

A Guided Tour Through Arena

Chapter 3

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What We'll Do ...

- **Start Arena**
- **Load, explore, run an existing model**
 - Basically the same model as for the hand simulation in Chapter 2
 - Browse dialogs and menus
 - Run the model
 - Look at results
- **Construct the same model from scratch**
- **Tour menus, toolbars, drawing, printing**
- **Help system**
- **Options for running and control**

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Behavior of Arena

- **Arena is a true Windows application**
 - Appearance, operation, functions, are standard
 - Interoperability with other software (MS Office, CAD)
 - Interact, communicate with other software (Chapter 10)
- **Assume you already know basics of Windows:**
 - Disks, files, folders, paths
 - Mousing, keyboarding
 - Resizing, moving, maximizing, minimizing windows
 - Menu operations
 - Ctrl, Alt, Shift keys
 - Cut, copy, paste
 - Filling out dialog fields


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Starting Up

- **Installing Arena – Appendix E**
- **Locate icon or shortcut; double-click**
 - Or, *Start > Programs > Rockwell Software > Arena 7.0 > Arena 7.01*
 - Licensed vs. Academic, Evaluation mode
- **See File, View, Tools, Help menus**
 - Other menus present if a model file is open
- **Toolbars with buttons**
 - Unless a model file is open, only New model file, Open model file, Template Attach/Detach, Context Help (click it, then click on buttons or menu items)
- **Tooltips – roll over toolbar buttons for names**
- **Quitting Arena: File > Exit or Alt+F4 or top right X button**

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Opening an Existing Model

- **File > Open ... or  button**
 - Navigate to desired disk/directory
 - Click > Open or double-click `Model 03-01.doe`
 - Book models: Rockwell Software\Arena 7.0\Book Examples
 - More examples: Rockwell Software\Arena 7.0\Examples
- **Model window (usually on right side of Arena window)**
 - Where model is built
 - Resize, maximize, minimize, scroll/pan, zoom
 - Can have multiple model windows open at once
- **Cut, Copy, Paste within Arena, and between Arena and other applications (when sensible)**

Why the .doe default extension to Arena model filenames?



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Flowchart and Spreadsheet Views

- **Model window split into two views**
 - **Flowchart view**
 - Graphics
 - Process flowchart
 - Animation, drawing
 - Edit things by double-clicking on them, get into a dialog
 - **Spreadsheet view**
 - Displays model data directly
 - Can edit, add, delete data in spreadsheet view
 - Displays all similar kinds of modeling elements at once
 - Many model parameters can be edited in either view
 - Horizontal splitter bar to apportion the two views
 - **View > Split Screen** (or push ) to see both flowchart and spreadsheet views (otherwise, get just flowchart view)

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Project Bar

- Usually down the left edge of Arena window
- Hosts panels with modeling building blocks: **modules**
 - Both flowchart and spreadsheet modules
- Displays one panel at a time
 - Switch to different panels via horizontal buttons
 - Panels for Basic Process, Reports (after running), Navigate (to different views within a model or to different hierarchical submodels), ... others can be attached (Template Attach button ) for different modeling levels, specialties
- Usually docked to left edge but can move, float
- Hide it via **View > Project Bar** or its own small 






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Status Bar

- At very bottom of Arena window
- Displays various information sensitive to status
 - Coordinates of cursor in "worldspace"
 - Simulation clock value, replication number being executed, number of replications to be done, when simulation is running
- Hide by clearing (unchecking) **View > Status Bar**

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Moving Around, Up, Down in Flowchart View of Model Window

- Underlying **world space** for model
 - (x, y) coordinates, arbitrary units (thousands in each direction)
- Pan with scroll bars, arrow keys
- Zoom in (down):  or + key
- Zoom out (up):  or - key
- See all at min altitude:  or * key
- **Named views**
 - Save a pan/zoom view for different parts of model
 - Assign a **Hot key** (case-sensitive)
 - Access via **View > Named Views ...** or ? key
- Display **grid** (), **snap to grid** () toggles

To navigate via keyboard, the model window must be active ... click in it.

