Getting Started with Real-Time SPC
Powered by Minitab®
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1. **Introduction**

This guide introduces you to some of the most common features and tasks in Real-Time SPC Powered by Minitab®. Use this guide to learn how to set up this application to best meet the needs of your organization. Many organization-wide settings can be set once and applied across this platform with the help of the Minitab® Customer Success team. Other settings may depend on department and division preferences and can change more frequently.

Real-Time SPC Powered by Minitab® is organized into 3 main portals. Your access within the application depends on your role in the application.

**Administration portal**
- The Administration portal contains user settings as well as settings for tags and hierarchy groups to use across the platform.
- To learn about these settings, go to Administration Portal on page 8.

Note: You cannot add products, processes, or stations until hierarchy groups are committed. Once committed, they cannot be changed. For more information, go to Hierarchy Groups on page 9.

**Engineering portal**
- The Engineering portal contains many settings that must be specified to create the control charts, capability analyses, and dashboards for your processes.
- To set up processes, products, and stations, go to Engineering Portal: Create Products, Processes, and Stations on page 11.
- To learn about the settings for the available analyses, go to Engineering Portal: Analysis Preferences on page 23.
- To learn about report and dashboard settings, go to Reports and Dashboards on page 33.

**Operations portal**
- The Operations portal gives access to the supervisor and operator dashboards and data collection forms.
- To learn about these features, go to Operations Portal on page 30.

**Navigation within Real-Time SPC Powered by Minitab®**

Use the button at the top right of the window to easily switch between the portals and to access Minitab Connect, depending on your permission settings.

![Navigation Menu](image)

Within a portal, use the button at the top left of the window to show/hide the navigation labels.
These images are from the Engineering portal, but other portals are similar.

Navigation to Minitab Connect™

If you have permission, you can access Minitab Connect from the dropdown list of portals. From Minitab Connect, you can create data tables for your SPC data. You can also set up data import connections and use the other Connect tools to prepare and visualize your data. For more information on permissions, go to Roles on page 8.

The story

This guide walks through a variety of common tasks and uses a fictional fruit processing company, the Flavorful Fruit Company, to illustrate how to set up products, processes, and stations.
2. My Account

Account Settings are available in the My Account settings at the top right of the window, next to the portal selector. Displays your user name and role. You can change your password. You can also add a phone number for notification purposes.

Notifications are available in the My Account settings.

Real-Time SPC Powered by Minitab® allows you to have multiple custom subscriptions for your product, process, and station notifications. By default, each subscription is set to receive all notifications, as they occur, by email.

To change the delivery method for a subscription, select Options for that subscription and select to receive notifications by email, text, or both.

Email only
   Email notifications are sent to the email address of your user account.

Text only
   Text notifications are sent to the phone number of your user account.

Email and text
   Receive both email and text notifications.

To specify which notifications to receive for a subscription, select Options for that subscription and choose one or more types.

Out-of-control process
   Receive notifications when a subgroup on a control chart is out-of-control. You will receive notifications for only the tests that are specified. By default, all control charts use only Test 1, unless you specify otherwise. To change tests for individual control charts, go to Specify control chart and capability settings for each measure on page 19. To change tests for all control charts, go to Analysis preferences for control charts on page 23.

Specification limit violation
   Receive notifications when an individual measurement exceeds the specification limits. To specify specification limits, go to Define process targets and process limits for each measure on page 18.

Action limit violation
   Receive notifications when an individual measurement exceeds the action limits. To specify action limits, go to Define process targets and process limits for each measure on page 18.

Station shutdown
   Receive notifications when a station status has been set to Shutdown.

To receive a daily summary instead of individual notifications for all selected notification types, select Daily Summary for the subscription.

Tip: You can also access your subscriptions from the Manage Notifications link on the Account Settings page.
Example of creating a new subscription for specification limit notifications

Complete the following steps to create a subscription for specification limit violations in your product. This example subscription provides a daily summary of specification limit violations via text message.

1. Select My Account.
2. Select Edit in the Phone/Text field and enter your phone number. You must add a phone number to receive text messages.
3. Select Notifications.
4. Select New Subscription, then select the products, processes, stations, and tags to add to the subscription.
5. Select Options, then from the drop-down, select Text only.
6. Uncheck all options except Specification limit violation.
7. Select OK.
8. Select Daily Summary to receive a daily summary instead of individual notifications.
    For more information on these options, go to Notifications on page 6.
3. **Administration Portal**

From the **Administration** portal, users with administrator privileges can complete the following tasks:

- Define user roles and permissions. For more information, go to **Roles** on page 8.
- Assign user roles and user access. For more information, go to **Manage Users** on page 8.
- Establish hierarchy groups. You cannot add products, processes, or stations until hierarchy groups are committed. Once committed, they cannot be changed. For more information, go to **Hierarchy Groups** on page 9.
- Add tags to the tag library to help categorize and organize elements. For more information, go to **Tags** on page 9.

### Roles

**Roles** and **Permissions**

**Roles** are available through the **Administration** portal.

**Real-Time SPC Powered by Minitab®** provides 4 standard user roles with default permissions for each role.

- **Administrator**: Administrators have all permissions.
- **Engineer**: Engineers have all permissions, except that they cannot manage users.
- **Supervisor**: Supervisors have selected permissions to enter data observations, set station status, view the supervisor and station dashboards, and edit preferences for the operations portal.
- **Operator**: Operators have selected permissions to enter data observations, set station status, view the station dashboards, and edit preferences for the operations portal.

The default permissions for the user are based on the assigned role. You can change the role names and the default permissions.

- To add a role, select **Add Role** and enter the role name and a description of the role.
- To specify permissions based on role to grant or restrict access to specific items, select **Manage permissions**.

**Tip:** Access to specific items are different from user permissions. To give process, product, or station access to a user, go to **Manage Users** on page 8.

### Manage Users

**Manage Users** is available through the **Administration** portal.

Assign a role and access level to each user of **Real-Time SPC Powered by Minitab®**.

- The user role specifies the level of privileges.
- The user access specifies which products, processes, and stations the user can view and change.

**Tip:** To add or remove users from the subscription, go to the Minitab License Portal.

**Tip:** To add role or update default role permissions, go to **Roles** on page 8.
**Hierarchy Groups**

Hierarchy Groups are available through the Administration portal.

Use hierarchy groups to organize the system elements for your company. For instance, you can organize dashboards by division, region, or other groups. Products, processes, and stations may be placed at any level.

You must have at least one group, Level 1. Level 2 groups are within Level 1. Level 3 groups are within Level 2, and so on. To add a group, choose Add Group and enter the group name and a description.

You must commit hierarchy groups before you can add products, processes, and stations. Because these groups are used throughout the platform, groups that are committed can only be changed with help from the Minitab Customer Success team.

**Example of Hierarchy Groups**

Because the Flavorful Fruit Company is a large global company, they decide to use 5 hierarchy group levels to track their manufacturing processes across the company.

**Level 1 Group**

In this example, Company is the Level 1 group. They add a single company called the Flavorful Fruit Company. You can have more than one company.

