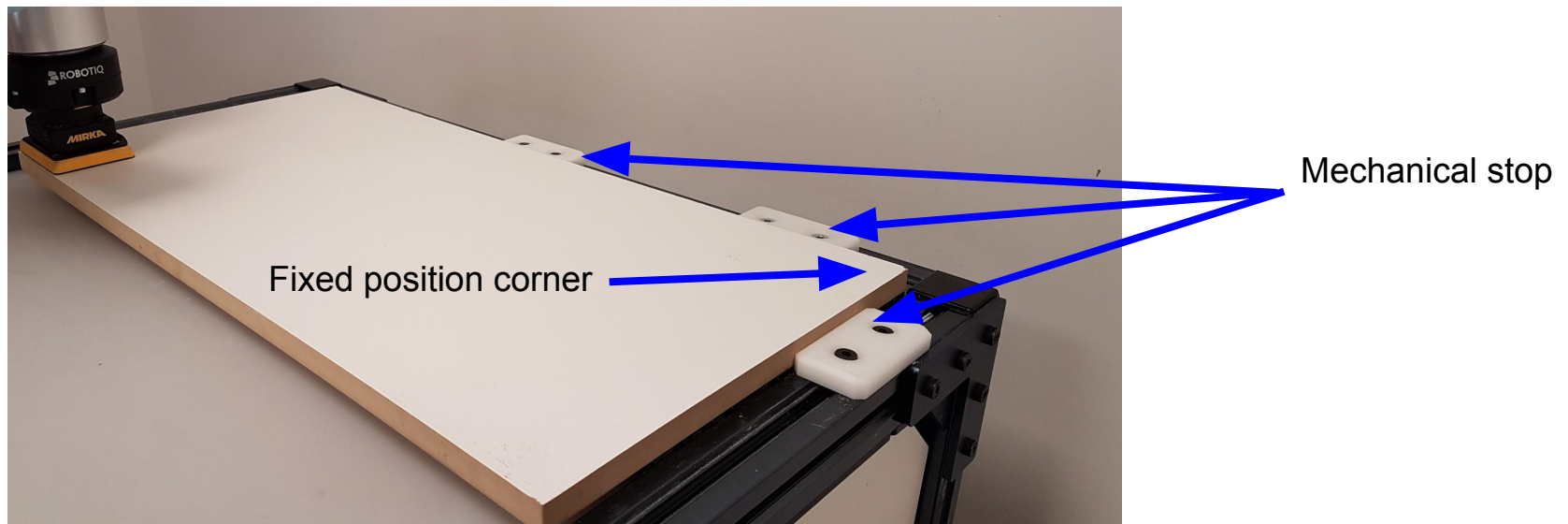


Cabinet door template

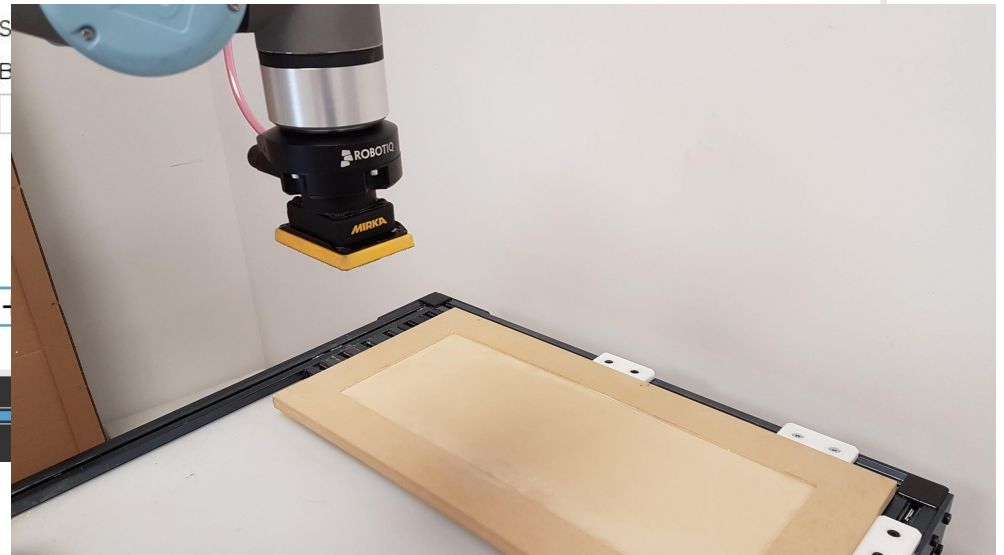
Cabinet door template

- Install the new URCap Finishing copilot.
- Load the program “cabinet door template”.
- Make sure the TCP is set correctly.
- One corner of the cabinet door must remain in the same position. Mechanical stops could be placed beside this corner.
- Use the biggest part to teach / adjust the program



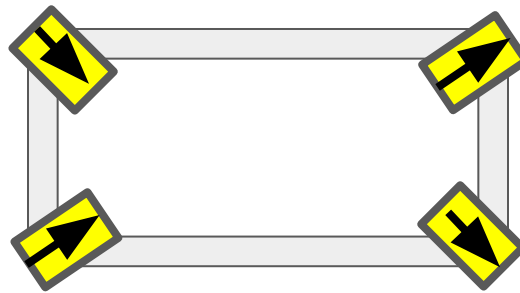
Teach an home position

The screenshot displays the Robotiq software interface. The top toolbar includes icons for Run, Program, Installation, Move, I/O, Log, and file operations (New, Open, Save). The left sidebar shows the 'Advanced' menu with 'Home' selected. The main panel displays the 'Waypoint' configuration screen, which includes a dropdown menu set to 'home', a 'Set Waypoint' button, an 'Edit pose' button, and a 'Move here' button. The bottom status bar shows 'Power off' and a speed slider.



