

**| ENGINEERING**



International  
Water Association

DESIGN, MANUFACTURE, SUPPLY, CONSTRUCTION OF "TURNKEY" OBJECTS  
OF WATER INDUSTRIAL ENTERPRISES

ISO  
9001



## ► About company



**HydroTech Engineering**, founded in 1998, is a member of the international group of the companies **"Water Group"**.

**"HydroTech Engineering"** is one of the leading companies in engineering and water treatment equipment manufacturing in the CIS countries.

The Company's main function is focused on solving processing water preparation problems. Inclusive in this function is: the production of drinking water, industrial waste water treatment, closed cycles of water supplies and the production of cooling circuits.

The company performs an individual approach to solving water treatment technological tasks and "turn-key" project implementation including the design, construction, installation and the commissioning works (EPC contracts engineering, procurement, construction).

**HydroTech Engineering Co Ltd** has its own engineering center and manufacturing complex. The production includes assembly production facilities of water treatment equipment and polymeric products; welding and mechanical production facilities, and stocks. Production facilities allow to perform a full cycle of work and production of finished goods. It significantly reduces the cost of equipment required for solving technological problems.

**Engineering Center** is one of the most important components of the Company. It consists of highly skilled specialists and includes technical, engineering and automation departments, and a chemical laboratory.

The Company's specialists regularly visit major Water treatment international exhibitions and congresses. There, training seminars with well known world experts are performed. It helps us to be informed about advanced achievements in new technologies and to use these in our projects.

**Certificates and licenses** allow to implement projects at a higher level and to work with a wider range of enterprises. The intensive development of industry and energy, agriculture and communal services, increasing of the water consumption and the water quality requirements need the use of modern water treatment technologies that provide an efficient use of water and energy resources, reliability, and the simplicity of installation and maintenance.



► Preparation for dispatch of the Reverse Osmosis plant.



## ► Technologies

Depending on the source water quality and requirements to the treated water, the Company can apply all modern water treatment technologies:

- **Reverse Osmosis and nanofiltration** are used for providing partly desalinated and softened water. Reverse Osmosis technology does not require a large quantity of reagents (acids, alkalis); it is a continuous process.
- **Ultrafiltration** is used for removal of suspended solids and reduction of turbidity and content of any organic substances (oxidation reduction, COD, BOD, etc.). Ultrafiltration is the most effective technological process available for water clarification or feed water preparation for nanofiltration, reverse osmosis and ion-exchange. During this process you can obtain the following quality parameters of feed water as: turbidity, less than 0.1 NTU, sediment density index SDI (15 min), less than 3.0. Besides Ultrafiltration provides the reduction of virus and bacterial content on the order of 4 or more; and the reduction of oxidability by 65% or more. It influences on increasing of membrane elements efficiency and ion exchange resins.
- **Electro-deionization** is an alternative to mixed bed filters (MBF). This technology combines electrodialysis and ion exchange; it provides complete water desalination in power and electronic engineering, and pharmaceutical industry. This technology provides water with resistivity of 18 Mom. It does not require the acid or alkali usage. "HydroTech Engineering" Co Ltd. has the status of Master Service Provider, acquired from Ionpure/Siemens Company, a leading equipment manufacturer of electro-deionization technologies. Nine engineers have been certified by this technology and have the right for training and providing services of this equipment. In addition, the Company applies the classical water treatment technologies:
- **chemical treatment** is used for effective filtration of the source water (coagulation and flocculation) as well as for inhibition of corrosion processes and bactericidal treatment of purified water in the areas of the treated water usage;
- **filtration** with self-cleaning and sand filters usage;
- **water decarbonization** is used for free carbon dioxide removal by "blowing";
- **ion-exchange technologies** can provide processes from the simplest softening, absorption of organics and selective deionization to complete desalination. This technology is applied for receiving of boiler's feed water from low to extra-high pressure, as well as for electronic and pharmaceutical industries. The company has experience in desalination projects realization of Puropack technology (Packed Bed);
- **chemical and / or microbiological disinfection** of the industrial waste water with centrifugal or gravity filtration to obtain the sludge with moisture content up to 30%.



► Ultrafiltration plant



► Reverse osmosis plant



► Sorption plant



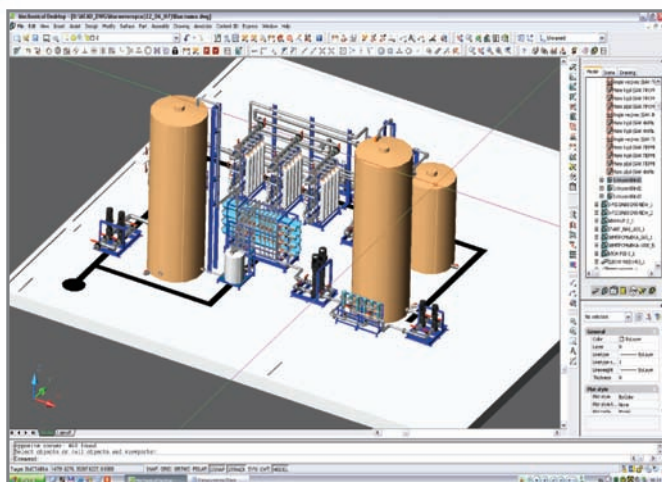
► Mechanical filters

## ► Design (Engineering)

The **Engineering design department** is one of major departments of **“HydroTech Engineering” Co Ltd.** Its purpose is a higher level of the enterprise’s development and increasing of the manufacturing output quality.

### Main tasks and functions of the department:

- Realization of the pre-project activities.
- Preparation of the initial data, materials and design specifications for contract works.
- Organization of the design works implementation; the quality control of design decisions and Design Rule Checking of the project documentation in accordance with the applicable rules, regulations, public and international standards.
- Implementation of the design works at a high quality level.
- Participation of performed projects at the customer’s base and at the consideration of the state supervision authority.
- Presentation of design decisions to the customer and at the state supervision authority.

