WATER MANAGEMENT SYSTEMS
Sustainable and economic solutions
As a leading system supplier in the fields of metallurgical and rolling mill technology and mechanical engineering, SMS Siemag provides individual solutions for plant owners. Such solutions include water management systems.

FROM PLANNING TO COMMISSIONING

In SMS Siemag, steelmakers and aluminum manufacturers have a competent partner for the provision of water management systems, with services extending from planning and design to supply and then to commissioning. High quality and smoothly project handling are assured for all stages of construction of the systems. All process-relevant plant components are made by SMS Siemag. In addition, the worldwide service ensures the high availability of the systems because SMS Siemag also inspects older plants with regard to their cost-effectiveness and efficiency and modernizes them at the request of the customer.

Furthermore, SMS Siemag provides assistance with approval procedures and official requirements. SMS Siemag plans each plant in close cooperation with all parties involved, enabling a water supply and treatment system to be produced that is tailored to each individual case of application.

TAILOR-MADE WATER SUPPLY AND TREATMENT

The water management systems benefit from more than 100 years of experience in metallurgical plant and rolling mill engineering. This know-how ensures the optimized and reliable integration of water treatment plants into a production process that saves energy and water.

For example, as early as 1985, SMS Siemag planned and installed the complete utility supply systems for the hot strip mill at the Baoshan iron and steel plant in China. The systems are still in operation today. The water management systems are tailor-made to the capacity of the production lines and operate with a high degree of cost-efficiency.

SMS SIEMAG WATER MANAGEMENT SYSTEMS

- Steelmaking
- Continuous casters
- Secondary metallurgy
- CSP® plants
- Hot rolling mills
- Cold rolling mills
- Strip processing lines
- Integrated plants
- Copper rolling mills
- Aluminum rolling mills
- Tin plate mills
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The range of solutions for water supply and treatment systems from SMS Siemag is basically subdivided into two major areas: Cooling water circuits for production lines and ancillary plants, and make-up water treatment plants as well as wastewater treatment plants.

**PRIMARY AND SECONDARY CIRCUITS**

Depending on the local situation, the cooling water systems can be designed either as primary or secondary circuits (e.g. seawater circuits, cooling of emulsion circuits or of rolling-oil circuits).

**DIRECT AND INDIRECT COOLING**

Depending on the production process, a distinction is made between direct or contact cooling (contact with the process) and indirect or non-contact cooling (heat exchanger). SMS Siemag can furnish perfected solutions for both options.

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**Cooling water circuits**

- **Contact cooling**
  - Open circuits
    - Examples:
      - Laminar cooling for a hot strip mill
      - Spray cooling for a continuous caster

- **Non-contact cooling**
  - Open circuits
    - Examples:
      - Cooling tower circuits
      - Furnace cooling
  - Closed circuits
    - Examples:
      - Cooling of machines
      - Cooling of moulds
WATER AND WASTEWATER TREATMENT

In conjunction with the cooling systems, all additional units belong to the range of supplies of SMS Siemag. The following are used, depending on the production process: Units for filter sludge treatment, for the treatment of make-up water, boiler feed water, industrial water (e.g. desalination, softening, deacidification, iron removal), for wastewater treatment (for oil-bearing, acid, basic, metal-laden and chromate-laden wastewater) as well as for utilities distribution.
Wastewater treatment system

- Oil-bearing wastewater
  - Chemical cracking / Ultrafiltration
  - Neutralisation
  - Flocculation / Sedimentation
  - Filtration
  - Sewer

- Acid and alkaline wastewater
  - Detoxification
  - Neutralisation
  - Flocculation / Sedimentation
  - Filtration
  - Sludge / Filter cakes

- Chromate-bearing wastewater
  - Detoxification
  - Neutralisation
  - Flocculation / Sedimentation
  - Filtration
  - Sludge / Filter cakes

Chemistry
### RANGE OF SOLUTIONS

**Task** | **Plant components**
---|---
Delivery | Pumps
Conveying | Pipes, Troughs
Storage | Vessels, Basins, Emergency-water tanks
Cleaning | Filtration plants, Ultrafiltration plants, Scale pits, Oil skimmers, Longitudinal clarifier basin, Precipitators, Separators, Sludge treatment systems, Filter presses
Cooling | Heat exchangers, Cooling towers, Energy-recovery facilities
**Altering of the water properties** | Reverse-osmosis units, Ion exchangers, Deacidification units
Chemical conditioning | for the avoidance of deposits (e.g. boiler scale), corrosion and formation of algae, for improvement of water-cleaning
SMS Siemag has supplied a 20-roll cold mill to Bahru Stainless, which will be producing high-grade special steel strip as from the end of 2012. The cold rolling mill produces special steel strips 0.15 to 6 mm thin. SMS Siemag designed and supplied the water treatment plant and supply system for this mill.

