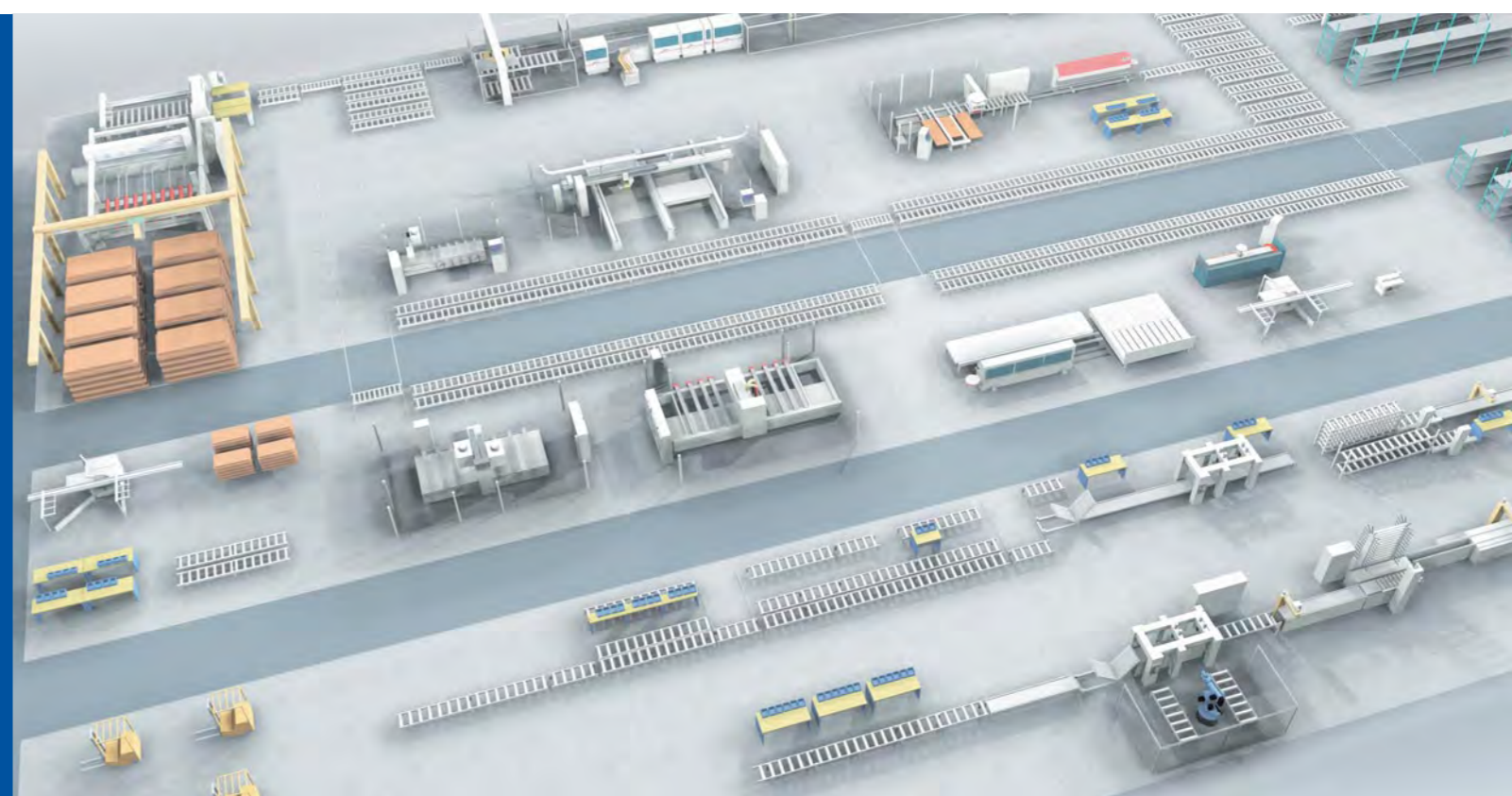


Simulation Technology – Anticipate Reality



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Simulation Technology



Safe investment even with complex manufacturing systems

Complex manufacturing systems with irregular, interlinked material flows or with “breathing” buffer areas cannot at all or only very inaccurately be analyzed by statistical calculating methods. This inaccuracy however causes considerable investment risks or necessitates expensive “oversizing” of system components to ensure the required result.

