



ALL NEW RSCAD-FX

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AGENDA

- RSCAD Re-Write Project Overview
- RSCAD-FX RunTime
- RSCAD-FX Features
- Future Developments
- Questions

RSCAD[®]FX

RSCAD-FX RE-WRITE PROJECT

Overview

- RSCAD FX project began in 2018
- Objectives were
 - To modernize the RSCAD GUI
 - To improve RSCAD's useability by addressing the requests from customers over the years.
 - To use an updated technology stack
- The project was broken up into phases
 - Phase I Draft Re-write, C-Builder Re-write and the ICT Development
 - Phase II Runtime Re-write
 - Phase III Python Scripting Support
 - Phase IV ???

RSCAD-FX REWRITE PROJECT

Phase I – Draft Rewrite (RSCAD-FX 1.0)

- Released in April 2021
- Largely a porting of existing functionality into a modernized framework.
- More extensive use of Tabs and Drag and Drop functionality.
- Redesigned the library into a Tree Structure.
- New features such as Wire Mode and Auto-Naming were introduced.
- The CBuilder and ICT Tool redevelopments were initiated.
- Initially, some users liked it, others did not.
- The Draft portion of RSCAD FX is maturing and users are becoming comfortable with it.

RSCAD-FX REWRITE PROJECT

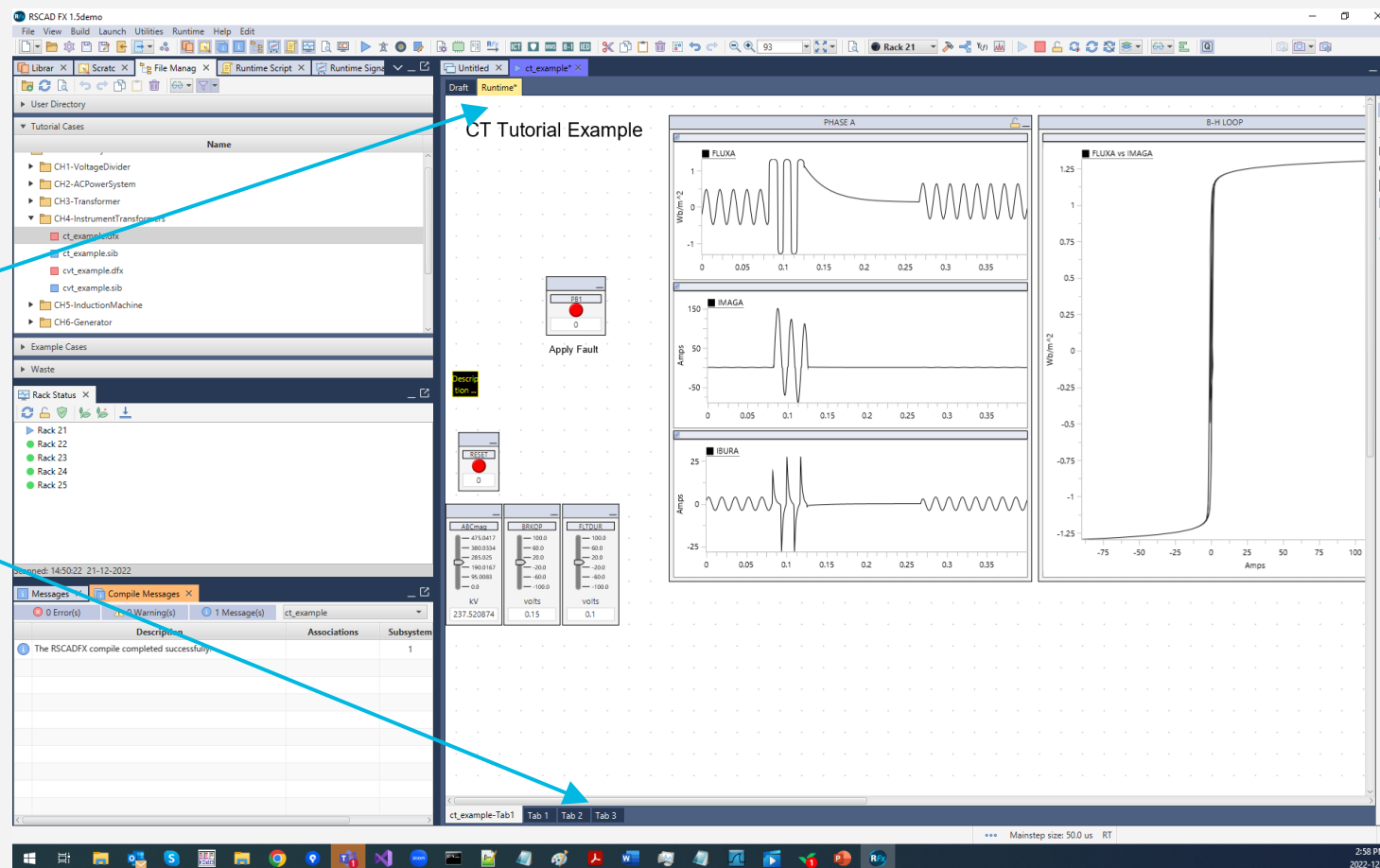
Phase II – Runtime Rewrite (RSCAD-FX 2.0)

