

Week 4 – ABB Robot Teaching Shifting Work-Object Frame

Advanced Robotic Systems – MANU2453

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- Re-calibrate the Workobject Frame
- Modifying the Rapid File
- Synchronize the Rapid File to Station
- Re-Position the Object
- Re-teach Robot Configuration
- Synchronize to Rapid

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Introduction

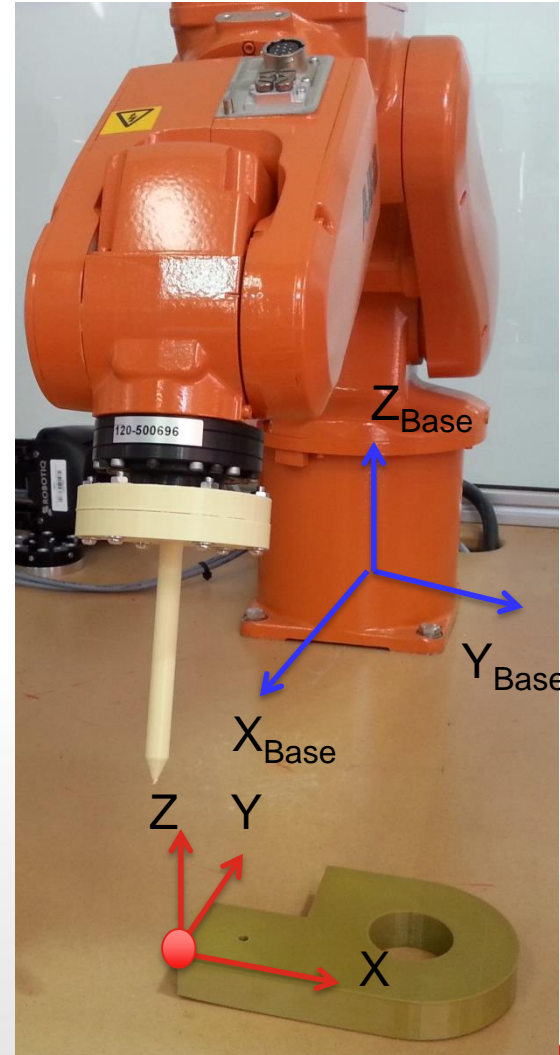
- In “ABB Robot Programming”, you have learnt how to generate the robot code, which can be uploaded to the actual robot for operation.
- If, for any reasons, the **workpiece is shifted** in the actual work cell, then the **robot tool will not be able to do** what it's supposed to do – for e.g. welding the joint between two parts, grasping object etc.
- We need to know how to **update the work-object frame**, and **re-generate the robot code**, without teaching all the target points again.

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Re-Calibrate the Workobject Frame

- Once this is done, write down the **new values** for workobject frame.
- In this example:
 - $X = 580 \text{ mm}$ (changed)
 - $Y = 8 \text{ mm}$ (changed)
 - $Z = 25.703 \text{ mm}$
 - $Q1 = 0.711348$
 - $Q2 = -0.00712328$
 - $Q3 = -0.00124353$
 - $Q4 = 0.702803$
- All the above values are with respect to the robot base frame.

