

The companies in the Business Unit

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Business Unit Industrial Process & Waste Water

All-inclusive solutions for economical concepts



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Water is a raw material – we are responsible for how we use it

Water is the most important raw material on our planet for human beings, for animals, for plants and for micro-organisms. Practically all processes in the biosphere that create and maintain life depend on the availability of water. Water is thus a living environment, an energy medium and a transport medium, and also an important element for all types of production.

The total amount of water available has remained practically constant over the last few thousand years. 2000 years ago, 200 to 300 million inhabitants of Earth could utilise the available resources. Today, more than 6 billion persons have to make do with almost the same amount of water. This means that the raw material water, which was for a long time freely available in many parts of the world, is now seriously stressed. Furthermore, the natural cleaning systems of our planet are considerably overloaded.

The Christ Water Technology Group is fully aware of its major responsibilities in maintaining water resources as a raw material and this contribution will become even more important in the future.



Image:
Page 2 left: Clarified water

Water recovery and the recycling of valuable substances have matured into key strategies of economical and environmental considerations in almost all sectors of industrial production.

The **Christ Water Technology Group** has reached its leading position as a system partner in the area of water management as the result of its customer-orientation, its qualified and motivated staff and its complete range of efficient process technologies and services. It offers the complete engineering, the planning, installation and commissioning of standalone systems and also the project management of large turn-key systems.

Goema AG in Vaihingen/Enz, Germany, is a leading supplier of systems and technology for water treatment to all sectors of industry, and heads this Business Unit within the Christ Water Technology Group. All over the world, the systems, products, processes and services offered by Goema guarantee quality, environmental protection and economical operation. More than 1,000 systems installed worldwide in the last 50 years are proof of the quality and reliability of the GOEMA developments and products. The product range encompasses chemical-physical, biological and thermal process technologies. In order to produce economical and integrated process combinations for the treatment of water and any possible recycling measures, Goema has a very modern laboratory and technical centre. Goema is certified in accordance with ISO 9001.

Hinke Tankbau GmbH in Vöcklamarkt, Austria, has been manufacturing tanks for more than 50 years. Many years of experience and the use of the most modern technology permit the manufacture and delivery of well-designed, high-quality components and tanks. One of the many strong points of Hinke Tankbau is the flexibility which results from the manufacture of tank bases in their own factory.

Hinke Kft. in Tamasi, Hungary, plans and produces pressure tanks and storage tanks made of stainless steel and carbon steel, with diameters of up to 4 m, heights of up to

20 m and a total weight of up to 20 tonnes. The carbon-steel tanks can be supplied with a sand-blasted finish and with various types of corrosion-protection (epoxy or rubber coatings, Säka-phen, Halar, etc.). In addition to being licensed as a tank manufacturer in accordance with AD 2000, HPO, the company is certified in accordance with ISO 9001 and can meet the most demanding quality requirements. As well as tanks, Hinke primarily produces pipes and welded-steel constructions.

Tepro Project Engineering Wassertechnik Ges.m.b.H. has been building industrial turn-key systems for the treatment of process and wastewater for more than 45 years and has a large number of references in the treatment of water for power stations, the steel industry, the paper and pulp industry, the chemical industry, automobile factories, breweries and the beverage industry. Tepro is located in Lieboch, to the west of Graz, Austria, and is also certified in accordance with ISO 9001.

Markets

The Christ Water Technology Group has successfully introduced customer-specific solutions in many sectors of industry and possesses specialised expertise in the areas of the waste disposal and recovery industry, the automobile industry, the chemical industry, the semiconductor and electronics industry, printed-circuit board technology, surface treatment and the textile industry.

The main sales markets, in addition to western and eastern Europe, are Brazil, Turkey, the Middle East and the People's Republic of China.



Bespoke system solutions for water management and components for better economy and environmental protection

Individual system solutions based on suitable components are available to meet every requirement in the area of water management. A system of modular components permits the configuration of supply and disposal plants which meet the most demanding requirements for economical operation and environmental protection. The Christ Water Technology Group sets great value on concepts with low power consumption and waste production.

