

# **SIL Solver® Enterprise**

## **Rev 1.2.0**

### **User Instructions**

SIS-TECH Solutions, LP

**We're Proven-in-Use®**

# Welcome

- Welcome to SIL Solver® Enterprise.
- This presentation is sectioned to make it easier to navigate. You can collapse the slides to the sections using the tool bar.
- **If you need assistance or would like to provide us with feedback, contact:**
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# SIL Solver®

## **We are Proven in Use**

- More than 100 companies have chosen SIL Solver® for their functional safety verification since 2002

## **We Build upon Field Experience**

- The built-in SIL Solver® database uses field failure data as a basis, reflecting real-world device performance

## **We are Internationally Recognized**

- SIL Solver® uses internationally recognized methods for PFD and STR calculation
- SIL Solver® is used by companies worldwide

# User Instructions

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1. Logging in
2. Creating a new project and functions
3. Editing, Copying or deleting a project
4. Generating reports
5. Importing/Exporting projects and functions
6. Datasheets
7. Troubleshooting

# 1. LOGGING IN

- Licensing
- Assigning username and password for new user
- Logging in



# Licensing

- SIL Solver<sup>®</sup> is licensed software
  - Each enterprise license includes one administrator account and two user licenses
  - Additional user licenses can be purchased
- To request a quote for a new license, contact SIS-TECH at:  
<http://sis-tech.com/applications/sil-solver>

# Assigning username and password to new user

- Assignment/re-assignment of usernames and passwords is performed through the administrator account of the purchasing company

# Logging In: User Name and Password

Purchasing companies  
will have their own server  
locations

For training classes,  
in any web browser go to,  
[http://silsolver.sis-  
tech2.com/](http://silsolver.sis-tech2.com/)

Log in with your assigned  
User name and Password



The image shows a login interface for 'SIL SOLVER'. At the top, the text 'SIL SOLVER' is displayed in a large, green, 3D-style font, with a green diamond-shaped logo containing a stylized 'S' between the words. Below this, the word 'LOGIN' is centered in a white, sans-serif font on a green background. Underneath 'LOGIN', there are two white input fields. The first field is labeled 'USER NAME' in a small, green, sans-serif font. The second field is labeled 'PASSWORD' in a small, green, sans-serif font. At the bottom of the green area, there is a white rectangular button with the word 'Login' in a green, sans-serif font.



## 2. CREATING A NEW PROJECT

- Setting up the project information
- Creating a safety function
- Copying a safety function
- Editing a safety function

Starting a new project

Exit the software



Welcome, srtzvi

Site: BOGCI  
Projects

Project ID: SPLPNCwork

|            |        |        |               |                  |                     |            |                 |                   |                   |
|------------|--------|--------|---------------|------------------|---------------------|------------|-----------------|-------------------|-------------------|
|            |        | Open   | New           | Edit             | Copy                | Delete     | Exit            | Project Revision  | User Guide        |
| DBF Import | Import | Export | Print Reports | PF Documentation | Project Data Sheets | PF Details | PF Data Summary | PF Target Results | PF Result Summary |

| Site | Location | Project ID | Project Name |
|------|----------|------------|--------------|
|      |          |            |              |

No data to display

Create Filter

Project List

Filters may be useful to users with long project lists

Site: [BOGCI](#) Project ID: [SPLPNCwork](#)

# Projects

|            |  |        |            |               |                  |                     |            |                  |                   |                   |
|------------|--|--------|------------|---------------|------------------|---------------------|------------|------------------|-------------------|-------------------|
|            |  | Open   | <b>New</b> | Edit          | Copy             | Delete              | Exit       | Project Revision | User Guide        |                   |
| DBF Import |  | Import | Export     | Print Reports | PF Documentation | Project Data Sheets | PF Details | PF Data Summary  | PF Target Results | PF Result Summary |

| Site                 | Location             | Project ID           | Project Name         |
|----------------------|----------------------|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

No data to display

Create Filter

Click to create a new project

The window below pops up,  
type in relevant information  
and click "Save"

Add New Project

Site:

Location:

Project ID:

Name:

Save Close

Add New Project

Site:

Location:

Project ID:

Name:

Save Close

# Success!

**SIL SOLVER** Welcome, srizvi

Site: **SIS-TECH** Project ID: **Practice**

Projects

**Saved Successfully**

DBF Import Import Export Print Reports PF Documentation Project Data Sheets PF Details PF Data Summary PF Target Results PF Result Summary

Open Review Edit Copy Delete Exit **Project Revision** User Guide

| Site     | Location           | Project ID | Project Name        |
|----------|--------------------|------------|---------------------|
| SIS-TECH | Pretend location 1 | Practice   | Practice setting up |

Set initial project revision information

**SIL SOLVER** Welcome, srizvi

Site: **SIS-TECH** Project ID: **Practice**

New Open Delete Report Exit

| Project Version             | Performed By | Date      | Approved By | Date |
|-----------------------------|--------------|-----------|-------------|------|
| My Training Class Project 1 | S. Rizvi     | 5/22/2019 |             |      |

No data to display

☒ Begins with([Project Version], 'My Training Class Project 1') And Begins with([Performed By]),...

Clear



# Steps for adding a safety function

1. Obtain functional description from Hazard and Risk Analysis (H&RA) documentation
2. Open Project
3. Select new function and enter function identification fields
4. Enter performance targets
5. Enter function architecture through GUI interface and populating the architecture with devices
6. Perform calculation
7. Re-iterate with design modifications if necessary to get successful design



# Example SIF

Information from H&RA and related process requirement specification (PRS) information

- SIF 01
- SIL-1 (20% design margin)
- Low Demand mode
- Spurious trip target = 20 yrs
- Desired test interval = 5 yrs
- V-101 High DP (2oo3, DP-101A/B/C) trip closes XV-101A and XV-101B (1oo2) ball valves spring loaded to the closed position, each with a single ETT solenoid (XY-101A and XY-101B)
- Power supply is monitored and is tested at 5 yr interval
- Existing logic solver (SIS-A) is safety configured system with 1oo2D CPU and simplex I/O

# Opening the project

Start from Project home page

Select the Project by left-click (first project in list is selected by default)

Click Open



Welcome, srtzvi

Site: [SIS-TECH](#) Project ID: [Practice](#)

Projects

| Site     | Location           | Project ID | Project Name        |
|----------|--------------------|------------|---------------------|
| SIS-TECH | Pretend location 1 | Practice   | Practice setting up |

Create Filter

DBF Import Import Export Print Reports PF Documentation Project Data Sheets PF Details PF Data Summary PF Target Results PF Result Summary

Open New Edit Copy Delete Exit Project Revision User Guide

# Protective Function Level

- The layout is the same as the main page with list of projects except that on the project level, we have the project information listed and do NOT have the DBF import function

**SIL SOLVER** Welcome, srizvi

Site: [SIS-TECH](#) Project ID: [Practice](#) Function ID:

**Protective Function**

|                    |          | Import            | Export           | Open                | New               | Edit              | Copy              | Delete             | Exit | PF Revision Level |
|--------------------|----------|-------------------|------------------|---------------------|-------------------|-------------------|-------------------|--------------------|------|-------------------|
|                    |          | Print Reports     | PF Documentation | Project Data Sheets | PF Details        | PF Data Summary   | PF Target Results | PF Results Summary |      |                   |
| Function ID        | Function | Mode Of Operation | PFD Target       | PFD Result          | STR Target (1/yr) | STR Result (1/yr) | IL Target         | IL Result          |      |                   |
|                    |          |                   |                  |                     |                   |                   |                   |                    |      |                   |
| No data to display |          |                   |                  |                     |                   |                   |                   |                    |      |                   |

Create Filter

Project information.

# Start a new safety function

**SIL SOLVER** Welcome, srizvi

Site: **SIS-TECH** Project ID: **Practice** Function ID:

**Protective Function**

| Function ID | Function | Mode Of Operation | PFD Target | PFD Result | STR Target (1/yr) | STR Result (1/yr) | IL Target | IL Result |
|-------------|----------|-------------------|------------|------------|-------------------|-------------------|-----------|-----------|
|             |          |                   |            |            |                   |                   |           |           |

No data to display

Create Filter

- Enter ID, brief version of H&RA description, Mode of Operation, and Save

**Protective Function**

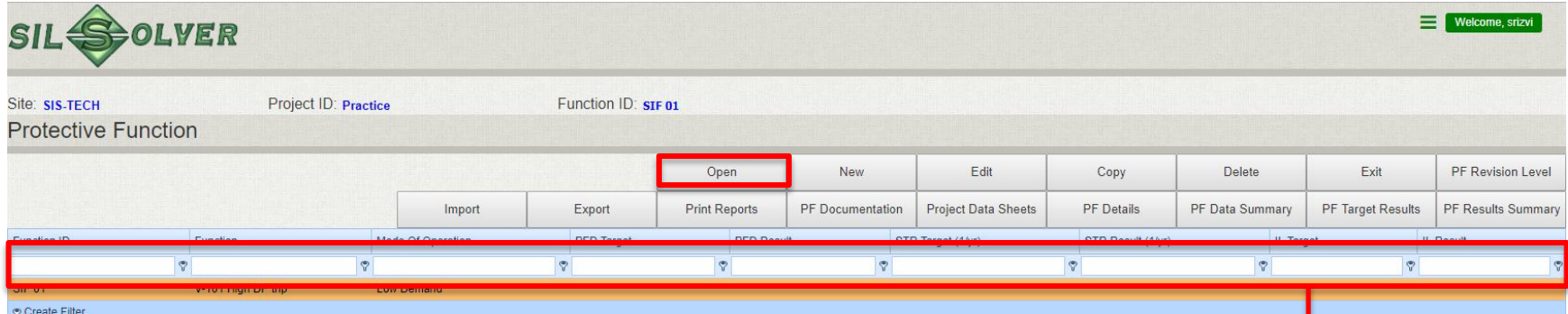
Function ID:

Function :

Mode of Operation:



# Success!



- Select function and click Open to begin configuring SIF

Fields for filtering can be useful for projects with long lists of protective functions



# Function GUI Interface

SIF project information

SIF calculation results both numerical and graphical

HFT for Logic Solver

HFT for Inputs(s)

HFT for Action(s)

HFT for Support System 1

HFT for Support System 2

HFT for Manual Input

HFT for Manual Action

The Backward and Forward buttons only have meaning when you have multiple functions in the project

Modelling panel, where you select system configuration and component.

The screenshot shows the SIS-TECH SIL SOLVER GUI. At the top, there's a header bar with project information: Site: SIS-TECH, Project ID: Prac Proj, Function: and so on, Function ID: test42. A welcome message 'Welcome, kkottawar' is displayed. Below this is a table with columns: PFDavg, IL, STR (1/Yr), MTTFs (Yr), and HFT. The table has rows for TARGETS, RESULTS, and TARGETS MET?. To the right of the table is a 'PFD/STR Breakdown' section with two sub-sections: PFDavg and STR, both showing 'No data'. Further right is a grid of HFT buttons: HFT<sub>IN</sub>, HFT<sub>LS</sub>, HFT<sub>ACT</sub>, HFT<sub>SPT1</sub>, HFT<sub>SPT2</sub>, HFT<sub>MIN</sub>, and HFT<sub>MACT</sub>. Below the table and breakdown sections are buttons for 'Calculate and Save', 'Print', and 'Reset'. On the left side, there's a 'Modelling panel' with a list of system configurations: SRS, LOGIC SOLVER, INPUT CONFIGURATION, INPUT DEVICE, ACTION CONFIGURATION, ACTION DEVICE, SUPPORT CONFIGURATION, SUPPORT SYSTEM, CUSTOMER DEVICE, and MANUAL DEVICE. A red box highlights this panel. Red arrows point from the labels to the corresponding GUI elements: 'SIF project information' points to the header bar; 'SIF calculation results both numerical and graphical' points to the table and breakdown sections; 'HFT for Logic Solver' points to the HFT<sub>LS</sub> button; 'HFT for Inputs(s)' points to the HFT<sub>IN</sub> button; 'HFT for Action(s)' points to the HFT<sub>ACT</sub> button; 'HFT for Support System 1' points to the HFT<sub>SPT1</sub> button; 'HFT for Support System 2' points to the HFT<sub>SPT2</sub> button; 'HFT for Manual Input' points to the HFT<sub>MIN</sub> button; 'HFT for Manual Action' points to the HFT<sub>MACT</sub> button; 'The Backward and Forward buttons only have meaning when you have multiple functions in the project' points to the 'Calculate and Save' and 'Print' buttons; and 'Modelling panel, where you select system configuration and component.' points to the 'Modelling panel' list.

# Zooming

Use the + and – buttons to zoom in and out on the figure

*You cannot interact with certain features in a zoomed state*

The screenshot displays the SIL SOLVER software interface. At the top, the header shows 'Site: SIS-TECH Practice' and 'Function: V-101 High DP trip SIF 01'. A 'Welcome, srizvi' message is also present. The main workspace is divided into several sections: 'PFDavg', 'IL', 'STR (1/Yr)', 'MTTFs (Yr)', and 'HFT'. The 'PFD/STR Breakdown' section shows 'No data' for both 'PFDavg' and 'STR'. The 'HFT' section includes a table with columns for 'HFT<sub>IN</sub>', 'HFT<sub>LS</sub>', 'HFT<sub>ACT</sub>', 'HFT<sub>SPT1</sub>', 'HFT<sub>SPT2</sub>', 'HFT<sub>MIN</sub>', and 'HFT<sub>MACT</sub>'. The left sidebar contains a list of navigation options: SRS, PROCESS HAZARD, DESCRIPTION, DIAGNOSTICS, RESET, SHUTDOWN, REFERENCE, COMMENTS, LOGIC SOLVER, INPUT CONFIGURATION, INPUT DEVICE, ACTION CONFIGURATION, ACTION DEVICE, SUPPORT CONFIGURATION, SUPPORT SYSTEM, and CUSTOMER DEVICE. The main workspace shows a zoomed-in diagram of a process unit, which is a rectangle with 'Noon' written vertically on both the left and right sides. Red arrows point to the zoom controls (a '+' and '-' button) and the 'Reset' button in the top right corner of the workspace.

Use the Reset to return to the base view required for editing

# Entering Performance Targets

Click any cell in Targets row of table to open dialog box

Site : SIS-TECH  
Project ID: Practice

Function : V-101 High DP trip  
Function ID : SIF 01

Welcome, srizvi

SIL SOLVER

|              | PFDavg | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|--------------|--------|----|------------|------------|-----|
| TARGETS      |        |    |            |            |     |
| RESULTS      |        |    |            |            |     |
| TARGETS MET? |        |    |            |            |     |

PFDavg

STR

HFT<sub>IN</sub>

HFT<sub>LS</sub>

HFT<sub>ACT</sub>

HFT<sub>SPT1</sub>

HFT<sub>SPT2</sub>

HFT<sub>MIN</sub>

HFT<sub>MACT</sub>

Exit

Calculate and Save

Print

Reset

SRS

PROCESS HAZARD

DESCRIPTION

DIAGNOSTICS

RESET

SHUTDOWN

REFERENCE

COMMENTS

LOGIC SOLVER

INPUT CONFIGURATION

INPUT DEVICE

ACTION CONFIGURATION

ACTION DEVICE

SUPPORT CONFIGURATION

SUPPORT SYSTEM

CUSTOMER DEVICE

Noon

Noon

Target Specification

PFDavg 0.08

MTTFs (Yr) 20

Save

Enter performance targets and save

# Success!

The screenshot displays the SIL Solver software interface. At the top, a status bar shows 'Site: SIS-TECH Practice' and 'Function: V-101 High DP trip SIF 01'. A central dialog box titled 'Silsolver' displays the message 'Target saved successfully..!!' with an 'OK' button. The main window features a 'Breakdown' section with a table of HFT values and a 'Logic Solver' menu on the left. The 'Logic Solver' menu is highlighted with a red box, indicating the next step in the configuration process.

|              | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|--------------|----------|----|------------|------------|-----|
| TARGETS      | 8.00E-02 | 1  | 5.00E-02   | 20         | 0   |
| RESULTS      |          |    |            |            |     |
| TARGETS MET? |          |    |            |            |     |

| HFT <sub>IN</sub>   | HFT <sub>LS</sub>   | HFT <sub>ACT</sub> |                     |
|---------------------|---------------------|--------------------|---------------------|
|                     |                     |                    |                     |
| HFT <sub>SPT1</sub> | HFT <sub>SPT2</sub> | HFT <sub>MIN</sub> | HFT <sub>MACT</sub> |
|                     |                     |                    |                     |

Logic Solver Menu:

- SRS
- PROCESS HAZARD
- DESCRIPTION
- DIAGNOSTICS
- RESET
- SHUTDOWN
- REFERENCE
- COMMENTS
- LOGIC SOLVER**
- INPUT CONFIGURATION
- INPUT DEVICE
- ACTION CONFIGURATION
- ACTION DEVICE
- SUPPORT CONFIGURATION
- SUPPORT SYSTEM
- CUSTOMER DEVICE

Close dialog box and select Logic Solver on left to begin configuration

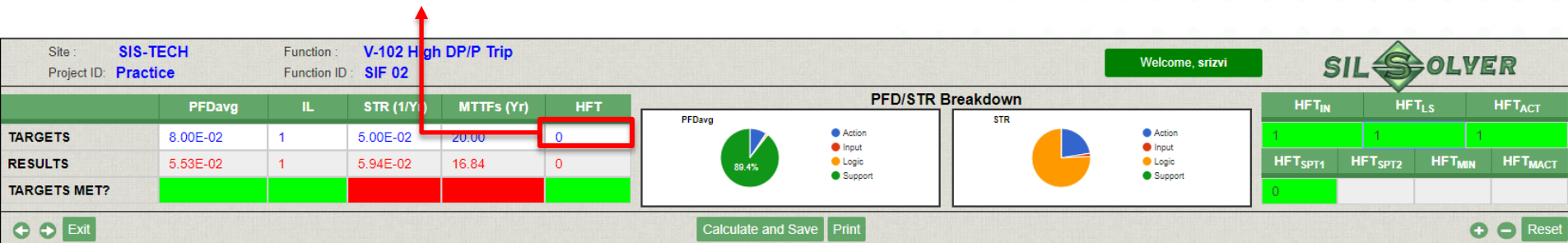


# HFT Target

HFT target is based on the SIL Target and SIS Mode of Operation. If no PFDavg target has been entered (which would result in no SIL target), HFT target will be set to null.

| SILTarget | Mode of Operation | HFT target for each subsystem |
|-----------|-------------------|-------------------------------|
| 1         | Low Demand        | 0                             |
| 1         | High Demand       | 0                             |
| 2         | Low Demand        | 0                             |
| 2         | High Demand       | 1                             |
| 3         | Low Demand        | 1                             |
| 3         | High Demand       | 1                             |

## HFT Target





# Picking Logic Solver (LS)

Left click desired logic solver to copy  
Move the mouse to the box in the middle and click to paste.

|   |          |  |            |                 |     |                    |                     |
|---|----------|--|------------|-----------------|-----|--------------------|---------------------|
| Site : SIS-TECH<br>Project ID: Practice |          | Function : V-101 High DP trip<br>Function ID: SIF 01 |            | Welcome, srizvi |     | SIL SOLVER         |                     |
|   | PFDavg   | IL   | STR (1/Yr) | MTTFs (Yr)      | HFT | PFD/STR Breakdown  |                     |
| TARGETS                                 | 8.00E-02 | 1  | 5.00E-02   | 20              | 0   | PFDavg             | STR                 |
| RESULTS                                 |          |  |            |                 |     | No data            | No data             |
| TARGETS MET?                            |          |  |            |                 |     |                    |                     |
|   |          |  |            |                 |     | HFT <sub>IN</sub>  | HFT <sub>LS</sub>   |
|   |          |  |            |                 |     | HFT <sub>SP1</sub> | HFT <sub>SP2</sub>  |
|   |          |  |            |                 |     | HFT <sub>MIN</sub> | HFT <sub>MACT</sub> |
|   |          |  |            |                 |     |                    |                     |
| Exit                                    |          |  |            |                 |     | Calculate and Save | Print               |
|   |          |  |            |                 |     | +                  | -                   |
|   |          |  |            |                 |     | Reset              |                     |

SRS

LOGIC SOLVER

GENERIC 2004D DUAL MP, DUAL I/O

GENERIC 1002D DUAL MP, SIMPLEX I/O

NON-SC D/D  
NON SC PES DUAL MP, DUAL I/O

NON-SC D/S  
NON SC PES DUAL MP, SIMPLEX I/O

NON-SC S/S  
NON SC PES SIMPLEX MP, SIMPLEX

RELAY - FAIL TO CLOSE

RELAY - FAIL TO OPEN



Wrong one?  
To delete the logic solver, move the mouse to icon and right click to delete

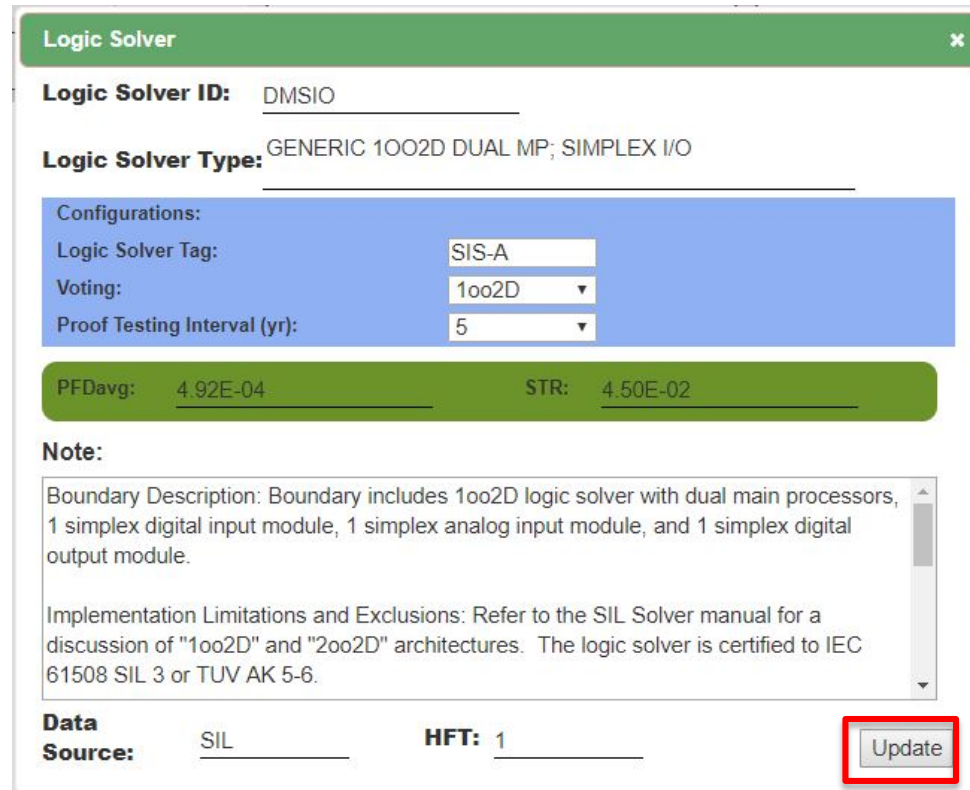
# Adding LS details

Edit the logic solver parameter by left click the logic solver icon on in the box. Where Assign a tag name, select the voting, and enter the test interval (TI)

**Note:** the voting needs to be selected before test interval.

**Caution:** Logic Solver test interval may be prescribed in vendor safety manual or prior use justification documentation

Tool will automatically calculate LS contributions to PFDavg and STR



**Logic Solver**

**Logic Solver ID:** DMSIO

**Logic Solver Type:** GENERIC 1002D DUAL MP; SIMPLEX I/O

**Configurations:**

Logic Solver Tag: SIS-A

Voting: 1oo2D

Proof Testing Interval (yr): 5

PFDavg: 4.92E-04 STR: 4.50E-02

**Note:**

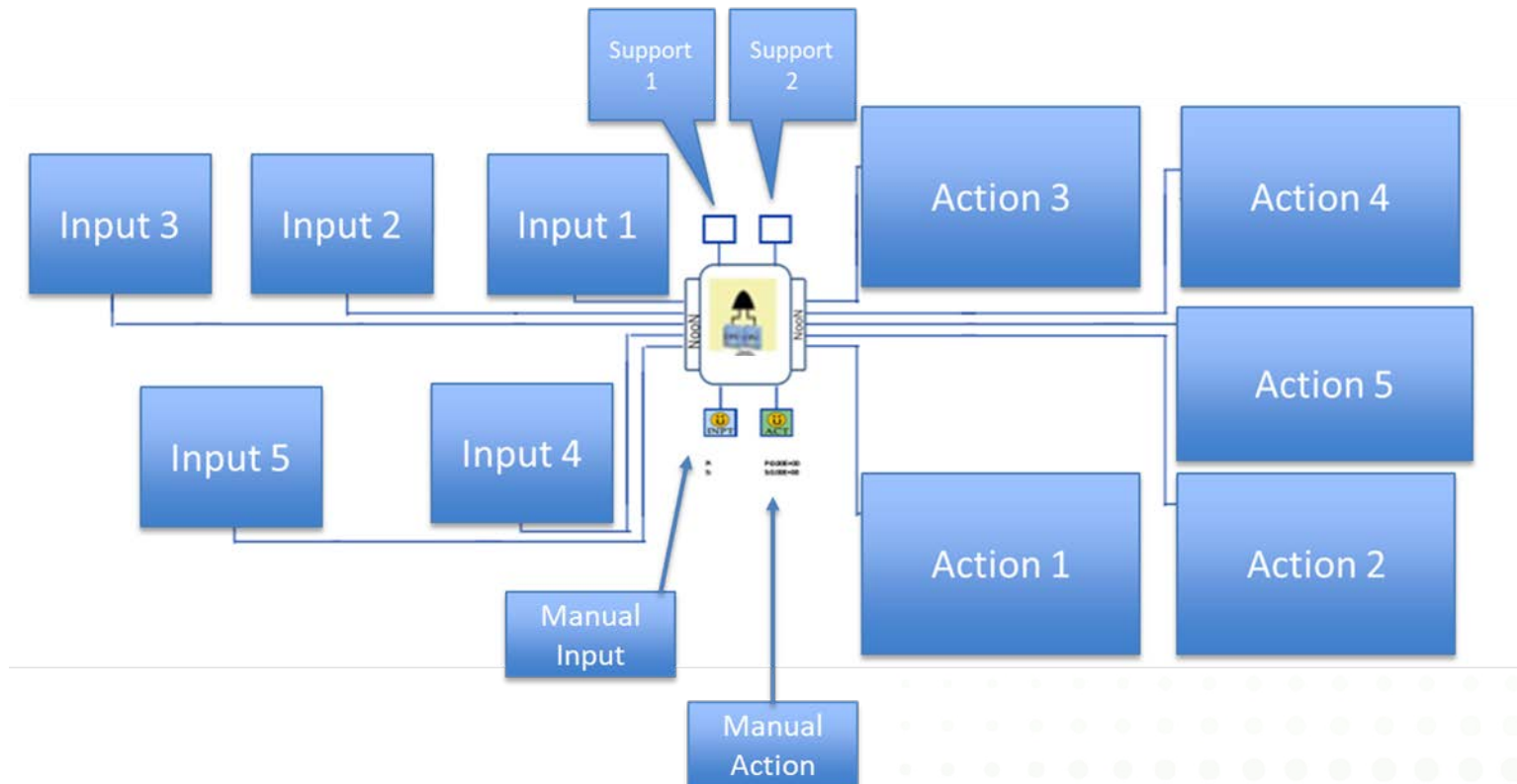
Boundary Description: Boundary includes 1oo2D logic solver with dual main processors, 1 simplex digital input module, 1 simplex analog input module, and 1 simplex digital output module.

Implementation Limitations and Exclusions: Refer to the SIL Solver manual for a discussion of "1oo2D" and "2oo2D" architectures. The logic solver is certified to IEC 61508 SIL 3 or TUV AK 5-6.

**Data Source:** SIL **HFT:** 1 **Update**

Click Update to return to GUI page

# Other Subsystems are added to the GUI in the order selected



# Adding Inputs (aka Sensors)

Adding an input is divided into two steps

1. add the input configuration
2. add each device.

# Input Configuration

Click “Input Configuration” to open selection list

Select the desired voting. Click the selected configuration to add to the GUI.

Wrong choice? Hover over that portion of the architecture until grey selection box appears and right-click to get option to delete.

Site : SIS-TECH  
Project ID: Practice

Function : V-101 High DP trip  
Function ID: SIF 01

Welcome, srizvi

SIL SOLVER

|              | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|--------------|----------|----|------------|------------|-----|
| TARGETS      | 8.00E-02 | 1  | 5.00E-02   | 20.00      | 0   |
| RESULTS      |          |    |            |            |     |
| TARGETS MET? |          |    |            |            |     |

PF/D/STR Breakdown

HFT<sub>IN</sub>

HFT<sub>LS</sub>

HFT<sub>ACT</sub>

HFT<sub>SPT1</sub>

HFT<sub>SPT2</sub>

HFT<sub>MIN</sub>

HFT<sub>IMACT</sub>

Exit

Calculate and Save

Print

Reset

SRS

LOGIC SOLVER

INPUT CONFIGURATION

ONE DEVICE

TWO DEVICES

THREE DEVICES

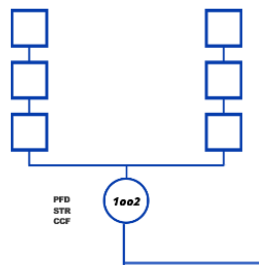
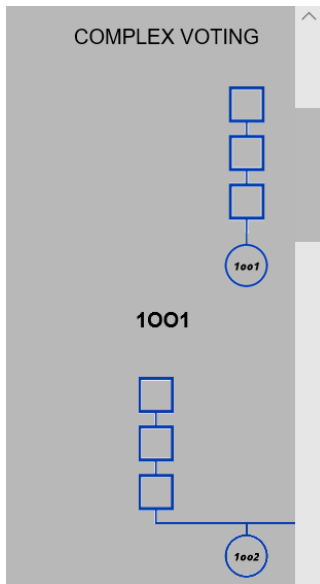
1003

2003

3003



# Complex Voting Architectures



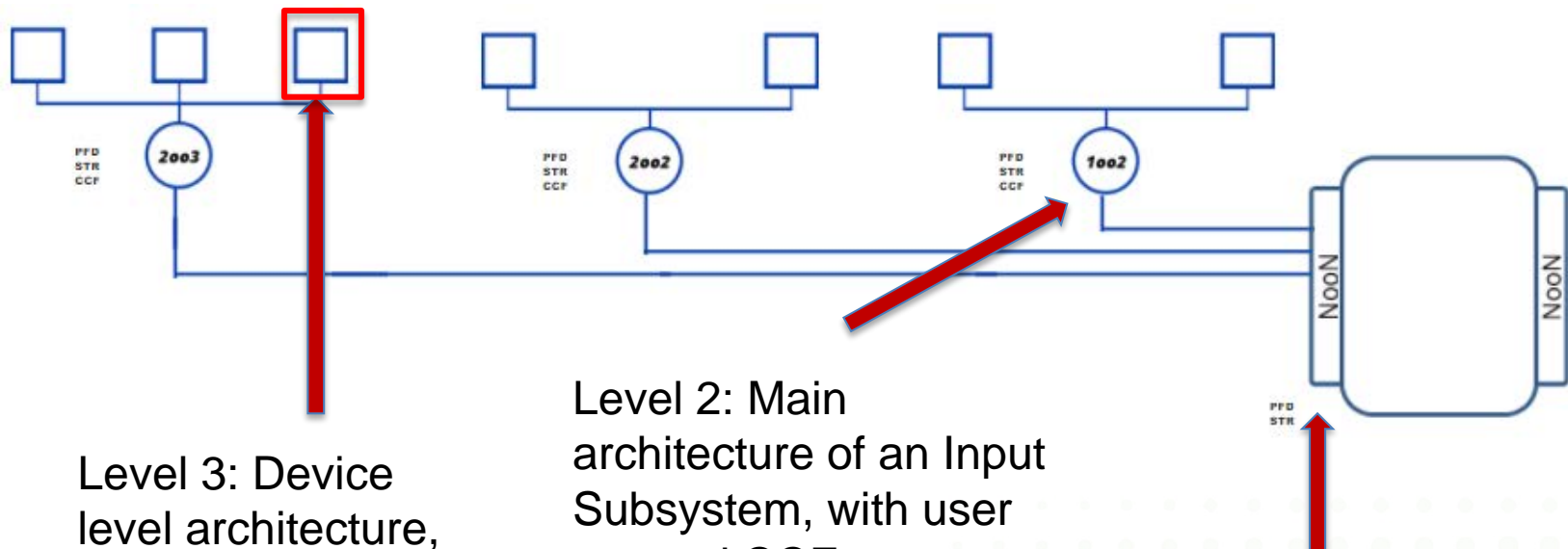
- If a single variable value is made up of multiple devices, use a **Complex Voting Architecture**
- All the devices for each separate value go in a single vertical channel

Common examples:

- Sensor Transmitter with a Signal Splitter, Trip Amp, or a Relay
- Pressure/Temperature compensated flow

# Three levels of Input Architecture

Best Practice: Only use Level 3 if you must for the complexity of the function (some details will not show on reports)



Level 3: Device level architecture, with fixed CCF from datasheet

Level 2: Main architecture of an Input Subsystem, with user entered CCF

Level 1: 1ooN or NooN **VOTING** between Input Subsystems, with no CCF

# Picking Technology

Click “input device” to access to the list of device categories  
Left-click the relevant category to access the list of devices technology

Site : SIS-TECH  
Project ID: Practice  
Function : V-101 High DP trip  
Function ID : SIF 01  
Welcome, srizvi  
SIL SOLVER

|              | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|--------------|----------|----|------------|------------|-----|
| TARGETS      | 8.00E-02 | 1  | 5.00E-02   | 20.00      | 0   |
| RESULTS      |          |    |            |            |     |
| TARGETS MET? |          |    |            |            |     |

PFD/STR Breakdown

| HFT <sub>IN</sub>   | HFT <sub>LS</sub>   | HFT <sub>ACT</sub> |
|---------------------|---------------------|--------------------|
|                     |                     |                    |
| HFT <sub>SPT1</sub> | HFT <sub>SPT2</sub> | HFT <sub>MIN</sub> |
|                     |                     |                    |

Calculate and Save Print + - Reset

INPUT DEVICE






- TRIP AMPLIFIER
- ANALYZER
- PRESSURE
  -  DIFFERENTIAL PRESSURE TRANSMITTER
  -  PNEUMATIC PRESSURE SWITCH
  -  PNEUMATIC PRESSURE TRANSMITTER
  -  PRESSURE SWITCH - NORMAL SERVICE
  -  PRESSURE TRANSMITTER

Diagram showing a process flow with a 2001 valve and a DP (Differential Pressure) sensor connected to a control system.

