Civil LAB developer framework

1. Introduction

This is a small guide for developers who wants to together build the CIVIL-LAB. In this document there are some tips for available tools which I have used for the initial development. In order to make the document organised and easier for users / other developers, here I also add a name-rule for the resources added in the Excel (such as names for functions, build in tables, user forms).

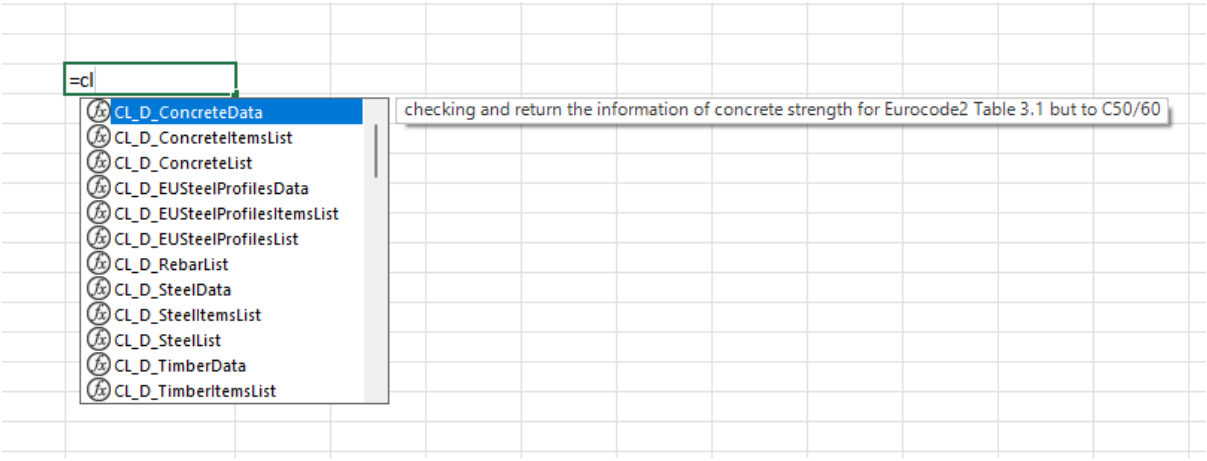
2. Resources

Here are some useful website / tools could be useful for the development:

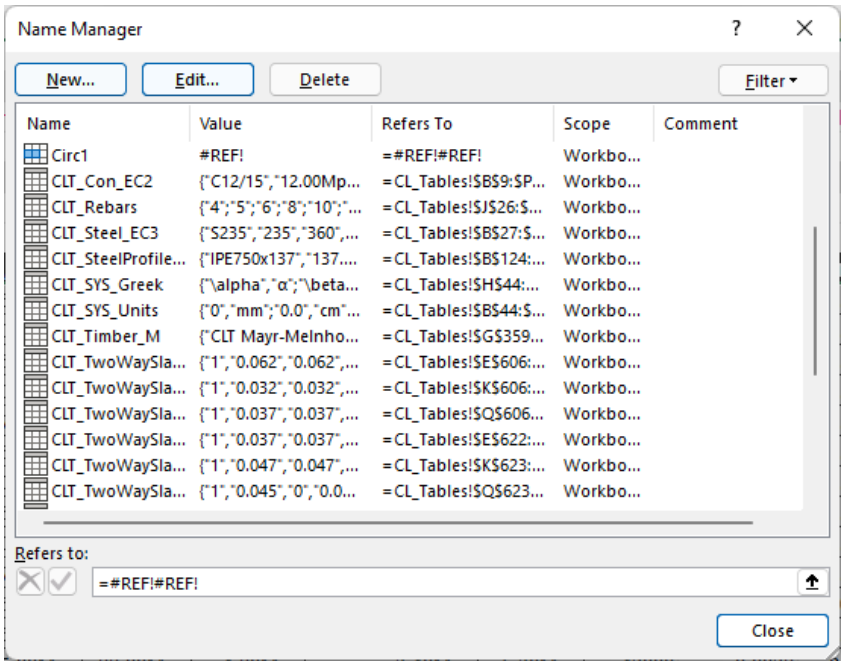
CIVIL-LAB Main website (Gitbook)	What is CIVIL LAB Excel? - Civil LAB - Excel (civil-lab.lu)
CIVIL-LAB Github	GitHub - zqj423/CIVIL-LAB-EXCEL: A Excel add-in for civil engineer practice to simplify the work
Excel DNA (for display the dynamic function guides and much more)	Excel-DNA | Free and easy .NET for Excel
Office RibbonX Editor (tools to add ribbons in excel)	GitHub - fernandreu/office-ribbonx-editor: An overhauled fork of the original Custom UI Editor for Microsoft Office, built with WPF
ScreenToGif (useful tool to record a small gif animation for the guide)	ScreenToGif - Record your screen, edit and save as a gif, video or other formats

