

- **Following tasks are to be done until 10.12.2018.**
- **Volkan Erbay will give you only technical assistance. You must complete the tasks by yourself.**

Task 1: Exchange

Using “appro” function defined in VAL3 programming language, exchange the places of 3 metal cylinders. Use the four holes in a row from the pallet such that the first one is empty, the other three is full with a metal cylinder. The order of cylinders A, B, C prior to exchange should be as shown in Figure1. After exchanging the positions of cylinders, their positions should be as shown in Figure 2 such that C, A, B.

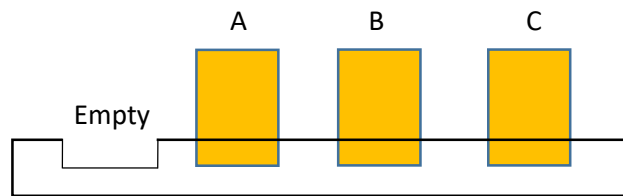


Figure 1: Initial positions of metal cylinders on the pallet

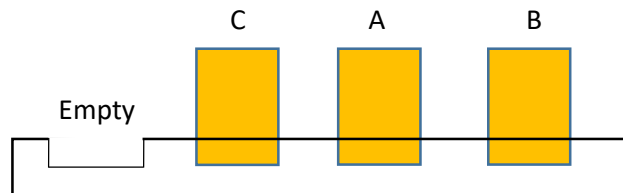


Figure 2: Last positions of metal cylinders on the pallet

Note: *Prior to gripping a cylinder*, Step 1: Gripper z-axis should be aligned with world frame z axis. Step 2: Gripper must be opened. Step 3: It should be moved to a point above the cylinder at a preselected distance **along world z axis** and Step 4: Gripper should approach to the cylinder. Step 5: Gripper should be closed to grip the cylinder. *Prior to delivering a cylinder*, Step 1: Gripper holding cylinder should be moved away from the pallet **along world z-axis** to a point lying above the pallet. Step 2: It should be moved to a point at a selected distance along z-axis to the target point. Step 3: Gripper should approach to the target. Step 4: Gripper should be opened and cylinder should be left on the target.

Task 2: Pick and Place

Step 1: Using “setFrame” function defined in VAL3 programming language, create a frame “fPallet” for the pallet fixed on the table as shown in Figure 3a. Take the *origin*, x and y axes of fPallet as shown in Figure 3a. After teaching the center location of the closest hole to the origin of fPallet frame, derive the location of three consecutive holes along x axis using “compose” function defined in VAL3 programming language. Keep in mind that the distance between centers of two neighbor holes is 55mm.

Step 2: Pick and place cylinders on top of each other at a selected point on the table other than pallet as shown in Figure 3b. The height of a cylinder is 40mm.

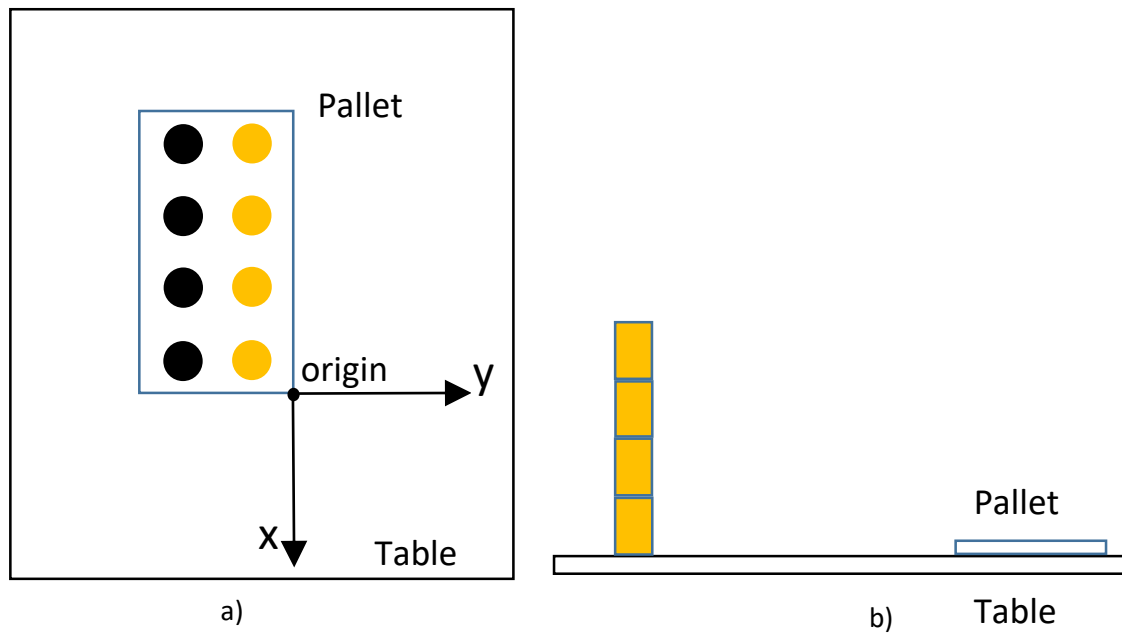


Figure 3: a) View from top of the table. Initially, cylinders are placed in the first row of pallet placed on the right hand side of the table. Yellow circles represent metal cylinders while black circles represent empty holes. b) View from side of the table. Cylinders are put onto each other to form a stack located next to the pallet.