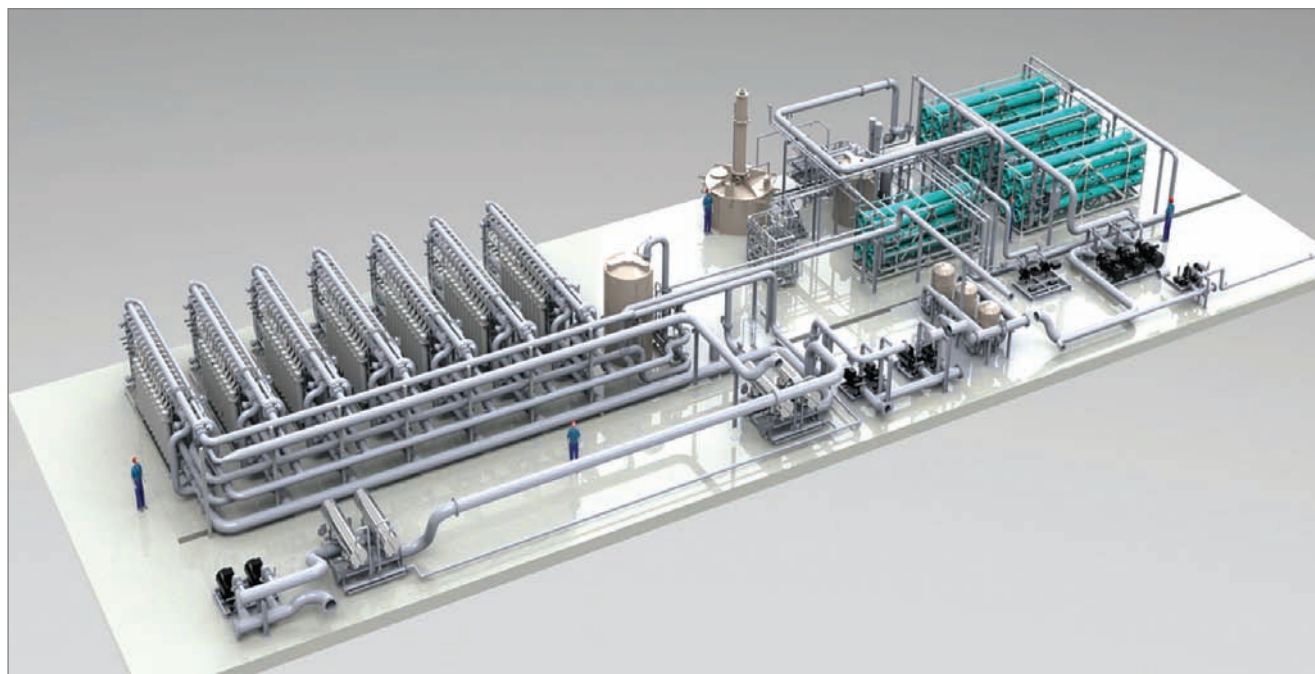


► Model of a water treatment area of the metallurgical complex

The Department develops and designs the water and wastewater treatment systems for various industries, such as: metallurgical, food, energetic, pharmaceutical and others. Our specialists perform an individual approach to each object. It allows to obtain the unique equipment which complies with the customer’s requirements.

Our specialists develop engineering and project documentation of the water treatment systems based on the leading-edge water purification technologies. We have designed a unique reverse osmosis desalination system which meets the requirements of established worldwide standards.

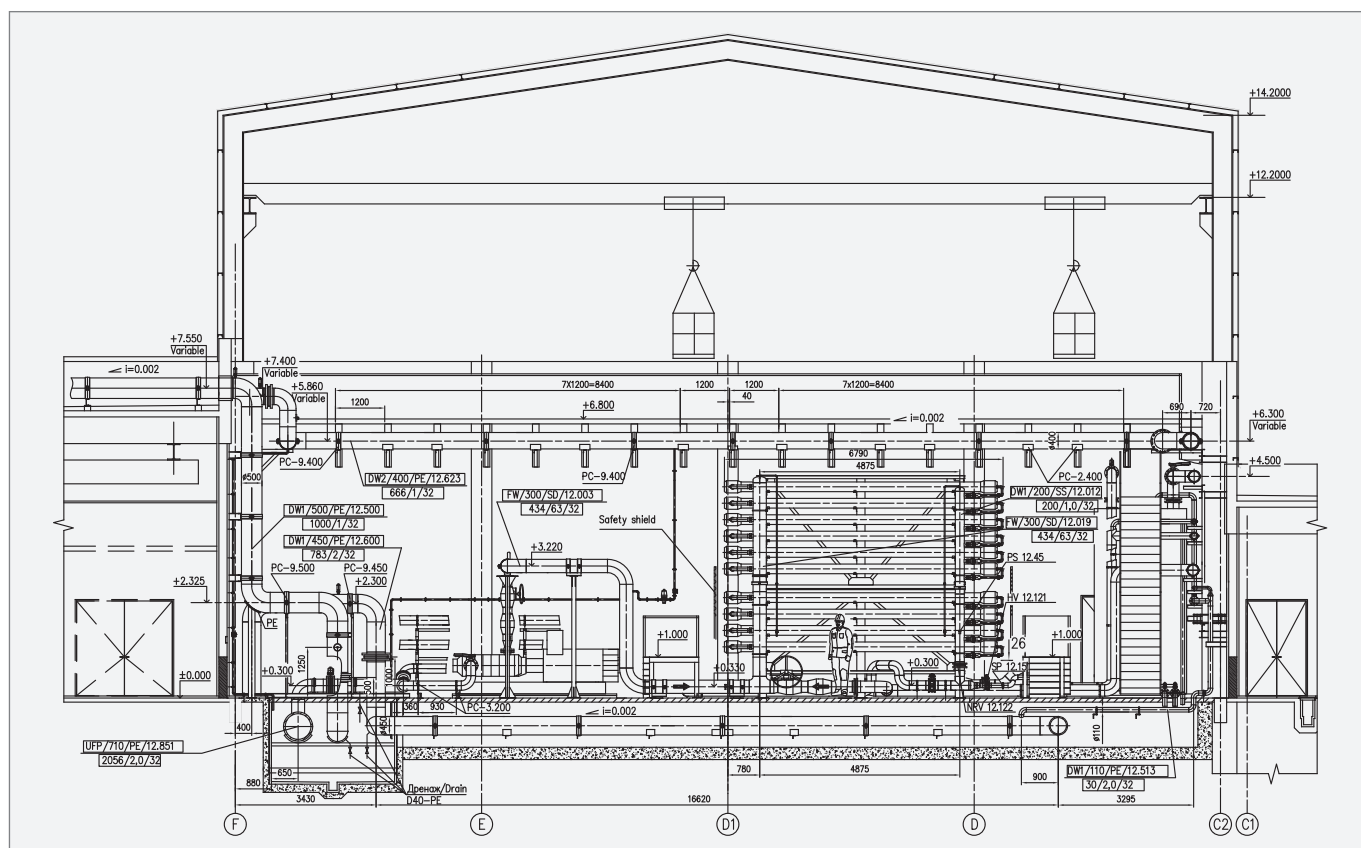
After learning of the UF engineering technology, the department has implemented the development of innovative design solutions for JSC “AMC” Alchevsk, CJSC “AZOVELEKTROSTAL” Mariupol and JSC “MMK”, Magnitogorsk.



► Model of the water treatment production facility



## ► Design (Engineering)



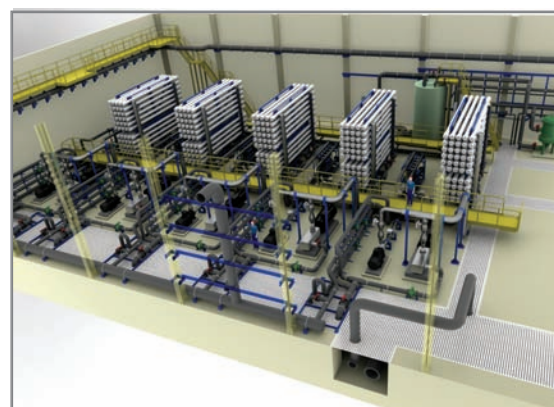
The first department's development was a documentation for the multiple mounting of the chemical water treatment with capacity of 320 m<sup>3</sup>/h by the UF-filtrate and 120 m<sup>3</sup>/h by the permeate. It has been performed for JSC "AMC" Alchevsk.

**Modern methods of parametric 3D modeling are used in design process for providing the proper quality of design works. It helps to focus on the development of technical solutions, rather than drawing.**

Furthermore the department performs the development of preliminary design and project documentation, together with Company's technical department and design institutes.

The Engineering design department and technical department of the Company are intended to the designed equipment unification and standardization. It allows to reduce time for implementation of the project and designing documentation for new facilities.

The company's employee training is realized by means of experience exchange inside the company. Young specialists attend building projects, exhibitions and seminars. Their shared experience and knowledge helps to prevent mistakes at the project design stages and to develop creative thinking.



