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

Product Brochure

Flue Gas Treatment

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

DeSOx Technology

Wet DeSOx and Dust Collection Technology

It is a wet flue gas alkali washing process and can not only efficiently remove SOx, but also the particulates in flue gas to a large extent. Each functional area is built with independent modules which may be tailored according to project requirements, to make the project technically advanced and economic.

At present, more than 70 systems have been successfully operated in China, including treatment of SOx and dust from catalytic, coal-fired and oil-fired boilers, MTO and other flue gas emission plants.

Technical Advantages

- Realizing desulfurization, denitrification, dust removal, mist removal and other functions at the same time.
- Dust can achieve ultra-clean emissions of less than 5mg/Nm³.
- Cope with high temperature, run-off and other special working conditions.

Para.	Inlet	Outlet
Flue gas flow rate, Nm³/h	460,000 wet basis	
SO_2 mg/Nm³	1,800 wet basis	≤95 dry basis
Dust mg/Nm³	Up to 540 dry basis	≤45 dry basis

3,300,000 t/a Catalytic Cracking Regeneration Flue Gas Desulfurization and Dust Collection Project of a CNPC Petrochemical Company

M·Dwave® Reverse Jetting Technology

M·Dwave system is a wet alkali washing process, featured by simple design and low maintenance. It can not only desulfurize the flue gas and treat the wastewater in one column, but make the flue gas load fluctuation under well control.

At present, more than 20 systems have been successfully operated in China, including treatment of exhaust gas from sulfur recovery, acid water stripping and other plants.

Technical Advantages

- Withstand flue gas load of 30-130%.
- Withstand normal and high sulfur conditions with automatic system switching.
- Efficient waste heat utilization system, no white smoke and rain generation.

Para.	Inlet	Outlet
Flue gas flow rate, Nm³/h	90,000 wet basis	
SO_2 mg/Nm³	Up to 30,000 wet basis	≤60 dry basis

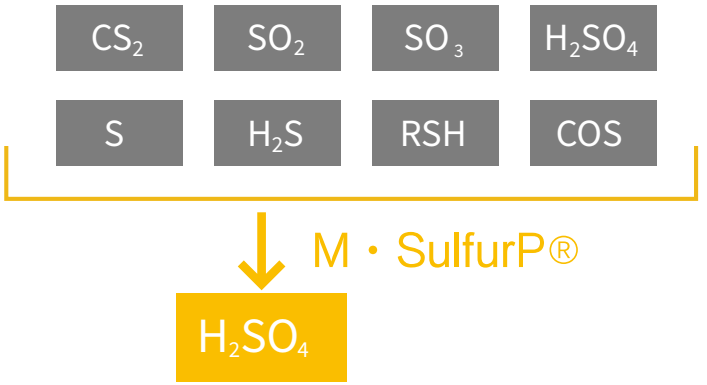
270,000 t/a Sulfur Recovery Plant Exhaust Gas Purification Project of a CNPC Petrochemical Company

M·Sulfurp® Acid Gas Treatment/Waste Acid Recovery Technology

This process converts sulfide in sulfur-containing waste gas into 98% concentrated sulfuric acid. Its great advantage is not only to deal with different concentration (high to low) of acid gas but also the complex impurities in acid gas.

Technical Advantages

- It produces 98% concentrated sulfuric acid, which has economic value.
- No other chemical or consumption.
- No waste liquid, waste residue, etc.
- The system converts SO_2 to 98% concentrated sulfuric acid eventually.
- System heat recovers by-product steam.

