Clash Detection (By Hamid Abdirad)

Please note that we used a different file (low rise-architectural model.rvt) in class for this exercise.

"Clash Detective offers the ability to work with coordination teams to help you identify where changes need to occur so that you can respond accordingly. Clash Detective goes beyond the act of simply finding the clashes. With this tool you can create reports, set up predefined batch items (saved clashes), set rules, and group your clashes" [1].

Starting Clash detection

In professional practice, clash detection can be performed either by using several different models in different disciplines (e.g. Structure, MEP, Architecture, etc) or by using different object sets in a single file. If you have several models you must use Append or Merge commands to add models to your Navisworks file. An important benefit of using several models is that the different project teams can work on their models and update the Navisworks simulations and clash detection as they model objects. In this regard, Navisworks project file must be saved as Navisworks link file (NWF).

As an example, you can use the files provided Stadium- Arch.NWD, Stadium-Mech-Ducts.NWD, and Stadium- Electrical.NWD to use Append command.

After opening the Stadium-Arch.NWD, append two other files to your model using Append command from the Home tab or from the Application Menu > Open (Figure 1).

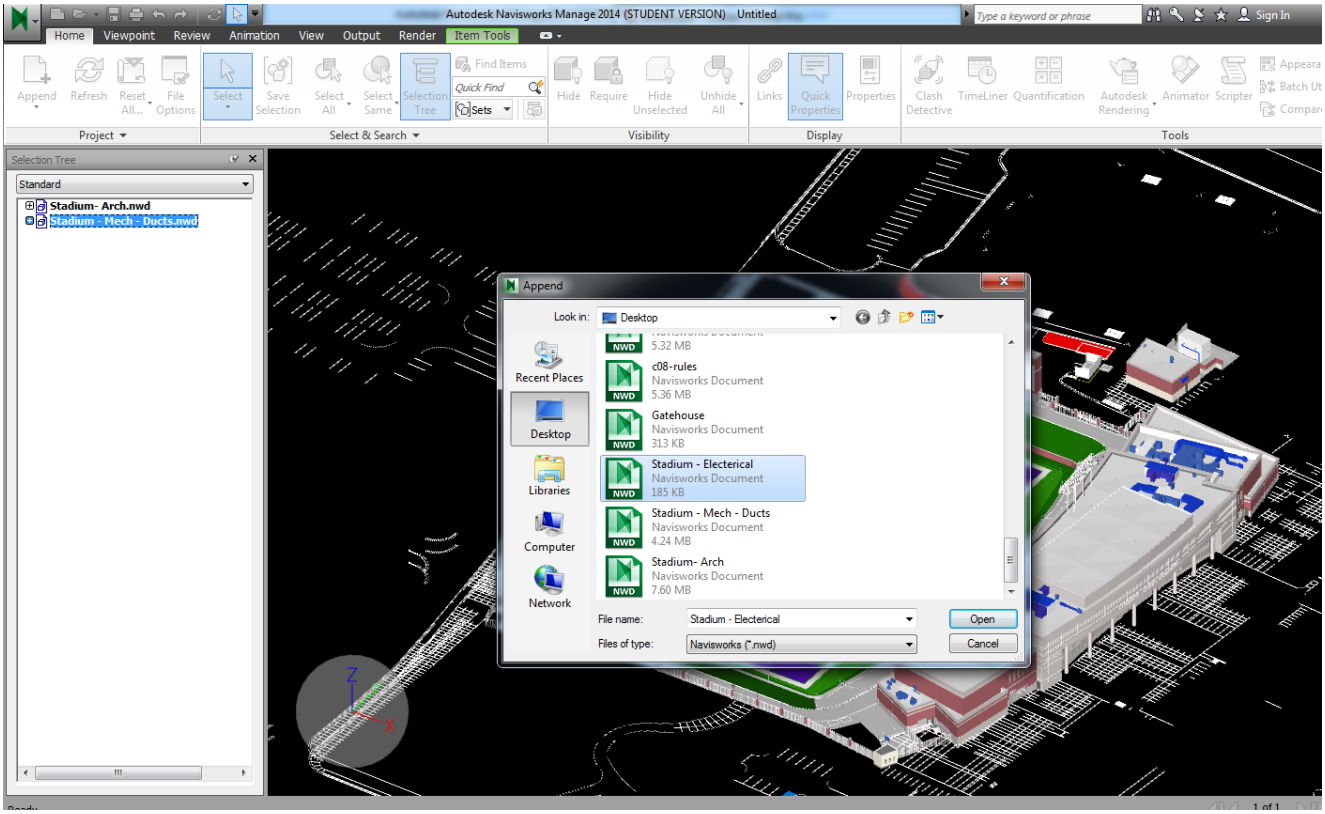

Figure 1

Clash detective tool is located in the Home Tab > Tools Panel. Click on its icon to open Clash Detective Pane (Figure 2).