Frame sanding

- It is proposed to sand the frame at 45 degrees at each corner. It will help to keep the sanding paper well-fixed under the sanding pad when climbing the inner edge.

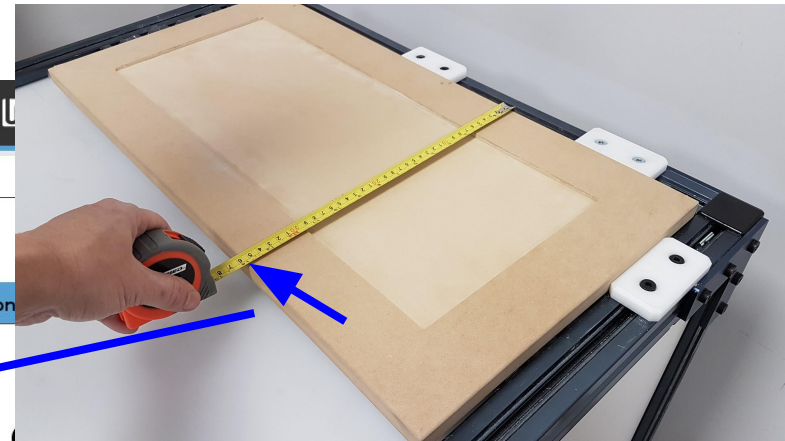
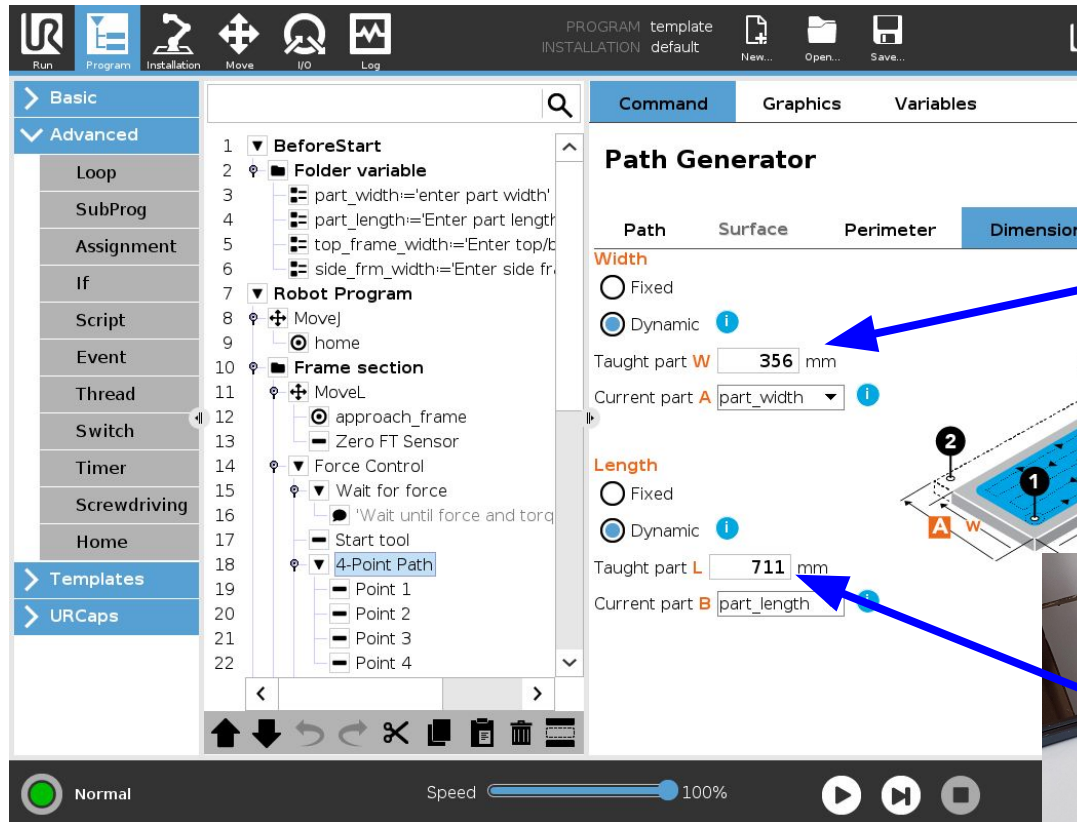


Teach an approach position over the fixed corner at 45 degrees

The screenshot displays the Robotiq software interface. On the left, a sidebar contains a tree view of the program structure, including sections like 'Robot Program', 'Frame section', 'Force Control', '4-Point Path', and 'Center section'. The 'approach_frame' is highlighted. The main area is divided into 'Command', 'Graphics', and 'Variables' tabs. The 'Waypoint' tab is active, showing a 'Fixed position' dropdown, a 'Set Waypoint' button, an 'Edit pose' button, and a 'Move here' button. A 3D model of a robotic arm is visible in the 'Graphics' tab. At the bottom, there is a 'Normal' status indicator and a 'Speed' slider.