**Level 2 Group**

In this example, Division is the Level 2 group. The Flavorful Fruit Company has several divisions within the company, such as the Fruit Spread Division.

**Level 3 Group**

In this example, Region is the Level 3 group. The Fruit Spread Division has several regions within the division, such as the North American Region.

**Level 4 Group**

In this example, Site is the Level 4 group. The North American Region has several sites within the region, such as the Marion Site.

**Level 5 Group**

In this example, Department is the Level 5 group. The Marion Site has several departments within the site, such as the Quality Engineering Department.

**Tags**

Tags are available through the Administration portal.

Use tags to group and organize system elements. Tags allow you to easily filter dashboard data. The tags that you add to this library are available across the platform. Real-Time SPC Powered by Minitab® provides 4 standard types of tags.

- **Global Tags**: Use global tags to group and organize all elements.
- **Product Tags**: Use product tags to group and organize products.
- **Process Tags**: Use process tags to group and organize processes.
- **Station Tags**: Use station tags to group and organize stations.

To add a tag, select Add Tag and enter the tag name. Use a consistent naming convention for tags across your organization.
You can edit a tag name to update all instances of the tag name in the system. You can also delete a tag from the list and remove it from any object to which it had previously been assigned.

**Example of Tags**

Because the *Flavorful Fruit Company* has many different types of products that use similar processes, they decide to add product and process tags.

**Product Tags**

The *Flavorful Fruit Company* adds product tags for the 100% Fruit Spread, Jelly, Jam, and Preserves products.

**Process Tags**

The *Flavorful Fruit Company* adds process tags for the Inspection, Cleaning, and Pasteurizing processes.
4. **Engineering** Portal: Create Products, Processes, and Stations

The [Workflow Library](#) is available through the Engineering portal.

From the Workflow Library, users with engineer privileges can set up processes, products, and stations.

Before you start to collect and monitor data, you must first define the processes and stations where the data are generated and specify the type of data. You must also define the product specifications.

- To add a new process, go to Add a new process on page 12. After a process has been added, engineers can add process measures, output measures, and lists of defects and defective items to the process. After these items are established, engineers can develop sampling plans, analyses preferences, and reporting preferences.
- To add a new product, go to Add a new product on page 14. After a product has been added, engineers can add process steps and related sampling plans, analyses preferences, and reporting preferences.
- To add a new station, go to Add new station on page 16. After a station has been added, engineers can add the processes for each product and specify the data sources for the data collections.

**Tip:** To save time during setup, select **Duplicate** to duplicate a process, product, or station, if you have already created a similar item to use as a starting point.

### Process, product, and station workflow tips

While it is easy to add processes, products, and stations that represent your manufacturing flow, keep the following tips in mind.

1. All processes should have a least one measure. If you do not define a continuous measure or attribute measures, you cannot collect data to monitor.
2. All products should have at least one process step. Again, if you do not have a defined process, you cannot collect data to monitor.
3. All stations must have at least one process and the attached product.
4. To collect data from a station, make sure you specify a sampling plan and its data source.

### What is a process?

A process represents a single step or a series of steps used to produce a product or provide a service. A product or service may have several required processes. You can add processes at any level of your hierarchy groups within a company.

Processes may be used for one product or may be used across many different products. Each process has associated product and output measures and can have visual inspection measures.

### Example of processes

The Flavorful Fruit Company uses several processes to create their products. Not all processes are used in every product. For instance, the fruit spreads do not use the chopping and crushing process.

- Inspection
- Cleaning
- Chopping and crushing
• Pasteurizing
• Cooking
• Cooling
• Filling
• Labeling and packaging

Add a new process

When you add a new process, you must first decide the hierarchy level of the process. You can add processes at any level of your hierarchy groups, within a company. Then you can add a helpful description and image to describe the process.

Next, determine the process and output measures to monitor this process. Usually, each process has at least one measure. Your process may also have visual inspections. You can define the defects and defectives that you want to track.

If you can identify standard assignable causes, add them too. Assignable causes explain an out-of-control process and list the corresponding corrective actions.

Example of adding a new process

The Flavorful Fruit Company adds new processes at the division level.

1. Open the Workflow Library and select your company folder.
2. Select the appropriate folder to add the process. For this example, we add the process to the Fruit Spread Division.
4. Enter a name for the new process and then select OK. For this example, we add the Filling process.
5. Open the process template that you created.
6. In the Description section of the template, select Edit to enter a description. Upload an image and add tags, if you like.
   For more information on using process tags, go to Tags on page 9.
7. Save your changes.

Example of adding measures to the process

The Filling process has 2 process measures to monitor.

1. In the Measures section of the template, select Add Process Measure.
2. Enter a name and an optional description for the new measure and then select OK.
3. Continue for all process measures and output measures.
4. If you count the number of defects, check Defects. If you count the number of defective items, check Defectives.
   You can count one or the other, both, or none.
5. Save your changes.
Example of adding defect types and defective types
The *Filling* process has several defect types and defective types to monitor.

1. In the **Measures** section of the template, check **Defects** and **Defectives**.
2. Save the changes.
3. Select **Edit List of Defects**.
4. Select **Add Defect Type**.
5. Enter the name of the defect, the defect severity, and an optional description for the new defect.
6. Select **OK**.
7. Continue for all defect types.
8. Save the changes.
9. Select **Edit List of Defectives**.
10. Select **Add Defective Type**.
11. Enter a the name of the defective type and an optional description for the new defective cause.
12. Select **OK**.
13. Continue for all defective types.
14. Save your changes.

Example of adding assignable causes and corrective actions to the process
The quality team identifies several assignable causes and corrective actions for out-of-specification measures and rates of defects and defectives.

1. In the **Assignable Causes** section of the template, select **Add Assignable Cause**.
2. Enter a name for the new assignable cause and then select **OK**.
3. Continue for all assignable causes related to this process.
4. Save your changes.
5. To add a description of the assignable cause or add corrective actions for an assignable cause, select **Edit**.
6. Save your changes.

**What is a product?**
A product is the tangible item that is delivered to a customer. A product or service may have several required processes. You can add products at any level of your hierarchy groups within a company.

Process measures are collected on the process that creates the product and output measures are collected on the product.

**Example of products**
The *Flavorful Fruit Company* creates several kinds of products.
100% Fruit Spread
100% fruit and no sugar added. Includes Blackberry, Grape, Raspberry, and Strawberry.

Jelly
Clear fruit spread made from cooked and strained fruit juice, sugar, and pectin to thicken. Includes Apple, Blackberry, Grape, and Strawberry.

Jam
Thick spread made from mashed fruit and sugar, and pectin. Includes Blackberry, Seedless Blackberry, Grape, Raspberry, Seedless Raspberry, Strawberry, and Seedless Strawberry.

Preserves
Thicker spread that has whole or large pieces of fruit and sugar. Includes Blueberry, Cherry, Peach, Raspberry, and Strawberry.

Add a new product
When you add a new product, you must first decide the hierarchy level of the product. You can add products at any level of your hierarchy groups within a company. Then you can add a helpful description and image to describe the product.