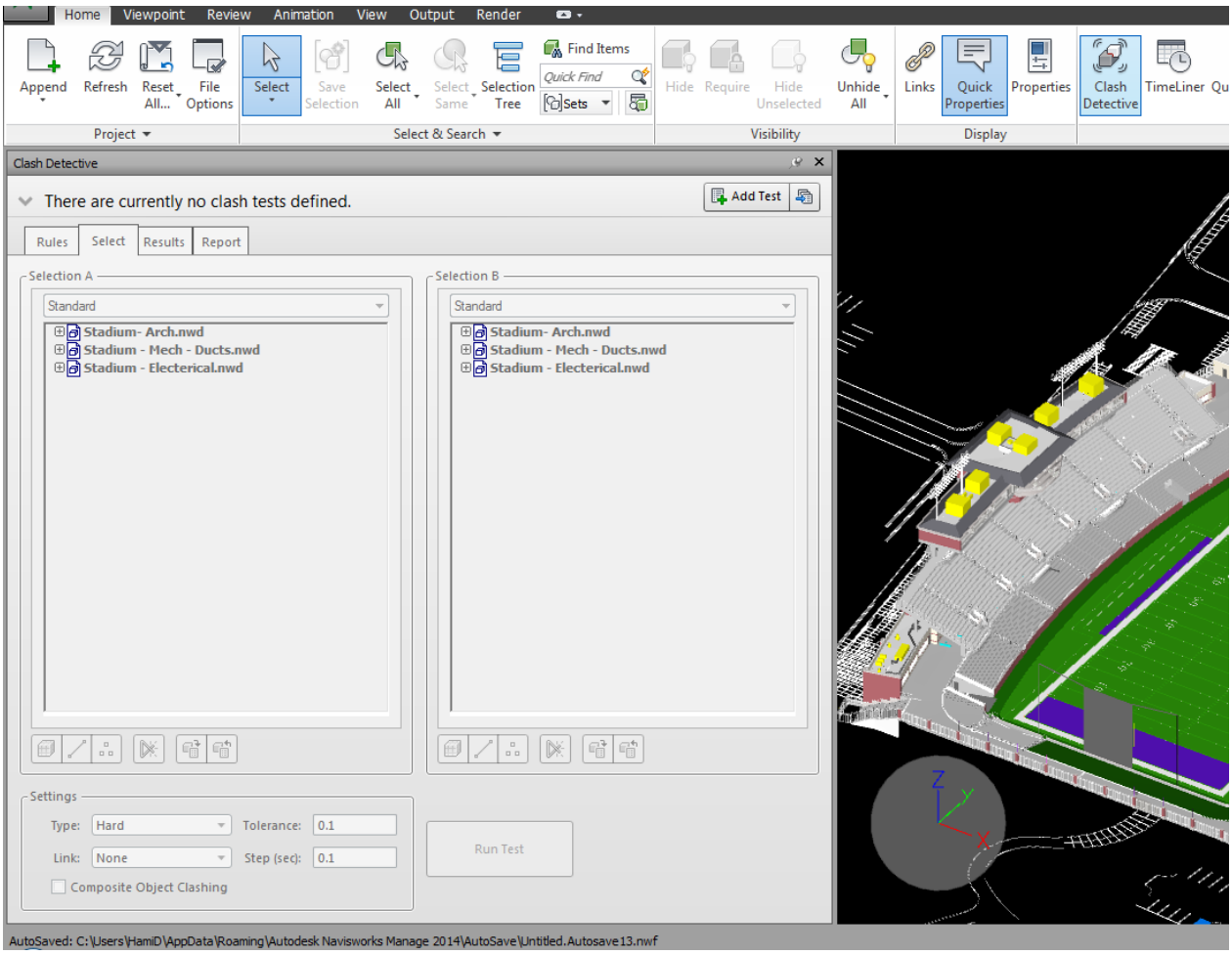

Figure 2

If you are running the clash detection for the first time, in Clash Detective Pane you must click on Add Test to enable the detection mode and other options. After clicking on Add Test, the pane enables the detection mode by adding the “Test 1” batch in the window. Each batch stores all clashes between two specific object sets. Let’s rename the batch to Mech vs. Electrical by double clicking on the batch’s name and typing the new name (Figure 3). Columns in front of the batch’s name show number of the clashes and their status.