- Released in May of 2023
- The main objective was to implement the key functionality available in RSCAD-V5 RunTime.
- Other objectives were to add following features to make it more user friendly.
 - Runtime Overlays.
 - Better Mechanism for adding plots and meters.
 - Integrated Case Files.
 - Enhanced Runtime Graphics.
 - Tighter integration of Draft and Runtime functionality.
- Like the Draft release, reception has been mixed. Some users like it, others don't.
- We're actively fixing bugs and making refinements.

RSCAD-FX RUNTIME

RunTime Environment

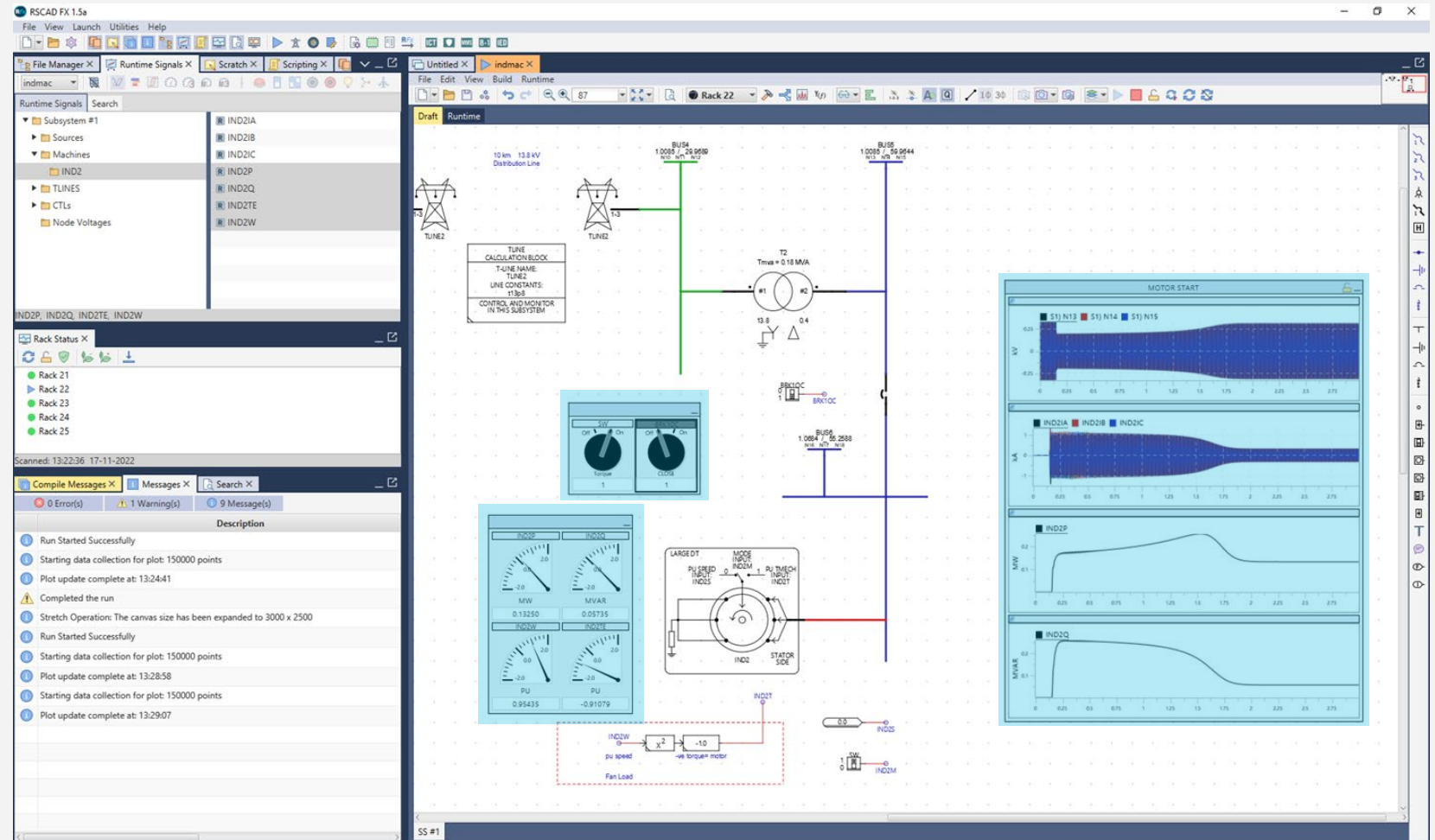
- RunTime is now a Tab under the case tab
- It can be docked/undocked.
- Multiple RunTime Panels can be added



