



SAND2019-13336PE

# SNAP Post Processing



PRESENTED BY

Larry Humphries      llhumph@sandia.gov





Provide a review of the SNAP GUI for post-processing data

- Working with Animations and View Ports
- Data Connections
- Color Maps

Working with Drawing Tools

- Indicators
- Plant Components
- Interactive Controls

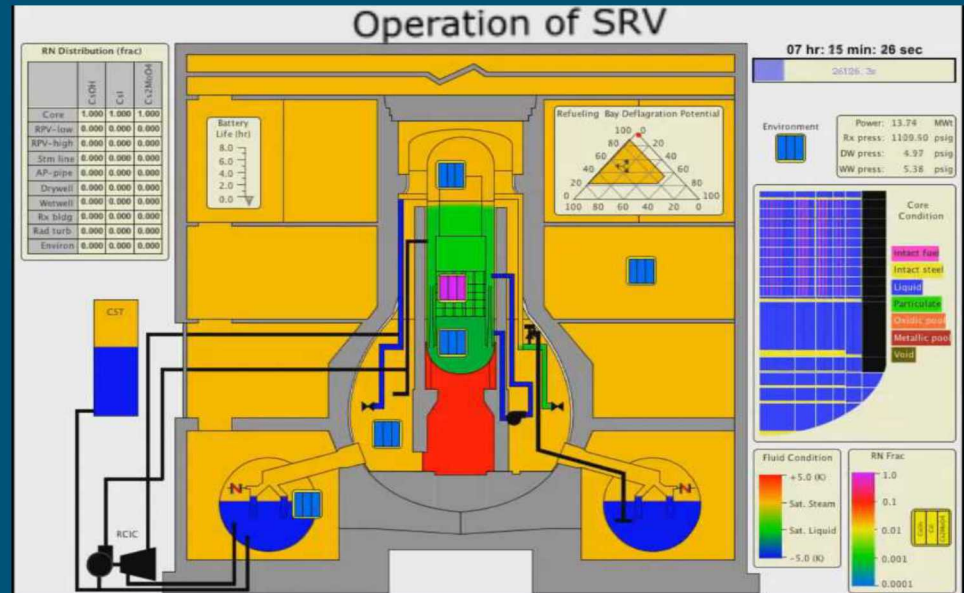
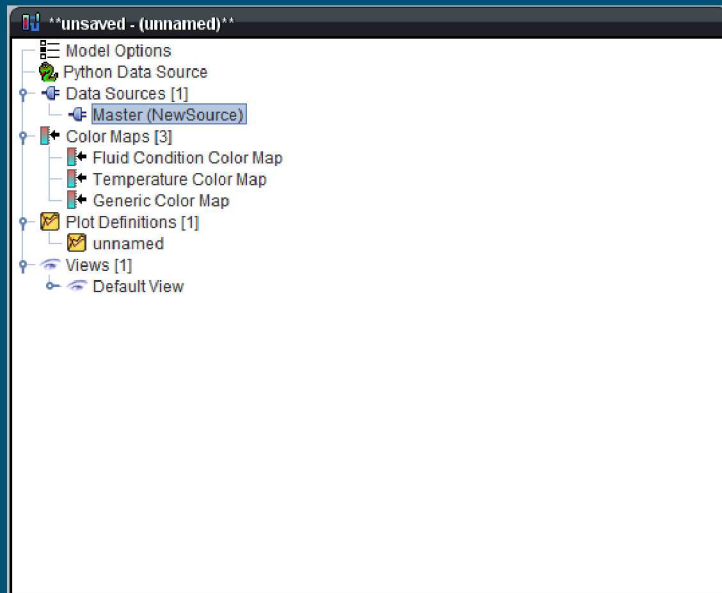
SNAP Demonstration