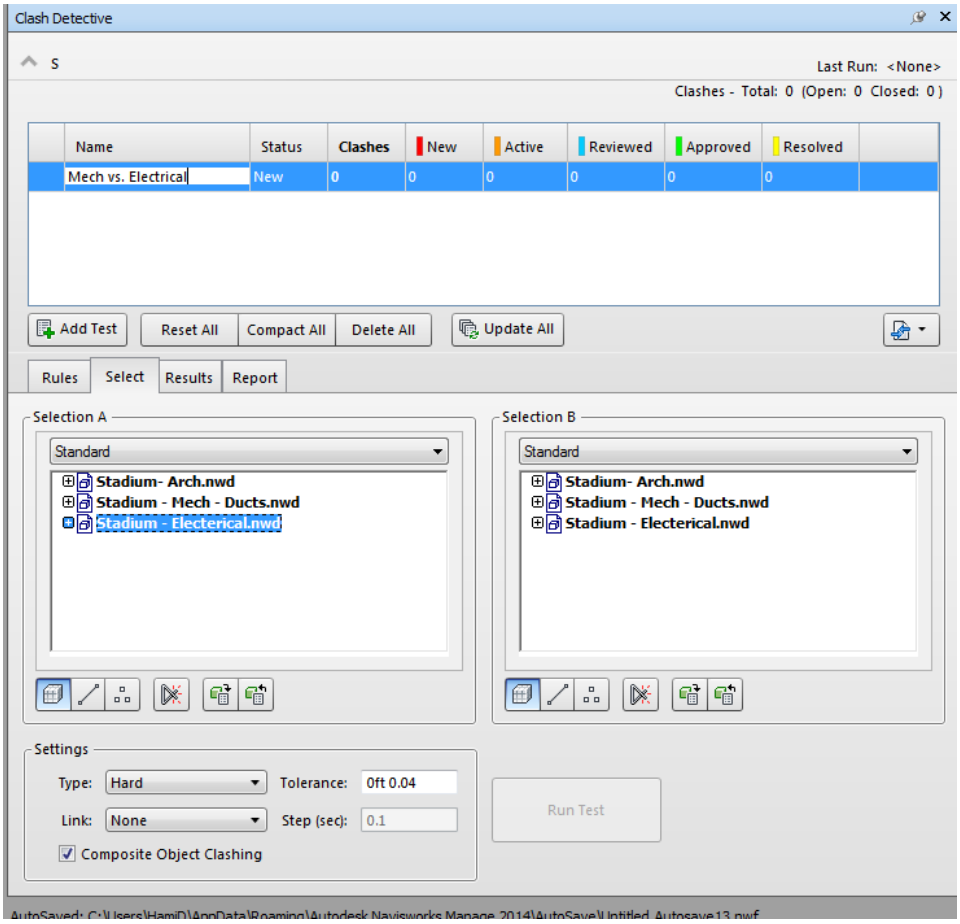

Figure 3

Clash status

In the Clash Detective Pane, **Status** Displays one of four available status of the listed batches and will change as batches are updated or run from the Select tab [1]:

"**New** Refers to a clash batch that has not been run with the current model.

Done Refers to a clash analysis that has been completed successfully.

Old Indicates that the clash analysis may be out-of-date and is not the latest version or that it has modified in some way, including changing a setting or option of the selection.

Partial Typically indicates that a dash analysis was interrupted during execution.

Results will typically be available up to the point of interruption.

Clashes Shows the total number of clashes in the batch [1].'

Clash Status There are five types of status that can be displayed in the Batch tab. They will change depending on how items and settings are adjusted in the Results tab (possibly during a coordination meeting). When in the Results tab you will notice that each of the status are denoted by a certain color as well [1].

"New Denotes that a clash has been found for the first time in the current run of the clash; denoted as red.

Active Refers to a clash found in a previous run of the test and that has not yet been resolved; denoted as orange.

Reviewed Indicates that a clash was previously found and marked as reviewed; denoted as light blue.

Approved Indicates that a clash was previously found and marked as approved; denoted as green.

Resolved A clash found in the previous clash run but not in the current run. It is then usually assumed that the clash has been resolved; denoted as yellow." [1]

Clash Detective Tabs

Rules Tab

"Clash detection rules are useful in that they give you parameters to run against your clash batches. You can use the rules to **ignore certain types of geometry or certain items contained within the same file**. Rules can also be created and modified as needed to give you flexibility on your projects" [1].

Select Tab

In the Select tab you can determine "what objects to clash against each other, the type of clash, and how you want to select your objects" [1].

In this tab, you can see left and right panes that show the selection tree objects. In these panes you can select the objects (sets) that you want to clash in Navisworks. For example, you can select the Mechanical Model in the left pane and the Electrical Model in the right pane to find clashes between those two. Then click on Run Test to start the clash detection (Figure 4). As you can see, Navisworks finds 350 clashes between these two object sets (Figure 5).