RSCAD-FX RUNTIME

RunTime Overlay

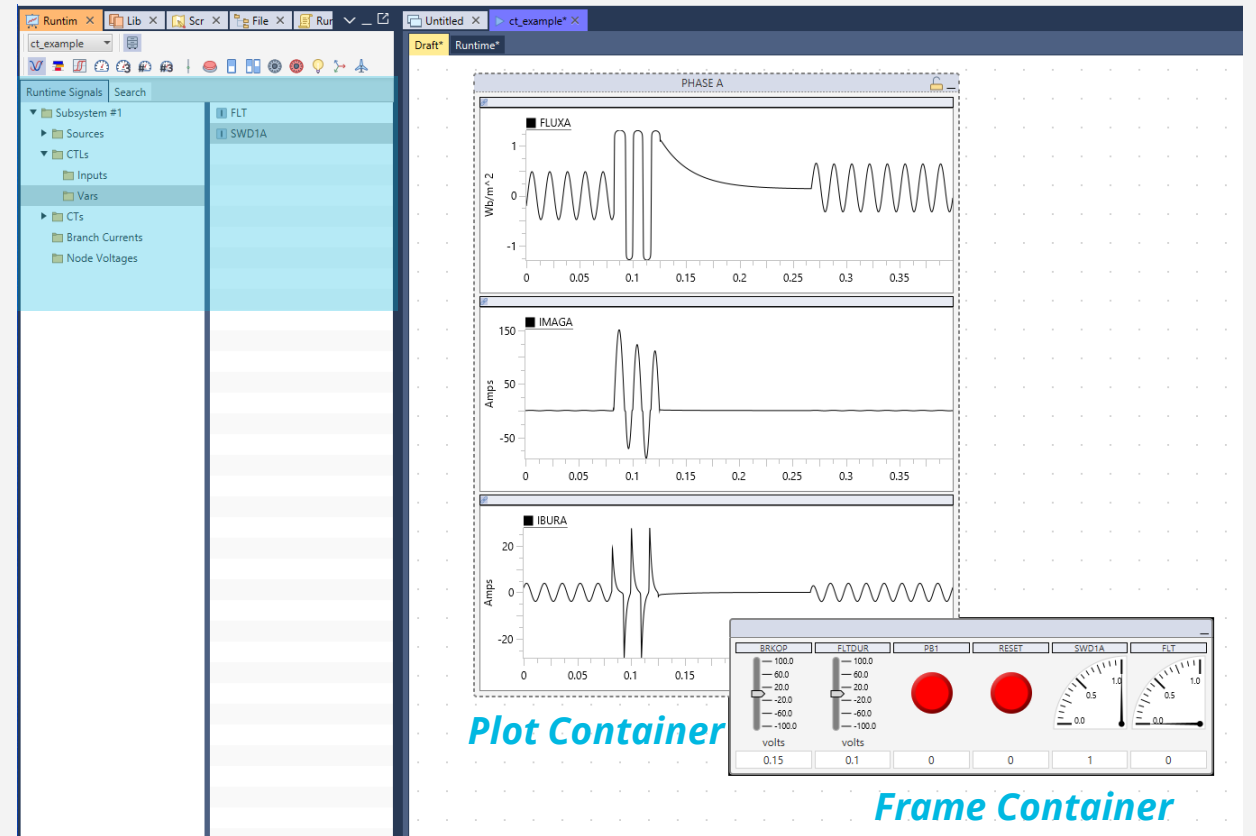
- Plots, Meters and Other RunTime Objects can be placed in Draft canvases.



