北京美斯顿科技开发有限公司
MSTN TECHNOLOGIES CO., LTD.

# Wastewater Treatment

## Technology & Equipment

Enthusiasm · Innovation · Service · Respect · Responsibility

# About MSTN

MSTN TECHNOLOGIES CO., LTD. has been dedicated to environmental governance since 2004. As a specialized environmental protection company, we integrate technology R&D, process design, equipment manufacturing, system integration, and EPC , and successively obtained certifications including National High-tech Enterprise, Specialized and Sophisticated SMEs.

Our independently developed technologies, including flue gas DeSOx, DeNOx and dust removal, wastewater treatment, CCUS, oil slurry filtration, multi-series environmental protection skid-mounted systems and equipment, smart environmental protection technologies, and intelligent monitoring systems, have collectively secured hundreds of intellectual property rights. Up to now, we have successfully completed over 500 flue gas treatment and wastewater treatment projects, encompassing numerous environmental protection projects under models such as BT, BOT, and EPC.

↖ R&D Center (Beijing)

↖ Graphene Material Production Plant (Xiamen)

↗ Equipment Manufacturing Plant (Yixing)

↗ R&D Center (Shenyang)

↖ 3D Construction Printing Plant (Chuzhou)

↖ Catalyst Production Plant (Tianjin)

**2**
R&D Centers

**4**
Manufacturing Plants

**8**
Subsidiaries

**300+**
Intellectual Property Rights

**500+**
Completed Projects In Total

## Beijing R&D Center

The Beijing R&D Center was established in 2016 and is located in Beijing. As a municipal-level corporate scientific research institution in Beijing, it covers an area of approximately 800 square meters. The center is equipped with comprehensive instruments and facilities, featuring four independent small-scale test areas, one shared test zone, one sterile laboratory, one 3D printing mechanics lab, one large-scale pilot test area, as well as office and warehouse spaces.

The R&D center focuses on the treatment of three wastes (flue gas treatment, wastewater treatment, solid waste treatment, etc.) in the field of environmental protection, as well as the development of processes and chemicals, new energy, and new materials.


## AI Visual Recognition R&D Center

The AI Visual Recognition R&D Center was established in 2018 and is located in Shenyang City. The R&D center is committed to deeply integrating cutting-edge digital technologies such as AI and big data with MSTN's traditional environmental protection technology advantages, intelligently reshaping and upgrading MSTN's environmental protection technology, aiming to make environmental governance more intelligent, while safeguarding industrial enterprise safety production, creating a new generation of "smart environment+digital security" integrated solutions, and building a solid technological barrier for the company's sustainable development.

# CONTENTS

# 1 Wastewater Treatment Technology

# MSTN®
# PTU Drainage Treatment Technology

Processes such as flocculation precipitation, aeration and oxidation, neutralization and heat exchange, etc. are used to make the TSS, COD, pH and temperature of wastewater meet the discharge standard. It is mainly used for the treatment of salinity wastewater from the wet desulfurization system. At present, more than 40 systems have been successfully put into use in China.

## Technical Advantages

- It uses proprietary chemicals, which offers a good flocculation precipitation and friendly to equipment.
- It is a highly integrated system, with a small footprint.
- It is simple to operate and stable to run.
- It can be applied to the mud dewatering equipment, to make the moisture content in cake up to 40%wt, and is friendly to the on-site environment.

| Para. | Inlet | Outlet |
|---|---|---|
| Wastewater flow rate t/h | 13 | |
| TSS mg/L | 5000 | ≤60 |
| COD mg/L | 2100 | ≤50 |
| PH | | 6~9 |

▸ 2,200,000 t/a Catalytic Flue Gas Desulfurization Plant Drainage Treatment Project of a CNOOC Petrochemical Company

# BioCleaning®
# Biochemical Treatment of High-salinity Wastewater Technology

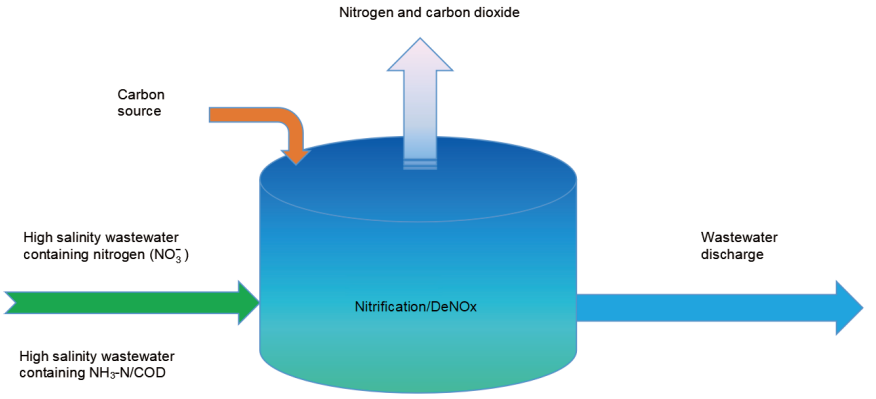
This process uses high-salinity tolerant microorganisms to treat the ammonia nitrogen, total nitrogen, BOD5 and other pollutants in salinity wastewater into stable and harmless nitrogen, carbon dioxide and water.

