

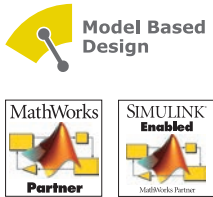
# SYSTEMATIC ROLLING

Modeling provides the critical edge

Roller mills from Achenbach Buschhütten are renowned worldwide for the precision and speed of their roller production. An essential part of this success is the OPTIROLL® system for rolling mill automation developed by Achenbach. The traditional family company headquartered in Kreuztal, Germany, has used the Bachmann M1 automation system as a basis for this for more than ten years. M-Target for Simulink® enables complex control functions to be implemented on the plant in less than a third of the time.

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**T**he history of Achenbach Buschhütten goes back to 1452: The "Buschhütter Eisenhammer" was founded by the brothers Gotthard, Henne and Siebel Busch precisely at the spot where the headquarters of Achenbach currently now stand. From 1846 the company operated as an iron foundry, specializing towards the end of the 19th century in the casting of rollers and rolling stands. The construction of the first rolling mill for iron plate dates from this time (1888). Achenbach now specializes in rolling mills for non-ferrous metals and is world renowned for first-class plants for the production of flat-rolled products from aluminum, magnesium, copper, zinc and their alloys.

#### Combination of extremes

One of the greatest challenges in the rolling process is ensuring an excellent strip quality, even at the highest rolling speeds, rolling widths and coil weights. "Our plants process metal strips of over two meters in width and at speeds of 100 km/h and higher. We roll here foils to a thickness of up to 5 micrometers – almost eight times thinner than a human hair," Roger Feist, head of engineering and

automation, describes the impressive parameters that the closed-loop control system of the rolling mill has to manage. Added to this is the fact that huge masses are moved in this dynamic environment: Rollers weighing several tons have to be positioned with a precision of less than a micrometer, and a coil in the thin strip rolling mill often weighs 20 tons or more.

#### Rolling mill automation of the third generation

Achenbach has been using the Bachmann M1 system as the basis of its rolling mill automation for over ten years. Over this time it has been continuously further developed and with OPTIROLL® i3 provides the rolling mill construction with a high performance system platform.

The precise control of coil thickness and evenness in the rolling process is particularly complex and demands a lot of processing power. The control of the rolling mill function is therefore implemented with two MC210 series CPUs from the M1 modular system. One of the two includes the control of the



► Flatness measuring roller: Piezo sensors underneath the roller surface enable even the smallest differences in coil tension to be detected and regulated by the M1.



▲ Foil rolling mill in pre-assembly at the Kreuztal plant. From left to right: Thomas Schmidt, Martin Greif, Roger Feist, Thomas Jauch, Bertram Lange, Dr. Maksim Klinkov.

servo hydraulics for the rollers with their variable mechanical dimensions (position, bending, and crown). "The second CPU is for measuring and controlling flatness," explains Roger Feist. The reason for this division of tasks is easy to understand if you just take the enormous volume of data to be processed into account: A measuring roller developed by Achenbach for measuring the flatness supplies over 200,000 measured values per second to the controller. This in turn controls several hundreds of coolant nozzles individually, thus guaranteeing the rolled strip or coil has an outstanding degree of flatness.

Strip thickness and flatness control must also guarantee the smallest tolerances and absolutely flat strips even at maximum rolling speeds. For this reason, the communication between the two CPUs must also be carried out at high speed: "For this we use the bluecom protocol from Bachmann," Roger Feist explains. bluecom is ideal for speed and strip width, with only a minimum load on the CPU and network.

»M-Target for Simulink® from Bachmann considerably shortened the development time.«

*Dipl.-Ing. Thomas Schmidt,  
group supervisor for automation and  
technical control systems*

#### Model-based development

"Due to the high level of complexity and the small tolerances required, we are naturally modeling large sections of the rolling process," Thomas Schmidt, group supervisor in automation, technological control systems, describes his major area of responsibility and adds: "M-Target for Simulink® from Bachmann has not only simplified our work for us but has also critically shortened the development time required." The virtual rolling mill model is linked with the actual controller and all signals are exchanged in real time. "This enables us for example to transfer the rolling of a real coil with the entire data set back to our model. Here we can re-simulate the process with different closed-loop controllers and thus optimize the system extremely quickly," explains Thomas Schmidt.

#### System solution with high customer benefit

"For the perfect implementation of the production process we offer cross-system ►►



Achenbach is a global provider of non-ferrous metal rolling mills and foil slitting machines for the non-ferrous metal and finishing industry. The company has its production facilities in Kreuztal, Germany and a service subsidiary in China, as well as agencies all over the world. It has an export ratio of approximately 85%.

➤ [www.achenbach.de](http://www.achenbach.de)



▲ Aluminum foil rolling mill: State-of-the-art measuring technology and the powerful M1 controller system used in innovative machinery enable maximum plant productivity and rolled products of the highest quality.



» The connectivity required for this is one of the outstanding strengths of the M1 automation system. «

*Dipl.-Ing. Roger Feist,  
Head of engineering,  
Automation*

►► technical solutions – from rolling to slitting right through to the further processing of the rolled product – everything from a single source," Roger Feist describes the integrative approach of Achenbach as a system provider. The interfaces between design and implementation are systematically kept to a minimum. This enables the individual requirements of the customer with regard to the quality of the rolled product and the productivity of the rolling mill to be met optimally and cost-effectively at the same time. However, this approach places considerable demands on all the components of the plant control system since they have to serve a wide range of different interfaces to the individual systems: "The connectivity required for this is one of the outstanding strengths of the M1 automation system," confirms Roger Feist.

#### **Partnership for innovation**

Achenbach is a world market leader for aluminum thin strip and foil rolling mills as well as for rolling mill automation.

A key factor for its success is the pronounced innovation culture of the company as well as its uncompromising first-class quality. "Besides the further increase in the efficiency of our plants in terms of energy and resources, we are currently focusing on the further development of model-based automation technology," says Roger Feist and sums up: "With Bachmann we have a powerful partner that supplies us with the excellent technology platform provided by the M1 system."