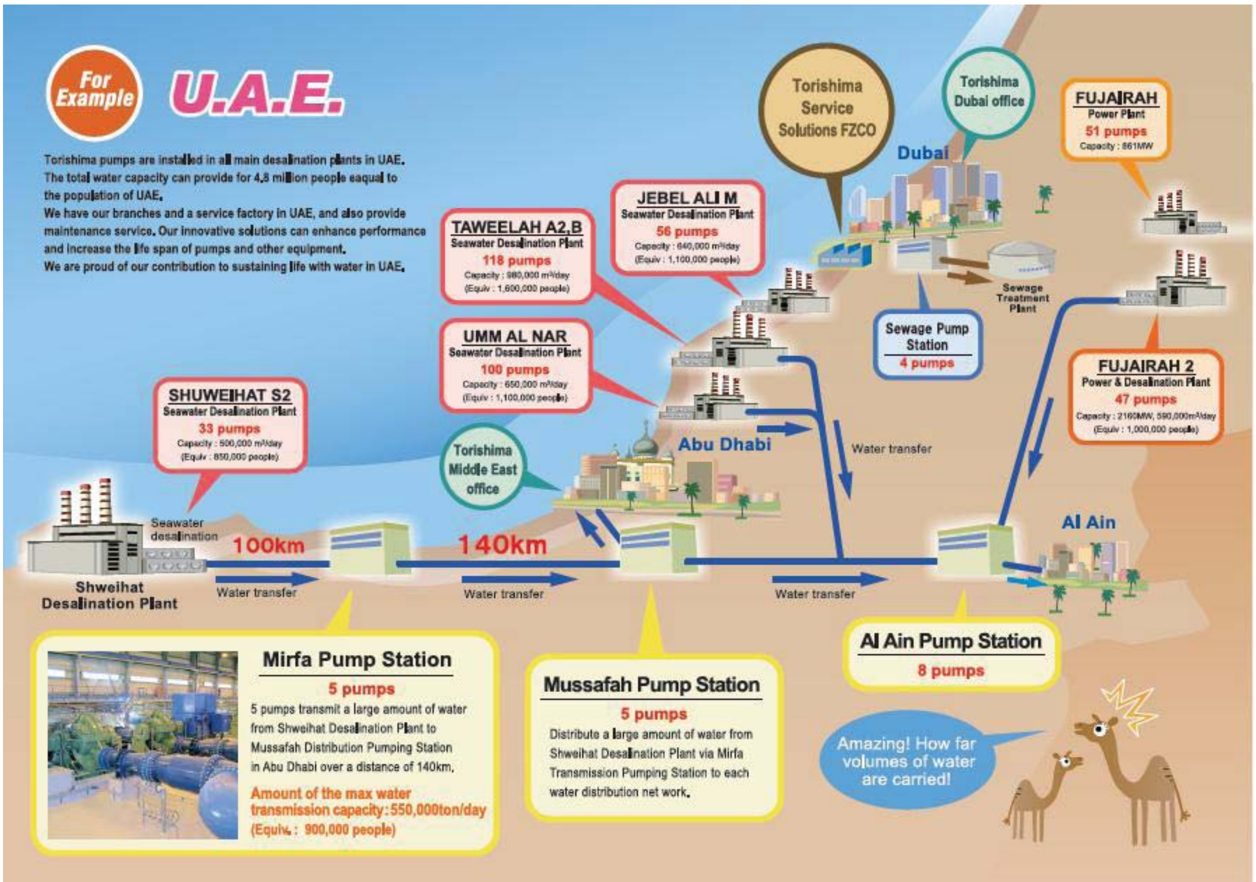


TORISHIMA

Water Transmission

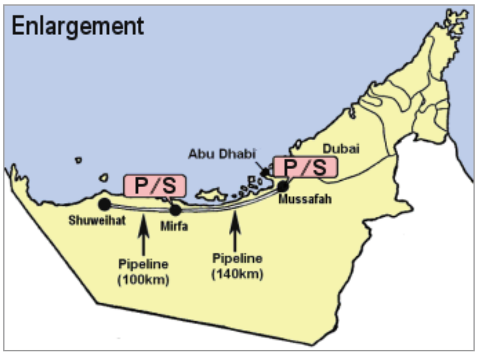
Less Pumping Stations with High Head Pump

Transmission of Water for Long Distance Pipe Line



TORISHIMA

Shuwaihat Potable Water Transmission Project, UAE (1/2)



Long distance (140km) water supply pump for drinking water manufactured in the seawater desalination plant, Shuweihat water transmission scheme in U.A.E.
(Abu Dhabi Water and Electricity Authority)
(CDM800x500 : 4700kW)

TORISHIMA

Shuwaihat Potable Water Transmission Project, UAE (2/2)

Musaafah pumping station
2,840m³/h - 65m - 4690kW – 5units

Serge Vessels
Dis.side : 120m³/h Vessel – 16units
Suc.side : 20m³/h Vessel – 2units

TORISHIMA

Water Transmission Plant in Al Ain, UAE

Al Ain (UAE)
Main Pump
(CDM800x500 : 5200kW)

TORISHIMA

Pumps in Water Transmission Plant (1/2)

Shuqaiq 2 (Saudi Arabia)
Main Pump
(MSH300/2T : 6150kW)

New Mirfa (UAE)
Main Pump
(MHH350/6 : 1950kW)

Pumps in Water Transmission Plant (2/2)

Melbroune (Australia)
Transfer Pump
(MSH450/2T : 3000kW)

Al Ain (UAE)
Main Pumps
(CDM800x500 : 4800kW)