# Selecting the Device

Scroll to the desired device

Left click device in list to copy (right-click to open datasheet – more later)

Left click in device box on diagram to add device to the input subsystem

Site : SIS-TECH  
Project ID: Practice

Function : V-101 High DP trip  
Function ID : SIF 01

Welcome, srizvi

|              | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|--------------|----------|----|------------|------------|-----|
| TARGETS      | 8.00E-02 | 1  | 5.00E-02   | 20.00      | 0   |
| RESULTS      |          |    |            |            |     |
| TARGETS MET? |          |    |            |            |     |

PFD/STR Breakdown

| HFT <sub>IN</sub>   | HFT <sub>LS</sub>   | HFT <sub>ACT</sub> |
|---------------------|---------------------|--------------------|
| HFT <sub>SPT1</sub> | HFT <sub>SPT2</sub> | HFT <sub>MIN</sub> |
|                     |                     |                    |

← → Exit

Calculate and Save Print

+ - Reset

INPUT DEVICE

TRIP AMPLIFIER

ANALYZER

PRESSURE

DIFFERENTIAL PRESSURE TRANSMITTER

PNEUMATIC PRESSURE SWITCH

PNEUMATIC PRESSURE TRANSMITTER

PRESSURE SWITCH - NORMAL SERVICE

PRESSURE TRANSMITTER

To delete or copy the device, move the mouse to device icon in function diagram and right click.



# Adding Device Details

White boxes are editable fields. Some are pre-populated

Device

Device ID: DPTR

Device Type: DIFFERENTIAL PRESSURE TRANSMITTER

Configurations:

Device Tag:

Proof Testing Interval (yr):

0

Voting:

1001

Subsystem Diagnostic Level: ?

NO DC

Maintenance:

Mean Time to Repair (hr):

72

Diagnostic Interval (hr):

0.500

Overhaul Interval (yr):

20

Proof Testing Coverage (%): ?

100

User Specified

☐

Properties:

Failure Dangerous Failure Rate (1/yr):

8.00E-03

Failure Spurious Failure Rate (1/yr):

1.67E-02

Common Cause Factor CCF Dual (%):

2

Common Cause Factor CCF Triple (%):

2

Diagnostic Coverage Simplex DC1 (1/yr):

60.00

Diagnostic Coverage Dual DC2 (1/yr):

80.00

Diagnostic Coverage Triple DC3 (1/yr):

90.00

PFDavg:

0.00E+000

STR:

0.00E+000

Note:

Boundary Conditions: Boundary includes the electronic transmitter, sensing diaphragm and process connection.

Process Severity Assumption: Clean

Implementation Limitations and Exclusions: No limitations beyond standard assumptions (see SIL Solver Enterprise User

Data Source: SIL

Update

# Filled In

Test Interval  
is in years

Define  
Voting of  
one device.  
Use 1001  
most of the  
time

Define  
Diagnostic  
NO DC in  
this case.

Define OI, default  
is 20Year

Define PTC,  
default is 100 %

Device

Device ID: DPTR
Device Type: DIFFERENTIAL PRESSURE TRANSMITTER

Configurations:

Device Tag: DP-101A
Proof Testing Interval (yr): 5
Voting: 1001
Subsystem Diagnostic Level: ? NO DC

Maintenance:

Mean Time to Repair (hr): 72
Diagnostic Interval (hr): 0.500
Overhaul Interval (yr): 20
Proof Testing Coverage (%): ? 100
User Specified:

Note:

Boundary Conditions: Boundary includes the electronic transmitter, sensing diaphragm and process connection.
Process Severity Assumption: Clean
Implementation Limitations and Exclusions: No limitations beyond standard assumptions (see SIL Solver Enterprise User

Data Source: SIL
Update

Properties:

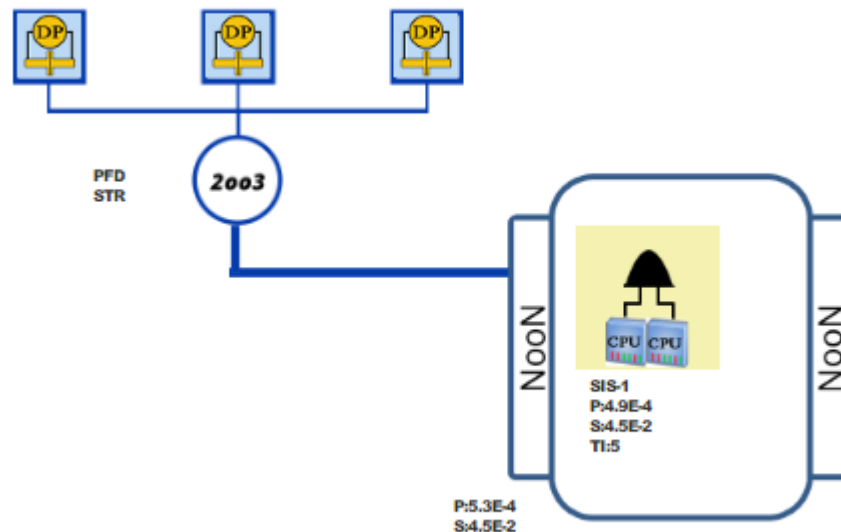
Failure Dangerous Failure Rate (1/yr): 8.00E-03
Failure Spurious Failure Rate (1/yr): 1.67E-02
Common Cause Factor CCF Dual (%): 2
Common Cause Factor CCF Triple (%): 2
Diagnostic Coverage Simplex DC1 (1/yr): 60.00
Diagnostic Coverage Dual DC2 (1/yr): 80.00
Diagnostic Coverage Triple DC3 (1/yr): 90.00

PFDavg: 2.01E-002
STR: 1.67E-002

Click Update to save change

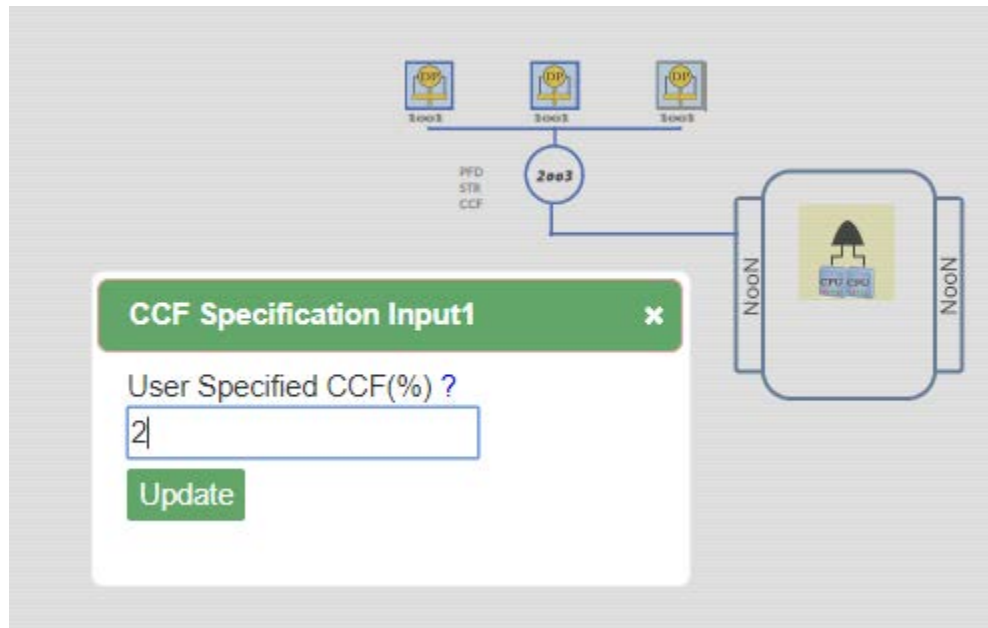
# Completing the subsystem

1. Copy DP-101A Pressure transmitter
2. Paste DP pressure transmitter to each of box in the 2003 input configuration
3. Update the tags for DP-101B and DP-101C and any other parameters that were modified for DP-101A.



# Adding Common Cause

- Left-click on the voting 2oo3 circle
- Put in CCF value as a percentage (for example, 2%)  
Note: Recommended values for duplex and triplex architectures are shown in the device datasheet under “Properties”
- Click Update to close the dialog box



CCF is not used in non-redundant (i.e., 1oo1 or 2oo2) architectures

Note: When using diverse instrumentation in a redundant architecture, use the rightmost box(es) of the subsystem (input or action) for the channel with the highest total dangerous failure rate.



# 2oo3D vs. 2oo3

- What if automated diagnostics is going to be used to take safe action on diagnosed failure?
- Enter each device and change the Diagnostic level to DC3 (diagnostic level for intercomparison of 3 transmitters)
- Click Update to close dialog box

Define Diagnostic DC3 is used since 3 PTs are used for comparison. The DC used in 90%

Device

Device ID: DPTR

Device Type: DIFFERENTIAL PRESSURE TRANSMITTER

Configurations:

Device Tag: DP-101A

Proof Testing Interval (yr): 5

Voting: 1oo1

Subsystem Diagnostic Level: ? DC3

Maintenance:

Mean Time to Repair (hr): 72

Diagnostic Interval (hr): 0.500

Overhaul Interval (yr): 20

Proof Testing Coverage (%): ? 100

User Specified ☐

Properties:

Failure Dangerous Failure Rate (1/yr): 8.00E-03

Failure Spurious Failure Rate (1/yr): 1.67E-02

Common Cause Factor CCF Dual (%): 2

Common Cause Factor CCF Triple (%): 2

Diagnostic Coverage Simplex DC1 (1/yr): 60.00

Diagnostic Coverage Dual DC2 (1/yr): 80.00

Diagnostic Coverage Triple DC3 (1/yr): 90.00

PFDavg: 2.01E-002

STR: 1.67E-002

Note:

Boundary Conditions: Boundary includes the electronic transmitter, sensing diaphragm and process connection.

Process Severity Assumption: Clean

Implementation Limitations and Exclusions: No limitations beyond standard assumptions (see SIL Solver Enterprise User

Data Source: SIL

Update

The triplex DC for this device is 90%

# FYI:

## DC for other architectures

For all other input configurations with safe action on diagnosed failure, the general rule for the selection of Diagnostic level is as below:

1oo1D → DC1 (Diagnostic Coverage Simplex)

1oo2D and 2oo2D → DC2 (Diagnostic Coverage Dual)

1oo3D, 2oo3D and 3oo3D → DC3 (Diagnostic Coverage Triplicated)

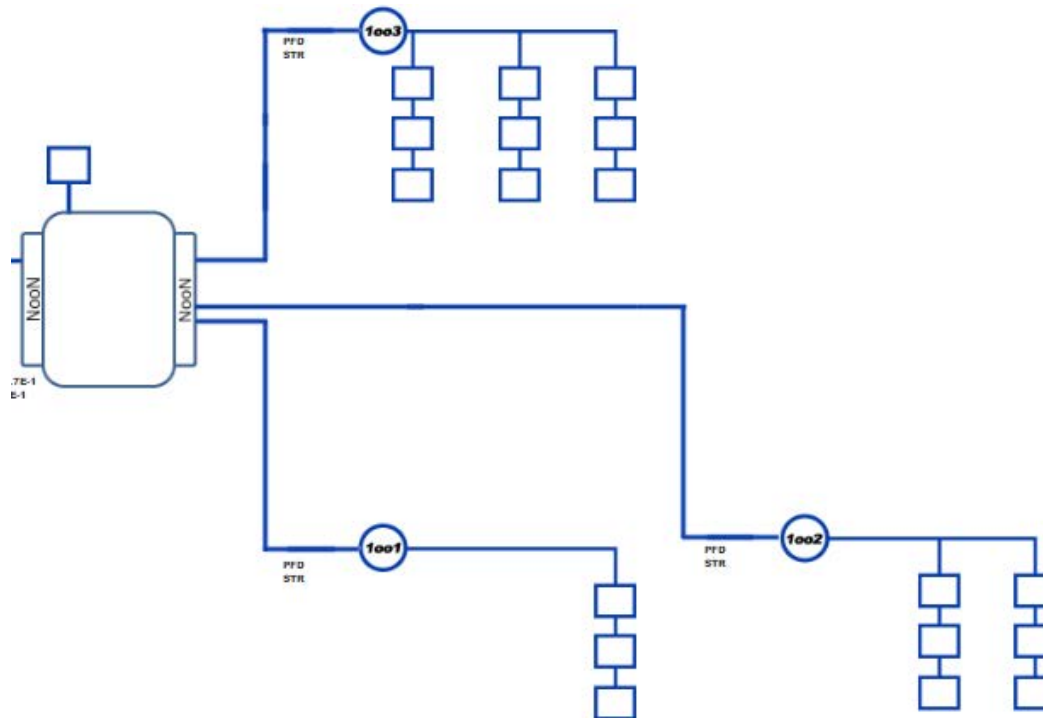
May need to select a lower DC when diverse devices are used in the same voting.

May select a higher DC when an external independent reading can be used for inter-comparison with the SIF sensor.

# Adding the rest of the system

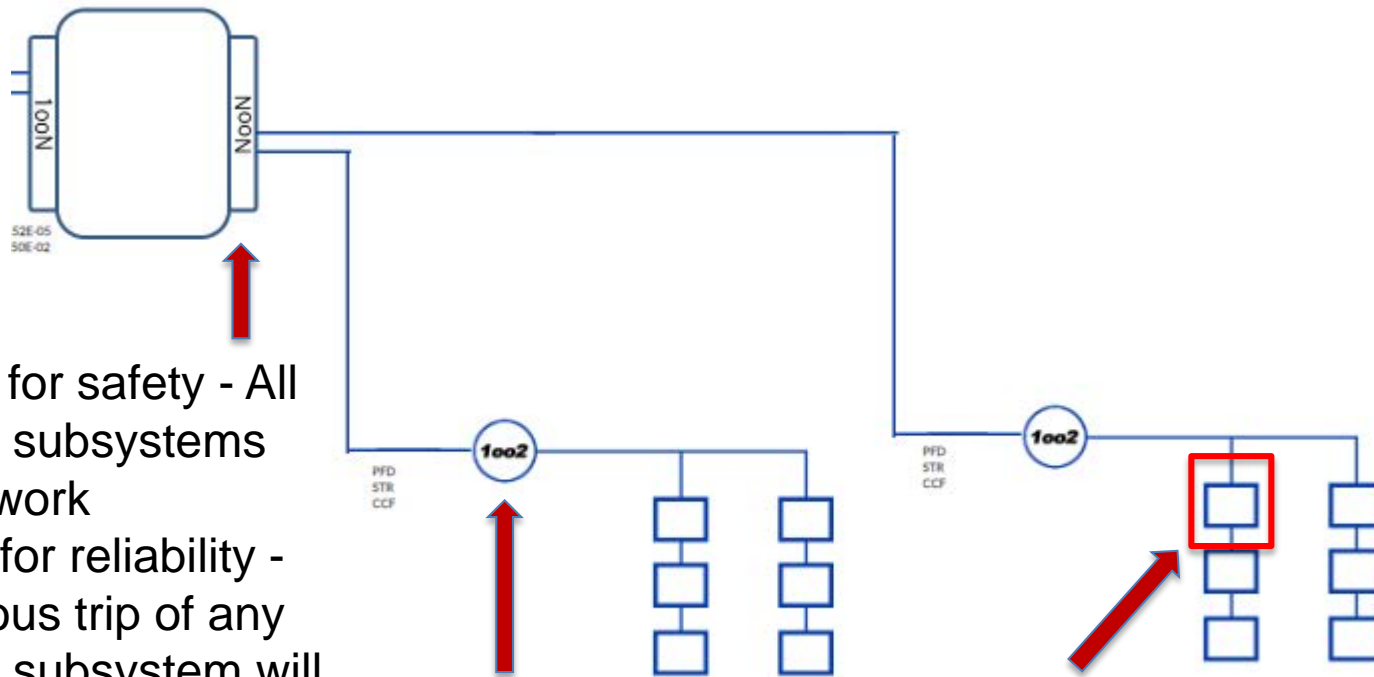
The support system and final actions are modelled in a similar way as the input.