3. Naming rules

In order to separate the Civil LAB functions with other built-in Excel functions and tables, all the Civil LAB modules are suggested to start with the keyword “CL_”. For example when you type in “=cl” in excel, all the newly added functions are shown.



And the built-in data are storage in tables with the name “CLT_”, under the spreadsheet “CL_Tables” (hidden by default)



1) Naming rules for new functions

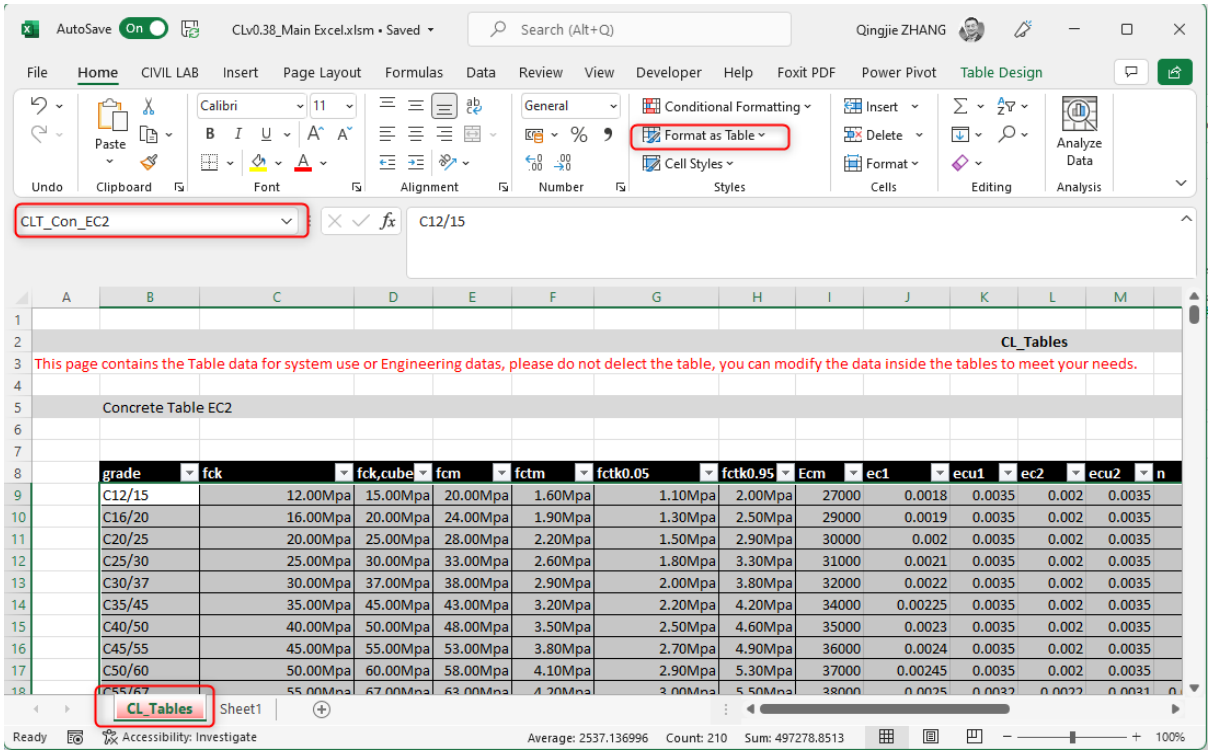
The new added functions should started with the keyword “CL_” and a second keyword indicates the categories of the function such as *“CL_D_ConcreteData”*. The details are as follow in the table, new category names could be added.