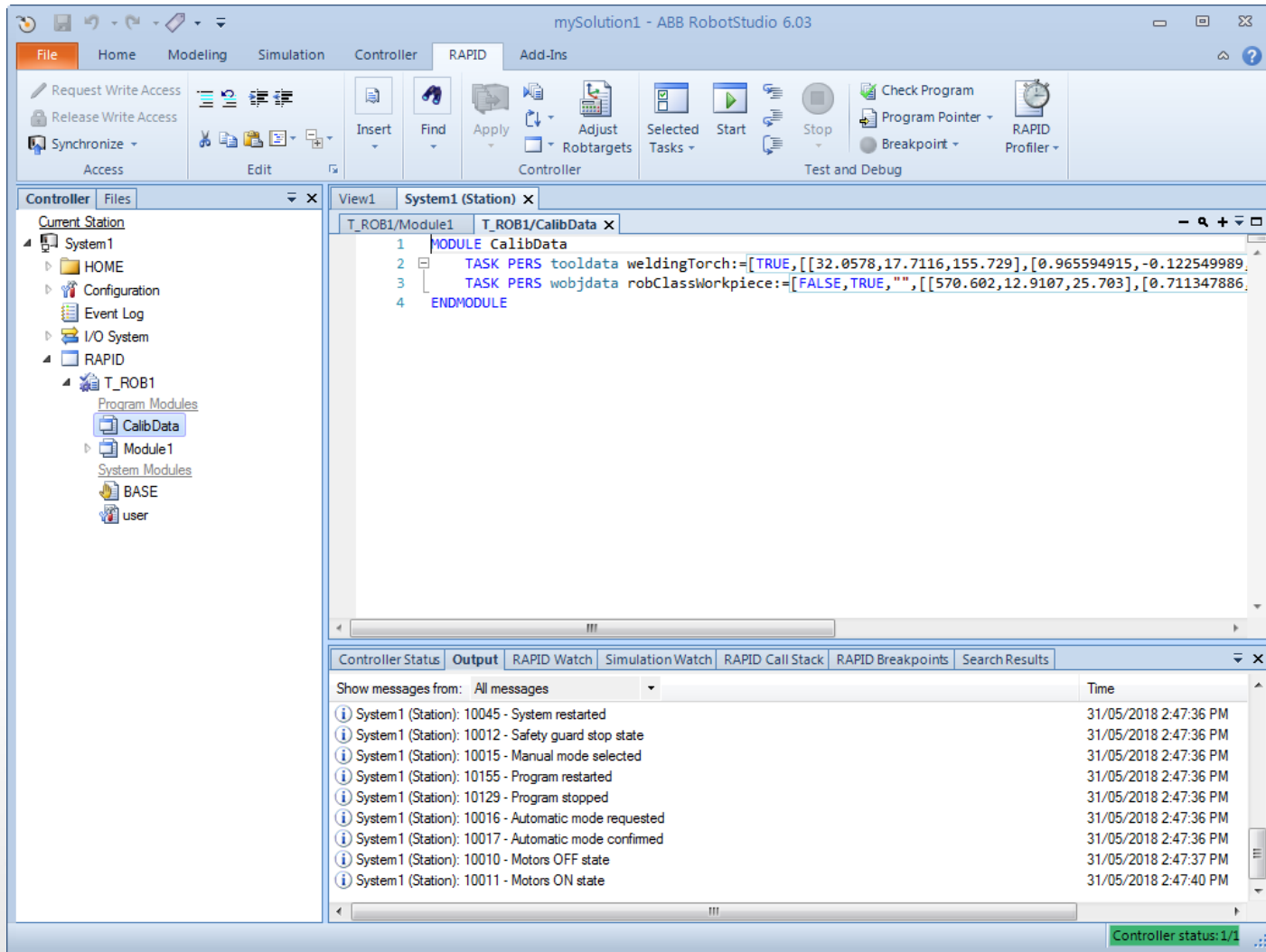


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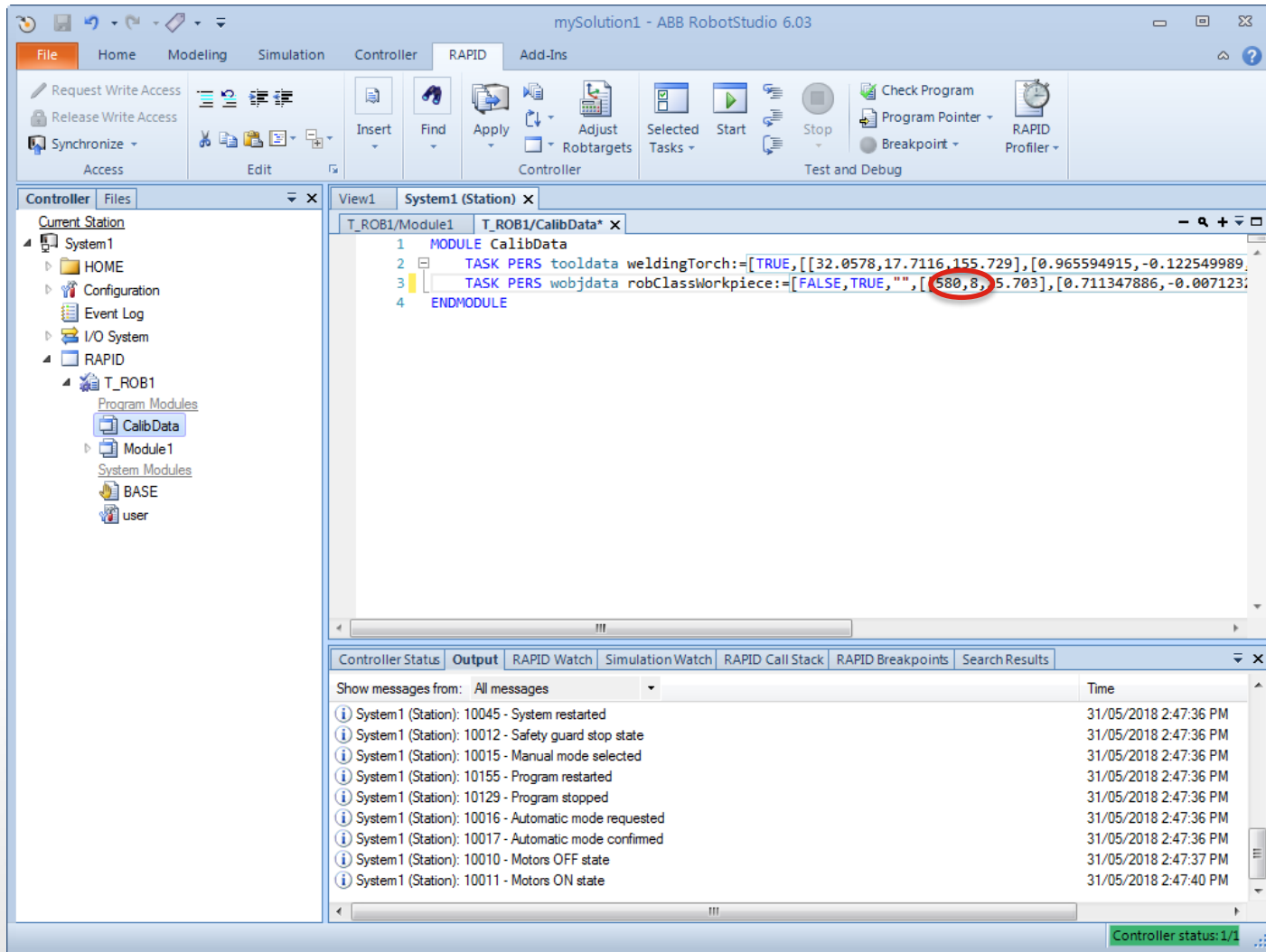
Modifying the Rapid Files

- In RobotStudio, Open **CalibData** under the **Rapid** tab.



Modifying the Rapid Files

- Change the values in the workobject frame.

