COPPER PLANTS
Save resources, improve quality
THE SMS GROUP IS A GROUP OF GLOBALLY OPERATING COMPANIES IN PLANT AND MACHINERY CONSTRUCTION FOR STEEL AND NON-FERROUS METALS PROCESSING. WE COVER EVERYTHING FROM PIG IRON PRODUCTION TO METALLURGICAL PLANT, ROLLING MILLS TO STRIP PROCESSING LINES, TUBE MILLS TO THERMAL TECHNOLOGY – COMPLETE WITH ELECTRICS AND AUTOMATION AS WELL AS SERVICE.
Whether in electrical engineering or electronics, in heating and air conditioning engineering or in the motor vehicle industry – copper is an irreplaceable material. Above all, its high electrical and thermal conductivity makes copper indispensable for many applications. The metal is long lasting, recyclable and environmentally sound.

BUNDLED EXPERIENCE
SMS group has been active in the copper field for more than 50 years. During this period such long-established companies as Mannesmann, Krupp, Technica and most recently Schumag and MRB with their know-how and their leading products have gradually become a part of the division. Moreover, through numerous innovations SMS group has continuously improved its market position.

INTEGRATED SOLUTIONS FROM ONE SOURCE
We are the world’s leading manufacturer of plants, systems and machines for processing copper into semi-finished products. As regards tube plants for copper, we are the only supplier worldwide who covers the entire production line – from the copper melting bath to the final product. Our business partners benefit significantly from our comprehensive portfolio: they receive all copper plants from one source – perfectly coordinated.
THE CUSTOMER’S PERSPECTIVE

“When we built our new plant, we looked at a number of suppliers and compared them carefully: SMS group offered the best engineering solution and enabled us to achieve best product quality. Now, four years after commissioning, SMS group is still a real business partner for us. We can really rely on the employees’ skills and first-class services.”

Graham Cheetham, General Manager (Manufacturing), Dubai Cable Company Pvt. Ltd. (Ducab), UAE

RELIABILITY THROUGH EXPERIENCE

More than 600 reference projects in over 50 countries testify to our experience and competence. We tailor each individual plant to the requirements of our customers. Our employees not only know the market, they also understand the forming processes and the metallurgical properties of copper. Thus we are able to optimally advise our customers. On request we take on the complete project management, including the financing service.

REWARDING INVESTMENTS

The customer defines the goal, and together we develop a suitable integrated solution. Thus our business partners can be sure that their investments will pay off – from the very first day of production. And to ensure that it will stay like that for years, our customers can rely on our comprehensive service even after commissioning. We keep our partners and their plants up to date.

INNOVATIONS IN LINE WITH MARKET REQUIREMENTS

Our integrated solutions are a byword for robust and reliable state-of-the-art technology. And we never stop trying to become even better. The raw material prices for copper are high – which is why we are continuously looking for new ways to reduce material use and material loss during production. Close tolerances, top quality and efficient processes – that is what you can expect from our plants.

TYPICAL PRODUCTS WHICH ARE MANUFACTURED ON SMS GROUP COPPER PLANTS:

- Extrusion billets
- Slabs
- Cold-rollable strip
- Tubes
- Wire rod
- Bars
- Hollow billets
- Profiles
- Anodes
Our employees know every step in the copper working process, from the melting bath to the final product. We connect individual machines to form integrated systems which meet all the requirements of the customer. At the same time we offer our customers configurations in which all the components are ideally coordinated – both technically and economically.

ECONOMIC SOLUTIONS FOR SEMI-FINISHED PRODUCTS
We are a world leader for plants and systems for processing copper into semi-finished products. With our CONTIROD® casting and rolling plants our customers set standards worldwide for wire rod production. We supply continuous casting plants of various designs – horizontal and vertical, continuous and semi-continuous, as well as for special alloys. To produce copper anodes, customers can choose a wide range of individual solutions – from melting to final processing.

