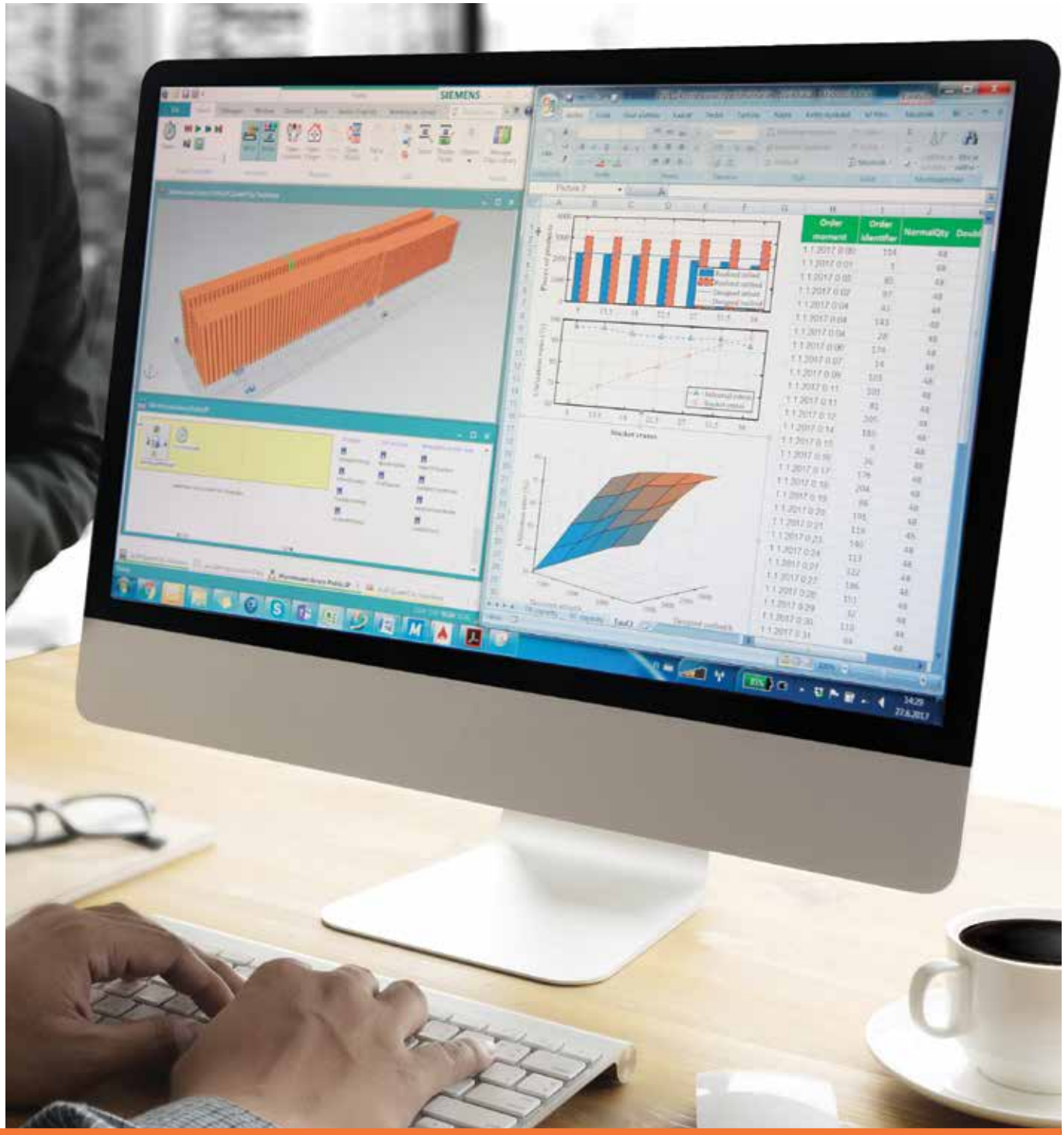


PESMEL MATERIAL FLOW HOW

Simulation and Data Analysis

PESMEL

Simulation and Data Analysis

What is simulation?

Simulation is a tool that is used in early phase of the investment planning to digitally analyze the production and material flows at the mills. Purpose is to understand and improve the existing or planned production by analyzing it and finding the possible bottlenecks.

The simulation model uses actual data from the customer's existing or planned production system, including the dimensions of products and the storage facilities, as well as the speed, acceleration and capacity of transport devices. Interfaces with other systems complete the model, and repeated validation rounds ensure that the model represents a fully functional system.

Test runs carried out with the completed model help to ensure that the planned system has adequate capacity and to find the best operating practices. Weeks or even months of operations can be simulated in mere minutes, broadening the perspective and revealing bottlenecks that would otherwise only emerge over longer periods of time. The model can also be adjusted to test alternative solutions, and uncertainties can be introduced into the model to establish their impact.

