Robot Structural Analysis API Add-Ins as Benefits for Structural Design Modeling

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Robot Structural Analysis API

Custom-tailored software has never been easier to achieve in Robot Structural Analysis software.

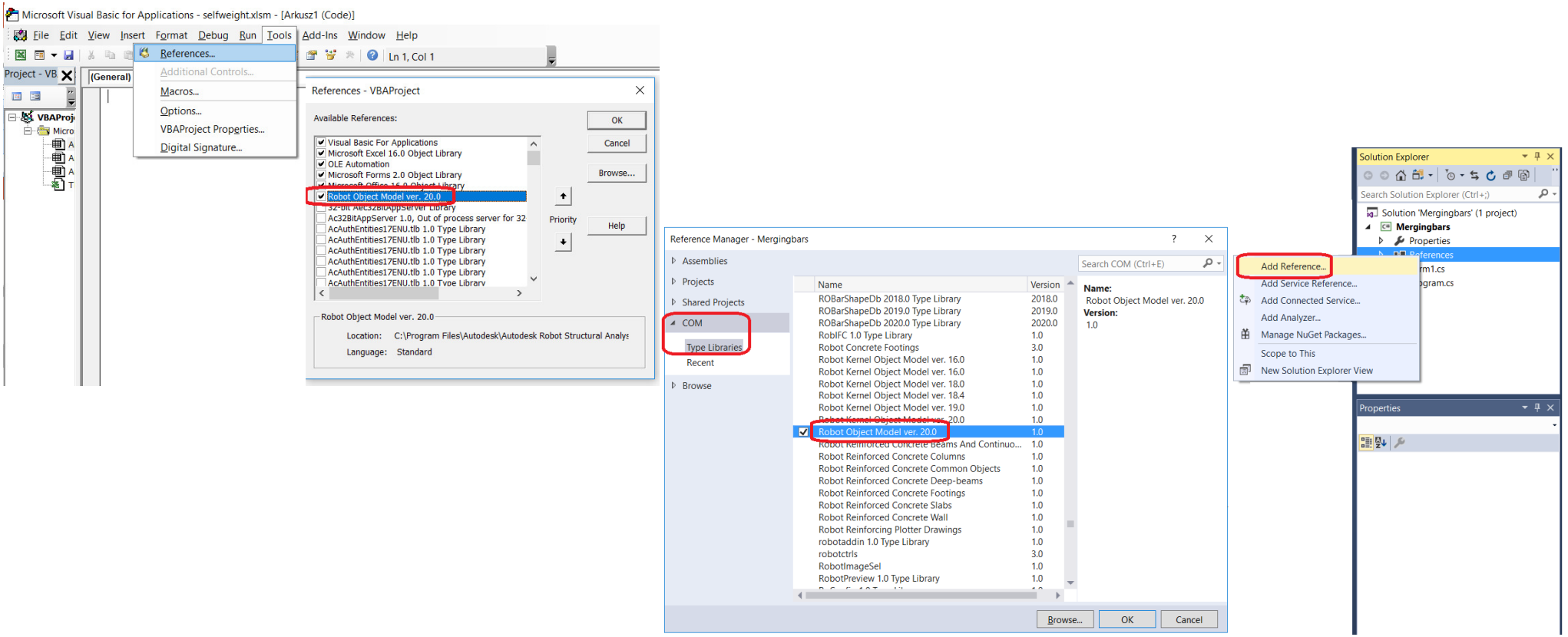
If you’re writing, or willing to write, add-ins for Robot Structural Analysis to expand its capabilities, this is the perfect place to get to know the subject.

API References

Before starting

To get connected to Robot Structural Analysis API, reference to **Robot Object Modeler** must be set in programming environment.

API References



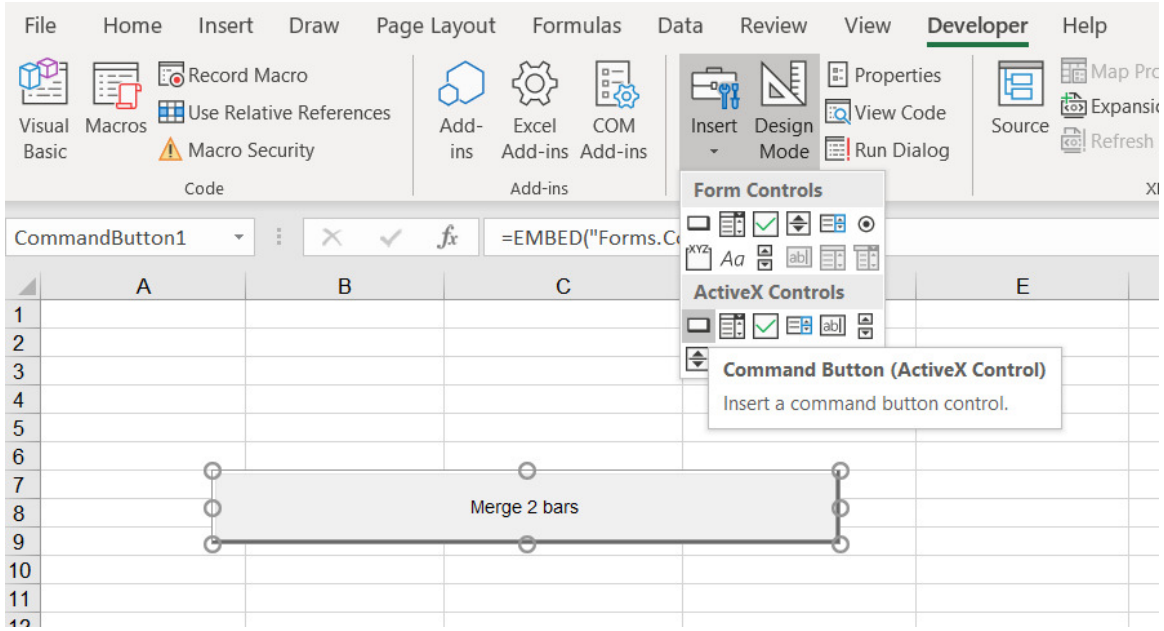
Macro in Excel

Macro in Excel – Merging 2 Bars

Add button to Sheet

On Developer tab

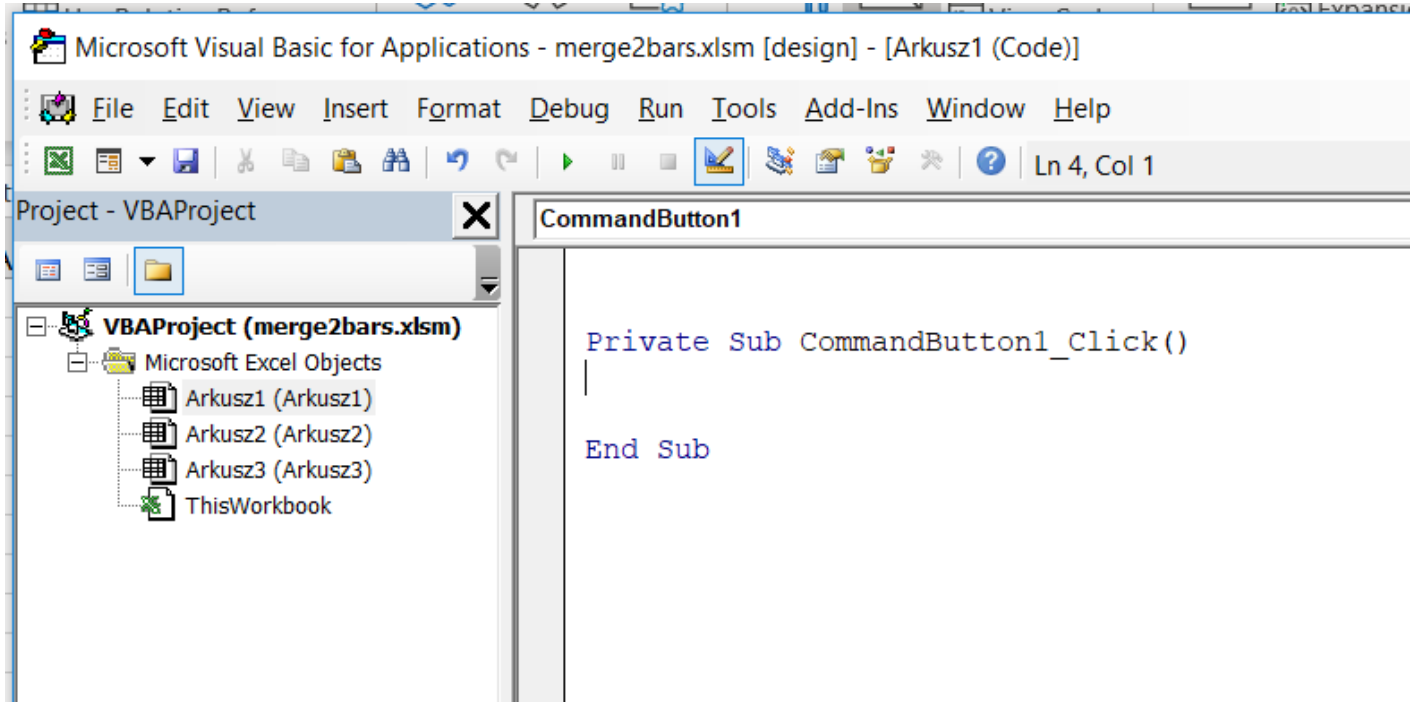
- Activate Design Mode
- Use Insert menu to add Command Button