Re Engineer – manufacture original part

Design Up – improve design of original part/pump

TORISHIMA

▪Re Engineering & Design Up

Pump Manufacturer's Specialty

•Scan by 3D machine

•3D Drawing

•Hydraulic analysis

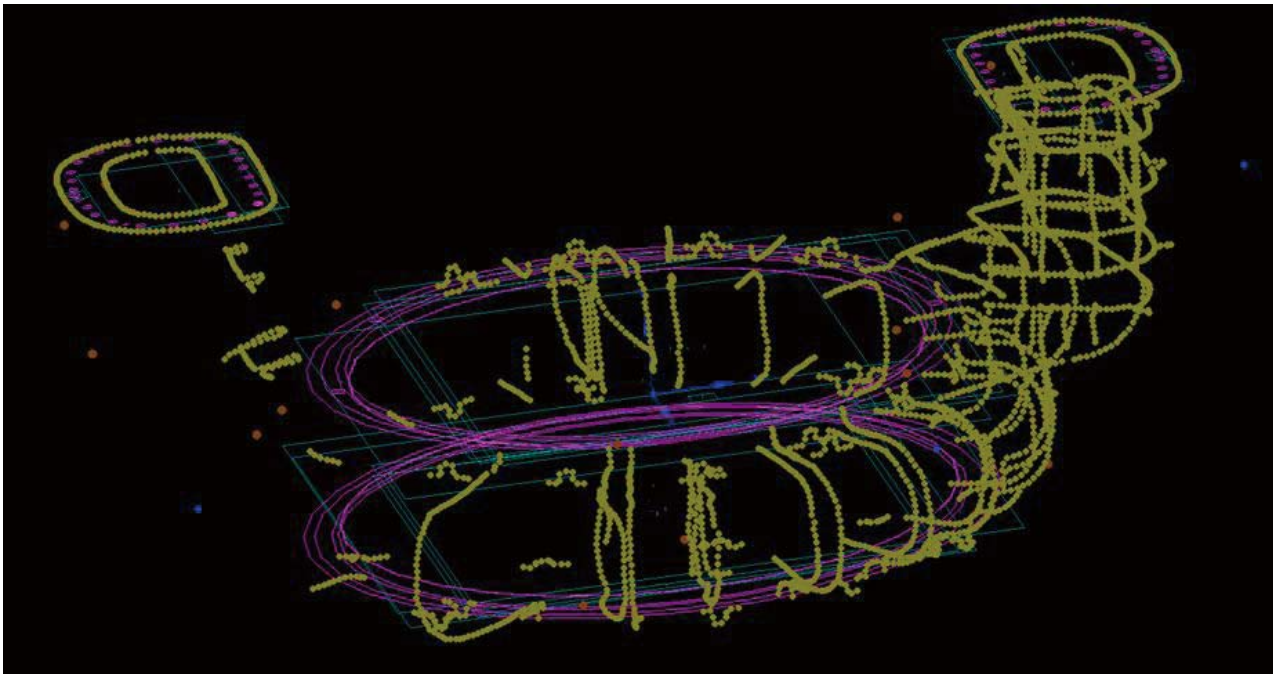
•Manufacturing Drawings

•Manufacturing

TORISHIMA

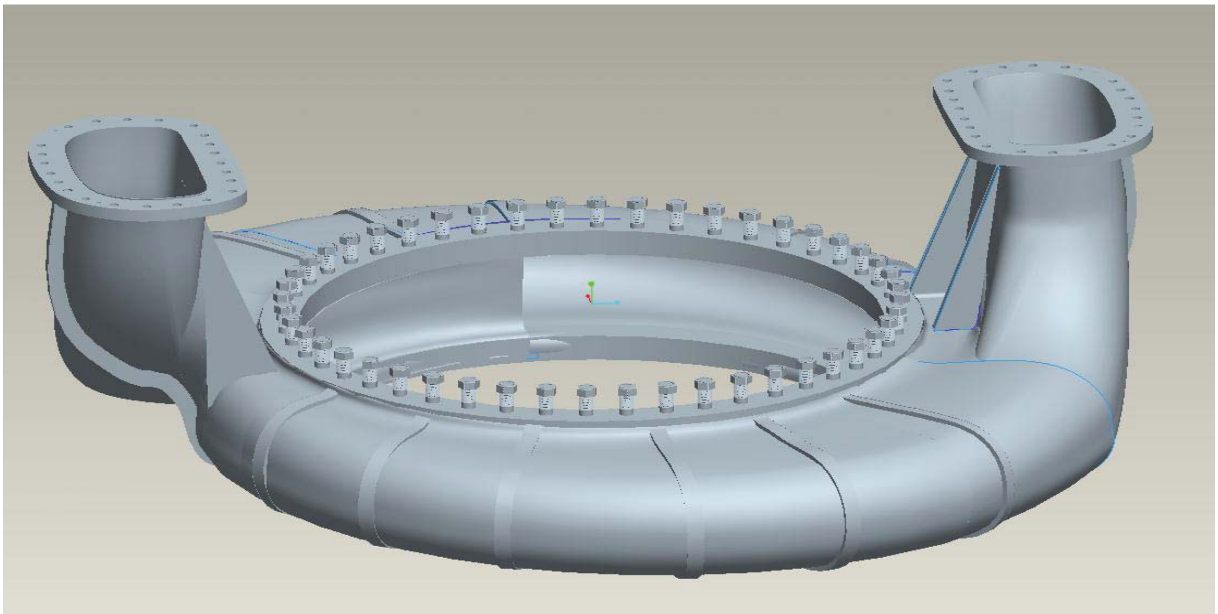
TORISHIMA

3D Scan of Double Entry Volute for 5MW BRP



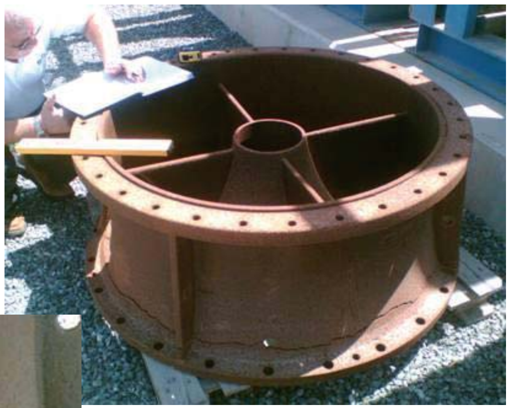
TORISHIMA

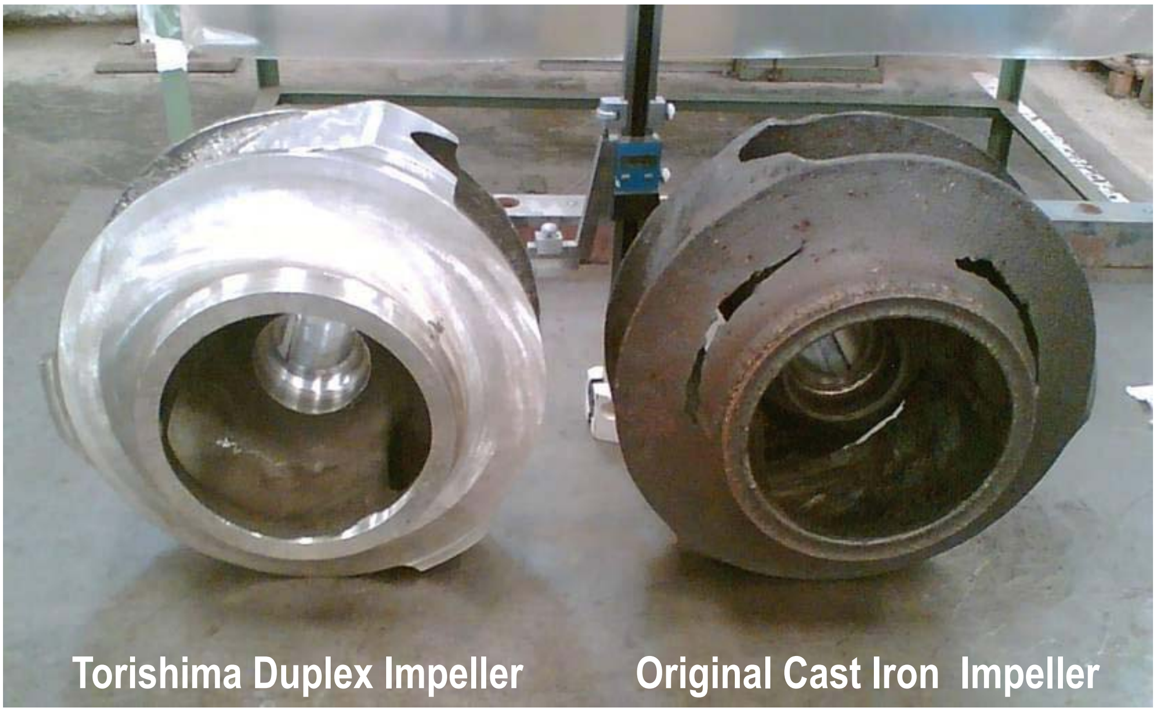
3D Solid Model of Double Entry Volute for 5MW BRP