RAW MATERIAL
- Copper, copper alloys, e.g. scrap or cathodes
- Cast iron, noble metals and special alloys

MELTING, CASTING AND ROLLING
CONTIROD® and CONAS casting and rolling plants
- Continuous casting plants
- directube® system
- Extrusion presses
- Cold pilger mills
- Casting wheels and CONTILANOD®

* CONTIROD® is a registered trademark of Aurubis Belgium.
between the time-tested casting wheels and the CONTILANOD process for applications on an industrial scale.

COMPLETE PACKAGE FOR TUBES
In the case of tubes, our portfolio covers the entire production process. To produce mother tubes economically, customers rely on the directube® system, as well as on our extrusion presses and cold pilger mills. Onward processing is carried out by drawing machines for preliminary, intermediate and finish drawing. Handling systems, for example for tube and basket transport, storage, feed as well as loading and unloading, round off the overall package.

MORE THAN GOOD TECHNOLOGY
We accompany our customers from the initial idea on, and together we develop a suitable solution. In the process we advise holistically, which includes advice on control and automation. Our machines and plants are robust and remain in use for decades. Our service is equally reliable, for example regarding maintenance and servicing management, or revamping. Our employees remain at the service of our customers even after commissioning – a plant-life long.

AUTOMATION

DRAWING AND FINISHING
- Preliminary drawing, e.g. drawing cascade
- Intermediate and finish drawing, e.g. spinner block, finishing
- Combined drawing machine, tube production line, coiler, finning machine
- Handling, e.g. systems for tube and basket transport, storage, feed as well as loading and unloading

PRODUCTS
- Semi-finished products, e.g. wire rod, strip, mother tubes, copper anodes
- Tubes, e.g. straight lengths, pancakes, large coils, level-wound coils, finned tubes

– A PLANT-LIFE LONG
CASTING AND ROLLING PLANTS
Achieve more with CONTIROD®* and CONAS

With minimum production costs our CONTIROD® plants achieve highest product quality and product flexibility: we have already realized wire rod with diameters of 8 to 30 millimeters and flat cross-sections with widths between 18 and 120 millimeters. The in-line casting and rolling plants offer advantages through the continuous process: the copper is rolled to its final dimensions immediately after casting. The modular design of the plants allows exact tailoring to customer requirements. At the same time, the high degree of standardization reduces the need for spare parts and wear parts to a minimum. The comprehensive automation system ensures stable production conditions and good operator controllability.

MINIMAL USE OF RESOURCES
The annual capacity of the CONTIROD® plants is between 40,000 and 400,000 tonnes. This corresponds to a casting rate of between 8 and 60 tonnes per hour. SMS group uses a high-power shaft furnace which in addition to copper cathodes also allows the use of large amounts of scrap – the residual material which accumulates during production, as well as scrap from the cable drawing plants, can be recycled. Resources are thus optimally used and the environment is protected. Moreover, the plant operators profit from even more process flexibility and low processing costs. The shaft furnace is also used as melting furnace for continuous casting plants.

IN-LINE NARROW STRIP PRODUCTION
CONAS is a further development of the CONTIROD® process. In this process the cast strand from the Hazlelett twin-belt caster is not rolled to wire rod, but to narrow strip. The casting cross-section is rolled down to the required size in the rolling mill with its up to fourteen individually driven stands and wound in-line on two coilers – as with the CONTIROD®* this is a continuous process. The strip is used in the tube industry. It can either be formed into a mother tube.

* CONTIROD® is a registered trademark of Aurubis Belgium.
and welded, or it can be used to manufacture finned heat exchanger tubes (ACR). In this case the narrow strip is cold rolled to final thickness.

On request, SMS group combines CONTIROD® and CONAS into a plant which produces both wire rod and narrow strip. The advantage for the customers: they can react quickly to changed demand and changed market conditions.

THE CUSTOMER’S PERSPECTIVE

“We have been producing high-quality copper wire rod on a CONTIROD® plant from SMS group since 1999. The technology and the results are convincing: the customers appreciate our quality and flexibility. Thus we increased our capacity from 18 to 30 t/h to consolidate our position on the wire rod production market.”