► Feed water treatment production facility



► Sea water desalination area



### ► Advantages

In comparison with conventional methods of treatment, ultrafiltration has a lot of advantages:

- Ultrafiltration is a reliable prevention from the microorganisms and solids.
- Filtrate quality does not depend on the water quality.
- Ultrafiltration cleans water of the pathogenic microorganisms that are steady to chloride
- Brine, appearing during the ultrafiltration process, consists of only impurities, so a number of emerged sediment is less than in conventional cleaning methods.
- Compact system allows to save a production area; it is more economical than traditional treatment systems.
- The process of ultrafiltration can be easily automated.
- The following stages of cleaning will be more effective because all suspended solids are removed during the Ultrafiltration.
- The expenses of nanofiltration or reverse osmosis methods will decrease significantly i.e. the flow rate will be higher so the cleaning will take place with less energy consumption.



► Pilot plant testing

### ► Ultrafiltration

Ultrafiltration plant is used for clarification and purification of any water source: drilled wells, surface sources, waste water and post-treatment of drinking water.

Ultrafiltration is the most efficient process of feed water preparation for nanofiltration, reverse osmosis and ion-exchange. Ultrafiltration provides a reliable barrier against microorganisms and particles.

**Ultrafiltration technology** is used for removal of suspended solids and reduction of turbidity and content of any organic substances (oxidation reduction, COD, BOD, etc.). During this process you can obtain the following quality parameters of feed water as: turbidity, less than 0.1 NTU, sediment density index SDI (15 min), less than 3.0. Besides Ultrafiltration provides the reduction of virus and bacterial content on the order of 4 or more; and the reduction of oxidability by 65% or more. It influences on increasing of membrane elements efficiency and ion exchange resins.

**Ultrafiltration membranes** are the modules containing thousands of capillaries with an internal diameter of 0.7-1.0 mm. These capillaries are made of polyethersulfone with special added components (PES). This hydrophilic material is resistant to the layering of the organic sediment. The filtering area of one module is from 30 to 70 m<sup>2</sup>.

The flow moves from inside to out, i.e. water flow enters into the capillaries and filter goes outside via their walls. It is possible to obtain the opposite direction of filtration.

**Ultrafiltration membranes** are specially designed for removal of suspended solids. Pressured water flows through the membrane but the solids remain on its surface. Due to the small size of the membrane pores all suspended solids and microorganisms are effectively removed out of the water. As these solids form the sediment layer on the membrane surface, the water flow direction will change to remove this layer (backwashing).

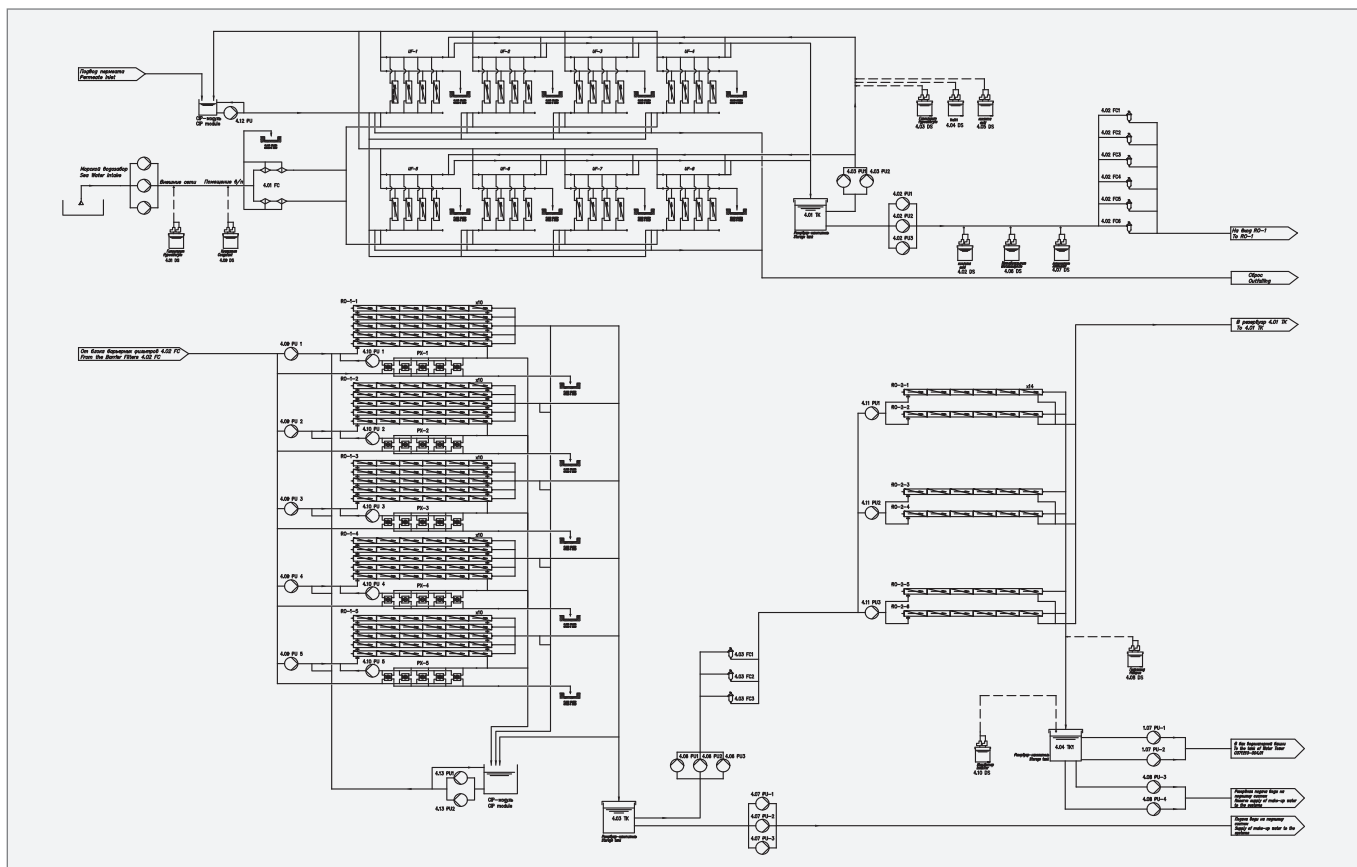
**Ultrafiltration** is one of the best technologies of drinking water treatment. It is proved by a fact that the annual increasing of the water after ultrafiltration is approximately 25%.



► Ultrafiltration racks



## Ультрафильтрация



Considering only one area of the membrane application (water treatment), we can obtain that membrane usage is continuously increasing. Regardless of the given problem, membrane plants can provide clear water of any water flow. But energy consumption, membranes clogging (siltation), as well as membranes cost are barriers for their wider distribution. But these problems are becoming insignificant because of the increasing of clearing membranes efficiency and their cost reduction at the market since 1995.

**Ultrafiltration** is progressively replacing the traditional clearing systems of drinking or industrial water production of natural or recycled water, as well as in water pretreatment for osmotic systems.

## Application

**Drinking water production.** Ultrafiltration can be used for single-level water treatment, as well as in combination with the coagulation, sedimentation, clarification or flotation.

**Desalination or water reusability.** Considering high-quality physical characteristics of the obtained permeate, ultrafiltration can be recommended as a preferred engineering solution for removal of the clogging solids from the membranes before reverse osmosis plant. Primarily, the Ultrafiltration membrane applications were effective for reuse of municipal waste water, irrigation systems, and other water resources.

**Waste water treatment by the membrane bioreactor.** Membrane biological reactors (MBR) apply membranes with the internal filtration surface as well as the submerged membranes. MBR is an effective technical solution for the municipal and industrial wastewater treatment of food, pulp and paper industries.



Комплексная водоподготовительная установка



## ► Reverse osmosis plants HT-R0

### ► Application

Reverse osmosis systems are implemented for obtaining of partially desalinated water.

Reverse osmosis is an effective engineering process for partial water desalination. It is used for: filling and feeding of cooling circuits; steam boilers feeding; incorporating technological processes provided by various enterprises; purification of drinking water for the food industry.