Essentially, the following plant components are to be cooled in an indirect or non-contact manner (i.e. by means of heat exchangers):
- Rolling oil unit
- Centralized oil lubrication system
- Hydraulic system
- Motors of pay-off and tension reels
- Millstand motors
- Hydrostatic system
- Measuring devices

The water treatment plant cools the return water out of the indirect cooling system, filters the dust from the cooling water which has entered the cooling towers, and conditions the cooling water so as to avoid corrosion and deposits.

**MAIN COMPONENTS**
- Pump station
- Cooling towers
- Filter station
SMS Siemag has supplied a 20-roll cold mill to Bahru Stainless.
MMK, RUSSIA

Water management system and wastewater treatment plant

The cold rolling mill at MMK produces various finished products (coils). On the continuous galvanizing line (CGL) up to 450,000 tons of hot-galvanized strip are manufactured, on the continuous annealing/galvanizing line (CAL/CGL) up to 400,000 tons of annealed strip and 249,000 tons of hot-dip galvanized strip, and on the pickling line/tandem cold mill (PLTCM) a maximum of 900,000 tons per year of rolled strip.

The cold rolling complex was erected as a new plant with all necessary auxiliary systems. Besides the water management system with the indirect open and closed cooling circuits, the SMS Siemag supply scope included the wastewater treatment of oil-bearing, acid/alkaline and chromate-laden water, the production of fully demineralized water by means of ultrafiltration and reverse-osmosis, the production of industrial water by means of two-stage filtration, the production of compressed air with oil-free compressors and adsorption driers, and steam pressure reduction.

MAIN COMPONENTS

- Cooling towers
- Pump station
- Heat exchangers
- Filters
- Wastewater treatment
**TECHNICAL DATA**

**Commissioning:** 2012

**Cooling water circuits**
1. Circuit A, closed cooling circuit
   - IC2-1, conti.-galvanizing furnace 917 m³/h
2. Circuit A, closed cooling circuit
   - IC2-2, conti.-galvanizing/annealing furnace 2,519 m³/h
3. Circuit B, indirect cooling IC1-1
   - Compressor station, acid regeneration, pickling line, conti.-galvanizing, conti.-pickling, conti.-galvanizing / annealing, H2 plant, recoiling line 3,287 m³/h

**Wastewater treatment**
1. Oil-bearing 40 m³/h
2. Acid/alkaline 60 m³/h
3. Chromate-laden 3 m³/h
   - Production of fully demineralized water 255 m³/h
   - Production of industrial water 590 m³/h
   - Production of instrument air 10,200 m³/h
   - Production of saturated steam 180 °C 54,000 kg/h

---

**Indirect cooling circuits A and B**

- **CGL**: Cont. galvanizing line
- **CGL/CAL**: Cont. galvanizing and annealing
- **CA Station**: Compressed-air station
- **ARP**: Acid-regeneration plant
- **TCM**: Tandem cold mill
- **PL**: Pickling line
- **CPL**: Cont. pickling line
- **H2**: Hydrogen plant
SSAB, SWEDEN
Efficient water management and laminar cooling

“Compared to operation with our previous cooling section, we are now in the position to produce hot strip for heavy-duty vehicles with a higher cargo capacity and better resistance to wear thanks to the new laminar cooling system. The results for our customers are lower costs and a reduced environmental pollution.”

(Börje Sundell, SSAB, Sweden)

The hot strip mill at SSAB in Borlänge (Sweden) produces wear-resistant hot strip with a new laminar cooling system. In order to supply the laminar cooling system with sufficient water of the required quality and temperature, SMS Siemag installed a new water treatment plant and supply system alongside the laminar cooling in 2011.

LESS ENERGY CONSUMPTION, LOWER COSTS

SMS Siemag has designed the system in such a way that the costs and the burden on the environment are reduced over the entire life-cycle. Here are a few examples: The system’s pumps are operated variable speed. This reduces the energy requirement and the energy costs.

