



"AUTOMATING CLASH DETECTION EXCEL MATRIX AND NAVISWORKS CLASH TEST"

Developed by;

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WORKFLOW



BIM model well developed
for coordination/clash detection



User interactive script to populate all
the model components data from a
federated model needed for
clash detection, into excel workbook



Excel Clash matrix populated with
automated model data, clash matrix
clash types and tolerances



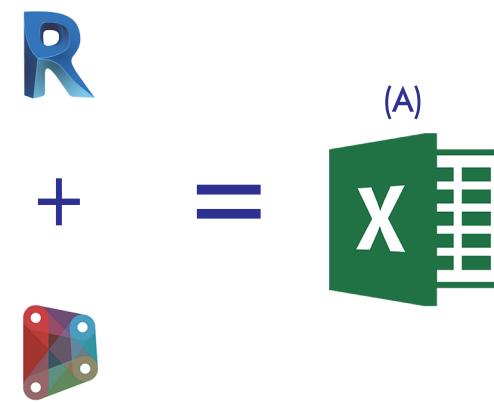
Two separate python script. First to
automate the creation of the excel
clash matrix and secondly, to automate
the creation of Navisworks clash
tests as .XML import file



Import .XML clash tests file, update
clash test and visualise clash tolerances
and results in Navisworks

PART 1

Federated model in Revit containing BIM models from all disciplines



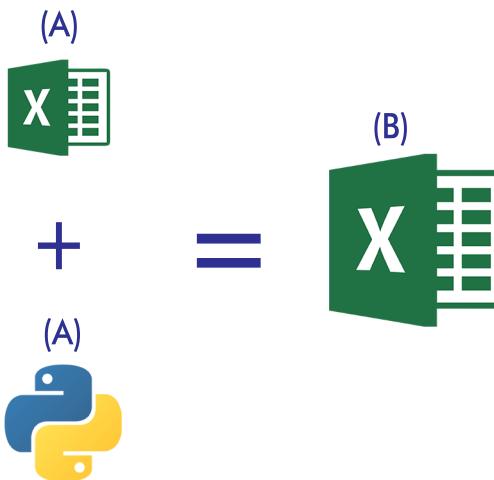
Interactive script in dynamo to query model data from all revit linked models, well organised as family types and categories; then exported to excel workbook with each sheet assigned to specific disciplines

Excel workbook (A) containing all model components data from all linked models (discipline). Each discipline (e.g. Architecture) is automatically assigned to a sheet

A screenshot of Microsoft Excel showing a federated model data sheet. The table has two columns: 'Floors' and 'Walls'. Row 1 contains headers 'Floors' and 'Walls'. Rows 2 through 5 list various floor and wall elements with their descriptions. The bottom of the screen shows tabs for ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, and PLUMBING, indicating multiple sheets for different disciplines.

PART 2

Excel workbook (A) with all model element categories and family types prepared for clash matrix automation



Python script (A) written to automate the creation of a clash detection matrix in excel which where clash types and tolerances would be assigned to clashing elements

Excel workbook (B) containing all model components data (discipline, categories, element types) in form of a matrix, following a standard clash matrix template.
Clash types; H = Hard clash, C = Clearance clash and D = Duplicates clash
Clash tolerances are in millimeters

A screenshot of Visual Studio Code showing a Python script for creating a clash matrix. The script imports various packages like textwrap, pandas, numpy, xlswriter, itertools, and openpyxl. It defines file paths and reads an Excel file named 'All Model Elements Data.xlsx' into a DataFrame. The code then processes the data to create a clash matrix.

```

#COPYRIGHT KEHINDE AYOBADE
#Importing the required packages
import os
from textwrap import fill
import pandas as pd
import numpy as np
import xlswriter
import itertools
import openpyxl
#Import file from file path
file_path = r'E:\NAVISWORKS CLASH TEST FILES\Excel Files'
os.chdir(file_path)
Excel_File_Name = "All Model Elements Data"
Excel_File = 'E:\NAVISWORKS CLASH TEST FILES\Clash Matrix Data\All Model Elements Data.xlsx'
excel_df = pd.read_excel(Excel_File, sheet_name=None)

```

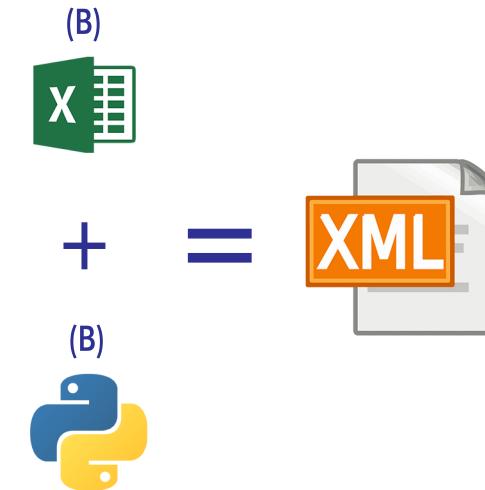
PARTS 1-2

WORKFLOW BROKEN DOWN INTO PARTS



PART 3

Excel workbook (B) populated with desired clash types and tolerances in the following combination; H100, C200, etc. Prefix letter stands for clash type and number represents clash tolerance in millimeters



