

Automation in Spotfire

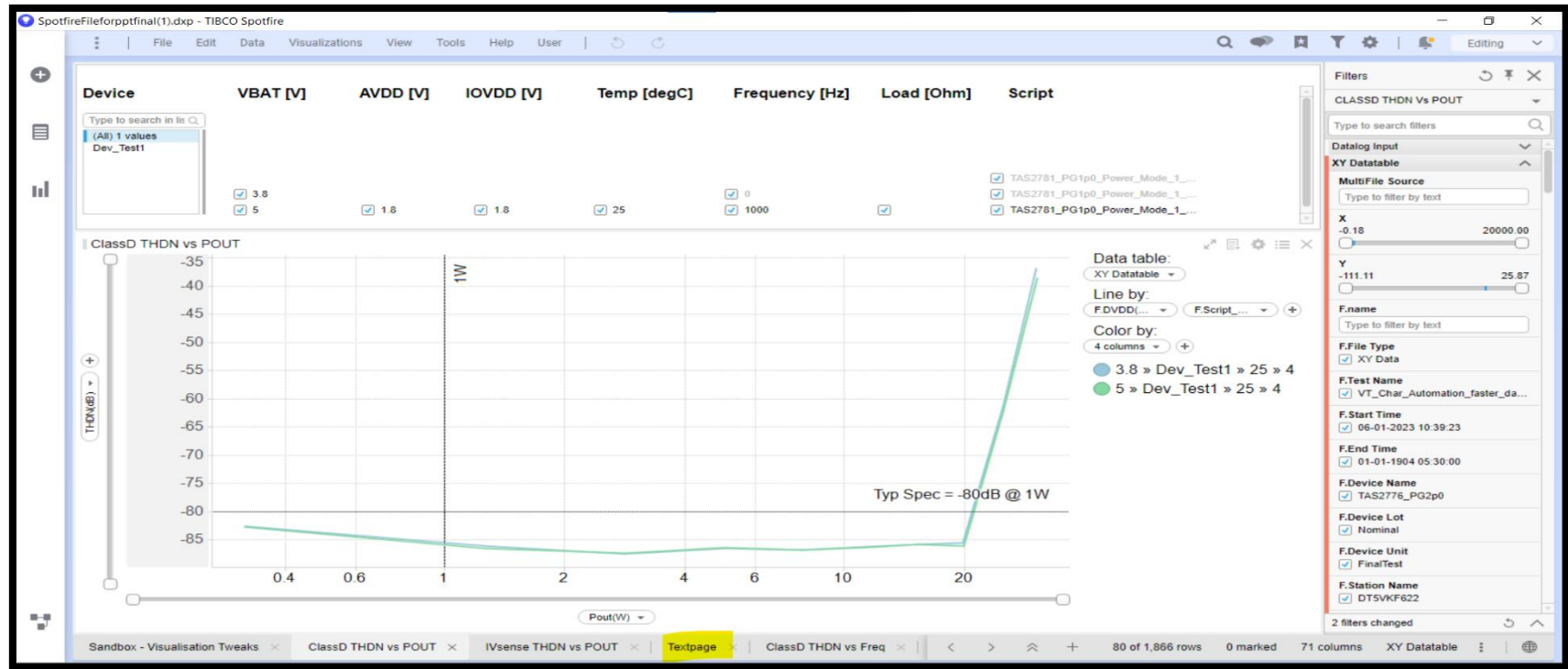
- 1) Automation of File Handling in Spotfire (Using Iron-Python)
- 2) Generating Report of Current file in ppt format (Using Python , Iron-Python)

1) Automation of File Handling in Spotfire (Using Iron-Python)

1) Automate the file handling/loading in Spotfire

- I. Iron-Python is a Script used in Spotfire to interact with the interface of the software
- II. The objective of the project is to automate the process of file upload on Spotfire.
- III. Files are dumped from the tester in a folder and we manually upload the latest file and refresh the Spotfire.
- IV. Automating the manual process to get the latest file from the folder and uploading the data in Spotfire using Iron-Python
- V. If the latest file is in 2 parts (Header and Data) ,It converts the file automatically into a single file and uploads the combined file in Spotfire

Interface of Spotfire :



1) Automate the file handling/loading in Spotfire

- Multiple files are dumped into a folder location and we have to Upload and Reload the required file in the Spotfire
- The script will take the address of the folder in the text area and on pressing Go button it will updated the Spotfire with the latest created file.If the latest file is present into two parts as Header file and Data file then this code will merge two files into a single file as combined file and upload this file in the Spotfire
- Iron python Script: We will ask user to give the location of the folder in which our files will be stored .We will iterate through each file to check for the latest and second latest file by iterating through the files . If the latest file is in correct format then it will directly update the spotfire with this file.
- If the latest file is Header or Data file then it will merge it with the second latest file accordingly taking into consideration all cases and upload the merged file in the spotfire displaying a message that the file has been uploaded with its address.

Working of the Script

Text Area in Spotfire :

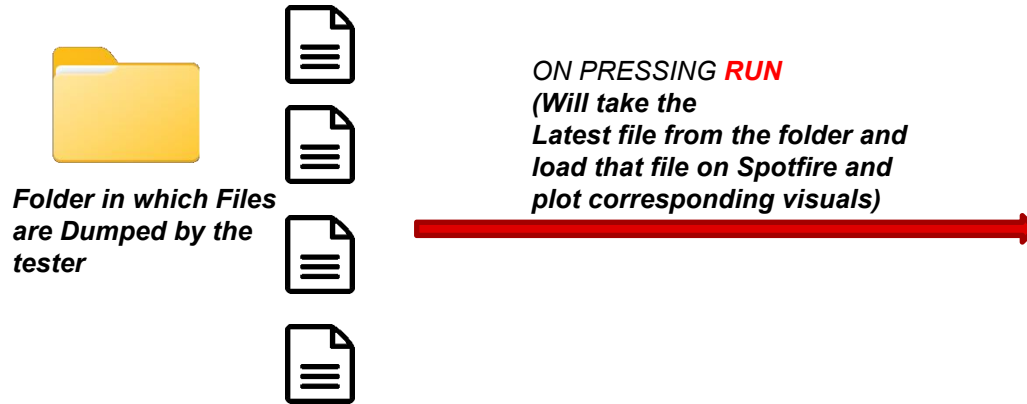
- **Address of the folder in which files are stored** (Address in the form C:\\Users\\Desktop\\MYFolder)

Will give the latest file in the folder. If Header and Data files are present it will combine the files into a new merges file and import it

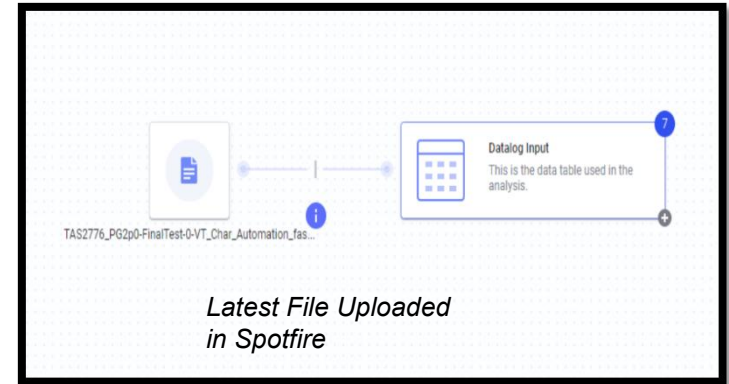
Address: C:\\Users\\la0504877\\Desktop\\My_folder