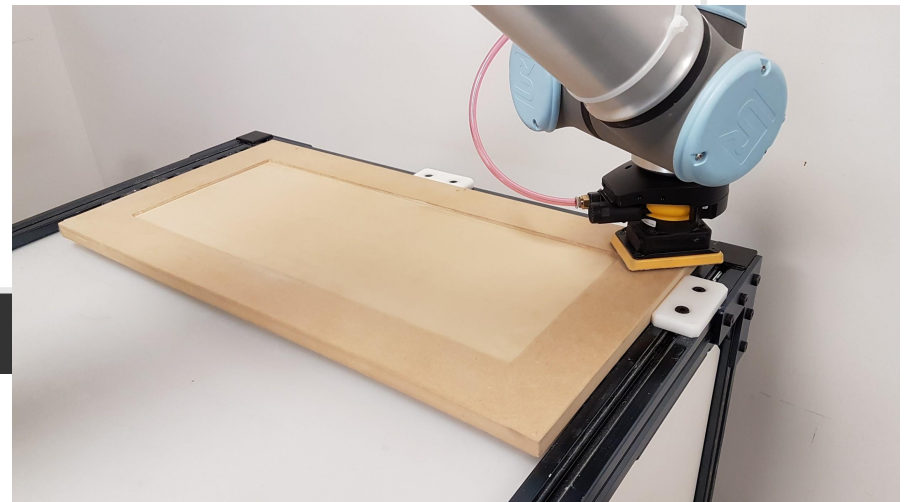


In the 4-Point Path generator node, Enter the dimension of the taught part. Use the biggest part to teach your points.



Teach point 1 at the fixed position corner.

The screenshot displays the UR Studio software interface. The top toolbar includes icons for Run, Program, Installation, Move, I/O, Log, and file operations (New, Open, Save). The left sidebar shows a tree view with 'Basic' and 'Advanced' sections. The 'Advanced' section is expanded, showing a list of programming blocks: Loop, SubProg, Assignment, If, Script, Event, Thread, Switch, Timer, Screwdriving, and Home. The 'Command' tab is active, showing a list of commands: BeforeStart, Folder variable, Robot Program, MoveJ, home, Frame section, MoveL, approach_frame, Zero FT Sensor, Force Control, Wait for force, Start tool, 4-Point Path, Point 1, Point 2, Point 3, and Point 4. The 'Point' tab is selected, showing a 3D diagram of a rectangular workpiece with four numbered points (1, 2, 3, 4) and arrows indicating a path. Two buttons, 'Edit waypoint' and 'Move here', are visible. The bottom status bar shows 'Normal' mode and a speed slider set to 100%.



Teach point 2

The screenshot displays the Robotiq Lean Robotics software interface. The top toolbar includes icons for Run, Program, Installation, Move, I/O, Log, New..., Open..., Save..., Local, and a status bar showing '3 F 5 0'. The left sidebar contains a tree view with 'Basic' and 'Advanced' sections. The 'Advanced' section is expanded, showing a list of programming blocks: Loop, SubProg, Assignment, If, Script, Event, Thread, Switch, Timer, Screwdriving, and Home. The 'Templates' and 'URCaps' sections are also visible. The main workspace is titled 'Point' and shows a 3D model of a robot arm with four numbered waypoints (1, 2, 3, 4) on a blue surface. Two buttons, 'Edit waypoint' and 'Move here', are present. The bottom status bar shows 'Normal' mode and a speed slider set to 100%.

PROGRAM template
INSTALLATION default

Run Program Installation Move I/O Log

New... Open... Save... Local

3 F 5 0

Basic

Advanced

Loop

SubProg

Assignment

If

Script

Event

Thread

Switch

Timer

Screwdriving

Home

Templates

URCaps

1 BeforeStart

2 Folder variable

3 part_width:='enter part width'

4 part_length:='Enter part length'

5 top_frame_width:='Enter top/b'

6 side_frm_width:='Enter side fr'

