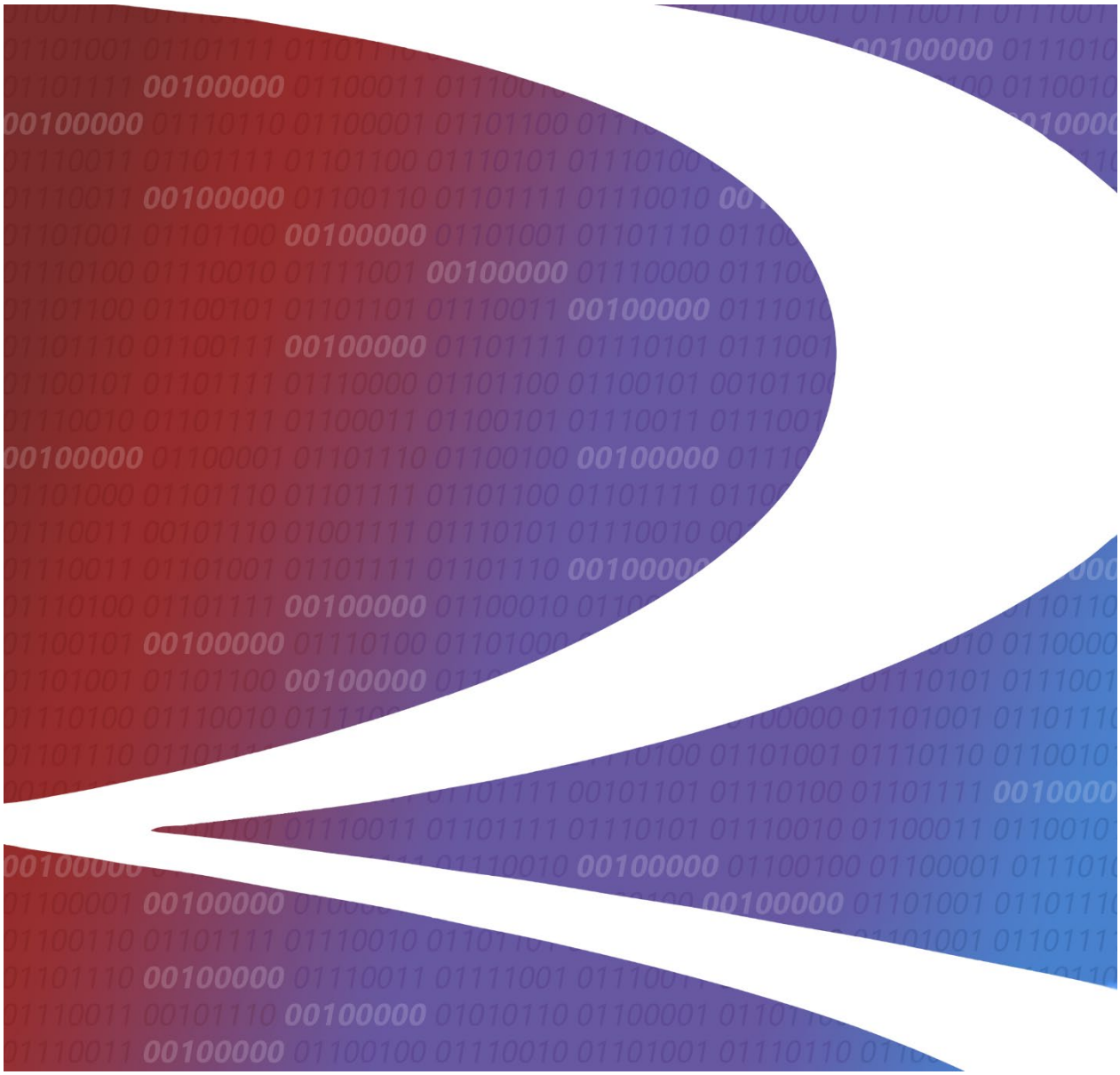


Positive Train Control
Train Braking Simulation User Guide

Last Updated: December 2024

Table of Contents

List of Exhibits

Learning about PTC Train Braking Simulation

Positive Train Control Train Braking Simulation (PTC TBS) is a web-based application that enables railroads to simulate how a configured train would brake on a selected track under certain conditions.

Overview

PTC TBS enables you to select a train and a track, configure additional parameters, and run a simulation of that train against the simulation model, which is provided by MxV Rail. The simulation model consists of two parts: Train Operations and Energy Simulator (TOES) and Test Controller and Logger (TCL). The simulation model is supported by MxV Rail. PTC TBS provides an indirect interface to TOES and TCL. If you have questions about TOES and/or TCL or need access to these applications, you can contact the Railinc Customer Success Center to begin your support case and be referred to MxV Rail.

When you use PTC TBS, you configure building blocks for scenarios to be tested. You can run a Stop Distance Simulation (which evaluates the distance it takes a train to stop under certain specified conditions) or an Enforcement Algorithm Simulation (which evaluates the behavior of a vendor-provided PTC Enforcement Algorithm).

The first building block is the consist. You can create a consist or select an existing consist to use in your simulation. The consist contains vehicles created by MxV Rail, and you can modify parameters to fit your simulation needs.

The next step in building a simulation is to select a track for your simulated train to use. You can optionally create a Train Handling File, which is generally used for Enforcement Algorithm simulations. Once these parameters are set up, you can set up and run a Simulation Job Request and then view the results in reports. In addition, you can set up batches to efficiently repeat Simulation Job Requests.

Tip! As you use PTC TBS and work under one menu, you may want to refer to information under another menu without losing your work under the original menu. You can easily do this by right-clicking on the second menu item and selecting **Open link in new tab**. A new PTC TBS browser tab is created. Use this tab to look up the needed information and close it when you are finished.

This document describes how to use PTC TBS through the following major sections:

- "Getting Started" on page 3 describes how to access and log in to the system.
- "Working with Simulation Job Requests" on page 7 describes how to manage existing Job Simulation Requests and create new Simulation Job Requests for simulating train braking scenarios.
- "Working with Batches" on page 32 describes how to manage existing batches and create new batches for efficiently running Simulation Job Requests.
- "Working with Consists" on page 46 describes how to manage existing consists and create new consists for use in Simulation Job Requests.

- "Working with Vehicles" on page 62 describes how to work with existing vehicles (simulated railcars and locomotives) for use in Simulation Job Requests.
- "Working with Track" on page 65 describes how to manage existing tracks and upload new track files for use in Simulation Job Requests.
- "Working with Train Handling Files" on page 74 describes how to manage existing train handling files and create new train handling files for use in Simulation Job Requests.
- "Working with Reports" on page 84 describes how to view PTC TBS reports, which provide statistical and graphical results of simulations.
- "Working with Shared Resources" on page 88 describes how to manage resources that are shared between your railroad and MxV Rail.

For additional information, contact the Railinc Customer Success Center (see "Accessing the Railinc Customer Success Center" on page 2).

System Requirements

For information about the system requirements of Railinc web applications and for information about downloading compatible web browsers and file viewers, refer to the *Railinc UI Dictionary*.

Accessing the Railinc Customer Success Center

The Railinc Customer Success Center provides reliable, timely, and high-level support for Railinc customers. Representatives are available to answer calls and respond to emails from 7:00 a.m. to 7:00 p.m. Eastern time, Monday through Friday, and provide on-call support via pager for all other hours to ensure support 24 hours a day, 7 days a week. Contact us toll-free by phone at 877-RAILINC (1-877-724-5462) or send an email directly to csc@railinc.com.

Getting Started

PTC TBS uses Railinc Single Sign-On (SSO) to manage permissions. To access SSO, view the Railinc portal at http://www.railinc.com and select **Customer Login** at the top right of the page.

Registering to Use Railinc SSO

Each PTC TBS user must register to use Railinc Single Sign-On (SSO). If you are not already registered, refer to the *Railinc Single Sign-On and Launch Pad User Guide* for more information. Once you have completed SSO registration, request access to PTC TBS within SSO.

Requesting Access to PTC TBS

After you receive authorization to use Railinc SSO, you must request general access to PTC TBS by following instructions in the *Railinc Single Sign-On and Launch Pad User Guide*.

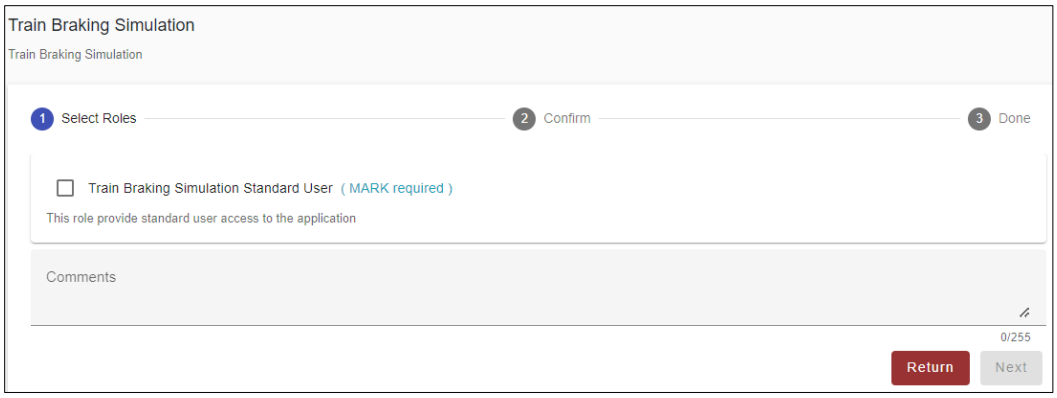
Your level of access and authorization for PTC TBS is determined when you request access through Railinc SSO. Exhibit 1 shows a complete list of PTC TBS roles as seen in SSO.

Exhibit 1. User Roles and Tasks

Task	Description
Train Braking Simulation Standard User	This role provides standard access to the application.

Your assigned user role determines what functions you can perform. User roles are assigned by Railinc through the Single Sign-On interface (see Exhibit 2).

Exhibit 2. PTC TBS Request Permission



Choose your role and enter the mark for your railroad. Select **Next** to proceed. Once you receive e-mail notification of access, you can log in and begin using PTC TBS.

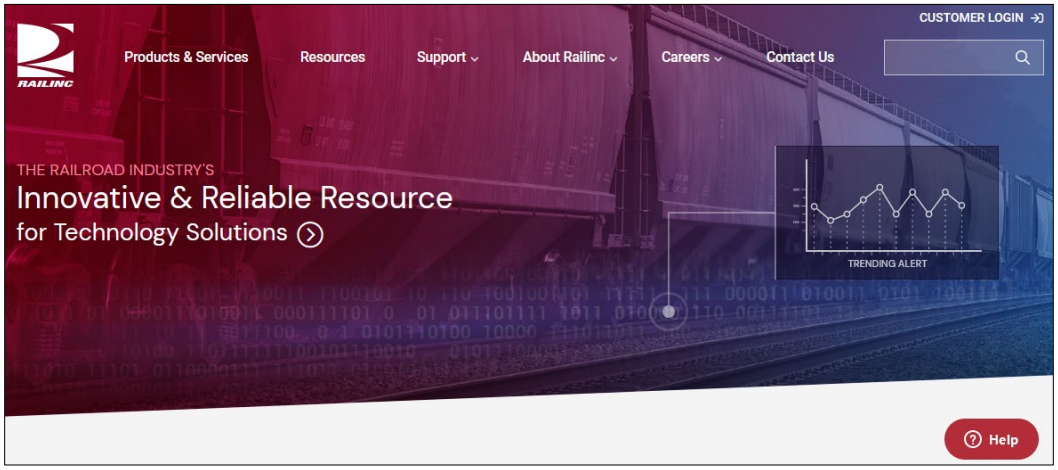
Logging In

Use the following procedure to log into PTC TBS:

1. Open your internet browser.

2. Enter the following URL: http://www.railinc.com. The Railinc Welcome page is displayed (see Exhibit 3).

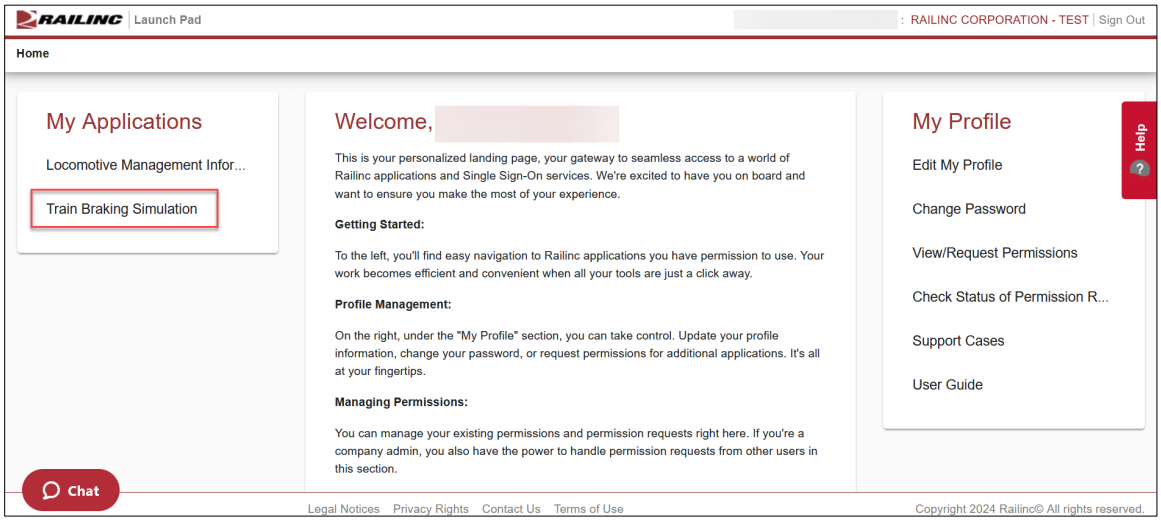
Exhibit 3. Railinc Welcome Page



3. Select **Customer Login** at the top right. The Railinc Account Access panel is displayed.

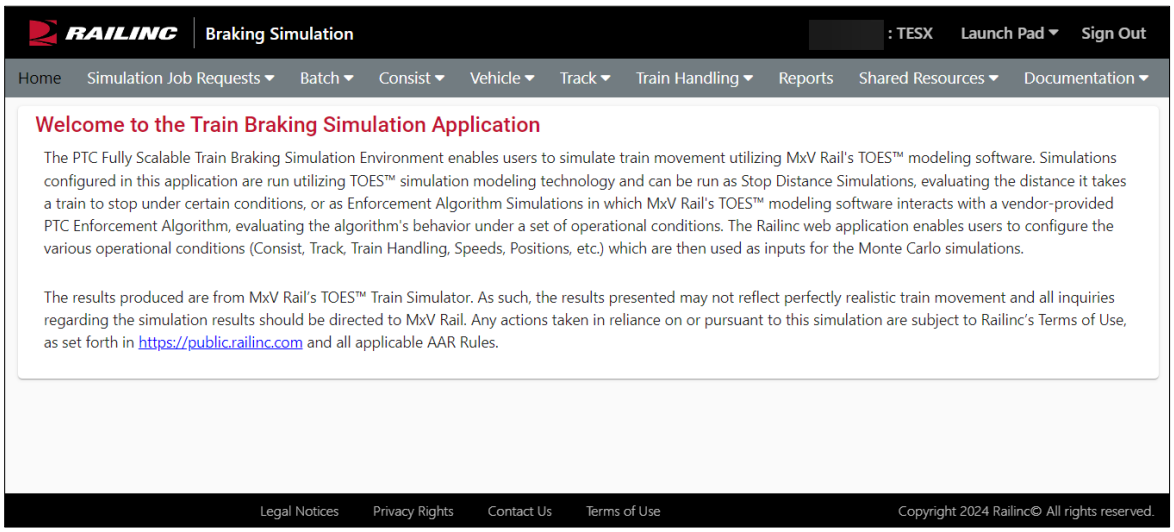
4. In the Account Access panel, enter your User ID and Password. Select **Sign In**. The Railinc Launch Pad is displayed (see Exhibit 4).

Exhibit 4. Railinc Launch Pad



5. Under My Applications, select **Train Braking Simulation** (you may need to scroll down). The PTC Train Braking Simulation (PTC TBS) Home page is displayed (see Exhibit 5).

Exhibit 5. PTC Train Braking Simulation (PTC TBS) Home Page



PTC TBS has a menu bar with the following options:

Home	Displays the PTC TBS Home page.
Simulation Job Requests	Enables you to work with existing simulation job requests on the Simulation Job Dashboard as well as create new simulation job requests. See "Working with Simulation Job Requests" on page 7 for more information.
Batch	Enables you to configure and manage batches, which are re-usable inputs for a Simulation Job Request. See "Working with Batches" on page 32 for more information.
Consist	Enables you to configure and manage consists, which are a primary input to your batches and Simulation Job Requests. See "Working with Consists" on page 46 for more information.
Vehicle	Enables you to work with templated railcars and locomotives. Vehicles are currently managed by MxV Rail. See "Working with Vehicles" on page 62 for more information.
Track	Enables you to upload and manage track files for use in Simulation Job Requests. See "Working with Track" on page 65 for more information.
Train Handling	Enables you to create and manage simple train handling instructions that can be applied as inputs to your Simulation Job Requests. See "Working with Train Handling Files" on page 74 for more information.
Reports	Enables you to view statistical and graphical results of simulations. See "Working with Reports" on page 84 for more information.

Shared Resources	Enables you to access and manage any resources that your railroad has shared with MxV Rail as well as any resources that MxV Rail has shared with your railroad. See "Working with Shared Resources" on page 88 for more information.
Documentation	Enables you to view the *PTC TBS User Guide* (this document).

Logging Out

Select the **Sign Out** link to end a PTC ITS session.

Working with Simulation Job Requests

Simulation Job Requests are requests to the modeling software to simulate train behavior under specified conditions.

PTC TBS supports the following types of Simulation Job Requests:

- Stop Distance Simulation – a simulation that evaluates the distance it takes a train to stop under certain specified conditions.
- Enforcement Algorithm Simulation – a simulation in which MxV Rail's TOES™ modeling software interacts with a vendor-provided PTC Enforcement Algorithm and evaluates the algorithm's behavior under a specified set of operational conditions.

The Simulation Job Requests menu contains the following options:

- Select **Manage Simulation Job Requests** to work with existing Simulation Job Requests. See "Managing Simulation Job Requests" on page 7 for more information.
- Select **Create New Simulation Job Requests** to create a new Simulation Job Request. See "Creating Simulation Job Requests" on page 27 for more information.

Managing Simulation Job Requests

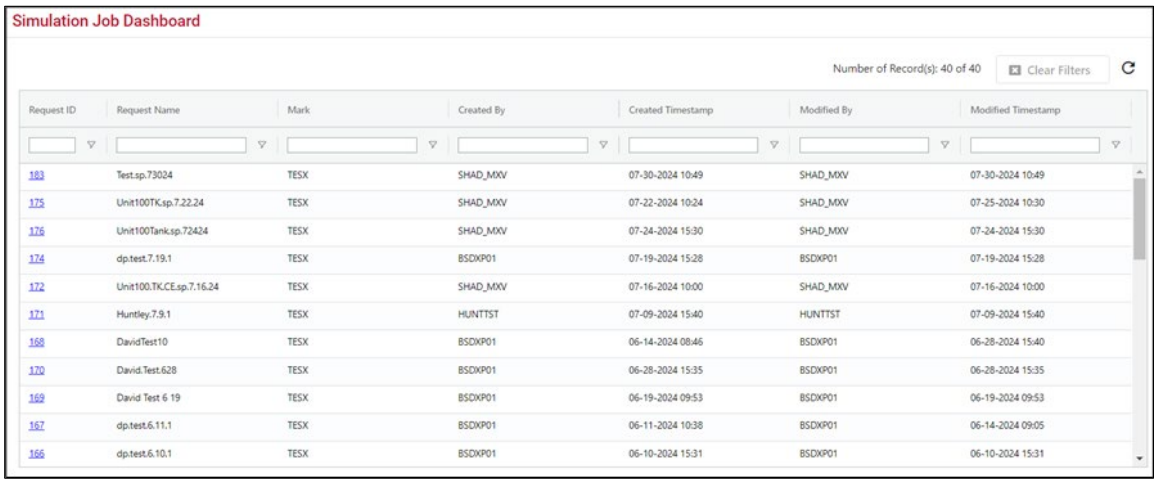
Managing Simulation Job Requests includes viewing the list of all available Simulation Job Requests, selecting and viewing the details of an individual Simulation Job Request, and performing operations on the selected Simulation Job Request (such as editing, cloning, adding a new instance of an existing request, and running a simulation).

See the following sections for detailed information about managing Simulation Job Requests:

Viewing All Available Simulation Job Requests

The Simulation Job Dashboard page (see Exhibit 6) is displayed when you select **Manage Simulation Job Requests** from the Simulation Job Requests menu.

Exhibit 6. Simulation Job Dashboard Page



The Simulation Job Dashboard page enables you to view all available Simulation Job Requests. It consists of a table with a row (record) for every active Simulation Job Request contained in PTC TBS. These rows contain the following columns:

Request ID	Displays the numeric Simulation Job Request identifier. This identifier is a link, which you can select to view detailed information about the Simulation Job Request as well as perform tasks related to the selected Simulation Job Request (see "Viewing Simulation Job Request Details" on page 10).
Request Name	Displays the descriptive name of the Simulation Job Request.
Mark	Lists the mark of the Simulation Job Request creator.
Created By	Lists the user ID that created the Simulation Job Request.
Created Timestamp	Displays the date and time, in Eastern Time, when the Simulation Job Request was originally created.
Modified By	Lists the user ID that last modified the Simulation Job Request.
Modified Timestamp	Displays the date and time, in Eastern Time, when the Simulation Job Request was last modified.

By default, the Simulation Job Dashboard page displays all Simulation Job Requests in reverse chronological order, with the last modified Simulation Job Request displayed at the top of the list. The Number of Records field at the top right indicates the number of Simulation Job Requests you are currently working with and the total number of Simulation Job Requests in the list. These numbers are the same unless a filter is set.

You can quickly drill down to the Simulation Job Requests you need by sorting and/or filtering the rows of information.

Sorting

To sort the rows in ascending or descending order by a specified column, select the heading of the column by which you want to sort. An up or down arrow is displayed to indicate the sort direction. To remove the sort, select the heading again until the arrow disappears. You can also

sort by multiple columns by pressing and holding the Shift key while selecting additional columns. If you sort by multiple columns, the column heading for the primary sort is appended with “1”, and the column heading for the secondary sort is appended with “2”, etc.

Filtering
You can filter using two different methods – simple column filtering and advanced column filtering.

- For simple column filtering, enter a character or string in the text box field below the column heading. The table displays only the rows that contain the character or string you specified (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, simply delete the text in the Filter field.

- For advanced column filtering, select the column filter icon (▽) next to the text box field below any column heading to filter the data in that column. A tool is displayed that enables you to select parameters such as “Contains”, “Not contains”, “Equals”, “Not equal” “Starts with”, and “Ends with”, and type characters into a Filter field. The table displays only the rows that meet the filter rule you set up (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, select the filter icon (▽) and delete the text in the Filter field.

Note: Once you apply a filter, that filter remains in effect throughout your use of the application. Select **Clear Filters** at the top right to remove all of the filters.

Tip! You can apply filters to multiple columns at once. For example, you could apply a column filter containing “TESX” on the Mark column, and another column filter containing “2024” on the Modified Timestamp column. This would enable you to only display rows for Simulation Job Requests created by TESX that were modified in 2024.

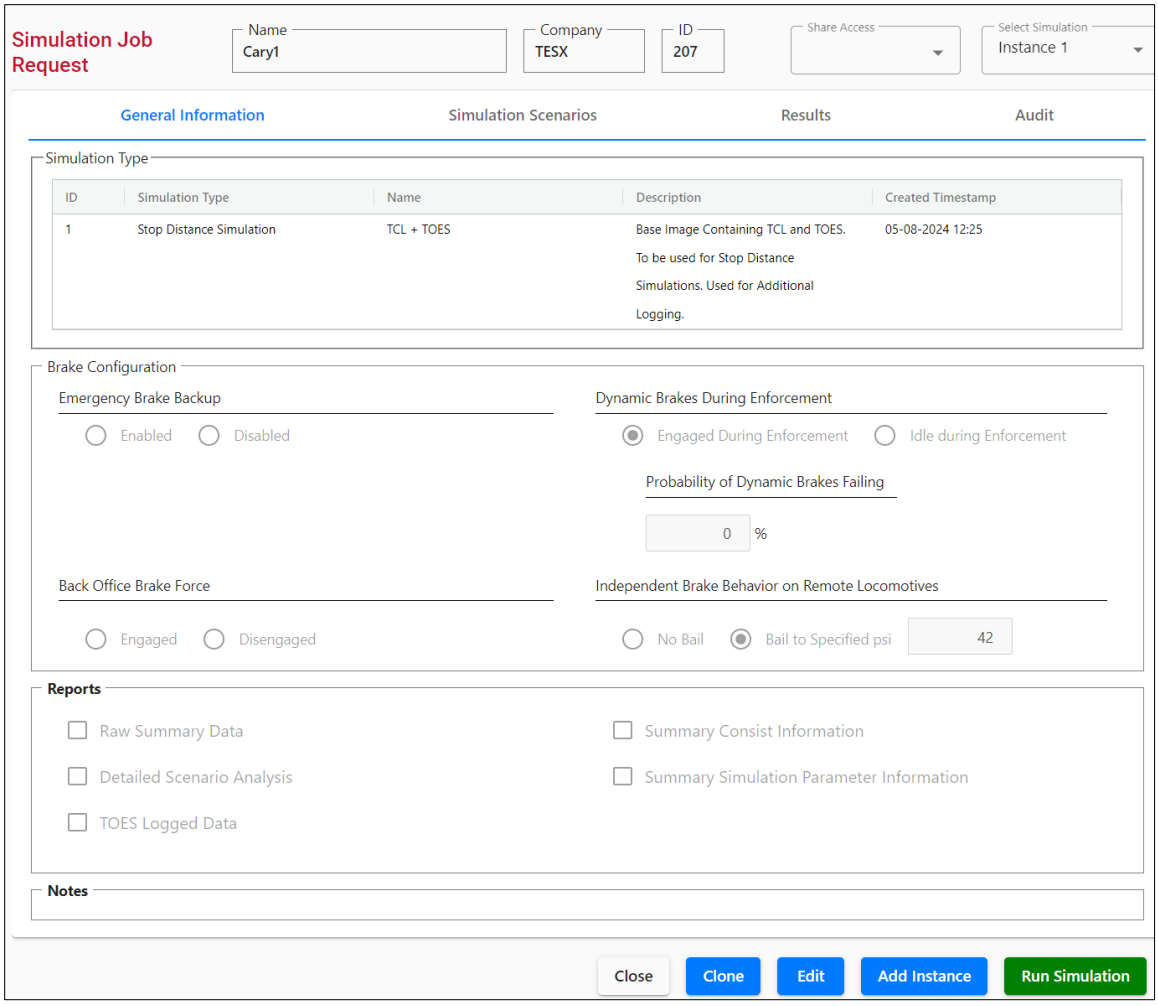
To see all the rows in the table, use the vertical scroll bar. Use the horizontal scroll bar to view any data that exceeds the width of the viewable area.