Run

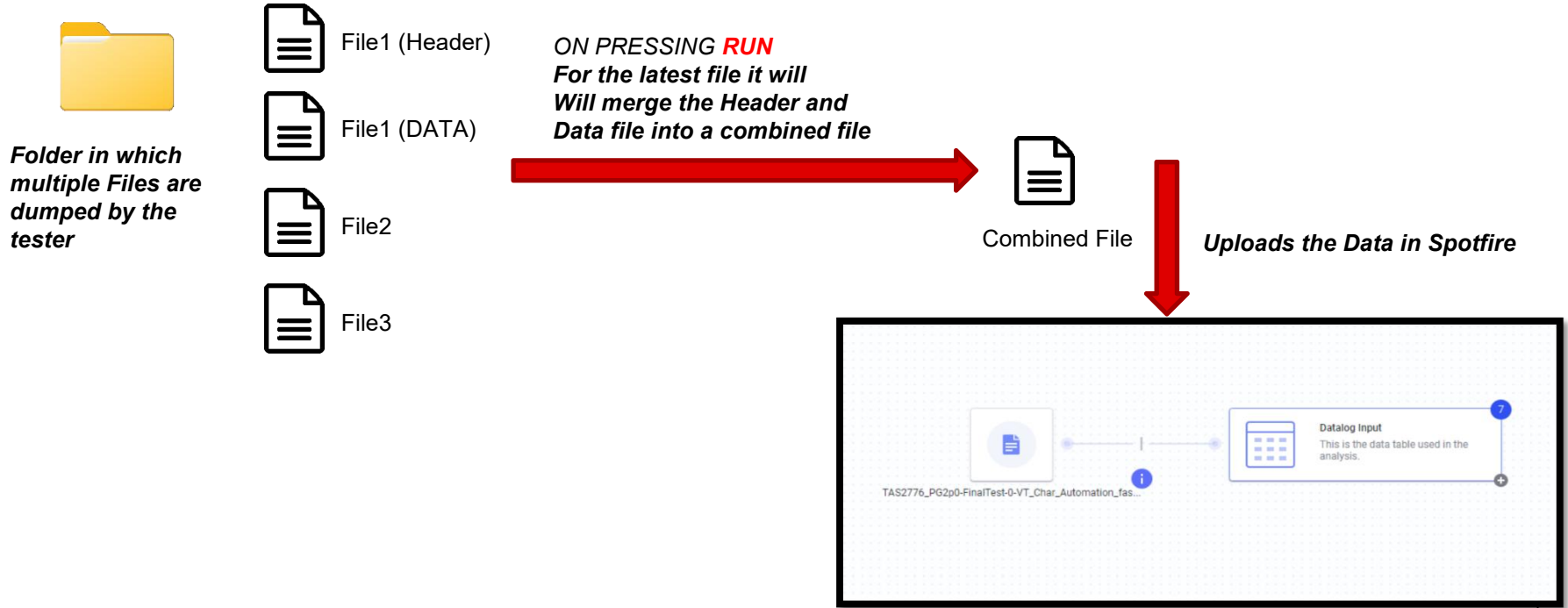
CASE 1 : If the latest File is Complete File



The latest file(TAS277_Pg...) is updated on Spotfire and all the visuals can be seen for that file in different pages



- CASE 2: If the Latest File is broken into Header and Data File



Input in Text Page

Text area

Enter the address of the Folder in which files are stored *(Address in the form of C:\\Users\\Desktop\\MYFolder)*

Will Upload the Latest File in the folder. If Header and Data files are present then it merge the files together and upload

C:\\Users\\a0504877\\Desktop\\ALLLLLLLLLLL\\FirstFinal\\Testing

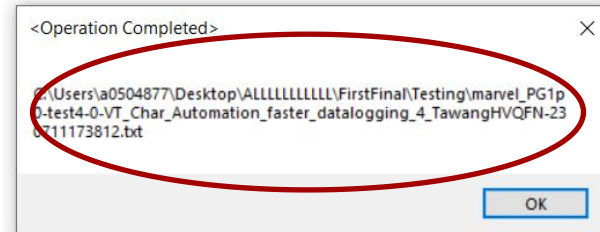
PressGo

Button for Script

marvel_PG1p0-test4-0-VT_Char_Automation_faster_datalogging_4_TawangHVQFN-230711173812.txt - Notepad

```
File Edit Format View Help
DeviceUnit RunID ProductName TestSite PackageType ProductRevision TestProgram M
STRING STRING STRING INTEGER STRING STRING STRING STRING STRING INTEGER DATETIME
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
test4 marvel_PG1p0 0 VT_Char_Automation_faster_datalogging_4_TawangHVQFN.seq N
```

File



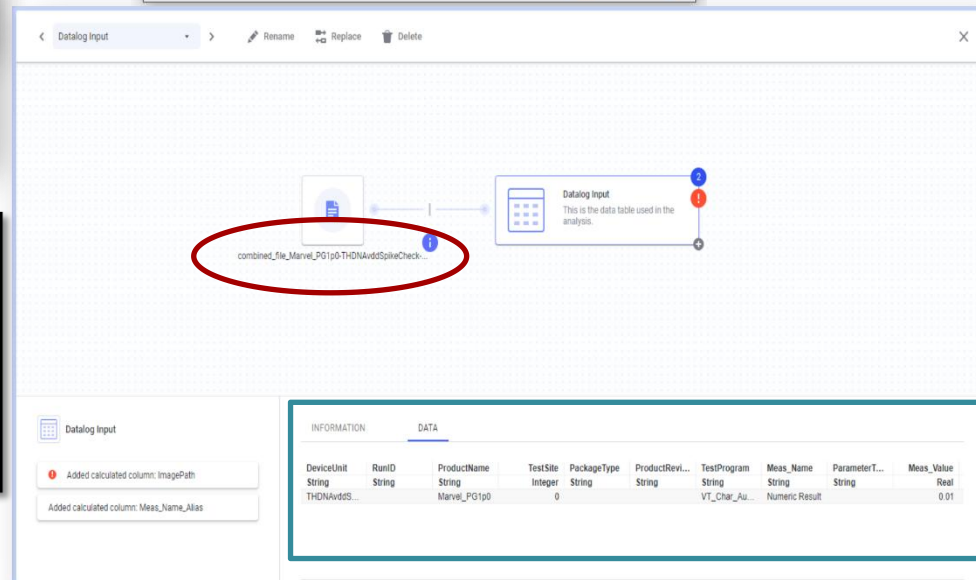
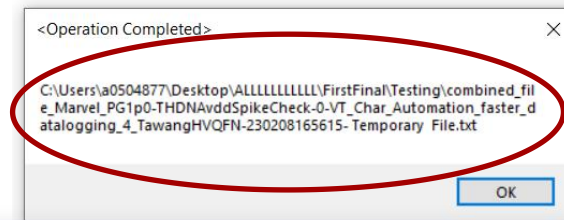
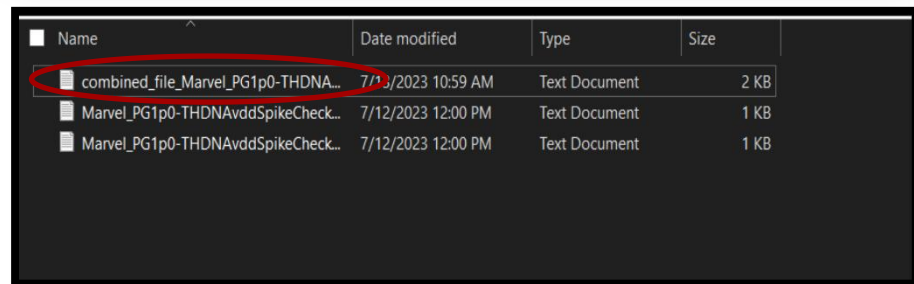
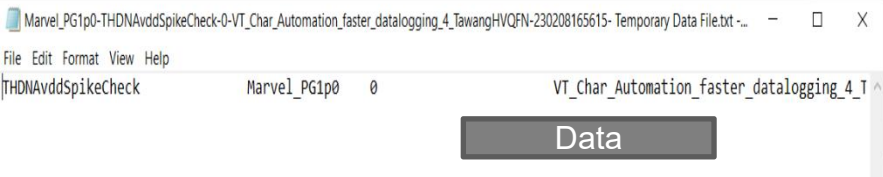
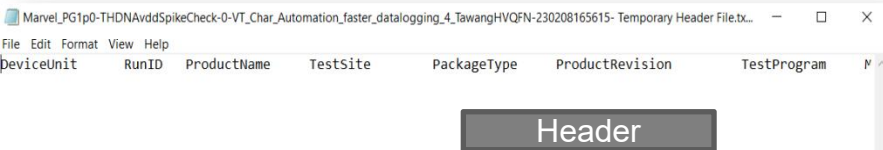
< Datalog Input > Rename Replace Delete

marvel_PG1p0-test4-0-VT_Char_Automation_faster_da...