The circuit cooling is performed by means of heat exchangers in which river water is used as the coolant. The advantages are: Water losses due to evaporation in the laminar cooling circuit are reduced. The pipes and tubes, filter tanks and other components that are in contact with water are made of stainless steel in order to avoid corrosion or the use of additional chemicals. Scale particles, oils and greases are removed in a sedimentation basin.

MAIN COMPONENTS

- Pump stations
- Filter station (pressureless sand filters; thickener for filter sludge)
- Heat exchanger station (with CIP system)
TECHNICAL DATA

Commissioning: 2011
Cooling capacity: 100 MW
at river water temperature: max. 23 °C
Cooling water circulating flowrate: 354 to 16,080 m³/h
Cooling water temperature: 22 °C to 31 °C

New laminar cooling section with controlled cooling water flow.
In the electrolytic tinning of sheets, it is possible not only to recondition the water but also to recover the electrolytes and the chromium used for passivation purposes.

For this purpose, environment-friendly and economically efficient evaporator systems were installed at the Chinese customer from Shougang. On the total of two tinning lines approx. 475,000 t of high-grade tinplate are produced each year. In the lines, the strip is coated with tin in the respective electrolysis step and then subjected to passivation so as to make it insensitive to oxidation.

**EVAPORATOR** for recovery of the electrolyte and of the water

In electrolysis, the tin is transferred by means of an electrically conductive electrolyte from the soluble sacrificial anode and onto the steel sheet, where it is precipitated. In an evaporator heated by process steam and equipped with mechanical vapor compression, the rinsing water utilized and the consumed electrolyte are recovered together with the dissolved tin.
Evaporation of electrolyte rinsing water

Order placement: 2011
Infeed of rinsing water: 3,800 l/h
Concentrates recovered: 800 l/h
Condensates recovered: 3,000 l/h
Specific electrical consumption: 23 KW/m³

* Basis for data is one evaporator line in each case

Evaporation of passivation rinsing water

Order placement: 2011
Infeed of rinsing water: 3,800 l/h
Concentrates recovered: 680 l/h
Condensates recovered: 3,120 l/h
Specific electrical consumption: 20 KW/m³

* Basis for data is one evaporator line in each case

In this way, each year, up to 125 tons of tin per evaporator line are returned to the process. The rinsing water is likewise cleaned, treated and conducted in the circuit. Significant cost savings are achieved by conducting the tin the circuit and by reusing the electrolyte and the rinsing water.

Evaporator system for closed material-flow circuits

In this way, each year, up to 125 tons of tin per evaporator line are returned to the process. The rinsing water is likewise cleaned, treated and conducted in the circuit. Significant cost savings are achieved by conducting the tin the circuit and by reusing the electrolyte and the rinsing water.

Passivation of the coating takes place in a chromium-containing solution bath and is intended for protection of the surface. Installed downstream of this process are cascade-type rinsing unit and a drying unit. Here also, the rinsing water is evaporated in an evaporator with mechanical vapor compression. The clean condensate is then re-utilized for rinsing while the solution remaining, with a high chromium content, is returned to the passivation bath.
SALZGITTER, GERMANY
Hot strip mill extended in two stages

The hot strip mill at Salzgitter Flachstahl GmbH (Germany) has been made more powerful and efficient by means of continuous modernization measures. The water management system was adapted to the increased cooling requirement in two construction stages in 2005 and 2008.

CONSTRUCTION STAGE 1

In the first construction stage, the cooling circuit of the laminar cooling was separated from the “direct cooling circuit” and extended. For this, a new laminar flume was installed over the existing flume, through which water from laminar cooling is discharged into the hot-water basin. The hot-water basin was extended and the existing longitudinal clarifier was integrated into the laminar circuit. The following new components were installed: Separators, filters, cooling towers, cold well, feed pumps, bypass pumps and pumps delivering to the longitudinal clarifier.

MAIN COMPONENTS
- Cooling towers
- Pump station
- Separators
- Filter station
(Sand filter)

CONSTRUCTION STAGE 2

In 2008, the hot strip mill at Salzgitter Flachstahl GmbH (Germany) was revamped to a finished strip width of 2,000 mm and an annual capacity of 4.5 million t. The direct cooling water circuit was also rebuilt as part of these revamps. The scale flume was routed past the old scale pit and the old precoat filters which use diatomaceous earth. It now discharges into a scale pit with modern coarse-scale separation and preliminary oil removal. The new longitudinal clarifiers comprise the next process stage. Here, the medium-sized scale is separated, along with a further oil removal. Finally, the fine scale is efficiently separated and the residual oil is removed in the new filters. The cooling towers were also extended accordingly and modernized to take account of the new requirements.

