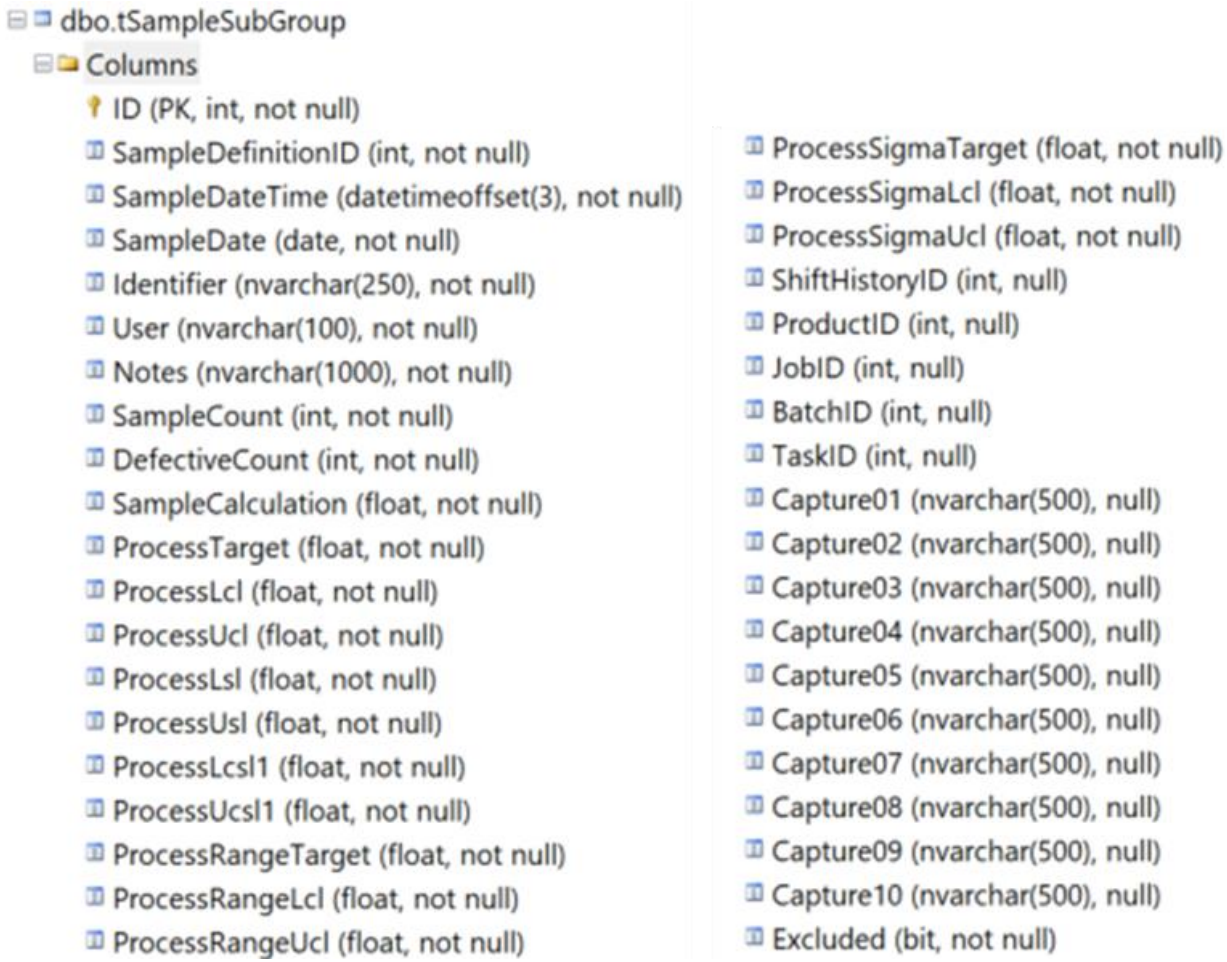
Context Data

When a Sample Sub-Group is created, a variety of context is recorded as part of the record. This includes...