The main factor of Reverse Osmosis is applied an external pressure. The amount of energy required for reverse osmosis separation is directly proportional to the saline content of the solution.

The higher saline content in the solution, the greater specific



► Membrane rack of the Reverse Osmosis

energy consumption is needed for desalinated water. The Reverse Osmosis process is the most effective when saline content of the source water is more than 500 mg / liter. As a result, there are two flows along the membrane: a permeate, that passes through the membrane creating partially desalinated water; and a brine consisting of a concentrated solution of the original saline levels.

Inhibitors are used for prevention of the loss of poorly soluble salts on the membrane surface. Prevention of the microbial contamination of the membrane surface is accomplished by the treated source water with biocides.

Permeate recovery rate varies from 30% for sea desalination to 80% for low saline content water desalination. It is necessary to use additional Reverse Osmosis installations for increasing of the permeate output.

Suspended solids, colloids and strong oxidants must be removed from the source water for efficient and extended operation of the reverse osmosis plant. Therefore, the source water must be pre-treated. Ultrafiltration is a perfect solution for pretreatment process.

The high quality of the feed water significantly increases the efficiency, working lifespan and reduction of the membrane costs.

Modern **reverse osmosis membranes** are made of polyamide materials. A wide range of materials and methods of their production allows to use a large range of reverse osmosis membranes:

- selectivity varies from 85% (nanofiltration) to 99.8% (sea water desalination and high saline content of industrial waste waters);
- working pressure varies from 4 bar (nanofiltration) to 80 bar (sea desalination);
- membranes with an uncharged surface for water with high levels of organic substances

Membrane types and their various configurations achieve the required characteristics of desalinated water of any quality water.



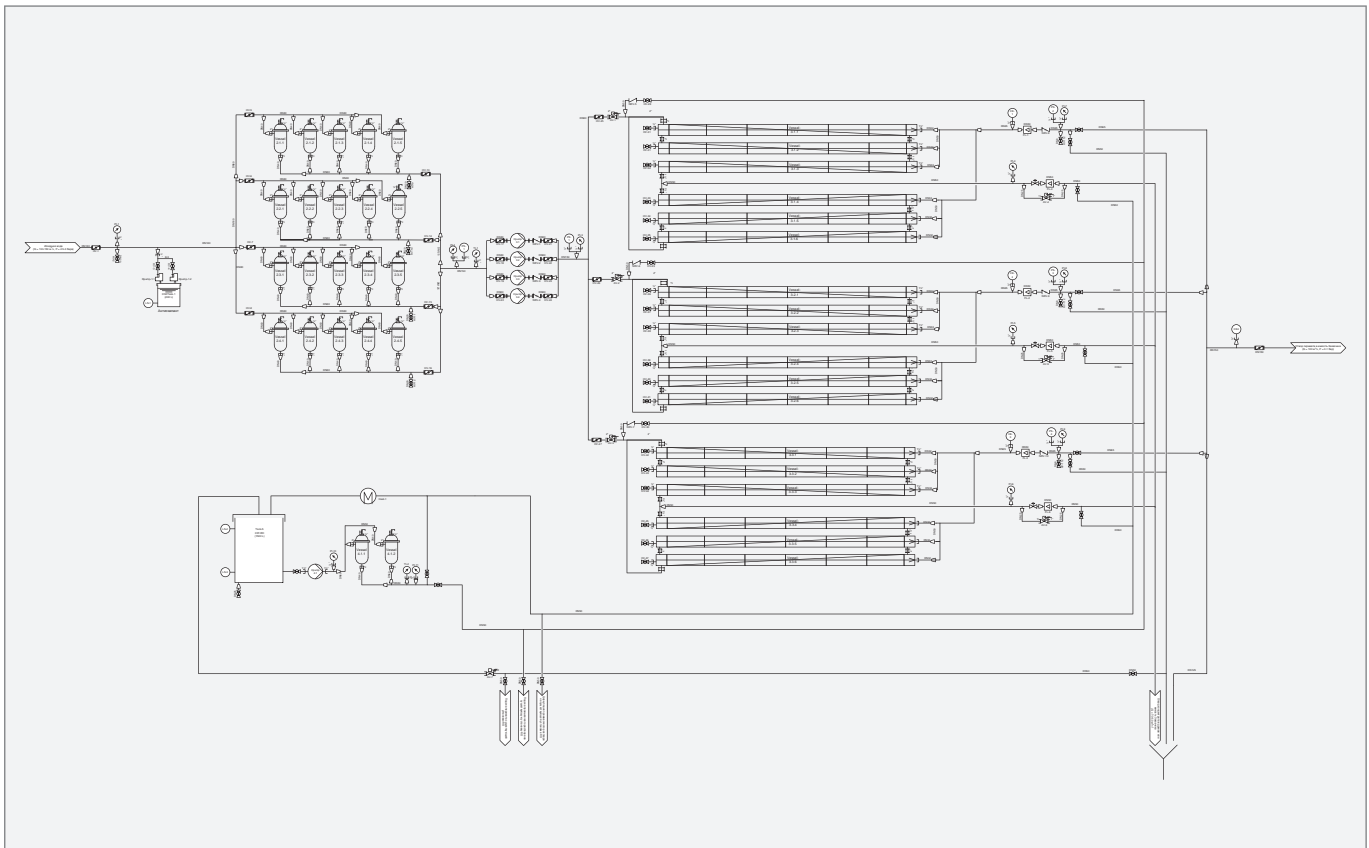
► Reverse Osmosis Plant in the greenhouses



► Reverse Osmosis Plant in the metallurgical complex



## ► Reverse osmosis plants HT-RO



## ► Advantages

In comparison with conventional desalination methods, reverse osmosis has plenty advantages:

- It does not require a large quantity of reagents (acid, alkali).
- It is a continuous process.
- Compact system allows to save the production area; it is more economical than other desalination systems.
- Ultrafiltration can be easily automated.
- It is a perfect solution for desalination of the water with difficult saline composition.
- Ultrafiltration provides the feed water for complete desalination methods such as: Electrodeionisation and mixed bed filters.
- Standard components are used for ease of maintenance, reconstruction and system expansion.

All systems and installations are developed individually; it allows manufacturing of all types of water treatment supply systems.

**Reverse osmosis** technology helps to reduce the total saline content and organic matter content (almost complete removal of oxidation, COD, BOD, etc.)



► Reverse osmosis



► Nanofiltration



► Decarbonator

## ► Decarbonization

**Decarbonator** is used in water treatment schemes to remove free carbon dioxide from the treated water.

Our company produces **decarbonators** of polymeric materials (polypropylene) with the application of polymeric nozzles (Pall rings), to provide effective and reliable work.

## ► Application

- Cooling water decarbonization.
- Feed water preparation for steam boilers.
- Water decarbonization in brewing process.
- Water decarbonization in dye production.
- Irrigation water decarbonization (horticulture).

## ► Advantages

- High quality of water treatment.
- Decarbonator's durability (it is made of polypropylene).
- Easy decarbonator installation and operation.
- Decarbonator insensitivity to the sediments.
- Reliability of a tower decarbonator operation.
- High maintainability.

## ► Degasification

Our company applies a technology of dissolved gases removal on the hydrophobic membranes.

