Real-Time SPC
Powered by Minitab

Getting Started with Real-Time SPC Powered by Minitab®

Contents

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 27.

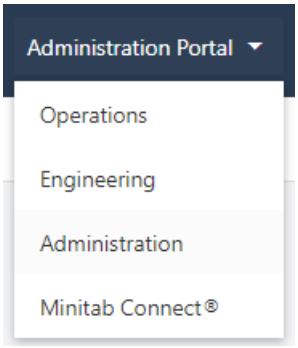
To learn about report and dashboard settings, go to Reports and Dashboards on page 51.

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 35.

Navigation within Real-Time SPC

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.



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 Minitab 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

Displays your user name and role. You can change your password. You can also add a phone number for notification purposes.

Account Settings are available in the **My Account** settings at the top right of the window, next to the portal selector.

Notifications

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.

Notifications are available in the **My Account** settings.

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 21. To change tests for all control charts, go to Analysis preferences for control charts on page 27.

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 20.

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 20.

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 dropdown box, 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.
- Manage data archiving settings. For more information, go to Data Management on page 10.

Roles

Roles and **Permissions**

Real-Time SPC Powered by Minitab® provides 4 standard user roles with default permissions for each role. **Roles** are available through the **Administration** portal.

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

You can assign a role and access level to each user. **Manage Users** is available through the **Administration** portal.

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

To add role or update default role permissions, go to Roles on page 8.

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

Hierarchy Groups

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.

Hierarchy Groups are available through the **Administration** portal.

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

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.

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

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.

Data Management

Data Archiving

Real-Time SPC migrates quality data every 90 days into a Minitab Connect data table, named *Quality Data*, located in the SPC folder. The *Quality Data* table contains all migrated and archived data. Historic data within this table can be further analyzed using Minitab Connect's dashboarding tool or exported for further analysis in Minitab Statistical Software. For more information on exporting data from Minitab Connect, go to Exporting Data from Minitab Connect.

Who can update archiving settings?

By default, Real-Time SPC purges data after 90 days; however, users with appropriate permissions can configure the purging frequency and the time of day to perform the data purge. By default, all users with **Administrator** permissions can update archiving settings. Other roles may need modification. To see available permissions, go to the **Roles** page and select **Manage permissions**. For more information, go to Roles and permissions.

How to update archiving settings

1. Open the **Data Management** page in the portal.
2. Enter an integer value between 1 and 365 to specify the frequency of data archiving, in days.

   Note: Large amounts of data in the app can increase the time it takes to generate reports over time. In these cases, archive your data more frequently.

3. Specify the time of day and the time zone for when the data purge occurs.

Note: Increasing the number of days affects only future data archiving. Previously archived data are not moved back into the application.

4. **Engineering** Portal: Create Products, Processes, and Stations

Using the Workflow Library

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.

Using the Descriptor Library

The **Descriptor Library** is available through the **Engineering** portal.

Descriptors are categorical variables that identify individual observations or subgroups. For example, your company may collect supplier lot numbers, shift identifiers, and measuring device identifiers. These data are collected to enable traceability of product and improve quality analysis through data reporting, root cause analysis, and predictive analytics analysis. To add a descriptors, go to Add descriptors to the Descriptor Library on page 18.

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. Control chart points with assignable causes are not used in the control limit calculations.

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*.
3. Select **New**. Select **Process**.
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 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 20.

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*.

3. Select **New** . Select **Product**.
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.

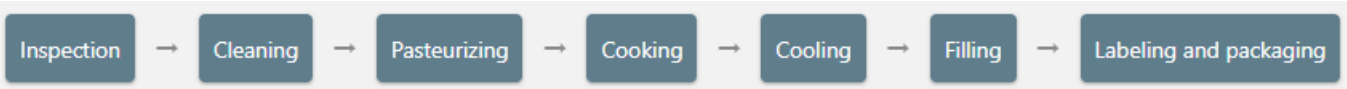
Example of adding process steps to the product

The production of the *Strawberry Fruit Spread* product involves 7 process steps.

1. Select **Add** . Select **Process**.
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.

Name
Inspection
Cleaning
Pasteurizing
Cooking
Cooling
Filling
Labeling and packaging

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 24.

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 1* 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. In **Time Zone**, select the time zone of the location of the station.
   By default, the time zone is set to the location of the server, but you must change it to the location of the station to represent the time zone when the data are collected.
8. 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. In the **Processes by Product** section of the template, select **Add Process**.
2. Under **Product**, select an existing product from the dropdown list.
3. Under **Process**, 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. In the **Processes by Product** section of the template, select **Configure** to specify the collection methods for the sampling plans.
   To add sampling plan, go to Define a new sampling plan on page 24.
2. For each sampling plan, select how the plan will import the data.
   - Select **Automatic** when all your data are in a single Minitab Connect data table. Then specify the data table. For more information, go to Set up automatic data collection on page 40.
   - Select **Data Collection Form**, select when data come from various sources. The collection is manual unless you specify another option. For more information, go to Set up data collection in a form on page 41.
3. Select **Save**.

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. In the **Processes by Product** section of the template, select **Configure** to specify the collection methods for the sampling plans.
   Once you specify the collection method, you can access the control chart settings.

2. Select **Edit** for each measure to access the control chart settings. Under **Control Chart**, select 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.

Add descriptors to the Descriptor Library

The **Descriptor Library** is available through the **Engineering** portal.

Descriptors are categorical variables that identify individual observations or subgroups. For example, your company may collect supplier lot numbers, shift identifiers, and measuring device identifiers. These data are collected to enable traceability of product and improve quality analysis through data reporting, root cause analysis, and predictive analytics analysis.

Each descriptor in the **Descriptor Library** has several attributes that you can specify.

- **Name**: Use a unique name for each descriptor.
  You can edit a descriptor name to update all instances of the descriptor in the system. You can also delete a descriptor from the library which make the descriptor unavailable for future data collections. However, information from previous collections remain for tracing and reporting purposes.
- **Type**: Use descriptor type to organize your descriptors. For example, use Operations descriptors to describe measurement gages and use Materials descriptors to describe raw material lots.
- **Scope**: Select whether the descriptor scope is by product or globally.
- **Use**: Select whether the descriptor values apply to an entire subgroup or to individual observations.

You can also specify how to collect values during data collection.