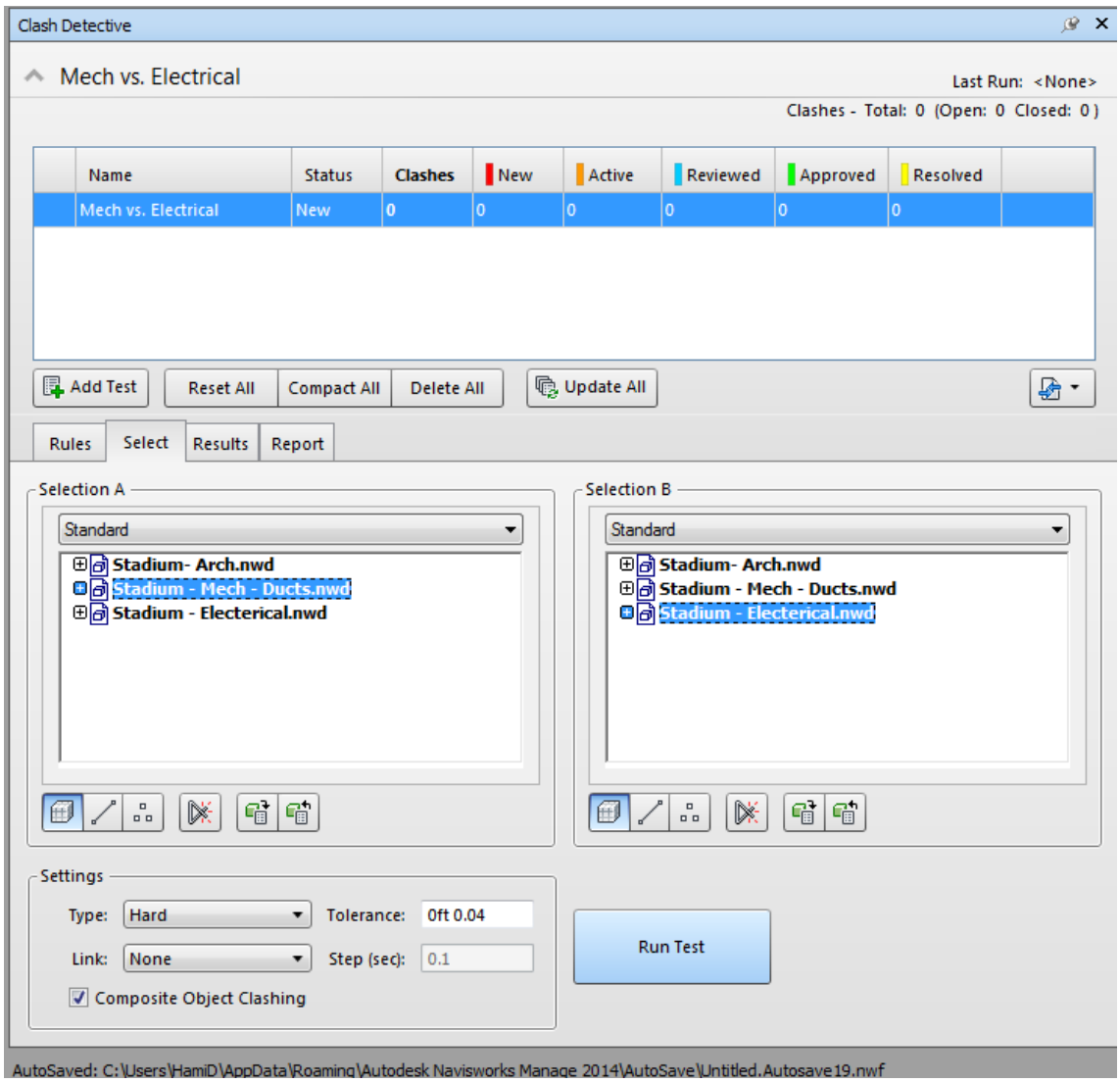
Clash Detective
Mech vs. Electrical
Last Run: <None>
Clashes - Total: 0 (Open: 0 Closed: 0)
Name
Status
Clashes
New
Active
Reviewed
Approved
Resolved
Mech vs. Electrical
New
0
0
0
0
0
0
Add Test
Reset All
Compact All
Delete All
Update All
Rules
Select
Results
Report
Selection A
Standard
Stadium- Arch.nwd
Stadium - Mech - Ducts.nwd
Stadium - Electerical.nwd
Selection B
Standard
Stadium- Arch.nwd
Stadium - Mech - Ducts.nwd
Stadium - Electerical.nwd
Settings
Type:
Hard
Tolerance:
0ft 0.04
Link:
None
Step (sec):
0.1
Composite Object Clashing
Run Test
AutoSaved: C:\Users\HamiD\AppData\Roaming\Autodesk Navisworks Manage 2014\AutoSave\Untitled.Autosave19.nwf