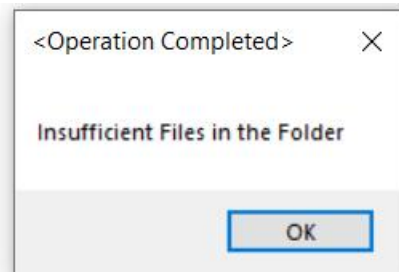
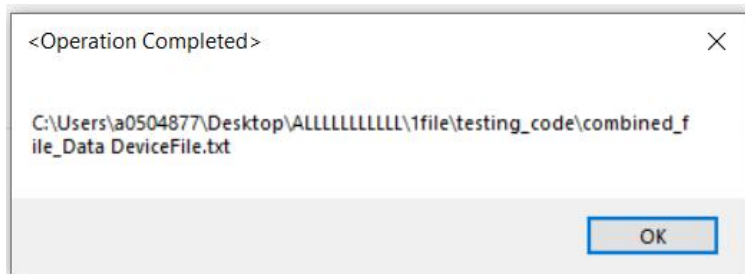
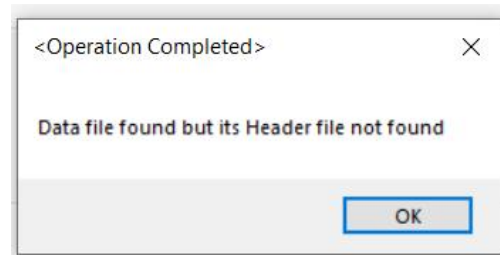
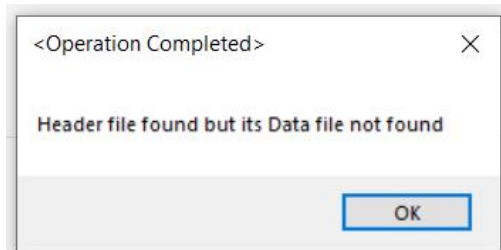
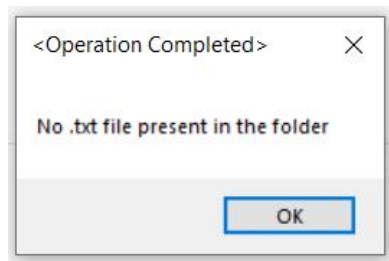
Datalog Input
This is the data table used in the analysis.

Added calculated column: ImagePath
Added calculated column: Meas_Name_Alias

INFORMATION		DATA									
DeviceUnit	RunID	ProductName	TestSite	PackageType	ProductRev...	TestProgram	Meas_Name	ParameterT...	Meas_Value		
String	String	String	Integer	String	String	String	String	String	Real		
test4	marvel_PG1p0	0				VT_Char_Au...	Numeric Result		7.85		
test4	marvel_PG1p0	0				VT_Char_Au...	Numeric Result		21.50		
test4	marvel_PG1p0	0				VT_Char_Au...	Numeric Result		43.01		
test4	marvel_PG1p0	0				VT_Char_Au...	Numeric Result		70.94		
test4	marvel_PG1p0	0				VT_Char_Au...	Numeric Result		83.45		
test4	marvel_PG1p0	0				VT_Char_Au...	Numeric Result		87.96		



Error Handling



2) Generating a report of the Current file in ppt format using (Iron-Python and Python Script)

Input in Text Page in Spotfire

Text area

Address of the Folder and Name of the ppt (Address in the form C:\\Users\\Desktop\\MYFolder) (Name of the ppt Randomxyz123)

Address : C:\\Users\\a0504877\\Desktop\\ALLLLLLLLLLL\\SecondFin\\Test

PPT Name : Hello

PPT and Report :

Only Visuals:

Pressing this button to Export Visuals along with Analysis

Faster: To export only the Visuals of the file

User gives the the Address of the folder to store the report in ppt format, and give a name of the output ppt

For the active File in the Spotfire If we press the Press Go button then we get the ppt in the desired location with the Visuals and Analysis

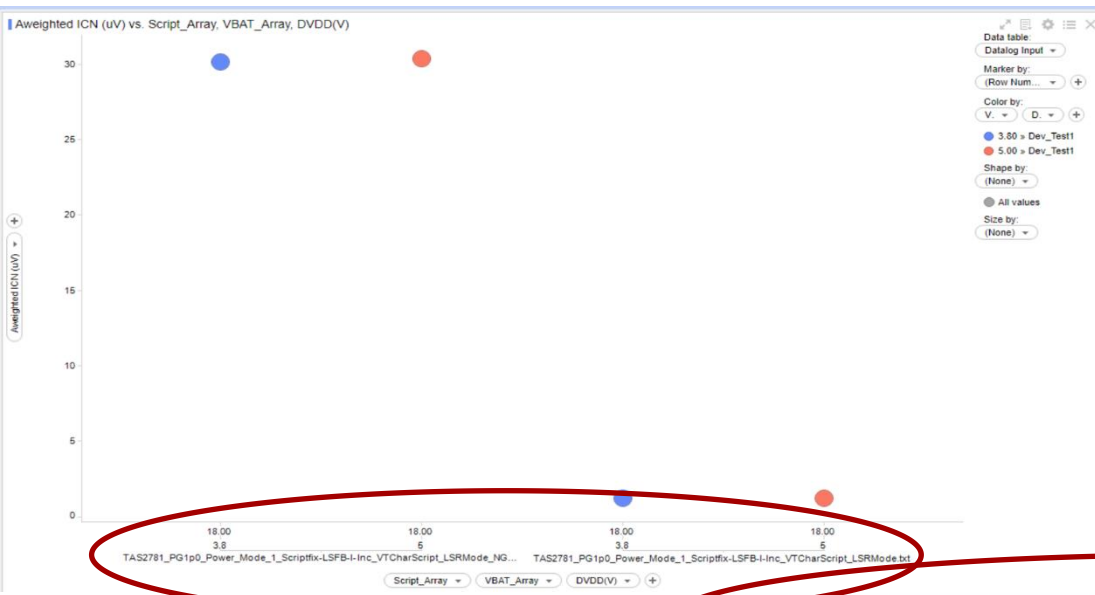
- Spotfire has different pages and every page has different visuals
- Different Visuals are formed by different files (Data log Input or XY Data log)
- Every visual is formed based on the filtering conditions applied on the particular file
- Every visual is grouped by using particular columns and Graphs are plotted
- The Y expression of the can be any mathematical expression as the function of the column
- Final code works on Iron-Python Script and Python Script and should be able to do overcome all the problems

Output PPT formed by pressing PressGo

Table for file:- grouped_1_Sandbox - Visualisation Tweaks_XY Waveform Parametric.csv

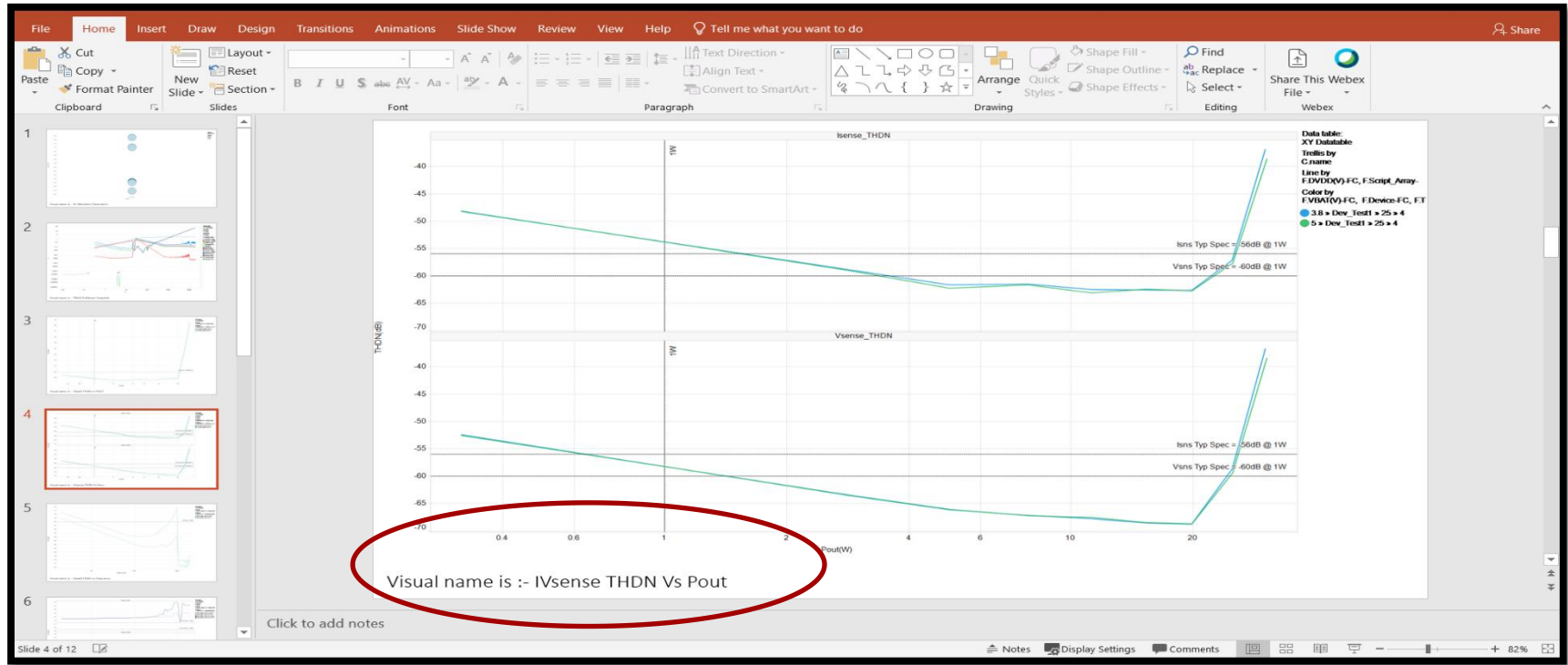
Device	max	min	mean	std	mean + 3*std	mean - 3*std
X15	0.0	-118.5	-89.62333333333332	44.13193284500563	42.77246520168357	-222.0191318683502
X3	0.0	-117.63	-56.65013888888889	57.151422307860585	114.80412803469288	-228.10440581247065
X4	0.0	-117.33	-56.544166666666666	57.04235566787934	114.58290033697136	-227.67123367030467
X6	0.0	-117.9	-56.725555555555556	57.231107489509085	114.96776691297168	-228.4188780240828
X9	0.0	-117.66	-56.674027777777778	57.174815239168225	114.8504179397269	-228.19847349528246
Z12	0.0	-116.85	-56.445555555555556	56.93338496550747	114.35459934096687	-227.245710452078
Z14	0.0	-117.52	-56.619722222222222	57.1191079982286	114.73760177246358	-227.97704621690804
Z15	0.0	-116.77	-18.796990740740743	42.170170761629954	107.71352154414913	-145.3075030256306
Z4	0.0	-117.81	-56.721805555555555	57.22521081684265	114.95382689497237	-228.3974380060835
Z9	0.0	-116.85	-56.427638888888886	56.91711244180289	114.3236984365198	-227.17897621429756

