

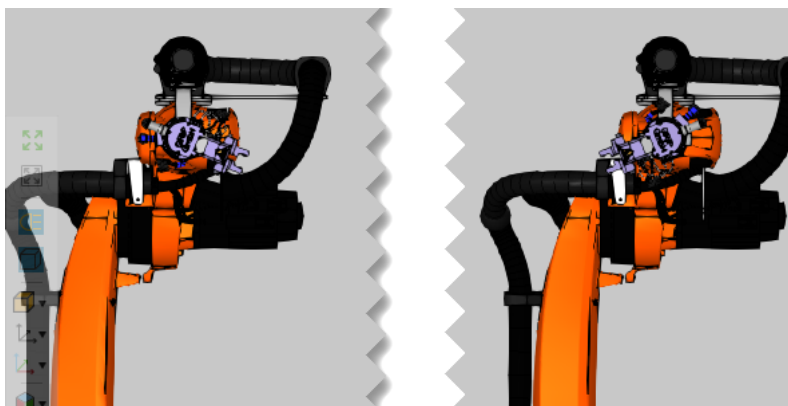
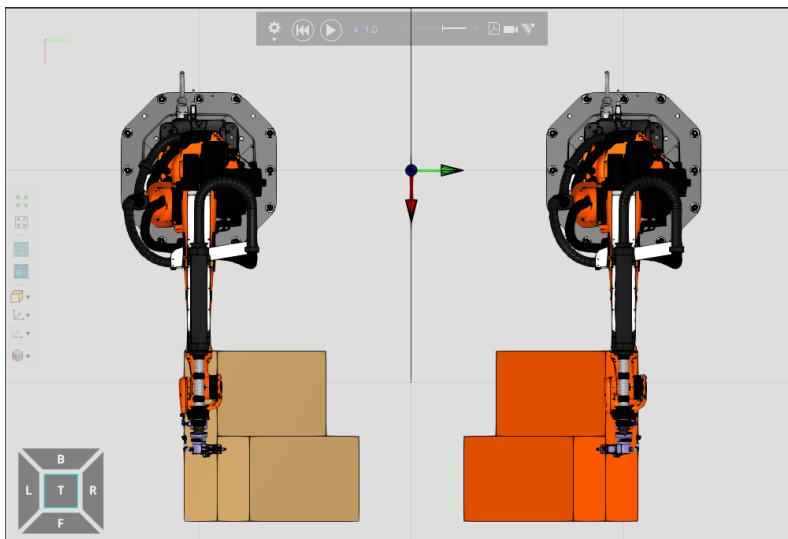
Mirror Positions Wizard

Introduction

This wizard mirrors position statements relative to a reference plane. The plane is chosen from a selectable reference base coordinate system. The mirrored positions may have to be manually optimized regarding reachability (status and turn values) afterwards. This can be done with by multi selecting statements and changing the properties as needed or by manipulating the position coordinates (see Optimizing mirror result).

If “Parent” is chosen as reference coordinate system, the coordinate of the statement is used as reference. You can also choose any other base as reference and therefore create mirror results for your specific use case by positioning a base in the 3D environment.

If the mirrored program should be transferred to a different robot, the robot, its tooling, and the application layout should be built mirrored to the reference application.

