MDF & Co Magazin

2020

Produktionstechnik 4.0
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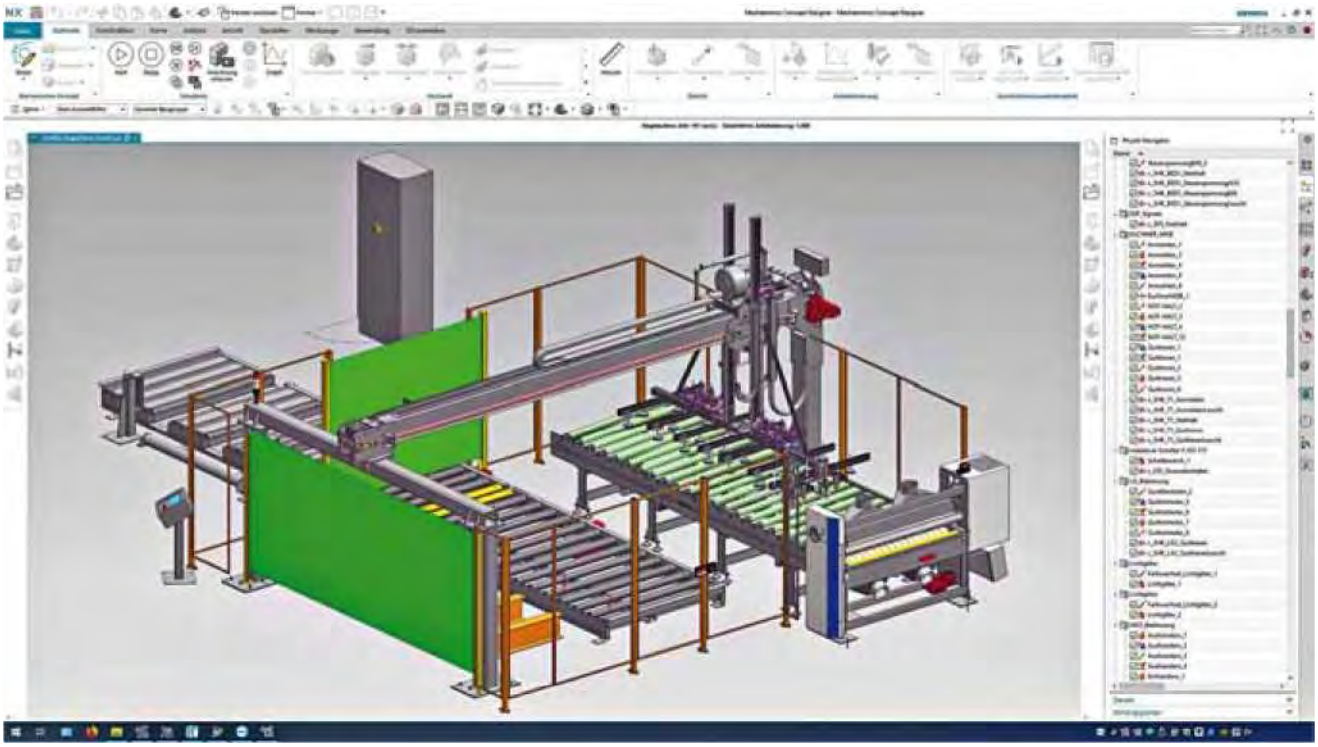
Umwelt-Management
Environmental management

Holzwerkstoff-Objekte
Wood materials objects

Ein Supplement von **Holz-Zentralblatt** und **HK**

Digital Twin increases efficiency and cost effectiveness – Bürkle customers benefit



