Programming with RoboDK

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02 October, 2025

Interface

The RoboDK interface serves as the central workspace where all robot programming and simulation tasks begin. Before diving into advanced features, it is essential to understand the fundamentals of navigating the environment. This chapter introduces the core interface elements and workflows that form the foundation of any project—starting with how to import and configure a robot, organize reference frames for accurate positioning, and finally export completed simulations for further use.

Every time you start RoboDK, you will see the screen below. This is where whole action takes place.

Main Screen is where the imported objects appear, and any action performed by the objects or manipulators will be viewable in this area.

Station Tree is the place where the organization is performed. A single project can have more than one station. The hierarchy and frame referencing are also viewable from this tree.

Main Menu provides access to all the menu, such as File, Edit, Program etc.

Toolbar displays the options already available from the menu for quick access.

🟡 **Note**

In the following sections, menu and toolbar options are discussed in detail.
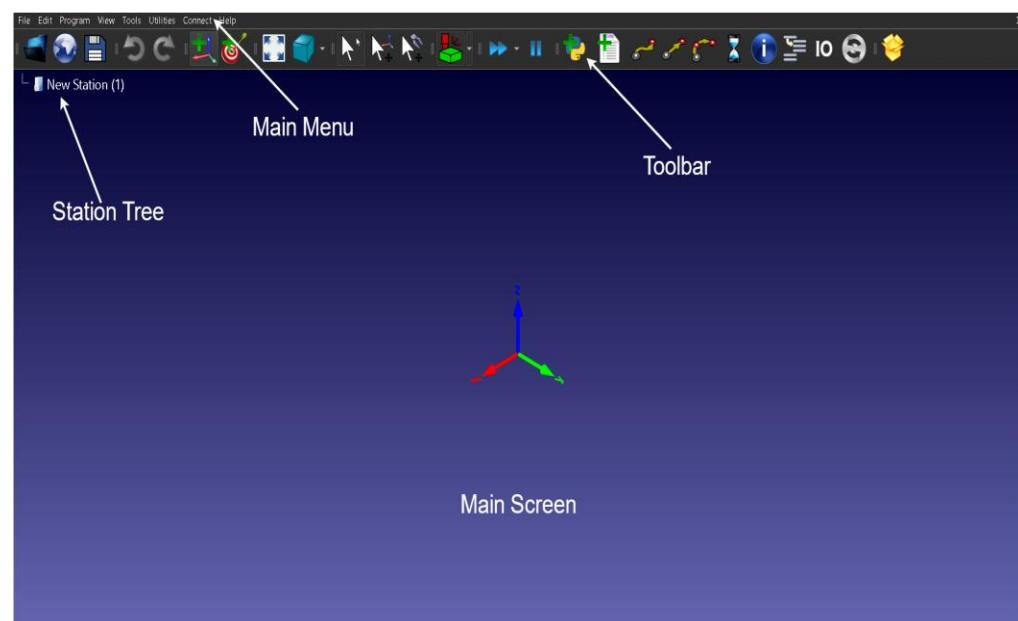
1.1 Importing a Robot Manipulator to the Workstation

RoboDK comes with an extensive library of more than 300+ manipulators from well-known manufacturers. Chances are that your desired manipulator is already available in the library. To access the library

1. Go to File → Open Robot Library

When you click on this option, it will redirect you to the library page on RoboDK website. If you know the exact name/model of your manipulator, you can directly search for it from the search bar.

Search library

2. If the manipulator's name/manufacturer is not known, but you wish to find one that matches your specification, it is possible to use filters. The filters can be applied to a variety of options, such as their type, axes, reach, payload, weight, repeatability, and applications.

Brand	∨
Type	∨
Axes	∨
Reach	∨
Payload	∨
Weight	∨
Repeatability	∨
Applications	∨

3. Hover over the desired robot to reveal options:
   - o Open: Load the selected model directly into RoboDK platform and stores it in a temporary location.
   - o 3D View: Preview the robot model in a web browser, where you can view it in a 3D environment with all 3D options such as move, rotate, zoom, or similar.
   - o Download: Save it locally, by default to the Downloads folder, from where you can manually import to RoboDK.

ABB CRB 1300-7/1.4

Open	
Details	
3D View	
Download	

Brand	ABB
Model	CRB 1300-7/1.4
Axes	6
Reach	1400 mm
Payload	7 kg
Weight	79 kg
Repeatability	0.030 mm

4.   Once imported, the robot will appear in your station tree and can be configured further.

💡 **Pro Tip**

If your robot isn't available, you can import CAD models and define its joints manually (covered in Chapter 8).

