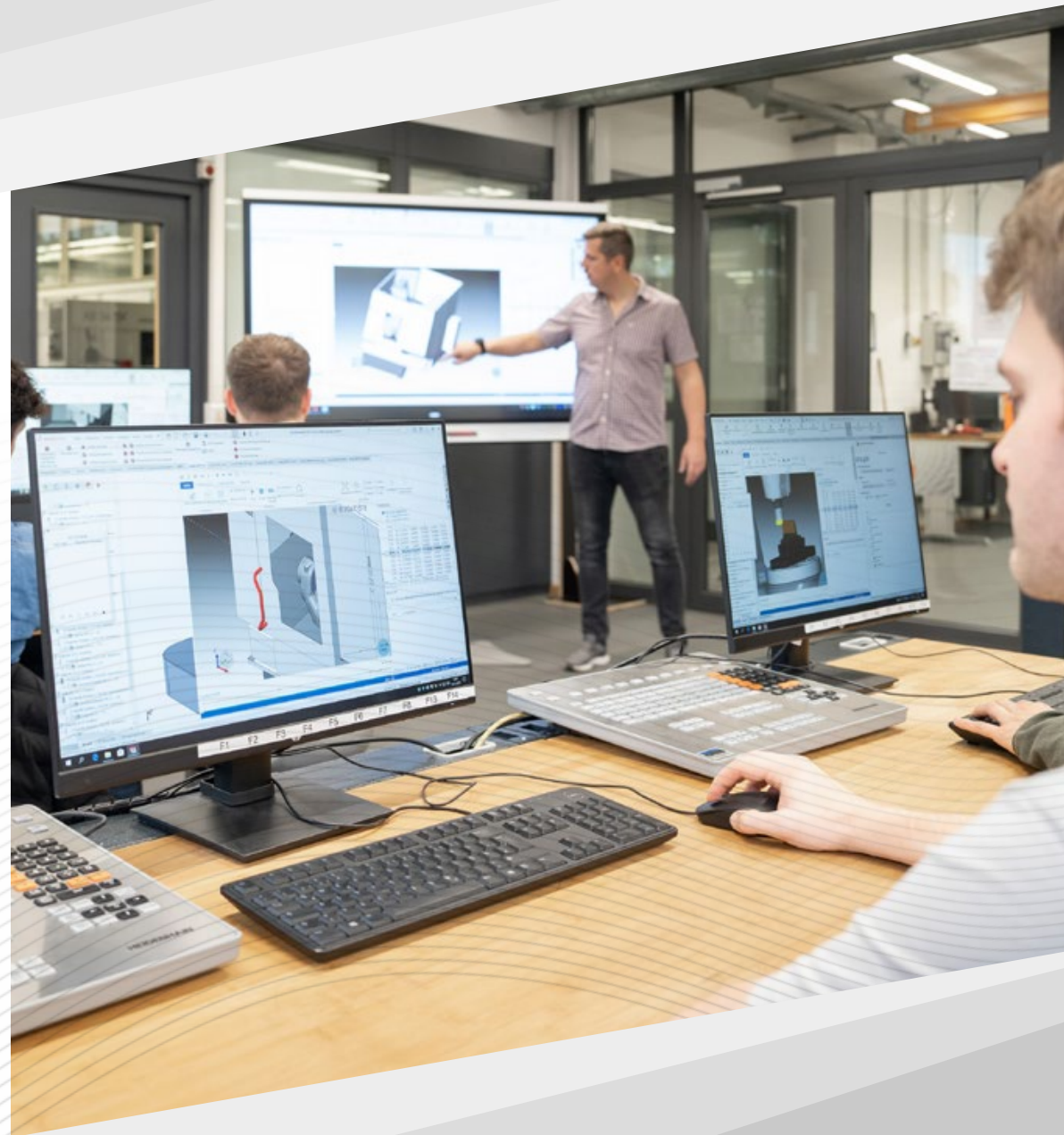


Technical vocational training at the
Hohentwiel Gewerbeschule School Singen

From “museum”
to learning factory
of the future



FOREWORD

In order to meet challenges such as technological change and the increasing digitization of skilled work, and to generate enthusiasm among trainees, teachers and trainers are needed who are and remain at the cutting edge of current developments. After all, teachers play a key role in determining how attractive and up-to-date dual training and continuing education programs at schools will be in the future.