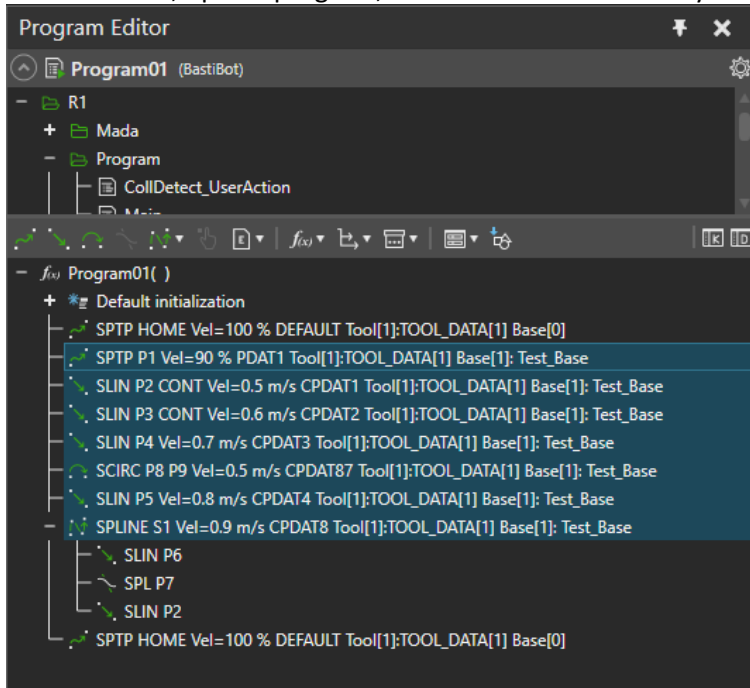


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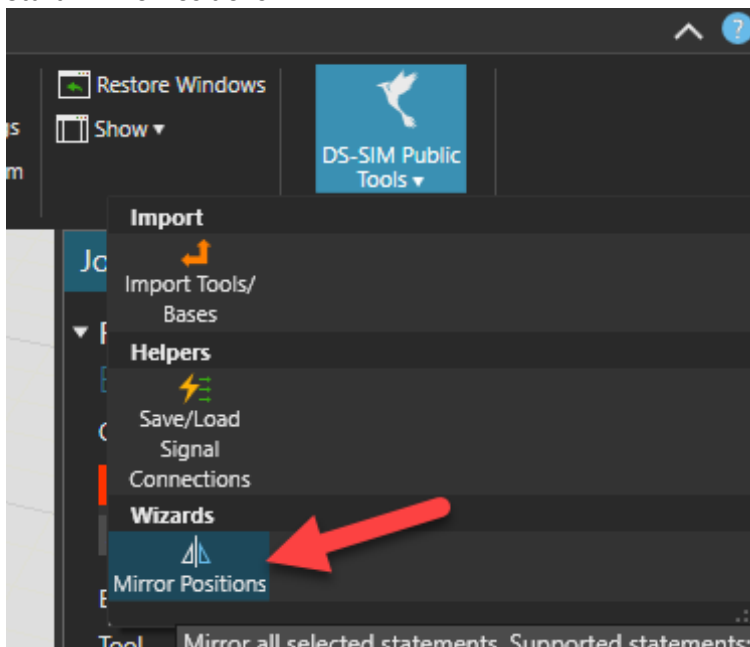
Working with the wizard

The following steps describe how to use the mirror position wizard.

1. Select a robot, open a program, and select all statements you want to mirror



2. Start “MirrorPositions”

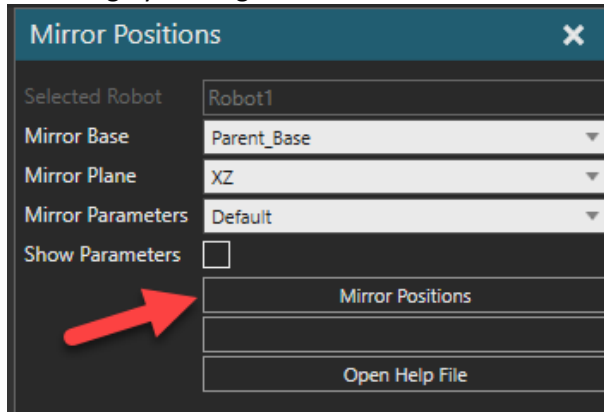


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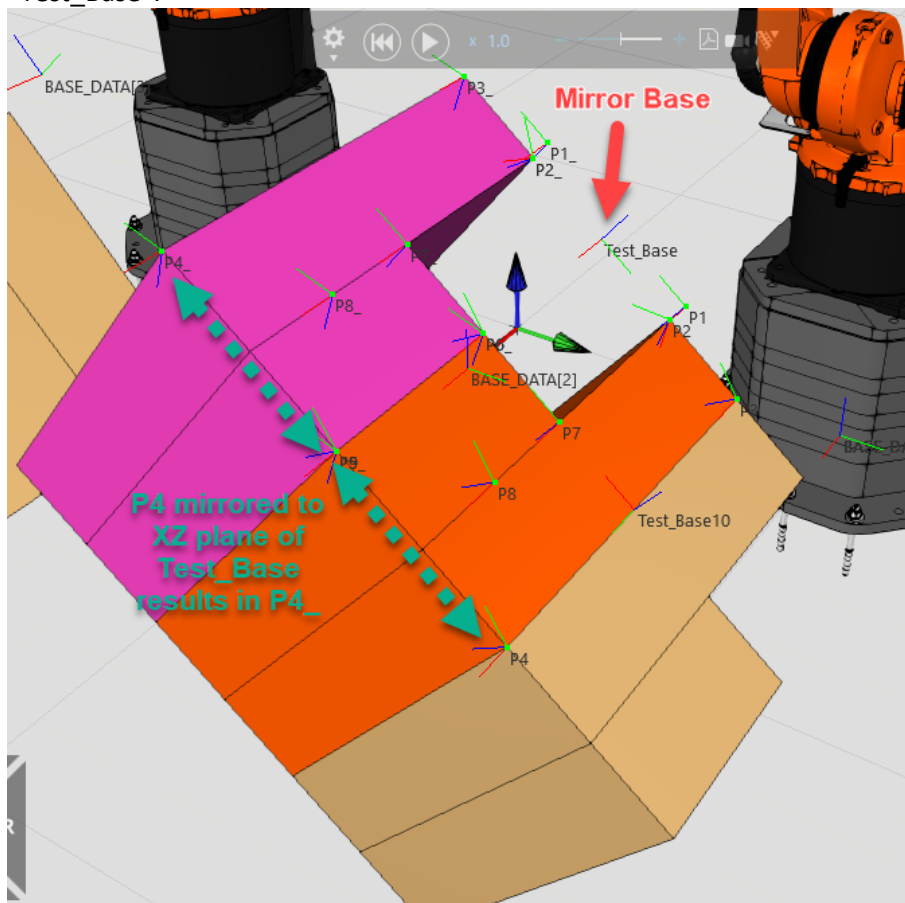
3. Set the parameters according to your use case.