1.2 Import stations from RoboDK Library to RoboDK

RoboDK also has an impressive library of already built projects which can be accessed from the RoboDK resource webpage or from

File → Open Sample Stations

Similar to the robot's library, it is also possible to search for a specific project from the 'Search Library' option. Otherwise, filters can be applied of various natures, ranging from applications, features, brands, mechanism types, size, and similar.

When a mouse is hovered over a specific project, four options of 'Open', 'Details', '3D View', and 'Download' are available, which work in the same manner as explained in the previous section.

1.3 Exporting Simulation

Once a project is built, it can be exported for sharing – even with people who don't have RoboDK installed.

Go to File → Export Simulation to reveal the export options.

The simulation can be exported in many possible ways.

1. **Export as a weblink:** A unique link is generated for a project exported to the RoboDK web server. Anyone with the link will be able to view the project. (Note: A professional license is needed)
2. **Export as HTML:** A project's simulation can be exported as an HTML file that can be viewed in a browser. It is possible to generate a simulation for a specific program from the 'Existing Program' drop-down menu.
3. **Export as PDF:** A project's simulation is also viewable in a PDF viewer when exported as a PDF file. Simulation can be exported for any specific program from the available list of programs. (Note: Plug-ins are needed)

1.4　Add Reference Frame

Reference frames are particularly important in defining the relationship between different objects or different interest points on the same object (such as joints).

If a cylinder is added to the scene, it is by default added to the center of the screen with the virtual reference frame. This reference frame is immovable. If you wish to change the orientation and positioning of the cylinder with respect to the station's reference frame, it is not possible, unless it is attached to the reference frame.

Either from the toolbar or from the Program's menu, a new reference frame can be added to the scene. First time when a reference frame is added, it is added as 'Frame 1', and every time a new frame is added, an increasing index is assigned, such as 'Frame 2', 'Frame 3', and so on.

By default, Frame 1 is added at the center of the screen, the same origin as the station. Every subsequent frame added to the scene will be displaced by 1000mm along the Y-axis in reference to the station's reference frame which is considered parent to both Frame 1 and Frame 2.
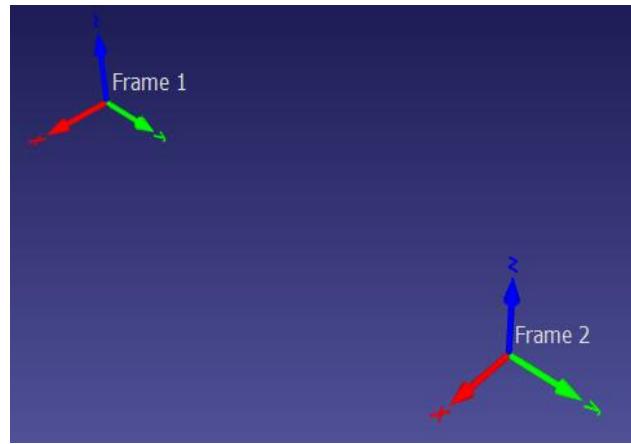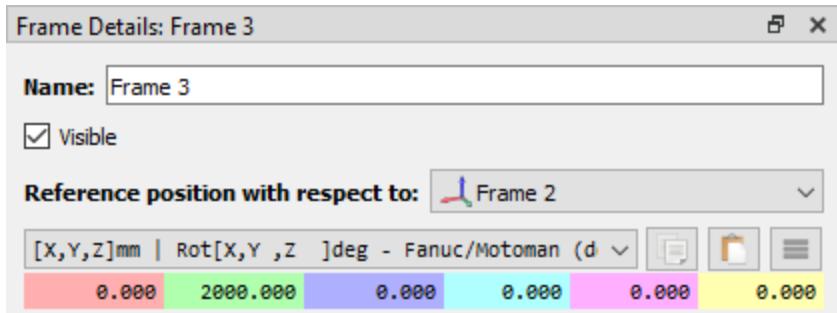
If Frame 2 is enabled by clicking on it, then it becomes an active frame. Now, if we add a reference frame to the scene, it becomes a child of Frame 2.

As Frame 3 is defined as a child of Frame 2; hence its referencing by default is also with respect to Frame 2.

Frame Details: Frame 3

Name: Frame 3

☑ Visible

Reference position with respect to: Frame 2

[X,Y,Z]mm | Rot[X,Y ,Z]deg - Fanuc/Motoman (d ∨					
0.000	2000.000	0.000	0.000	0.000	0.000

1.5 Adding Cylinder to the reference frame

A cylinder can be associated with reference to Frame 1.