Next, determine which processes are used to make the product. You can only add processes that have already been defined. For more information, go to Add a new process on page 12. You can arrange the process steps in a process flow or list view.

Once you have assigned processes to products, you can specify process targets, specification limits, data collection plans, and appropriate control charts and their settings. For more information, go to Engineering Portal: Specify Product, Process, and Station Details on page 18.

Example of adding a new product
The Flavorful Fruit Company adds new products at the division level.

1. Open the Workflow Library and select your company folder.
2. Select the appropriate folder to add the product.
   For this example, we add the product to the Fruit Spread Division.
4. Enter a name for the new product and then select OK.
   For this example, we add the Strawberry Fruit Spread product.
5. Open the product template that you created.
6. In the Description section of the template, select Edit to enter a description. Upload an image and add tags, if you like.
   For more information on using process tags, go to Tags on page 9.
7. Save your changes.

Example of adding process steps to the product
The production of the Strawberry Fruit Spread product involves 7 process steps.
2. Select an existing process and then select the position in the process flow.
   You can add process steps to the beginning or end of the flow. Once added, you can use the Previous and Next buttons to rearrange the process steps.
3. Select OK.
4. Continue for all process steps.
5. Save your changes.

**Flow View**

Select the View button and select Flow to arrange the process steps in a process flow view.

**List View**

Select the View button and select List to arrange the process steps in a process list view.

**What is a station?**

A station is the location where process step or process is completed. More than one sequential step may be performed at the station. Stations are associated with particular processes of specific product. You can add stations at any level of your hierarchy groups within a company.

**Example of stations**

The Flavorful Fruit Company uses many stations to create products. The Labeling and packaging process for the Blackberry Jam product uses 5 stations: Jar Weight Station 1, Jar Weight Station 2, Label Print Station, Packaging 1, and Packaging 2.
Add new station

When you add a new station, you must first decide the hierarchy level of the station. You can add stations at any level of your hierarchy groups within a company. Then you can add a helpful description and image to describe the station.

Next, determine which processes and products use this station. Processes used by multiple products must be added for each product.

Finally, specify the data collection method and data source for each measure or inspection of this station. Sampling plans are defined in the data collection area within the product template. For more information, go to Define a new sampling plan on page 20.

Example of adding a new station

The Flavorful Fruit Company adds new stations at the division level.

1. Open the Workflow Library and select your company folder.
2. Select the appropriate folder to add the station.
   For this example, we add the station to the Fruit Spread Division.
3. Select New, Select Station.
4. Enter a name for the new station and then select OK.
   For this example, we add the Chamber I station.
5. Open the station template that you created.
6. In the Description section of the template, select Edit to enter a description. Upload an image and add tags, if you like.
   For more information on using process tags, go to Tags on page 9.
7. Save your changes.

Example of adding processes and products to a station

The Strawberry Fruit Spread product has 2 stations for the pasteurization process of the strawberry fruit spread.

1. Select Add Process.
2. Select an existing product from the dropdown list.
3. Select an existing process from the dropdown list.
4. Select OK.
5. Continue for all processes and products that use this station.
6. Save your changes.

Example of specifying data sources for a sampling plan

If you have sampling plans for your process data collections, specify the data collection methods and sources.

1. Select Configure.
2. Select Edit for each measure to choose the data source. Under Data Source, choose the method for entering data.
   - Select Manual to enter data into a data collection form.
   - Select Connect data table to pull data from an existing data table.
3. If you pull data from an existing data table, select the correct table and enter the fields for the data, time, and subgroup indicators.

4. Select **OK**.

5. Continue for all measures to configure.

**Example of specifying the method for calculating control limits for each measure**

You can specify the method to calculate control limits and the number of observations for each control chart that has been added to each station.

1. Select **Configure**.

2. Select **Edit** for each measure to choose the data source. Under **Control Chart**, choose the method to calculate control limits.

   - You can calculate from recent observations, or you can provide historical parameter estimates.

3. You can also change from the default number of observations or default number of subgroups.

4. Select **OK**.

5. Continue for all measures to configure.
5. **Engineering Portal: Specify Product, Process, and Station Details**

After you have created products, processes, and stations, as shown in *Engineering Portal: Create Products, Processes, and Stations* on page 11, you can specify process targets, specification limits, data collection plans, and appropriate control charts and their settings. For more information, go to one of the following topics.

- Define process targets and process limits for each measure on page 18
- Define a new sampling plan on page 20
- Select assignable causes for each product and process on page 21
- Specify control chart and capability settings for each measure on page 19
- Select process defects and defectives on page 22

### Define process targets and process limits for each measure

You can specify the target values and specification limits for each measure of a particular process for a particular product.

**Note:** To add measures to your process template, go to Example of adding measures to the process on page 12. To add the process to a process flow for a product, go to Example of adding process steps to the product on page 14.

1. Go to the **Workflow Library** and select a product. Then select the process flow step of your product.

2. Open the process step and go to the **Process Summary** section to access the target and specification limits.

3. Enter values for the target, the specification limits, and the action limits for each measure.

   **Target**
   - Indicates the setpoint of the process or product measurement. Often, the target is centered between the control limits (for an in-control process) or specification limits. You must enter a target value to calculate Cpm, a capability index that also considers how much the data deviate from the target.

   **Lower specification limit (LSL) and Upper specification limit (USL)**
   - Indicate the minimum acceptable value or the maximum acceptable value for the product or service. To perform a capability analysis, you must enter a lower specification limit, an upper specification limit, or both.

   **Lower action limit (LAL) and Upper action limit (UAL)**
   - Optional values that indicate an early warning sign to take action on the process. Usually, the LAL is greater than the LSL, and the UAL is less than the USL.

4. Select **Additional Settings** to enter reasonable limits and absolute limits for each measure.

   **Reasonable lower limit (RLL) and Reasonable upper limit (RUL)**
   - Indicate values that identify unlikely measurements. Reasonable limits are used to flag data entry errors.

   **Absolute lower limit (ALL) and Absolute upper limit (AUL)**
   - Indicate values that identify impossible or extremely unlikely measurements. Absolute limits are used to prevent data entry errors. Reasonable lower limits must be greater than absolute lower limits, and reasonable upper limits must be less than absolute upper limits.

To set analysis options, go to **Specify control chart and capability settings for each measure** on page 19.
Specify control chart and capability settings for each measure

You can specify the control chart and capability analysis settings for each measure of a particular process for a particular product.

1. Go to the Workflow Library and select a product. Then select the process flow step of your product.

2. Open the process step and go to the Process Summary section.

3. Select Additional Settings to access the control chart and capability analysis options for each measure.

Note: To add measures to your process template, go to Example of adding measures to the process on page 12. To add the process to a process flow for a product, go to Example of adding process steps to the product on page 14.

Control Charts

You can specify the control chart settings for each measure.

Note: These setting apply only to the control chart for this measure. Changing this value will not affect the analyses preferences. To change the preferences for all control charts, go to Analysis preferences for control charts on page 23.

Subgroup size

A rational subgroup is a small sample of items that are similar, produced in a short period of time under the same conditions (such as operator, equipment, or supplier), and are representative of the output from a process. Enter a value to use as the same subgroup size for all samples.