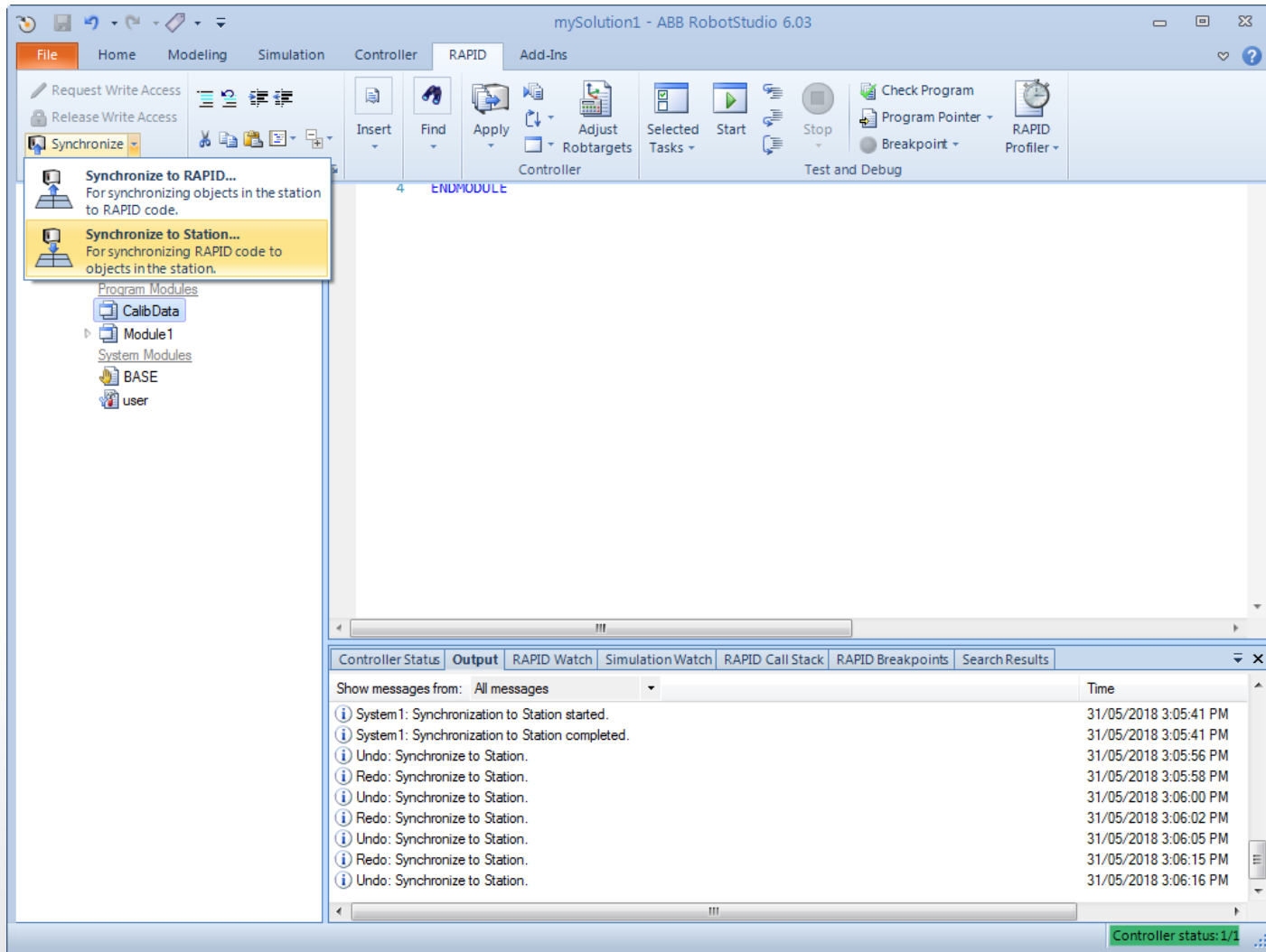


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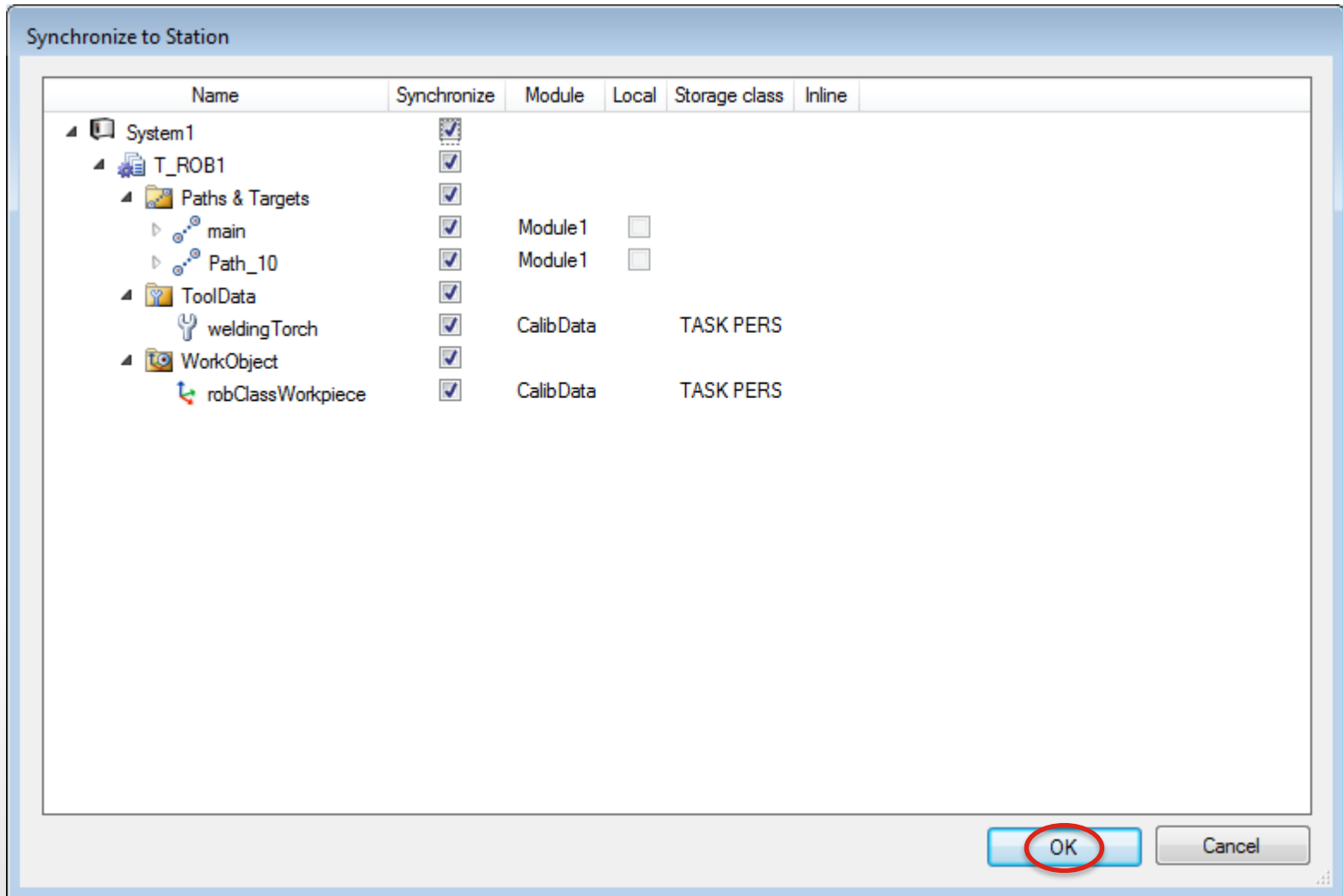
Synchronize the Station

- Click Synchronize → Synchronize to Station.