- Creating an axial plot
- Creating a deflagration bean
- Stacked elements

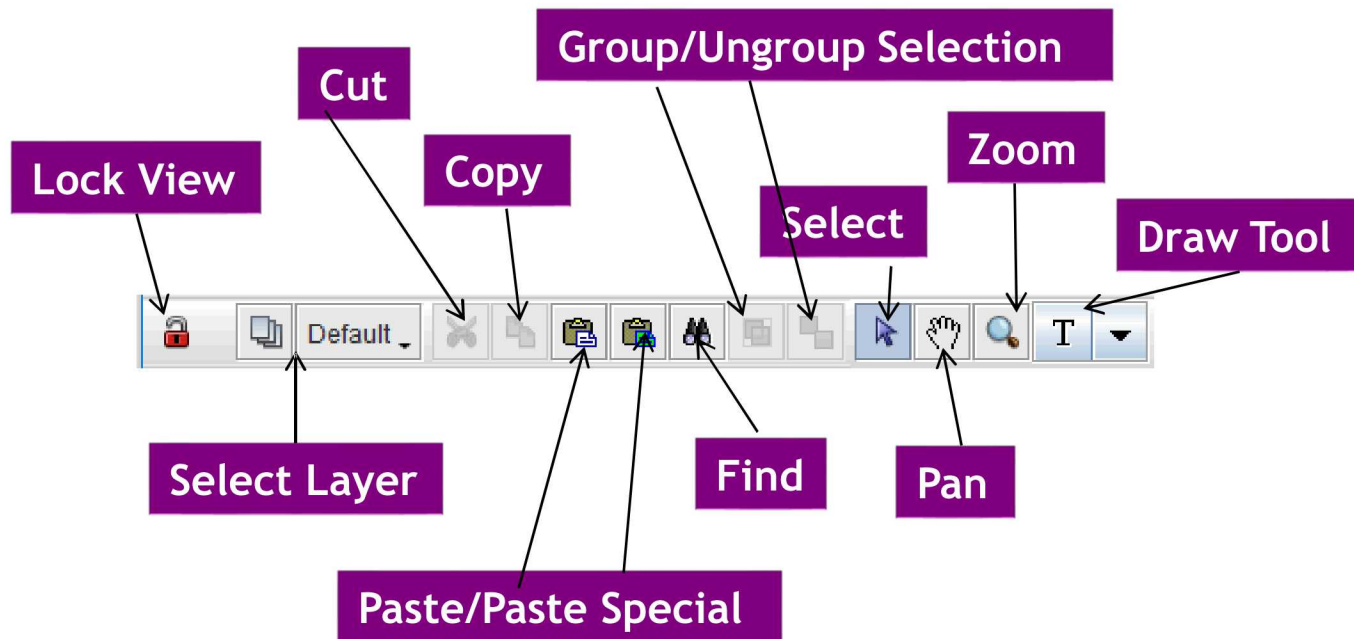
# Post Processing with SNAP

Animation Model is a separate model from the MELCOR model

- File>New select Animation model
- Data connection to the plotfile(s) must be established
- Animations are displayed in View Port



## View Port Toolbar



Interactive elements can only be selected from the View Port if the view is locked

- This is to prevent accidental interactions while editing the view components

If the screen is locked you cannot edit any of the components

Graphics can be assigned to layers for better organization and control

- Individual layers can be locked to prevent editing certain components



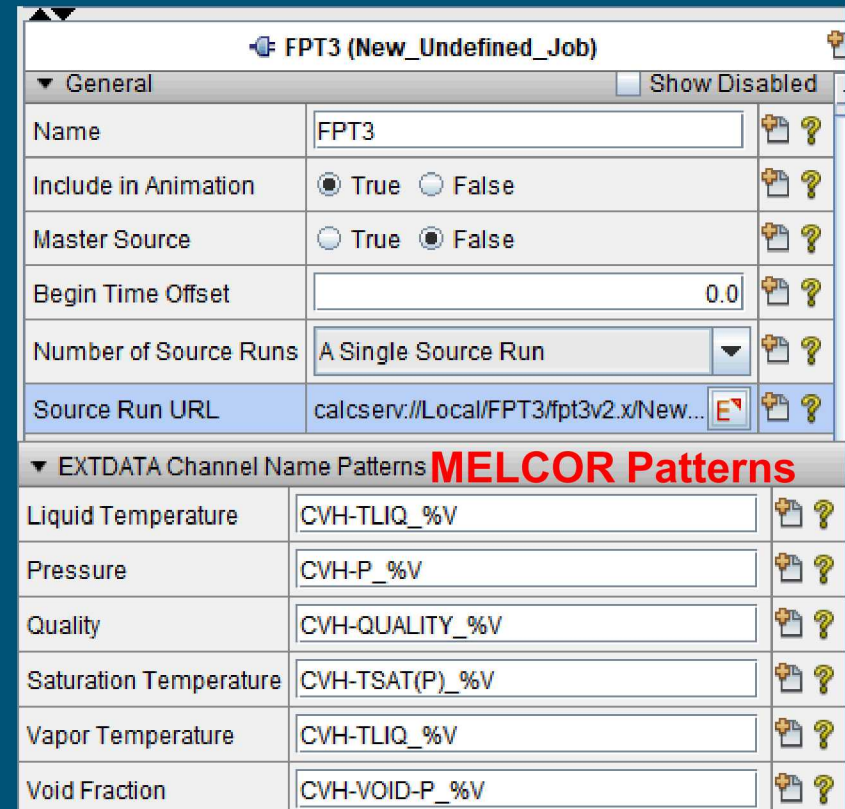
# Data Sources

## Attaching a plotfile

- Data Sources
  - Plot file data
  - Python Data Sources
- Multiple data sources can be specified
  - One source is designated master and used to determine Tstart, Tend, and time steps
  - Other sources are interpolated between time steps
- Selecting Data Source
  - Click on Master in the Data Source Tree in the Navigator and set the Source Run URL in the Properties to a completed Job
  - Click the Data Connector Icon
- Number of Source Runs
  - Data Source can span multiple plot files assuming they are from sequential restart runs.
- Patterns for variables can be specified for data sources
  - i.e., MELCOR, TRACE, RELAP5 have different patterns



Click Data Connection to make connection to the data source.