With technically perfect and economical technology modules, the Christ Water Technology Group offers optimal user solutions with intelligent combinations of high-quality system components for almost every task in the sector of wet chemical processes:

- Membrane technology
- Evaporator technology
 - Vacuum evaporator systems
 - Vacuum drying systems
- Ion exchangers
- Flue-gas neutralisation processes
- Biological processes
 - Activated-sludge processes
 - Solid-bed processes
- Combined processes
- Control technology for all of the above processes and combinations

Membrane technology

Membrane filtration technologies optimised for individual solutions, as system components or integrated into a combined process. All filtration processes are optimally designed to match their applications. In particular, the following membrane processes are used:

- Microfiltration
 - Application areas: removal of metal hydroxides, biomasses
- Ultrafiltration
 - Application areas: treatment of surface water, cooling lubricants, degreasing baths, wastewater containing oil, biology, bilge water, lees
- Nanofiltration
 - Application areas: recycling of acids and lyes, concentration of metals
- Reverse osmosis
 - Application areas: cooling water, fresh water, boiler feedwater, rinsing water, production of pure water, demineralisation, treatment of leakage water from garbage dumps

Evaporator technology

The range of evaporator systems used today in the electroplating industry, the chemicals industry, the foodstuffs industry, in recycling and disposal, and in the petrochemical industry extends from the small laboratory still to systems the size of a football pitch used, for example, for the desalination of sea water.

Almost all substances known to man are today evaporated or distilled. The treatment of industrial wastewater uses special vacuum evaporators. There are two basic processes:

- Vapour-compression under a slight vacuum and
- Vacuum evaporation with a heating or cooling in a vacuum

GOEMA vacuum evaporator systems with hot and cold water units, Series VV-WP

The heat exchangers of the evaporator systems are powered either by specially designed "modular heat pump systems" or with alternative energy sources. This newly developed vacuum system technology permits superfluous energy to be used either externally or in other stages of combined processes. Such systems are manufactured from all types of stainless steel and special alloys of these, depending on the customer's requirements.

GOEMA vacuum drying systems, Series VT-WP

The energy supplies are optimally matched to each other in accordance with the typical GOEMA concept and require little space. Connected in series with vacuum evaporators which concentrate the substances to a pumpable consistency, or as standalone units, equipped with mechanical scrapers and removal systems for the dry substances.



Images:
 Page 4 left: Reverse osmosis plant
 Page 4 right: Membrane filtration at a customer site in China
 Page 5 left: "Zero discharge" production in an electroplating facility
 Page 5 right: Vacuum evaporator module VV-1200 for eloxal solutions

Ion exchange

Ion exchange recirculation systems are recycling systems which clean used water and return it to the process for further use. This system technology is used in all areas of electroplating, chemical surface treatment and printed circuit board manufacture. When used in combination with a pre-rinsing cascade, this system permits major savings in rinsing water costs and ensures optimal rinsing quality.

The advantage of the ion exchanger systems is the high efficiency of Christ Water Technology and GOEMA systems, achieved by the combination of series-connected units and fluidised beds with backflow regeneration.

Flue-gas neutralisation processes

Here, particular emphasis is placed on cost-reducing wastewater neutralisation systems for the textile and beverages industries. These are used for the treatment of alkaline water generated by production systems when flue gas is available for this purpose.

- Low-cost treatment of wastewater with the aid of the available flue gas
- Active environmental protection by reduction of the CO₂ emissions
- No need for neutralisation chemicals

Biological processes

Christ Water Technology offer individual systems based on biological processes. In some cases, these are combined with physical-chemical and thermal technologies. Such systems are used, amongst other, for solving the following wastewater problems:

- Reduction of the chemical oxygen demand and destruction of carbon (aerobic, anaerobic)
- Nitrification
- Denitrification
- Elimination of phosphates

The following are some of the processes used for this:

- Activation processes
 - Conventional, as the water passes through the system
 - Or as a sequential batch reactor (SBR) process
- Solid-bed processes
 - Immersed, rigid solid bed
 - Moving rigid solid bed (immersed discs)
 - Mobile carrier materials
 - Inclusion of immobilised micro-organisms

Depending on their size, the composition of the wastewater and the customer's wishes, these systems are built in plastic, steel or concrete.



