

# Appendix A

## User manual for plug-in application

This document will give a detailed introduction to the user interface and functionalities of the Dynamic Clash Verification Plug-in to Autodesk Navisworks Manage 2014, developed in the Master thesis spring 2014. The document will give a step-by-step presentation on how to use the application, as the needed pre-steps done with Navisworks functionality. The user manual is based on Windows 8 OS.

### A.1 Setting up plug-in with Navisworks

In order to use the plug-in application with Navisworks Manage<sup>1</sup> 2014, the plug-in class library has to be imported to the \Plugins folder in Navisworks.

1. Locate the \Plugins folder in one of the following location. If one uses the first \Plugins folder, one needs to restart the system, to let Navisworks find the new plug-in. If one uses the second folder, from the \AppData location, the plug-in will work at once.
  - C:\Program Files\Autodesk\Navisworks Manage 2014\Plugins\
  - C:\Users\*your user name*\AppData\Roaming\Autodesk Navisworks Manage 2014\Plugins\ \*
2. Copy the \DynamicClash.MHRK folder with the plug-in class library files from the Master's thesis attachments into the \Plugins folder. The class library folder should include a lot of .dll-files.

\* The \AppData folder is by default hidden in Windows. To reveal the folder do the following:

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<sup>1</sup>**Note** that the plug-in application only works with Autodesk Navisworks Manage 2014 and newer, and not Freedom and Simulate. This because of Navisworks Manage's clash detection feature, which is used by the plug-in.

- In the Ribbon toolbar select *View*.
- Check *Hidden Items*, under *Show/hide*

The plug-in application is now ready for use with Autodesk Navisworks Manage.

## A.2 Setting input parametre in Navisworks

This section expects that the user already has experience with Autodesk Navisworks Manage software.

1. Open model document, in which the model items to be verified is.
2. Use the *Save Selection* feature to create selection sets for the validation object, boundary geometry and path. The floor which the validation object is moving on, should not be a part of the boundary geometry.
3. The user should now have e.g. the following selection sets in the list of selection set in Navisworks: Trolley, Walls, Path.
4. Start the plug-in application "DynamicClashAddin" from the *Add-ins* tab.

## A.3 The plug-in application

This section goes through the different steps in the Dynamic Clash Verification Plug-in. The different elements of the plug-in UI is shown in fig: A.1.

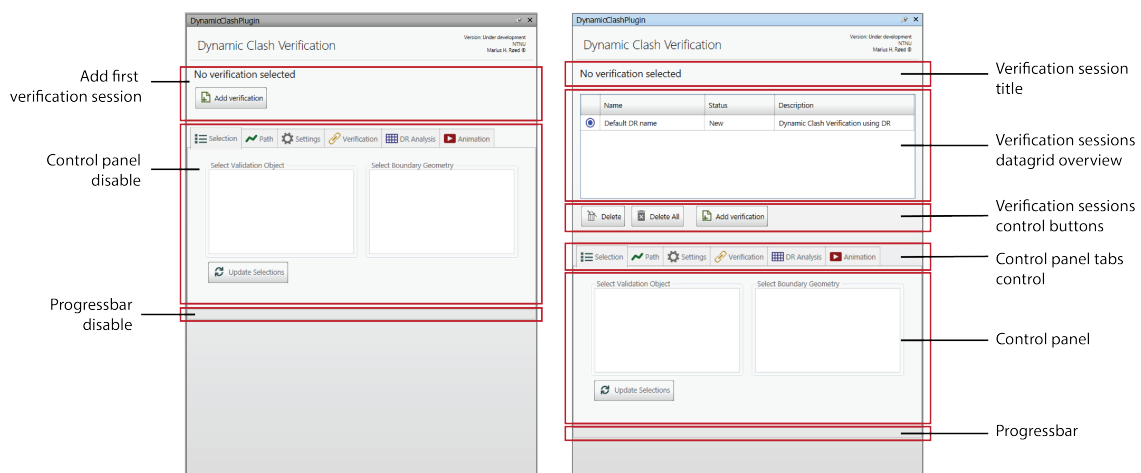


Figure A.1: Overview of the UI, and its different elements.

