The Arena simulation tool delivers the technology required to support all aspects of a simulation project. Arena is a collection of modules providing general-purpose features for modeling all types of applications. In addition to the standard features, such as resources, queuing, process logic and system data, the Arena template includes modules focused on specific aspects of manufacturing and material-handling systems. At the heart of Arena is the SIMAN simulation language, which provides a powerful foundation for modeling complex systems and a fast simulation engine for efficient analysis.

**Background**

The Rockwell Automation Central European Distribution Centre, in Best, the Netherlands, is a joint operation between Rockwell Automation and Road Air. In a highly automated warehouse system, 4000 order lines per day are picked and distributed to different customers and affiliates throughout Europe, and to other locations across the globe.

Rockwell Automation is headquartered in Milwaukee, USA. The company currently employs around 23,000 people worldwide.

Road Air is a subsidiary of Transport Management International Holding, based in the Netherlands. The company currently employs approximately 1,700 people in the Benelux.

**Challenge**

The outbound process in the highly automated distribution centre can be divided in three main areas: the non-conveyable products, the fast moving products and the slow moving products. A shipment can include products from every area. To get all those products together on the same shipping chute, the Warehouse Management System has specific procedures per area. To use the system as efficient as possible and to meet the compliance the operational planner makes batches of orders with the same criteria. When the planner makes mistakes in the batching or in the release of batches, under load or overload could occur, totes could block the system and the utilization of the resources could be low.

To get familiar with the procedures and to make up an effective planning will take at least an intensive training of a few months. And even than mistakes can be made.

**Solution**

The business unit Manufacturing Business Solutions made up a custom application in narrow cooperation with the department Logistic Engineering. The order information is downloaded from current systems in a Microsoft® Access™ Database. In this database an algorithm performs the calculations and a sorting takes place based on country, due date, shipment date and number.

In the user interface the parameters can be set, such as opening hours of the warehouse, working hours and the percentage of order lines that have to go through the Quality Control.

In the user interface it is also possible to choose from different strategies, such as a batch make up based on time, or a make up based on a fixed number of pick lines per batch or on a fixed number of totes per batch.
The algorithm results in a suggested batch make up. In this batch make up the different kind of shipments (pallets or parcels) will be put together and sorted on priority and on sub criteria (pallet batches with pick to belt and pallet batches without pick to belt, with or without non conveyable products). The number of batches is based on the selected input parameters.

Simulation based sequence

The suggested batch make up will be transferred to the simulation tool. The planner can choose from different physical strategies.

In the simulation run all physical constraints of the system will be considered: for instance when the buffers before the picking stations at the mini load are full the next tote will be delayed. Or when the number of pallet shipments in the system is exceeding the allowed number, then parcel shipments could be sent into the system.

The simulation tool will sequence the different batches based on the physical constraints.

Reports

Several custom reports are available for planners and management, like Workforce utilization per area, Picks completed, Time in system, Conveyor and Zone utilization etc.

EASY IN USE

Every person without knowledge of the Material Handling System can plan with the simulation tool

With this Simulation tool Road Air can train new planners very fast, without a detailed knowledge of the installed Material Handling System.

Results

• The simulation tool batch make up covers 90 – 95 % of a planners make up.
• The use of the tool adds about 4 minutes extra time.

Benefits

• Possibility to make rapidly a new batch make up after the last order release
• The time to train the planners is reduced from six months to one week.
• Possibility to make What-if analysis.
• Possibility to use different strategies.
• Possibility to deal with multi carriers.
• Possibility to automate the planning in the future