- **Enter values**: The operator enters descriptor values during data collection.
  The supplied descriptor values can be shared across stations and other hierarchy groups. Specify how long to retain these values before purging.
- **Select from a list**: Create a fixed list in Real-Time SPC.
- **Select from a list (Connect data table)**: Use a fixed list from Minitab Connect.

Once defined, Engineers will be able to associate descriptors with specific product-processes and include them in sampling plans much like how they currently set up continuous process variables. Operators will be able to collect descriptor information using the same manual, gage-assisted, and automatic methods used for collecting continuous process variable data.

Finally, descriptor information will be exportable alongside other process variables for analysis in external applications like Minitab.

Example of adding a new descriptor

The *Flavorful Fruit Company* adds new descriptors for material lots.

1. Open the **Descriptor Library** in the **Engineering** portal.
2. Select **New**.

3. Enter a name, the descriptor type, the descriptor scope, and the descriptor use.

   For this example, we add the *Sugar Batch* descriptor that is **Materials** type, **Product** scope, and applies to entire subgroups.

4. Select **Enter values** to add values during data collection.
5. Select **OK** to save your changes.

5. Engineering Portal: Specify Product, Process, and Station Details

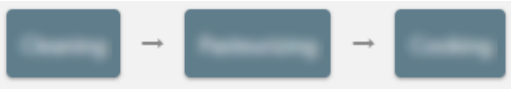
After you have created products, processes, and stations, as shown in Engineering Portal: Create Products, Processes, and Stations on page 11, you can specify process targets, specification limits, data collection plans, and appropriate control charts and their settings. For more information, go to one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

Define process targets and process limits for each measure

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 13. To add the process to a process flow for a product, go to Example of adding process steps to the product on page 15.

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)

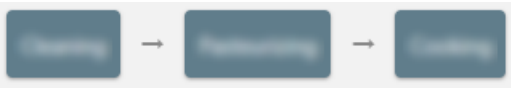
Indicate values that identify impossible or extremely unlikely measurements. Absolute limits are used to prevent data entry errors. Reasonable lower limits must be greater than absolute lower limits, and reasonable upper limits must be less than absolute upper limits.

To set analysis options, go to Specify control chart and capability settings for each measure on page 21.

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 13. To add the process to a process flow for a product, go to Example of adding process steps to the product on page 15.

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 27.

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.
- Use an **EWMA** chart to detect small shifts in the process mean, without influence by low and high values. The EWMA chart monitors exponentially weighted moving averages, which remove the influence of low and high values. The observations can be individual measurements or subgroup means.

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. Control chart points with assignable causes are not used in the control limit calculations.

Note: You can turn off the control limits for any control chart. When you turn off the limits, only Test 2, Test 3, and Test 4 are available. When you turn off the control limits during product and process setup, they are turned off for all the stations.

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.

Note: To learn about the test options or to change the test preferences for all control charts, go to Analysis preferences for control charts on page 27.

Continuous Capability Analyses

With the **I-MR**, **Xbar-R**, **Xbar-S**, and **EWMA** control charts, the default capability analysis is a **Normal Capability Analysis**. You can select a **Nonnormal Capability Analysis** if your data do not follow a normal distribution. For more information, go to When to use a nonnormal capability analysis on page 23.

With the **I-MR-R/S** control chart, the capability analysis is **Between/Within Capability Analysis**.

Options

Use the default normal distribution if your data follow a normal distribution. If you have nonnormal data, you can either transform the data to fit a normal distribution or select a nonnormal distribution that fits your data.

Normal distribution

Select to perform a normal capability analysis.

Normal distribution with 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 (ln)**: Use the natural log of your data.
- **λ = 0.5 (square root)**: Use the square root of your data.
- **Specify λ**: 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.

Fit distribution

Select the distribution that best fits your data and perform a nonnormal capability analysis.
Most often, it is best to use engineering and historical knowledge of your process to identify a distribution that fits your process data. However, Minitab Statistical Software has many tools, such as **Individual Distribution Identification**, that can help you assess the fit of various distributions.

Note: This setting applies only to the capability analysis for this measure. Changing transformation settings here will not affect the analyses preferences. To change the preferences for all capability analyses, go to Analysis preferences for capability analysis on page 31.

When to use a nonnormal capability analysis

If you have nonnormal data, you can use one of the following methods to perform a capability analysis.

- Transform the data so that the normal distribution is an appropriate model and then use **Normal Capability Analysis**. To transform your data and use a normal capability analysis, go to Specify control chart and capability settings for each measure on page 21.
- Select a nonnormal distribution model that fits your data and then use **Nonnormal Capability Analysis**. To choose an appropriate distribution and use a nonnormal capability analysis, go to Specify control chart and capability settings for each measure on page 21.

A comparison of normal and nonnormal capability models

Consider the following when deciding whether to use a nonnormal distribution or a normal distribution with a transformation.

- Generally, you should choose the model that is most effective for your data. If a nonnormal distribution or a transformation is equally effective, some practitioners recommend using a nonnormal model because it uses the actual data units. However, others may prefer the normal model because it provides estimates of both overall and within process capability.
- If you plan to perform repeated capability analyses on your process over time, try to choose a distribution or transformation that is likely to adequately characterize your process consistently over time. Using the same distribution or transformation lets you easily and directly compare the indices from the repeat analyses.

Normal capability

- Uses actual or transformed data for the histogram.
- Calculates within, between/within (when both within-subgroup and between-subgroup variation exists), and overall capability.
- Draws a normal curve on the histogram to help you determine whether the transformation was effective in making the data follow a normal distribution.

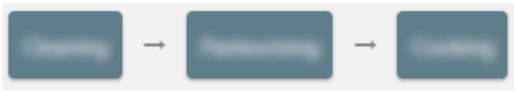
Nonnormal capability

- Uses actual data units for the histogram.
- Calculates only overall capability.
- Draws the chosen nonnormal distribution curve on the histogram to help you determine whether the data fits the specified distribution.

Add descriptors to the product and process

You can add categorical descriptor variables, such as lot numbers or other identifiers to 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 **Descriptors** section to access the categorical descriptors available with this product and process.
3. Begin typing to add **Product** descriptor variables to this product and process. By default, **Global** descriptors have been added.
4. Save your changes.

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.

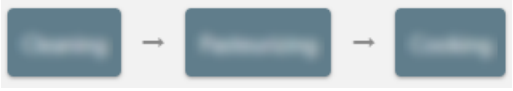
The first step is to add a new sampling plan to the process of the product of interest. Then you can specify the sampling schedule and specific measures.

