



Chemical surface treatment with integrated environmental protection

Flexible complete solutions through modular systems

Complete systems for higher treatment quality and increased throughput at reduced operating costs

Steuler Surface Technology ...

Tunnel pickling line for stainless steel wire



The Steuler chemical surface treatment systems show you in every respect that Steuler is a partner for you who has gained practical experiences for more than 30 years.

System conceptions with a guaranteed future are the basis for optimum surface quality at simultaneous reduction of your operating costs through integrated treatment, regeneration and environmental technology. Besides proven primary measures like complete encapsulated systems and multicascade rinsing our conceptions stand for comprehensive solutions of your waste, waste water and flue gas problems.

The Steuler surface technology offers systems and processes for treatment of steels, stainless steels, aluminium, non-ferrous metals, glass, special materials, etc. for

wires, sheets, tubes, profiles, components,

with the essential treatment steps:

- salt melting or sand blasting
- degreasing
- pickling
- phosphating/liming/boraxing
- soaping
- galvanizing/coppering/tinning
- drying

For the various materials, shapes and throughputs the following systems optimized to the respective case of application are available:

Tunnel Pickling Lines for Wires, Sheets, Tubes and Parts

The chemical treatment is carried out in dip baths within a closed tunnel. The material is transported program-controlled through the different baths by a transport unit. The treatment sequence can be adapted to the requirements of the surface quality.

Roll Pickling Lines for Sheets and Profiles

The treatment material is transported continuously via roller tables through the treatment stages which are completely encapsulated. The respective treatment solution is sprayed everywhere onto the material. Different solutions can be used in the single treatment stages which can be adapted to the requirements.

Autoclave Pickling Lines for Tubes, Parts, Sheets and Profiles

The treatment is carried out in a tank that is entirely closed, the autoclave. The pickling material is deposited into the autoclave and tightly closed by a cover. The treatment solutions are resupplied back program-controlled in succession from the different receiver tanks to the autoclaves as required for the surface quality. The materials can be dipped or sprayed.

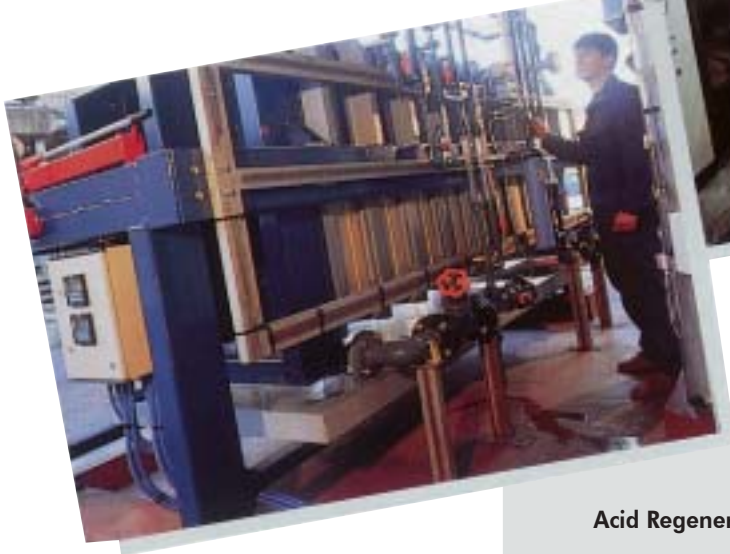
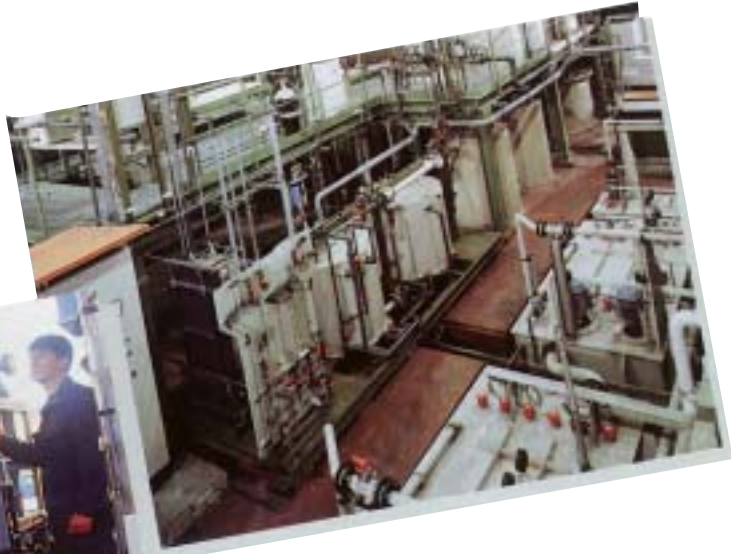
Continuous Pickling Lines for Wires