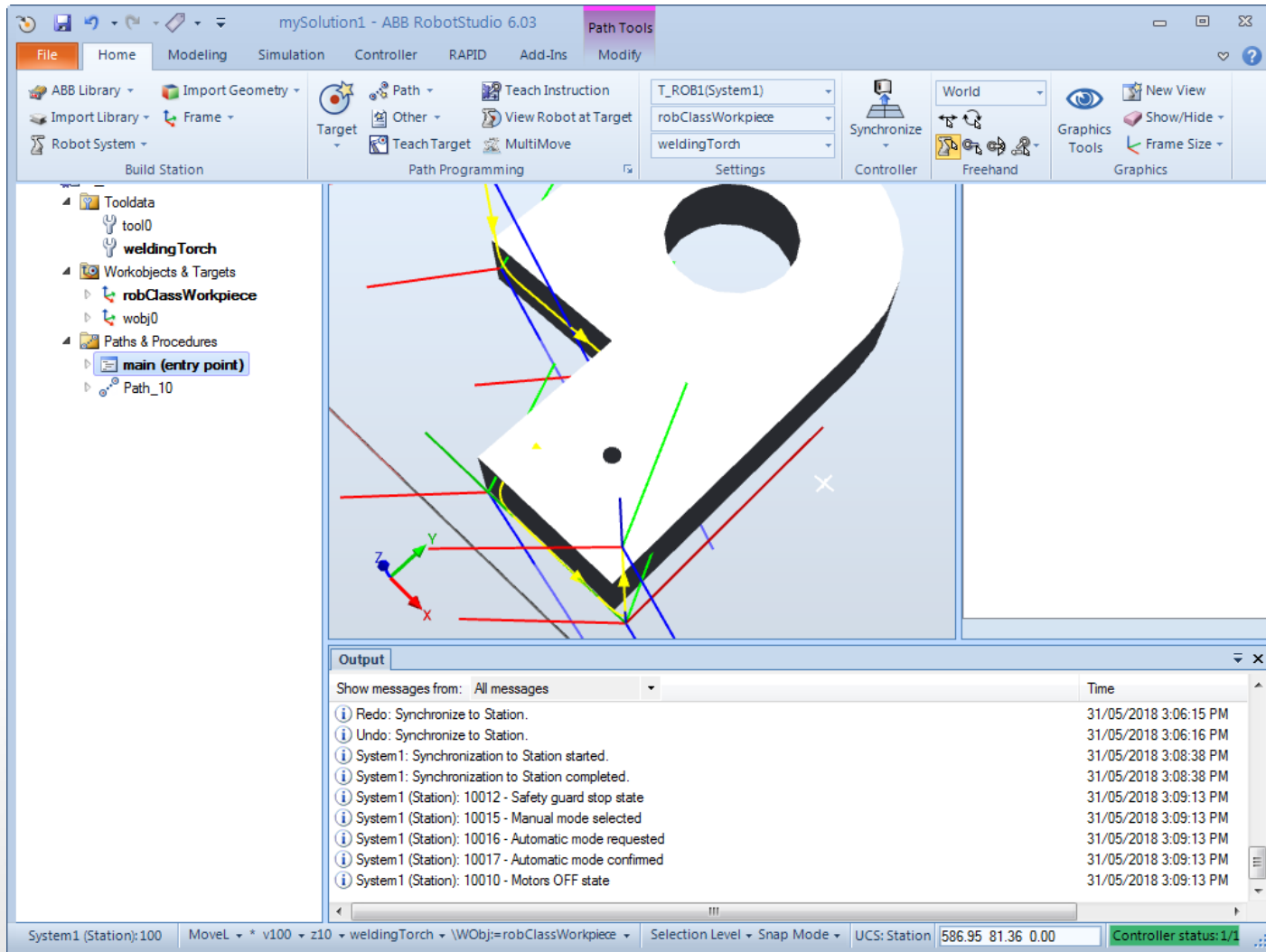
Synchronize the Station

- Tick **all the selections** and click **OK**.



Synchronize the Station

- Under the Home tab, we see that the **frame** and **target points** are shifted.