Note: To add measures to your process template, go to Example of adding measures to the process on page 13. To add the process to a process flow for a product, go to Example of adding process steps to the product on page 15.

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.

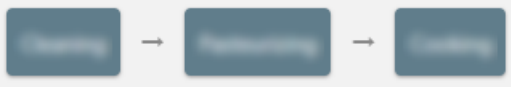
2. Open the process step and go to the **Data Collection** section.
3. Select **Add Sampling Plan**.

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 and descriptors to include in the sampling plan.
   You can add or edit relevant instructions. 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.



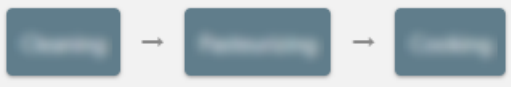
2. Open the process step and go to the **Assignable Causes** section.
3. Select the assignable causes to use for the process of the product. Once selected, the assignable causes are available to identify flagged points on a control chart for the process measures and inspections of the process. Control chart points with assignable causes are not used in the control limit calculations.

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 15.

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 15.

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 27.
- For more information on default capability analysis settings, go to Analysis preferences for capability analysis on page 31.
- For more information on default Pareto chart settings or defect severity levels, go to Analysis preferences for quality tools on page 33.

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.

EWMA Charts

Estimation method for standard deviation (subgroup size > 1)

Select a method to estimate the standard deviation when the subgroup size > 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 standard deviation (subgroup size = 1)

Select a method to estimate the 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

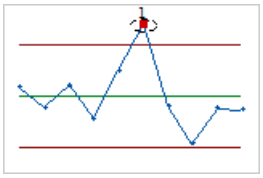
Unbiasing constants reduce the bias that can occur when a parameter is estimated from a small number of observations. As the number of observations increases, unbiasing constants have less effect on the calculated results.

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.

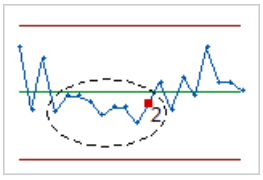
Test 1: One point more than 3σ from center line

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.



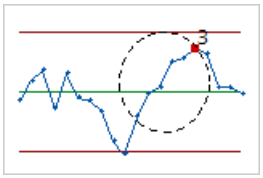
Test 2: Nine points in a row on the same side of the center line

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.



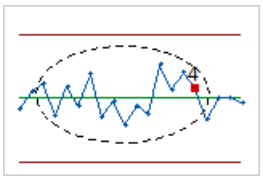
Test 3: Six points in a row, all increasing or all decreasing

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



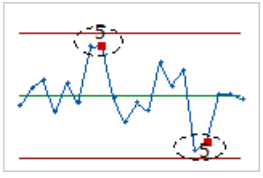
Test 4: Fourteen points in a row, alternating up and down

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.



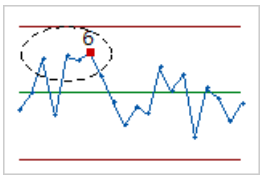
Test 5: Two out of three points more than 2σ from the center line (same side)

Test 5 detects small shifts in the process.



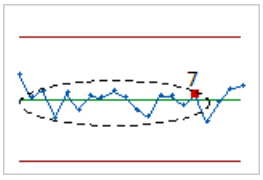
Test 6: Four out of five points more than 1σ from center line (same side)

Test 6 detects small shifts in the process.



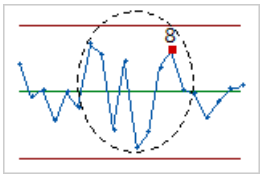
Test 7: Fifteen points in a row within 1σ of center line (either side)

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 1σ 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.

Shared Preferences

Specify the default capability analysis settings including estimation methods and display settings.

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).
- **Percents**: 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.

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.

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 ≤ 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.

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 35. For a user with an operator role, the home page is the Operator dashboard on page 36. Both types of users can view or set up station dashboards from their home pages.

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.

3: Refresh data settings

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

4: Add and remove stations to the dashboard

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

5: 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.

6: 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.

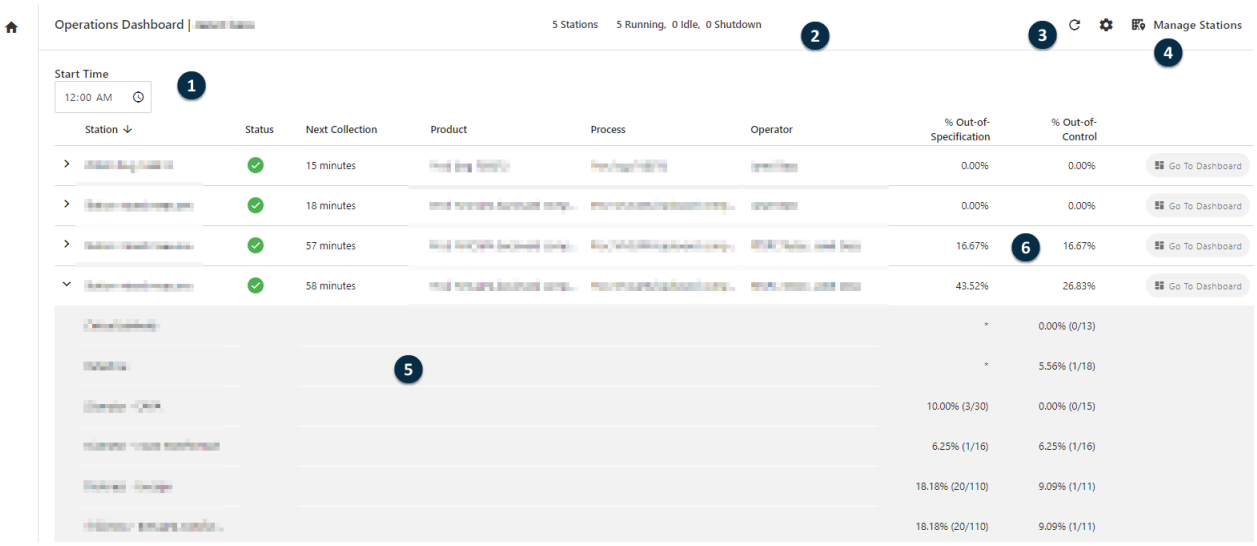
%Out-of-Action

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 51.



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**.

