TECNOMATIX Plant Simulation

SIEMENS

Description of the Geilinger Warehouse Demo Model for Tecnomatix Plant Simulation

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CONTENT

1. Description

This model shows a distribution center in the consumer goods industry.

1.1 Objective

- Provide planning support to ensure the system reaches the required overall performance
- Optimizing and examining the functionality and performance of the complete model and the corresponding sub-models
- Before the start-up of the warehousing center all necessary operation facilities must be tested under stringent conditions.

1.2 System Characteristics

- large and complex model with many interfaces between the model sections and sub-models
- different types of transportation systems (automated guided vehicle system, conveyors, rack serving units)

1.3 Tasks

The entire distribution center was planned and built by GEILINGER, Winterthur, Switzerland. Its value amounts to 100,000,000 SFr. Simulation was performed parallel to the development and the design process. The simulation built during this process was further used in the set-up period and for training purposes. In addition, this Plant Simulation model is useful in daily operations to check the feasibility of changes regarding order load and product mix of the distribution center.

1.4 Results

Due to the optimization of the interactions of all sub-models one vehicle of the automated guided vehicle system could be saved by adding a short conveyor element in the receiving station.

2. Demo Instructions

This model demonstrates the following Plant Simulation features:

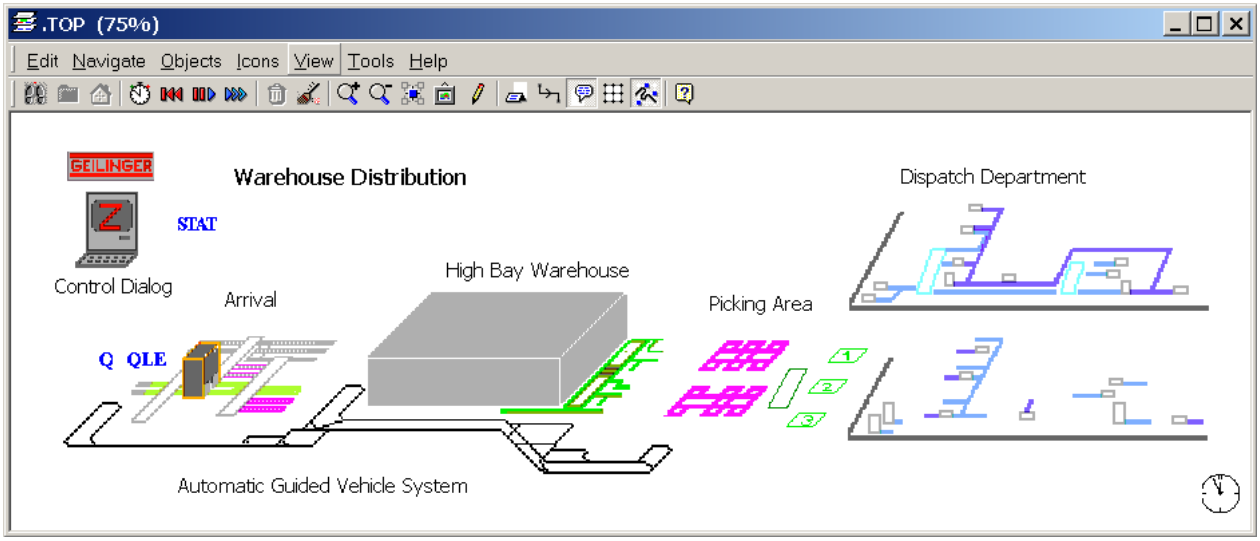

Figure 1: hierarchical Structure of the Distribution Center Model

- The ability to model a highly complex system in detail in Plant Simulation.
- Clear model structure and efficient model handling using hierarchies
- Modular model design: The ability to test modules separately and integrate the modules easily in the main model.

2.1 Study Overview

Start the simulation with the control window (double-click the “Control” object).

- “Min Quantity / h” is the minimum throughput the system should provide. The value is only used to compare the actual value to this value.
- “Number of AGVs” is the quantity of automated guided vehicles (AGVs).
- “AGV-Evaluation-Plotter” opens a plotter which shows the utilization of the AGVs
- Note, that you have to click on “Apply” and “Reset” before you start a simulation run when you changed the quantity of AGVs

Look at the different departments (open them by double-click).