### A.3.1 Creating a new dynamic validation session

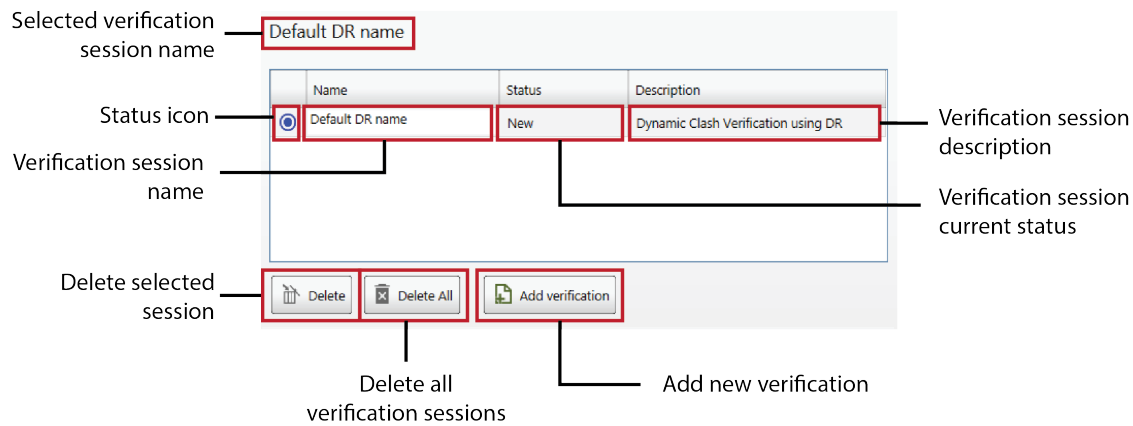


Figure A.2: Overview of the verification sessions, and its elements.

The user can switch between, add and delete verification sessions in the verification session view. To create new verification session do:

1. Add new verification session using the *Add verification* button.
2. Create/ change name of the verification session.
3. Create/ change the description of the verification session.

A verification session has a status describing the current status of how long the verification has come in the verification process. The different statuses are:

Status icon	Status
	New
	Working
	Optimized
	Finished
	Cancelled
	Failed

Table A.1: Overview over the different status icons.

### A.3.2 Setting selections

After the a verification session has been created, the control view enables. The user must now go through the tabs from left to right sequentially.

The first tab is the **Selection** tab. This tab is used to set the validation object and boundary geometry for the verification. (Fig: A.3)

1. Push the *Update Selections* button to update the list box with the newest created selection sets.
2. Select the selection set, which should be the validation object in the left list box.
3. Select the selection set, which should be the boundary geometry in the right list box.
4. Go to next tab (the Path tab).

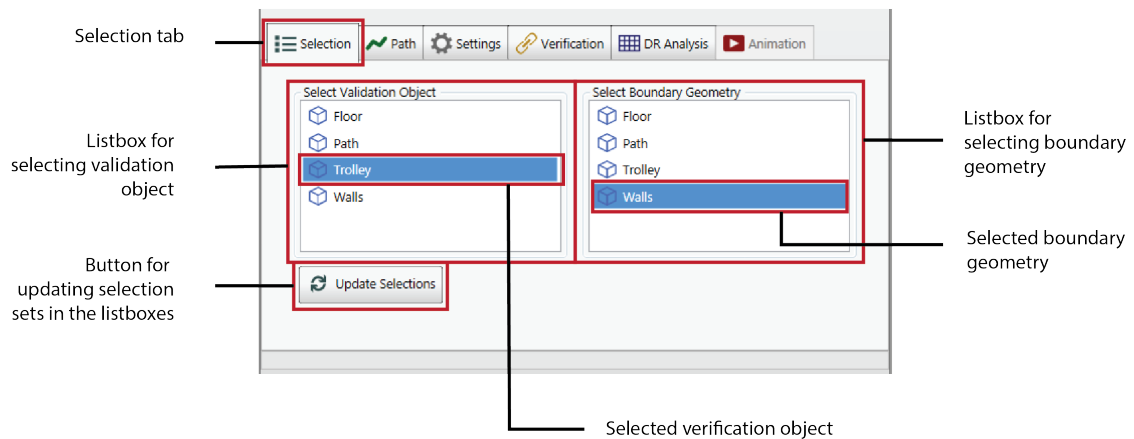


Figure A.3: Overview of the selection tab, and its different elements.

### A.3.3 Setting path

The user should generate a path for use in the verification, from a selected selection set in the **Path** tab. (Fig: A.4)

1. Select the selection set, which should be the path from the list box.
2. Push the *Run Path Factory* button, to run path generation. When the progress bar is finished, go to (3).
3. Push the *Show/Hide Paths* button.
4. Control that the path looks correct in the path grid.
5. Revert the start point if needed using the *Revert Start Point* button. (See fig: A.5)
6. Use if necessary the check boxes to hide/unhide paths and points.
7. Unhide the popup view using the *Show/Hide Paths*.
8. Go to next tab (the settings tab).