## Technical Advantages

- The self-domesticated and cultured high salt-tolerant microorganisms could still maintain high activity at 8%wt salt concentration.
- It produces no sludge particles compared with traditional activated sludge.
- Microorganisms are added at one time without additional feed.
- Microorganisms reproduce and form membranes quickly.

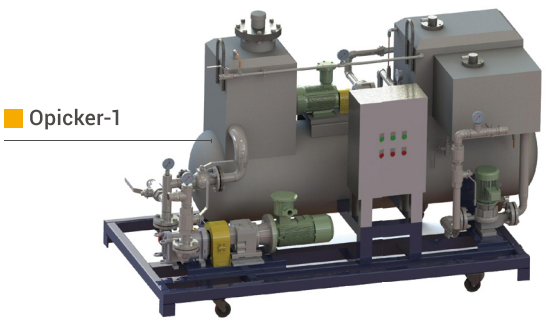
| Para. | Inlet | Outlet |
|---|---|---|
| Wastewater flow rate $m^3/h$ | 60 | |
| TDS %wt | 7.7 | |
| Ammonia nitrogen mg/L | 110 | ≤4 |
| Total nitrogen mg/L | 350 | ≤25 |
| COD/BOD5 mg/L | 120 | ≤45 |

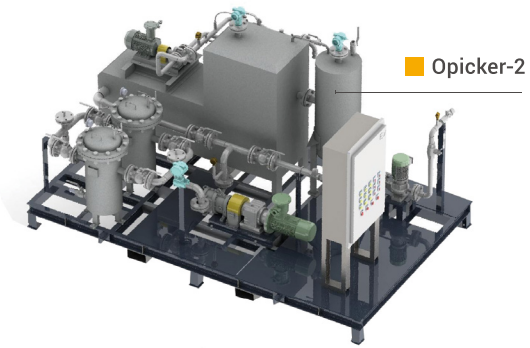
▸ A Saline Wastewater Treatment Project of a Sinopec Petrochemical Company

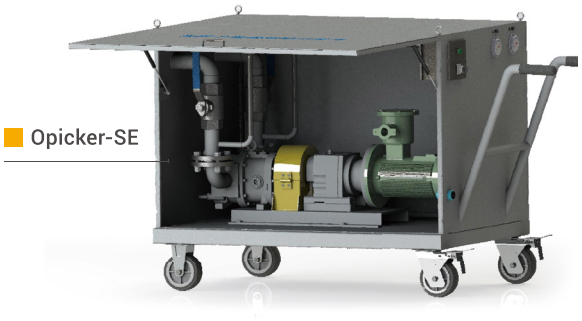


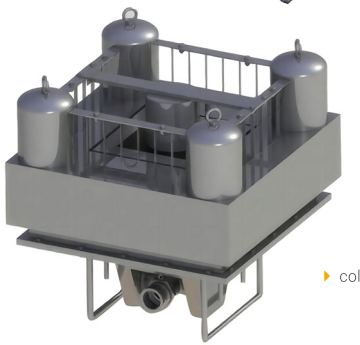
# 2 Wastewater Treatment Equipment

# Opicker®
# Floating Oil Recovery System




The system consists of two parts: oil collection and oil-water separation, utilizing the difference in density between oil and water to recover floating oil on water. It is a purely physical treatment process utilizing the principles of laminar flow and gravity separation. It can be used as an oil collector as well as for separating liquids with different specific gravity. It is a new type of energy-saving, environmentally friendly and efficient oil-collecting equipment, which can bring economic and environmental benefits.

## Equipment Technical Process

- The floating skimmer floats naturally on the water surface, close to the shore. The floating skimmer is connected via a hose to an oil-water separation unit on shore. The system utilizes negative-pressure vacuum technology to draw the oil-water mixture into a separation tank, where the oil-water mixture is then separated.
- After the separation unit is filled with mixed liquid, the vacuum pump stops working, and the pump will automatically start to return the separated water to the sewage collection pool or tank, while the mixed liquid is constantly being fed into the separation unit.
- The separated oil is concentrated in the oil storage chamber through the preset flow path. When the level of the oil tank reaches a high level, the induction device will automatically start the oil pump and transfer the oil to the oil storage container (oil drum or oil tank). When the oil in the oil tank drops to the low level, the oil pump stops working, and when the oil reaches the high level, the oil pump will start again.

