

TRACE/SNAP User Workshop
September 30 - October 3, 2014

Hilton Garden Inn
Idaho Falls, ID

Introduction to SNAP

Applied Programming Technology, Inc.



What is SNAP?

- Symbolic Nuclear Analysis Package
 - Suite of Applications
- Standard Graphical User Interface designed to simplify the use of analytical codes.
 - Construct, Maintain and Document Models
 - Run Cases
 - Analyze Results
- Platform Independent, Pure-Java, Plug-in Arch.
 - Can Be Adapted to Any Engineering Code
 - Highly Extensible and Flexible

SNAP is a Suite of Applications

- Primary SNAP Apps:
 - Configuration Tool
 - Model Editor
 - Job Status
 - Calculation Server
- Associated Software
 - AptPlot & Demuxers – Plotting Tools
 - jEdit – ASCII Editor
 - ACAP - Automated Code Assessment Program
 - TSA – Test Suite Analyzer
 - Matlab / Mathcad

Consistent and Intuitive User Interface

- Common Functionality Across Several Codes.
- Minimize Learning Curve for Analysis Codes
- Logical Organization of Model Components and Interconnections
- 2D and 3D Visualization
- Input Checking and Model Validation Tests
- Advanced Model Editing Tools
- Manage Model Documentation
- Easily Submit, and Monitor Calculations
- Analyze Results

Why Use SNAP?

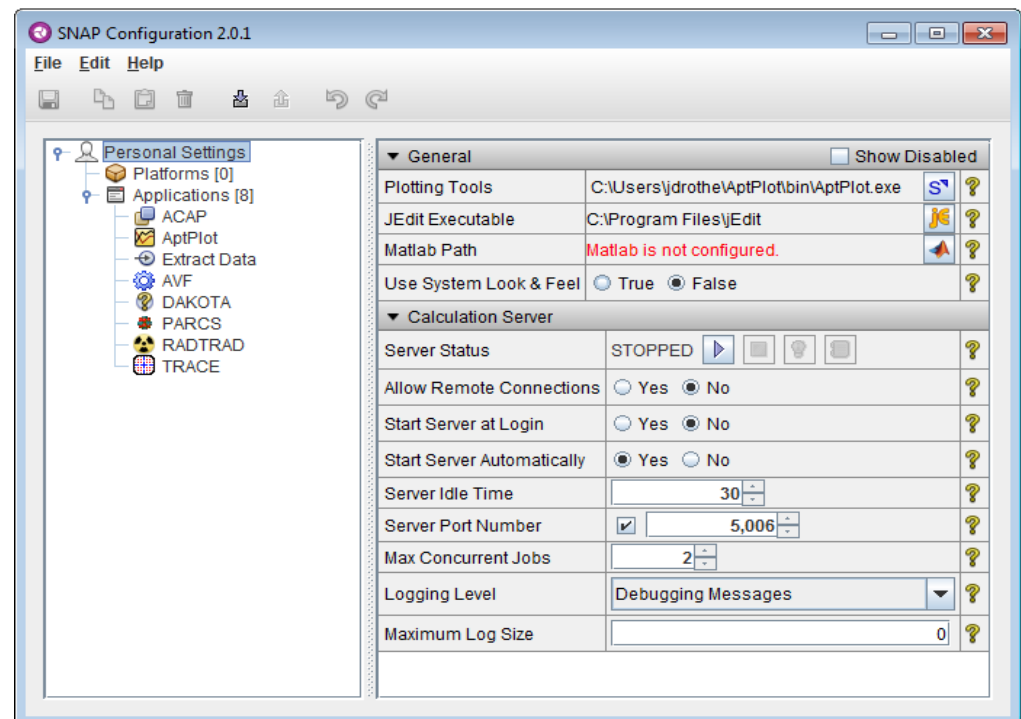
- Greatly reduces time to develop and/or modify analytic code models.
- Permits model developers to graphically annotate and document their input models.
- Simplifies the process of running analytical codes using job automation.
- Provides for quick and easy visualization of code results and/or data.
- Improves Efficiency and Quality!

