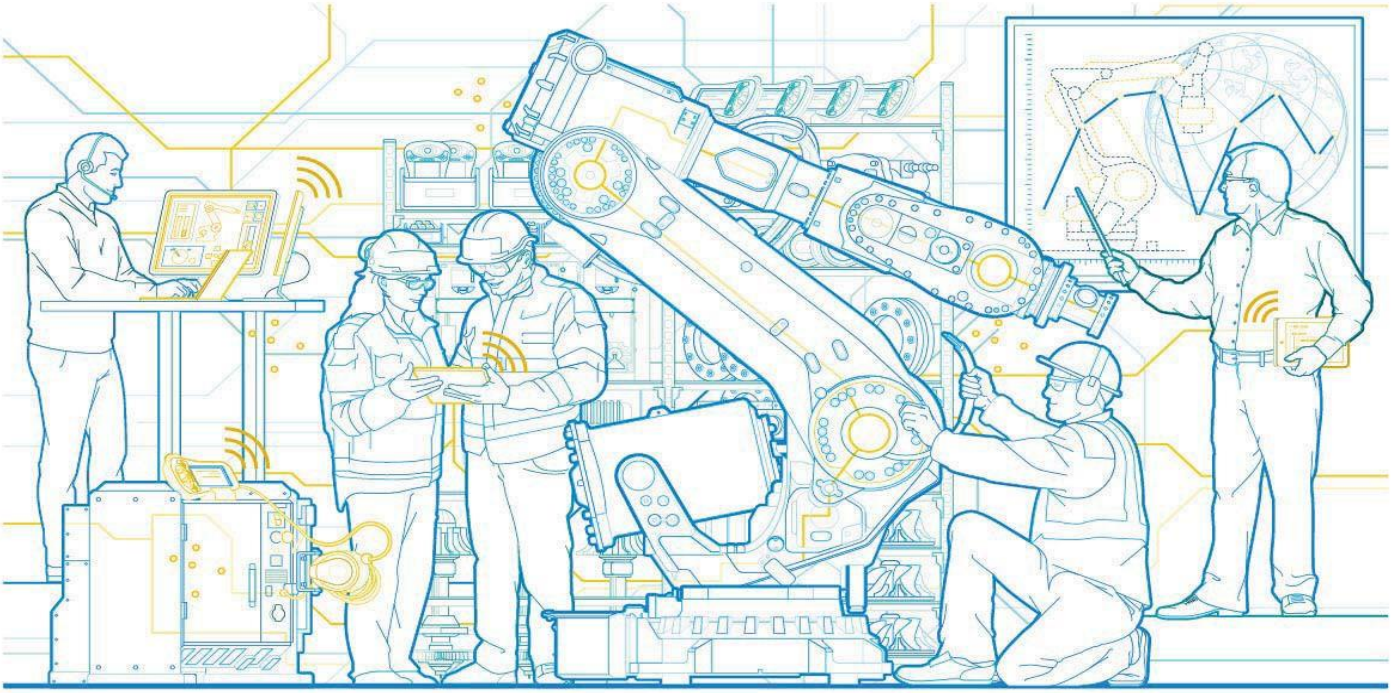

RobotStudio^{tm} 6.08

External Axes

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ABB AB
Robotics Products
SE-721 68
Västerås Sweden

2017-05-09 ABB

1. External Axes

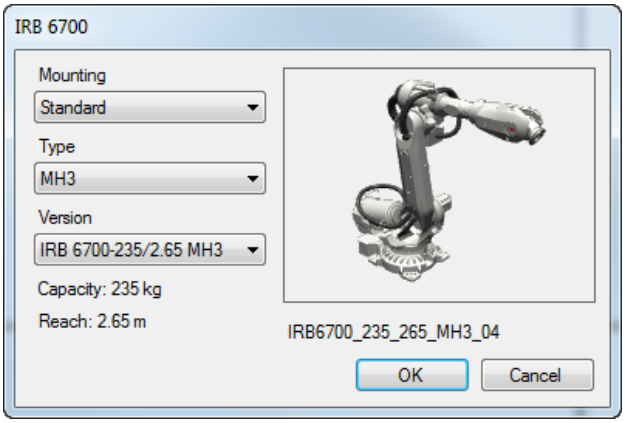
1.1. Setting up a Track Simulation

Overview

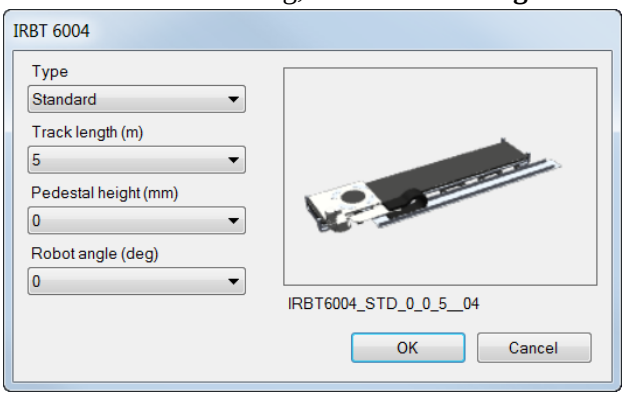
In this exercise we will create a simulation that includes a robot on a track. We will use the system from layout function to create this system.

Layout

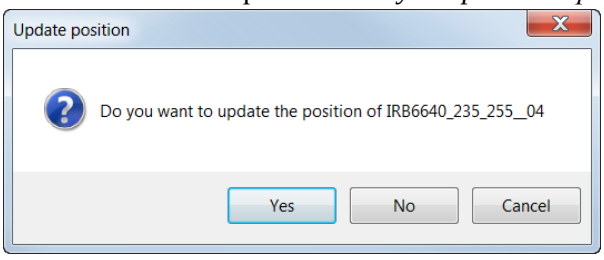
1. On the **File** menu select **Empty Station** and click **Create**.
2. On the **Home** tab click the **ABB Library** button, in the gallery select **IRB 6700**.
3. In the **IRB 6700** dialog, in the **Type** box select **MH3** and in the **Version** box select the **IRB6700-235/2.65**. Click **OK**.



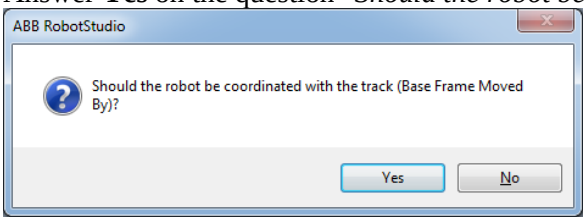
4. Again, on the **Home** tab click the **ABB Library** button, select **IRBT 6004** from the **Track** list.
5. In the **IRBT 6004** dialog, in the **Travel length** combo box, select **5** and click **OK**.



