

System Dynamic Models and Real-time Simulation of Complex Material Flow Systems

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A multi-scale simulation approach based on system dynamics is introduced and divided into a microscopic and a macroscopic scale.

On the microscopic scale only small amounts of parts are simulated. The motion of each single discrete element is explicitly realized by means of a physically-based simulation. On the macroscopic scale a simulation of the material flow is realized. Therefore a two-dimensional hyperbolic partial differential equation will be discussed.

We explicitly examine the requirements on the virtual commissioning, which are a strongly time-deterministic computation in the range of one millisecond, robust and efficient computing algorithms and system-dynamic features. The simulation concept is validated against a real conveyor belt.