

## 8 Workcell Design

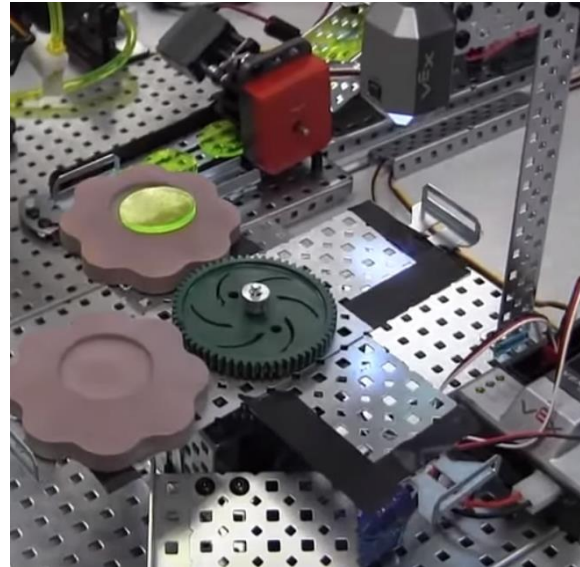
NAME: \_\_\_\_\_ Date: \_\_\_\_\_ Section: \_\_\_\_\_

### **INTRODUCTION**

A robotic workcell is defined as the complete environment around a robot. This environment may include tools, machines and/or other robots.

In this activity you will use a robot and a microcontroller system to recreate a workcell. Your workcell will incorporate all of the devices that you have learned about in previous activities including:

- Inputs & outputs
- Sensors
- Machines
- Robots



*An example of an assembly operation using robots and VEX components*

**Due Date:** \_\_\_\_\_

### **KEY VOCABULARY**

- Handshaking
- Workcell
- Output
- Nesting
- Optical Isolator
- Sensor
- Input
- Palletize

## EQUIPMENT & SUPPLIES

- Robot Magician
- Microcontroller System & Components
- 1" x 1" cylinders or 1" cubes
- Servo extension cables
- Dobot Input/Output Manual
- Breadboard/wire/4N25 Optical Isolator and 100 ohm & 4.7K ohm resistors
- DobotStudio software
- RobotC or other VEX control software
- Pneumatic Gripper or Suction Cup Gripper
- Handshake device
- Input & Output devices
- VEX, PIC, Arduino may all be used in this activity, but wiring may vary.

## PROCEDURE



**Caution: NEVER wire anything to the Dobot Magician while it has power on. ALWAYS turn it off before making connections or damage to the robot could occur. Be sure to ask your instructor if you have any questions.**

1. Using the list of manufacturing process below, find an example in a video on the internet that you can recreate a simulation of. Fill in the blanks below after you have your instructor's approval.

● Assembly (Ex. Spraying)	● Joining (Ex. Welding)
● Forming (Ex. Extrusion)	● Finishing (Ex. Spraying)
● Separating (Ex. Grinding or cutting)	● Conditioning (Ex. Dipping)
● Casting or molding (Ex. Injection Molding)	

2. Be sure to note any parameters that are given to you by your instructor. Take notes in the space below.



3. Be sure to pick a process that can be easily simulated with the materials given to you by your instructor.

My topic: \_\_\_\_\_

4. In the time allotted for this project design a workcell that includes the following:
  - a. An accurate pick and place routine that uses a robot.
  - b. At least one input that controls a process.
  - c. At least one output that controls a process.
  - d. A simulation of a manufacturing process.
  - e. A palletize or nesting routine.
5. Be sure to have it graded by your instructor when complete and be sure to do a demonstration to your classmates!



***Be sure to consult the Dobot Input/Output manual if you want to use other inputs and outputs, as damage to your robot or your other equipment may result.***

## **CONCLUSION**

1. *Describe the manufacturing process you chose and explain how it works. (At least 4 to 5 sentences.)*
2. *Make a flowchart/Process flowchart. of your workcell as indicated by your instructor in the space below.*
3. *What's the pseudocode that you used for your microcontroller program? Copy and paste it here.*



4. *What are the inputs you used in your workcell?*

5. *What are the outputs you used in your workcell?*

6. *Explain how nesting parts is important in any manufacturing process.*

### **GOING BEYOND**

***Finished early? Try some of the actions below. When finished, show your instructor and have them initial on the line.***

\_\_\_\_\_

1. Make your workcell communicate with someone else in your class. When your process ends, theirs begins.

\_\_\_\_\_

2. Put your workcell together with someone else in class and make it do BOTH processes, then palletize the finished product.