1. Select the action configuration
2. Select the action device (Identical logic as SIL Solver® V 7.0)
3. Specify relevant parameters



# Two configurable levels of Action Architecture

Best Practice: Only use Level 2 if you must for the complexity of the function (some details will not show on reports)



## FIXED:

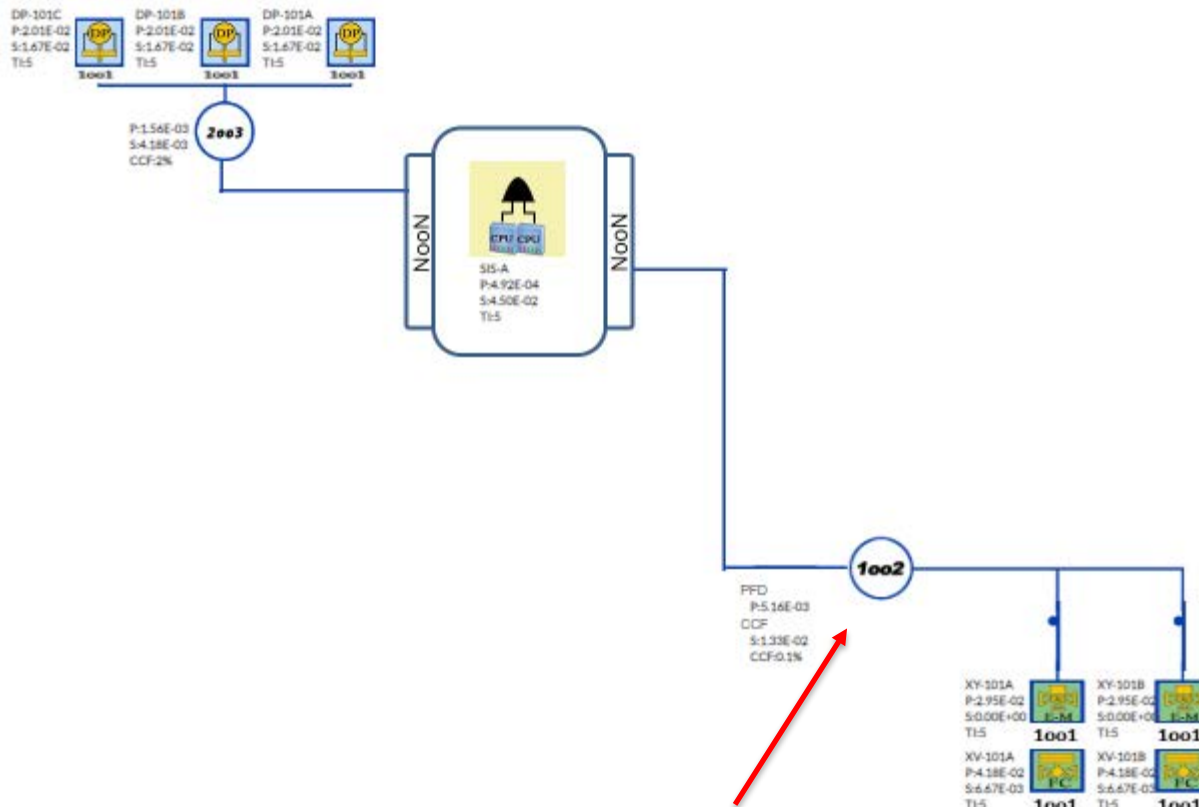
- NooN for safety - All action subsystems must work
- 100N for reliability - Spurious trip of any action subsystem will cause an operational problem

Level 1: Main architecture of an Action Subsystem, with user entered CCF

Level 2: Device level architecture, with fixed CCF from datasheet



# Adding valves and solenoids



Don't forget to enter CCF

**Device**

Device ID: SVETM Device Type: SOLENOID VALVE - ETT - MONITORED

| Configurations:               |                          | Properties:                            |           |
|-------------------------------|--------------------------|--|-----------|
| Device Tag:                   | XY-101A                  | Failure Dangerous Failure Rate (1/yr): | 1.18E-02  |
| Proof Testing Interval (yr):  | 5                        | Failure Spurious Failure Rate (1/yr):  | 0         |
| Voting:                       | 1001                     | CCF Dual(%):                           | 1         |
| Subsystem Diagnostic Level: ? | NO DC                    | CCF Triple(%):                         | 1         |
| <b>Maintenance:</b>           |                          | Diagnostic Coverage Simplex(1/yr):     | 0.00      |
| Mean Time to Repair (hr):     | 72                       | Diagnostic Coverage Dual(1/yr):        | 0.00      |
| Diagnostic Interval (hr):     | 0.000                    | Diagnostic Coverage Triple(1/yr):      | 0.00      |
| Overhaul Interval (yr):       | 20                       |  |           |
| Proof Testing Coverage (%): ? | 100                      |  |           |
| User Specified                | <input type="checkbox"/> |  |           |
|                               |                          | PT Day:                                | 2.65E-002 |
|                               |                          | STR:                                   | 0.00E+000 |

**Note:**  
Boundary Conditions: Boundary includes solenoid and solenoid wiring up to monitoring device.  
Process Severity Assumption: N/A  
Implementation Limitations and Exclusions: Vent port for redundant configurations is unobstructed and protected from debris.

Data Source: SIL Update

**Device**

Device ID: BVFCC Device Type: BLOCK VALVE-BALL-FTC-CLEAN

| Configurations:               |                          | Properties:                            |           |
|-------------------------------|--------------------------|--|-----------|
| Device Tag:                   | XY-101A                  | Failure Dangerous Failure Rate (1/yr): | 1.67E-02  |
| Proof Testing Interval (yr):  | 5                        | Failure Spurious Failure Rate (1/yr):  | 6.87E-03  |
| Voting:                       | 1001                     | CCF Dual(%):                           | 0.1       |
| Subsystem Diagnostic Level: ? | NO DC                    | CCF Triple(%):                         | 0.1       |
| <b>Maintenance:</b>           |                          | Diagnostic Coverage Simplex(1/yr):     | 85.00     |
| Mean Time to Repair (hr):     | 72                       | Diagnostic Coverage Dual(1/yr):        | 85.00     |
| Diagnostic Interval (hr):     | 0.000                    | Diagnostic Coverage Triple(1/yr):      | 85.00     |
| Overhaul Interval (yr):       | 20                       |  |           |
| Proof Testing Coverage (%): ? | 100                      |  |           |
| User Specified                | <input type="checkbox"/> |  |           |
|                               |                          | PT Day:                                | 4.19E-002 |
|                               |                          | STR:                                   | 6.67E-001 |

**Note:**  
Boundary Conditions: Boundary includes spring return, pneumatically-operated ball valve, operating in a standby (dormant) mode of operation. The solenoid is NOT INCLUDED. Safe-state specified is fail closed.  
Process Severity Assumption: Clean

Data Source: SIL Update

# What if the design has a complicated “black box” subsystem?

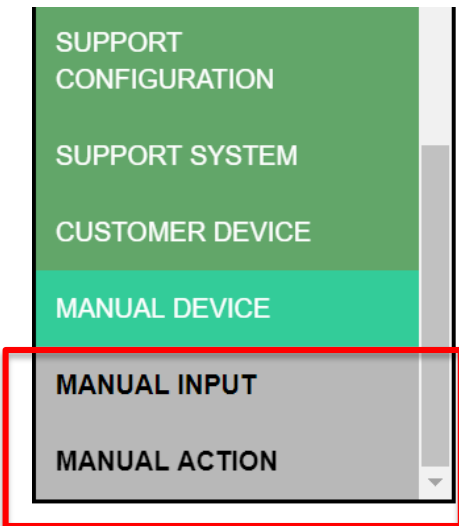
Most commonly used for complex designs where there is a complicated subsystem in the design that is evaluated using an advanced method such as FTA

SIL Solver® allows for a MANUAL ACTION subsystem and a MANUAL INPUT subsystem

**THESE ARE NOT POPULATED LIKE NORMAL DEVICES**

The PFDavg and STR contributions for these subsystems are entered directly into the tool

These performance of these subsystems are additive to the overall PFD and STR analysis



Click to add  
field to GUI

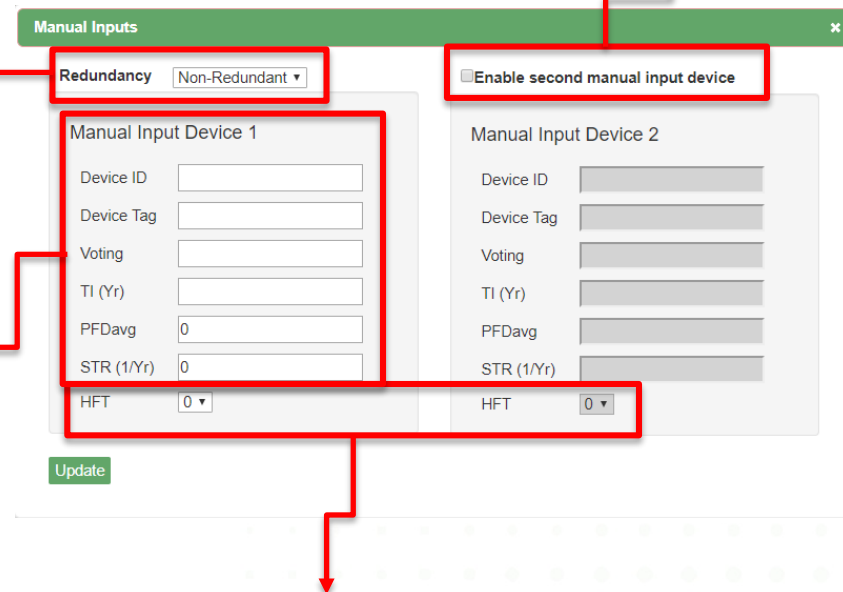
# Manual Inputs

The user can enter two parts of a Manual Input analysis:

If two are used, the user must define whether they are redundant to each other (i.e., EITHER subsystem working will allow the overall Manual Input to work) or non-redundant (i.e., BOTH parts must work for the overall Manual Input to work)

DeviceID, Tag, voting architecture and TI are entered for completeness of reporting. The PFDavg and STR are entered directly for each portion of the Manual Input

Check to allow entry of the second Manual Input



The user selects the Hardware Fault Tolerance value appropriate for each part of the Manual Input

# Manual Action

DeviceID, Tag, voting architecture and TI are entered for completeness of reporting. The PFDavg and STR are entered directly for each portion of the Manual Input

The screenshot shows a 'Manual Actions' dialog box with a green title bar and a close button. Inside, the 'Manual Action' section contains several input fields: 'Device ID', 'Device Tag', 'Voting', 'TI (Yr)', 'PFDavg' (with a value of 0), 'STR (1/Yr)' (with a value of 0), and 'HFT' (with a dropdown menu showing 0). A red rectangular box highlights the 'Device ID', 'Device Tag', 'Voting', 'TI (Yr)', 'PFDavg', and 'STR (1/Yr)' fields. A red arrow points from the text on the left to this box. Another red arrow points from the 'HFT' dropdown menu to the text at the bottom. A green 'Update' button is located below the input fields.

User enters Manual Action HFT Value

# Ready to Calculate?

All devices entered, filled out, and CCF added?  
Click the “Calculate and Save” button

|                                     |          |                             |            |                           |     |  |                     |
|-------------------------------------|----------|-----------------------------|------------|---------------------------|-----|--|---------------------|
| Site : <b>SIS-TECH</b>              |          | Function : <b>and so on</b> |            | Welcome, <b>kkottawar</b> |     | <b>SIL SOLVER</b>  |                     |
| Project ID: <b>Prac Proj</b>        |          | Function ID: <b>test42</b>  |            |                           |     |  |                     |
|                                     | PFDavg   | IL                          | STR (1/Yr) | MTTFs (Yr)                | HFT | PFD/STR Breakdown  |                     |
| TARGETS                             | 8.00E-02 | 1                           | 5.00E-02   | 20                        | 0   | PFDavg   | STR                 |
| RESULTS                             |          |                             |            |                           |     | No data  | No data             |
| TARGETS MET?                        |          |                             |            |                           |     |  |                     |
|                                     |          |                             |            |                           |     | HFT <sub>IN</sub>  | HFT <sub>LS</sub>   |
|                                     |          |                             |            |                           |     | HFT <sub>SPT1</sub>  | HFT <sub>SPT2</sub> |
|                                     |          |                             |            |                           |     | HFT <sub>MIN</sub>   | HFT <sub>MACT</sub> |
|                                     |          |                             |            |                           |     |  |                     |
| <input type="button" value="Exit"/> |          |                             |            |                           |     | <input type="button" value="Calculate and Save"/> <input type="button" value="Print"/>                 |                     |
|                                     |          |                             |            |                           |     | <input type="button" value="+"/> <input type="button" value="-"/> <input type="button" value="Reset"/> |                     |

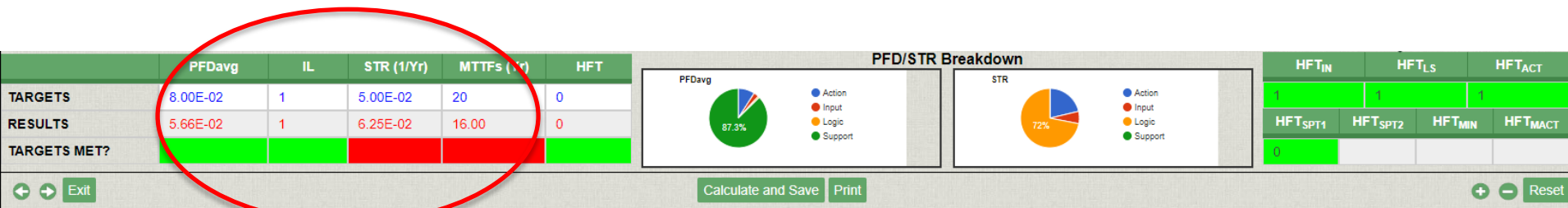
Note any **ERRORS** or **Warnings** that are generated during the calculation:

**ERRORS**: A problem exists in GUI configuration that will make the calculated results INCORRECT

**Warning**: A value is missing from the configuration that may or may not be a technical issue, depending on the overall design



# Are PFDavg and STR good enough?



Numerical results and red-green pass-fail indicator on top left of GUI and most SIF reports

Graphical Charts provide information on which components are dominating PFDavg and STR

If necessary, modify design until performance targets are achieved.