Select the Refresh icon (↻) to refresh the Simulation Job Dashboard page contents.

Viewing Simulation Job Request Details

To view detailed information about a Simulation Job Request, select its Request ID link on the Simulation Job Dashboard page (see Exhibit 6). The Simulation Job Request page is displayed (see Exhibit 7).

Exhibit 7. Simulation Job Request Page (General Information Tab)



The Simulation Job Request page contains the following four tabs of information:

- General Information – Displays general information about the Simulation Job Request.
- Simulation Scenarios – Displays the batches and/or consists that have been added to the Simulation Job Request.
- Results – Displays the results of the scenarios included in the Simulation Job Request.
- Audit – This tab is for internal use.

The General Information tab contains the following sections and fields:

Name Displays the name of the simulation.

Company Displays the Mark of the company that created the simulation.

Simulation Type Displays the following information about the simulation type:

ID	The numeric identifier of the simulation type.
Simulation Type	The type of simulation.
Name	The name of the modeling engine used for the simulation.
Description	A description of the simulation type.
Created Timestamp	The date when the simulation type was created.

In addition, you can select the Select/Change Simulation Type drop-down to change to a different simulation type.

Brake Configuration Displays information about brakes used in the simulation.

This section contains the following subsections:

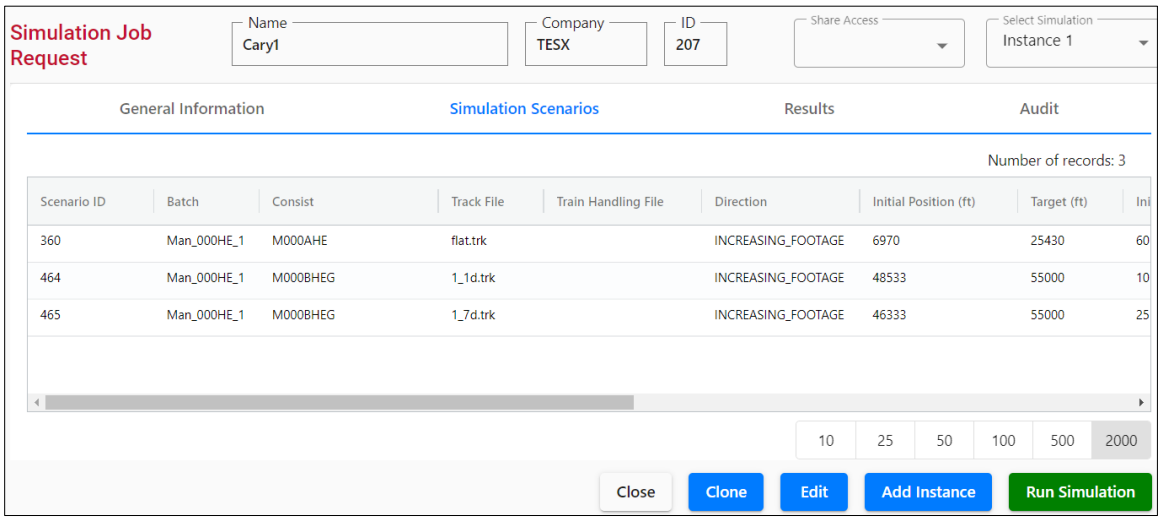
Emergency Brake Backup	Indicates whether emergency brake backup is enabled or disabled. This configuration option is only available for the Enforcement Algorithm simulation type. When enabled, this subsection provides options for emergency brake behavior, including Two-Way Emergency, Head End Only Emergency, and No Emergency.
Dynamic Brakes During Enforcement	Indicates whether dynamic brakes are engaged during enforcement or idle during enforcement. When engaged, this subsection enables you to specify the probability of failure of the dynamic brakes.
Back Office Brake Force	Indicates whether back office brake force is engaged or disengaged. This configuration option is only available for the Enforcement Algorithm simulation type.
Independent Brake Behavior on Remote Locomotives	Indicates the amount of brake pressure applied. When Bail is selected, you can specify the psi (the default is 42psi).

Reports See "Working with Reports" on page 84 for detailed information about PTC TBS reports.

Notes Displays notes about the simulation. Notes can only be added when a Simulation Job Request is edited.

The Simulation Scenarios tab contains a grid with information about simulation scenarios (see Exhibit 8).

Exhibit 8. Simulation Job Request Page (Simulation Scenarios Tab)



The Simulation Scenarios tab contains the following columns of information:

Scenario ID Displays the identifier for each scenario in the Simulation Job Request.

Batch Displays the batch file selected for the Simulation Job Request (see "Working with Batches" on page 32 for more information).

Consist Displays the consist selected for the Simulation Job Request (see "Working with Consists" on page 46 for more information).

Track File Displays the Track File selected for the Simulation Job Request (see "Working with Tracks" on page 65 for more information).

Train Handling File Displays the Train Handling File selected for the Simulation Job Request (see "Working with Train Handling Files" on page 74 for more information). Including a Train Handling File is optional.

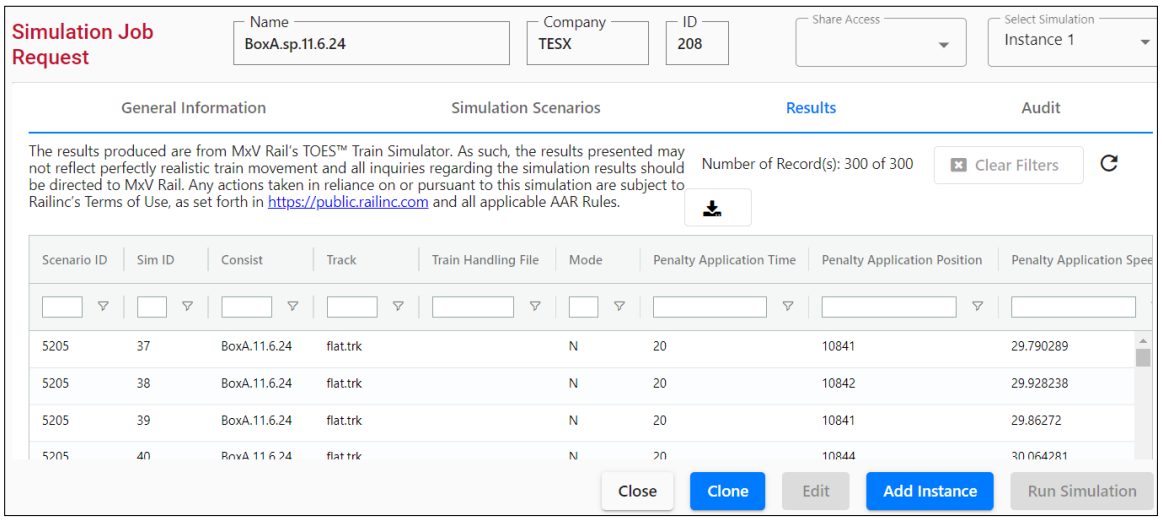
Direction Displays the direction of the simulation (increasing footage starts from the beginning of the track and moves forward; decreasing footage starts from the end of the track and moves backward).

Initial Position (ft) Displays the position, in feet, of the front edge of the consist from the beginning of the track. The initial position should be at least the length of the consist and no further than the length of the track.

Target (ft)	Displays the position on the track where the train should be stopped, in feet. The value for this field must be between the initial position and the end of the track, inclusive.
Initial Velocity (mph)	Displays the starting speed of the train, in miles per hour.
Target Speed (mph)	Displays the desired speed of the train at the target, in miles per hour. The value of this field must be between 0 and the initial velocity, inclusive.
Record	Displays whether the record is the first or last record in the consist portion of the consist file. TOES orients the train on the track based on this entry and the increasing and decreasing footage entry. For braking simulations, it is recommended to use “first record” along with “increasing footage”.
Notch	Displays the specific position on the locomotive throttle.
Throttle	Displays information about the locomotive power control.
Acceleration Profile	Displays how the speed changes over time.
Brake Initial File	Displays whether Brake Initial File is selected or not. If the Brake Initial File checkbox is selected, then TOES runs a brake init simulation prior to the actual braking simulation. The brake init simulation applies a 10psi brake reduction, and then runs the simulation for 300 seconds to let the brake application propagate through the train and settle. TOES then saves the brake system state for that simulation in a BRK_INIT.BRK file. When the actual simulation is run, the BRK_INIT.BRK file is loaded so that the consist starts out with the 10psi brake application applied through the train instead of starting with the brakes released.

The Results tab contains a grid with information about simulation scenario results (see Exhibit 9).

Exhibit 9. Simulation Job Request Page (Results Tab)



The Results tab shows the results of the scenarios included in the Simulation Job Request. Every scenario is simulated 100 times with slight variations.

The Results tab contains the following columns of information:

Scenario ID	Displays the identifier for the scenario.
Sim ID	Displays the Simulation ID for the scenario. There are 100 simulations for each scenario. The Simulation IDs for a scenario always begin with the number 3 and end at 102.
Consist	Displays the consist selected for the Simulation Job Request (see "Working with Consists" on page 46 for more information).
Track	Displays the Track File selected for the Simulation Job Request (see "Working with Tracks" on page 65 for more information).
Train Handling File	Displays the Train Handling File selected for the Simulation Job Request (see "Working with Train Handling Files" on page 74 for more information). Including a Train Handling File is optional.
Mode	Displays the mode as "N" for "Non-Interactive", which is a stopping distance simulation, or "I" for "Interactive", which is a braking simulation using an Enforcement Algorithm.
Penalty Application Time	Displays the time when the brakes were applied during the simulation.
Penalty Application Position	Displays the location on the track where the brakes were applied during the simulation.
Penalty Application Speed	Displays the speed at which the penalty application was enforced.

Actual Stop Time	Displays the time in seconds that it took for the train to stop during the simulation.
Actual Stop Position	Displays the position of the train in feet when it stopped during the simulation.
Brake Application Notch Position	Displays the notch position for the lead locomotive at the time of the brake enforcement. A positive notch value means the train was in a throttle notch and a negative value means it was in a dynamic setting, with 0 representing idle.
Simulation Timestamp	Displays the time at which the Simulation Job Request was run.
Simulation Duration	Displays the amount of time that it took for the Simulation Job Request to run.
Error	Displays any error that occurred during the simulation. If the simulation does not complete, provide this error message to the support team.

The Audit tab is for internal use.

In addition, the Simulation Job Request page contains the following buttons:

Close	Close the Simulation Job Request page and return to viewing the Simulation Job Dashboard page (see Exhibit 6).
Clone	Create a copy of the selected Simulation Job Request. See "Cloning a Simulation Job Request" on page 16 for more information.
Edit	Modify the selected Simulation Job Request. This button is not available if the simulation has already been run. See "Editing a Simulation Job Request" on page 17 for more information.
Add Instance	Enables you to add another occurrence of the Simulation Job Request. See "Adding an Instance" on page 24 for more information.
Run Simulation	Enables you to submit the Simulation Job Request to the TOES simulation engine. This button is not available if the simulation has already been run. See "Running a Simulation" on page 25 for more information.

Cloning a Simulation Job Request

Cloning a Simulation Job Request makes a copy of an existing Simulation Job Request that you can use as the basis for creating a new Simulation Job Request.

To clone a Simulation Job Request, first view the Simulation Job Request that you want to clone on the Simulation Job Request page (see Exhibit 7), and then select the **Clone** button. The Clone Simulation Job Request popup is displayed (see Exhibit 10).

Exhibit 10. Clone Simulation Job Request Popup

Enter a name for the new Simulation Job Request in the Simulation Job Request Name field and select **Save**.

A new Simulation Job Request is created as a copy of the selected Simulation Job Request and is added to the list on the Simulation Job Dashboard page (see Exhibit 6). You can then select and modify the new Simulation Job Request as needed (see "Editing a Simulation Job Request" on page 17).

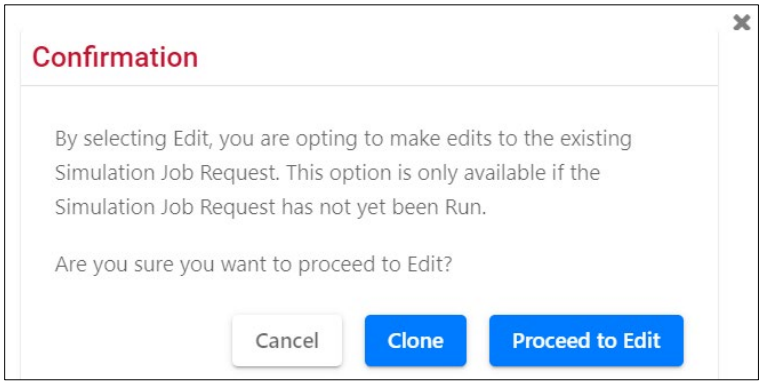
Editing a Simulation Job Request

You can edit a Simulation Job Request to modify its contents.

Note: You cannot edit a Simulation Job Request if it has already been run. You can clone the Simulation Job Request or add a new instance of the Simulation Job Request.

To edit a Simulation Job Request, first view the Simulation Job Request that you want to modify on the Simulation Job Request page (see Exhibit 7), and then select the **Edit** button. The Edit Simulation Job Request Confirmation popup is displayed (see Exhibit 11).

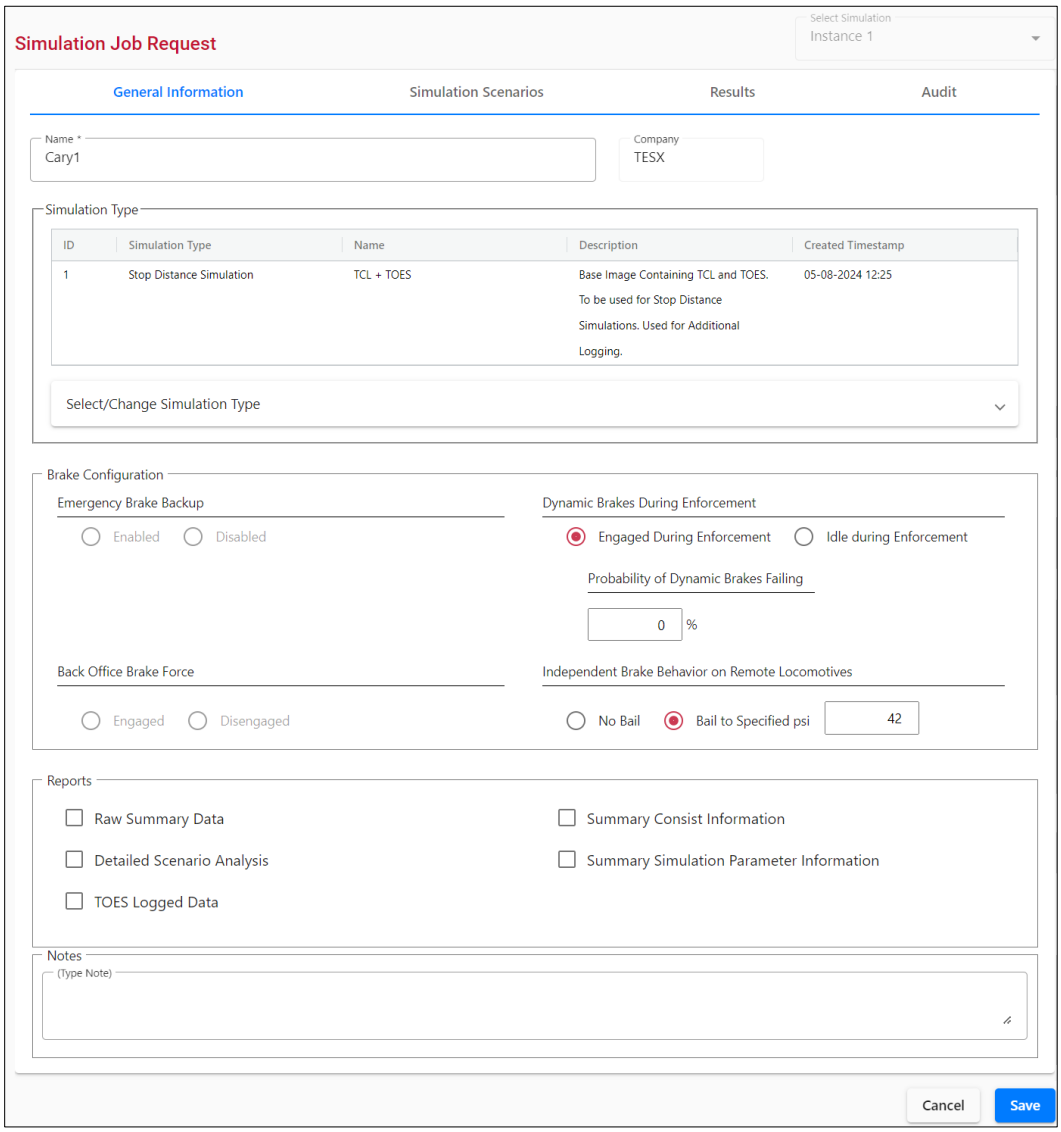
Exhibit 11. Edit Simulation Job Request Confirmation Popup



The Edit Simulation Job Request Confirmation popup provides a reminder that changes to a Simulation Job Request are only permitted if the Simulation Job Request has not yet been run. You can select **Cancel** to cancel the edit and return to the Simulation Job Request page, **Clone** to make a copy of the selected Simulation Job Request that you can then edit (see "Cloning a Simulation Job Request" on page 16), or **Proceed to Edit** to continue with editing the selected Simulation Job Request.

If you select **Proceed to Edit**, the Simulation Job Request page is displayed in edit mode (see Exhibit 12).

Exhibit 12. Simulation Job Request Page (In Edit Mode)



In edit mode, the Simulation Job Request page contains the following four tabs of information:

- General Information – Enables you to modify general information about the Simulation Job Request.
- Simulation Scenarios – Enables you to modify the batches and/or consists that have been added to the Simulation Job Request.
- Results – Displays the results of the scenarios included in the Simulation Job Request. You cannot change anything on this tab.
- Audit – This tab is for internal use.

The General Information tab contains the following sections and fields:

Name Enables you to modify the name of the simulation.

Company Displays the Mark of the company that created the simulation (you cannot modify this field).

Simulation Type Displays the following information about the simulation type (you cannot modify any of these fields directly):

ID	The numeric identifier of the simulation type.
Simulation Type	The type of simulation.
Name	The name of the modeling engine used for the simulation.
Description	A description of the simulation type.
Created Timestamp	The date when the simulation type was created.

You can select the Select/Change Simulation Type drop-down to change to a different simulation type.

Brake Configuration Enables you to modify information about brakes used in the simulation.

This section contains the following subsections:

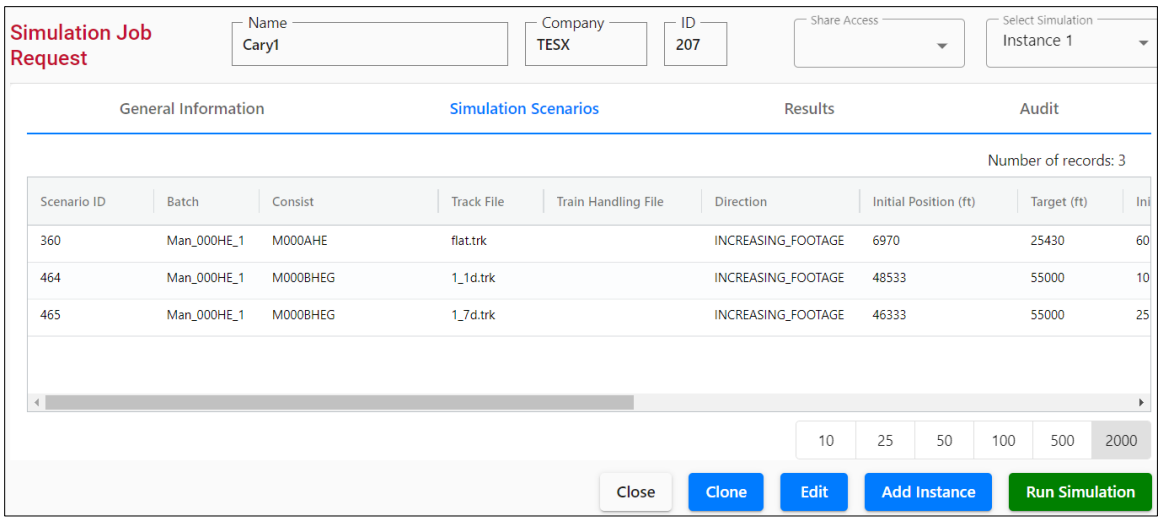
Emergency Brake Backup	Indicates whether emergency brake backup is enabled or disabled. This configuration option is only available for the Enforcement Algorithm simulation type. When enabled, this subsection provides options for emergency brake behavior, including Two-Way Emergency, Head End Only Emergency, and No Emergency.
Dynamic Brakes During Enforcement	Indicates whether dynamic brakes are engaged during enforcement or idle during enforcement. When engaged, this subsection enables you to specify the probability of failure of the dynamic brakes.
Back Office Brake Force	Indicates whether back office brake force is engaged or disengaged. This configuration option is only available for the Enforcement Algorithm simulation type.
Independent Brake Behavior on Remote Locomotives	Indicates the amount of brake pressure applied. When Bail is selected, you can specify the psi (the default is 42psi).

Reports — For reports, select **Reports** from the main menu and then choose the report that you want to view.

Notes — Enables you to add and/or modify notes about the Simulation Job Request.

The Simulation Scenarios tab contains a grid with information about simulation scenarios (see Exhibit 13).

Exhibit 13. Simulation Job Request Page (Simulation Scenarios Tab)



The Simulation Scenarios tab contains the following columns of information:

Scenario ID — Displays the identifier for the scenario (you cannot modify this field).

Batch — Displays the batch file associated with the Simulation Job Request (see "Working with Batches" on page 32 for more information). You cannot modify this field.

Consist — Enables you to modify the consist selected for the Simulation Job Request (see "Working with Consists" on page 46 for more information).

Track File — Enables you to modify the Track File selected for the Simulation Job Request (see "Working with Tracks" on page 65 for more information).

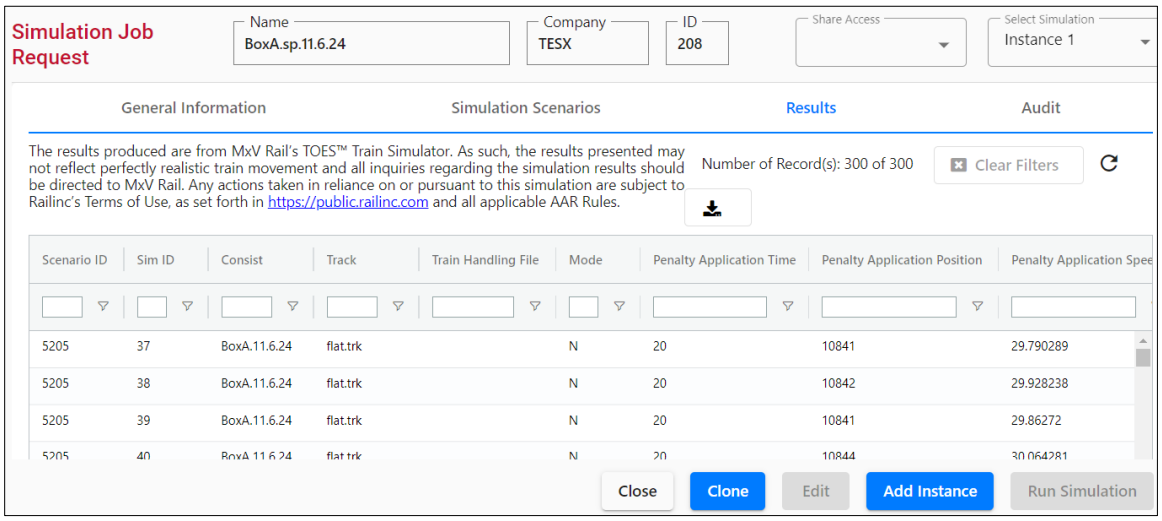
Train Handling File — Enables you to select or modify the Train Handling File selected for the Simulation Job Request (see "Working with Train Handling Files" on page 74 for more information). Including a Train Handling File is optional.

