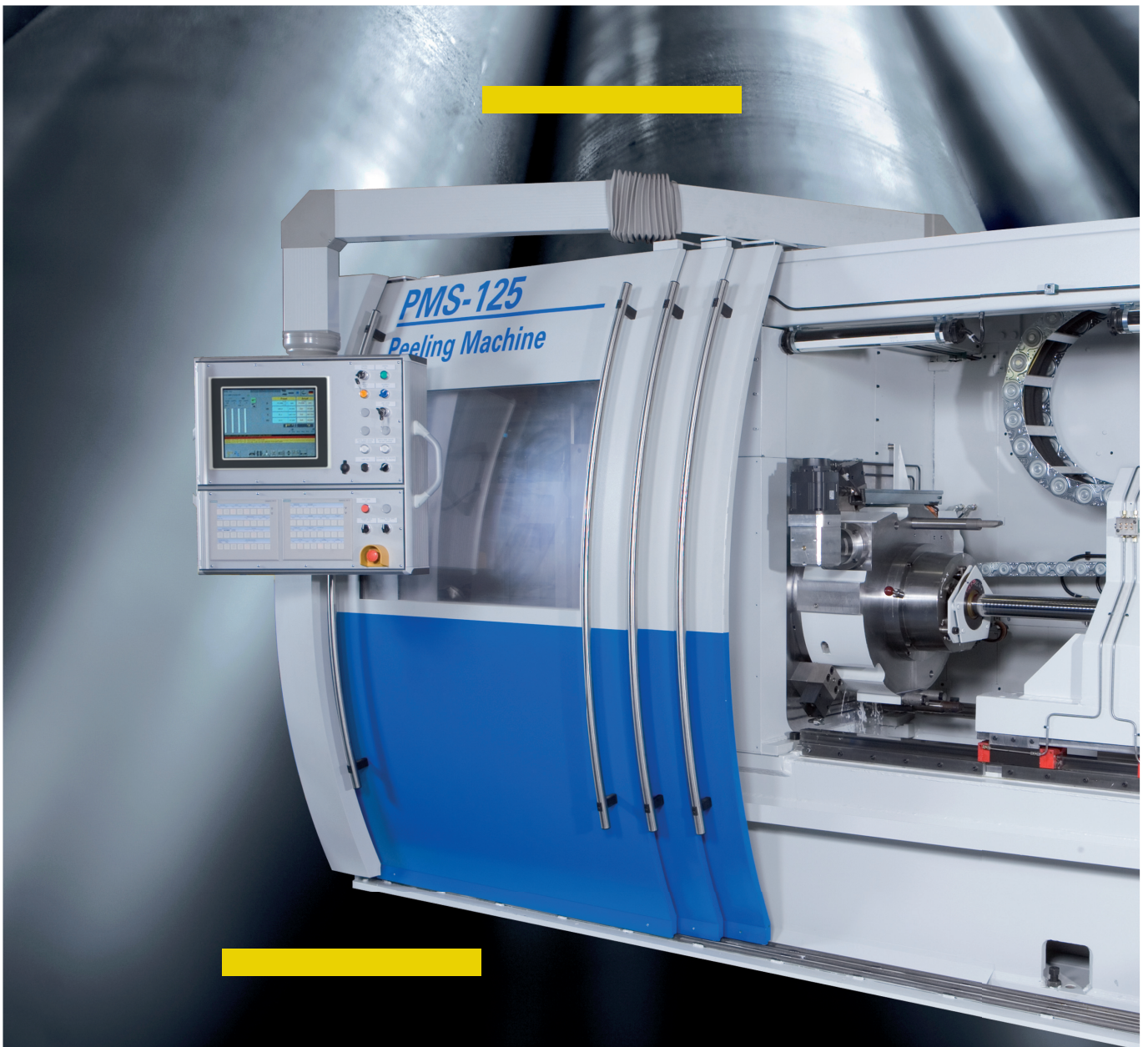


**SCHUMAG** Schumag AG | 52076 Aachen | Germany

# Bachmann controller increases flexibility and protects know-how

How the steel processing specialist Schumag AG uses controls to remain internationally competitive.