Figure 4

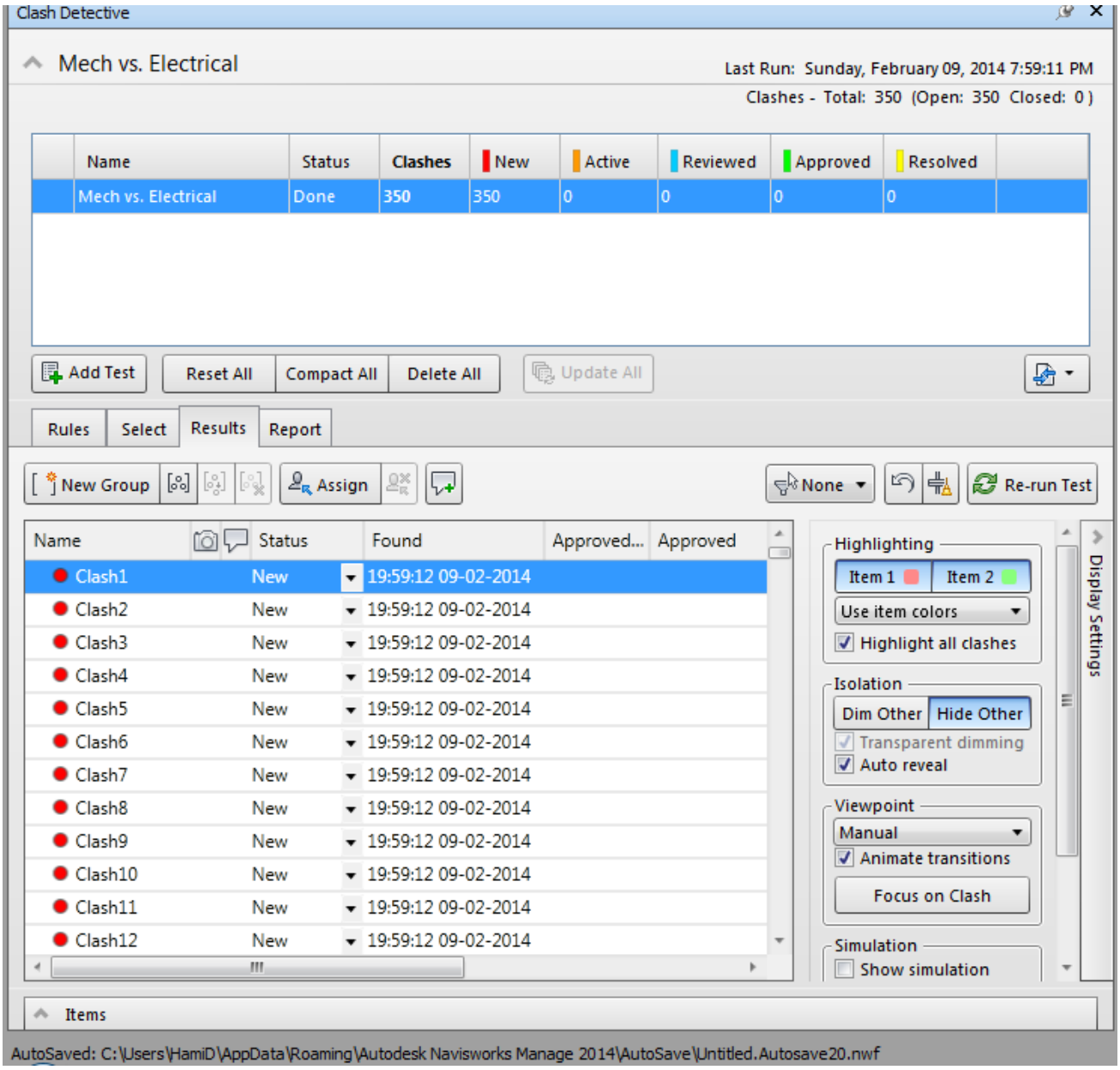
Clash Detective
Mech vs. Electrical
Last Run: Sunday, February 09, 2014 7:59:11 PM
Clashes - Total: 350 (Open: 350 Closed: 0)
Name
Status
Clashes
New
Active
Reviewed
Approved
Resolved
Mech vs. Electrical
Done
350
350
0
0
0
0
Add Test
Reset All
Compact All
Delete All
Update All
Rules
Select
Results
Report
New Group
Assign
None
Re-run Test
Name
Status
Found
Approved...
Approved
Clash1
Clash2
Clash3
Clash4
Clash5
Clash6
Clash7
Clash8
Clash9
Clash10
Clash11
Clash12
New
19:59:12 09-02-2014
Highlighting
Item 1
Item 2
Use item colors
Highlight all clashes
Isolation
Dim Other
Hide Other
Transparent dimming
Auto reveal
Viewpoint
Manual
Animate transitions
Focus on Clash
Simulation
Show simulation
Display Settings
Items
AutoSaved: C:\Users\HamiD\AppData\Roaming\Autodesk Navisworks Manage 2014\AutoSave\Untitled.Autosave20.nwf

Figure 5

You can view the clashes by clicking on their name and then clicking on Focus on Clash in the Display Settings > Viewpoint.