Direction — Enables you to modify the direction of the simulation (increasing footage starts from the beginning of the track and moves forward;

	decreasing footage starts from the end of the track and moves backward).
Initial Position (ft)	Enables you to modify the position, in feet, of the front edge of the consist from the beginning of the track. The initial position should be at least the length of the consist and no further than the length of the track.
Target (ft)	Enables you to modify the position on the track where the train should be stopped, in feet. The value for this field must be between the initial position and the end of the track, inclusive.
Initial Velocity (mph)	Enables you to modify the starting speed of the train, in miles per hour.
Target Speed (mph)	Enables you to modify the desired speed of the train at the target, in miles per hour. The value of this field must be between 0 and the initial velocity, inclusive.
Record	Enables you to modify the first or last record setting. TOES orients the train on the track based on this entry and the increasing and decreasing footage entry. For braking simulations, it is recommended to use “first record” along with “increasing footage”.
Notch	Enables you to modify the specific position on the locomotive throttle.
Throttle	Enables you to modify the setting of the locomotive power control.
Acceleration Profile	Enables you to modify how the speed changes over time.
Brake Initial File	Enables you to control whether the brake init simulation functionality is enabled. See “Brake Initial File” on page 13 for more information.

The Results tab contains a grid with information about simulation scenario results (see Exhibit 14).

Exhibit 14. Simulation Job Request Page (Results Tab)



The Results tab shows the results of the scenarios included in the Simulation Job Request. Every scenario is simulated 100 times with slight variations.

The Results tab contains the following columns of information: (You cannot modify anything on this tab.)

Scenario ID	Displays an identifier for the scenario.
Sim ID	Displays the Simulation ID for the scenario. There are 100 simulations for each scenario. The Simulation IDs for a scenario always begin with the number 3 and end at 102.
Consist	Displays the consist selected for the Simulation Job Request (see "Working with Consists" on page 46 for more information).
Track	Displays the Track File selected for the Simulation Job Request (see "Working with Tracks" on page 65 for more information).
Train Handling File	Displays the Train Handling File selected for the Simulation Job Request (see "Working with Train Handling Files" on page 74 for more information). Including a Train Handling File is optional.
Mode	Displays the mode as "N" for "Non-Interactive", which is a stopping distance simulation, or "I" for "Interactive", which is a braking simulation using an Enforcement Algorithm.
Penalty Application Time	Displays the time when the brakes were applied during the simulation.
Penalty Application Position	Displays the location on the track where the brakes were applied during the simulation.
Penalty Application Speed	Displays the speed of the train during the simulation.

Actual Stop Time	Displays the time in seconds that it took for the train to stop during the simulation.
Actual Stop Position	Displays the position of the train in feet when it stopped during the simulation.
Brake Application Notch Position	Displays the notch position for the lead locomotive at the time of the brake enforcement. A positive notch value means the train was in a throttle notch and a negative value means it was in a dynamic setting, with 0 representing idle.
Simulation Timestamp	Displays the time at which the Simulation Job Request was run.
Simulation Duration	Displays the amount of time that it took for the Simulation Job Request to run.
Error	Displays any error that occurred during the simulation. If the simulation does not complete, provide this error message to the support team.

The Audit tab is for internal use.

Once you have finished editing the Simulation Job Request, select **Save** to save your changes.

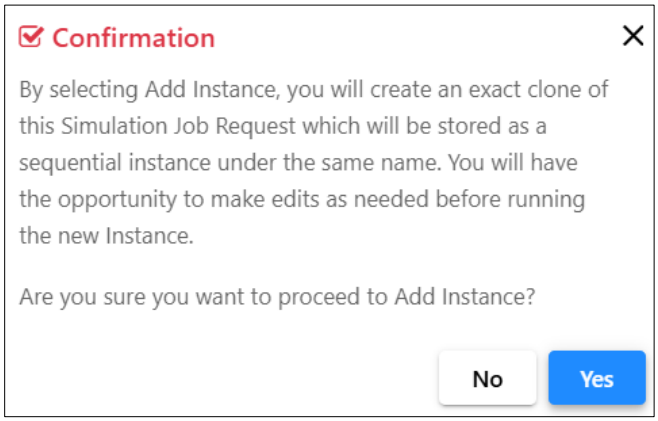
Note: Once you modify a Simulation Job Request, you need to create new consist text files to make the modified consist available for use in batches and simulation job requests (see "Creating Consist Text Files" on page 57 for more information.

Adding an Instance

Adding an instance enables you to create and run another occurrence of a Simulation Job Request, with the opportunity to modify some configuration fields before submitting the Simulation Job Request again.

To add an instance, select **Add Instance** from the Simulation Job Request page. A confirmation popup is displayed (see Exhibit 15).

Exhibit 15. Add Instance Confirmation Popup



Select **Yes** to continue with the Add Instance process. Another instance is created. You can select the instance you want to work with by using the Select Instance drop-down at the top right of the Simulation Job Request page.

You can edit any instance that has not yet been run.

Once you have selected the newly created instance, you can make any needed changes, save the Simulation Job Request, and then select **Run Simulation** to run the new instance.

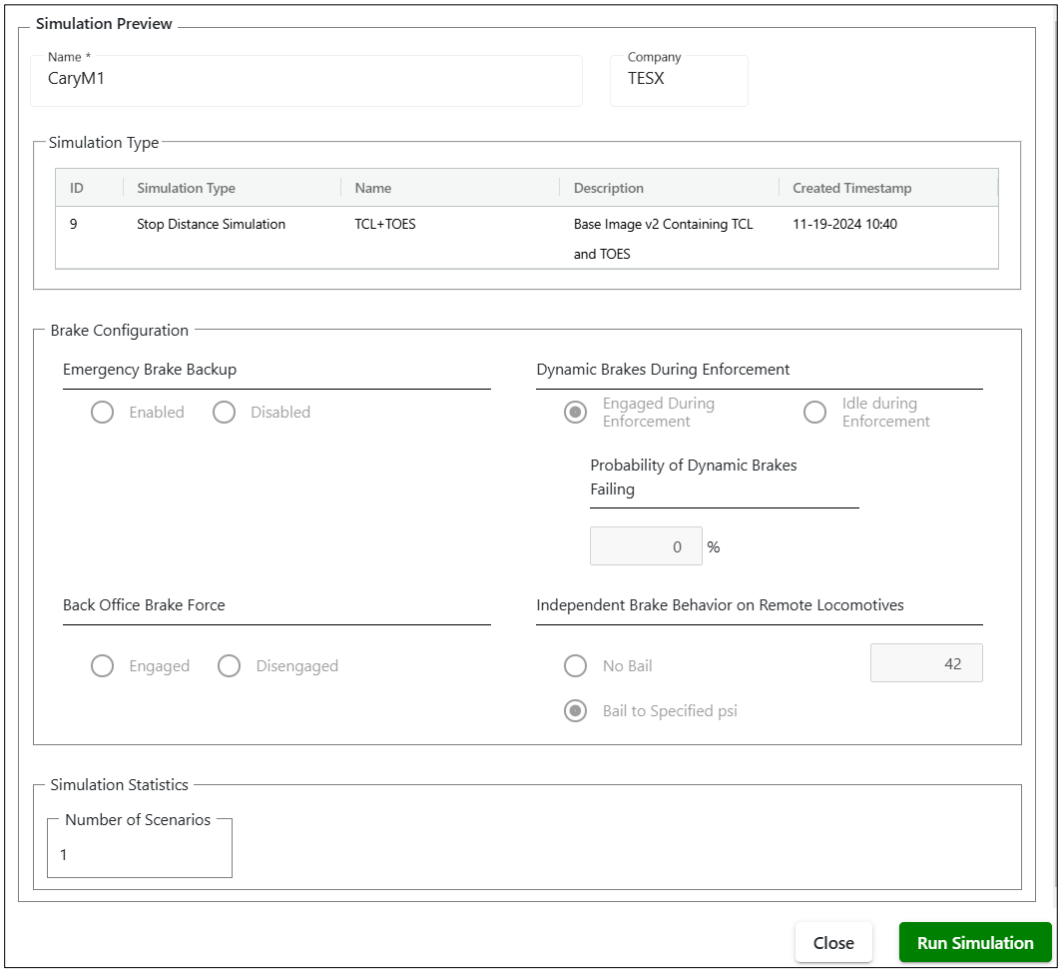
Running a Simulation

Running a simulation sends the Simulation Job Request to the TOES simulation engine, which runs Monte Carlo-style simulations according to the instructions you provide.

To run a simulation, select **Run Simulation** from the Simulation Job Request page. The Simulation Preview popup is displayed (see Exhibit 16).

Note: You cannot run a Simulation Job Request if it has already been run. You can clone the Simulation Job Request or add a new instance of the Simulation Job Request and then run it.

Exhibit 16. Simulation Preview Popup



The Simulation Preview popup provides a summary of the simulation, including the brake configuration and the number of scenarios. This popup does not allow you to make any changes. If you want to make changes, select **Close** and then select **Edit** on the Simulation Job Request page.

Select **Run Simulation** to run the simulation. If the simulation job is submitted successfully, a success message is displayed (see Exhibit 17).

Exhibit 17. Simulation Success Message

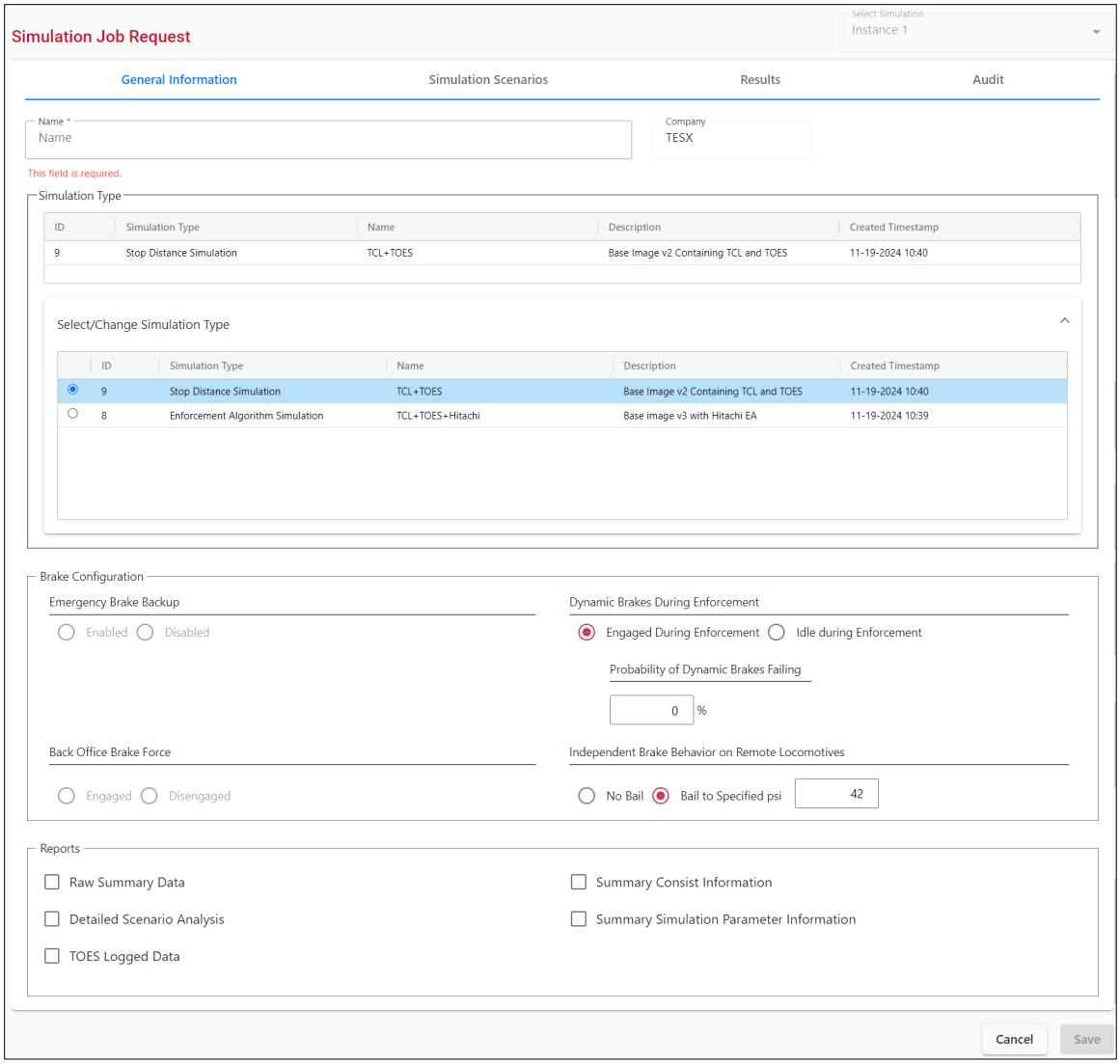
The simulation runs in the background and may take a few minutes to complete depending on the current demands on the system.

Check the results tab periodically to see if the simulation has completed and view your results.

Creating Simulation Job Requests

To create a new Simulation Job Request, select **Create New Simulation Job Request** from the Simulation Job Requests menu. The Create Simulation Job Request page is displayed (see Exhibit 18).

Exhibit 18. Create Simulation Job Request Page (Showing the General Information Tab)



The Create Simulation Job Request page contains the same tabs and fields as the Simulation Job Request Details page. See "Viewing Simulation Job Request Details" on page 10 for a complete description of these tabs and fields.

Use the following procedure to create a new Simulation Job Request:

1. Starting with the General Information tab, type a descriptive name for the request in the Name field.

2. In the Simulation Type section, use the Select/Change Simulation Type drop-down to choose a simulation type (Stop Distance Simulation or Enforcement Algorithm Simulation).

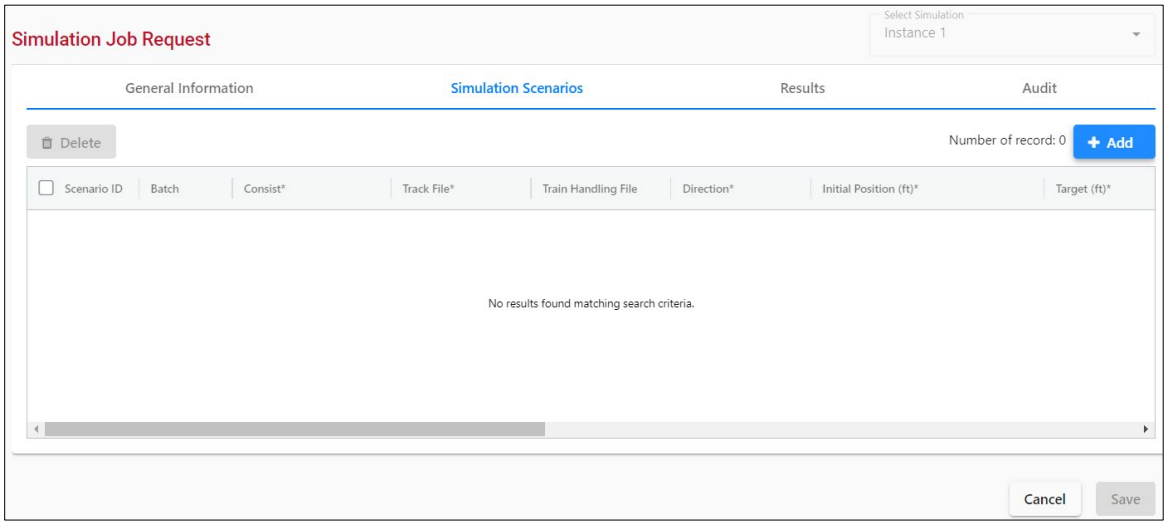
   - A Stop Distance Simulation simply stops the train at a certain time.
   - An Enforcement Algorithm Simulation constantly evaluates the conditions and determines if the train needs to stop, while considering a wide variety of factors (this is applicable to Positive Train Control).

3. In the Brake Configuration section, select the configuration options for Emergency Brake Backup, Back Office Brake Force, Dynamic Brakes During Enforcement, and Independent Brake Behavior on Remote Locomotives. There are different brake configuration options available depending on the simulation type you selected.

4. In the Reports section, select the reports to be generated when the Simulation Job Request is run. You can select any or all of the following reports: Raw Summary Data, Detailed Scenario Analysis, TOES Logged Data, Summary Consist Information, and/or Summary Simulation Parameter Information.

5. Switch to the Simulation Scenarios tab (see Exhibit 19).

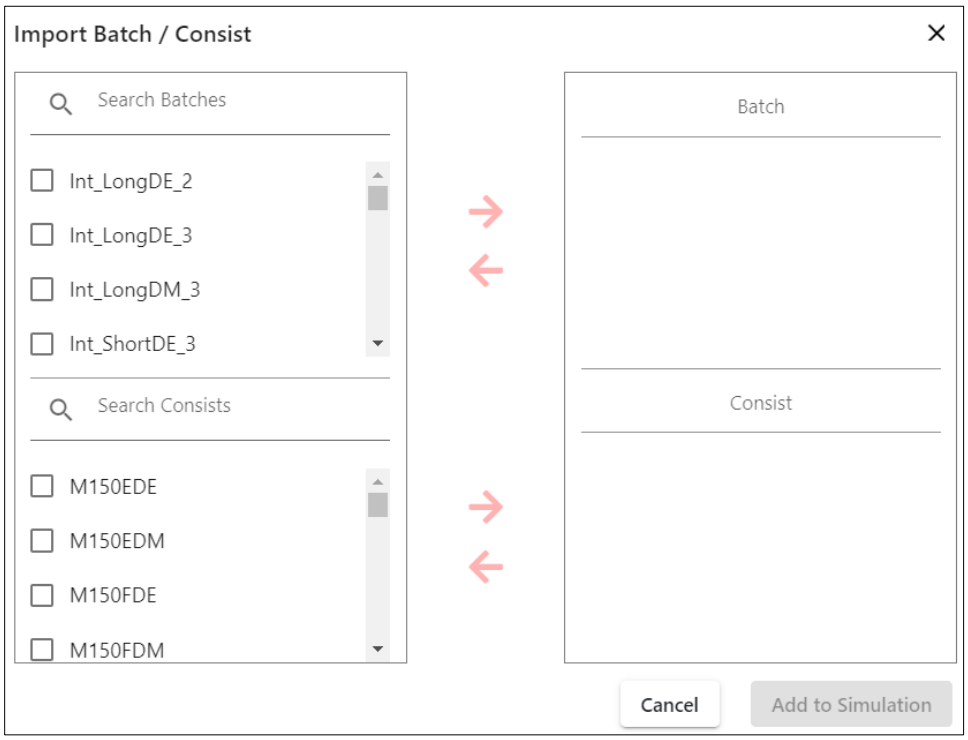
Exhibit 19. Create Simulation Job Request Page (Showing the Simulation Scenarios Tab)



The Simulation Scenarios tab enables you to choose parameters for your simulation.

6. Select + Add. The Import Batch/Consist popup is displayed (see Exhibit 20).

Exhibit 20. Import Batch/Consist Popup



7. Select the checkbox for a batch and/or a consist to use in the simulation (the consist must have text files already generated as described in "Creating Consist Text Files" on page 57).

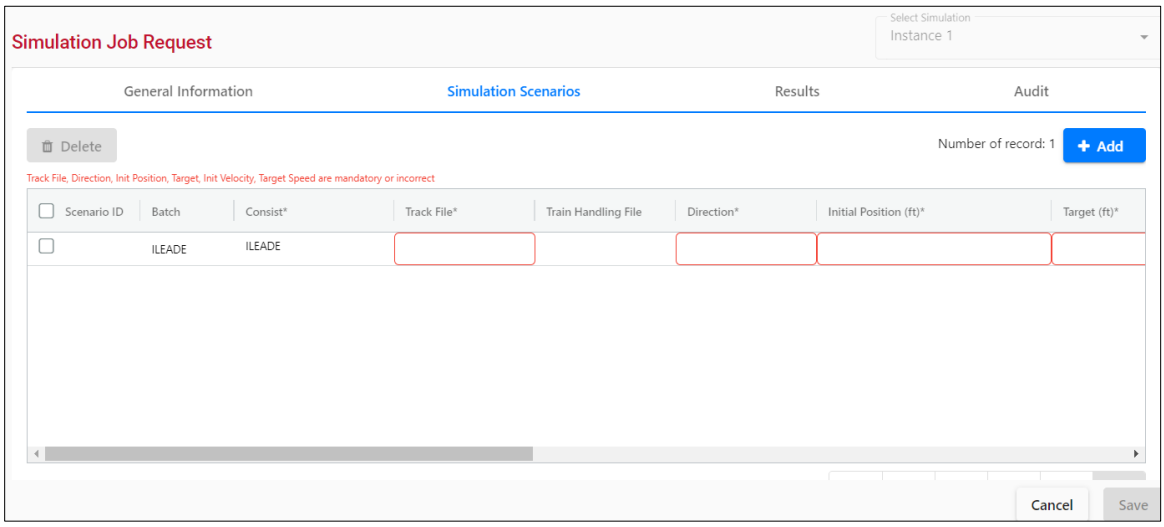
   Optionally, you can select the search icon ( ) and type a string to help you locate batches and consists.

8. Select the right arrow button ( ) to add the selected batch or consist to the list of selected batches and consists on the right.

   Optionally, if you decide not to use a batch or consist that you have added to the list, you can select the checkbox associated with that batch or consist and then select the right arrow button ( ) to remove it from the list.

9. Select **Add to Simulation**. The Import Batch/Consist popup is closed and the simulation information associated with the selected batch or consist is added to the list on the Simulation Scenarios tab (see Exhibit 21).

Exhibit 21. Create Simulation Job Request Page (Showing the Simulation Scenarios Tab)



10. On the Simulation Scenarios tab, move from *left to right* to complete any mandatory fields that are missing or incorrect. Mandatory fields are marked with an asterisk (*).

    a) Select the Track File field to display a drop-down list that allows you to choose a track file to use in the simulation.

    b) Select the Train Handling File field to choose a Train Handling File if needed (this field is optional).

    c) Select the Direction field to choose the direction of your simulation (increasing footage starts from the beginning of the track and moves forward; decreasing footage starts from the end of the track and moves backward).

    d) Select the Initial Position (ft) field to indicate the position, in feet, of the front edge of the consist from the beginning of the track. As guidance, this field shows the length of the consist and the length of the track, so the initial position must be between those points.

    e) Select the Target (ft) field to indicate the desired final position, in feet. The value for this field must be between the initial position and the end of the track, inclusive.

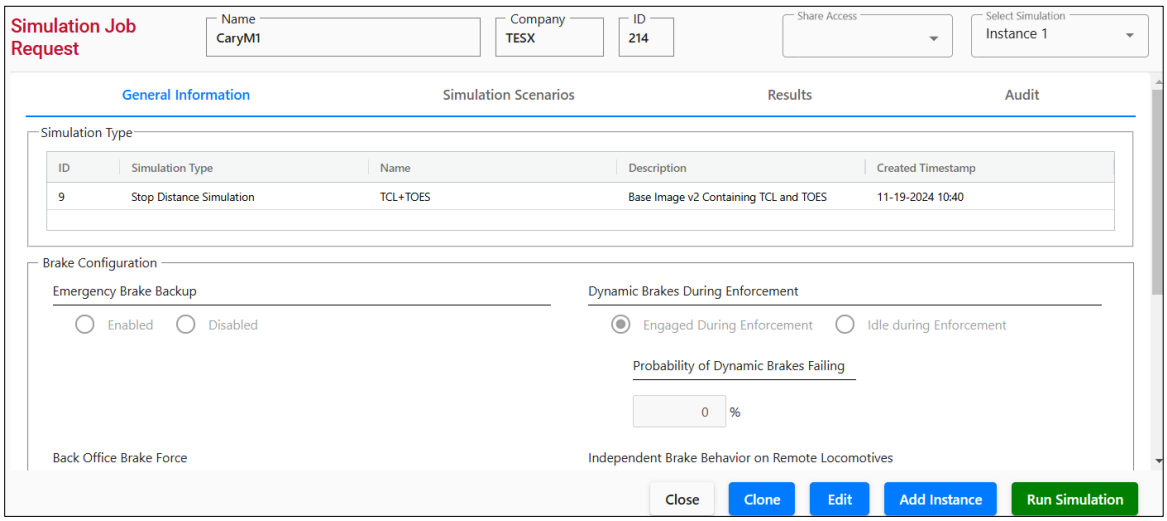
    f) Select the Initial Velocity (mph) field to indicate the starting speed of the train, in miles per hour.

    g) Select the Target Speed (mph) field to indicate the desired speed of the train at the target, in miles per hour. The value of this field must be between 0 and the initial velocity, inclusive.

    h) Optionally, modify the Record, Notch, Throttle, and/or Acceleration Profile fields as needed.

11. Select **Save** to save the new Simulation Job Request. A Simulation Saved message is displayed, and you are returned to the General Information tab (see Exhibit 22).

Exhibit 22. Create Simulation Job Request Page (Showing the Newly Created Request)



The Simulation Job Request page now includes the Clone, Edit, Add Instance, and Run Simulation buttons.

12. The next step is to run the simulation. Refer to "Running a Simulation" on page 25 for more information.

Working with Batches

The Batch menu provides functionality that enables you to configure and manage batches, which are re-usable inputs for a Simulation Job Request.

For example, if you want to test a series of 25 manifest trains, running over flat track, with each starting at a slightly different speed, it would be efficient to configure this as a batch so that you can simulate it once, review the results, and then simulate it again with different simulation settings (i.e., brake configurations, etc.).

Managing Batches

Managing batches includes viewing the list of all available batches, selecting an individual batch, and performing operations on the selected batch (such as editing, cloning, retiring, and preparing for a simulation).