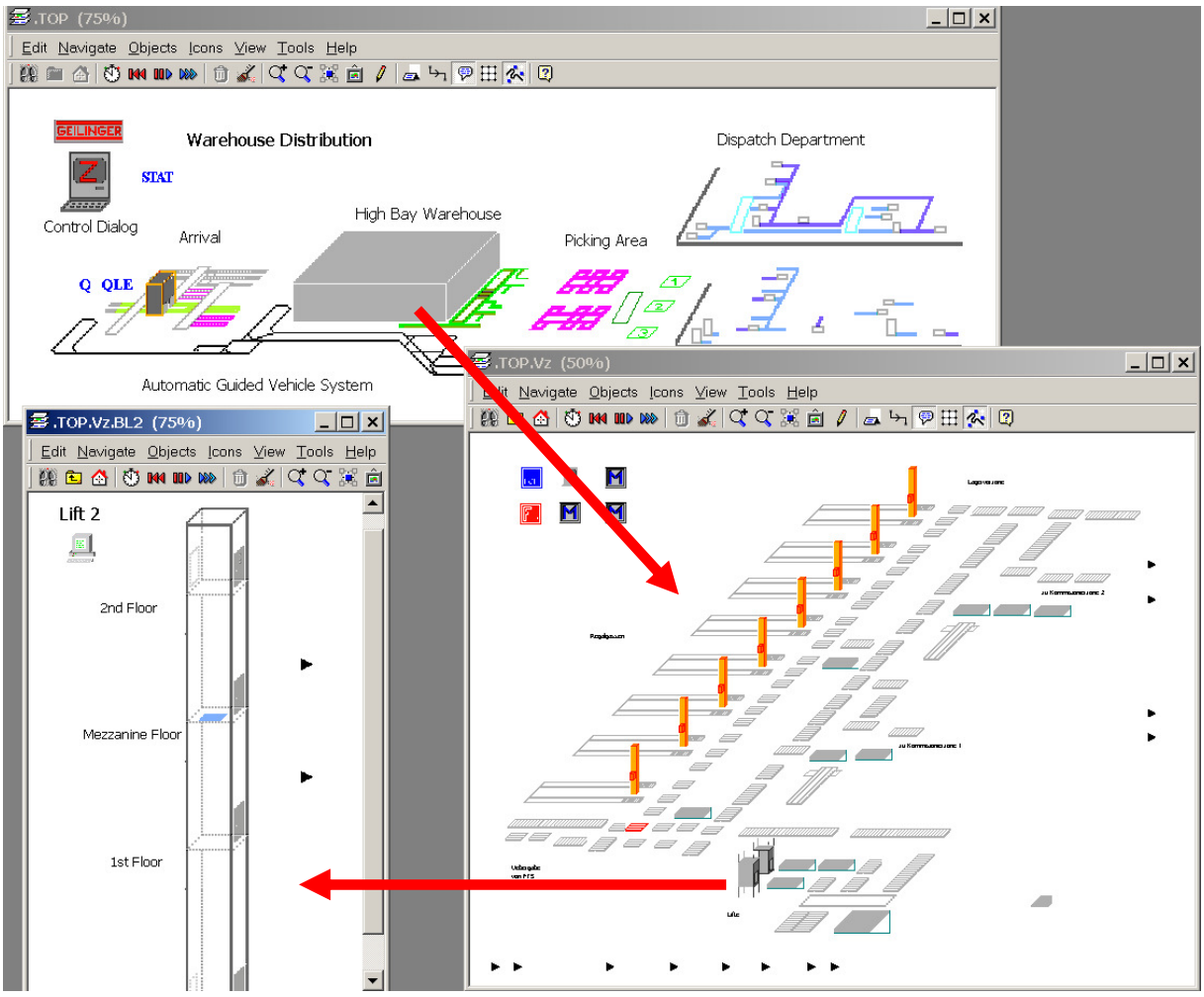

Figure 2: Detailed layout of the warehouse and the lift in the warehouse

Note, that complex processes can be modeled in Plant Simulation in a user-friendly manner giving a clear survey of the system structure.