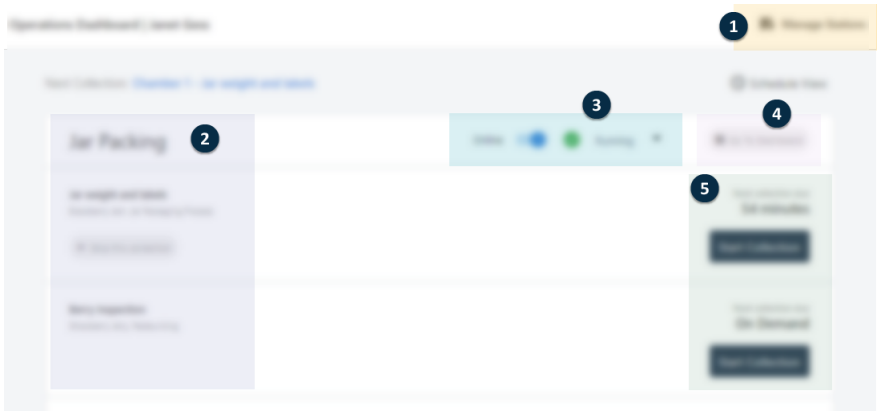
The station is offline.

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

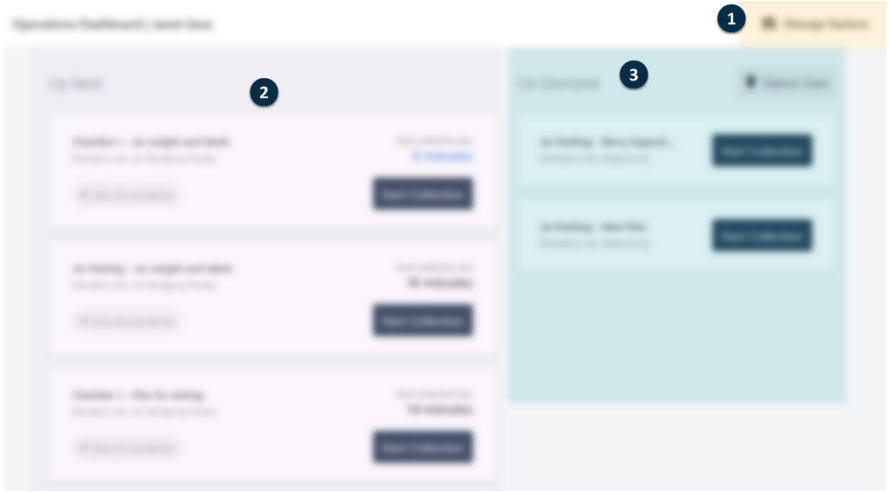
Select **Manage Stations** at the top of the dashboard to add or remove stations from this dashboard.

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 settings

The station settings are in a pane that can be expanded to change settings and collapsed to view the control charts more easily.

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** ⋮ to the 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

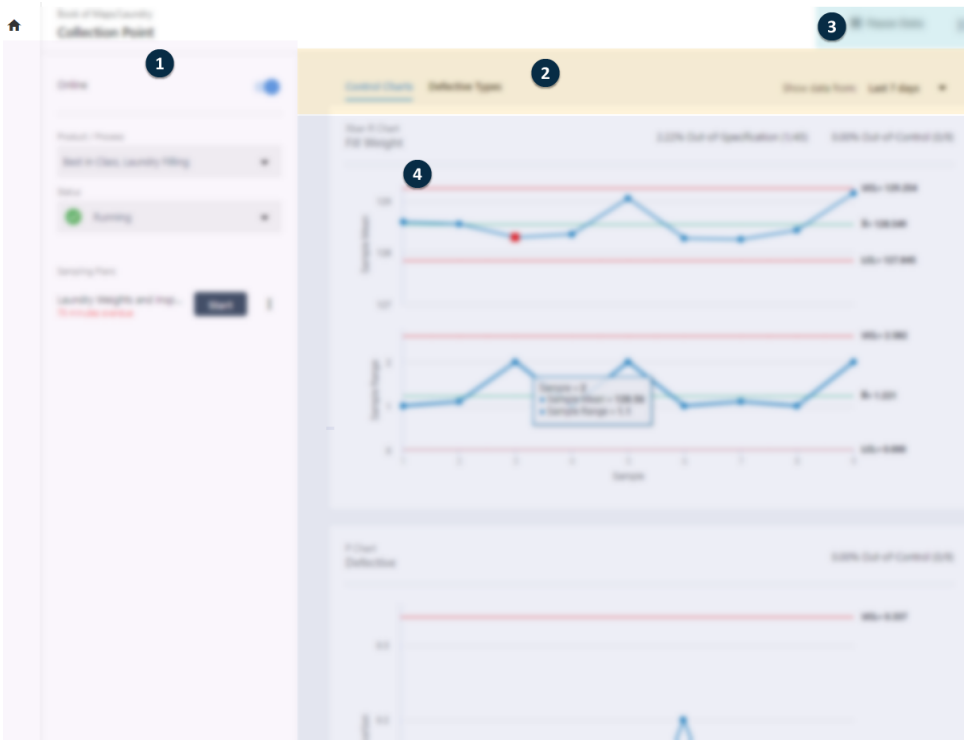
Displays percentage of subgroups that are out-of-action for each station. Expand the station to see the percentage of subgroups that are out-of-action for each measure.

%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.

You can access and edit the data from this view. For more information, go to Edit observations on page 44.

For more information on these calculations, go to Current Performance Summary on page 51.


1
2
3
4

8. Data Imports and Exports

To import data that are associated with a sampling plan, you must set up the method for data collection for each sampling plan.

1. Open the **Workflow Library** and browse to the station that contains your sampling plan.
2. Under the **Processes by Product** section, select **Configure**.
3. For each sampling plan, select how the plan will import the data.
   - Select **Automatic** when all your data are in a single Minitab Connect data table. For more information, go to Set up automatic data collection on page 40.
   - Select **Data Collection Form** when data come from various sources. For more information, go to Set up data collection in a form on page 41.

Set up automatic data collection

Use **Automatic** to import all data automatically from a single Minitab Connect data table.

To link a Connect data table to a sampling plan, you must have a data table that contains data from at least one measure, date/time information, and subgroup information, if applicable. For more information on creating a data table in Minitab Connect, go to Create a Minitab Connect® data table on page 47.