## Application Field

It can be widely used in oil refining, petrochemical, metallurgy, mechanical engineering and other industries for the treatment of oily wastewater containing motor oil, diesel, lubricating oil and vegetable oil.

## Technical Advantages

| | |
|---|---|
| 01 | High efficiency of floating oil collection |
| 02 | Free-installation |
| 03 | Without wearing parts |
| 04 | Full automatic movement |
| 05 | Automatic oil discharge |
| 06 | Clean and tidy workplace |
| 07 | Long service life |
| 08 | Compact and lightweight floating skimmer |
| 09 | Easily maintenance |

## Technical Features

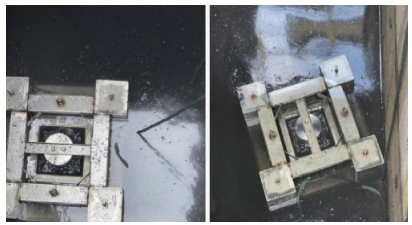
- Reasonable structure design, light weight, compact size, easy to operate, mobile type, space saving, reduce energy consumption.
- The oil slicks are collected by the overflow mode, and the overflow layer always maintains dynamic balance without manual adjustment, and the oil-water mixture collected contains a high proportion of oil.
- A secondary separation device is added to the system to improve the purity of recovered oil.
- The system adopts negative pressure suction and vacuum auxiliary system, which has high speed of oil collection, high collection efficiency, and the oil slick collection rate more than 99%.
- The floating skimmer is equipped with a filter screen to avoid floating debris blocking the device and ensure the stable operation of the system.

## Project Case

### The Collection of Floating Oil in a Petrochemical Plant

Information: A petrochemical plant's oily sewage storage pool contains light oil and a large number of oily floccules, the oil layer thickness nearly 10mm. It is necessary to recycle the oil layer to reduce the volatilization of VOCs.

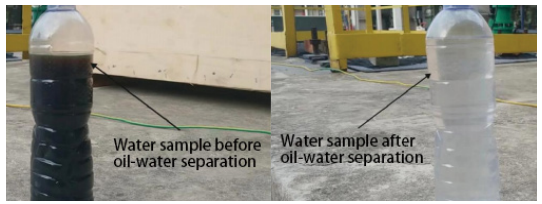
There is an oil slick on the surface of the water in the wastewater pond as shown in the diagram. The color is black and the water is opaque. There is a pungent odor in the pool and a large amount of oily floc floating on the water surface.



Panoramic view of oily wastewater

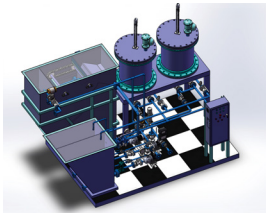
Inside oily waste water

During the operation of the floating skimmer, the oil floating on the water surface and the oil like floc are recovered simultaneously. After 2 hours of operation of the equipment, the oil slick on the water surface has been collected, the water is transparent and clear, and the pungent odor is significantly reduced.




Floating oil recovered and separated by Opicker system (water and oil)

# Isplitter
# Graphene-Based Oil-Water Separator


## Demonstration of Oil-Water Separation Process

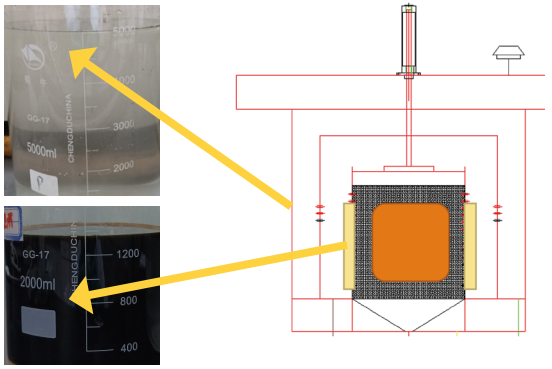



A special process is adopted to make the graphene and adsorption material bounded, so that the adsorption material become oleophilic and hydrophobic. In addition, a simple extrusion/back blowing technology is used to completely regenerate the adsorption materials for reuse and reduction of solid waste.