Then make double click on it

Macro in Excel – Merging 2 Bars

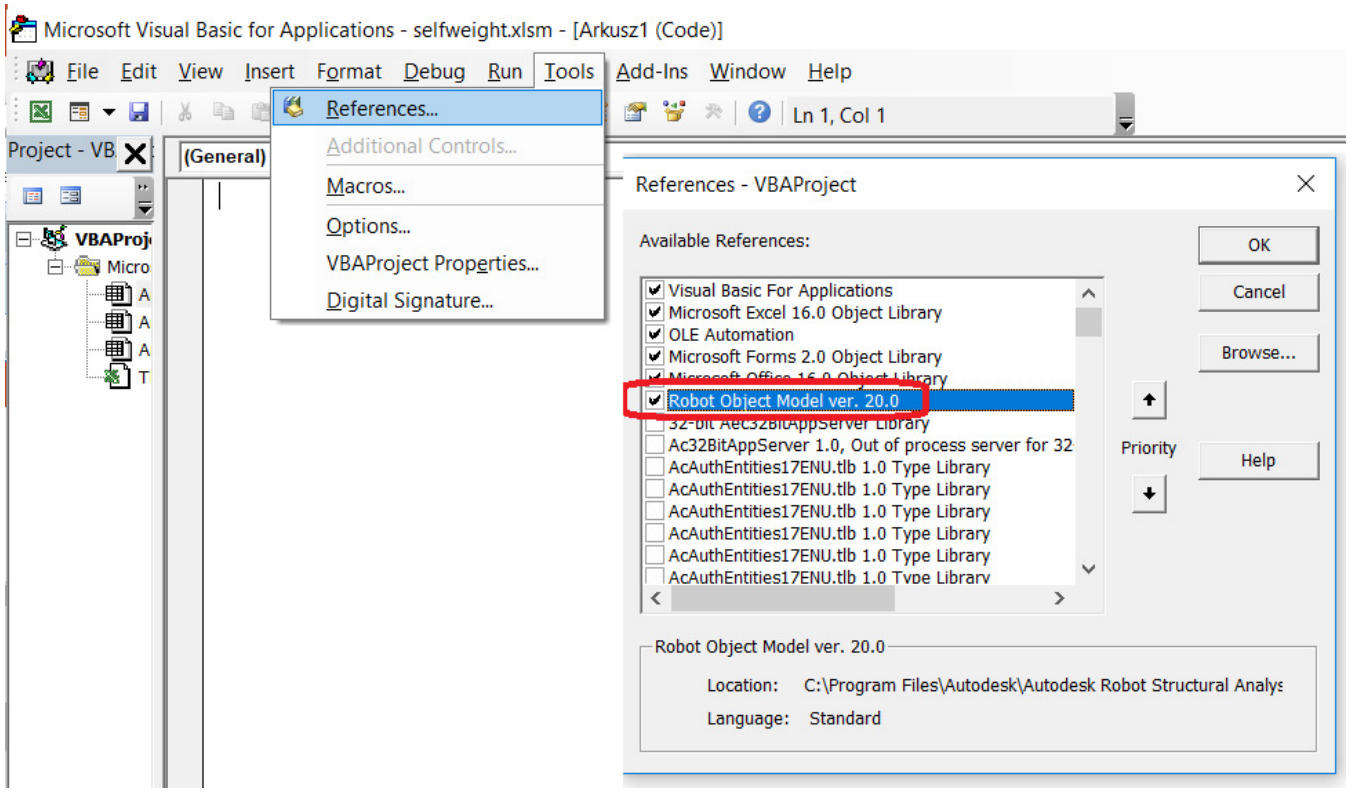
VBA Editor



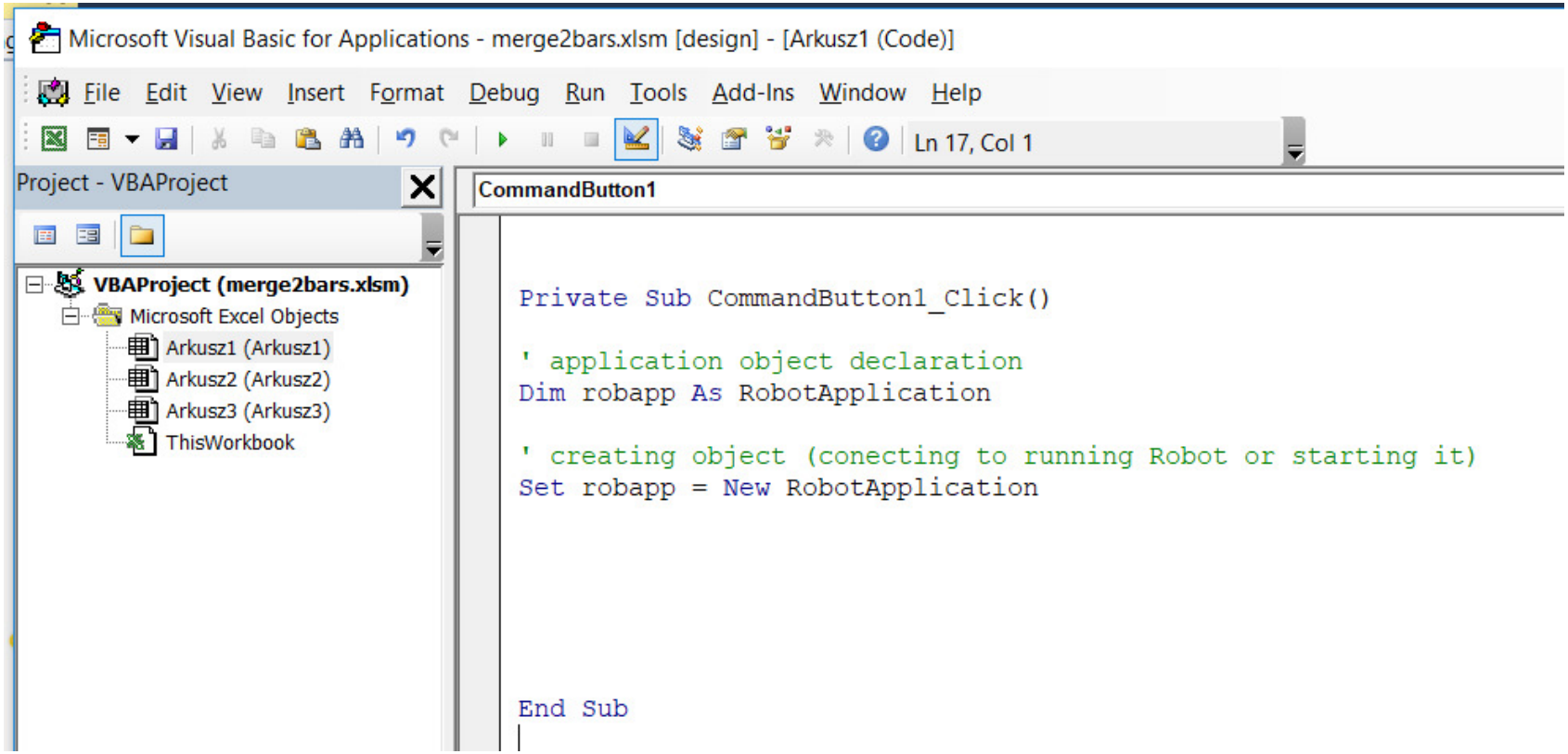
Note: VBA Editor can be accessed also by pressing ALT+F11