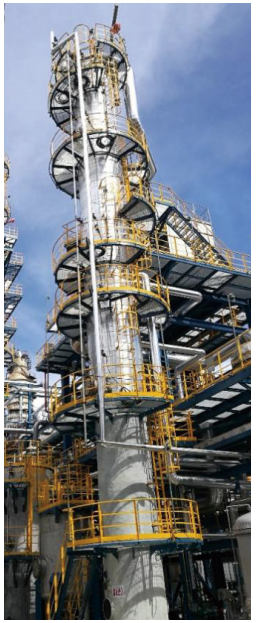


M·Sorb® Sulfur Dioxide Recovery Technology

This process uses the organic solvent to absorb SO_2 in flue gas and recycles it. It consists of pre-scrubbing, absorption, and solvent regeneration. The recycled SO_2 may be used as raw material and fed to sulfur and acid production plants.

Para.	Inlet	Outlet
Flue gas flow rate, Nm^3/h	72,000 wet basis	
SO_2 mg/Nm^3	22,770 wet basis	≤70 dry basis

150,000 t/a Sulfur Recovery Plant Exhaust Gas Treatment Project of a SINOPEC Petrochemical Company



M·HyPerO® Hydrogen Peroxide Oxidation DeSOx Technology

This process uses hydrogen peroxide as an absorbent to absorb SO_2 in flue gas to produce valuable sulfuric acid.

It is mainly applied in acid industry, such as WSA gas emission cleaning treatment.

Para.	Inlet	Outlet
Flue gas flow rate, Nm^3/h	18,000 wet basis	
SO_2 mg/Nm^3	1,270 wet basis	≤100 dry basis

WSA Exhaust Gas Treatment Project of a Chemical Plant in Shanghai

H_2S Removal Technology

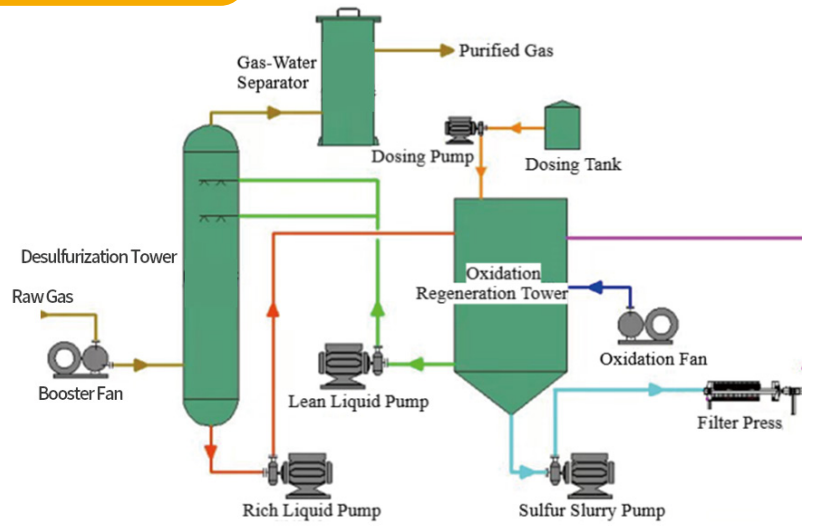
Complex Iron H_2S Removal

Complex iron H_2S Removal technology is a wet oxidation method that uses complex iron as a catalyst to remove hydrogen sulfide. Its characteristic is to directly convert H_2S into elemental S, and the treated H_2S content to less than 10ppm. It is a new type of desulfurization technology with simple process, high sulfur capacity, and environmentally friendly and non-toxic characteristics.

Principle of Reaction

- **Desulfurization Reaction** $H_2S + 2Fe^{3+} \rightarrow 2H^+ + S\downarrow + 2Fe^{2+}$
- **Regeneration Reaction** $1/2O_2 + H_2O + 2Fe^{2+} \rightarrow 2OH^- + 2Fe^{3+}$
- **Total Reaction** $H_2S + 1/2O_2 \rightarrow H_2O + S\downarrow$

Process Flow Diagram



Common Scale

Gas volume (Nm^3/h)	Inlet H_2S (ppm)	Outlet H_2S (ppm)	Inlet Pressure (kPa)	Power (kW/h)	Size (m)
10000	5000	10	10	11.5	3×6
20000	5000	10	10	13.5	3×8
30000	5000	10	10	17	3×10
40000	5000	10	10	19	3.5×16
50000	5000	10	10	26	4×17.5

Technical Advantages

Simple Process

The treatment process is simple, utilizing a one-step method to rapidly oxidize H_2S directly into elemental sulfur (S). It achieves high H_2S removal efficiency, can reduce H_2S to below 10 ppm.