1. Open the station setup page for the product and process you want to configure.
2. Under the **Processes by Product** section, select **Configure**.
3. In **Data Collection**, select **Automatic**.
4. Select **Set Data Source**.
5. In **Source**, browse to the appropriate folder and table. You can select the table or a particular data view within the table.
6. Link the date/time column and the subgroup identifier column.
   a. In **Time column**, select a date/time column that contains the time stamp. The acceptable date and time format is yyyy-mm-dd hh:mm:ss.

   Note: If timestamps are different within the same subgroup, **Real-Time SPC** uses the first valid timestamp for the entire subgroup.

   b. In **Subgroup ID**, select a numeric or text column.
   c. Select **OK**.
7. Link each measure and descriptor with a data column. Each field must use a unique table column.
8. Select **OK**.

If you need to change the data table or data view, date column, or subgroup column, select **Set Data Source**.

Complete the following steps if you need to edit the data columns.

1. Select **Edit** to change the data column for a measure.
2. In **Data column**, select a numeric column that contains your data.
3. Select **OK**.

About control chart calculations for automatic import

When data are imported, **Real-Time SPC** performs the necessary calculations on the entire batch of data.

- Test results for each point in the batch use the summary statistics (such as, mean and standard deviation) calculated from the batch.
- For **I-MR-R/S** charts, **Real-Time SPC** creates either an R chart or an S chart based on the same subgroup size rule that **Minitab Statistical Software** uses.

Note: If the batch of observations is smaller than what is necessary for the recent observation/subgroup requirement found in the product and process settings, **Real-Time SPC** performs the calculations on the entire batch plus additional observations necessary to meet the minimum recent observation/subgroup requirement. However, only the results for the batch are updated based on the batch calculation; the results for any additional observations added to meet recent observation/subgroup requirement remain unchanged.

Set up data collection in a form

Use **Data Collection Form** to specify the data source for each measure and descriptor with a combination of data entry methods.

Use a data collection form for manual or gage entry

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, descriptors, collection methods, and data sources.

Note: Each sampling plan must have at least one measure.

With a data collection form, you can enter data manually into the form, or you can import data from a gage or file using a template. For more information on entering data into a data collection form, go to Enter data manually on page 42. For more information on using a template to enter data into a data collection form, go to Import data from a file with an existing template on page 43.

Follow these steps to specify a manual data collection.

1. Open the station setup page for the product and process you want to configure.
2. Under the **Processes by Product** section, select **Configure**.
3. In **Data Collection**, select **Data Collection Form**.
4. Select **Edit** for the measure or descriptor to link.
5. Under **Data Source**, in **Method**, select **Manual**.
6. Select **OK**.

Link a Connect data table to a single measure

To link a Connect data table to a sampling plan, you must have a data table that contains data from the measure or descriptor, date/time information, and subgroup information, if applicable. For more information on creating a data table in Minitab Connect, go to Create a Minitab Connect® data table on page 47.

1. Open the station setup page for the product and process you want to configure.
2. Under the **Processes by Product** section, select **Configure**.
3. In **Data Collection**, select **Data Collection Form**.
4. Select **Edit** for the measure or descriptor to link.
5. Under **Data Source**, in **Method**, select **Connect data table** to pull data from an existing data table.

6. In **Source**, browse to the appropriate folder and table. You can select the table or a particular data view within the table.
7. Link the data field, the date/time, and the subgroup identifiers with a data column. Each field must use a unique table column.
   a. In **Data column**, select a numeric column that contains your data.
   b. In **Time column**, select a date/time column that contains the time stamp. The acceptable date and time format is yyyy-mm-dd hh:mm:ss.
   c. In **Subgroup ID**, select a numeric or a text column.
8. Select **OK**.

Enter data observations

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.

Add a station to the operator dashboard

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

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

Each sampling plan must be defined within the product/process template. For more information, go to Define a new sampling plan on page 24. 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 17.

Enter data manually

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

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

   Note: If you use a Connect data table as your data source, Real-Time SPC Powered by Minitab®, retrieves the latest subgroup from the Connect data table and populates the data collection form for that measure or descriptor.

2. Descriptors are collected first. If you have subgroup descriptors, you enter one value that applies to the entire subgroup. Individual descriptors are collected for each measurement in the subgroup.

   For more information, go to Add descriptors to the Descriptor Library on page 18.

3. 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.

4. Enter the continuous measurement or a count of the defects or defectives.

Defects	Defectives
20	Fail (1)
2	Fail (3)
4	Pass

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.

5. Use the following buttons to advance through the data collection sheet.
   - Select **Skip** to skip an observation.
   - Select **Previous** to edit the previous observation.
   - Select **Next** to advance to the next cell.
   - Select **Finish now** to complete the data collection.
6. Select **Add Row** to add another row to the data collection form, if necessary.

Note: A measure that creates an I-MR chart can have only one observation.

7. 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 (CSV or TXT) 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 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 descriptors and continuous data.

1. Select **Import**.
2. Select **Create a new template**, then select **Next** to continue.
3. Select **Choose Files**, then browse to the file (CSV or TXT) that contains your data. Select **Open**.

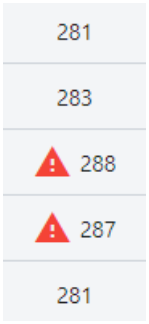
4. Select whether to enter data down each column or across each row.
   - Select **One sample per file** to import observations for one sample.
   - Select **Multiple samples per file** to import observations for several samples.
5. Select **Next**.
6. Select **Add variables** to specify which column contains the data for each measure or descriptor. Complete for all descriptors and 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 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 20.

Edit observations

You may need to update individual data observations to fix data entry errors or update assignable causes and corrective actions. Both the **Station Dashboard** and the **Process Quality Snapshot** provide access to the individual observations via the control charts.

What happens when I update individual observations?

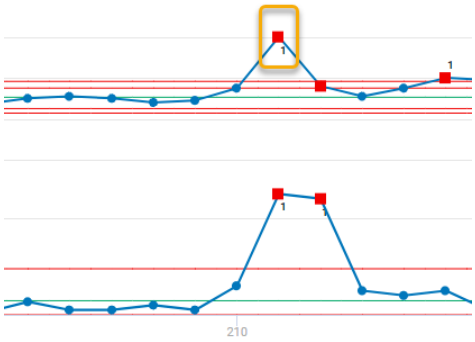
The editing of an individual observation follows the same workflow as entering a new observation, and the calculations and flagged points are updated with the new data. When you update an individual observation, the following items are also updated.