The HGS in Singen has been aware of this responsibility for a long time and offers a large number of its students the opportunity to train in CAD/CAM. Via entry-level or even advanced training, to develop further in order to make the transition to actual working life as easy as possible.

There are numerous opportunities to take the future of education to the next level together. Let the example of HGS Singen inspire you!



FROM “MUSEUM” TO LEARNING FACTORY OF THE FUTURE

The future viability and attractiveness of in-company training will depend crucially on the ability to integrate technological change in the economy and the increasing digitization of skilled work into in-company training processes. In order for the German government's high-tech strategy and the German future project Industry 4.0 to work, “teachers and trainers who are on top of current developments are needed.” This is the conviction of Peter Bole, Chairman of the Supervisory Board of the Nachwuchsstiftung Maschinenbau...

and a total of 1,800 students in 12 school types, is technically and didactically up to date. Pascal Noppenberger, senior technical teacher for metal technology at the HGS, is convinced of this. Noppenberger trained as a tool mechanic at the Gewerbeschule Tuttlingen, earned his master's degree and worked for several years as a production manager in the machining industry before qualifying as a specialist teacher and joining HGS in 2008. The technical equipment at the time, he recalls, “was actually ripe for the museum.” In the meantime, it has become clear that the eight technical instructors at HGS can invest in the latest generation of machining technology in an exemplary manner.

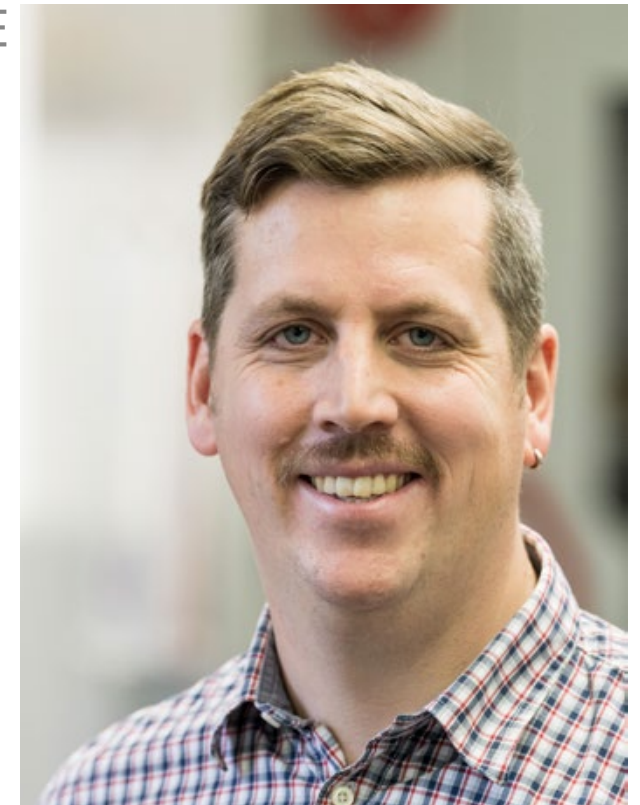
After the acquisition of a Mikron VCE600h in 2010, it had taken years to free up the funds for a five-axis Hermle C12U and a DMG CTX 500 turning-milling center. Here, the commitment of the instructors to secure funds from the various funding programs of the state, such as “Lern- fabrik 4.0,” certainly helped, but also the good cooperation with the Nachwuchsstiftung Maschinenbau. Already in 2015 and again in 2020, the metal sector passed the certification as VDW Mobile Learning Factory. The MLS - “Mobile Learning in

Smart Factories” system of the VDW is successfully used at the HGS in all technical industrial training areas at the Technical High School and in the technician training from level 1.

Partnerships at eye level

Despite all the funding programs, Noppenberger says that the HGS is also dependent on the support of the economy and sponsors for its equipment. This applies in particular to the important CAD/CAM training area. “Partnerships at eye level bring advantages for both sides,” Noppenberger affirms. Thanks to annual training and certification of the instructors, HGS has developed into the Southern Competence Center of the control manufacturer Heidenhain, for example. Pascal Noppenberger also praises the long-standing commitment of CAM supplier SolidCAM. At SolidCAM GmbH in Schramberg, about seventy kilometers from Singen, he completed his training in 2011.