7 Robot Program

8 MoveJ

9 home

10 Frame section

11 MoveL

12 approach_frame

13 Zero FT Sensor

14 Force Control

15 Wait for force

16 'Wait until force and torq

17 Start tool

18 4-Point Path

19 Point 1

20 Point 2

21 Point 3

22 Point 4

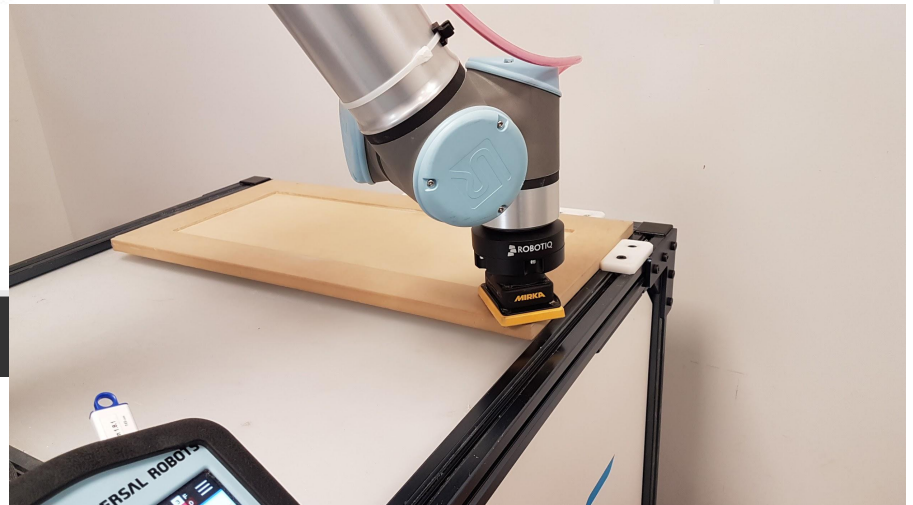
Point

Edit waypoint

Move here

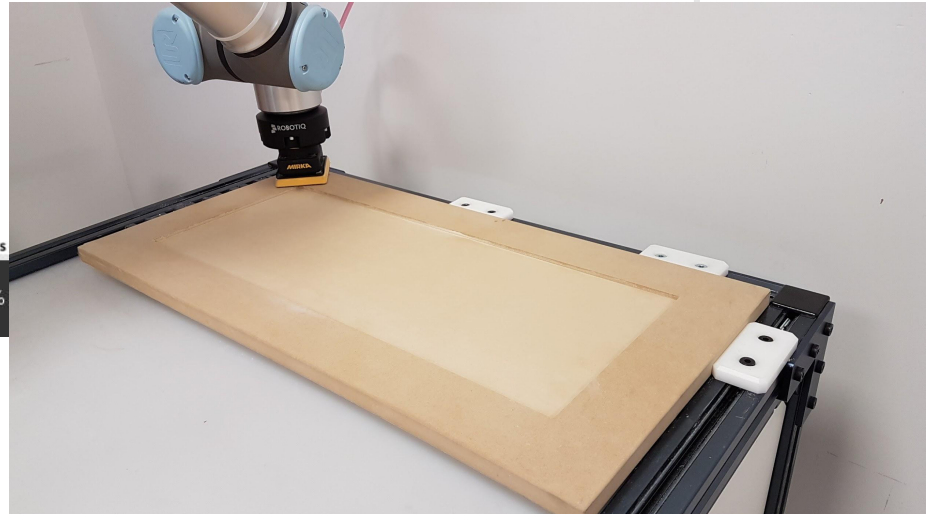
Normal

Speed 100%



Teach point 3

The screenshot shows the Robotiq software interface. The top bar includes icons for Run, Program, Installation, Move, I/O, Log, and buttons for New..., Open..., and Save... The left sidebar has a tree view with 'Basic' and 'Advanced' sections. The 'Advanced' section is expanded, showing a list of programming blocks: Loop, SubProg, Assignment, If, Script, Event, Thread, Switch, Timer, Screwdriiving, Home, Templates, and URCaps. The main area is titled 'Point' and shows a diagram of a 4-point path on a rectangular surface. The path consists of four points labeled 1, 2, 3, and 4. Point 3 is highlighted. Below the diagram are two buttons: 'Edit waypoint' and 'Move here'. The bottom status bar shows a green circle with 'Normal' and a speed slider set to 100%.



Teach point 4

The screenshot displays the Robotiq software interface. The top toolbar includes icons for Run, Program, Installation, Move, I/O, Log, and a menu. The left sidebar shows a tree view with 'Basic' and 'Advanced' sections. The 'Advanced' section is expanded, showing a list of functions: Loop, SubProg, Assignment, If, Script, Event, Thread, Switch, Timer, Screwdriving, and Home. The main workspace is divided into 'Command', 'Graphics', and 'Variables' tabs. The 'Command' tab is active, showing a 'Point' section with a 4-point path diagram. The path consists of four points: Point 1 (blue), Point 2 (black), Point 3 (black), and Point 4 (yellow). The 'Point 4' is highlighted. Below the path diagram are two buttons: 'Edit waypoint' and 'Move here'. The bottom status bar shows 'Normal' and a 'Speed' slider set to 100.



Teach a retract in Z using a relative move. In this way, whatever the door dimension, it will retract in Z.