Now, by pressing the ALT key, it is possible to change the pose of the cylinder.

🟡 **Note**

Upon double clicking the name of the reference frame, details of the reference frame can be observed such as its visibility control, parent reference frame and pose.
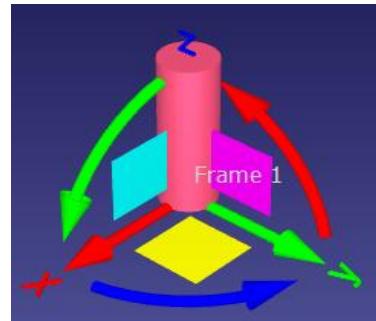
It is possible to control the movements of the cylinder in 9 possible ways. Six are related to the translation of the object.

1. Independently along the X-axis, by dragging the red arrow.
2. Independently along the Y-axis, by dragging the green arrow.
3. Independently along the Z-axis, by dragging the blue arrow.
4. Along with the X-Y axes by holding and dragging a yellow frame.
5. Along the X-Z axes by holding and dragging a green frame.
6. Along with the Y-Z axes by holding and dragging a pink frame.

Three movements are related to the independent rotations.

1. Independently along the X-axis, by dragging the curved red arrow.
2. Independently along the Y-axis, by dragging the curved green arrow.
3. Independently along the Z-axis, by dragging the curved blue arrow.

It is important to keep in mind that the relationship between Frame 1 and the cylinder remains unaffected. It can also be witnessed from the cylinder object details.
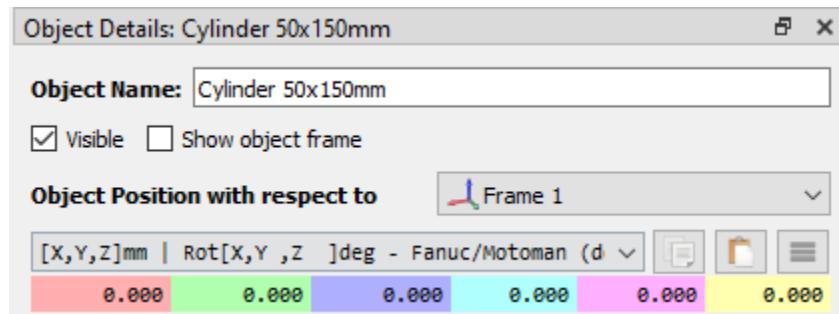
If you wish to observe the pose of the cylinder with respect to the origin, select New Station (1) from the drop-down menu.

● Note

If the arrows of the reference frame are not visible, you can always increase its size using + or - option on the keyboard or from the View menu.

1.6 Add Target

Targets are defined as the pose of interest reachable by the manipulator which can further be used in a program to define a sequence of poses.

Add any robot of interest from the RoboDK Library. The manipulator, by default, will be referenced with respect to its base frame. You will also observe a reference frame attached to its tool. The purpose of this reference frame is to control the movements of the tool.

At a current pose, add a new target by either clicking from the toolbar or select 'Teach Target' from the Program's menu. A new target point is added as 'Target 1'. Rename it as 'Retract' by pressing F2. Now, right-click on the Retract target and turn off its visibility. This action is performed to avoid dragging the retract target point to another location. Now, by pressing the ALT key, move the tool along the Z-axis. Now, define another target at this location and rename it as 'Approach'. Now, you can turn the visibility on for the retract target. You shall be able to see your robot in action when you click between 'Retract' and 'Approach'. This gives you the sense that the robot's movements can be controlled, but this is not a very ideal way as we are manually selecting the target point for the robot to access that pose.