Grouped by the x axis expressions



Script_Array	VBAT_Array	DVDD(V)	max	min	mean	std
TAS2781_PG1p0_Power_Mode_1_Scriptfix-LSFB-I-Inc_VTCharScript_LSRMode.txt	3.8	18.0	1.23	1.23	1.23	
TAS2781_PG1p0_Power_Mode_1_Scriptfix-LSFB-I-Inc_VTCharScript_LSRMode.txt	5.0	18.0	1.23	1.23	1.23	
TAS2781_PG1p0_Power_Mode_1_Scriptfix-LSFB-I-Inc_VTCharScript_LSRMode_NGDis.txt	3.8	18.0	30.17	30.17	30.17	
TAS2781_PG1p0_Power_Mode_1_Scriptfix-LSFB-I-Inc_VTCharScript_LSRMode_NGDis.txt	5.0	18.0	30.36	30.36	30.36	

Output PPT formed by pressing “Go”



Error Handling



Could not perform action 'Press GO'.

Could not execute script 'IronpythonScript': name 'csv_file' is not defined

CLOSE

If this error is encountered then uncheck Allow Caching

Edit Script

Name:

Script_python

Type:

Python script

Description:

☐ Allow caching

Script Input Parameters Output Parameters

```
1 #PYTHON SCRIPT name is Script_pyhton
2 import pandas as pd
3 #Reading the filehai.csv
4 #PPP=r"C:\Users\ao504877\Desktop\ALLLLLLLLLLL\2file\Testing_code"
5 df=pd.read_csv(PPP+"\\temp_folder\\filehai.csv",encoding='ISO-8859-1')
6 #----->Totalnumber of times we need to run is equal to the number of visual
7 length_arr=len(df)
8 print("The number of times we need to perform is ",length_arr)
9
10 page_arr=df["page_arr"].tolist() #---> Converting the column of the csv
11 page_vis_title=df["page_vis_title"].tolist()
12 visual_ka_org=df["visual_ka_org"].tolist()
13 page_vis_xaxis_modl=df["page_vis_xaxis_modl"].tolist() #----->Array for e
14
15
16 #-----> Color by axis array was basically a string seprated by spaces repres
17 import os
18 for i in range(length_arr):
```

Help

Save

Close

Combining Both into a single Text Page

The screenshot shows a software interface with a main text area and a right-hand sidebar. A red circle highlights the main text area, which contains the following text:

Text area
Address of the Folder in which Files are Stored (Address in the form C:\\Users\\Desktop\\MYFolder)
Will Upload the Latest File in the folder. If Header and Data files are present then it merge the files together and upload
Address :

Address of the Folder and Name of the ppt (Address in the form C:\\Users\\Desktop\\MYFolder) (Name of the ppt Randomxyz123)
Address : C:\\Users\\a0504877\\Desktop\\ALLLLLLLLLLLLLL\\SecondFm\\Test
PPT Name : Hello
Only Visuals:

The right-hand sidebar contains a 'Filters' panel with the following settings:

- CLASSD THDN Vs POUT
- Type to search filters
- Dialog Input
- DeviceUnit
- ☒ FinalTest
- Product Name
- ☒ TA-2776_PG2p0
- PackageType
- Type to filter by text
- ProductRevision
- Type to filter by text
- TestProgram
- ☒ VT_Char_Automation_faster_da...
- Meas_Name
- ☒ Numeric Result
- ParameterType
- Type to filter by text
- Meas_Value
- 111.11 25.87
- Meas_Unit
- Type to filter by text
- PFStatus
- ☒ Passed
- StartTime
- 1/6/2023 10:... 1/6/2023 10:...
- Lot
- ☒ Nominal
- TestBench
- 2 filters changed

A dialog box titled '<Operation Completed>' is shown in the foreground, with the message 'Execution of code completed' and an 'OK' button.

Problem statement 2:

Creating a GUI Based Analysis tool for ATE Data logfiles

Outline

Aim – To Automate the generation of various Data analysis reports/summary needed for ATE

1. In **engineering development**, this tool can be continuously fed log files as and when any data is collected and continue to have an idea of marginalities or instabilities or data distributions during development.
2. In **production data** analysis, the tool can be used specifically to understand the yield losses, site – site skews or lot –lot skews seen, understand the data distributions for high volumes, Cpk.
3. The tool gives a summary on the
 1. type of distribution/skews
 2. Generates the histogram plots for visual analysis
 3. Data statistics / Cpk
 4. Site wise Mean / Sigma drifts
 5. Site wise distributions & statistics
 6. Lot wise Mean / Sigma drifts

Input File: Engineering File

Parameters

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Name	SBIN	HBIN	DIE_X	DIE_Y	SITE	TIME	TOTAL_TF	FAIL_TEST	OUTLIER	LOT_ID	WAFER_ID	PRE_CONTI:avdd_ncon[1]	PRE_CONTI:iovd_ncon[1]	PRE_CONTI:vbat_ncon[1]	PRE_CONTI:bst_ncon[1]	PRE_CONTI:bst_ncon[1]	PRE_CONTI:bst_ncon[1]	PRE_CONTI:bst_ncon[1]
TEST_ID												100101002	100101003	100101004	100101005	1E+08	1E+08	1E+08
UNIT						ms					V	V	V	V	V	V	V	V
LOW_LIMIT												-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	0
HIGH_LIMIT												-0.25	-0.25	-0.25	-0.25	-0.25	-0.25	0
1	13	7				4448	71	0	0	0		-0.58	-0.642	-0.609	-0.636	-0.529	-0.512	0
2	13	7				4448	71	0	0	0		-0.58	-0.643	-0.609	-0.635	-0.529	-0.511	0.6
3	13	7				4448	71	0	0	0		-0.579	-0.641	-0.609	-0.636	-0.529	-0.514	0.6
4	13	7				4448	71	0	0	0		-0.58	-0.642	-0.61	-0.636	-0.529	-0.513	0
5	34	14				4448	71	1	0	0		-0.579	-0.642	-0.609	-0.635	-2	-0.513	0
6	13	7				4448	71	0	0	0		-0.58	-0.643	-0.609	-0.635	-0.529	-0.511	0.6
7	13	7				4448	71	0	0	0		-0.582	-0.645	-0.61	-0.635	-0.53	-0.512	0.6
8	13	7				4448	71	0	0	0		-0.579	-0.641	-0.609	-0.635	-0.528	-0.515	0.6
9	13	7				4448	71	0	0	0		-0.581	-0.644	-0.61	-0.636	-0.529	-0.512	0
10	13	7				4448	71	0	0	0		-0.579	-0.641	-0.609	-0.635	-0.528	-0.514	0.6
11	13	7				4448	71	0	0	0		-0.581	-0.645	-0.609	-0.635	-0.53	-0.511	0
12	13	7				4448	71	0	0	0		-0.582	-0.646	-0.61	-0.636	-0.53	-0.508	0.6
13	13	7				4448	71	0	0	0		-0.582	-0.646	-0.61	-0.637	-0.53	-0.506	0.6
14	13	7				4448	71	0	0	0		-0.58	-0.642	-0.609	-0.636	-0.529	-0.512	0
15	13	7				4448	71	0	0	0		-0.583	-0.646	-0.61	-0.636	-0.53	-0.505	0.6
16	13	7				4448	71	0	0	0		-0.58	-0.644	-0.609	-0.636	-0.529	-0.511	0
17	13	7				4448	71	0	0	0		-0.579	-0.641	-0.609	-0.635	-0.529	-0.515	0.6
18	13	7				4448	71	0	0	0		-0.579	-0.642	-0.609	-0.636	-0.529	-0.514	0.6
19	13	7				4448	71	0	0	0		-0.578	-0.64	-0.609	-0.635	-0.528	-0.514	0.6
20	13	7				4448	71	0	0	0		-0.574	-0.641	-0.608	-0.635	-0.496	-0.513	0.6
21	13	7				4448	71	0	0	0		-0.579	-0.642	-0.609	-0.635	-0.528	-0.512	0
22	13	7				4448	71	0	0	0		-0.578	-0.643	-0.609	-0.635	-0.529	-0.511	0
23	64	42	22			36305	134	1	0	0		-0.58	-0.642	-0.609	-0.635	-0.528	-0.512	0.6
24	65	42	22			36305	134	1	0	0		-0.58	-0.643	-0.609	-0.635	-0.529	-0.511	0