## Technical Advantages

- It has a good removal effect on floating oil, emulsified oil, and partially dissolved oil in water;
- The core oleophilic and hydrophobic adsorption material is reusable and has a long service life;
- No need to add excess chemicals, the regenerated oil has a low moisture content and can be recovered;
- High adsorption rate, capable of adsorbing crude oil up to 120 times its own weight;
- High oil phase desorption rate;
- The regeneration of adsorbent materials is simple, and can be completed by extrusion or reverse blowing, with low energy consumption.

## Saturation Regeneration of Sponges




## Application Field

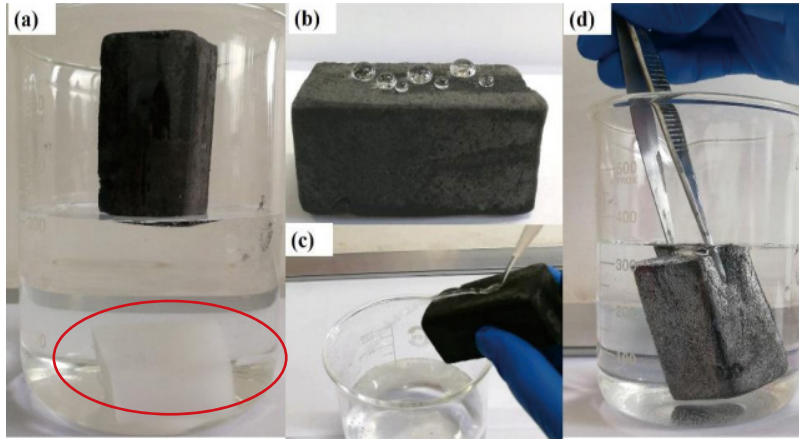
▪ Food Processing and Production Industry

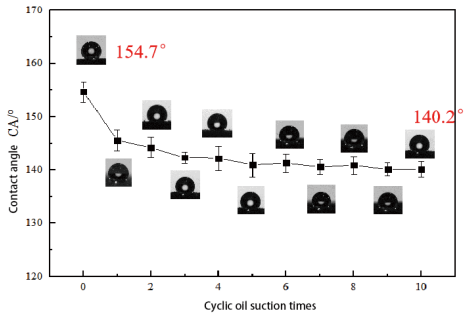
▪ Metal Smelting Industry

▪ Petrochemical Industry

▪ Chemical and Pharmaceutical Industry

## Wettability of Materials



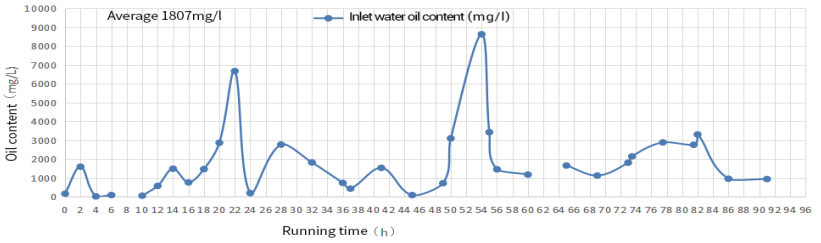

The blank sponge and the graphene sponge were placed in pure water at the same time, and the blank sponge rapidly absorbed water and swelled up and sank to the bottom; the latter floated completely on the surface of the water, and no water absorption occurred. The water droplets were spherical on the surface of the graphene sponge, similar to the surface of a lotus leaf, and could roll back and forth.

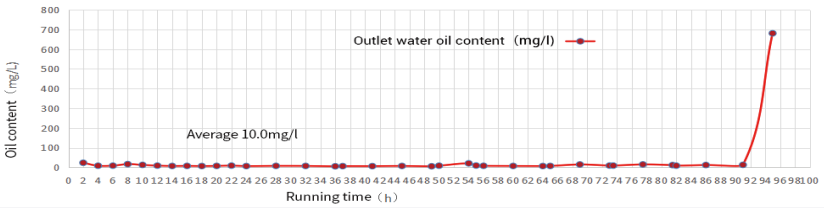
Project Case

## Continuous Operation Parameters

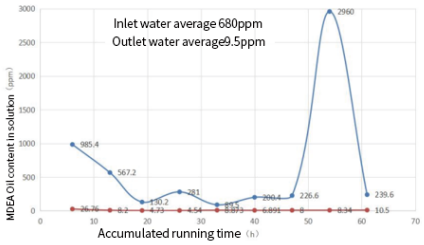

## Comparison of Oily Wastewater Treatment Before and After

- Continuous operation time: 103h;
- Oil content of influent water: 80~8600mg/L, average value at 1800mg/L;
- Oil content of effluent: ~10mg/L.
- Oil removal rate: 85~99%, the average value is 97.2%.




