

# Systems Modelling and Simulation (Lab session 5)



After this session you should understand

1. The concepts of stations and routes
2. How to further enhance your animation
3. How to find and fix errors

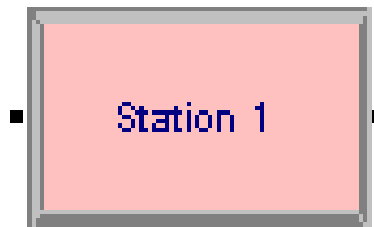


# Entity transfers

- Methods of entity transfer in Arena
  - **Connectors**
  - **Station and Route modules**
  - **Resource constrained transfer**
  - **Transporters**
  - **Conveyors**

# Stations

- Stations in Arena correspond to physical or logical locations in a system where processing occurs.
- Stations can be starting points or destinations in an entity's transfer.
- The station module is found in the Advanced Transfer panel in Arena.



# Routes

- The Route module transfers an entity to a specified station, or the next station in the station visitation sequence defined for the entity.
- The route module is also found in the Advanced Transfer panel in Arena





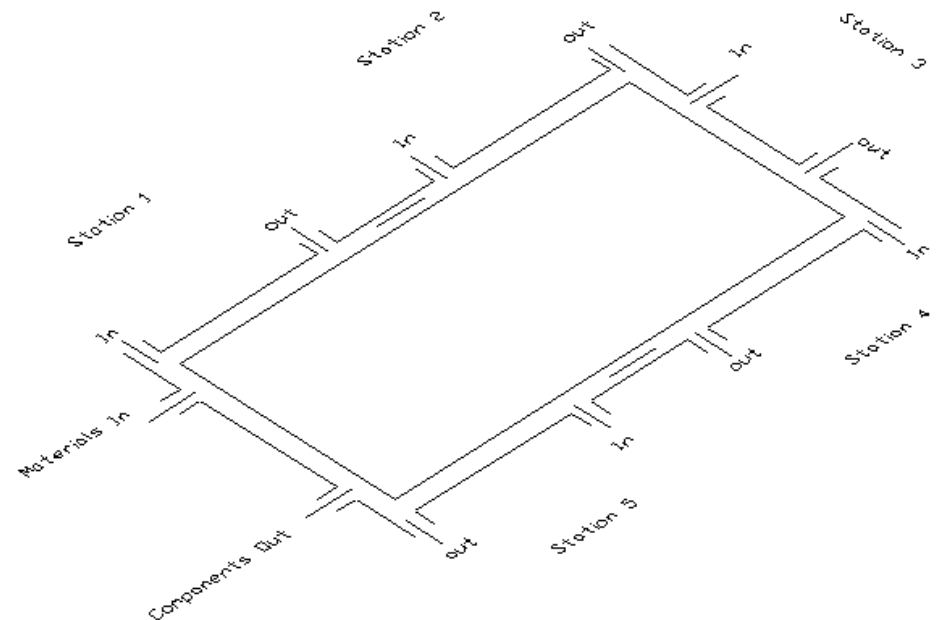
# Using station concept in model 8-4

## Derived stations

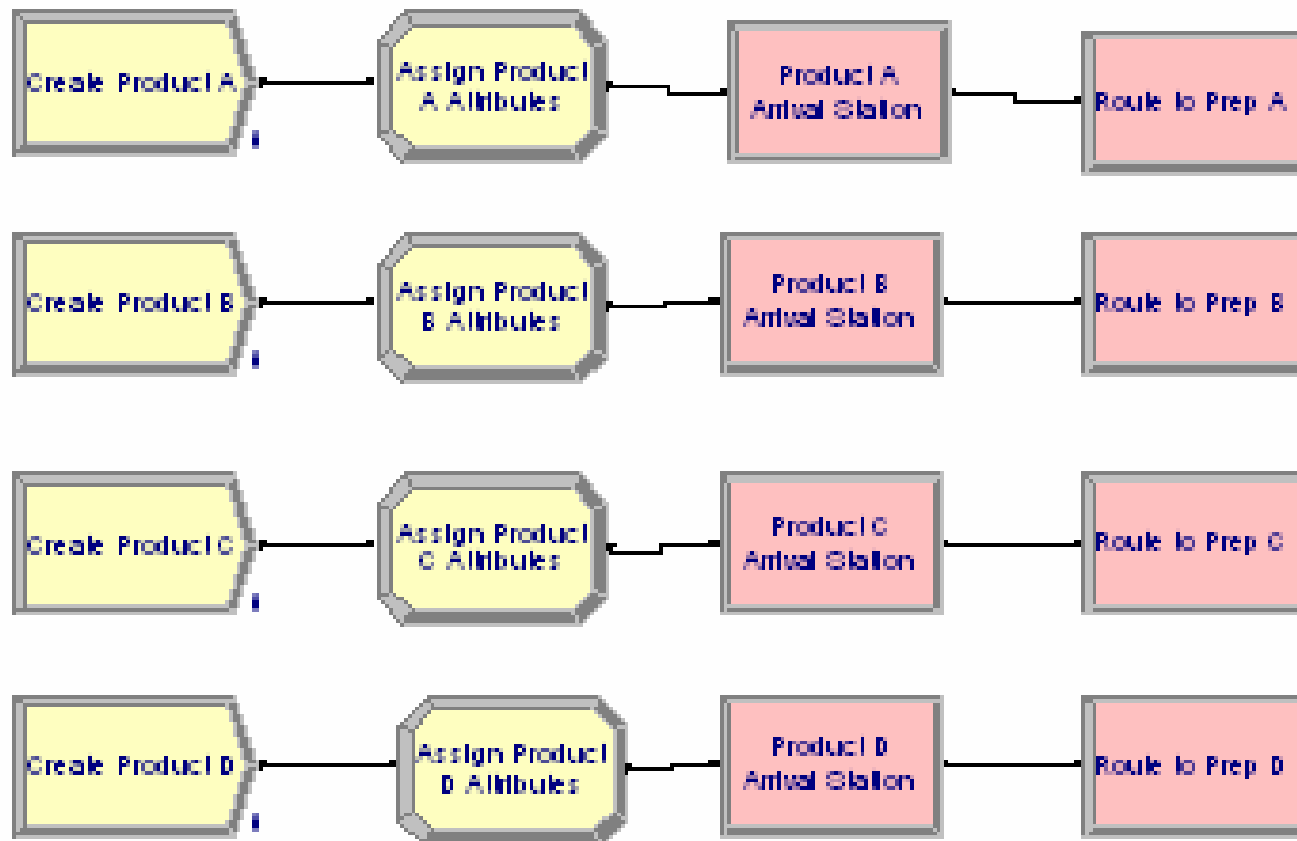
- Product A arrival station
- Product B arrival station
- Product C arrival station
- Product D arrival station
- Prep A station
- Prep B station
- Prep C station
- Prep D station
- Inspection station
- Refurbishment station
- Dismantling station
- market station
- Remanufacturing station
- Recycling station