- Aggregate Information
  - Sample Count
  - Sample Calculation
  - Defect Count
- Constant and Tag-Based Limits at Time of Capture
  - UCL/LCL
  - USL/LSL
  - Process Target
- Production Context
  - Job ID
  - Product ID

Additional Properties of the Sample Sub-Group can be leveraged to help with operational flow or reporting. This includes the use of...

- Upper/Lower Custom Specification Limits
- Related Task ID
- 10 Capture Fields on the Sample Sub-Group
- 5 Capture Fields on the Sample
- An Excluded Option



SPC

Standard Rules

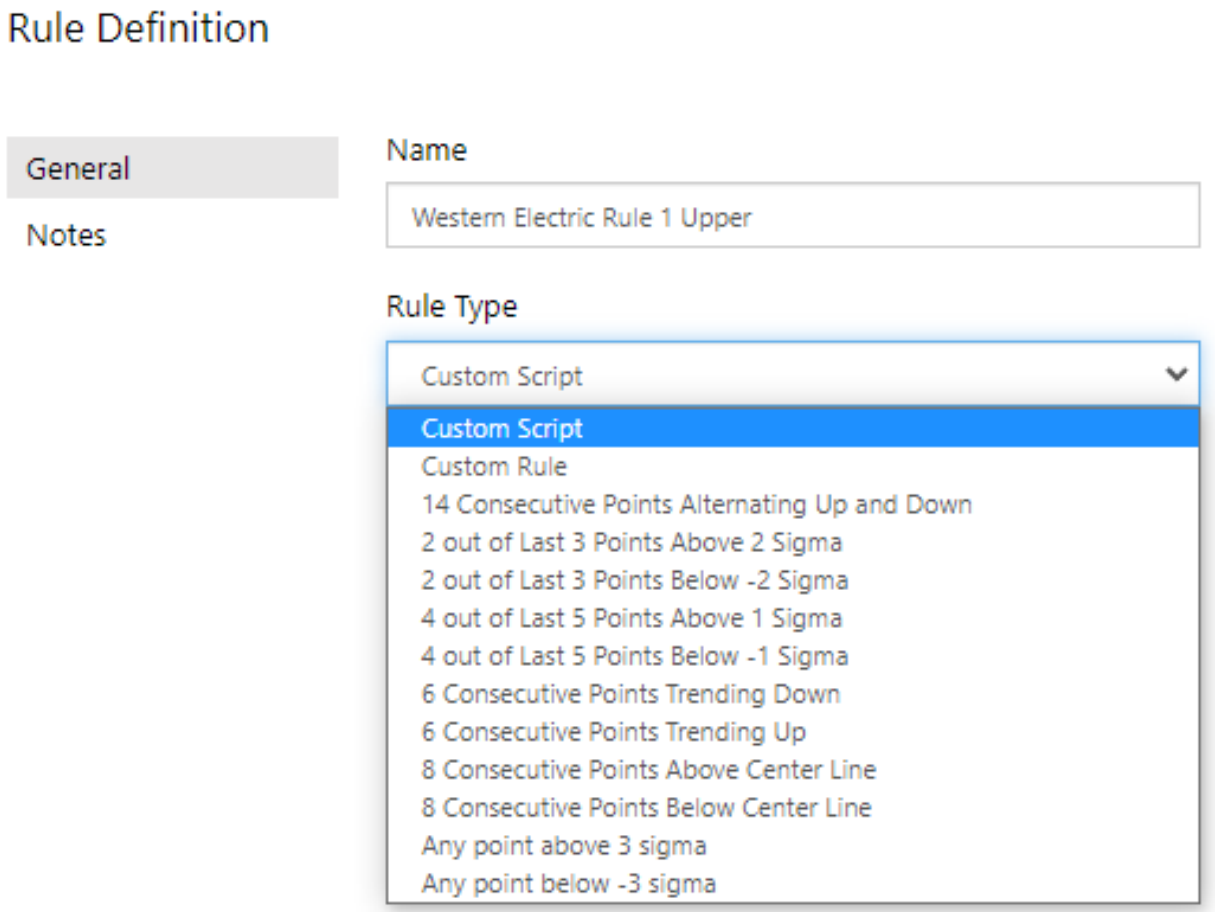
Standard SPC Rules can be evaluated against each Sample Sub-Group. As Logic Service collects SPC data, each point is evaluated against any configured rule in real-time, with violations being recorded as Sample Sub-Group Rule records.