Advanced SNAP Functionality

- Numerics - Use variables & functions to define input and control execution
- Model Notes - Attach HTML notes to components & individual attributes
- Attribute Ownership & Reviewer
- Model Notebook Generation
- Master Integrator - Split complex models into sub-models.
- Engineering Templates - Provides support for multiple diverse models.
- Kiosk - Create Input templates to constrain execution of predefined engineering templates.
- Uncertainty Quantification Analysis (Dakota)
- Restart Cases
- Component & Group Renodalization
- I/C Import & Management
- Model to Model Comparison
- Advanced Job Stream (Under Design)

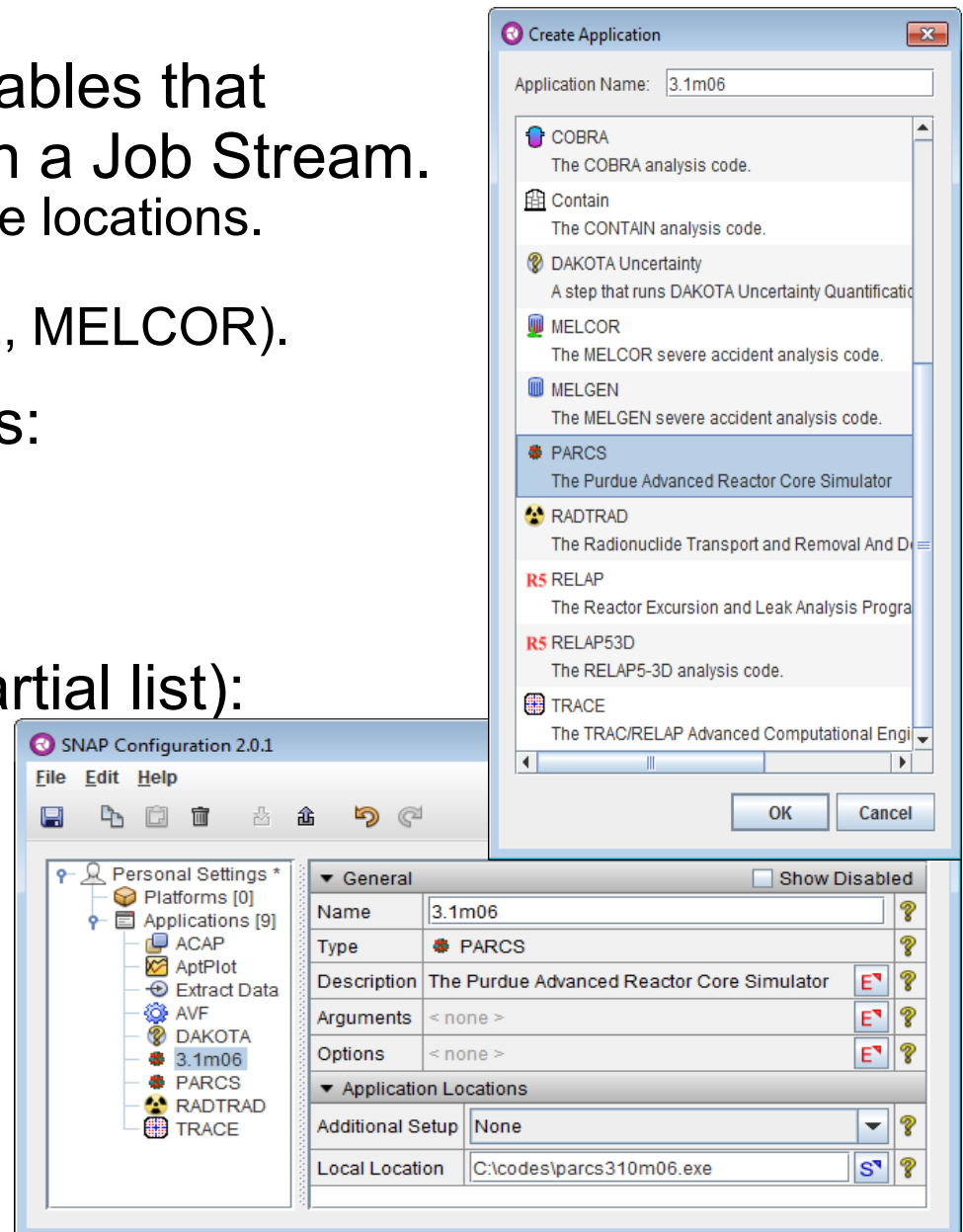
Configuration Tool

- Personal Settings are stored in the User's home directory.
- Application paths for jEdit, AptPlot, and Matlab.
- Local Calculation Server Settings
 - Status, Server Port, Logging Level, etc.
- No longer need to start/stop the Calculation Server manually.
- Manages the available set of Platforms & Applications.
- Global Settings are setup by your System Admin.