Original NiResist Cast Iron Column Piece

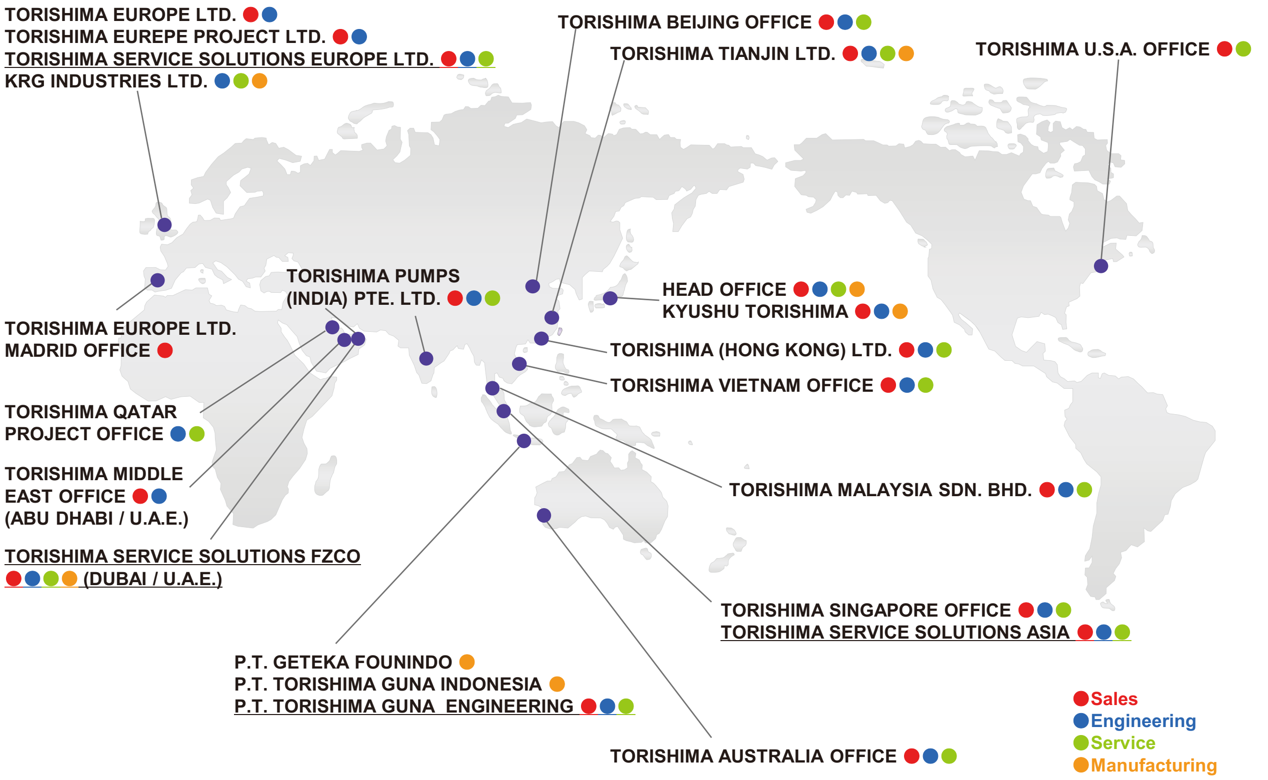
Failed due to stress corrosion





TORISHIMA

World Wide Network including Maintenance and Operation



TorishimaGuna

Engineering Services

TORISHIMA PUMP

Indonesian Manufacturing & Engineering Services

Manufacturing Facility
FOUNDRY SHOP




Manufacturing Facility Machining Shop




Testing Facility

ISO 9906
JIS B8301 : 2000
ANSI/HI 6.2000

Low Pressure Facility Test

380-600V & 3.3 kV - 6.6 kV Motor Control Center with Variable Spee Drive

Low Pressure Facility Test

Pressurized & Vacuum Tank

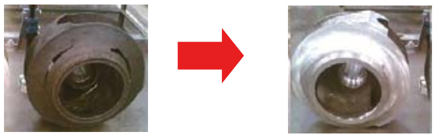
High Pressure PumpTesting

Control Board

Central Service Workshop

Pump Services

- Installation
- Commissioning
- Repair
- Refurbishment
- Performance Analysis
- Upgrade
- Spareparts Supply
- Operate & Maintenance
- Troubleshooting



TorishimaGuna **Engineering Services**

Line of Services

Field Services

- Condition Monitoring
- In-Situ Vibration Analysis & Balance
- On Site Efficiency Testing
- Installation & Commissioning

TorishimaGuna **Engineering Services**

TORISHIMA

Thank you
for your attention

<Aquarator>

The World's First

Submerged Mechanical Aerator/Agitator

HANSHIN ENGINEERING Co., Ltd.

<F Type>

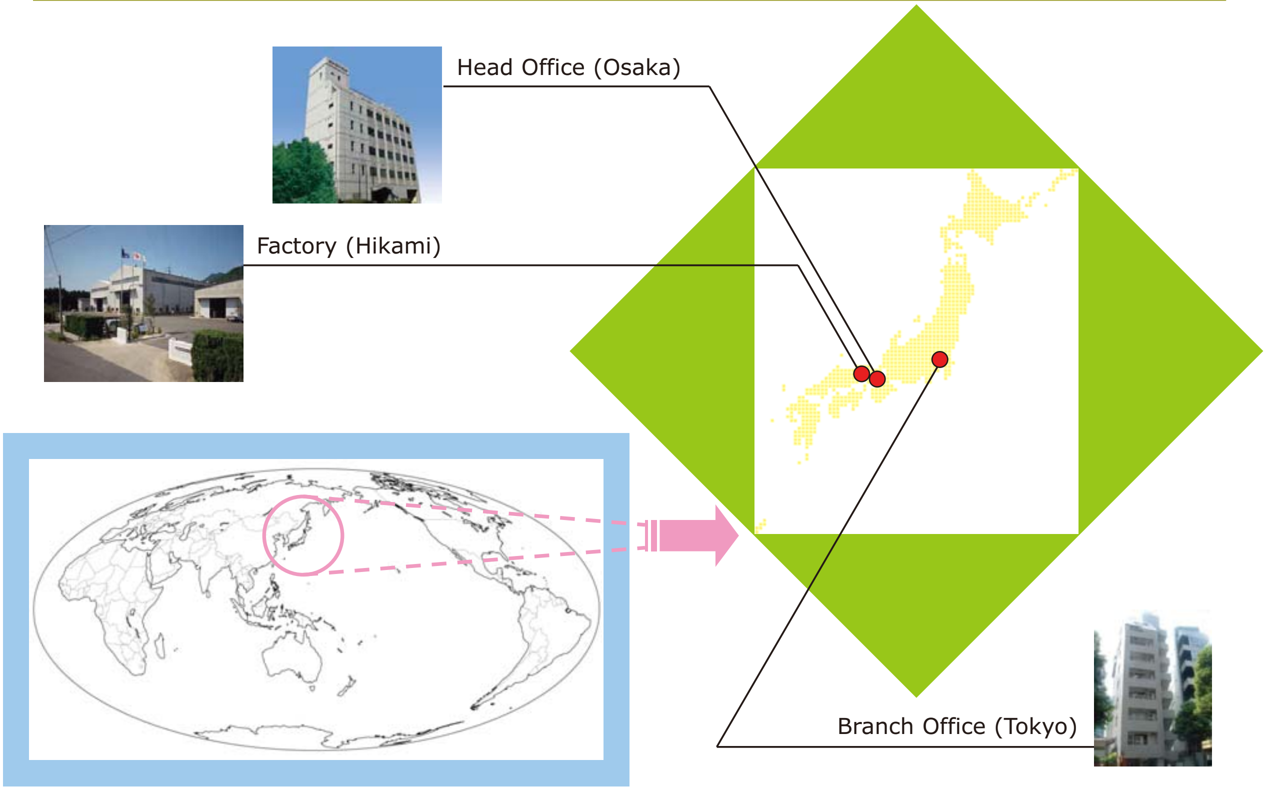
F-15 (1.5kW)
F-22 (2.2kW)
F-37 (3.7kW)
F-55 (5.5kW)
F-75 (7.5kW)
F-110 (11.0kW)
F-150 (15.0kW)
F-185 (18.5kW)
F-220 (22.0kW)
F-300 (30.0kW)

