Chapter 8
Warehousing and Procurement

You can use several objects for modeling storage and warehouse processes. The main building blocks are buffer and store. A number of tasks of material flow simulations deal with the simulation of buffer, warehousing and transport operations. Questions to be addressed, for example, include the dimensions of buffers or warehouses and the review of the planned transport capacity. The modeling of warehouse controls, combined with production control systems, is a major challenge for the simulation.

8.1 Buffer

Plant Simulation distinguishes between two types of buffers: PlaceBuffer and Buffer.

a) PlaceBuffer

The MUs pass the PlaceBuffer one after another in the "processing time." MUs cannot pass each other within the buffer. Only when the MU has reached the place with the highest number can it be passed on. When the last MU has been passed on, all other MUs can move forward one place. The processing time can be specified only in relation to the entire buffer (e.g. dwell time in the buffer is 20 minutes), not in relation to a single place (10 places per two minutes). The attribute Accumulating determines whether the exit of the buffer is blocked (e.g. the successor is occupied) and any following MUs move up (Accumulating = TRUE) or have to wait.

b) Buffer:

The buffer does not have a place-oriented structure. After the processing time is over, you can remove the MU again. You can determine a mode for unloading:

- Buffer type Queue: First in, first out
- Buffer type Stack: Last in, first out

From Version 10, you can represent the filling level of the buffer graphically below the block icon (tab Attributes). As an MU exits the buffer, the following blocks are served in turn (or special exit behavior). The most important settings are capacity (number of places in a buffer), processing time (total time, the dwell time of a piece in the buffer), recovery time and cycle time.
8.2 The Sorter

If you have to map queues controls, then the sorter can be helpful.

8.2.1 Basic Behavior

The sorter can receive a certain number of MUs and pass them on in a different order. The removal order of MUs, which the sorter contains, depends on definable priorities. The MU with the highest priority will be transferred first, regardless of when it entered.

E.g. the following selection criteria are offered:

- Duration of stay
- MU attribute
- Control

The content of the sorter is sorted, if either

- an MU enters the sorter or
- the content of the sorter is accessed.

When several MUs have the same value within a sort criterion, then the order of these MUs remains undefined. You can use the sorter for simulating queue logics.

8.2.2 Attributes of the Sorter

A number of rules (e.g. shop floor management) exist for controlling queues. An important criterion is, for example, the throughput time of an order (from entry to the production and, finally, to delivery to the customer). Special orders from major customers are often preferred in order to deliver quicker. The throughput time of the remaining orders thus increases. Another rule is that the order with the least setup cost will be fulfilled first. The simplest queue management follows the first come, first served principle (or first in, first out).

Fig. 8.1 shows the main attributes of the sorter.

![Fig. 8.1 Sorter Attributes](image-url)