Week 4 – ABB Robot Teaching Machining Processes

Advanced Robotic Systems – MANU2453

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- Introduction
- Drilling
- Milling
- Deburring
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Introduction

- So far, we have learnt how to program the robot to perform welding.
- In the manufacturing industry, robots are also used to perform many other tasks, for e.g. drilling, milling, polishing and deburring.
- In this notes, we will learn some general tips on how to program robots in ABB Robotstudio for these processes.

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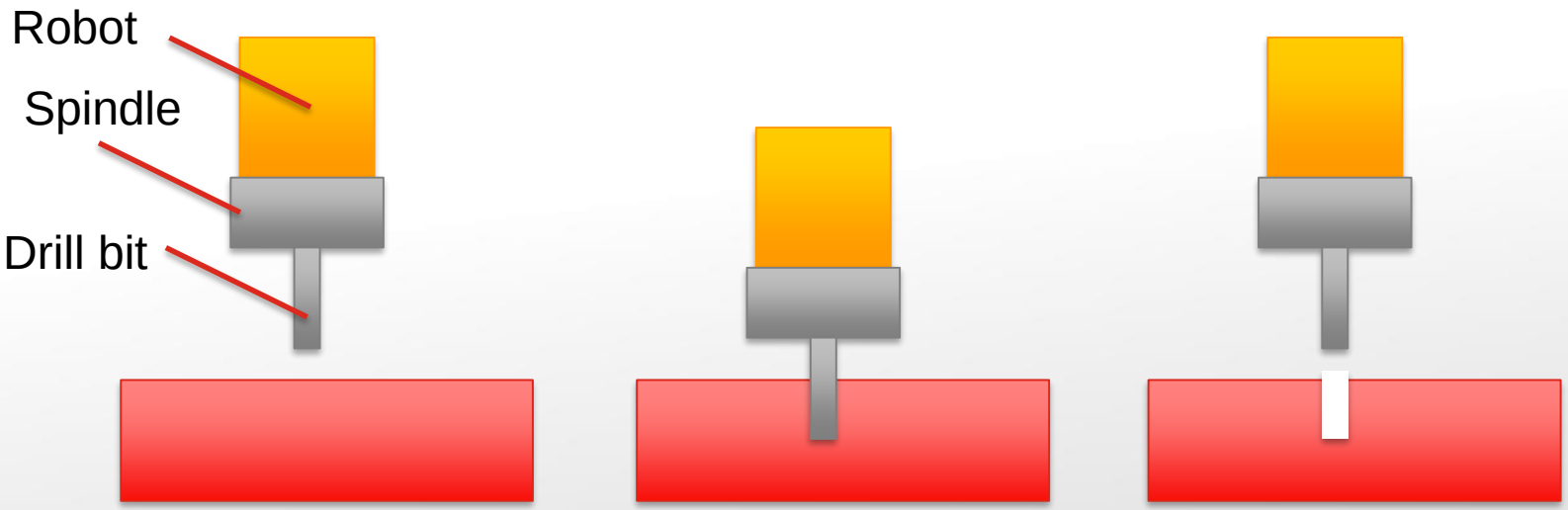
Drilling

- Drilling is a relatively simple process.
- It is done using drill bit attached to a spindle.
  a) Set a target point perpendicularly above the drilling position.
  b) Set a target point at the depth of drill.
  c) Set a lift-off point.



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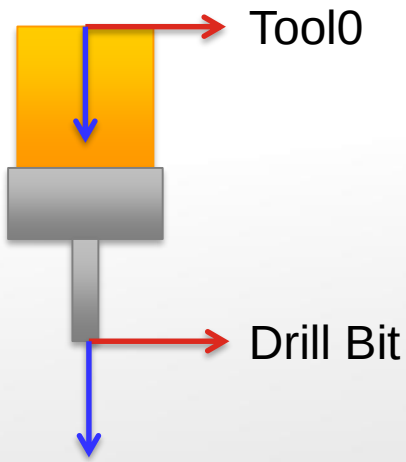
Drilling

- It might not be necessary to calibrate the tool as was shown for the welding torch.
- This is because the tool sits directly along the z-axis of Tool0.
- With respect to Tool0, the tool tip should ultimately be at the position of x=0, y=0 and z = some known distance.
- This can be set directly in RobotStudio.