RSCAD-FX RUNTIME

RunTime Signals Utility Tab

- Runtime Signals Utility Tab allows signals to be drag and dropped onto the runtime canvas
- RunTime objects like Meters, Graphs, 3P RMS, Vector Displays, Switches, Buttons etc. can be grouped in containers to be easily moved together and re-arranged.
- Multiple types of RunTime objects can be added at one time making it faster to create an HMI for a simulation



RSCAD-FX RUNTIME

Scripting

Scripting Utility Tab

Integrated Text Editor

The screenshot displays the RSCAD-FX Runtime interface. On the left, the 'Scripting Utility Tab' is active, showing an integrated text editor with the following code:

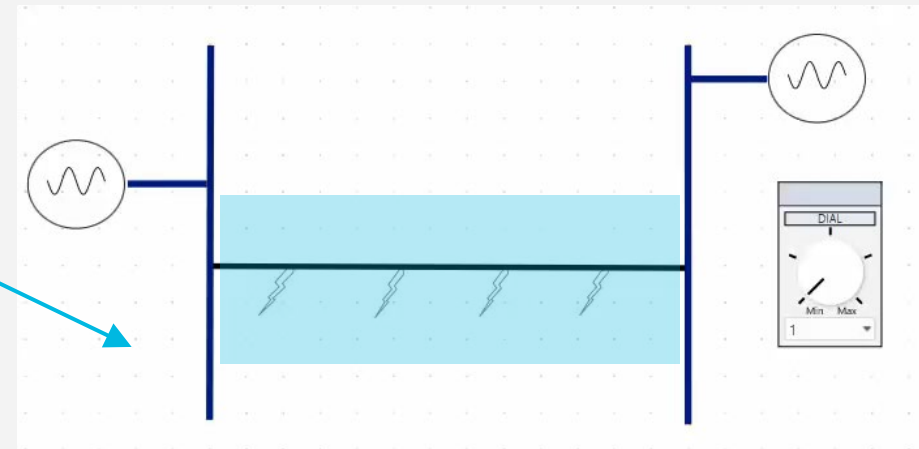
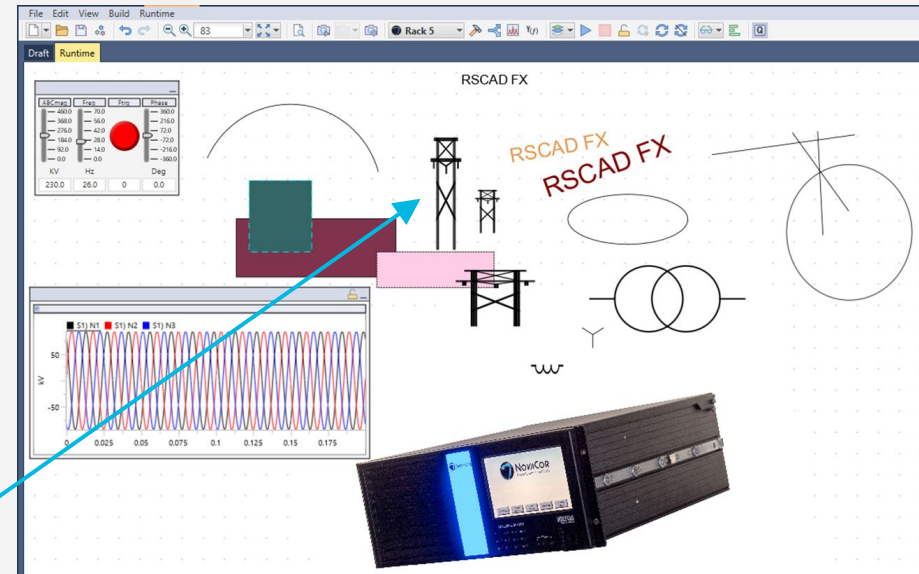
```
batchmode.scr X
8
9 /*-----*/
10 /*      Initialization      */
11
12 length[0] = 40.0;
13 length[1] = 50.0;
14 length[2] = 80.0;
15
16 res[0] = 0.1;
17 res[1] = 1.0;
18 res[2] = 5.0;
19
20 fault_typeA[0] = 1;
21 fault_typeA[1] = 0;
22 fault_typeA[2] = 0;
23
24 fault_typeB[0] = 0;
25 fault_typeB[1] = 2;
26 fault_typeB[2] = 0;
27
28 fault_typeC[0] = 0;
29 fault_typeC[1] = 0;
30 fault_typeC[2] = 4;
31
32 for (j=0;j<3;j++)
33 {
34 /* Set the preprocessor variable length */