- The plotted points of a control chart are updated, including the updated point and any associated subgroups.
- The tests for special causes of a control chart are rerun.
- The summary and performance statistics are updated.
- If the original data point was flagged and had assignable causes and/or corrective actions, these will remain if the point still exceeds the limits. If the point no longer exceeds the limits, the flag, assignable cause, and correctives are removed.

Note: Control chart points with assignable causes are not used in the control limit calculations.

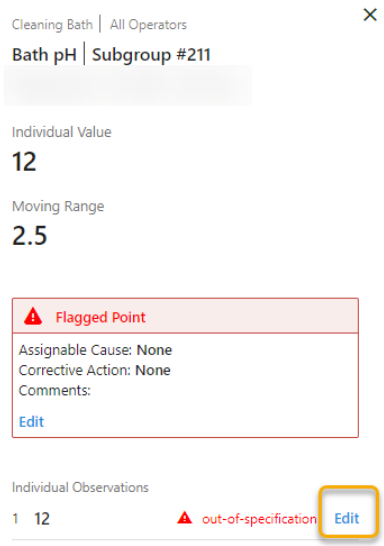
How to edit individual observations

In this example, the supervisor reviews the **Process Quality Snapshot** and notices that a pH measurement was recorded incorrectly.



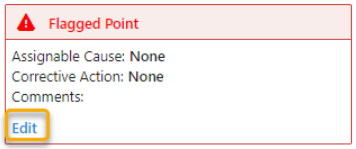
1. Open the control chart that contains the observation that you want to edit.
   You can access the control charts from the **Station Dashboard** or the **Process Quality Snapshot**.

2. Select the plotted point to edit, then open the details pane.



Under **Individual Observations**, select **Edit** to open a dialog to edit the data observation or descriptor value. You can also update the assignable causes and corrective actions and add any additional comments.

3. If you want to edit only the assignable causes, corrective actions, or comments for the entire plotted point, select **Edit** in the flagged point box.



How to edit individual or subgroup descriptor values

You can edit descriptor values for observations in the same way that you can edit the data values.

1. Open the control chart that contains the descriptor values that you want to edit.

   You can access the control charts from the **Station Dashboard** or the **Process Quality Snapshot**.

2. Select the plotted point to edit, then open the details pane.
   - Under **Individual Observations**, select **Edit** to open a dialog to edit the descriptor value for an individual descriptor.
   - Under **Additional Information**, select **Edit** to edit a subgroup descriptor values. These values apply to every observation in the subgroup.

   For more information on descriptors, go to Add descriptors to the Descriptor Library on page 18.

Collect a startup sample

A startup sample is a data collection taken immediately after the station comes online from an offline state. A startup sample helps to ensure that the product meets the quality standards prior to bulk production.

Specify whether to collect a startup sample when you define the sampling plan. For more information on defining a sampling plan, go to Example of adding a new sampling plan on page 24.

Collect a startup sample with an automatic data collection

1. Bring the station **Online**.
2. Real-Time SPC Powered by Minitab® checks for data every minute until it finds data for the first subgroup.
3. Subsequent subgroups are collected according to the sampling schedule.

Collect a startup sample with a manual data collection

1. Bring the station **Online**.
2. Manually collect the startup sample.
3. Collect subsequent subgroups according to the sampling schedule.

Create a Minitab Connect® data table

You can import data from a Minitab Connect table into your data collection sampling plans. Each Minitab Connect table includes data fields and data records. Each column in the table is a data field that has name, type, and format attributes. Each row in the table is a data observation.

To link a data table to a data collection form, your data table must have at least 3 columns.

1. Data Column — must be a numeric column. See the sections below to set up data columns that contain defects and/or defectives.
2. Time Column — must be a date/time column. The acceptable date and time format is yyyy-mm-dd hh:mm:ss.
3. Subgroup Column — must be a numeric column or a text column.

Note: By default, **Real-Time SPC Powered by Minitab®** uses the first numeric column as the data column, the first date/time column as the time column, and then the next numeric or first text column as the subgroup column unless you specify other columns.

Follow these instructions to create a standard table for manual data entry. You could also create a table from an existing file or template, create a mashup table, or create a custom SQL table.

1. From the **Home** screen, select the **Minitab Connect** button to open the **Navigation** pane. Under **Tables**, select **Add New Table**.

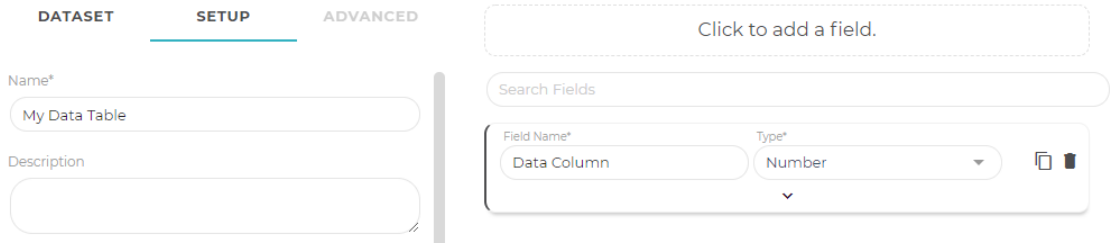
   Or, from the **Home** screen, select the **Add** button under **Tables**.

2. On the **Dataset** tab, enter the following:
   a. Under **Name**, enter the name to identify the new table.
   b. Under **Folder**, select the plus button to create a new folder.

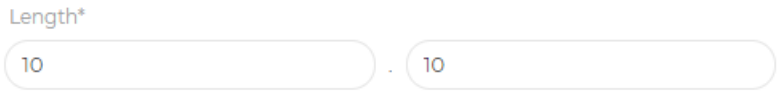
   c. Under **Name**, enter the name of the folder that stores the new table.
   d. Under **Parent**, keep *//(root)* to create the new folder at the root level.
   Alternatively, you can browse to another location to create the new folder.
   e. Select **Save**.
   f. Under **Status**, select **Production**.
   g. Under **Backup**, select how often you want to back up your data.

   You can also enter optional fields, which are helpful to describe your data set.

3. Under **Tables**, select **Standard**.
4. On the **Setup** tab, add a new field for each variable in your table.
   Click to add a field opens a data entry field.



   a. Under **Field Name**, enter the name of your data column.
   b. Under **Type**, select **Number**.
   c. Select the down arrow to expand this field. Under **Length**, specify the length of the number to allow and the number of decimal places.