6. In the **Layout** browser drag *IRB6700_235_265_MH3_04* and drop it on the **IRBT 6004**.
7. Answer **Yes** on the question "*Do you update the position of…?*"



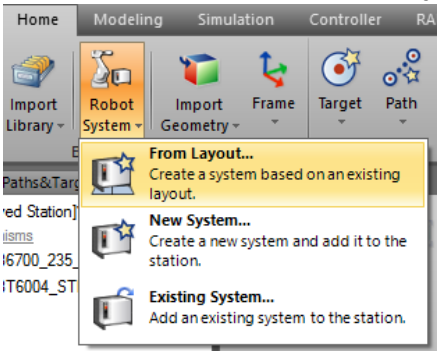
8. Answer **Yes** on the question "*Should the robot be coordinated with the track?"*.



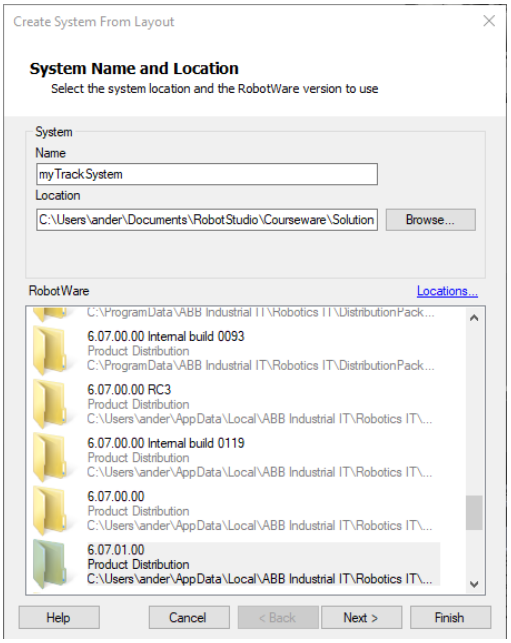
Create System from Layout

In order to create a **System from Layout** RobotStudio requires the configuration files for both the robot and external axis. With RW6.x these configuration files are loaded automatically when RobotStudio is installed. For RW 5.1x versions of RW you need to install the **Track Motion** mediapool located in **Additional Options** folder in the RobotWare download. (unless it was installed previously)

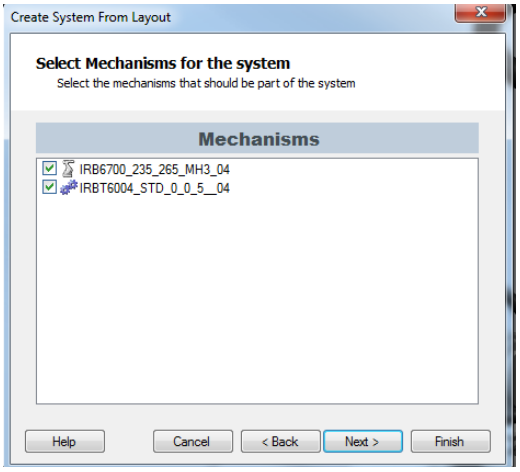
1. On the **Home** tab click the **Robot System** button and select **From Layout**.



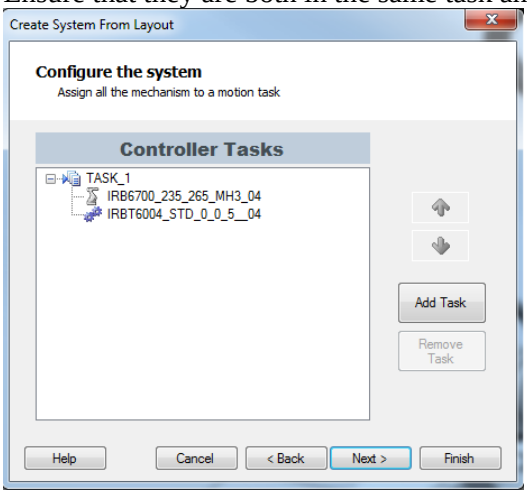
2. In the **Name** field enter *myTrackSystem.* For the location browse to and put it in a new folder *courseware/Solutions/Module_8/myTrackSolution*. Select the verision of RW you wish to use and click the **Next** button.



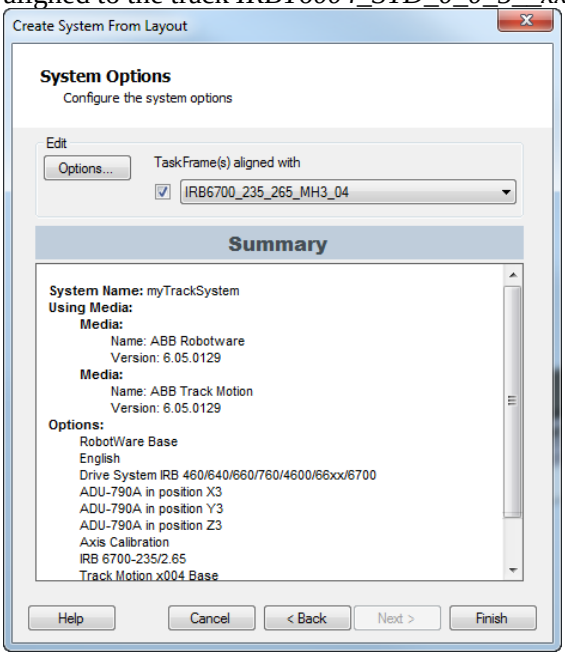
3. Ensure that both mechanisms are selected and click the **Next** button



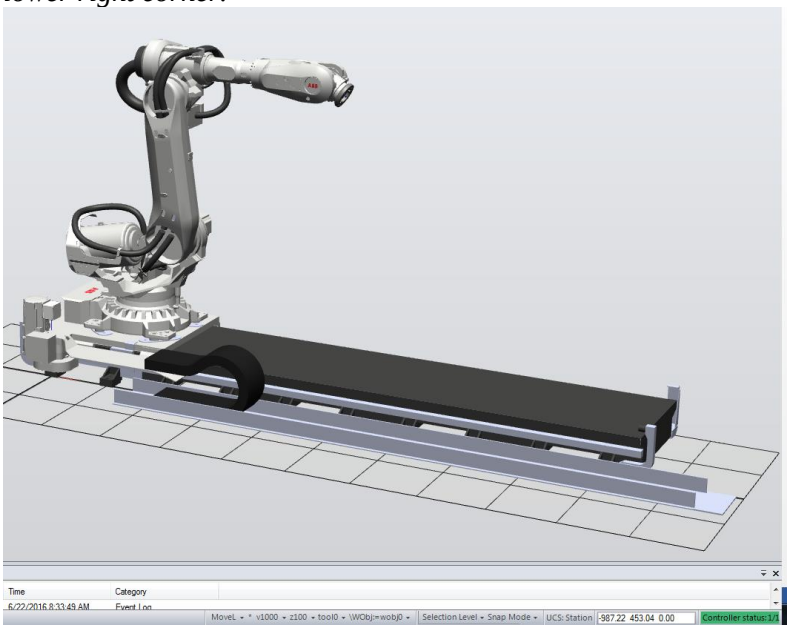
4. Ensure that they are both in the same task and click the **Next** button.