Continuous Control Charts

Continuous control charts plot continuous measurement process data, such as length or pressure, in a time-ordered sequence. The two main types of continuous control charts are charts for data collected in subgroups and charts for individual measurements.

- Use an I-MR chart to monitor the mean and variation of your process when you have continuous data that are individual observations not in subgroups.
- Use an Xbar-R chart to monitor the mean and variation of a process when you have continuous data and subgroup sizes of 8 or less.
- Use an Xbar-S chart to monitor the mean and variation of a process when you have continuous data and subgroup sizes of 9 or more.
- Use an I-MR-R/S chart to monitor the mean of your process and the variation between and within subgroups when each subgroup is a different part or batch.

Attribute Control Charts

Attribute control charts plot defects or defectives. Select your attribute control chart based on whether your data represent a count of defectives and follow a binomial distribution, or whether your data represent a count of defects and follow a Poisson distribution.

- Use an NP chart to monitor the number of defective items where each item can be classified into one of two categories, such as pass or fail.
- Use a P chart to monitor the proportion of defective items where each item can be classified into one of two categories, such as pass or fail.
- Use a Laney P' chart (P' is pronounced as P prime) to monitor the proportion of defective items that are produced by your process and to adjust for overdispersion or underdispersion in your data.
• Use a C chart to monitor the number of defects per unit, where each item can have multiple defects. You should use a C chart only when your subgroups are the same size.
• Use a U chart to monitor the number of defects per unit, where each item can have multiple defects.
• Use a Laney U' chart (U’ is pronounced as U prime) to monitor the defect rate for your process and to adjust for overdispersion or underdispersion in your data.

Control limits
Control limits are the horizontal lines above and below the center line that are used to judge whether a process is out of control. The upper and lower control limits are based on the random variation in the process. By default, the control limits are displayed 3 standard deviations above and below the center line. Choose to calculate the control limits from recent data or enter the historical values for the parameters to use to calculate the center line and control limits.

Number of observations or Number of subgroups
If you use recent data to calculate the control limits, you can specify how much data to use. For continuous measures, specify the number of observations; the default is 100 observations. For attribute measures, specify the number of subgroups; the default is 25 subgroups.

Tests
Real-Time SPC Powered by Minitab® provides eight tests for special causes for control charts with continuous data and four tests for special causes for control charts with attribute data. Use the tests to determine which observations to investigate, and to identify the specific patterns and trends in your data. By default, Real-Time SPC Powered by Minitab® uses only Test 1. Select additional tests based on company or industry standards.

Continuous Capability Analyses
You can transform your data to fit a normal distribution in order to satisfy the assumptions for the analysis.

Box-Cox transformation
Use the Box-Cox transformation if your nonnormal data are all positive (> 0) and you want to obtain estimates of within-subgroup (potential) capability as well as overall capability. Select the lambda (λ) value to transform the data.
• Optimal λ: Use the optimal lambda, which should produce the best fitting transformation.
• λ = 0 (natural log): Use the natural log of your data.
• λ = 0.5 (square root): Use the square root of your data.
• Specify a value for lambda. Other common transformations are square (λ = 2), inverse square root (λ = −0.5), and inverse (λ = −1). In most cases, you should not use a value outside the range of −2 and 2.

Define a new sampling plan
After you add measures to a process and add that process to the process flow for a product, you can specify sampling plans for all the measures.
The first step is to add a new sampling plan to the process of the product of interest. Then you can specify the sampling schedule and specific measures.

Note: To add measures to your process template, go to Example of adding measures to the process on page 12. To add the process to a process flow for a product, go to Example of adding process steps to the product on page 14.

Example of adding a new sampling plan

The Flavorful Fruit Company adds new sampling plans for the inspection process.

1. Go to the Workflow Library and select a product. Then select the process flow step of your product.

For this example, we navigate to the Inspection process of the Strawberry Fruit Spread product.

2. Open the process step and go to the Data Collection section.


4. Enter a name and description for the new sampling plan and then select OK.

For this example, we add the Berry Inspection plan.

5. Save your changes.

6. Select Edit to open the sampling plan settings.

7. In the Sampling Plan Settings section, determine the sampling schedule and frequency.
   - Select Set time interval to specify the time interval between data collections.
   - Select On-demand sampling to collect data on demand and not according to a schedule.

8. In the Collection Details section, select the measures to include in the sampling plan.
   - You can add or edit relevant instructions for the measurements and inspections. Subgroup size changes can be made on the control chart settings page.

9. Save your changes.

Select assignable causes for each product and process

After you add assignable causes and corrective actions to a process and add that process to the process flow for a product, you can specify which assignable causes to add to the specific process of a product.

1. Go to the Workflow Library and select a product. Then select the process flow step of your product.

2. Open the process step and go to the Assignable Causes section.

3. Select the assignable causes to use for the process of the product. Once selected, the assignable causes are available to identify flagged points on a control chart for the process measures and inspections of the process.

Note: To add assignable causes to your process template, go to Example of adding assignable causes and corrective actions to the process on page 13. To add the process to a process flow for a product, go to Example of adding process steps to the product on page 14.
Select process defects and defectives

After you add defects and/or defectives to a process and add that process to the process flow for a product, you can specify which defects and defectives to add to the specific process of a product.

1. Go to the Workflow Library and select a product. Then select the process flow step of your product.

2. Open the process step and go to the Process Summary section to access the list of defects and defectives.

3. Select Edit List of Defects and select the defects to add.

4. Save your changes.

5. Select Edit List of Defectives and select the defectives to add.

6. Save your changes.

After you select the defects and/or defectives, they are available in the data collection forms and Pareto charts.

Note: To add defect types and defective types to your process template, go to Example of adding defect types and defective types on page 13. To add the process to a process flow for a product, go to Example of adding process steps to the product on page 14.
6. **Engineering Portal: Analysis Preferences**

From the Engineering portal, users with engineer privileges can specify default preferences for the analyses. Select **Analysis Preferences**, then navigate to particular settings.

- For more information on default control chart settings, go to Analysis preferences for control charts on page 23.
- For more information on default capability analysis settings, go to Analysis preferences for capability analysis on page 27.
- For more information on default Pareto chart settings or defect severity levels, go to Analysis preferences for quality tools on page 29.

### Analysis preferences for control charts

Specify the default control chart settings, including estimation methods, control chart tests, and control limit settings.

#### I-MR Charts

**Estimation method for standard deviation**

The available methods depend on the type of control chart and the subgroup size.

- **Average moving range**: The average moving range is the average value of the moving range of two or more consecutive points. This method is commonly used when the subgroup size is 1.
- **Median moving range**: The median moving range is the median value of the moving range of two or more consecutive points. This method is best to use when data have extreme ranges that could influence the moving range.

**Length of moving range**

Enter the number of observations used to calculate the moving range. The length must be ≤ 100. The default length is 2 because consecutive values have the greatest chance of being alike.

**Use Nelson estimate**

Select this option to correct for unusually large moving range values in the calculation of the control limits.