## An Amine Solution Treatment Unit of a Refining Company

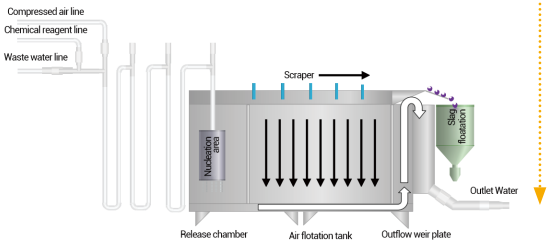



The average oil content in the amine solution is 631mg/L (with a fluctuation range of 89~3000mg/L), and the average oil content in the effluent is 9.6mg/L (with a fluctuation range of 4.5~10mg/L). The average oil removal efficiency is 96.6%, with a maximum of 99.7%.

# Eddyflo®
# High Efficiency Air Flotation System

## Technical Process

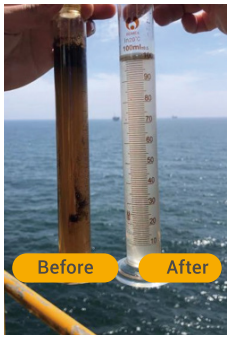
- Coagulation
- Oil slick/Oil sludge adjustment
- Circulation Flocculation
- High Pressure Dissolved Gas
- Stretching Chemical Agent
- well-mixed




## Technical Advantages

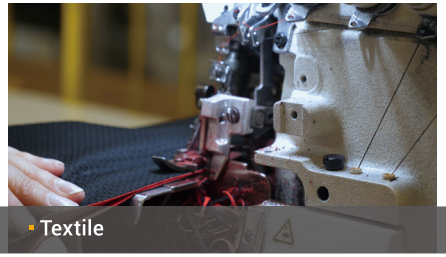
- High treatment capacity;
- Outlet of oil content <50mg/L;
- Outlet of TSS <50mg/L;
- High chemical utilization rate (saves >20%);
- Small Size & Less Footprint, around 20% of Traditional Device;
- Low moisture content in floating sludge;
- Automated monitoring and control.

The gas dissolution component and the dosing component, a breakthrough improved from the conventional air flotation technology, are integrated, not only making the gas dissolved better, but also reducing the footprint and investment cost. It is mostly used for oil-water separation of produced water in oil production and can replace the traditionally used inclined plate and air flotation device.




## Application Field


Petrochemical


Textile


Leather


Dairy Food


Frozen foods


Biodiesel


Coal


Baking


Mining

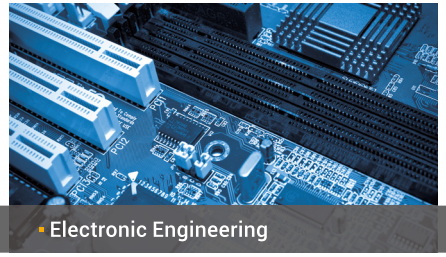

Cement


Medicine


Papermaking


Printing & Dyeing


Oil & Gas Exploitation


Electronic Engineering


Metallurgy

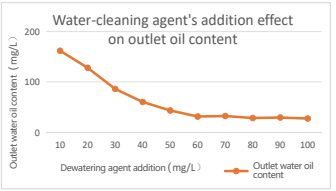
## Project Case

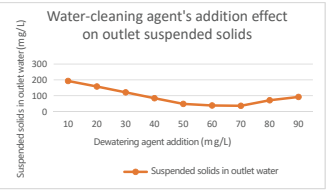
### CNOOC Offshore Platform - An Oil Production Platform

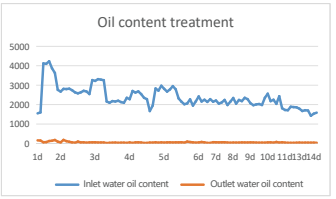
- Design input capacity: 5000m$^3$/d (oilfield production water), Inlet oil content: 4000ppm, TSS: 500ppm; After treatment oil content <60ppm, TSS: <60ppm. Installation dimensions(L×W×H): 9mx3mx4.2m.
- Continuous operation .
- Service content: Design, Eddyflo system supply, installation, commissioning.
- Design input capacity: 5000m$^3$/d, after treatment oil content ≤60ppm, TSS≤ 60ppm .

