

## **FA 01 New Equipment for Tube Manufacturing**

### **Part 1: Asia, East Europe and South America**

New, modern tube plants are emerging worldwide on a continuous basis. Currently, the primary geographic areas affected are Asia, East Europe, South America and, most importantly, the USA. German companies – particularly from North Rhine-Westphalia – are partners in many of these projects, participating either in the entire manufacturing plant or in partial areas.

The German machinery and plant engineering sector is expecting actual growth at the rate of approximately three percent in 2014. Outgoing VDMA president Dr. Thomas Lindner announced this prognosis during the general meeting – which takes place every three years – in October 2013 in Stuttgart. The industry managed to recover almost fully from the slump of 2009 with a 24 % increase in production in the years between 2010 and 2012. The economists at VDMA expect a production value of EUR 195 billion for 2013 – the same amount as in 2012.

The decline in turnover in the metallurgical plants and rolling mill equipment sector recorded in 2011 and 2012 is expected to level off. For this reason, the VDMA association for metallurgical plants and rolling mills predicts a slight stabilisation in the course of the year for 2013. As of mid-2013, the trade association was forecasting a 5 % increase in turnover and a 4 % increase in incoming orders for the year. Admittedly, not everyone is happy about new plants – especially when they result in increased capacity. “Excess capacity remains a fundamental problem in the world markets,” writes for example the German Steel Tube Association in its current annual

report for 2012. “The Chinese manufacturers’ capacity expansion – which seems to lack sufficient market-economy based scrutiny – occurs particularly threatening.”

German manufacturers of metallurgical plants and rolling mill equipment play a significant role in this sector – not only economically. Their products also enjoy an excellent reputation for their solid engineering. Among other factors, this is in part due to the fact that the industry has managed repeatedly “to offer plant and machine design concepts that enable customers to manufacture their products more competitively,” according to Heinrich Weiss, Chairman of the Supervisory Board of the SMS Group in Düsseldorf.

### **Higher Efficiency and Profitability in Tube Manufacturing**

SMS Meer in Mönchengladbach is responsible for the tube sector as a business group. It is here that the directube® method was developed, which allows more efficient and economical production of copper tubes than before. Next to reduced production costs, the quality of the finished products, energy efficiency and environmental considerations – as well as efficient use of raw and input materials – were primary focal points of the development.

With directube® copper tube production, copper cathodes are formed directly into mother tubes. Compared to the traditional extrusion process with subsequent cold pilger rolling, the directube® process saves several time-consuming intermediate steps: extrusion, preheating and one of two intermediate annealing stages.

The directube® method consists basically of two production stages. In the first stage, the copper cathodes are melted down, tube shells

are continuously cast in multiple strands, and the surfaces are milled. In the second stage, the tube shells are cross-rolled in a planetary cross-rolling mill and coiled. Finally, the mother tubes are processed into the desired end products.

The steel tube production process is being further developed with the same tenacity. A new detaching mill developed by SMS Meer for a Voestalpine Tubulars plant at the Kindberg, Austria location promises to deliver a high level of plant availability and product quality. As a technological innovation, the detaching mill features a hydraulic quick-release mechanism that ensures speedy lifting of the mill in the case of a jam, preventing damage to the product and the machine.

### **Seamless Tubes up to 20 Inches in Diameter**

There is also news to report in the area of dimensions of seamless tubes. After around two years of construction, Jiangsu Tianhuai Steel Pipe (Jiangsu, China) began operating a new 20" PQF tube rolling plant for seamless precision tubes in late 2012. The new plant – the world's largest continuous tube rolling plant – is equipped to produce seamless tubes up to 53 mm in diameter. The plant has a production capacity of 500,000 tons per year. "The maximum diameter of 20 inches is a record," rejoices SMS Meer Project Director, Roland Preuten. "This opens the door to an entirely new performance level for PQF seamless tubes."

Developed by SMS Meer, PQF (Premium Quality Finishing) technology is designed to ensure a continuously high level of tube quality inside of tight tolerances, as well as reliably high productivity. For the 20" tubes, SMS Meer designed the largest cone-type cross-

roll piercing mill with a roll diameter of 1,700 mm. Since a PQF rolling mill has three rolls that uniformly encompass the tube, it distributes the force much more evenly than the conventional two-roll configuration.

A new groove-dressing machine is slated to go into operation in the production of seamless tubing at Interpipe Niko Tube in Nikopol, Ukraine in early 2014. According to SMS Meer, this three-axis groove-dressing machine improves production accuracy while shortening processing time. With the KR III 33 CNC groove-dressing machine, grooves in the rolls are fully automatically machined. Each operation takes less than 30 minutes. A measuring mechanism automatically records the stand and roll data, making it easy to modify the groove forms.

