MTRN4230 PSE2

2018 S2

Basic Kinematic Model:

Figure 1 (adapted from ABB Robotics, 2013, p. 12) below shows the robot drawing with all coordinate frames (x_i, y_i, z_i), links (1-6), origins (O_i) and joints (q_i) labelled. A zoomed version of the Side View and Front View can be seen in figures 3 and 4 below.

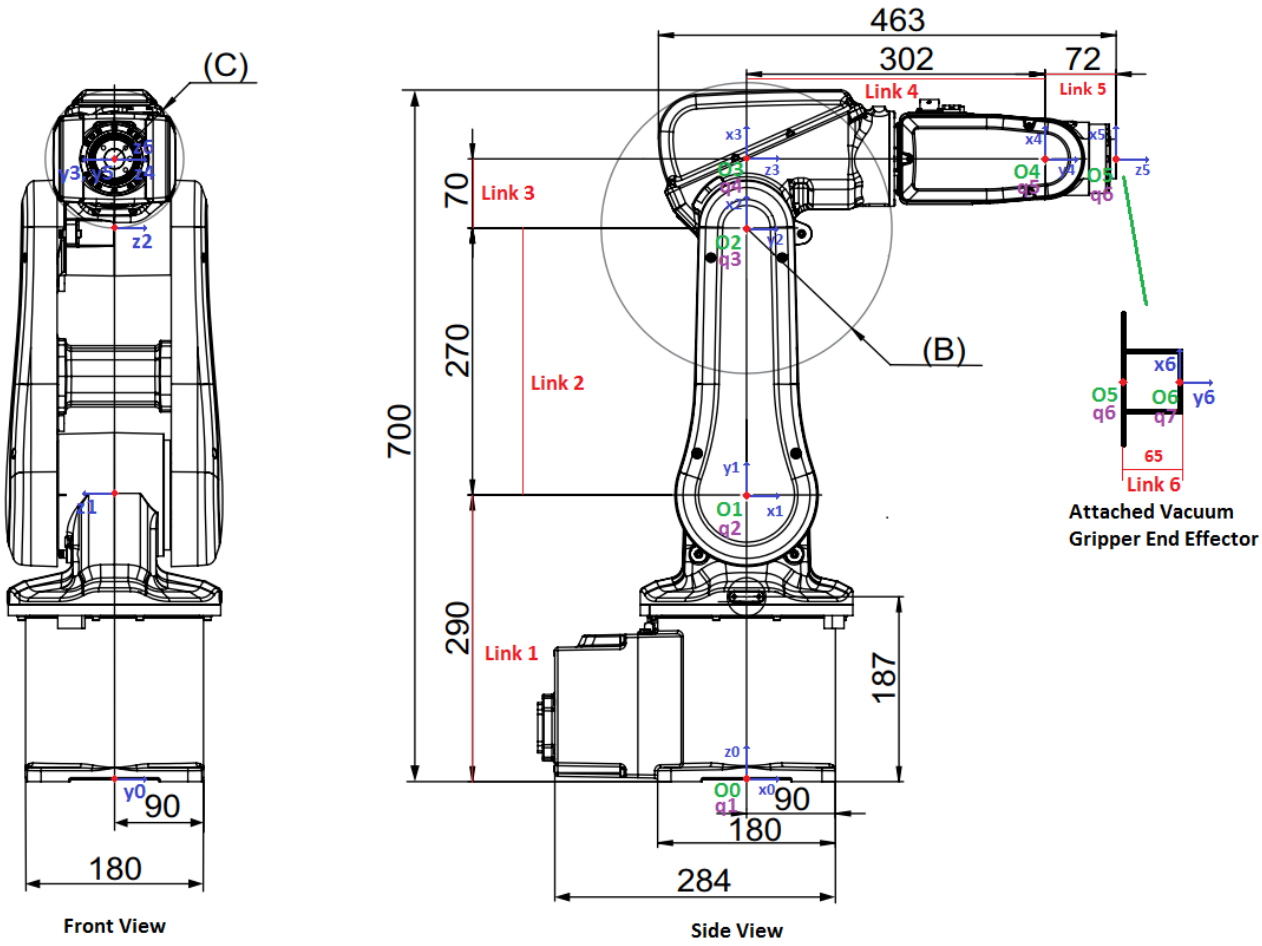

Figure 1 Labelled IRB120 Robot Schematic

The above coordinate directions were defined following the right-hand rule, with angle directions following the CCW positive convention.

The axes have been labelled in blue, the links in red, the origins in green and the joints in purple. A 65mm long vacuum gripper is mounted onto the end of link 5.

From the definitions specified above, the DH parameters were calculated in table 1 below:

Table 1 DH Parameters for IRB120

Link Parameter Table				
Link	θ_i (Angle)	d_i (Offset)	a_i (Length)	α_i (Twist)
1	θ_1	0.290	0	$\pi/2$
2	θ_2	0	0.270	0
3	θ_3	0	0.070	$-\pi/2$
4	θ_4	0.302	0	$\pi/2$
5	θ_5	0	0	$-\pi/2$
6	θ_6	0.065	0	$\pi/2$

Offset and Length are specified in metres.