Macro in Excel – Merging 2 Bars

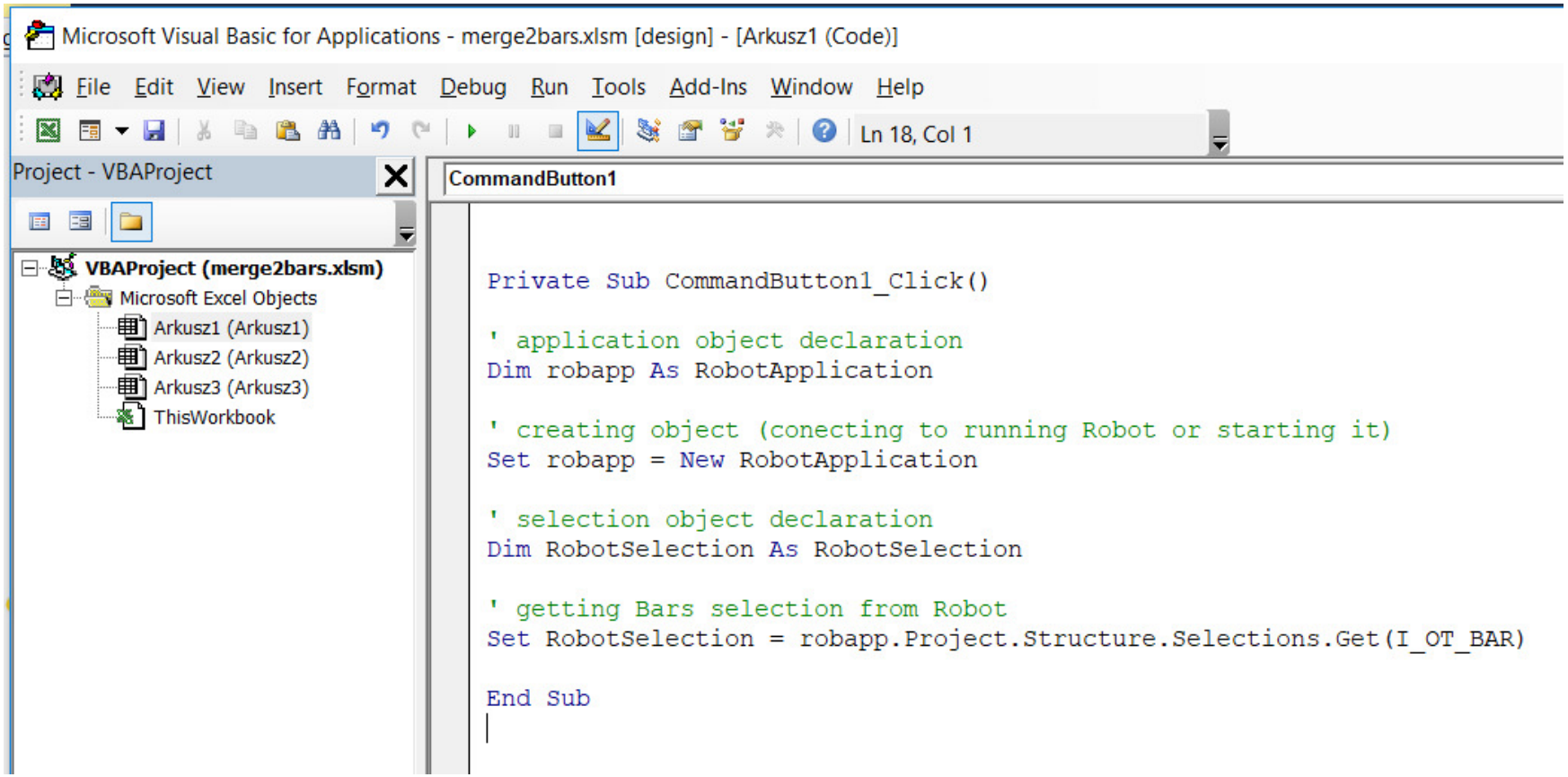
Setting up Reference



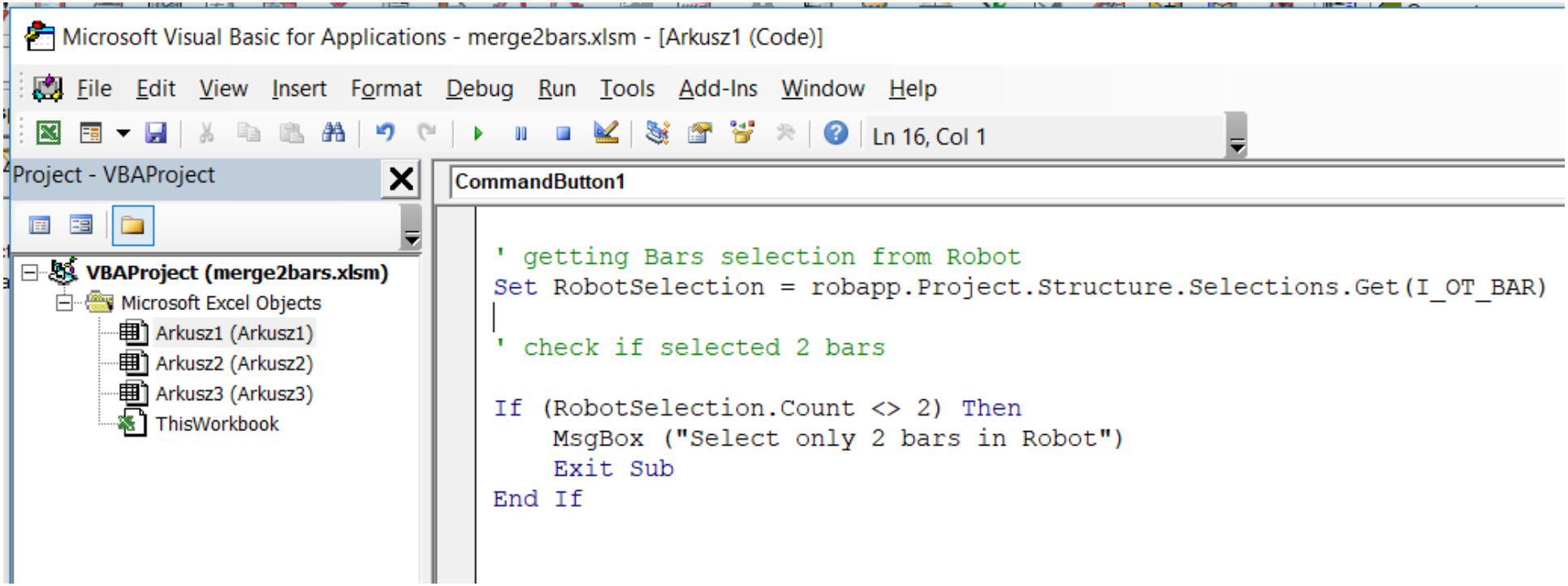
Macro in Excel – Merging 2 Bars



Macro in Excel – Merging 2 Bars



Macro in Excel – Merging 2 Bars



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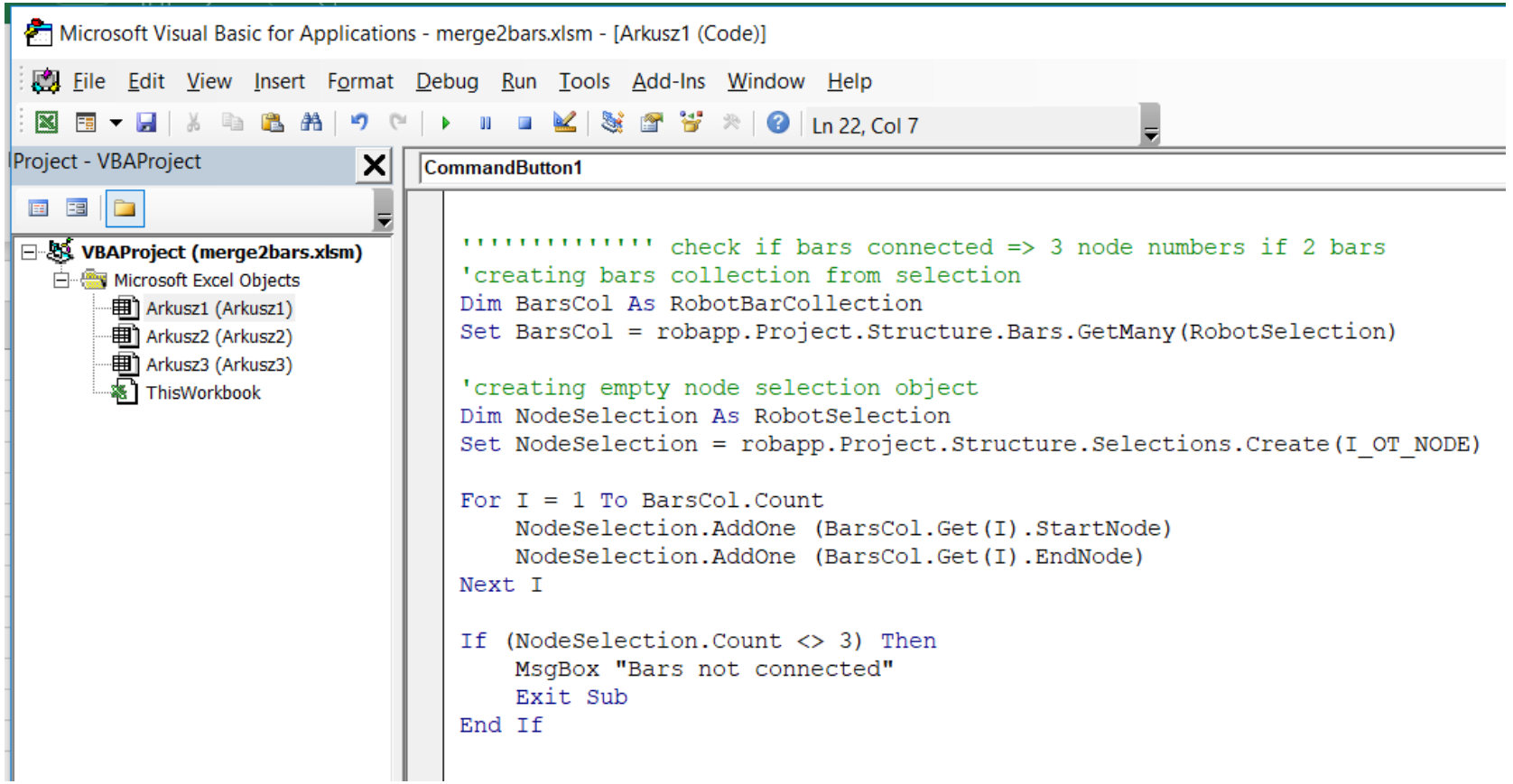