Configuration Tool – Applications

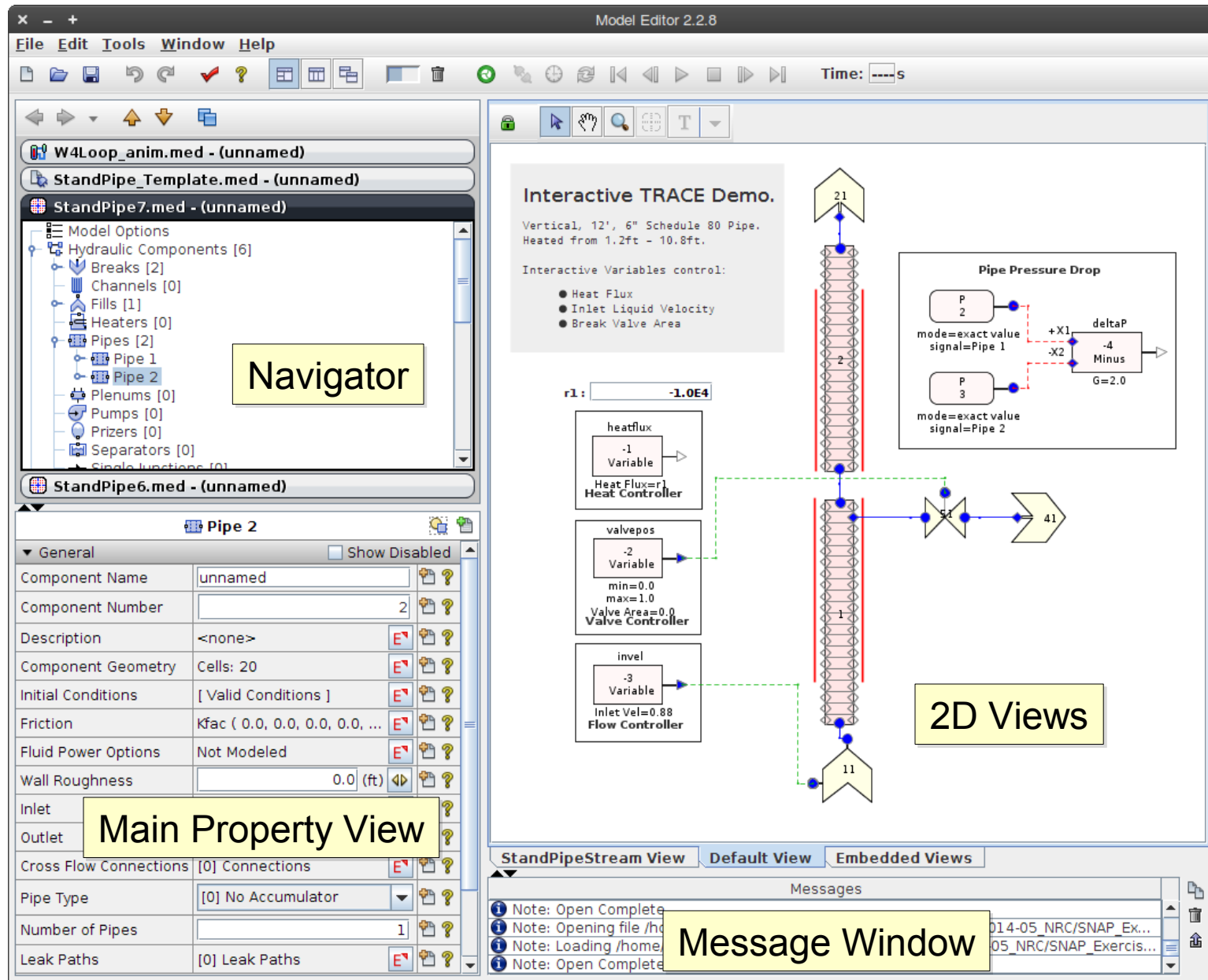
- Applications define executables that can be included as steps in a Job Stream.
 - Local and remote executable locations.
 - Command line arguments.
 - Application version (TRACE, MELCOR).
- Pre-configured applications:
 - ACAP
 - AptPlot
 - DAKOTA Uncertainty
- Supported applications (partial list):
 - COBRA-IE
 - CONTAIN
 - MELCOR
 - PARCS
 - RELAP5 / RELAP5-3D
 - TRACE
 - RADTRAD
 - FRAPCON/FRAPTRAN
 - SCALE