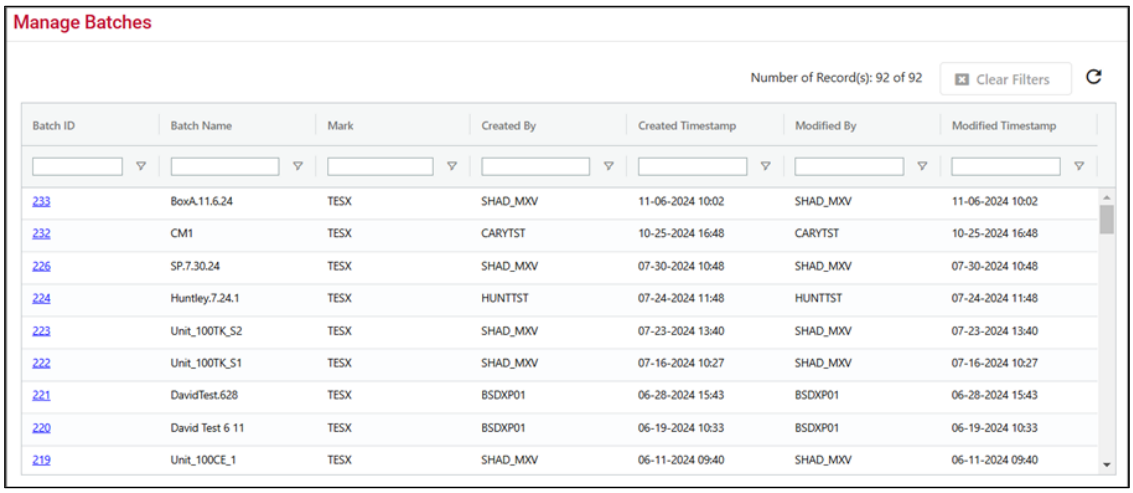
See the following sections for detailed information about managing batches:

- "Viewing All Available Batches" on page 32
- "Viewing Batch Details" on page 35
- "Retiring a Batch" on page 37
- "Cloning a Batch" on page 39
- "Editing a Batch" on page 39
- "Creating Batch Text Files" on page 42

Viewing All Available Batches

The Manage Batches page is displayed when you select **Manage Batches** from the Batch menu (see Exhibit 23).

Exhibit 23. Manage Batches Page



The Manage Batches page enables you to view all available batches. It consists of a table with a row (record) for every active (non-retired) batch contained in PTC TBS. These rows contain the following columns:

Batch ID	Displays the numeric batch identifier. This identifier is a link, which you can select to view detailed information about the batch as well as perform tasks related to the selected batch (see "Viewing Batch Details" on page 35).
Batch Name	Displays the descriptive name of the batch.
Mark	Lists the mark of the batch creator.
Created By	Lists the user ID that created the batch.
Created Timestamp	Displays the date and time, in Eastern Time, when the batch was originally created.
Modified By	Lists the user ID that last modified the batch.
Modified Timestamp	Displays the date and time, in Eastern Time, when the batch was last modified.

By default, the Manage Batches page displays all batches in reverse chronological order, with the last modified batch displayed at the top of the list. The Number of Records field at the top right indicates the number of batches you are currently working with and the total number of batches in the list. These numbers are the same unless a filter is set.

You can quickly drill down to the batches you need by sorting and/or filtering the rows of information.

Sorting

To sort the rows in ascending or descending order by a specified column, select the heading of the column by which you want to sort. An up or down arrow is displayed to indicate the sort direction. To remove the sort, select the heading again until the arrow disappears. You can also sort by multiple columns by pressing and holding the Shift key while selecting additional

columns. If you sort by multiple columns, the column heading for the primary sort is appended with “1”, and the column heading for the secondary sort is appended with “2”, etc.

Filtering
You can filter using two different methods – simple column filtering and advanced column filtering.

- For simple column filtering, enter a character or string in the text box field below the column heading. The table displays only the rows that contain the character or string you specified (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, simply delete the text in the Filter field.

- For advanced column filtering, select the column filter icon (▽) next to the text box field below any column heading to filter the data in that column. A tool is displayed that enables you to select parameters such as “Contains”, “Not contains”, “Equals”, “Not equal” “Starts with”, and “Ends with”, and type characters into a Filter field. The table displays only the rows that meet the filter rule you set up (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, select the filter icon (▽) and delete the text in the Filter field.

Note: Once you apply a filter, that filter remains in effect throughout your use of the application. Select **Clear Filters** at the top right to remove all of the filters.

Tip! You can apply filters to multiple columns at once. For example, you could apply a column filter containing “TESX” on the Mark column, and another column filter containing “2024” on the Modified Timestamp column. This would enable you to only display rows for batches created by TESX that were modified in 2024.

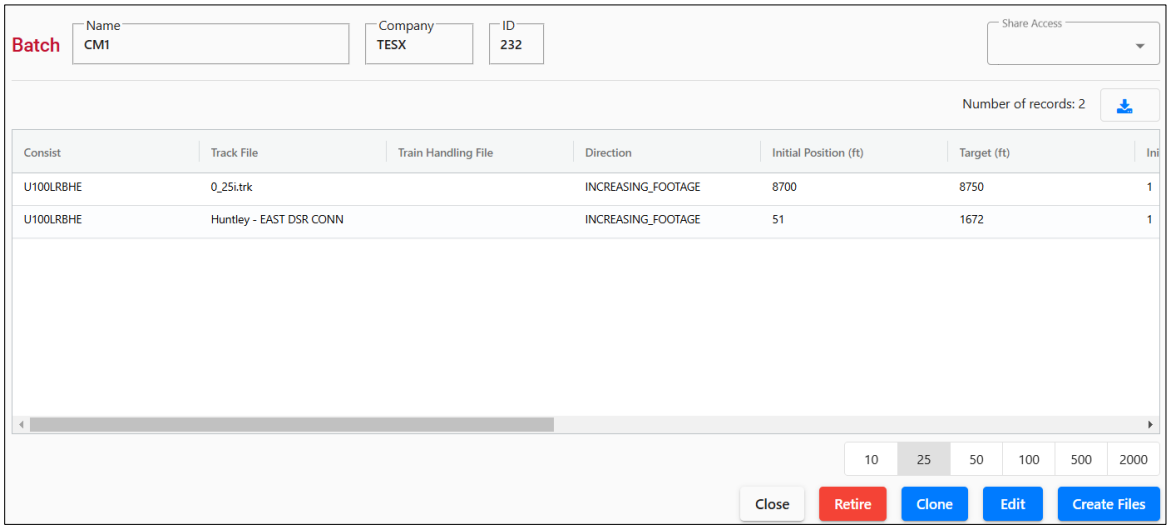
To see all the rows in the table, use the vertical scroll bar. Use the horizontal scroll bar to view any data that exceeds the width of the viewable area.

Select the Refresh icon (↻) to refresh the Manage Batches page contents.

Viewing Batch Details

To view detailed information about a batch, select its Batch ID link on the Manage Batches page. The Batch page is displayed (see Exhibit 24).

Exhibit 24. Batch Page



The Batch page contains the following sections:

Name — Displays the following general information about the batch.

- **Name** — A descriptive name for the batch.
- **Company** — The company that created the batch.
- **ID** — The numeric identifier for the batch.

Share Access — A drop-down list that enables you to select checkboxes to indicate which marks should have access to the batch. MxV Rail can share batches with railroads. Railroads can only share batches with MxV Rail.

Batch Summary — Displays the following summary information about the batch:

- **Consist** — Displays the consist selected for the Simulation Job Request (see "Working with Consists" on page 46 for more information).
- **Track File** — Displays the Track File selected for the Simulation Job Request (see "Working with Tracks" on page 65 for more information).
- **Train Handling File** — Displays the Train Handling File selected for the Simulation Job Request (see "Working with Train Handling Files" on page 74 for more information). Including a Train Handling File is optional.

Direction	Displays the direction of the simulation (increasing footage starts from the beginning of the track and moves forward; decreasing footage starts from the end of the track and moves backward).
Initial Position (ft)	Displays the position, in feet, of the front edge of the consist from the beginning of the track. The initial position should be at least the length of the consist and no further than the length of the track.
Target (ft)	Displays the position on the track where the train should be stopped, in feet. The value for this field must be between the initial position and the end of the track, inclusive.
Initial Velocity (mph)	Displays the starting speed of the train, in miles per hour.
Target Speed (mph)	Displays the desired speed of the train at the target, in miles per hour. The value of this field must be between 0 and the initial velocity, inclusive.
Record	Displays the first or last record setting (the first or last record in the consist portion of the consist file). TOES orients the train on the track based on this entry and the increasing and decreasing footage entry. For braking simulations, it is recommended to use “first record” along with “increasing footage”.
Notch	A specific position on the locomotive throttle.
Throttle	The locomotive power control.
Acceleration Profile	How the speed changes over time.
Brake Initial File	Indicates whether the brake init simulation functionality is enabled. See “Brake Initial File” on page 13 for more information.

In addition, the Batch page contains the following buttons:

Close	Close the Batch page and return to viewing the Manage Batches page (see Exhibit 23).
Retire	Remove the selected batch from the lists of available batches on the Batch pages and the Simulation Job Request pages. Retired batches are still listed on the Manage Batches page, and can be un-retired at any time. See “Retiring a Batch” on page 37 for more information.

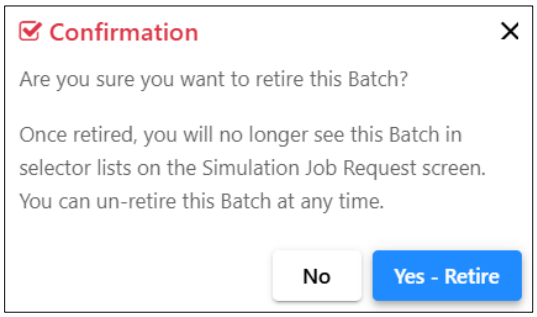
Clone	Create a copy of the selected batch. See "Cloning a Batch" on page 39 for more information.
Edit	Modify the selected batch. See "Editing a Batch" on page 39 for more information.
Create Files	Enables you to create the batch text files that are required by the TOES simulation engine. See "Creating Batch Text Files" on page 42 for more information.

Retiring a Batch

Retiring a batch removes it from the lists of available batches on the Batch page and the Simulation Job Request pages. A retired batch is not purged from the system; therefore, you can continue to perform analyses using batches that have been retired.

To retire a batch, first view it on the Batch page (see Exhibit 24), and then select the **Retire** button. The Retire Batch Confirmation popup is displayed (see Exhibit 25).

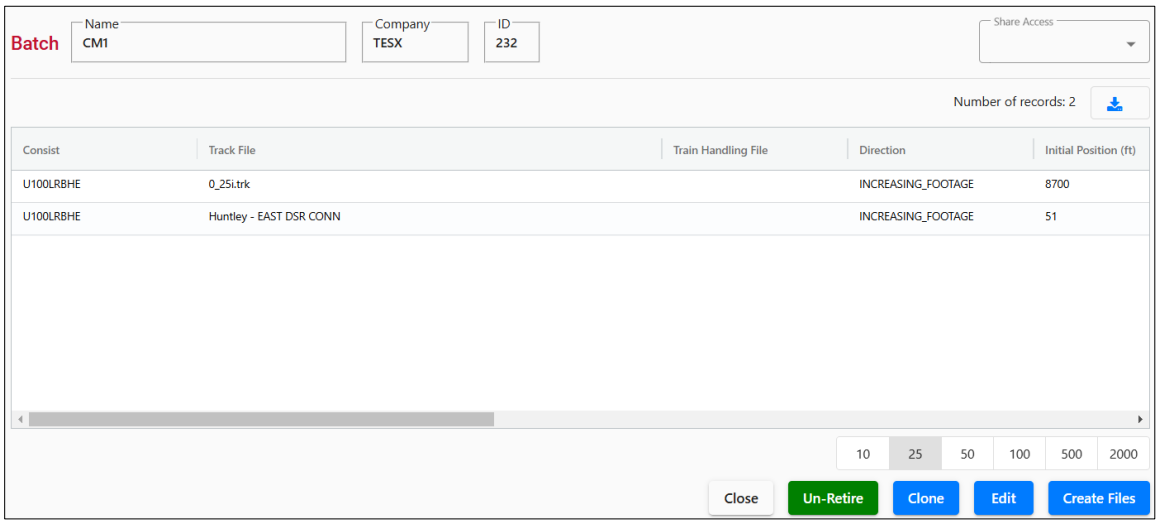
Exhibit 25. Retire Batch Confirmation Popup



Select **Yes-Retire** to retire the batch. The Simulation Job Dashboard is displayed (see Exhibit 6).

Retired batches continue to be listed on the Manage Batches page. You can select a retired batch to view its details on the Batch page (see Exhibit 26).

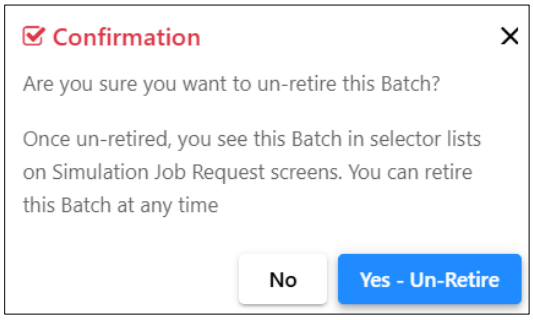
Exhibit 26. Batch Page Showing the Un-Retire Button



You can un-retire a retired batch at any time.

To un-retire a batch, first view it on the Batch page, and then select the **Un-Retire** button. The Un-Retire Batch Confirmation popup is displayed (see Exhibit 27).

Exhibit 27. Un-Retire Batch Confirmation Popup



Select **Yes-Un-Retire** to un-retire the batch and make it available for use in Simulation Job Requests. The Simulation Job Dashboard is displayed (see Exhibit 6).

Cloning a Batch

Cloning a batch makes a copy of an existing batch.

To clone a batch, first view the batch that you want to clone on the Batch page (see Exhibit 24), and then select the **Clone** button. The Clone Batch popup is displayed (see Exhibit 28).

Exhibit 28. Clone Batch Popup

Enter a name for the new batch in the Batch Name field and select **Save**.

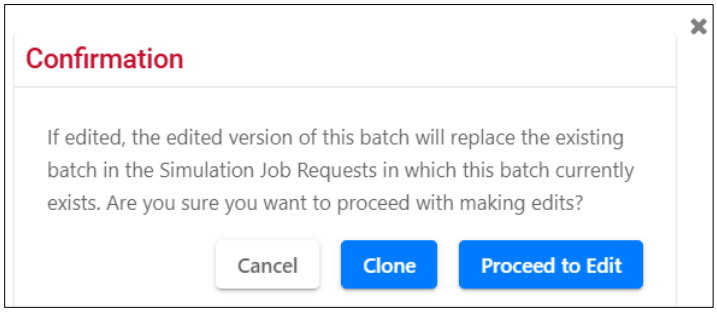
A new batch is created as a copy of the selected batch and is added to the list on the Manage Batches page (see Exhibit 23). You can then select and modify the new batch as needed (see "Editing a Batch" on page 39).

Editing a Batch

You can edit a batch to modify its contents.

To edit a batch, first view the batch that you want to modify on the Batch page (see Exhibit 24), and then select the **Edit** button. The Edit Batch Confirmation popup is displayed (see Exhibit 29).

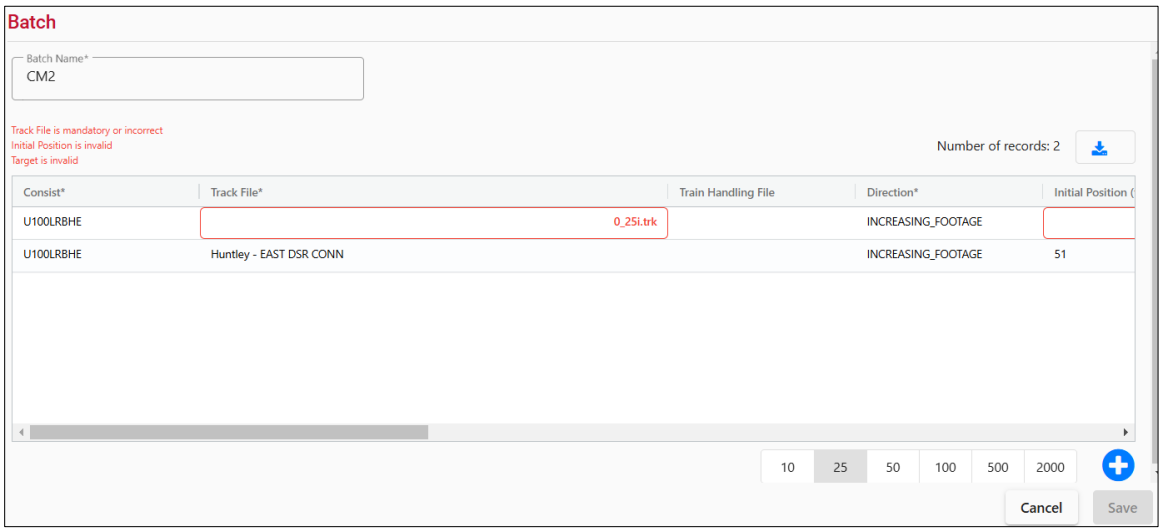
Exhibit 29. Edit Batch Confirmation Popup



The Edit Batch Confirmation popup provides a reminder that if you make changes to a batch, the edited version will replace the existing version in batches and simulation job requests. You can select **Cancel** to cancel the edit and return to the Batch page, **Clone** to make a copy of the selected batch that you can then edit (see "Cloning a Batch" on page 39), or **Proceed to Edit** to continue with editing the selected batch.

If you select **Proceed to Edit**, the Batch page is displayed in edit mode (see Exhibit 30).

Exhibit 30. Batch Page (In Edit Mode)



In edit mode, the Batch page enables you to modify the following fields:

Batch Name	Enables you to change the name of the batch.
Consist	Enables you to select a different consist for the Simulation Job Request (see "Working with Consists" on page 46 for more information).
Track File	Enables you to select a different Track File for the Simulation Job Request (see "Working with Tracks" on page 65 for more information).
Train Handling File	Enables you to select or choose a different Train Handling File for the Simulation Job Request (see "Working with Train Handling Files" on page 74 for more information). Including a Train Handling File is optional.
Direction	Enables you to choose a different direction for the simulation (increasing footage starts from the beginning of the track and moves forward; decreasing footage starts from the end of the track and moves backward).
Initial Position (ft)	Enables you to set or modify the position, in feet, of the front edge of the consist from the beginning of the track. The initial position should be at least the length of the consist and no further than the length of the track.
Target (ft)	Enables you to set or modify the position on the track where the train should be stopped, in feet. The value for this field must be between the initial position and the end of the track, inclusive.
Initial Velocity (mph)	Enables you to set or modify the starting speed of the train, in miles per hour.

Target Speed (mph)	Enables you to set or modify the desired speed of the train at the target, in miles per hour. The value of this field must be between 0 and the initial velocity, inclusive.
Record	Enables you to modify the record setting (the first or last record in the consist portion of the consist file). TOES orients the train on the track based on this entry and the increasing and decreasing footage entry. For braking simulations, it is recommended to use "first record" along with "increasing footage".
Notch	Enables you to set or modify a specific position on the locomotive throttle.
Throttle	Enables you to set or modify the locomotive power control.
Acceleration Profile	Enables you to set or modify how the speed changes over time.
Brake Initial File	Enables you to control whether the brake init simulation functionality is enabled. See "Brake Initial File" on page 13 for more information.
Actions	Enables you to copy a row by selecting the copy icon () or delete a row by selecting the trash icon ().

In addition, you can add a new row by selecting the add icon () at the bottom right.

You can download a CSV file of the batch by selecting the download icon ().

Once you have finished editing the batch, select **Save** to save your changes (or select **Cancel** to leave the page without saving your changes).

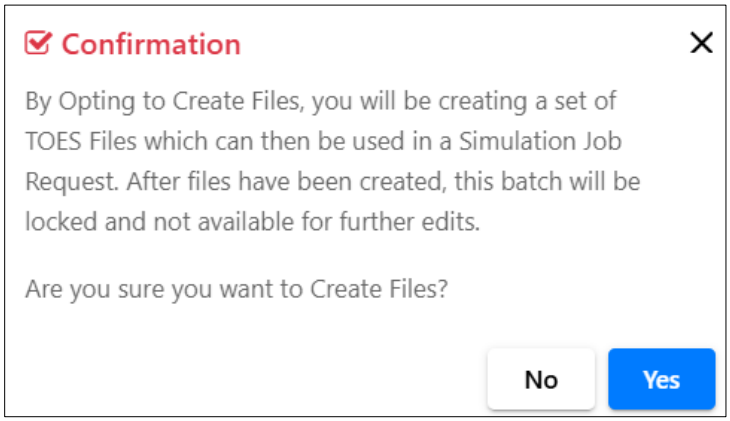
Note: Once you modify a batch, you need to create new batch text files to make the modified batch available for use in batches and simulation job requests (see "Creating Batch Text Files" on page 42 for more information.

Creating Batch Text Files

The TOES simulation engine requires specific text files to process a consist (consists are contained in batches). PTC TBS enables you to create these text files. To begin this process, select **Create Files** from the Batch page. A confirmation popup is displayed (see Exhibit 31).

Note: If you do not create the text files as described in this section, the batch will not be available for use.

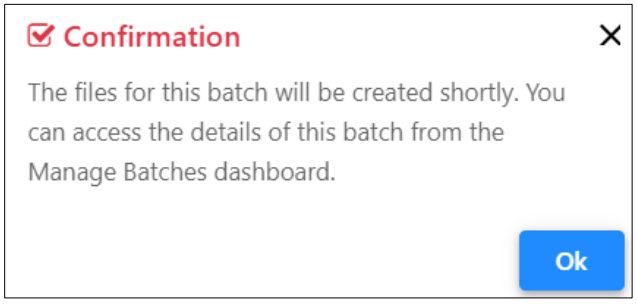
Exhibit 31. Create Files Confirmation Popup



The confirmation popup informs you that once you create a set of text files, the batch will be locked and can no longer be edited.

Select **Yes** to continue with the Create Files process. A second confirmation popup is displayed to inform you that the files will be created shortly and that you can manage the details of the batch from the Manage Batches page (see Exhibit 32).

Exhibit 32. Create Files Information Popup



Select **OK** to continue.

Once the files have been created, the **Create Files** button on the Batch page changes to a **Download Files** button.

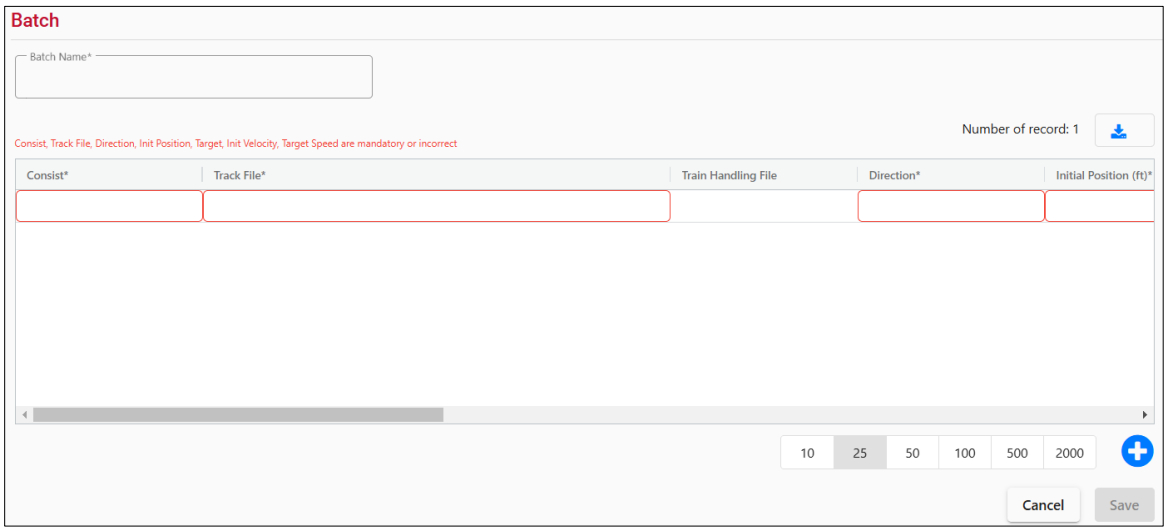
You can select **Download Files** to download the text files as a zip file for reference purposes. The zip file contains 100 .CON text files and 100 .CSV files to facilitate a simulation. These files contain slight variations to enable a statistically valid simulation.

Once the text files have been created, you cannot edit the batch again (the **Edit** button is disabled). However, you can clone the batch and create new text files.

Creating Batches

To create a new batch that you can use repeatedly, select **Create New Batch** from the Batch menu. The Create Batch page is displayed (see Exhibit 33).

Exhibit 33. Create Batch Page



The Create Batch page contains the same fields as the Batch Details page. See "Viewing Batch Details" on page 35 for a complete description of these fields.

Use the following procedure to create a new batch:

1. Type a descriptive name for the batch in the Batch Name field.

2. Move from *left to right* in the grid to complete the remaining fields. Mandatory fields are marked with an asterisk (*) and are highlighted with red boxes.

    a) Select the Consist field and choose a consist to use in the simulation (the consist must have text files already generated as described in "Creating Consist Text Files" on page 57).

    b) Select the Track File field to display a drop-down list that allows you to choose a track file to use in the simulation.

    c) Select the Train Handling File field to choose a Train Handling File if needed (this field is optional).

    d) Select the Direction field to choose the direction of your simulation (increasing footage starts from the beginning of the track and moves forward; decreasing footage starts from the end of the track and moves backward).

e) Select the Initial Position (ft) field to indicate the position, in feet, of the front edge of the consist from the beginning of the track. As guidance, this field shows the length of the consist and the length of the track, so the initial position must be between those points.

f) Select the Target (ft) field to indicate the desired final position, in feet. The value for this field must be between the initial position and the end of the track, inclusive.

g) Select the Initial Velocity (mph) field to indicate the starting speed of the train, in miles per hour.

h) Select the Target Speed (mph) field to indicate the desired speed of the train at the target, in miles per hour. The value of this field must be between 0 and the initial velocity, inclusive.

i) Select the Record field to indicate whether the record is the first or last record in the consist portion of the consist file. TOES orients the train on the track based on this entry and the increasing and decreasing footage entry. For braking simulations, it is recommended to use “first record” along with “increasing footage”.. TOES orients the train on the track based on this entry and the increasing and decreasing footage entry. For braking simulations, it is recommended to use “first record” along with “increasing footage”.

j) Select the Notch field to set a specific position on the locomotive throttle.

k) Select the Throttle field to set the locomotive power control.

l) Select the Acceleration Profile field to specify how the speed changes over time.

m) Optionally, select the Brake Initial File checkbox to control whether the brake init simulation functionality is enabled. See “Brake Initial File” on page 13 for more information.

n) Optionally, in the Actions column, select the copy icon ( ) to copy the current row. You can then make changes to the copied row as needed.