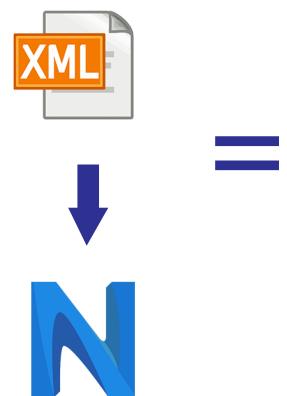
Python script (B) written to automate the creation of Navisworks clash tests using the data from excel clash matrix in excel workbook B. Output is a XML file which would be imported into Navisworks to run clash detection

.XML file export from Python script (B) containing all search sets and clash tests that would be used for clash detection in Navisworks. Depends on the data populated in the excel clash matrix (Excel workbook B)

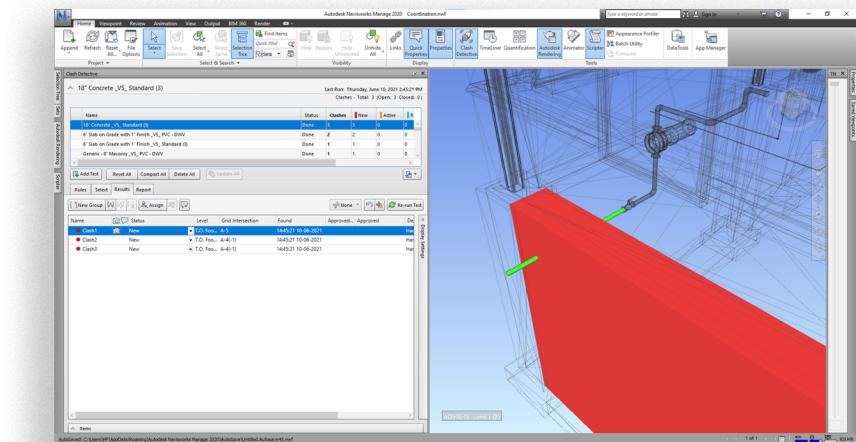
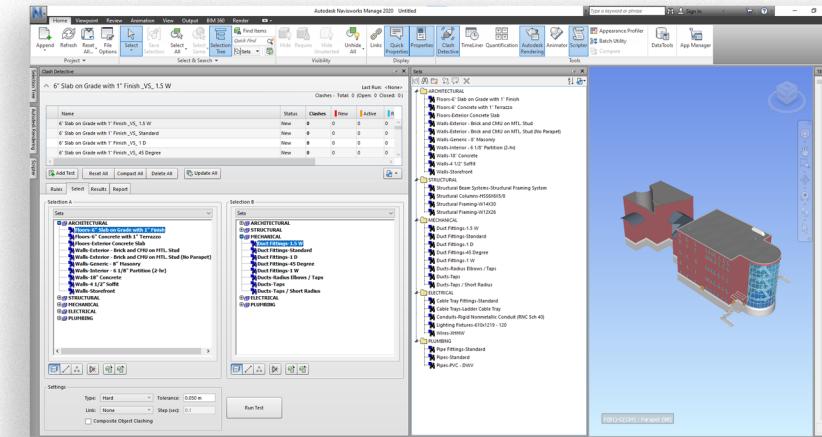
Discipline	Element Category	Element Type	Floors			Walls		
			Architectural	Structural	Mechanical	Electrical	Plumbing	
ARCHITECTURAL	Floors	6" Stub on Grade with 1" Finish	H-50					
		6" Concrete with 1" Terrazzo	H-50					
	Walls	Exterior Concrete Slab	H-50					
		Exterior - Brick and CMU on MTL Stud	H-50					
		Generic - 8" Masonry	H-50					
		Generic - 10" Partition (2-hr)	H-50					
		18" Concrete	H-50					
		4 1/2" Soffit	H-50					
		Interior - Drywall	H-50					
		Interior - Gypsum	H-50					
STRUCTURAL	Structural Beam Systems	NS554X10/8	H-100	H-100				
	Structural Columns	W12x20	H-100	H-100				
	Structural Framing	W12x20	H-100	H-100				
		W12x20	H-100	H-100				
MECHANICAL	Duct Fittings	1.5 W	C-1000	C-1000				
		Standard	C-1000	C-1000				
		10	C-1000	C-1000				
		45 Degree	C-1000	C-1000				
		90 W	C-1000	C-1000				
	Ducts	Elbows / Taps	H-200	H-200				
		Taps / Short Radius	H-200	H-200				
	ELECTRICAL	Cable Tray Elbows	C-1000	C-1000				
	Cable Trays	Ladder Cable Tray	C-1000	C-1000				
	Conduits	Rigid Nonmetallic Conduit (RNC Sch A)	C-1000	C-1000				
		Flexible Metal Conduit (FMC)	C-1000	C-1000				
		Wires	XRay	C-1000	C-1000			
	PLUMBING	Pipe Fittings	Standard	C-500	C-500			
		Lead	C-500	C-500	C-500			
		PVC - DWV	C-500	C-500	C-500			

PART 4

Import clash test XML file into the clash detective window inside of Navisworks. Search sets are automatically created in the search/selection set dialog box



Inside of Navisworks, update all clash tests in the clash detective window and visualize clash results in the 3D view



PARTS 3-4

WORKFLOW BROKEN DOWN INTO PARTS