Model Editor

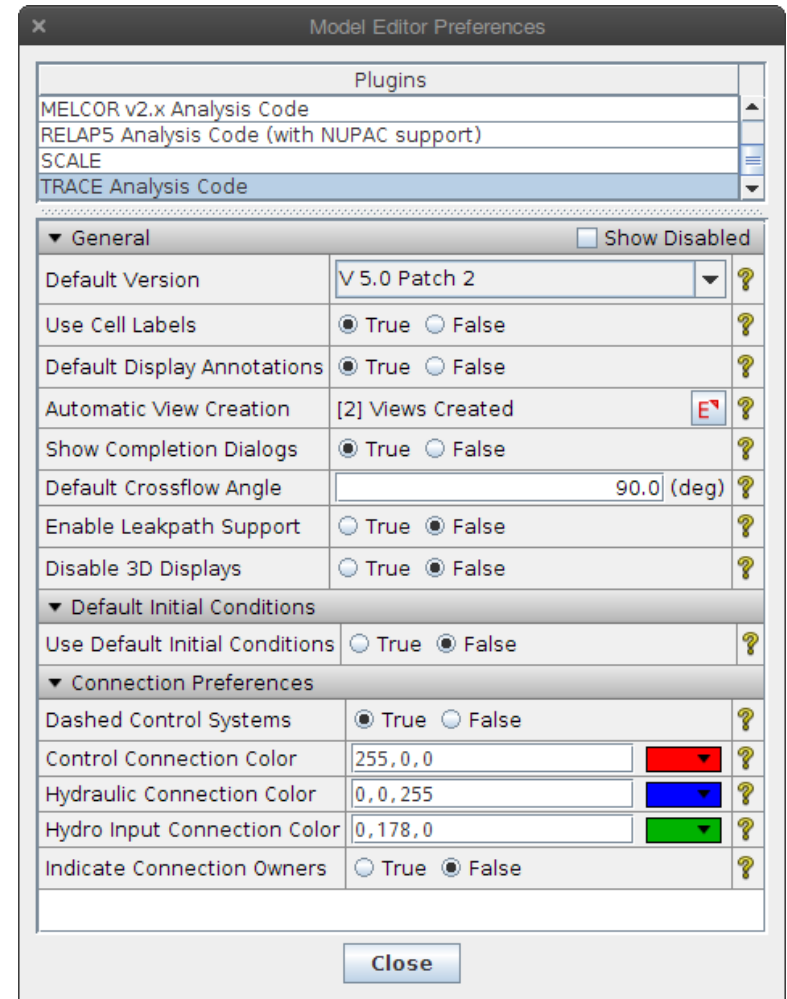
- Primary User Interface
 - Navigator, 2D/3D Views, Property View, Message Window, ASCII Views
- Model Editing and Animation
- Platform Independent Binary save format.
- Allows Editing Multiple Models Simultaneously
- Data Driven Hierarchy
 - Component Data model
 - Displayed in multiple Places
- Built in Engineering Unit Support