In **System Options** you can add other options to your system. With the taskframe aligned to the track *IRBT6004_STD_0_0_5__xx* (check box checked), click **Finish**.



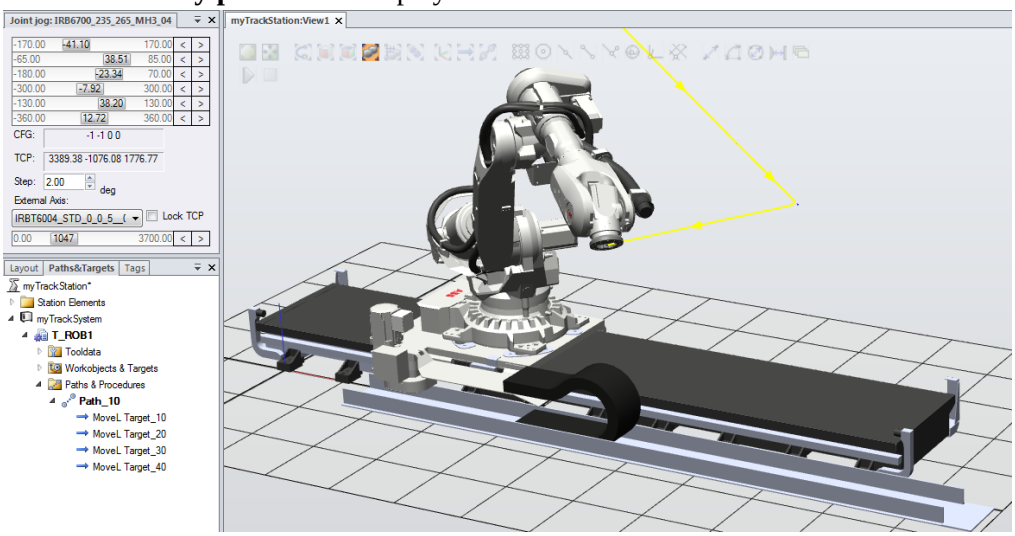
The system starts and when it is fully started you will have a green indication in the lower right corner.



5. **Save** the station at *courseware\solutions\Module_8\MyTrackSolution\myTrackStation*.

Challenge

Create an empty path then use the **Jog Joint** and the **Teach Instruction** functions to create a path of motions that use the coordinated track. **Synchronize to Rapid,** set the path as **simulation entry point** and then play the simulation.



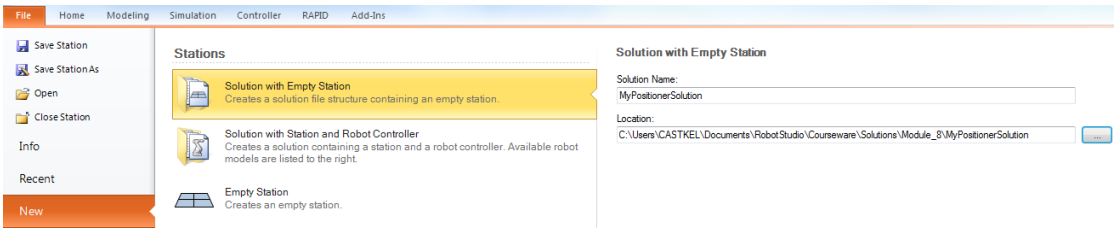
1.2. Setting up a Positioner Simulation

Overview

In this exercise we will build up a station by importing library and geometry files. We will then create a system from layout and setup a simulation with a coordinated positioner.

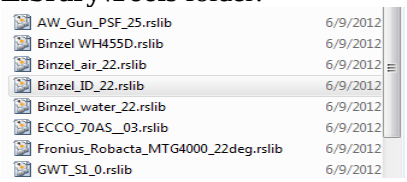
Layout

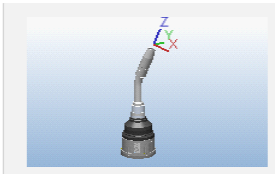
1. In the **File** menu select **New Solution with Empty Station.**
2. Name the solution *MyPositionerSolution* and set the location to *courseware\solutions\Module_8\MyPositionerSolution***.**
3. Click **Create**.



4. On the **Home** tab click the **ABB Library** button, in the gallery select **IRB 1660ID**. (4kg variant)

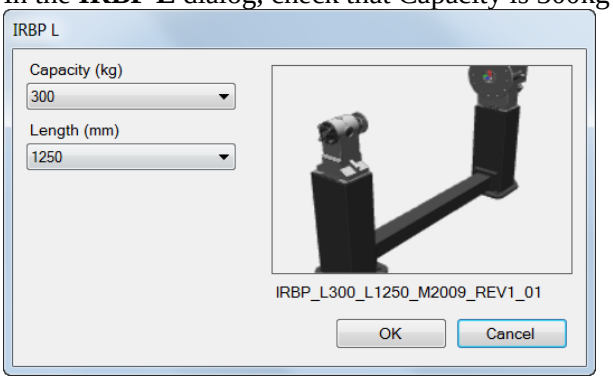
5. On the **Home** tab click the **Import Library** button, select **Binzel_ID_22** from the **ABB Library\Tools** folder.



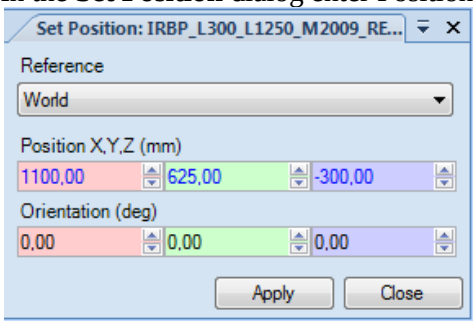


6. In the **Layout** browser right click *Binzel_ID_22*, point to **Attach to** and select *IRB1660ID_4_150__03*.
7. In the **Update Position** dialog click the **Yes** button.
8. On the **Home** tab click the **ABB Library** button, in the gallery select **IRBP L**.