2.2 The AGV System

Close the distribution center model. Open the separate model of the automated guided vehicle system (AGV model). The first planning approach of the vehicle system is optimized in this model. Open the plotter from the Control Dialog. In order to get a better and faster display deactivate MU Animation and Icon Animation in the Plant Simulation toolbar. The number of vehicles can be defined with the central control as well. Discover that the minimum throughput of 150 parts per hour is only possible if nine vehicles are in process. Vary the number of vehicles from 7 to 11. Note that for a value of less than 10, the total output is below the target value of 1500. For a value of less than 9, the AGVs get stuck because there are not enough AGVs available to unload the sorting buffers in the Arrival department.

Remember that you always press Reset and Apply (OK) in the Control Dialog before starting a simulation run with a different number of vehicles. Close the separate automated guided vehicle system (AGVs).

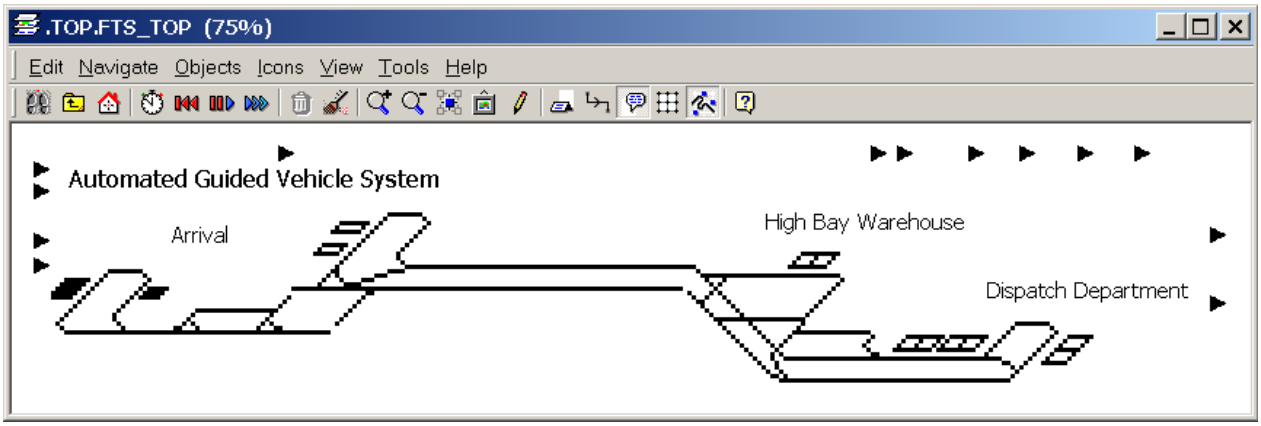

Figure 3 : AGV System

This example demonstrates clearly that the optimum result was only possible by considering the interrelations of the sub-models. The saving of one vehicle reduced the investment costs by EUR 140,000.

2.3 Statistics

Open the charts which are enclosed in the object STAT. The charts on the bottom of the right hand side depict the results of four experiments with a varying number of commission locations.