Strong Anti-Fluctuation Capability

The system automatically handles fluctuations without manual intervention, ensuring stable desulfurization rates under variable conditions.

Low Operating Costs

The complex iron catalyst is regenerable and reusable, with no side reactions, significantly reducing OPEX.

High Sulfur Loading Capacity

The complex iron catalyst have high sulfur capacity. Can significantly reduce the amount of circulating fluid, reduce equipment size, and save investment and operating costs.

Effective Organic Sulfur Removal

Capable of removing organic sulfur compounds (COS and mercaptans).

Compact & Skid-Mounted Design

The system has a small footprint, making it ideal for skid-mounted deployment, especially suited for small-scale projects.

High Safety & Environmental Benefits

The iron-chelate catalyst is non-toxic and harmless to humans and the environment.

Near-zero waste Emission

The system produces no waste gas, solid waste, or liquid effluent.

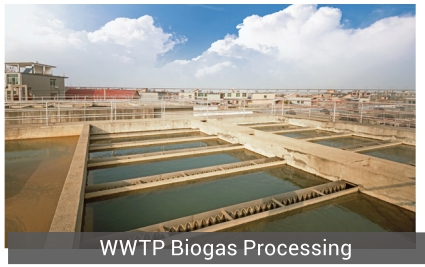
Applications

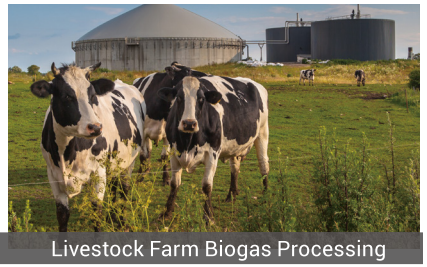

Natural Gas Processing


Petroleum Refining


Biogas Treatment


Landfill Gas Treatment


WWTP Biogas Processing


Livestock Farm Biogas Processing


Food Waste Biogas

DeNOx Technology

Low Temperature Ozone Oxidation DeNOx Technology

This process uses ozone to oxidize NOx in flue gas into N_2O_5 which is effectively removed by an alkali washing system. It is very suitable for wet flue gas desulfurization system due to its high adaptability, minor modification and low investment cost. At present, more than 20 systems have been successfully operated in China.

Technical Advantages

- It is suitable for normal temperature flue gas atmosphere.
- Its DeNOx efficiency is more than 90%.
- It may be started or stopped as needed.
- It consumes no chemicals.

Para.	Inlet	Outlet
Flue gas flow rate, Nm³/h	350,000, wet basis	
NOx mg/Nm³	220 dry basis	40 dry basis

A 3,400,000 t/a Catalytic Regeneration Flue Gas DeNOx Project of a SINOPEC Petrochemical Company

M·SNCR DeNOx Technology

This process uses NH_3 as a reductant to convert NOx in flue gas into N_2 and H_2O in a high temperature environment. It is suitable for the system that has a flue gas temperature above 800℃ and a low DeNOx efficiency.

Technical Advantages

- The reaction temperature should be above 800°C.
- Reconstruction of furnace is simple, requiring a small quantity of work.
- It has a DeNOx efficiency of 40~60% and can be used together with other DeNOx processes to achieve a higher efficiency and reduce the investment cost.

