

**Sedus Systems: Complete production networking – range covers
100,000 variants****One component produced every TWELVE SECONDS**

Sedus Systems generates 30 percent of its turnover with custom produced articles. The time had come for furniture manufacturer Sedus Stoll AG to think about replacing its aging machinery and investing in a modern, flexible equipment outfit capable of meeting its production needs. Simply replacing individual machines would not be enough. To retain its position as a competitive player in tomorrow's tough markets, Sedus decided to work with the HOMAG Group to create a completely new production philosophy: data-based, fully automatically operating batch size 1 production.

Office furniture has been produced in Geseke for over 50 years, and under the banner of Sedus Stoll AG since 2002. Sedus Systems, which contributes around 50 million Euro to the total 158 million turnover of Sedus Stoll AG, has now heralded in a whole new era: Its part production has been completely revamped.

"Our production required urgent investment, and was simply no longer in step with the times", reports CEO Dr. Rolf Hallstein. "Series production is generally on a decline, giving way to ever greater customer individuality. Up until 2013, we were still working on a weekly batch basis, collating all the orders for a week's worth of production orders at a time. By introducing cutting waste optimization and trimming our operations towards series production, we tried to achieve maximum productivity and efficiency. The drawbacks are self-evident: We had only conditional flexibility, a lot of capital was tied up by the unavoidable storage of parts through to final assembly, and occasionally we even sustained

quality impairment as a result of repeated relocation of stored parts, and ultimately our quality control was also far from adequate. In the worst case scenario, a production error might only be noticed a week later. Following an analysis of the situation, we realized that simple replacement investment would not be enough. Instead, the answer to our specific needs was a demand-driven batch size 1 production system involving the greatest possible degree of automation."

Having invested in a new storage-sawing combination from the HOMAG Group back in 2008, the Schopfloch-based experts were the obvious first port of call for Sedus Systems, and the project was first broached at the "LIGNA" 2009. Ultimately, a completely networked production plant was installed. Following initial entry of the panels into storage, practically no further human handling is required – with the exception of non-standard formats produced at the processing center, or the occasional segregation of part stacks if panels have been cut in books rather than separately. After this, everything occurs on a fully automated basis, the information flow takes place by means of bar codes on the individual parts.

Downstream from the saw, the parts enter an isolating buffer upstream from the edging line. Depending on the degree of filling, this buffer can continue to supply the edge processing line with material for up to an hour if the saw should be out of action. The edging line comprises two stand-alone machines of the KAL 624 **profiline** series with **laserTec**. As a rule, circulating parts twice is sufficient for complete part edge application. For very small components, four passes are even possible. The system uses the bar code to determine which parts are recirculated or forwarded towards the sorting buffer.

The HOMAG Automation sorting storage system with its three lanes finally supplies parts to the next processing step: The WEEKE drilling line. However, this only happens once all the components for an item of furniture such as a

cabinet have been collated, so that everything arrives in the assembly department simultaneously. Because: There are three shift batches per day, meaning that panel thickness and cutting waste are optimized three times a day. Sawing always begins with the thickest parts. The machine operator is given the opportunity after every optimization process to enable processing or to integrate so-called "can parts" if the cutting waste values are inadequate. These are also parts which relate to a concrete customer order, but which may only be due for production the following day and then remain somewhat longer in the sorting storage system for reasons of efficiency.

Once all the parts are collated in line with the respective optimization process – for instance the 25 millimeter upper and lower panel of a cabinet, the 19 millimeter side walls and the 10 millimeter rear wall – the sorting storage system removes them from storage and the parts pass through the WEEKE drilling line where all the planned trimming and drilling operations are performed.

Ultimately, production takes place on the basis of the pull principle: Removal from the sorting storage system always takes priority over entry into storage, or in other words, downstream processes take priority – even if this occasionally results in brief standstill periods for certain machine parts. "There are plant components which can be permitted to take a break at times: because the remainder of the plant operates more slowly. The output of the entire plant is so high that these brief standstill periods are compensated for without problems", explains Anton Niggemann of HOMAG Sales and Servicing.

It is precisely this issue of process interlinking and coordination that posed the special challenge during the installation, commissioning and "fine tuning" of the overall plant in Westphalia during three phases between October 2011 and the start of 2014 during running production. "The capacity of the saw is higher than the edging line is able to cope with. This interaction applies equally to the edging line and the downstream sorting buffer storage system, which in turn feeds the drilling line. Turning an adjusting screw generally influenced another

machine or part of the machine. The aim was to find the optimum setting to ensure that the plant as whole achieved the required output", explained Norbert Sprick, responsible for production and quality management at Sedus Systems. "It was an enormous learning curve for all those involved, but it kept our team on their toes and ready to tackle new challenges."