The screenshot displays the Robotiq software interface. On the left, a sidebar shows a tree view of the program structure. The 'Robot Program' is expanded, showing a sequence of steps: 'MoveJ', 'home', 'Frame section', 'MoveL', 'approach_frame', 'Zero FT Sensor', 'Force Control', 'Wait for force', 'Wait until force and torque', 'Start tool', '4-Point Path' (with sub-steps 'Point 1', 'Point 2', 'Point 3', 'Point 4'), 'Stop tool', 'MoveL', 'retract_frame', 'Center section', 'MoveL', and 'approach_center'. The 'retract_frame' step is highlighted. The main window shows the 'Waypoint' configuration for this step. It includes a dropdown menu set to 'Relative position', a 'retract_frame' label, and a 'Distance' field showing '35.05 mm'. There are also 'Set Point' and 'Move here' buttons. A speed slider at the bottom is set to 100%.

Command Graphics Variables

Waypoint

Relative position

retract_frame

Relative Motion, given by the difference between from and to positions

Distance 35.05 mm

Angle 0.0 °

Set Point Set Point

Move here Move here

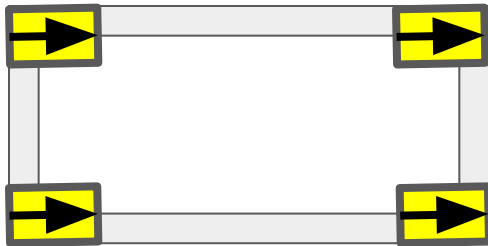
Stop at t Blend w

Normal Speed 100

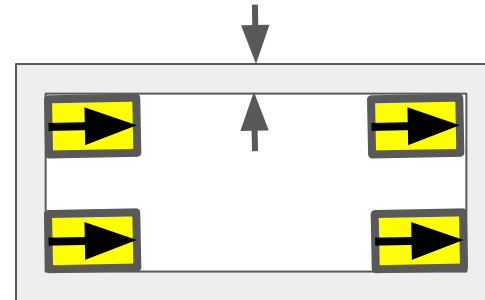
Center section

- The center section must adapt to the frame size.
- The center section must be taught with a 0 mm frame size.
- Using a UR variable having the frame size value in mm. The path will be offset to sand only the center section. The UR variable must be selected in the margin tab of 4-Point path generator node.

Taught position

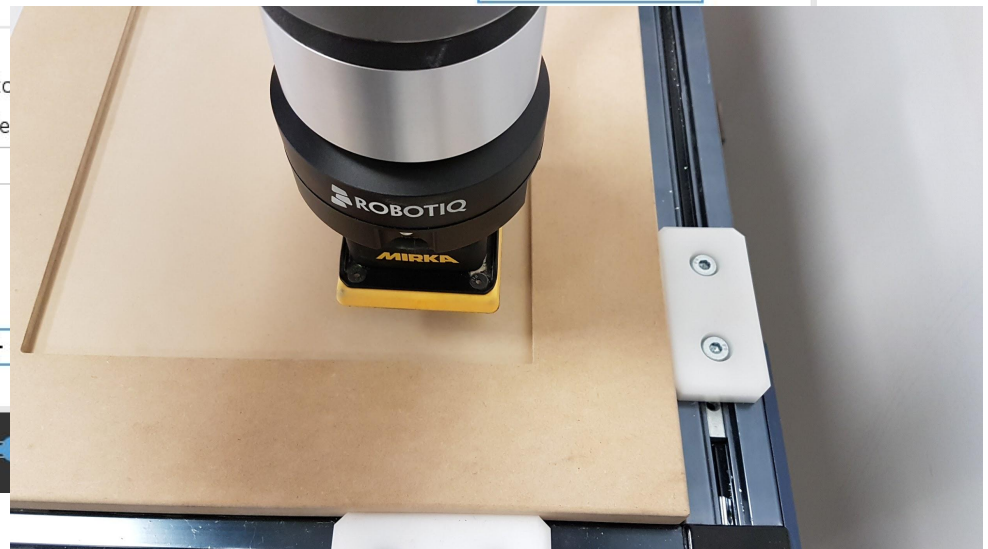


At runtime, offset with a UR variable value by margin option of path generator node.