Company Summary

<HANSHIN ENGINEERING Co., Ltd.>

- Establishment: November 13, 1950
- Business: Gear speed reducers/ Waterway facilities equipment/ Water-treatment facilities equipment/ Industrial facilities equipment
- Capital: 72,600,000 yen
- President: Hiroyuki Izui
- Employees: 100

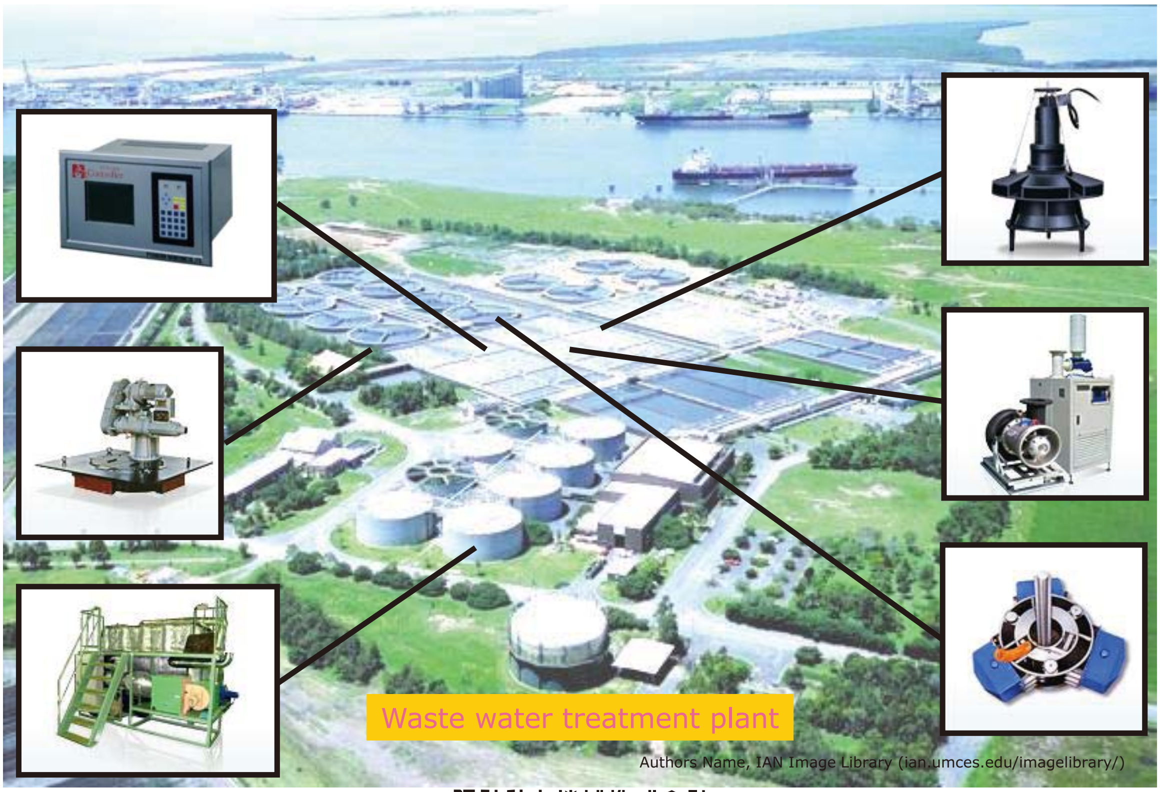
Company Location



Company History

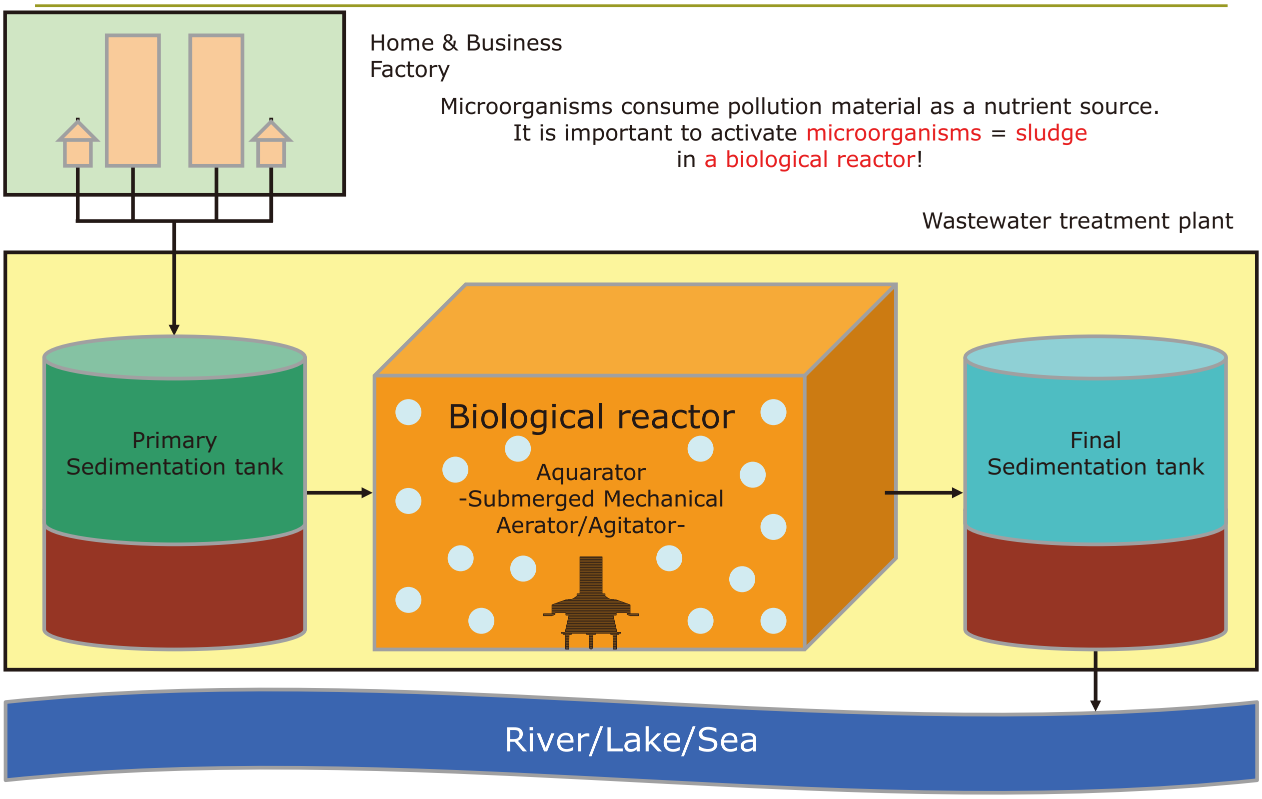
- 1950 Establishment of HANSHIN ENGINEERING Co., Ltd.
- 1970 Development, production and sales of drive unit for sludge collector, thickener, clarifier
- 1975 Development, production and sales of the world’s first submerged mechanical aerator/agitator (Aquarator)
- 1987 Development, production and sales of AS controller
- 1992 Delivery of supernatant water discharger
- 2004 Delivery of bio processing unit
- 2006 Delivery of turbo blower

Environmental Equipments



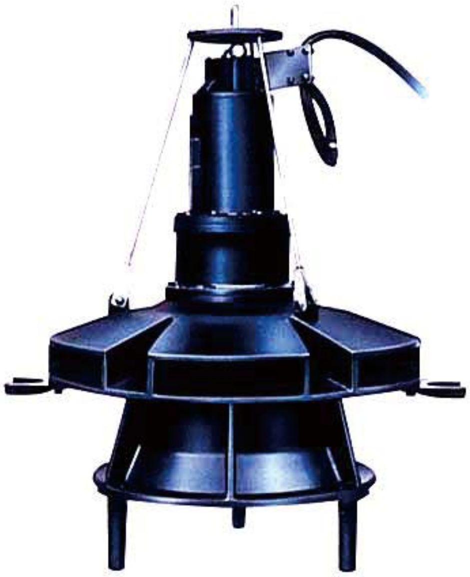
This is a image.

