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BIM

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SPECIAL ISSUE

Digitalization in wood construction

an exciting challenge

In the leading article about BIM in the Neues! In 2017, we asked what BIM means for wood construction and whether wood construction is already BIM-ready. What does BIM mean in the context of digitalization in wood construction? What challenges are waiting specifically for those carpenters and wood builders who have not left tradition to enter the era of digitalization yet at all or are doing so too slowly?

With this article, we want to show to you what digitalization in wood construction means, while at the same time giving wood builders security and confidence —a lot has already been achieved. What are the next challenges, however?

Wood has long become a high-tech building material. There is hardly any other building industry in which the degree of automation has progressed as far as in the wood processing operations. Many have already

put digitalization into practice and digital processes or CAD/CAM have become the state of the art in wood construction.

The larger share of the profession is - often in connection with a change of generations - in the middle of the switch from tradition to modernity or has just started the journey into the digital age. According to a survey, less than 6 percent of all building companies use only digital planning instruments. The share in wood construction is much higher - for example, more than 50% of the projects are constructed in 3D. Digitally controlled machine-based timber framing has mostly become the default. Nevertheless, all wood construction companies have not fully utilized their digitalization potentials yet. Therefore, wood construction must also continue to face digitalization if it wants to be ready to face new challenges.

What does "Industry 4.0" mean in wood construction?

Industry production processes, e.g. in engineering, cannot be compared to wood construction and assembly processes. After all, this is not about producing mass products, but about completing individual projects, and usually ones of a kind, with machines and divided craft work. After all, there are no two identical roof trusses! Nevertheless, some areas of industry 4.0 can be transferred to wood construction and have already partially become reality. The pioneer in the industry is clearly the prefabricated home industry, which is able to specifically make the cost savings potential of improved processes work for it based on the requested higher piece numbers.

The key word "fourth industrial revolution" represents a future project of the Bundesministerium für Forschung und





Bildung (BMBF). Essential characteristics of industry 4.0 include continuous digitalization of production and logistics, as well as networking of autonomous, "smart" objects and systems with the target of making production more flexible and optimized. Digitalization includes planning, production, ordering, delivery and assembly processes, as well as business management processes, and includes the entire value-added chain. If information and processes are consistently digitized and linked across all crafts and building phases, work processes can be optimized, productivity increased, data redundancies avoided and error sources minimized. Adjustments to new national and European directives, statutory specifications or archiving of data are made easier by this.

What are the components of digitalization?

The subject of Building Information Modelling (BIM, see Neues! 2017) is an important component of digitalization. With the new planning method and cooperation of all project partners in a shared data model, continuous digital process chains are currently becoming established. Cooperation is based on 3D building data

models, clearly defined responsibilities, quality specifications, coordination and communication processes. BIM permits static, building-physical or energy-related optimization, collision controls or simulation of building and assembly processes in advance. The entire building project can be digitally anticipated before it is implemented. Problems and bottlenecks can be recognized quickly and avoided as far as possible this way. Processes and dates can be forecast more precisely. Networking is another digitalization component. This not only includes cooperation and coordination of project partners through virtual internet project spaces. The links between physical objects and a virtual representation through the internet, the internet of things, will change wood construction during the next few years as well. "Internet of Things" links physical objects to the internet. This permit, for example, mutual coordination of devices among each other –an important feature of Industry 4.0. For example, the Smartphone can display availability of all tools and materials necessary for the next order in stock.

It will be possible to document the rendered services, installed materials and parts automatically during the entire production and assembly process in future. ERP or PPS systems can thus keep up with the actual occurrences in the workshop, on the construction site or at the customer's site and serve as a reliable decision-making aid. "Smart" parts can be used for controlling building processes, real-time tracking of parts (material storage, production,

delivery, assembly), acceptances and service tracking or for traceability of installed materials and parts, for removal or recycling –and thus across the entire life cycle of a building.

