

**CE4002 Homework 2 (15%)**  
**Multidisciplinary Coordination (Due: 06/12/2016 9:30)**  
“This is a group assignment!”

For Assignment #2, assume that you are the BIM Project Manager of a 4-storey building project. Your job is to check the combined model, composed of designs of different trades/participants, for interferences by using Navisworks Clash Detective tool and create clash detection reports before the weekly coordination meetings with subcontractors.



**Figure 1. 4-storey building combined model**

In very few projects, teams work on a single software platform. As teams work with their own preferred software tools, you are given models in different file formats. For this week's meeting, you have been submitted the model files below:

- A combined Navisworks model of Architectural, Structural, and MEP\_HVAC elements (4002\_HW2\_Combined.nwd)
- Plumbing model (Plumbing.nwc)
- Lighting model (Lighting.nwc)

**Step 1:** First you need to combine these models into one .NWF file in Navisworks.

To do this, open the HW2\_Combined.nwd file first. Then, Append the Plumbing model. Continue with Appending Lighting model. You will realize lighting model is not aligned with the rest of the models. Select the lighting model from selection tree and move the model by Clicking Items Tool Tab, Choosing Move, and from Transform Drop Down menu typing X: -6.10m. You should see that the components are aligned with the other elements now.

Save the combined model as **HW2\_groupX.nwf**. Perform your clash tests on this model.

**Step 2:** Now you can define and run your clash tests to identify the interferences in the combined model.

Open Clash Detective window. Add a new **Test1**, rename as **Architectural and Structural**. In Select tab choose Arch and Str model for Selection A and B respectively. Select Hard type

clashes and 0.0m Tolerance in Settings. Then Run the test. You will see that thousands of clashes have been identified. Go over several of these clashes by clicking them in the Results tab. Clash detection will be overwhelming if not performed systematically. You should select smaller subsets of the models to get manageable clash results. (Note: Right-click and delete this test before exporting your clash report as these results will be too long to report.)

Continue with performing the clash tests listed below:

- Add **Test2**, rename as **Structural Wood and HVAC**. Levels 2 to 4 have wooden structural elements. Select Structural Model Level 2, 3, and 4 by Ctrl clicking in Selection A and MEP\_HVAC in Selection B. Use Hard clash with 0.0m Tolerance. After running the test, you should identify about 53 clashes.

Review these clashes in Results Tab. You should realize there will be clashes showing the similar type of design problems between same types of components (use Items menu at the bottom of the clash results to see component types). Group those clashes in Results tab and give the clashing component's names to the groups you created. You should have at least 3 groups for clashes of Glulam Beam, Joist, and Column that interferes with HVAC components.

- Add **Test3**, rename as **Structural Concrete and HVAC**. Select Structural Model, then Sets (instead of standard) under Selection A and Select Concrete Framing. A smaller subset of structural model will be used by this way. In Selection B select HVAC. Use Hard clash with 0.0m Tolerance. Test run should give 8 clashes. Group these as Flex Duct and Oval Duct clash results. Use Review Tab and add redlines (clouds etc.), tags, and comments to these clashes for explaining the problem and/or showing the suggestion to correct the clash.
- Add **Test4**, rename as **Duct and Lighting**. Choose HVAC and Lighting models. Choose Clearance type of clashes this time and give 0.15m Tolerance. Run the test and review the clashes you have found. Change the status of these clashes to Reviewed. Enable sectioning from Viewpoint tab and get a section view showing one of the clashes by making all the model components visible (not dimmed). Save this as a viewpoint.
- Add **Test5**, rename as **Plumbing and Lighting**. To check the clearance between fire sprinklers and light fixtures select Plumbing and Lighting models in Selection Tab. Choose Clearance type of clashes and give 0.30m Tolerance. Run the test and observe the clash results. For these clashes, measure (from Review tab select shortest distance) the clearance distance on 3D view to show the problem and save it as a viewpoint. Don't forget that you can change the orientation and display settings in results tab and create a more clear view.

**Step 3:** Create and export a report of the Clash Tests 2, 3, 4, and 5.

**Step 4:** Save your Navisworks model as .NWD file.

To create separate reports for each test, in Reports Tab of Clash Detective, Select to Include all clashes (Everything), Output type Current test, and Report Format HTML (tabular). You will need to do this for each test you select in the menu and create separate HTML reports.

**Alternatively**, delete first test between the architectural and structural elements (Test 1). Create an HTML (tabular) report by selecting All tests (combined) in the output report type. This will give you one combined report and this is enough for the homework submission.

**Deliverables:** (*Due: 06/12/2016 9:30*)

1. Your combined .NWD model including all the clash test (1-5) results, comments, measurements and viewpoints.
2. Your HTML (tabular) report(s) showing all the clashes from **Tests 2 to 5**.
3. A one-page report with discussion of the questions below and any other views that you would like to share on this process.

Here are some discussion points in relation to this assignment:

1. What are the advantages of automated clash detection of BIM when compared to the traditional method of comparing paper or CAD documents? What are the limitations of automated clash detection?
2. The number of interferences reported when the entire project is checked is too much and it becomes overwhelming to identify the real issues. How can you refine the clash tests to get manageable results (give examples from Navisworks Clash Detective features)?
3. Do you think Navisworks will provide enough support in identifying and reporting clashes throughout the design process, considering there will be multiple revisions of the models? Will it be possible to track resolved issues (clashes)?
4. What are your suggestions for improving the capabilities of this tool?

On **6/12/16**, submit your assignment zip file (HW2.groupX.zip) as a Group to [odtuclass.metu.edu.tr](mailto:odtuclass.metu.edu.tr) by 9:30am.

The selected groups (Groups 7-8-9) will be asked to make a 15-20 minutes presentation on this assignment by discussing specific topics assigned to them (the guidelines for the presentation will be provided separately). The presentations will be during the classes on 06/12/2016.