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LEADING ENVIRONMENTAL & WATER SOLUTION PROVIDER

HANSUNG CLEANTECH CO., LTD

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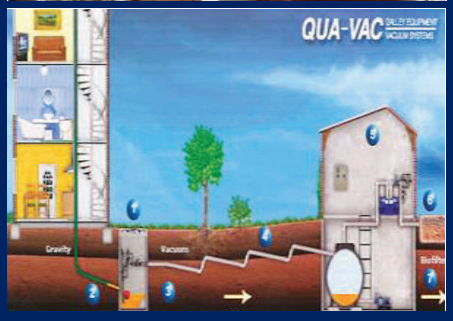


HASCO
Sustainable Water Solutions

Hansung Cleantech Co.,Ltd (HASCO) is a full service environmental consulting and management company, which providing engineering, manufacturing, constructing service to the clients to maximize profits and mitigate risks, while minimizing their ecological footprints. Since 1990, HASCO has been a leading company of innovated water and wastewater treatment technologies servicing a global market place with over 20 years of experience with wide range of project worldwide.

HASCO's philosophy is to provide the highest quality service at the most cost effective price to assure that the client's objectives are met. To meet this commitment to excellence, HASCO has provide effective solutions for sustainability, reuse and reclamation with outstanding, experienced and high educated technical staffs.

Our mission is to offer private industries and municipalities the most advanced, efficient, and cost effective project design available. Our expertise in environment project design will provides you with low maintenance, prolonged efficient systems.

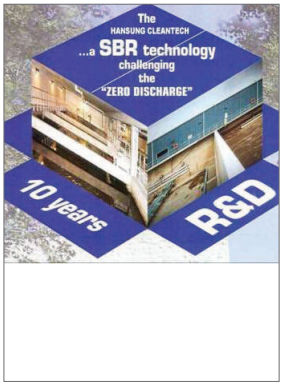
HASCO is currently committed to the highest efficiency in water and wastewater treatment systems fully compatible with the goal of "Sustainable Development" of industrial activities.

We invite you to contact our worldwide project installations.

HS-MBR SYSTEM

HS- UPW Water

Ion Exchanger Unit



HS-SBR System

Vacuum Sewage
Collection system

HASCO Integrate Technologies

DESALINATION & DRINKING WATER PRODUCTION, DEMINERALISATION & CONDENSATE POLISHING, COOLING WATER TREATMENT & FILTRATION, MUNICIPAL & INDUSTRIAL WASTEWATER TREATMENT

MUNICIPAL WASTEWATER TREATMENT & INDUSTRIAL WASTEWATER TREATMENT

DESALINATION & DRINGKING WATER PRODUCTION

FILTRATION PROCESSES

- Deep Bed Filtration
- Dual Media & Multimedia Filtration
- Gravity Self backwashing Filteration
- Granular Activated Carbon Filteration
- Ion & Manganese Removal
- Pre-Coat Filteration

ION EXCHANGER

- Multistep Deionisation
- Packed & Fluidised Bed Ion-Exchange
- Mixed Bed Ion- Exchangers

MEMBRANE PROCESES

- Reverse Osmosis(R/O)
- Electro Deionization(EDI)
- Membrane Degassing
- Micro Filtration(MF)
- Ultra Filtration(UF)

CHEMICAL PHYSICAL PROCESS

- Oil & Grease Separation(API, CPI)
- Coagulation & Flocculation
- Gravity & Lamella Separator
- Dissolved Air Floatation(DAF)

BIOLOGICAL PROCESSES

- Activated Sludge
- Membrane Bio- Reactor(MBR)
- Sequencing Bath Reactor(SBR)