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Modules

- **Basic building blocks of a simulation model**
- **Two basic types: *flowchart* and *data***
- **Different types of modules for different actions, specifications**
- **“Blank” modules are on the Project Bar**
 - To add a flowchart module to your model, drag it from the Project Bar into the flowchart view of the model window
 - Can have many instances of the same kind of flowchart module in your model
 - To use a data module, select it (single-click) in the Project Bar and edit in the spreadsheet view of the model window
 - Only one instance of each kind of data module in your model, but it can have many entries (rows) in the spreadsheet view
 - Can edit via dialog – double-click on number in leftmost column

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Flowchart Modules

- **Describe dynamic processes**
 - Nodes/places through which entities flow
 - Typically connected to each other in some way
- **Basic Process panel flowchart module types:**
 - Create, Dispose, Process, Decide, Batch, Separate, Assign, Record
- **Other panels – many other kinds**
- **Shape like flowcharting (also use colors for hints)**
- **Two ways to edit**
 - Double-click to open up, then fill out dialogs
 - Select (single-click) a module type in model or Project Bar, get all modules of that type in the spreadsheet view

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Data Modules

- **Set values, conditions, etc. for whole model**
 - No entity flow, no connections
- **Basic Process panel data module types:**
 - Entity, Queue, Resource, Variable, Schedule, Set
- **Other panels – many other kinds**
- **Icons in Project Bar look like little spreadsheets**
- **To use a data module, select it (single-click) in the Project Bar, edit in spreadsheet view**
 - Can edit via dialog – double-click in leftmost column
 - Double-click where indicated to add new row
 - Right-click on row, column to do different things
- **Only one instance of each kind of data module in a model**
 - But each one can have many entries (rows)

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Relations Among Modules

- **Flowchart and data modules are related via names for objects**
 - Queues, Resources, Entity types, Variables ... others
- **Arena keeps internal lists of different kinds of names**
 - Presents existing lists to you where appropriate
 - Helps you remember names, protects you from typos
- **All names you make up in a model must be unique across the model, even across different types of modules**

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Internal Model Documentation

- **Data Tips on modules, graphics – hover mouse over object to see**
 - Default part – generic info on object (name, type)
 - User-defined part – right-click on object, select Properties, enter text under Property Description
 - Toggle display of Data tips via *View > Data Tips*
- **Project Description – Run > Setup > Project Parameters, enter text under Project Description**
- **Model Documentation Report – Tools > Model Documentation Report**
 - Generates HTML file with model details (can choose which kinds of details to include)

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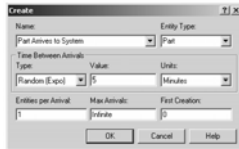
Browsing Through Model 3-1

- **Open Model 03-01.mod (in Book Examples folder)**
- **Three flowchart modules (Create, Process, Dispose)**
- **Entries in three data modules (Entity, Queue, Resource)**
- **Animation objects**
 - Resource animation
 - Two plots
 - Some (passive) labels, artwork

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The Create Flowchart Module

- “Birth” node for entities
- Gave this instance of the Create-type module the Name **Part Arrives to System**
 - If we had other Create modules (we don't) they'd all have different Names
- Double-click on module to open property dialog:



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The Create Flowchart Module (cont'd.)

- Name – for module (type it in, overriding default)
- Entity Type – enter a descriptive name
 - Can have multiple Entity Types with distinct names
- Time Between Arrivals area
 - Specify nature of the time separating consecutive arrivals
 - Type – pull-down list with several options
 - Value – depends on Type ... for Random (Expo) is mean
 - Units – time units for Value
- Entities per Arrival – constant, random variable, very general “Expression” (more later ...)
- Max Arrivals – choke off arrivals (from this source) after this many entities
- First Creation – time of first arrival (need not be 0)

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Editing Flowchart Modules in the Spreadsheet View

- Alternative to dialog for each instance of a module type
- See all instances of a module type at once
 - Convenient for seeing, editing lots of things at once
- Selecting a module in either flowchart or spreadsheet view also selects it in the other view
- Click, double-click fields to view, edit
- Right-click in row to Edit via Dialog, define a user Data Tip (via Properties)
- Right-click in expression fields to get Expression Builder for help in constructing complex expressions with Arena variables (more later ...)