The wires are drawn continuously through the different treatment solutions. Depending on the used solution the wires are treated in flood, dip, turbulence or spray tanks. It is feasible to treat 36 wires at the same time.

Regeneration Systems

Modular designed technologies for system covering complete solutions

Waste water treatment plant
with recycling of residual materials



Diffusion dialysis



For comprehensive solutions complete regeneration systems are an addition to our performance scope:

It is no problem to enlarge the concepts and thus to meet all specific requirements!

Acid Regeneration based on Cooling Crystallization

- Continuous process, therefore no breakdown by bleeding the treatment baths as well as constant operating conditions
- Reduction of the operatin costs through acid and chemical saving and production of iron sulfate
- Low investment and operating costs
- Easy handling
- Minimum downtime periods and operating safety

Acid Regeneration based on the Stripping Process combined with the Cooling Crystallization

- Total acid recovery
- Simplified system and process technology, therefore high operating safety
- Low investment and operating costs
- Easy handling

Mixed Acid Regeneration based on Membrane Technology

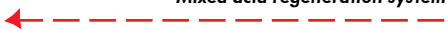
- Total recovery of the free and bound acids
- Metal recovery
- Complete recycling of water and circulation of the neutralizer (KOH)
- Reduction of operating costs through saying of the fresh acid, neutralizer, sludge removal and waste water fees
- Constant operating conditions

Rinsing Water Regeneration based on Membrane Technology

- Circulation of the whole quantity of water
- Total recovery of acids and bases
- Surface treatment free of waste water and waste



Mixed acid regeneration system



Flue Gas Technology

No waste water, recycling of the pollutants as raw material – the economically feasible and ecologically sensible solution

Through the use of acids and bases in surface treatment systems flue gases charged with pollutants are produced. In order not to jeopardize the operating staff these flue gasses must be sucked off and the containing pollutants be removed in a flue gas purification system as per the rules currently effective before being released into the atmosphere.

Besides the removal of pollutants Steuler developed suitable flue gas purification systems especially in view of the following points:

- **Low investment and operating costs**
- **Recycling of the pollutants as raw material to the process**
or:
- **Conversion of the pollutants into natural constituents of the air**

To treat the flue gas in the field of surface treatment systems the following system and process technologies are available:

- **Absorption Technology for Physical or Chemical Absorption of Pollutants**
- **Catalyst Technology for Conversion of the Pollutants into Natural Constituents of the Air**

Absorption System for Separation of HCl, HF and/or NO_x

HCl, HF or NO_x are converted into hydrochloric/hydrofluoric acid and/or nitric acid upon the absorption with water and supplied back to the process. As water rinsing water from the surface treatment system is used.

According to the customer's need capillary packed scrubbers or filter mat scrubbers are used as absorption systems.

The considerable advantages are:

- high separation rates at low operating and investment costs
- no shifting of the flue gas problem from the air into the waste water through feedback of the pollutants as raw material to the process
- high operating safety at lowest operating expenditure

Catalyst Systems for Conversion of NO_x into the Natural Constituents of the Ambient Air, Nitrogen and Water

- no waste water production
- low NO_x emission values at low operating costs
- minimum downtime periods and operating safety
- low operating expenditure through simple system and process technology

NO_x-absorption plant with nitric acid as final product, raw material for the downstream process



Catalytic facility

These types of pickling lines described above were developed especially in view of low personnel requirement, high surface quality, low operating and maintenance expenditure, low operating costs as well as low environmental loads.