Images:

Page 6: Production integrated rinsing water treatment plant in a brass plating line with a tyre manufacturer in China

Page 7 top: Biological treatment in the foodstuffs industry

Page 7 bottom: Clarifier with scraper

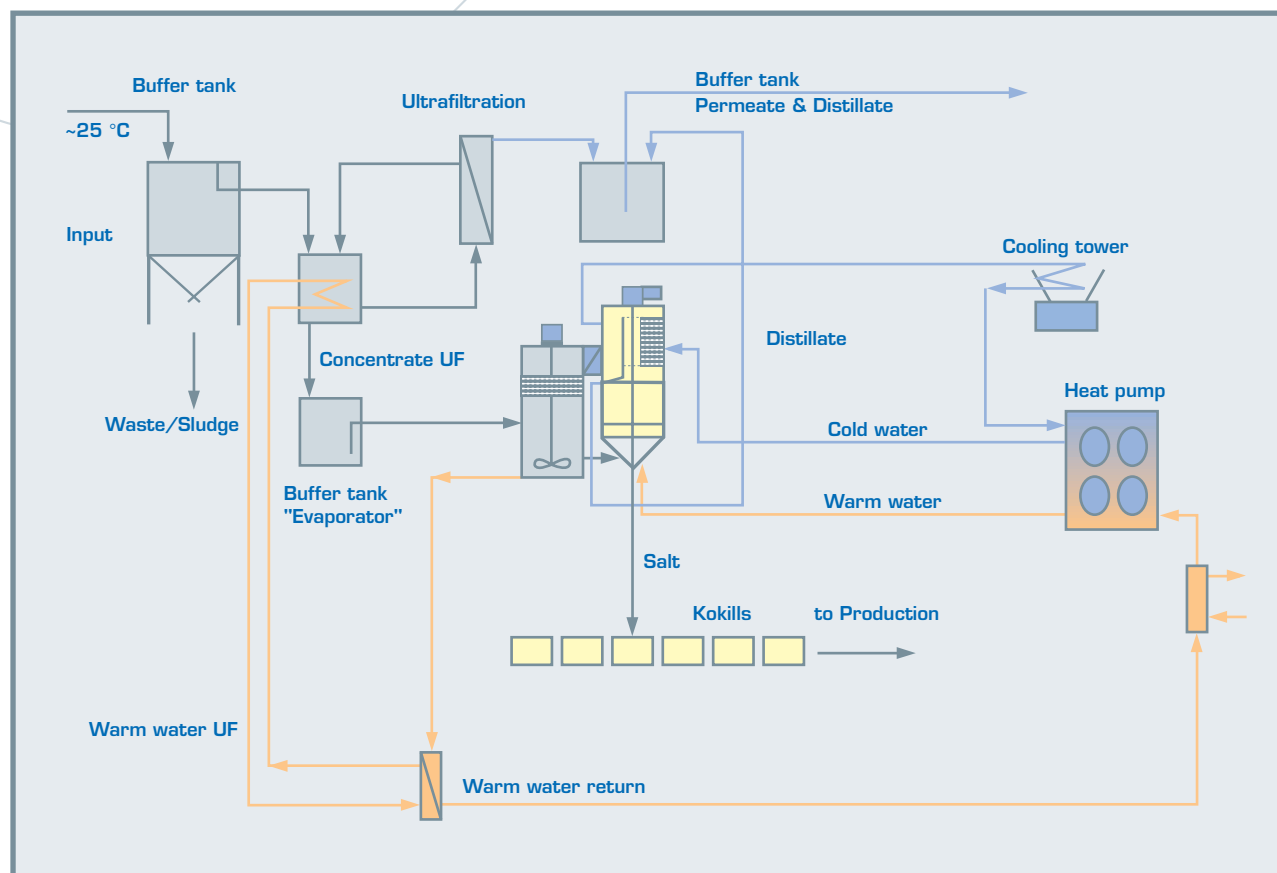
Membrane technology/evaporator technology

The energy consumption of the evaporator technology is reduced by pre-concentration with the aid of membrane technology. This also minimises the physical size of the evaporator system. Superfluous energy from the thermal stage is fed to the membrane stage in order to increase the flow.

Goema have also developed a system which can be built in the form of modules. Thermal separation technology with a flange-mounted ultrafiltration unit.

Combined processes

With the aid of synergistic effects within the Christ Water Technology Group, Goema have, in the past few years, not only optimised the existing combined processes but also developed many more such processes ready for the market. Their main advantages are the reduced energy consumption, investment costs and space requirements. The main emphasis of research and development work lies in the further development of processes and technologies which use less or no chemicals.