VACUUM SEWAGE COLLECTION SYSTEM

- Vacutlow collection
- Rain station
- Storm water Filtration

Membranes Technologies

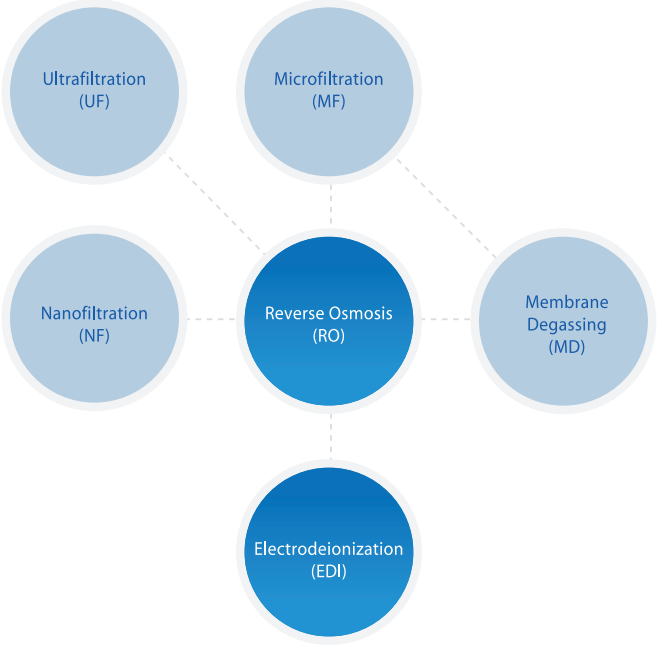
Membrane separation is one of the fastest growing

Processes and has many applications in water and effluent treatment.

Reverse osmosis and electro-dialysis are well established technologies and ,with the addition of ultrafiltration, microfiltration and membrane electrolysis, membrane technologies covers the complete spectrum of contaminant size from suspended particles through colloids and organic macro-molecules to dissolved ionic specifies with the addition of ultrafiltration, microfiltration, and membrane electrolysis.

HASCO Water treatment technologies have a rich experience in all these membrane separation technologies, and we are able to advice which process is the most suitable to solve a specific particular problem.

Available membrane-separation technologies:



Membranes Technologies

Reverse Osmosis

Reverse Osmosis is widely used for the desalination of blackish water, sea water for potable use, and municipal and Industrial area.

Reverse Osmosis is widely used for the following fields;

- Potable water for municipal & Industrial supply
- Process boiler feed and cooling water
- High purity water for special applications in the electronic, semiconductor, pharmaceutical and chemical industries
- Demineralized water
- Recycling of process water
- Municipal and wastewater treatment
- Desalination water treatment

Reverse Osmosis plant

Micro-Filtration

Crossflow microfiltration achieves higher flux rates than traditional membrane filtration techniques do. They can be done by limiting the build up of filtered solids on the membrane surface. It does this by means of a high fluid velocity at right angles to the membrane surface which sweeps away accumulated solids.

Applications

- Oily water
- Removal and recovery of metal hydroxides
- Sterilization of solutions
- Clarification of solutions
- Recovery of valuable suspended or emulsified substances
- Pretreatment for reverse osmosis process

Ultra-Filtration

Ultrafiltration is membrane process used to remove impurities on the basis of molecular size. The separation is achieved by the none - permeable membranes for particles above a certain molecular weight. Dilute solutions can be concentrated by recycling techniques on a batch basis. Compared with reverse osmosi, the trans membrane pressure of the pressure of the process is quite low, typically 1.5-3 bar

Applications

- Recovery of proteins from whey
- Wastewater treatment
- Ultra pure water production
- Pyrogen free water
- Concentration of plating solutions, ell harvesting, etc.

Ion Exchanger

HASCO water treatment systems have a good reputation In the application of ion exchange techniques for boiler Feed water and process water treatment.

Among the processes, there are base exchange water Softening, de-alkalization and complete demineralization using conventional two bed systems with co-or counter-current regeneration, stratified bed units utilizing combinations of weak and strong resins in the same unit, and mixed bed polishing units with two or three components.

A major development by HASCO systems is a special counter flow regeneration system.