Waste Water and Regeneration Technology

The surface treatment systems produce the most different waste solutions containing high concentrations of acids, bases and metals. In order not to have to neutralize and to drain these solutions entailing high costs, Steuler developed modular systems which treat the respective waste solutions while recovering and recycling the containing raw materials and water to the process.

The following processes and technologies are used for treatment being optimized according to the requirements:

Crossflow Microfiltration with Periodic Backwashing for Continuous Separation of Solids (> 1 micron). Oils and Fats from Process and Waste Solutions.

Diffusion Dialysis for Recovery of free Acids and Bases

Electrodialysis for Selective Separation and Concentration of Salts from Waste Solutions including Water Recycling

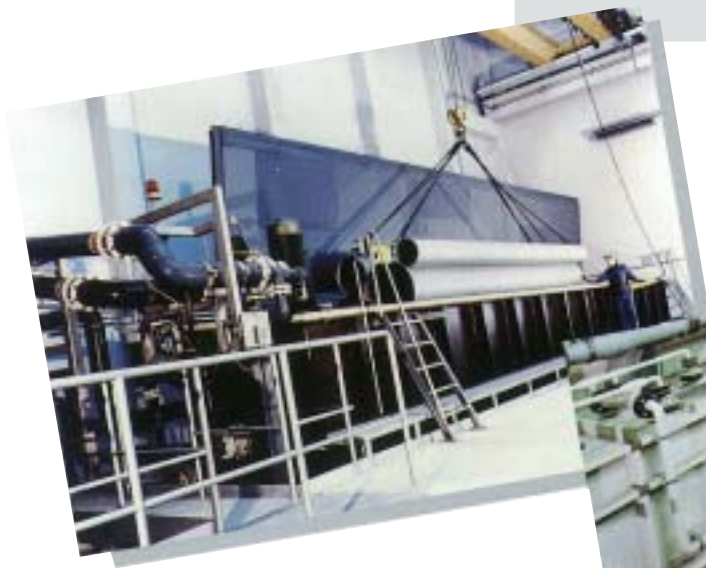
Electrodialysis with Bipolar Membranes for Splitting Salts into Acid and Base

Reverse Osmosis for Recycling Water from Waste Solutions

Distillation for Concentration of Acids and Bases incl. Water Recycling

Crystallization for Selective Removal of Salts from Waste Solutions

Stripping for Recovery of Acids and Ammonia



Hermetically sealed roll pickling line for stainless steel sheets

Autoclave pickling line for stainless steel tubes



... with integrated environmental protection

Careful resource management in closed cycles

Steuler – your system partner with the connected know how

- **Surface treatment facilities** with integrated environmental protection to improve quality, increase throughput and lower operating costs.
- **Single and multiple wire lines** for galvanic and electrolytic coating offering high throughput, requiring little space and maintenance.
- **Regeneration plants** using membrane technology to recover water, acids, alkalis and metals from rinse water, spent acids, waste and treatment solutions.
- **Waste water treatment facilities for industrial water** with complete water recycling and disposal concepts for the residual materials.
- **Catalytic exhaust gas treatment facilities** for the conversion of NO_x , CO , CH_x , NH_3 dioxins and furanes into their natural components N_2 , CO_2 , und H_2O using fully recyclable zeolite catalyzers.
- **Absorption facilities** to separate and break down the hazardous substances HCl , HF , SO_x , aerosols, sublimates and heavy metals into raw materials.
- **Waste-water-free flue gas purification facilities** conforming to the German Clean Air Act and all pertinent regulations (17. BImSchV. and TA-Luft) for power stations, combustion engines, waste and hazardous waste incineration plants, process gases, etc. with recycling of residual materials.



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