Some suggestions for viewing the clashes in a better way:

- In the Clash Detective Pane > Results Tab > Display Settings > Viewpoint, in the menu select the Auto Load option. Navisworks will focus on the clash automatically whenever you click on a clash's name.
- Choose either DIM OTHER or HIDE OTHER to see the clash without any obstacles. Transparent Dimming usually help with finding and seeing the objects better.
- Item 1 in Red Color shows the objects you selected in the Left pane of the Select tab, Item 2 in Green Color shows the objects you selected in the Right pane of the Select tab.

Important:

In the select Tab you can choose clashing objects by their properties and/or the selection sets. To do this you must use the menu under the Selection A and Selection B panes and change the Standard mode. Standard means showing objects as they are shown in the selection tree.

Clash Types

Different types of clashes in Navisworks includes (Figure 6) [1]:

Hard Clash A hard clash is where **two physical objects intersect with each other**.

Hard (Conservative) Hard (Conservative) gives you an additional clash option in which the geometry intersections are clashed in more of a theoretical intersecting clash. In Navisworks terms, the two objects are treated as intersecting even though the geometry may not be. You will notice that using this option will give you a far greater number of results. So keep that in mind when using this feature.

Read this article to understand the concept of Conservative Hard Clashes:

http://beyonddesign.typepad.com/posts/2011/07/why-do-i-sometimes-get-inaccurate-clash-results.html

Clearance Clash Clearance Clash gives the intersecting objects a specified distance that they must remain apart from each other.

Duplicate Clash Duplicate Clash helps you to find intersecting objects of identical position and type (the objects have to have both **type** and **position** to be considered duplicate). Often the entire model may be clashed against itself to find duplicate clashes, but be warned that this could take some time to complete.

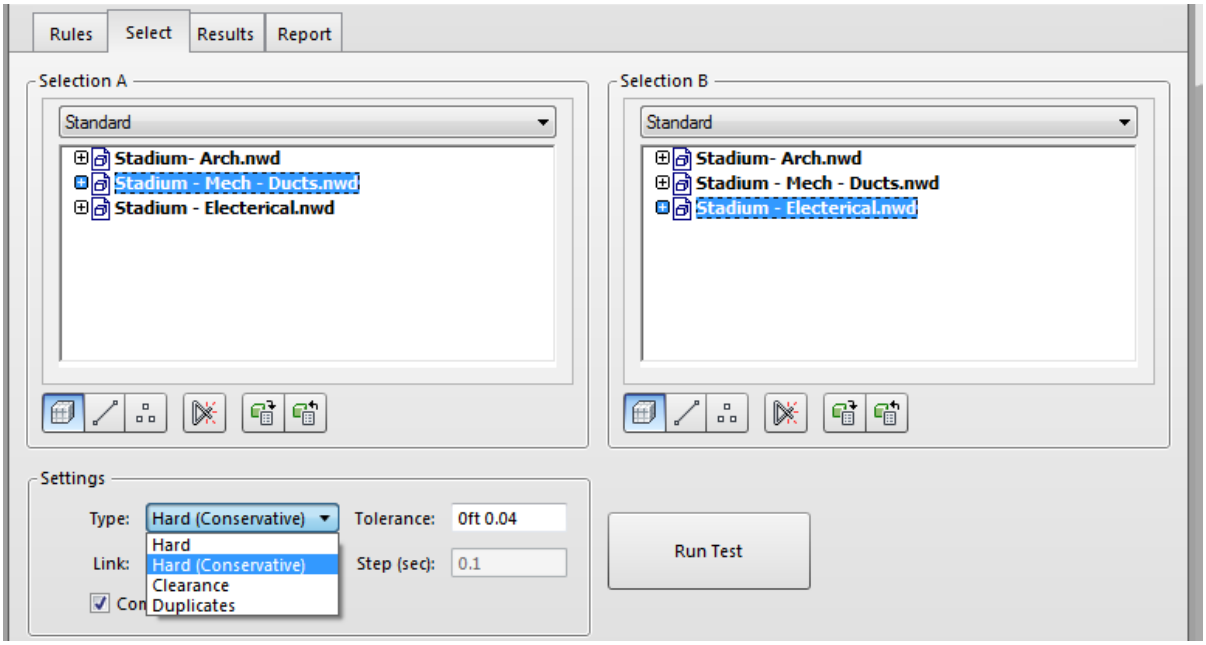

Figure 6

Understanding Clash Test Results

In the Results tab, there are some columns in the results pane [1]:

Name Column Displays the name of the clash, which you can change as needed. The default numbering system is to simply count the clashes found and number them accordingly.