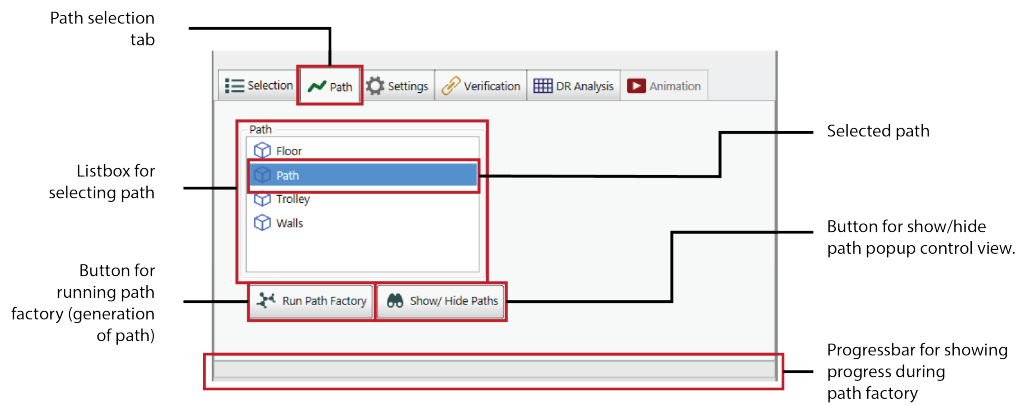


Figure A.4: Overview of the path tab, and its different elements.