MAIN COMPONENTS
- Scale pit
- Longitudinal clarifiers
- Filter station
- Cooling towers
- Separators
- Pump stations
**TECHNICAL DATA (1ST STAGE)**

<table>
<thead>
<tr>
<th>Commissioning</th>
<th>2005</th>
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<tbody>
<tr>
<td>Cooling water circulating flowrate via filter/cooling tower (basic load)</td>
<td>13,700 m$^3$/h</td>
</tr>
<tr>
<td>via longitudinal clarifiers</td>
<td>5,000 m$^3$/h</td>
</tr>
<tr>
<td>Untreated</td>
<td>3,800 m$^3$/h</td>
</tr>
</tbody>
</table>

**Cooling water circulating flowrate (via filter, cooling tower) (basic load)**

<table>
<thead>
<tr>
<th>Commissioning</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling water circulating flowrate (via scale pit, longitudinal clarifiers and filter)</td>
<td>13,000 m$^3$/h</td>
</tr>
<tr>
<td>Cooling water circulating flowrate (via cooling tower, difference with bypass to the cooling tower)</td>
<td>11,400 m$^3$/h</td>
</tr>
<tr>
<td>12-bar system</td>
<td>8,745 m$^3$/h</td>
</tr>
<tr>
<td>4-bar system</td>
<td>2,565 m$^3$/h</td>
</tr>
<tr>
<td>Flume flushing / Reserve</td>
<td>1,690 m$^3$/h</td>
</tr>
</tbody>
</table>

**Laminar cooling water circuit**

**Contact cooling water circuit**

- Overhead tank
- U-Pipe cooling
- Laminar cooling
- Run out table transvers strip flushing
- Hot well
- Separator
- Cooling tower
- Cold well
- Filter
- Clarifier
- Pumps
- Scale pit
- Longitudinal clarifiers
- Filters
- Cooling towers and Cold water basin
- To filter sludge treatment
- Overflow
An integrated water management system was installed for the new continuous caster No. 4. It supplies the mould and machine cooling circuits integrated into the caster with recooling water. The direct cooling water is pre-cleaned in a scale pit before being conducted to the cooling tower via sand filters. Integrated into the water treatment plant are three speed-controlled screw compressors which provide the atomizing air for the direct cooling.

The make-up water for the closed-circuit machine cooling is obtained from drinking water via a softening plant with downstream reverse osmosis. For emergency-water supply, tanks are installed on the bay roof above the continuous caster.

MAIN COMPONENTS
- Pump stations
- Cooling towers
- Scale flume
- Sand filter
- Emergency water tank
- Softening plant / Reverse-osmosis plant
- Compressor station for atomizing air
- Chemicals metering system

SMS Siemag also supplied the cooling towers.
**TECHNICAL DATA**

Commissioning: 2010
Direct cooling water flowrate: 470 m³/h
Recooling water flowrate: 2,350 m³/h
Atomizing air flowrate: 4,846 Nm³/h

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**Continuous caster No. 4 with water treatment plant**

- **Emergency water tank**
- **Mould**
- **Machine**
- **Spray cooling**
- **Scale pit**
- **Filter**
- **Cooling tower**
- **Cold well**

Drinking water
Make-up water treatment

Gravel filter are cleaning the re-circulating water.
PNTZ PERVOURALSKY NEW PIPE WORKS, RUSSIA
Water management system for steel plant

The integrated water management system supplies a steel plant with EAF, LF, VD and two continuous casters with cooling water. Closed circuits supply cooling water to the vast majority of the process plants.

A cooling tower circuit is available for cooling these circuits. The splash water from both continuous casters is cleansed in a scale pit of coarse constituents, grease and oil before it is conducted to a sand-filter system. For compensating the water losses, only river water is available, which has to be elaborately cleaned before further use.

Particular challenges during the planning were the constricted space situation and the installation of mould and machine cooling between the two continuous casters. Owing to official regulations, a cooling tower unit had to be relocated away from the WTP building.