35 SetSlider "DraftVariables : length" = length[j];
36
37 for (k=0;k<3;k++)
38 {
39 /* Set the fault type */
40 SetSwitch "Subsystem #1 : CTLs : Inputs : AG" = fault_typeA[k];
41 SetSwitch "Subsystem #1 : CTLs : Inputs : BG" = fault_typeB[k];
42 SetSwitch "Subsystem #1 : CTLs : Inputs : CG" = fault_typeC[k];
43
44 for (i=0;i<3;i++)
45 {
46 loop_counter++;
47 /* Set the fault resistance */
48 SetSlider "DraftVariables : Res" = res[i];
49 fprintf(stderr,"Running Simulation Case Number %d\n",loop_counter);
50 Start;
51 UpdatePlots;
52 pk_volts = arraymax(Volts);
53 fprintf(stdout,"Fault Bus Voltage = %f kV\n",pk_volts);
54
55 WAIT 2.004;
56 PushButton "Subsystem #1 : CTLs : Inputs : Fault";
57 WAIT 0.201;
58 ReleaseButton "Subsystem #1 : CTLs : Inputs : Fault";
59 }
60 }
61 }
62
63 offline.
```

On the right, the 'Runtime' tab is active, showing a 'Fault Bus' plot with three waveforms (S1 N1, S1 N0, S1 N9) and several control panels: 'Apply Fault', 'Fault Duration', 'Fault Type', 'Fault Resistance', and 'Line Length'. The 'Fault Bus' plot shows a sinusoidal waveform with a peak voltage of approximately 200V. The 'Fault Resistance' panel shows a slider set to 100 ohms, and the 'Line Length' panel shows a slider set to 80.0.