# Stations and sequences

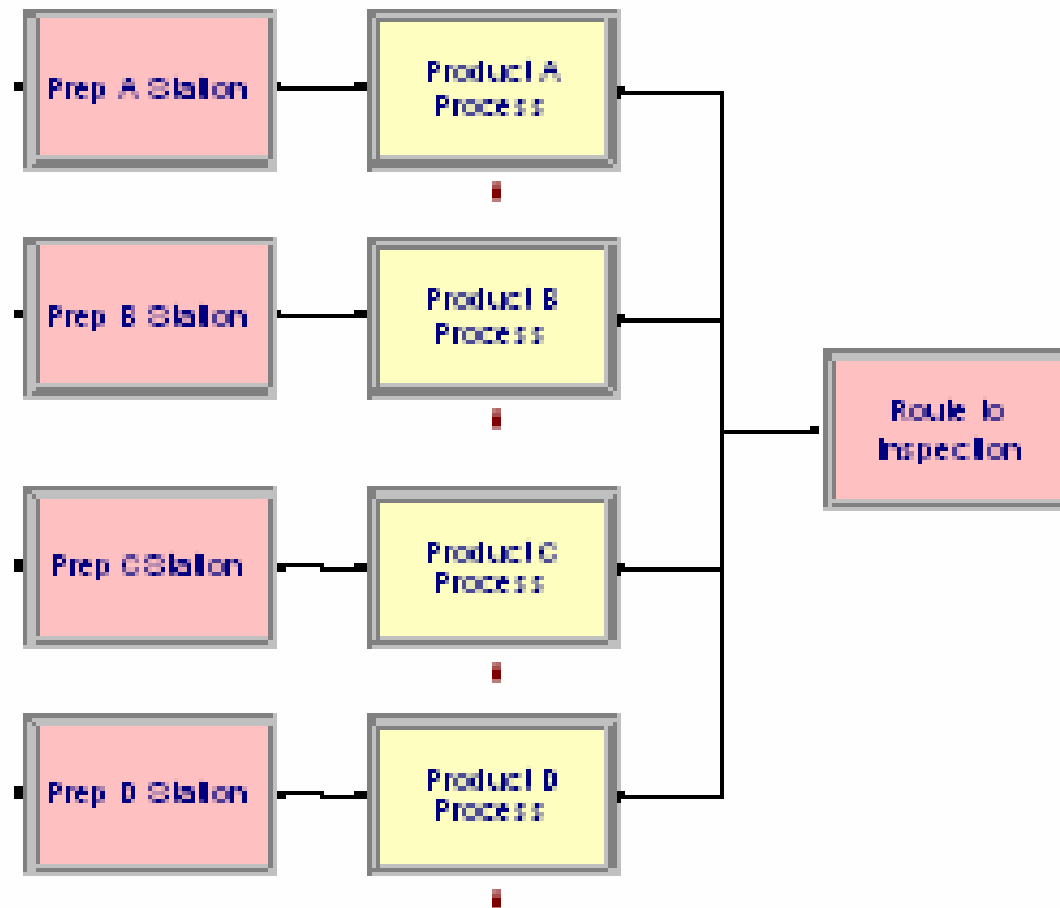
- A sequence consists of an ordered list of stations that an entity will visit.
- Example
  - **Cell 1-Cell 2-Cell 5-Cell 3-Cell 4-Exit**