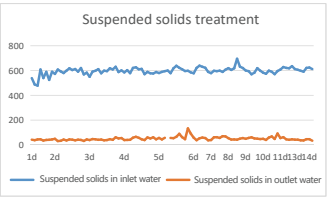
| Eddyflo -High Efficiency Air Flotation System | | | | |
|---|---|---|---|---|
| No. | System unit | Footprint (m$^2$) | Net Weight (T) | Operating Weight (T) |
| 1 | Air flotation tank | 19.82 | 7.6 | 52 |
| 2 | Sludge buffer tank skid | 8.3 | 2.4 | 9 |
| 3 | Inlet pump skid | 15.35 | 3.5 | 4 |
| 4 | Discharge pump skid | 7.96 | 1.8 | 2.2 |
| 5 | Chemical injection skid | 10.7 | 5 | 10 |

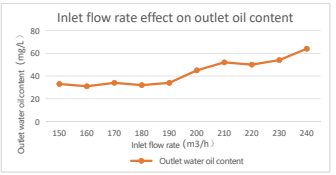
## Water-cleaning Agent's Addition Effect on Outlet Oil Content

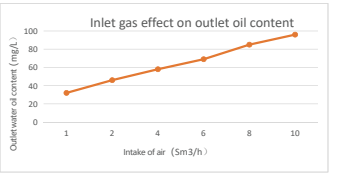


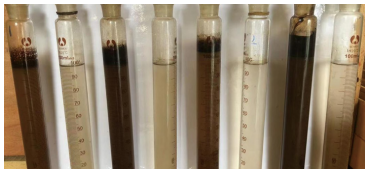



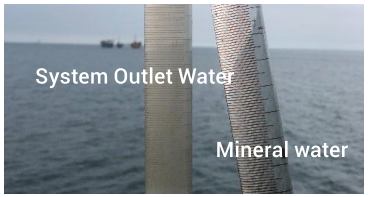



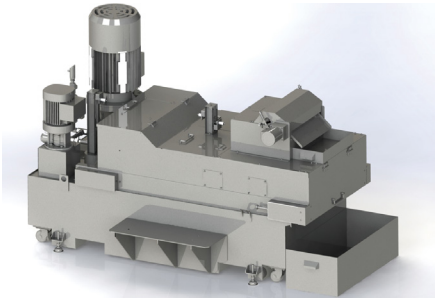



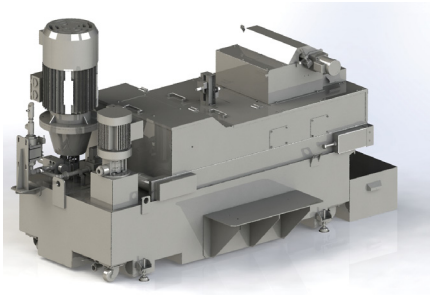



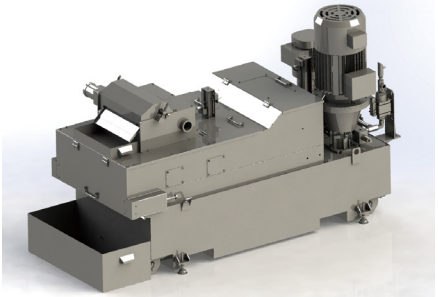



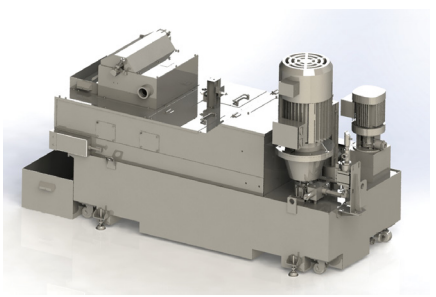



# Aquasolid®
# Solid-Liquid Separation and Drying System









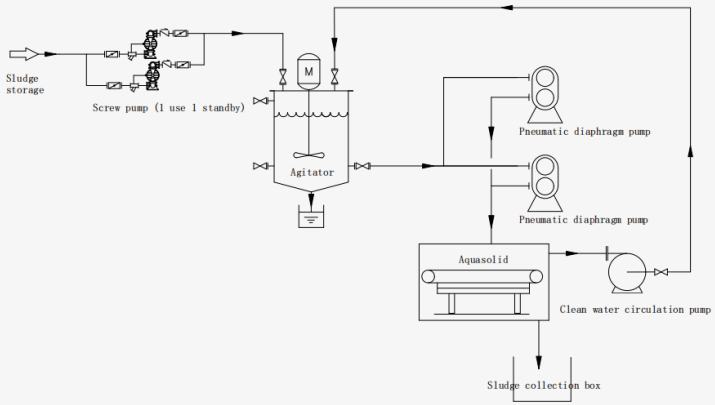
Aquasolid is a kind of solid wastewater pressure filtration equipment, suitable for the filtration treatment of solid wastewater in various industries such as coolant filtration in machining industry, wastewater treatment and heavy metal recovery in electroplating industry, wastewater treatment in food processing industry, wastewater treatment in petrochemical industry, glass industry, mining industry, building materials industry, etc.