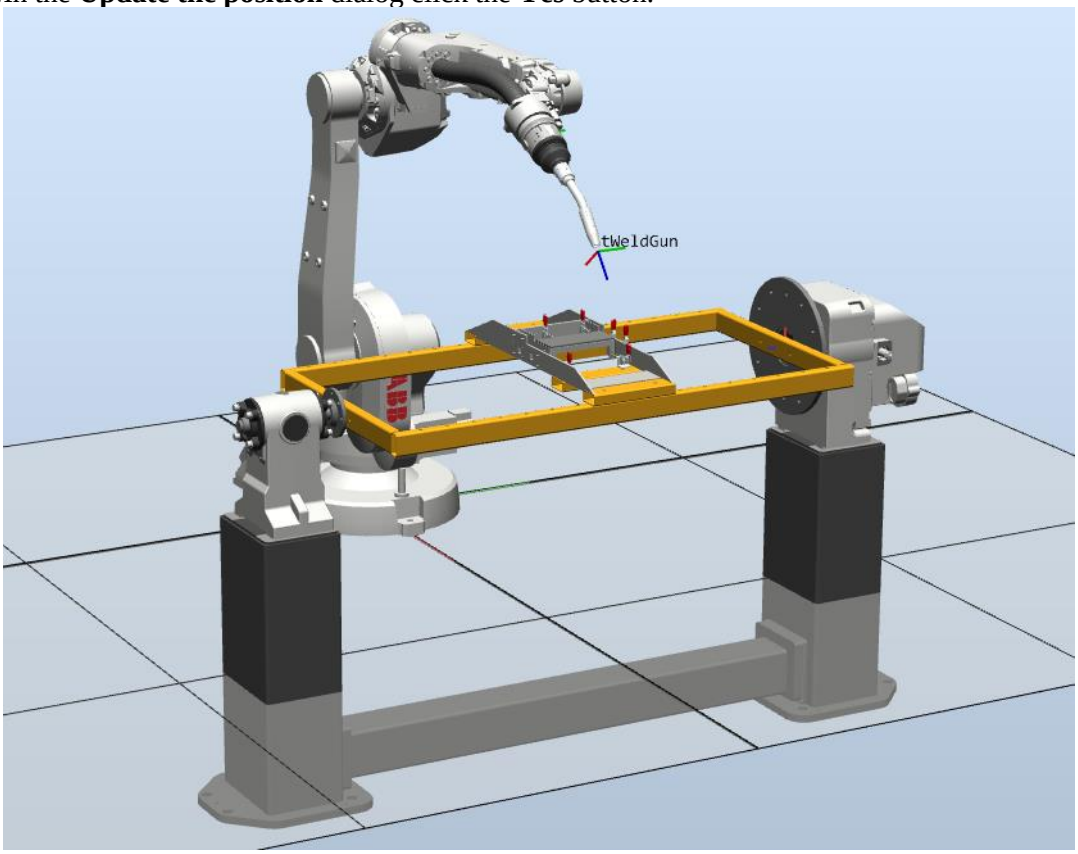
9. In the **IRBP L** dialog, check that Capacity is 300kg and Length is 1250mm, click **OK**.



10. In the **Layout** browser right click the positioner, select **Position>Set Position**.
11. In the **Set Position** dialog enter Position 1100, 625, -300 and click the **Apply** button.



12. On the **Home** tab click the **Import Geometry** button.
13. In the **Open** dialog browse to *\Courseware\Geometry\ test part.sat* and click the **Open** button.
14. In the **Layout** browser right click *test part*, point to **Attach to** and select the positioner.
15. In the **Update the position** dialog click the **Yes** button.



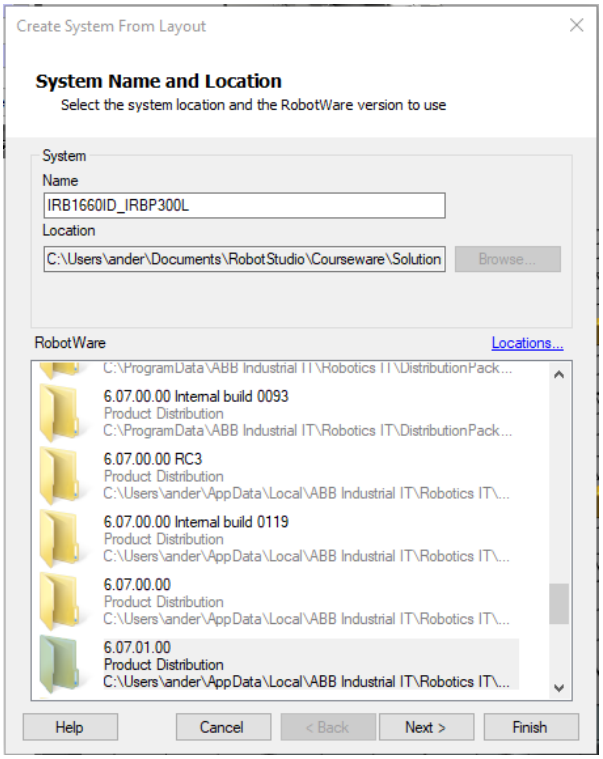
We have now created the basic layout.

16. Save your station as *courseware\solutions\Module_8\MyPositionerSolution\MyPositionerLayout.*

Create System from Layout

Note that when we created our layout we left the origin of the robot baseframe at the RobotStudio world coordinate system origin.

1. On the **Home** tab click the **Robot System** button and select **From Layout**.
2. In the **Name** field enter IRB1660ID_IRBP300L. Note that because we used the **Solution** method for the creation of our station, the file structure is already set and we do not have to select the location for the system.



3. Click **Next**.
4. Ensure that both mechanisms are checked and click the **Next** button
5. Ensure that they are both in the same task and click the **Next** button.

Note: In **System Options** you could add other options to your system such as various arc welding related options. In this case, since we are only covering external axis functionalality, we will work with just the base RobotWare. For information on working with arc welding functionality please refer to the Arc Weld PowerPac Module and the Arc Welding PowerPac help files.

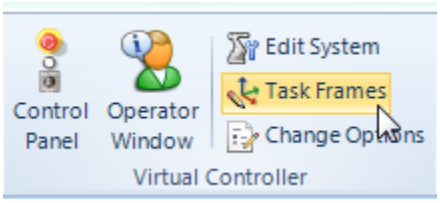
6. Click the **Finish** button.

The system starts and when it is fully started you will have a green indication in the lower right corner.

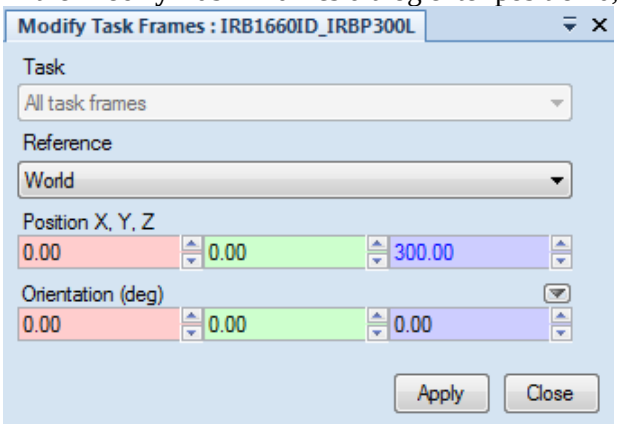
Set the Task Frame

Now that the system is created we will import a robot stand and use the task frame to move the robot relative to the RobotStudio world coordinate system.