Halil Göker, General Manager, ErBakır, Turkey

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CONTINUOUS CASTING PLANTS
High flexibility and economic efficiency

Whether strip, billets or bars: SMS group offers economic and flexible continuous casting plants for every kind of copper casting. In over 50 years we have become experts in all the common casting processes and gained experience with widely different products, capacities and quality requirements. As a function of these factors and together with our business partners we select the best process for the case in hand and set the process parameters to allow the customer to produce optimum quality – reliably and cost efficiently. At the same time we gain in knowledge with every new plant: more than 500 supplied continuous casting plants in 50 countries testify to our competence and to the success of our customers on the market.

VERTICAL VERSATILITY
Our vertical continuous casting plants are synonymous with maximum economic efficiency and operational safety, for example in the manufacture of slabs, extrusion billets or cold-rollable strip. Our optimized mould technology is a byword for high product quality combined with high productivity. Depending on the casting format, outputs of up to
120,000 tonnes per year are achieved. For frequently changing casting schedules, our vertical semi-continuous plants with up to 6 strands provide the necessary flexibility. In our vertical continuous casting plants for precision casting of tubes, wire rod, bars and profiles we have combined the advantages of vertical and horizontal casting. This allows the manufacture of smaller and medium-sized dimensions with good dimensional stability.

**COST EFFICIENCY FOR SMALL CAPACITIES**

Our horizontal continuous casting plants are used for the production of high-grade cold rollable strip, wire rod, tubes and bars, mostly of copper alloys. Low investment and operating costs result in high cost efficiency for small and medium-sized capacities. The horizontal casting technology has also established itself for extrusion billets of brass. With a specially developed high-performance secondary cooling system, outputs of more than 100,000 tonnes per year can be achieved, depending on the casting format.

Moreover, we also supply continuous casting plants for cast iron, noble metals and special alloys. They allow a wide range of formats and are profitable even for very small outputs.

**RELIABILITY THANKS TO INTEGRATION**

Together with supplementary equipment and the control and automation systems, we, on request, also supply complete fully integrated copper foundries. The advantage for our customers: they can depend on productivity and quality being achieved as planned.
For example, we are supplying to our customer Jiangxi Copper the most powerful CONTIROD® plant in the world: it casts and rolls 60 tonnes of wire rod an hour, which is 400,000 tonnes a year. At the same time the plant has the largest casting cross-section in the world: it is 132 x 75 millimeters.

ALWAYS A LIVE WIRE
New impulses for the industry

More than half of the entire demand for copper is for continuously cast copper wire rod as a starting product for the electrical and electronics industry. With almost 40 years of experience and more than 40 installed or commissioned CONTIROD® plants, SMS group is world leader in this field. And we provide the market with new impulses again and again.

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Seamless copper tubes are traditionally made from continuously cast billets: the core stages in the process are the pressing of the tube blanks, the pass through the cold pilger mill and the drawing stage. This process chain however is profitable only where high production capacities are concerned – casting and pressing in particular are very resource-intensive.

With its directube® system, SMS group offers an innovative process which is cost-efficient even for small and medium-sized outputs. The special thing about it is that the “Pressing” process stage is no longer required. The tube blanks are cast from copper cathodes on a horizontal continuous casting plant and then directly converted to mother tubes in the planetary rolling mill. Finally, the ingoing shells are further processed on continuous straight-line drawing machines, bull blocks, finish drawing machines and coilers.

CASTING OF MOTHER TUBES
Fewer processes, more efficiency – with directube®
The directube® process has significant advantages over conventional processes: the production path is shorter, efficiency is higher. At the same time there are smaller amounts of copper in circulation, which noticeably reduces production losses. Added to this is the excellent concentricity of the products. Thus less material is needed for the same length of tube. The plant operator profits from lower energy consumption and lower operating and investment costs.

**HIGH QUALITY YOU CAN RELY ON**

At the same time customers can rely on excellent production results with the directube® system: the tube blank produced during casting has a fine-grain structure uniformly distributed over the cross-section, as well as a clean surface free of oxidation, scale and defects. The rolling process can produce up to 1,300 meters per hour and runs continuously without any stops for loading. This guarantees very stable, constant rolling conditions which allow extremely high rolling quality, higher output and extended tool life.

