Electronic Assembly and Test System with Part Transfers

1) Open INDE 504 website and download arena Lab 5.doe

Lab 5 _ Animation

Diagram showing a process flow with steps such as Part A arrives, Part A prep, Assign A seal time and arrival time, Part A prep, Assign A seal time, Part B arrives, Part B prep, Assign B seal time and arrival time, Prep A, Prep B, Sealer, and Rework Queue Process.
Electronic Assembly and Test System with Part Transfers

• Get generic default animation for some things
  1. queues
  2. connector-animation movement

Usually sufficient for verification, validation

• We might want the animation to look more like the real system before allowing the decision makers to view the model
Enhancing Animation

• Pull animation away from logic in model window
  ▪ Useful for big models, complex animation
  ▪ Named Views for model logic, animation, or close-ups

Select the View → View → Named views

When typing a the selected view will appears
Changing Animation Queues

- Lengthen (click, drag, maybe hold shift) to “hold” more entities
  - Simulation logic, results OK if animated queue overflows
- Rotate to re-orient for realism
- Change “form” of queue from *Line* (default) to *Point* — fixed places for entities
  - Double-click on queue
  - Select Type to be Point
  - Click Points… button
  - Successively click Add for points, then OK
  - Drag them around on screen
  - *Check* Rotate box to show entities turning
Changing Animation Queues

Change “form” of queue from *Line* (default) to *Point* — fixed places for entities:

1) Double-click on queue
2) Select Type to be Point
3) Click Points… button (40 points)

Successively click Add for point (40 points), then OK

Drag them around on screen

*Check* Rotate box to show entities turning

Rework Queue Process
Changing Entity Pictures

• Earlier – used Entity data module to assign different Initial Pictures to different Entity Types

• Can customize list, alter pictures in it
  - Edit > Entity Pictures
  - Left column – names, pictures currently on list
  - Right column – picture libraries (.plb filename extension)
  - Add a hand-drawn picture – Add button on left, name it in Value field at top, double-click on blank depressed button, then artwork (or paste in a copied graphics image)
    - New name won’t appear in Entity data module until you type it there
  - Edit an existing picture – double-click, artwork
  - Copy a picture over from picture library
Enhancing Animation

- Cut and paste the queues and resources, and then arrange in the following way.
More on Drawing

• Draw via toolbar buttons only (no menus):

  • Line, Polyline (Shift for $45^\circ$), Arc, Bézier Curve
  • Box, Polygon, Ellipse (fill, line, shade)
  • Text (font, size, style)
  • Colors for Lines, Fill, Text, Window Background
  • Line Width, Style, Arrow Style, Pattern
  • Show Dimensions – shows sizes, lengths for precise drawing
  • Best way to learn: play around on scratch model
1) Choose black colors for lines and for fill

2) Choose this pattern for drawing the wall

3) Draw rectangles to represent the map of the working area
Adding Pictures and Drawings

- Edit → Insert new object → paintbrush picture

You can insert pictures from paint. Useful if you want to simulate over a floor plan!
Adding Variables

To show a value of something as a number, watch it change

- Variable object from Animate toolbar
- Double-click, specify Expression to be shown (Expression Builder), and cosmetics
Adding Pictures and Variables
Electronic Assembly and Test System with Part Transfers

- Assume All part transfers now take 2 minutes
  - Materially changes model logic, results
  - Two-minute transfer times for:
    - Arriving parts to prep areas
    - Departing parts to appropriate exit
    - All internal part transfers
  - Transfers take two minutes regardless of distance
New Arena Construcst

- **Station** – location where some process occurs
  - Arrivals, manufacturing cells, departures
  - Each Station given a unique name
  - Can serve as an entry point for a section of model logic

- **Station Transfer** – entities move between Stations without direct connection
  - Several different types – we’ll use *Routes* here, which allow for positive transfer time, but no other delays like “room” on transitway or transporters
Adding Route Logic – From Arrival

- Stations and Station Transfers affect both model logic and animation
- For incoming parts (A and B) delete connection from Assign modules to “Prep” Process modules
  - Replace with Station/Route module pairs
    - Station module (Advanced Transfer panel) – define entity’s location Module Name vs. Station Name
    - Route module (Advanced Transfer panel) – send entity out Route Time, Destination Station
  - No direct connections exiting from Route modules – Route module’s Destination Station Name defines that
Adding Remaining Route Logic

- Add Station modules for entry to each Prep area
  - Station names are Prep A Station, Prep B Station, and are destination stations for Routes after arrivals
- Process modules for Prep A, Prep B unchanged
- After prep, entities connected to Route module to send to next station (sealer)
  - Don’t need a separate Station module for outgoing side
- Similar changes for rest of model
  - Station modules for incoming parts into sealer, rework, each of three Record modules (entity exit points)
  - Route modules for outgoing parts out of sealer inspection, rework inspection (two for each Decide module – pass/fail)
- Could run model now, get correct results … but no animation of transfers …
Each route has a start and a destination
Animation

- Animate via animate transfer toolbar

- Route paths represent Routes in flowchart/animation
- Station marker represents a logical station in flowchart/animation
Altering Animation – Stations

- Add animation for Stations and Routes
- Station button 🔄, Animate Transfer toolbar
  - Attach Identifier to it from pull-down list of station names
  - Get cross hairs, place (click) marker in animation
  - Can place several station markers for same logical station (e.g., to represent incoming, outgoing sides)
  - Can drag station markers around later
Altering Animation – Routes

• Route button 🌌 from Animate Transfer toolbar
  ▪ Options for appearance of entities as they travel route
  ▪ Get cross hairs; click in origin, destination Station Markers
    – Intermediate clicks for corners along route
  ▪ Can drag around endpoints, corners later
  ▪ Alternatively, use Route animation to create both Station markers and Route animation
    – Click for beginning Station marker
    – Intermediate clicks for route corners
    – Double-click for ending Station marker
    – Then go back and double-click on the two Station markers to define their logical Identifiers
Part A take this path to reach the preparation process.