System Flow for Wastewater Treatment



Aquarator

Aquarator = the world's first
Submerged Mechanical Aerator/Agitator



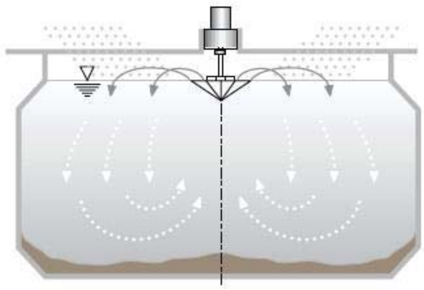
<F Type>
F-15 (1.5kW)
F-22 (2.2kW)
F-37 (3.7kW)
F-55 (5.5kW)
F-75 (7.5kW)
F-110 (11.0kW)
F-150 (15.0kW)
F-185 (18.5kW)
F-220 (22.0kW)
F-300 (30.0kW)

Problems of Existing Aerator

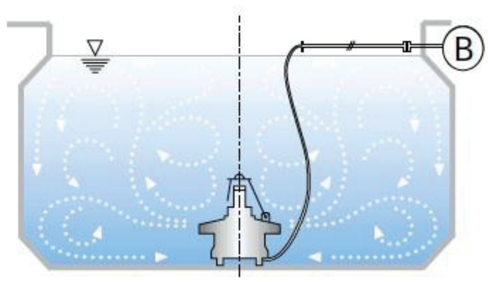
<Problems for environment & pollution aspect>
- Energy efficiency is bad.
- Occur noise and vibration.
- Make dispersion sewage mist.
  -> Change for the worse sanitary conditions.
- Accumulate sludge.
  -> Occur bad smell.
  -> Change for the worse treated water quality.

Paper Mill in Thailand (Activated Sludge Process)

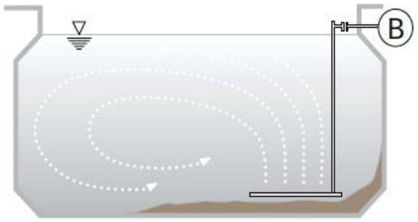
Comparison of Aeration Equipment



-Lack of agitation at the bottom of a tank
-Dispersion of sewerage mist

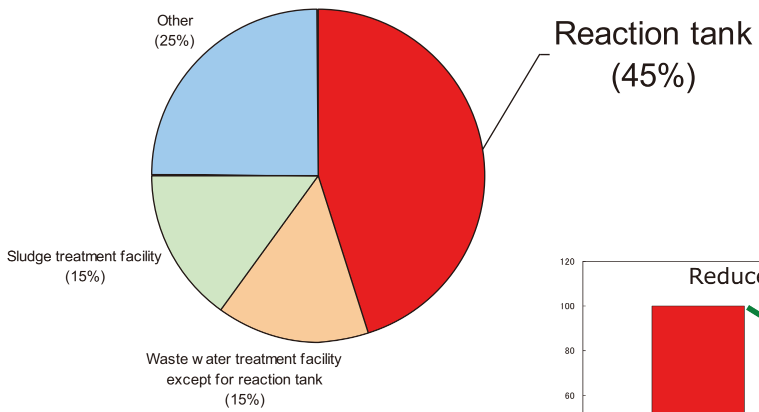


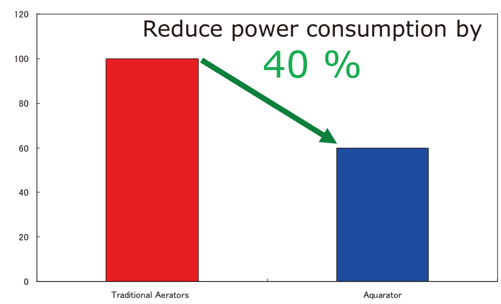
-Realization of extremely high energy efficiency
-Easy maintenance
-Accommodates various processing methods
-No clogging



-Sedimentation of sludge
-Progression of clogging

Energy Conservation of Reaction Tank





<Reference>
Tetsuo Ide ed: Wastewater Treatment Technology -Theory and Application- (2nd ed.), GIHODO SHUPPAN Co., Ltd. p.738, 1990.

Comparison of Energy Cost

Aeration system	Submerged mechanical aeration/agitation system (Aquarator + Blower)	Surface aeration system (Surface aerator)
Electrical power	<Unit number> 21 units <1 unit> P = 45.1kWh	<Unit number> 31 units <1 unit> P = 55kWh
	P1 + P2 = 947 kWh	P1 = 1705 kWh
Energy reduction	44.5% (758kWh)	
Cost effective	385,125USD (6,640,080kW/year)	

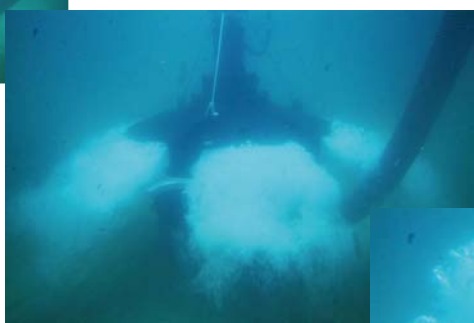
* Commercial standard electricity rate (1kW/1h) of Bangkok, Thailand was estimated as 0.058USD.
The data is based on Japan External Trade Organization (JETRO).
http://www.jetro.go.jp/world/search/cost/

Paper Mill in Thailand

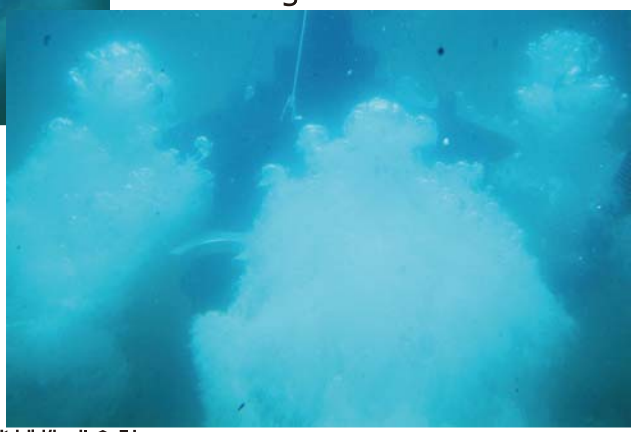
Operation Situation of the Aquarator

Before aeration

After aeration



During aeration



Reference: F-300 (30kW)