MAIN COMPONENTS
- Pump stations
- Cooling towers
- Scale flume
- Sand filter
- Emergency water tank
- River-water treatment plant
- Treatment of the filter backwash water
- Chemicals metering system
TECHNICAL DATA
Commissioning 2009
Direct cooling water flowrate 1,145 m³/h
Indirect cooling water flowrate 14,812 m³/h

Water management system for steel plant EAF, LF, VD and two continuous casters
To increase the previous throughput rate in a sustained manner, our customer ThyssenKrupp Nirosta, one of the world’s leading manufacturers of corrosion-, acid- and heat-resistant special-steel flat products, entrusted us with a comprehensive modernization of the Hot Strip Pickling Line 1300 at the Benrath location. The used pickling-line rinsing water is treated by means of a microfiltration plant. This rinsing-water treatment plant allows the re-use of up to 75 percent of the rinsing water which would otherwise have been discharged wholly into the wastewater. That avoids an early closing of the cooling holes and extends the service life of the brushes.

**MANNER OF FUNCTIONING**

A filter is installed in front of the process tank, enabling the brush waste to be separated continuously. From the process tank, the wastewater is pumped through the modules and conveyed back into the filtration tank. Since the diaphragms only allow water and water-soluble substances to pass through, the tank contents are constantly drained. The condensate is discharged into the wastewater system. The system operates continuously 24 hours a day.

**MAIN COMPONENTS**

- Pump stations
- Diaphragms
- Circulatory container
- Treatment of the filter-flushing wastewater
- Chemicals metering system

Pickling line with microfiltration plant.
**TECHNICAL DATA**

- **Commissioning**: 2008
- **Capacity**: 50 m³/h
- **Reduction of cooling water consumption at brushes from 20 - 30 m³/h to 6 – 7 m³/h**
- **Filtration capacity**: 30 m³/h
- **Circulation capacity**: 250 m³/h
- **Blowdown**: 14 – 16 m³/h
- **Rinsing-water correction (DM water)**: 14 – 16 m³/h

**Conventional system**

- Fresh water
- Wastewater treatment plant
- 100%

**New system**

- Fresh water
- Wastewater treatment plant
- 75%
- Mikrofiltration
- 25%

Plant for the treatment of the filter-flushing wastewater.
The 3.6 m heavy plate mill at Ilsenburger Grobblech GmbH (Germany) was equipped with a new plate cooling system (U-bend cooling) in 2007. For this, SMS Siemag supplied a new cooling water circuit including cooling-water treatment system. The water supply and treatment devices are integrated into the existing system. The scale flume is provided with drilled through-holes beneath the works and is constructed of finished parts in the roller table area. Also, in order to save space, the medium-fine scale is removed by separators (as an alternative to the longitudinal clarifiers). The steel made overhead tank is integrated in the buildings steel construction.

A complete sludge treatment plant separates the rinsing water from the filters and the separators into clarified water and so-called “filter cake”. The make-up water is de-acidified in order to save on corrosion inhibitors.

**MAIN COMPONENTS**

- Cooling towers
- Pump station
- Scale pit
- Filter station
- Separators
- Filter sludge treatment
- Overhead tank
**TECHNICAL DATA**

Commissioning: 2007

Cooling water circulating flow rate:
- 6,160 m³/h (max.),
- 2,520 m³/h (mean)

U-bend cooling: 6,000 m³/h

Cross-spraying system: 160 m³/h

De-acidified make-up water: 34 m³/h

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**Plate spray cooling circuit**

- Overhead tank
- U-Pipe cooling
- Cross spraying
- Scale pit
- Separator
- Dual media filters
- Cooling tower
- Cold well
- Filter sludge treatment
- Pumps
- Make-up
- De-acidification filters

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Pump bay, inside view.
BAOSTEEL, CHINA
Plate cooling – both economical and ecological

The 5.0 m heavy-plate mill at Baoshan Iron & Steel Co. Ltd. in Shanghai (China) was newly erected in 2003. SMS Siemag planned the cooling water circuit for the combined spray and laminar cooling for high-strength plates. This combination allows cooling strategies with economical alloying concepts.

To save energy and thus reduce the overall life-cycle costs and to achieve a precise control of the cooling system, the main feed pumps for the spray cooling and U-bend cooling (“laminar cooling”) have variable-speed drives. Furthermore, pumps with a high operating efficiency were chosen. These were supplied and installed by SMS Siemag. Further components were planned with their equipment originating in China, such as vertical pumps, scale pit and concrete overhead tank.