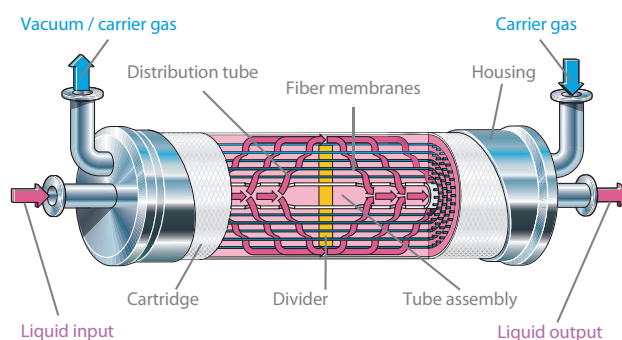
A contact element of the **degassing membrane** contains a large quantity of the hollow capillaries. Water enters the intercapillary space and passes through the contact element. Capillaries are made of the hydrophobic material so the water does not pass through them.

However, gases dissolved in the water can easily penetrate into the capillary because of a vacuum formation inside it. A carrier gas, such as nitrogen, can be used for this process.

**Membrane degasification** is used for decarbonization and water soluble gases removal (oxygen, nitrogen, hydrogen sulfide, volatile matters).

## ► Application

- Dissolved oxygen removal.
- Production of the ultrapure water for microelectronics and photo industry.
- Deaeration of feed water for the atomic power plants.
- Feed water preparation for boilers.
- Removal of the dissolved free carbon dioxide to increase the filtration cycle of ion exchange filters and electro-deionization efficiency (instead of decarbonators).
- Degasification in the pharmaceutical industry.
- Oxygen removal of the feed water in the closed cooling circuits.
- Removal of the organic volatile solutes from the liquids.
- Degasification of the transformer oil.
- Carbonization, decarbonization and nitridation in the food industry.



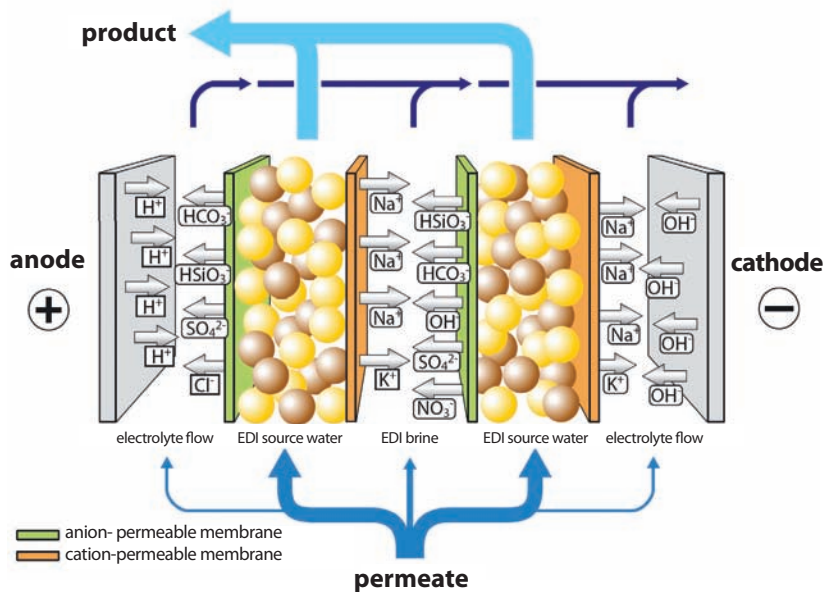
► Contact part of the membrane degasification



► Membrane degasification plant



## ► Electrodionisation



Electrodionisation (EDI) is an alternative to mixed bed filters (MBF).

It provides the water quality of 16-18 MOhm.

Electrodionisation combines two methods:

- Electrodialysis
- Ion exchange with ion exchange resins.

This technology allows to remove dissolved salts without chemical regeneration at low energy consumption.

**"HydroTech Engineering" Ltd.** has the status of Master Service Provider acquired from Ionpure / Siemens Company, a leading equipment manufacturer of electrodionisation technologies. Nine engineers are certified in this technology and have the right for training and service of this equipment.

## ► The Process Description

Permeate, obtained in the reverse osmosis system, is divided in two flows before the EDI module. EDI feed water passes through the desalination chambers, which are filled with ion exchange resin. Due to the electric field, ions move to the anode through the ionite layer.

As a result, they pass through the anion permeable membrane to the concentrate flow. Cations move through the ionite layer in the cathode direction; they pass through the cation permeable membrane to the concentrate flow.

Ions and concentrate flow leave the module. Electrolyte flow removes ions and gases that appear on the electrodes; they leave the module.

Because of the electric voltage, there is water decomposition in the ionite layer.  $H^+$  and  $OH^-$  ions implement regeneration of the ion-exchange resin.

It provides a continuous operation without stopping for generation.

## ► Advantages

In the comparison with ion exchange filters which require regeneration, electrodionisation has such advantages, as:

- It doesn't need chemical reagents
- The waste water has no toxic chemical substances
- Continuous operation
- Permanent quality of the ultrapure water
- There are no pathogenic microorganisms
- Reduction of the capital and service expenditures
- Electricity costs are up to 0.5 kW per m<sup>3</sup>
- It is a profitable process

### What does EDI remove?

Ions	> 99,5 %
Free CO <sub>2</sub>	> 99 %
Silicium	> 95 %
Barium	> 99,5 %
Total organic carbon	60 — 90 %
No growth of bacteria	

Local areas with low or high pH value work as a biostat. It limits the need of sanitation.



► EDI



## ► Seawater Desalination

**Seawater Desalination** is one of the most important processes which helps to prevent many problems in the future. Presently, at time of global and gradual reduction of water reserves, the problem of seawater desalination and water purification becomes quietly significant.

**“HydroTech Engineering” Ltd.** is developing seawater desalination together with water and waste water treatment technologies.

### • Thermal Desalination (Distillation)



### • Desalination on semipermeable membranes (Reverse Osmosis)



## ► Comparison of desalination methods

- **Thermal Desalination** (MED, MSF) is a power-consuming process.
- **Membrane Desalination** (RO) is a power efficient process.

## ► Energy consumption, kwh/m<sup>3</sup>

	Steam	Electr.	Total
• MED	4,5	1,2 — 2,0	5,7 — 6,5
• MSF	14	3,0 — 4,0	17 — 18
• RO	—	2,6 — 4,2	2,6 — 4,2

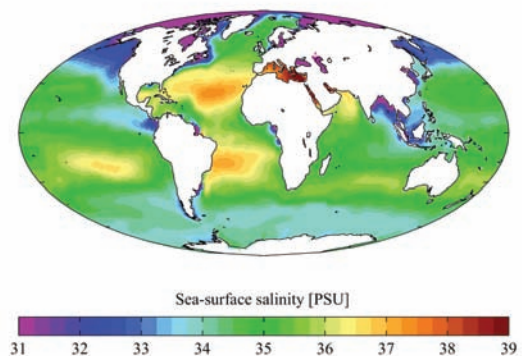
**“HydroTech Engineering” Ltd.** develops seawater desalination plants based on the Reverse Osmosis technology.

## ► Application

- Water for technological processes: feeding of power boilers and cooling circuits.
- Drinking water production.
- Production of demineralized or ultrapure water.
- Irrigation.