Aquasolid can be customized according to different requirements and can remove particles larger than 0.5 μm. Its system is sturdy in design, easy to maintain, and can achieve long-term automated operation.

## Technical Advantages

- Low pressure filtration with maximum pressure 0.3MPa;
- Modular design, which covers a small area and easy to assemble;
- Mechanical parts and their components or local components have good interchangeability;
- Highly automatic, easy to maintain;
- No chemicals are required, and compared to similar products, the operating and maintenance costs are much lower.

## Process Flow Diagram



## Application Field

▪ Cooling fluid filtration in machining plants

▪ Water treatment system for desulfurization units

## Project Case

▸ The treatment of bottom slurry of the desulfurization tower in a petrochemical company


▪ The treated sludge cake

# Ozone Generator

MSTN Ozone Generator is a solution for advanced oxidation processes, designed to produce high-purity ozone efficiently and reliably. Utilizing corona discharge technology, our generators convert oxygen ($O_2$) into ozone ($O_3$) with precision, catering to diverse industrial and municipal applications. The system integrates glass/ceramic dielectric tubes, IGBT frequency conversion power supply, and PLC automation, ensuring optimal performance, energy efficiency.

- Oxygen Source System

- Ozone Generator System

- Ozone Reaction Unit

- Exhaust Destruction Unit


- PLC Control System

## Process Flow

- Gas Preparation: Oxygen/air is purified (dew point ≤−55°C) and pressurized.
- Ozone Generation: High-voltage corona discharge splits $O_2$ into $O_3$in cooled dielectric tubes.
- Reaction: Ozone is injected via:
- Jet Venturi (for pretreatment) or Micro-bubble Diffusers (post-treatment).
- Destruction: Residual ozone is thermally/catalytically decomposed to $O_2$.

## Technical Advantages

### High Efficiency & Low Energy Consumption

- ≤7.0 kW/kg$O_3$ power consumption with patented glass/ceramic tubes.
- IGBT high-frequency power supply (3,000–5,000 Hz) ensures stable output and power factor ≥0.92.

### Durability & Safety

- Corrosion-resistant materials (SS316L) and multi-segment discharge design for uniform ozone production.
- Independent fuse protection and low-voltage discharge enhance operational safety.

### Smart & Adaptive

- Fully enclosed air-conditioned cabinets (IP55) withstand extreme environments.
- PLC control with remote IoT monitoring for real-time adjustments (constant concentration/flow modes).

### Compact & Modular

- Skid-mounted designs save space; optional catalytic tail gas destructor ($O_3$ ≤0.1 ppm).

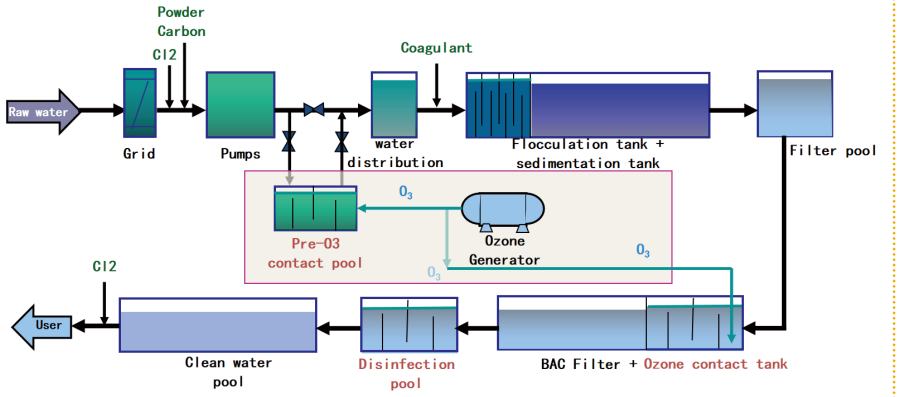
### Diverse application

- Remove TOC, COD, decolorization, and deodorization in municipal water supply and wastewater treatment, and can also be used in metallurgical & refining to remove NOx.