RSCAD-FX RUNTIME

Enhanced Runtime Graphics

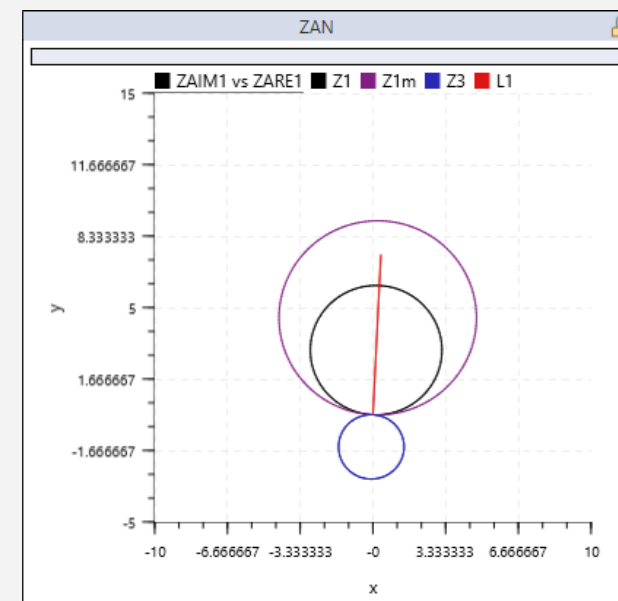
- Increased number of shape properties gives increased flexibility
- Added the ability to add multiple resizable images so that it is easier to make HMIs representing the simulation.
- Properties can be changed conditionally based on signals in simulation.



RSCAD-FX RUNTIME

Other Notable Features in Runtime

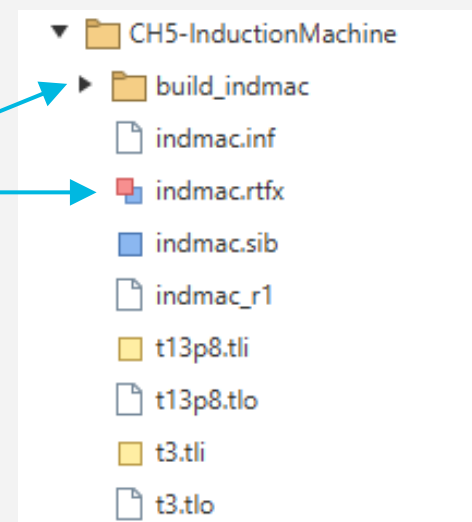
- Added Undo/Redo Functionality.
- Tighter integration of Draft and Runtime so that changes in one does not break the other.
 - Ex: Moving signals between Subsystems or between Mainstep-Substep)
- Improved Relay Characteristics Curves in Plots.
- Added support for saving plot data in COMTRADE v2013 format.



RSCAD-FX FEATURES

Integrated Case File – RTFX File

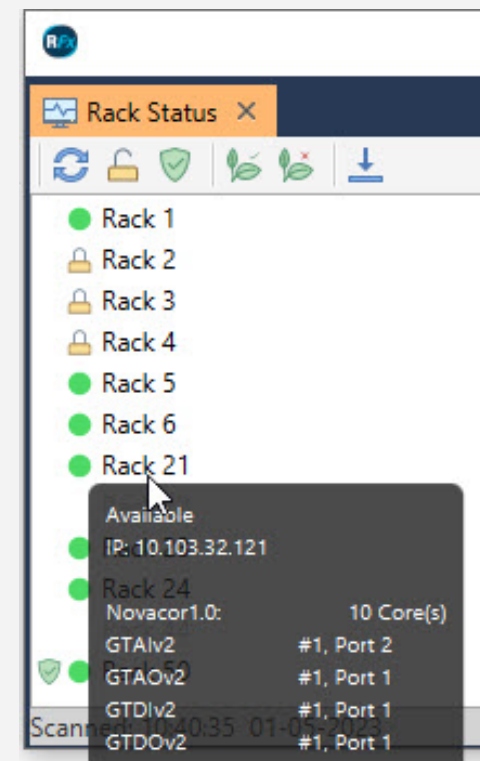
- RTFX case file is a zip file
 - DFX – Draft case
 - RTX – Runtime
 - Other connecting files
- Build folder
 - Contains files created during a draft compile
- All other files (Cable, Tline, etc.)
 - Linked to RTFX case file by being in the same directory
- When the user converts a .sib file to .rtx, the conversion will put it inside the RTFX zip file