“CL_D_”	Functions related to Database handling and Data related
“CL_Dr_”	Functions related to drawing and plotting, visualization
“CL_G_”	Functions related to general calculations (interpolation etc.)
“CL_EC0” to “CL_EC9”	Functions related to Eurocodes from EN1990 to EN1999
“CL_M_”	Functions related to the general Mechanical calculations, such as cross-section properties
“CL_IO_”	Functions relates to inputs/outputs communications

2) Naming rules for new tables

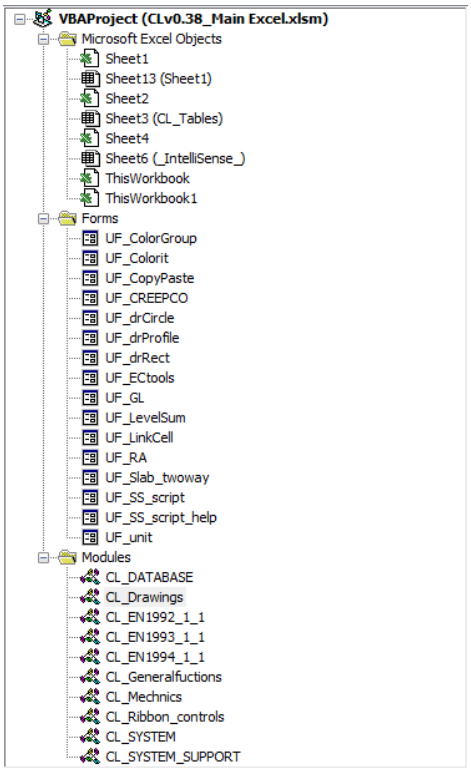
The new added built-in tables should started with the keyword “CLT_” and followed by the table name. All the tables should be stored in the spread sheet started with “CL_”, it is suggested to add new tables directly in the default “CL_Tables”.

The data table should “format as table” to create excel data table for easier handling and manage the data. The names of the data can be modified by Formulas > Name Mangers.



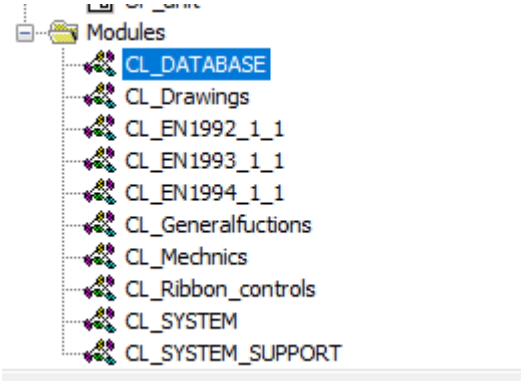
3) Naming rules for new User Forms

The new added built-in user forms should started with the keyword “UF_”



4. Guides to function modules

The function modules are stored inside the files with “CL_xxx” for different categories



In order to improve the stability of the code, the “Option Explicit” is used, which means all the parameters must be defined first before use.

Among the Modules, the “CL_Ribbon_controls”, “CL_SYSTEM”, “CL_SYSTEM_SUPPORT” are only for system purpose (private module, thus hidden from user)