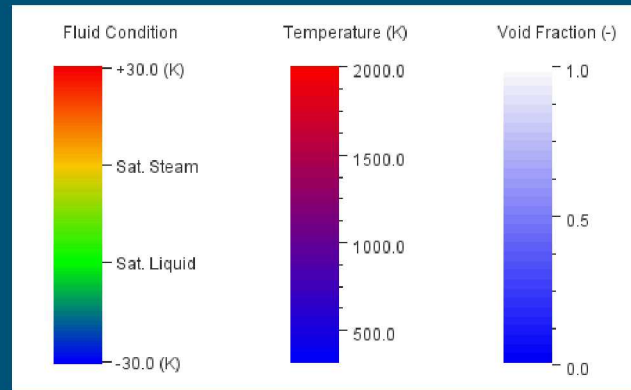
The screenshot shows the 'FPT3 (New\_Undefined\_Job)' dialog box with the 'General' tab selected. The 'Show Disabled' checkbox is unchecked. The 'Name' field is 'FPT3'. The 'Include in Animation' radio button is set to 'True'. The 'Master Source' radio button is set to 'False'. The 'Begin Time Offset' is '0.0'. The 'Number of Source Runs' is set to 'A Single Source Run'. The 'Source Run URL' is 'calcserv://Local/FPT3/ftp3v2.x/New...'. Below the 'General' tab is the 'EXTDATA Channel Name Patterns' section, which is titled 'MELCOR Patterns' in red. It contains a table with the following data:

EXTDATA Channel Name Patterns <b>MELCOR Patterns</b>	
Liquid Temperature	CVH-TLIQ_%V
Pressure	CVH-P_%V
Quality	CVH-QUALITY_%V
Saturation Temperature	CVH-TSAT(P)_%V
Vapor Temperature	CVH-TLIQ_%V
Void Fraction	CVH-VOID-P_%V

# Color Maps

## Built-in Color Map Options

- Fluid Condition Color Map
- Temperature Color Map
- Void Fraction Color Map
- Generic Color Maps



## Creating a Generic Color Map

1. Right Click Color Maps in the Navigator>New
2. Right Click the new Generic Color Map>Add To View
3. Adjust some Properties
  - Set Color Map Type to Generic
  - Specify Dynamic as True
  - Set Channel Name Pattern to MELCOR "CVH-P\_%V"
  - Review the MELCOR User's Guide to see all the available plot channels
  - %V is a place holder for the components Control Volume number (see notes for a detailed description on its use)

The 'Generic Color Map' dialog box shows the following settings:

- Name:** unnamed
- Color Map Type:** Generic
- Paint Background:** ☐ True ☒ False
- Minor Ticks Per Major:** 4
- Number of Major Ticks:** 10
- Dynamic:** ☐ True ☒ False
- Segmentation Style:** Gradient
- Color Display Width:** 35
- Show Title:** ☒ True ☐ False
- Use Custom Title Font:** ☐ True ☒ False
- Use Custom Legend Font:** ☐ True ☒ False
- Range Segments:** [1] Segments
- Channel Name Patterns:** < none >
- Engineering Units:** No Units
- Use Out of Range Low Color:** ☐ True ☒ False
- Use Out of Range High Color:** ☐ True ☒ False
- Use Non-Linear Scaling:** ☐ True ☒ False

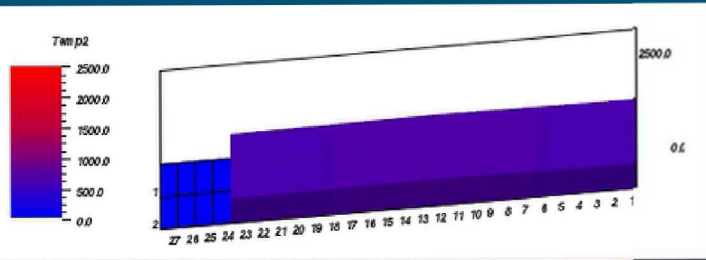
The 'Generic Color Map - Define Range Segments' dialog box shows a table with the following data:

Segment Index	Start Value	End Value	Start Color	End Color
1	300.0	1000.0	Blue	Red
2	1000.0	2000.0	Blue	Red
3	2000.0	3000.0	Blue	Red

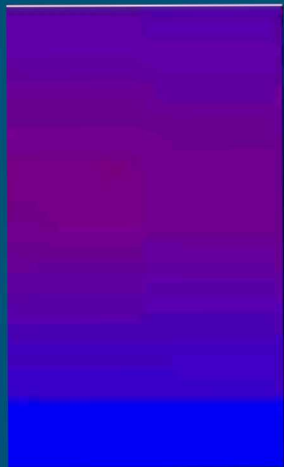
Buttons at the bottom: Add, Remove, OK, Cancel.