Status Column Each clash has a status associated with it. Each status can be set by clicking on the drop-down associated with it. Notice the colors of the objects change as you change the status. The five different types of clash status are explained previously in clash status section.

Distance Column Displays the distance or depth of the actual clash.

Description Column Lists the type of clash found: Hard, Hard (Conservative), Clearance, or Duplicate.

Found Column Lists the date and time the clash was most recently found.

Assigned To Column You can assign clash results to specific team members for resolution. You also can add notes directly in the Assign dialog box as needed. You access the Assign Clash dialog box, shown in Figure 8.14, by using the context menu.

Using Redline Tools

You can use drawing and writing tools directly on the clashes viewpoints. In this case a camera icon will be displayed on the right hand side of the Name column in the Results Tab (Figure 7).

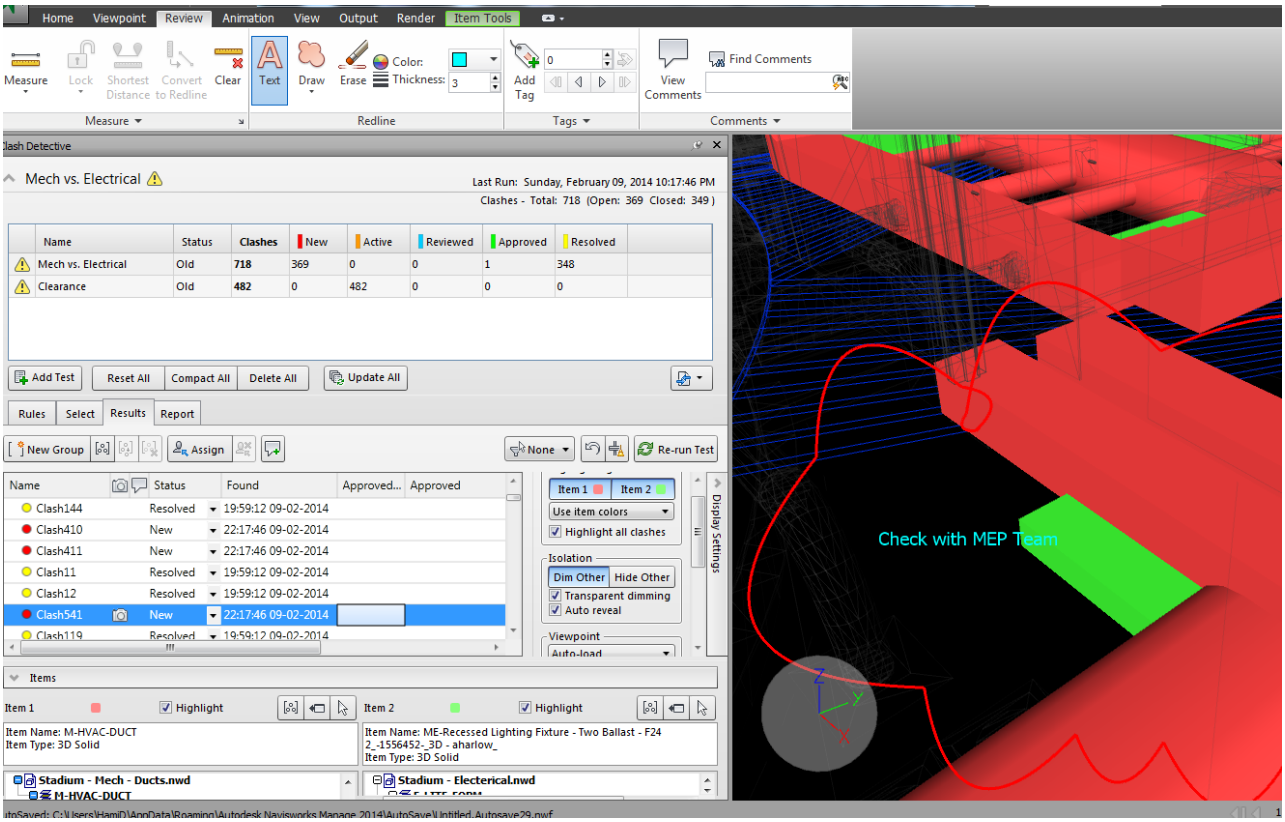

Figure 7

Clash Reports

You can create reports out of your clash tests from the Report Tab. In this tab you can select your report contents in the left pane and clashes in the right pane. Most common way to export the report to an external file is to select the Report format as HTML (TABULAR). The report will be created after clicking on Write Report (Figure 8). Then choose the saving destination and a name for the report.

