

HUBER+SUHNER

SPC scripting

why writing information back into a database is important

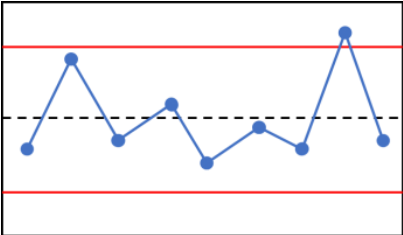
General overview



Measurement System



DB

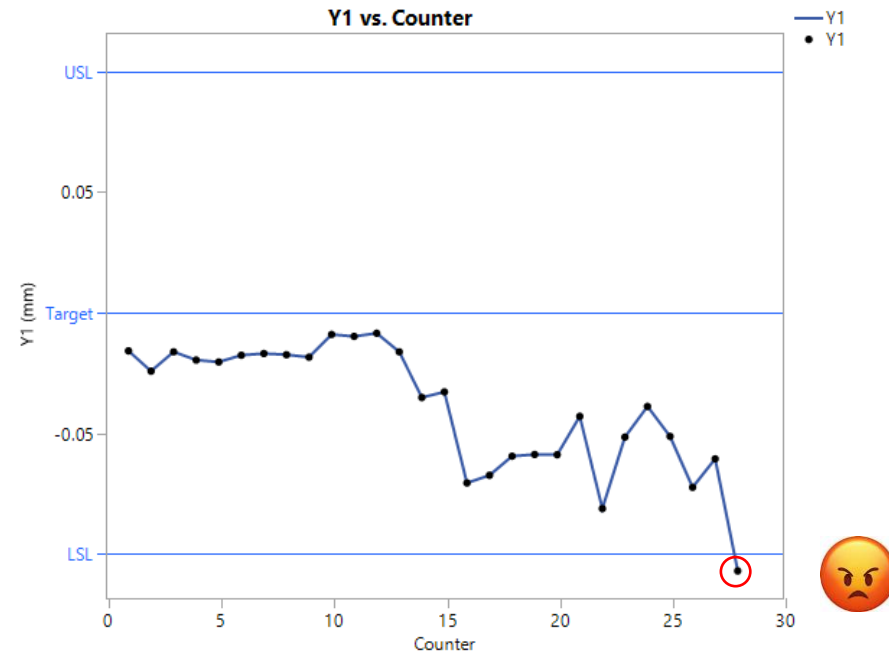


SPC

Problem description

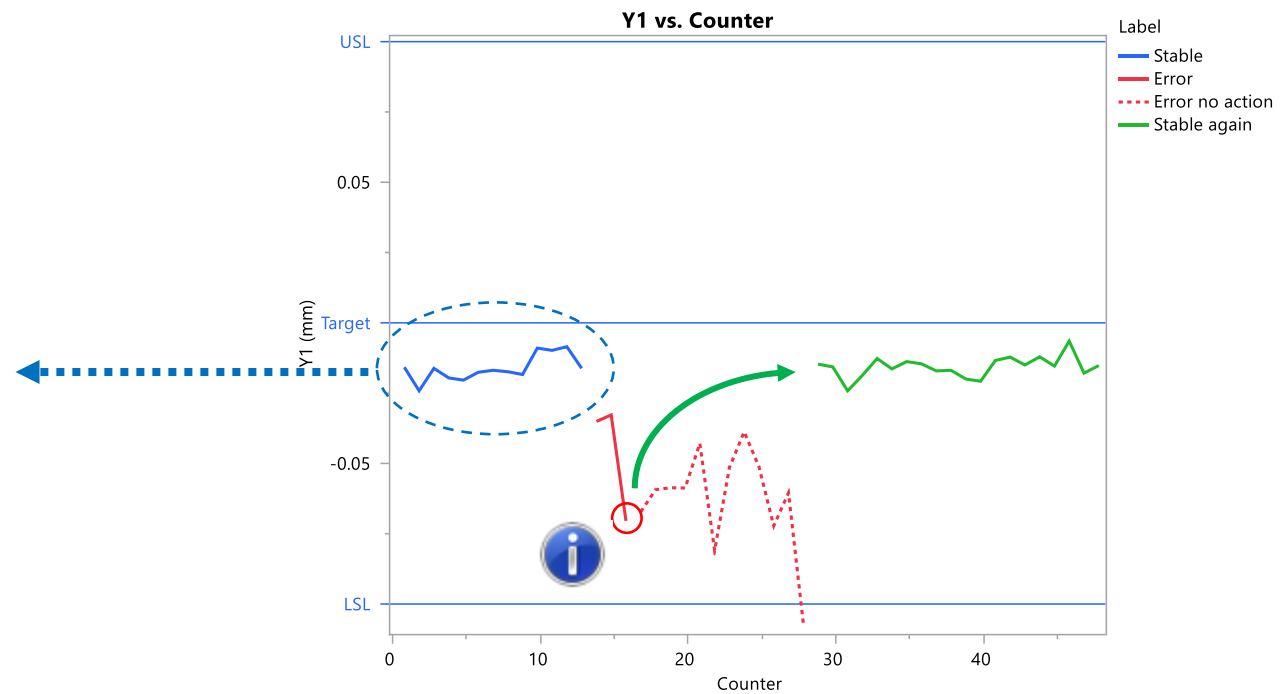
Process is unstable:

- Influence of time or unknown variable
- Process moves slowly towards out of spec
- An incident shift the process



Overview SPC

- SPC is like telling a dog to “stay”. Wherever the process is, it should remain in that place.
- A stable phase should be defined and notify the operator when the process is out of control limits before it's out of spec.



Problems with SPC:

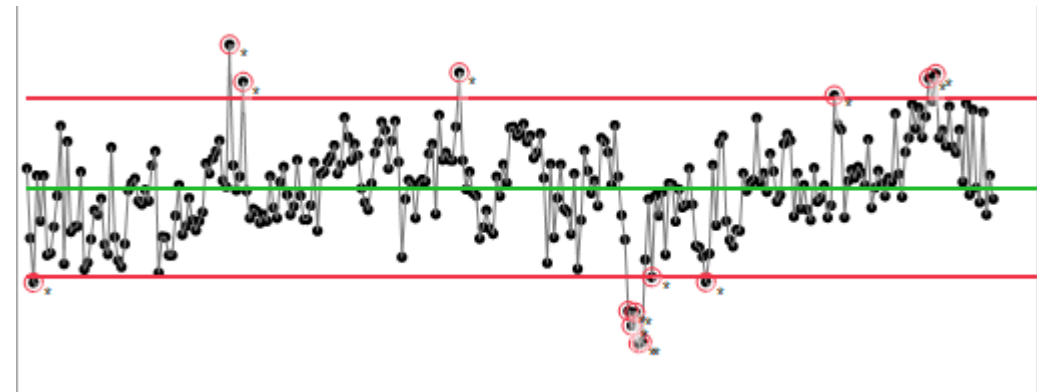
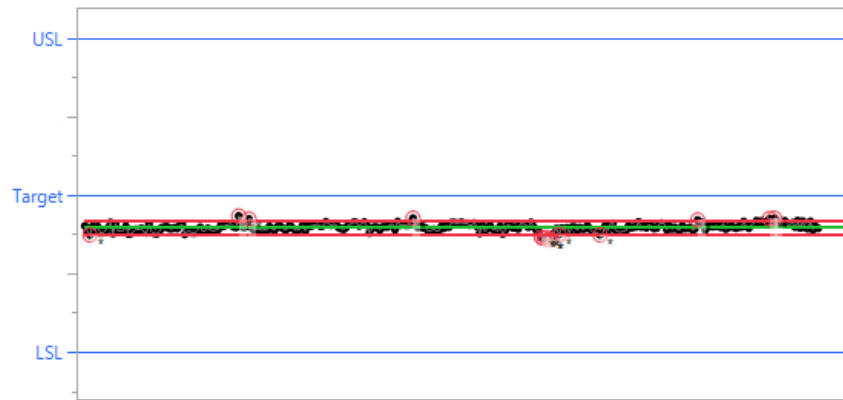
- Process screening platform gives a lot of false positives and is therefore not always useable for prioritizing improvements