Customer involvement for maximum benefit

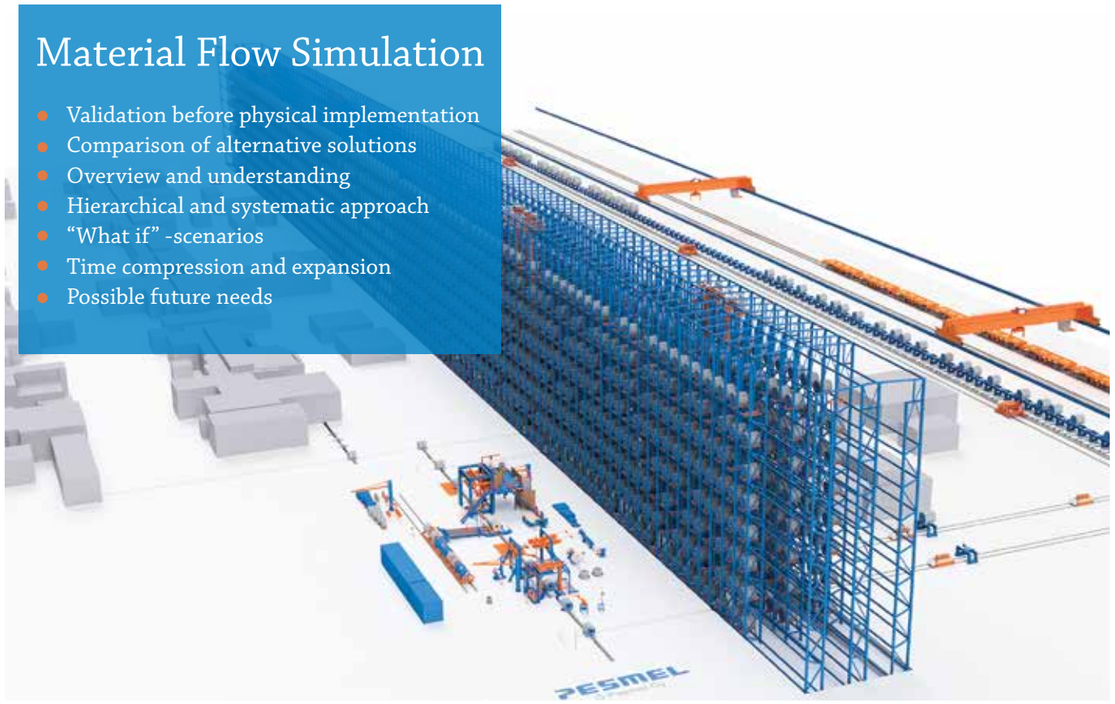
Intelligent simulation brings the shared vision of Pesmel and the customer to life during the design process, allowing testing of complex systems and removal of possible bottlenecks before the construction phase even begins. This saves costs and speeds up the launch of full production operations.

The model is always built in close cooperation with the customer. Each simulation process begins with a specific issue, such as the need to know whether the capacity of the system is large enough, or if the planned layout works for the facility or process.

The customer provides information and understanding of the usage of the system, and the team decides on the appropriate level of detail for the model. It's vital for the customer to be actively involved throughout the process: to gain maximum benefit, the designers and the customer work together to find the right questions as well as the best ways to answer them.

Material Flow Simulation

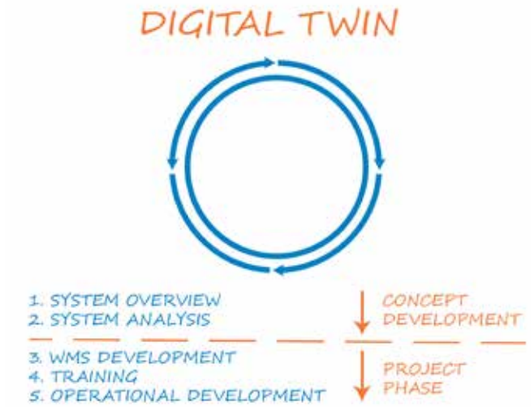
- Validation before physical implementation
- Comparison of alternative solutions
- Overview and understanding
- Hierarchical and systematic approach
- "What if" -scenarios
- Time compression and expansion
- Possible future needs



Digital Twin

Simulation is a part of the entire life cycle of systems developed by Pesmel. Simulation model virtually imitates the real system and updates when the system design or physical counterpart updates. This actively updating and accurate model is a Digital Twin.

With Digital Twin, designers and customer can immediately observe and validate the effects of design changes. During the project phase, Digital Twin integrates virtually to the surrounding systems and it is interactive part of the training sessions. When the operational use of the system starts, simulation model provides valuable information if possible future needs or system updates need to be validated.



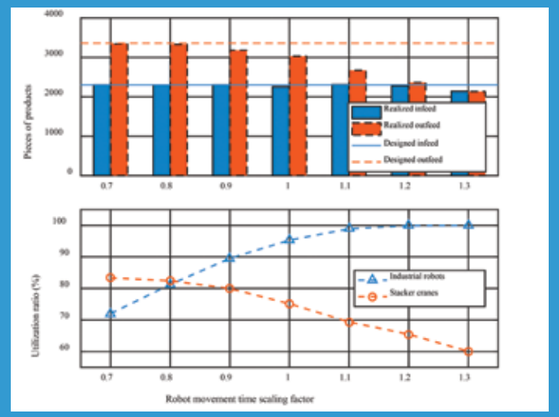
Simulation is an integral part of the design process

"Simulation should be introduced into the process as early as possible," says Pesmel's simulation specialist Eero Anttila. "It produces valuable information that can help to tweak the development process and make sure that the customer only invests in a system that is truly optimal."

Hard facts beat intuition

"Simulation provides a realistic overview of the system," says Anttila. "It's very important for both the customer and the designers to be able to see the system in action." The detailed input parameters and the authentic rendition of the mill's actual processes, complete with correct timing, produce a level of accuracy that cannot be achieved with other design tools.

In addition to the intended operation of the system, unwanted scenarios can be also simulated. Experiments can, for example, include component failures. The impact of these failures can then be analyzed, and appropriate precautions taken.



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