**bachmann.**



**Schumag AG is a medium-sized machine-building company and manufactures machines for drawing solid material as well as cold-drawn steel systems, loop and polishing machines and copper tube systems. The company also fulfills individual customer wishes regarding control technology.**

**The following article shows how Schumag, with the help of Bachmann control technology, avoids constant reprogramming and simultaneously protects its know-how.**

Aachen lies in the northwest of the Eifel mountains. Schumag AG has its headquarters here. In the course of its 175-year history, the company has developed from a needle manufacturer to a company with special expertise in the treatment of solid materials and tubes.

Besides machine and plant construction for the steel and nonferrous metals industry, Schumag produces precision parts to customer specifications (diesel injection systems, pumps, speedometer parts, etc.) and fabricates precision standard parts for stamping tools and mold-making. Schumag currently employs a total of 1,100 people and achieves annual sales between 100 and 130 million euros.

Pulling, cutting, aligning, beveling, grinding and polishing are among the disciplines that Schumag performs during machine building and plant construction. All machines have modular design, that is, customers can individually configure their machines within certain parameters to suit their needs. The same holds for the control technology – particularly with the many international customers.

But that also has its problems. "Earlier, we developed and produced the hardware for our entire control technology ourselves, and if there was software, we wrote it ourselves," explains Hubert Stiel, software developer

at Schumag AG. "Since we don't need large numbers – we normally sell only one controller per machine – that no longer paid off."

And so we decided to find a system in which the hardware is maintained by the supplier, but the machine-specific functions could remain in our own hand. After a long search, we came across the Bachmann company: »The control platform from Bachmann electronic suited us exactly: from the hardware concept, software, and also the service,« says Johannes Warns, E-Design department head at Schumag.

The first project was creation of a 'flying saw'. The first machine with Bachmann controller

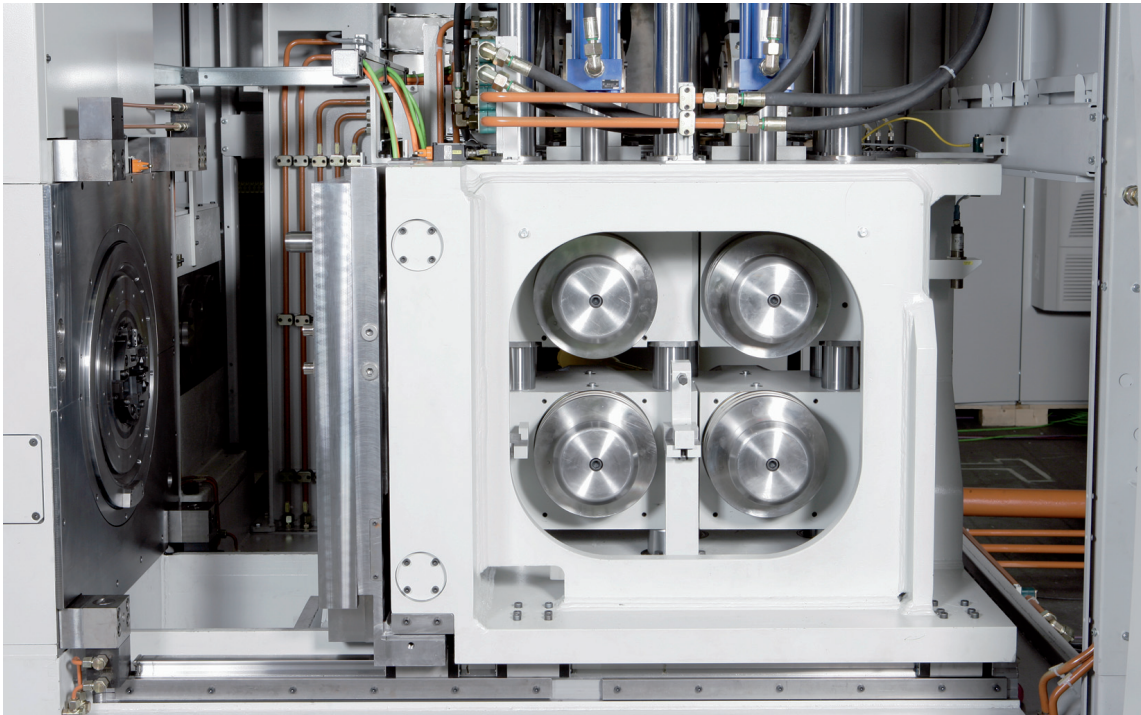


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Johannes Warns, E-Design department head (right)  
Hubert Stiel, software development (left),  
Schumag AG

was placed in operation in 2002 by a customer in Nuremberg. "Since then, we've shipped around 100 'flying saws' and cutters. The feed speed ranges from 80 to 150 m/min.