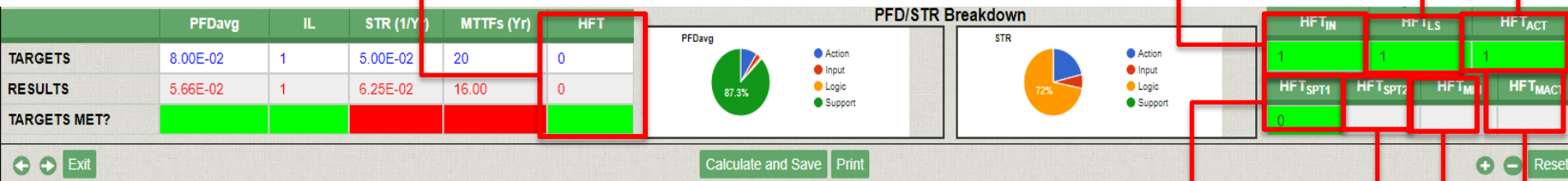
# Don't forget Hardware Fault Tolerance (HFT)

HFT Target and  
Overall HFT  
Result

HFT for Input(s)

HFT for  
Logic  
Solver

HFT for  
Action(s)



Overall HFT result is the minimum HFT out of the seven main subsystems (see far right side of GUI) for those subsystems that are configured for use in that architecture

HFT for Support  
System 1

HFT for Support  
System 2

HFT for Manual  
Input

HFT for Manual  
Action

# HFT for Device

The HFT for each field device box (Moon) is determined by the selected architecture within that box as below. The resulting HFT value for each field device is not shown on the GUI, except for logic solver, support system, manual input, and manual action in their respective data sheets.

| Architecture(s)   | HFT = N - M |
|---|-------------|
| 1001, 1001D   | 0           |
| 1002, 1002D   | 1           |
| 2002, 2002D   | 0           |
| 1003, 1003D   | 2           |
| 2003, 2003D   | 1           |
| 3003, 3003D   | 0           |
| 2004, 2004D   | 2           |
| HFAT/HPATD<br>(unused for LS, but<br>used for some<br>action devices) | 1           |

Site : **SIS-TECH**  
Project ID: **Practice**

Function : **V-102 High DP/P Trip**  
Function ID : **SIF 02**


Welcome, srizvi

**SIL SOLVER**

|                     | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|---------------------|----------|----|------------|------------|-----|
| <b>TARGETS</b>      | 8.00E-02 | 1  | 5.00E-02   | 20.00      | 0   |
| <b>RESULTS</b>      | 5.53E-02 | 1  | 5.94E-02   | 16.84      | 0   |
| <b>TARGETS MET?</b> |          |    |            |            |     |

**PFD/STR Breakdown**


PFDavg



89.4%

- Action
- Input
- Logic
- Support

STR



- Action
- Input
- Logic
- Support

| HFT <sub>IN</sub>   | HFT <sub>LS</sub>   | HFT <sub>ACT</sub> |
|---------------------|---------------------|--------------------|
| 1                   | 1                   | 1                  |
| HFT <sub>SPT1</sub> | HFT <sub>SPT2</sub> | HFT <sub>MIN</sub> |
| 0                   |                     |                    |

← → Exit

Calculate and Save Print

+ - Reset

# HFT for Logic Solver

The HFT value for the logic solver (MooN) is determined by the selected architecture. The resulting HFT value for the logic solver is shown on the logic solver data sheet and on the GUI as below. Default value is 0 when importing a logic solver that is not in the current SIL Solver logic solver datasheet.

In this case,  
MooN is 1oo2D  
 $2-1=1$

Logic Solver  
HFT Value

HFT for  
Logic  
Solver

Site : SIS-TECH  
Project ID: Practice

Function : V-102 High DP/P Trip  
Function ID : SIF 02

Welcome, srizvi

|              | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|--------------|----------|----|------------|------------|-----|
| TARGETS      | 8.00E-02 | 1  | 5.00E-02   | 20.00      | 0   |
| RESULTS      | 5.53E-02 | 1  | 5.94E-02   | 16.84      | 0   |
| TARGETS MET? |          |    |            |            |     |

**PFD/STR Breakdown**

PFDavg

89.4%

STR

| HFT <sub>IN</sub>   | HFT <sub>LS</sub>   | HFT <sub>ACT</sub> |
|---------------------|---------------------|--------------------|
| 1                   | 1                   | 1                  |
| HFT <sub>SPT1</sub> | HFT <sub>SPT2</sub> | HFT <sub>MIN</sub> |
| 0                   |                     |                    |

← → Exit

Calculate and Save Print

+ - Reset

# HFT for Support System

The HFT value for the support system is shown on the support system data sheet and on the GUI as below. Default value is 0 when importing support systems that are not in the current SIL Solver support system datasheet.

Support System

Support System ID:

UPSE5S

Support System Type:

POWER SUPPLY - ETT - 5  
YEAR TESTING

Support System Tag:

UPSE5S-101

Proof Testing Interval (yr):

5

PFDavg:

4.94E-002

STR:

0.00E+000

Note:

Boundary Description: The boundary includes: the incoming ac surge-protection rectifier stage, input capacitors, dc/dc converter or chopper circuit, dc battery circuit and a dc pulse with modulation (PWM) inverter.

Implementation Limitations and Exclusions: Energize-to-trip (ETT) circuits must include: " Line monitoring and loss of circuit continuity alarm

Data

Source:

SIL

HFT:

0

Update

Support System  
HFT Value

HFT for Support  
System 1 and  
Support System 2

Site: SIS-TECH

Project ID: Practice

Function: V-102 High DP/P Trip

Function ID: SIF 02

Welcome, srizvi

SIL SOLVER

|              | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|--------------|----------|----|------------|------------|-----|
| TARGETS      | 8.00E-02 | 1  | 5.00E-02   | 20.00      | 0   |
| RESULTS      | 5.53E-02 | 1  | 5.94E-02   | 16.84      | 0   |
| TARGETS MET? |          |    |            |            |     |

PFDavg

89.4%

Action

Input

Logic

Support

STR

Action

Input

Logic

Support

| HFT <sub>IN</sub>   | HFT <sub>LS</sub>   | HFT <sub>ACT</sub> |
|---------------------|---------------------|--------------------|
| 1                   | 1                   | 1                  |
| HFT <sub>SPT1</sub> | HFT <sub>SPT2</sub> | HFT <sub>MIN</sub> |
| 0                   |                     |                    |

Calculate and Save

Print

+

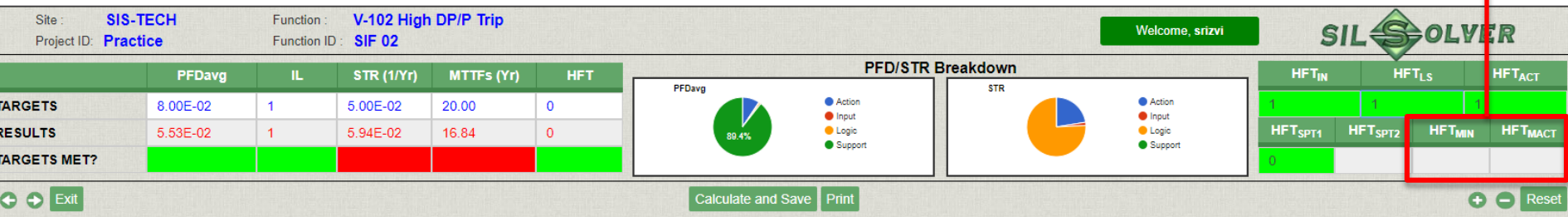
-

Reset



# HFT Results for Manual Input and Manual Action

HFT Results for Manual Input and Manual Action



## Is that all?

- The SIL Calculation is performed within a context of performance assumptions and other SIL evaluations (e.g., independence of SIF from other functions in the hazard case the SIF is designed for)
- The documentation of the SIL calculation should include sufficient SRS information to provide this context

# SRS Info

Site : **SIS-TECH**  
Project ID: **Practice**

Function : **V-101**  
Function ID : **SIF 01**

Welcome, srizvi

|                     | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|---------------------|----------|----|------------|------------|-----|
| <b>TARGETS</b>      | 8.00E-02 | 1  | 5.00E-02   | 20.00      | 0   |
| <b>RESULTS</b>      | 5.51E-02 | 1  | 5.83E-02   | 17.14      | 0   |
| <b>TARGETS MET?</b> |          |    |            |            |     |

**PFDavg**

- Action
- Input
- Logic
- Support

**STR**

- Action
- Input
- Logic
- Support

← → Exit

Calculate and Save Print

+ - Reset

**SRS**

PROCESS HAZARD

DESCRIPTION

DIAGNOSTICS

RESET

SHUTDOWN

REFERENCE

COMMENTS

---

LOGIC SOLVER

INPUT CONFIGURATION

INPUT DEVICE

ACTION CONFIGURATION

ACTION DEVICE

SUPPORT CONFIGURATION

SUPPORT SYSTEM

CUSTOMER DEVICE

MANUAL DEVICE

# Done with SIF 01

Site : **SIS-TECH**  
Project ID : **Practice**

Function : **V-101**  
Function ID : **SIF 01**

Welcome, srizvi

**SIL SOLVER**

|                     | PFDavg   | IL | STR (1/Yr) | MTTFs (Yr) | HFT |
|---------------------|----------|----|------------|------------|-----|
| <b>TARGETS</b>      | 8.00E-02 | 1  | 5.00E-02   | 20.00      | 0   |
| <b>RESULTS</b>      | 5.51E-02 | 1  | 5.83E-02   | 17.14      | 0   |
| <b>TARGETS MET?</b> |          |    |            |            |     |

**PFD/STR Breakdown**

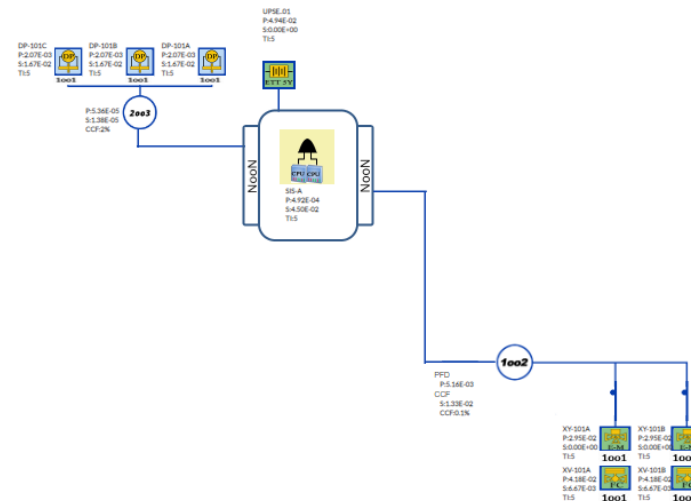
**PFDavg**

**STR**

| HFT <sub>IN</sub>   | HFT <sub>LS</sub>   | HFT <sub>ACT</sub> |                     |
|---------------------|---------------------|--------------------|---------------------|
| 1                   | 1                   | 1                  |                     |
| HFT <sub>SPT1</sub> | HFT <sub>SPT2</sub> | HFT <sub>MIN</sub> | HFT <sub>MACT</sub> |
| 0                   |                     |                    |                     |

Exit to return to  
main Protective  
Function screen  
for this project

- SRS
- PROCESS HAZARD
- DESCRIPTION
- DIAGNOSTICS
- RESET
- SHUTDOWN
- REFERENCE
- COMMENTS
- LOGIC SOLVER
- INPUT CONFIGURATION
- INPUT DEVICE
- ACTION CONFIGURATION
- ACTION DEVICE
- SUPPORT CONFIGURATION
- SUPPORT SYSTEM
- CUSTOMER DEVICE
- MANUAL DEVICE



## Second Function

- This project includes V-102 as well
- V-102 has an analogous protective function, SIF 02
- Key difference, SIF 02 uses a single pressure transmitter as the third device, instead of a DP
- Tags: DP-102A/B, PT-102, XV/XY-102A/B



# Copy SIF 01

**SIL SOLVER** Welcome, srizvi

Site: [SIS-TECH](#) Project ID: [Practice](#) Function ID: [SIF 01](#)

Protective Function

|             |          | Open              | New        | Edit          | <b>Copy</b>       | Delete              | Exit       | PF Revision Level |                   |                    |
|-------------|----------|-------------------|------------|---------------|-------------------|---------------------|------------|-------------------|-------------------|--------------------|
|             |          | Import            | Export     | Print Reports | PF Documentation  | Project Data Sheets | PF Details | PF Data Summary   | PF Target Results | PF Results Summary |
| Function ID | Function | Mode Of Operation | PFD Target | PFD Result    | STR Target (1/yr) | STR Result (1/yr)   | IL Target  | IL Result         |                   |                    |
| SIF 01      | V-101    | Low Demand        | 8.00E-02   | 7.21E-03      | 5.00E-02          | 6.25E-02            | 1          | 2                 |                   |                    |

[Create Filter](#)

From the main Protective Function page, selecting the function to be copied and clicking the Copy button...

**SIL SOLVER** Welcome, srizvi

Site: [SIS-TECH](#) Project ID: [Practice](#) Function ID: [SIF 01](#)

Protective Function

|             |          | <b>Paste</b>      | Open       | New           | Edit              | Copy                | Delete     | Exit            | PF Revision Level |                    |
|-------------|----------|-------------------|------------|---------------|-------------------|---------------------|------------|-----------------|-------------------|--------------------|
|             |          | Import            | Export     | Print Reports | PF Documentation  | Project Data Sheets | PF Details | PF Data Summary | PF Target Results | PF Results Summary |
| Function ID | Function | Mode Of Operation | PFD Target | PFD Result    | STR Target (1/yr) | STR Result (1/yr)   | IL Target  | IL Result       |                   |                    |
| SIF 01      | V-101    | Low Demand        | 8.00E-02   | 7.21E-03      | 5.00E-02          | 6.25E-02            | 1          | 2               |                   |                    |

[Create Filter](#)

Causes the Paste button to activate...

# Create SIF 02

Clicking the Paste button opens the dialog box to enter the new function ID and description



Welcome, srizvi

Site: SIS-TECH

Project ID: Practice

Function ID: SIF 01

Protective Function

|             |          | Import            | Paste         | Open             | New                 | Edit              | Copy            | Delete            | Exit               | PF Revision Level |
|-------------|----------|-------------------|---------------|------------------|---------------------|-------------------|-----------------|-------------------|--------------------|-------------------|
|             |          | Export            | Print Reports | PF Documentation | Project Data Sheets | PF Details        | PF Data Summary | PF Target Results | PF Results Summary |                   |
| Function ID | Function | Mode Of Operation | PFD Target    | PFD Result       | STR Target (1/yr)   | STR Result (1/yr) | IL Target       | IL Result         |                    |                   |
| SIF 01      | V-101    | Low Demand        | 8.00E-02      | 7.21E-03         | 5.00E-02            | 6.25E-02          | 1               | 2                 |                    |                   |

Create Filter

Protective Function

Function ID:

SIF 02

Function :

V-102 High DP/P Trip

Save

Close

# Success!

Site: SIS-TECH

Project ID: Practice

Function ID: SIF 01

Protective Function

Function ID Saved Successfully

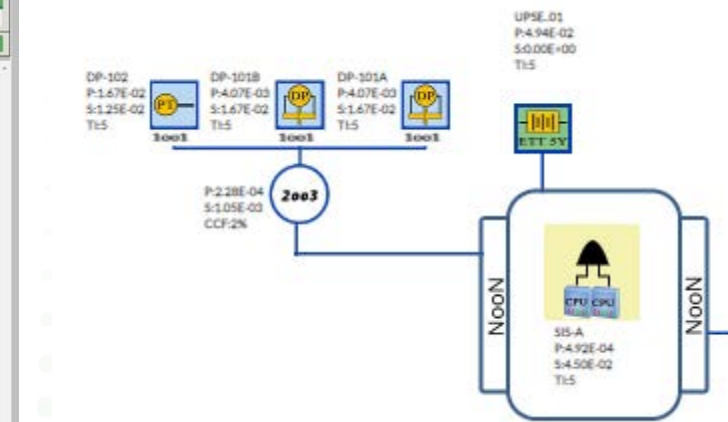
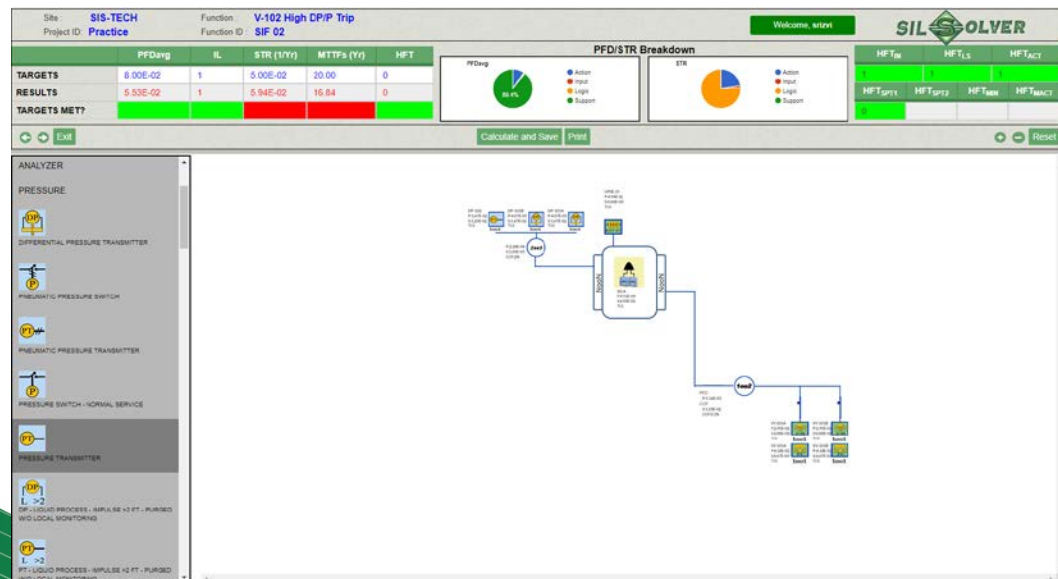
|             |                      |                   | Import     |            | Export            |                   | Open               | New              | Edit                |
|-------------|----------------------|-------------------|------------|------------|-------------------|-------------------|--------------------|------------------|---------------------|
|             |                      |                   |            |            |                   |                   | Copy               | Delete           | Exit                |
|             |                      |                   |            |            |                   |                   | PF Revision Level  |                  |                     |
|             |                      |                   |            |            |                   |                   | Print Reports      | PF Documentation | Project Data Sheets |
|             |                      |                   |            |            |                   |                   | PF Details         | PF Data Summary  | PF Target Results   |
|             |                      |                   |            |            |                   |                   | PF Results Summary |                  |                     |
| Function ID | Function             | Mode Of Operation | PFD Target | PFD Result | STR Target (1/yr) | STR Result (1/yr) | IL Target          | IL Result        |                     |
| SIF 01      | V-101                | Low Demand        | 8.00E-02   | 7.21E-03   | 5.00E-02          | 6.25E-02          | 1                  | 2                |                     |
| SIF 02      | V-102 High DP/P Trip | Low Demand        | 8.00E-02   | 7.21E-03   | 5.00E-02          | 6.25E-02          | 1                  | 2                |                     |

Create Filter

Select the new function and Open  
Update tag ID fields for all devices

# Modeling diverse sensors

1. Delete the third DP sensor
2. Copy General Pressure transmitter
3. Paste General pressure transmitter to the last box in the 2003 input configuration
4. Change Diagnostic level to DC2 for the two DP pressure transmitters and keep the General PT Diagnostic level as NO DC (no device to compare with).