▲ Recycling of salt solutions with recovery of valuable materials, here: hardening salt, vulcanisation salt with the aid of membrane technology/vacuum evaporation technology and vacuum dryer

All tasks involved in the measurement, control and regulation of systems, from the planning of the switchgear to the commissioning of the systems, are carried out by CWT electronics and software specialists.

Process visualiation

The design of the process visualisation is particularly important to the Christ Water Technology Group. The primary objectives are ease of use of the switchgear and controls, together with a uniform and clear structure of the control elements, some of which are manufactured by other companies of the Group. Programming and visualisation are carried out with the aid of the most modern visualisation techniques.

- PC-based and/or touch-PC-panel
- Uniform operation and display in Windows style for all systems
- User-friendly, self-explanatory graphical representation
- Clear-text designations of all components
- Control and parameter setting for individual units in separate windows
- Display of the unit status in clear text
- Overview of the entire system or display of the individual system components with cross-references between the diagrams
- Easy-to-use, chained-step operation
- Fault signalling system with archiving
- Display of measured values in the form of trend curves
- Access control with multi-level passwords
- Online language switching for worldwide use

PLC programming

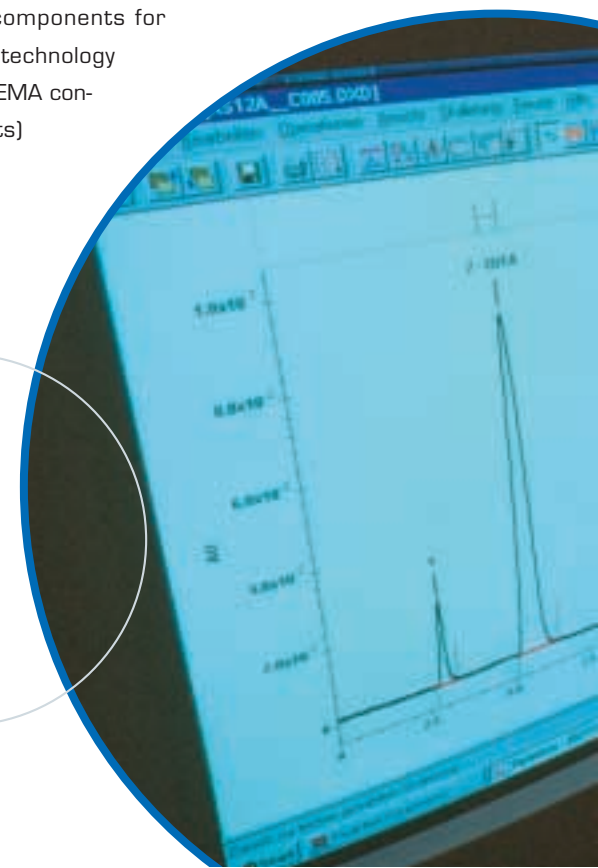
- Structured programming, divided into sections corresponding to the process steps
- Modular design permits expansion
- Clear-text variable names

Software service

- Commissioning by software specialists
- Remote maintenance with teleservice adapter and modem