1. On the **Home** tab click **Import Geometry**.
2. In the **Open** dialog browse to *\Courseware\Geometry\ robot stand.sat* and click the **Open** button.
3. On the **Controller** tab click the **Task Frames** button.

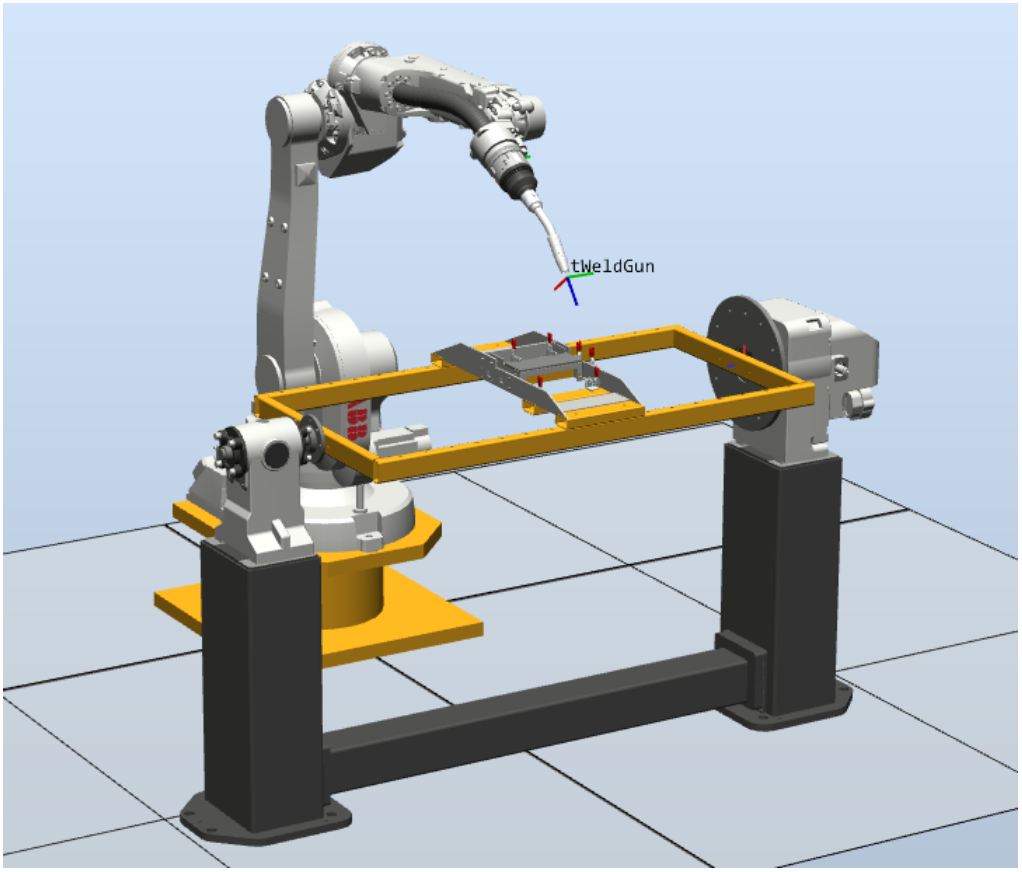


4. In the **Modify Task Frames** dialog enter position 0, 0, 300.



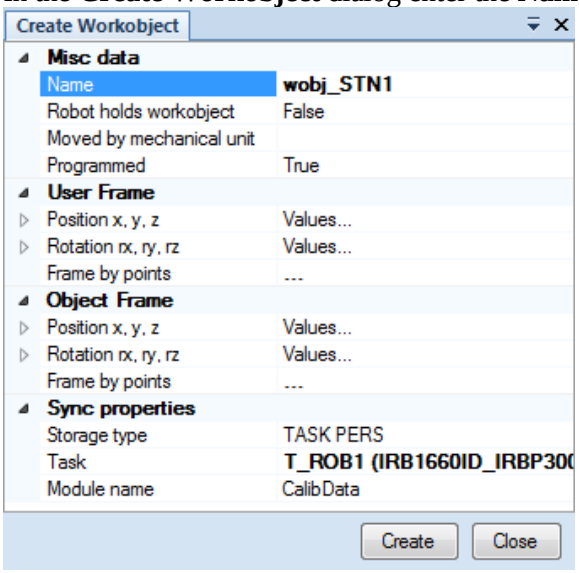
The 300mm value can easily be acquired by clicking on the robot stand and looking in the task bar.

5. Click the **Apply** button.
6. Answer **Yes** to the questions *"Do you also want to move the base frame(s)?"*

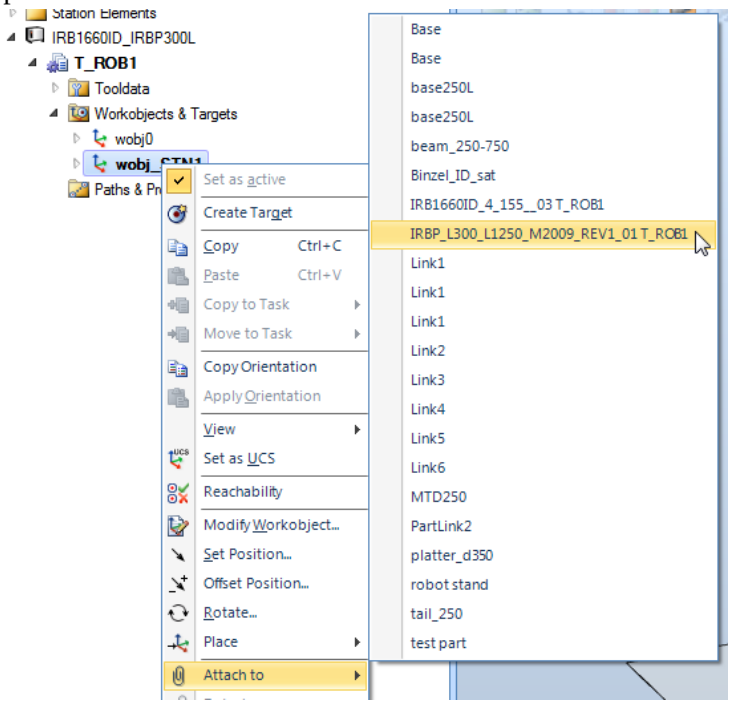


Create a Coordinated Workobject

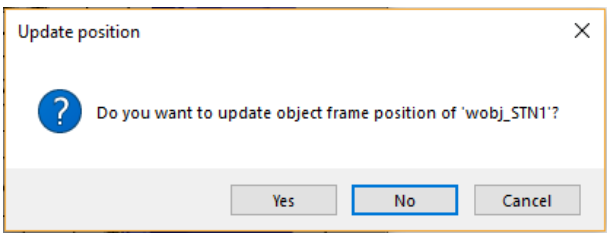
1. On the **Home** tab click the **Other** button and select **Create Workobject**.
2. In the **Create Workobject** dialog enter the **Name** *wobj_STN1* and click **Create**.