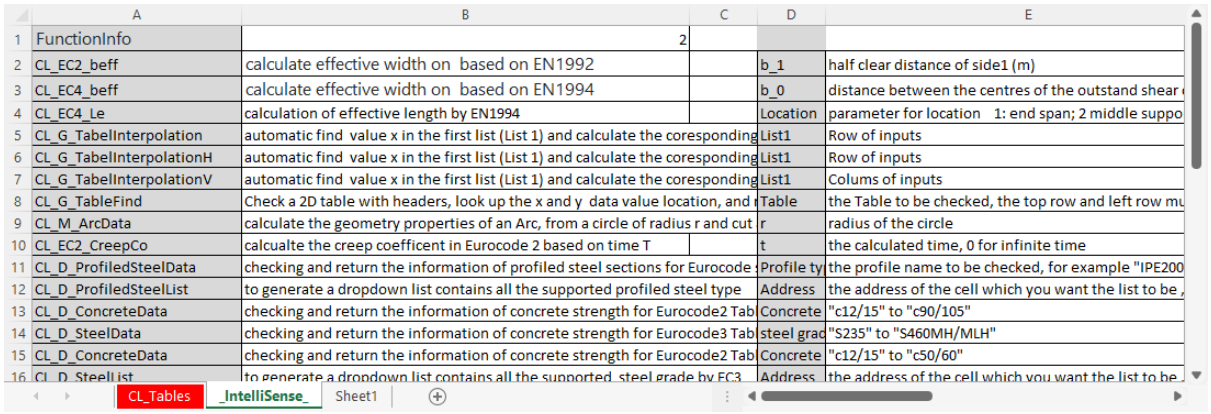
1) How to add functions

You can open any of the module document or create your own ones as well to add the functions. It is suggested to add clear comment for the functions. (well, seems I did not do a good example 😊)

```
'######################################## GET DATA ########################################


Function CL_D_SteelData(SteelGrade As String, datatype As String) As Double
'Checking steel material properites

Dim tablename As String
tablename = "CLT_Steel_EC3"
CL_D_SteelData = CL_G_ListTableFind(Range(tablename), SteelGrade, datatype)

End Function
```

2) “ExcelDNA” – add function guides

Excel cannot natively show the dynamic functions guides, thus we use a third-part add-in called “EXCELDNA” to do the job. (thus you will see two files “ExcelDna.IntelliSense.xll” and “ExcelDna.IntelliSense64.xll” along with the Main excel when you download it. There is also way to merge the ExcelDNA into the main excel, however will perhaps we will do so for the next build.) In the main excel there is a hidden spreadsheet named “_IntelliSense_” which defines all the function guides.



	A	B	C	D	E
1	FunctionInfo	2			
2	CL_EC2_beff	calculate effective width on based on EN1992		b_1	half clear distance of side1 (m)
3	CL_EC4_beff	calculate effective width on based on EN1994		b_0	distance between the centres of the outstand shear
4	CL_EC4_Le	calculation of effective length by EN1994		Location	parameter for location 1: end span; 2 middle suppo
5	CL_G_TabelInterpolation	automatic find value x in the first list (List 1) and calculate the coresponding		List1	Row of inputs
6	CL_G_TabelInterpolationH	automatic find value x in the first list (List 1) and calculate the coresponding		List1	Row of inputs
7	CL_G_TabelInterpolationV	automatic find value x in the first list (List 1) and calculate the coresponding		List1	Colums of inputs
8	CL_G_TableFind	Check a 2D table with headers, look up the x and y data value location, and r		Table	the Table to be checked, the top row and left row mu
9	CL_M_ArcData	calculate the geometry properties of an Arc, from a circle of radius r and cut		r	radius of the circle
10	CL_EC2_CreepCo	calcualte the creep coefficent in Eurocode 2 based on time T		t	the calculated time, 0 for infinite time
11	CL_D_ProfiledSteelData	checking and return the information of profiled steel sections for Eurocode		Profile ty	the profile name to be checked, for example "IPE200
12	CL_D_ProfiledSteelList	to generate a dropdown list contains all the supported profiled steel type		Address	the address of the cell which you want the list to be
13	CL_D_ConcreteData	checking and return the information of concrete strength for Eurocode2 Tab		Concrete	"c12/15" to "c90/105"
14	CL_D_SteelData	checking and return the information of concrete strength for Eurocode3 Tab		steel grad	"S235" to "S460MH/MLH"
15	CL_D_ConcreteData	checking and return the information of concrete strength for Eurocode2 Tab		Concrete	"c12/15" to "c50/60"
16	CL_D_SteelList	to generate a dropdown list contains all the supported steel grade by EC3		Address	the address of the cell which you want the list to be

CL_Tables | _IntelliSense_ | Sheet1

A guide for Excel DNA

[GitHub - Excel-DNA/IntelliSense: Add in-sheet IntelliSense for Excel UDFs]

For VBA and C# based functions.