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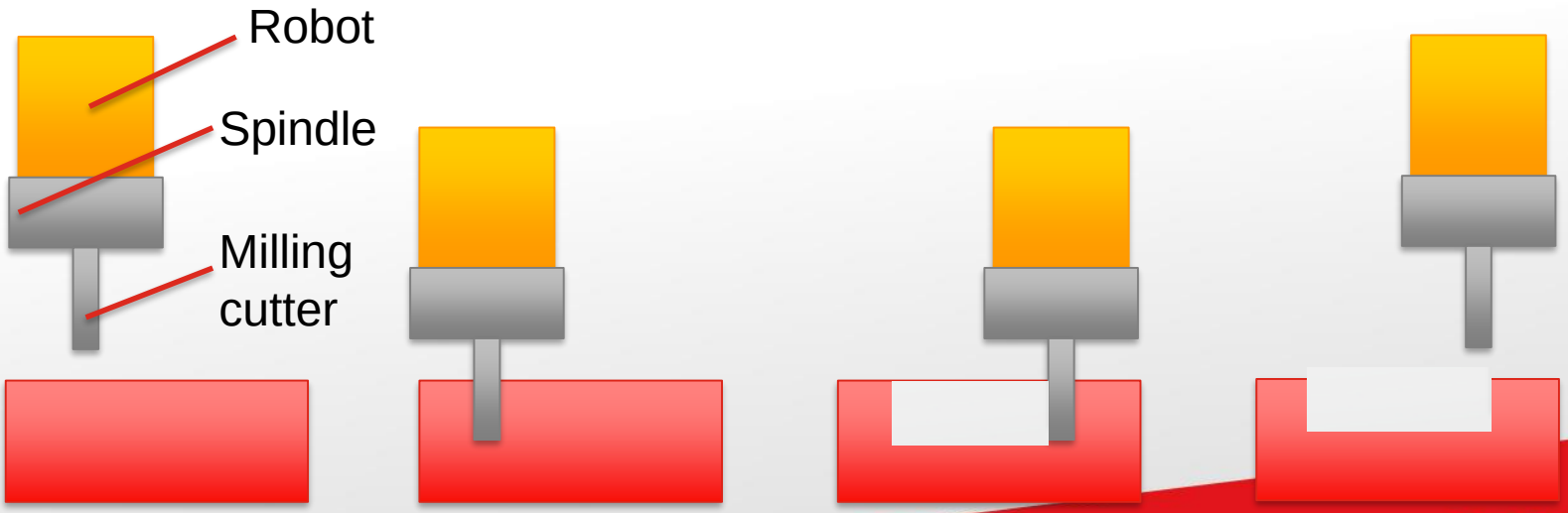
Milling

Milling cutter

- Milling is somewhat similar to drilling
- It is done using milling cutter attached to a spindle.
  a) Set a target point perpendicularly above the milling position.
  b) Set a target point at the depth of mill.
  c) Move across the workpiece.
  d) Set a lift-off point.