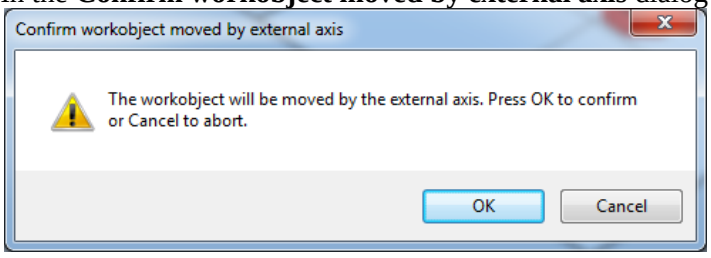
3. In the **Paths&Targets** browser right click *wobj_STN1* point to **Attach to** and select the positioner.



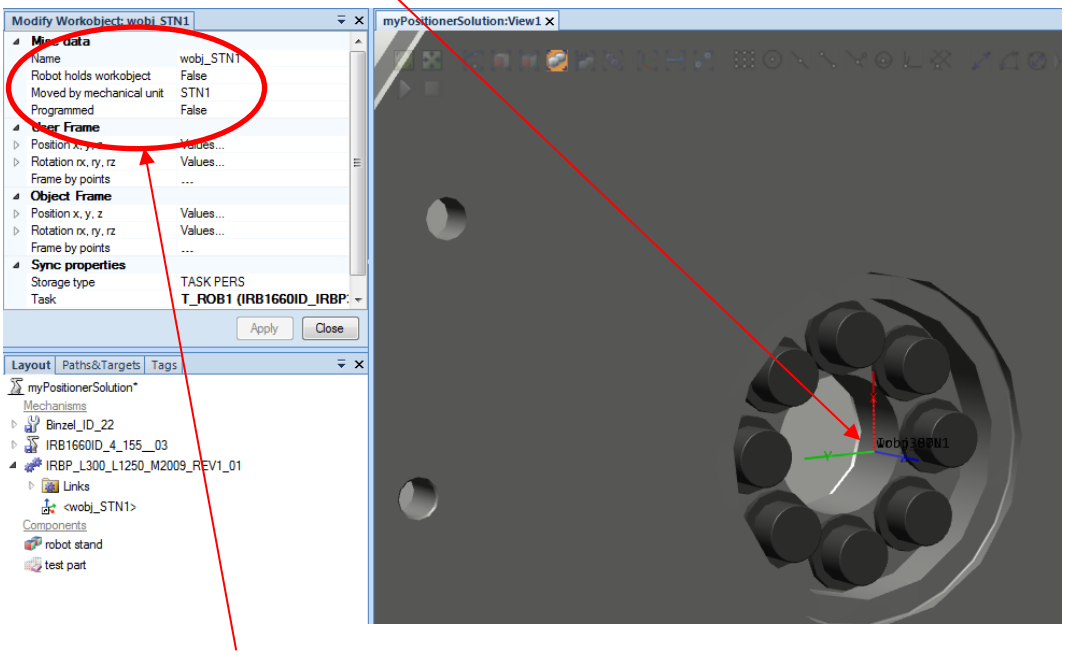
4. In the **Update position** dialog click the **Yes** button.



5. In the **Confirm workobject moved by external axis** dialog click the **OK** button.



The workobject is now placed in the positioner baseframe and is coordinated with the positioner.



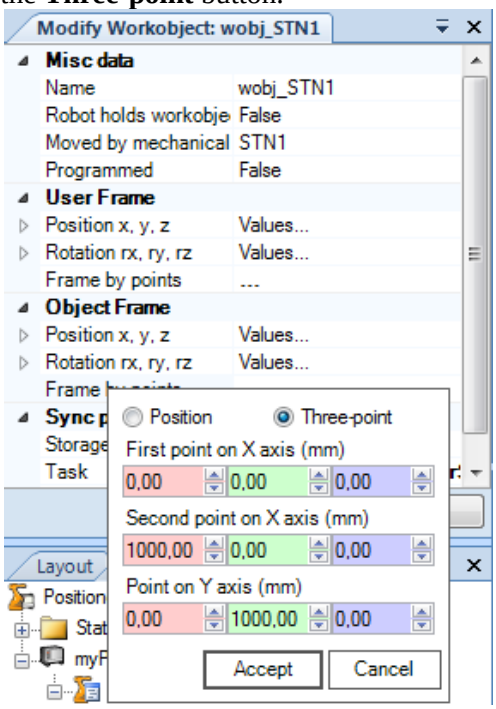
Alternatively when the workobject was created you can also select the mechanical unit that it is moved by (**STN1**) and change **Programmed** to **False**. This automatically attaches the workobject.

Define the Object Frame

A workobject consists of two coordinate systems the User Frame and its dependent Object Frame. Since the workobject is now coordinated with the positioner the User Frame is already located at the positioner's baseframe. Here we will define the Object Frame somewhere on the part/fixture in order to set this frame as close to the intended targets as possible.

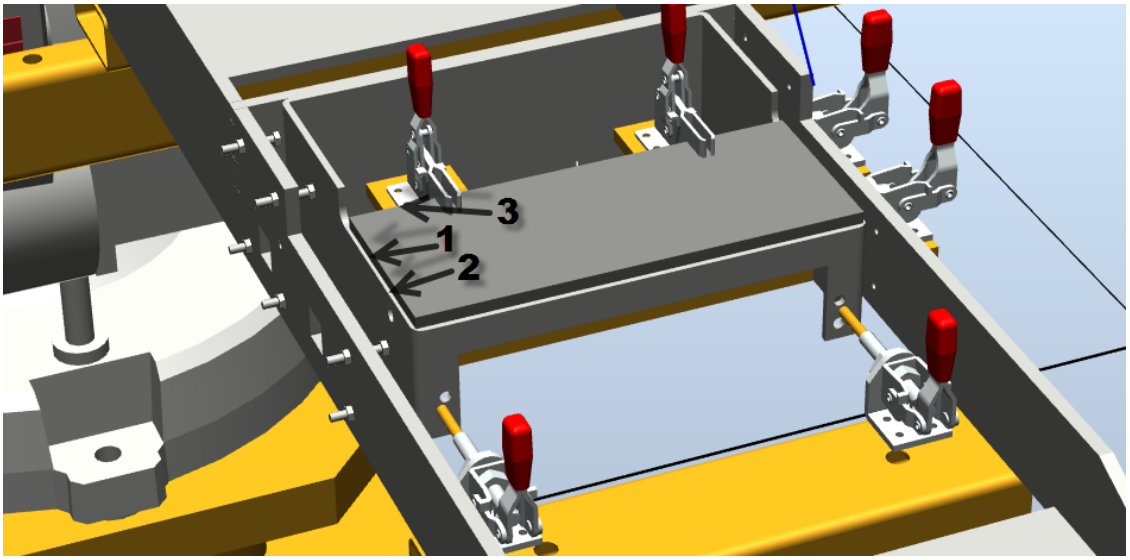
1. In the **Paths&Targets** browser right click *wobj_STN1* and select **Modify Workobject**.