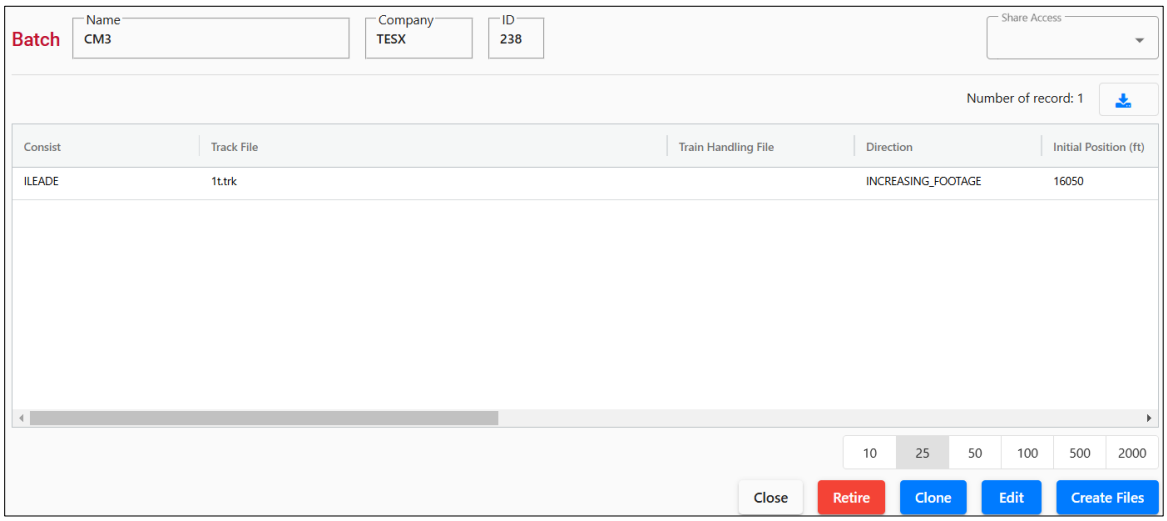
o) Optionally, select the add icon ( ) at the bottom right to add a new row.

p) Optionally, select the download icon ( ) at the top right to download a CSV file of the batch.

3. Select **Save** to save the new batch. A Save Batch Table message is displayed, and the Batch page is displayed in view mode with the Retire, Clone, Edit, and Create Files buttons (see Exhibit 34).

   Note: Before you can use the new batch, you must create new text files as described in “Creating Batch Text Files” on page 42.

Exhibit 34. Batch Page (Showing the Newly Created Batch)



4. The next step is add the batch to a Simulation Job Request. Refer to "Working with Simulation Job Requests" on page 7 for more information.

Working with Consists

The Consist menu enables you to select, configure, and create simulated consists for use in PTC TBS.

The Consist menu contains the following options:

- Select **Manage Consists** to work with existing consists. See "Managing Consists" on page 46 for more information.
- Select **Create New Consist** to create a new consist. See "Creating Consists" on page 59 for more information.

Managing Consists

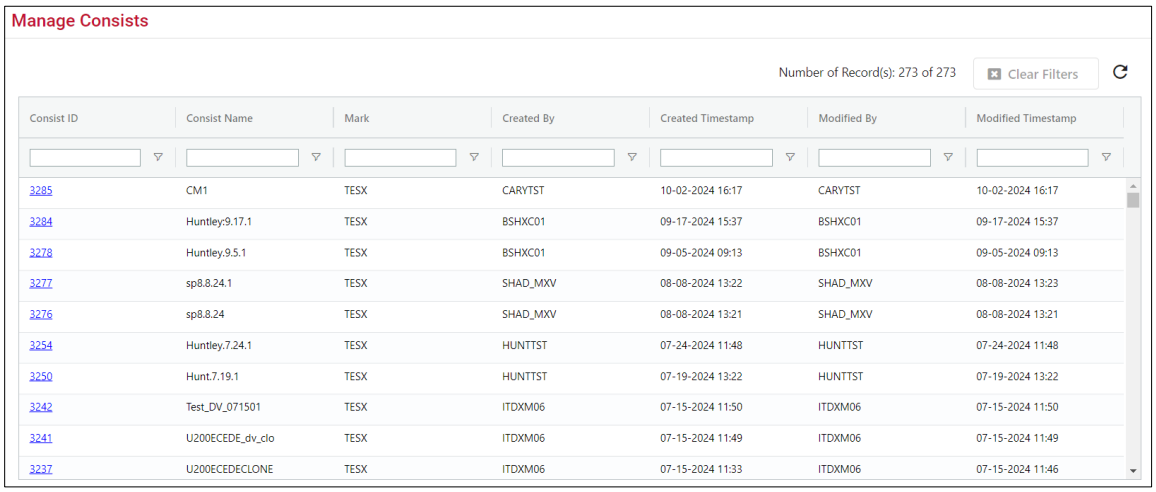
Managing consists includes viewing the list of all available consists, selecting an individual consist, and performing operations on the selected consist (such as editing, cloning, retiring, and preparing for a simulation).

See the following sections for detailed information about managing consists:

Viewing All Available Consists

The Manage Consists page is displayed when you select **Manage Consists** from the Consist menu (see Exhibit 35).

Exhibit 35. Manage Consists Page



The Manage Consist page enables you to view all available consists. It consists of a table with a row (record) for every active (non-retired) consist contained in PTC TBS. These rows contain the following columns:

Consist ID	Displays the numeric consist identifier. This identifier is a link, which you can select to view detailed information about the consist as well as perform tasks related to the selected consist (see "Viewing Consist Details" on page 49).
Consist Name	Displays the descriptive name of the consist.
Mark	Lists the mark of the consist creator.
Created By	Lists the user ID that created the consist.
Created Timestamp	Displays the date and time, in Eastern Time, when the consist was originally created.
Modified By	Lists the user ID that last modified the consist.
Modified Timestamp	Displays the date and time, in Eastern Time, when the consist was last modified.

By default, the Manage Consists page displays all consists in reverse chronological order, with the last modified consist displayed at the top of the list. The Number of Records field at the top right indicates the number of consists you are currently working with and the total number of consists in the list. These numbers are the same unless a filter is set.

You can quickly drill down to the consists you need by sorting and/or filtering the rows of information.

Sorting

To sort the rows in ascending or descending order by a specified column, select the heading of the column by which you want to sort. An up or down arrow is displayed to indicate the sort direction. To remove the sort, select the heading again until the arrow disappears. You can also sort by multiple columns by pressing and holding the Shift key while selecting additional

columns. If you sort by multiple columns, the column heading for the primary sort is appended with “1”, and the column heading for the secondary sort is appended with “2”, etc.

Filtering
You can filter using two different methods – simple column filtering and advanced column filtering.

- For simple column filtering, enter a character or string in the text box field below the column heading. The table displays only the rows that contain the character or string you specified (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, simply delete the text in the Filter field.

- For advanced column filtering, select the column filter icon (▽) next to the text box field below any column heading to filter the data in that column. A tool is displayed that enables you to select parameters such as “Contains”, “Not contains”, “Equals”, “Not equal” “Starts with”, and “Ends with”, and type characters into a Filter field. The table displays only the rows that meet the filter rule you set up (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, select the filter icon (▽) and delete the text in the Filter field.

Note: Once you apply a filter, that filter remains in effect throughout your use of the application. Select **Clear Filters** at the top right to remove all of the filters.

Tip! You can apply filters to multiple columns at once. For example, you could apply a column filter containing “TESX” on the Mark column, and another column filter containing “2024” on the Modified Timestamp column. This would enable you to only display rows for consists created by TESX that were modified in 2024.

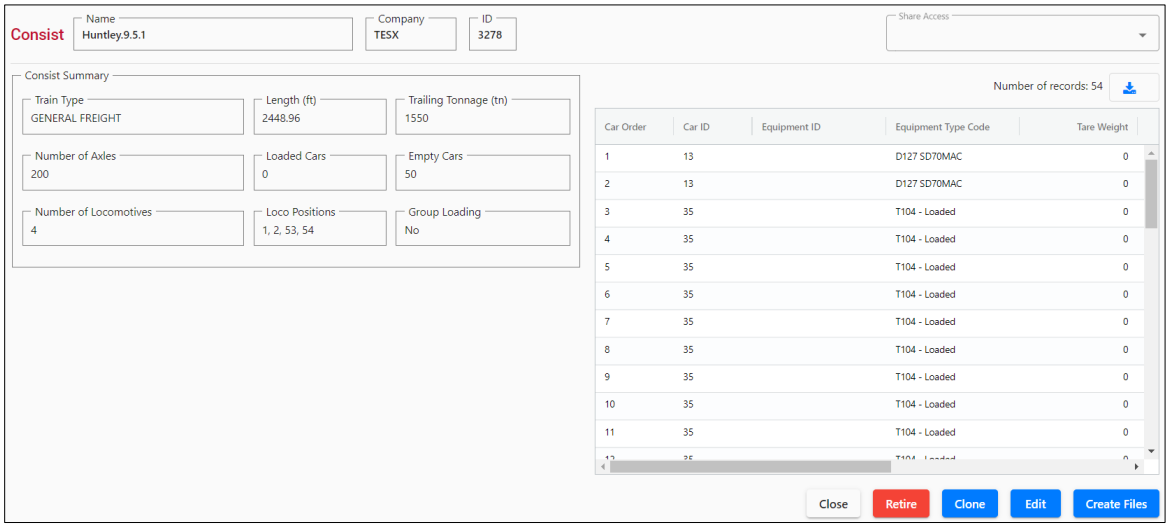
To see all the rows in the table, use the vertical scroll bar. Use the horizontal scroll bar to view any data that exceeds the width of the viewable area.

Select the Refresh icon (↻) to refresh the Manage Consists page contents.

Viewing Consist Details

To view detailed information about a consist, select its Consist ID link on the Manage Consists page. The Consist page is displayed (see Exhibit 36).

Exhibit 36. Consist Page



The Consist page contains the following sections:

Name	Displays the following general information about the consist.
	Name — A descriptive name for the consist.
	Company — The company that created the consist.
	ID — The numeric identifier for the consist.
Share Access	A drop-down list that enables you to select checkboxes to indicate which marks should have access to the consist. MxV Rail can share consists with railroads. Railroads can only share consists with MxV Rail.
Consist Summary	Displays the following summary information about the consist:
	Train Type — The type of train (General Freight, Passenger, etc.).
	Length (ft) — The total length of the train in feet.
	Trailing Tonnage (tn) — The total weight of the railcars being pulled by the locomotive(s) in tons.
	Number of Axles — The number of axles in the consist.
	Loaded Cars — The number of loaded cars in the consist.
	Empty Cars — The number of empty cars in the consist.

Number of Locomotives	The number of locomotives in the consist.
Loco Positions	The position of each locomotive in the consist.
Group Loading	Whether or not Group Loading is in effect. **Note:** Group loading is used by TCL to modify the loading of a block of cars by the same value for each car. For example, if there is a block of grain cars all loaded to the same value and Group Loading is in effect for the consist, then TCL will determine if the load is going to be varied, based on the Monte Carlo distributions and then vary the load the same way for the entire group. If Group Loading is not in effect, then TCL will perform this process on a car-by-car basis and vary each car independently. For a set of cars to be considered a group, they need to be next to each other within a consist, be the same car type, and have the same load.

Equipment

Displays information about each piece of equipment in the consist.

Notes:

- The Number of Records field indicates the total number of pieces of equipment in the consist.
- The download icon () enables you to save the list of equipment in the consist as a CSV file.

This section contains the following columns:

Car Order	The position of the equipment in the consist.
Car ID	PTC TBS Vehicle Type ID.
Equipment ID	An identifier for the piece of equipment.
Equipment Type Code	A code that indicates the type of equipment. This column can also indicate whether the equipment is loaded or empty.
Tare Weight	The weight of the car when empty.
Load (lb)	The weight of the load carried by the car in pounds.
Cut-Out Vehicle Brakes	A checkbox that indicates whether the equipment's brakes have been disabled. **Note:** If this checkbox is selected, TCL will cut the

	brakes out for that equipment during the simulation (the equipment will not produce any braking force when the brakes are applied). This is not typical, but crews can cut-out vehicle brakes during the route for various reasons.
Cut-Out Dynamic Brakes	(Locomotives Only) A checkbox that indicates whether the locomotive's dynamic brakes have been disabled.
Isolate Locomotive	(Locomotives Only) A checkbox that indicates whether the locomotive is isolated. **Note:** An isolated locomotive operates by itself. Non-isolated locomotives operate in sync with one another. If they are *not isolated*, then when power is applied using the first locomotive, the locomotives are synced to also provide power using the second locomotive. If the first locomotive applies the brakes, then the brakes are applied on the second locomotive as well. If the locomotive is isolated, then whatever is done with the first locomotive does not also happen to the second locomotive.

In addition, the Consist page contains the following buttons:

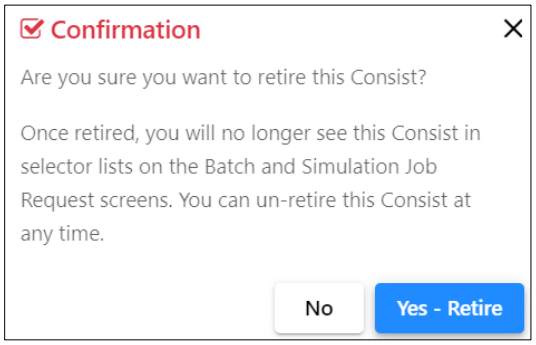
Close	Close the Consist page and return to viewing the Manage Consists page (see Exhibit 35).
Retire	Remove the selected consist from the lists of available consists on the Batch pages and the Simulation Job Request pages. Retired consists are still listed on the Manage Consists page, and can be un-retired at any time. See "Retiring a Consist" on page 52 for more information.
Clone	Create a copy of the selected consist. See "Cloning a Consist" on page 53 for more information.
Edit	Modify the selected consist. See "Editing a Consist" on page 54 for more information.
Create Files	Enables you to create the consist text files that are required by the TOES simulation engine. See "Creating Consist Text Files on page 57" for more information.

Retiring a Consist

Retiring a consist removes it from the lists of available consists on the Batch page and the Simulation Job Request pages. A retired consist is not purged from the system; therefore, you can continue to perform analyses using consists that have been retired.

To retire a consist, first view it on the Consist page (see Exhibit 36), and then select the **Retire** button. The Retire Consist Confirmation popup is displayed (see Exhibit 37).

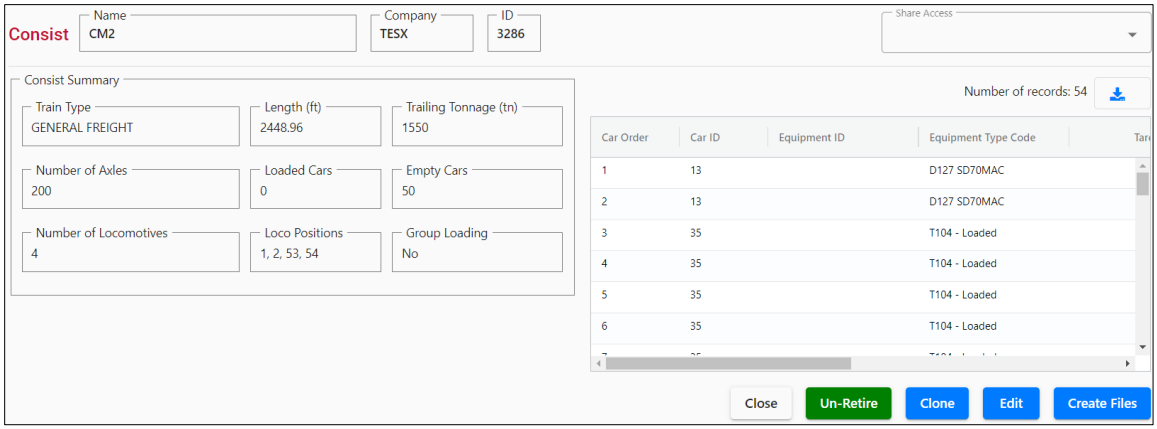
Exhibit 37. Retire Consist Confirmation Popup



Select **Yes-Retire** to retire the consist. The Simulation Job Dashboard is displayed (see Exhibit 6).

Retired consists continue to be listed on the Manage Consists page. You can select a retired consist to view its details on the Consists page (see Exhibit 38).

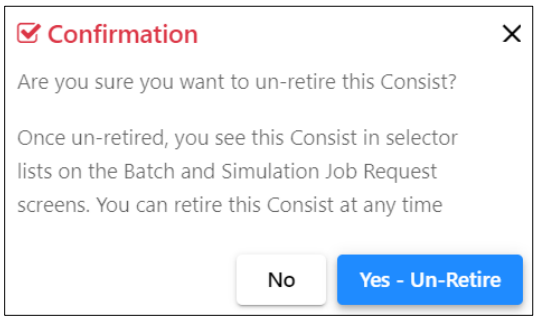
Exhibit 38. Consist Page Showing the Un-Retire Button



You can un-retire a retired consist at any time.

To un-retire a consist, first view it on the Consist page, and then select the **Un-Retire** button. The Un-Retire Consist Confirmation popup is displayed (see Exhibit 39).

Exhibit 39. Un-Retire Consist Confirmation Popup



Select **Yes-Un-Retire** to un-retire the consist and make it available for use in batches and simulation job requests. The Simulation Job Dashboard page is displayed (see Exhibit 6).

Cloning a Consist

Cloning a consist makes a copy of an existing consist.

To clone a consist, first view the consist that you want to clone on the Consist page (see Exhibit 36), and then select the **Clone** button. The Clone Consist popup is displayed (see Exhibit 40).

Exhibit 40. Clone Consist Popup

Enter a name for the new consist in the Consist Name field and select **Save**.

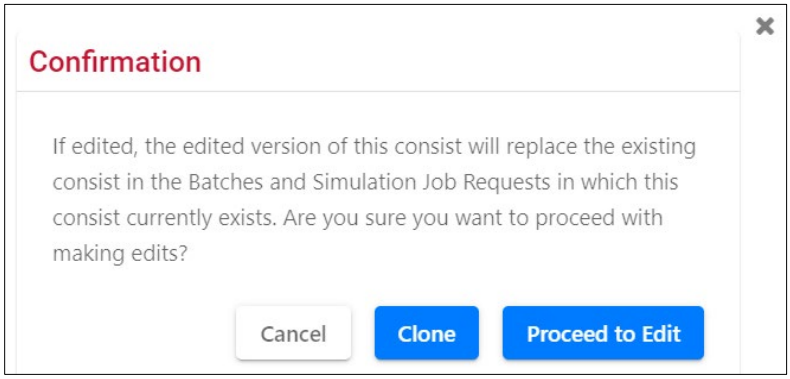
A new consist is created as a copy of the selected consist and is added to the list on the Manage Consists page (see Exhibit 35). You can then select and modify the new consist as needed (see "Editing a Consist" on page 54).

Editing a Consist

You can edit a consist to modify its contents.

To edit a consist, first view the consist that you want to modify on the Consist page (see Exhibit 36), and then select the **Edit** button. The Edit Consist Confirmation popup is displayed (see Exhibit 41).

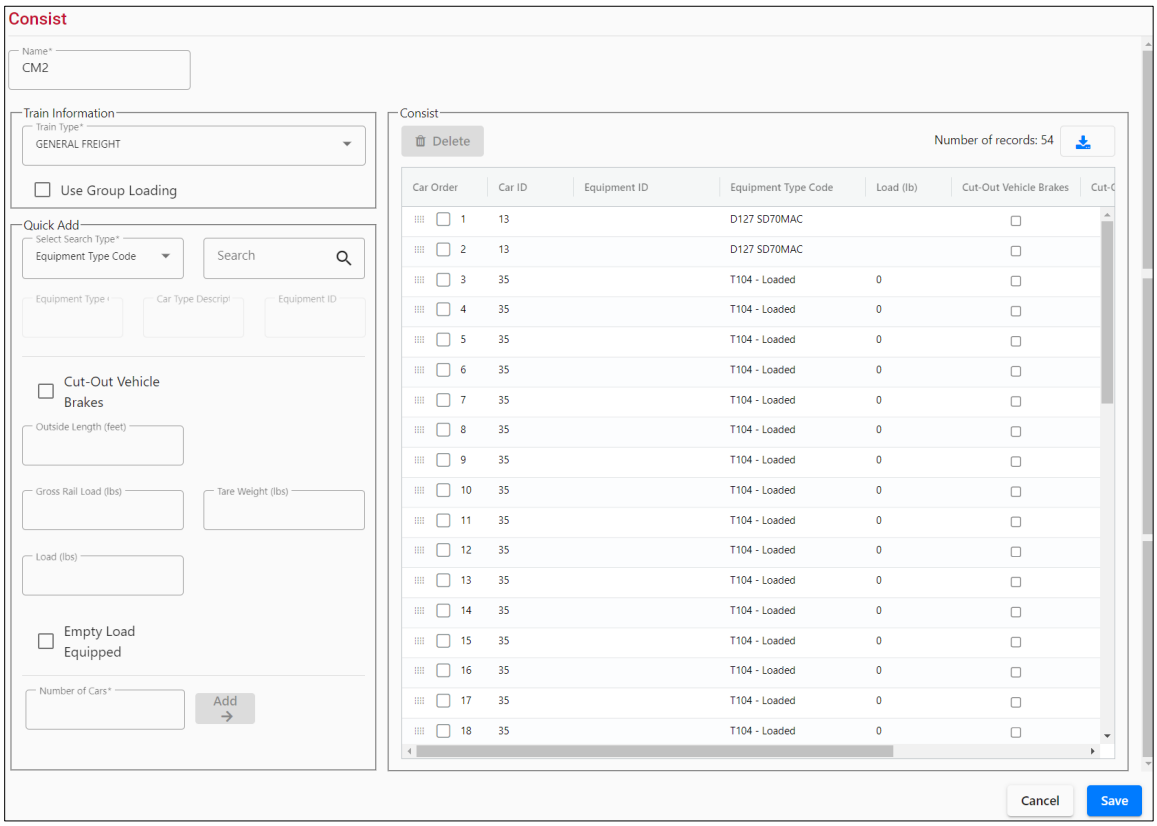
Exhibit 41. Edit Consist Confirmation Popup



The Edit Consist Confirmation popup provides a reminder that if you make changes to a consist, the edited version will replace the existing version in batches and simulation job requests. You can select **Cancel** to cancel the edit and return to the Consist page, **Clone** to make a copy of the selected consist that you can then edit (see "Cloning a Consist" on page 53), or **Proceed to Edit** to continue with editing the selected consist.

If you select **Proceed to Edit**, the Consist page is displayed in edit mode (see Exhibit 42).

Exhibit 42. Consist Page (In Edit Mode)



In edit mode, the Consist page contains the following sections:

Name	You can modify the descriptive name of the consist.
Train Information	You can select the Train Type drop-down to modify the type of train (General Freight, Passenger, etc.). You can select the Use Group Loading checkbox to indicate whether or not Group Loading is in effect (see "Group Loading" on page 50 for more information).
Quick Add	You can configure a car type (vehicle) and add a number of the configured cars to the consist.

Select Search Type	Use this drop-down to select the type of search you want to perform to locate equipment (Equipment Type Code, Car Type Description, Locomotive, or Umler).
Search	Enter the parameters for the search (once you have selected the Search Type).
Cut-Out Vehicle Brakes	Select this checkbox to disable the brakes for the equipment. See "Cut-Out Vehicle Brakes" on page 50 for more information.

Outside Length (feet)	Enter the total length of the piece of equipment in feet.
Gross Rail Load (lbs)	Enter the total weight of the piece of equipment in pounds.
Tare Weight (lbs)	Enter the weight when empty of the piece of equipment in pounds.
Load (lbs)	Enter the weight of the load in pounds.
Empty Load Equipped	Select this checkbox to specify whether or not the equipment has the ability to adjust its braking strength based upon whether or not it is loaded. If the equipment has this capability, it brakes harder loaded, when loaded and uses less braking strength when empty.
Number of Cars	Enter the number of cars/equipment of this type that you want to add to the consist.
	Select this button to add the specified number of configured cars/equipment to the consist.

Consist

Displays information about each piece of equipment in the consist (see "Viewing Consist Details" on page 49 for a description of the fields in this section).

You can perform the following tasks:

Modify the Car Order	Select the drag icon (⁞⁞) in the Car Order column to move the position of the equipment up or down in the consist.
Remove Equipment	Select the checkbox in the Car Order column and then select the **Delete** button to remove the selected equipment from the consist. You can select multiple checkboxes to remove multiple pieces of equipment.
Modify the Load Weight	Select the Load (lb) field and enter a new load weight.
Cut-Out Vehicle Brakes	Select this checkbox to disable the vehicle's brakes. If the checkbox is selected, you can unselect it to enable the vehicle's brakes. See "Cut-Out Vehicle Brakes" on page 50 for more information.
Cut-Out Dynamic Brakes	Select this checkbox to disable the dynamic brakes on a locomotive. If the checkbox is selected, you can unselect it to enable the locomotive's dynamic brakes.

Isolate a Locomotive	Select this checkbox to isolate a locomotive. If the checkbox is selected, you can unselect it to cause the locomotive to operate in sync with other locomotives. See "Isolate Locomotive" on page 51 for more information.

Once you have finished editing the consist, select **Save** to save your changes.