HASCO Water systems also specialized in condensate treatment packages suitable for both internal and external regeneration, using own exclusive designs.

A combination of several techniques such as reverse osmosis, ion exchange, disinfection and microfiltration can be applied in installations to produce ultra-pure water for the electronics or semiconductor industries.

Demineralization

Demineral ization is the removal of minerals and nitrate from the water. Demineralisation can be achieved by a variety of methods, and HASCO provide the following technologies: Ion exchange, reverse osmosis, and electro-dialysis.

These methods are widely used for water and wastewater treatment. Ion exchange is primarily used for the removal of hardness ions like magnesium and calcium and for water demineralization. Reverse osmosis and electrodialysis, which are both membrane processes, remove dissolved solids from water using membranes.

Desalination

Desalination is increasingly being used for potable water production and as a means of producing high quality industrial process water around the globe. Desalination is also an important process for offshore use, including oil rigs, naval use and cruise ships.
Wherever desalination is required.

HASCO have the experience and technical know-how to deliver desalination systems, whether they are for permanent, temporary or niche installations such as HASCO's range of transportable water production units.

Application

Well water treatment
Surface water treatment
Sea water treatment & desalination

Advantage

Low-cost fresh water supply
Minimal environmental impact
Energy efficient desalination methods

HASCO Expertise

comparison with groundwater or freshwater, preparing potable water from saltwater for consumption is an expensive, energy-intensive process. HASCO's innovative water management solutions make effective and efficient use of the water and the energy required to treat it.

HASCO's specialists in desalination are familiar with overcoming all the challenges of reliable, quality water production from saline sources and the particular requirements for the pre-treatment of influent water to give long, effective membrane life. HASCO has the experts who can help design a suitable plant tailored to your desalination needs.

Semiconductor/ Electronics

The fabrication of semiconductor devices requires large volumes of ultrapure water (UPW) and generates vast quantities of wastewater. Only the purest possible water is acceptable for use in semiconductor manufacture.

HASCO's technologies remove impurities from water at the limits of their detection with an ultimate reliability.

HASCO provides complete solutions as following section

- Ultrapure Water Treatment
- Pre-treatment
- Make-up Section
- Polishing Section
- Distribution Loops
- Reuse, Reclaim and Recycle of Waste Water
- Treatment of Wastewater



Rinse Water Recycling

Recirculation systems for rinsing water and processes require high quality. In surface treatment lines, two-stage or more rinsing steps are generally applied. In the first stage, the parts are rinsed with a small amount of water to reduce the amount of wastewater to be cleaned. In the second stage, a large amount of water is recirculated, passing through ion exchangers that remove dissolved mineral salts. HASCO's expertise and technologies in this field enables us to provide the most economic and effective rinsing stages. Economical processes and process combinations

- Microfiltation
- Ultrafiltration
- Nanofiltration
- Reverse Osmosis

Benefits of a long-term Commitment to Water Reuse

Complementary Applications:

- Biological Aerobic Treatment
- Chemical Physical Wastewater Treatment
- Disinfection
- Zero Liquid Discharge

HASCO Integrate Water Solution Industries

Integrated Solutions

HASCO integrated water solutions range from engineering & equipment supply and supervision, installation to the integration of complete systems combining the solution technologies in variety of industries ;

- Power Generation
- Electronics
- Pulp & paper
- Semiconductor
- Food & Beverage
- Oil & Gas
- Metal Treatment & Automotive
- Municipal Wastewater treatment
- Sanitary Water Treatment



" Integrity Water Solutions for all your water & wastewater solution needs."

We have water & wastewater treatment systems such as Municipal wastewater, Sanitary water, Industrial water & wastewater, and etc.
We always seek to achieve the best effort to ensure the highest level of project performances and to satisfy any requirement of our client.

We have been providing the world wide fields for over 20years for all kinds of technologies requirements.