3.1. Example 1 – Mirror to parent base

For this example, we will use the parent base as mirror reference. Execute the mirroring by clicking on the “Mirror Positions” button.



The positions of the selected statements are mirrored to the XZ plane of the base in which the positions have been taught. For this example, this base is “Test_Base”.

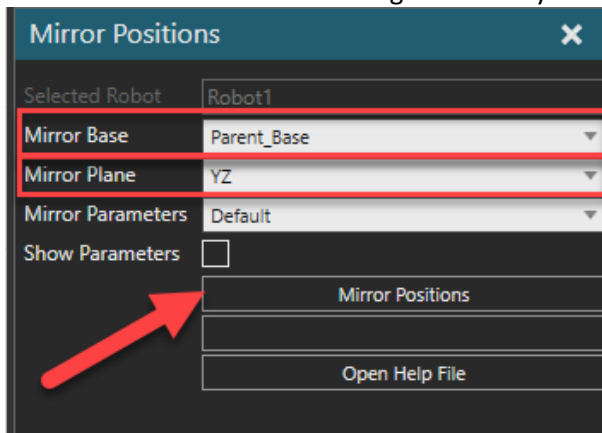


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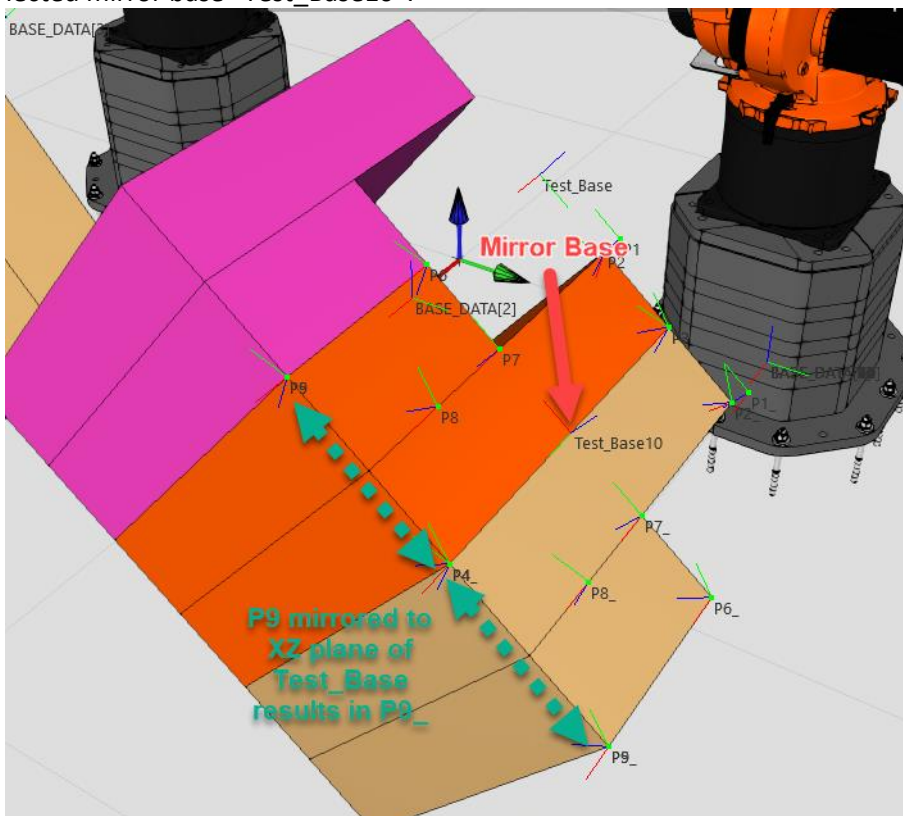
3.2. Example 2 – Mirror to custom base

For this example, we will choose a custom base as mirror reference.