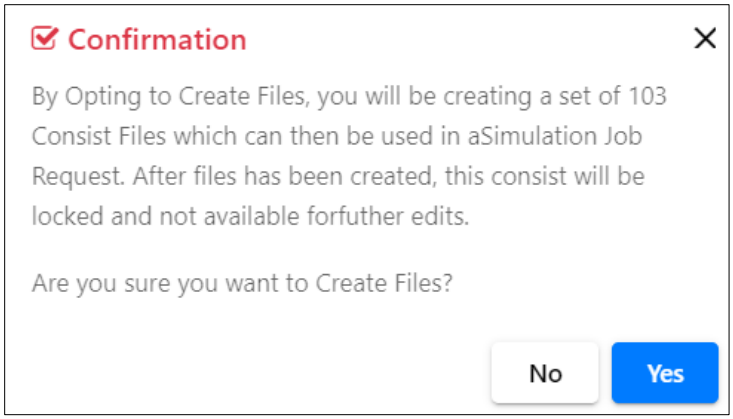
Note: Once you modify a consist, you need to create new consist text files to make the modified consist available for use in batches and simulation job requests (see "Creating Consist Text Files" on page 57 for more information.

Creating Consist Text Files

The TOES simulation engine requires specific text files to process a consist. PTC TBS enables you to create these text files. To begin this process, select **Create Files** from the Consist page. A confirmation popup is displayed (see Exhibit 43).

Note: If you do not create the consist text files as described in this section, the consist will not be available for use in a batch as described in "Creating Batches" on page 43.

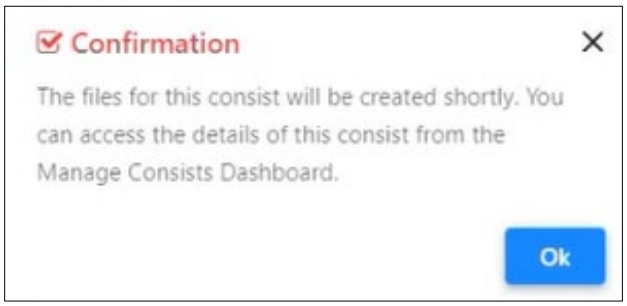
Exhibit 43. Create Files Confirmation Popup



The confirmation popup informs you that once you create a set of consist files, the consist will be locked and can no longer be edited.

Select **Yes** to continue with the Create Files process. A second confirmation popup is displayed to inform you that the files will be created shortly and that you can manage the details of the consist from the Manage Consists page (see Exhibit 44).

Exhibit 44. Create Files Information Popup



Select **OK** to continue.

Once the files have been created, the **Create Files** button on the Consist page changes to a **Download Files** button.

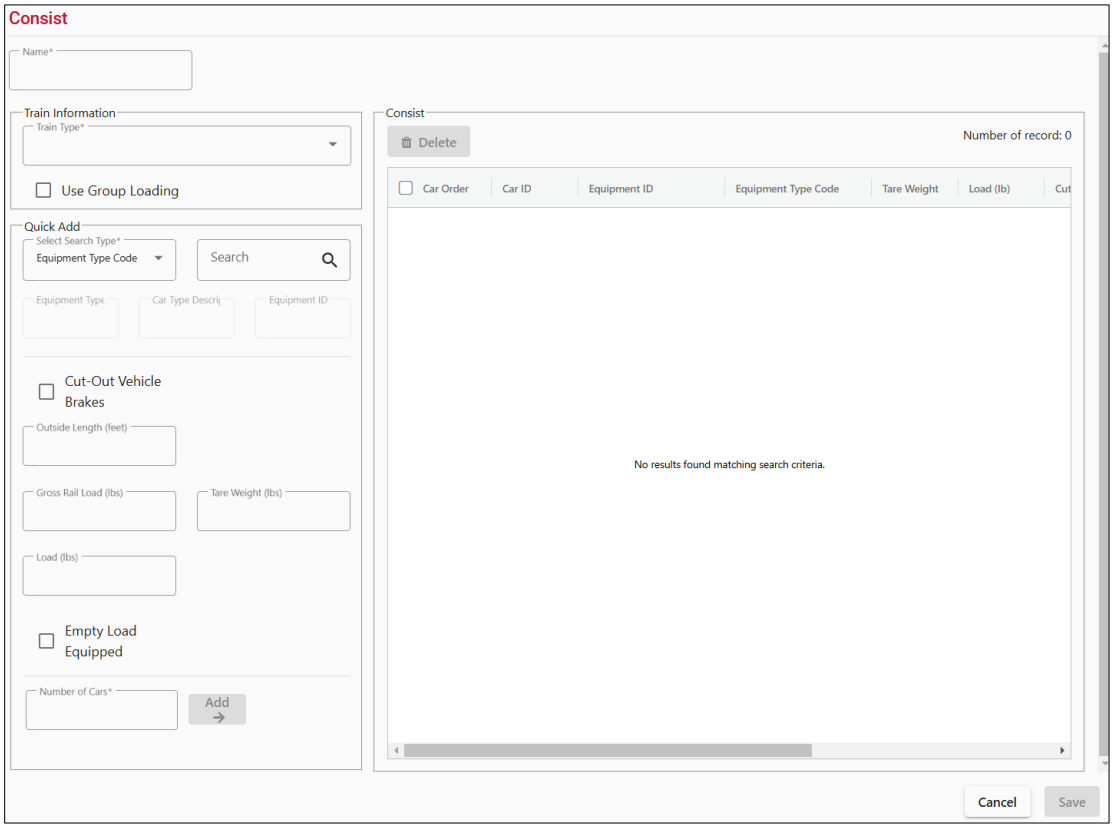
You can select **Download Files** to download the consist text files as a zip file for reference purposes. The zip file contains 100 .CON text files and 100 .CSV files to facilitate a simulation. These files contain slight variations to enable a statistically valid simulation.

Once the consist text files have been created, you cannot edit the consist again (the **Edit** button is disabled). However, you can clone the consist and create new consist text files.

Creating Consists

To create your own consist, select **Create New Consist** from the Consist. The Create Consist page is displayed (see Exhibit 45).

Exhibit 45. Create Consist Page



The Create Consist page contains the following sections:

Name	Enter a descriptive name for the consist.
Train Information	Select the Train Type drop-down to choose the type of train (General Freight, Passenger, etc.). Select the Use Group Loading checkbox if Group Loading is in effect (see "Group Loading" on page 50 for more information).
Quick Add	Use this section to configure a vehicle and add a number of the configured cars to the consist.
Select Search Type	Use this drop-down to select the type of search you want to perform to locate equipment (Equipment Type Code, Car Type Description, Locomotive, or Umler).
Search	Enter the parameters for the search (once you have selected the Search Type).

Cut-Out Vehicle Brakes	Select this checkbox to disable the brakes for the equipment. See "Cut-Out Vehicle Brakes" on page 50 for more information.
Outside Length (feet)	Enter the total length of the piece of equipment in feet.
Gross Rail Load (lbs)	Enter the total weight of the piece of equipment in pounds.
Tare Weight (lbs)	Enter the weight when empty of the piece of equipment in pounds.
Load (lbs)	Enter the weight of the load in pounds.
Empty Load Equipped	Select this checkbox to specify whether or not the equipment has the ability to adjust its braking strength based upon whether or not it is loaded. If the equipment has this capability, it brakes harder loaded, when loaded and uses less braking strength when empty.
Number of Cars	Enter the number of cars/equipment of this type that you want to add to the consist.
	Select this button to add the specified number of configured cars/equipment to the consist.

Consist

Displays information about each piece of equipment in the consist (see "Viewing Consist Details" on page 49 for a description of the fields in this section).

You can perform the following tasks:

Modify the Car Order	Select the drag icon (⠿) in the Car Order column to move the position of the equipment up or down in the consist.
Remove Equipment	Select the checkbox in the Car Order column and then select the **Delete** button to remove the selected equipment from the consist. You can select multiple checkboxes to remove multiple pieces of equipment.
Modify the Load Weight	Select the Load (lb) field and enter a new load weight.
Cut-Out Vehicle Brakes	Select this checkbox to disable the vehicle's brakes. See "Cut-Out Vehicle Brakes" on page 50 for more information.
Cut-Out Dynamic Brakes	Select this checkbox to disable the dynamic brakes on a locomotive.

Isolate a Locomotive	Select this checkbox to isolate a locomotive. See "Isolate Locomotive" on page 51 for more information.

Once you have completed the consist fields, select **Save** to save your new consist.

Note: After you create a consist, you need to create consist text files to make the new consist available for use in batches and simulation job requests (see "Creating Consist Text Files" on page 57 for more information.

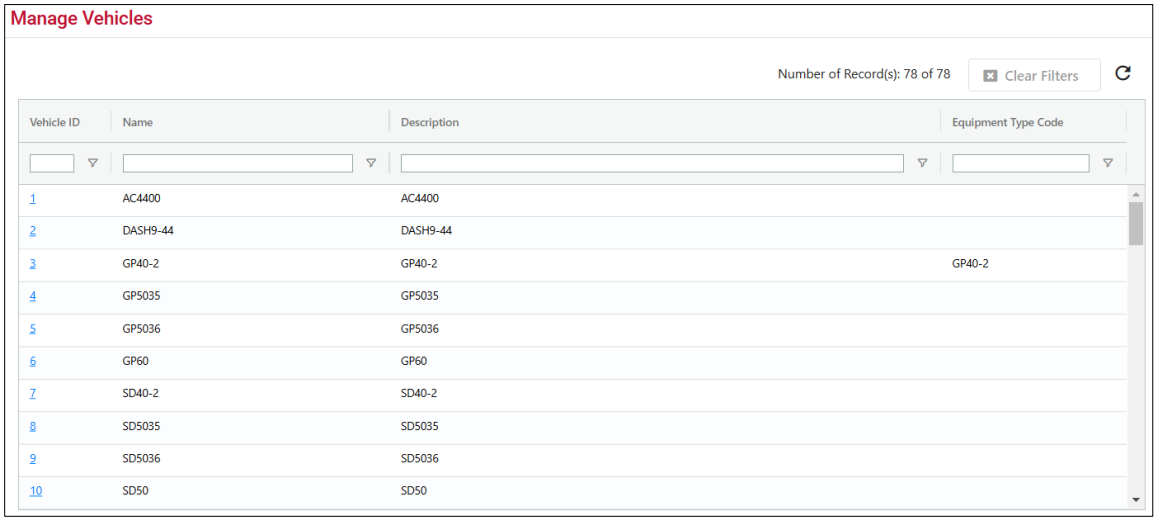
Working with Vehicles

If available to you, the Vehicle page enables you to work with templated railcars and locomotives. You can view the properties of these vehicles as well as clone them and edit their descriptive information.

You can view vehicles and select them for use in consists. The ability to create new types of vehicles is currently limited to MxV Rail.

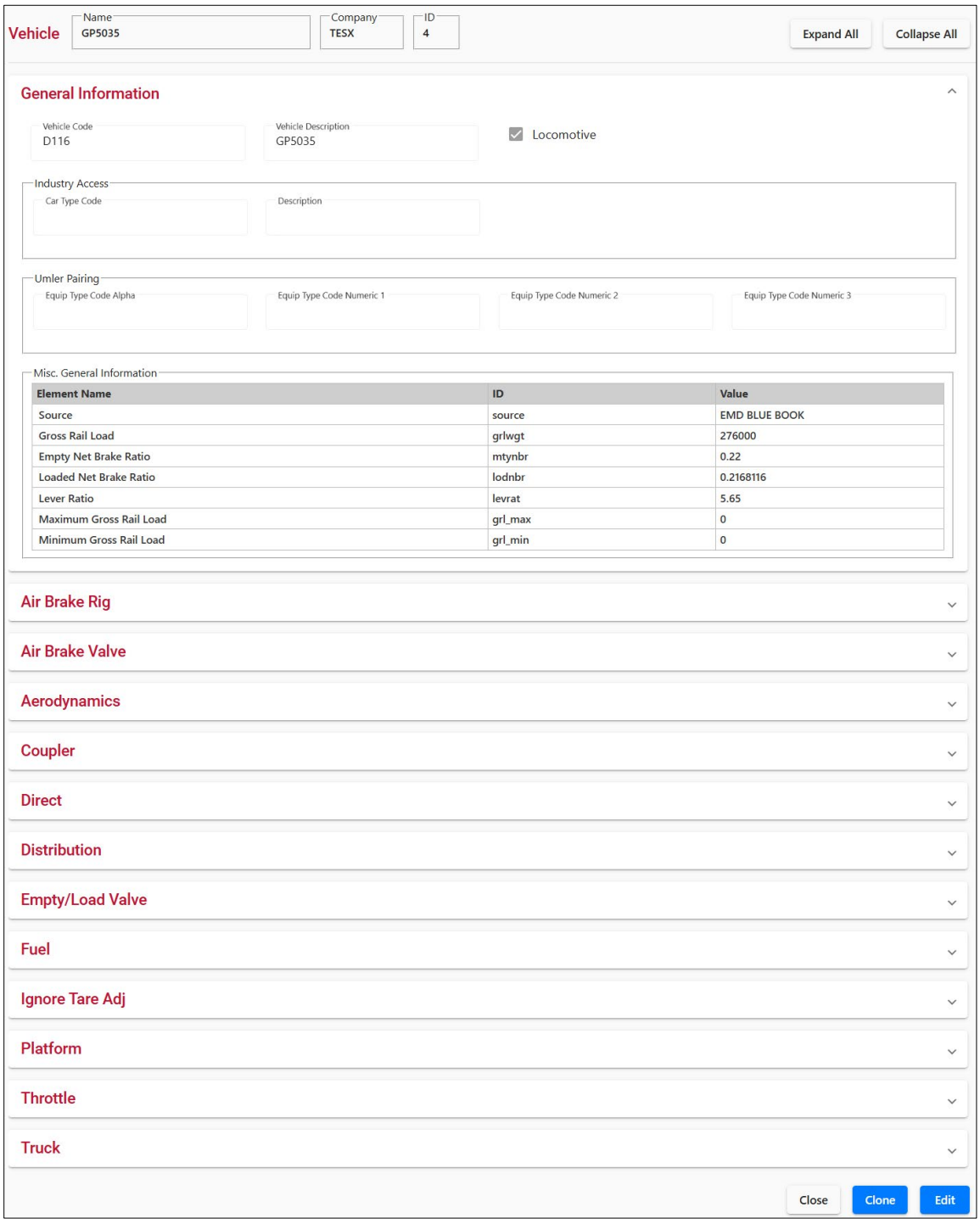
To view the list of available vehicles, select **Manage Vehicles** from the Vehicle menu. The Manage Vehicles page is displayed (see Exhibit 46).

Exhibit 46. Manage Vehicles Page



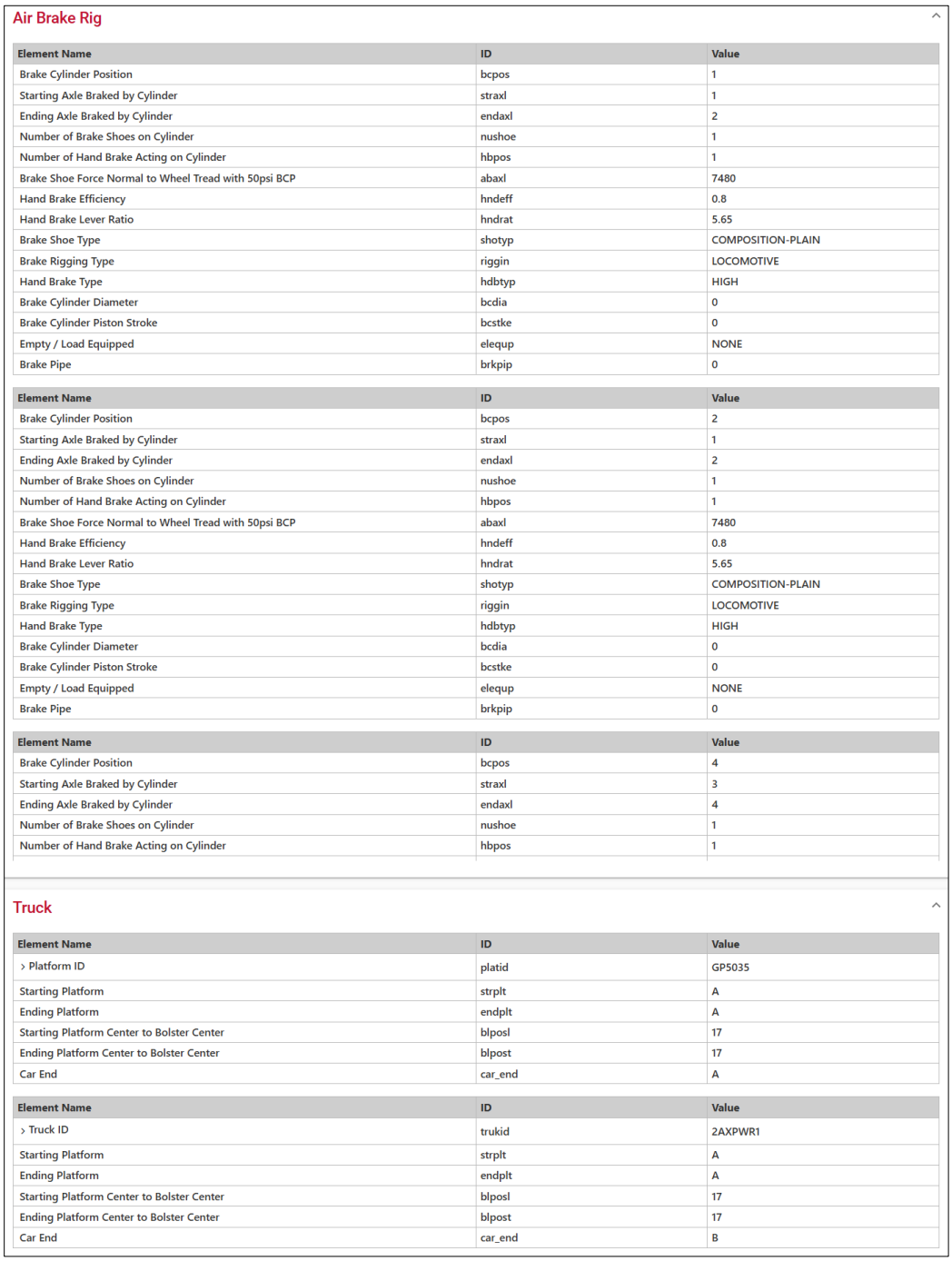
Select a Vehicle ID link to view the Vehicle page for that vehicle. This page displays data from a physics perspective, such as aerodynamics, as well as Umler properties (see Exhibit 47).

Exhibit 47. Vehicle Page (Properties Collapsed – Full View)



You can select the **Expand All** button at the top right to expand and view all of the vehicle properties (see Exhibit 48).

Exhibit 48. Vehicle Page (Properties Expanded – Partial View)



Air Brake Rig

Element Name	ID	Value
Brake Cylinder Position	bcpos	1
Starting Axle Braked by Cylinder	straxl	1
Ending Axle Braked by Cylinder	endaxl	2
Number of Brake Shoes on Cylinder	nushoe	1
Number of Hand Brake Acting on Cylinder	hbpos	1
Brake Shoe Force Normal to Wheel Tread with 50psi BCP	abaxl	7480
Hand Brake Efficiency	hndeff	0.8
Hand Brake Lever Ratio	hndrat	5.65
Brake Shoe Type	shotyp	COMPOSITION-PLAIN
Brake Rigging Type	riggin	LOCOMOTIVE
Hand Brake Type	hdbtyp	HIGH
Brake Cylinder Diameter	bcdia	0
Brake Cylinder Piston Stroke	bcstke	0
Empty / Load Equipped	elequp	NONE
Brake Pipe	brkpip	0

Element Name	ID	Value
Brake Cylinder Position	bcpos	2
Starting Axle Braked by Cylinder	straxl	1
Ending Axle Braked by Cylinder	endaxl	2
Number of Brake Shoes on Cylinder	nushoe	1
Number of Hand Brake Acting on Cylinder	hbpos	1
Brake Shoe Force Normal to Wheel Tread with 50psi BCP	abaxl	7480
Hand Brake Efficiency	hndeff	0.8
Hand Brake Lever Ratio	hndrat	5.65
Brake Shoe Type	shotyp	COMPOSITION-PLAIN
Brake Rigging Type	riggin	LOCOMOTIVE
Hand Brake Type	hdbtyp	HIGH
Brake Cylinder Diameter	bcdia	0
Brake Cylinder Piston Stroke	bcstke	0
Empty / Load Equipped	elequp	NONE
Brake Pipe	brkpip	0

Element Name	ID	Value
Brake Cylinder Position	bcpos	4
Starting Axle Braked by Cylinder	straxl	3
Ending Axle Braked by Cylinder	endaxl	4
Number of Brake Shoes on Cylinder	nushoe	1
Number of Hand Brake Acting on Cylinder	hbpos	1

Truck

Element Name	ID	Value
› Platform ID	platid	GP5035
Starting Platform	strplt	A
Ending Platform	endplt	A
Starting Platform Center to Bolster Center	blposl	17
Ending Platform Center to Bolster Center	blpost	17
Car End	car_end	A

Element Name	ID	Value
› Truck ID	trukid	2AXPWR1
Starting Platform	strplt	A
Ending Platform	endplt	A
Starting Platform Center to Bolster Center	blposl	17
Ending Platform Center to Bolster Center	blpost	17
Car End	car_end	B

Select **Collapse All** to hide all of the vehicle properties.

Working with Tracks

The Track menu enables you to select, configure, and upload simulated tracks for use in PTC TBS.

The Track menu contains the following options:

- Select **Manage Tracks** to work with existing tracks. See "Managing Tracks" on page 65 for more information.
- Select **Create New Track** to upload a new track. See "Creating Tracks" on page 71 for more information.

Managing Tracks

Managing tracks includes viewing the list of all available tracks, selecting tracks, and performing operations on the selected tracks (such retiring).

Note: You cannot edit tracks.

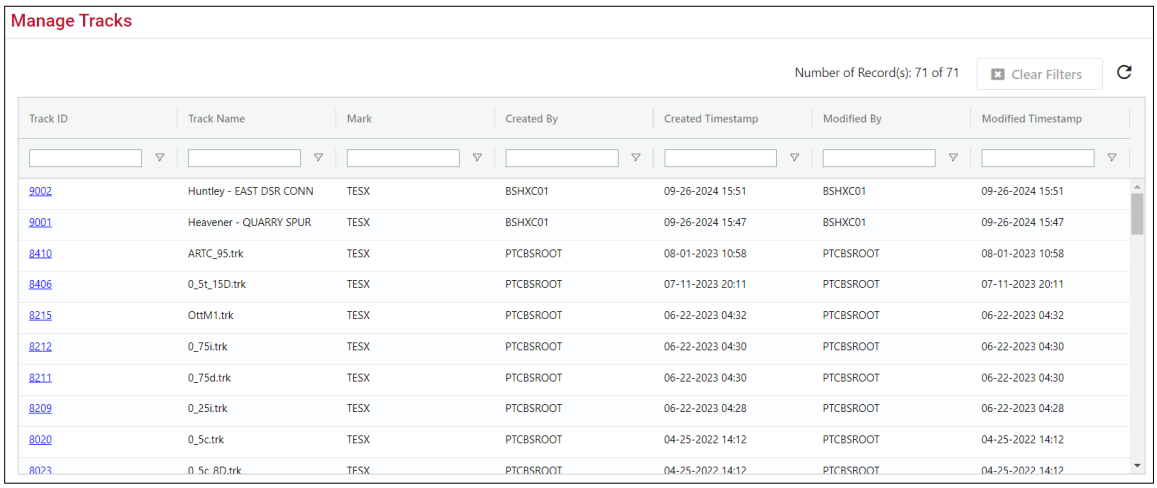
See the following sections for detailed information about managing tracks:

- "Viewing All Available Tracks" on page 65
- "Viewing Track Details" on page 68
- "Retiring a Track" on page 70

Viewing All Available Tracks

The Manage Tracks page is displayed when you select **Manage Tracks** from the Track menu (see Exhibit 49).

Exhibit 49. Manage Tracks Page



The Manage Tracks page enables you to view all available tracks. It consists of a table with a row (record) for every active (non-retired) track contained in PTC TBS. These rows contain the following columns:

Track ID	Displays the numeric track identifier. This identifier is a link, which you can select to view detailed information about the track as well as perform tasks related to the selected track (see "Viewing Track Details" on page 68).
Track Name	Displays the descriptive name of the track.
Mark	Lists the mark of the company that uploaded the track.
Created By	Lists the user ID that created the track.
Created Timestamp	Displays the date and time, in Eastern Time, when the track was originally created.
Modified By	Lists the user ID that last modified the track.
Modified Timestamp	Displays the date and time, in Eastern Time, when the track was last modified.

By default, the Manage Tracks page displays all tracks in reverse chronological order, with the last modified track displayed at the top of the list. The Number of Records field at the top right indicates the number of tracks you are currently working with and the total number of tracks in the list. These numbers are the same unless a filter is set.

You can quickly drill down to the tracks you need by sorting and/or filtering the rows of information.

Sorting

To sort the rows in ascending or descending order by a specified column, select the heading of the column by which you want to sort. An up or down arrow is displayed to indicate the sort direction. To remove the sort, select the heading again until the arrow disappears. You can also sort by multiple columns by pressing and holding the Shift key while selecting additional

columns. If you sort by multiple columns, the column heading for the primary sort is appended with “1”, and the column heading for the secondary sort is appended with “2”, etc.

Filtering
You can filter using two different methods – simple column filtering and advanced column filtering.

- For simple column filtering, enter a character or string in the text box field below the column heading. The table displays only the rows that contain the character or string you specified (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, simply delete the text in the Filter field.

- For advanced column filtering, select the column filter icon (▽) next to the text box field below any column heading to filter the data in that column. A tool is displayed that enables you to select parameters such as “Contains”, “Not contains”, “Equals”, “Not equal” “Starts with”, and “Ends with”, and type characters into a Filter field. The table displays only the rows that meet the filter rule you set up (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, select the filter icon (▽) and delete the text in the Filter field.

Note: Once you apply a filter, that filter remains in effect throughout your use of the application. Select **Clear Filters** at the top right to remove all of the filters.