If you are not satisfied with the defined target points, you can always manipulate them either by pressing the ALT key or by pressing F3 that will directly give you access to its pose or joint's configuration.
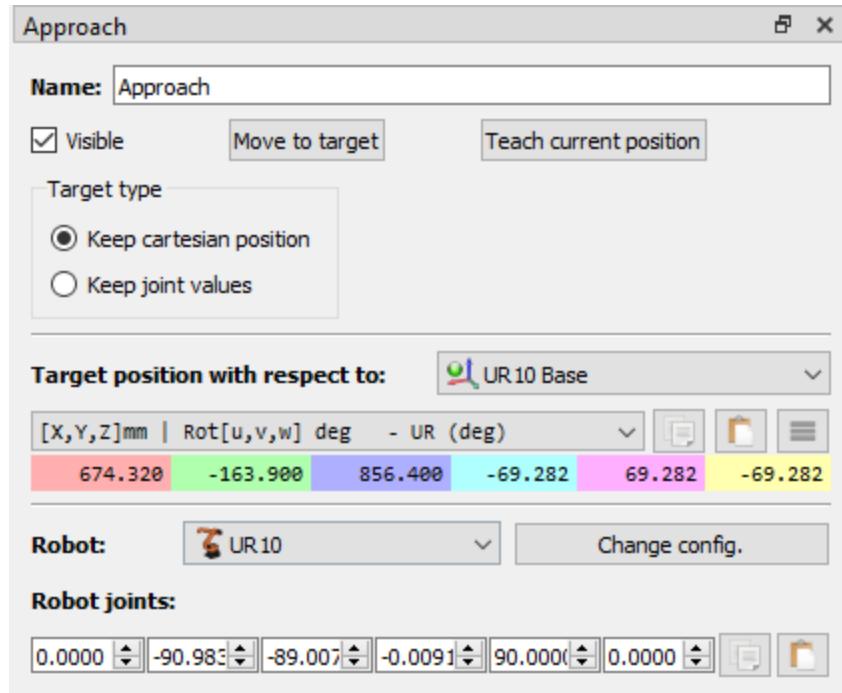
The targets can be configured to ensure that the robot is either bound to move in cartesian space or in joint space. By default, all targets are defined in cartesian space.

1. If the target is defined in a cartesian space, , target point is shown with a red arrow. This ensures that when the robot approaches this target point, the same pose will be ensured, but in joint space there can be variations (due to elbow-up or elbow-down or similar configurations).

2. If the target is defined in the joint space, , target point is shown with a green arrow. This ensures that when the robot approaches this target point, same joint values will be ensured, but in the pose, there can be variations.

The pose of the target position can be modified by either manually entering translation and rotation or by placing the cursor over any variable and scrolling the mouse wheel up and down.

The robot's configuration can also be changed from its default behavior. By clicking on the Change configuration button against a certain target point, a new dialog box will open as

Approach: Robot Configurations (UR10)

Front/Rear
- ○ Front
- ○ Rear
- ◉ Both

Elbow up/down
- ○ Elbow Up
- ○ Elbow Down
- ◉ Both

Flip/non-Flip
- ○ Non-Flip
- ○ Flip
- ◉ Both

Show all
Recommended
Config. id 0,1,2,3,4,5,6,7 ∨

Showing: 14 / 14 configurations

	id	F/R	U/D	F/N	J1	J2	J3	J4	J5	J6
1	2	●	○	●	-0.0	-91.0	-89.0	-0.0	90.0	0.0
2	6	○	○	●	148.6	-26.5	-60.1	86.6	58.6	-180.0
3	5	○	●	○	148.6	-89.0	89.0	-180.0	-58.6	0.0
4	4	○	●	●	148.6	-84.3	60.1	24.2	58.6	-180.0
5	3	●	○	○	-0.0	-95.7	-60.1	155.8	-90.0	-180.0
6	7	○	○	○	148.6	-3.9	-89.0	-87.1	-58.6	0.0
7	1	●	●	○	-0.0	-153.5	60.1	93.4	-90.0	-180.0
8	0	●	●	●	-0.0	-176.1	89.0	-92.9	90.0	0.0
9	2	●	○	●	-0.0	-95.7	-60.1	155.8	270.0	-180.0
10	0	●	●	●	-0.0	-153.5	60.1	93.4	270.0	-180.0
11	3	●	○	○	-0.0	-95.7	-60.1	155.8	-90.0	180.0
12	1	●	●	○	-0.0	-153.5	60.1	93.4	-90.0	180.0
13	2	●	○	●	-0.0	-95.7	-60.1	155.8	270.0	180.0
14	0	●	●	●	-0.0	-153.5	60.1	93.4	270.0	180.0

Ok   Cancel

It shows that the UR10 robot can move to the 'Approach' target with 14 different configurations, front, rear, elbow-up, elbow-down, non-flip, flip, or all possibilities. In the listed configurations, green color code gives the hint that the configuration is possible for the first element of the pair and not for the second element, available/not available. The white code hints at not available/available.