Because alongside concrete implementation of the new production philosophy, getting all 230 employees in Geseke on board and able to run with the process was another challenge. "We tackled the issue of employee communication at an early stage and made an effort to allay any anxiety associated with the new system. Because a change as radical as this tends to spread a fear of loss of jobs. Luckily, during our recovery phase following the financial crisis, we had of course replaced some employees who had been made redundant by temporary agency staff. This meant that we were able to offer our permanent workforce secure jobs. We communicated with employees what we were planning right from an early juncture. We also made it clear that there would be fewer jobs in the part production department, and started to organize our team: Some of them made it known that they would could not envisage their role in the new production process, and in these cases we endeavored to accommodate these employees elsewhere. Conversely there were those who we began to realize would relish the challenge of driving the new project forward. Training courses at an early juncture by the HOMAG Group, accompanied by hands-on instruction by the individual HOMAG Group producing companies at the machines during the commissioning process prepared our production team for the task", concludes Dr. Hallstein.

As the various parts of an order emerge from the WEEKE drilling line, specially designed transport caddies wait to be loaded for transport into the assembly department. Here, there are three assembly lines which marry up desk pedestals, cabinets, desks and screen walls. Following assembly, they are directly packaged.

Vital to this form of production is the relevant data and then the individual bar code which carries the information. "Initially we had contemplated RFID chips, but decided against this for cost reasons, even though this form of identification would offer benefits, for instance in the event of complaints, even years after delivery. Instead we compromised and opted for bar codes, which have to be removed again before packaging", says Dr. Hallstein.

To allow an order to go into production, it has to be complete – including confirmation of dispatch from the supplier of externally supplied items, in order to avoid unnecessary long storage times in the sorting storage system. All data relating to the order has to be entered, and every part virtually described.

"There's no way we can just spontaneously knock up a part nowadays. We didn't operate this type of data-based system in the past, and we had to make a consistent effort to engage with the new philosophy", explains Sprick. The whole system is completely SAP-controlled. Material characteristics are taken for a concrete part, and individual characteristics are added in accordance with the drawings. This data is then used for the fully automatic generation of production programs. Errors at this juncture can result in the worst case scenario in machine standstill or an incorrectly processed part.

Production is monitored by in-process quality controls at several different stations: In the edging line, a part is separated out of the process every half an hour and various specific characteristics are inspected by the machine operator. In addition, at least once per shift a test component is taken through the drilling line with its full complement of drills and cutters from WEEKE. This part is then inspected for unwanted edge chippings and the drilling depths checked. And the final quality control takes place in the assembly department. If a defective part is actually discovered, it can be called in again using the bar code. The options include immediate new production – this type of component would then be ready for assembly within three hours – or subsequent production with the next optimization process. The digital order data contained in the bar code continues to be used right up to the last moment: At the end of the assembly process,

operators use this data to generate the order papers for delivery. 80 decor finishes, over 150 edging colors, any component sizes and thicknesses within a minimum and maximum value – there are practically no holds barred with the new production system. Around 3,500 parts are produced every day, with one finish processed component rolling off the line every twelve seconds. The average component size is 0.8 square meters. Sedus Systems uses 3,000 square meters of panel material every day, plus around 12 kilometers of edging material.

"There must be some 100,000 variants currently in the system. Around 30 percent of our turnover is generated with furniture. These are not standard off the shelf items but bespoke articles. Practically every order we produce contains some form of non-standard part – and the new method of fully data-based automatic production allows us to master all these customer-specific variants", emphasizes Dr. Hallstein. Alongside the achievement of this output level and particularly this degree of flexibility, Sedus Systems was delighted by the saving of over 1,000 square meters of storage space in the factory and the complete elimination of external warehousing. "We are currently optimizing our logistics processes in the assembly department. This was only made possible by the space gains we have made", says Sprick.