RSCAD-FX FEATURES

Rack Status Utility Tab

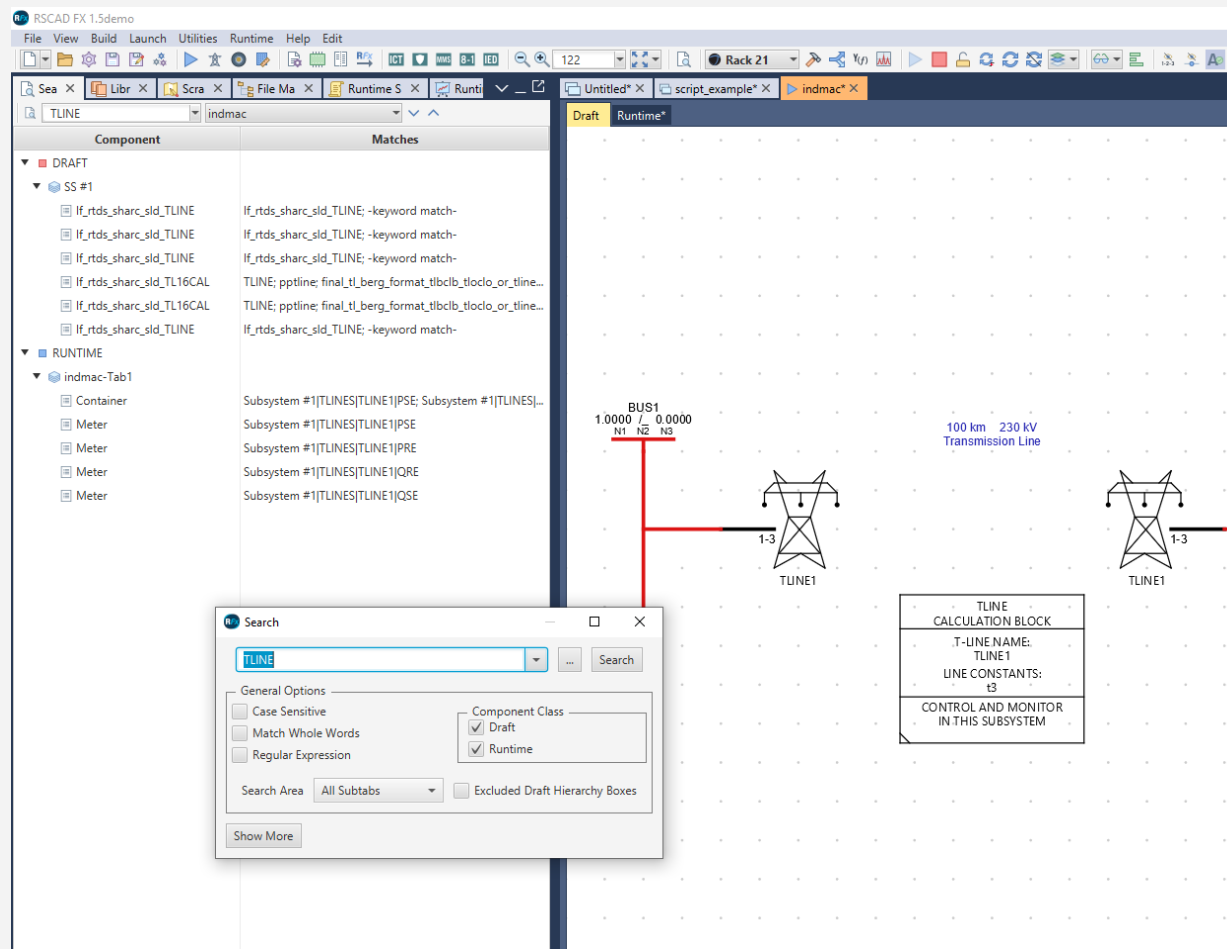
- Provides easy access to available hardware configurations
- Provides information on
 - Current status (Free/Used/Locked)
 - IP address
 - Number of Cores
 - Connected peripheral cards and port numbers
- Rack Security
- Retrieve Rack Logs
- Low Power Mode