The directube® system is suitable for tube blanks with a diameter of between 90 and 150 millimeters. After rolling, the diameter of the mother tube is between 48 and 90 millimeters.
Whether a conduit for water and gas or industrial tubing (ACR) for refrigeration and air conditioning – SMS group has suitable systems for every requirement. And we cover the entire process: not only production of the mother tubes, but also preliminary, intermediate and finish drawing, and finishing. The advantage for our customers: they receive an integrated solution in which all the components fit together smoothly.

**LOW ECCENTRICITY AND CLOSE TOLERANCES**
Depending on requirements, we use conventional two-carriage drawing machines or high-power caterpillar drawing machines. Preliminary drawing of larger ingoing shells is done on drawing cascades in a single or multi-coupled straight-line drawing machine. Plant operators can thus reduce the eccentricity of their tubes and maintain close tolerances. This guarantees excellent quality and productivity.

**MAXIMAL SPEED**
For intermediate drawing, our customers benefit from the competence of SMS group who specializes in bull blocks. The new machine type SB4F allows continuous drawing of unlimited tube lengths, and at a speed of up to 1,500 meters a minute is particularly fast. Moreover, these machines allow great flexibility and involve low maintenance outlay.
FINISHING EFFICIENCY
The most economic way to finish tubes into straight lengths or spirally-wound coils is to use our combined drawing machines. These machines integrate widely different facilities for straightening, testing, sawing, separating, setting down, collecting, bundling and finishing. Finning machines and coilers complete the portfolio.

NO POTENTIAL WASTED
Depending on the requirements of our customers, we supply our machines and plants either as individual modules or combine them into a turnkey integrated solution. This also includes the material logistics: complete systems for tube and basket transport, storage, feed as well as loading and unloading ensure that our customers can exploit the full potential of their plants.

FIELDS OF APPLICATION FOR THE SMS GROUP COPPER TUBE PLANTS

Conduits
- hard or half-hard drawn
- for water and gas, sanitary installations and air conditioning

Industrial tubes (ACR)
- smooth or finned
- for heat exchangers, refrigeration and air conditioning

In the form of
- straight lengths
- spirally-wound coils (pancakes)
- bunch coils
- level-wound coils (LWCs)
For the production of copper anodes SMS group offers two different systems, depending on requirements: the conventional casting wheel and the continuous CONTILANOD process for applications on an industrial scale with annual outputs of 100,000 to 400,000 tonnes.

CASTING WHEEL – RELIABLE AND PROCESS-STABLE
Anode casting wheels are the most common technical system used to produce copper anodes. They are easy to operate and are characterized by a high degree of process stability. Moreover, when designing and constructing the machines we take care to ensure reliable operation, high availability and minimum running costs. Thanks to the modular design, customers can install and start up the plant quickly – so that they can profit very quickly from their investment.

Our reference list includes a range of designs and production capacities of between 30 and 100 tonnes an hour. We constantly improve the technology and are meanwhile building single and twin casting wheels with 16, 24, 28 or 32 moulds. Our computer controlled three-point weighing and casting system guarantees anode weight precision of ±1 percent. The special design of the casting wheel support guarantees gentle and smooth turning of the casting wheel. This prevents “skull” formation when the anodes solidify, which could cause problems during electrolysis.
CONTILANOD – EXTREME PRECISION

The CONTILANOD process produces anodes with a very uniform metallurgical microstructure. The flatness of the anodes, the geometrical precision and high weight consistency are other important advantages.

The closed mould casting method means that the CONTILANOD anodes are free of any surface unevenness. Thanks to the shape of the anodes and their uniform thickness, users of the CONTILANOD systems can reduce the spacing between the cathodes in the electrolysis bath. This considerably increases the economic efficiency of the electrolysis. The anode lugs are completely formed and have a defined sharp edge for contact with the bus bar – the usual straightening and additional machining of the lugs is no longer required.

SMS group builds the CONTILANOD plants in cooperation with the Hazelett Strip Casting Corp./USA.
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.