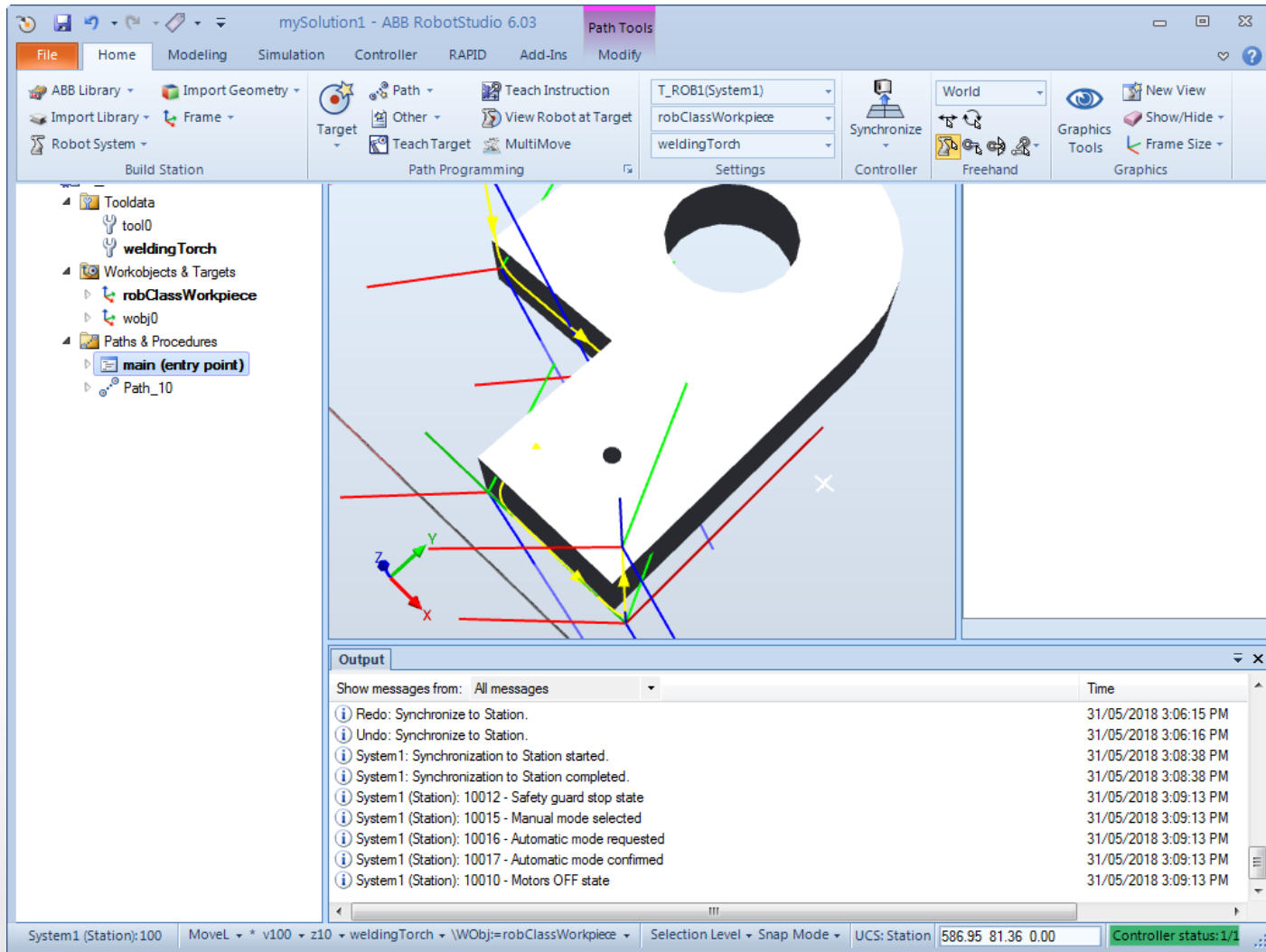


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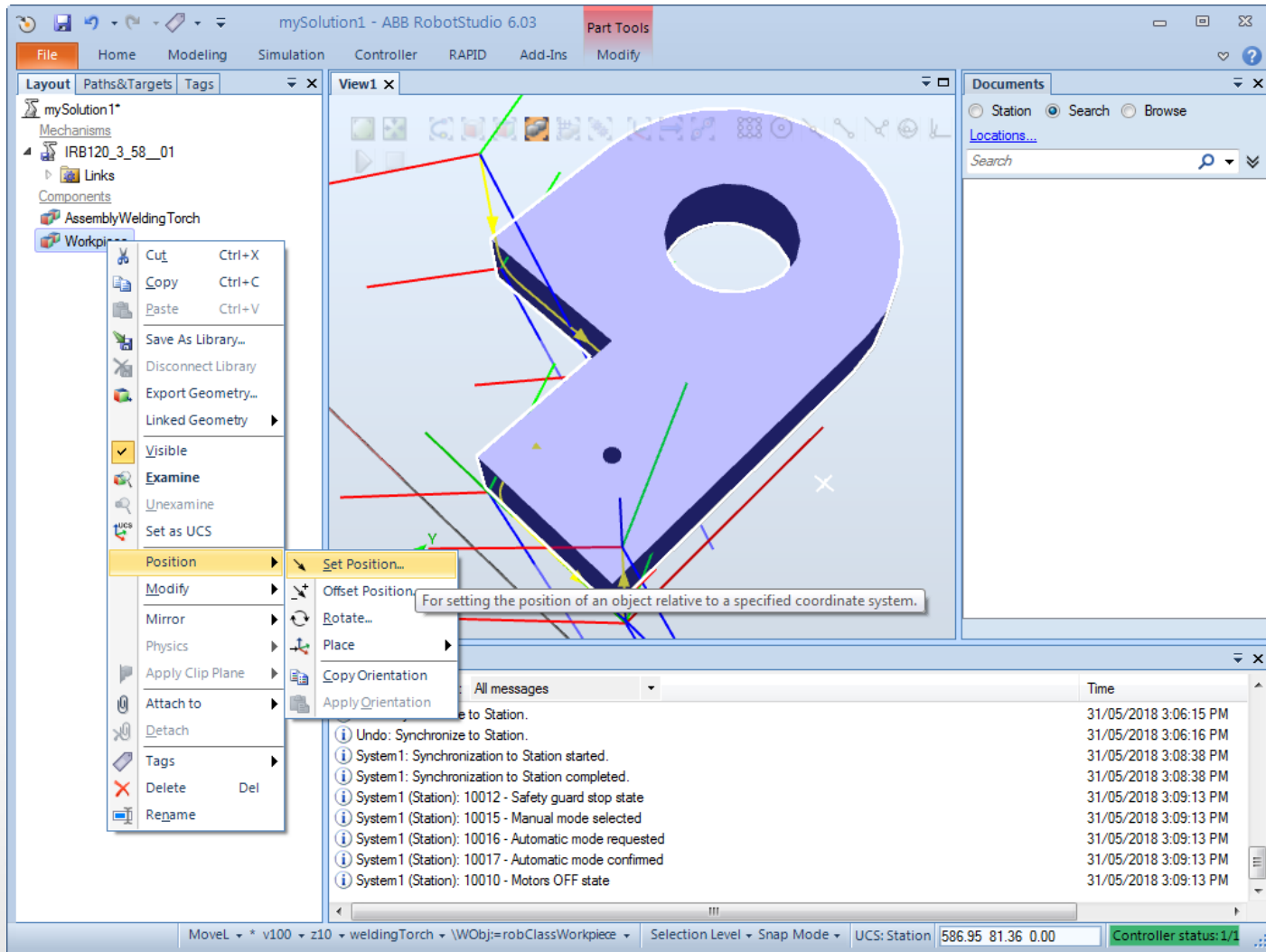
Reposition the Workpiece

- However, the **CAD model of the workpiece** is still at the original position.



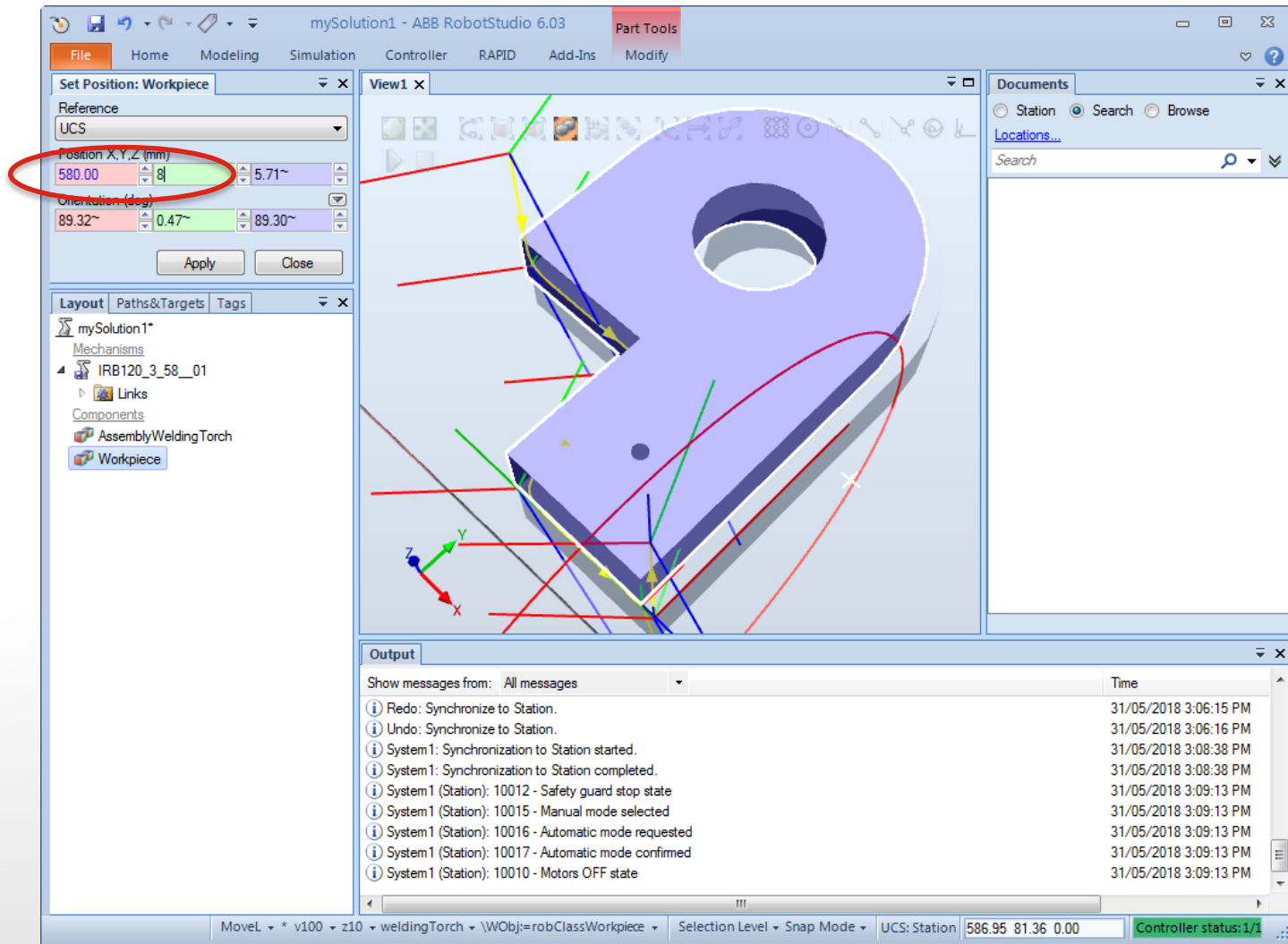
Reposition the Workpiece

- We can **shift the workpiece** as well. This is not critical but **good for visualisation**.