Para.	Inlet	Outlet
Flue gas flow rate, Nm³/h	350,000 wet basis	
NOx mg/Nm³	150 wet basis	80 dry basis

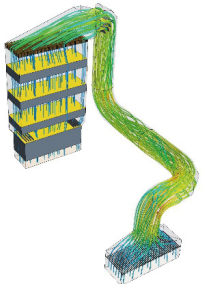
2×310 t/h Power Boiler Flue Gas Denitrification Project In a Refining Company of Sinopec

M·SCR DeNOx Technology

This process uses NH_3 as a reductant to convert NOx into N_2 and H_2O under the action of catalyst.

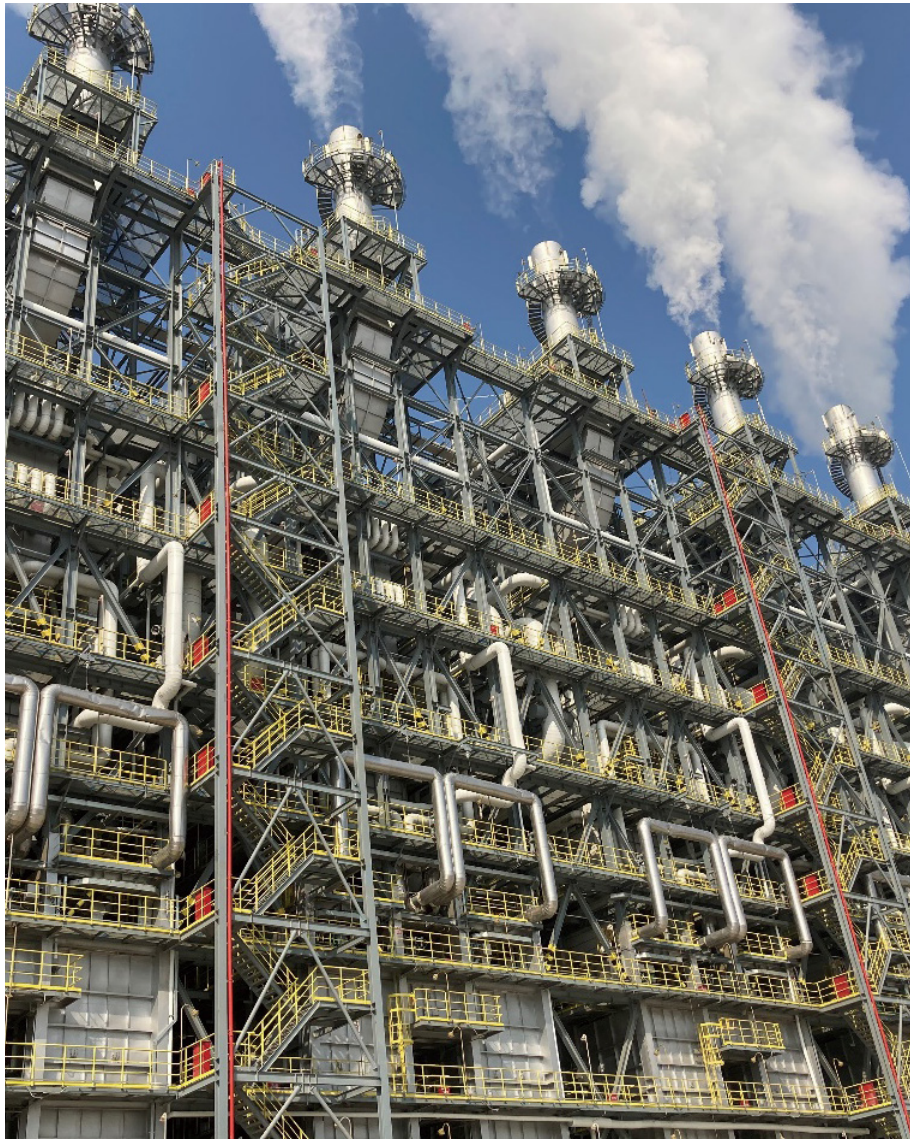
Technical Advantages

- The DeNOx catalyst has a wide reaction temperature range from 150℃ to 550℃ .
- Flow field simulation makes the overall design optimized.
- It produces no secondary pollutants.
- It has a high DeNOx efficiency, meeting the cleaning emission standard.
- It is easy to reconstruct and requires a small quantity of works.