His first CAM training: “A logical step, because from the very beginning we used SOLIDWORKS in CAD training. The perfect



Since 2008, Pascal Noppenberger and his colleagues at HGS have been committed to modernizing the technical equipment: “On the one hand, we must consistently develop vocational training with regard to the needs of companies and modern manufacturing, but at the same time also interest young people in these important technical professions and bring them into training relationships.”

VOCATIONAL TRAINING METAL: HOHENTWIEL VOCATIONAL SCHOOL SINGEN

integration of SolidCAM in SOLIDWORKS ensures a seamless transition from CAD to CAM. This is ideal for the students because they don't have to learn another CAD interface." All metal apprentices in the areas of toolmaking, machining, and industrial mechanics, as well as mechanical and mechatronic technicians and TG 12 technical high school students in the Constance district are taught at HGS after basic metal training and receive uniform training on SolidCAM.

Currently, the school has sixty student licenses and five to ten teacher workstations for the CAM modules 2.5D milling, iMachining 2.5D/3D, HSS, turning, turn-milling, HSS surface machining and 5-axis simultaneous milling. However, the curriculum only allows time for the basics in 2.5D milling, iMachining, turning and lathe milling, Noppenberger said. However, if there is sufficient demand, special evening courses with a certificate are offered for motivated trainees and technical students. As part of the nationwide teacher training program offered by the Nachwuchsstiftung Maschinenbau, the training program at HGS covers all CAM modules of SolidCAM.

Education offensive 2023

Vocational training suffered a noticeable setback as a result of the Corona crisis - on the one hand due to substantial declines in the training market, but also in training and further education at schools and in teacher training. After the pandemic subsided, Simon Sommer and sales manager Dirk Klinge from SolidCAM GmbH see a considerable need to catch up, which they want to meet in 2023 with a large-scale education offensive.

Simon Sommer from SolidCAM: "There are many dedicated teachers at schools, vocational training facilities, universities and institutes with whom we have already worked closely before the pandemic. At the moment, we are in the process



They are actively working on an educational offensive in the CAM field: Simon Sommer from SolidCAM, Senior Technical Instructor Metal Technology Pascal Noppenberger and Dirk Klinge, Sales Manager of SolidCAM GmbH.

of evaluating the current status of the approximately 300 schools." Then, collaboration with schools and educational institutions regarding teacher training will be intensified and targeted through the Young Professionals Foundation. Inexpensive educational licenses for educational institutions as well as free access to SolidCAM for students so that they can work with the CAM system in their free time or at home should make this possible.

HGS is a great example of what dedicated teaching staff can achieve. The industry is desperate for employees with CAM skills, especially as CNC machines become increasingly complex, such as multi-axis CNC turning and milling centers like HGS's CTX 500.

Noppenberger himself believes that his training department is on the right track. With the current equipment, including five 3D filament printers and an SLA printer, he can teach the students all the techniques. The feedback from students and

the numerous graduates, with whom he is still in contact, encourages him in his path. One thing he has learned personally: "An enormous amount of work and time can go into a double lesson. You have to want it, but for the students, the commitment pays off in any case." For Pascal Noppenberger, it obviously does professionally as well. Since September 2022, he has been a supervisor at the Freiburg Regional Council in the school development department for CNC/CAD/CAM. There, he can ideally continue to shape his vision of the future in technical vocational training.

Sommer explicitly praises the extensive training opportunities for teachers offered by the Nachwuchsstiftung Maschinenbau, but agrees with Pascal Noppenberger that there is a need for optimization here because, despite all the efforts on the part of the Nachwuchsstiftung, too few teachers find or take advantage of them.



“What you see is what you get”: At HGS in Singen, 75 CAM licenses from SolidCAM are available to students and teachers. In addition, students can program and simulate their CAM parts at home on their PCs completely free of charge.

DIVERSE LEARNING FACTORY 4.0

SolidCAM sales managers, Dirk Klinge and Simon Sommer, are impressed by the many projects that Noppenberger and his colleagues at the Hohentwiel Gewerbeschule in Singen have implemented with the trainees and technician students as part of the "Learning Factory 4.0" support program. With funds from the district of Constance, the Ministry of Economics and donations from local industry, a seven-figure sum was invested in 2018 in the areas of automotive engineering, manufacturing technology and robotics, thus getting the project off the ground.