#### Xbar-R Charts

**Estimation method for standard deviation**

The available methods depend on the type of control chart and the subgroup size.

- **Rbar**: Rbar is the average of the subgroup ranges. This method is a common estimate of the standard deviation and works best with subgroup sizes from 2 to 8.
- **Pooled standard deviation**: The pooled standard deviation is the weighted average of subgroup variances, which gives larger subgroups more influence on the overall estimate. This method provides the most precise estimate of standard deviation when the process is in control.

**Use unbiasing constants**

Unbiasing constants reduce the bias that can occur when a parameter is estimated from a small number of observations. As the number of observations increases, unbiasing constants have less effect on the calculated results.
**Xbar-S Charts**

**Estimation method for standard deviation**

The available methods depend on the type of control chart and the subgroup size.

- **Sbar**: Sbar is the average of the subgroup standard deviations. This method provides a more precise estimate of the standard deviation than Rbar, especially with subgroup sizes > 8.

- **Pooled standard deviation**: The pooled standard deviation is the weighted average of subgroup variances, which gives larger subgroups more influence on the overall estimate. This method provides the most precise estimate of standard deviation when the process is in control.

**Use unbiasing constants**

Unbiasing constants reduce the bias that can occur when a parameter is estimated from a small number of observations. As the number of observations increases, unbiasing constants have less effect on the calculated results.

**I-MR-R/S Charts**

**Estimation method for between-subgroup standard deviation**

Select a method to estimate the between–subgroup standard deviation that is used in the I-MR chart.

- **Average moving range**: The average moving range is the average value of the moving range of two or more consecutive points. This method is commonly used when the subgroup size is 1.

- **Median moving range**: The median moving range is the median value of the moving range of two or more consecutive points. This method is best to use when data have extreme ranges that could influence the moving range.

**Length of moving range**

Enter the number of observations used to calculate the moving range. The length must be ≤ 100. The default length is 2 because consecutive values have the greatest chance of being alike.

**Estimation method for within-subgroup standard deviation (subgroup size ≤ 8)**

Select a method to estimate the within–subgroup standard deviation that is used in the R chart.

- **Rbar**: Rbar is the average of the subgroup ranges. This method is a common estimate of the standard deviation and works best with subgroup sizes from 2 to 8.

- **Sbar**: Sbar is the average of the subgroup standard deviations. This method provides a more precise estimate of the standard deviation than Rbar, especially with subgroup sizes > 8.

- **Pooled standard deviation**: The pooled standard deviation is the weighted average of subgroup variances, which gives larger subgroups more influence on the overall estimate. This method provides the most precise estimate of standard deviation when the process is in control.

**Use unbiasing constants**

Unbiasing constants reduce the bias that can occur when a parameter is estimated from a small number of observations. As the number of observations increases, unbiasing constants have less effect on the calculated results.

**Estimation method for within-subgroup standard deviation (subgroup size > 8)**

Select a method to estimate the within–subgroup standard deviation that is used in the S chart.

- **Sbar**: Sbar is the average of the subgroup standard deviations. This method provides a more precise estimate of the standard deviation than Rbar, especially with subgroup sizes > 8.
- **Pooled standard deviation**: The pooled standard deviation is the weighted average of subgroup variances, which gives larger subgroups more influence on the overall estimate. This method provides the most precise estimate of standard deviation when the process is in control.

**Use unbiasing constants**

Unbiasing constants reduce the bias that can occur when a parameter is estimated from a small number of observations. As the number of observations increases, unbiasing constants have less effect on the calculated results.

**Tests for Special Causes**

Use the tests to determine which observations to investigate and to identify the specific patterns and trends in your data. By default, **Real-Time SPC Powered by Minitab** uses only Test 1. Select additional tests based on company or industry standards.

**Test 1: One point more than 3σ from center line**

Test 1 identifies subgroups that are unusual compared to other subgroups. Test 1 is universally recognized as necessary for detecting out-of-control situations. If small shifts in the process are of interest, you can use Test 2 to supplement Test 1 in order to create a control chart that has greater sensitivity.

**Test 2: Nine points in a row on the same side of the center line**

Test 2 identifies shifts in the process centering or variation. If small shifts in the process are of interest, you can use Test 2 to supplement Test 1 in order to create a control chart that has greater sensitivity.

**Test 3: Six points in a row, all increasing or all decreasing**

Test 3 detects trends. This test looks for a long series of consecutive points that consistently increase in value or decrease in value.

**Test 4: Fourteen points in a row, alternating up and down**

Test 4 detects systematic variation. You want the pattern of variation in a process to be random, but a point that fails Test 4 might indicate that the pattern of variation is predictable.
Test 5: Two out of three points more than 2\(\sigma\) from the center line (same side)
Test 5 detects small shifts in the process.

Test 6: Four out of five points more than 1\(\sigma\) from center line (same side)
Test 6 detects small shifts in the process.

Test 7: Fifteen points in a row within 1\(\sigma\) of center line (either side)
Test 7 detects a pattern of variation that is sometimes mistaken as evidence of good control. This test detects control limits that are too wide. Control limits that are too wide are often caused by stratified data, which occur when a systematic source of variation is present within each subgroup.

Test 8: Eight points in a row more than 1\(\sigma\) from center line (either side)
Test 8 detects a mixture pattern. In a mixture pattern, the points tend to fall away from the center line and instead fall near the control limits.

Control Limit Settings
The center line and control limits are calculated from the data. You can specify the moving data range for these calculations.

For continuous data, the default is 100 observations. For attribute data, the default is 25 subgroups. Change these settings if you want to include more or less data in the calculations.
Analysis preferences for capability analysis
Specify the default capability analysis settings including estimation methods and display settings.

Normal Capability Analyses

Estimation methods

Estimation method for within-subgroup standard deviation (subgroup size > 1)
Select a method to estimate the within–subgroup standard deviation when the subgroup size is larger than 1.

- **Pooled standard deviation**: The pooled standard deviation is the weighted average of subgroup variances, which gives larger subgroups more influence on the overall estimate. This method provides the most precise estimate of standard deviation when the process is in control.
- **Rbar**: Rbar is the average of the subgroup ranges. This method is a common estimate of the standard deviation and works best with subgroup sizes from 2 to 8.
- **Sbar**: Sbar is the average of the subgroup standard deviations. This method provides a more precise estimate of the standard deviation than Rbar, especially with subgroup sizes > 8.

Estimation method for within-subgroup standard deviation (subgroup size = 1)
Select a method to estimate the within–subgroup standard deviation when the subgroup size equals 1.

- **Average moving range**: The average moving range is the average value of the moving range of two or more consecutive points. This method is commonly used when the subgroup size is 1.
- **Median moving range**: The median moving range is the median value of the moving range of two or more consecutive points. This method is best to use when data have extreme ranges that could influence the moving range.
- **Square root of MSSD**: The square root of MSSD is the square root of the mean of the squared differences between consecutive points. Use this method when you cannot reasonably assume that at least 2 consecutive points were collected under similar conditions.

Length of moving range
Enter the number of observations used to calculate the moving range. The length must be ≤ 100. The default length is 2 because consecutive values have the greatest chance of being alike.