“Test_Base10” has been positioned in the 3D environment beforehand so that the desired mirror result will be generated by choosing mirror plane “YZ”

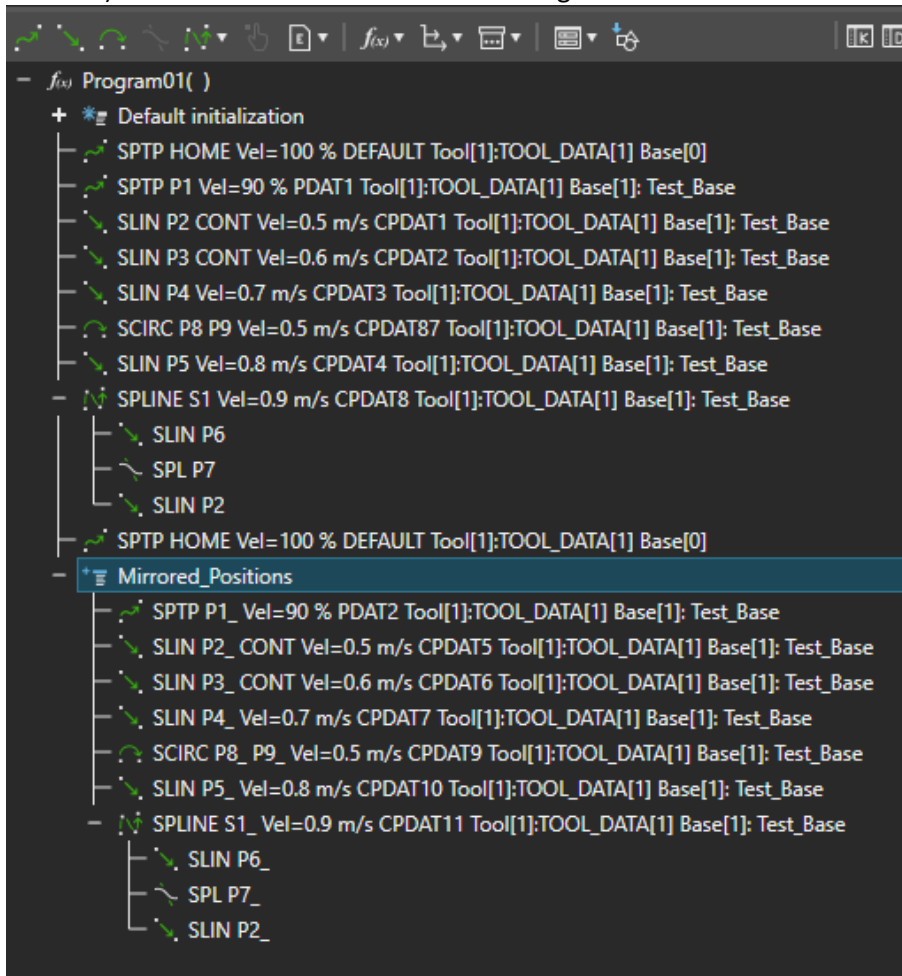


The positions of the selected statements are mirrored to the XZ plane of the selected mirror base “Test_Base10”.



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- The result of the mirroring is written into a created fold with the name “Mirrored_Positions”. The point names in the generated statements match the original statements and are complemented with a “_” character. Motion parameters (velocity, acceleration etc.) should also be inherited from the original statements.