Introduction Case of the Aquarator

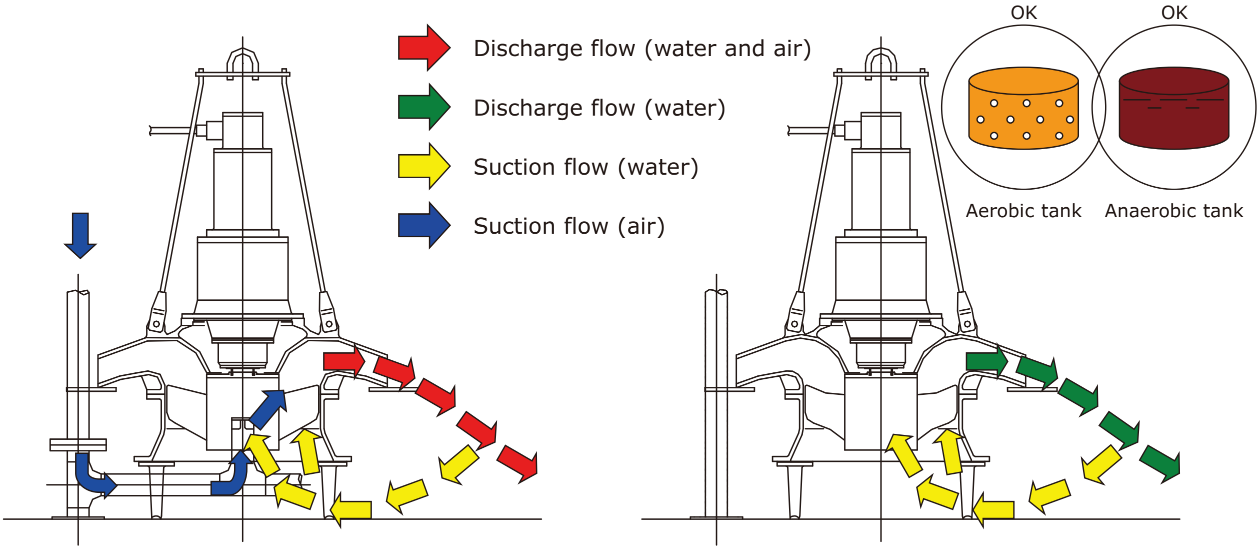
- Aquarator is the most suitable equipment for biological treatment of industrial wastewater.

<Equipment model>
[Raw water reserver]
BA-100 (15kW): 1 unit
F-150 (15kW): 1 unit
[Aeration tank]
F-150 (15kW): 8 units

Chemical Plant in Japan (Activated Sludge Process)

Advantage of the Aquarator

- The equipment is able to be used flexibly as aerobic agitation or anaerobic agitation.



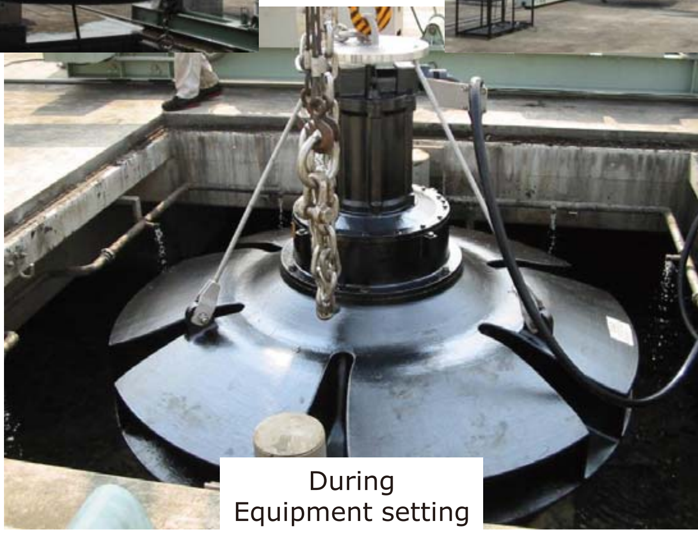
Using for aerobic treatment

Using for anaerobic treatment

Installation Situation of the Aquarator

During
Equipment moving

During
Equipment moving

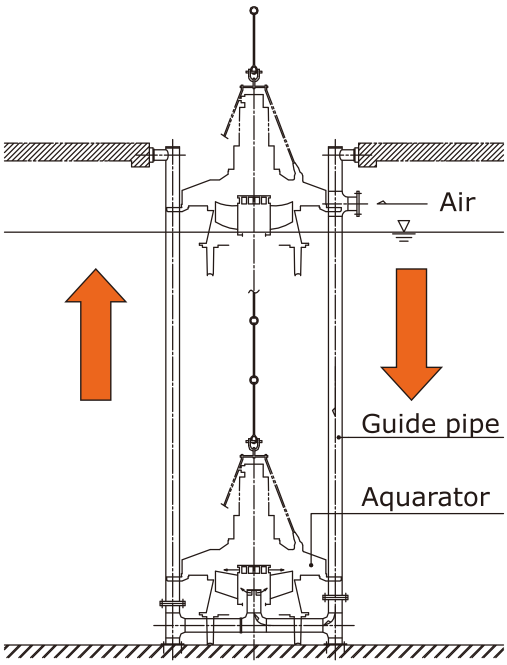


During
Equipment setting

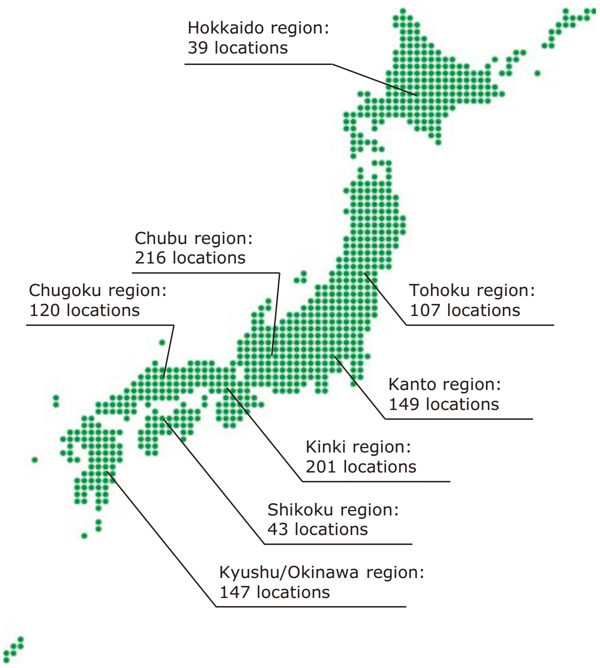
Reference: F-300 (30kW)

Feature of the Aquarator

- Equipment installation and removal is easy.
- Water and sludge are not required to be removed when installing or removing the equipment because the main body is not fixed on a tank bottom.



Record, Assessment, Certification, Specification in Japan

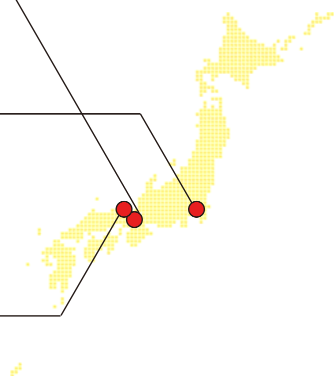


- The number of the Aquarator that is installed in Japan's sewage treatment plant is
  "10,000 units in 1,000 locations"
  (at of March, 2010)

- Aquarator >>>
  which is certified as "Energy Conservation Type Diffused Aerator" from "Ministry of Construction (Current Ministry of Land, Infrastructure, Transport and Tourism)"
  (Technology Assessment No.81102)

  is designated as "Submerged Agitation Type Aerator" by "Japan Sewage Works Agency"

HANSHIN ENGINEERING Co., Ltd.



<Head Office (Osaka)>
2-26-7 Shikanjima, Konohana-ku, Osaka 554-0014, Japan
TEL. +81-6-6461-6551 FAX. +81-6-6461-6555

<Branch Office (Tokyo)>
4th Floor, Shibakaga Bldg., 2-3-1 Shibakoen, Minato-ku, Tokyo 105-0011, Japan
TEL. +81-3-5776-1401 FAX. +81-3-3438-2171

<Factory (Hikami)>
1383 Shingo, Hikami-cho, Tanba-shi, Hyogo 669-3571, Japan
TEL. +81-795-82-3422 FAX. +81-795-82-3424

<Sales department>
Hirotaka Kawashima
kawashima@hanshin-pm.co.jp

http://www.hanshin-pm.co.jp/

Novel Energy-efficient Municipal Wastewater Treatment System for Low Carbon Society

February 1, 2013

METAWATER

A Glance of METAWATER

METAWATER is one of the leading engineering companies in Japan with unique products and wide range of experiences from product supply, EPC up to O&M service incl. PFI projects.