Use unbiasing constants
Unbiasing constants reduce the bias that can occur when a parameter is estimated from a small number of observations. As the number of observations increases, unbiasing constants have less effect on the calculated results.

**Note**: Often, the choice to use unbiasing constants depends on company policy or industry standards.

Capability statistics options

Tolerance
Enter the width of the tolerance in number of standard deviations (σ). By default, the tolerance is 6 standard deviations wide (3 standard deviations on each side of the process mean). The K value represents the width of a two-sided tolerance. If you want to use a one-sided tolerance, enter a two-sided tolerance value that is twice that of the one-sided tolerance. For example, if you want to use a one-sided tolerance of 3σ, enter 6.
Display performance metrics
Select how you want to display the expected and observed out-of-specification values.

- **Parts per million**: Display the values in parts per million (PPM).
- **Percent**: Display the values as percentages.

Display capability metrics
Select the measures of capability to display.

- **Capability statistics (Cp, Pp)**: Calculate and display capability indices, such as Cp and Pp.
- **Benchmark Z's (σ level)**: Calculate and display Z.bench values. The choice to use Z.bench often depends on company or industry practices.

**Between/Within Capability Analyses**

**Estimation methods**

**Estimation method for within-subgroup standard deviation**
Select a method to estimate the within–subgroup standard deviation.

- **Pooled standard deviation**: The pooled standard deviation is the weighted average of subgroup variances, which gives larger subgroups more influence on the overall estimate. This method provides the most precise estimate of standard deviation when the process is in control.
- **Rbar**: Rbar is the average of the subgroup ranges. This method is a common estimate of the standard deviation and works best with subgroup sizes from 2 to 8.
- **Sbar**: Sbar is the average of the subgroup standard deviations. This method provides a more precise estimate of the standard deviation than Rbar, especially with subgroup sizes > 8.

**Estimation method for between-subgroup standard deviation**
Select a method to estimate the between–subgroup standard deviation.

- **Average moving range**: The average moving range is the average value of the moving range of two or more consecutive points. This method is commonly used when the subgroup size is 1.
- **Median moving range**: The median moving range is the median value of the moving range of two or more consecutive points. This method is best to use when data have extreme ranges that could influence the moving range.
- **Square root of MSSD**: The square root of MSSD is the square root of the mean of the squared differences between consecutive points. Use this method when you cannot reasonably assume that at least 2 consecutive points were collected under similar conditions.

**Length of moving range**
Enter the number of observations used to calculate the moving range. The length must be \( \leq 100 \). The default length is 2 because consecutive values have the greatest chance of being alike.

**Use unbiasing constants**
Unbiasing constants reduce the bias that can occur when a parameter is estimated from a small number of observations. As the number of observations increases, unbiasing constants have less effect on the calculated results.

**Note**: Often, the choice to use unbiasing constants depends on company policy or industry standards.
**Capability statistics options**

**Tolerance**
Enter the width of the tolerance in number of standard deviations ($\sigma$). By default, the tolerance is 6 standard deviations wide (3 standard deviations on each side of the process mean). The K value represents the width of a two-sided tolerance. If you want to use a one-sided tolerance, enter a two-sided tolerance value that is twice that of the one-sided tolerance. For example, if you want to use a one-sided tolerance of $3\sigma$, enter 6.

**Display performance metrics**
Select how you want to display the expected and observed out-of-specification values.
- **Parts per million**: Display the values in parts per million (PPM).
- **Percents**: Display the values as percentages.

**Display capability metrics**
Select the measures of capability to display.
- **Capability statistics ($C_p$, $P_p$)**: Calculate and display capability indices, such as $C_p$ and $P_p$.
- **Benchmark Z's ($\sigma$ level)**: Calculate and display Z.bench values. The choice to use Z.bench often depends on company or industry practices.

**Analysis preferences for quality tools**
Specify the default quality tool settings, including Pareto chart settings and defect severity levels.

**Pareto Charts**
Specify the percentage at which you want to create a category to represent the remaining defects.
- **Combine remaining categories into summary category at this percentage**: Generates bars for defect categories until the cumulative percentage surpasses the percentage that you specify, then, groups the remaining defects into a category labeled "Other".
- **Display all categories**: Generates bars for all the defect categories.

**Defect Severity Levels**
Use severity levels to indicate the impact of each defect type. These severity levels are used across the platform and should not be changed or deleted after setup.
1. Select **Add Severity Level**.
2. Enter a name for the new severity level.
3. Select **OK**.
7. **Operations Portal**

Within the **Operations** portal, users with operator or supervisor privileges have access to their home page and to the station dashboard.

Select the Home button to open your home page. For a user with a supervisor role, the home page is the Supervisor dashboard on page 37. For a user with an operator role, the home page is the Operator dashboard on page 38. Both types of users can view or set up station dashboards from their home pages.

**Enter data for a sampling plan into a data collection form**

Data collection forms for each sampling plan are accessible via the operator dashboard. Before you can collect data, you must have a defined sampling plan with specified measures, collection methods, and data sources.

*Note:* Each sampling plan must be defined within the product/process template. For more information, go to Define a new sampling plan on page 20. Specify the data collection methods and data sources at the appropriate station. For more information, go to Example of specifying data sources for a sampling plan on page 16.

Go to the **Operator Dashboard** and select Add/Remove Stations at the top of the dashboard to add the stations that contain your sampling plans. If you have a manual collection and it is due for collection, select **Start Collection**.

*Note:* The station must be **Online** and **Running** to start a data collection.

**Enter data manually**

The sampling plan that you specify creates a data collection form with the appropriate measures, defects, defectives, and subgroup sizes for each collection event.

1. Select **Start Collection** from the station on the operator dashboard.

2. Select whether to enter data down each column or across each row.
   - Select **By Row** to enter data by sample. Thus, enter the first observation for each variable before entering the second observation.
   - Select **By Column** to enter data by measure. Thus, enter all the observations for the first variable before entering observations for the next variable.

3. Enter the continuous measurement or a count of the defects and defectives.

![Defects and Defectives Table](image)

The column of defects indicates the total count of all defects in the unit. The column of defectives indicates Pass or Fail for each unit. If a unit fails, the number in parenthesis indicates the number of reasons for failing. For instance, Fail (3) means that the unit is defective and contains 3 of the defective types.
4. Use the following buttons to advance through the data collection sheet.
   • Select **Skip** to skip an observation.
   • Select **Previous** to edit the previous observation, if necessary.
   • Select **Next** to advance to the next cell.
   • Select **Finish now** to complete the data collection.

5. Select **Add Row** to add another row to the data collection form, if necessary.
   A measure that creates an I-MR chart can have only one observation.

6. When the collection is complete, save and exit, or cancel and exit.

**Import data from a file with an existing template**

Follow these steps to import continuous data from a file using an existing template. If you do not have an existing template, then follow the steps in the next section to create a new template.
1. Select **Import**.
2. Select **Use an existing template**, then select the template that you want to use. Select **Next** to continue.
3. Select **Choose Files**, then browse to the file that contains your data. Select **Open**.
4. Select whether to enter data down each column or across each row.
   • Select **One sample per file** to import observations for one sample.
   • Select **Multiple samples per file** to import observations for several samples.
5. Select **Next**.
   Select **Previous** to go back to the previous screen, if necessary. Select **Cancel** to go cancel this import event.