Page 197 (p. 216 on PDF version), figure 7.5 on the Robotics, Vision and Control textbook provides an effective visual representation for calculating the DH parameters.

The MATLAB plot of the robot in the calibration position, using the derived DH parameters are shown in figure 2 below.

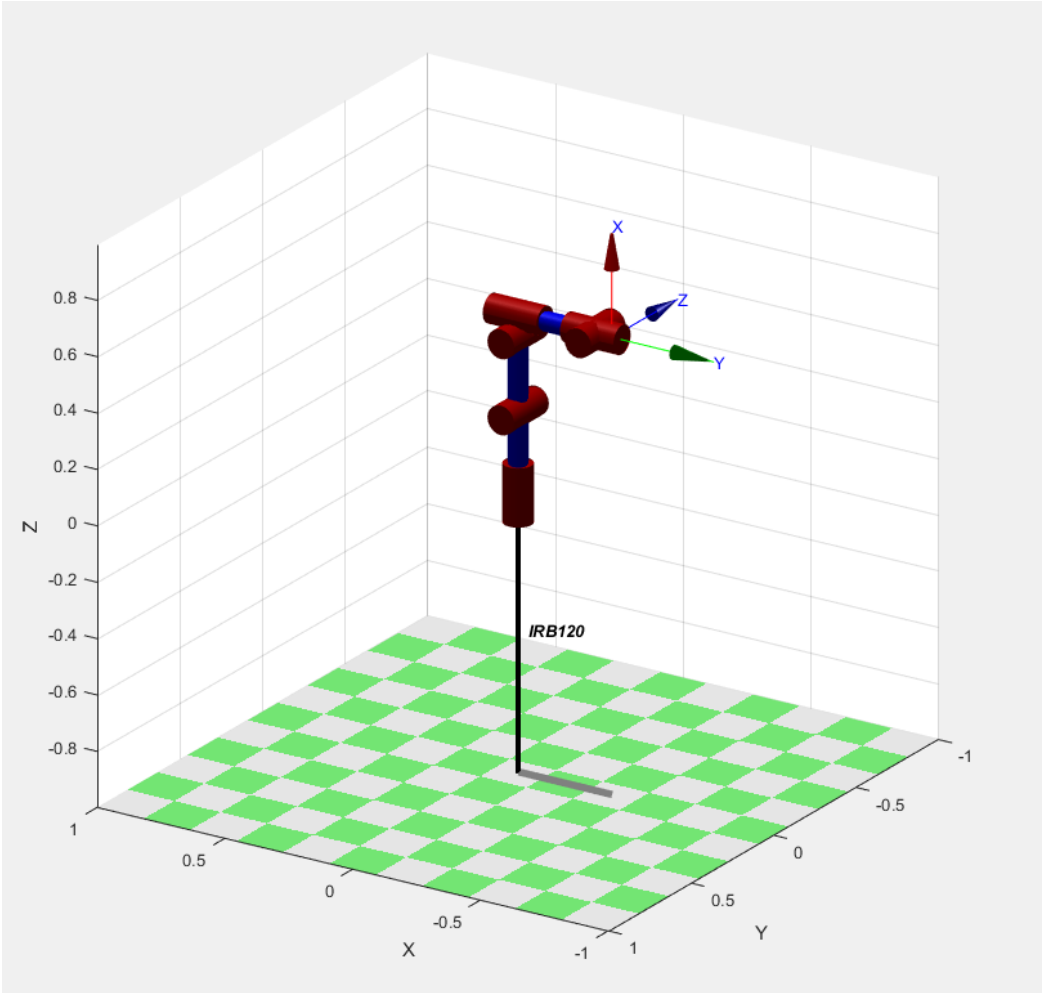

Figure 2 MATLAB plot of robot in calibration position using derived DH parameters.

Zoomed Labelled Schematic of IRB120 - Side View:

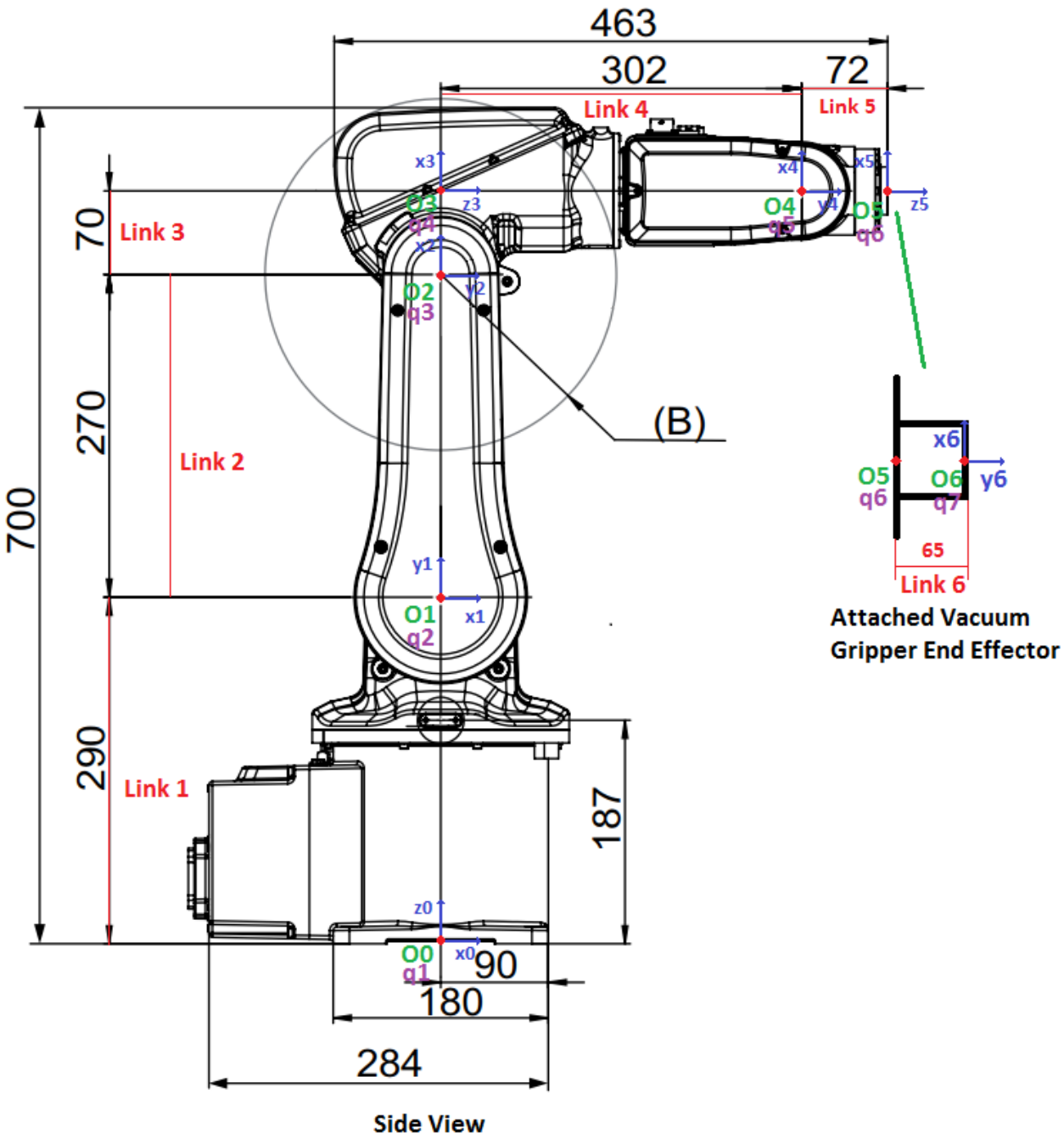

Figure 3 Labelled IRB120 Robot Schematic – Zoomed Side View

Zoomed Labelled Schematic of IRB120 - Front View:

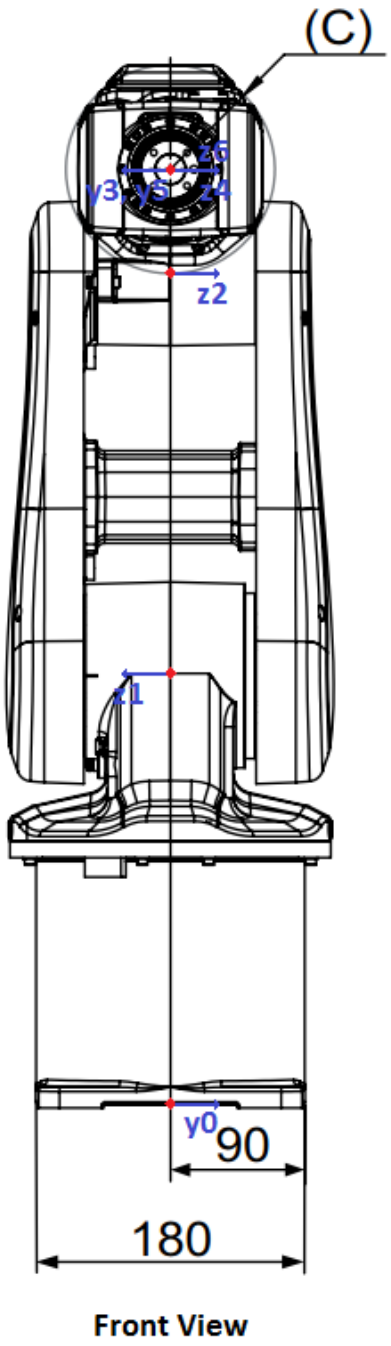

Figure 4 Labelled IRB120 Robot Schematic – Zoomed Front View

List of References:

ABB Robotics, 2013, *IRB120 Product Specification,* ABB AB, Sweden.

Corke, P 2017, Robotics, Vision and Control – 2nd Edition*,* Springer International Publishing AG, Switzerland.

Whitty M, Jayakody H, Voorthuysen E, 2018, *MTRN4230 Lecture 4 Slides,* UNSW, Sydney