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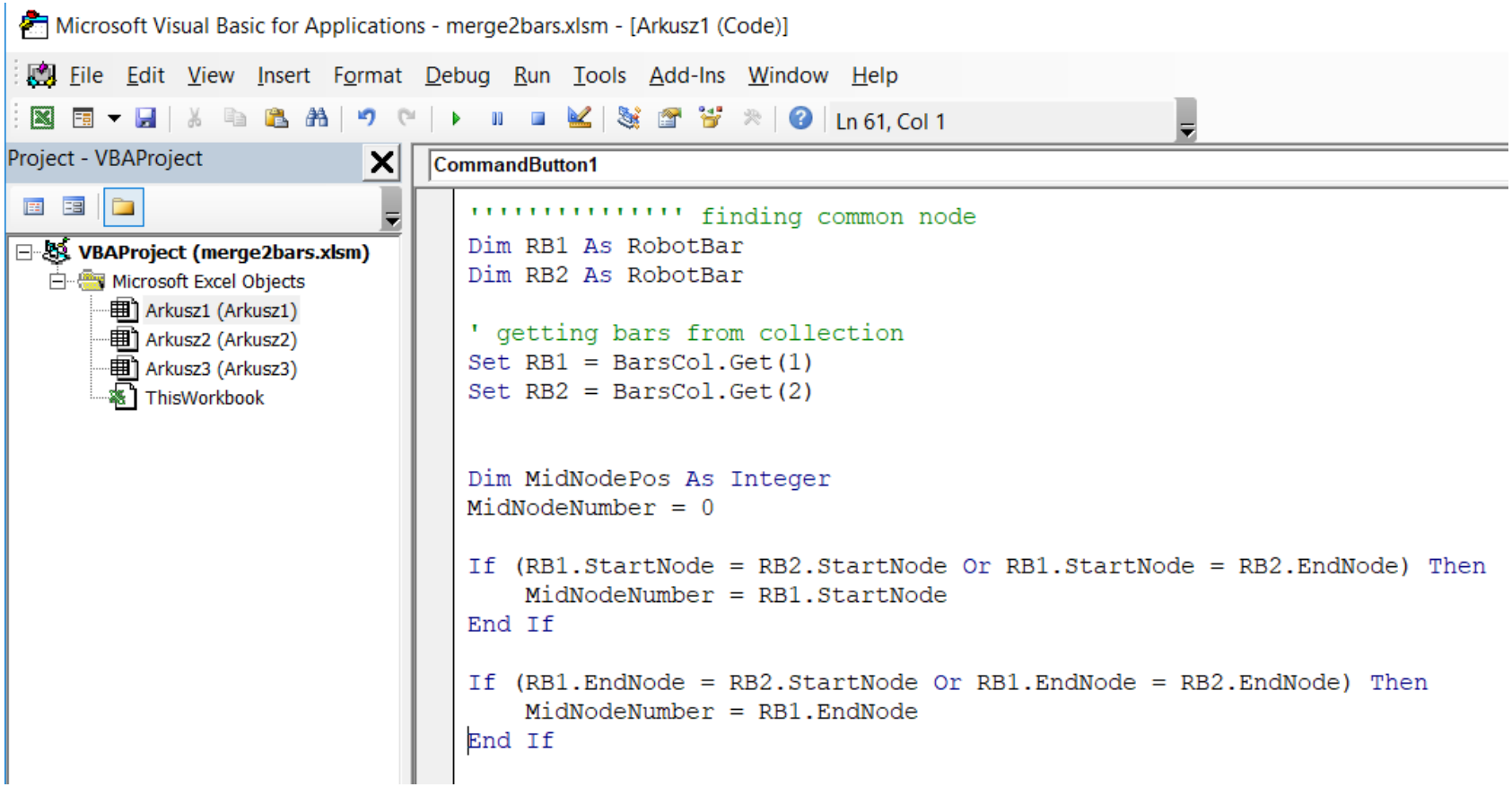
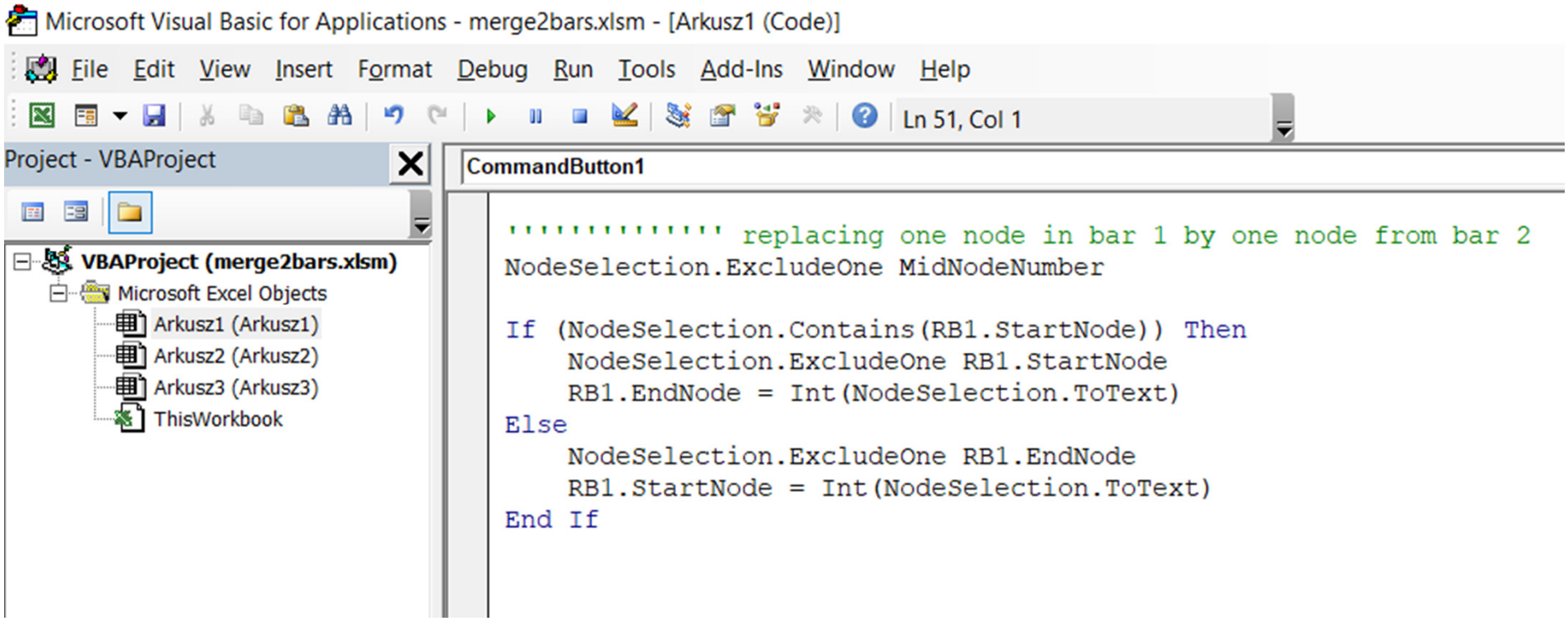


Macro in Excel – Merging 2 Bars



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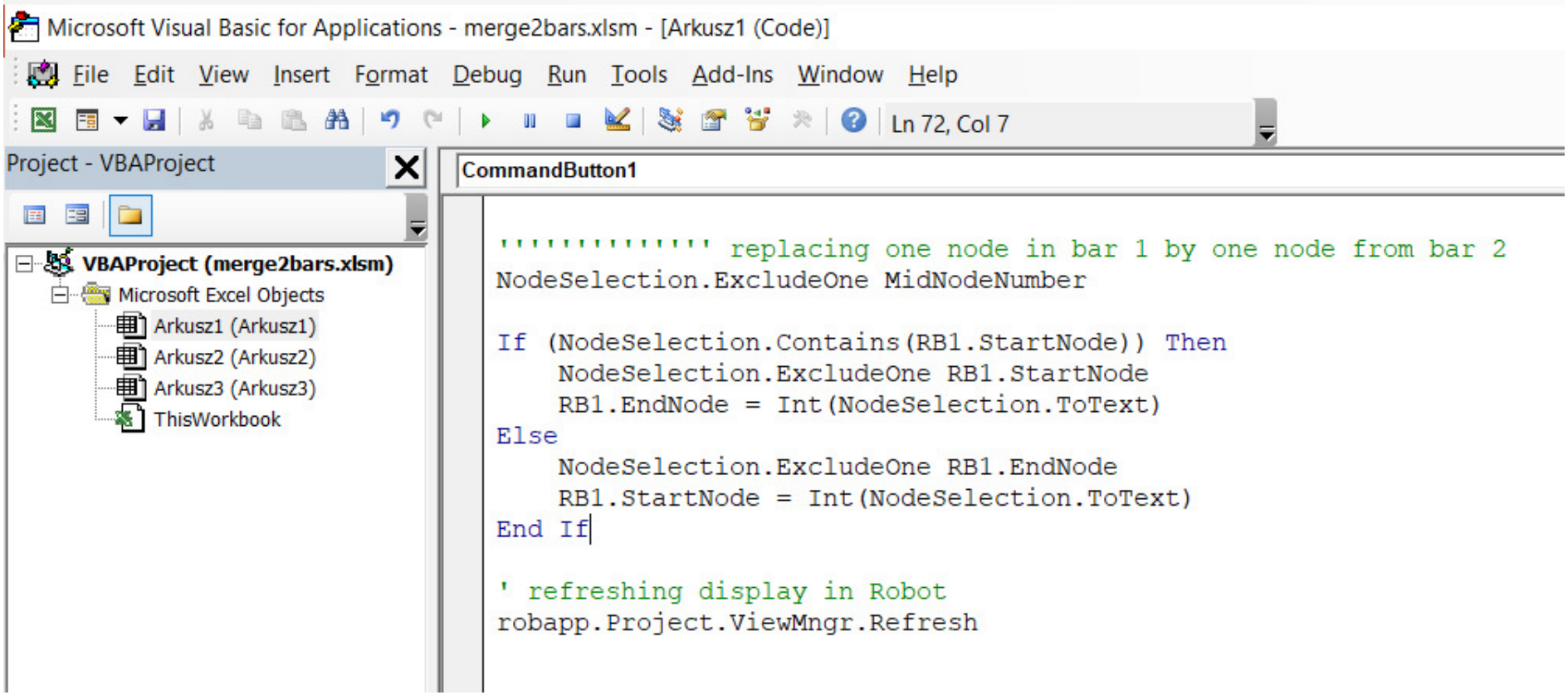