6. Verify that the measures and the data are correct.
   • Select **Previous** to edit the measure, if necessary.
   • Select **Finish** to import the data.

**Import data from a file with a new template**

Follow these steps to create a new template and then import continuous data using this template.
1. Select **Import**.
2. Select **Create a new template**, then select **Next** to continue.
3. Select **Choose Files**, then browse to the file that contains your data. Select **Open**.
4. Select whether to enter data down each column or across each row.
   • Select **One sample per file** to import observations for one sample.
   • Select **Multiple samples per file** to import observations for several samples.
5. Select **Next**.
6. Select **Add Measure** to specify which column contains the data for each measure.
   Complete for all continuous measures.
7. Select **Next**.
8. Select whether to save this template.
   - Select **Add to templates** to name and save this new template for future use.
   - Select **Import without saving** to import the data without saving the template.

9. Verify that the measures and the data are correct.
   - Select **Previous** to edit the measure, if necessary.
   - Select **Finish** to import the data.

Data warnings and errors

You can use the specification limits and absolute limits to flag data points and alert you to a potential process issue or potential data entry problem.

**Specification limit warning**

A warning indicates that a continuous measurement is out-of-specification. You can add assignable causes, corrective actions, or comments to these measurements.

**Absolute limit error**

Use absolute limits to protect your data collection from data entry errors. For instance, if the jar weight target is 280g, a measurement of 50g or 500g would likely be an error. For manual data entry, you will receive an error when you try to enter data that exceed the absolute limits. For imported data, the values that exceed the absolute limits are converted to missing values.

To add specification limits and absolute limits, go to Define process targets and process limits for each measure on page 18.

Manage templates

You can manage the list of available data import templates. You can rename a template, update its description, or delete a template from this list.

1. Select the **Manage templates** button.
2. Edit the name or description, or delete the template.
3. Select **OK**.
8. Reports and Dashboards

**Real-Time SPC Powered by Minitab** has several reports and dashboards to monitor your processes and communicate process performance. Your access to various reports and dashboards depends on your role in the organization.

**Current Performance Summary**
Provides a performance summary for all the measures from the stations that you specify. At a glance, you can see which stations are running and the percentages that are out-of-specification, out-of-action, and out-of-control. For more details on a particular measurement, go to the Process Quality Snapshot on page 35.

**Process Quality Snapshot**
Provides the process control details associated with a measure. Includes control charts, capability analyses, and Pareto charts. You can also specify historical parameters to set control limits for the control charts.

**Supervisor Dashboard**
Provides a performance summary for all the measures from the stations that you supervise. At a glance, you can see which stations are running and the percentages that are out-of-specification, out-of-action, and out-of-control. For more details on a particular measurement, go to the Station Dashboard on page 40.

**Operator Dashboard**
Provides a list of the data sampling plans by station. From this dashboard, an operator can start a data collection.

**Station Dashboard**
Provides the station status and the upcoming data sampling schedule. Also displays the control charts and Pareto charts for a particular station.

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**Current Performance Summary**

The **Current Performance Summary** provides a performance summary for all the measures from the stations that you specify. At a glance, you can see which stations are running and the percentages that are out-of-specification, out-of-action, and out-of-control.

The **Current Performance Summary** is available through the Engineering portal and has the following main areas.

1: Refresh data
   
   Select the Refresh Data button to refresh the station data. Use the Settings icon to the right to change the automatic refresh rate.

2: Filter settings
   
   Select the filter settings to view station performance. You can select all products, processes, and stations, or only the stations of interest. Also, specify the start time for this summary as well as the station status.

3: Station identification information
   
   In the default view, stations are arranged in alphabetical order by station status. To rearrange, sort by the column of your choice.

4: Station performance information
   
   Expand the station to see the performance by individual measure.

   **%Out-of-Specification**
   
   Displays percentage of subgroups that are out-of-specification for each station. Expand the station to see the percentage of subgroups that are out-of-specification for each measure.
%Out-of-Action
Displays percentage of subgroups that are out-of-action for each station. Expand the station to see the percentage of subgroups that are out-of-action for each measure.

%Out-of-Control
Displays percentage of subgroups that are out-of-control for each station. Expand the station to see the percentage of subgroups that are out-of-control for each measure.

Save and manage filters
Complete the following steps to save your filter selections as a saved view.
1. Select the products, processes, stations, start time, and station status.
2. Select Save.
3. Enter a name for your new filter and decide whether to set as the default view.
4. Click OK.
5. Select Manage Filters to delete filters or set a new default filter.

Calculations
For each measure:

\[
\%\text{Out-of-specification} = \frac{\text{Number of out-of-specification subgroups}}{\text{Total number of subgroups}}
\]

\[
\%\text{Out-of-action} = \frac{\text{Number of out-of-action subgroups}}{\text{Total number of subgroups}}
\]

\[
\%\text{Out-of-control} = \frac{\text{Number of out-of-control subgroups}}{\text{Total number of subgroups}}
\]

For the overall station:
%Out-of-specification = 100 * (1 − (1 − % OOSₙ₁) * (1 − OOS₂) * ... * (1 − OOSₙ))

%Out-of-action = 100 * (1 − (1 − % OOAₙ₁) * (1 − OOA₂) * ... * (1 − OOAₙ))

%Out-of-control = 100 * (1 − (1 − % OOCₙ₁) * (1 − OOC₂) * ... * (1 − OOCₙ))

For this station, the overall % out-of-specification = 18.58%. Each of the measurements show the number of subgroups out of the total that are out-of-specification.

<table>
<thead>
<tr>
<th>Station</th>
<th>%OOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 1</td>
<td>1.41% (1/71)</td>
</tr>
<tr>
<td>Measure 2</td>
<td>7.04% (5/71)</td>
</tr>
<tr>
<td>Measure 3</td>
<td>2.94% (2/68)</td>
</tr>
<tr>
<td>Measure 4</td>
<td>1.47% (1/68)</td>
</tr>
<tr>
<td>Measure 5</td>
<td>0.00% (0/68)</td>
</tr>
<tr>
<td>Measure 6</td>
<td>1.47% (1/68)</td>
</tr>
<tr>
<td>Measure 7</td>
<td>5.71% (4/70)</td>
</tr>
</tbody>
</table>

**Process Quality Snapshot**

The Process Quality Snapshot provides the process control details associated with a measure. Includes control charts, capability analyses, and Pareto charts. You can also specify historical parameters to set control limits for the control charts.

The Process Quality Snapshot is available through the Engineering portal and has the following main areas.

1: Station filter settings
   Select the filter settings to choose the stations of interest. Also, specify the start and end times for the quality analyses.

2: Measure and analyses settings
   Display the analyses by measure, station, and operator. Switch between tabs to see control charts, capability analyses, and assignable causes.

3: Export analyses
   You can download a GIF of the analysis results or you can export to a Minitab worksheet or to a CSV file.