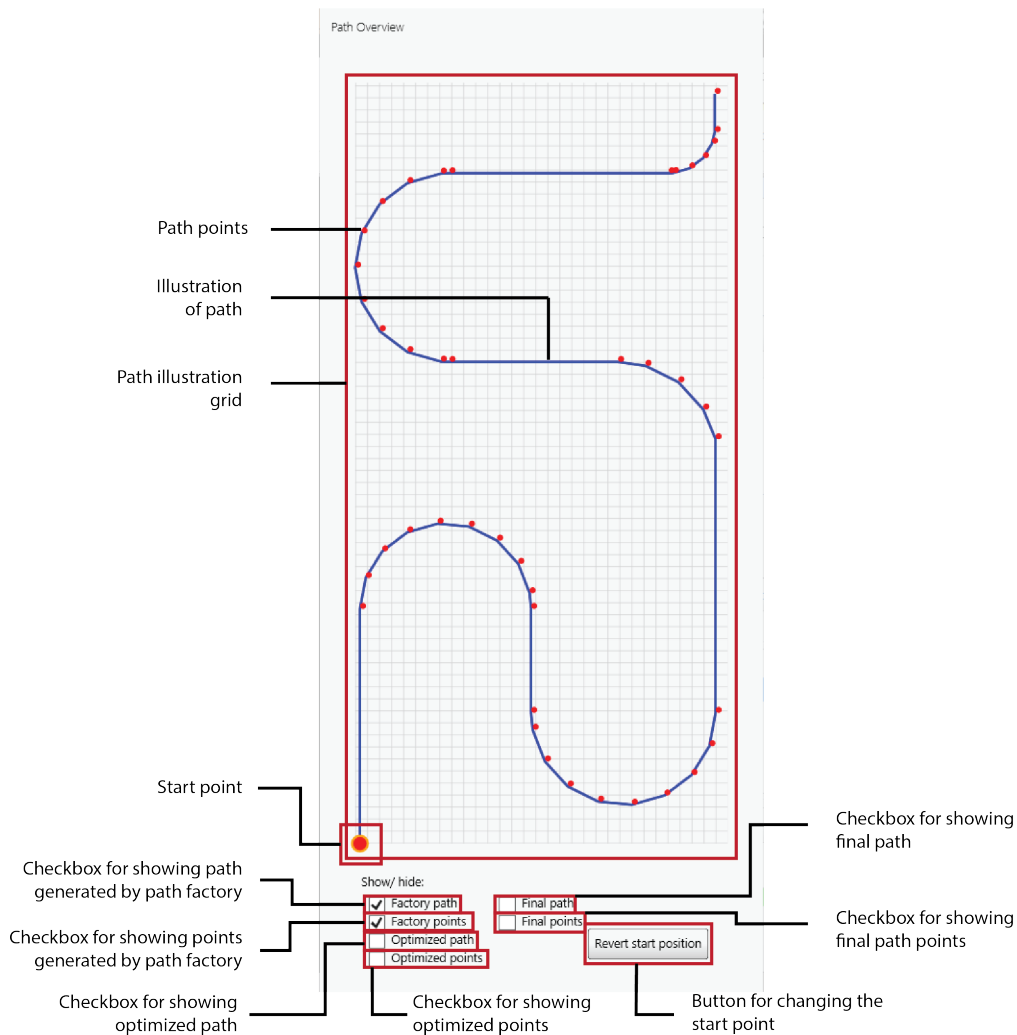


Figure A.5: Overview of the path popup view, and its different elements.

The user can at any time go back to this tab to review the different paths generated after path factory, path optimizing and DR verification.

### A.3.4 Setting the verification settings

The user should set needed settings for movement precision and axle settings in the **Settings** tab . (Fig: A.6)

1. Use the slider in Movement precision to set the step precision<sup>2</sup>. A high precision causes a low step size, and a low precision causes a high step size. The tool-tip of the slider gives the step size in [mm].
2. Set the Axle-centre length in [mm]. Default is 0. If no axle exists, the value should be 0.
3. Set axle position; Front or Rear. NOTE: The validation objects front has to be facing in the path direction. Default is centre. If no axle the axle position should not be selected. (It is not dangerous if it is, as long the axle-centre distance is 0.)
4. Go to next tab (the verification tab).

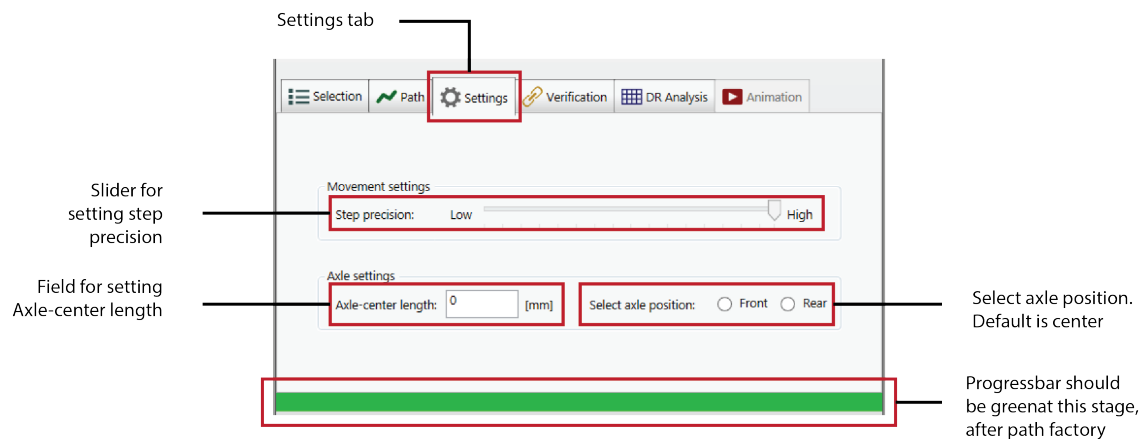


Figure A.6: Overview of the settings tab, and its different elements.

### A.3.5 Running optimizing and verification

The user can run both the path optimizing and the DR verification in the **Verification** tab . The optimizing should be run before the DR analysis, but it is not demanded. The progress bar will show the progress during both optimizing and verification. The status in the verification sessions view will show the results.

<sup>2</sup>The step precision should be high (around 100-200 mm) during path optimizing, and lower during verification due to run-time speed (around 300-400 mm).