Control Chart Alarms			Ppk	Cpk
Alarm Rate	Test1	Latest Alarm		
0.04878	14	7	11.104	17.285
0.03484	10	1	2.342	2.958
0.03136	9	47	6.116	7.813
0.02787	8	10	6.136	8.494
0.02439	7	9	2.497	3.345
0.02439	7	6	3.292	4.309
0.02091	6	5	4.289	5.686
0.02091	6	39	1.904	2.417

Paradoxically the most stable process gives the most warnings!

Problems with SPC:

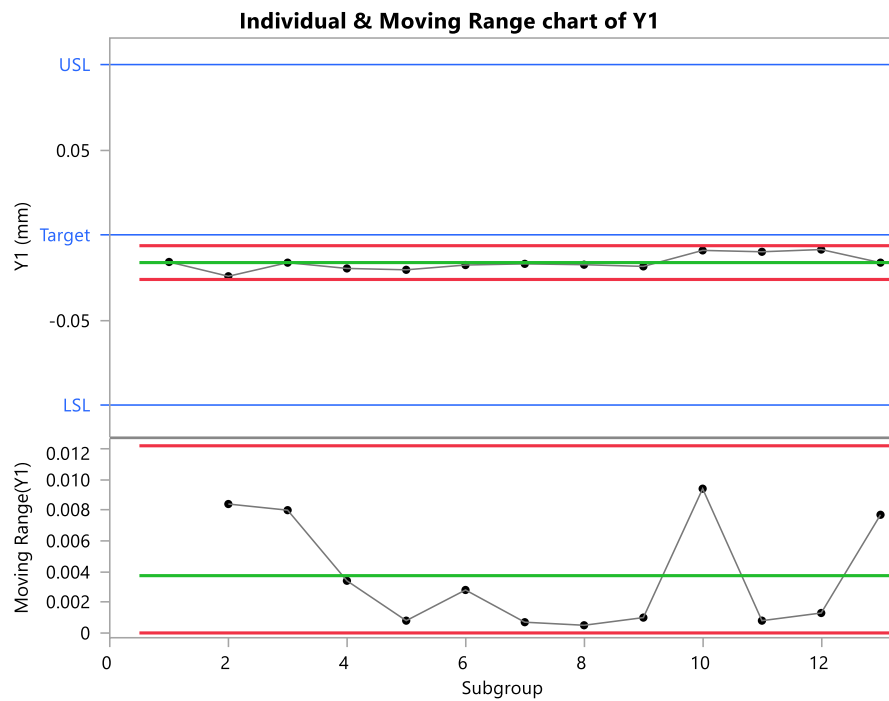
- Default SPC control limits on our data are often too strict:



