CATHARINA DAUM

Smart and speedy storage solutions

Choosing exactly the right dimensions for a STOPA large-scale storage system is no easy matter – but fortunately TRUMPF's SimStore storage simulation software is on hand to help. The results of a SimStore analysis provided a solid basis for an important decision by Christina Gretschmann from Memmert.

Brightly lit, neat and tidy, the production facility echoes to the staccato sound of the punching machines and the steady humming and whirring of the SheetMaster. An operator strolls up to the machine, glances at the control screen and continues on his way. Behind the machine, a STOPA storage system towers up to the ceiling. Almost seven meters high and some 65 meters long, it provides 582 storage bays for large-format metal sheets and a total storage capacity of 1,750 metric tons. The storage and retrieval machine whizzes back and forth with barely a sound, one minute removing empty pallets and transporting them by rail or trolley to a machine, the next inserting pallets of semi-finished and finished parts into vacant slots. Things are quieter on the other side of the STOPA storage system where two automatic bending machines are hard at work, both of which are also receive their raw materials from the SRM. Productivity on both sides is high, with everything running smoothly and fully automatically. But it wasn't always like this.

One or two systems?

Over the past 85 years, Memmert GmbH + Co. has evolved into a leading innovator in the field of temperature control technology. In 2016, the company opened a fourth production hall, adding a further 4,200 square meters of space to its facilities in Büchenbach near the city of Nuremberg in Germany. "Our aim was to relocate the noisy punching and bending areas," says Christina Gretschmann, who took on the role of project manager for the new building at this time. "But we also wanted greater transparency. In the old production hall, our raw materials were spread throughout the facility, and we often struggled to find batches of finished parts, so people were wasting time searching for them." The decision was therefore taken to install a large-scale STOPA storage system at the heart of the new building with enough capacity to connect up six punching and bending machines plus all the necessary automation components. The main doubt in Gretschmann's mind when planning the new facility was whether one storage and retrieval machine would be enough, or whether the new storage system would need two. "Our punching machines run 24 hours a day, seven days a week. That's what the SRM has to cope with!"

Pallets are used to supply the connected machines with raw materials and return finished parts to storage.
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The storage and retrieval machine is the key to efficient sheet metal processing, ensuring that all the necessary materials are supplied to the connected machines and then returned to storage. The SRM is mounted on rails in the middle of the storage system, allowing it to travel at tremendous speed both vertically and horizontally to reach any storage bay. The TRUMPF project planners have to take into account the customer's specific production requirements as well as minimizing both the distances the SRM has to travel and the time each machine has to spend waiting for materials.

Digital twin creates clarity

The suggestion to use the storage simulation software SimStore came from TRUMPF, says Michael Schmider, TruConnect project manager at TRUMPF at this time: "SimStore lets you enter a customer's specific project data and then simulate anything from expanded storage options to a whole new storage facility. The goal is to get materials to the machines exactly when they're needed." The machines should ideally spend as little time as possible waiting for materials or standing idle. SimStore tackles this challenge by calculating the capacity and operating times of the SRM system or systems and all the connected machines. The software also takes into account shift models and the SRM systems' traverse speeds. The data provided by the customer is critical to achieving a good result. Once the simulation has been running for a week, SimStore delivers its calculations for the overall system and for each individual connected component. These results can then be exported as a simulation report. This shows the amount of SRM capacity used by the connected machines as well as the time taken to transport pallets, travel back and forth and take goods into and out of storage. The report also presents the capacity usage of each individual machine.

The storage system has 582 storage bays for large-format metal sheets.
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Solid basis for planning

SimStore was developed specially for TRUMPF in 2008 by the Fraunhofer Institute for Manufacturing Engineering and Automation IPA. The software is primarily geared toward analyzing the overall system when planning complex storage projects, specifically when a customer needs to connect up many machines or switch frequently between different materials. It can also be used to compare two different storage configurations or – as in the case of Memmert – to evaluate capacities and optimize production times. "We ran simulations for Memmert with traverse speeds of 100 meters a minute as well as one at up to 150 meters a minute. That allowed us to squeeze out another two to three percent increase in productivity," says Schmider. But the most interesting result for Christina Gretschmann was the discovery that the SRM systems are currently only running at 60 percent capacity. "That puts us safely in the green zone, so for now we won't be needing a second SRM even if we increase capacity. At peak times – in other words in the morning when the raw material is fed into the machines – we have a maximum waiting time of between three and five minutes. That's a figure I find perfectly acceptable," she says.

The planners opted to connect the laser and punching machines to one side of the STOPA storage system, and the bending machines to the other.

Higher sales revenue, no downtime

Gretschmann was delighted with how the entire project was handled: "The management team was adamant that we shouldn't have any downtime while setting up new facility. The fact that we actually increased our sales revenue by ten percent during that period shows just how smoothly everything went with TRUMPF and STOPA." Integrating two third-party machines with loading robots into the overall system was just one of the challenges the team tackled successfully.

Today, everything is running like clockwork, says Gretschmann: "There's much more transparency throughout the system and our throughput times are lower thanks to automated machine loading." By connecting the company's ERP to TRUMPF's TruTops Fab production control software, Gretschmann has also ensured she can sleep easy at nights and on the weekend: raw materials are requested by the machine, reliably delivered by the SRM and then transported back to storage after processing. "We make far less use of forklifts now, so less material gets damaged, which reduces waste. That also means our workers can get on with other jobs, because they only have to intervene if problems occur," says Gretschmann. "Our production manager summed it up nicely," she adds with a smile: "It's all much better organized now!"

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TRUMPF MEDIA RELATIONS, TISKOVÁ REFERENTKA