## Application Field

| | | |
|---|---|---|
| Municipal Water Industry | Steel, Coal Coking Industry | Wastewater Plant Industry |
| Landfill leachate Industry | Petroleum, petrochemical Industry | Textile, printing and dyeing Industry |
| Flue Gas DeNOx Industry | Papermaking wastewater Industry | Chemical Oxidation Industry |

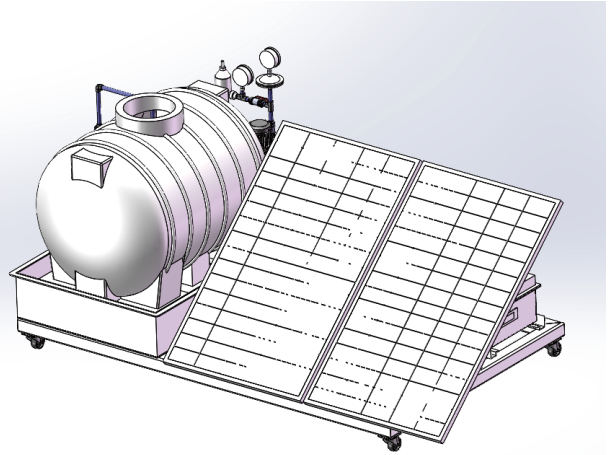
## Ozone Application in Drinking Water Deep Treatment

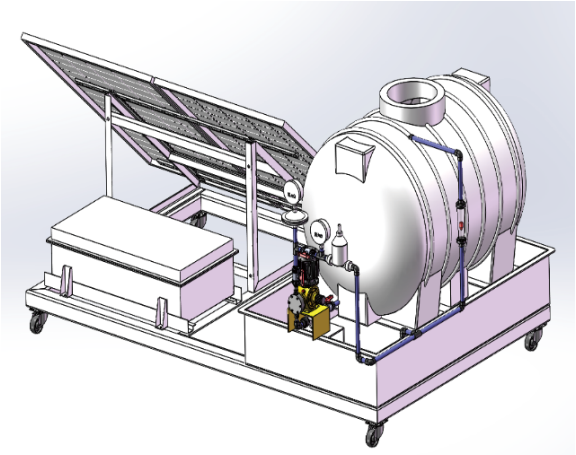



**Water plant ozone dosing section:**Pre-oxidation & Deep Oxidation, Disinfection.

01. Pre-oxidation: removes inorganic color, turbidity, suspended solids, odor and taste, partially decomposes organic matter and inactivates microorganisms, and helps to accelerate flocculation, shortening the flocculation time from 20min to 10min.
02. Back-end oxidation: decomposes toxic micropollutants, removes dichloromethane precursors, and improves the biodegradability of organic pollutants. Often used in combination with biological activated carbon (BAC)
03. Final disinfection: inactivates residual microorganisms, minimizes by-products of disinfection, and does not produce harmful substances.

# Solar Chemical Injection System





The solar chemical injection system converts solar energy into battery chemical energy, generates current through monocrystalline silicon to charge the energy storage battery, and converts DC power into AC power through an inverter to provide power for electrical equipment such as metering pumps. The metering pump is continuously dosing without the need for utility power. Solar energy can be used for continuous operation in the wild or areas without utility power.

## Technical Advantages

- The solar photovoltaic panels are in the form of monocrystalline double-glass, arranged side by side, and the number of solar panels is designed according to the power of the power-using equipment. The solar photovoltaic panels are connected to the battery through a controller.
- The controller can effectively track the maximum point of light power and prioritise the input to ensure that the maximum output of power generated is charged for the battery.
- The controller can control the charging power of the PV panels to ensure that it is within a safe range, and it can also monitor the battery voltage and other data to provide the user with historical operating data.
- The controller can be integrated with the communication module, and users can monitor and control the operation of the equipment in cloud through 5G network.

## Specifications

| Models | Solar Panel/W | Batteries | | Dimension(L*W*H)/mm | Volume/$m^2$ | Output pressure max/psi | Output flow rate/L/min |
|---|---|---|---|---|---|---|---|
| | | v | Ah | | | | |
| MSTN-SCL-500 | 500 | 24 | 150 | 2400*1500*1000 | 1 | 1800 | Customised |
| MSTN-SCL-1500 | 1500 | 24 | 500 | 3500*1300*3600 | 1.5 | 1800 | Customised |
| MSTN-SCL-2000 | 2000 | 24 | 1000 | 3700*1800*2000 | 2 | 1800 | Customised |

# Cooperation Advantages

01

**Design&Manufacturing**

Advanced design and manufacturing capabilities ensure performance, quality, and delivery time.

02

**Flexible&Customized**

Flexible cooperation mode and customizable technical solutions.

03

**Technical Service**

Professional technical service team to provide Installation, commissioning, and training service.


04

**Experience**

500+ completed projects with rich experience in overseas projects.

05

**AI intelligent system**

MSTN independently developed AI intelligent monitoring and analysis system.

# Main Partners

Developing and Protecting, Earth Life Better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