Standard SPC Rules include the list shown on the right. These are designed to include the basic Western Electric and Nelson rules.

Each rule follows the same core pattern...

- Each Sample Sub-Group is evaluated in the context of the last 100 groups that share the same Target value.
- Average and Standard Deviation is calculated against the 100 groups.
- Center Line and Sigma Bands are determined using the calculated Average and Standard Deviation.
- Violations are then checked for against the most recent point.

Where the Standard Rules do not fulfill the requirements, Custom Script or Custom Rules can be applied.



SPC

Custom Rules

Custom Rules can be created through the Developer options of a TrakSYS implementation. Custom Rules can be written once and then configured against multiple Sample Definitions.

The sample Script Class for a Custom Rule provides context about the different variables provided. It includes...

- The last 100 Sample Sub-Groups with the same Process Target
- The last 100 Sample Sub-Groups for the Sample Definition
- An instance of the API
- The SampleDefinitionID

Using these components, any Standard Rule can be recreated with any desired modification. Some examples of adjustments include...

- Changing the context or number of points used in the calculation of sigma, centerline, or other key variables.
- Changing the calculation of sigma, centerline or other key variables, or setting their values to historical reference values.
- Changing the number of points required to violate common patterns (such as requiring 7 points trending in a direction instead of 6).

X out of Y Above or Below Z Sigma

Script

Edit

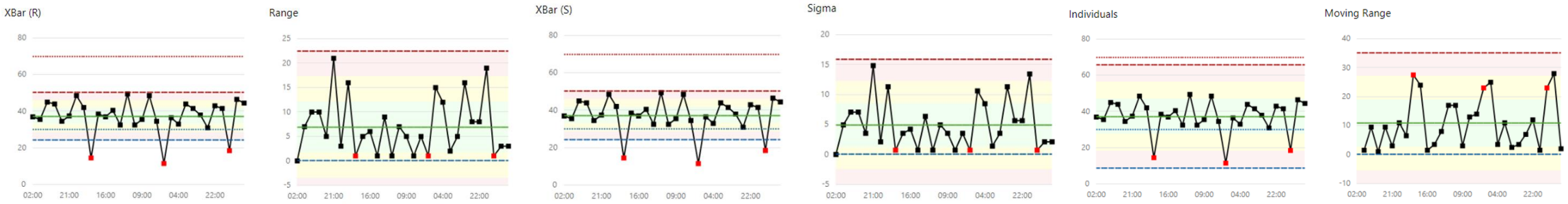
Save | Save & Close | Test

```
10  namespace ETS.Core.Scripting
11  {
12      /// ************************************************************************
13      /// <summary>Custom SPC Rule</summary>
14      /// ************************************************************************
15      public class CustomRule1 : SampleRuleDefinitionRunnerBase
16      {
17          /// ************************************************************************
18          /// <summary>
19          /// this is intended to be a template rule that can be used for any
20          /// value for X/Y/Z and follow the same patterns as the standard rules
21          /// return true if there is a violation.
22          /// </summary>
23          /// ************************************************************************
24          public override bool EvaluateRule()
25          {
26              int x = 2; // number of values...
27              int y = 3; // ... out of a group of values ...
28              bool isAbove = true; // ... is above (or false for below) ...
29              int z = 2; // ... a certain range of sigma
30              bool useProcessLimits = true; // these rules will use the process limits, instead of the autocalculated limits
31              bool useProcessTarget = true; // these rules will use the process target, instead of the autocalculated centerline
32
33              // filter and reduce
34              var ssgList = this.SampleSubGroups.Current;
35              var filteredList = CustomSpcRuleUtility.FilterList(ssgList);
36              var filteredSsgs = filteredList.GetRecentNSubGroups(y);
37
38              // check for minimum number needed for the rule to evaluate
39              if(filteredSsgs.Count < y) return false;
40
41              // check the first datapoint to get the limits
42              SampleSubGroupData firstPoint = filteredSsgs[0];
```