- File has information related to Parameters which are tested for the device along with its specified Low_Limit and High_Limit values ,Site in which the device was tested etc

Input Files: Production

Parameters

	AT	AU	AV	AW	AX	AY	AZ	BA	BB
1	PRR_TEST_PRR_NUM	P100001_NCON_PRE	P100002_NCON_PRE_M1	P100003_NCON_PRE_M1MA_VBAT	P100004_NCON_PRE_M1MA_DREG	P100005_P100006_P100007_1			
2	19629	511	1	-0.482102148	-0.579101378	-0.542690032	-0.58861	-0.6685	-0.65022
3	19629	511	1	-0.475877762	-0.57915318	-0.540232241	-0.59158	-0.66895	-0.64933
4	19629	511	1	-0.480917186	-0.579145193	-0.542391598	-0.58935	-0.66849	-0.65018
5	19629	511	1	-0.481231362	-0.579436004	-0.542364001	-0.58992	-0.66871	-0.65035
6	19629	511	1	-0.474864811	-0.579627216	-0.539803028	-0.58926	-0.66898	-0.65132
7	19629	511	1	-0.475352854	-0.579448283	-0.53949362	-0.59061	-0.669	-0.65013
8	19629	511	1	-0.480600357	-0.579694092	-0.542490542	-0.5899	-0.66876	-0.65513
9	19629	511	1	-0.480635285	-0.579975963	-0.542461753	-0.59163	-0.66873	-0.65681
10	19629	511	1	-0.474720597	-0.579920948	-0.53990221	-0.58919	-0.66924	-0.65128
11	19629	511	1	-0.474367082	-0.580115795	-0.539986074	-0.59293	-0.66918	-0.65448
12	19629	511	1	-0.481796294	-0.57984066	-0.542626441	-0.58934	-0.66876	-0.65386
13	19629	511	1	-0.481773704	-0.580002785	-0.542889237	-0.59199	-0.66858	-0.657
14	19629	511	1	-0.474634111	-0.580891669	-0.539982855	-0.59042	-0.66931	-0.65254
15	19629	511	1	-0.474532932	-0.580914199	-0.539821148	-0.59435	-0.66931	-0.65709
16	19270	511	1	-0.474633574	-0.580780447	-0.539895177	-0.5924	-0.66908	-0.65129
17	19270	511	1	-0.474450767	-0.580901802	-0.540066719	-0.59531	-0.66921	-0.65265
18	19270	511	1	-0.473809272	-0.580769181	-0.539668441	-0.59233	-0.66937	-0.65162
19	19270	511	1	-0.483317167	-0.580154061	-0.542982221	-0.5914	-0.6686	-0.6533
20	19270	511	1	-0.474536896	-0.580707729	-0.539756179	-0.59148	-0.66965	-0.65486
21	19270	511	1	-0.475337038	-0.580553508	-0.540001408	-0.59305	-0.66938	-0.65513

(Testing File)

1	TestNo	SubTestNo	Tests	LTL	UTL
2	1	1	1 ncon_pre_allopen_na	1	1
3	1	2	2 ncon_pre_m1ma_avdd	-0.7	-0.4
4	1	3	3 ncon_pre_m1ma_vbat	-0.7	-0.4
5	1	4	4 ncon_pre_m1ma_dreg	-0.7	-0.4
6	1	5	5 ncon_pre_m1ma_iovdd	-0.7	-0.4
7	1	6	6 ncon_pre_m1ma_pvdd	-0.9	-0.4
8	1	7	7 ncon_pre_m1ma_icc	-0.9	-0.4
9	1	8	8 pcon_pre_1ma_icc	1.8	2.1
10	1	9	9 ncon_pre_m1ma_sdout	-0.9	-0.4
11	1	10	10 pcon_pre_1ma_sdout	1.8	2.1
12	1	11	11 ncon_pre_m1ma_fsync	-0.9	-0.4
13	1	12	12 pcon_pre_1ma_fsync	1.8	2.1
14	1	13	13 ncon_pre_m1ma_scl	-0.9	-0.5
15	1	14	14 pcon_pre_1ma_scl	1.8	2.1
16	1	15	15 ncon_pre_m1ma_sdz	-0.9	-0.4
17	1	16	16 pcon_pre_1ma_sdz	1.8	2.1
18	1	17	17 ncon_pre_m1ma_sdin	-0.9	-0.4
19	1	18	18 pcon_pre_1ma_sdin	1.8	2.1
20	1	19	19 ncon_pre_m1ma_sbclk	-0.9	-0.4
21	1	20	20 pcon_pre_1ma_sbclk	1.8	2.1
22	1	21	21 ncon_pre_m1ma_sda	-0.9	-0.4
23	1	22	22 pcon_pre_1ma_sda	1.8	2.1
24	1	23	23 ncon_pre_m1ma_bstp	-0.9	-0.4
25	1	24	24 ncon_pre_m1ma_bstn	-0.9	-0.4
26	1	25	25 pcon_pre_m1ma_bstn	-1.6	-1.2

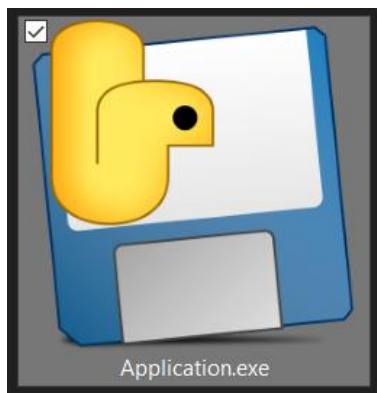
(Limit File)

- For the Production File Analysis we give two Input files .The Limits are mapped automatically to the parameter with the help of code

Creation of the .exe file

Exe file is created that can be easily shared and will work on every system even if Python and the necessary libraries are not installed

The GUI can work for Data log Files from the tester which includes Engineering File and Production File



Standalone exe
file

GUI For Engineering File

The screenshot shows a software window titled "Calculator" with the following fields and controls:

- Enter the Address of the file :** A text input field with a "Browse" button next to it.
- Enter the Address for output folder :** A text input field with a "Browse" button next to it.
- Checkmarks:** Two checkboxes labeled "Should graphs be plotted" and "Site Wise Individual Analysis".
- File Format for Code:** A dropdown menu with "Calculate" and "Combine" options.
- Enter the Address of the folder :** A text input field with a "Browse" button next to it.
- Enter the Address for output folder :** A text input field with a "Browse" button next to it.
- Checkmarks:** Two checkboxes labeled "Should graphs be plotted" and "Site Wise Individual Analysis".
- File Format for Code:** A dropdown menu with "Calculate" and "Combine" options.

Annotations with arrows point to the following elements:

- Input file address:** Points to the "Enter the Address of the file" field.
- Output Folder address:** Points to the "Enter the Address for output folder" field.
- Format for input file:** Points to the "File Format for Code" dropdown menu.
- Checkmarks:** Points to the checkboxes.
- For Multiple File:** Points to the "Enter the Address of the folder" field.