We take full responsibility for project management and to provide equipments and solutions for the individual elementsof water and wastewater treatment system.


Biological Processes

Biological treatment is a more environmentally friendly wastewater treatment process than other wastewater treatment methods. Microorganisms feed on the complex materials which are present in the wastewater and turn the materials into simpler substances for preparing the water for further treatment Typical Biological applications are the following:

- Activated Sludge
- Membrane Bio- Reactor(MBR)
- Sequencing Bath Reactor(SBR)
- Expanded Granular Sludge Bed(EGSB)
- Auto-Thermophilic Aerobic Digester(ATAD)
- Sanitary Water Treatment

Activated Sludge

HNR System (HASCO BNR)

HASCO HNR Biological Nutrient Removal (HNR) process is a widely utilized technology for treating wastewater to a very high standard, particularly when stringent nutrients requirements are in force, the HNR process offers dependable and stable performance with minimal operator requirements.
Smart design makes the process highly cost effective and minimizes ongoing operating and maintenance issues.

- Advantages

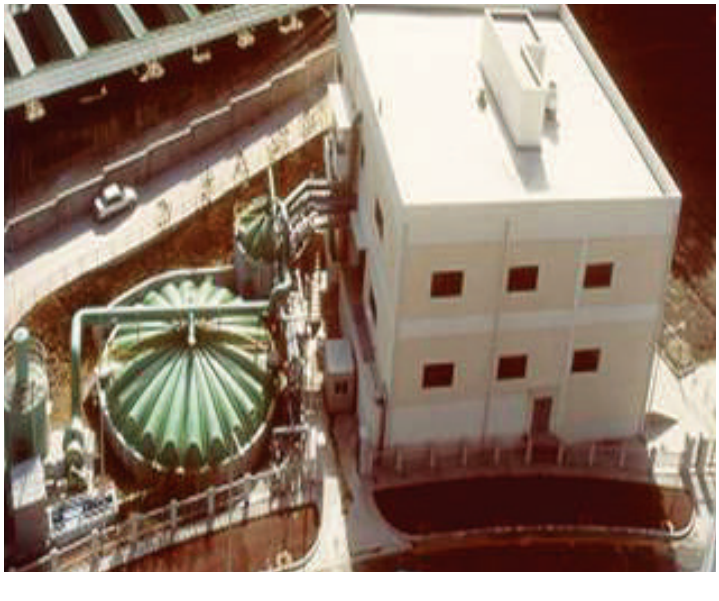
  Ideal for stringent nutrient removal requirements

  Cost - effective installation

  High quality effluent

- Design Criteria

  The process is designed on a case by case basis. The design elements are flexible, allowing locally available form or existing tankage to be utilized, minimizing construction time and cost.



Biological Processes

Membrane Bio - Reactor

HASCO Membrane Bioreactor (HSMBR) is a combination of a membrane process like microfiltration or ultra-filtration with a suspended growth bioreactor, and it is now widely used for municipal and industrial wastewater treatment. When used with domestic wastewater, MBR processes can produce high quality effluent wich is good enough to be discharged to coastal, surface or brackish waterways or to be reclaimed for urban irrigation. Other advantages of MBRs over conventional processes include small footprint and easy retrofit and upgrade of old wastewater treatment plants.

Advantages

- Effluent with high quality hygiene standards
- High potential biomass concentration (10-25 g MLSS /L)
- The reactor has low volume and surface area
- Reduced sludge production
- More economical than other treatment systems

Objectives

- Reduce Biodegradable components
- Reduction of germs
- Reducing the turbidity and particles
- Reduction of surface-active substances

HASCO provides two MBR configurations exist : internal/submerged, where the membranes are immersed in and integral to the biological reactor; and external/side stream, where membranes are a separate unit process requiring an intermediate pumping step.