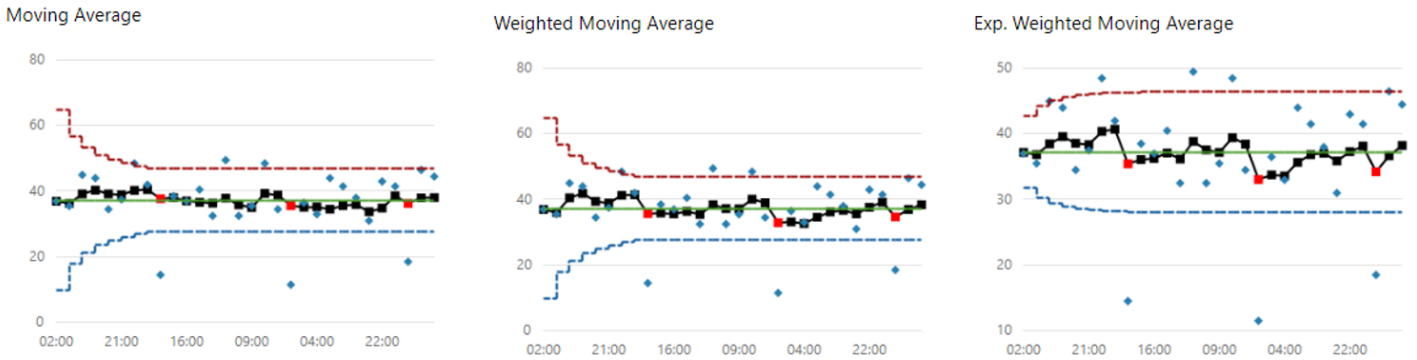
SPC

Charting Options

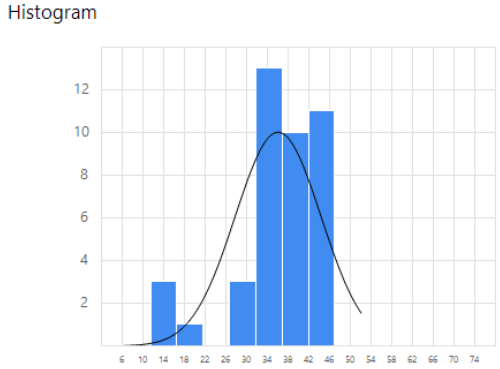
Processing and Visualization of Sample Sub-Groups are done independently. Any SPC chart can be used with any SPC data, based upon the desired result.
Below are examples of the different, specialized SPC Charts available in TrakSYS...



Paired SPC Charts [Xbar-R, X-Bar-S, and I-M]



Moving Average Charts [Individual, Weighted, and Exponential Weighted]



Histogram Chart

SPC

Charting Options

Compared to the standard Charts, each SPC chart has an extended set of properties to allow for more significant control over the visualization.

SPC Charting Properties include...

- Hide/Show Sigma Bands
- Auto-Calculate or Set Control Limits
- Visualization Settings for all Limits
- Special Data Visualization for Groups with Violations
- Special On-Click Overrides for Groups with Violations
- And more...