2. In the Modify Workobject dialog under **Object Frame** click **Frame by points** and select the **Three-point** button.

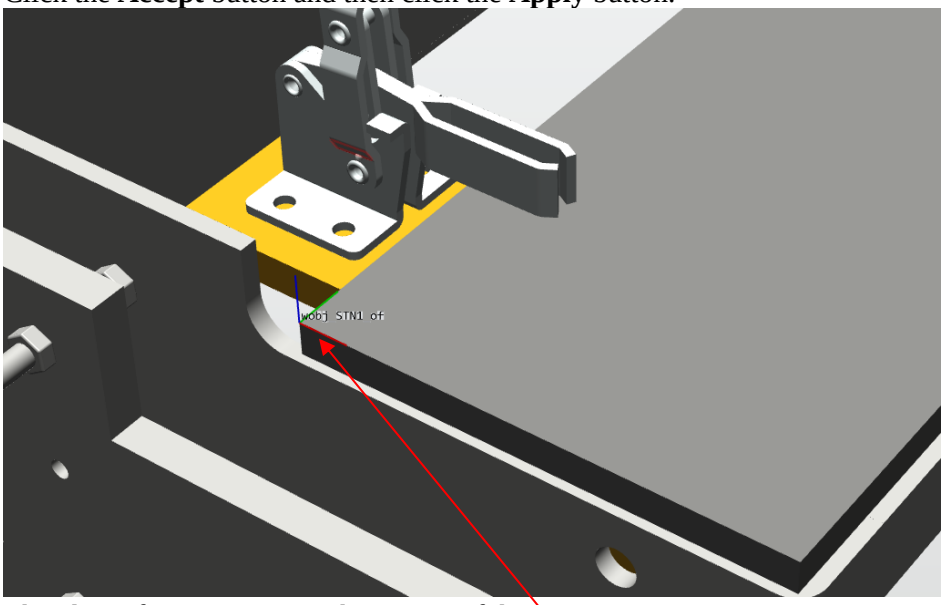


3. Set the **Selection Level** to **Surface** and the **Snap Mode** to **Edge**.

4. Click in the **First point** and then in the **Graphics** window click twice on the X axis and once on the Y axis, see picture.



5. Click the **Accept** button and then click the **Apply** button.



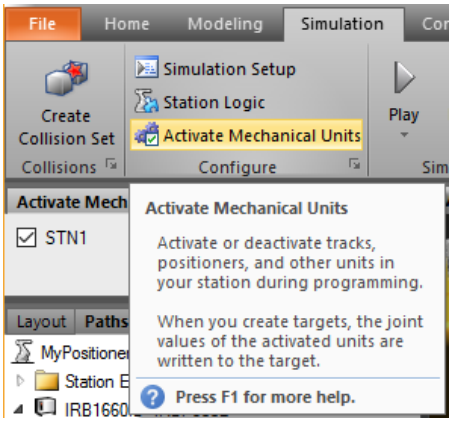
The object frame is now on the corner of the part.

Activate the Mechanical Unit

For RobotStudio to take into consideration the external axis you need to activate it. This is especially important when having several external axes that are not run at the same time.

1. On the Simulation tab click the Activate Mechanical Units button.

2. In the **Activate Mechanical Units** dialog check the **STN1** checkbox.

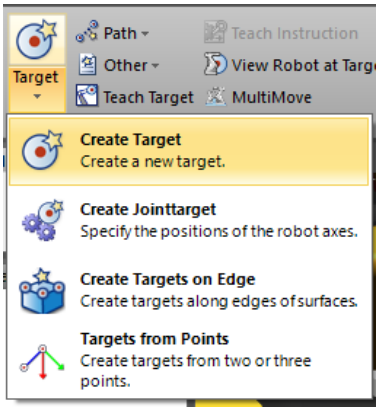


Now that the positioner unit is activated, external axis values will be assigned to targets as they are created.

Create Targets

We now want to create targets for a weld going between the two plates at a 45º angle. We also want approach/depart targets 50mm from the weld.

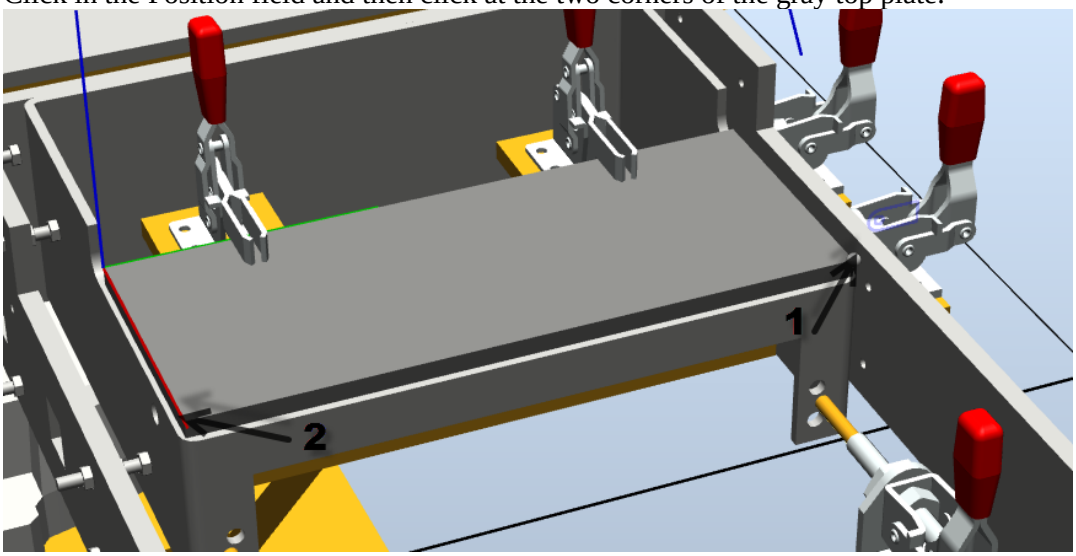
1. On the **Home** tab click the **Target** button and select **Create Target**.