GUI For Production File

Testing File

Limit File

Checkmarks

For Multiple File

Proposed solution :Engineering File temp

Created a GUI
based tool that
can perform

Overall File analysis

Number of outliers

Overall File analysis without outlier

CPL ,CPU and CPK

Graphs for all the parameters

Site wise Analysis

Intermediate Files

Graphs for all the Individual Site parameter

Site wise Distribution

Multiple File Analysis Feature

Proposed solution :Engineering File

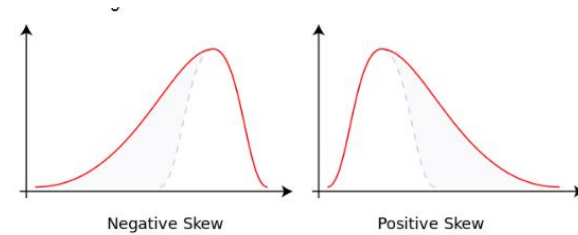
Created a GUI based tool that can perform following operations:

- **Overall File analysis** :Finds Max,Min,Mean,Std for all the parameters.

For every parameter we can get these values which gives us understanding about the overall value of a particular parameter and how much deviation is there

Parameter_Name	Site	Max	Min	Mean	Std	Max_no_out	Min_no_out	Mean_no_out	Std_no_out	Distribution	Skew	Outliers_No
avdd_ncon	1	-0.54	-0.58	-0.577	0.004	-0.565	-0.583	-0.576832536	0.002644969	Moderately Right skewed	0.8498	1
iovdd_ncon	1	-0.64	-0.65	-0.641	0.002	-0.638	-0.646	-0.640528571	0.001944602	Extremely Left Skewed	-1.184	0
vbat_ncon	1	-0.6	-0.61	-0.606	0.002	-0.602	-0.61	-0.606433333	0.001852926	Symmetrical	-0.465	0
bst_ncon	1	-0.63	-0.64	-0.632	0.002	-0.63	-0.637	-0.632442857	0.001929145	Moderately Left Skewed	-0.506	0
dreg_ncon	1	-0.02	-2	-0.587	0.321	-0.0225	-2	-0.586845238	0.320928864	Extremely Left Skewed	-4.038	0
sw_ncon	1	-0.49	-0.52	-0.505	0.006	-0.488	-0.515	-0.50492381	0.006193368	Symmetrical	0.0985	0

- Skewness is measured with the help of `skew(df[col])` which returns a numerical value based the spread of the data with respect to the mean of the data. High value of Skew means data is either left skewed or right skewed



Proposed solution :Engineering File

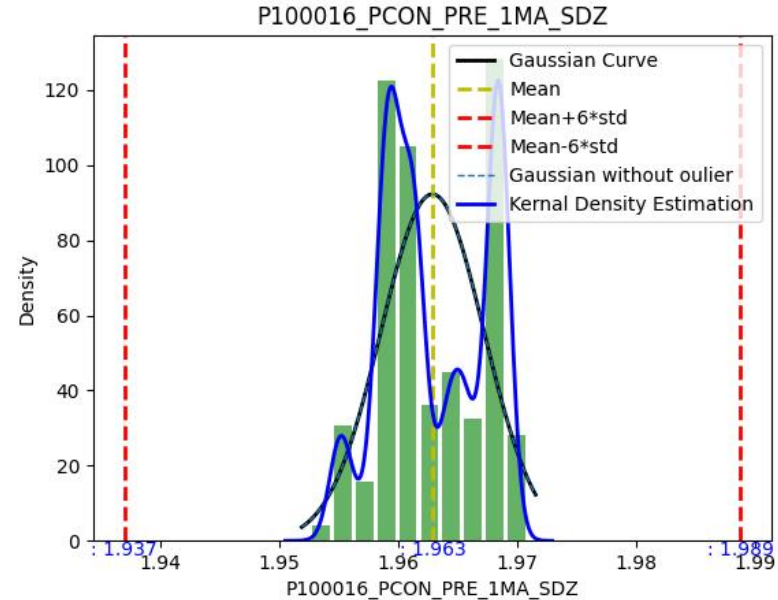
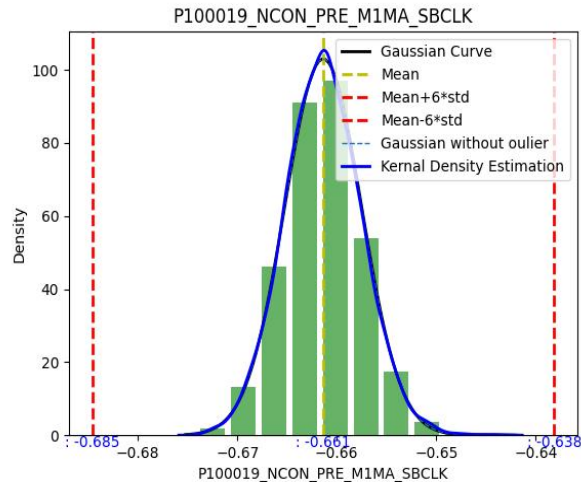
- Skewness is measured with the help of `skew(df[col])` which returns a numerical value based the spread of the data with respect to the mean of the data. High value of Skew means data is either left skewed or right skewed
 - By default `skew()` function is a biased estimator which means it assumes the dataset is a sample from a large dataset
 - Skewness is calculated by $(1/n) * \sum (X_i - X)^3 / (\text{std})^3$. Where X_i is the every data point and X is the Mean, Std is the standard deviation and n is the total number of data points
-
- **Number of outliers:** Number of outliers and Max, Min, Mean, Std values for all the parameters after removing the outliers. Also includes $\text{Mean} + 6 * \text{Std}$ and $\text{Mean} - 6 * \text{std}$ before and after removing the outliers for every parameter.

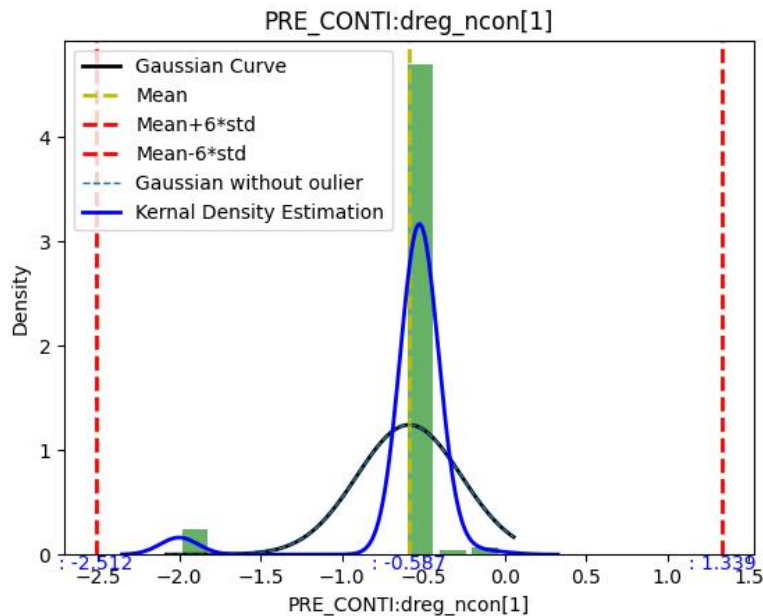
Since outliers can affect the values of the parameters. .All the outliers are removed within the range and corresponding values of Max, Min, Mean etc are calculated

- **CPL ,CPU and CPK** : Finds the CPK,CPU and CPK values for all the parameters before and after removing the outliers
- Marks the bad CPL ,CPU ,CPK values in the output for the user
- Threshold of the value is 1.8 to 30