# Indicators

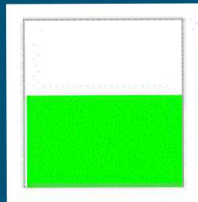
## 3D Graph



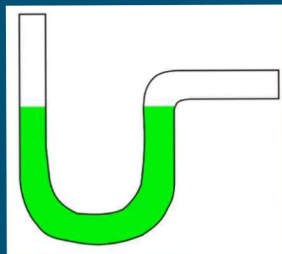
## Axial Map



## Fluid Level



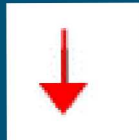
## Polygon



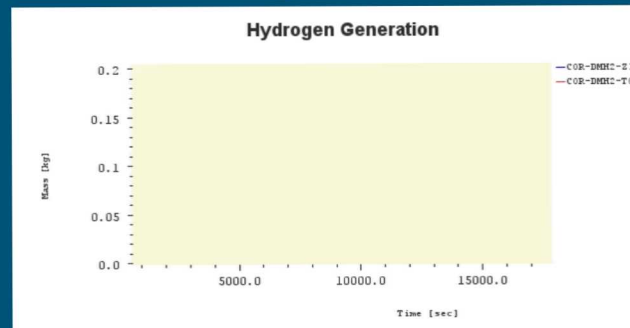
## Data Value

100000.65 Pa

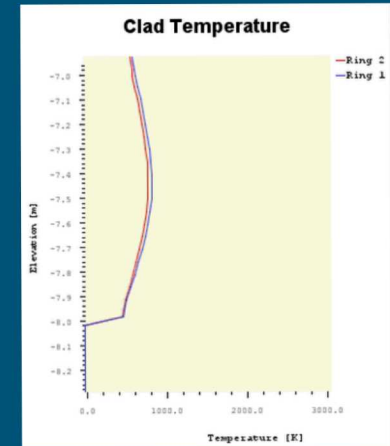
## Flow Indicator



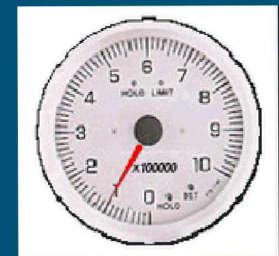
## Strip Plot



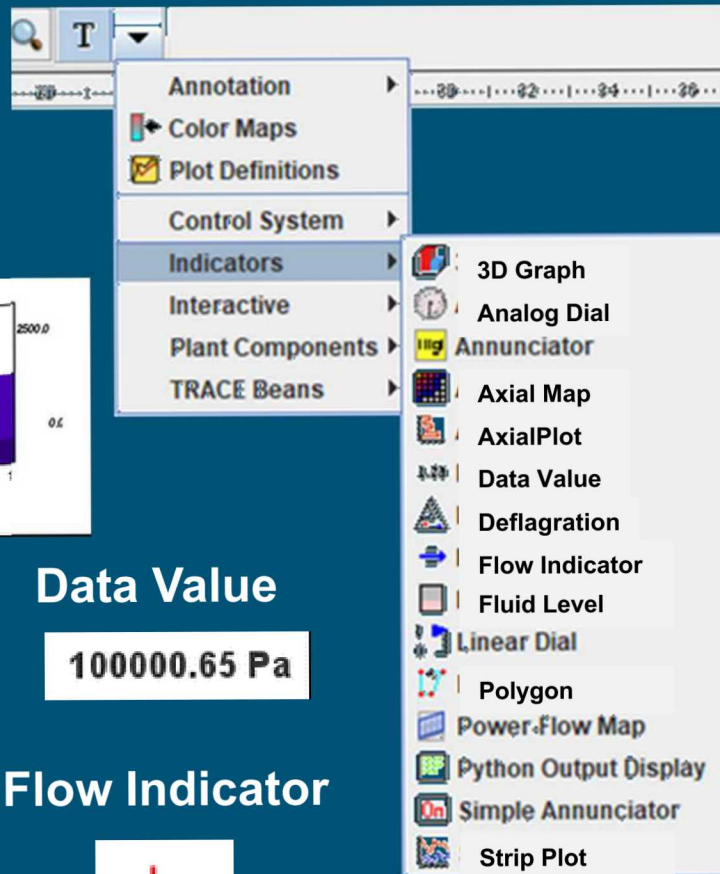
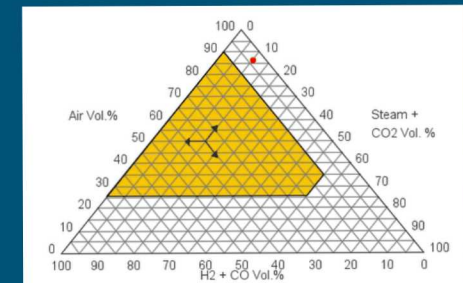
## AxialPlot



