

Lesson: Manufacturing (the Assembly Line)

Use WOW! Lesson Intro to begin.

<p>Background Info for Wizards:</p>	<p>This is a very active lesson. All students are involved, some are moving around, some are working while others are waiting. Good time management is very important.</p> <p>This is a fun lesson for students to learn how an Assembly Line works.</p>
<p>Materials:</p>	<p>Balsa wood gliders – 1 for each student (extras to replace any that break) Job Cards Scissors (trash can from the classroom) Trays Rulers Stickers Calculator Stopwatch</p>
<p>Lesson Time: 45-60 minutes</p>	<p>Introduction: 2-3 minutes Guided Lesson: 5-10 minutes Set Up: 3-5 minutes Giving Student Directions: 3-5 minutes Activity: 30 minutes Conclusion: 5 minutes</p>
<p>Learning Targets:</p>	<p>Students will have an understanding of how an Assembly Line works.</p>
<p>Introduction for Students: 2-3 minutes</p>	<p>Ask students what they know about Manufacturing or Assembly Lines. (show pictures)</p>
<p>Guided Lesson: 5-10 minutes</p>	<p>Discuss some facts about <u>Manufacturing</u>. (pick a few to talk about)</p> <ol style="list-style-type: none"> 1. The manufacturing field consists of men and women with many different skills, coming together to produce a product. 2. Think about the car or bus that brought you to school it was manufactured. 3. Manufactured products include bikes, kitchen appliances, airplanes, TVs, gaming systems, cell phones, toys, furniture, clothing, computers, construction equipment, food processing machines and many more.

4. Manufacturing keeps money moving through our country. Every dollar spent creates jobs and money for the US economy.

5. Manufacturing supports more than 15 million US jobs.

7. Manufacturing offers career opportunities for everyone.

- mechanical engineers, technicians that test, operate, and repair machines, computer-aided designers, plant operators, quality control inspectors, designers, sales & marketing professionals, electricians, assemblers and many more.

8. Manufacturing pays well – most manufacturing workers make \$60,000 - \$96,000 a year.

Discuss some facts about **Assembly Line**. (pick a few to talk about)

1. The origins of the assembly line can be traced back to miners during medieval times who used bucket elevators.

2. By the 1900's the assembly line was used by many industries (shipbuilding, canning, milling, meat-packing, etc.), but was most successful in the automobile industry.

3. Henry Ford created the Model T automobile in 1908. It was sturdy and inexpensive, and had a simple enough design that owners were able to fix it themselves when needed. Orders for the Model T kept increasing and the Ford Motor Company couldn't keep up with building enough. Henry Ford needed to speed up production.

Their manufacturing plant had existed of several small groups of workers building one car at a time. Ford changed this to today's assembly line. Now, workers were in charge of their part, and added it as the car moved past them on conveyor belts. This was much faster, more cars were produced, and the Ford Motor Company made a lot more money.

4. This method of production was rapidly adopted by many industries when they discovered that mass production on assembly lines sped up manufacturing time and lowered costs.

Today you will form your own Assembly Line, and manufacture gliders.

Discuss the **parts of a glider**. Show the picture, and discuss the 4 parts that they need to know.

	<ul style="list-style-type: none"> - Rudder: a flat piece at the tail of the plane used for steering - Stabilizer: a piece of the airplane tail, attached to the rudder, used for balancing the plane - Wings: wings produce the force that lifts an airplane, and its shape helps keep it in the air - Fuselage: the body of the airplane
<p>Set Up: 3-5 minutes</p>	<p><u>Let's talk about how we are going to set up our assembly line.</u></p> <ol style="list-style-type: none"> 1. First, we need to use some desks. Clear your desk tops... 2. Move desks as needed to create a long working table top. (The teacher will be told about this set-up, maybe it's already been done before you get there.) 3. Move trashcan closer to Assembly Line. 4. Now we need to assign roles. Everyone is part of the process. Our mission is to have a class set of gliders when we finish. <p><i>Do a quick headcount and determine how many jobs are needed. If there are enough students, have 2 at each job. Extra accountants can be helpful.</i></p> <p><i>If there are not enough students to have 2 at each job, positions 1-4 can be cut to 1 person.</i></p>
<p>Giving Student Directions: 3-5 minutes</p>	<p>Have students stand up and form 2 lines – one on each side of the desks.</p> <p style="text-align: center;"><i>The first 2 students will serve as the Production Prep Associates...</i></p> <p>Explain the roles as printed on the table tents.</p> <p>Remind the Material Prep Technician (#2), the Delivery Person (#4) and the Specialists (#5-7) which piece is which.</p> <p>Place the tents as you go – all the way down the line.</p> <p>Give the Production Prep Associates only enough gliders for each student.</p>