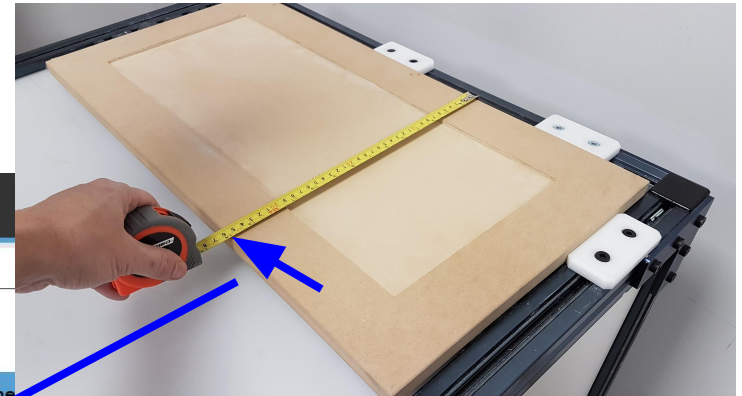
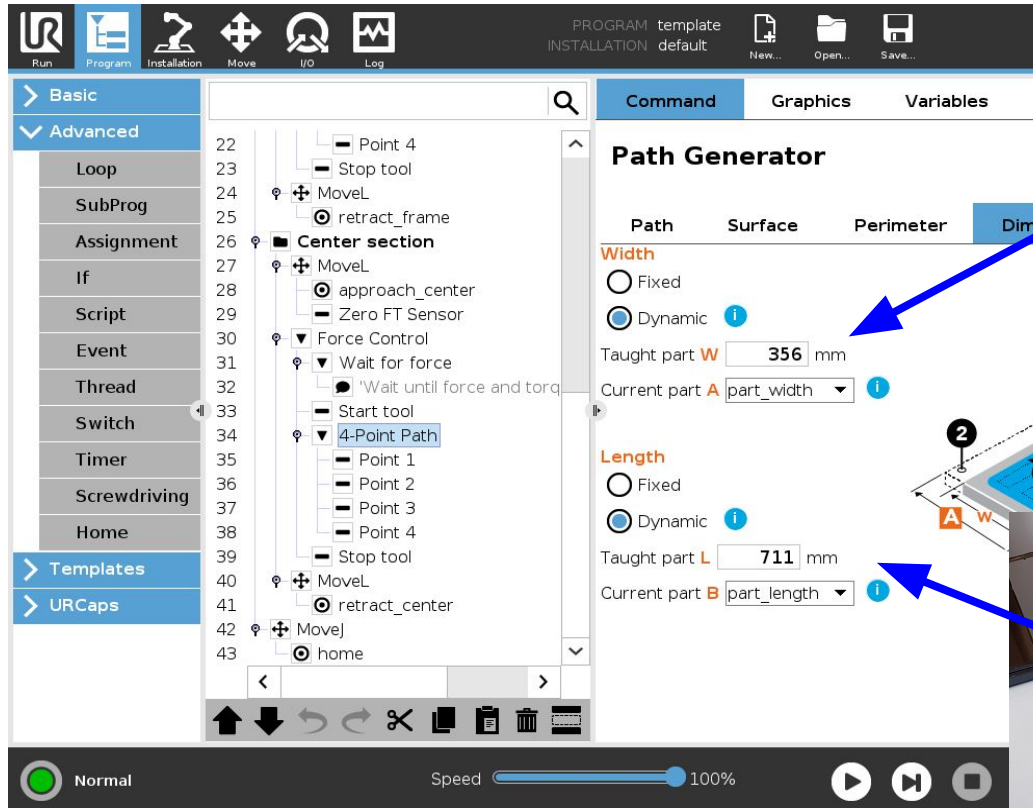


Teach an approach position over the center section of a door having the biggest frame width.

The screenshot displays the Robotiq software interface. On the left, a sidebar contains a tree view of the program structure. The 'Advanced' section is expanded, showing a sequence of steps: 'Loop', 'SubProg', 'Assignment', 'If', 'Script', 'Event', 'Thread', 'Switch', 'Timer', 'Screwdriving', and 'Home'. The 'Center section' is highlighted, containing a 'MoveL' step with a target point 'approach_center'. Below this, a '4-Point Path' is defined with points 1 through 4. The main panel on the right is titled 'Waypoint' and shows a 'Fixed position' dropdown. It includes a 'Set Waypoint' button, an 'Edit pose' button, and a 'Move here' button. A small diagram of a robotic arm is visible in the 'Move here' button area. At the bottom of the interface, there is a 'Normal' status indicator and a 'Speed' slider.



In the 4-Point Path generator node, Enter the dimension of the taught part.



Teach Point 1 at the fixed position corner.

Hint: Because we're executing the center section, leave some space between sander and the border to prevent the sander oscillation to hit the inner edge.

The screenshot displays the UR Robot Studio software interface. The top toolbar includes icons for Run, Program, Installation, Move, I/O, Log, and file operations (New, Open, Save). The left sidebar shows a tree view of the program structure, with the 'Center section' expanded. The main workspace shows a 3D model of a sander head with four numbered waypoints (1, 2, 3, 4) defining a rectangular path. A blue button labeled 'Edit waypoint' is visible. The bottom status bar shows 'Normal' mode and a speed slider set to 100%.

PROGRAM template
INSTALLATION default

Run Program Installation Move I/O Log

New... Open... Save...