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The *Entity* Data Module

- A data module, so edit in spreadsheet view only
- View, edit aspects of different Types of entities in your model (we have just one Type, Part)
- Pull-down lists activated as you select fields
- Our only edit – Initial Picture for animation
 - We picked `Picture.Blue Ball` from the default list

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The *Process* Flowchart Module

- Represents the machine, including the resource, queue, and entity delay time (processing)
- Enter Name – Drilling Center
- Type – picked `Standard` to define logic here rather than in a submodel (more later ...)
- Report Statistics check box at bottom
 - To get utilizations, queue lengths, queue waiting times, etc.

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The *Process* Flowchart Module (cont'd.)

- Logic area – what happens to entities here
 - Action
 - *Seize Delay Release* – entity Seizes some number of units of a Resource (maybe after a wait in queue), Delay itself there for the processing time, then Release the units of the Resource it had Seized – we chose this option
 - Could just *Delay* entity (red traffic light) – no Resources or queueing
 - Could also *Seize Delay* (no Release ... Release downstream)
 - Could also *Delay Release* (if Resource had been Seized upstream)
 - Priority for seizing – lower numbers mean higher priority
 - Different Action choices could allow stringing together several Process modules for modeling flexibility
 - Resources – define Resource(s) to be seized, released
 - Double-click on row to open subdialog
 - Define Resource Name, Quantity of units to be Seized/Released here
 - Several Resources present (Add) – entities must first Seize all

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The *Process Flowchart Module* (cont'd.)

- **Delay Type** – choice of probability distributions, constant or general Expression (more later ...)
- **Units** – time units for the delay (*don't ignore*)
- **Allocation** – how to “charge” delay in costing (more later ...)
- **Prompts on next line** – change depending on choice of Delay Type – specify numerical parameters involved
- **Can also edit in spreadsheet view**
 - Subdialogs (e.g., Resource here) become secondary spreadsheets that pop up, must be closed



The *Resource Data Module*

- **Defining the Drilling Center Resource in the Process module automatically creates an entry (row) for it in the Resource data module**
- **Can edit it here for more options**
 - **Type** – could vary capacity via a Schedule instead of having a fixed Capacity
 - Would define the Schedule via Schedule data module ... more later
 - **Failures** – could cause resource to fail according to some pattern
 - Define this pattern via Failure data module (Advanced Process panel) ... more later

The *Queue Data Module*

- **Specify aspects of the queues in the model**
 - We only have one, named `Drilling Center.Queue` (the default name given the Process name)
- **Type** – specifies *queue discipline* or ranking rule
 - If Lowest or Highest Attribute Value, then another field appears where you specify which attribute
- **Shared** – it this queue will be shared among several resources (more later ...)
- **Report Statistics** – check to get automatic collection and reporting of queue length, time in queue

Animating Resources and Queues

- **Got queue animation** ————— | **automatically by specifying a Seize in the Process module**
 - Entity pictures (blue balls) will line up here in animation
- **Don't get Resource animation automatically**
 - To add it, use Resource button  in Animate toolbar ... get Resource Picture Placement dialog
 - Identifier – link to Resource name in pull-down list
 - Specify different pictures for Idle, Busy state
 - For pre-defined artwork, Open a picture library (.plb filename extension)
Scroll up/down on right, select (single-click) a picture on right, select Idle or Busy state on left, then  to copy the picture
 - To edit later, double-click on picture in flowchart view

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The *Dispose* Flowchart Module




- **Represents entities leaving model boundaries**
- **Name the module**
- **Decide on Record Entity Statistics (average and maximum time in system of entities exiting here, costing information)**

Check boxes for statistics collection and reporting:

- Most are checked (turned on) by default
- Little or no modeling effort to say yes to these
- However, in some models this can slow execution markedly
- Moral – if you have speed problems, clear these if you don't care about them


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Connecting Flowchart Modules

- **Establishes the (fixed) sequence of flowchart modules through which entities will flow**
- **To make a connection**
 - Click Connect button  (or *Object > Connect*)
 - Cursor changes to cross hairs
 - Click on exit point  from source module, then entry point  on destination module
 - Make intermediate clicks for non-straight line in segments
- **Object menu toggles**
 - Auto-Connect – automatically connect entry point of newly placed module from exit point of selected module
 - Smart Connect – force segments to horizontal/vertical
 - Animate Connectors – show entities moving along connectors (zero time for statistics collection)

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Dynamic Plots

- Trace variables, queues as simulation runs – a kind of “data animation”
- Disappear after run is ended (to keep, must save data, postprocess via Output Analyzer – later)
- Plot button  from Animate toolbar... “Add” for
 - Expression to plot (help via Expression Builder ... later)
 - Min/Max y-axis values (initially guesses, maybe revise)
 - Arena can do this automatically and dynamically in Plot dialog
 - Number of “corners” to show (# History Points) at a time
 - Stepped option (for piecewise-constant curves)
 - Colors
- In Plot dialog – Time Range (x axis), cosmetics, automatic scaling options
- Drop plot in via crosshairs (resize, move later)

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Dressing Things Up

- Add drawing objects from Draw toolbar
 - Similar to other drawing, CAD packages
 - Object-oriented drawing tools (layers, etc.), not just a painting tool
- Add Text to annotate things
 - Control font, size, color, orientation

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Setting the Run Conditions

- **Run > Setup** menu dialog – five tabs
 - Project Parameters – Title, your name, output statistics, Project Description
 - Replication Parameters
 - Number of Replications
 - Initialization options Between Replications
 - Start Date/Time to associate with start of simulation
 - Warm-up Period (when statistics are cleared)
 - Length of Replication (and Time Units)
 - Base Time Units (output measures, internal computations)
 - Hours per “Day” (convenience for 16-hour days, etc.)
 - Terminating Condition (complex stopping rules)
 - Other tabs for animation speed, run conditions, reporting

Terminating your simulation:

- You must specify – part of modeling
- Arena has no default termination
- If you don't specify termination, Arena will usually keep running forever

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Running It

- **Plain-vanilla run: Click ▶ from Standard toolbar (like audio/video players)**
 - First time or after changes: *Check*
 - Enters *run mode* — can move around but not edit
 - Speed up (> on keyboard) or slow down (<) animation display
 - When done, asked if you want to see summary reports
 - Click ■ to get out of run mode (*can't edit until you do*)
 - Can *pause* run with || or Esc key
- **Other run control, viewing, checking options**

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Viewing the Reports

- **Click Yes in the Arena box at the end of the run**
 - Opens up a new reports window (separate from model window) inside the Arena window
 - Project Bar shows Reports panel, with different reports (each one would be a new window)
 - Remember to close all reports windows before future runs
- **Default installation shows Category Overview report – summarizes many things about the run**
 - Reports have “page” to browse (◀▶ and ▶▶)
 - Also, “table contents” tree at left for quick jumps via ⊕, ⊖
- **Times are in Base Time Units for the model**

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Viewing the Reports – Examples

- **Entity → Time → Total Time → Part:**
 - Avg. time in system was 6.4397 min., max was 12.6185
- **Resource → Usage → Instantaneous Utilization → Drill Press:**
 - Utilization was 0.9171 (busy 91.71% of the time)
- **Process → Other → Number In → Drilling Center:**
 - During the run, 7 parts entered the *Drilling Center*
- **Process → Other → Number Out → Drilling Center:**
 - 5 entities left the *Drilling Center* (so were produced)
- **Entity → Time → Wait Time → Part:**
 - Avg. wait time in all queues was 3.0340 min. (counts only entities that left the *system*, but Queue → Time → Waiting Time → *Drilling Center*. Queue counts all entities that left *this queue*, so can differ)
- **Entity → Other → Wip → Part:**
 - Average Work in Process was 1.7060, max WIP was 4