### **Increased Productivity in Tube Welding Lines**

SMS Meer developed a tube welding line for Arvedi Metalfer Do Brasil in Salto (Brazil) that is designed for a capacity of 150,000 tons per year. The range of dimensions includes tube diameters from 33.4 mm to 139.7 mm and wall thicknesses from 1.5 mm to 8.0 mm. Tube lengths from 5.0 m to 12.6 m are possible. The tube welding line is capable of a maximum production speed of 130 m per minute. With the new line, Arvedi is able to manufacture precision thick-walled tubes with round, square and rectangular cross-sections.

"Thanks to the innovative quick-change systems, the line is on average about 30 percent more productive than conventional solutions," explains Michael Cottin, Vice President – Welded Tube Plants at SMS Meer. "In addition, Arvedi can adapt flexibly to

changes in market requirements for welded tubes. Orders for increasingly small lot sizes with a variety of dimensions require plant solutions with short changeover times and minimal downtimes."

These newly developed inline and offline quick-change systems make changeovers to new tube dimensions possible in as little as 90 minutes to two hours. SMS Meer's CSS Quicksetting System plays a special role in this: Among other things, this computer-controlled system ensures that the rolls are automatically set exactly to the required working position after such a dimension change.

### **Expanding and Straightening on One Machine**

SMS Meer designed a mechanical expander with a newly developed straightener for a Tenaris Confab S.A. tube rolling plant in Pindamonhangaba, near São Paulo in Brazil. The innovative AGT (Advanced Geometry Technology) allows precise calibration and straightening of longitudinally welded pipes with small diameters and large wall thicknesses on a single machine. Pipes such as these are required for offshore pipelines that are laid in extremely deep waters. Tenaris Confab produces up to 450,000 tons of tubing annually, in diameters ranging from 12" to 48" and wall thicknesses from 6.4 mm to 40 mm. The longest tubes produced by Tenaris are 12.5 metres.

According to SMS Meer, AGT is a flexible and efficient solution for straightening large pipes that become bent due to the heat supply during submerged-arc welding. For the first time, pipes can be straightened selectively in all directions during expansion,

eliminating the need for downstream straighteners. Compared to conventional solutions, this new design is expected to produce better straightening results via over-bending. Moreover, strain on the expander mechanism is minimized. The machine is designed for diameters up to 30 inches. In the case of larger diameters, the units can be entirely separated from the machine, which also allows for easy tool change.

### **More Cost-Efficient Production of Small, Thick-Walled Tubes**

A new gap closing press developed by SMS Meer with a press force of 25 MN was constructed for Izhorsky Trubny Zavod (ITZ) of Kolpino, near St. Petersburg (Russia). The new press allows for more cost-efficient production of tubes with small diameters and large wall thicknesses. The new method promises to triple productivity compared with a single JCO long-stroke press.

First, heavy plates are formed quickly and precisely using a JCO pipe forming press. The remaining gap is then reduced to a minimum in just a few steps using the new gap closing press – a requirement for a safe tack welding process. The result is highest quality pipes with extremely low tolerances for demanding applications. In addition, the new gap closing press is the first to utilize the VSP (Variable Speed Pump) technology. According to SMS, this modern and extremely efficient hydraulic drive offers a significant reduction in energy and maintenance costs.

Also in Russia, JSC Vyksa Steel Works in Vyksa successfully put a new gap closing press from SMS Meer into operation in late 2013. With the new machine, the company has modernized its large-diameter pipe production line while significantly increasing its

productivity. Pipes with these special dimensions are required in particular for offshore pipelines. The specially adapted forming and closing processes are controlled by the SHAPE software developed by SMS Meer, resulting in high-quality pipes with very low tolerances for demanding applications. This gap closing press also features VSP variable speed pump control, which reduces the machine's energy consumption by up to 50 percent compared to earlier-generation machines.

### **Pressure Control System with Reduced Cycle Time**

Salzgitter Mannesmann Line Pipe (SMLP) in Siegen, Germany has been using the globally unique HTM (Hydrostatic Testing Machine) from spiral tube manufacturer PWS since the second quarter of 2013. With this machine, up to three pipes of different lengths can be tested simultaneously on three test stations, with a total cycle time of only 48 seconds (for 16 inches/12 meters). This represents a time saving of 30 percent per test. Moreover, it is possible to test different diameters and lengths simultaneously. Each section can be individually and independently controlled.

"The new facility marks a significant improvement of the strategy for hydrotesting and pipe manufacturing," states Michael Stark of PWS. "The need to sort out shorter pipe lengths during the manufacturing process for testing at a later time is eliminated, which is an enormous advantage in terms of production logistics and throughput. The extremely fast and extraordinarily precise pressure control system rounds off the technology package." Thanks to its state-of-the-art technology, the modern pressure control system offers a high level of flexibility and efficiency.

Part 2 of the article covers new tube manufacturing plants in the USA. The significant increase in gas and oil production there is causing local and foreign manufacturers to invest in new tube mills. This benefits plant manufacturers worldwide, who of course also participate as exhibitors at the world leading trade fair Tube. The next international tube and pipe trade fair takes place from 4 to 8 April 2016, once again simultaneously with the international leading trade fair wire in Düsseldorf.

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