4: Analysis display
   Select the Settings icon to the right of an analysis to modify the analysis options.
Save and manage filters

Select the filter settings to view station performance. You can select the time frame for this report and the products, processes, and stations of interest. Complete the following steps to save your filter selections as a view.

1. Select the time frame, products, processes, and stations.
2. Select Save.
3. Enter a name for your new filter and decide whether to set as the default view.
4. Click OK.
5. Select Manage Filters to delete filters or set a new default filter.

Control Charts

View control charts for the measures of the selected stations. Select the measure of interest and choose whether to view by each station or by each station and operator.

The control chart pane is interactive. You can select a single selected point, a range of points, or the entire chart.

- Select a single point to see the individual observations represented by the point. If the point is a flagged point, you can also see the assignable causes, corrective actions, and comments.
- Select a range of points to see the summary statistics for the selected points. You can use these calculated parameters to update the center line and control limits, or you can adjust the calculated parameters if you have historical data.
- Select the entire chart to see the summary statistics for all plotted points. You can use these calculated parameters to update the center line and control limits, or you can adjust the calculated parameters if you have historical data.

Complete the following steps to update the center line and control limits.

1. Select the control chart or a range of points to use as the starting point for the calculated summary statistics. For example, for an Xbar-R chart, you can select subgroups 5-17 to see the calculated mean and standard deviation for this range of points.
2. Use the calculated values or adjust the values based on other historical information. Select Update Control Limits.
3. Select whether to update the limits for this station or for several stations.
4. Click **OK**.

**Capability Analysis**

View capability analyses for the measures of the selected stations. Select the measure of interest and choose whether to view by each station, each station and operator, or a single analysis for all stations.

You can add confidence intervals for the capability indices for this analysis. Also, you can transform your data to fit a normal distribution to satisfy the assumptions for this analysis. To change the default display settings for all capability analyses, go to Analysis Preferences on page 27.

**Pareto Charts**

View Pareto charts for assignable causes and corrective actions for continuous measures and for the defect and defective types for attribute measures. Select the measure of interest and choose whether to view by each station, each station and operator, or a single analysis for all stations.

**Assignable Causes**

View Pareto charts for assignable causes and corrective actions for the measures of the selected stations.

**Defect or Defective Types**

View Pareto charts for defect or defective types at the selected stations.

If you have many categories with small counts, you can set a percentage to combine these categories into a summary category called "Other".

**Supervisor Dashboard**

Provides a performance summary for all the measures from the online stations that you supervise. At a glance, you can see which stations are running and the percentages that are out-of-specification, out-of-action, and out-of-control.

The Supervisor Dashboard is available through the Operations portal. This dashboard is the home page for a user with a supervisor role. This dashboard is similar to the Current Performance Summary, but is set for the stations assigned to an operations supervisor. From this dashboard, you can open a station dashboard using the link to the right of the quality metrics.

The Supervisor Dashboard has the following main areas.

1. **Start time filter**
   Specify the start time for this dashboard. Generally, this view is for the last 24 hours of performance.

2. **Station summary**
   Shows a status summary of the stations so you can easily see how many stations are running, idle, or shutdown.

   Select the Refresh Data button to refresh the data at any time. Use the Settings icon to the right to change the automatic refresh rate.

3. **Add and remove stations to the dashboard**
   Select Add/Remove Stations at the top of the dashboard to add or remove stations from this dashboard.

4. **Station identification information**
   In the default view, stations are arranged in alphabetical order by station status. You can select whether the online station is Running, Idle, or Shutdown. To rearrange the order of the stations, sort by the column of your choice.
5: Station performance information

Expand the station to see the performance by individual measure.

**%Out-of-Specification**
Displays percentage of subgroups that are out-of-specification for each station. Expand the station to see the percentage of subgroups that are out-of-specification for each measure.

**%Out-of-Action**
Displays percentage of subgroups that are out-of-action for each station. Expand the station to see the percentage of subgroups that are out-of-action for each measure.

**%Out-of-Control**
Displays percentage of subgroups that are out-of-control for each station. Expand the station to see the percentage of subgroups that are out-of-control for each measure.

For more information on these calculations, go to Current Performance Summary on page 33.

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**Operator Dashboard**

Provides a list of the data sampling plans by station. From this dashboard, an operator can start a data collection.

The Operator Dashboard is available through the Operations portal. This dashboard has 2 views. The station view organizes the sampling plans by station, and the schedule view organizes the dashboard by the sampling plan schedule.

**Station View**

Organizes the sampling plans by station.

The Station View of the Operator Dashboard has the following main areas.

1: Manage stations
   Select Manage Stations at the top of the dashboard to add or remove stations from this dashboard.

2: List of sampling plans by station
   Lists each sampling plan and gives the option to skip the next collection.

3: Station status
   The station is online. You can select whether the online station is Running, Idle, or Shutdown.
The station is offline.

4: Go to the station dashboard
   Select the link to open the station dashboard.

5: Sampling plan schedule
   Lists when each sampling plan is due or when the data were last imported. Select Start Collection to open the data collection form for a manual data collection.

Schedule View
Organizes the dashboard by sampling plan schedule.

The Schedule View of the Operator Dashboard has the following main areas.

1: Manage stations
   Select Manage Stations at the top of the dashboard to add or remove stations from this dashboard.

2: List of scheduled sampling plans
   The scheduled plans are on the left in order of when the collection is due.

3: List of on-demand sampling plans
   The on-demand plans are on the right, in alphabetical order.
Station Dashboard

The Station Dashboard is available through the Operations portal. This dashboard displays the station status, quality charts, and sampling plans.

The Station Dashboard has the following main areas.

1: Station summary

The station is online.

The station is offline.

When the station is on, you can do the following.

**Product/Process**
Select which product and process to monitor. Many products and processes can use the same station, and each combination has its own sampling plans and control charts.

**Status**
Select whether the online station is **Running**, **Idle**, or **Shutdown**.

**Sampling Plans**
Lists the sampling plans for the current product, process, and station. Select **Start** to open the data collection form.

2: Chart and date selector

Toggle between the control charts and Pareto charts for each measure of the station.

Specify the start time for this dashboard. Generally, this view is for the last 4 hours of data, but can show up to 7 days of data.

3: Pause or resume data collection

Select **Pause Data** to pause the station data at any time. Select **Resume Data** to continue collecting data at this station.

Open the **Settings** icon to change the display options.

4: Chart data

Displays the control charts or Pareto charts for each measure. Also indicates the percentage of subgroups that are out-of-specification, out-of-action, or out-of-control.

**%Out-of-Specification**
Displays percentage of subgroups that are out-of-specification for each station. Expand the station to see the percentage of subgroups that are out-of-specification for each measure.

**%Out-of-Action**
Displays percentage of subgroups that are out-of-action for each station. Expand the station to see the percentage of subgroups that are out-of-action for each measure.

**%Out-of-Control**
Displays percentage of subgroups that are out-of-control for each station. Expand the station to see the percentage of subgroups that are out-of-control for each measure.

For more information on these calculations, go to **Current Performance Summary** on page 33.
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