Outline

Capital	JPY 7.5 Bil. (ca. US$ 85 Mil.)
Net Sales	JPY 100 Bil. (FY2011) (ca. US$ 1.2 Bil.)
Employees	1,800 (consolidated)
Location (JPN)	Tokyo (Head Office), Hino Office, Nagoya Office
(Intl.)	China, Korea, Germany, USA, Vietnam

Ceramic Membrane

more than 30% of share in Japan

Ozonizer

Top supplier (more than 170 installations)

Sludge Incineration

more than 25% of share (more than 45% in large scale)

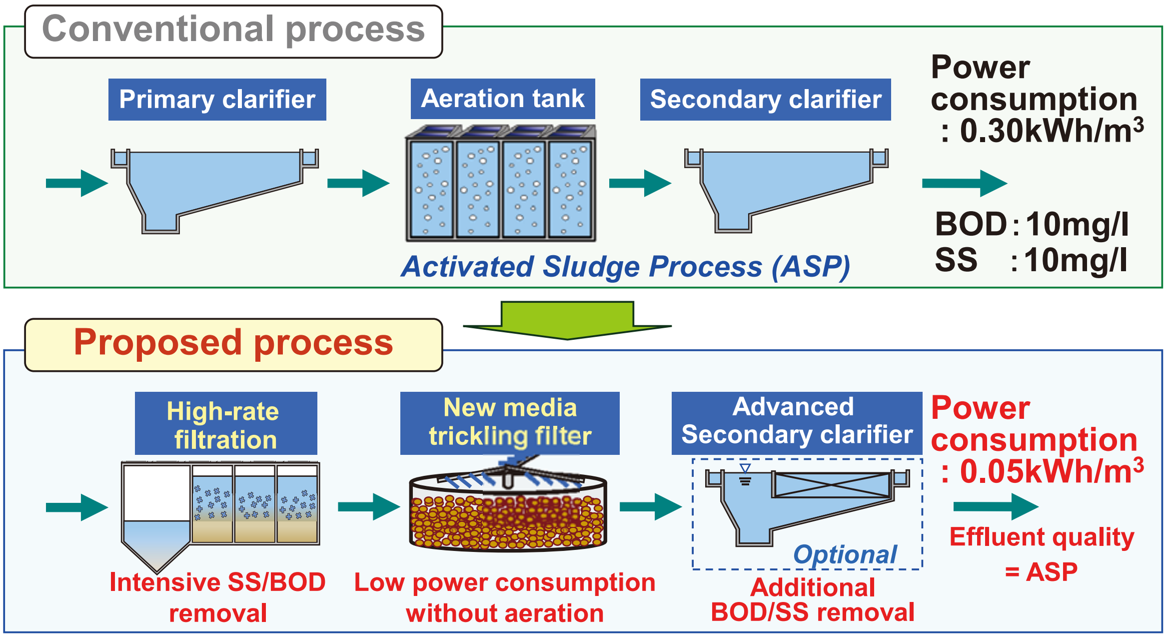
PFI/BOT Business

more than 10 installations

Development Goal

METAWATER

- New wastewater treatment process suitable for developing countries in the tropics
- Lower capital & operational costs than those of conventional process (ASP)
- Feasible combination with biosolid energy utilization (digestion) in the future



Pilot Tests in Vietnam

METAWATER

The pilot study has been carried out in Da Nang, Vietnam supported by universities, authorities in both countries and the MLIT of Japan

Hệ thống xử lý nước thải đô thị tiên tiến, hiệu quả cao.

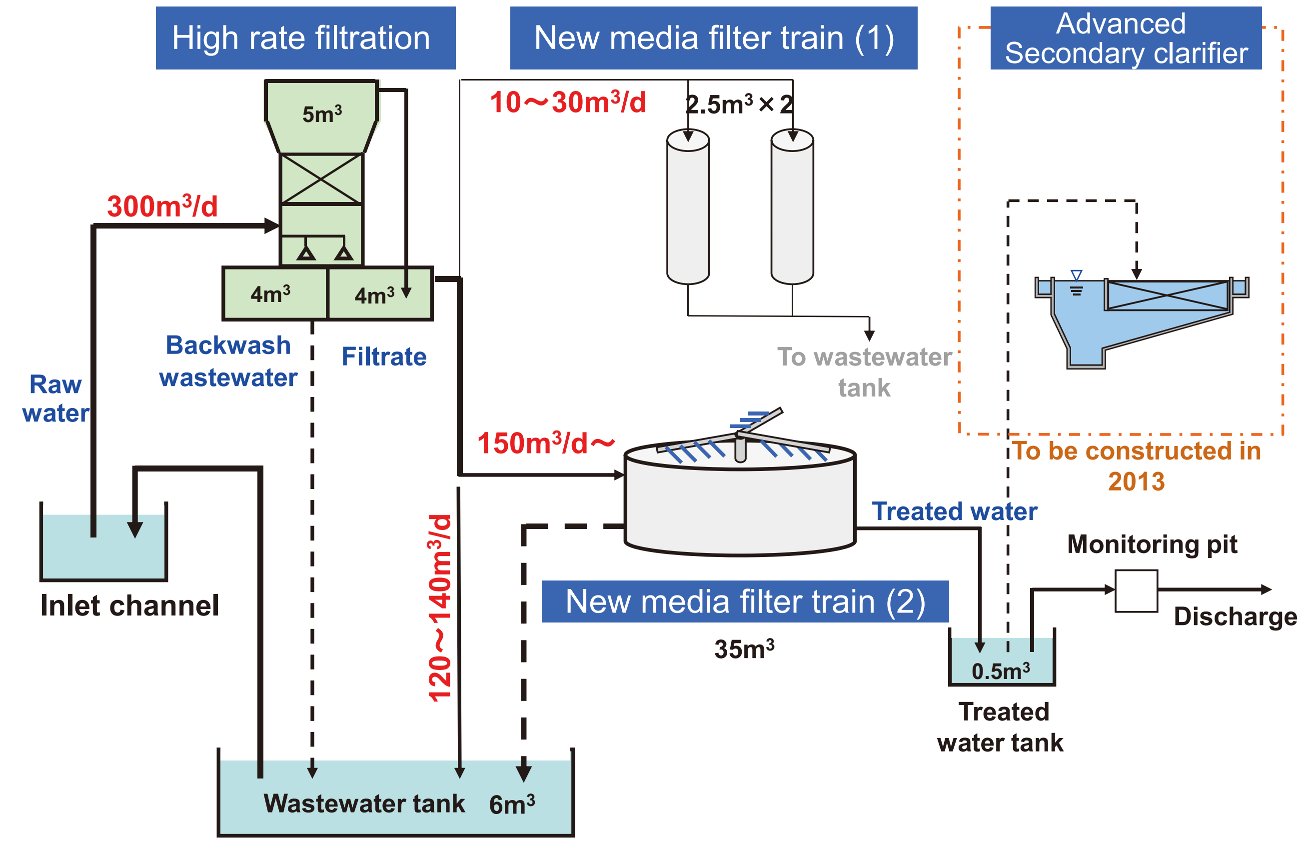
Novel energy-efficient municipal wastewater treatment system

先進的省エネ型下水処理システム

Demonstration of new suitable sewage treatment system for Da Nang City

DA NANG DRAINAGE AND WASTEWATER TREATMENT COMPANY | DA NANG UNIVERSITY OF TECHNOLOGY | ENVIRONMENTAL PROTECTION RESEARCH CENTER | 国土交通省 | 北九州市立大学 | METAWATER メタウォーター株式会社

Pilot Plant Flow Diagram



Process Comparison

The new process can achieve the high effluent quality with lower energy consumption and easier O&M than ASP