MAIN COMPONENTS
- Pump station
- Filter station
- Inlet basin
- Cooling towers
- Overhead tank
TECHNICAL DATA

<table>
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<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Commissioning</td>
<td>2003</td>
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<tr>
<td>Cooling water circulating flowrate</td>
<td>20,200 m³/h (max.), 13,900 m³/h (mean)</td>
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<tr>
<td>Spray cooling</td>
<td>7,000 m³/h</td>
</tr>
<tr>
<td>U-bend cooling</td>
<td>13,000 m³/h</td>
</tr>
<tr>
<td>Cross-spraying system</td>
<td>200 m³/h</td>
</tr>
</tbody>
</table>

Plate spray cooling circuit

Pump stations: left: electrical building, right: intake opening of cooling tower.
ABU ZAABAL, EGYPT
Water management system for heavy plate mill

SMS Siemag has erected an integrated water management system for the heavy-plate mill at Abu Zaabal in Cairo (Egypt). It makes it possible to treat direct and indirect cooling water as well as make-up water by means of filtration and reverse-osmosis and also sludge liquor treatment by using thickener and belt filter press. The direct cooling water is utilized in the rolling mill, the plate spray-cooling, the hot plate leveler and in the quench. The indirect cooling water is used for furnace cooling, inclusive of emergency water and motor and oil cooling.

THE BENEFITS TO THE CUSTOMER
The customer manufactures high-strength heavy plates on the mill. At Abu Zaabal, the water management system is aligned towards these special processes and operates in a highly efficient and environment-friendly manner. To this end, the treatment systems for the direct cooling water for the millstands and the quench, which are actually separate systems in standard cases, were combined efficiently into a single treatment circuit. For the separation of medium-fine scale, use is made of economical separators. By using separators Abu Zaabal needs less space and therefore saves investment costs.

Proven technology as regards efficiency and service life was thus employed at Abu Zaabal.

MAIN COMPONENTS
- Pump station
- Scale pit
- Separators for medium-fine scale
- Cooling towers
- Filter station
- Filter sludge treatment
TECHNICAL DATA

Commissioning: 2003
Capacity, indirect cooling: 12.9 MW
Capacity, direct cooling: 27.9 MW
Cooling water circulating flowrate:
  Indirect cooling: 1,400 m³/h
  Direct cooling: 3,000 m³/h

Direct cooling circuit „C“

Separators for removing medium-fine scale.
Scale pit: In the foreground: scale basin, tank for skimmed-off oil; in the mid-ground: opening of scale pit; in the background: opening of clarified water chamber.
The CSP® plant at Zhujiang was built for the production of 792,000 tons of steel strip per annum (first stage of construction). The strip gauge is between 1.8 and 12.7 millimeters, and the strip width between 1,000 and 1,300 millimeters. The CSP® plant was erected as a new facility with all necessary auxiliary systems, including the water treatment plant.

The SMS Siemag scope of supply comprised not only the water management system but also the utilities supply for the water systems of the casting machine, the rolling mill and the laminar cooling. The reduced quantity of interfaces enabled the complete water supply system to be tailored to the CSP® process.

Already in 1998, the water management system was designed to take account of the later expansion of the CSP® plant to two casting strands and two coilers. In the layout, consideration was given to dimensioning components such as the scale pit, longitudinal clarifier basin and emergency water tank in accordance with the final construction phase.

**MAIN COMPONENTS**

- Pump station
- Scale pit
- Longitudinal clarifier basin
- Cooling towers
- Filter station
- Filter sludge treatment
- Heat exchangers
- Emergency water system incl. emergency-water overhead tanks
TECHNICAL DATA
Commissioning 1998
Cooling water circulating flowrate
1. Circuit A, mould cooling MC 760 m³/h
2. Circuit B, indirect cooling IC
   - Casting machine, closed machine 330 m³/h
   - Tunnel furnace 280 m³/h
   - Hot strip mill 955 m³/h
3. Circuit C, direct cooling DC
   - Casting machine, open cooling 700 m³/h
   - Hot strip mill, 12-bar system 4,220 m³/h
   - Hot strip mill, 4-bar system 1,070 m³/h
4. Circuit D, direct cooling DC
   - Laminar cooling 4,755 m³/h
   - Cross-spraying system 198 m³/h
### FURTHER REFERENCES