1.7   Tool center point (TCP)

A TCP can be added to the robot either through the Program menu or by right clicking the robot. A TCP is defined as a reference frame with some displacement from the actual tool. This is useful for applications such as spraying or blowing etc. By default, it is displaced at 200 mm with respect to the robot flange's Z-axis.
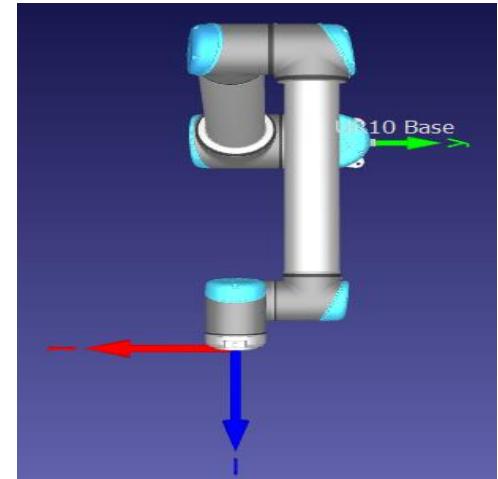
1.8   Viewing

If for some reason, your screen/objects go out of focus, it is very convenient to return them to the screen by View → Fit All. In case, if you wish to particularly focus on a single object of interest, click on that object from the station tree and then, View → Fit to Selection, will bring the focus on that particular object.
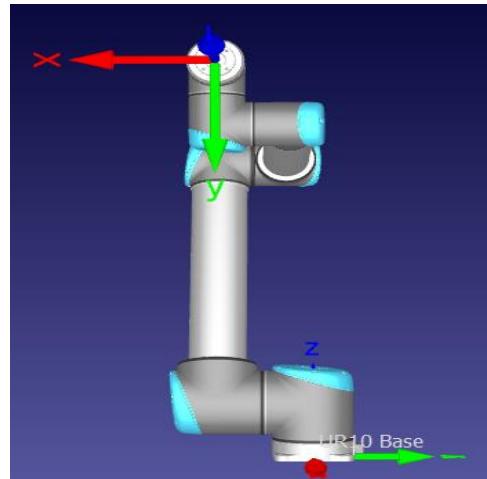
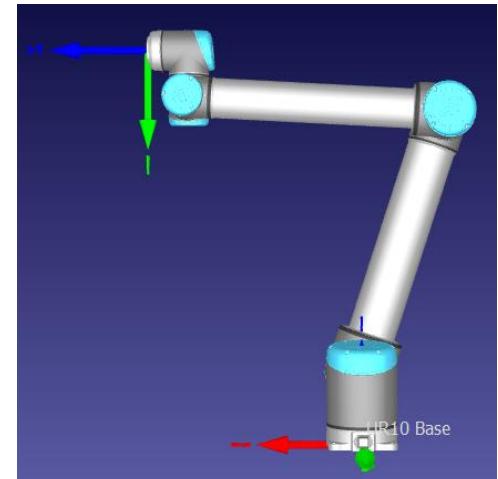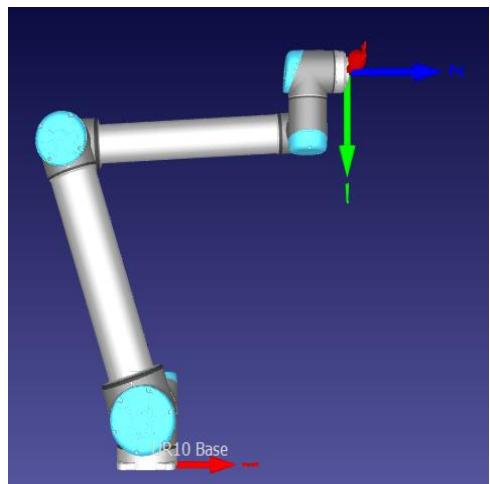In the viewport, the objects can be easily viewed from many different perspectives such as:
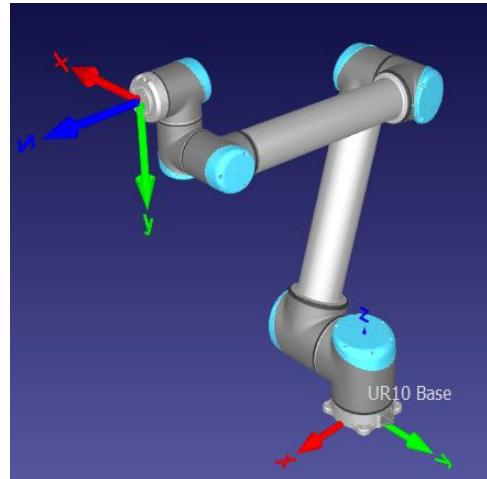
Isometric

Top

Front

Right

Left

Back