# Arrival stations

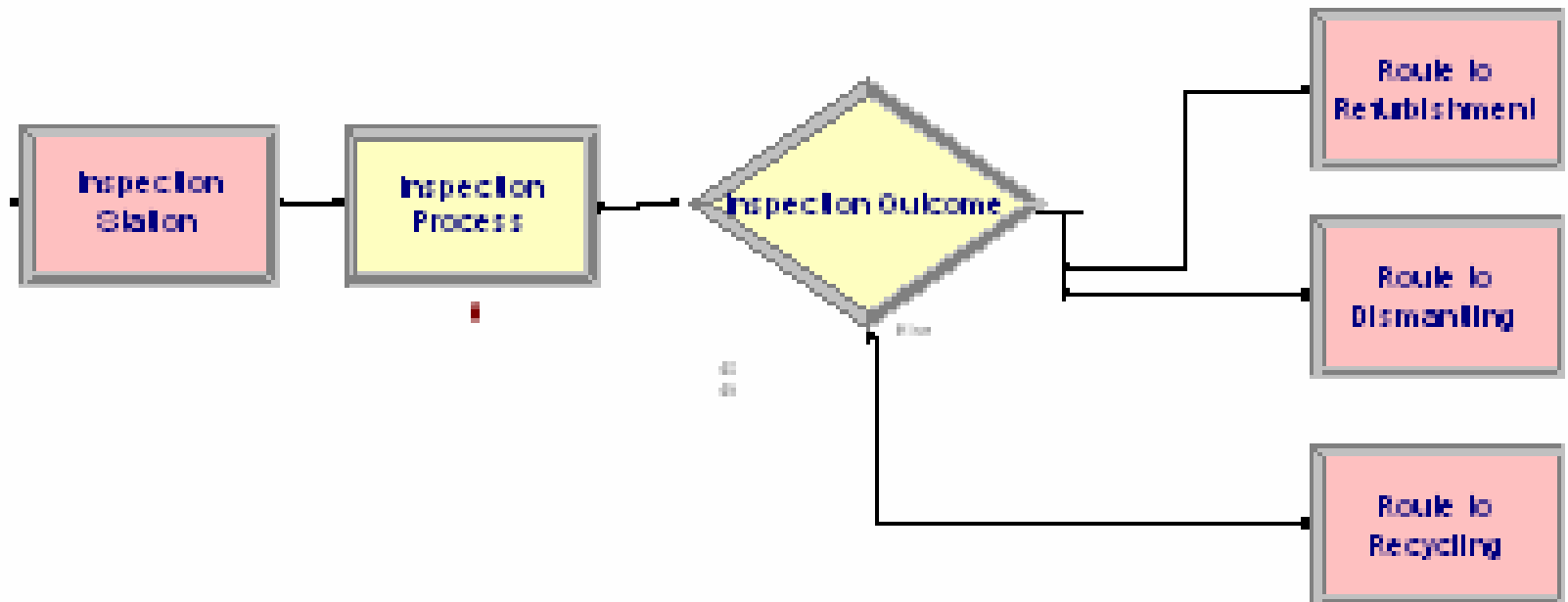


# Prep stations

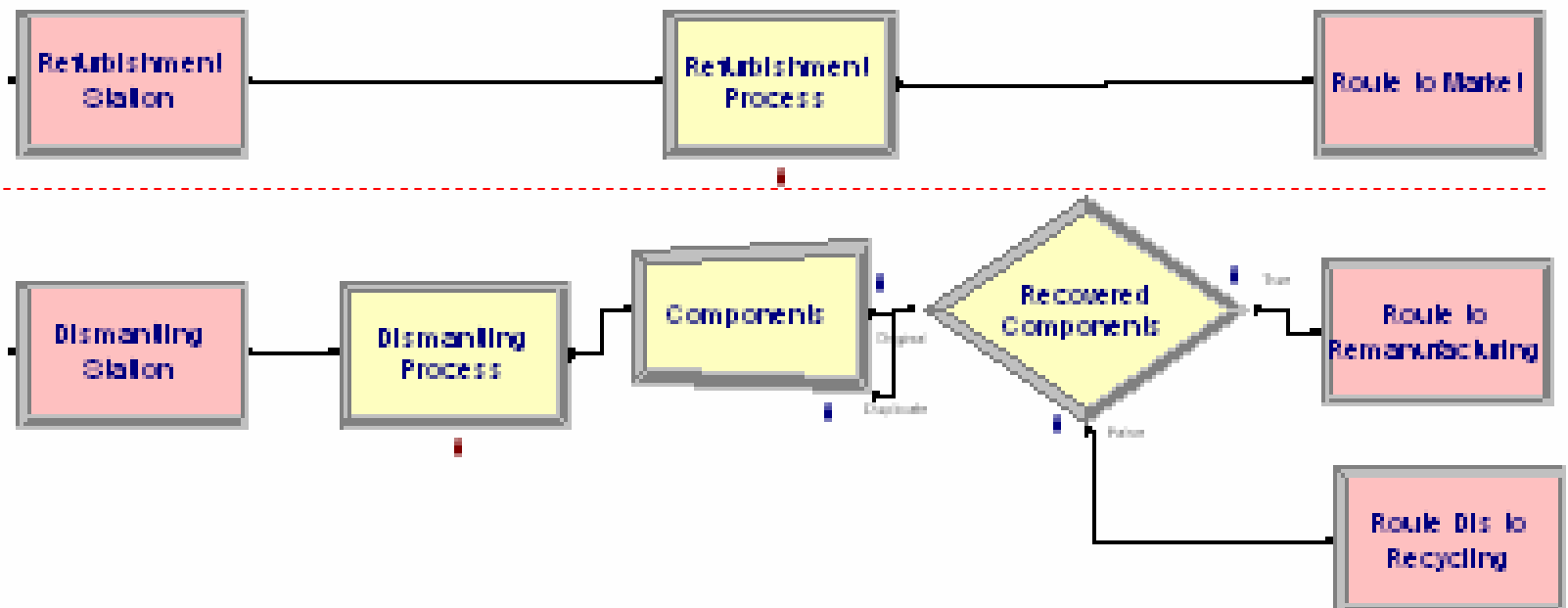




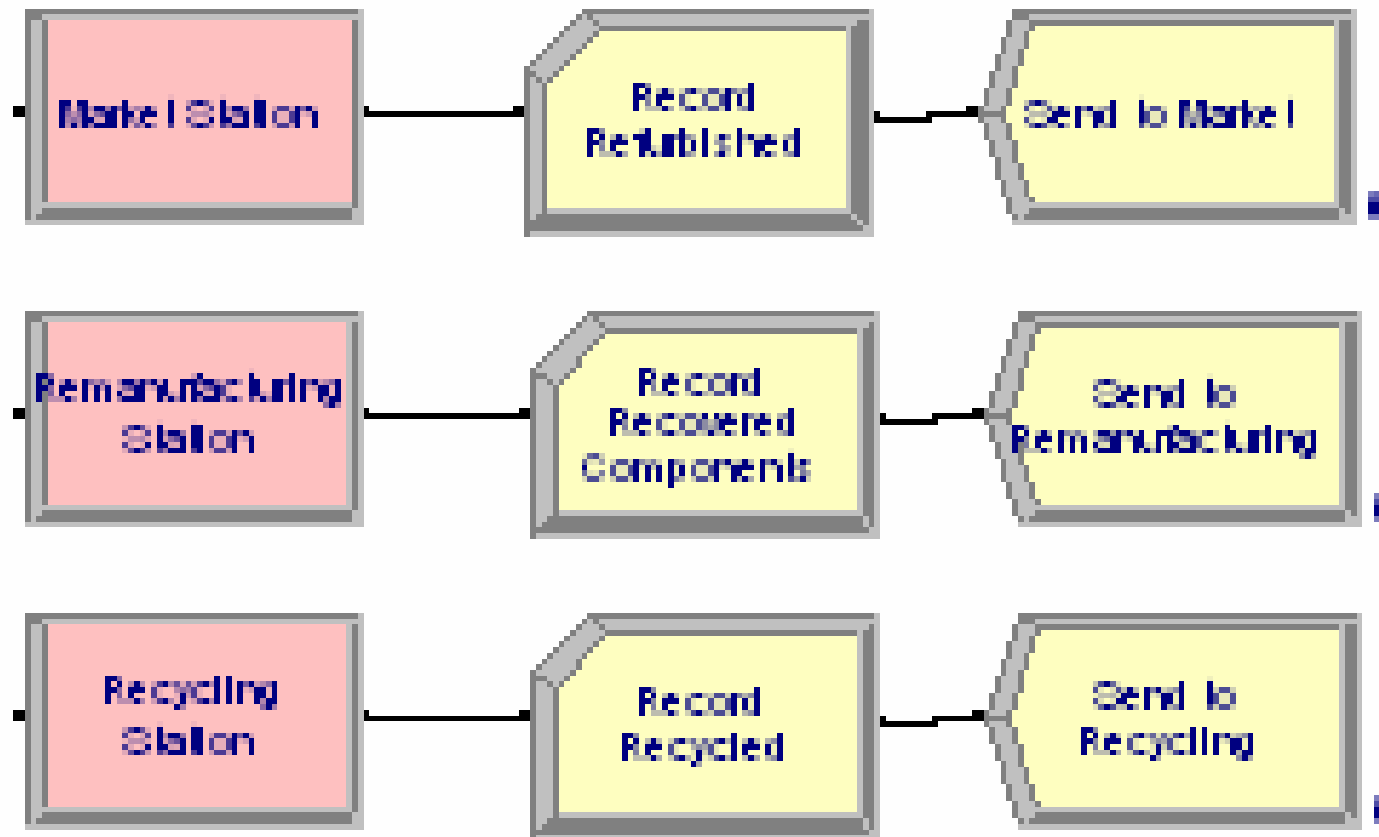
# Inspection station



# Refurbishment and dismantling stations



# Marketing, remanufacturing & recycling

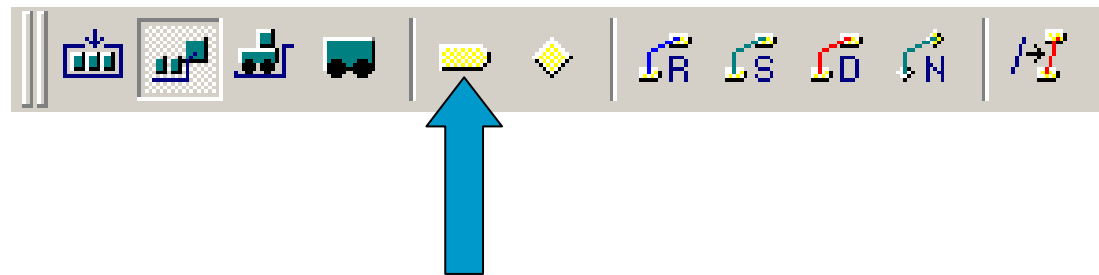


# Animating stations

- Stations are animated by clicking on the station icon



on the animate transfer toolbar



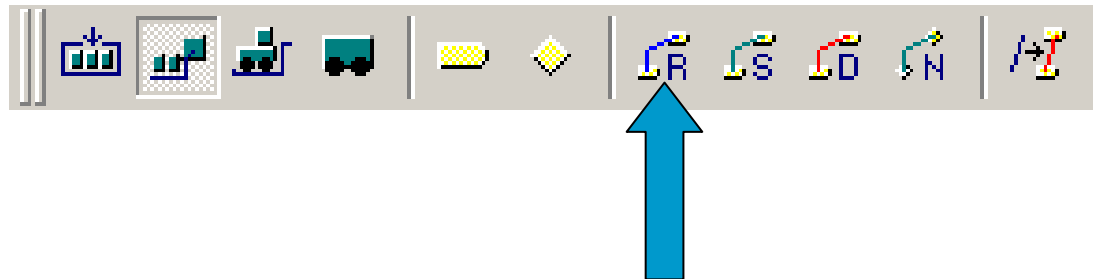
- Try it in Arena

# Animating routes

- Routes are animated by clicking on the station icon



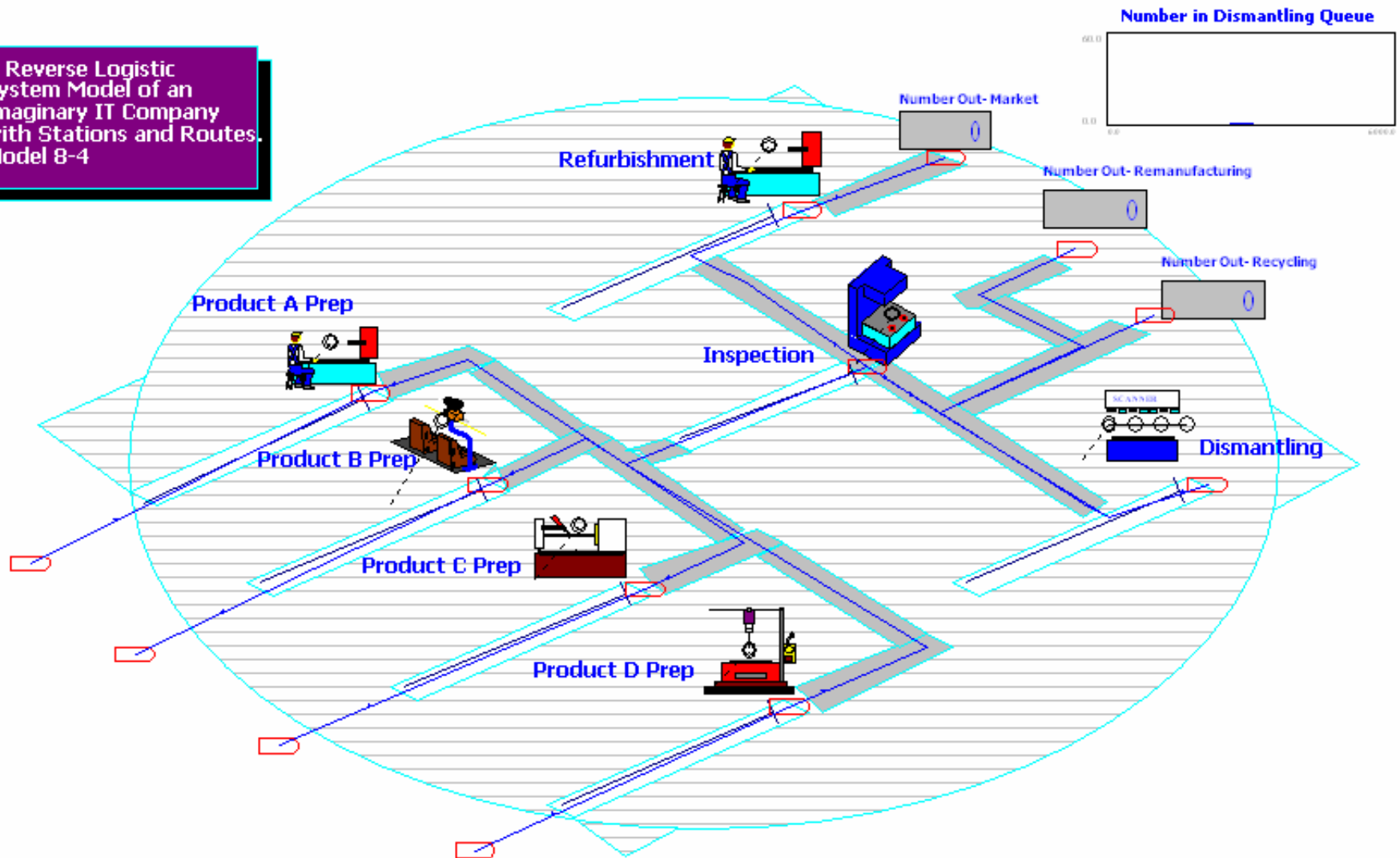