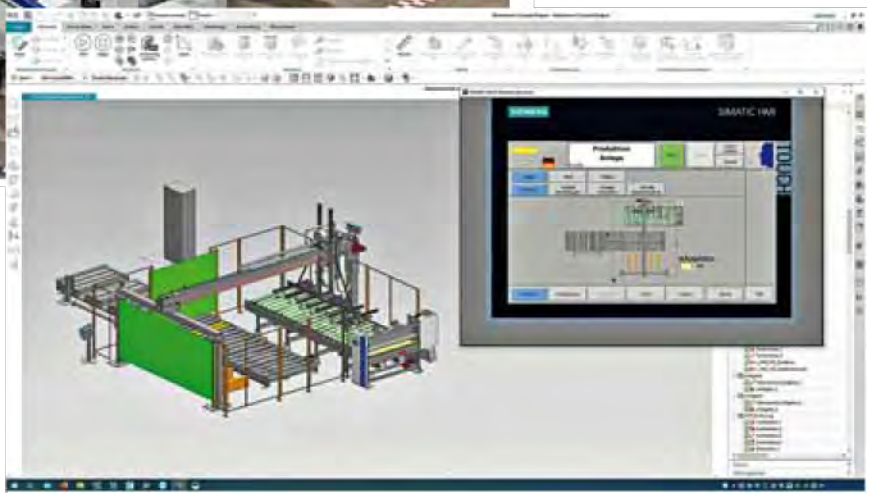
By Reinhard Huber, Freudenstadt

Several elements underpin the digital corporate evolution that is also bringing about lasting and sustainable change in the wood-based materials industry and resulting in new technical solutions. Together with Siemens AG and the Campus Schwarzwald, a centre for teaching, research, technology transfer and more with a focus on digitisation in mechanical engineering, the Freudenstadt-based mechanical engineering and systems company Robert Bürkle GmbH is part of a collaborative network. Between them, the partners contribute specific know-how with the aim of advancing the digital transformation.

The parties involved are confident that they are on the right track. The objective is a digitally dominated future of mechanical and plant engineering for the surface finishing of MDF and other materials as well as woodworking and panel processing. The entry point to these processes is the “Digital Twin” in the design of systems and components. Bürkle designers primarily use it for the development, design and virtual commissioning of complex systems.

Screen view of a CAD drawing for the gantry feeder with protection board storage (see also original photo of the system for comparison). Full view without overlays

After installation and commissioning. Side view of panel de-stacking with protection board feed (middle) and exit position of the finished stacks (concealed at the rear) with panels passing through



Screen view of a CAD drawing for the gantry feeder with protection board storage. Overlaid: Siemens touch panel (HMI) for complete view

Processes are simulated as realistically as possible on the screen. The risk of error is minimised, and commissioning times as well as the start of production at the users facilities are optimised. Conservative estimates assume a time saving of up to 25 % in the commissioning of complete systems alone. A win-win situation for systems engineers and users.

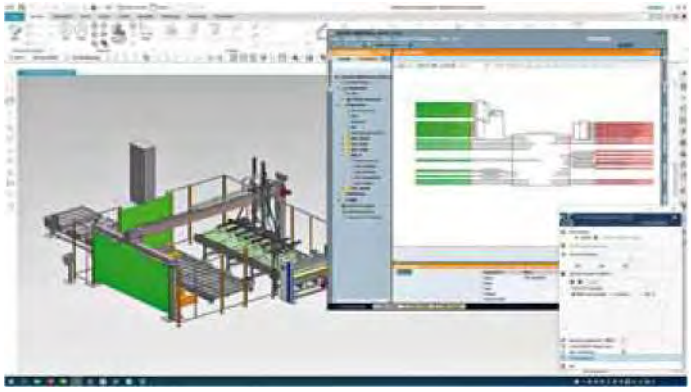
Digital Twin links the virtual world to the real world

The Digital Twin is the virtual data model of a product or service. It is a link between the real and virtual world. Among other things, digital twins use real data from sensors or motors to describe the position of machine parts and components in a complex overall system. Precise simulations of processes can be carried out virtually, without having them in front of you in the real world. Whereas previously all information, parts, etc., used to be located in different places before being put together in the assembly hall to form a single unit, nowadays this is carried out virtually in a software system during the design process. Using the example of a surface coating system, it is possible to simulate on the design monitor how maximum-sized MDF panels would run through a real, finished system. This simulation can be reproduced over and over again without any material being consumed. For producers of MDF panels, this is often no longer possible once the system is installed.