Tip! You can apply filters to multiple columns at once. For example, you could apply a column filter containing “BNSF” on the Mark column, and another column filter containing “2024” on the Modified Timestamp column. This would enable you to only display rows for tracks uploaded by BNSF that were modified in 2024.

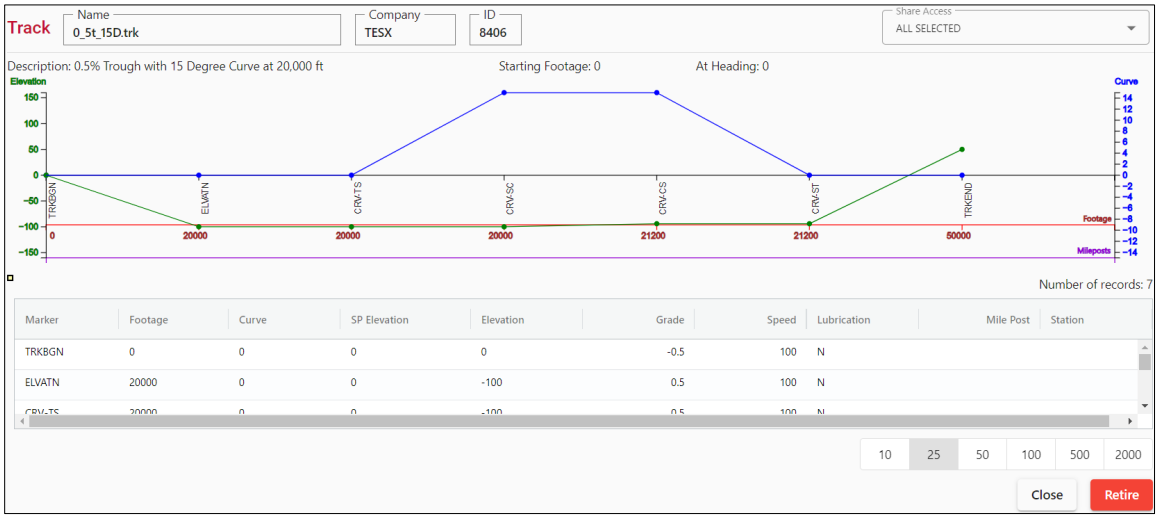
To see all the rows in the table, use the vertical scroll bar. Use the horizontal scroll bar to view any data that exceeds the width of the viewable area.

Select the Refresh icon (↻) to refresh the Manage Tracks page contents.

Viewing Track Details

To view detailed information about a track, select its Track ID link on the Manage Tracks page. The Track page is displayed (see Exhibit 50).

Exhibit 50. Track Page



The Track page contains the following sections:

Name	Displays the following general information about the track.
	Name — A descriptive name for the track.
	Company — The company that uploaded the track.
	ID — The numeric identifier for the track.
Share Access	A drop-down list that enables you to select checkboxes to indicate which marks should have access to the track. MxV Rail can share tracks with railroads. Railroads can only share tracks with MxV Rail.
Description	Provides a brief description of the track.
Graph	A graphical representation of the track. You can hover your mouse over a point on the graph to view detailed information associated with that point.
	Green line — Indicates the elevation of the track in feet.
	Blue line — Indicates the curve of the track in degrees.
	Red line — Indicates the footage of the track from start to finish.
Table	Displays a row for each marker on the track. Each row contains the following columns of information:

Marker	An identifier for a section of track.
Footage	The distance from the beginning of the track.
Curve	The degree of curvature of the track at the specified marker.
SP Elevation	The super elevation (i.e., the height of one side of the track vs. the height of the other side of the track).
Elevation	The elevation above sea level of the track.
Grade	The slope of the track.
Speed	The speed limit of the track.
Lubrication	Reference information for the track owner. This information is not used in simulation calculations.
Mile Post	Reference information for the track owner. This information is not used in simulation calculations.
Station	Reference information for the track owner. This information is not used in simulation calculations.

In addition, the Track page contains the following buttons:

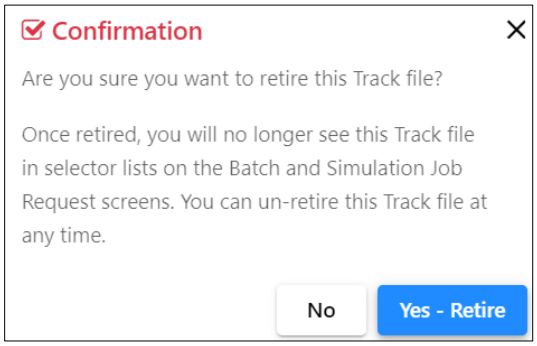
Close	Close the Track page and return to viewing the Manage Tracks page (see Exhibit 49).
Retire	Remove the selected track from the lists of available tracks on the Batch pages and the Simulation Job Request pages. Retired tracks are still listed on the Manage Tracks page, and can be un-retired at any time. See “Retiring a Track” on page 70 for more information.

Retiring a Track

Retiring a track removes it from the lists of available tracks on the Batch pages and the Simulation Job Request pages. A retired track is not purged from the system; therefore, you can continue to perform analyses using tracks that have been retired.

To retire a track, first view it on the Track page (see Exhibit 50), and then select the **Retire** button. The Retire Track Confirmation popup is displayed (see Exhibit 51).

Exhibit 51. Retire Track Confirmation Popup



Select **Yes-Retire** to retire the track. The Simulation Job Dashboard is displayed (see Exhibit 6).

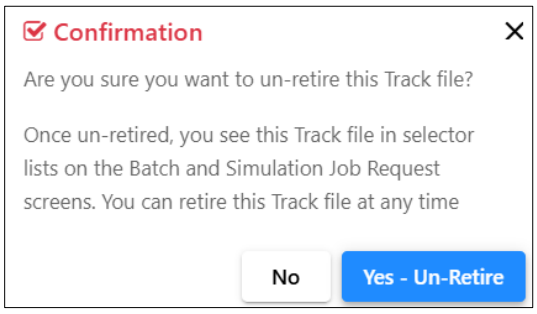
Retired tracks continue to be listed on the Manage Tracks page. You can select a retired track to view its details on the Track page (see Exhibit 52).

Exhibit 52. Track Page Showing the Un-Retire Button

You can un-retire a retired track at any time.

To un-retire a track, first view it on the Track page, and then select the **Un-Retire** button. The Un-Retire Track Confirmation popup is displayed (see Exhibit 53).

Exhibit 53. Un-Retire Track Confirmation Popup



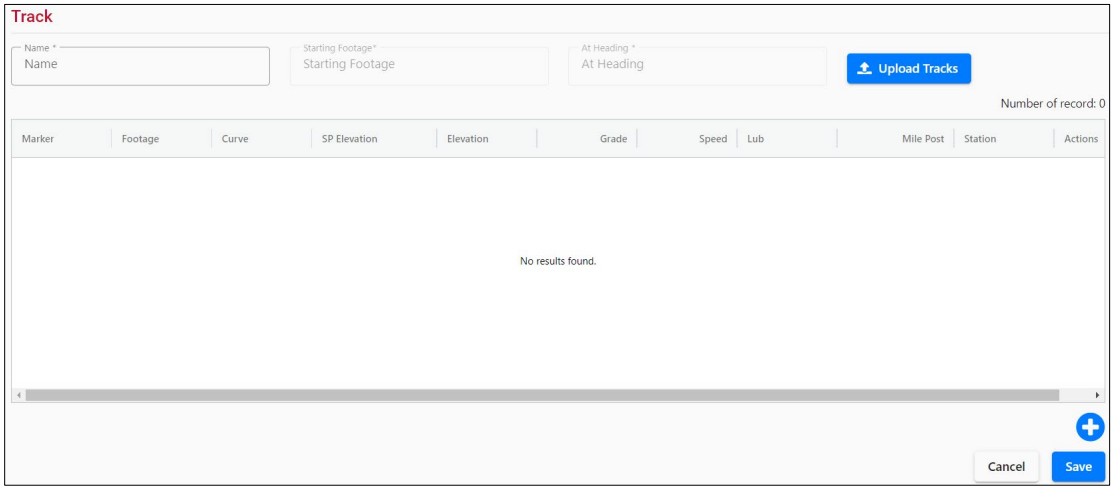
Select **Yes-Un-Retire** to un-retire the track and make it available for use in batches and simulation job requests. The Simulation Job Dashboard is displayed (see Exhibit 6).

Creating Tracks

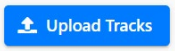
PTC TBS enables you to upload your own track for use in simulations. This is referred to as creating track.

To upload your own track, select **Create New Track** from the Track menu. The Create Track page is displayed (see Exhibit 54).

Exhibit 54. Create Track Page

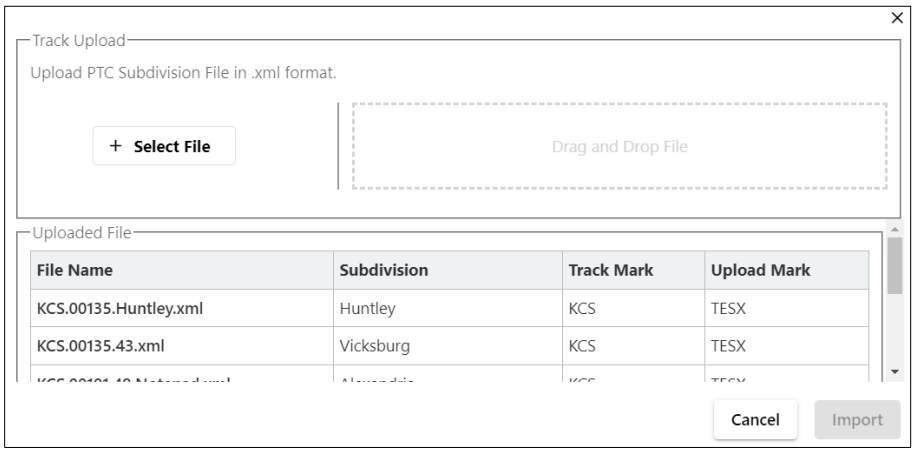


The Create Track page enables you to upload a file containing track information.

To upload a file containing track information, select 

. The Track Upload popup is displayed (see Exhibit 55).

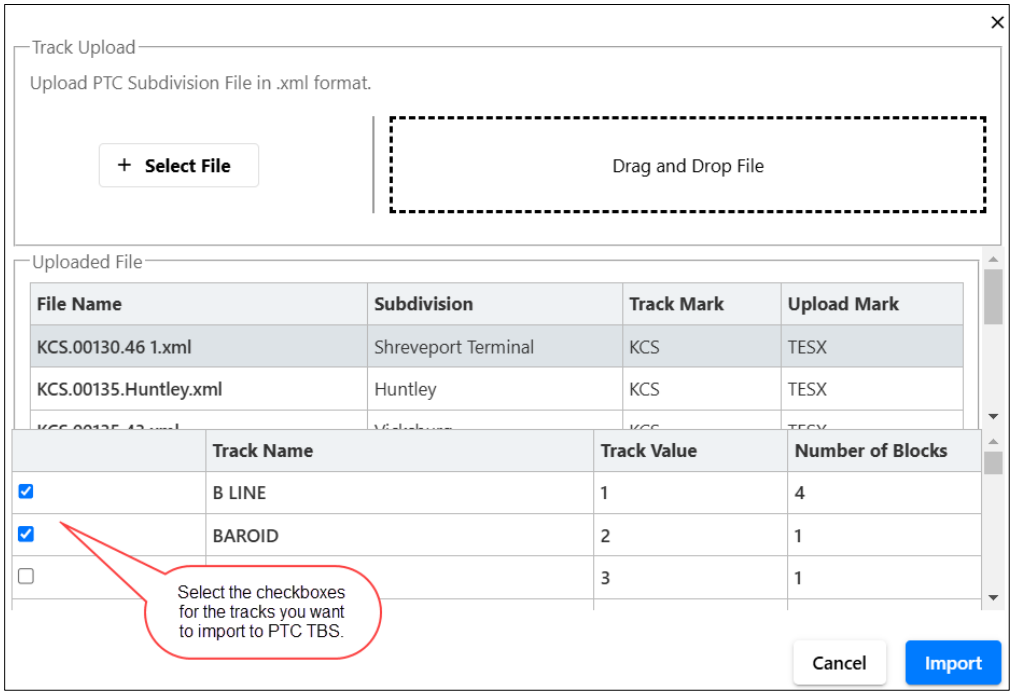
Exhibit 55. Track Upload Popup



In the Track Upload section, use the **Select File** button (or drag and drop) a PTC Subdivision XML file containing track information. The Track Upload popup is updated with the names of tracks that you can import (see Exhibit 56).

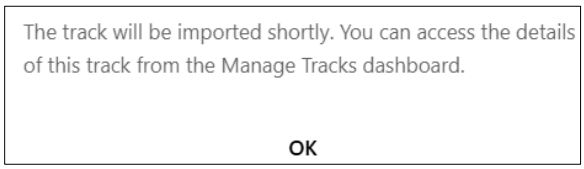
Note: The Uploaded Files section contains the names of track files that have already been uploaded.

Exhibit 56. Track Upload Popup Showing the Tracks Available to Import



Select the checkboxes for the tracks you want to import and then select **Import**. A confirmation popup is displayed (see Exhibit 57).

Exhibit 57. Track Upload Confirmation Popup



Select **OK** to acknowledge the popup. The Manage Tracks page is displayed (see Exhibit 49).

The tracks are displayed on the Manage Tracks page once the import has completed.

Working with Train Handling Files

Train Handling Files contain data that controls how the train operates during a simulation. You can optionally configure train handling events to occur at a specific time.

Train Handling Files are especially useful when working with enforcement algorithm simulations.

The Train Handling menu contains the following options:

- Select **Manage Train Handling Files** to work with existing Train Handling Files. See "Managing Train Handling Files" on page 74 for more information.
- Select **Create New Train Handling File** to create a new Train Handling File. See "Creating Train Handling Files" on page 82 for more information.

Managing Train Handling Files

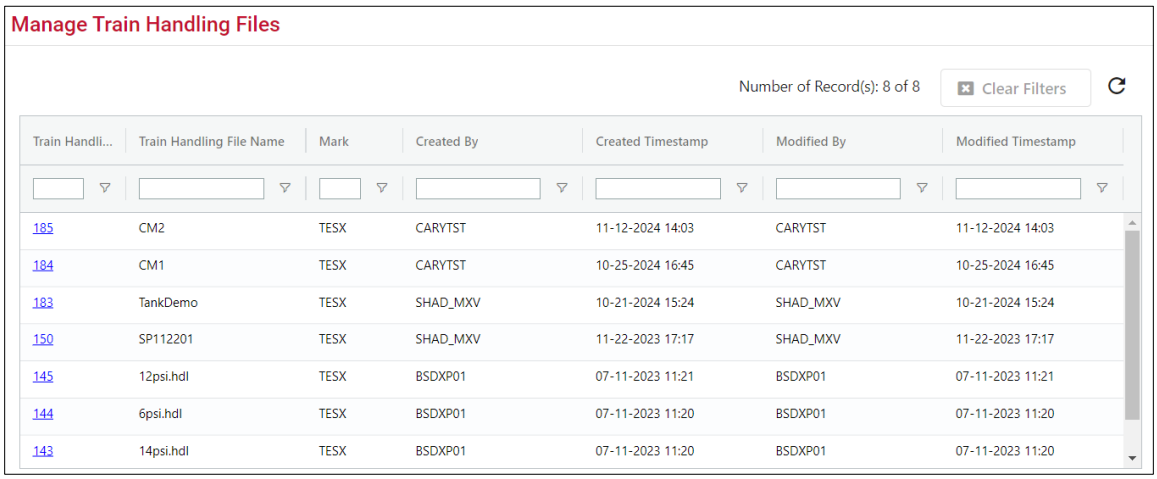
Managing Train Handling Files includes viewing the list of all available Train Handling Files, selecting an individual Train Handling File, and performing operations on the selected Train Handling File (such as editing, cloning, and retiring).

See the following sections for detailed information about managing Train Handling Files:

Viewing All Available Train Handling Files

The Manage Train Handling Files page is displayed when you select **Manage Train Handling Files** from the Train Handling menu (see Exhibit 58).

Exhibit 58. Manage Train Handling Files Page



The Manage Train Handling Files page enables you to view all available Train Handling Files. It consists of a table with a row (record) for every active (non-retired) Train Handling File contained in PTC TBS. These rows contain the following columns:

Train Handling ID	Displays the numeric Train Handling File identifier. This identifier is a link, which you can select to view detailed information about the Train Handling File as well as perform tasks related to the selected Train Handling File (see "Viewing Train Handling File Details" on page 77).
Train Handling File Name	Displays the descriptive name of the Train Handling File.
Mark	Lists the mark of the Train Handling File creator.
Created By	Lists the user ID that created the Train Handling File.
Created Timestamp	Displays the date and time, in Eastern Time, when the Train Handling File was originally created.
Modified By	Lists the user ID that last modified the Train Handling File.
Modified Timestamp	Displays the date and time, in Eastern Time, when the Train Handling File was last modified.

By default, the Manage Train Handling Files page displays all Train Handling Files in reverse chronological order, with the last modified Train Handling File displayed at the top of the list. The Number of Records field at the top right indicates the number of Train Handling Files you are currently working with and the total number of Train Handling Files in the list. These numbers are the same unless a filter is set.

You can quickly drill down to the Train Handling Files you need by sorting and/or filtering the rows of information.

Sorting

To sort the rows in ascending or descending order by a specified column, select the heading of the column by which you want to sort. An up or down arrow is displayed to indicate the sort

direction. To remove the sort, select the heading again until the arrow disappears. You can also sort by multiple columns by pressing and holding the Shift key while selecting additional columns. If you sort by multiple columns, the column heading for the primary sort is appended with "1", and the column heading for the secondary sort is appended with "2", etc.

Filtering
You can filter using two different methods – simple column filtering and advanced column filtering.

- For simple column filtering, enter a character or string in the text box field below the column heading. The table displays only the rows that contain the character or string you specified (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, simply delete the text in the Filter field.

- For advanced column filtering, select the column filter icon (▽) next to the text box field below any column heading to filter the data in that column. A tool is displayed that enables you to select parameters such as "Contains", "Not contains", "Equals", "Not equal" "Starts with", and "Ends with", and type characters into a Filter field. The table displays only the rows that meet the filter rule you set up (in that column). A filter icon (▽) is displayed in the column heading to remind you about the filter. The count at the top right reflects the number of currently displayed rows and the number of rows in the entire table. To return to viewing the entire table, select the filter icon (▽) and delete the text in the Filter field.

Note: Once you apply a filter, that filter remains in effect throughout your use of the application. Select **Clear Filters** at the top right to remove all of the filters.

Tip! You can apply filters to multiple columns at once. For example, you could apply a column filter containing "TESX" on the Mark column, and another column filter containing "2024" on the Modified Timestamp column. This would enable you to only display rows for Train Handling Files created by TESX that were modified in 2024.

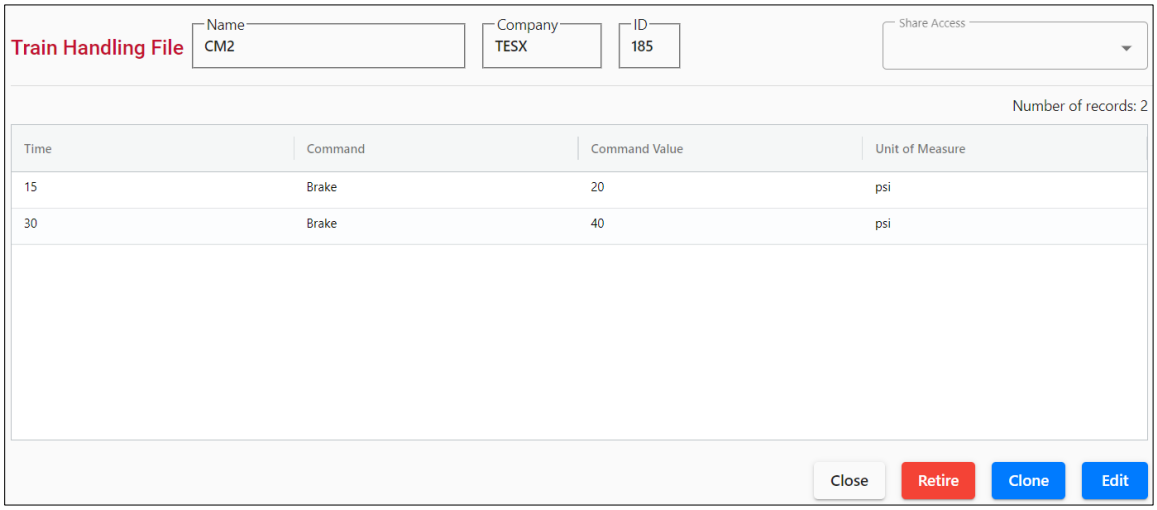
To see all the rows in the table, use the vertical scroll bar. Use the horizontal scroll bar to view any data that exceeds the width of the viewable area.

Select the Refresh icon (↻) to refresh the Manage Train Handling Files page contents.

Viewing Train Handling File Details

To view detailed information about a Train Handling File, select its Train Handling ID link on the Manage Train Handling Files page. The Train Handling File page is displayed (see Exhibit 59).

Exhibit 59. Train Handling File Page



The Train Handling File page contains the following sections:

Name	Displays the following general information about the Train Handling File.
	Name — A descriptive name for the Train Handling File.
	Company — The company that created the Train Handling File.
	ID — The numeric identifier for the Train Handling File.
Share Access	A drop-down list that enables you to select checkboxes to indicate which marks should have access to the Train Handling File. MxV Rail can share Train Handling Files with railroads. Railroads can only share Train Handling Files with MxV Rail.
Train Handling File Details	Displays the following detailed information about the Train Handling File:
	Time — The time (in seconds) from the beginning of the simulation at which an action should occur.
	Command — The type of action that should occur at the specified time.
	Command Value — The value of the specified command.
	Unit of Measure — The unit of measure of the command value.

In addition, the Train Handling File page contains the following buttons:

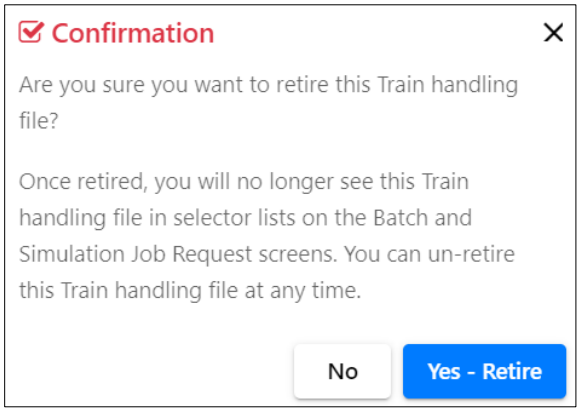
Close	Close the Train Handling File page and return to viewing the Manage Train Handling Files page (see Exhibit 58).
Retire	Remove the selected Train Handling File from the lists of available Train Handling Files on the Batch pages and the Simulation Job Request pages. Retired Train Handling Files are still listed on the Manage Train Handling Files page, and can be un-retired at any time. See "Retiring a Train Handling File" on page 78 for more information.
Clone	Create a copy of the selected Train Handling File. See "Cloning a Train Handling File" on page 80 for more information.
Edit	Modify the selected Train Handling File. See "Editing a Train Handling File" on page 80 for more information.

Retiring a Train Handling File

Retiring a Train Handling File removes it from the lists of available Train Handling Files on the Batch pages and the Simulation Job Request pages. A retired Train Handling File is not purged from the system; therefore, you can continue to perform analyses using Train Handling Files that have been retired.

To retire a Train Handling File, first view it on the Train Handling File page (see Exhibit 59), and then select the **Retire** button. The Retire Train Handling File Confirmation popup is displayed (see Exhibit 60).

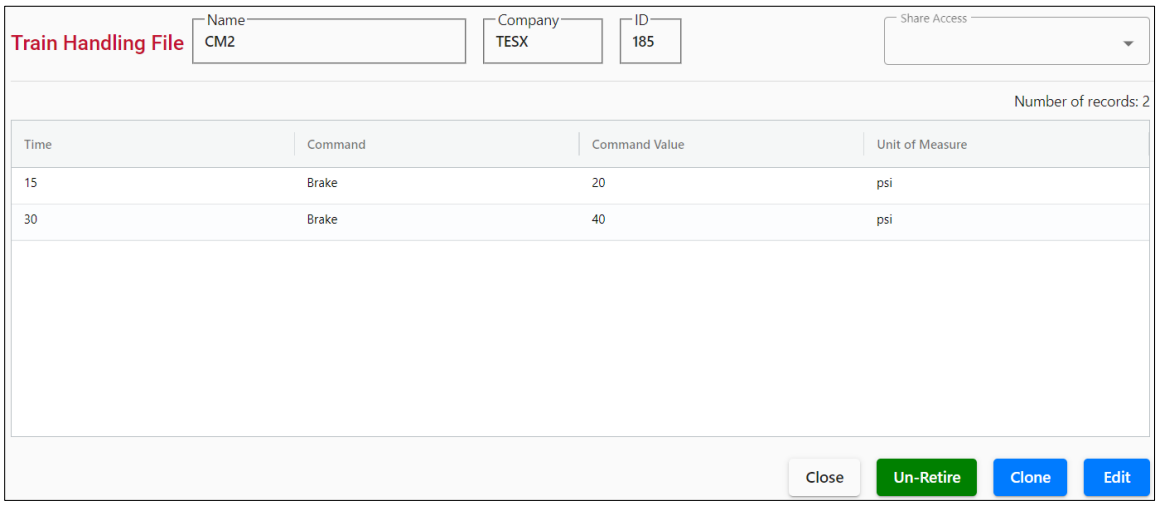
Exhibit 60. Retire Train Handling File Confirmation Popup



Select **Yes-Retire** to retire the Train Handling File. The Simulation Job Dashboard is displayed (see Exhibit 6).