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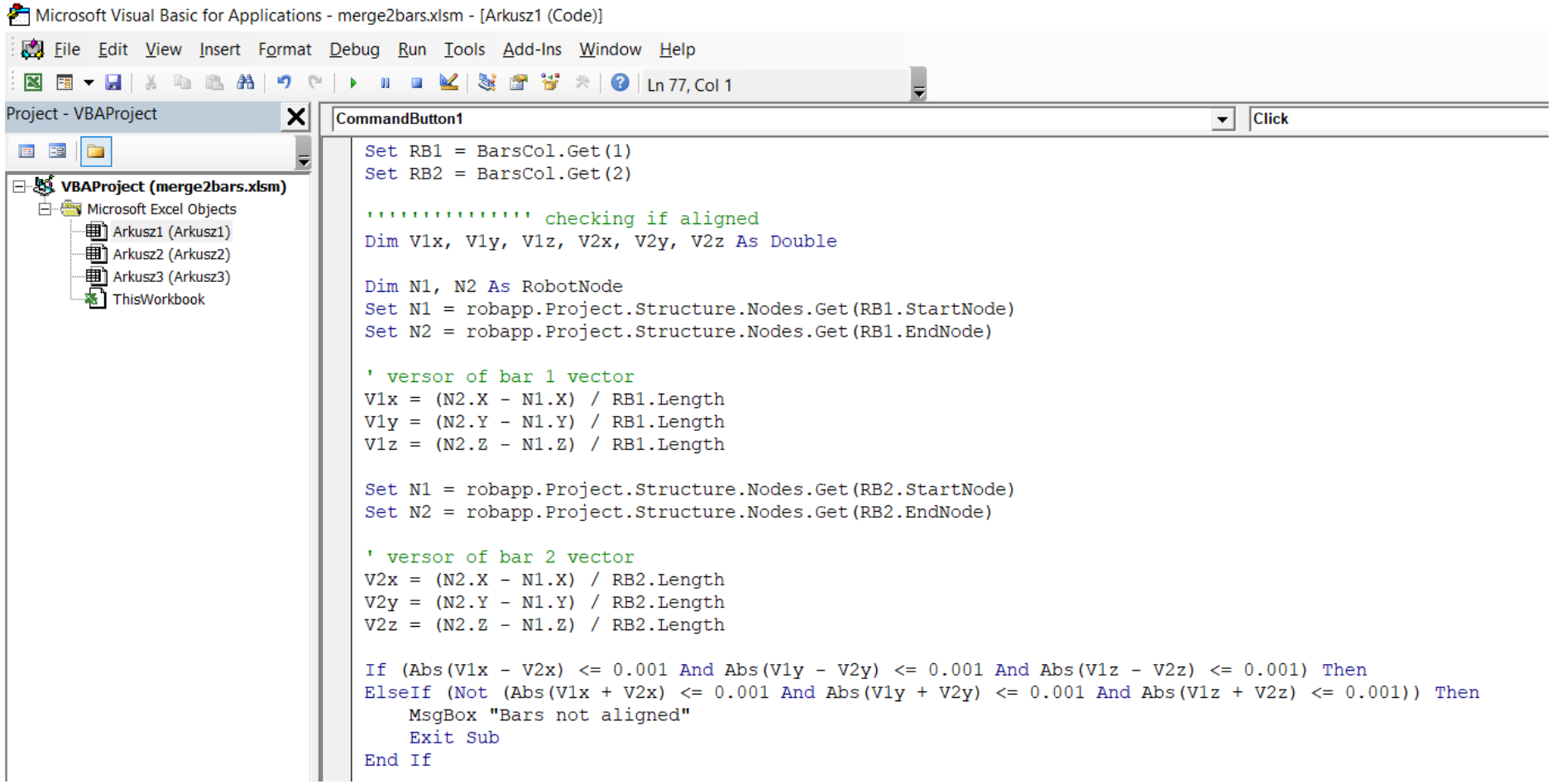
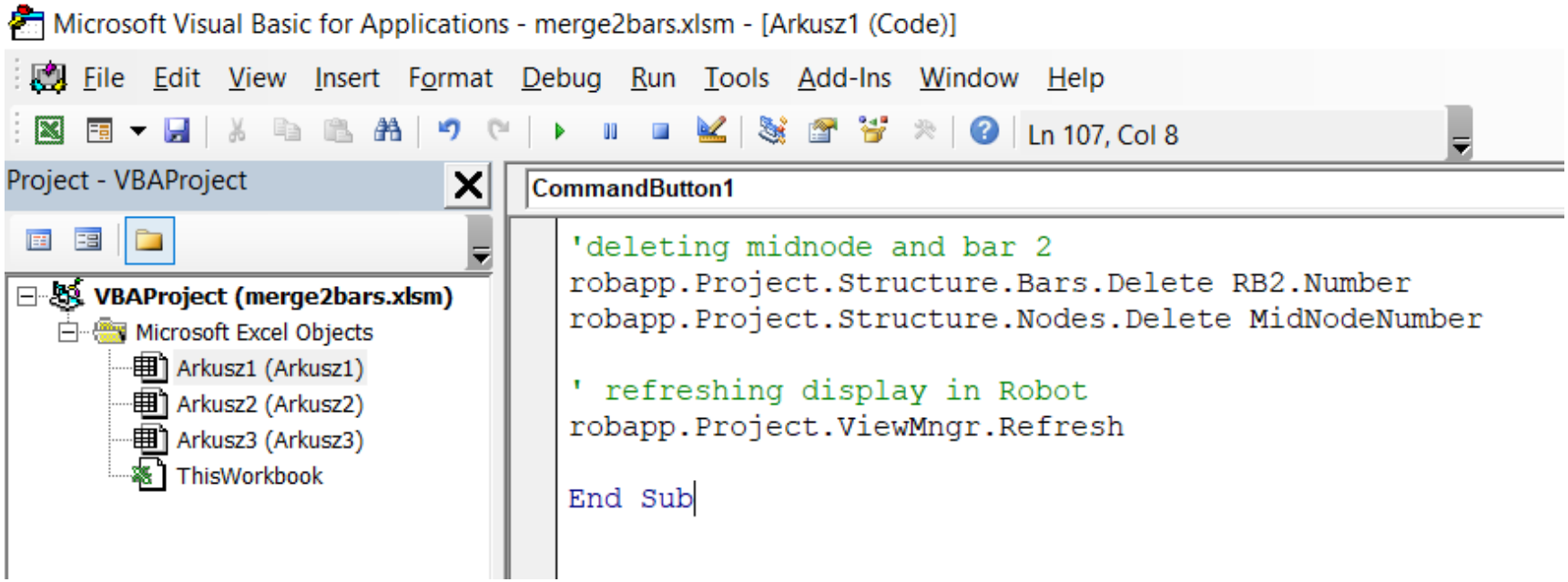
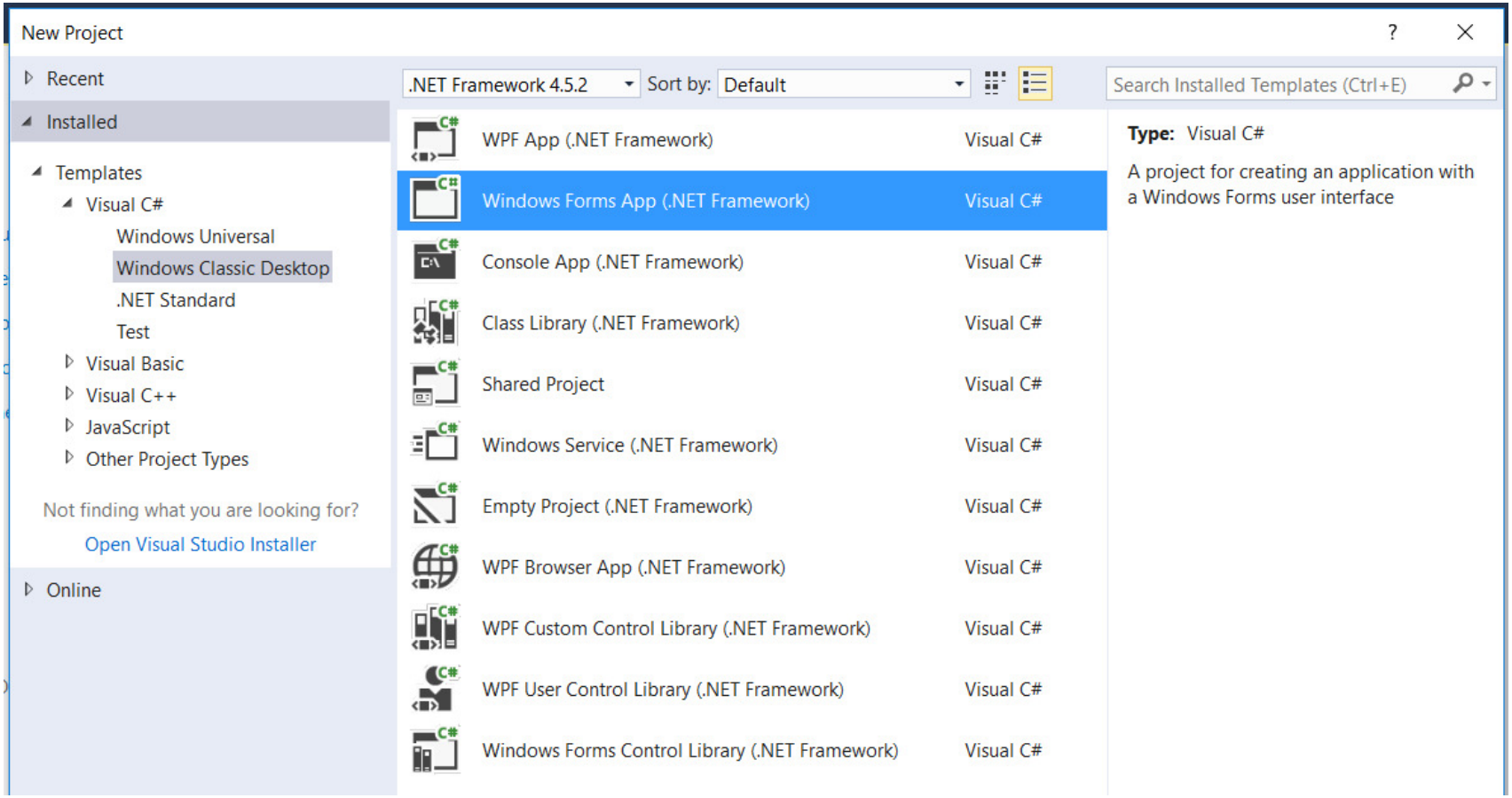


Macro in Excel – Merging 2 Bars



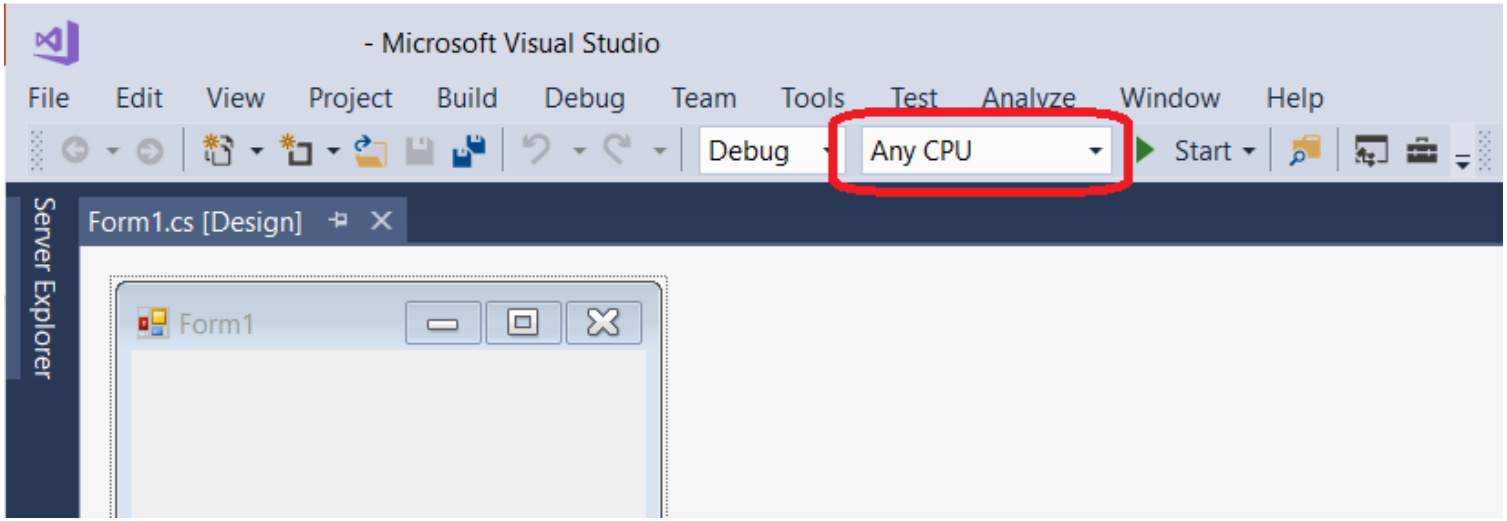
C# addin

C# addin


New Project
Recent
Installed
Templates
Visual C#
Windows Universal
Windows Classic Desktop
.NET Standard
Test
Visual Basic
Visual C++
JavaScript
Other Project Types
Not finding what you are looking for?
Open Visual Studio Installer
Online
.NET Framework 4.5.2
Sort by:
Default
Search Installed Templates (Ctrl+E)
WPF App (.NET Framework) Visual C#
Windows Forms App (.NET Framework) Visual C#
Console App (.NET Framework) Visual C#
Class Library (.NET Framework) Visual C#
Shared Project Visual C#
Windows Service (.NET Framework) Visual C#
Empty Project (.NET Framework) Visual C#
WPF Browser App (.NET Framework) Visual C#
WPF Custom Control Library (.NET Framework) Visual C#
WPF User Control Library (.NET Framework) Visual C#
Windows Forms Control Library (.NET Framework) Visual C#
Type: Visual C#
A project for creating an application with a Windows Forms user interface