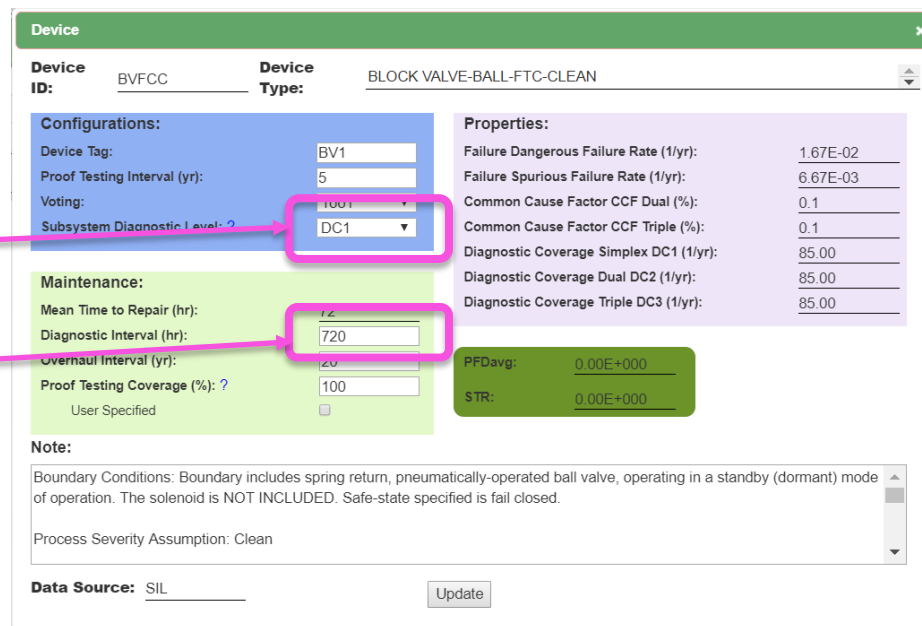
# Partial Stroke Testing of Valves

- For valves, the DC selection can be used to model partial stroke testing

1. Set the diagnostic level to DC1

2. Set the diagnostic interval to partial stroke testing interval

Both fields must be configured for correct use of equation



**Device**

Device ID: BVFCC Device Type: BLOCK VALVE-BALL-FTC-CLEAN

**Configurations:**

Device Tag: BV1

Proof Testing Interval (yr): 5

Voting: 1001

Subsystem Diagnostic Level: **DC1**

**Maintenance:**

Mean Time to Repair (hr): 720

Diagnostic Interval (hr): **720**

Overhaul Interval (yr): 20

Proof Testing Coverage (%): 100

User Specified

**Properties:**

|   |          |
|---|----------|
| Failure Dangerous Failure Rate (1/yr):  | 1.67E-02 |
| Failure Spurious Failure Rate (1/yr):   | 6.67E-03 |
| Common Cause Factor CCF Dual (%):       | 0.1      |
| Common Cause Factor CCF Triple (%):     | 0.1      |
| Diagnostic Coverage Simplex DC1 (1/yr): | 85.00    |
| Diagnostic Coverage Dual DC2 (1/yr):    | 85.00    |
| Diagnostic Coverage Triple DC3 (1/yr):  | 85.00    |

PFDavg: 0.00E+000

STR: 0.00E+000

**Note:**

Boundary Conditions: Boundary includes spring return, pneumatically-operated ball valve, operating in a standby (dormant) mode of operation. The solenoid is NOT INCLUDED. Safe-state specified is fail closed.

Process Severity Assumption: Clean

Data Source: SIL

Update



# Partial Interim Testing of Sensors

- Sometimes an imperfect test is performed on a sensor at a shorter interval, with a 100% proof test (or complete replacement) performed at a longer interval
- Use the Proof Test coverage and Overhaul interval to model this

Example:  
Sensor installation  
with an 85% test  
performed  
annually with  
100% test or full  
replacement done  
every 10 years

Both fields must be  
configured for correct use  
of equation

Device

Device ID: THMLS

Device Type: THERMOCOUPLE - LOW STRESS ENVIRONMENT

Configurations:

Device Tag: TT1

Proof Testing Interval (yr): 1

Voting: 1001

Subsystem Diagnostic Level: ? NO DC

Maintenance:

Mean Time to Repair (hr): 72

Diagnostic Interval (hr): 0.500

Overhaul Interval (yr): 10

Proof Testing Coverage (%): ? 85

User Specified ☒

Properties:

Failure Dangerous Failure Rate (1/yr): 5.00E-03

Failure Spurious Failure Rate (1/yr): 4.00E-02

Common Cause Factor CCF Dual (%): 2

Common Cause Factor CCF Triple (%): 2

Diagnostic Coverage Simplex DC1 (1/yr): 60.00

Diagnostic Coverage Dual DC2 (1/yr): 80.00

Diagnostic Coverage Triple DC3 (1/yr): 90.00

PFDavg: 0.00E+000

STR: 0.00E+000

Note:

Boundary Conditions: Boundary includes thermocouple element and insulators, terminal head and protecting tube or thermowell.

Process Severity Assumption: Clean

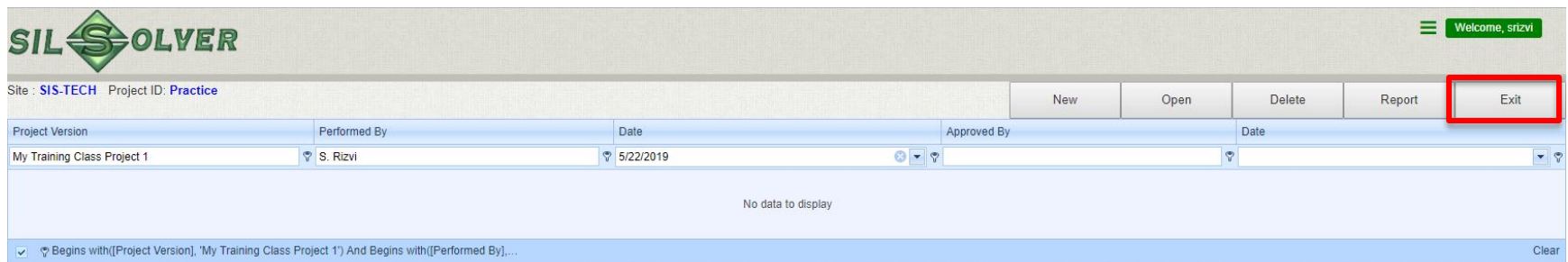
Implementation Limitations and Exclusions: A low stress environment does not include the following: high vibration application

Data Source: SIL

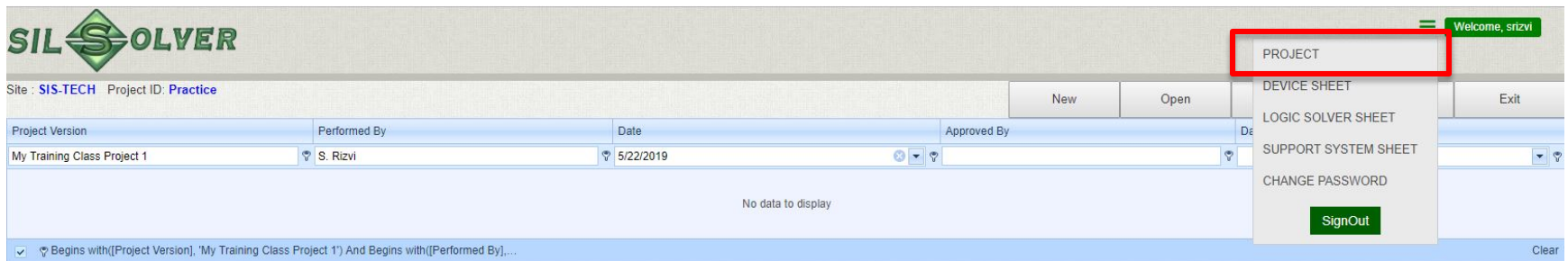
Update

# Getting back to Project Home

2 WAYS



The screenshot shows the SIL SOLVER Project Home interface. The top header includes the SIL SOLVER logo and a welcome message 'Welcome, srizvi'. Below the header, the site is identified as 'SIS-TECH' and the project as 'Practice'. A navigation bar contains buttons for 'New', 'Open', 'Delete', 'Report', and 'Exit'. The 'Exit' button is highlighted with a red box. Below the navigation bar, there is a table with columns for 'Project Version', 'Performed By', 'Date', 'Approved By', and 'Date'. The table contains one row with the data: 'My Training Class Project 1', 'S. Rizvi', '5/22/2019', and empty fields for 'Approved By' and 'Date'. Below the table, there is a message 'No data to display'. At the bottom, there is a search bar with a filter icon and a 'Clear' button.



The screenshot shows the SIL SOLVER Project Home interface with the 'PROJECT' dropdown menu open. The top header includes the SIL SOLVER logo and a welcome message 'Welcome, srizvi'. Below the header, the site is identified as 'SIS-TECH' and the project as 'Practice'. A navigation bar contains buttons for 'New', 'Open', 'Delete', 'Report', and 'Exit'. The 'PROJECT' dropdown menu is highlighted with a red box and contains the following options: 'PROJECT', 'DEVICE SHEET', 'LOGIC SOLVER SHEET', 'SUPPORT SYSTEM SHEET', 'CHANGE PASSWORD', and a 'SignOut' button. Below the navigation bar, there is a table with columns for 'Project Version', 'Performed By', 'Date', 'Approved By', and 'Date'. The table contains one row with the data: 'My Training Class Project 1', 'S. Rizvi', '5/22/2019', and empty fields for 'Approved By' and 'Date'. Below the table, there is a message 'No data to display'. At the bottom, there is a search bar with a filter icon and a 'Clear' button.

# Exiting SIL Solver®?

Exit the software  
from the main  
screen



Welcome, srizvi

Site: SIS-TECH  
Project ID: Practice

|            |        |        |               |                  |                     |            |                 |                   |                   |
|------------|--------|--------|---------------|------------------|---------------------|------------|-----------------|-------------------|-------------------|
|            |        | Open   | New           | Edit             | Copy                | Delete     | Exit            | Project Revision  | User Guide        |
| DBF Import | Import | Export | Print Reports | PF Documentation | Project Data Sheets | PF Details | PF Data Summary | PF Target Results | PF Result Summary |

SignOut from  
the menu  
dropdown at top  
right of main  
screen



Welcome, srizvi

Site: SIS-TECH  
Project ID: Practice

|            |        |        |               |                  |                     |            |         |  |                   |
|------------|--------|--------|---------------|------------------|---------------------|------------|---------|--|-------------------|
|            |        | Open   | New           | Edit             | Copy                | Delete     |         |  | User Guide        |
| DBF Import | Import | Export | Print Reports | PF Documentation | Project Data Sheets | PF Details | PF Data |  | PF Result Summary |

PROJECT

DEVICE SHEET

LOGIC SOLVER SHEET

SUPPORT SYSTEM SHEET

CHANGE PASS WORD

SignOut

# **3. EDITING, COPYING OR DELETING AN EXISTING PROJECT**

# If click Edit on main screen when there are No projects...

By default, the first project in the project list is selected.

Error text will pop up if user attempts a feature (e.g., Edit) that requires a project to be selected and there are no projects in the list.

Site:  
Projects

Project ID:

Must Select Project..

|            |        |        |               |                  |                     |            |                 |                   |                   |
|------------|--------|--------|---------------|------------------|---------------------|------------|-----------------|-------------------|-------------------|
|            |        | Open   | New           | Edit             | Copy                | Delete     | Exit            | Project Revision  | User Guide        |
| DBF Import | Import | Export | Print Reports | PF Documentation | Project Data Sheets | PF Details | PF Data Summary | PF Target Results | PF Result Summary |

| Site | Location | Project ID | Project Name |
|------|----------|------------|--------------|
|      |          |            |              |

No data to display

Create Filter



# Function Revision Info

To create/edit function revision information, select the function and click “function Revision level” to get to the editing page, where you can create/edit and delete the function revision information



Welcome, srizvi

Site: SIS-TECH

Project ID: Practice

Function ID: SIF 02

Protective Function

|               |                      |                   |            | Open          | New               | Edit                | Copy       | Delete          | Exit              | PF Revision Level  |
|---------------|----------------------|-------------------|------------|---------------|-------------------|---------------------|------------|-----------------|-------------------|--------------------|
|               |                      | Import            | Export     | Print Reports | PF Documentation  | Project Data Sheets | PF Details | PF Data Summary | PF Target Results | PF Results Summary |
| Function ID   | Function             | Mode Of Operation | PFD Target | PFD Result    | STR Target (1/yr) | STR Result (1/yr)   | IL Target  | IL Result       |                   |                    |
|               |                      |                   |            |               |                   |                     |            |                 |                   |                    |
| SIF 02        | V-102 High DP/P Trip | Low Demand        | 8.00E-02   | 5.51E-02      | 5.00E-02          | 5.83E-02            | 1          | 1               |                   |                    |
| SIF 01        | V-101                | Low Demand        | 8.00E-02   | 5.51E-02      | 5.00E-02          | 5.83E-02            | 1          | 1               |                   |                    |
| Create Filter |                      |                   |            |               |                   |                     |            |                 |                   |                    |



Welcome, srizvi

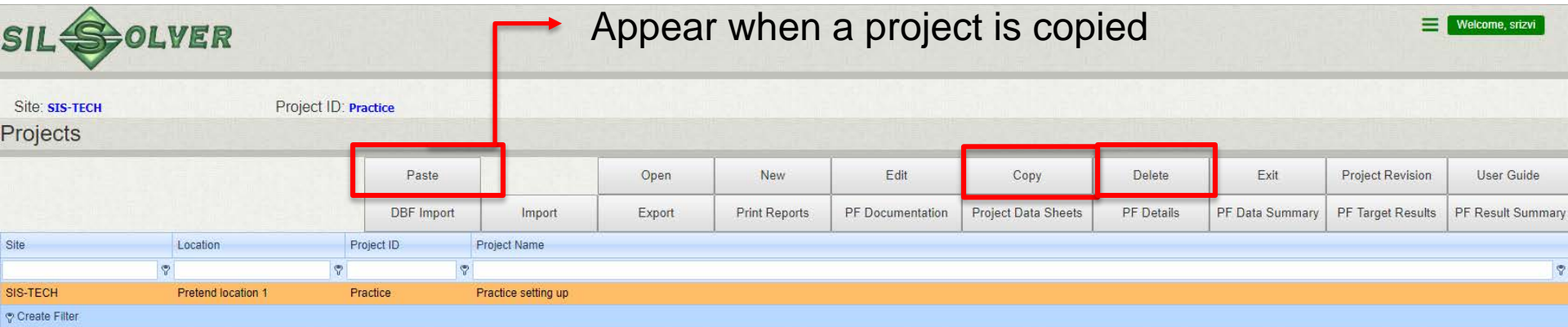
Site: SIS-TECH Project ID: Practice Function: SIF 02

|                  |              |      | New         | Open | Delete | Report | Exit |
|------------------|--------------|------|-------------|------|--------|--------|------|
| Function Version | Performed By | Date | Approved By | Date |        |        |      |
|                  |              |      |             |      |        |        |      |

No data to display

Create Filter

# Copying or deleting a project works like copying or deleting a function



Select the project

Copy → Make a copy of the selected project and after that a paste button will appear, when “paste” is click a window will pop up for you to enter new project designation.