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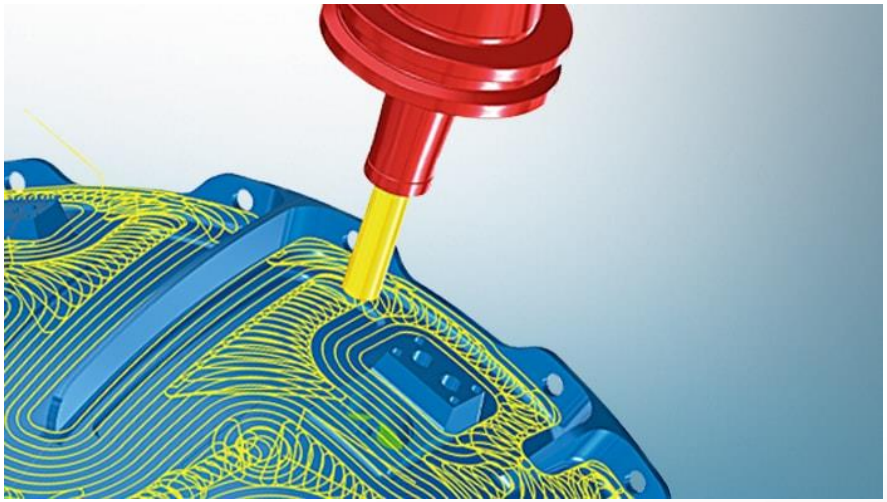
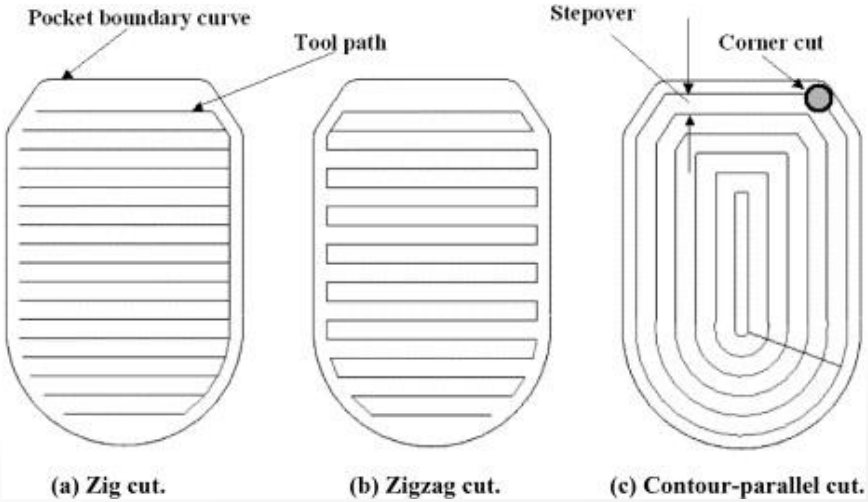
Milling

- However, depending on the shape of the intended cut, the milling path may be different.



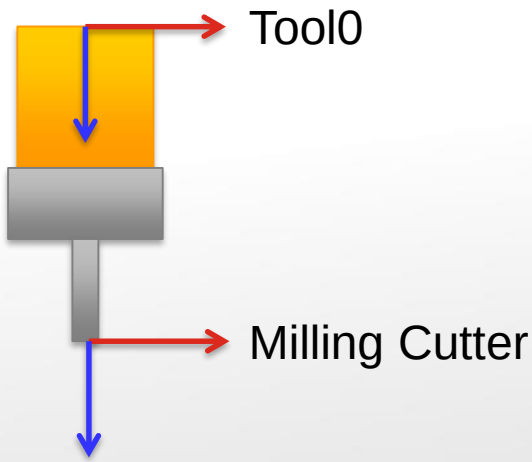
http://www.johnhart.com.au/129-software/hypermill/maxx-machining



https://www.sciencedirect.com/science/article/pii/S0010448502000490

Milling

- It might also not be necessary to calibrate the tool as was shown for the welding torch.
- This is because the tool sits directly along the z-axis of Tool0.
- With respect to Tool0, the tool tip should ultimately be at the position of x=0, y=0 and z = some known distance.
- This can be set directly in RobotStudio.



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Deburring

- Deburring means the removal of burrs after some machining operations.

https://www.canadianmetalworking.com/article/fabricating/automated-deburring-basics

- For robotic deburring, it is suggested to use some softer tools which would not damage the workpiece.

https://www.rsa.de/en/products/brushes/product-finder/deburring/

http://www.abtex.com/fiber-abrasive-finishing-system-article.html?no_redirect=true