	<p><u>Assembly Line:</u> Your Job is the Plant Supervisor.</p> <p>Students: (2 students at each position)</p> <ol style="list-style-type: none"> 1. Production Prep Associate 2. Material Prep Technician 3. Sorting Technician 4. Parts Delivery Person ** 5. Rudder Assembly Specialist 6. Stabilizer Assembly Specialist 7. Wing Assembly Specialist 8. Quality Assurance Controller 9. Shipping and Receiving Specialist ** (give broken parts to accounting manager to assess costs) 10. Flight Test Pilot ** 11. Product Assessor 12. Route Delivery Driver ** 13. Accounting Manager (extra students if necessary) <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-left: 150px;">Positions 1-4 can have only 1 student if necessary</div> <p>** Students that will be allowed up and moving through the room.</p> <p>During the activity:</p> <ul style="list-style-type: none"> • Monitor the activity • Assist when/where needed • Make adjustments if necessary
<p><i>Student Activity #1:</i> 30 minutes</p>	<p><u>Assembly Line:</u> Wizard Roll – Plant Supervisor Students: (2 students at each position)</p> <ol style="list-style-type: none"> 1. <u>Production Prep Associate</u> <ul style="list-style-type: none"> - Use your scissors to carefully open each package - Dispose of the plastic packaging in the trashcan - Remove the parts and slide them to the next station 2. <u>Material Prep Technician</u> <ul style="list-style-type: none"> - Receive parts from the previous station - Carefully snap the wooden pieces apart (look for line) - You have separated the Stabilizer from the Rudder. - Slide all parts to the next station

3. Sorting Technician

- Receive parts from the previous station
- Carefully sort and make piles of like pieces
- Slide all parts to the next station

4. Parts Delivery Person**

- Receive parts from the previous station
- Carefully transport sorted parts to the Rudder, Stabilizer and Wing stations
- Slide the fuselage to the next station

5. Rudder Assembly Specialist

- Receive glider from the previous station
- Carefully insert the rudder into the fuselage
- Slide the glider, with attached rudder, to the next station

6. Stabilizer Assembly Specialist

- Receive glider from the previous station
- Carefully insert the stabilizer into the fuselage
- Slide the glider, with attached rudder and stabilizer, to the next station

7. Wing Assembly Specialist

- Receive glider from the previous station
- Carefully insert the wing into the fuselage
- Slide the glider to the next station

8. Quality Assurance Controller

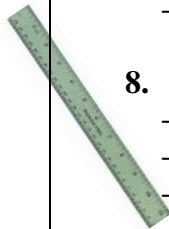
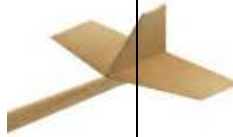
- Receive glider from the previous station
- Carefully measure the wing length on each side
- Make adjustments if necessary
- Slide the glider to the next station

9. Shipping and Receiving Specialist **

- Receive glider from the previous station
- Organize the product to prevent damage
- Prepare the finished product for transport

10. Flight Test Pilot **

- Receive glider from the previous station
- Maintain a safe flight path
- Carefully complete ONE flight test
- Slide the glider to the next station





	<p>11. <u>Product Assessor</u></p> <ul style="list-style-type: none"> - Receive glider from previous station - Confer with Test Pilot on glider's performance - If it does not pass the test, return it to the station that can fix the problem - Give it a star if it passes product testing - Slide the glider to the next station <p>12. <u>Route Delivery Driver **</u></p> <ul style="list-style-type: none"> - Consult with Shipping & Receiving - Determine the best way to deliver products - Receive instructions from your Teacher, then Deliver <p>13. <u>Accounting Manager (extra students if necessary)</u></p> <ul style="list-style-type: none"> - Supervise the Assembly Process - Obtain an Accounting Worksheet - Make calculations of price per unit, labor efficiency, and production time - <p>** students that will be allowed up and moving through the room</p>
<p>Conclusion: 5 minutes</p>	<p>Have students return to their seats.</p> <p>Have the Route Delivery Person count the gliders, making sure the correct number of finished product was produced.</p> <p>Ask the Accountants to report to the class.</p> <p>Summarize the lesson – Was it easy? What were some challenges? Individually and group? Where there any spare parts? Scrap parts? What could that mean? How could we improve? How could we increase productivity? Is it necessary to all start at the same time? Discuss staggered start times many employers practice in manufacturing.</p>