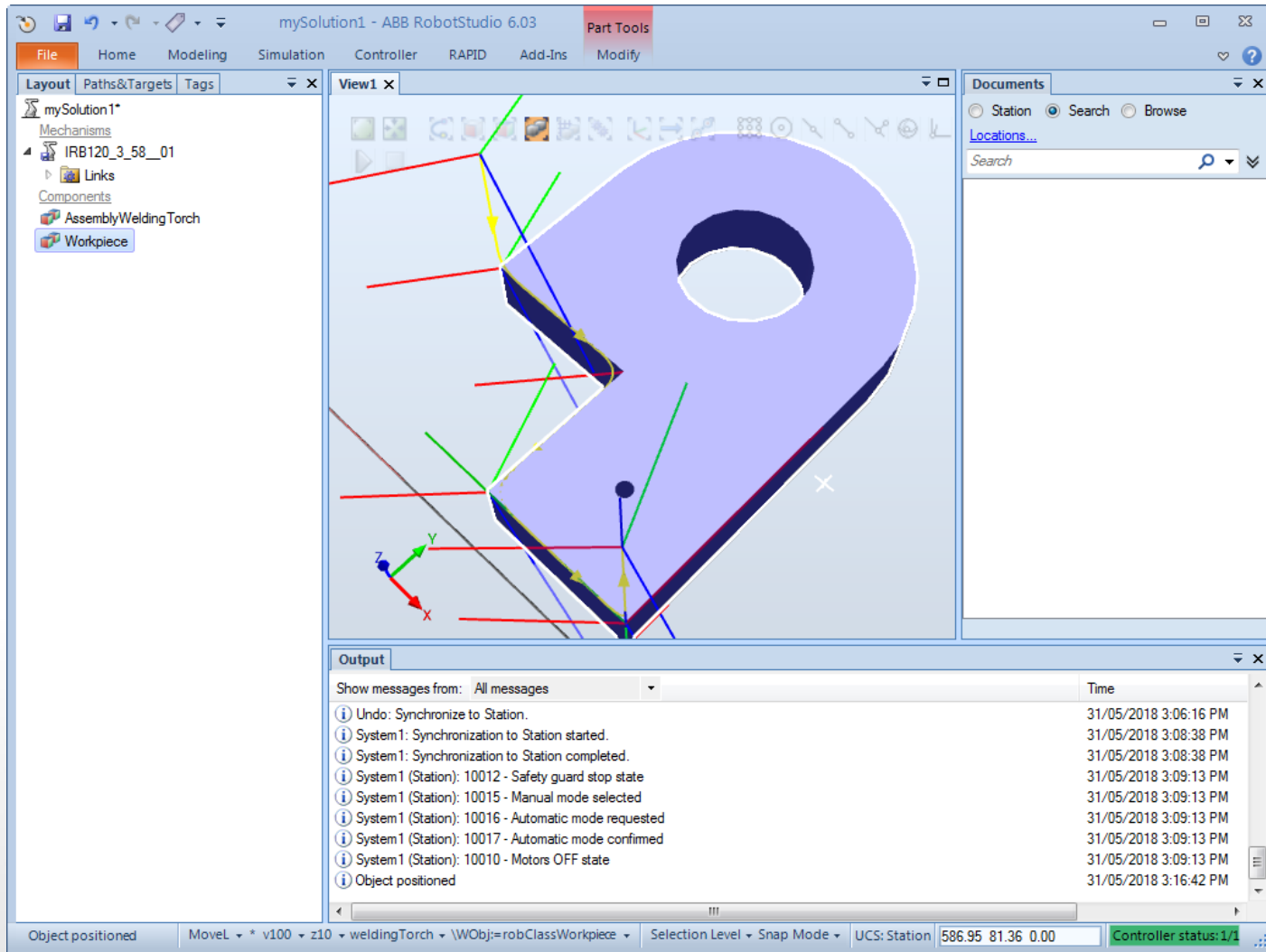
Reposition the Workpiece

- Use **UCS** and enter the **new known values**.



Reposition the Workpiece

- Hit “**Apply**” we see that the workpiece is shifted to match the frame.