<table>
<thead>
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<th>Year</th>
<th>Customer</th>
<th>Country</th>
<th>Plants</th>
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<tr>
<td>2013</td>
<td>Salzgitter Flachstahl</td>
<td>Germany</td>
<td>Water management system: Direct cooling circuit for a Steckel mill</td>
</tr>
<tr>
<td>2012</td>
<td>Bahru</td>
<td>Malaysia</td>
<td>Water management system: Indirect cooling circuit for cold rolling mill (20-roller)</td>
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<td>2012</td>
<td>MMK</td>
<td>Russia</td>
<td>Water management system and waste-water treatment system</td>
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<td>2012</td>
<td>Azovstal</td>
<td>Ukraine</td>
<td>Water management system: Heavy-plate mill</td>
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<td>2012</td>
<td>ArcelorMittal Kryiv Rih</td>
<td>Ukraine</td>
<td>Primary dust-collecting system: Hydro-hybrid with SMS Elex ESP, design and partial delivery of the hot water system for cooling stack</td>
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<tr>
<td>2011</td>
<td>SSAB</td>
<td>Sweden</td>
<td>Water management system: Laminar cooling</td>
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<tr>
<td>2010</td>
<td>Salzgitter Flachstahl</td>
<td>Germany</td>
<td>Water management system: Single-strand slab caster</td>
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<td>2010</td>
<td>IISCO</td>
<td>India</td>
<td>Primary dust-collecting system and secondary dust-collecting system, X-Melt Scrubber/APS, design and partial delivery of the hot water system for cooling stack</td>
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<td>2010</td>
<td>Bhusan Steel</td>
<td>India</td>
<td>Primary dust-collecting system and secondary dust-collecting system, X-Melt Scrubber, design and partial delivery of the hot water system for cooling stack</td>
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<tr>
<td>2009</td>
<td>Pervouralsky New Pipe Works (PNTZ)</td>
<td>Russia</td>
<td>Water management system and utilities distribution for a steel plant (EAF, LF, VD) and two continuous casters</td>
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<td>2009</td>
<td>Neelachal Ispat Ngam</td>
<td>India</td>
<td>Primary dust-collecting system: SMS Siemag Baumco filter system, design and partial delivery of the hot water system for cooling stack</td>
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<td>2009</td>
<td>MAGHREB Steel</td>
<td>Morocco</td>
<td>Water management system: EAF-LF-CCM</td>
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<td>2009</td>
<td>Jindal South West Steel</td>
<td>India</td>
<td>Primary dust-collecting system: X-Melt Scrubber, design and partial delivery of the hot water system for cooling stack</td>
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<td>2009</td>
<td>Tata Steel</td>
<td>India</td>
<td>Primary dust-collecting system and secondary dust-collecting system: X-Melt Scrubber and APS, design and partial delivery of the hot water system for cooling stack</td>
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<tr>
<td>2008</td>
<td>Salzgitter Flachstahl</td>
<td>Germany</td>
<td>Water management system: New direct cooling system for hot rolling mill</td>
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<td>2007</td>
<td>Islenburger Grobblech</td>
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<td>Water management system: Direct cooling for the plate mill</td>
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<td>2007</td>
<td>Isdemir</td>
<td>Turkey</td>
<td>Primary dust-collecting system and secondary dust-collecting system: X-Melt Scrubber and APS, design and partial delivery of the steam system for cooling stack</td>
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<td>2006</td>
<td>Arcelor Mittal</td>
<td>Poland</td>
<td>Water management and utilities distribution system: Two-strand slab caster</td>
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<td>2006</td>
<td>Angang New Iron &amp; Steel</td>
<td>China</td>
<td>Primary dust-collecting system: SMS Siemag Baumco filter system</td>
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<td>2005</td>
<td>Stramit</td>
<td>Poland</td>
<td>Water management system: CCM/Supply/Electrical/Installation</td>
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<td>Water management system: New laminar cooling system for hot rolling mill</td>
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<td>CISA</td>
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<td>Cold rolling mill: Utilities systems, utilities distribution &amp; ultrafiltration</td>
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<td>Water management system: Single-strand slab caster</td>
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<td>2004</td>
<td>VGEA</td>
<td>Brazil</td>
<td>Cold rolling mill: Utilities systems, utilities distribution &amp; measuring instruments</td>
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<td>2003</td>
<td>Baosteel</td>
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<td>Water management system: DQ and ACC for heavy-plate mill</td>
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<td>Ilva Taranto</td>
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<td>Lysteel</td>
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<td>Water management and utilities distribution system; Basic engineering for a special steel plant (EAF, AOD-L, VAI continuous caster)</td>
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<td>Abu Zaabal</td>
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<td>Oil-skimming equipment: Hot strip mill</td>
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<td>Year</td>