Model Editor User Interface

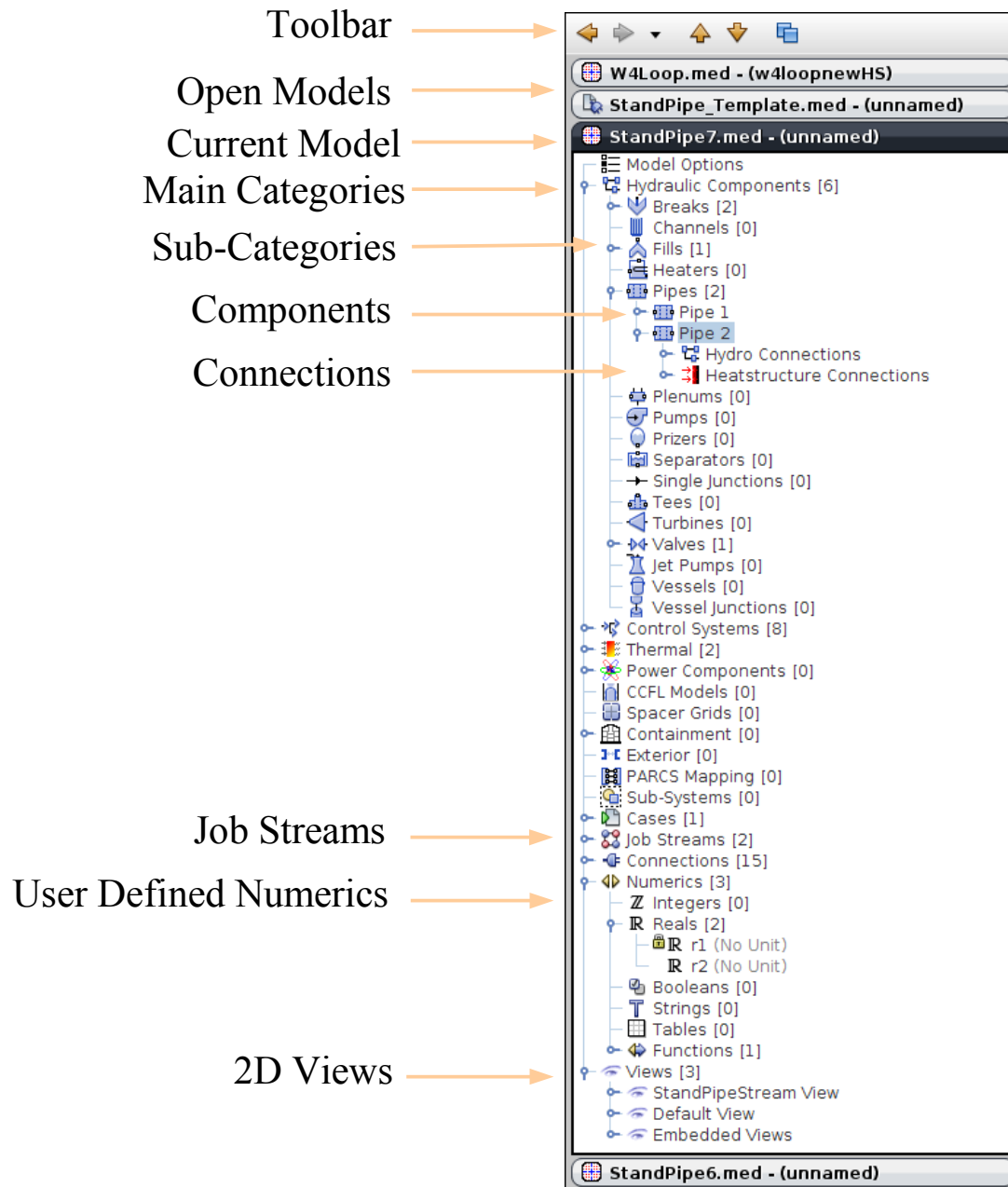


Model Editor Preferences

- Located under Edit menu
- General Preferences
 - Default Units
 - Session
 - Selection Modes
- Plug-in Preferences
 - Completion dialogs
 - User Manual Locations
 - Drawing Options



Component Navigator



- Multiple Open Models
 - Accordion Layout
- Organizes all Model Components
- Categories and Root Components
- Interconnections
- Copy/Paste
- Add/Remove
- Drag onto 2D View

Property Views

- Main Property View
 - Data Follows Selection in 2D Views or the Navigator
 - Multi-Select Editing
- Component Property View
 - Separate Window
 - Single Component Only
- Custom Editors
- Attribute Documentation
- Pop-up Help

The screenshot shows a software window titled "Pipe 1" with a "Show Disabled" checkbox. The window is divided into sections: "General" and "Pipe Wall". The "General" section contains a table of properties with input fields and icons. The "Pipe Wall" section has a "Use Pipewall" option with radio buttons for "True" and "False". Below this are expandable sections for "Wall Power" and "Trace Species".

Pipe 1	
▼ General <input type="checkbox"/> Show Disabled	
Component Name	unnamed
Component Number	1
Description	<none>
Component Geometry	Cells: 20
Initial Conditions	[Valid Conditions]
Friction	Kfac (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, ...
Fluid Power Options	Not Modeled
Wall Roughness	0.0 (ft)
Inlet	Fill 11 Cell 1 outlet
Outlet	Pipe 2 Cell 1 inlet
Cross Flow Connections	[1] Connections
Pipe Type	[0] No Accumulator
Number of Pipes	1
Leak Paths	[0] Leak Paths
▼ Pipe Wall	
Use Pipewall	<input type="radio"/> True <input checked="" type="radio"/> False
▶ Wall Power	
▶ Trace Species	

Property Editors and Selectors

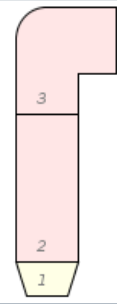
- Property Editors – **E**
 - Detailed custom dialogs
 - Display/edit sets of values

Pipe 11 (\$11\$ int-loop st-gen primary)

▼ General ☐ Show Disabled

Component Name	\$11\$ int-loop st-gen primar	?
Component Number	11	?
Description	<none>	E ?
Component Geometry	Cells: 3	E ?
Initial Conditions	[Valid Conditions]	E ?