2. In the **Create Target** dialog enter the Orientation 0, 225, 0.
   Since a target at 180º is directed straight down we need to add the 45º to that.

3. Change to **Surface Selection Level and** to **Snap Mode** to **End**.

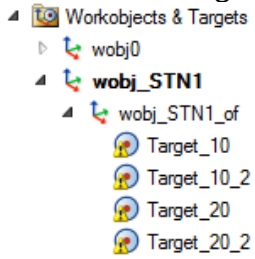
4. Click in the Position field and then click at the two corners of the gray top plate.



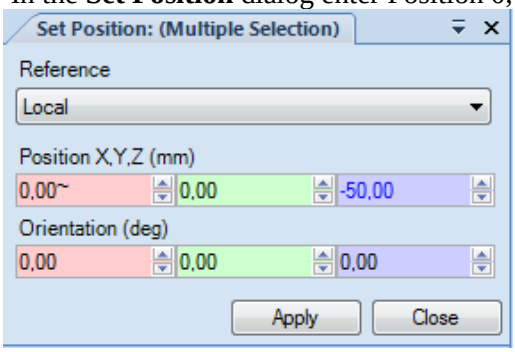
5. In the **Create Target** dialog click the **Create** button.

6. In the **Paths&Targets** browser select the two targets. (*Target_10* and *Target_20*), right click on them and select **Copy**.

7. In the **Paths&Targets** browser right click the *wobj_STN1* workobjcet and select **Paste**.

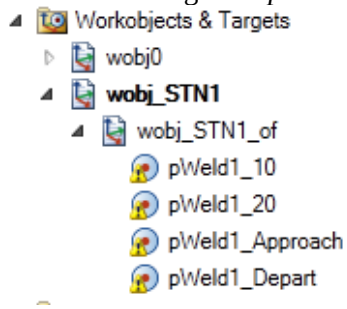


8. In the **Paths&Targets** browser select the two new targets (*Target_10_2* and *Target_20_2*) right click on them and point to **Modify Target** and select **Set Position**.
9. In the **Set Position** dialog enter Position 0, 0, -50 and click **Apply**.



Note that the reference is local so the targets are moved in its own coordinate system.

10. Rename the targets to *pWeld1_Approach*, *pWeld1_10*, *pWeld1_20* and *pWeld1_Depart*.

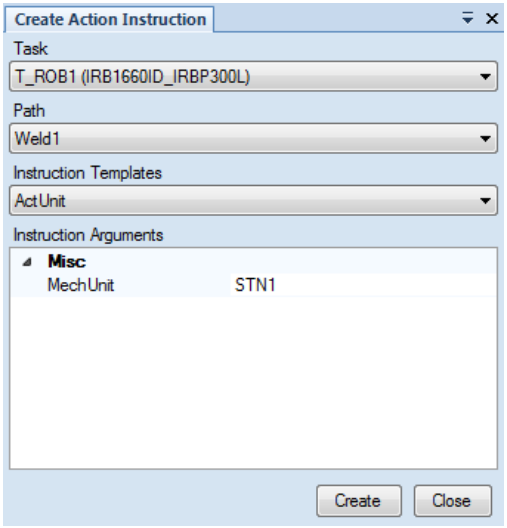


11. In the **Paths&Targets** browser right click *Paths & Proceedures* and select **Create Path**.

12. **Rename** the new path to *Weld1*.

13. Right click the *Weld1* path and select **Insert Action Instruction**.

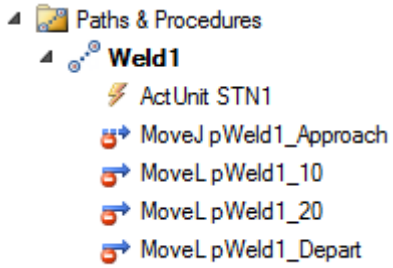
14. In the dialog on the **Instruction Templates** combobox select **ActUnit**. Ensure **STN1** is set as the MechUnit.



15. Click the **Create** button.

16. Add the targets to the path. (Via drag and drop).
For the approach use joint move, max speed and 10mm zone (z10).

For the other targets use linear move, 500mm/s and fine.



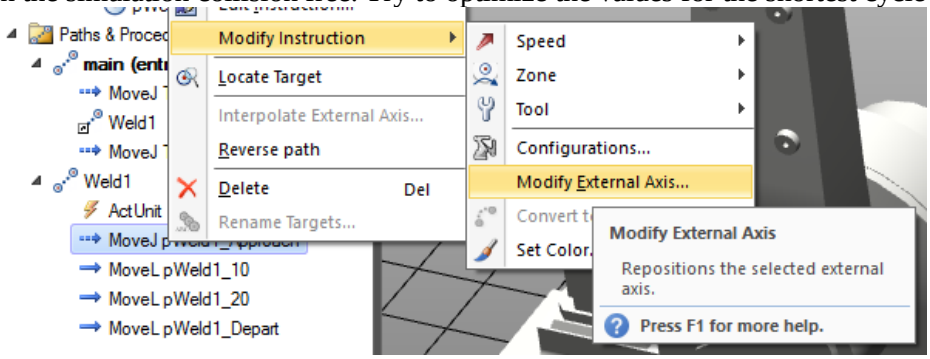
17. **Synchronize**, set as **Entry Point** and try to **Play** the simulation.
The positions will be out of reach. In the challenge you will fix this.

18. **Save** the station as
courseware\solutions\Module_8\MyPositionersolution\MyPositionerPath.

Challenge

Create a GoHome path to which you Teach a pHome target in wobj0 with the positioner in 0. Add that path before and after in the simulation. Now for the big challenge.

Change the external axis values for the targets so that you can give them a configuration and run the simulation collision free. Try to optimize the values for the shortest cycle time.



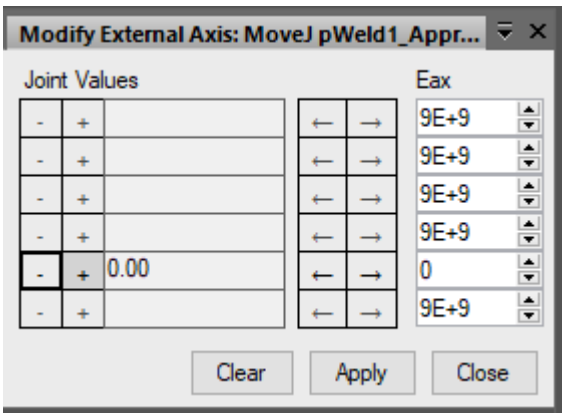


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ABB AB
Robotics Products
SE-721 68 Västerås
Sweden