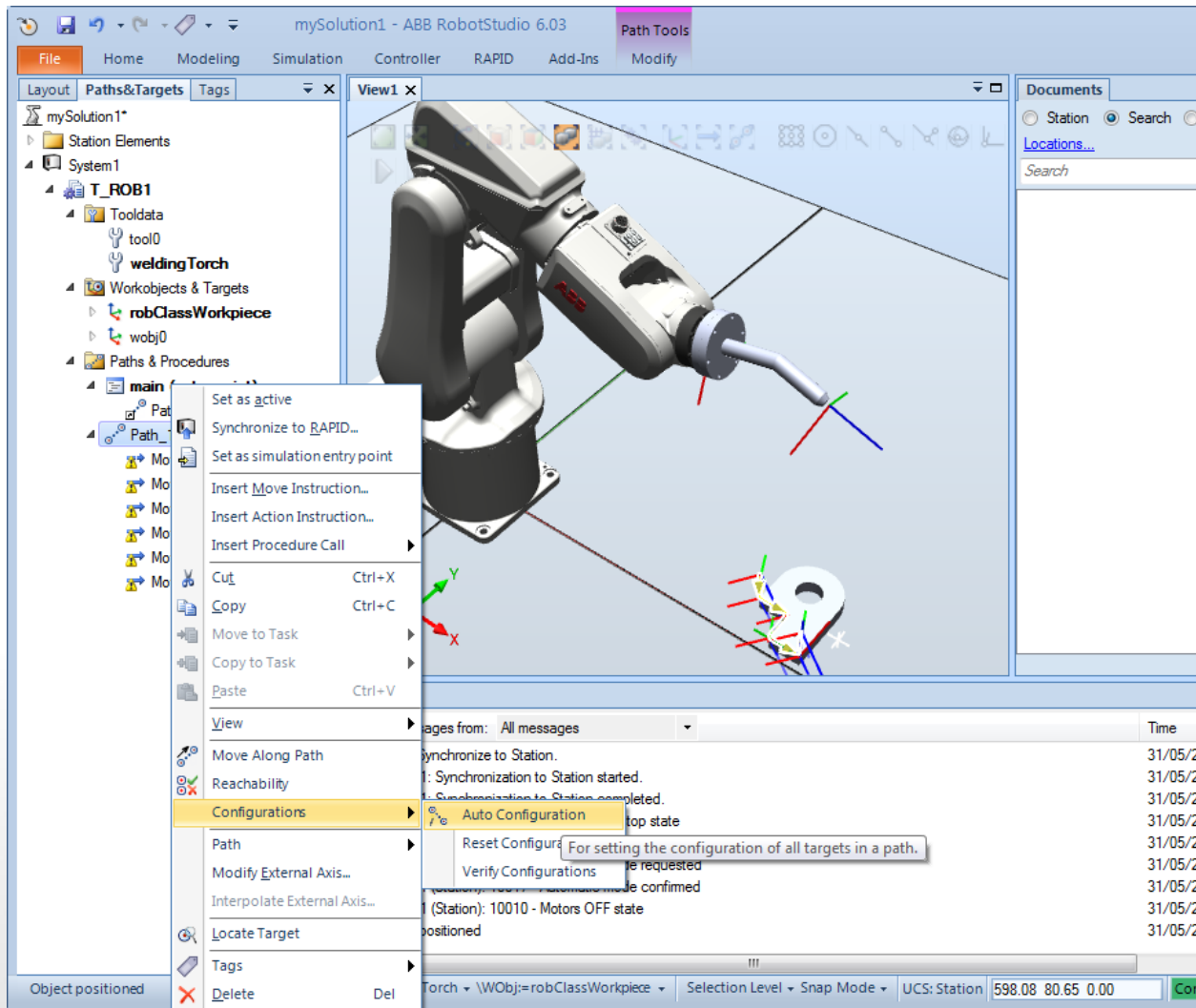


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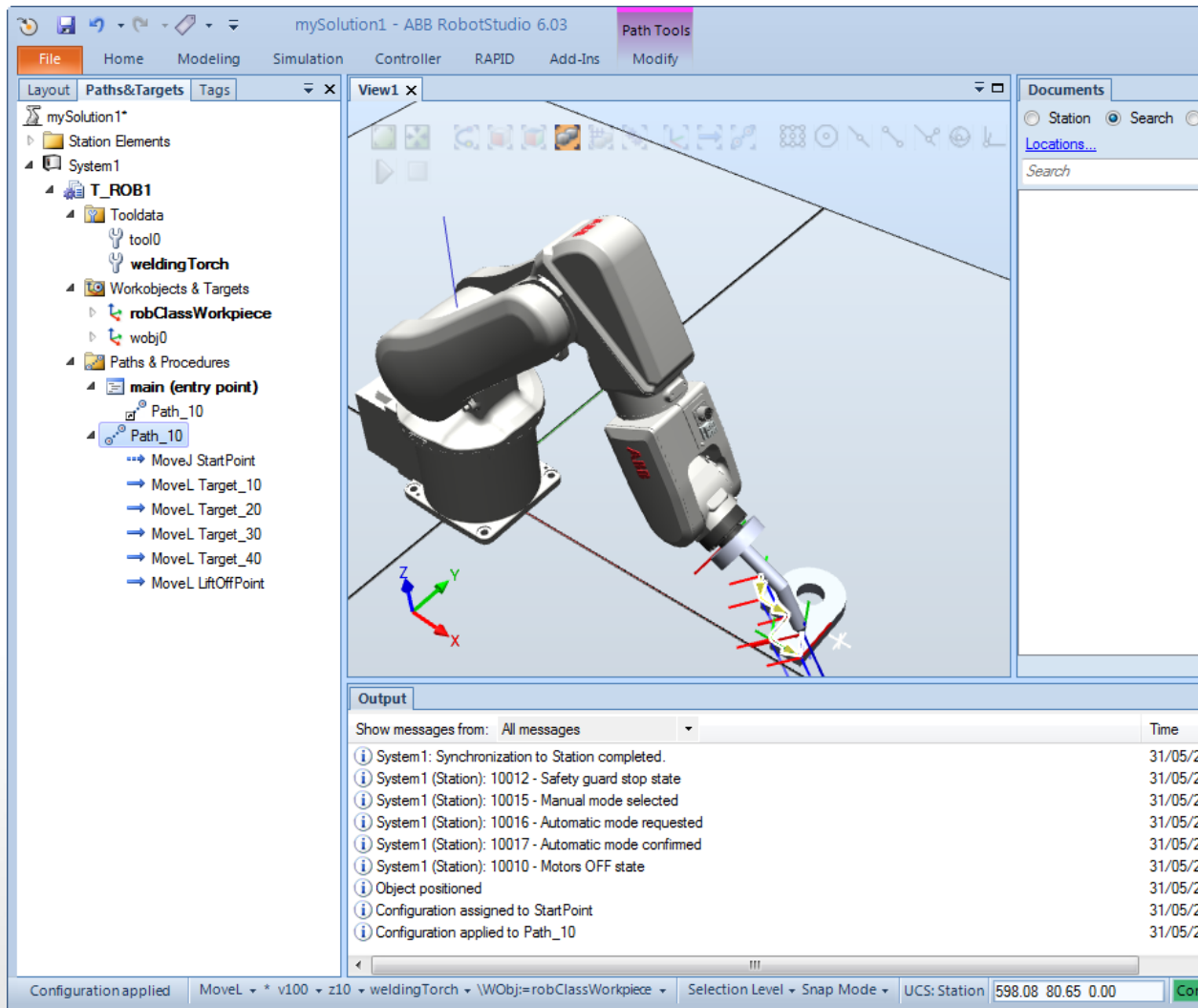
Re-Teach Robot Configuration

- We need to **re-teach robot configuration**, as previous ones may not work.



Re-Teach Robot Configuration

- Choose any configuration, and you should see the robot move to all points.

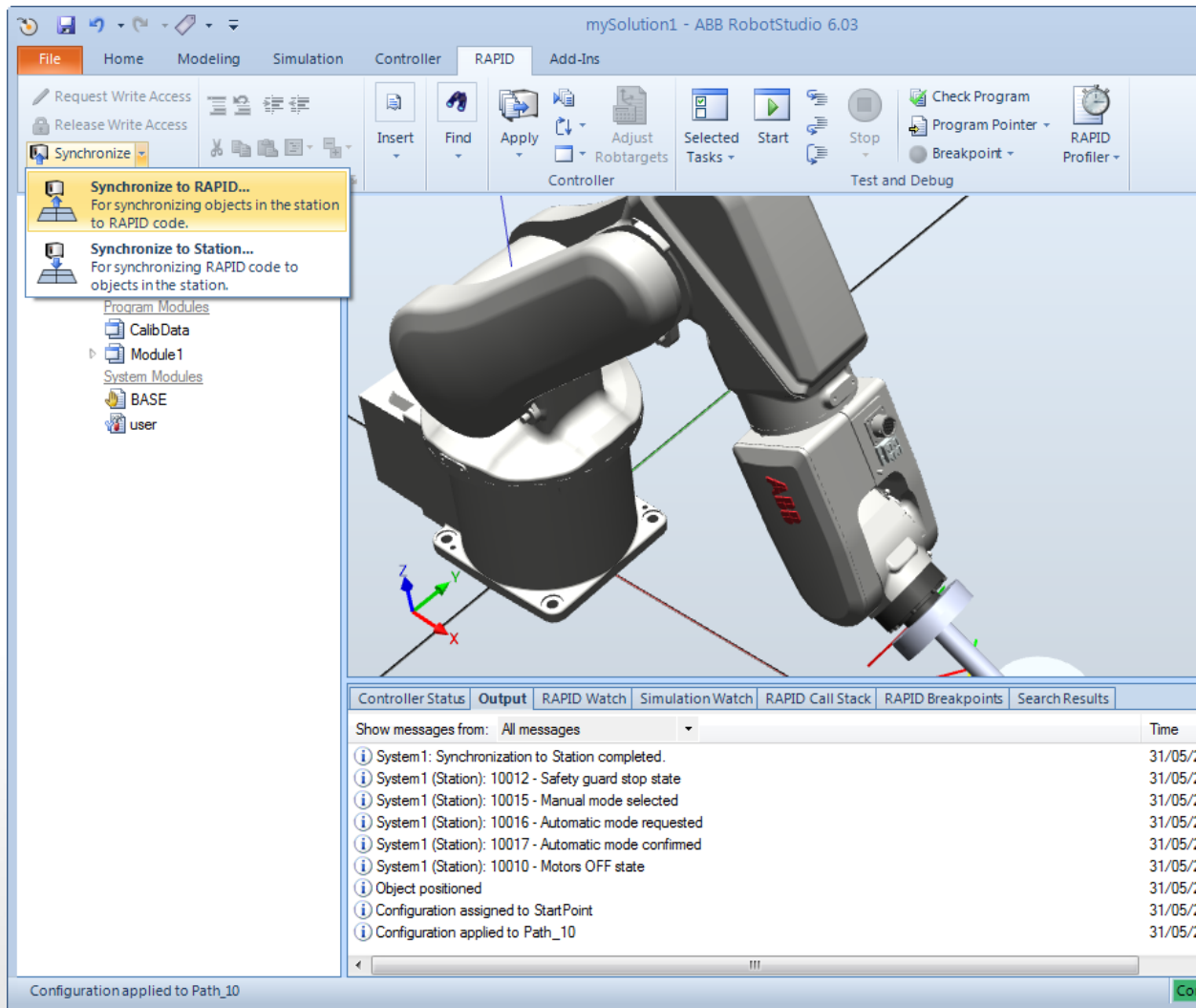


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Synchronize to Rapid

- Finally, **Synchronize to Rapid** again.