Delete → Delete the selected project

# 4. GENERATING REPORTS

# Project Report generation

Print the reports for the whole project by selecting project and click relevant report tab.

When the project reports are printed, the report will include project revision information



Welcome, srtzvi

Site: [SIS-TECH](#) Project ID: [Practice](#)

Projects

| Site     | Location           | Project ID | Project Name        | Open       | New    | Edit   | Copy          | Delete           | Exit                | Project Revision | User Guide      |                   |                   |
|----------|--------------------|------------|---------------------|------------|--------|--------|---------------|------------------|---------------------|------------------|-----------------|-------------------|-------------------|
| SIS-TECH | Pretend location 1 | Practice   | Practice setting up | DBF Import | Import | Export | Print Reports | PF Documentation | Project Data Sheets | PF Details       | PF Data Summary | PF Target Results | PF Result Summary |

Create Filter

# Function Report generation

Print the reports for a function by going to the function list, select a function and click relevant report tab.

When the function level reports are printed, the report will include function revision information

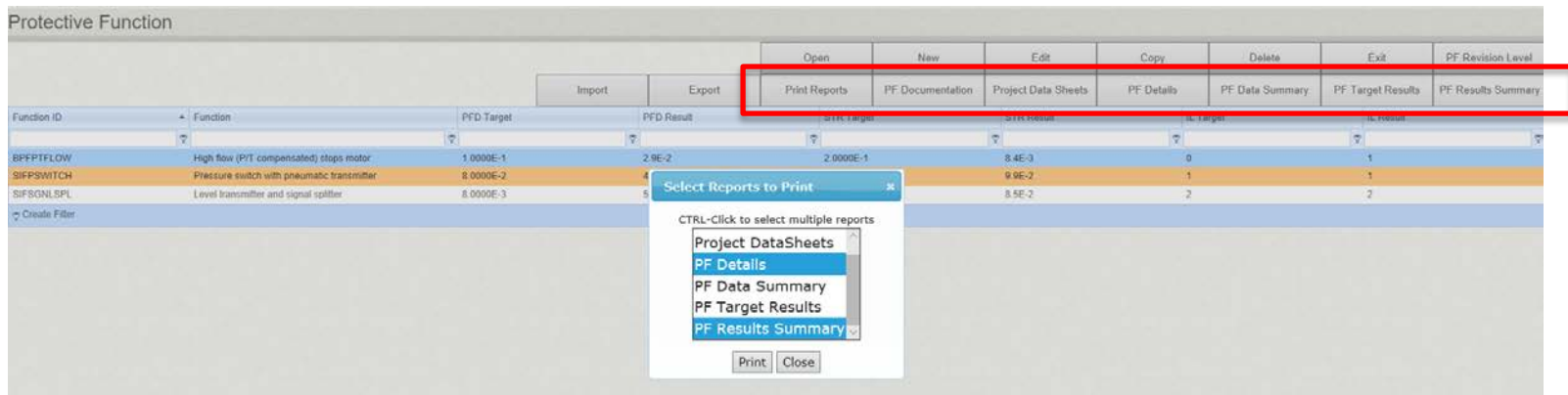
## Protective Function

|             |                      |                   |            | Open       | New               | Edit              | Copy             | Delete              | Exit       | PF Revision Level |                   |                    |
|-------------|----------------------|-------------------|------------|------------|-------------------|-------------------|------------------|---------------------|------------|-------------------|-------------------|--------------------|
|             |                      |                   |            | Import     | Export            | Print Reports     | PF Documentation | Project Data Sheets | PF Details | PF Data Summary   | PF Target Results | PF Results Summary |
| Function ID | Function             | Mode Of Operation | PFD Target | PFD Result | STR Target (1/yr) | STR Result (1/yr) | IL Target        | IL Result           |            |                   |                   |                    |
|             |                      |                   |            |            |                   |                   |                  |                     |            |                   |                   |                    |
| SIF 02      | V-102 High DP/P Trip | Low Demand        | 8.00E-02   | 5.51E-02   | 5.00E-02          | 5.83E-02          | 1                | 1                   |            |                   |                   |                    |
| SIF 01      | V-101                | Low Demand        | 8.00E-02   | 5.51E-02   | 5.00E-02          | 5.83E-02          | 1                | 1                   |            |                   |                   |                    |



# Selecting Reports

Use Print Report to select multiple reports at once or look at one at a time...



| <input type="checkbox"/> | Name                             | Type                   | Compressed size | Password pr... |
|--------------------------|----------------------------------|------------------------|-----------------|----------------|
|                          | PF_DETAILS-20180205-224320       | Adobe Acrobat Document | 183 KB          | No             |
|                          | PF_RESULT-SUMMARY-20180205-22... | Adobe Acrobat Document | 122 KB          | No             |

# 5. IMPORTING/EXPORTING

- Project export from SIL Solver® Enterprise
- SIL Solver® Enterprise project import
- Function Export/Import
- Importing SIL Solver® desktop application files into SIL Solver® Enterprise (DBF Import)

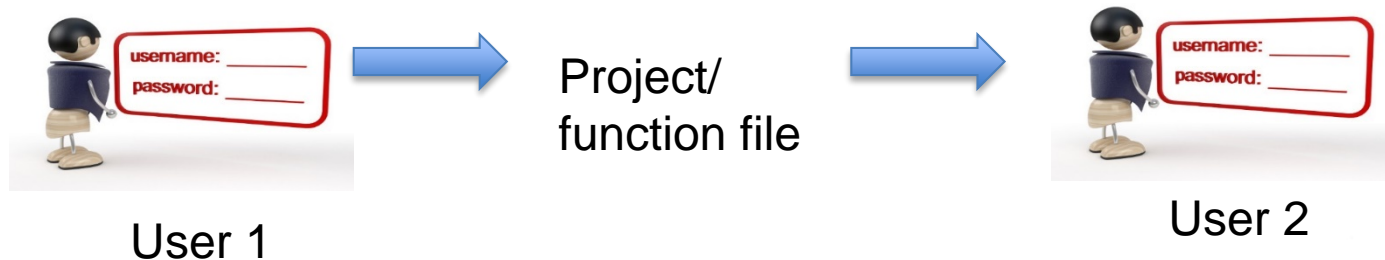
|            |                | Open            | New               | Edit             | Copy                | Delete     | Exit            | Project Revision  | User Guide        |
|------------|----------------|-----------------|-------------------|------------------|---------------------|------------|-----------------|-------------------|-------------------|
| DBF Import | Import         | Export          | Print Reports     | PF Documentation | Project Data Sheets | PF Details | PF Data Summary | PF Target Results | PF Result Summary |
| Site       | Location       | Project ID      | Project Name      |                  |                     |            |                 |                   |                   |
| TEST       | Houston        | LSVIBtest       | blah blah         |                  |                     |            |                 |                   |                   |
| SIS-TECH   | Houston; Texas | Practice proj 3 | Practice proj 3   |                  |                     |            |                 |                   |                   |
| TEST       |                | FINALTEST       |                   |                  |                     |            |                 |                   |                   |
| BACK       | Houston Texas  | FLOW            | Reverse flow case |                  |                     |            |                 |                   |                   |
| HILEV      | Houston Texas  | SURGE DRUM      | Surge Drum        |                  |                     |            |                 |                   |                   |

Used to transfer information

- between people
- between SIL SOLVER® Enterprise tool versions
- from SIL SOLVER® desktop program to SIL SOLVER® Enterprise

# Import and export

- The way to share a project/function between SIL Solver<sup>®</sup> Enterprise users



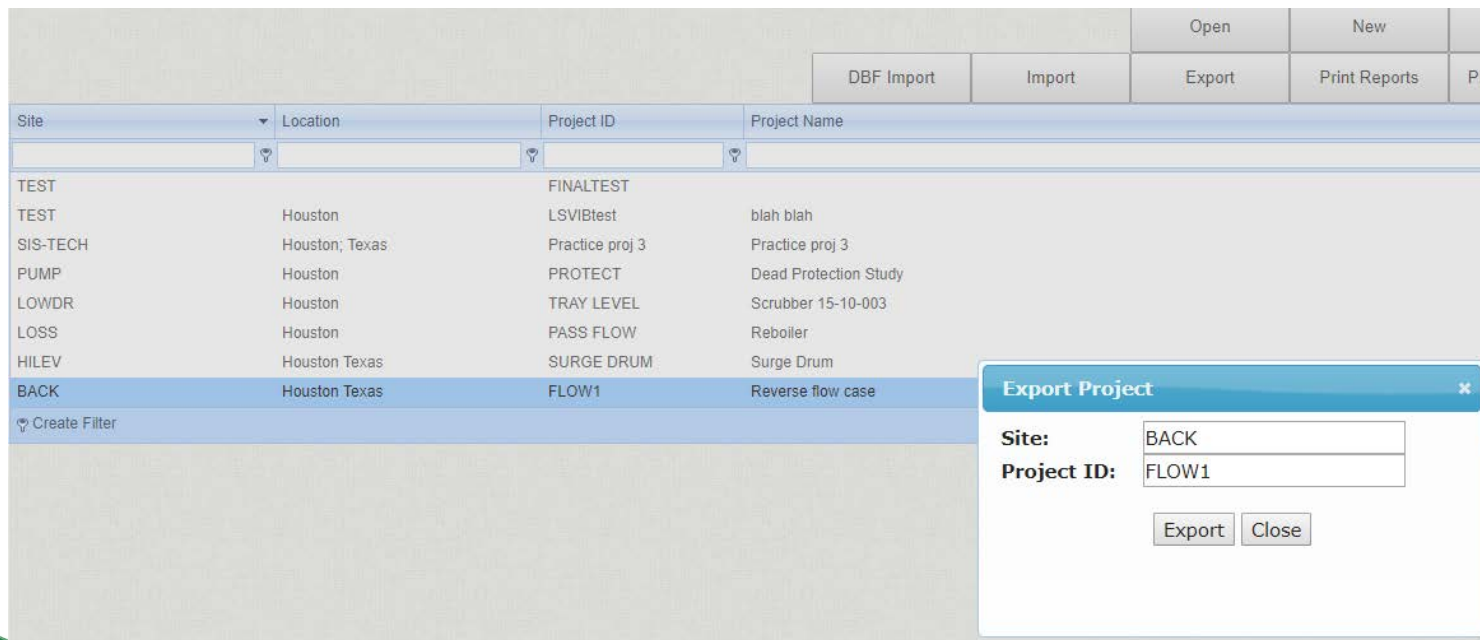
## DBF Import

- The way to transfer a project from a SIL Solver<sup>®</sup> desktop program into SIL Solver<sup>®</sup> Enterprise

# Project export

To export a project:

1. Go to the project page
2. Select the project
3. Click export – confirm the Site and ProjectID and click Export in dialog
4. A \*.sifprj file of the project will be created in the download folder



The screenshot shows a web application interface for project management. At the top, there are buttons for 'Open', 'New', 'DBF Import', 'Import', 'Export', 'Print Reports', and 'PF'. Below these is a table with columns: Site, Location, Project ID, and Project Name. The 'BACK' project is selected. An 'Export Project' dialog box is open, showing the 'Site' as 'BACK' and 'Project ID' as 'FLOW1'. The dialog has 'Export' and 'Close' buttons.

| Site     | Location       | Project ID      | Project Name          |
|----------|----------------|-----------------|-----------------------|
| TEST     |                | FINALTEST       |                       |
| TEST     | Houston        | LSVIBtest       | blah blah             |
| SIS-TECH | Houston, Texas | Practice proj 3 | Practice proj 3       |
| PUMP     | Houston        | PROTECT         | Dead Protection Study |
| LOWDR    | Houston        | TRAY LEVEL      | Scrubber 15-10-003    |
| LOSS     | Houston        | PASS FLOW       | Reboiler              |
| HILEV    | Houston Texas  | SURGE DRUM      | Surge Drum            |
| BACK     | Houston Texas  | FLOW1           | Reverse flow case     |

**Export Project**

**Site:** BACK

**Project ID:** FLOW1

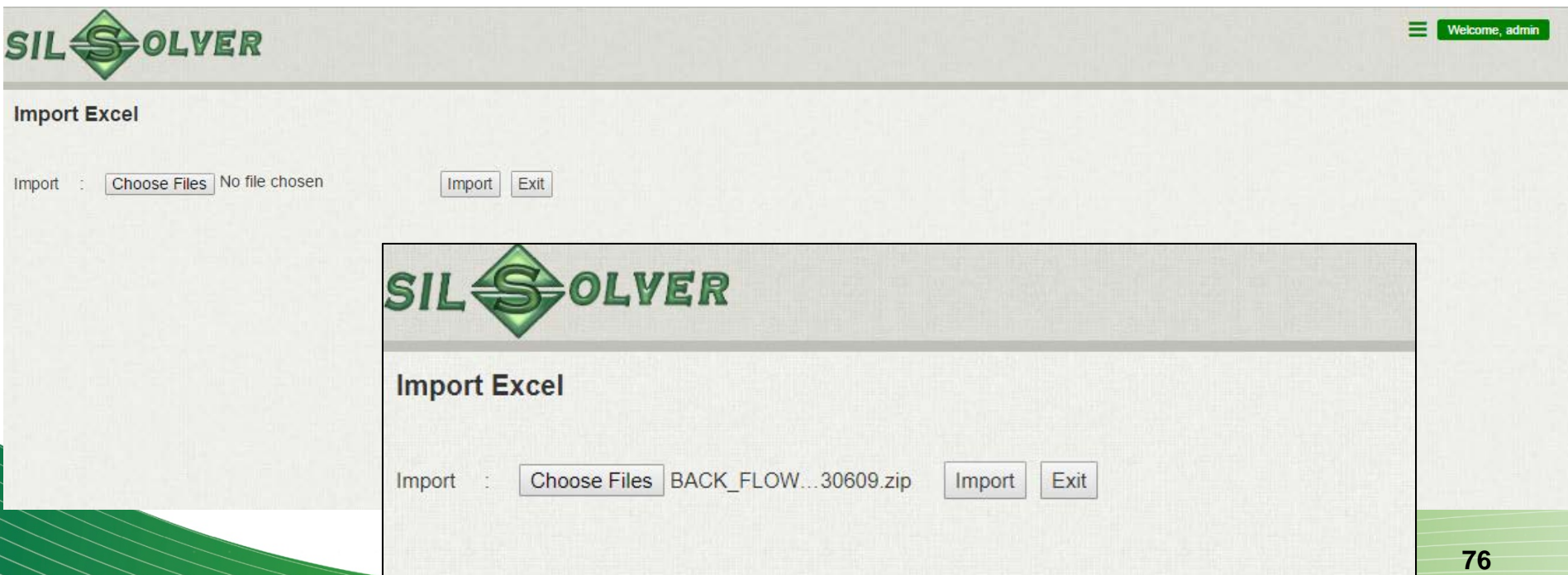
Export Close



# Project import

To import a previously exported Enterprise project:

1. Go to the project page
2. Click import, the following page will open
3. Click “choose files”, then change the directory to the project (\*.silprj)) file you want to import
4. Click Import and the tool will attempt to import the file



# SIL Solver® Enterprise

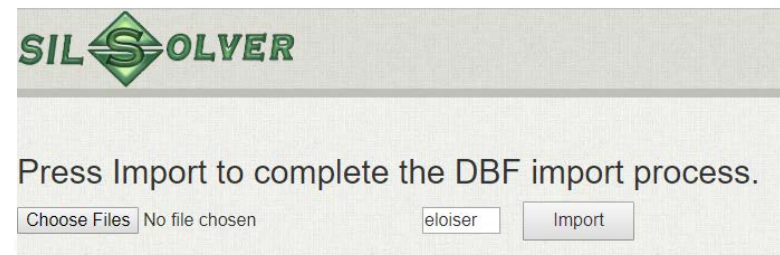
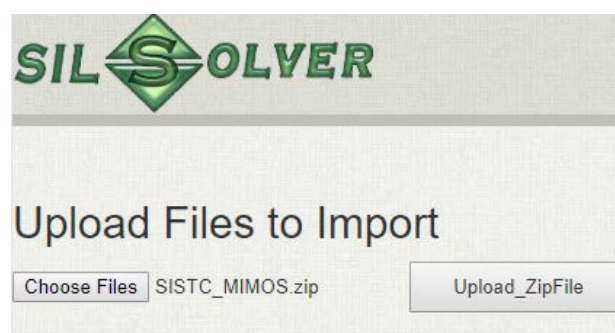
## Function export/import