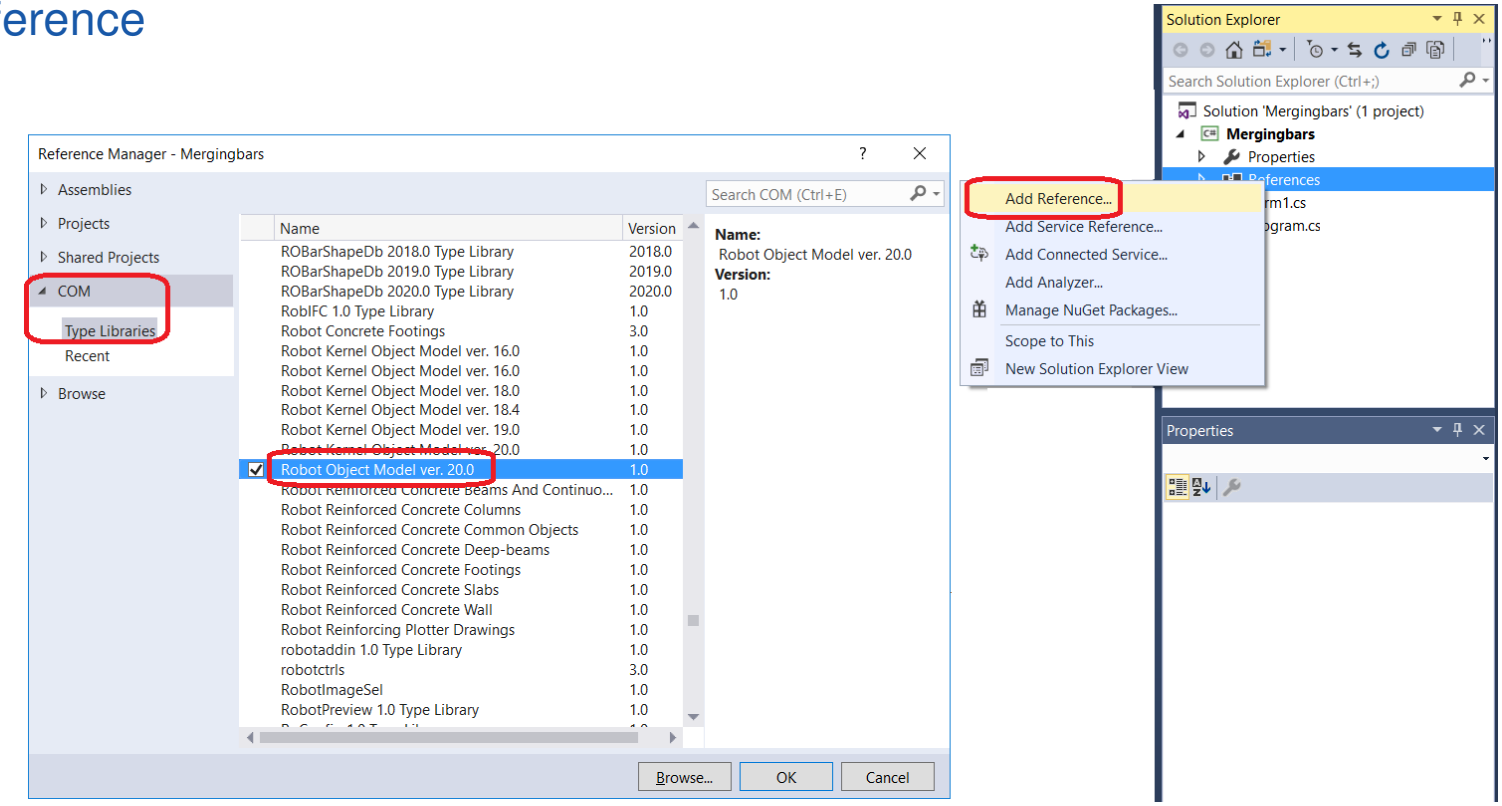
C# addin

Build for Any CPU



C# addin

Add COM reference

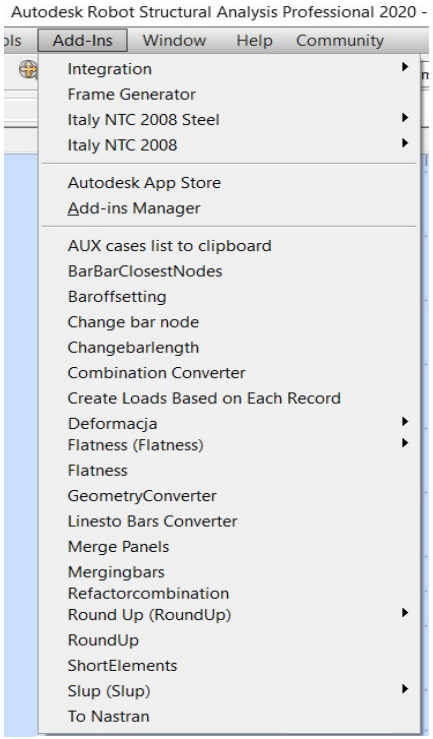


C# addin - Merging 2 Bars

Complete C# project available in class materials

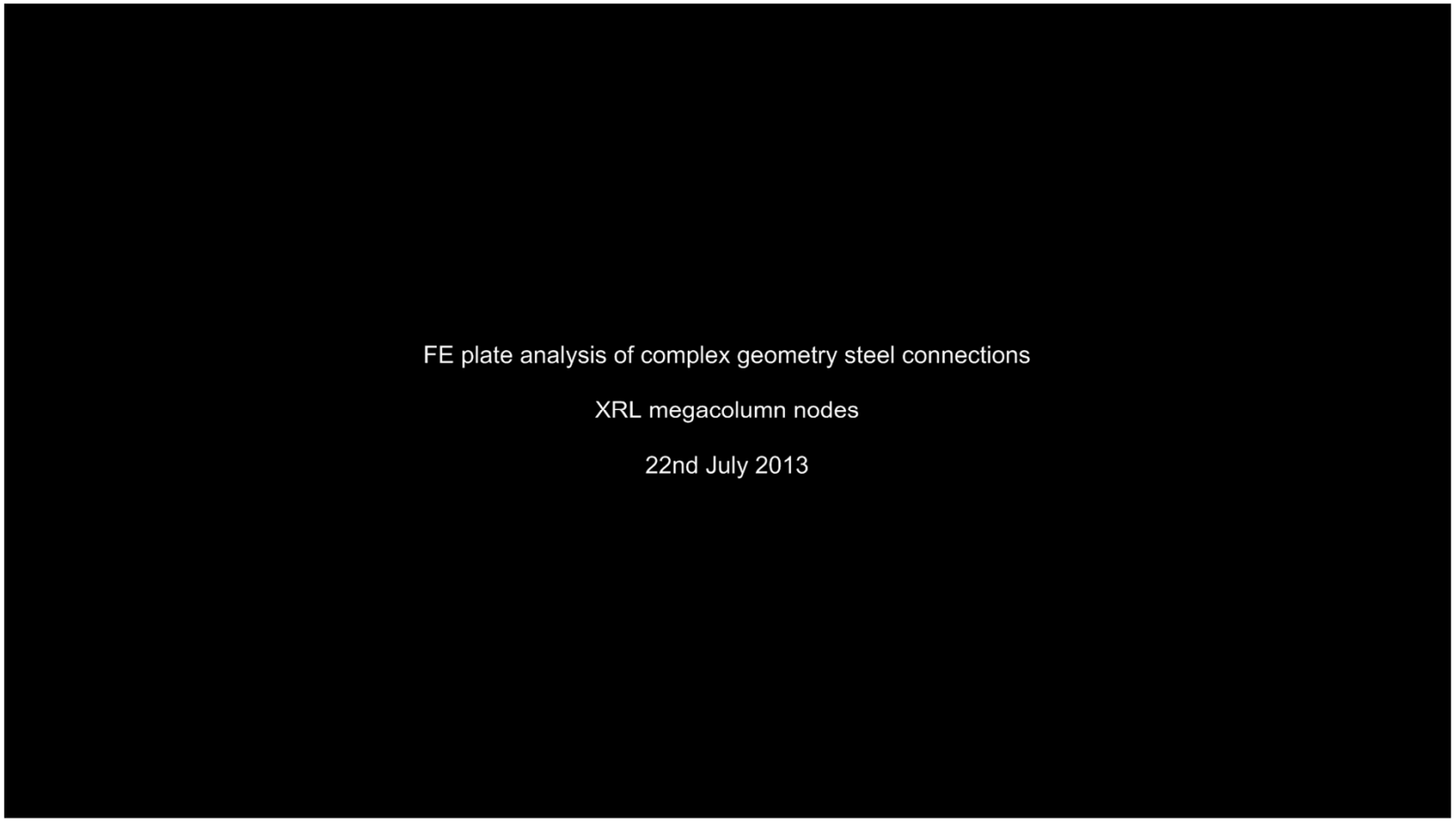
Robot Add-Ins menu

Developed addins can be attached to Robot menu

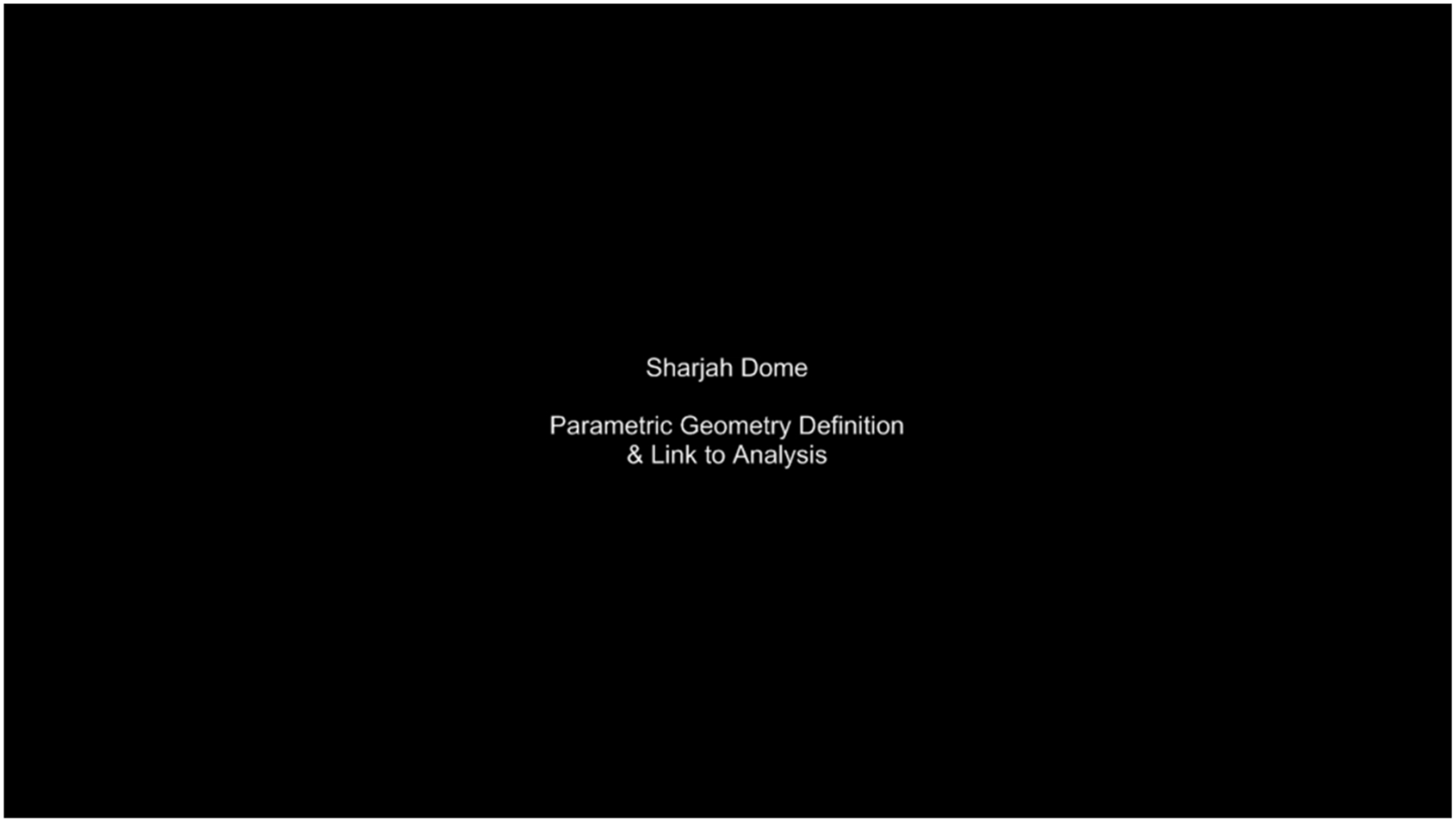


Example programs and addins

Buro Happold

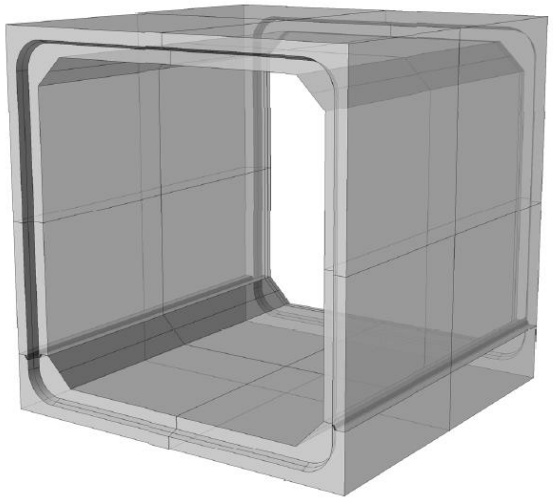


Buro Happold



Hector Bernardo

The parametric design has been implemented through an Excel sheet with VBA macros, handling ROBOT via API interface.



Tool for design of Concrete Culverts		Office:	Designer:
Version	5.9	Date: 28/11/2013	Project:
		Destinatary:	

Folder:

1. Geometry and Materials

Type:	Biapoyado		Culvert Structural Type
Height =	2.00	[m]	Free inner height
Width =	3.00	[m]	Free inner width
Top thickness =	0.20	[m]	Top slab thickness
Bottom Thickness =	0.25	[m]	Bottom slab thickness
Wall thickness =	0.20	[m]	Wall thickness
Horizontal camfer =	0.15	[m]	
Vertical Chamfer =	0.15	[m]	
Concrete =	HA-45		Concrete grade

2. Soil parameters

Groundwater presence:	SI	[m]	Is the Ground waterlevel in the walls?
Distance to GWL =	1.00	[m]	Height to the groundwater level measured from the bottom slab
Soil Specific Weight =	20.00	[KN/m^3]	Soil specific weight (Dry)
Submerged Soil Spec. W =	40.00	[KN/m^3]	Soil specific weight (Submerged)
Horizontal Earth Pres. Coef =	0.50		Horizonal Earth Pressure coefficient