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Types of Statistics Reported

- **Many output statistics are one of three types:**
 - *Tally* – avg., max, min of a discrete list of numbers
 - Used for discrete-time output processes like waiting times in queue, total times in system
 - *Time-persistent* – time-average, max, min of a plot of something where the x-axis is continuous time
 - Used for continuous-time output processes like queue lengths, WIP, server-busy functions (for utilizations)
 - *Counter* – accumulated sums of something, usually just nose counts of how many times something happened
 - Often used to count entities passing through a point in the model

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More on Reports and their Files

- **Reports we just saw – based on a MS Access database that Arena writes as it runs**
 - Can be saved and viewed later
 - Viewing within Arena done via Crystal Reports to query the Access database
- **Arena also produces a plain-text summary report (.out filename extension)**
 - Was in previous versions of Arena, underlying SIMAN simulation language
 - Fairly cryptic, but gives quick view of lots of output data
- **Get multiple reports for multiple replications**
- **“Half Width” columns – for confidence intervals on outputs in long-run simulations ... more later**

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Build It Yourself

- **Build the same model from scratch – see book for more detail**
- **Handy user-interface tricks:**
 - Right-click in an empty spot in flowchart view – small box of options, including Repeat Last Action ... useful in repetitive editing like placing lots of the same module type
 - Ctrl+D or Ins key – duplicates whatever’s selected in flowchart view, offsetting it a bit ... usually drag elsewhere and edit
- **Open a new (blank) model window – name it, save it, maybe maximize it**
- **Attach modeling panels you’ll need to Project Bar if they’re not there**

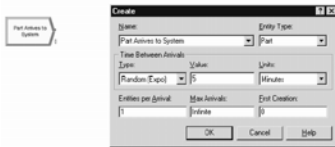
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Build It Yourself (cont'd.)

- **Place and connect flowchart modules**
- **Edit flowchart and data modules as needed**
 - Experiment with Expression Builder – right-click in expression field
- **Add plots, animation, artwork**
- **Add named views (? key or View > Named Views)**
 - Name, hot key (case-sensitive) – useful in big models
- **Edit Run > Setup dialog**
- **“Displays” in text**
 - Compact way of saying what needs to be done in a dialog
 - Omits Arena defaults
 - Shows completed dialogs

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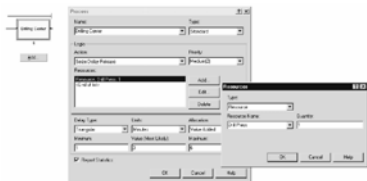
Display for the Create Module



Name	Part Arrives to System
Entity Type	Part
Time Between Arrivals area	
Type	Random (Expo)
Value	5
Units	Minutes

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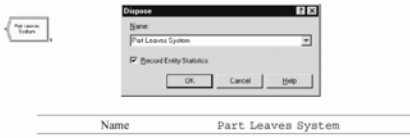
Display for the Process Module



Name	Drilling Center
Action	Seize Delay Release
Resources (secondary dialog via Add button)	
Type	Resource
Resource Name	Drill Press
Quantity	1
Delay	
Delay Type	Triangular
Units	Minutes
Minimum	1
Value	3
Maximum	6

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Display for the Dispose Module



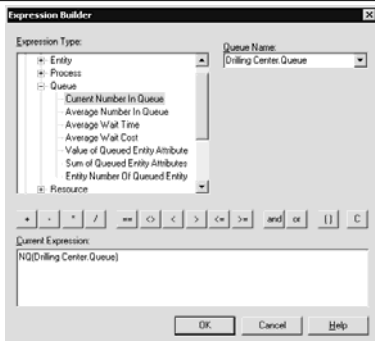
Name Part Leaves System

Display for the Queue-Length Plot



Plot Expressions (secondary dialog via Add button)
 Expressions NQ(Drilling Center-Queue)
 Maximums 5
 Color Max
 Plot
 Time Range 20
 X-axis labels clear (i.e., uncheck)
 Title - Use Title select
 Horiz. Alignment Center
 Title Text Drilling Center Queue:
 Number Waiting