External / Side Stream HS-MBR

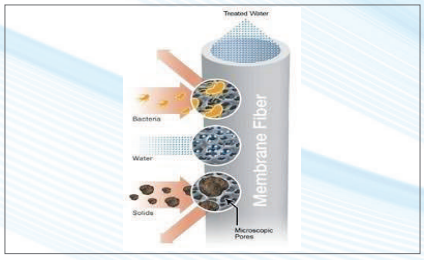
- Membranes placed externally (external loop to the bioreactor)

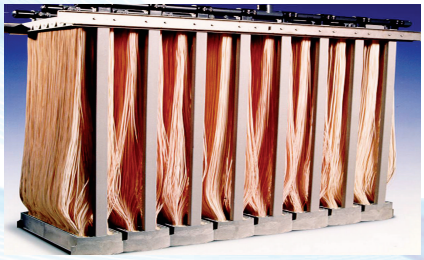
Internal HS-MBR

- Membranes placed Submerged in the bioreactor

Application Areas

- Advanced treatment of domestic and industrial wastewater
- Discharge limits of water basins
- Treatment of water containing high pollution
- Obtain irrigation water from wastewater and recycling projects
- When wastewater treatment plan is adequate because of increased capacity
- Waste water recycling processes, which has high water consumption
- Conventional methods for inadequate settlement area





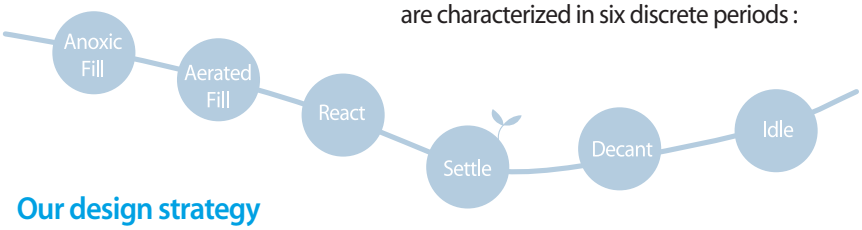
Biological Processes

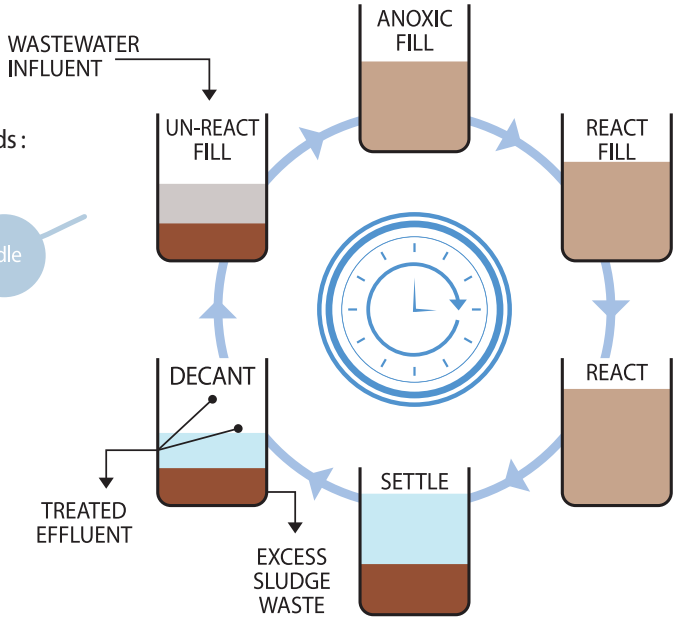
Sequencing Batch Reactor

The HASCO Sequencing Batch Reactor (HSBR) is an activated sludge process designed to operate under non-steady state conditions. An HSBR operates in a true batch mode with aeration and sludge settlement and they are both occurring in the same tank. The major differences between HSBR and conventional continuous-flow, activated sludge system is that the HS-SBR tank carries out the functions of equalization aeration and sedimentation in a time sequence rather than in the conventional space sequence of continuous-flow systems. In addition, the HS-SBR system can be designed with the ability to treat a wide range of influent volumes whereas the continuous system is based upon a fixed influent flow rate. Thus, there is a degree of flexibility associated with working in a time sequence rather than in a space sequence.