RSCAD-FX FEATURES

Search Feature

- Moved existing functionality into a utility tab
- Required in order to consolidate Runtime and Draft searches
- Kept existing Tree view



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Upcoming Features

RSCAD-FX FUTURE DEVELOPMENTS

Python Scripting

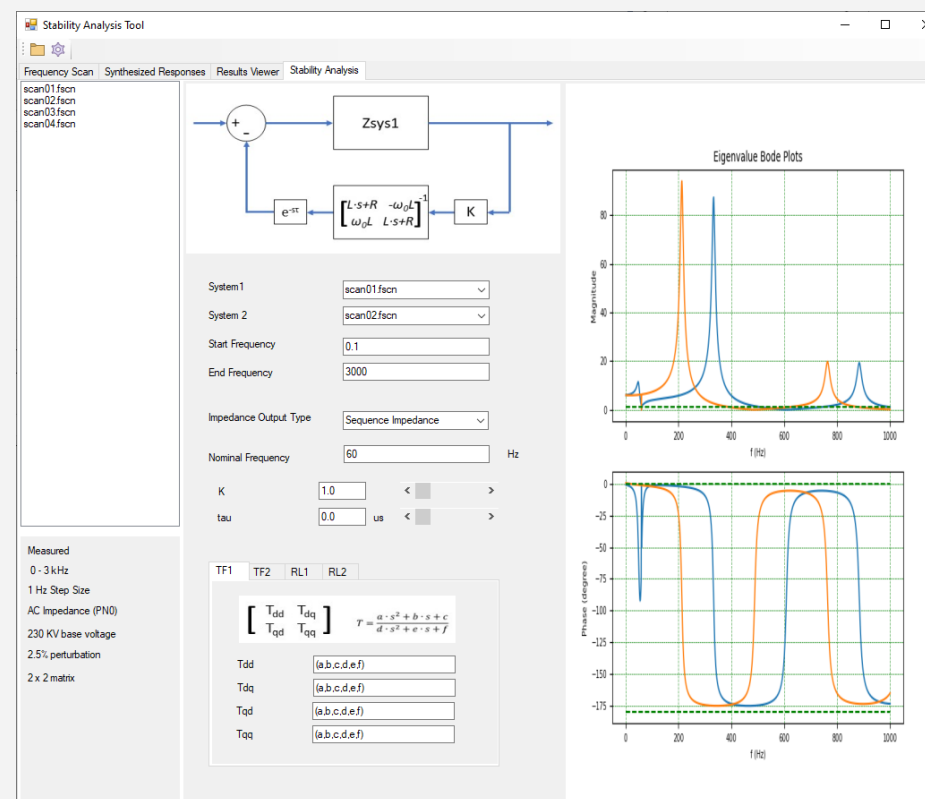
- Moving towards Python-based scripting.
- Increasingly common feature requests from clients.
- Future scripting enhancements will be made for Python Scripting only.
- Legacy scripting support will remain but will be deprecated.
- Functionality will probably be released in stages.



RSCAD-FX FUTURE DEVELOPMENTS

Stability Analysis Tool

- Tool to analyze the harmonic scan.
- Input impedance as a function of frequency can be measured and plotted
- The effect of providing specific closed loop control of the measured systems can be analyzed.
- phase margin and magnitude margin of the closed loop systems is provided.



RSCAD-FX FUTURE DEVELOPMENTS

Incremental Improvements

- Bug fixes
- Refinements based on the feedback received.
- Performance improvements
- There were several omissions from the initial Runtime FX release due to time constraints. Those features will be added in future.
 - Displaying meters as a graphs
 - Saving plots as vector graphics
- Going forward RSCAD-FX development will be an ongoing, continual process to address the feedback from users.

Questions?