also on the animate transfer toolbar



- Try it in Arena

# Animation of model 8-3 with stations and routes

A Reverse Logistic System Model of an Imaginary IT Company with Stations and Routes. Model 8-4





# Finding and fixing errors in Arena

- Most common types of errors are;
  - **Arena trial version error**
  - **Undefined variables, attributes, resources**
  - **Unconnected modules**
  - **Duplicate use of module names**
  - **Misspelling of names**
  - **Etc.**
- Test errors;
  - **Remove connector between Product A Arrival and Assign module**
  - **Change Arrival time attribute from TNOW to TNO**



# Methods of tracing errors (1)

- Animations help to check model accuracy and logic errors
- Highlight Active module option
  - *Run- Run Control- Highlight Active module- (menu options).*
- Stepping through the model
  - *Run – Step (or F10 key)- (menu options).*
- Hiding layers during model run
  - *View – Layers - (menu options).*
- Stop simulation on a specific module
  - *Run – Run Control – Break on Module - (menu options).*





# Methods of tracing errors (2)

- The Debug bar (right-click on tool bar to select)
  - **Breakpoints window**
    - *Displays all breakpoints entered in the model*
  - **Calendar window**
    - *The Calendar window allows you to view all future events scheduled on Arena's SIMAN event calendar for the running simulation.*
  - **Active entity window**
    - *The Active Entity window displays the number and attribute values of the active entity (if there is one) in a tree-view organization.*
  - **Watch windows**
    - *Three identical Watch windows allow you to monitor the values of any expression in the simulation.*



# Methods of tracing errors (3)

- Run time element bar
  - *View – Runtime Element Bar - (menu options).*
- Run controller
  - *Run – Run Control – Command - (menu options).*
- Report panel
  - *Project bar*