## ► World water reserves

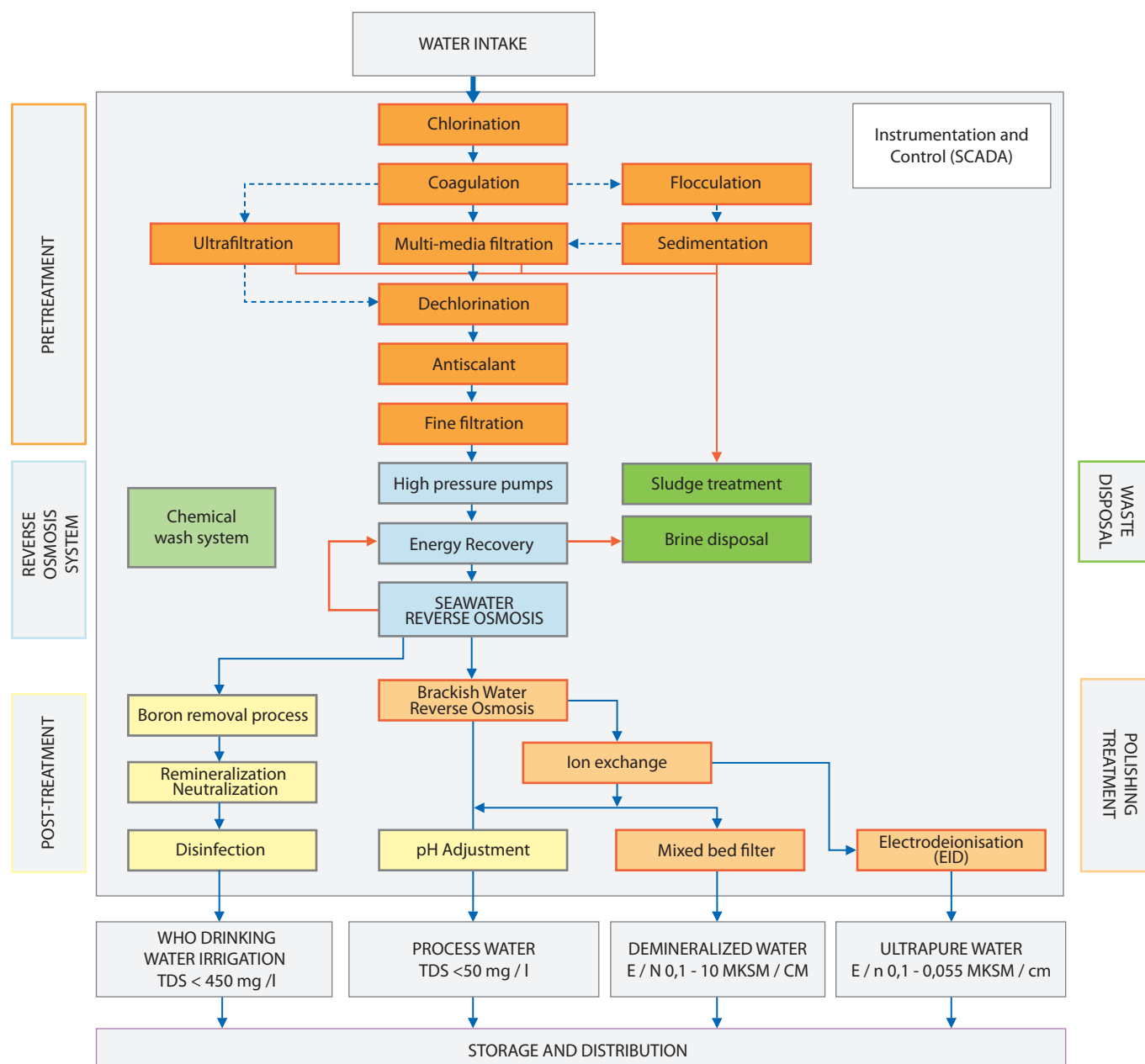
A large saline water layer, that covers main part of the earth's surface, is the whole entity. It has approximately constant composition.



The World Ocean is enormous. Its volume is 1,35 billion km<sup>3</sup>. It covers approximately 72 % of the earth's surface. The World Ocean consists of almost all the water on the Earth (97 %). Almost 2,1 % of the water is concentrated in the polar ice and glaciers. 0,6 % consist of fresh water in lakes, rivers and ground water. The rest 0,1 % is saline water of drilled-wells and brackish water.



## Main technological stages of the seawater desalination



### ► Features

High saline content of the sea water (up to 45 mg/l) provides the sea membranes and special materials usage. Corrosion of the equipment and pipelines is one of the major problems. So pipelines of glass, plastic, polymeric materials (for low pressure areas), high-quality stainless steel of austenitic or duplex type are applicable in the water treatment.

It is necessary to apply high pressure of 50-80 bar for osmosis operation. Energy consumption needed for the high-pressure pumps can be reduced with energy recovery devices (ERD).

Our developments correspond to the recommendations of the membrane elements manufacturers of such technological parameters as «recovery», specific flux, etc. We take into account a material of the pipelines, shut-off valves, pumps and devices. Production capacity allows to perform the installation of pipelines which are made of high-grade steel, such as 254 SMO, etc.

There is an important fact, that the control system is developed by highly skilled engineers. This provides detailed elaboration of transient control, such as start-stop system based on the availability of energy recovery system (turbines, Isobar modules).



## ► Automation

Nowadays it is hard to imagine a modern production without automated technological lines, microprocessor technology, tracking and control systems of the technological parameters.

Presently, our company provides a full range of Automatic Control Systems of the Technological Processes.

Automation department consists of: design team, assembly and configuration section, testing laboratory, software engineers, installation and commissioning group. Our company's expertise combined with technologically advanced component parts are implemented at ACSTP Development. We are ready to propose implementation of all project stages of EM and ATH.

## ► Services

Our company offers such Automation, as:

- Development of ACSTP as a "turn-key" operation for reconstructed and newly established production methods.
- Reconstruction of the existing ACSTP based on the microprocessor technology with modern elements.
- Automation of the objects with available devices and executive mechanisms.
- Development of ACSTP Design Documentation.
- Assembly, installation supervision and start-up of the control and automation systems.
- Supply of the instrumentation and automated control systems
- Warranty and after sales service
- Audit of the projects and equipment.

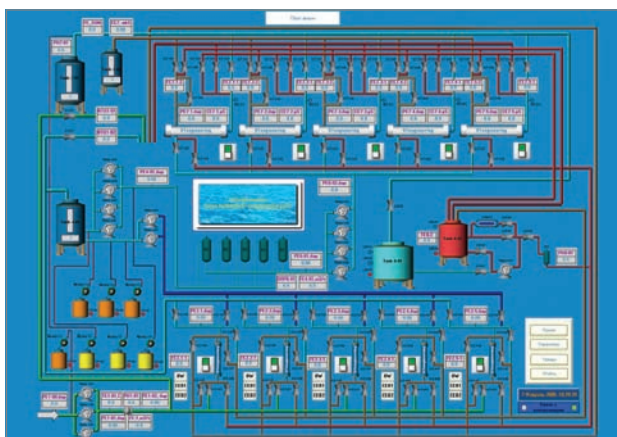
Our company is an official authorized distributor of Danfoss Company. Danfoss is an officially system integrator of Rittal products and an officially authorized system integrator of AdAstra Research Group.

ACSTP's facilities consist of:

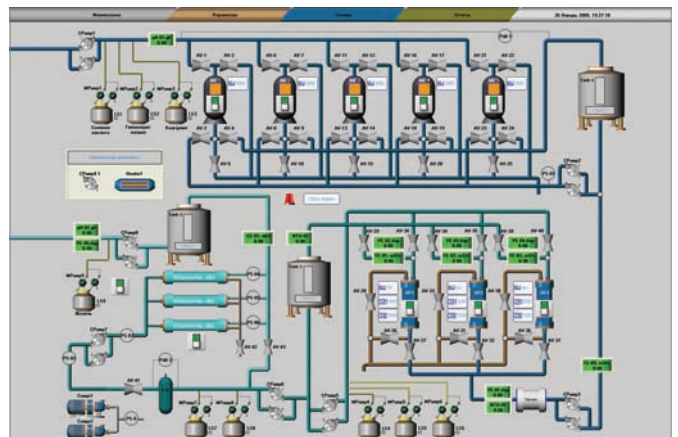
- Programmable Logic Controllers (Siemens, Mitsubishi, Allen- Bradley, ICP/DAS)
- The Primary Gauges and Devices (George Fischer, Endress+Hauser, Danfoss)
- Power-operated systems (Danfoss, Siemens);
- Low-Voltage Equipment (Danfoss, GE, Moeller);
- Working positions at the SCADA systems monitoring (WinCC, Trace Mode, iFIX).