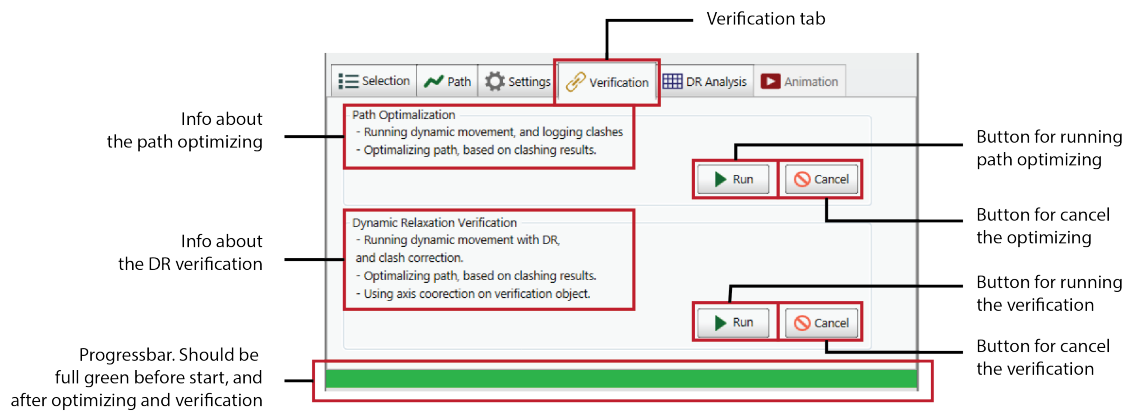


Figure A.7: Overview of the verification tab, and its different elements.

### A.3.6 Monitor verification

The user can in the **DR Analysis** tab monitor the velocity, acceleration and applied force during clash of the validation object during the DR verification.

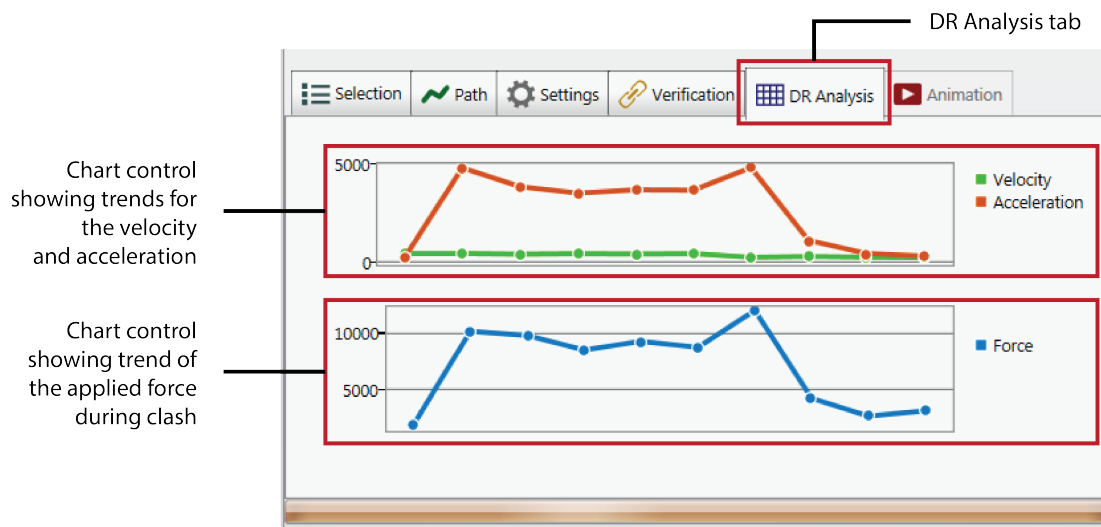


Figure A.8: Overview of the DR Analysis tab, and its different elements.

**NOTE:** The **DR Analysis** tab only works in some versions of Windows 8. It may occur some errors using it in Windows 8, and in Windows 7 with specific updates.

### A.3.7 Visualize result

The user can in the **Verification** tab, also visualize the result after DR verification by using the "Visualize result" button (fig: A.9).

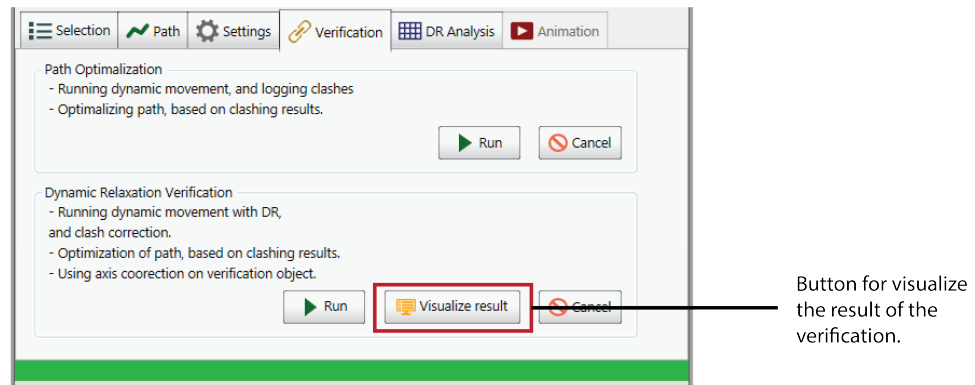


Figure A.9: Overview of the verification tab after verification. The user can use the "Visualize result" button to visualize the result.