Local 3 F 5 0

Basic
Advanced

Loop
SubProg
Assignment
If
Script
Event
Thread
Switch
Timer
Screwdriving
Home

Templates
URCaps

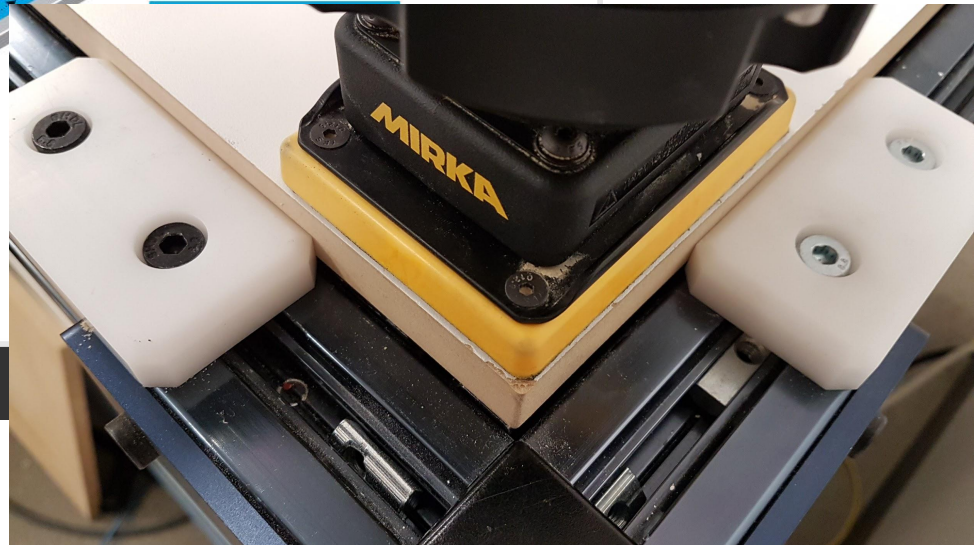
22 Point 4
23 Stop tool
24 MoveL
25 retract_frame
26 Center section
27 MoveL
28 approach_center
29 Zero FT Sensor
30 Force Control
31 Wait for force
32 'Wait until force and torque
33 Start tool
34 4-Point Path
35 Point 1
36 Point 2
37 Point 3
38 Point 4
39 Stop tool
40 MoveL
41 retract_center
42 MoveJ
43 home

Command Graphics Variables

Point

Edit waypoint

Normal Speed 100%



Teach Point 2

The screenshot displays the Robotiq Teach Pendant interface. The top bar includes icons for Run, Program, Installation, Move, I/O, and Log, along with a status bar showing 'PROGRAM template INSTALLATION default' and file management options (New..., Open..., Save...). The main interface is divided into three tabs: Command, Graphics, and Variables. The 'Command' tab is active, showing a list of commands on the left and a 'Point' diagram on the right. The 'Point' diagram shows a 4-point path with points 1, 2, 3, and 4. Point 2 is highlighted. Below the diagram are two buttons: 'Edit waypoint' and 'Move here'. The bottom status bar shows 'Normal' and a speed slider set to 100%.

Run Program Installation Move I/O Log

PROGRAM template INSTALLATION default New... Open... Save...

UR+ Local 3 F 5 0

> Basic
✓ Advanced

Loop
SubProg
Assignment
If
Script
Event
Thread
Switch
Timer
Screwdriving
Home

> Templates
> URCaps

22 Point 4
23 Stop tool
24 MoveL
25 retract_frame
26 Center section
27 MoveL
28 approach_center
29 Zero FT Sensor
30 Force Control
31 Wait for force
32 'Wait until force and torque
33 Start tool
34 4-Point Path
35 Point 1
36 Point 2
37 Point 3
38 Point 4
39 Stop tool
40 MoveL
41 retract_center
42 MoveJ
43 home

Point

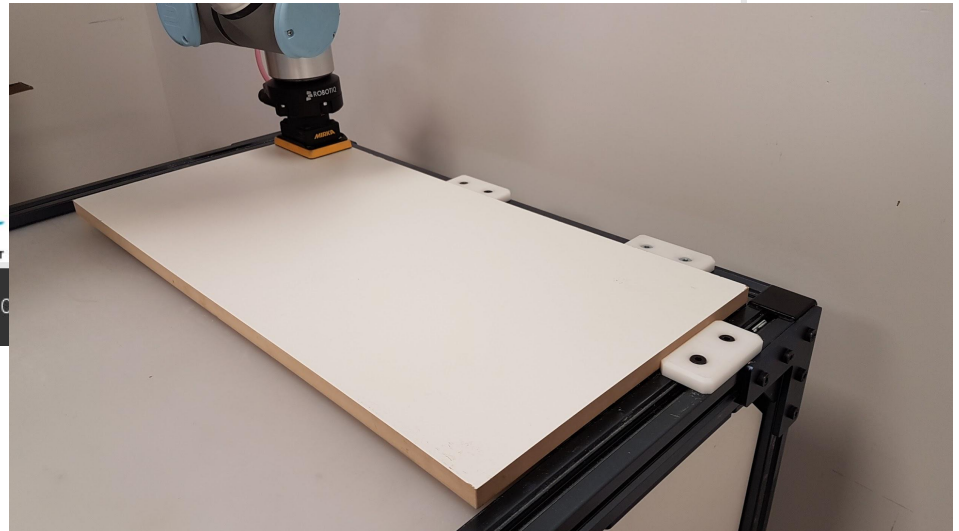
Edit waypoint
Move here

Normal Speed 100%



Teach Point 3

The screenshot displays the Robotiq software interface for teaching a robot. The top toolbar contains icons for Run, Program, Installation, Move, I/O, and Log. The main menu on the left lists various programming options: Basic, Advanced, Loop, SubProg, Assignment, If, Script, Event, Thread, Switch, Timer, Screwdriving, and Home. The central workspace shows a 4-Point Path diagram with four numbered points (1, 2, 3, 4) and a 'Point' section with buttons for 'Edit waypoint' and 'Move here'. The bottom status bar indicates 'Normal' and a speed slider.