   The number is 10 digits before the decimal and 10 digits after the decimal. Adjust your settings as needed.

5. Select *Click to add a field* to add the time column.
   a. Under **Field Name**, enter the name of your date/time column.
   b. Under **Type**, select **Date**.
   c. Select the down arrow to expand this field. Under **Format**, select **Date/Time**.
   d. Under **Date/Time Type**, select **Insert Date/Time**.

6. Select *Click to add a field* to add the subgroup identifier column.
   a. Under **Field Name**, enter the name of your subgroup column.
   b. Under **Type**, select **Text**.
      Subgroup identifiers can be text or numeric.
   c. Select the down arrow to expand this field. Under **Length**, select enter the character length. The default length values are usually adequate, but you can increase or decrease as you like.
7. Select **Save**.

   When you save the table, the **Prep Tool** opens and you can now add data to the table.

Setup for Defect data

When you collect defect data, the Minitab Connect data table must have the following columns.

1. Time Column — must be a date/time column. The acceptable date and time format is yyyy-mm-dd hh:mm:ss.
2. Subgroup Column — must be a numeric column or a text column.
3. Data Columns
   a. Defects — must be a text column.
   b. Defect tally — must be a numeric column.
   c. Unit ID — must be a numeric or text column.

Setup for Defectives data

When you collect defectives data, the Minitab Connect data table must have the following columns.

1. Time Column — must be a date/time column. The acceptable date and time format is yyyy-mm-dd hh:mm:ss.
2. Subgroup Column — must be a numeric column or a text column.
3. Data Columns
   a. Defective type — must be a text column.
   b. Pass/fail column — must be a text column.

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**.

Export data to MWX and CSV files

The **Process Quality Snapshot** provides the ability to export data to a Minitab worksheet (MWX) or a CSV file.

The filename is defined by the *Product Name_Process Name*. The file contains the following columns.

- Date/time of the data collection
- Subgroup ID
- Columns for continuous and attribute process data
- Columns for hierarchical group identification
- Product ID
- Process ID
- Station ID
- Operator ID

1. Open the **Process Quality Snapshot**.
2. Select the time frame, products, processes, and stations.
3. Select to download an MWX.
   If you would like to download a CSV, then select .

The data file is added to your Downloads folder.

9. 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 53.

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 37.

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.

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 **Auto-update Settings** button 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 data range for this summary as well as the station status.
You can save and manage the filter settings.

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.

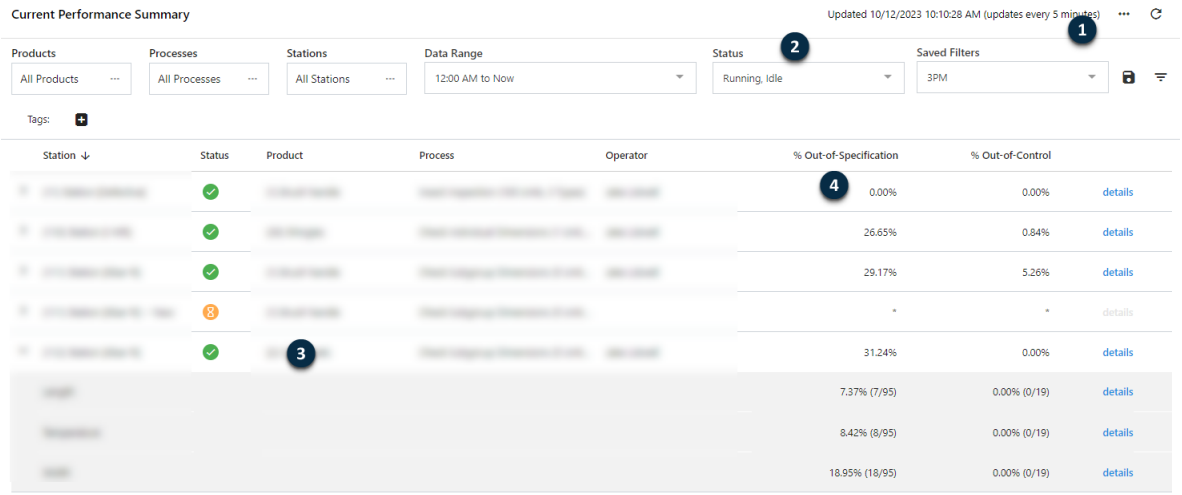
%Out-of-Specification
Displays percentage of subgroups that are out-of-specification for each station. Expand the station to see the percentage of subgroups that are out-of-specification for each measure.

%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.



Select the data range

Select the range of data to display in the **Current Performance Summary**. Select one of the following options.

Daily Window

Displays the data of the current day, beginning at the start time that you specify. By default, the data range is 12:00 AM to the current time.

Last X Hours

Displays up to 168 hours of recent data.

Last X Days

Displays up to 365 days of recent data.

Fixed Date/Time Range

Displays the current data between the start and end times that you specify.

Note: The maximum data range depends on how frequently data are archived. For more information, go to Data Management on page 10 settings within the Administrator Portal.

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:

$$\%\text{Out-of-specification} = 100 * (1 - (1 - \%\ OOS_1) * (1 - OOS_2) * \ldots * (1 - OOS_n))$$

$$\%\text{Out-of-action} = 100 * (1 - (1 - \%\ OOA_1) * (1 - OOA_2) * \ldots * (1 - OOA_n))$$

$$\%\text{Out-of-control} = 100 * (1 - (1 - \%\ OOC_1) * (1 - OOC_2) * \ldots * (1 - OOC_n))$$

For this station, the overall % out-of-specification = 56.25%. Each of the measurements show the number of subgroups out of the total that are out-of-specification.

Station %OOS	56.25%
Measure 1 %OOS	*
Measure 2 %OOS	*
Measure 3 %OOS	25.00% (1/4)
Measure 4 %OOS	25.00% (1/4)
Measure 5 %OOS	22.22% (2/9)
Measure 6 %OOS	0.00% (0/3)

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: General settings

The display settings are in a pane that can be expanded to change settings and collapsed to view the reports more easily. Select the stations of interest and their start and end times for the quality analyses. You can also add advanced filters to the display.

2: Station filter settings

You can save and manage the filter settings.