Switchgear design

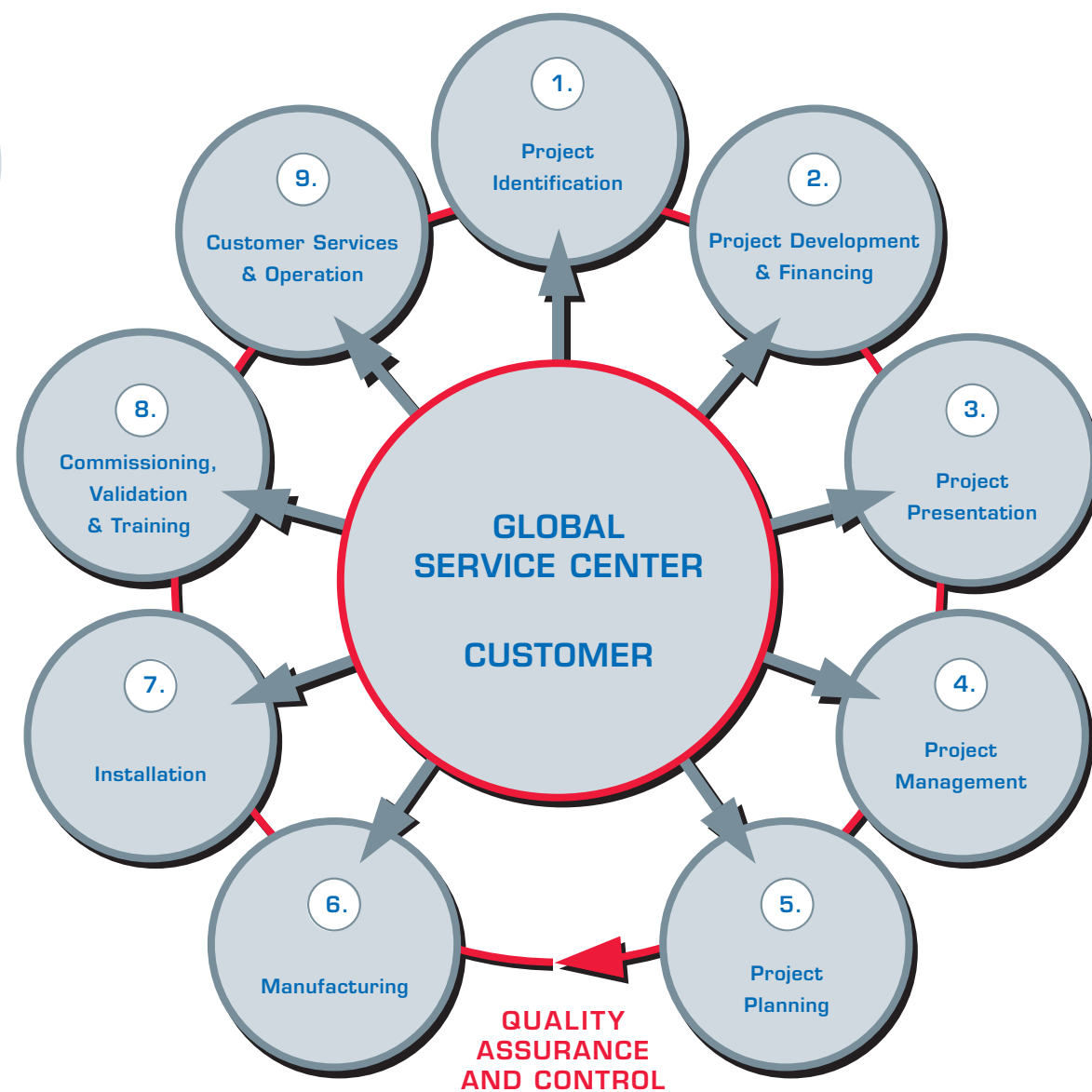
- In accordance with international standards
- Use of components from internationally renowned manufacturers ensures worldwide support
- Spare parts are available directly in almost all countries or can be obtained quickly
- Detailed documentation
- Hardware components for automation technology (such as GOEMA control elements)



From design to production, to the final acceptance

Internationally experienced teams are at the service of CWT customers all over the world for the system design, manufacture and handover. The services of the Christ Water Technology Group cover the entire spectrum of system engineering, including the production of specific studies, the design of the systems and their operation. Professional project management with the aid of the latest software tools is one of the most important foundations of success.

Production facilities at the headquarters near Basel and at locations in Germany, Austria and Hungary work with materials such as PP, PE, PVDF, PVC, steel, stainless steel, titanium, etc. If requested by customers, the system components are subjected to a factory acceptance test on the own test bed.



Customer Services

With comprehensive service, maintenance and training measures and operator models, the Christ Water Technology Group offers its customers all necessary services, including day-to-day operation. With its own measuring technology and its laboratory and technical centre for research and development, it is able to continually increase the benefits to the customers with respect to efficiency, quality and safe investments.

Range of services

- On-demand service
- Short, medium and long-term maintenance contracts
- Hotline service (24 hours, 365 days per year)
- Spare-parts service
- System operation and supervisor agreements
- Remote system maintenance via modem connection
- Training of operating personnel
- Operation and maintenance agreements
- Laboratory analyses
- System audits (system and process optimisation)
- Proposals for renovations and upgrading of systems

Scope of services during the entire project cycle

Planning, erection, commissioning and maintenance, together with training, guarantee uniform and highly-qualified project management in every phase of the project.

By the integration of all process steps, the Christ Water Technology Group offers its customers a complete concept beginning with the project identification and extending through commissioning, training, customer services and operation of the systems. Depending on their requirements, customers can sign an agreement for customer-oriented services with the Christ Water Technology Group.

The contacts for this are:

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Images:
Page 11: Test stand