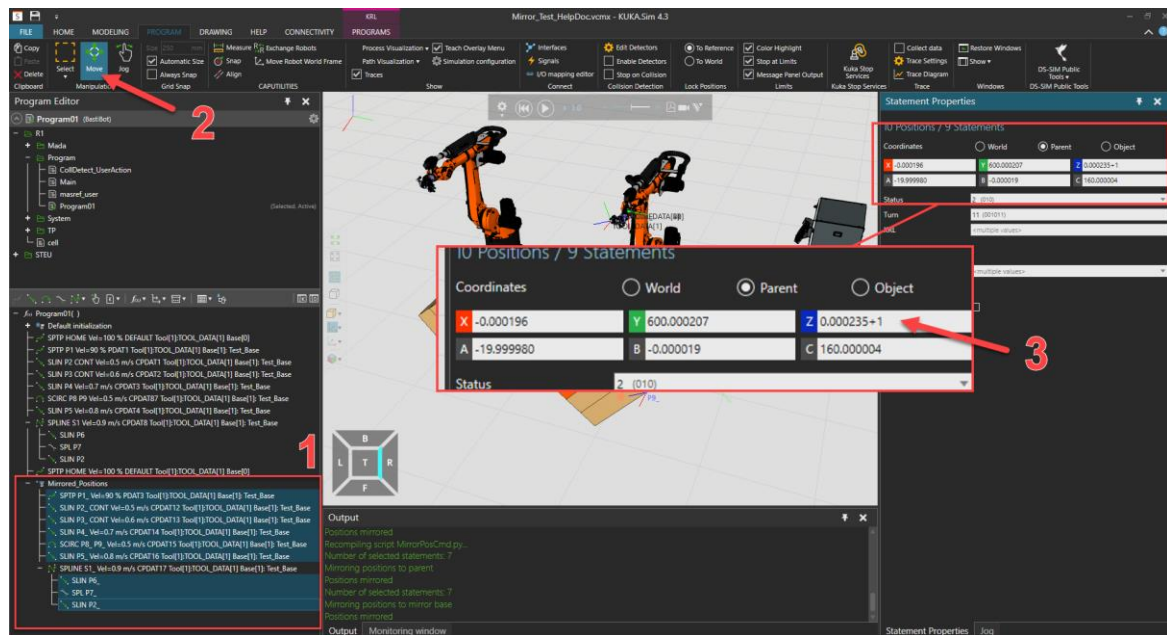
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Optimizing mirror result

The mirror wizard will not always generate executable statements out of the box every time. This can be checked by activating the jogging option and browsing through the mirrored statements. If the robot is not able to reach the generated positions, for instance because some axes are out of their limits, status and turn values need to be optimized. One option is to manually optimize status and turn accordingly for every position or for multiple positions by multi selection of statements.

The other option is to select all mirrored statements, activate the move option and then change the position of all statements through the statement properties for +1 mm in Z direction (write +1 in the Z coordinate and confirm with enter). After that just move all positions back to their original coordinates by moving them for -1 mm in Z direction. Through the movement of the positions KUKA.Sim re-evaluates and updates the status and turn values. Most of the time this leads to an executable result.

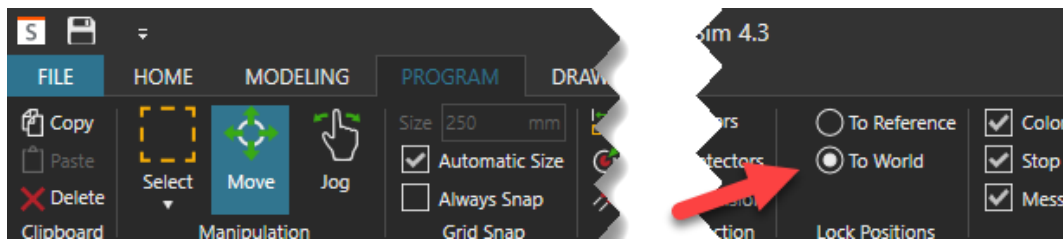
Info: For spline blocks you will need to select each spline block statement not the spline block itself!



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Export program to a mirrored robot

You can either mirror your program on the original robot, export your program to KRL and import the program to the mirrored robot, or you export your original program to KRL, import it to the mirrored robot and mirror it there. You will probably have to set bases for the programs so that it will aid your mirroring process. A valid workaround is to use a help base used as base for the statements. After mirroring the statements, activate “Lock Positions → To World”. Then select all your statements and change the base to the final base that should be used for the statements. The points should stay at the current position but now should be referenced to the newly selected base.



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Known Issues

1. Unused points in the data list can interfere with the generation of new statements
→ delete unused points in data list before mirroring positions
2. KUKA.Sim - BUG: a single CIRC statement is not recognized as a selected statement from the selection manager of KUKA.Sim
→ a single CIRC is currently not mirrorable
3. Path statements are not supported (mirror_V1-3.py)
4. Sometimes parameters of copied points are not transferred to new generated points
→ cause unknown, probably the issue is related to old or different versions of KUKA.Sim
5. Sometimes if too many statements are selected, KUKA.Sim shows an error message and crashes. So far, it has not been possible to understand how many instructions are necessary to provoke this behavior and reliably reproduce the error.