Expression Builder for Queue-Length-Plot Expression



More on Menus – File Menu
<ul style="list-style-type: none"> • Model-file management • Template attach/detach • DXF import (from CAD packages), Visio import • Color palettes • Printing • E-mail open model file • Recent models • Exit from Arena
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Edit Menu
<ul style="list-style-type: none"> • Undo/Redo • Cut/Copy/Paste • Paste Link (create OLE link) • Duplicate, Delete selection • Select/Deselect All • Entity Pictures – change content, definition of pictures presented in Entity data module • Calendar Schedules – specify complex time patterns in hierarchies (weeks are made of days, which are made of shifts, etc.), exceptions (holidays), view composite net effect
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Edit Menu (cont'd.)
<ul style="list-style-type: none"> • Find – searches all modules and animation objects for a text string ... useful for finding wrong names, typos after an error message from Arena • Properties – display internal Arena object properties • Links – to link to other files (spreadsheets, sounds, etc.) • Insert New Object – from other applications (e.g., graphics) • Object – edit object imported from another application
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View Menu

- **Zooming** – discussed before
- **Zoom Factor** – step size when zooming
- **Views** – canned Arena views of flowchart view
- **Named Views** – define, change, use views
- **Grid/Snap/Grid Settings** – control grid, snapping
- **Page breaks** – shows page breaks if printed
- **Data Tips** – toggles display of Data Tips
- **Layers** – which objects show up in which mode
- **Split Screen** – toggle for viewing both flowchart and spreadsheet views, or just one of them
- **Toolbars** – decide which toolbars show up
- **Project/Status Bar** – toggle to show up or not

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Tools Menu

- **Separate applications for modeling, analysis**
 - Arena Symbol Factory – large collection of graphics in categories, use to create graphical symbols for animation
 - Input Analyzer – fit probability distributions for input, using field-collected data
 - Process Analyzer – run, compare many “scenarios” at once
 - Also Output Analyzer ... not on menus ... start from Start menu
- **Special “editions” of Arena (FactoryAnalyzer, Contact Center)** – depends on licensing
- **Model Documentation Report** – generate HTML file with many details of this model

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Tools Menu (cont'd.)

- **Import/Export model to/from Database** – bring in, save model details to Excel or Access
- **OptQuest for Arena** – separate application that “takes over” running of the model to search for an optimal scenario
- **Macro** – create Visual Basic macros (mini programs), VB editor ... more in Chapter 10
- **Options** – control many aspects of how Arena works, looks

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Arrange Menu

- For modeling, graphics objects – first select object(s)
- Bring object to Front, Send it to Back — for “stacking” effects
- Group, Ungroup
- Flip around Vertical, Horizontal line
- Rotate object (90° clockwise)
- Align objects on top, bottom, left, or right edges
- Distribute objects evenly (horizontally, vertically)
- Flowchart Alignment – arrange flowchart modules (horizontally, vertically)
- Snap to Grid the selected object(s)
- Change Snap Point on object that gets snapped

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Object Menu

- Connect tool – changes cursor to cross hairs
- Auto-Connect newly placed module to selected module – toggle on/off
- Smart Connect – new connections in horizontal/vertical segments rather than one diagonal segment – toggle on/off
- Animate Connectors – to show entities moving (at infinite speed for statistics collection)
- Submodel – define and manage hierarchical submodels (see Chapter 5)

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Run Menu

- Setup – control model run conditions
- Entries to run, check, pause, step through
- Alternatives to watch execution, view results (or errors)
- Control how run goes and is displayed
- Most capabilities on Run or Run Interaction Toolbar, and will be described a bit later in detail
- Access the “code” in the underlying SIMAN simulation language

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Window Menu

- Cascade, Tile multiple open model windows
- Arrange Icons for any minimized model windows
- Use system Background Color — use Windows colors rather than Arena settings
- List of open model windows

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Help Menu

- One of several ways to get into Help system
- Arena Help Topics – TOC, Index, Search
- What's This? – adds ? to cursor, then click on things for brief description
- Release notes – recent changes, requirements
- Arena SMART Files – subject-based index to many small (but complete) models that illustrate specific modeling techniques

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Help Menu (cont'd.)

