



Bending to perfection.

Tube Bending Technology

Fast and Precise in Chemical Plant Engineering

Within the next 8 years, investments in chemical plants will double worldwide based on the forecasts of the American Chemical Council (ACC). The reasons for this are the global mega trends such as population growth, emerging markets, and the appetite for raw materials. This increases the necessity for the plant designers to demand more machines that allow the time-efficient manufacture of enormous quantities of tubes. It goes without saying that this cannot happen at the expense of quality. This is not an easy task because the high-strength special materials – which are often flanged, beaded or double-walled tubes – require a demanding process.

There are two different production methods that have been established and are being used for chemical plants in order to manufacture tube systems: Welding of bent tube components or the production of complex tube systems by using bending technology. In order to fabricate tubing systems, many manufacturing plants commonly use welding procedures in order to connect straight tube sections with weld-in elbows. However, this procedure requires very time- and labor-consuming work steps: First, the individual tube components must be welded. Subsequently, each individual weld joint is subject to a costly inspection method that must guarantee the air tightness of the line. Considering the multitude of connecting points, this is a very labor-intensive procedure that may still contain the potential of making errors. The cold bending procedure reduces the required work steps to a minimum. Bending machines can form complex tubing systems from a single piece of blank. However, not every bending machine can guarantee compliance with the high demands the chemical industry places on the forming process. When selecting the right machine, one must verify



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that the machine is designed for bending stainless steel tubes and ensures the absolute minimum ovality when forming the tube. The latter is an important requirement for all tubes carrying chemical substances. Eventually, the tubes are cleaned using a spherical object that is slightly narrower in the center; it is referred to as a "PIGs" (Pipeline Inspection Gauges). Excessive ovality in these so-called PIG tubes can lead to chemical residues that become mixed in the next production loop. The automatic CNC machines of the heavy duty series from Schwarze-Robitec GmbH are optimized precisely to meet the requirements of the chemical industry. They produce three-dimensional tube systems rapidly and exactly. The tube is clamped into the index head and positioned in the space by means of the transport unit and index head. After the first bend, it is directly pushed on and rotated, if required. Thus, three-dimensional tube systems with minimum ovality are produced that fit precisely.

Focusing on increased production rate

When the speedy manufacture of different types of tubes is important, CNC tube bending machines with multi-stack bending tools is a wise choice. The multi-stack bending tools allow you to process tubes with different nominal diameters on a single system without retrofitting efforts. One of these systems is the CNC 220 HD MW of the HD series from Schwarze-Robitec. It bends tubes with a maximum diameter of 219.1 x 12.7 mm and a tube length of up to five meters. With the help of the multi-stack bending tool, up to 70 percent of the setup time of market-based systems can be saved. It is possible to process tubes of different materials, such as steel, nickel alloys, iron and stainless steel on one tool. Time-saving technologies are also available for the forming of double-walled tubes and flanged tubes. For example, Schwarze-Robitec offers flanged tube equipment that takes the flange and sleeve positions into consideration before the bending process starts.



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The time-consuming subsequent adding of flanges in order to finished tube bends is omitted, and the tubes can be implemented into existing systems after the bending process is completed. Another “time saver” is marking devices which indicate the positions on the tubes where welds or bypasses are to be implemented after bending.

Smart ways to curb the cost

Long pipelines made of high-quality materials create considerable costs and quite often must be integrated in a space-saving manner. One option are small bending radii. They optimize tube runs enormously if space is limited and reduce the usage of material. For example, the CNC 320 HD from Schwarze-Robitec produces extremely small bending radii of 1.5 x tube diameter. This applies also to large, very thin-walled tubes with a diameter of up to 323.9 mm and a length of 6 m. Similarly tight radii with such large tubes are usually achieved only with warm bending processes or welding elbows – a process that is much slower and more expensive. In addition to a wide variety of CNC controlled machines, the company from Cologne, Germany, also produces semi-automatic systems. Machines such as the SR 320 are perfectly suited for the production of individual bends and small production runs. However, all models of the HD series have one thing in common: A very rugged standard machine with extremely high structural rigidity. It withstands the enormous bending forces. Based on the tremendous power reserves of its clamping forces, the machine produces optimum bending results.

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Photos:

- 1. Bert Zorn, Managing Director of Schwarze-Robitec GmbH**
- 2. CNC 220 HD MW**
- 3. 3. CNC 320 HD**



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4. Tube system

5. Focusing on multi-stack bending tools

Caption 1

Dipl.-Ing. (FH) Bert Zorn, Managing Director of Schwarze-Robitec

Caption 2 – CNC 220 HD MW

Tube Cold Bending Machine CNC 220 HD MW from Schwarze-Robitec: Tubes with different nominal diameters can be processed quickly with this multi-stack bending tool.

Caption 3 – CNC 320 HD MW

The CNC 320 HD from Schwarze-Robitec produces extremely small bending radii of 1.5 x tube diameter, including very large, thin-walled tubes with a diameter of up to 323.9 mm.

Caption 4 – Tube system

The high-strength special materials, flanged, beaded and double-walled tubes used in the plant require a demanding process.

Caption 5 – Focusing on multi-stack bending tools

With the help of the multi-stack bending tool, up to 70 percent of the set-up time of market-based systems can be saved.

Schwarze-Robitec GmbH – the Company

The company, founded in 1903, is one of the leading international experts in the sector of tube bending machines. At its headquarters in Cologne, the specialist for cold bending machines currently employs 130 staff. The company is represented worldwide via long-term partner enterprises. Since 2015 Schwarze-Robitec has opened its own subsidiary in USA for customers in North America. The bending specialist already manufactured the world's first CNC-controlled tube bending machine back in 1977. To date, more than 2,400 machines have been sold – some of them have been used in production unrestrictedly for far more than 35 years. The Schwarze-Robitec product range includes, in addition to tube bending machines and bending tools, tube perforating machines, measuring stations, as well as



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solutions in the area of special machinery construction. The reference list of the tube bending expert includes, without exception, all renowned leading manufacturers from the automotive industry, energy sector as well as shipbuilding. Above and beyond that, the company solutions are employed in the aerospace sector as well as many other industries. Detailed information about Schwarze-Robitec can be found in the Internet at www.schwarze-robitec.com.

Company Contact Schwarze-Robitec GmbH

Bert Zorn • Schwarze-Robitec GmbH

Olpener Straße 460 - 474 • 51109 Cologne • Germany

Telephone: +49(0)221-89008-0 • Fax: 0221-89008-9920

Email: sales@schwarze-robitec.com • Internet: www.schwarze-robitec.com

Advertisements Contact

Corinna Hellwig • Schwarze-Robitec GmbH

Email: marketing@schwarze-robitec.com

Press Contact

Susanne Unmack • additiv pr GmbH & Co. KG

Public Relations for Logistics, Steel, Industrial goods and IT

Herzog-Adolf-Straße 3 • 56410 Montabaur • Germany

Telephone: 02602-950 99-12 • Fax: 02602-950 99-17

Email: su@additiv-pr.de • Website: www.additiv-pr.de