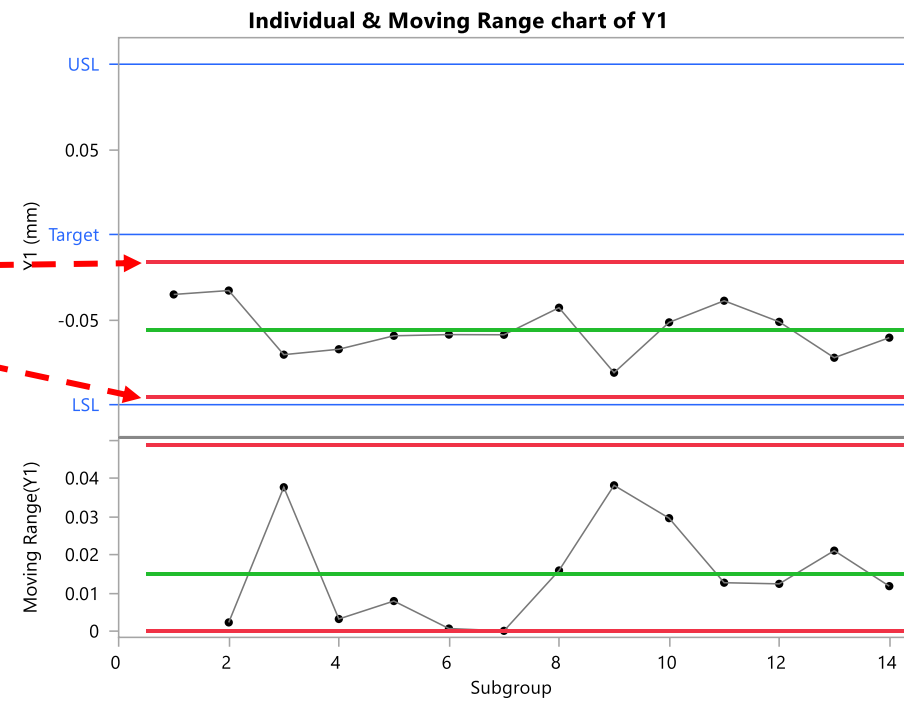
Problems with SPC:

- When new data are analyzed, the control limits shifts automatically.
- A change in the process can be overlooked.

