# THE THREADING CLASSROOM

Coordinating production, Otman Akhallouf knows all details from scratch.

Fotos: vor-ort-foto, Uwe Schinkel

A family-owned company in the fourth generation with 40 employees shows the way. Schumacher Precision Tools GmbH from Remscheid has digitized all processes so comprehensively, it can use its lessons learned as a blueprint for other small and medium-sized businesses. A journalist team from the VDMA magazine visited the company.

AUTHOR: NIKOLAUS FECHT

Remscheid, 9 Küppelsteiner Straße, July 2019: An entrepreneur in a dark blue suit stands in front of a flowering meadow and joyfully says: "Here at this place there used to be the small building in which our company started in 1918. And at exactly the same place we are building an illuminated glass cube digital factory. This laboratory will then lead directly into our production - illustrating the path technology has taken in digitization."

Dr. Bernd Schniering, the managing partner of Schumacher Precision Tools GmbH, which is in discussions with the German state of North Rhine-Westphalia to develop a learning factory for small and medium enterprises (SMEs). Native from Gelsenkirchen (born in 1951) and growing up in the Lebanon, Schniering is heading the group which which is active in key markets worldwide.

The direction of the company is clear: Schniering and his two sons Peter and Christoph not only work completely digitally, but they can also use a particular kind of method. We noticed that on the second floor of his production building in a bright meeting room with a giant computer monitor. Schniering advises SMEs with his process control unit GAP (Association for applied process control) - supported by his assistant Frauke Wüseke: the team immediately takes the role of advisor and teacher.

As responsible developer he makes a bold statement on key content of the Learning Factory: "Today, if you have a product with technical parameters created by us, then within the hour, we go from 3D model to machining the first chip on lathe machine. This includes the complete digitalization of the production process."

But how does it work and how can this digital production serve as a role model to others who are not producing tools?

"The digital, interdepartmental process definitions must be transformed," says Schniering. "The process planning procedure can be applied to other product types so that the modular structures can be combined while maintaining the system's character."

The former visiting professor wants to convey this message with learning moduls which he has developed in Malaysia. But to explain the work method of his

factory, he lets is engineers explain. He is leaving the room so we can discuss the digital process with its key protagonists.

“We are now in the design step, creating a virtual tap” says Volker Nötzel, general manager sales and technology. The participants of the learning factory get to know how Nötzel develops a data master for his products. This is the basic requirement for digitization.

“We need a unified digital structure which clearly describes and products and processes” adds Christoph Schniering, managing director for production and logistics. Hans-Gerd Koenen, member of the managing board for production, research and development, gets up from the table and explains the work principle on the screen:

“We can visualize how a slight modification of parameters turns a standard product into a special tool.”

### *Virtual Modification of Tools*

The modified 3D-model of the tool appears on the giant screen. The engineers check upon the modified design: questions come up, such as “is the flute core stable enough?” or “is the width of land sufficient”. Everything is on track. The engineer klicks on a green button and saves any relevant product data on a server. A spiral staircase is now taking us one floor down right into production. State of the art CNC machinery creates a buzzing background noise created by processes such as turning, milling and grinding. Workers are cleaning semi-finished products with air pressure, we can smell the characteristic factory flavor of metal processing. But where can we find Industry 4.0? Christoph Schniering takes a binder from the shelve: “This is a production order for a tap that has just been designed upstairs.” Why don’t you use a tablet?” We have deliberately chosen to print production orders while running – because what would we do if IT-system goes down duringa night shift?” replies Schniering. This binder contains the entire work description including 2D-drawing, the machining parameters, the workpiece description and the single work steps.” Operating a conventional, analog machine tool,which is giving tap blanks their final silhouette, we are greeted by Frank Reichel. “Digitization has made my work significantly easier. This selection of data, shown on these work papers are only the ones I absolutely need for this machine tool”, says Reichel and points to the binder. “It is no longer necessary for me to dig out the relevant data from a huge bunch on information.” Energetic Otman Akhallouf is receiving us at the next station in an office with all-glass walls. He is coordinating production processes with 3 screens. As a former machining expert, he knows any process by heart. “I started here as a flute grinder almost thirty years ago”, he welcomes us to his office. Speaking extremely fast and emphasizing his words with gestures, he adds: “I know this production to the core, after all, I have worked on any of this machinery already.” We realize immediately, he is an old-school workshop man, able to explain his work in a very pragmatic way. “Around twenty years ago we still controlled this production with instructions on card board in hand writing. That was before Dr. Schniering invented and implemented his system in the 1980s” says Akhallouf. “All the hand written information have been registered digitally in a strenuous process, taking into other systems with the help of Excel and implemented into new steering programs.