There are also special applications: they're no longer 'flying saws' but rotating shears with two crank arms. They meanwhile achieve speeds of up to 300 m per minute with cutting-length tolerances of  $\pm 2$  mm," Johannes Warns explains.



▲ The heart of the Schumag PM peeling machine: the feed unit. The material is fed and also cut, if desired, at up to 60 m/min.

### Advantages of the Bachmann controller

The Bachmann controller is based on Intel™ processors which, due to their power efficiency, are particularly suited for use in the fan-free industrial arena at up to 60°C. Schumag sees the advantage of the Bachmann controller also in the hardware's universality: "We can use the Bachmann controller for various functions and adapt the software very flexibly," says Hubert Stiel, software developer at Schumag AG.

The second step after the 'saw' applications and the 'flying shears' was then a spiral winder, more or less a waste product of the 'flying saw'. "In addition, there is a so-called sort controller, whose purpose is to assign errors detected in the production process to the rejected cut rods at the end of the machine and sorted accordingly into good and bad sides," says Stiel, explaining the machine components.

### From the module controller to the core machine

Schumag has developed a so-called peeling machine with the Bachmann controller. This is much more complex than the earlier applications. The loped a so-called peeling machine with the Bachmann controller is used here for the core machine. For peripheral functions, Schumag relies on various controllers, also from other manufacturers.

"After all, over half of the machines are exported outside Europe," Warns explains. A further advantage at Bachmann is that the core know-how can be delivered as a 'black box' for installers, software developer Stiel adds. There are defined interfaces for peripheral control. That is, the actual initial start up does not run in the software.

Errors that arise during start-up must be searched for outside the core functions.



“That shortens the start-up time for us, since we can fall back on building blocks about which we can say exactly that they work without error. The installers cannot look into the source code. And so we don’t run the danger that each machine gets a new software version.”

And Warns adds: “We strongly limited the degrees of freedom of the installers and so were able to reduce start-up times considerably.”

### **Simple programming**

Stiel is also visibly convinced about the performance itself: He prefers to program in structured text. On the question of whether programming in C was a possibility for him, he referred to the available performance: Programming in C has not been necessary. The performance is completely sufficient.

### **High performance**

With a fully built-up peeling machine, while there are only around 40 digital inputs and 30 digital outputs to supply, there are between 6 and 10 adjusting axes that are also position-controlled. Stiel divides the jobs into various tasks: The tasks that make the adjustments are not very time-critical and are accordingly placed on a long task cycle.

The critical axis regulations, in contrast, are placed on a short task. “That is the advantage of the Bachmann controller: You can break up the job the way you need to, and then it runs that way and is also controllable.

Things are different with a classical PLC; there it really depends on the conditions, how long the cycle time is,” says the E-Design department head, Johannes Warns. And he adds: “Fortunately, we don’t have that with

Bachmann. The cycle times are constant, which is very important, particularly for position control. The determinism on the system is always clearly maintained for every task. That is a very important aspect.”

### **Preventive maintenance**

One point that is becoming more and more important for the customers is preventive maintenance. For the Schumag peeling machine, this means preventive maintenance on the bearings. If changes are identified here, a planned machine maintenance interval can be used to check the bearings.

But such functions could be used well for changes in the peeling process, that is, knife wear. “The peeling knives that peel away the material have a certain service life. For over 80 % of this service life, the knives are stable. Only at the end do they change,” Johannes Warns explains.

If the quality that the knives still have could be reliably detected, the knives could be changed before the first bad rod comes out of the machine. And the cost of the peel product is very significant. “Throwing away a rod can cost a few hundred euros, depending on the material it’s made of,” Warns explains. “That goes up to titanium peeling, where even the shavings are collected.” On the other hand: Every half hour longer that the knives can be used saves money.

### **Communication leaves nothing to be desired**

Also regarding communication ability, the Bachmann controller leaves nothing to be desired: For pure data communication, Schumag uses PROFIBUS. The few time-critical signals are recorded directly over IOs.