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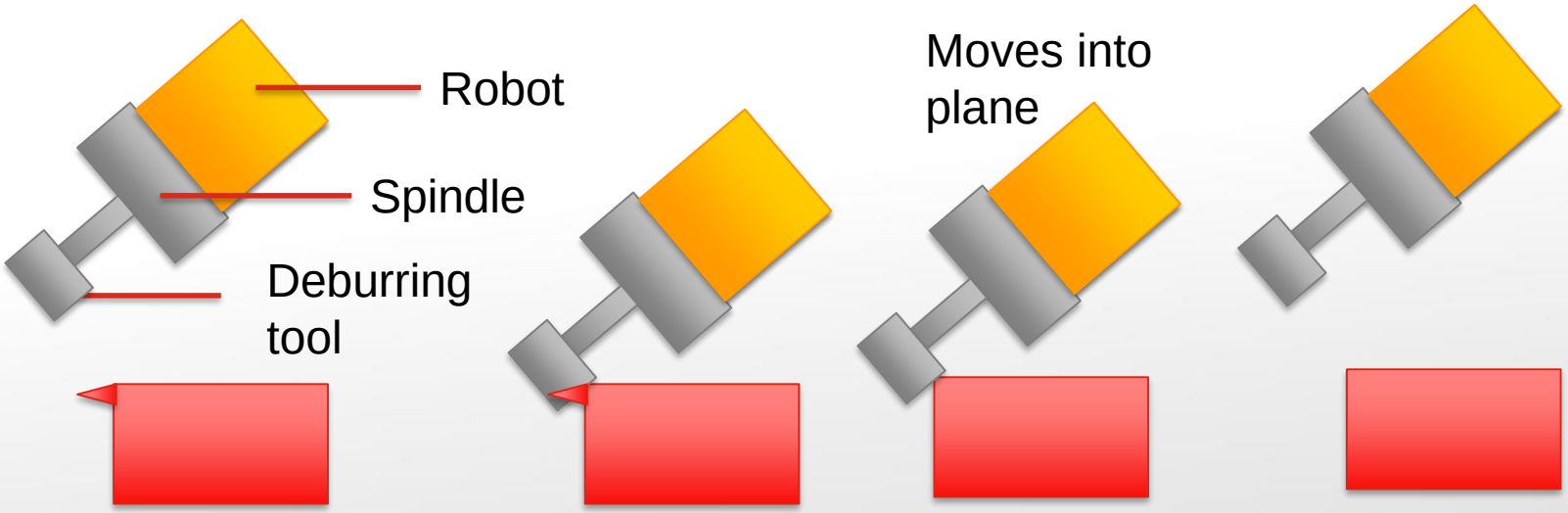
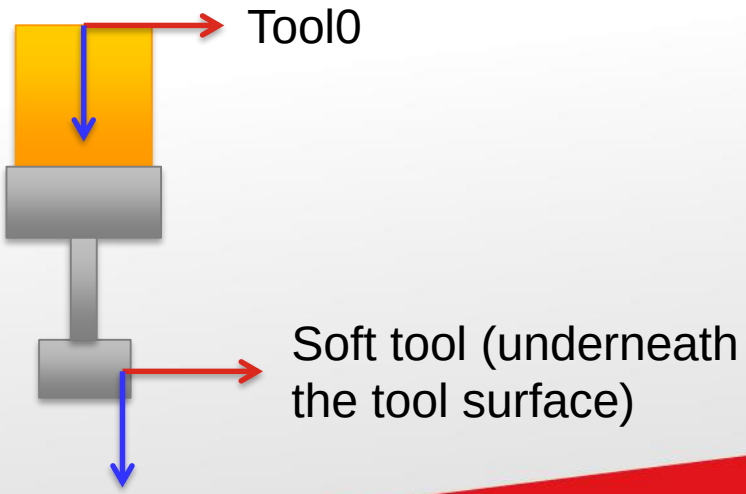
Deburring

- The robot path is as follows:
  a) Set a target point above the burrs position.
  b) Set a target point at the depth of burr.
  c) Move across the workpiece edge.
  d) Set a lift-off point.



Deburring

- Because the soft tool offers some flexibility, it is also not be necessary to calibrate the tool as was shown for the welding torch.
- With respect to Tool0, the tool frame should ultimately be at the position of x = some known distance, y = some known distance and z = some known distance. The distance can be obtained from rough measurement or CAD.
- This can be set directly in RobotStudio.
- The tool frame should be a little underneath the surface of the tool (as shown in figure), so that the tool “brushes into” the workpiece.