All equipment is applicable for majority of industries and it is selected for durable and reliable maintenance.

Our Company's equipment operates more than 100 enterprises in Ukraine, France, Turkey and CIS countries.



► Automation of the water treatment unit based on the membrane technologies



► Automation of the complex water treatment unit



## Automation

Highly skilled engineers of our company can solve any automation task. Our Company's staff consistently participates in training seminars dedicated to innovative equipment technologies.

All this allows to perform ACSTP's high quality in proper time, using the optimal technological decisions.

**"HT Engineering" Ltd.** performs after-sales service along with furthering development of implementation systems.

The company has a full range of operations in such industries, as: food, chemical, metallurgy, pharmaceutical and energetics (this information is observed in reference-list).

### The Automation Department includes:

- More than 20 specialists;
- More than 150 m2 of assembling areas;
- Equipment warehouse;
- Quality Control System.

Everyday energy resources are becoming more expensive. This is followed by an increase in product costs and the reduction in competitiveness of our products.

The primary method of energy recourses reduction is the implementation of energy-saving operations. You must have the proper tools for monitoring and reporting. These tools will promptly report the structure of energy consumption and any deviation from established norms of consumption for specific sites and the enterprise as a whole.

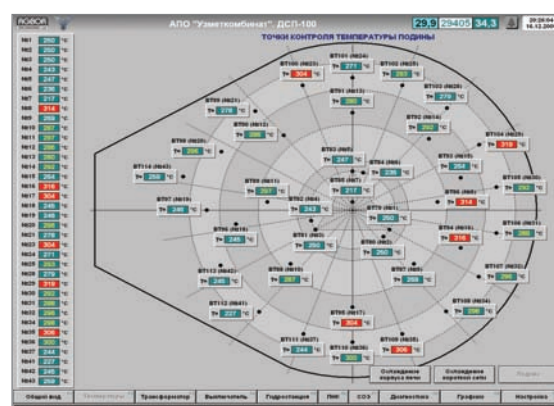
It is necessary to have the control and account tools to inform about the power consumption and deviation from the rated value of the consumption rates. It is performed in a proper time not only at the concrete sections but also at the whole company.

This tool is an Electricity Utility System (UMS).

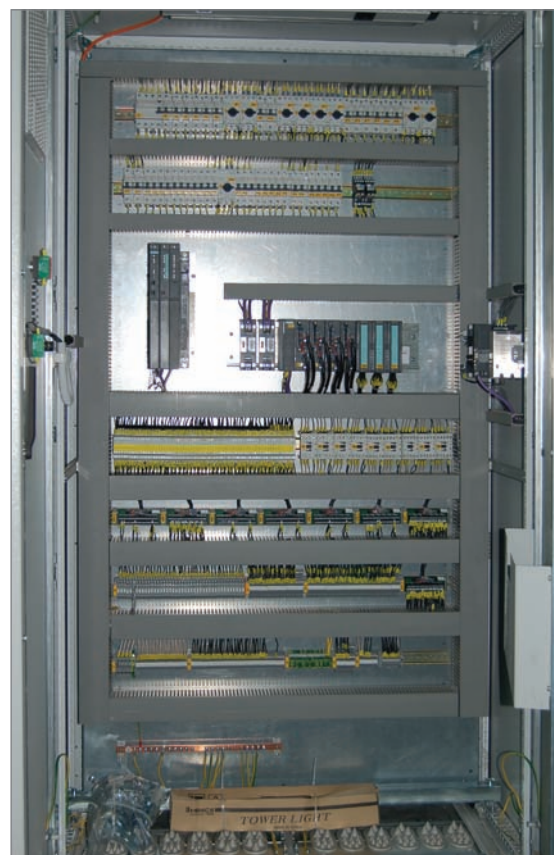
## Integrated EMS

**We offer you a full range of Utility Metering System works on a "turnkey" basis:**

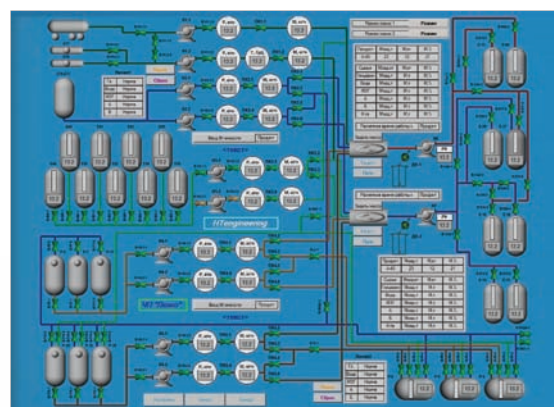
- Development of technical documentation for EMS.
- Supply automation and instrumentation equipment (Electrical Control & Instrumentation).
- Construction of an integrated accounting system for all types of energy resources.
- Manufacturing and installation of information accumulation cases.
- Accounting System Integration for all types of energy resources
- Development of the reporting forms and operational controls (in conjunction with the staff of our Customer);
- Defining boundary stations, shops, offices and Accounting organization for each structural unit
- Staff training
- The possibility of the development of self-expanding boundaries of AMR by the customer's personnel.



Control system of the arc furnace



Control cabinet of the water treatment unit



Automation of the cooling fluid preparation line



## ► Ion-exchange technology



► Puropack plant

Main principle of the ion exchange is that water passes through the resin bed where exchange of cations or anions is held. For example, there is one of the softening methods – a sodium cycle. In this case the calcium and magnesium ions, which form insoluble sediments, dissolve in the water and exchange into sodium ions in the equivalent amount.

**Ion exchange technology is applied in water treatment for softening, dealkalization, denitration and water demineralization.**

A wide range of ion exchange resins, as well as various schemes of plants allow us to produce equipment for many industries.

“HT Engineering” has implemented projects with the ion exchange usage in the power engineering, metallurgy, galvanic production, potable water supply, alcoholic beverage production and food industry.

We use Purolite (England) resins in our projects. Structurally the ion-exchange plants can be performed either by a conventional direct-flow or a counterflow principles. Our company has an experience of Puropack technology implementation (clamped layers) in the demineralization plants. Using this technology the water moves from the bottom upwards; during the regeneration the flow direction changes from the top downward (in this case the resin layer is compressed by the ascending current).

### **The advantages of Puropack technology:**

- Compressed layer regeneration is in the descending current.
- Low expenditure of the regenerants.
- Absence of the hole formation; low pressure difference
- Sewage water reduction
- Filtrate high quality
- Filtrate productivity improvement (100 % of the filter usage).
- Operating costs reduction (reagents, water for personal needs).
- Capital costs reduction (a number of equipment, building works)
- Possibility of the existing direct-flow filters reconstruction.

**Housings of the ion-exchange filters** are made of reinforced plastic or corrosion-preventive metal.

Commercial plants are usually implemented of steel. The internal vessels work surfaces are rubberized. Technological processes monitoring (regeneration, washing etc.) can be performed in manual or automatic mode (it is also possible to use semi-automatic mode).

**Good partnership relations** with major manufacturers of ion-exchange resins and component parts allow to solve water purification problems using ion-exchange technology. It is realized at a high level both for individual customers and for the industrial purposes.