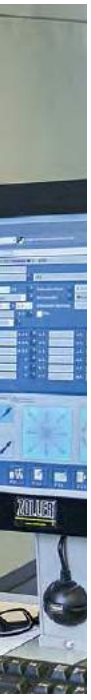

1 — Norbert Cranz checks tool parameters as quality manager.

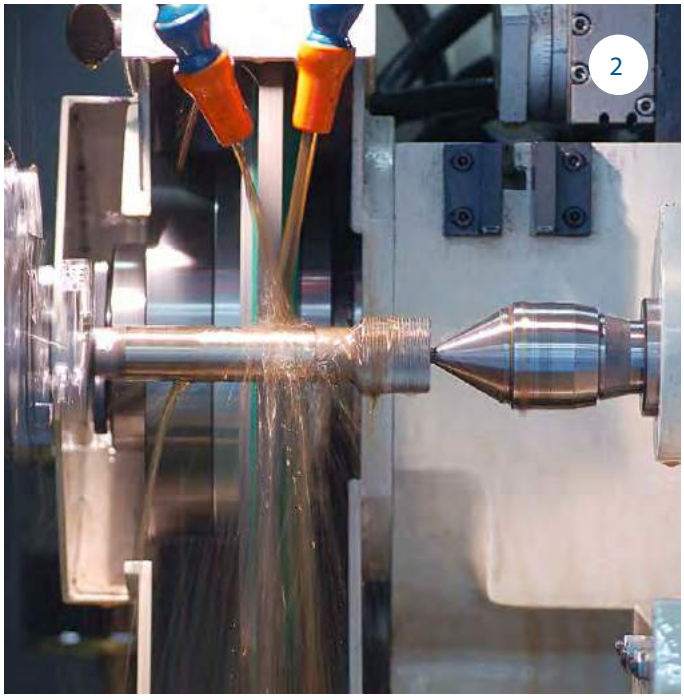
2 — Schumacher Precision Tools produces taps for applications in nearly all relevant industries.

3 — Frauke Wüseke and her boss Schniering advise SMEs with a separate cooperation on process control.

"When you order a product from us, we are able to create a 3D-Model of the tool within one hour."

DR. BERND SCHNIERING






Future Navigation Systems:
Digital Work Planning

But what would somebody experienced in digitization recommend to a visitor of the plant learning factory? “In a first step, he or she should remove any left-over data which has no function anymore”, goes the recommendation of the production coordinator. “I would recommend to start digitizing the workplans since they represent the navigational system of production.” The most competent person to judge this is Norbert Cranz, in charge of quality control and checking upon the design features of any tools produced by SCHUMACHER. “We have developed a digital quality control system within three years, drawing upon the expertise of metrology producer ZOLLER.” The target was to develop an automatic measuring machine which allows SCHUMACHER to replace conventional quality control. We are joined by company owner Schniering who ▸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4 —— Ongoing digitization has made the work of machining expert Frank Reichel significantly easier.

5 —— Volker Noetzel explains how a tap is virtually designed “if you order a product at SCHUMACHER we can generate the 3D-Model within an hour”.



“We compare the real data of tools coming from production with those from the digital 3D-models from our design department.” While manual quality control had often brought about errors in measuring, these phenomena have vanished thanks to the synchronization of the 3D-models and the digital measuring machine. Cranz: “I just need to clamp the tool, load the respective file from the system and just push the start button – that’s it.” But what can somebody take away from the new learning factory who has heterogeneous selection of machinery with both modern CNC and conventional machine tools? “ Also smaller producers know their products and workshop in great detail”, says Schniering. “These smaller producers do not need external advisers. By contrast, the entrepreneur should define the company’s processes in a modular way with responsible employees. The entire data architecture should be standardized without redundancy and the digitization of products and production processes can begin. ” There is another lesson we take away as test dummies of the learning factory: Any digitization requires a lot of effort, mistakes and gaps occur repeatedly and it takes years – but it is worth the change.

Alfred Zedtwitz
Telefon +49 69 6603-1269
alfred.zedtwitz@vdma.org

Infos zum Unternehmen
www.schumachertool.de