Geometry - Pipe 11 (\$11\$ int-loop st-gen primary)



Cell Number	Volume (m³)	Length (m)	Vol. Avg. Flow Area	DZ (m)	2D Drawing Pivot
1	16.77	1.0	16.77	1.0	<input type="checkbox"/>
2	14.153	4.35	3.2535632	4.35	<input type="checkbox"/>
3	14.153	4.35	3.2535632	2.175	<input type="checkbox"/>
Total	45.076	9.7	23.277126	7.525	

Calculate

☐ Volume ☐ Length ☒ Area

Cells Edges Orientation

Close

- Component Selectors – **S**
 - Select from the available components
 - Sort by category, number, or component

Fill 25 (\$25\$ int-loop hpis & lpiis)

Timestep Holdover	0.0 (-)	?
Max Acceleration	1.0E5 (m/s²)	?
Fill Table	Rows: 17 [0.0,32.8],[2.0E5,33....	E ?
Rate Factor Table	Rows: 0 []	E ?
Table Signal	Pressure 2	S ?

► Contan Coupling

► Scale Factors

► State Controllers

Select from Control Blocks and Signal Variables

Available Components

Category	Number	Component
Signal Variables	1	Problem Time 1
Signal Variables	2	Pressure 2
Signal Variables	3	Pressure 3
Signal Variables	4	Pressure 4
Signal Variables	17	Collapsed Water Level 17
Signal Variables	18	Collapsed Water Level 18
Signal Variables	19	Collapsed Water Level 19
Signal Variables	21	Collapsed Water Level 21

None

OK Cancel

Component Differencing

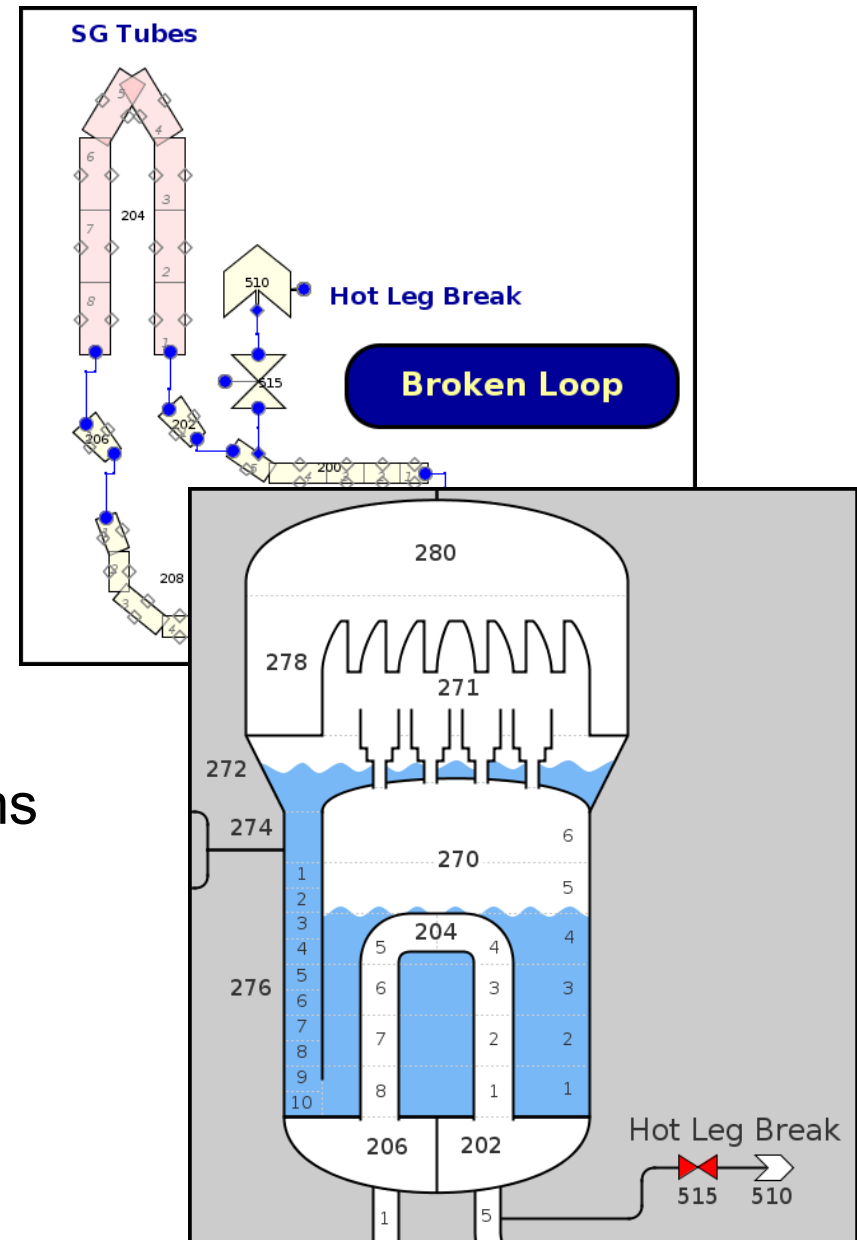
- Compare the ASCII input of two component selections
- Single Component to Entire Models
- Left Side Implements Component Listener Interface
 - Monitor Changes to a component
- Can Export Results to a File.