Sequencing Batch Reactor Process Cycles

The operating principles of a batch activated sludge process, or SBR, are characterized in six discrete periods :





Our design strategy

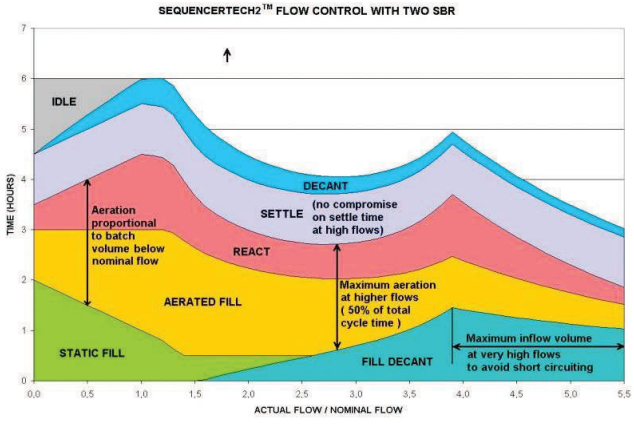
- Biological process control and treatment potential
- Mass balance on the total solids generated in a reactor
- Biomass activities
- Treatment sequence construction

Unique Features & Benefits

- P- removal capacities and more reliable process performance.
- capital cost savings, Permit the downsizing of the reactor and the mixing and aeration equipment due to an organic loads reduction through the wasted excess sludge of the HASCO SBR.
- Energy savings, Allow for significant energy savings due to inherent process improvement (up to 30% to 40%)

Applications

- Municipal and industrial wastewaters
- Enhanced biological nutrient removal(ENBR)
- Total nitrogen < 3 mg / l
- Total phosphorus < 0.3 mg / l
- Water reuse and reclamation
- New plant construction
- Retrofit existing activated sludge systems
- Plant up-grades



Oil & Gas Industries/ Petrochemical/ Refinement Industries

HASCO offers a full spectrum of reliable equipment for handling produced water. Our offerings have been proven over a broad range of applications and years of reliable performances. The offering includes primary, secondary, and tertiary treatment solutions for a broad spectrum of water treatment installations, for Oil and Gas, Petrochemical and Refinement Plants.

Key Applications

- Raw Water Treatment
- Wastewater Treatment
- Recycling, Reuse & ZLD
- Process Water Treatment
- Boiler Feed Water Treatment
- Condensate Polishing

Oil Separation Techniques

Oil separation is principally focusing on the difference in densities as the major driving force leas to the separation between oil and water.

Typical Oil Separation techniques are the following:

- API Oil Water Separators
- TPI / CPI
- Dissolved Air Flotation (DAF)
- Induced Gas Flotation (IGF)

API Oil Water Separators

Dissolved Air Flotation (DAF)

Power Generation Industry Solutions

The power sector requires a large amount of water as:

- Cooling water to condensers
- Feed water to boilers to produce the steam that drives the turbines to generate electricity
- A scrubbing medium to remove air pollutants

To meet customers' requirements in cooling water intakes and boiler feed water treatment, whether it be power generation or process steam production

HASCO is the world's leading supplier of high quality water treatment equipment.
Possessing a wealth of experience in cooling water intakes, the treatment of boiler feed water, condensate polishing, cooling tower make-up, side stream filtration and effluent treatment.

Power Generation

Whatever the kind of generation is adopted(combined cycle plants, coal fired, waste to energy, biomass fired, nuclear) the objectives of water treatment in the production of steam and power are to reduce the boiler corrosion, to prevent deposition of scale and maintain high heat-transfer efficiency, and to maintain the quality of the generated steam requirements of the manufacturers of critical equipment.