## Analog Dial



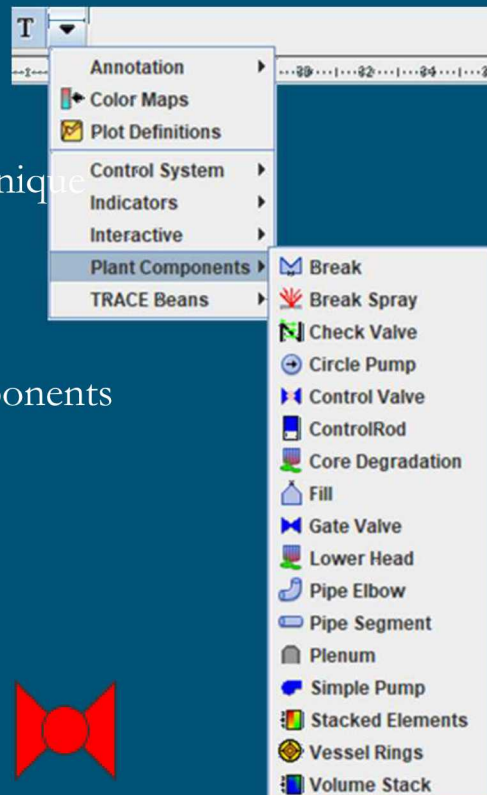
## Deflagration



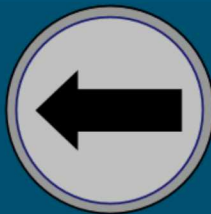
# Plant Components

Represents a component

- Some of these components are unique to TRACE or other code.
- Simple Components
  - Sprays, valves, break, pumps
- Simplification of Complex Components
  - Core Degradation component
  - Lower Head component
  - Stacked Elements
  - Volume Stack