	New Process	Anaerobic Lagoon * (AL)	Activated Sludge Process (ASP)
Power Demand	Pump (Head 7m) 0.05 kWh/m³	* Common in Vietnam Pump (Head 4m) 0.02 kWh／m³	Pump (Head 4m) Aeration 0.30 kWh／m³
Effluent BOD	10～20 mg/L	30～90 mg/L	10 mg/L
O&M	Easy	Easy	Not easy
Evaluation	Good	NG	NG

Pilot Plant in Da Nang

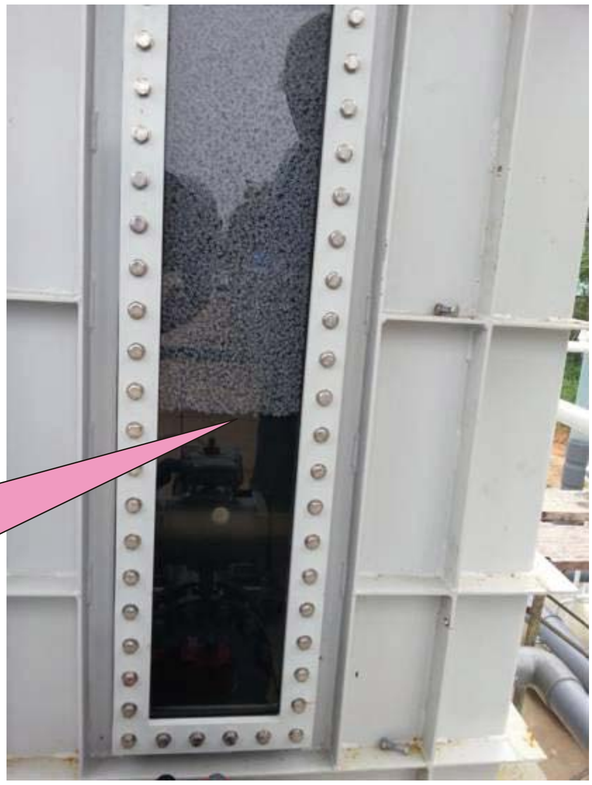
METAWATER

Test site : Phu Loc Wastewater Treatment Plant
Test start : Nov., 2012

High Rate Filtrer

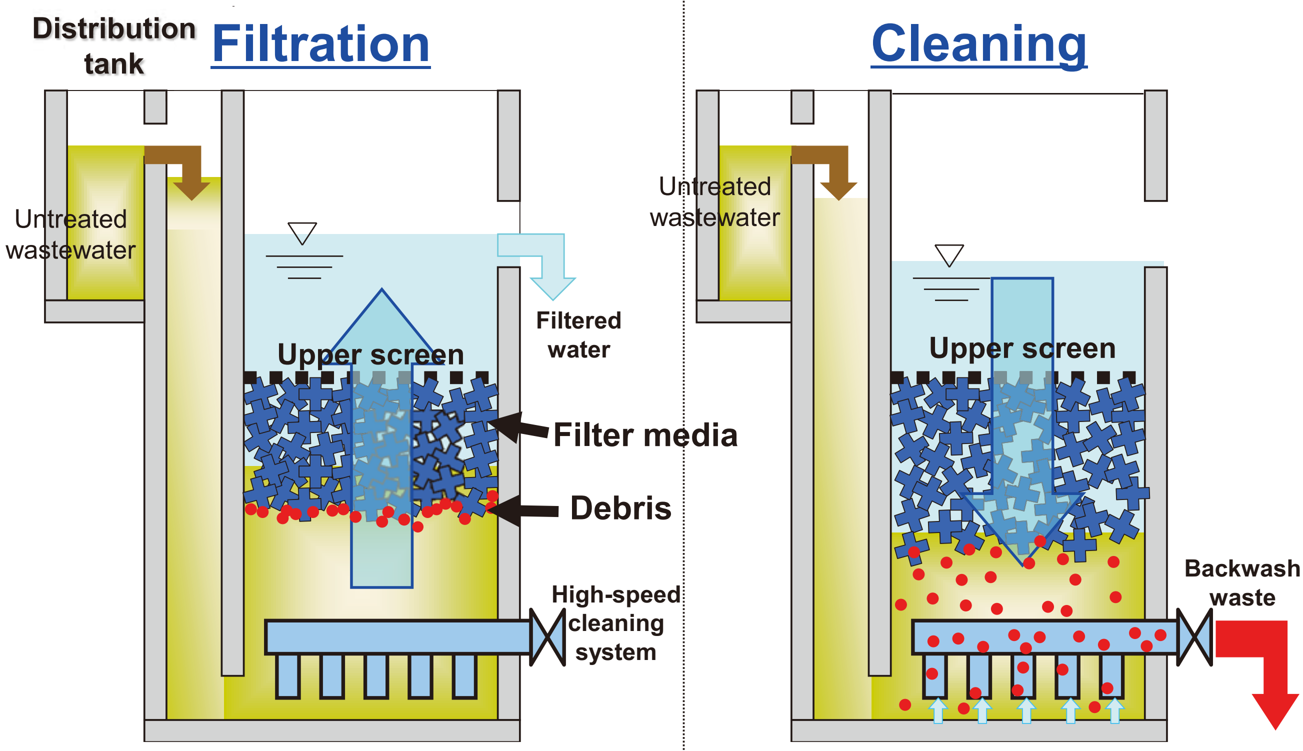
METAWATER

Filter material : Special plastic
Size : 7.5mm × 7.5mm × 4mm



Mechanism of High Rate Filtration

METAWATER



No coagulant !

No washout of filter media !

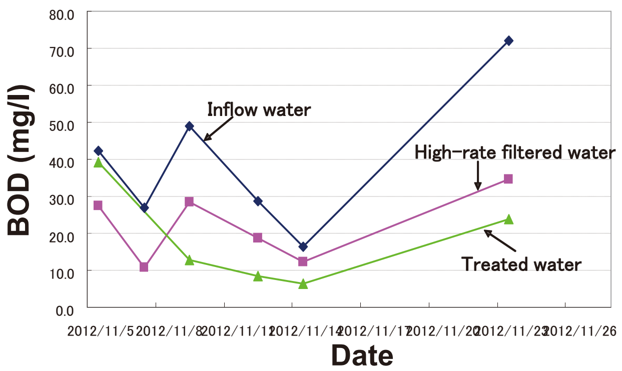
New Media Trickling Filter

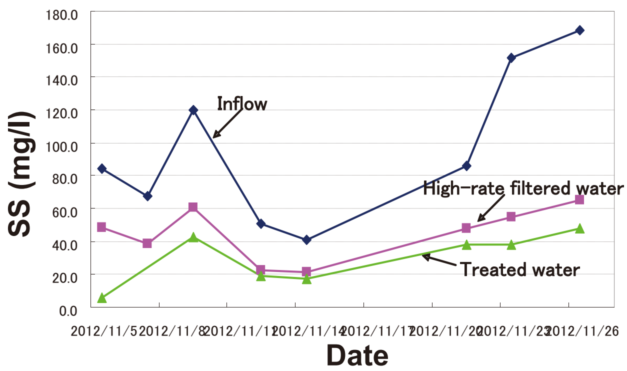
METAWATER

Example of Water Quality Data (2012/11/5～11/27)

METAWATER

- Although Inlet BOD and SS was low due to the rainy season, the high-rate filter and the trickling filter worked as expected
- BOD and SS removal rate by the high-rate filter is about 50 – 60%, which is higher than that of primary clarifier
- Data accumulation will be continued including the dry season





Pilot test will continue through November, 2013

Thank you for your attention.

METAWATER

Beyond engineering

Contact: www.metawater.co.jp/eng/index.html
info-kaigai@metawater.co.jp