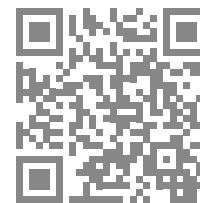
The heart of the production engineering department at HGS is a turning/milling machining center, a DMG CTX 500, on which spirit level blanks are produced according to the latest production strategies with the aid of a mobile placement robot. The production technology is supplemented by a modern tool management system.

In the connected basic laboratory, the CNC machine programs are created and simulated with SolidCAM from the CAD files. All the necessary data is stored on an RFID chip in the blank. This chip accompanies the blank until the finished spirit level.

The supplementary automation technology with an inter-linked machine system consists of various test stations, an assembly station and a dynamic warehouse. When the order is placed, the required data is read from the RFID chip at the stations and updated. The two-arm robot is responsible for mounting and screwing the vials into the spirit level housing.

Related links

- + Hohentwiel Vocational School Singen – <https://hgs-singen.de>
- + Nachwuchsstiftung Maschinenbau gGmbH – <https://www.nachwuchsstiftung-maschinenbau.de>
- + Training for teachers and trainers at SolidCAM GmbH – <https://www.solidcam.de/ausbildung>



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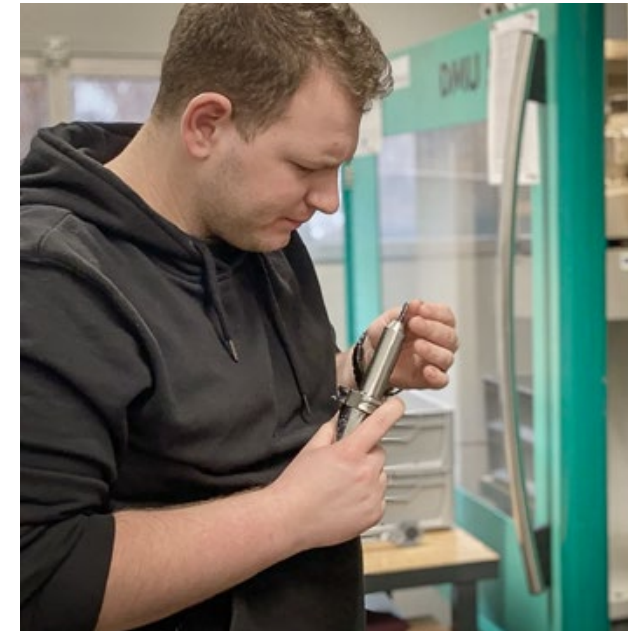
“MOTIVATION IS ALMOST EVERYTHING”

Give impulses, create incentives, recognize enthusiasm and motivate! Pascal Noppenberger's enthusiasm for manufacturing technology has probably infected dozens of apprentices and technical school students. One undeniable advantage of dual training is that apprentices learn things in the company that cannot be taught in vocational school - and vice versa. This is the case of Axel Rath. During his training in a toolmaking company, he had no contact with CAD/CAM. Nevertheless, he was enthusiastic about the subject at the vocational school right from the start. Since head teacher Pascal Noppenberger likes to organize extra-occupational evening courses on the basics of CAM programming with SolidCAM, provided that there are enough interested parties in the respective school year, Axel Rath had the opportunity to attend such a course.

After his apprenticeship, Axel Rath joined a company where he was employed as a CAM programmer and 5X cutter. Later, during his training as a technician, he again worked with SolidCAM. Another company change was imminent and almost at the same time he started his own business with a three-axis CNC machining center (ar-fertigungstechnik.de).

Company founder Axel Rath on his experience with SolidCAM:

“SolidCAM already convinced me during my training. In combination with SOLIDWORKS and also for machining companies without their own design in the embedded version, it is an absolutely round thing. Especially the iMachining machining strategy is unique, nothing else comes close. What I really liked is the profile management in SolidCAM. There are a lot of production-related options like easy extension of contours, startup options, collision control and fixture monitoring that I don't have in other systems. SolidCAM just offers that nuance more. I'm sure it's only a matter of time before I'm programming with SolidCAM in my own store.”





Pascal Noppenberger: "Multi-axis machining centers are becoming more and more prevalent in the working world. We want and need to prepare the machining mechanic and technician students for this."