Order 1



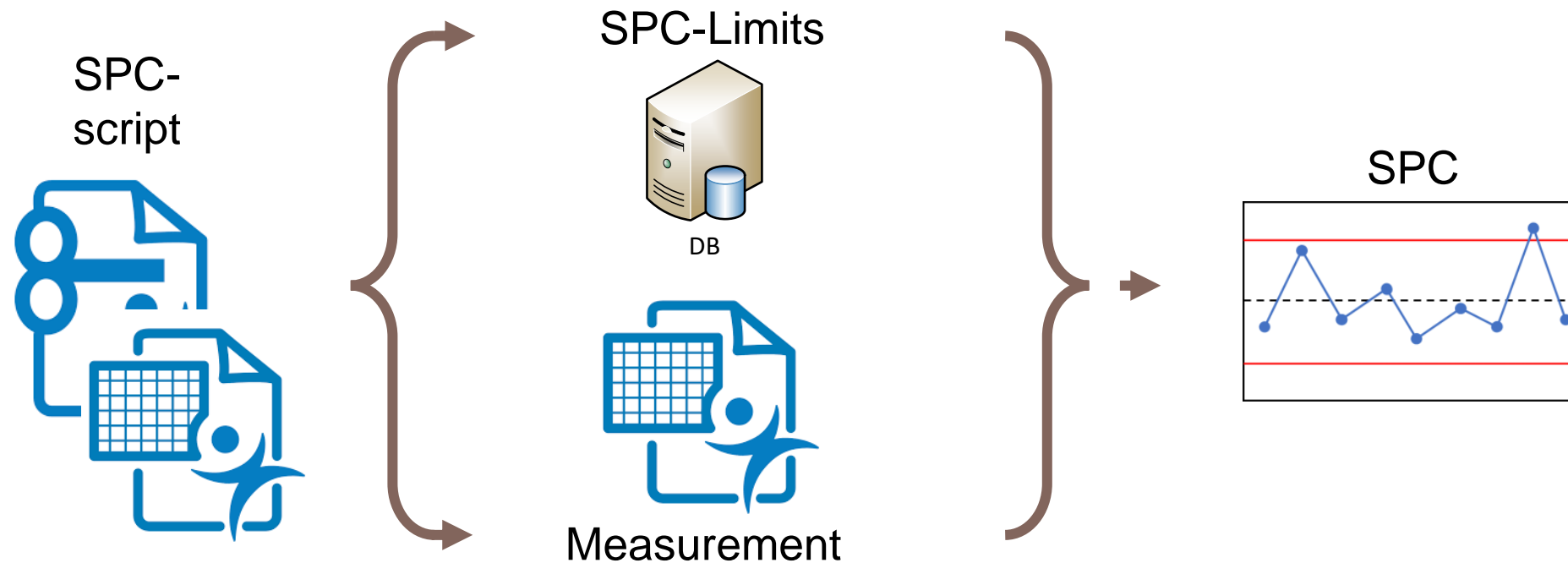
Order 2



SPC scripts

The solution should:

- Generate, store and update individual control limits.
- Help in setting limits for multiple variables.



SPC scripts

- The Script generates a table with each variable that contains spec limits.
- It tries to load existing control limits into the table from the DB
- It adds scripts to store and set the limits.

SPC_Limits		Program	Name	Sample_Size	LCL	UCL	LSL	USL
1	P1	Y1	*	*	*	-0.1	0.1	
2	P1	Y2	*	*	*	-0.5	0.5	
3	P1	Y3	*	*	*	9.5	10.5	

SPC scrips

- Demo

Main Table

	UUID	Time	Date	Program	PANr	Counter	Operator	PASS	SN_Equipment	Software_Version	SN	Charge	Label_1	Label_2	Inactive	DIA001 (mm)
1	0284F019-F96E-EC11-B819-005056838B47	06.01.2022 07:55:33	06.01.2022	Z_Test_SB	asd	0001	as	OK	BC020099	102.1.0	s	s				• 11.922
2	0084F019-F96E-EC11-B819-005056838B47	06.01.2022 07:58:25	06.01.2022	Z_Test_SB	asd	0001	sad	NG	BC020099	102.1.0	sdasd	asd				• 11.9101

SPC Table

Results		Messages				
	Program	Name	Sample_Size	LCL	UCL	
1	P1	Y1	NULL	-0.0360053292839088	0.00369763697621646	
2	P1	Y2	NULL	NULL	NULL	
3	P1	Y3	NULL	NULL	NULL	

SPC code snippets

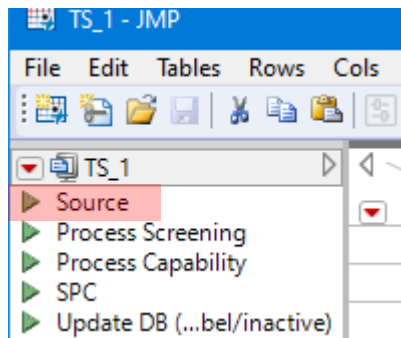
- Select rows with spec:

```
col_names = dt << get column names();
spec_list = {};
For( k = 1, k <= N Items( col_names ), k++,
  If( !Is Empty( Column( dt, k ) << Get Property( "SpecLimits" ) ),
    Insert Into( spec_list, col_names[k] )
  )
);
```

- This resolves problems when interacting with platforms who are dependent on spec limits.

SPC code snippets

- You may use: `pref(ODBC Hide Connection String(1));` to hide the connection string in the table. It could contain username and password.



```
Name: Source
Script: open Database(
        "DRIVER=SQL Server;SERVER=[REDACTED]APP=JMP;DAT
```

SPC code snippets

- Write into database:

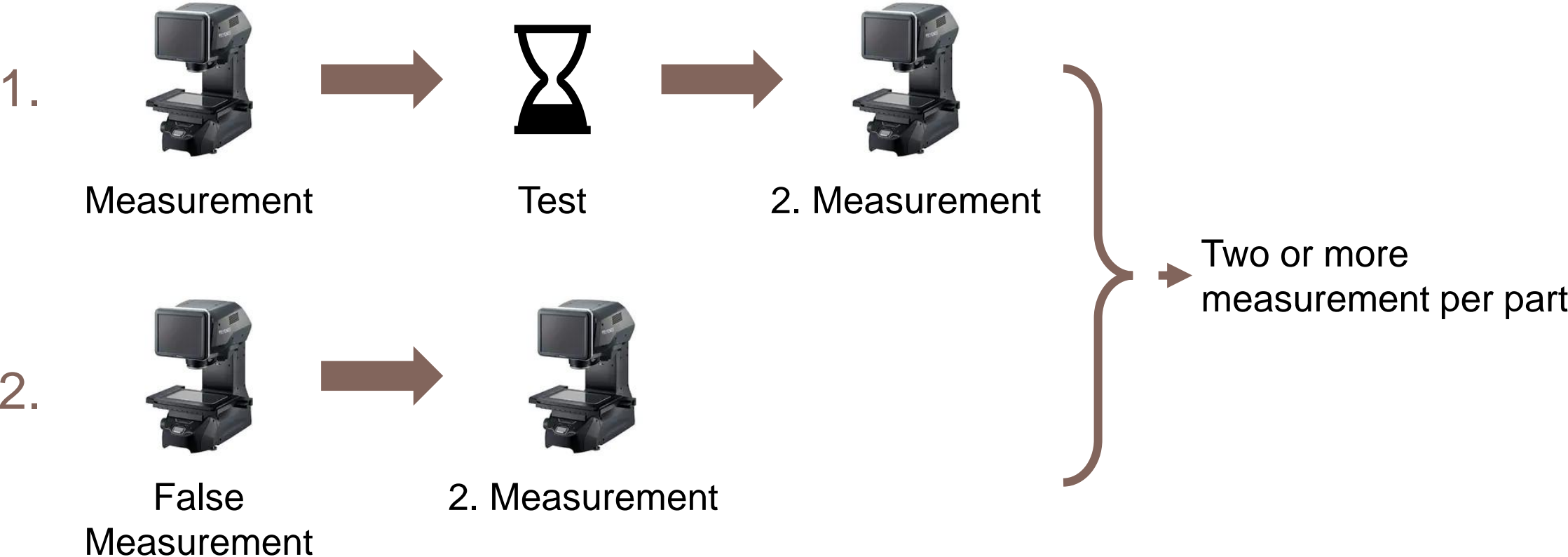
```
__dbc_mp = create database connection("DRIVER=SQL Server;SERVER=  
  
// insert table  
SQL_string = "INSERT INTO " || DB_name || " ([Program],[Name],[Sample_Size],[LCL], [UCL])  
VALUES ('" || char(dt_spc_limits:Program[k]) || "', '" || char(dt_spc_limits:Name[k]) || "', "  
|| value1 || ", " || value2 || ", " || value3 || ")";  
  
log = "";  
try(  
  log = Execute SQL(__dbc_mp, SQL_string);  
);  
  
if(length(log),beep();print(log)); ← Error handling!
```

SPC code snippets

- Write control limits into data table:

```
eval(eval expr(column(dt_source,dt_spc_limits:Name[k]) << Set Property(
  "Control Limits",
  {Individual Measurement(
    LCL( expr(dt_spc_limits:LCL[k]) ),
    UCL( expr(dt_spc_limits:UCL[k]) ),
    Subgroup Size( expr(dt_spc_limits:Sample_Size[k]) ))
  })
));
```

Second case:

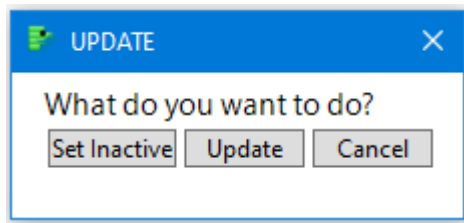


DB update scrips

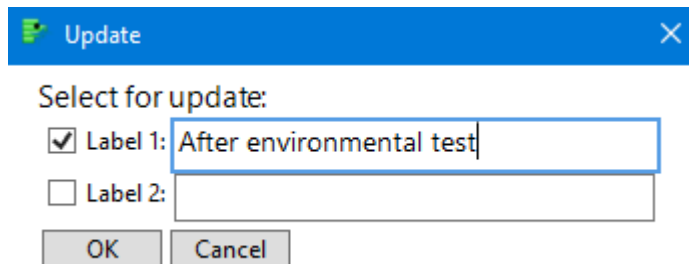
- Added script:

▶ Update DB (Label/inactive)

- Selection between set inactive and update



- Set Label (same as “Name Selection in Column”)



DB update scrips

- Result:

	UUID	Time	SN	Label_1	Label_2	Inactive
1	A02E75EF-735D-EC11-B819-005056838B47	14.12.2021 16:48:37	1	0h Test	Option 1	•
2	A6F77AF3-3D5F-EC11-B819-005056838B47	17.12.2021 13:34:47	1	100h Test	Option 1	•
3	A12E75EF-735D-EC11-B819-005056838B47	14.12.2021 16:50:47	2	0h Test	Option 1	•
4	A5F77AF3-3D5F-EC11-B819-005056838B47	17.12.2021 13:37:52	2	100h Test	Option 1	•
5	A22E75EF-735D-EC11-B819-005056838B47	14.12.2021 16:52:56	3	0h Test	Option 1	•
6	EF4FD3EC-3D5F-EC11-B819-005056838B47	17.12.2021 13:41:52	3	100h Test	Option 1	•
7	A32E75EF-735D-EC11-B819-005056838B47	14.12.2021 16:55:16	4	0h Test	Option 1	•
8	EE4FD3EC-3D5F-EC11-B819-005056838B47	17.12.2021 13:43:16	4	100h Test	Option 1	•
9	ED4FD3EC-3D5F-EC11-B819-005056838B47	17.12.2021 13:47:16	5	0h Test	Option 2	•
10	E94FD3EC-3D5F-EC11-B819-005056838B47	17.12.2021 13:55:35	5	100h Test	Option 2	•
11	EC4FD3EC-3D5F-EC11-B819-005056838B47	17.12.2021 13:51:49	6	0h Test	Option 2	•
12	FD4D4F8A-1C96-EC11-B81B-005056838B47	24.02.2022 14:08:11	6	100h Test	Option 2	•
13	EB4FD3EC-3D5F-EC11-B819-005056838B47	17.12.2021 13:53:13	7	0h Test	Option 2	•
14	FEDD4F8A-1C96-EC11-B81B-005056838B47	24.02.2022 14:10:17	7	100h Test	Option 2	•
15	EA4FD3EC-3D5F-EC11-B819-005056838B47	17.12.2021 13:54:24	8	0h Test	Option 2	•
16	FFDD4F8A-1C96-EC11-B81B-005056838B47	24.02.2022 14:12:50	8	100h Test	Option 2	•

- This information is then added to the measurement ID (UUID) and is present in the next data query.
- Inactive measurements will not be deleted but will not show up in the next query because of a filter on “Interactive”. This helps to keep the dataset clean. `where ([Inactive] is NULL or [Inactive] = 0)`

Key points

- Be careful not to store login credentials in the table.
 - Use encryption and decryption of sensitive code blocks. `JSL Encrypted("e-code")`
 - Use `pref(ODBC Hide Connection String(1))`; or delete scripts afterwards
 - Use windows authentication to avoid credentials all together.
- Check if the data set was written into the data base.
- Enrich data with important information.
 - Can be handy when other users open the dataset years later.
 - All have the same information who work with the data.

The background features a complex network of glowing blue nodes connected by thin, light blue lines. The nodes are scattered across the frame, with some appearing as bright, multi-pointed starbursts. The overall aesthetic is futuristic and digital, set against a dark blue gradient background.

Connecting – today and beyond