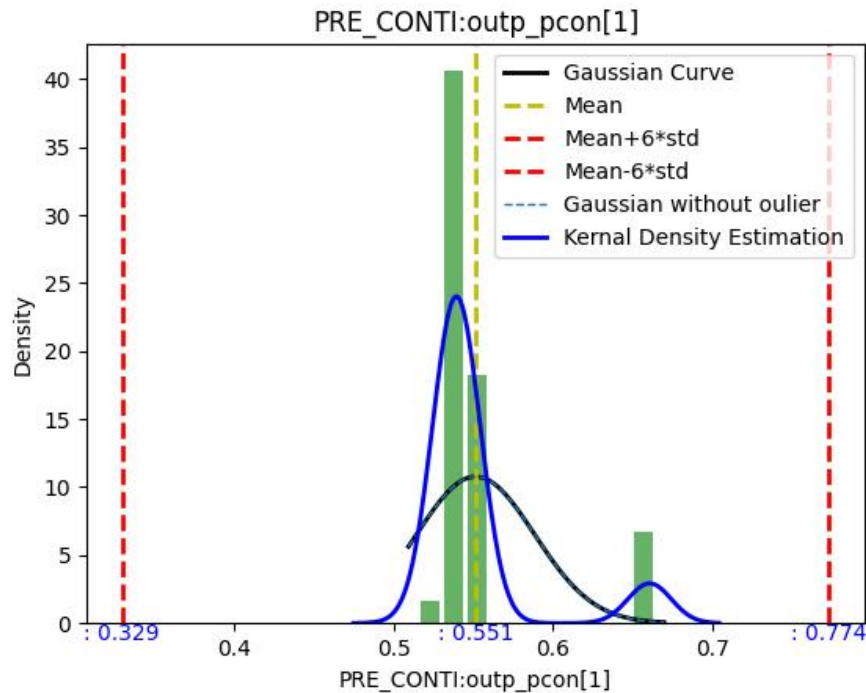
Mean+6*std	Mean-6*std	UNIT	LOW_LIMIT	HIGH_LIMIT	TEST_ID	CPL	CPU	CPK
-0.55408317	-0.599212068	V	-0.8	-0.25	100101002	19.8	28.95	19.8
-0.62886096	-0.652196183	V	-0.8	-0.25	100101003	27.34	66.94	27.34
-0.59531578	-0.617550887	V	-0.8	-0.25	100101004	34.82	64.12	34.82
-0.620867989	-0.644017726	V	-0.8	-0.25	100101005	28.95	66.08	28.95
1.338727948	-2.512418424	V	-0.8	-0.25	100101006	0.221	0.35	0.221
-0.467763603	-0.542084016	V	-0.8	-0.25	100101008	15.88	13.72	13.72
0.64498719	0.581955667	V	0.25	0.8	100101009	23.07	11.84	11.84
-0.466372101	-0.498713614	V	-0.8	-0.25	100101010	39.26	28.76	28.76

- **Graphs for all the parameters:** Adding a checkmark in GUI that will save the distribution for every parameter in given Folder Location to check how a parameter is performing overall on all the sites which includes Histogram ,Gaussian Curve without outliers, Gaussian Curve with outliers ,Kernel Density plot , vertical lines specifying mean , std



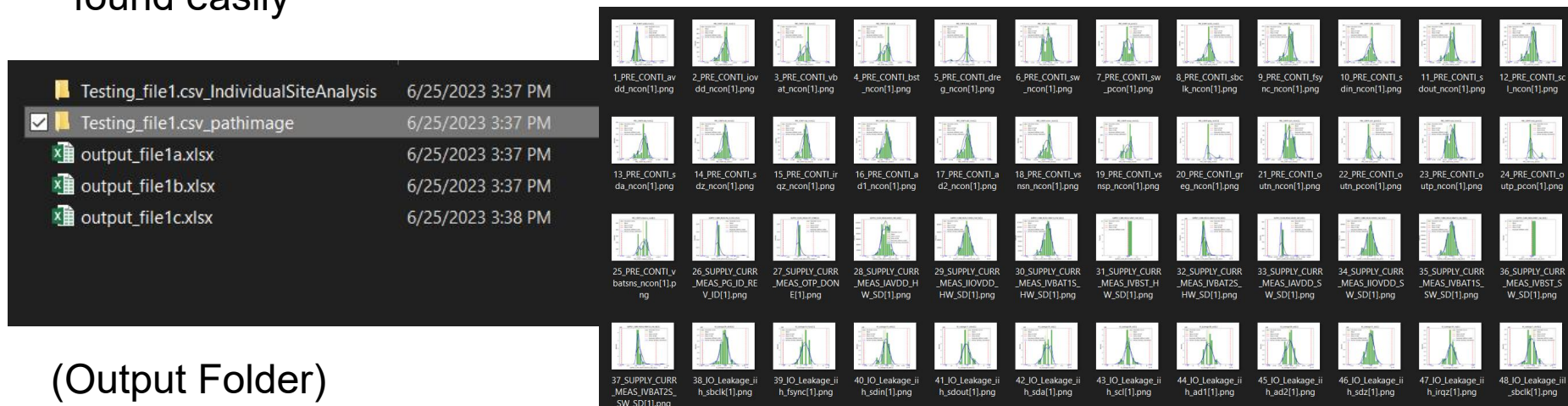


Left Skewed Graph



Right Skewed Graph

- If the checkmark is selected then a Folder is automatically created inside the output folder which stores all the individual graphs (pathimage Folder)
- All the graphs are properly named so that for a particular parameter it can be found easily



- **Site wise Analysis:** Site wise mean Drift and Site wise std Drift is calculated along individual Site wise Mean,Std

It is also important to know the functioning of every site . Data is filtered for every site and the analysis is done site wise. Drift tells about the deviation in the values of the sites .If any site is not performing as expected we can see a large drift in that site

- Marks the bad Site wise Drifts in the output for the user.

	A	B	C	D	E	F
1	Parameter	Site_mean 1	Site_mean 2	Site_mean 3	Site_mean 4	Site_mean 5
2	PRE_CONTI:avdd_ncon[1]	-0.577	-0.577	-0.577	-0.577	-0.577
3	PRE_CONTI:iovdn_ncon[1]	-0.641	-0.641	-0.64	-0.64	-0.641
4	PRE_CONTI:vbat_ncon[1]	-0.606	-0.606	-0.606	-0.607	-0.606

	A	B	C	D	E	F
1	Parameter	Site_std 1	Site_std 2	Site_std 3	Site_std 4	Site_std 5
2	PRE_CONTI:avdd_ncon[1]	0.002	0.002	0.001	0.002	0.002
3	PRE_CONTI:iovdn_ncon[1]	0.001	0.002	0.001	0.001	0.001
4	PRE_CONTI:vbat_ncon[1]	0.002	0.002	0.002	0.002	0.002

	A	B	C	D	E
1	Parameter	meandrift%S_1	meandrift%S_2	meandrift%S_3	meandrift%S_4
2	PRE_CONTI:avdd_ncon[1]	0	-0.02	0.03	0.05
3	PRE_CONTI:iovdd_ncon[1]	0	-0.06	0.06	0.08
4	PRE_CONTI:vbat_ncon[1]	0	0.02	0.02	-0.03

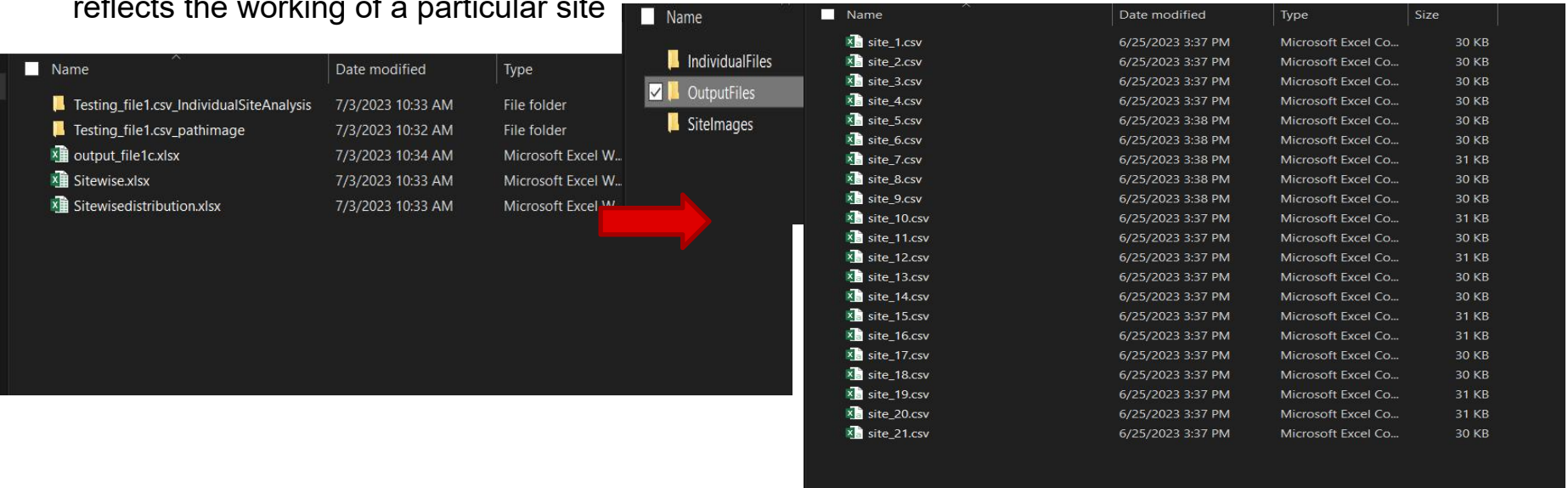
	A	B	C	D	E
1	Parameter	std drift%S_1	std drift%S_2	std drift%S_3	std drift%S_4
2	PRE_CONTI:avdd_ncon[1]	0	-2.38	-27.64	-15.13
3	PRE_CONTI:iovdd_ncon[1]	0	6.29	-4.42	-19.46
4	PRE_CONTI:vbat_ncon[1]	0	2.88	-9.87	2.43

