

MODIFIED UBD LESSON PLAN

COURSE: Middle School

UNIT: Manufacturing Level 1

EXERCISE: Unit Overview

TIME FRAME: 2 - 3 Hours



PREPARATION: *Summary of “to do’s” that the teacher should understand and prepare before bringing this lesson to the classroom.*

1. Agree ahead of time what you will do with whatever money (profit) is generated from sales. Donating to a charitable cause, like a food pantry, is a good idea.
2. Choose an assessment director. The assessment director should be student savvy. Students can be confused and aggressive when they are under pressure. Make sure the assessment director understands that their job is assessing, not criticizing. He or she should be careful not to tear down aspirations of success.
3. Negotiate the rules and regulations or predetermine them prior to the engineering phase. Most of this methodology is determined by how much time you have to dedicate to the process. Other factors include tools, materials, and production.

Teachers will need to ensure that the proper supplies are available for students to build their solutions.

From the kit you will need these items:

Materials:

- Sequins metallic 800pc
- Sticks craft pk1000
- Glue Elmer's school 4oz
- Magnets craft 1/3" pk100
- Bead pony opaque pk/1600
- Sequins & spangles shaker
- Glue stick mini all temp pk50
- Foam wonderfoam tub

Tools:

- Glue gun high temp
- Scissors safety point 7"



SAFETY: *Summary of safety strategies in the lesson.*

Safety is a mandated element of this activity. Supervision when using the hot glue gun is advised.

S1 DESIRED RESULTS:**ESTABLISHED GOALS:**

Problem Solving Techniques and Applications Standards:

Teachers should use the STEM Academy Standards Correlation System available in the STEM Connections area of a unit to extract specific standards and insert these standards here.

TRANSFER:

Students will be able to independently use their learning to...

- Problem solve and develop a design given product specifications and manufacturing limitations
- Fabricate or brainstorm a product to sell using their knowledge of sales and distribution
- Analyze a product to see if it meets quality standards

MEANING:**UNDERSTANDINGS**

Students will understand that...

- Engineers have to constantly fix and improve products to meet current manufacturing standards and consumer demands
- Experimentation and testing often end in failure, leaving room for improvement and a better final product
- Manufacturers have to follow OSHA's (Occupational Safety and Health Administration) safety standards to reduce the risk of workers' health complications or injuries
- The CAD (Computer-Aided Design) tool creates three-dimensional models and provides more accurate details than a two-dimensional sketch
- The CAD/CAM (Computer-Aided Manufacturing) is used to process materials for production
- Companies need a quality purchasing agent to order industrial or raw materials at the best price with the best delivery time
- The type of fabrication used for a product is highly dependent on the type and amount of product needed to be manufactured
- Quality assurance tests are essential for making sure a product meets standards and specifications
- A product's packaging is highly essential to attract consumers and securely protect the merchandise
- A product may be fabricated at various manufacturers before it is ready for the purchaser

ESSENTIAL QUESTIONS

Students will keep considering...

- Why do designs continue to change over the years?
- In what ways can engineers improve efficiency and keep costs down for manufactured products?
- In what situations would you want to purchase raw materials? Industrial materials?
- How do purchasing agents determine which materials to order?
- What manufacturing processes are most useful for which kinds of products?
- What are the types of production? How do you determine which type to use for a product?
- Why do we need quality-assurance tests?
- How do you design a product to sell?
- What purpose does packaging serve?
- Why might we need safety standards at a manufacturing company?
- How can we reduce the risk of injury within a company?

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ACQUISITION OF KNOWLEDGE AND SKILL:	
<i>Students will know...</i>	<i>Students will be skilled at...</i>
<ul style="list-style-type: none"> • The seven parts of the manufacturing system and how it is organized • Rules and regulations commonly used within a manufacturing company • The different manufacturing processes and when they are useful • The importance of safety in a company and common safety standards created by the OSHA • The role computers play in manufacturing and their importance to production • What information is needed to make a bill of materials • The difference between raw and industrial materials and which material to order for a given product • The different types of manufacturing processes • CAD/CAM and how the program is useful and efficient • The four types of production and when they are needed • The quality-assurance test and how to apply it to a product • The purpose of packaging • The different kinds of distribution 	<ul style="list-style-type: none"> • Negotiating, determining, and following rules, laws, and constraints • Developing ideas and working together as a team • Designing for manufacturability • Making a bill of materials • Compromising on a final design and create a prototype • Identifying manufacturing methods • Determining effective processes • Choosing appropriate materials • Operating equipment safely • Managing time and production factors • Sketching and drawing in order to communicate • Calculating material usage • Determining product quality in relationship to value • Identifying and maintaining appropriate working attitudes and behaviors • Measuring and evaluating time and production inputs • Calculating an appropriate selling price for a product • Making decisions concerning design elements

S2 EVIDENCE:	
EVALUATIVE CRITERIA:	ASSESSMENT EVIDENCE:
<ul style="list-style-type: none"> • Effort/Commitment • Self-motivated • Followed criterion • Appearance • Creativity • Time management • Completion 	<p><i>Performance Task(s):</i></p> <p>Will it sell? Students will demonstrate their understanding of the unit through a simulation activity. This activity teaches the different aspects of manufacturing through the eyes of a designer. Teams will design a product utilizing custom, job lot, and mass production as the process to produce a product for sale. The question is: will it sell?</p> <p>Students will develop and design the final product as well as figure out how to set up the management, labor, and design aspects that affect the resulting outcome of the product. There will be unknown circumstances imposed on the teams that will challenge their ability to produce the product, but the ultimate challenge will be the team's ability to problem solve and see the outcome of selling the product throughout the process.</p> <p>A self-assessment and rubric will be used to evaluate the activity. Teacher will continually observe students to assess their effort, commitment, and time management.</p>

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Other Evidence:

- Thoughtful, clear, thorough
- Correct answers
- Self-assessment
- Manufacturing A Product quiz

S3 LEARNING PLAN: *Summary of Key Learning Events and Instruction*

Pre-Assessment: Manufacturing a product pretest

1. Show video *NASA for Kids:-Intro to Engineering* to capture students' attention. Check for prior knowledge and skills via informal discussion as a whole class.