► Ion-exchange plant



► Puropack plant



## ► Reverse cycles. Cooling systems

The companies must evaluate the possibility of closed reverse systems construction because of the water shortage and its value increasing. As practice shows, economical and ecological estimations do not come into conflict - both problems may be solved positively at the correct technological approach. Regional programs of the water saving is economically and ecologically efficient for many regions and can be solved by **"HT Engineering" Ltd.** The example is a post treatment of municipal wastewater with the purpose of its reuse in the industry, irrigation, etc.

A great experience of the open and closed cooling systems development helps us to represent our design of these cycles at the enterprises.

We have both the ability to create water treatment systems depending on the quality requirements for circulating and the source water and to design the water treatment systems of feed water, except the blowing of the reverse circuits of the cooling systems. Thus we have water saving at the water intake and there is no sewage water.

## ► Stabilization treatment of cooling water

Its purpose is to prevent biogrowth, corrosion and scale formation in the cooling equipment during the cooling system operation.

Inhibitors are used for the prevention of scale and corrosion formation. They minimize these processes at low concentrations.

In order to create ideal chemical conditions for cooling systems, several inhibitors can be applied which will enhance the effectiveness of each other.

## ► Neutralization

Together with water treatment plant, we offer equipment for the neutralization and wastewater treatment for water treatment plants (drainless schemes) and other technological equipment.

For these purposes the following technologies are used: chemical treatment, coagulation, flocculation, flotation, sedimentation with the further filtration and sludge dewatering.

Besides we have experience of evaporation plants application which treats the concentrating saline waste water. Ultrafiltration and reverse osmosis are traditionally used in water treatment.

**"HT Engineering" Ltd.** is developing direction of the biological purification. The Company uses software GPS-X of Hydromantis Company's production for calculation of biological wastewater treatment systems.

This program is based on the internationally accepted mathematical models of the bioprocesses such as ASM-1, ASM-2, ASM-3, Mantis, and others.

The program allows you to calculate and optimize the processes of wastewater treatment by suspended and fixed mud water in the conventional systems and membrane bioreactors. It estimates the quality of treated wastewater at biochemical oxygen demand, chemical oxygen demand, suspended substances, nitrogen compounds, phosphorus and specific impurities.



► Cooling towers



► Dosing station



## ► Warranty and after-sales service

A full range of mobile and stationary service departments is one of the main advantages of the Group of our companies. Warranty and after-sales service of the equipment is one of the important tasks of these departments.

Due to the highly skilled staff and the availability of a large warehouse facility, we cooperate with organizations, which use water treatment equipment of other manufacturers with the purpose of entering into a contractual agreement for after-sales service.

## ► Audit and reconstruction

Most companies of the different industries have water treatment equipment which went out of the date. Presently, it does not meet the existing requirements of volume and feed water quality of the increasing production capacity, and it does not fit the standards for energy consumption.

Specialists with professional experience in the water treatment industry with more than 25 years enable us to perform audit of existing water treatment equipment with recommendations of the systems reconstruction and optimization.

## ► Seminars

Every year, our company realizes seminars for specialists of different branches of the industry:

- Equipment and modern technologies of water treatment.
- Two-bath process of the reverse cycles of industrial enterprises.
- Water chemical conditions of energy companies and chemical treatment of the boiler water.

**We offer you to have an appointment with our Company's specialists for discussing a cooperative projects realization.**

## ► Service

**Our service centers offer:**

- Service of the whole complex of water treatment equipment.
- Chemical washing of the reverse osmosis, nanofiltration, ultrafiltration and electrodeionisation plants.
- Component replacement of the reverse osmosis, nanofiltration, ultrafiltration and electrodeionisation plants.
- Replacement and washing of resins in ion-exchange filters.
- Service and repair of the pumping, dosing and compressor equipment.
- Repiping of pipelines; repair and / or replacement of the fittings and armature.
- Testing and calibration of EC&I.
- Adjustment of the automated mode.
- Chemical analysis of the water.



► Seminar







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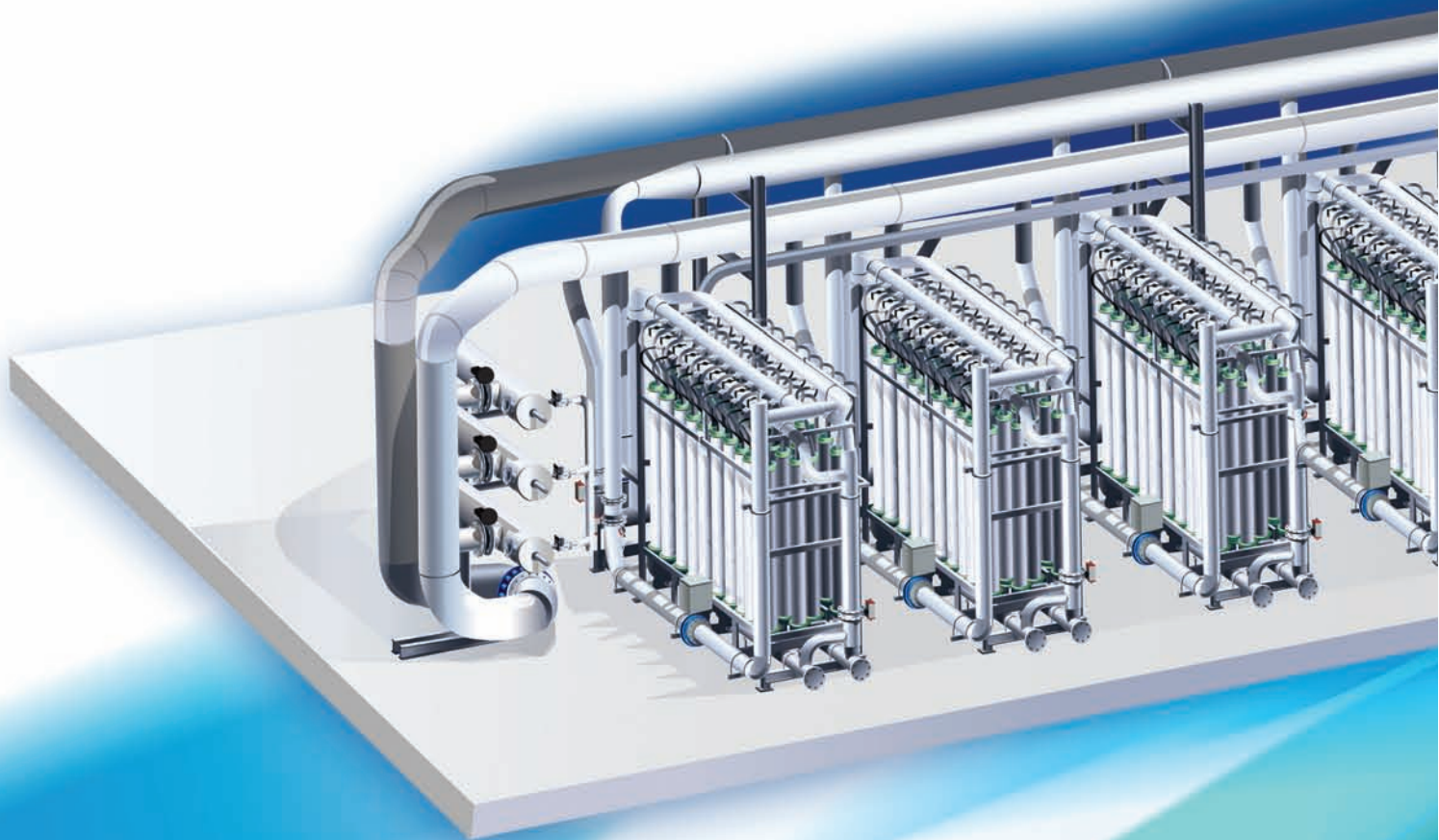
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