Teach Point 4

Run Program Installation Move I/O Log

PROGRAM template
INSTALLATION default

New... Open... Save...

Local 3 F 5 0

Basic Advanced

Loop SubProg Assignment If Script Event Thread Switch Timer Screwdriving Home

Templates URCaps

22 Point 4
23 Stop tool
24 MoveL
25 retract_frame
26 Center section
27 MoveL
28 approach_center
29 Zero FT Sensor
30 Force Control
31 Wait for force
32 Wait until force and torque
33 Start tool
34 4-Point Path
35 Point 1
36 Point 2
37 Point 3
38 Point 4
39 Stop tool
40 MoveL
41 retract_center
42 MoveJ
43 home

Command Graphics Variables

Point

Edit waypoint

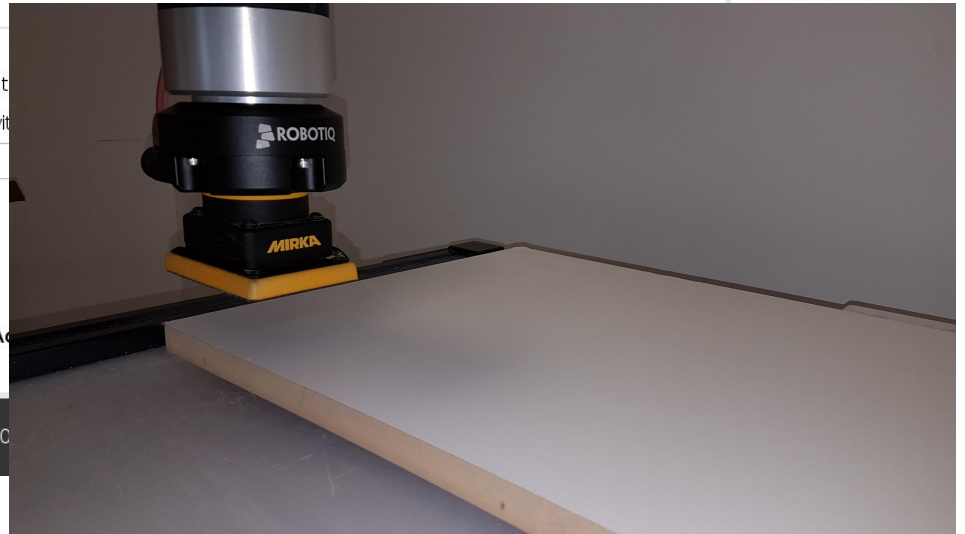
Move here

Normal Speed 100%



Teach a retract in Z using a relative move. Whatever the door dimension, it will retract in Z.

The screenshot displays the Robotiq software interface. On the left, a tree view shows a program structure with steps 22 through 43. Step 41, labeled 'retract_center', is highlighted. The main window is titled 'Waypoint' and contains a dropdown menu set to 'Relative position'. Below this, there are two 'Set Point' buttons, each with a 'Move here' button underneath. The distance between the points is shown as '28.02 mm' and the angle as '0.0 °'. At the bottom, there is a 'Normal' status indicator and a speed slider set to 100.



Adapt to the part size

- 4 Point path generator can adapt to the dimension of the current part using UR variable values.
- Variable values can be entered by the operator, calculated from Laser measurement, calculated by touching with the robot, from HMI, etc...

The screenshot displays the Robotiq software interface, which is divided into several panels. On the left, a 'Basic' and 'Advanced' menu is visible. The 'Advanced' menu is expanded, showing options like 'Loop', 'SubProg', 'Assignment', 'If', 'Script', 'Event', and 'Thread'. The main workspace shows a program tree with the following structure:

- 1. BeforeStart
- 2. Folder variable
- 3. part_width: 'Enter part width'
- 4. part_length: 'Enter part length'
- 5. top_frame_width: 'Enter top frame width'
- 6. side_frm_width: 'Enter side frame width'
- 7. Robot Program
- 8. MoveJ
- 9. home
- 10. Frame section
- 11. MoveL

On the right, the 'Path Generator' panel is active, showing the 'Dimensions' tab. It displays the '4-Point Path' configuration with the following settings:

- Width:** Dynamic (1). Taught part W: 356 mm. Current part A: part_width (1).
- Length:** Dynamic (1). Taught part L: 711 mm. Current part B: part_length (1).

Blue arrows indicate the mapping of the 'part_width' and 'part_length' variables from the program tree to the 'Current part A' and 'Current part B' fields in the Path Generator. A 3D model of a rectangular part is shown on the right, with dimensions A and B labeled. The bottom status bar shows 'Normal' mode, a speed slider at 100%, and a 'Simulation' toggle.

Adapt to the frame size at runtime

- After resizing, 4 Point path generator can add an offset from the edge by using the margin option and UR variable values.
- Variable values can be entered by the operator, from HMI, etc...