How digital is wood construction?

Some wood builders are already dealing with recording of sizes, employee times, customer and order data or resource and construction site deployment planning with mobile solutions, smartphone or tablet apps. If data are recorded digitally right at the customer's site or resources and materials are controlled from the construction site, media interruptions, multiple input, different data statuses and delays of deadlines can be avoided. Mobile hard- and software, as well as wireless communication technologies, are used to enter and call, display or modify information precisely where it arises or is needed at any time. This saves time and leads to fewer mistakes. The use of mobile and cloud computing that is already possible today implements digital process chains without media interruptions –from order recording to planning and execution, to assembly. This way, missed deadline and cost limits, planning and production errors can be minimised.

Wood construction is much farther already in the areas of production, delivery and assembly, where it has reached the state of the art. Current processes, technologies and tools such as BIM, CNC or robotics are used consistently. The design and industrial fabrication of pre-fabricated parts, ->

-> Page 5



such as wall elements, make it possible, e.g. to achieve similar rationalisation benefits as in other areas of the industry. Walls, ceilings and roof elements are produced in the factory, machines are controlled by fabrication and production control systems, times are optimized and all documents and information for storage, transport, construction site assembly, order management and controlling are output.

CAD design data form the basis for various process steps. On this database, control data for timber framing systems are calculated, planned and optimized, and the status can be continually reported back to the ERP/PPS system of the company. A workplace screen or tablet makes it possible to query the current production status of an order in a timely manner. This way, work preparation staff and production managers are always kept up to date, ensuring optimal control of production.

Numerous interfaces already ensure digital continuity in Dietrich's today'

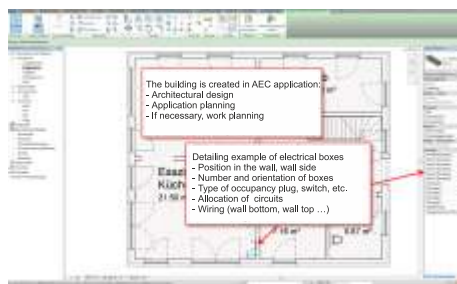
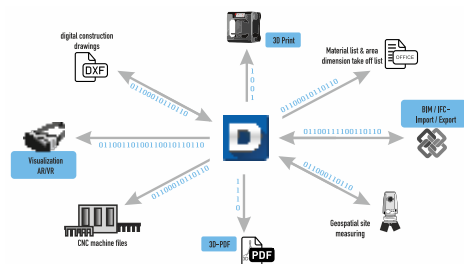
Best prepared with Dietrich's

Wood construction is in the middle of digitalization already, and wood construction operations have achieved a lot. Integrated CAD/CAM-, ERP-, MDE-Solutions and automated production systems are part of everyday life in all modern companies now.

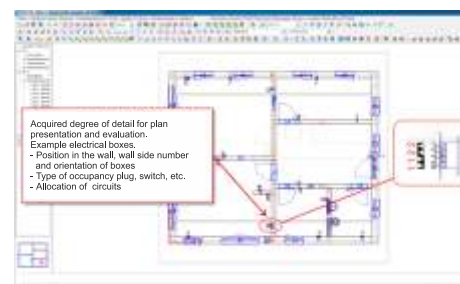
Due to the BIM-compliant building model, continuity and unique parameters of the wood construction programs, users of the modular solutions from Dietrich's are extraordinarily well prepared for the digital transformation in wood construction.

The BIM-capable programs and modules, in connection with the IFC connection or data import and export, permit efficient interaction with all project partners. Laser measurement, structural engineering or CAM interfaces and the new 3D PDF export module are further examples for digital continuity of the Dietrich's solutions.

Dietrich's optimally supports implementation of the digital transformation. It gives companies a competitive head start and makes them fit for future challenges on national, European and international levels.



IFC interface: Creation in AEC application



IFC Interface: Takeover in Dietrich's