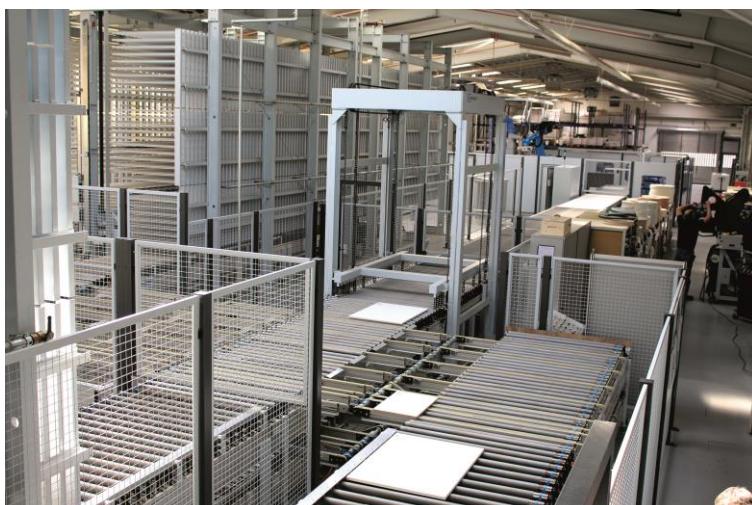
Pictures courtesy of: Furniture production, editorial team



Left Picture: Anton Niggemann, Sales Manager HOMAG Holzbearbeitungssysteme, and Norbert Sprick, Head of Order Processing at Sedus Systems.

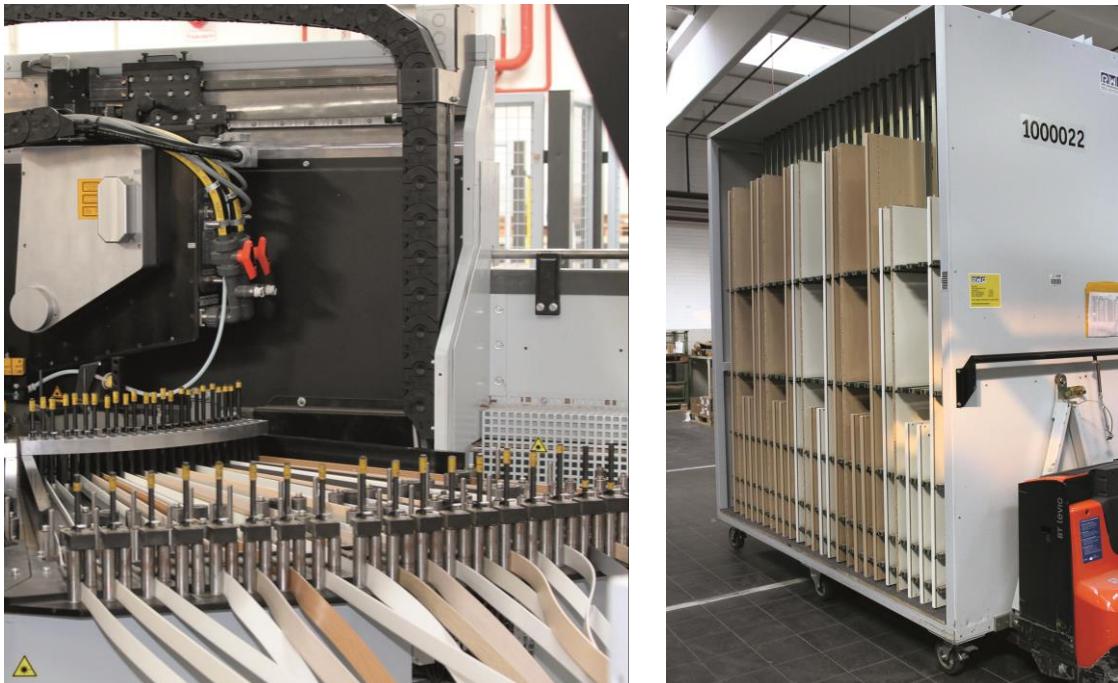
Right Picture: Dr. Rolf Hallstein, CEO of Sedus Systems.







The robot cell is predominantly used for complex trimming and drilling tasks on table tops, taking the strain from the WEEKE drilling line.



Sedus Systems, a subsidiary of Sedus Stoll AG, which produces cabinets, desks, desk pedestals and partition walls, has invested around 10 million Euro in a complete new part production system over recent years. And not just any new production system: the complete plant runs fully automatically, every part to be produced is stored in the form of a data set. This means that after entering the semi-sized panels into storage, the next time they are touched by human hands is at the end of the drilling line. For Sedus Systems, the new machine line was synonymous with a completely new production philosophy.

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