Para.	Inlet	Outlet
Flue gas flow rate, Nm³/h	175000 wet basis	
NOx mg/Nm³	100 wet basis	35 dry basis

1,000,000 t/a Ethylene Cracking Furnace (6 sets)Flue Gas Denitration Project of a Company .



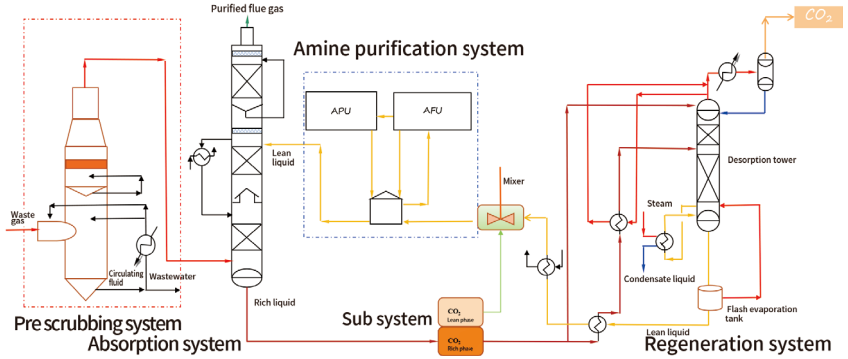
CCUS Technology

M · CO2C Carbon Dioxide Capture Technology

M • CO2C technology is a resource utilization technology for CO_2 capture developed by MSTN based on years of experience in acid gas treatment, combined with the use of specially developed high-efficiency absorbents. Compared with traditional alcohol amine absorbents, the two-phase absorption process only sends the heavy phase enriched in CO_2 after phase separation into the desorption system, which greatly reduces the scale and energy consumption of the desorption tower.

Technical Advantages

- 95% absorption efficiency+1.8~2.2GJ/tCO_2 desorption energy consumption.
- Phase change absorbent patent: precise control of phase change boundary (20%~40%).
- Smart Image Recognition System: Real time monitoring of absorption liquid stratification status.



Para.	Traditional amine method	MCO2C technology
Desorption energy consumption (GJ/tCO_2)	3.5~4.0	1.8~2.2
Phase change control accuracy	Non	±5%Interface

Special absorbent: active amine+phase separation agent+active agent

Application

Coal-fired power plant(12% CO_2) Steel plant(8%~15% CO_2)

Application classification (by scale)

P Series Engineering Site Large Projects

F-series skid-mounted distributed processing Projects

Cases

The CO_2 capture block for flue gas with a capacity of 300Nm ³/h of an oil field coal-fired boiler for one oil field subsidiary

A special formula of amine solution was adopted in this project to achieve phase change absorption of CO_2, with an average CO_2 capture rate of over 95%. The heat balance and water balance were fully considered, with designs such as increasing inter stage cooling for absorption, increasing rich liquid splitting for desorption, and preheating rich liquid for tower top gas. A special structure of phase separator has been designed, and the phase interface is stable within the required range.