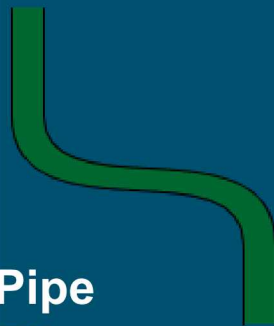
**Break  
Spray**



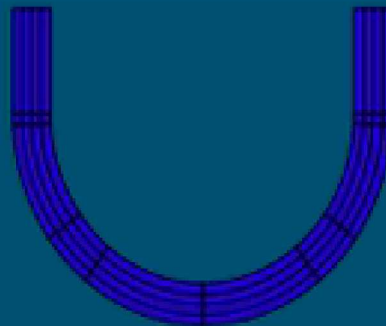
**Circle  
Pump**



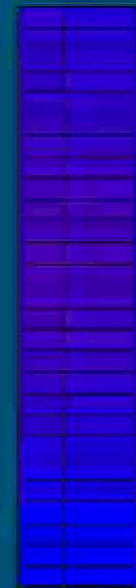
**Valve**



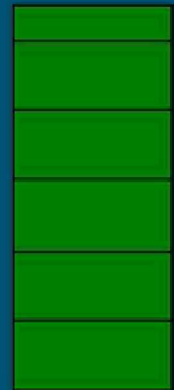
**Pipe  
Elbow**



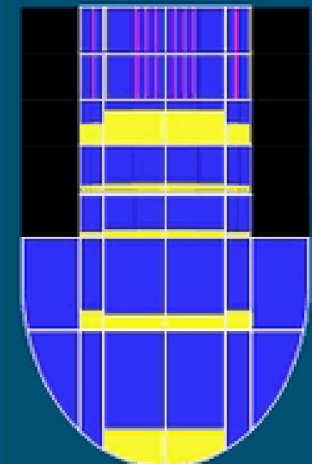
**Lower Head**



**Stacked  
Elements**



**Volume  
Stack**



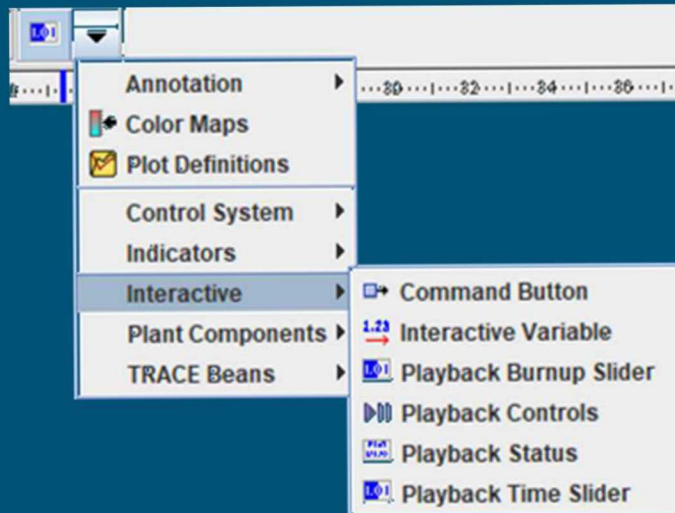
**Core Degradation**



**Pump**



## 9 Interactive Controls



### Playback Controls

Playing  
0.0s / 148.0s / 24954.5s

### Playback Status

148.0s

### Playback Time Slider

# Viewing CF Layout in an Animation

## Utility

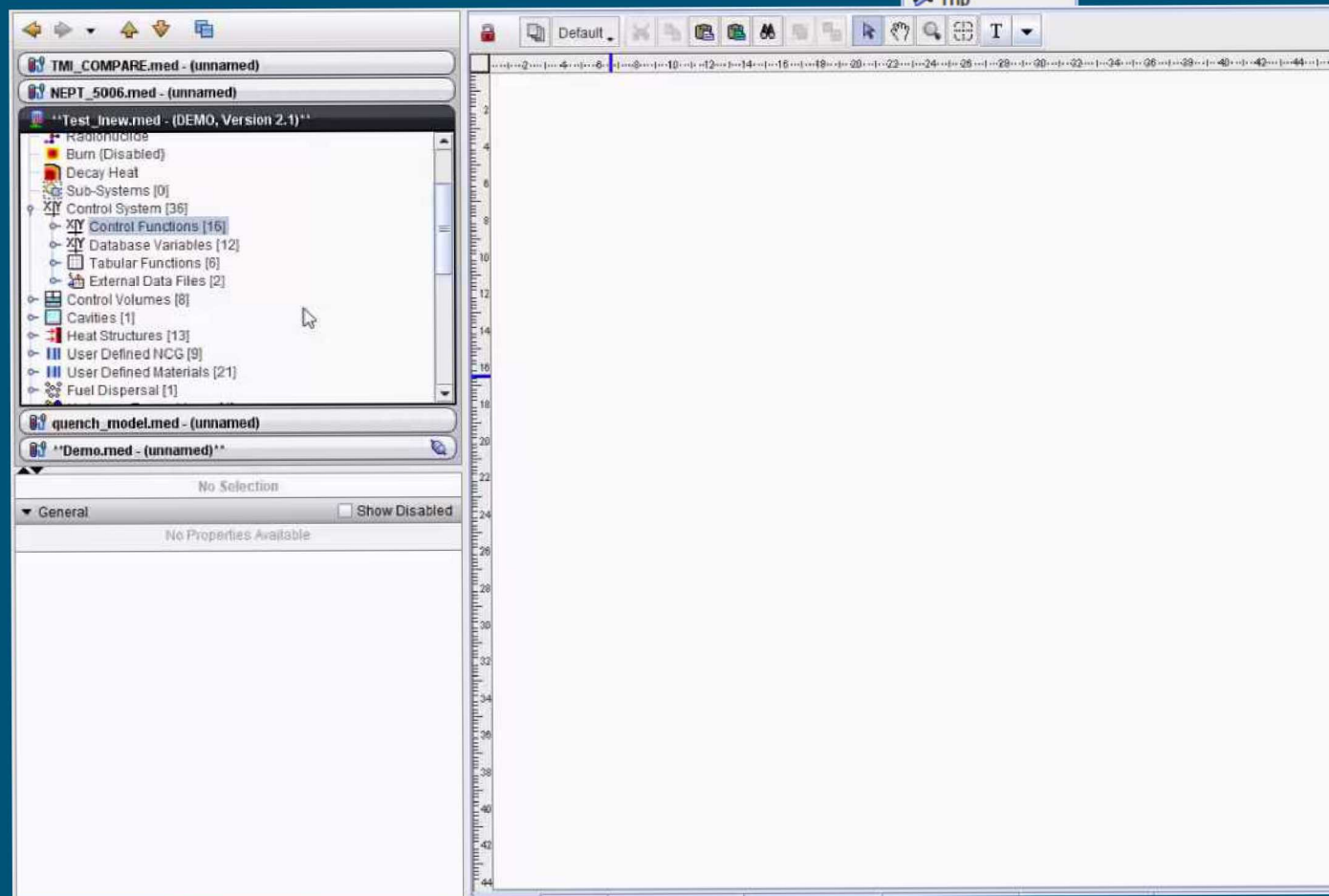
- Debugging complex control function logic
- User can watch (debug) control function values