Vertial K modulus =	50000	[KN/m^3]	Vertical Subgrade Reaction Modulus for the foundation soil
$E_{trasdos}/E_{relleno}$ =	1.00		Relation between Elasticity Modulus of soil over the top slab and walls

4. Loads

Permanent Load =	0.00	[KN/m^2]	Permanent load over the embankment
Separate V. and H. Loads =	SI		Create different Load Case for vertical and horizonal component of the load
Assymetric earth pressures =	10%		Assimmetry between soil pressure each side
Marston Theory =	SI		Marston Theory
Uniform Load =	9.00	[KN/m^2]	Uniform Distributed Load
Special Vehicle Standard =	IAP2011		Loads Standard
Type of equivalent Load =	Trapezoidal		Type of equivalent distributed loads (EDL) for embankment <0,5m
Max EDL Value =	11.90	[KN/m^2]	Mas distributed Load value due to special vehicle
Distance to max load =	1.60	[m]	Distance from left wall to max distributed load
Left EDL Value =	9.45	[KN/m^2]	Value of equivalent distributed load over left wall
Right EDL Value =	9.45	[KN/m^2]	Value of equivalent distributed load over rigth wall
Inner Distributed Load =	0.00	[KN/m^2]	Uniform distributed load on the bottom slab
Iner water level =	NO		Inner water level?
Number of cases =	4		Number of embankment heights

Case	h [m]	Type	Res. T. Loads	Dist. Res. T.C. Iz	Res. T.C. Der
1	1.00	Trapezoidal	37.75	1.60 13.29	13.29
2	2.00	Trapezoidal	23.00	1.60 16.69	16.69
3	3.00	Trapezoidal	16.70	1.60 12.91	12.91
4	4.00	Trapezoidal	11.90	1.60 9.45	9.45