Simulation technology permits to portray machines, plants or complex production areas in the form of dynamic models. Consequently their behavior in a given manufacturing program can be predicted in tight tolerances. This delivers valuable findings already in the planning phase, which in turn, will contribute to investment optimization and backup. The simulation model can also be used in the later operation phase in connection with adequate optimization algorithms for productivity enhancement and lead time reduction.

Your main benefits for planning and operation

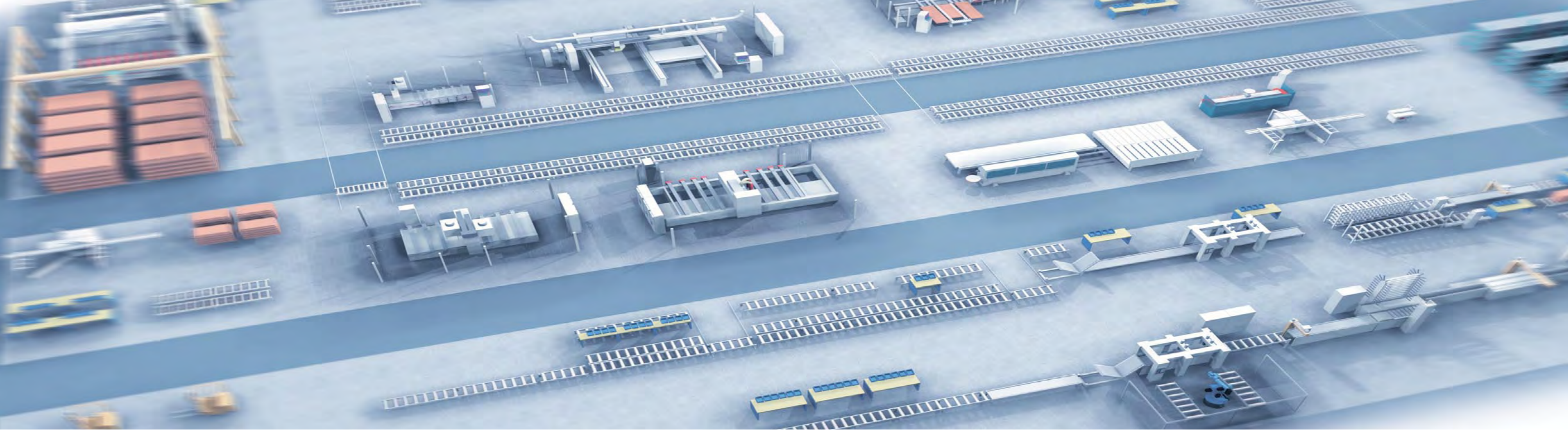


In the planning and implementation phase:

- reliable information on productivity and lead times
- bottleneck analysis and optimization
- sensitivity analysis (impact of individual parameters on a plant as a whole)
- analysis of disruptive scenarios and minimization of consequences
- interactive system optimization
- avoidance of expensive oversizing
- minimization of business risk
- effective support for presentation and discussion of projects
- reduction of time required for commissioning

In the operating phase:

- accurate planning data for production engineering and costing
- more efficient manufacturing control
- productivity optimization
- reduction of lead times
- practical training of workforce



With dynamic simulation you are on the winning side

In the planning phase:

The simulation model permits the analysis of a manufacturing system already in its planning phase under realistic conditions and with real manufacturing orders. The model delivers reliable information on productivity, lead times, buffer capacity used and utilization degrees of bottleneck areas. The graphic animation makes complex processes easier to understand and provides suggestions for improvement. The manufacturing system may be diversified and optimized through

further simulation experiments.

For example the buffer sizes or performance parameters of system components can be changed and the subsequent resulting impact on the entire system can then be checked. It is thus guaranteed that the target parameters are attained – without the need of an expensive oversizing of system components.

The developed model can also be used for project discussion and presentation in a team to facilitate and accelerate decisions.