## Model Editor

- Add the control functions to a view within the model editor
- Select those control functions you want to add to your animation and copy

## Animation Editor

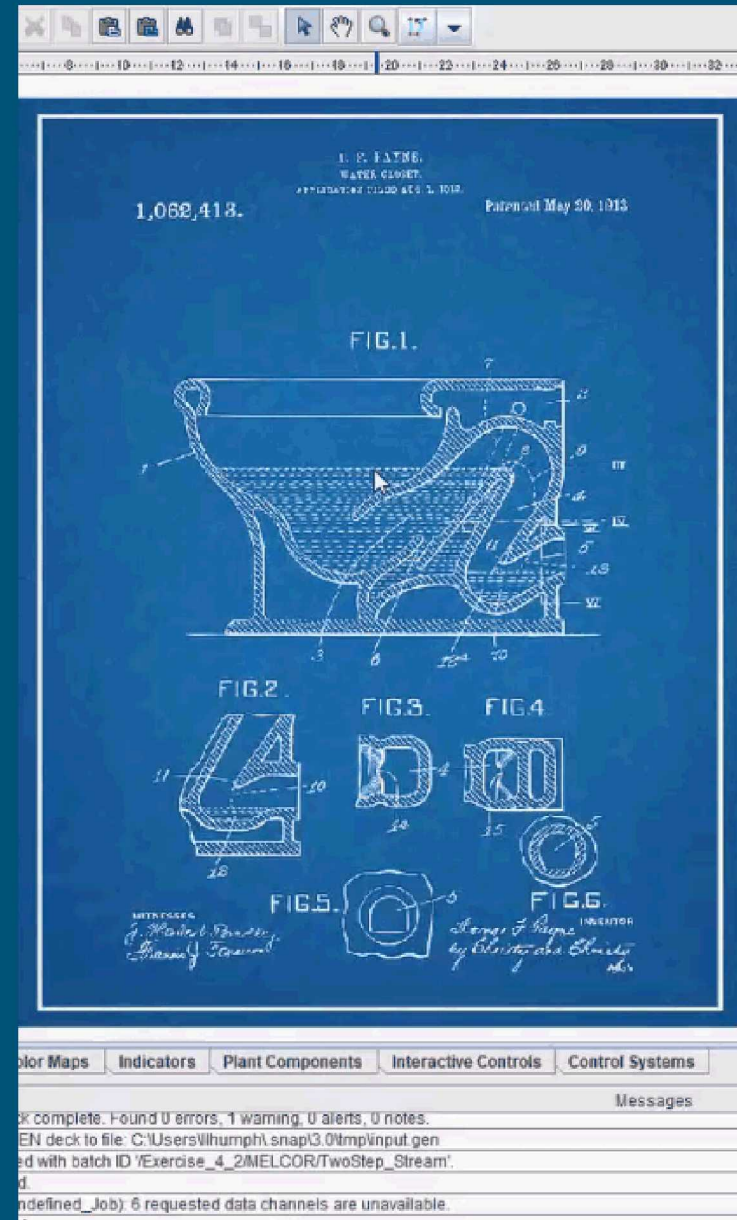
- Paste directly into a view
- Add any interactive controls
- Modify any formatting
- Lock view and play back



# Creating a Basic Animation Element

## Creating a Polygon

- Select Polygon from the Annotation section of the View Port Toolbar (review earlier slides if you can't remember what the Toolbar looks like)
- Start clicking in the View port and the drawing logic will become clear (left click to set a point, right click to remove the last point)
- If you click on top of an old point it will close the polygon and the instance will be complete.



# Running an interactive model – Model editor + coupled animation

Load Model in the Model Editor

- Modify the MELCOR Step
- Activate interactive step
- Start paused

MELCOR Step 2 (MC\_Step)

General ☐ Show Disabled

Name	MC_Step	
Description	<none>	E ?
Stream	TwoStep_Stream	S ?
Application	MELCORv22	S ?
Relative Location		
View in Job Status	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Animation Model	<input type="checkbox"/> <Inactive>	S ?
Interactive Step	<input checked="" type="radio"/> On <input type="radio"/> Off	
Start Paused	<input checked="" type="radio"/> On <input type="radio"/> Off	
Keywords	No Keywords	E ?
Conditional Logic	None	E ?
Input Files	[2] Inputs Defined	E ?
Output Files	[9] Outputs Defined	E ?
Custom Processing	2 System Commands	E ?

Task Bundling

Interactive variables are defined in the control functions

- READ for a real variable
- L-READ for a logical variable

XY CF 1 (valve)

General ☐ Show Disabled

Name	valve	
Number	1	
Description	<none>	E ?
Type	READ	S ?
Mult Scale Factor	1.0 (-)	
Additive Constant	0.0 (-)	
Initial Value	<input checked="" type="checkbox"/> 1000.0 (-)	
Boundary Input Mode	[0] No Boundary Input	
Arguments	[0] Valid Values	E ?