3: Measure and analyses settings

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

4: Export analyses

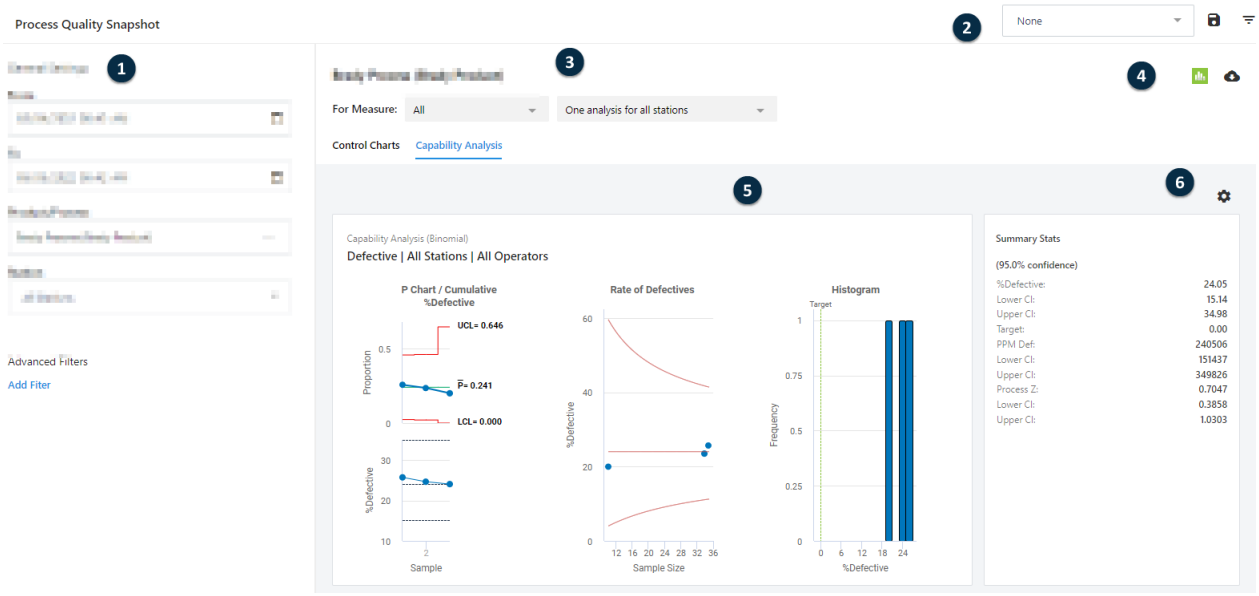
You can export the data from the selected time range to a Minitab worksheet (MWX) or to a CSV file.

5: Analysis display

View the analyses. You can access and edit the data from this view. For more information, go to Edit observations on page 44.

6: Analysis settings

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.

Advanced filters for descriptors

Select the filter settings to view station performance, filtered by descriptors. Complete the following steps to add filters by subgroup descriptors.

1. Under **Advanced Filters**, select **Add filter**.
2. In the first dropdown, select the subgroup descriptor.
3. In the second dropdown, select the condition, such as *Contains* or *Equals*.
4. Enter the values for the filter in the text box.

5. You can add multiple descriptor filters. Real-Time SPC Powered by Minitab® combines multiple filters, for example first filter AND second filter AND third 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.

Note: Control chart points with assignable causes are not used in the control limit calculations.

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 31.

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".

Control chart display options

Show failed tests of plotted points

You can choose whether to display or suppress the failed test number of a plotted control chart point on the **Station Dashboard**. Test numbers always display on the **Process Quality Snapshot**.

To display or suppress the test number on the plotted point, open the **Settings** ⋮ on the **Station Dashboard** and select or deselect **Show failed tests**.

Show annotations of plotted points

To display or suppress point annotations, open the **Settings** ⋮ on the **Station Dashboard** and select or deselect **Show point annotations**.

Use the following steps to add annotations to plotted control chart points.

1. Double-click the point to open the right details pane.
2. Select **Add Comment** or **Edit** if the point is flagged.
3. Enter relevant comments, then select **OK**.

Specify additional limits to display

Control charts always display the control limits unless you suppress them.

You can choose whether to display or suppress the action limits and the specification limits on the control charts of the **Station Dashboard**. All specified limits always display on the **Process Quality Snapshot**.

To display or suppress the action limits and specification limits, open the **Settings** ⋮ on the **Station Dashboard** and select or deselect **Show all limits**.

Note: Specification limits apply only to individual observations of continuous measures and subgroups of attribute measures. Thus, specification limits can only be displayed on I-MR charts and attribute charts.

Specify the x-axis label

By default, the x-axis displays the date and time of the observation. The other option is to display the sequential subgroup identifier (index value) on the x-axis.

Process Quality Snapshot

Open the **Settings** ⚙ to select **Date/Time** or **Index**. The x-axis label applies to all the control charts in the station.

Station Dashboard

Open the **Settings** ⋮ to select or deselect **Show Date/Time** to show either a time stamp or an index value.

Index

Minitab® Our mission is to help people discover valuable insights in their data.

Minitab helps companies and institutions to spot trends, solve problems and discover valuable insights in data by delivering a comprehensive and best-in-class suite of data analysis and process improvement tools. Combined with unparalleled ease-of-use, Minitab makes it simpler than ever to get deep insights from data. Plus, a team of highly trained data analytic experts ensure that users get the most out of their analysis, enabling them to make better, faster and more accurate decisions.

For nearly 50 years, Minitab has helped organizations drive cost containment, enhance quality, boost customer satisfaction and increase effectiveness. Thousands of businesses and institutions worldwide use our products to uncover flaws in their processes and improve them. Unlock the value of your data with Minitab.

Automation and Reporting

Minitab Connect®

Integrate and transform data for analysis, reporting and monitoring

Data Analysis & Predictive Modeling

Minitab®

Powerful statistical software everyone can use

SPM®

Machine Learning and Predictive analytics software

Model Deployment and Monitoring

Minitab Model Ops®

Model lifecycle management on a simple yet powerful platform

Visual Business Tools

Minitab Workspace®

Visual tools to ensure process and product excellence

Project Ideation & Execution

Minitab Engage®

Start, track, manage, and execute innovation and improvement initiatives

Self-paced Learning

Education Hub
Powered by Minitab®

Master statistics and Minitab anywhere with online training

Quality Solutions

Real-Time SPC
Powered by Minitab®

Monitor, respond, and deliver immediate quality and process monitoring