To export/import an Enterprise function is the same as for a project, the only difference is that the operations are on the function level page and the exported file extension is \*.silsif

# DBF import to Enterprise

To import a **project** from SIL Solver® desktop versions into SIL SOLVER® Enterprise

1. Go to the folder where you saved the desktop software project
  - For example the default directory: C:\SILSolver\_Projects
2. Make sure the project folder name is correct, the files in the folder have not been modified, and no additional files have been added to the folder
3. Zip the project folder that you want to import to SIL Solver® Enterprise
4. Go to the SIL Solver® Enterprise project page
5. Click “DBF import” tab, the following page will open
6. Click Choose Files to browse to the Zipped project folder
7. Click “Upload\_ZipFile”
8. When the upload is ready, click import
9. A message will pop up when the import is done, including any warnings

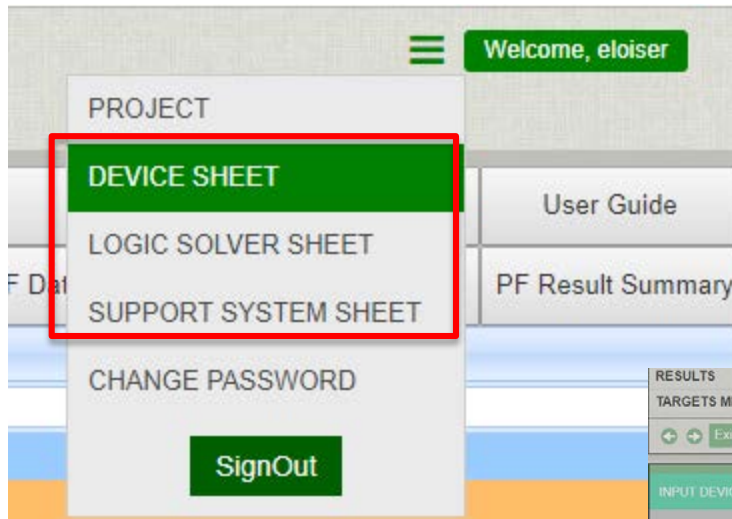


## 6. DATASHEETS

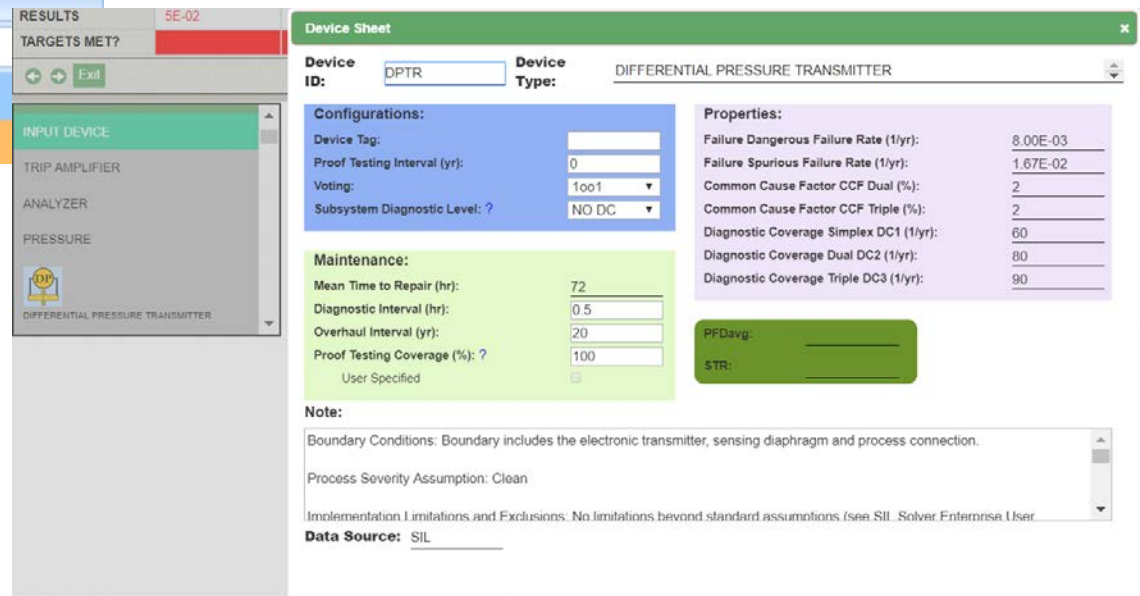
- Device
- Logic Solver
- Support System



# Accessing Datasheets



Access from main page dropdown menu or for individual devices right-click when in device list on GUI



The 'Device Sheet' window displays detailed information for a 'DIFFERENTIAL PRESSURE TRANSMITTER' (Device ID: DPTR). The window is divided into several sections:

- Configurations:**
  - Device Tag:
  - Proof Testing Interval (yr):
  - Voting:
  - Subsystem Diagnostic Level:
- Maintenance:**
  - Mean Time to Repair (hr):
  - Diagnostic Interval (hr):
  - Overhaul Interval (yr):
  - Proof Testing Coverage (%):
  - User Specified: ☐
- Properties:**

|   |          |
|---|----------|
| Failure Dangerous Failure Rate (1/yr):  | 8.00E-03 |
| Failure Spurious Failure Rate (1/yr):   | 1.67E-02 |
| Common Cause Factor CCF Dual (%):       | 2        |
| Common Cause Factor CCF Triple (%):     | 2        |
| Diagnostic Coverage Simplex DC1 (1/yr): | 60       |
| Diagnostic Coverage Dual DC2 (1/yr):    | 80       |
| Diagnostic Coverage Triple DC3 (1/yr):  | 90       |
- PFDAvg:**
- STR:**
- Note:**

Boundary Conditions: Boundary includes the electronic transmitter, sensing diaphragm and process connection.

Process Severity Assumption: Clean

Implementation Limitations and Exclusions: No limitations beyond standard assumptions (see SIL Solver Enterprise User

**Data Source:**



# Device datasheet list

**SIL SOLVER** Welcome, srizvi

SIL Solver Data Sheet

Back Version History Data ID List

Page 1 of 5 (248 items) < [1] 2 3 4 5 >

| Open | Data Version | Source | Device ID | Device Image | Device Description             | Fail_Dangerous | Fail_Spurious |
|------|--------------|--------|-----------|--------------|--------------------------------|----------------|---------------|
| Open | 8            | SIL    | ACC       |              | ACCELERATION MONITOR           | 1.25E-02       | 1.13E-01      |
| Open | 8            | SIL    | ALANN     |              | ALARM ANNUNCIATOR              | 1.33E-02       | 1.33E-02      |
| Open | 8            | SIL    | ANBTU     |              | BTU ANALYZER                   | 6.67E-02       | 1.00E-01      |
| Open | 8            | SIL    | ANCLR     |              | CHLORINE ANALYZER              | 6.67E-02       | 1.00E-01      |
| Open | 8            | SIL    | ANCMO     |              | CARBON MONOXIDE ANALYZER       | 6.67E-02       | 1.00E-01      |
| Open | 8            | SIL    | ANCO2     |              | CARBON DIOXIDE ANALYZER        | 6.67E-02       | 1.00E-01      |
| Open | 8            | SIL    | ANCON     |              | CONDUCTIVITY ANALYZER          | 2.00E-01       | 2.00E-01      |
| Open | 8            | SIL    | ANDO2     |              | DISSOLVED OXYGEN ANALYZER      | 2.00E-01       | 2.00E+00      |
| Open | 8            | SIL    | ANH2S     |              | HYDROGEN SULFIDE ANALYZER      | 3.33E-02       | 5.00E-02      |
| Open | 8            | SIL    | ANHCT     |              | HYDROCARBON ANALYZER-CATALYTIC | 2.00E-02       | 2.00E-02      |
| Open | 8            | SIL    | ANHIR     |              | HYDROCARBON ANALYZER-INFRARED  | 2.00E-02       | 2.00E-02      |

- Click open (far left) to look at the datasheet for that device

# Device Datasheet



Welcome, srizvi

SIL Solver Data Sheet

DATA SHEET

Back

DataSource

Device Id  

Device Type

Fail Dangerous Failure Rate(1/yr)

Fail Spurious Failure Rate(1/yr)

Mean Time to Repair(hrs)

Common Cause Factor Dual Mode(%)

Common Cause Factor Triple Mode(%)

Diagnostic Interval(hrs)

Diagnostic Coverage in Simplex Mode(%)

Diagnostic Coverage in Dual Mode(%)

Diagnostic Coverage in Triplicated Mode(%)

## Notes

Boundary Conditions: Boundary includes process connection, sampling system and analyzer.














Process Severity Assumption: Clean

Implementation Limitations and Exclusions: Calculation assumes the sampling system is monitored and alarmed. Calibration may be required more frequently than the calculation indicates due to sensor degradation and replacement.

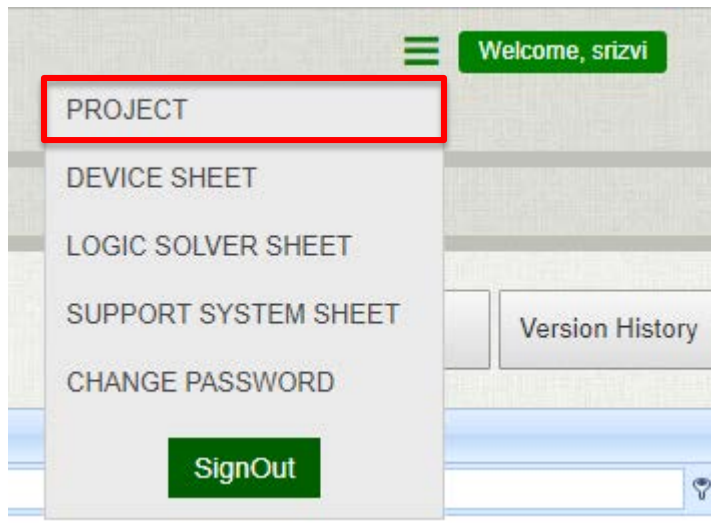
Diagnostic coverage and common cause factors are based on common sampling system. If sampling system is separate for each analyzer, the use of these values will result in a conservative PFDavg.

Data Sources:

# Same for LS and Support Systems

| SIL SOLVER                           |              |        |                   |   |   |
|--------------------------------------|--------------|--------|-------------------|---|---|
| SIL Solver Logic Solver Sheet        |              |        |                   |   |   |
| Open                                 | Data Version | Source | Logic Solver ID   | Logic Solver Image  | Logic Solver Description                    |
| Open                                 | 8            | SIL    | DWDIO             |  | GENERIC 2004D DUAL MP, DUAL I/O             |
| Open                                 | 8            | SIL    | DMSIO             |  | GENERIC 1002D DUAL MP, SIMPLEX I/O          |
| Open                                 | 8            | SIL    | N500              | NON-SC D/D  | NON SC PES DUAL MP, DUAL I/O                |
| Open                                 | 8            | SIL    | N5DS              | NON-SC D/S  | NON SC PES DUAL MP, SIMPLEX I/O             |
| Open                                 | 8            | SIL    | N5SS              | NON-SC S/S  | NON SC PES SIMPLEX MP, SIMPLEX              |
| Open                                 | 8            | SIL    | RELFC             |  | RELAY - FAIL TO CLOSE                       |
| SIL SOLVER                           |              |        |                   |   |   |
| SIL Solver Support System Data Sheet |              |        |                   |   |   |
| Open                                 | Data Version | Source | Support System ID | Support System Image  | Support System Description                  |
| Open                                 | 8            | SIL    | IAD RMS           |  | INSTRUMENT AIR-DIVERSITY/MONITORED RECEIVER |
| Open                                 | 8            | SIL    | IAD RS            |  | INSTRUMENT AIR-DIVERSITY/RECEIVER           |
| Open                                 | 8            | SIL    | IAD S             |  | INSTRUMENT AIR-COMPRESSOR DIVERSITY         |
| Open                                 | 8            | SIL    | IAD VS            |  | INSTRUMENT AIR-NO DIVERSITY                 |
| Open                                 | 8            | SIL    | IAD RCS           |  | INSTRUMENT AIR-RECEIVER                     |
| Open                                 | 8            | SIL    | IAD RMS           |  | INSTRUMENT AIR-MONITORED RECEIVER           |
| Open                                 | 8            | SIL    | UPSDMS            |  | UPS - POWER SUPPLY - DTT - MONITORED        |
| Open                                 | 8            | SIL    | UPSDTS            |  | POWER SUPPLY - DTT                          |
| Open                                 | 8            | SIL    | UPSET5            |  | POWER SUPPLY - ETT - 1 YEAR TESTING         |
| Open                                 | 8            | SIL    | UPSET25           |  | POWER SUPPLY - ETT - 2 YEAR TESTING         |
| Open                                 | 8            | SIL    | UPSET35           |  | POWER SUPPLY - ETT - 3 YEAR TESTING         |
| Open                                 | 8            | SIL    | UPSET45           |  | POWER SUPPLY - ETT - 4 YEAR TESTING         |

# Returning to Project View



Click Project on the dropdown menu or use Back buttons on the datasheet pages

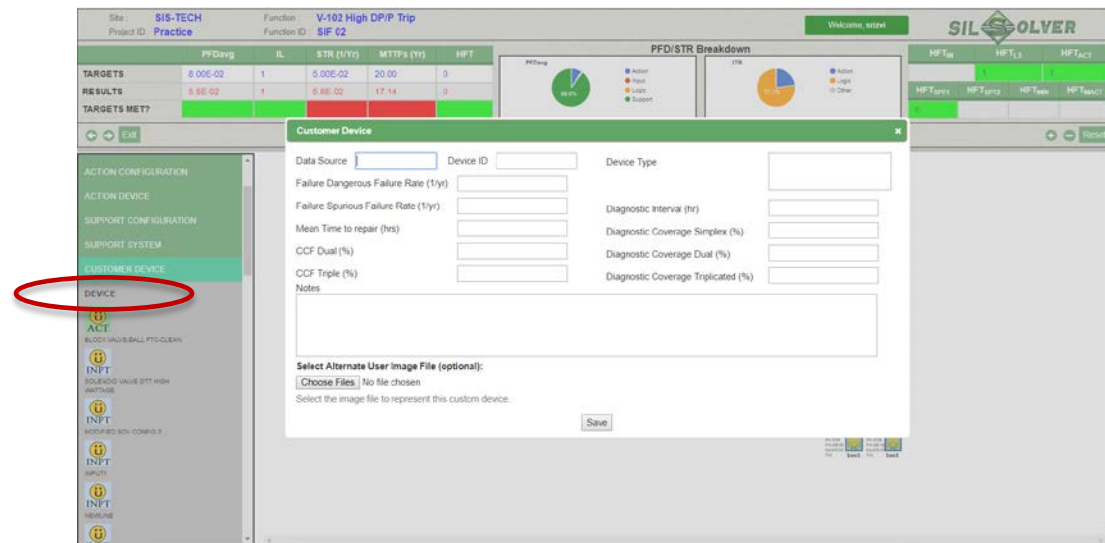


| Open | Data Version | Source | Support System ID | Support System Image | Support System Description |
|------|--------------|--------|-------------------|----------------------|----------------------------|
|      |              |        |                   |                      |                            |



# Adding a Custom Datasheet

- From GUI page, go to bottom of lists to the Customer Device section
- Left-click the **header** for the type of sheet this will be
- Enter the data for the new custom device and Save
  - Do not use special characters in the Data Source or Device ID fields
  - If desired, browse to a new image for this device to replace the default



Once created, custom datasheets are available to anyone on the server!



# 7. TROUBLESHOOTING

- Lost passwords
- Screen settings
- Import challenges
- Disconnects/timing out

# Troubleshooting: Lost Username or Password

- Individual username and password assignment is performed by the company that purchases the license through the ADMIN account for that license

# Troubleshooting: Screen Settings

- Some SIL Solver® Enterprise application screen content may be obscured if
  - Window is not maximized
  - Zoom >100% is used on the window

# Troubleshooting: Import Challenges

- When importing, confirm the final function successfully transferred into SIL Solver® Enterprise
- If warnings are generated during the import, there is an import log file that can be downloaded
- For DBF Import, use the Windows native “Send to” “Compressed (zipped) folder” feature, not any other zip application

# Troubleshooting: Disconnects/Timing Out

- Do not delay too long before saving.
- SIL Solver® Enterprise will time out after a period of inactivity.
- A warning screen will pop up during the last minute.
  - Click “Yes” to extend the session