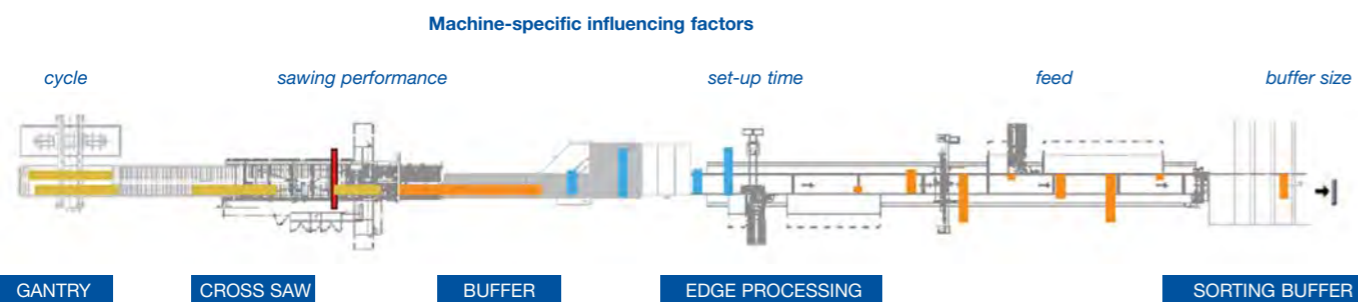
In the operating phase:

The simulation model can also be extremely useful in the later operation phase. For instance it delivers reliable planning data for costing and production engineering. In addition the model may be linked with adequate optimization algorithms and subsequently determines the optimum manufacturing flow in terms of productivity or lead time. The result is an efficient tool for the manufacturing control.

When developing new products the expected impact on manufacturing may be analyzed by means of the simulation model, which in turn, allows to draw consequences at an early stage – for the product or the manufacturing process.

The simulation model renders the relevant determining factors and their interrelation transparent thus providing the basis for a continuous optimization of the manufacturing system.

The simulation model is also a most effective tool for the training of operating and maintenance staff.

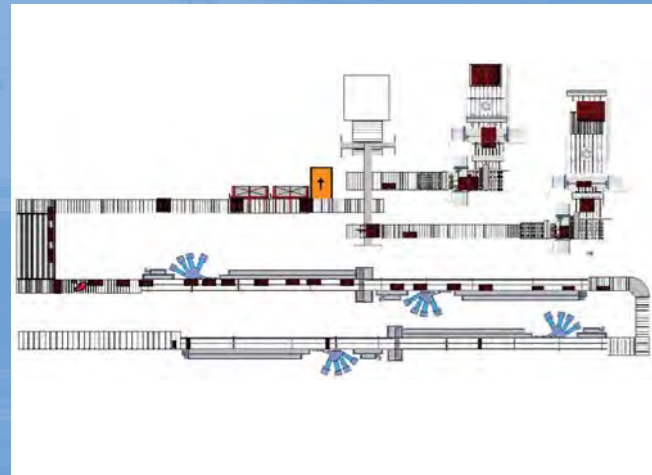


Global factors: Component sequence · Cut plans · Disturbance reaction · Operating staff

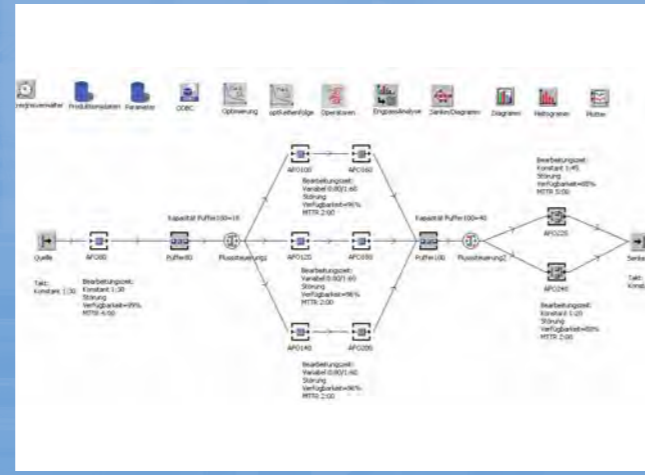
Example: Result through simulation

- Productivity + 30 %
- Piece cost reduction – 20 %
- Average lead time – 50 %
- Space requirement in the buffer – 60 %