Not all – sometimes rather costly – raw materials are available in significant quantities. Especially not if the panel is no longer usable after a single run because it has been varnished or coated with foil. In this way, the enormous space requirements for large systems in the assembly hall can also be reduced.
Until now, limitations often do not show up until a very late stage, e.g. during commissioning at the customer's premises where sufficient original workpieces are available. This frequently leads to surprises and costly rework. Simulation with the Digital Twin largely prevent such extreme cases. Feasibilities can already be determined by the system manufacturer at an early stage once the design is complete, and changes can be implemented at an earlier point in time.

Siemens provides a digital ecosystem

Siemens AG supports companies in the industry with hardware and software-based solutions, involving subjects such as the Digital Twin for virtual commissioning, for example. Furthermore, bilateral projects are initiated and the implementation of the overall process of the "digital transformation" is actively supported. As a medium-sized customer of Siemens from the mechanical engineering sector, the company from Freudenstadt benefits from the wide-ranging opportunities and experience of a global company that has declared digitisation as a strategic corporate objective. In the area of machinery and systems for the finishing of wood-based materials, the corporate group values Bürkle's vast and long-standing experience. Of course, there is also the possibility to have an influence on the software



Screen view of a CAD drawing for the gantry feeder. Control processes and physical movement can also optionally be displayed simultaneously in the on-screen display

Installed gantry feeder with protection board storage. Positioned in front of a panel cleaning and coating system at a renowned panel finishing company. Version as seen in the CAD drawings (1 to 3)

provided. Collaboration with a globally active major corporation does not always have to be a one-way street. The partners emphasise the coherent Siemens overall package, the flexible and open attitude to software adaptations and the pleasant and cooperative collaboration as a team. These are also good conditions for successfully tackling difficult subjects together in the uncharted territory of the digital world. With the Siemens Cloud ("Mindsphere World" - https://mindsphereworld.de), the partner network has a standardized digital ecosystem at its disposal.

In this way, the participating companies exchange ideas, use already implemented apps or, if necessary, individually adapt them. The data of different apps or companies can be networked, which may even result in the emergence of new business models.

Growing pool of apps in the "Mindsphere World"

This produces a flexible, networked digital data infrastructure, sub-areas of which can be individually tailored to the requirements of the partners. Partners can put their own apps in place, without other companies having access to them. Or they can network with other companies in defined areas and exchange data on the basis of clear rules.

This willingness to exchange enables the formation of new business relationships and business models. Clear rules and secure data transfer are, of course, a necessity that is guaranteed. However, countless companies remain highly sceptical about the use of a cloud. In this regard, the following should be noted here: Industrial Edge combines all the advantages of edge and cloud computing – optimally adapted to the respective company's specific needs. With Industrial Edge, all data can be evaluated and analysed at the machine or quickly preprocessed with no latency. Based on the application, the user can then decide whether and how to use the cloud in addition to Industrial Edge.
Finished apps are available in the cloud for everyday Bürkle applications. Consequently, they can more easily take practical customer concerns into account and are better suited for daily use in industry or trade.
Naturally, there is also the possibility for companies to create their own apps and submit them to the "Mindsphere World".
This results in a pool of practically tested apps full of know-how and data for areas relevant to Bürkle.
Such data initially belongs exclusively to Bürkle but can also be used by other companies by agreement. Of course, this applies to all partners involved in the digital ecosystem. Not everything has to be reinvented. Sharing is among the orders of the day. This opens up potential for innovative solutions or new business areas. Siemens provides a set of rules in the cloud. The required servers with high computing power are provided by the data centres of