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Polishing

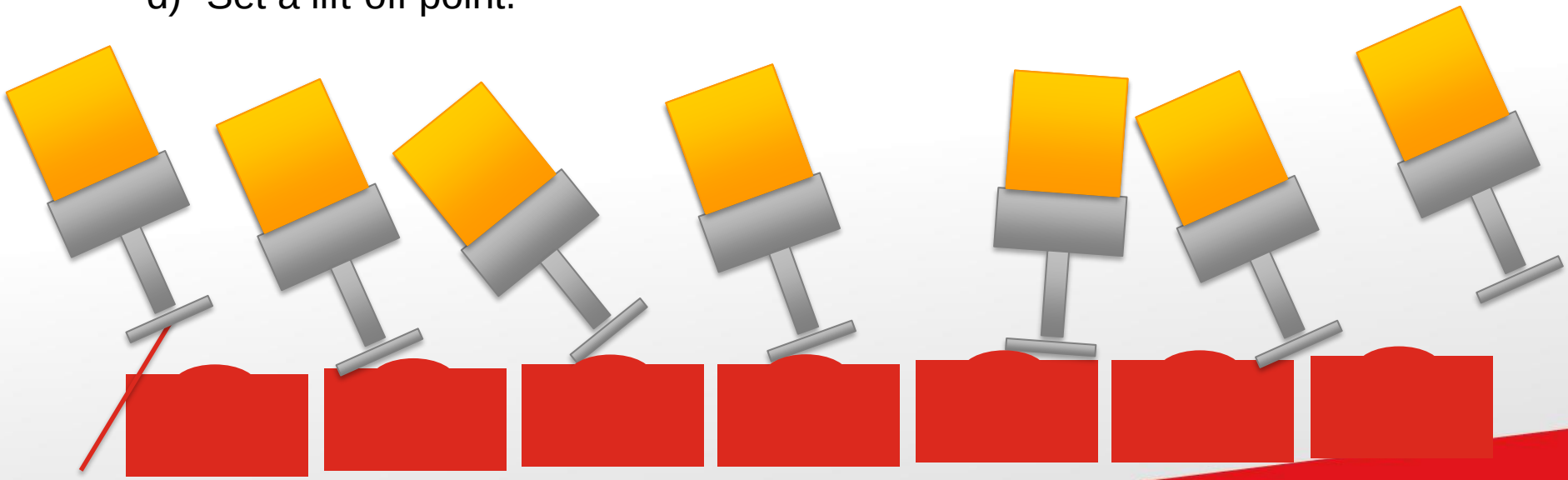
- Polishing is used to improve the surface quality, for e.g. increase smoothness or visual appearance.
- For robotic polishing, it is suggested to use some softer tools which would not damage the workpiece.

http://www.sterlingtools.com.au/GMFDZ5060/Mini-Flap-Disc-Quick-Change-%28Roloc-Type%29-50mm-ZK60-Grit/pd.php

https://www.mahanyweld.com/collections/abrasives-flap-disk

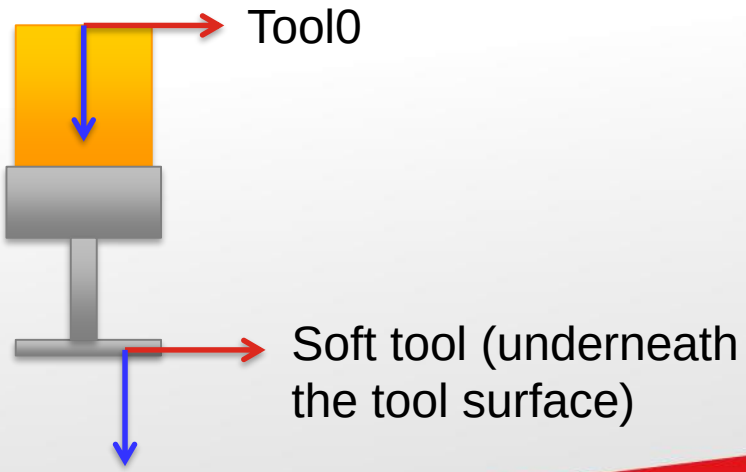
Polishing

- The robot path is as follows:
  a) Set a target point above the surface.
  b) Set a target point at the depth of polishing.
  c) Move across the workpiece surface. Always maintain same angle with respect to surface if possible.
  d) Set a lift-off point.



Polishing

- Again, because the soft tool offers some flexibility, it is not be necessary to calibrate the tool as was shown for the welding torch.
- With respect to Tool0, the tool frame should ultimately be at the position of x = some known distance, y = some known distance and z = some known distance. The distance can be obtained from rough measurement or CAD.
- This can then be set directly in RobotStudio.
- The tool frame should be a little underneath the surface of the tool (as shown in figure), so that the tool “brushes into” the workpiece .



Thank you!

Have a good evening.

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