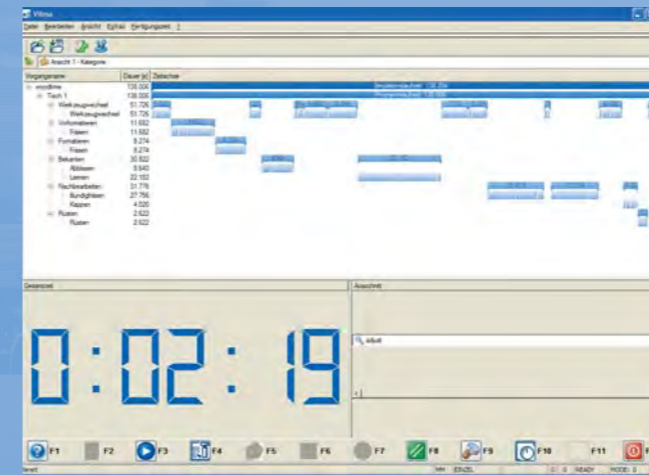




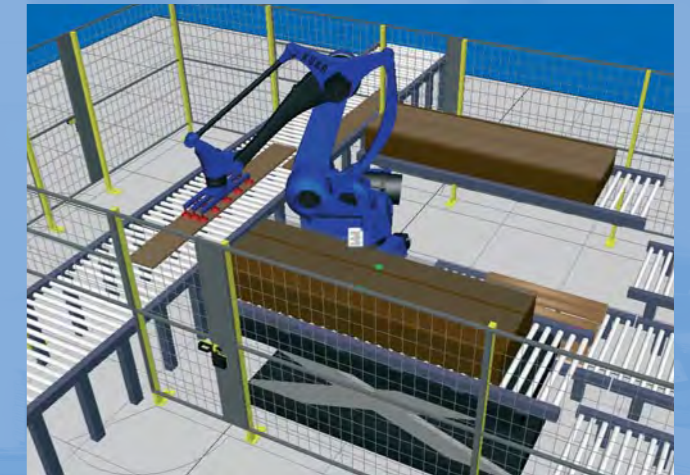
Animated model of a plant for furniture manufacturing



Simulation model of a complex interlinked plant



Simulation of a CNC processing with woodTime



Three-dimensional robot simulation

From the model to the perfect manufacturing flow

Simulation of machines and plants on the basis of abstracted models

The simulation model has become an indispensable tool for a reliable planning of flexible systems with frequent retooling down to batch size 1. It often turns out that an expensive investment for minimizing the time required for machine changeover is less effective than, for instance, the extension of the integrated buffer by one or two components. The analysis of disruptive scenarios plays also a significant role. The system must respond in a way that no rejects will be produced.

In this case simulation is performed on the basis of an abstracted model which portrays the real processes in a simplified form. The degree of abstraction is selected in such a way that the derived information is sufficiently accurate and reliable. Time and effort involved for modeling and computing is kept to a minimum. For an effective and flexible modeling the HOMAG Group develops detailed simulation models based on a pool of group-internal parametric simulation modules.

Real-time CNC simulation

Processing times depend largely on the processed workpieces as well as on the machine type and machine load. Simulation permits a detailed reproduction of manufacturing processes. Contrary to the previous example, in this case no abstracted model is required. All relevant model parameters are already integrated into the machine control system and the machine specific configuration data. By means of the module woodTime of the HOMAG Group a simulation mode can be applied to the machine control system permitting a realistic reproduction of the real manufacturing flow. The resulting processing times show a high degree of accuracy as the real machine and drive parameters flow into the computation.

Robot simulation

Robots are increasingly used in the woodworking and furniture industry. Due to their versatility they are capable of performing almost every conceivable task and function. Simulation is mostly indispensable due to the complicated three-dimensional flow of movement. It permits the determination of reliable cycle times and the elimination of collision risks. Here too the simulation is based on the real machine parameters of the used robot type. In addition to the real robot program it is also possible to simulate the interfaces to the robot environment and to check its accuracy.



HOLZMA panel dividing plant



Flexible sizing and edge processing line from HOMAG with feed and stacking station from BARGSTEDT



WEEKE drilling line with feed and stacking station from BARGSTEDT



LIGMATECH assembly and packaging line



Multifunction bridge for processing prefabricated house elements from WEINMANN



CNC machines from HOMAG and WEEKE



Robotic system from LIGMATECH



Door panel manufacturing plant from TORWEGGE