- List of attached modeling panels – select to get Help on that one
- Product Manuals – detailed documents on Arena components
- Web links to product support (must be online ...)
- Product support/training
- Copy protection information for commercial, research, and lab versions
- About Arena... – version number, etc.


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More on Toolbars

- **Collections of buttons for “frequent” operations**
 - Most are duplication of menu entries
 - Standard, Draw, Animate, Integration, View, Arrange, Run Interaction, Record Macro, Animate Transfer, Professional
- **View > Toolbars (or right-click in a toolbar area) to decide which ones show up, which to hide**
- **Toolbars can be torn off (“floating” palettes), or “docked” to an edge of screen**
- **Arena remembers your Toolbar configuration for next time**
- **View > Toolbars > Customize to alter how toolbars and buttons are displayed**
- **See text for run-through description of toolbars and buttons**

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More on Drawing

- **Draw via toolbar buttons only (no menus):**

- **Line, Polyline (hold Shift key for 45°), Arc, Bézier Curve**
- **Box, Polygon, Ellipse (fill, line, shade)**
- **Text (font, size, style)**
- **Colors for Lines, Fill, Text, Window Background**
- **Line Style, Fill Pattern**
- **By far best way to learn: just play around**




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Printing

- **Print all or parts of flowchart view of active model window – supports color**
- **Usual Print, Print Preview, Print Setup (File menu)**
- **Could consume many pages ... also prints named views separately**
 - Print Preview, select only what you want for printing
- **View > Page Breaks to show how pages will break**
- **Alternative to printing directly from Arena: PrintScreen key — sends screen to clipboard, paste into another application**
 - Alt+PrintScreen — sends only active window to clipboard
 - Could first pass through a paint application to crop, etc.






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Help!

- Extensive, comprehensive online system – including complete (electronic) manuals
- Interlinked via hypertext for cross referencing
- Multiple entry points, including Help menu (described above), links to websites
-  button for context-sensitive help
-  button in most dialogs
-  button (What's This?) for info on items
- Tooltips – roll over things, get little sticky note
- Examples folder inside Arena 7.0 folder
- SMARTs library – small models illustrating points – subject index via *Help > Arena Smart Files*






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More on Running Models

- Run Menu; Standard & Run Interaction toolbars
- *Run > Setup* – many options to control the run
 - These are attached to the model, and are not global
- *Run > Go*  – run simulation “normally” (depends on selections from *Run > Run Control* and *Tools > Options > Run Control*)
- *Run > Step*  – one “step” at a time (verify, debug)
- *Run > Fast-Forward*  – disable animation (faster)
- *Run > Pause*  (or Esc key) – freeze run, resume with Go
- *Run > Start Over*  – go back to beginning of simulation


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More on Running Models (cont'd.)

- *Run > End*  – get out of run mode
- *Run > Check Model*  – like compiling
- *Run > Review Errors* – for most recent Check
- *Run > Run Control > Command*  – bring up interactive command-line window to control run
- *Run > Run Control > Break*  – set times, conditions to interrupt for checks, illustration
- *Run > Run Control > Watch*  – bring up a window to watch a variable or expression during run

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More on Running Models (cont'd.)

- **Run > Run Control > Break on Module**  – set/clear break when an entity enters or resumes activity on a module
- **Run > Run Control > Highlight Active Module** – highlight the flowchart module being executed
- **Run > Run Control > Batch Run (No Animation)** – run model with no animation ... this is even faster than Fast-Forward ... usually used for “production runs” for statistical analysis
- **Run > SIMAN** – view or write the model (.mod) and experiment (.exp) files for the underlying SIMAN model