	A	B	C	D	E	F
1	Parameter	meanLNdrift%S_1	meanLNdrift%S_2	meanLNdrift%S_3	meanLNdrift%S_4	meanLNdrift%S_5
2	PRE_CONTI:avdd_ncon[1]	0	-0.02	0.04	0.05	0.04
3	PRE_CONTI:iovdd_ncon[1]	0	-0.07	0.07	0.09	-0.04
4	PRE_CONTI:vbat_ncon[1]	0	0.02	0.02	-0.04	0
5	PRE_CONTI:bst_ncon[1]	0	0.02	-0.07	0.07	0.07
6	PRE_CONTI:dreg_ncon[1]	0	-0.04	-0.02	0.02	-268.02

	A	B	C	D	E	F	G	H
1	Parameter	stdLNdrift%S_1	stdLNdrift%S_2	stdLNdrift%S_3	stdLNdrift%S_4	stdLNdrift%S_5	stdLNdrift%S_6	stdLNdrift%S_7
2	PRE_CONTI:avdd_ncon[1]	0	-0.01	-0.1	-0.06	-0.09	0	1.99
3	PRE_CONTI:iovdd_ncon[1]	0	0.02	-0.01	-0.05	0	0.13	0.25
4	PRE_CONTI:vbat_ncon[1]	0	0.01	-0.03	0.01	-0.02	0.02	0.1
5	PRE_CONTI:bst_ncon[1]	0	0.02	0.01	0.09	0.02	0.02	0.07
6	PRE_CONTI:dreg_ncon[1]	0	0.01	0.02	-0.01	-0.35	0.02	28.64

- **Intermediate Files:** Added a checkmark in GUI to get Filtered Input file for all the Sites is formed, Filtered Output files for all the Site is Formed. If we want to get the data of a particular site it can be obtained or If we want to get the overall analysis for a particular Site it can also be obtained

If we want to obtain the analysis of a particular Site. Individual Site wise analysis files are formed that reflects the working of a particular site



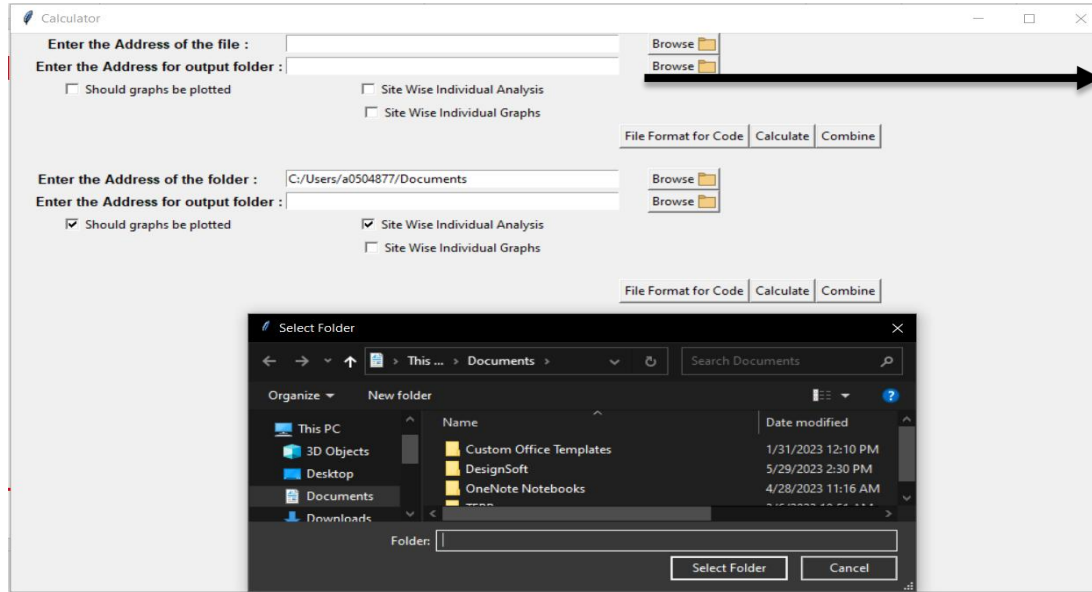
The image shows a file explorer interface. On the left, a sidebar lists folders: 'Testing_file1.csv_IndividualSiteAnalysis', 'Testing_file1.csv_pathimage', and files: 'output_file1c.xlsx', 'Sitewise.xlsx', and 'Sitewisedistribution.xlsx'. The 'OutputFiles' folder is selected and highlighted. A red arrow points from this folder to a larger, detailed view of its contents on the right.

Name	Date modified	Type	Size
site_1.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_2.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_3.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_4.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_5.csv	6/25/2023 3:38 PM	Microsoft Excel Co...	30 KB
site_6.csv	6/25/2023 3:38 PM	Microsoft Excel Co...	30 KB
site_7.csv	6/25/2023 3:38 PM	Microsoft Excel Co...	31 KB
site_8.csv	6/25/2023 3:38 PM	Microsoft Excel Co...	30 KB
site_9.csv	6/25/2023 3:38 PM	Microsoft Excel Co...	30 KB
site_10.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	31 KB
site_11.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_12.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	31 KB
site_13.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_14.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_15.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	31 KB
site_16.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	31 KB
site_17.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_18.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB
site_19.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	31 KB
site_20.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	31 KB
site_21.csv	6/25/2023 3:37 PM	Microsoft Excel Co...	30 KB

- **Graphs for all the Individual Site parameter: Adding** a checkmark in GUI that saves distribution plot for every site and its every parameter if we want to check for the specific site and specific parameter
- **Site wise Distribution:** Site wise distribution that shows the Distribution of the parameter across every Site
- Marks the bad Sites having bad Distribution

1	Parameter	site_1.Distribution_	site_10.Distribution_	site_11.Distribution_	site_12.Distribution_	site_
2	PRE_CONTI:avdd_ncon[1]	Symmetrical	Moderately Left Skewed	Moderately Left Skewed	Moderately Left Skewed	Moderately
3	PRE_CONTI:ioydd_ncon[1]	Symmetrical	Symmetrical	Moderately Left Skewed	Symmetrical	Moderately
4	PRE_CONTI:vbat_ncon[1]	Symmetrical	Symmetrical	Moderately Left Skewed	Moderately Left Skewed	Moderately
5	PRE_CONTI:bst_ncon[1]	Moderately Left Skewed	Symmetrical	Symmetrical	Moderately Left Skewed	Moderately
6	PRE_CONTI:dreg_ncon[1]	Symmetrical	Moderately Left Skewed	Moderately Left Skewed	Moderately Left Skewed	Moderately
7	PRE_CONTI:sw_ncon[1]	Symmetrical	Symmetrical	Symmetrical	Symmetrical	Symmetrical

- **Multiple File Analysis Feature:** Separate Input in the GUI to give Multiple files instead of a single File the code can also ask for the folder location in which multiple files are stored .It will merge it to give the analysis



We can choose location of the folder

Proposed solution :Production File

- The format of the Production File is Different from the Engineering File and a separate limit file is provided
- The Automatically **Maps the Parameter with the limits** and forms a temporary file and does the same analysis as of the Engineering File
- It has only one Additional File that does the Lot wise analysis
- It also works for the Multiple files
- Created a separate GUI for the Production File

Lot Wise
Analysis

	A	B	C
1	Parameter	LOT_ID_Mean'2283676	LOT_ID_Std'2283676
2	P100001_NCON_PRE_ALLOPEN_NA	0.937	0.242
3	P100002_NCON_PRE_M1MA_AVDD	-0.474	0.01
4	P100003_NCON_PRE_M1MA_VBAT	-0.575	0.001
5	P100004_NCON_PRE_M1MA_DREG	-0.536	0.01
6	P100005_NCON_PRE_M1MA_IOVDD	-0.587	0.001

39

Alert Message at the End

- Shows this message at the end when the GUI has executed the whole process
- Minimum Hard-Coded things in the code , Only Slight modification is required to make it work for some different kind of file
- Another column Peaks column which will tell the if the distribution is multimodal ,Unimodal etc. is to be implemented