



BUSINESS

# WITH MAGIC AND LOGIC TO PACKAGING 4.0



Synchronized cooperation of design, procurement and assembly.

**I**ntelligent machines, integrated processes, intuitive operation - these are the premises with which Windmüller & Hölscher has been implementing numerous digitalization projects for several years now. As a specialist for machines in the growth market of flexible packaging, innovations are important to us; with our products, we set new technological standards again and again.

There is also plenty of scope for ideas: Our gravure printing presses easily fill halls; cast film lines can reach the size of a multi-story single-family house and consist of at least 100,000 individual parts.

Due to this complexity and dimensions, no two identical machines leave the assembly line, especially since our customers also operate in different industries and require individually manufactured systems.

Despite low vertical integration and small quantities, we saw potential for digitization here. In order to meet individual customer requirements as precisely as possible when configuring the machine or system, every configure-to-order process includes an additional engineering-to-order component.

In order to improve these processes, among other things, we are currently introducing Product Lifecycle Management (PLM) in a new digitalization project. The focus is on resolving the gaps between the existing individual system solutions such as the ERP system, CAD systems and technical editing systems, significantly improving the flow of information between design, procurement and assembly and increasing data consistency.

Above all, a central "smart" bill of materials should make this possible.

### From Master to Multi-BOM Management

Until now, a single bill of materials has been used in the company. This master BOM (Bill of Materials) primarily satisfies the needs of procurement and assembly. The list was only partially integrated into the technical systems - for products with tens or hundreds of thousands

The change from uni- to multi-directional thinking was difficult, but proved to be decisive for the success of the project.

of material items and dynamic changes during the life cycle, this could hardly be handled any other way. The time required to maintain the

master BOM alone was very high, as this required constant coordination between development, procurement and assembly.

*Combining disciplines*

The goal of the PLM project was therefore to use digitization tools to establish multi-BOM management, in which each area maintains its own bill of materials. These lists are synchronized with each other using the logic and "magic" of software algorithms. The special feature: We connect the very heterogeneous structures and visualizations of the working environments. A machine designer, for example, works in CAD with his own spatial structure and parts list in order to recombine plant

All bills of material must represent the same product.

parts and improve installation spaces. An electrical designer, on the other hand, keeps a parts list in which the logical link between motor, converter and sensor is grouped. The assembly department, on the other hand, orients itself to pre-assembly processes, for example, from which another separate structure - and parts list - emerges. Ultimately, of course, all these lists must always represent the same product.

*Rapid exchange of information*

Here, the desire for a "red thread" that connects all these perspectives is obvious. But what is the best starting point for this? With a parts list in the design department, which is then passed on to the next station or department, rebuilt there, passed on and returned? This kind of unidirectional thinking and approach is classic. However, in this case it does not lead to a clear, but in the end very abstract chaotic "weaving pattern". This is not helpful when versioning customer-specific plans, e.g. if they were copied in the previous system and saved under a new assembly number. As a result, the plans were adjusted in assembly and procurement had to check these changes.

A smart algorithm reduces the complexity for the user to a minimum.

Our idea is to pursue a multi-directional path, i.e., mechanics and electronics work in parallel and always synchronize with a common BOM model. Assembly and service are also connected to this central bill of materials and also exchange information via it. If, for example, an electrical designer decides to use a different motor, his colleague in the mechanical department finds out directly and can ask questions or modify his planning directly.

The roll-out of the solution has already started, and in test and training phases we are training over 600 users to operate the system. A positive experience here is already that the employees, who mainly move in three-dimensional, imaginable space, also gain a good understanding of connections between the data of the specialist disciplines.

**Automated data reconciliation**

We are completely rebuilding this multidirectional synchronization with the PLM system. Thus, for example, the team in assembly should be able to access the information from the authoring systems in development very comprehensively and simultaneous work in the development disciplines should be possible. The central element is a function-oriented structured bill of materials (eBOM), with which every other bill of materials is synchronized.

In order to reduce the complexity for the user to a minimum, a "smart" algorithm allows the user to work only in "his" own BOM. This opens up further improvement options: For example, assembly can now access data from mechanical design, model-based definition, and electrical design (e.g., electrical component identifiers) directly and without manual data preparation. Assembly, in turn, can use an assembly-optimized BOM to manage digital work instructions.



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**Field of application:** Mechanical and plant engineering

**Challenge:** very high effort for the maintenance of a master BOM (Bill of Materials); constant reconciliation between design, purchasing and assembly necessary

**Solution:** Synchronization of several bill of material views that enable simultaneous work in the development disciplines; function-oriented structured bill of material (Engineering Bill of Materials, eBOM) as central element