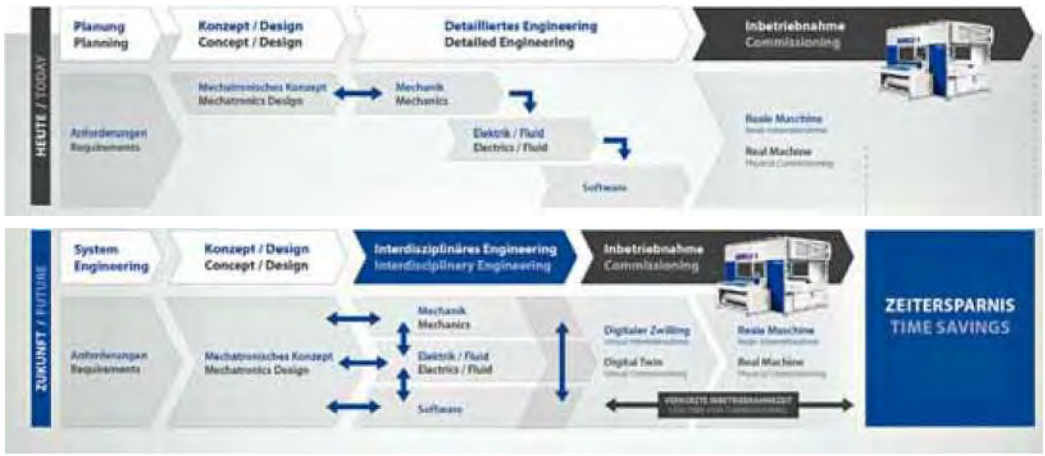
a globally active market leader.

Campus Schwarzwald integrates teaching and research

The Campus Schwarzwald (https://www.campus-schwarzwald.de), active in Freudenstadt since 2019, is also involved. Its contribution consists of enterprise-oriented teaching and research. Future-oriented technologies are prepared and optimised for industrial use. At the same time, the Campus is a hub linking a constantly growing innovation network, whose far-reaching connections also involve other institutions with a similar focus, such as the Fraunhofer societies.
“The campus was created through the initiative of strong regional companies such as Arburg, Fischer, Koch, Schmalz, Homag and Bürkle, as well as with support from the Chamber of Commerce and Industry Northern Black Forest, the city and district of Freudenstadt and the University of Stuttgart,” explains Dipl.-Ing. Stefan Bogenrieder, Managing Director of Campus Schwarzwald.
In addition to new research topics dealing with key issues such as data security in production facilities, various master's programs are also offered to students. A well-equipped laboratory and the wide-ranging machines of the partner companies, including robotics and diverse software solutions (including a partnership with Siemens), well and truly offer a playground for all partners involved in the innovation network. The campus is also intended to contribute to the emergence of a new atmosphere of cooperation and togetherness. The networked companies should recognise that there are great benefits to not tackling everything alone, rather that it is worthwhile casting a wider net for solutions, contributing ideas and initiating or participating in research projects.

Digital transformation - the path into the future

All in all, it is a top-class network that has dedicated itself to a digital transformation in Freudenstadt. On closer examination, the impression is certainly gained that all parties involved can and want to benefit from the joint projects and associated networking to the utmost degree. Ultimately, even trade partners, such as producers and finishers of wood-based panels, can benefit from new (digital) solutions. There is a sense of optimism and enthusiasm for a “digital topic”. Virtually every medium-sized company is dealing with it at present, even if it often raises more questions than answers.
The example of the “Digital Twin” at Bürkle shows how a traditional medium-sized enterprise can embrace the digital transformation and the associated changes, without immediately reversing all existing structures. In the end, companies that are willing to cooperate and exchange data and knowledge can be more successful in the market.
The growing acceptance of cloud-based solutions will significantly increase the opportunities of digital transformation in the near future. More than ever, however, the IT world should focus on the topic of data security. This applies to data on the system manufacturer and user side in equal measure.
Only in this way can potential users of the cloud be convinced to use it too. In any case, there is abundant need for action regarding data security. Cooperation and partnership are called for and will ultimately make successful solutions possible, with benefits for all trade partners as well as for research and teaching. The location of the Black Forest – with its innovative companies and the digital cluster in Freudenstadt – is ideally positioned for an even more heavily digitised future.



Engineering flowchart - today and in the future (with “Digital Twin”)