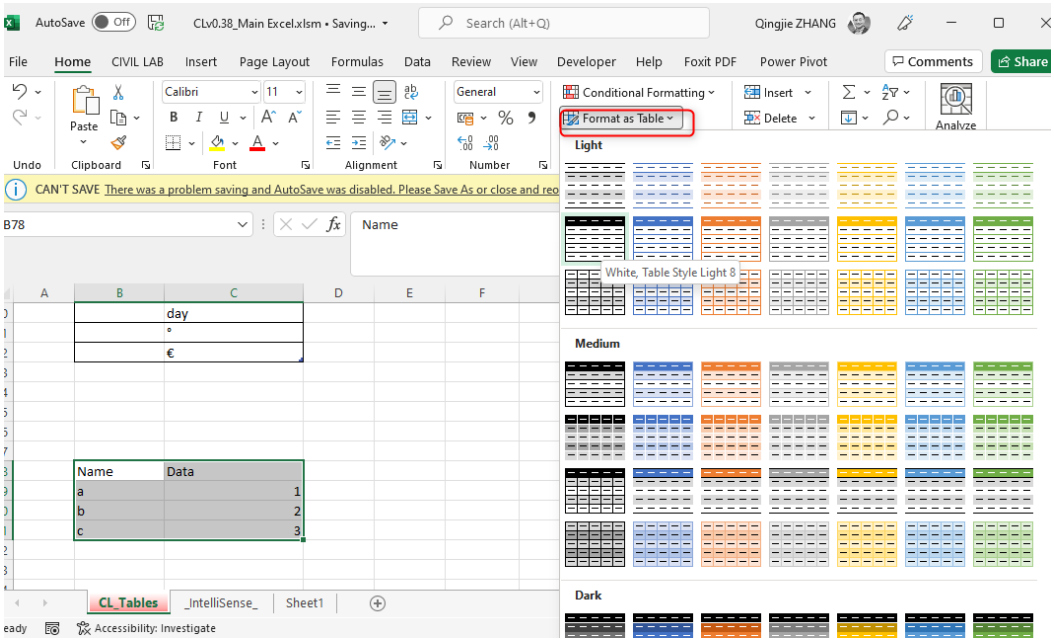
[Getting Started · Excel-DNA/IntelliSense Wiki · GitHub]

5. Guides to data tables

1) How to add tables

To add the data tables it could be simply added under the hidden spreadsheet “CL_Tables”. By the following step

- Add a new table
- Format as listTable by Home > Format as Table
- Change the Table name by Formulas -> Name Manager

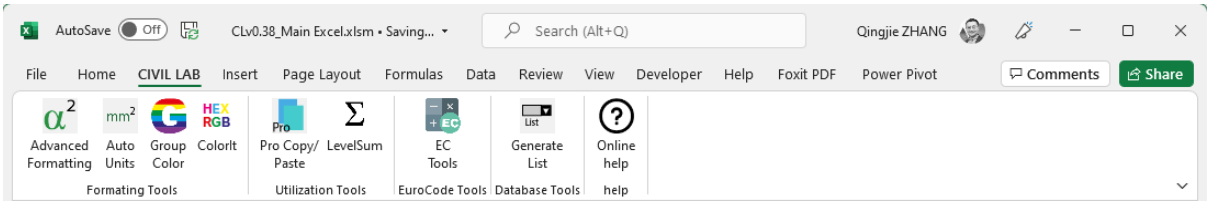


2) Functions for table data checking

There are built in function “CL_G_ListTableFind” for easer to check the data from a listTable, details could see the example in module in ““CL_DATABASE”. It is also possible to do a interpolation based on the xy data provided in the table by using “CL_G_TabelInterpolation”

```
'######################################## GET DATA ########################################


Function CL_D_SteelData(SteelGrade As String, datatype As String) As Double
'Checking steel material properites

Dim tablename As String
tablename = "CLT_Steel_EC3"
CL_D_SteelData = CL_G_ListTableFind(Range(tablename), SteelGrade, datatype)

End Function
```

6. Guides to Ribbons



It is possible to add self-made user forms / subroutines under the “CivilLAb” ribbons for the tools.