Tee 17 (\$17\$ bkn-loop sec-side downcomer)					Tee 27 (\$27\$ brk-loop sec boiler/stdome)				
* alp1	*	1.0	0.0	0.0	* pa1	*	4.85E6	4.85E6	4.85E6
* v11	*	0.0	0.0	0.0	* dx2	*	2.175e	0.0	0.0e
* v12	*	0.0e			* vo12	*	6.525e		
* vv1	*	0.0	0.0	0.0	* fa2	*	5.0	1.5e	
* vv2	*	0.0e			* kfac2	*	1.0E-10	3.0E-3e	
* t11	*	535.14	535.14	535.14	* grav2	*	-0.55758	-1.0e	
* tv1	*	535.14	535.14	535.14					
* p1	*	4.85E6	4.85E6	4.85E6					
* pa1	*	0.0	0.0	0.0					
* dx2	*	1.0e							
* vo12	*	0.5e							
* fa2	*	0.5	0.5e		* hd2	*	0.1	0.1e	
* kfac2	*	1.0E-10	0.0e		* nff2	*	1	1e	
* grav2	*	0.0	0.0e						
* hd2	*	0.1	0.1e		* alp2	*	0.0e		
* nff2	*	1	1e		* v12	*	0.0	0.0e	
* alp2	*	0.0e			* vv2	*	0.0	0.0e	
* v12	*	0.0	0.0e		* t12	*	440.0e		
* vv2	*	0.0	0.0e		* tv2	*	440.0e		
* t12	*	440.0e			* p2	*	4.85E6e		
* tv2	*	440.0e			* pa2	*	0.0e		
* p2	*	4.85E6e							
* pa2	*	0.0e							