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Hörstel branch

+49 5454 93395-0
nord@solidcam.de

Siegen branch

+49 271 234196-0
nord-west@solidcam.de

Sinsheim branch

+49 7261 945014-00
west@solidcam.de

Headquarters Schramberg

+49 7422 2494-0
info@solidcam.de

Suhl branch

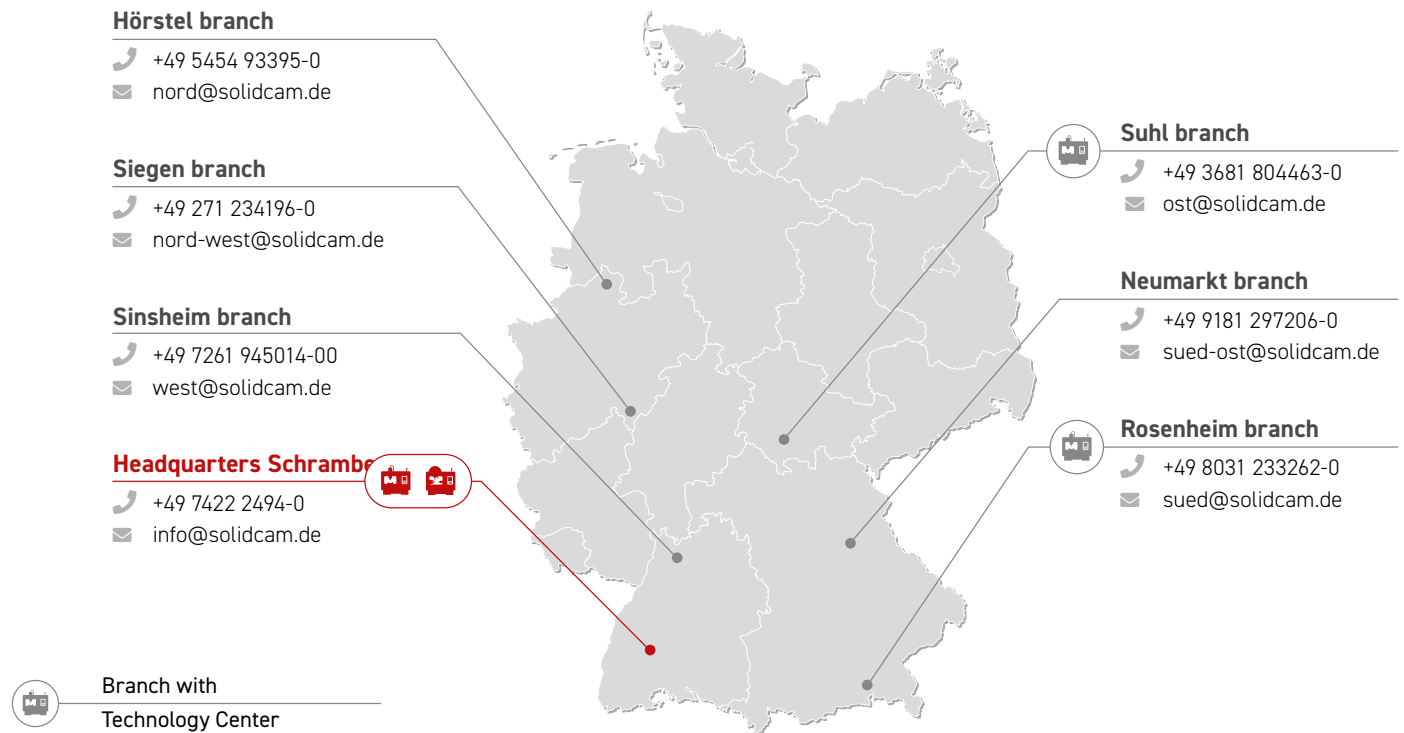
+49 3681 804463-0
ost@solidcam.de

Neumarkt branch

+49 9181 297206-0
sued-ost@solidcam.de

Rosenheim branch

+49 8031 233262-0
sued@solidcam.de





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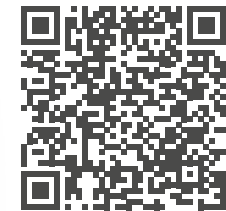
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SolidCAM GmbH
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78713 Schramberg

Phone: +49 7422 2494-0
E-mail: info@solidcam.de



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