1) How to add EXCEL VBA ribbons

To add the ribbons the following steps could be followed:

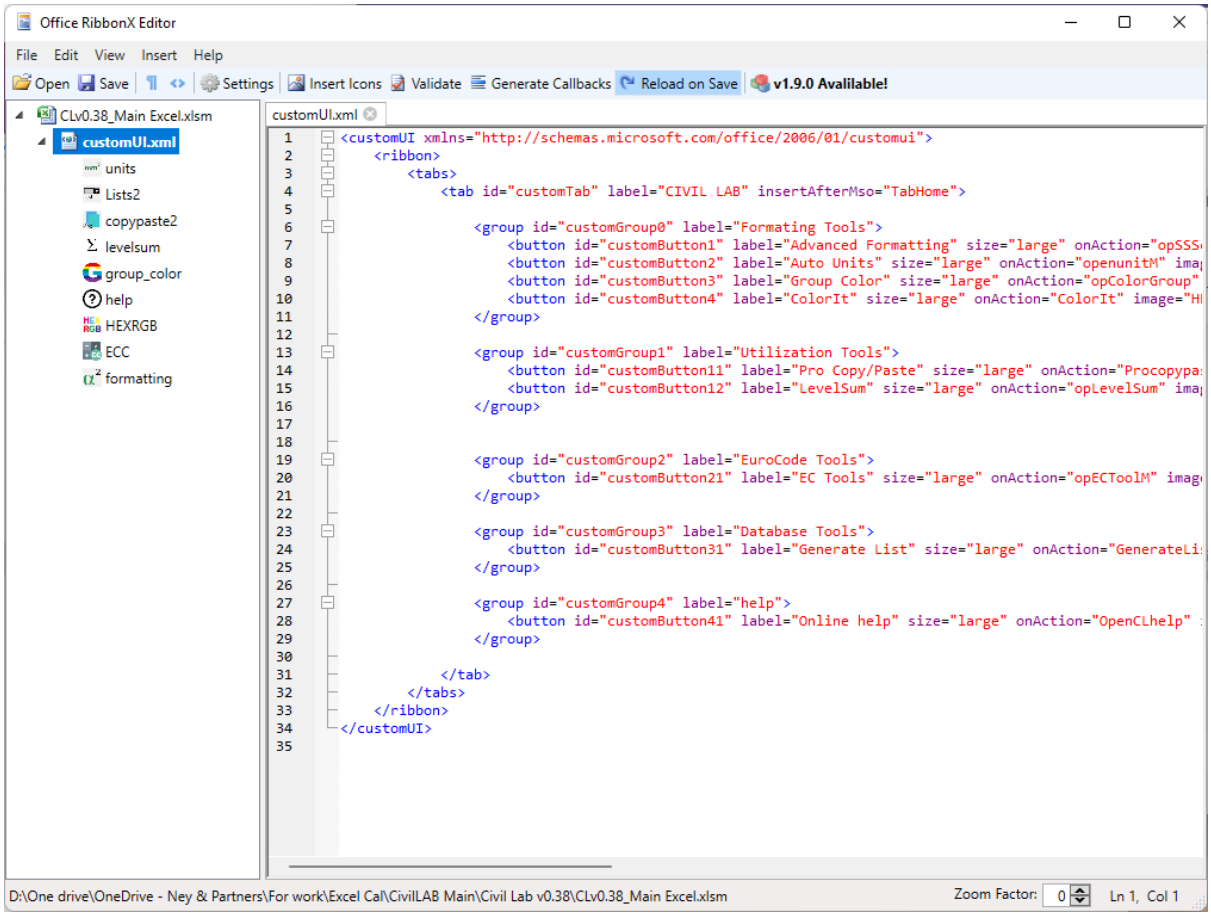
- Build your User Form / subroutines
- (only for User form) write a user form open subroutine under the module “Ribbon_controls”

```
'Callback for scripts onAction
Sub opSSScriptM(control As IRibbonControl)
UF_SS_script.Show vbModeless
End Sub
```

Edit the Ribbon by using the software “Office RibbonX Editor”

Guides could be found :

[GitHub - fernandreu/office-ribbonx-editor: An overhauled fork of the original Custom UI Editor for Microsoft Office, built with WPF]


Office RibbonX Editor
File Edit View Insert Help
Open Save Settings Insert Icons Validate Generate Callbacks Reload on Save v1.9.0 Avalilable!
CLv0.38_Main Excel.xlsm
customUI.xml
units
Lists2
copypaste2
levelsum
group_color
help
HEXRGB
ECC
formatting
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<button id="customButton4" label="ColorIt" size="large" onAction="ColorIt" image="HI
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Ln 1, Col 1