Retired Train Handling Files continue to be listed on the Manage Train Handling Files page. You can select a retired Train Handling File to view its details on the Train Handling File page (see Exhibit 61).

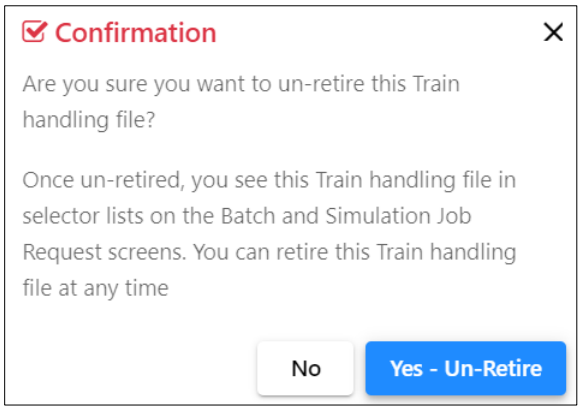
Exhibit 61. Train Handling File Page Showing the Un-Retire Button



You can un-retire a retired Train Handling File at any time.

To un-retire a Train Handling File, first view it on the Train Handling File page, and then select the **Un-Retire** button. The Un-Retire Train Handling File Confirmation popup is displayed (see Exhibit 62).

Exhibit 62. Un-Retire Train Handling File Confirmation Popup



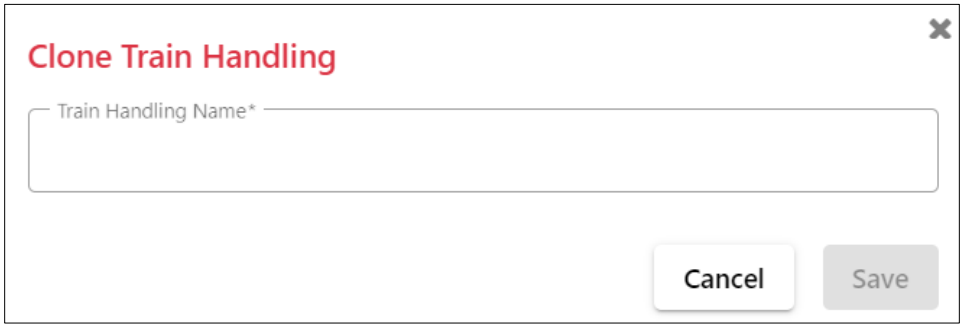
Select **Yes-Un-Retire** to un-retire the Train Handling File and make it available for use in batches and simulation job requests. The Simulation Job Dashboard is displayed (see Exhibit 6).

Cloning a Train Handling File

Cloning a Train Handling File makes a copy of an existing Train Handling File.

To clone a Train Handling File, first view the Train Handling File that you want to clone on the Train Handling File page (see Exhibit 59), and then select the **Clone** button. The Clone Train Handling popup is displayed (see Exhibit 63).

Exhibit 63. Clone Train Handling Popup



Enter a name for the new Train Handling File in the Train Handling Name field and select **Save**.

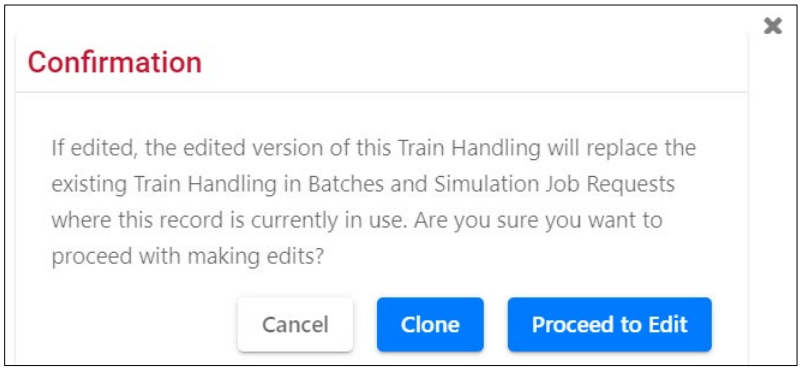
A new Train Handling File is created as a copy of the selected Train Handling File and is added to the list on the Manage Train Handling File s page (see Exhibit 58). You can then select and modify the new Train Handling File as needed (see "Editing a Train Handling File" on page 80).

Editing a Train Handling File

You can edit a Train Handling File to modify its contents.

To edit a Train Handling File, first view the Train Handling File that you want to modify on the Train Handling File page (see Exhibit 59), and then select the **Edit** button. The Edit Train Handling File Confirmation popup is displayed (see Exhibit 64).

Exhibit 64. Edit Train Handling File Confirmation Popup

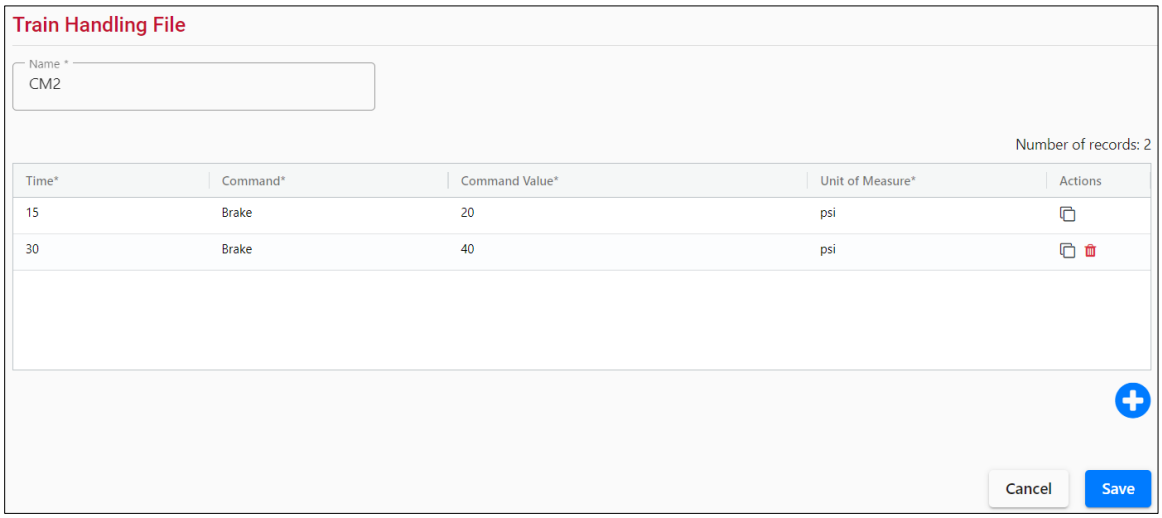


The Edit Train Handling File Confirmation popup provides a reminder that if you make changes to a Train Handling File, the edited version will replace the existing version in batches and simulation job requests. You can select **Cancel** to cancel the edit and return to the Train Handling

File page, **Clone** to make a copy of the selected Train Handling File that you can then edit (see "Cloning a Train Handling File" on page 80), or **Proceed to Edit** to continue with editing the selected Train Handling File.

If you select **Proceed to Edit**, the Train Handling File page is displayed in edit mode (see Exhibit 65).

Exhibit 65. Train Handling File Page (In Edit Mode)



In edit mode, the Train Handling File page contains the following sections:

Name	You can modify the descriptive name of the Train Handling File.
Command Table	You can modify the time and type of handling event(s).

Time	Select this column to modify the time (in seconds) when a handling event should occur.
Command	Use the drop-down list in this column to modify the type of handling event that you want to occur at the specified time (e.g., Brake, Bail Off, etc.).
Command Value	Use this column to modify the value for the command that you selected. If you delete the existing Command Value, this field displays acceptable parameters for each command (e.g., if you selected Brake as the command, the Command Value field displays that the value for "Brake" must be an integer >= 6 and <= 100).
Unit of Measure	Use this field to modify the unit of measure for the Command Value field. This field is populated when you select the command, but you may modify it if needed.
Actions	Optionally, select the copy icon ( ) in this column to copy the same set of commands to another row in the Train Handling File that you can then modify. Or, select the trash icon ( ) if you want to delete a row.

Optionally, select the add icon (⊕) at the bottom right to add an empty row to the Train Handling File that you can then modify.

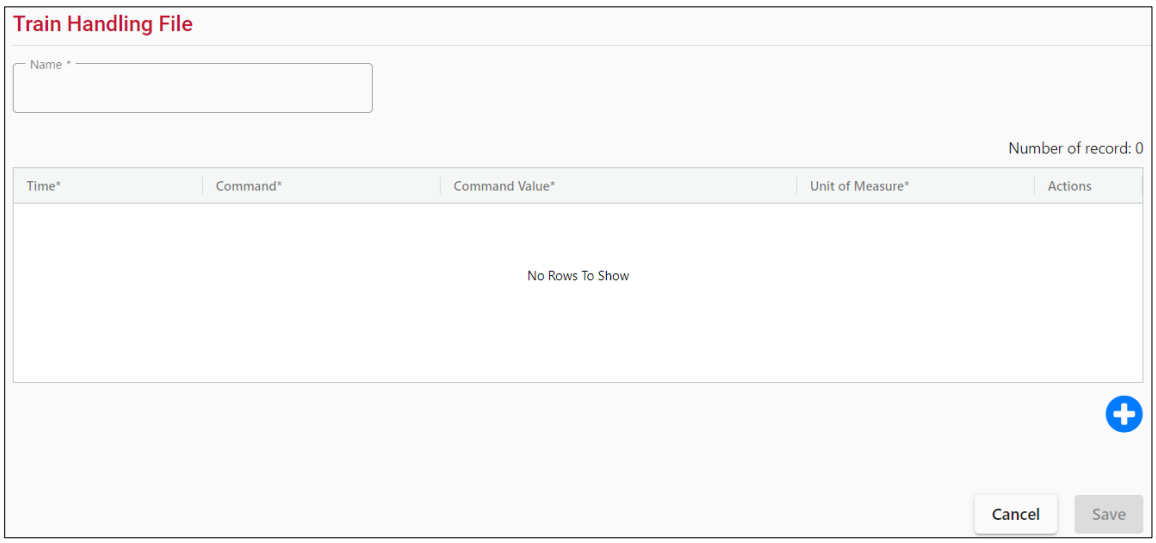
Note: Refer to the TOES documentation for information about Commands and Command Values.

Once you have finished editing the Train Handling File, select **Save** to save your changes.

Creating Train Handling Files

To create your own Train Handling File, select **Create New Train Handling File** from the Train Handling menu. The Create Train Handling File page is displayed (see Exhibit 66).

Exhibit 66. Create Train Handling File Page



The Create Train Handling File page enables you to create a new Train Handling File.

Use the following procedure to create a new Train Handling File:

1. Enter a descriptive name in the Name field.
2. Enter a time (in seconds) in the Time column when a handling event should occur.
3. In the Command column, select the type of handling event that you want to occur (e.g., Brake, Bail Off, etc.).
4. In the Command Value column, enter the value for the command that you selected. The Command Value field provides acceptable parameters for each command (e.g., if you selected Brake as the command, the Command Value field displays that the value for "Brake" must be an integer >= 6 and <= 100).
5. Optionally, modify the Unit of Measure column, which indicates the unit for the Command Value field. This field is populated when you select the command, but you may modify it if needed.

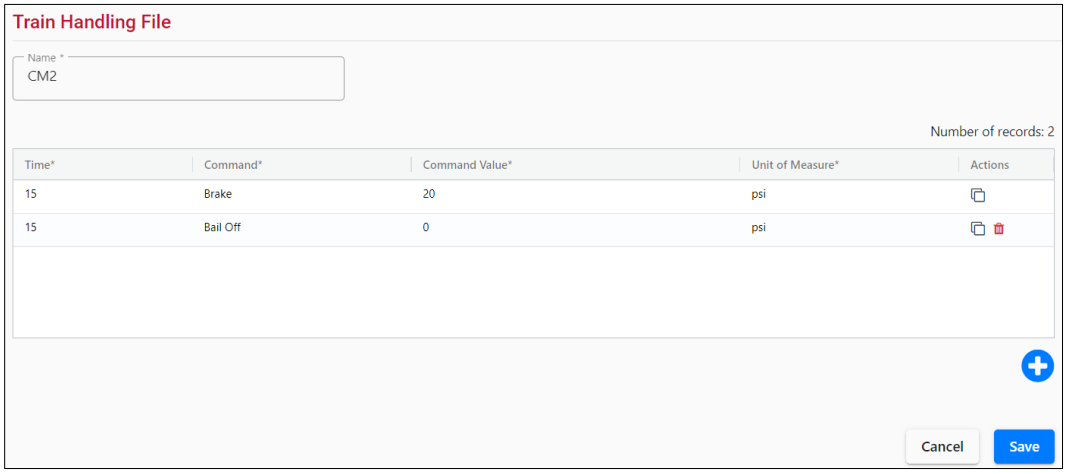
6. Optionally, select the copy icon ( ) in the Actions column to copy the same set of commands to another row in the Train Handling File that you can then modify.

7. Optionally, select the add icon ( ) to add an empty row to the Train Handling File that you can then modify.

8. Repeat this process as needed. Select the trash icon ( ) if you want to delete a row.

   See Exhibit 67 for an example of a completed Train Handling File page. Refer to the TOES documentation for information about Commands and Command Values.

Exhibit 67. New Train Handling File (Ready to Save)



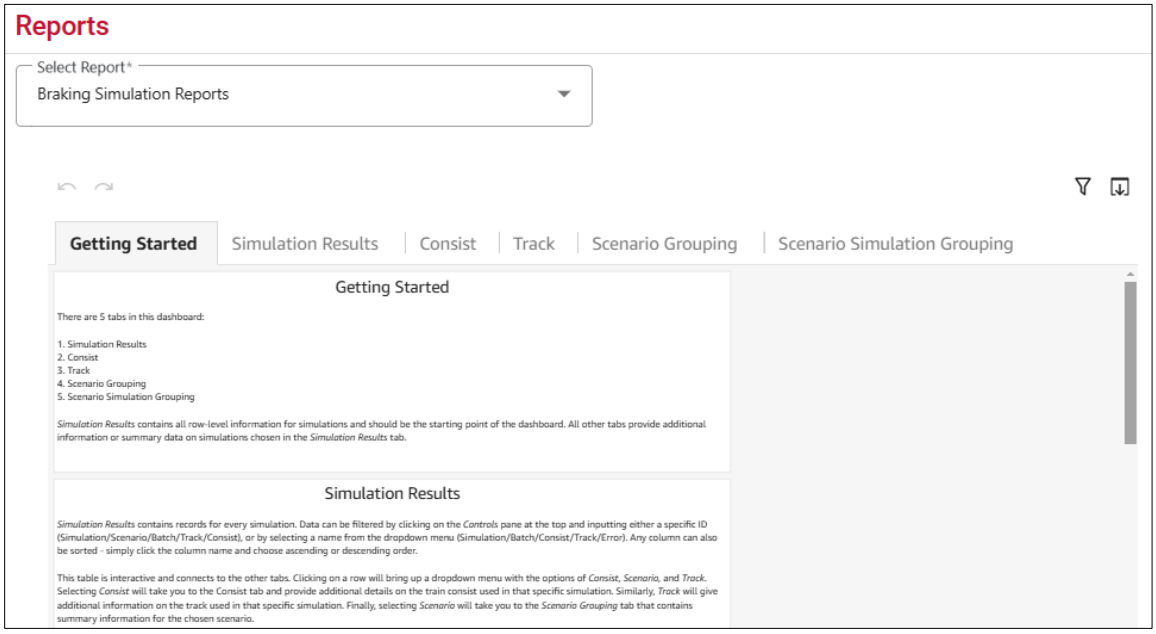
9. When you have finished, select **Save** to save the new Train Handling File.

10. Select **Close** to return to the Manage Train Handling Files page (see Exhibit 58), where the new Train Handling File is added to the list of available Train Handling Files.

Working with Reports

PTC TBS includes a set of reports that provide statistical and graphical results on several different aspects of the simulations. These reports are refreshed each morning at 3am Eastern Time. Access the reports by selecting **Reports** from the main menu. The Reports Dashboard page is displayed (see Exhibit 68).

Exhibit 68. Reports Dashboard Page



Note: Ensure that **Braking Simulation Reports** is selected in the Select Report drop-down.

The Reports Dashboard page contains the following tabs:

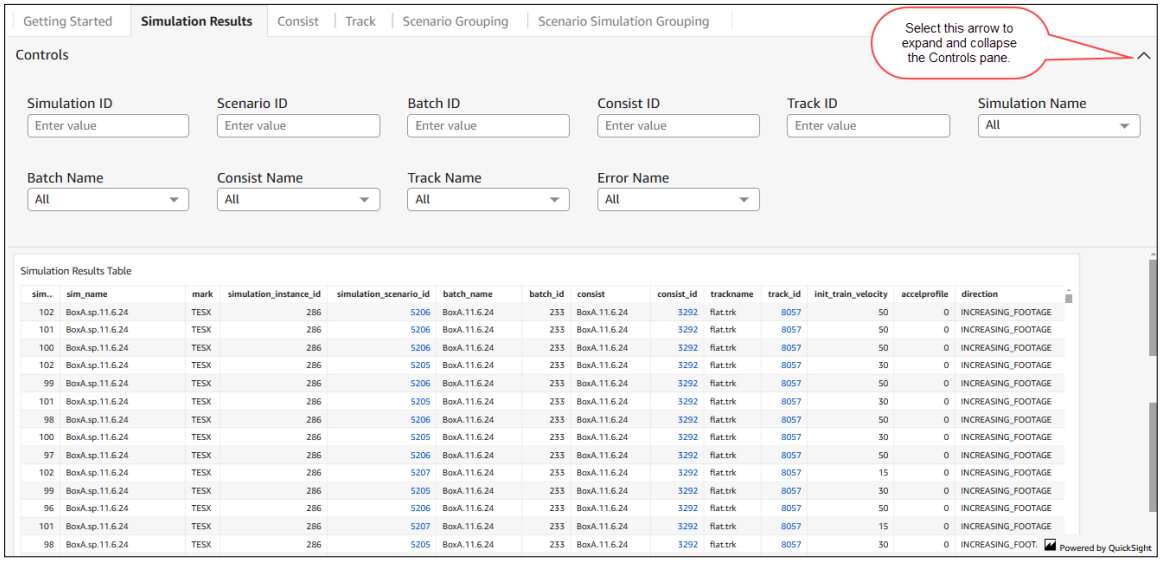
- Getting Started – contains instructions and information about the reports.
- Simulation Results – contains row-level information for simulations (this is the starting point for all tabs). See "Simulation Results" on page 85 for more information.
- Consist – provides additional information about the train consist used in the selected simulation.
- Track – provides additional information about the track used in the selected simulation.
- Scenario Grouping – provides summary information for the selected simulation. See "Scenario Grouping" on page 85 for more information.
- Scenario Simulation Grouping – provides summary information for a specific simulation ID for the selected simulation. See "Scenario Simulation Grouping" on page 87 for more information.

Simulation Results

The Simulation Results tab contains all row-level information for simulations. This tab is the starting point for the dashboard. All other tabs provide additional information or summary data on simulations you select in the Simulation Results tab.

The Simulation Results tab contains records for every simulation (see Exhibit 69).

Exhibit 69. Reports Dashboard Page Showing the Simulation Results Tab



You can filter data by selecting the Controls pane at the top and entering a specific ID in the Simulation ID, Scenario ID, Batch ID, Consist ID, or Track ID field or by selecting a Simulation Name, Batch Name, Consist Name, Track Name, or Error Name from a drop-down menu. You can sort by any column – simply select the column heading and choose ascending or descending order.

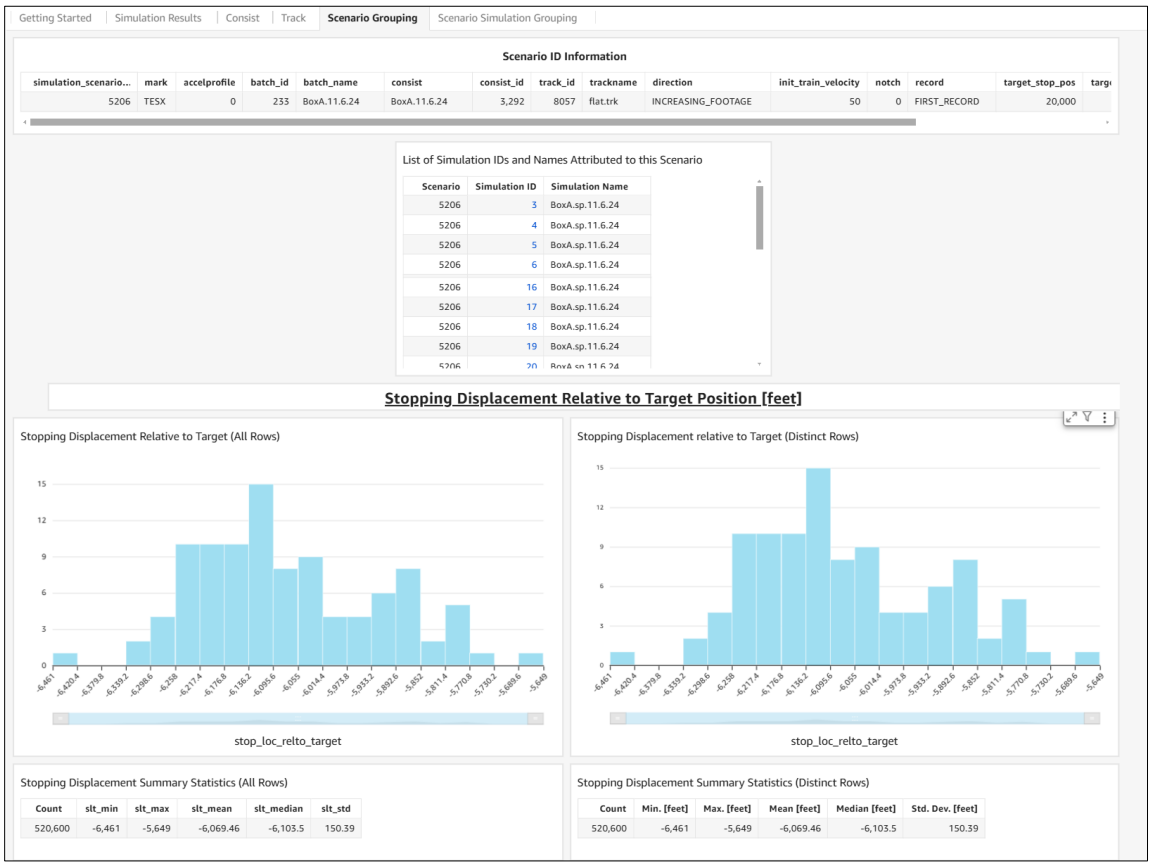
This table is interactive and connects to the other tabs. Select a row to see a drop-down menu with the options of Consist, Scenario, and Track. Select **Consist** to go to the Consist tab and view additional details on the train consist used in that specific simulation. Select **Track** to view additional information about the track used in that specific simulation. Select **Scenario** to go to the Scenario Grouping tab, which contains summary information for the chosen scenario.

Alternatively, you can select a **simulation_scenario_id**, **consist_id**, or **track_id** link to navigate to other tabs to view additional information about the associated simulation.

Scenario Grouping

By default, no data is displayed in this tab. To populate this tab, you must first select a scenario in the Simulation Results tab. Exhibit 70 shows a partial view of a Scenario Grouping Report.

Exhibit 70. Reports Dashboard Page Showing a Scenario Grouping Report (Partial View)



The first table, titled “Scenario ID Information”, contains static information (features that do not change between simulations) about the scenario.

The second table, titled “List of Simulation IDs and Names Attributed to this Scenario”, is a list of all simulations associated with the current scenario, along with their names.

The remaining graphs and tables display information for all simulations associated with that scenario. Histograms on the left show all simulation records, including duplicate values. Histograms on the right show only distinct values.

Every graph has an accompanying summary value table, displaying the minimum, maximum, mean, median, and standard deviation values for the graph.

The following is a list of the available graphs:

- Stopping Displacement Relative to Target Location
- Stopping Distance (Actual Stop Position - Penalty Application Position)
- Stopping Time (Actual Stop Time - Penalty Application Time)
- Actual Stop Position
- Actual Stop Time
- Penalty Application Position

- Penalty Application Time
- Penalty Application Speed
- Emergency Application Position
- Emergency Application Time
- Emergency Application Speed
- Position at Target Speed
- Speed at Target Position

Scenario Simulation Grouping

This tab has the same tables and graphs as the Scenario Grouping tab, except that it is for a specific simulation ID instead of the whole scenario. By default, no data is displayed. You must select a Simulation ID on the Scenario Grouping tab (click on the Simulation ID table for the desired ID) to go to the Scenario Simulation Grouping tab.

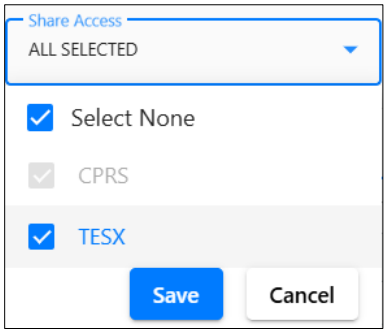
Working with Shared Resources

The Shared Resources menu at the top right of Simulation Job Request Details, Batch Details, Consist Details, Track Details, and Train Handling Details pages provides functionality that enables you to access and manage any resources that your railroad has shared with MxV Rail as well as any resources that MxV Rail has shared with your railroad.

Shared Resources can be particularly useful when trying to resolve an issue. For example, if you have questions about a simulation that you have run, you can share the simulation with MxV Rail, and then contact them for consultation about the resource that you have shared.

To use the Shared Resources menu, simply select the Share Access drop-down while viewing a resource (such as on the Simulation Job Request Details page) and select the checkbox for the Mark with which you want to share the resource (see Exhibit 71).

Exhibit 71. Share Access Drop-down



To share a resource with MxV Rail, select the "TESX" checkbox and then select **Save**.