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<td>Country</td>
<td>Plants</td>
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<td>Water management and utilities distribution system: Single-strand CSP® plant</td>
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<td>2001</td>
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<td>1999</td>
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<td>Saudi Arabia</td>
<td>Full-deionization system, wastewater system, cooling towers, indirect cooling for hot and cold rolling mills with hot-dip galvanizing</td>
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<td>1999</td>
<td>Diehl D</td>
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<td>Thyssen</td>
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<td>Cooling water system: DSC thin-strip caster, test installation revamp</td>
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<td>South Africa</td>
<td>Water management and utilities distribution system: Electric steelmaking plant with continuous caster</td>
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<td>Cooling water system: Continuous caster revamp</td>
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<td>Cooling water system: Continuous caster revamp</td>
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<td>Water management and utilities distribution system: Hot Eisenhüttenstadt rolling mill</td>
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<td>Water management and utilities distribution system: ISP minimill</td>
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<td>1997</td>
<td>SIAM Strip Mill</td>
<td>Thailand</td>
<td>Water management and utilities distribution system: Electric steelmaking plant</td>
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<td>Cooling water system: Copper converter, lance and stack cooling system</td>
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<td>1997</td>
<td>SIAM Strip Mill</td>
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<td>Water management and utilities distribution system: Electric steelmaking plant</td>
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<td>Spain</td>
<td>Water management and utilities distribution system: Two-strand CSP® plant</td>
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<td>Malaysia</td>
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<td>1997</td>
<td>Kardemir</td>
<td>Turkey</td>
<td>Primary dust-collecting system: SMS Siemag Baumco filter system, design and partial delivery of the hot water system for cooling stack + thickener system for scrubber</td>
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<td>1997</td>
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<td>1996</td>
<td>Hanbo</td>
<td>South Korea</td>
<td>Water management system: Utilities distribution, wastewater station and fully demineralized water station for cold rolling mill</td>
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<td>Jindal Vijayangar Steel</td>
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<td>Primary dust-collecting system: SMS Siemag Baumco filter system, design and partial delivery of the hot water system for cooling stack</td>
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<td>Iiva</td>
<td>Italy</td>
<td>Utilities and cooling water system: Converter bottom stirring, N2 compressor revamp</td>
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<td>Wuhan Iron &amp; Steel</td>
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<td>Primary dust-collecting system: SMS Siemag Baumco filter system, design and partial delivery of the steam system for cooling stack</td>
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<td>1994</td>
<td>Rourkela</td>
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<td>Water management and utilities distribution system: Steelmaking plant with continuous caster</td>
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<td>1994</td>
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<td>Luxembourg</td>
<td>Cooling water systems: Three-strand beam-blank caster, electric steelmaking plant</td>
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<td>1994</td>
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<td>India</td>
<td>Primary dust-collecting system: SMS Siemag Baumco filter system, design and partial delivery of the hot water system for cooling stack</td>
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<td>1994</td>
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<td>South Korea</td>
<td>Water management and utilities distribution system: ISP minimill</td>
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<td>1994</td>
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<td>South Korea</td>
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<td>1975</td>
<td>PTKS</td>
<td>Indonesia</td>
<td>One of the first water management systems from SMS Siemag for a hot strip mill</td>
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<tr>
<td>1954</td>
<td>Dominions Foundries and Steel</td>
<td>Canada</td>
<td>One of the first primary dust-collecting and gas-cleaning systems operating with the Baumco filter system</td>
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</table>
"The information provided in this brochure contains a general description of the performance characteristics of the products concerned. The actual products may not always have these characteristics as described and, in particular, these may change as a result of further developments of the products. The provision of this information is not intended to have and will not have legal effect. An obligation to deliver products having particular characteristics shall only exist if expressly agreed in the terms of the contract."