ASCII View - CF 1 (valve)

```
!      cfname      icfnum      cfstype
CF_ID      'valve'      1      READ
!      cfscal      cfadcn      cfvalr
CF_SAI      1.0      0.0      1000.0
```

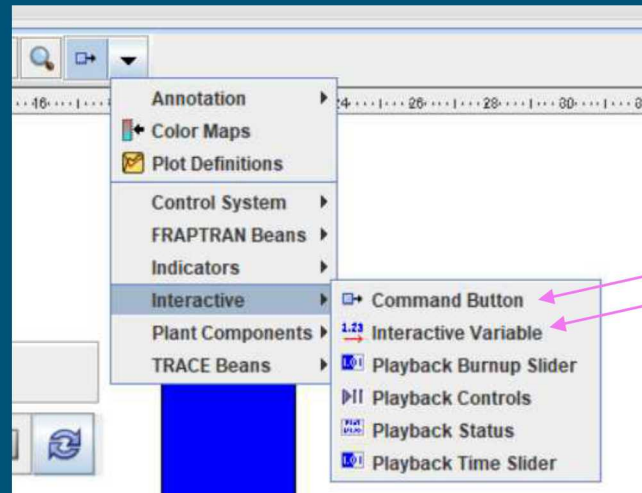
Close



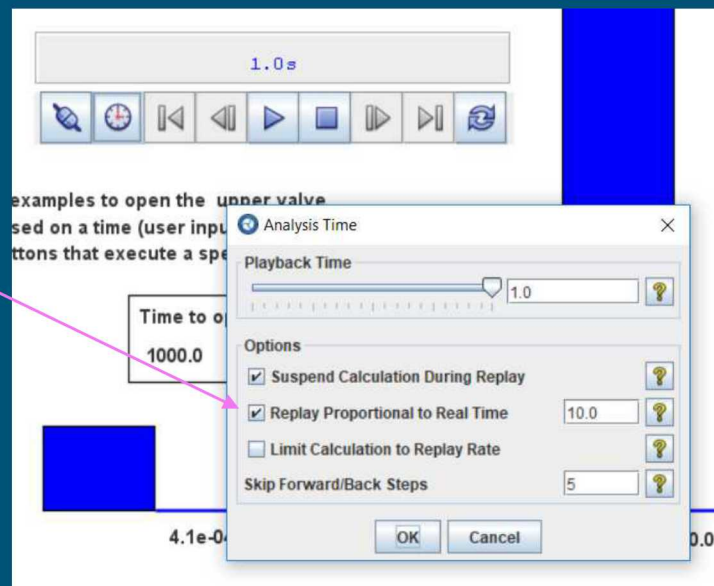
# Setting up a coupled interactive animation

Interactive variables are selected using the interactive functions

- Command button for selects pre-specified values
- Interactive variable takes user input (e.g., time to close the valve)



Slowdown the calculation for this example to 10X of real time



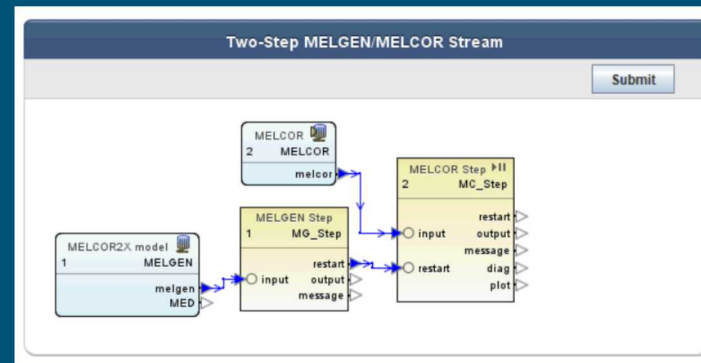
# Running an interactive model

## Launch the calculation in the Model Editor

- Use the two-step job stream in the Model Editor
- MELCOR will initialize as paused

## Open the Animation Display

- Data source is the calculation from the Model Editor (see below)
- Connect the Animation model and start the calculation.



The screenshot shows the "Master (MC\_Step)" configuration in the Model Editor on the left and the "Select Data Source" dialog on the right. The dialog lists various data sources, with "TwoStep\_Stream/MC\_Step" selected. A pink arrow points from the "Source Run URL" field in the Model Editor to the selected data source in the dialog.

Job	Job Type	Status	Submitted	Completed	Calc Time
MG_Step	MELGEN	Complete	11:15:34	11:15:40	No Data
MC_Step	MELCOR	Paused	11:15:44	n/a	1.0