Left [46] * alp2 * 0.0e
Right [39] * alp2 * 1.0e

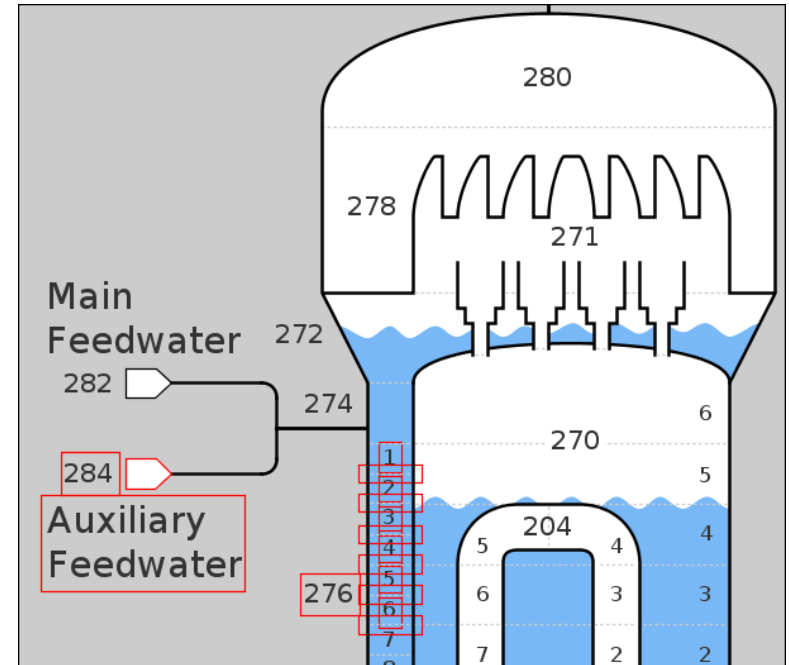
2D Views

- 2D Representation of Components and Interconnections
- Each Component may appear once in each view.
- Add & Remove Components
 - Delete – Remove from model
 - Cut – Remove from the view
- Annotations
 - Labels, Lines, Boxes, etc.
 - Can be associated with model components
- Group/Ungroup to treat a set of items as one.
- Use Layers to control selection and prevent modification.
- Use Embedded Views to hyperlink between views.

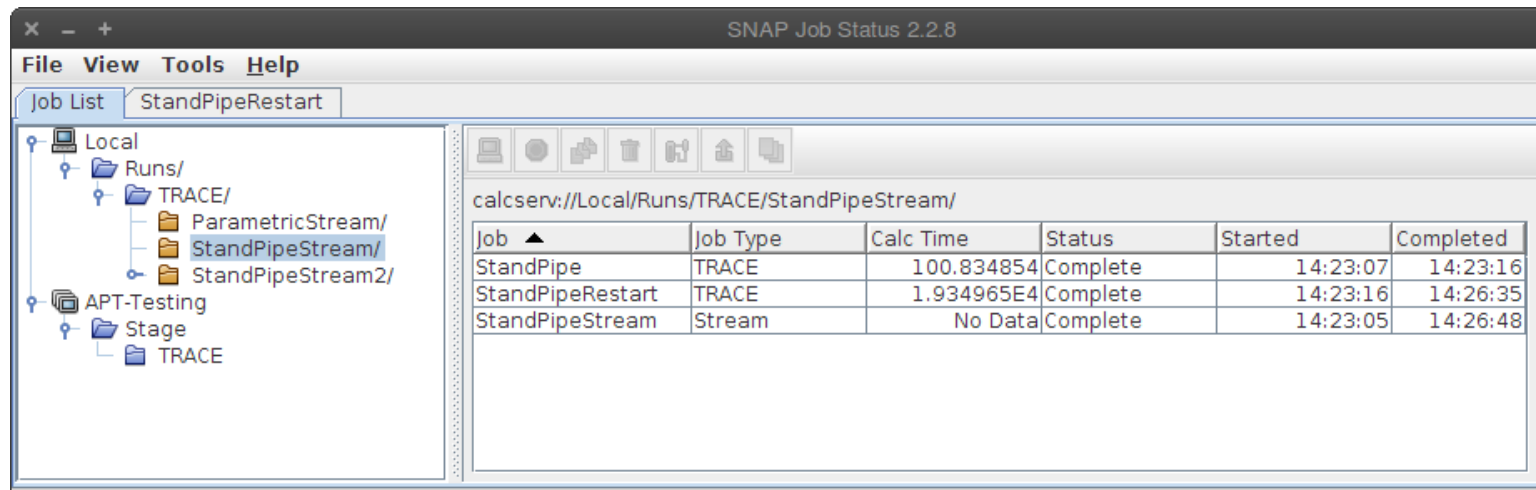


2D View Templates

- Exported From 2D Views
- Imported Into Any Similar Model
- Contains Annotations, Display Beans, Component Locations, etc.
- Complex Views Duplicated Between Models
- Recreate Views When Re-Importing a Modified Model



Job Status



- Display the Status of Submitted Jobs
- Connect to One or More Platforms
 - Calculation Server or Tracking Server
- Delete, Plot, and Terminate jobs
- Mount "Root Folders" (Calculation Server)
- View ASCII Input and Output Files (Calculation Server)
- Import Completed Jobs (Calculation Server)

Calculation Server

- Manages job stream execution.
- Required to Animate results. Interactively or in Replay mode.
- Provides access to files output by a calculation.
- Local server starts & stops automatically as needed.
- Use the Configuration Tool to Start/Stop remote servers.
- Completed Jobs can be imported using Job Status.