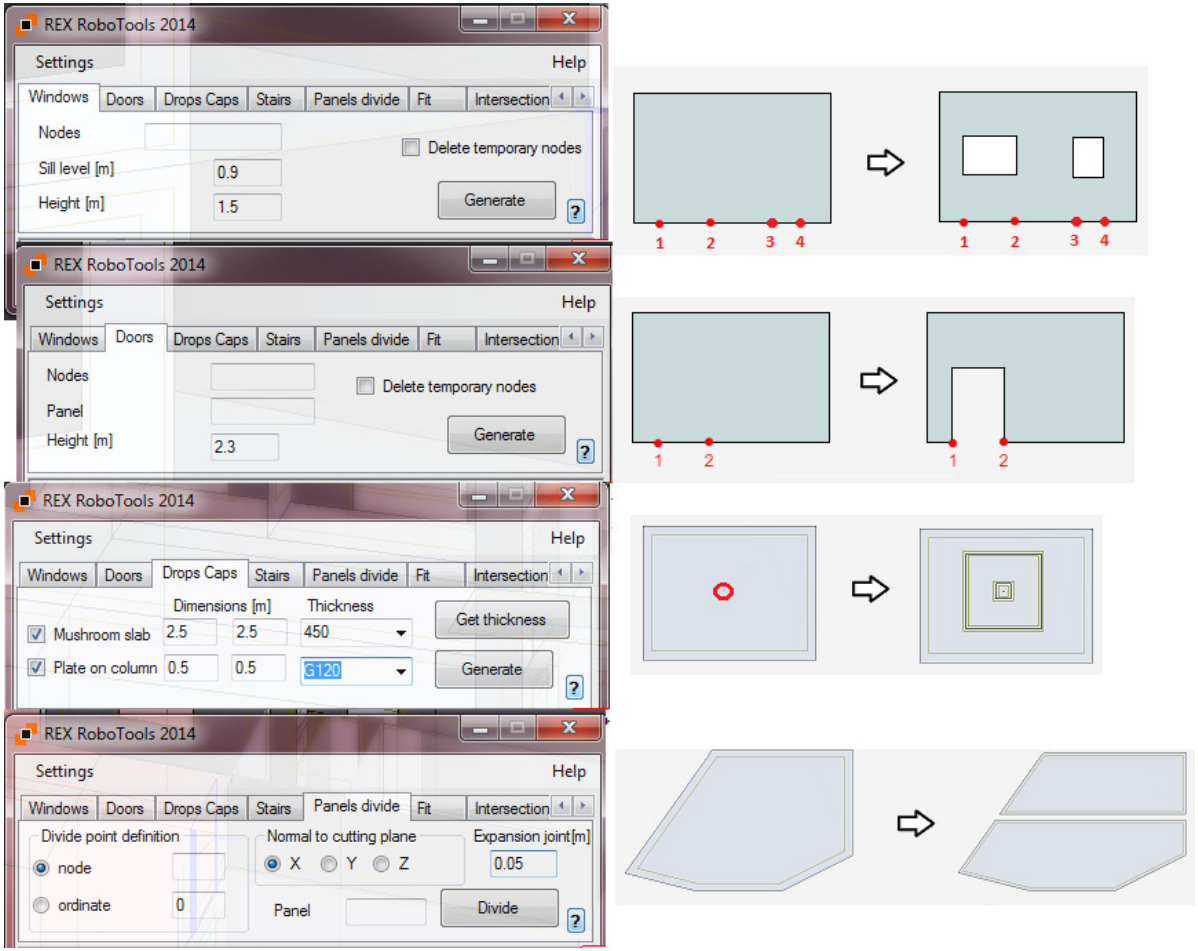
5. Calculation Model Parameters

Num.of elements top slab =	1	No. Of Elements to consider in the top slab
Num.of el. Bottom slab =	1	No. Of Elements to consider in the bottom slab
Num. of el. In walls =	2	No. Of Elements to consider in the walls
Node stiffenes =	SI	Consider increased stiffeness in the nodes
Rnode/Rbars =	10000	Ratio between node and bars stiffeness

5 . Results

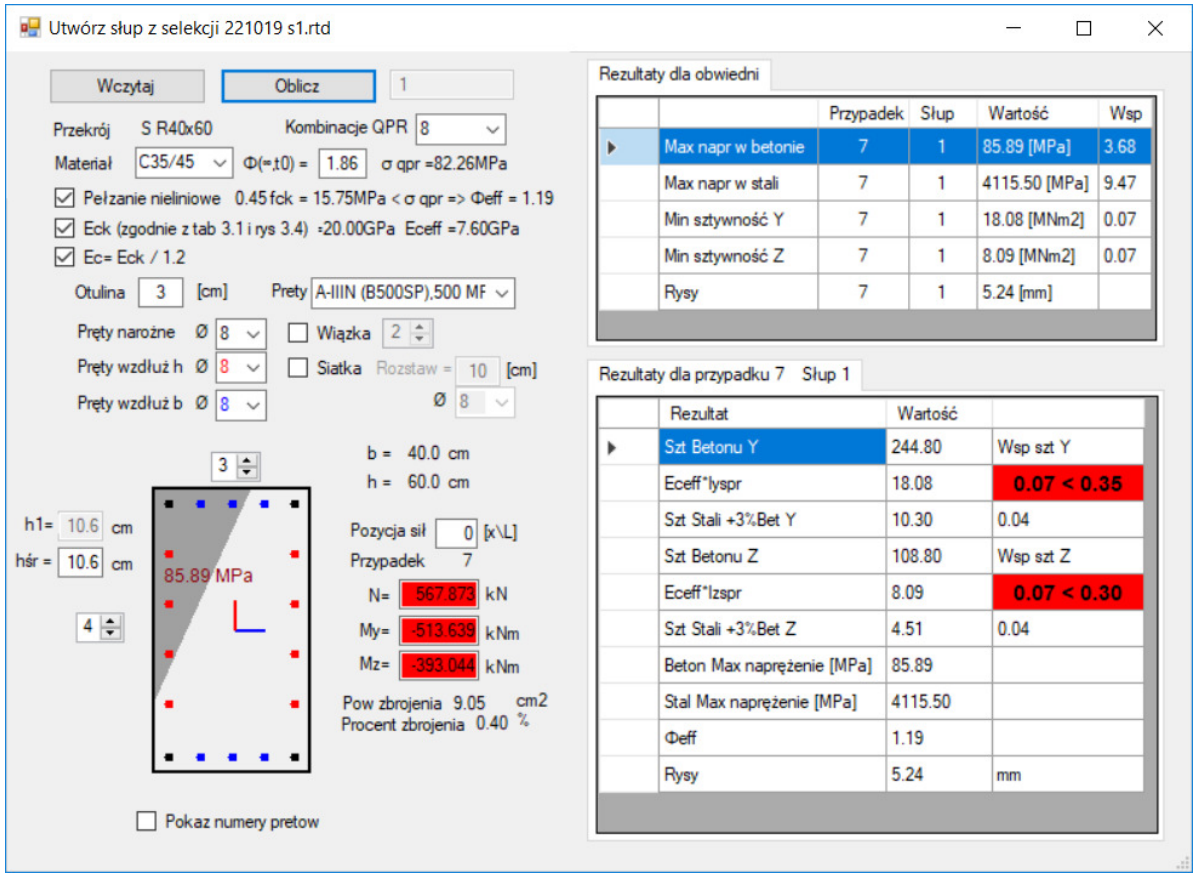
Point per bar =	11	
Case =	ELU	

EJG Bułat


REX RoboTools 2014
Settings
Help
Windows
Doors
Drops Caps
Stairs
Panels divide
Fit
Intersection
Nodes
Delete temporary nodes
Sill level [m]
0.9
Height [m]
1.5
Generate
REX RoboTools 2014
Settings
Help
Windows
Doors
Drops Caps
Stairs
Panels divide
Fit
Intersection
Nodes
Delete temporary nodes
Panel
Height [m]
2.3
Generate
REX RoboTools 2014
Settings
Help
Windows
Doors
Drops Caps
Stairs
Panels divide
Fit
Intersection
Dimensions [m]
Thickness
Mushroom slab
2.5
2.5
450
Get thickness
Plate on column
0.5
0.5
G120
Generate
REX RoboTools 2014
Settings
Help
Windows
Doors
Drops Caps
Stairs
Panels divide
Fit
Intersection
Divide point definition
node
ordinate
0
Normal to cutting plane
X
Y
Z
Expansion joint[m]
0.05
Panel
Divide
1
2
3
4
1
2
3
4
1
2
1
2
1
2
3
4

PIM Projekt

RC Column Design



Robot Forum

http://forums.autodesk.com/t5/Autodesk-Robot-Structural/bd-p/351

API Examples on Forum

http://forums.autodesk.com/t5/Robot-Structural-Analysis/useful-addins-for-Robot-API/td-p/3899448

SDK installation

DVD\x86\Tools\RSASDK

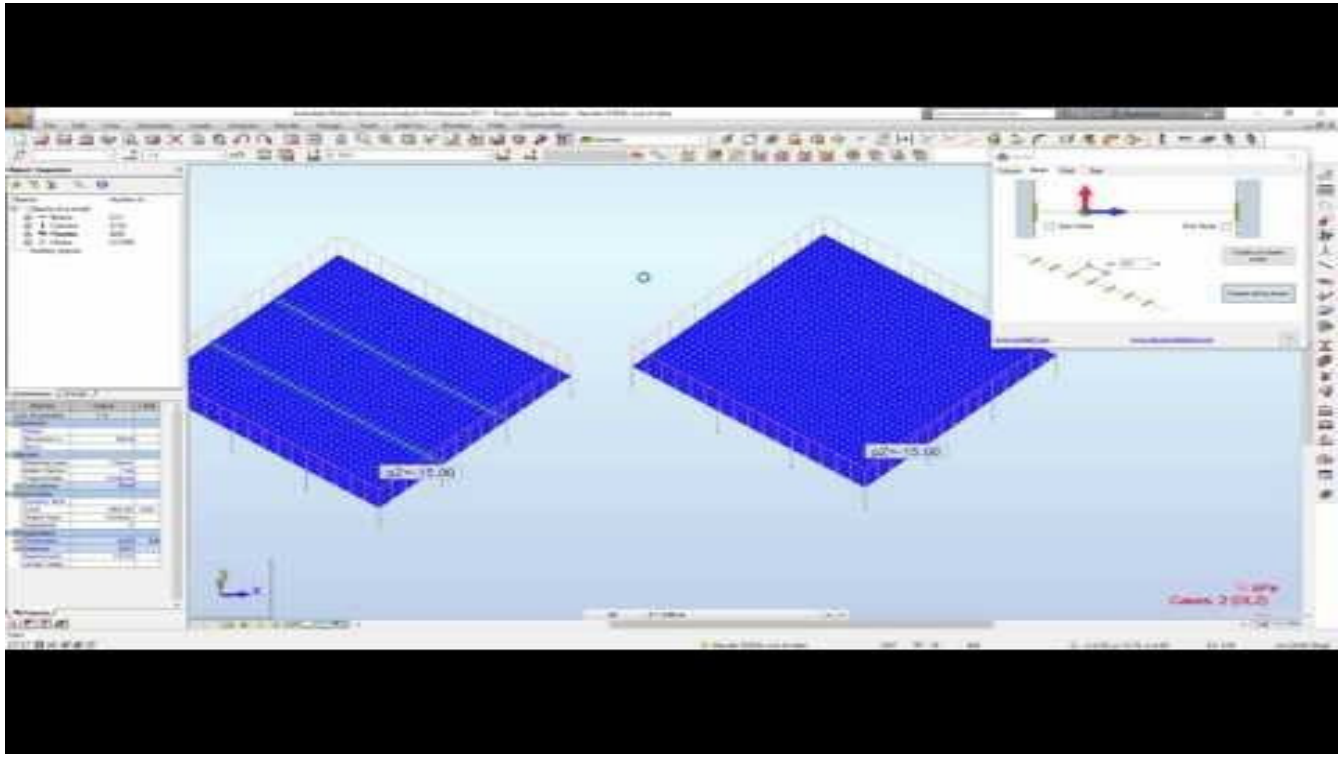
SDK and Examples on computer after installation

C:\Program Files\Autodesk\Autodesk Robot Structural Analysis Professional 2020\SDK\ROBOTSDK.html

Autodesk APP Store

Spider Pro

https://apps.autodesk.com/RSA/Detail/Index?id=9648136566270658 16&appLang=en&os=Win64



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