

**VOLUNTEER INSTRUCTIONS**  
**MANUFACTURING**

Welcome to Manufacturing! Thank you for volunteering your time and sharing your talents.

**Goal:** In this module, the students will learn basics about manufacturing through a hands on activity where the students will assemble items based on an order they receive.

**Introduce yourself and briefly share your career/education background.**

**Opening Comments:** Gather the students in a large group and ask if anyone knows what manufacturing is. Tell them that in simple terms, manufacturing is any industry in which products are made using raw materials and labor in a systematic fashion. Manufacturing was initially done by hand. Today, most modern manufacturing is done with the assistance of automated machines. ***Here in South Central Pennsylvania, there are over 3,800 manufacturing and distribution establishments employing over 153,000 workers! Combined, there are more jobs in manufacturing and distribution (with distribution technically known as transportation and warehousing) than in any other single sector including retail, health care, and education.***

Briefly explain the different activities that the students will be completing:

- **Activity 1** – Students will receive an order, then manufacture the order as well as determine the profits.
- **Activity 2** – (If time allows.) Students will do a sorting game where they will put Central PA Manufacturing companies in categories.

Divide the students equally into groups based on the number of tables. They will do the activities in their groups.

**Activity 1 – Manufacture an Order**

At each table, there should be an Order Form, a Bill of Materials, a Cost Analysis sheet, a plastic bag, pencils, and a calculator for each group to use. Explain to the groups that they work for a company that manufactures custom made items for kitchen remodeling projects and today, each group will have an order placed for drawer pulls and dessert tiers. You may show them the samples. The materials needed to assemble the order will be made from nuts, treaded rods, washers, plates, and a knob. The materials are in the labeled red and blue bins. The groups will work together to fulfill this order by confirming design, collecting the supplies, assembling the products, and doing a cost analysis. To complete this job please go over these components with the students.

1. **Plan:** The students need to work together to create a plan for executing this job. Give them a couple of minutes to look over the order and come up with a plan.
2. **Design:** Often a design team or engineer will design products for a manufacturer. Today, their product has already been designed. To complete the order, **ONE** student will be designated to go to the supply table and view the predesigned samples. They will then communicate the design information from the samples to the team.

The design samples will be at the supply table so the students may come up and look at them to see the design details. Please only allow one student from each group.

3. **Supplies:** **ONE** student will be responsible for collecting the materials needed to assemble the order. Each group should have a Bill of Materials that provides the information necessary to collect all the materials needed to assemble the order. Only the one designated student may collect the materials. They may use the plastic bag provided.

**SPECIAL NOTE:** One of the material bins has a note in it that indicates there has been a supply chain issue and the part is not in the bin. They are instructed to see the volunteer. Once the supply representative comes to you, you may give them the part, but let them know that because of the supply chain issue there is a 10% penalty to receive the materials immediately. This penalty will be reflected in the cost analysis.

4. **Assembly:** The group will now assemble the order. This will include making the required number of drawer pulls and dessert tiers. Please only allow the students to hand tighten the nuts since we will be reusing all the materials.
5. **Quality Check:** As with all work, there should be a quality check. The students should review their order, make sure the assembly is correct and to a high-quality standard. For example, does the dessert tier sit flat and are the drawer pulls symmetrical.
6. **Cost Analysis:** Each group has a cost analysis sheet to fill out. They will use the information provided to calculate the profit they will earn for fulfilling this order.

We hope that the students will work together, communicate as a team, and problem solve to complete this project.

Once a group has completed all the tasks, they should ask a volunteer to check their work including a quality check of the items assembled as well as confirming a correct cost analysis. If the group is good, the volunteer may sign off on their cost analysis sheet.

After this activity, have the students take apart their projects so we may use them for the next group. The student volunteers may help put the parts back in the correct bins. There are some wrenches for volunteers to use in case any of the bolts are too tight.

Feel free to use any time left to talk to the students about this project. Maybe talk about supply chain or teamwork. You could discuss what's most important to a manufacturing company such as profit versus quality versus speed.

## **Activity 2 – Central PA Manufacturing Company Card Game (if time allows)**

Give each group a set of cards. There should be 35 Central PA Manufacturing Company cards and 5 Manufacturing Category Name cards (7 company cards per category). Have students put the Category Name cards down first, then place company cards under the appropriate category **using only the company logo side**. When they are done, have the students use the information on the back of the cards to check and see if they are correct. They can then move cards around if needed. Students should raise their hand to also have a volunteer check. Students should continue until all companies are placed in the correct category. Once they are done, students should place all cards back in the bag. Bags should be taken back to the supply table.

**Note: There are also laminated copies of the answer key for this activity. An example of the chart follows.**

### **Manufacturing Categories Chart**

<b>Textiles, Construction, Consumer Packaging</b>	<b>Technology, Electronics, Energy, Transportation</b>	<b>Food Products</b>	<b>Plastics and Molding</b>	<b>Precision Machining</b>
Graham Packaging	TE Connectivity	Advanced Food Products	The Ames Companies	Ephrata Precision Parts
Church & Dwight	Mercury Electronics	Hanover Foods Corporation	Lancaster Mold LLC	GAM Precision
Dart Container	Stryten Energy	Martin's Snacks	McClarín Composite Solutions	Imperial Precision Manufacturing
Family Heirloom Weavers	Sechan Electronics	Starbucks	Plastic Molding Manufacturing	Military & Commercial Fasteners
Volvo Construction Equipment	Phoenix Contact	The Hershey Company	SAY Plastics	Plouse Precision Manufacturing
Herculite	World Electronics	Utz	York Imperial Plastics	Precision Custom Components LLC
Carlisle Construction	Harley Davidson	Wolfgang Confectioners	Crescent Industries	ASTRO Machine Works

When all teams have completed the activity, discuss with the students what they learned about Central PA Manufacturing companies.

***Student Helpers should collect parts and restock the bins. As well as place a new cost analysis sheet on each table.***

If there is any extra time, there are cards with QR Codes of manufacturing videos from some Central PA manufacturing companies. Students can scan the codes and watch the videos.

**End of the Day:**

- **JA staff and student volunteers will restock and pack the bins, so all items should be left on your table.**

**Thank you for making a difference today!**