The Technical scheme for 200Nm ³/h flue gas CO_2 capture block in a university

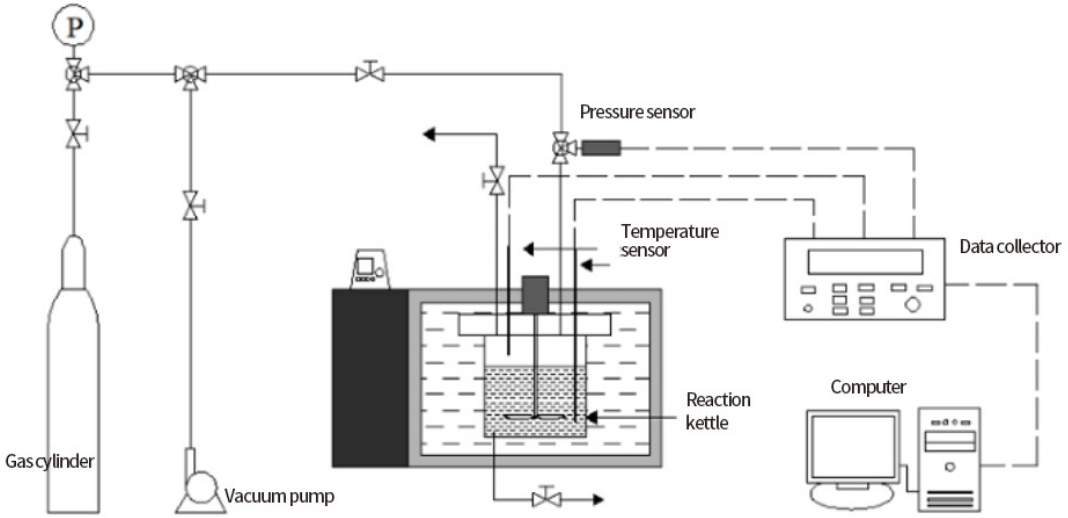
A special formula of amine solution was adopted in this project to achieve phase change absorption of CO_2, with an average CO_2 capture rate of over 95%. The heat balance and water balance were fully considered, with designs such as increasing inter stage cooling for absorption, increasing rich liquid splitting for desorption, and preheating rich liquid for tower top gas. A special structure of phase separator has been designed, an intelligent image recognition system has been added and the phase interface is stable within the required range.

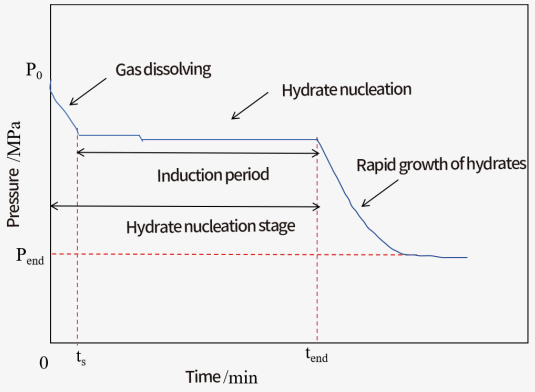
Hydrate Based Carbon Dioxide Capture Technology

Gas hydrates are crystals composed of water and gas under appropriate low temperature and high pressure conditions. Therefore, taking advantage of the large difference in phase equilibrium formed by different gas hydrates can effectively separate carbon dioxide from flue gas. MSTN adopts a special structure of microchannel mixer to fully contact the gas-liquid and improve the absorption rate by 83% wt~99% wt, and uses microwave-assisted to further improve the desorption rate.

Technical Advantages

- 83%~99% absorption rate+desorption at room temperature and pressure.
- Microchannel mixer: gas-liquid contact efficiency increased by 40%.
- Microwave assisted desorption: energy consumption is only one-third of traditional heating.





Pressure Time Curve during the Formation of CO_2 Hydrates

Cases

LNG Cold Energy Coupling Project | Ship Exhaust Gas Treatment

Hydrate based CO_2 capture has significant advantages in specific scenarios, such as high and low concentration CO_2 sources and excess cold energy areas. LNG cold energy provides a natural low-cost cold source for hydrate based CO_2 capture, especially suitable for industrial emission sources near coastal LNG receiving stations.

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

Tel:(0086-10) -65862969
Fax:(0086-10) -65923846
Website:www.mstn.com.cn www.mstnland.com
Address:5rd Floor, Fu Xing Business Building B, HeTaoYuan No.30, GuanDongDianBeiJie,ChaoYang District,Beijing, P.R.China

Website

WeChat Public Account

* First Edition 2026