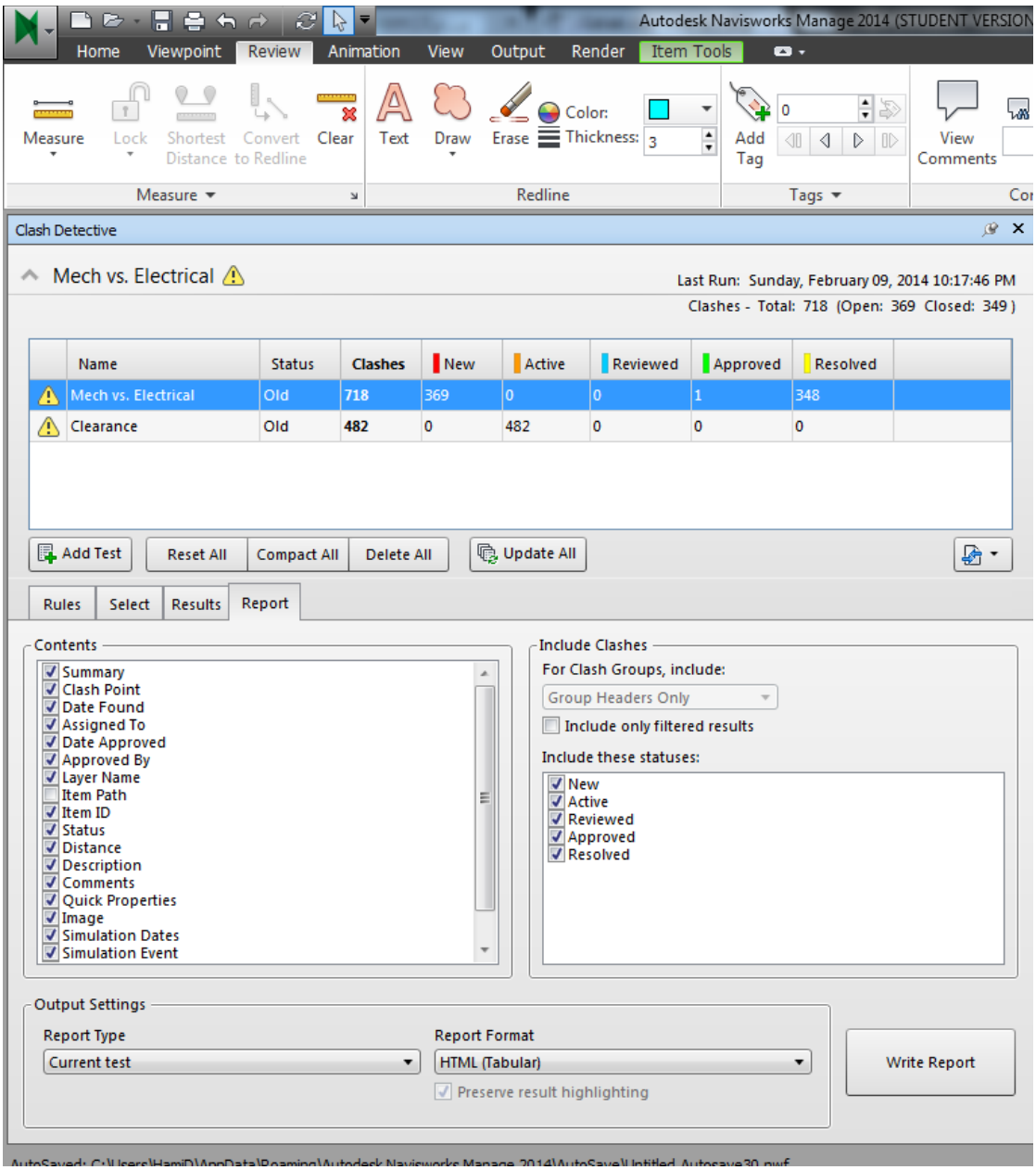

Figure 8

Reference

All the texts are extracted from the below reference:

[1] Jason Dodds and Scott Johnson. 2011. *Mastering Autodesk Navisworks 2012* (1st ed.). SYBEX Inc., Alameda, CA, USA.

Images are created by the author of this document: HAMID ABDIRAD.