Unit Introduction and Feedback

2. Introduce manufacturing to the class.
3. Have students read and listen to the "Introduction to Manufacturing" presentation.
4. Discuss the organization of steps involved in manufacturing.
5. Allow for feedback from the students to gauge their skill set on the information.

Safety

6. Have students read and listen to the "Safety" presentation.
7. Discuss safety standards and importance of safety in a company.
8. During the discussion, have students take notes and write down the answers to the following questions:
 - ❖ Why might we need safety standards at a manufacturing company?
 - ❖ How can we reduce the risk of injury within a company? (Refer to presentation on "Safety")

Lesson #1—Design

9. Have students read and listen to the "Design" presentation.
10. Discuss what is meant by "design for manufacturability".
11. Explain the role of computers in manufacturing.
12. During the discussion, have students take notes and write down the answers to the following questions:
 - ❖ Why do designs continue to change over the years?
 - ❖ Why are computers as important, if not more, as humans in the manufacturing business?
 - ❖ In what ways can engineers improve efficiency and keep costs down for manufactured products? (Refer to "Presentation 1: Design")

Lesson #2—Purchasing

13. Have students read and listen to the "Purchasing" presentation.
14. Discuss the importance of a bill of materials and a good purchasing agent.
15. Discuss and distinguish the difference between raw and industrial materials.
16. During the discussion, have students take notes and write down the answers to the following questions:
 - ❖ Which manufacturing processes are useful for what productions?
 - ❖ What materials might specific purchasers order and how are they determined? (Refer to "Presentation 2: Purchasing")

Lesson #3—Processing

17. Have students read and listen to the "Processing" presentation.
18. Summarize the different techniques of how materials can be formed.
19. Discuss the importance of having computer-aided manufacturing and design.
20. During the discussion, have students take notes and write down the answer to the following question:
 - ❖ What manufacturing processes are most useful for which kinds of products? (Refer to "Presentation 3: Processing")

Lesson #4-Production

21. Have students read and listen to the "Production" presentation.
22. Discuss and differentiate the four types of production and state when they are useful.
23. Discuss and clarify the significance of quality assurance tests.
24. During the discussion, have students take notes and write down the answers to the following questions:

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- ❖ What are the types of production?
- ❖ How do you determine which type to use for a product?
- ❖ Why do we need quality assurance tests? (Refer to "Presentation 4: Production")

Lesson #5-Packaging

25. Have students read and listen to the "Packaging" presentation.
26. Discuss how products are prepared for shipping and customers.
27. Explain the different types of packaging and what they are useful for.
28. Differentiate the importance of an RFID and a barcode.
29. During the discussion, have students take notes and write down the answers to the following questions:
 - ❖ How do you design a product to sell?
 - ❖ What purpose does packaging serve? (Refer to "Presentation 5: Packaging")

Lesson #6-Distribution

30. Have students read and listen to the "Distribution" presentation.
31. Discuss and clarify the role of a wholesaler or distributor.
32. Specify where customers can buy a product.
33. During the discussion, have students take notes and write down a response to the following:
 - ❖ Briefly explain the purpose of salespeople and advertising. (Refer to "Presentation 6: Distribution")

Will it sell? Manufacturing simulation

Students will develop and design the final product as well as figure out how to set up the management, labor, and design aspects that affect the resulting outcome of the product. Students will create a self-assessment at the end of the activity. Refer to lesson plan "Will It Sell? Manufacturing Simulation" for details on the activity.

End of Unit Quiz

Multiple-choice quiz will be handed out and graded on accuracy.

Progress Monitoring:

Teacher should observe students and provide on-going feedback during the activity. While introducing the unit, the teacher will pause and ask for questions to make sure everyone understands.

Students will complete self-assessment and brainstorm how they could improve their skills in the future. At the end of the unit, there will be a quiz to measure their overall understanding. During the activity, students will experience failure and success at different times than others. Make sure every student understands failure is okay, and it is a normal part of designing and producing a product.

DIFFERENTIATION: *Summary of Key Differentiation Techniques*

Please use this space to insert your differentiation techniques. Depending on the needs of students, various techniques might be needed in a classroom, therefore use the information below and experts in the area needed to design your plan for differentiation.

The ASCD Study Guide for Integrating Differentiated Instruction and Understanding by Design: Connecting Content and Kids.
by Carol Ann Tomlinson, Jay McTighe

Integrating Differentiated Instruction and Understanding by Design: Connecting Content and Kids.
by Carol Ann Tomlinson, Jay McTighe
ISBN-13: 978-1416602842
ISBN-10: 1416602844

Differentiating Reading Instruction
by Laura Robb.
ISBN13: 9780545022989

A Teacher's Guide to Differentiating Instruction
The Center for Comprehensive School Reform and Improvement

**CAREER CONNECTIONS:** *Summary of Career Opportunities Associated with this Lesson*

Please use this space to insert careers that might be connected to this lesson. This section will need continuous updating as new careers and emerging technologies change the opportunities available in the workforce.

Good sources for career connections:

Occupational Outlook Handbook

<http://www.bls.gov/ooh>

The National Career Clusters® Framework

<http://www.careertech.org/career-clusters>

**KEYWORDS:** *Please Insert Keywords from this Lesson with their Definitions*

Please use this space to insert keywords and their definitions

Use resources like dictionary.com to find definitions to your keywords