Synchronize to Rapid

- You will see that your **Rapid** files might have **changed**.

The screenshot displays the ABB RobotStudio 6.03 interface. The top menu bar includes File, Home, Modeling, Simulation, Controller, RAPID, and Add-Ins. The left sidebar shows the 'Controller' tab with a tree view of the system structure, including System1, HOME, Configuration, Event Log, I/O System, and RAPID. Under RAPID, there is a folder for T_ROB1 containing Program Modules (CalibData, Module1) and System Modules (BASE, user). The main window shows the 'View1' tab with the 'System1 (Station)' selected. The RAPID editor displays the following code:

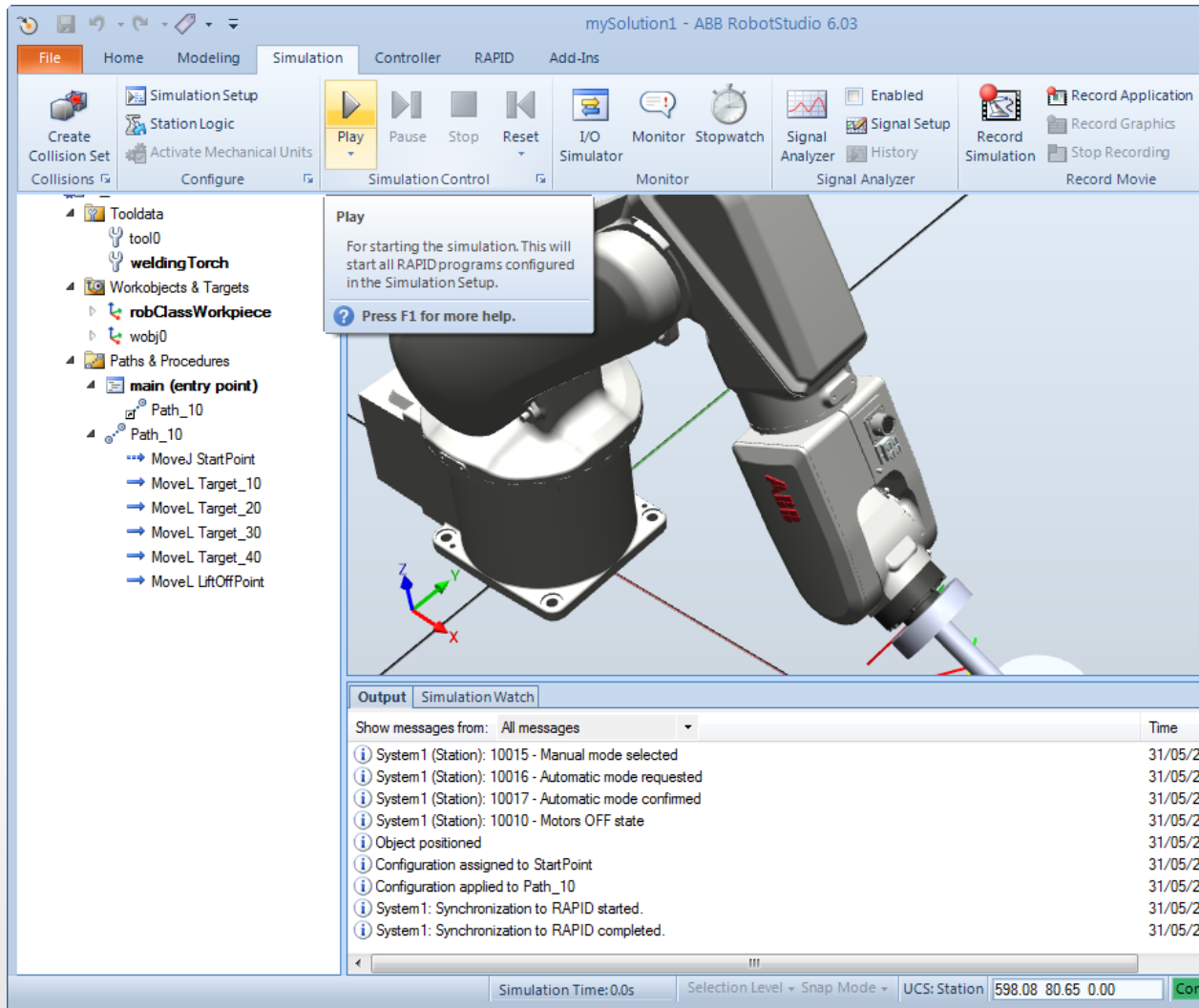
```
1 MODULE Module1
2   CONST robtarget StartPoint:=[[50,100,50],[0.129409523,0.482962913,0.836516304,-0.229110612]]
3   CONST robtarget Target_10:=[[50,100,0],[0.129409523,0.482962913,0.836516304,-0.229110612]]
4   CONST robtarget Target_20:=[[50,50,0],[0.129409523,0.482962913,0.836516304,-0.229110612]]
5   CONST robtarget Target_30:=[[0,50,0],[0.129409523,0.482962913,0.836516304,-0.229110612]]
6   CONST robtarget Target_40:=[[0,0,0],[0.129409523,0.482962913,0.836516304,-0.229110612]]
7   CONST robtarget LiftOffPoint:=[[0,0,50],[0.129409523,0.482962913,0.836516304,-0.229110612]]
8   PROC Path_10()
9     MoveJ StartPoint,v100,z10,weldingTorch\WObj:=robClassWorkpiece;
10    MoveL Target_10,v100,z10,weldingTorch\WObj:=robClassWorkpiece;
11    MoveL Target_20,v100,z10,weldingTorch\WObj:=robClassWorkpiece;
12    MoveL Target_30,v100,z10,weldingTorch\WObj:=robClassWorkpiece;
13    MoveL Target_40,v100,z10,weldingTorch\WObj:=robClassWorkpiece;
14    MoveL LiftOffPoint,v100,z10,weldingTorch\WObj:=robClassWorkpiece;
15  ENDPROC
16  PROC main()
17    Path_10;
18  ENDPROC
19 ENDMODULE
```

The bottom panel shows the 'Controller Status' tab with the 'Output' sub-tab selected. It displays a list of messages from the system, including mode changes and synchronization status.

Message	Time
System1 (Station): 10015 - Manual mode selected	31/05/2
System1 (Station): 10016 - Automatic mode requested	31/05/2
System1 (Station): 10017 - Automatic mode confirmed	31/05/2
System1 (Station): 10010 - Motors OFF state	31/05/2
Object positioned	31/05/2
Configuration assigned to StartPoint	31/05/2
Configuration applied to Path_10	31/05/2
System1: Synchronization to RAPID started.	31/05/2
System1: Synchronization to RAPID completed.	31/05/2

Simulation

- You can run simulation to see the robot motion.



Thank you!

Have a good evening.