HASCO's solutions targeted to the Power Generation fields are:

- Desalination & Raw Water Pre-treatment
- Demineralization Systems
- Condensate Polishing Units.
- De-aerators
- Zero Liquid Discharge System.
- Cooling Water Filtration



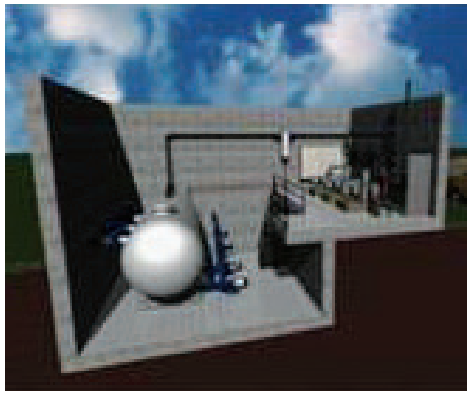
Vacuum Sewage Collection System

The HASCO HS-vacuflow system is a clean and highly efficient system for environmentally acceptable sewage disposal. Compared with traditional deep trench sewage, construction and installation is considerably simpler and cheaper.

In addition, the HS-vacuflow system is virtually maintenance. And, because it operates within a closed and leak proof vacuum system, the environment vacuum system, environment will benefit too, no sewage can escape to pollute surrounding area.

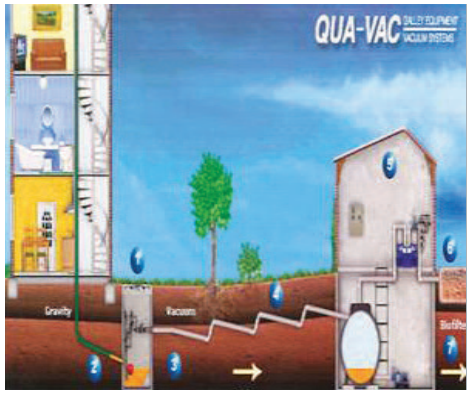
Expert in the field agree that in many applications, the HS-Vacuflow system is the better and Cheaper alternative to deep trench sewerage. The vacuum system is perfect for a wide range of applications, particularly where expensive and difficult construction work is to be avoided.

Think of areas of shallow topsoil as well as areas with a high water table or where the environment Is fragile.



Advantage of the HS-Vacuflow System;

- Small Diameters
- Low Investment Costs
- No Deep Trenches
- Quick Excavation
- Flexibility of Piping
- Low Energy Consumption
- No Ground Pollution
- Aeration of Sewage
- Minimal Maintenance



Application of the Vacuflow System;

- Sewerage of Ribbon Developments for Rural Village
- Recreation Areas
- Marinas
- River & Sea Side Area
- Industrial Projects
- Supermarkets
- Canal Estates
- Renovation of Sewerage Piping Project
- Power Plant
- Refinery & Petrochemical Area
- Electronics & Semiconductor Area
- Shipbuilding Industrial Area

Water & Wastewater Treatment Plant Site



Water & Wastewater Treatment for Andong Power Plant / Andong , Korea


Water & Wastewater Treatment Plant GS Caltex No2 Heavy oil Up-Grade Plant / Yeosu , Korea


Water & Wastewater Treatment Plant Aromatic LLC/ Sohar, Oman

Leading Environmental & Water Solution Provider

HANSUNG CLEANTECH CO., LTD

HASCO R/D CENTER

HEAD OFFICE

#713 Woolim e-Biz center II, 12 Digitalro-33 gil, Guro-gu, Seoul, Korea

Tel : +82-2-890-3900 **Fax :** +82-2-890-3933 **E-mail :** hasco@hscleantech.com

www.hscleantech.com

BEIJING HANSUNG CLEANTECH CO.,LTD

Regional Office : # Bldg 601, Wangjing Yuan, Chaoyang District, Beijing, China

Tel : +86-10-8478-7785/7082 **Fax :** +86-10-8478-7805 **E-mail :** hascobeijing@gmail.com