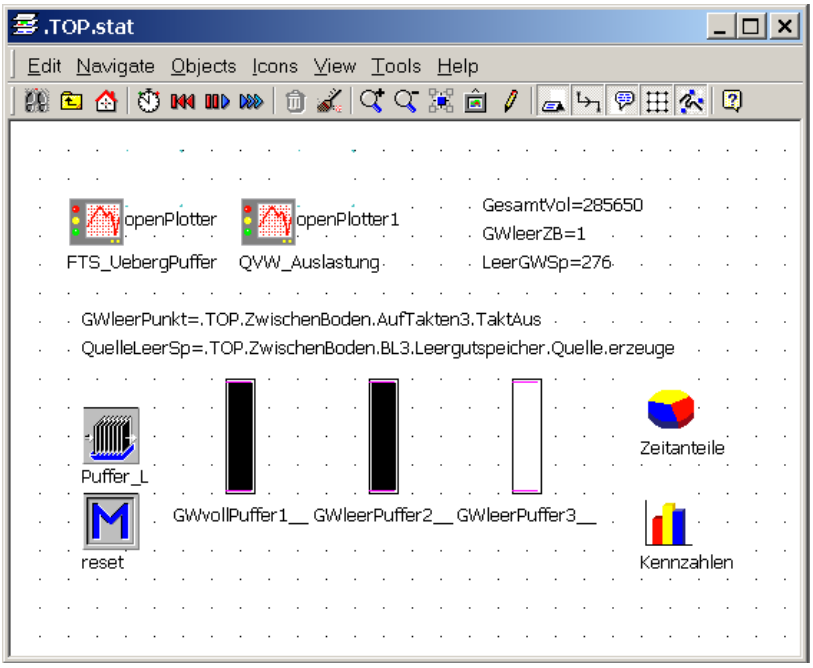

Figure 4: Stats Window

Open the two plotter windows on the top of the frame. The left plotter shows the occupation of the buffers to the high bay warehouse and to the dispatch department.

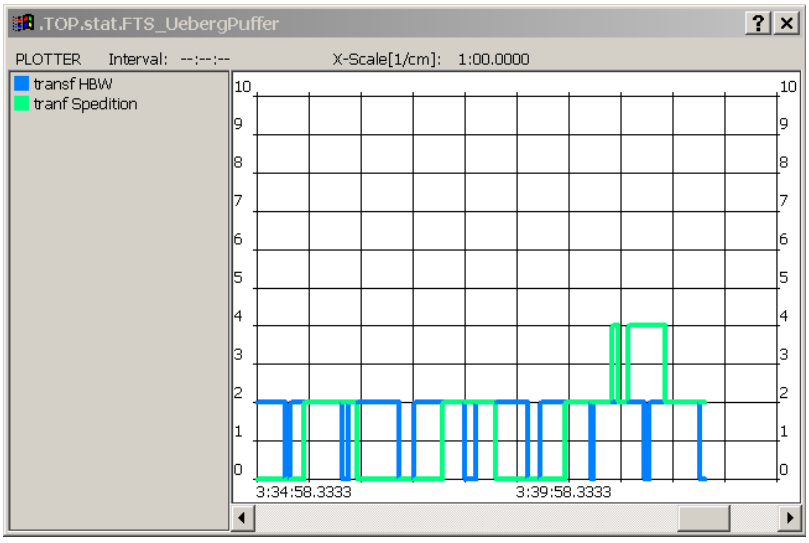

Figure 5: Buffer occupation

The right plotter shows the utilization of the cross transfer vehicles (“QVW” = “Querverschiebewagen” = cross transfer vehicle) in the arrival department.

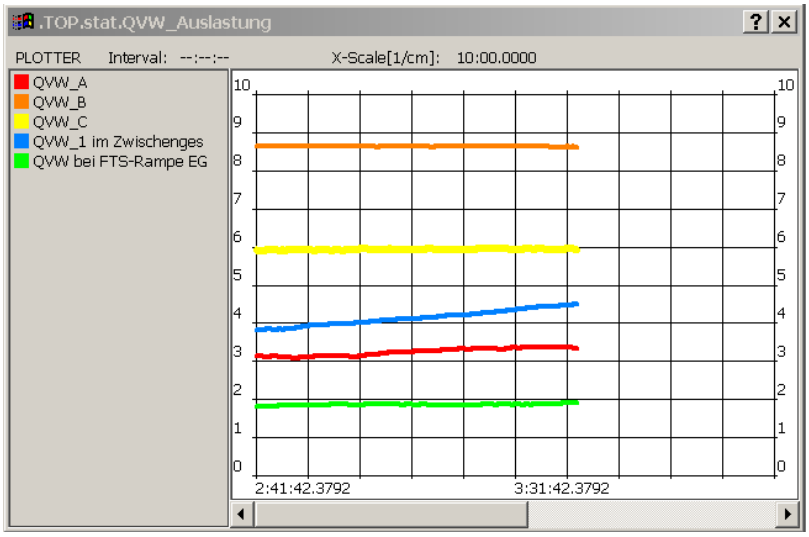

Figure 6: Cross transfer utilization