

# FUTURE U.

## Sit Down Activity

### Objectives

Students will:

- **Perform** several trials in order to **design** an efficient manufacturing process.
- **Review** and **analyze** a manufacturing process designed by their peers.
- **Develop** a recommendation to improve the efficiency of their peers' design.

## King Lam, Manufacturing Engineer

### Grade Range

5–8

### Overview

In this activity, students will be inspired by the work of a manufacturing engineer at Boeing as they simulate their own manufacturing process. After designing a new paper airplane model, students will create and test several iterations of a process to manufacture their plane. They will then review each other's processes and provide recommendations to increase efficiency.

### Timing

45–60 minutes

### Materials

- Device with the ability to project video, one for the teacher
- [King Lam, Manufacturing Engineer](#) video, to project
- For each group of four students:
  - “*Design an Airplane*” handout, one
  - “*Manufacturing Design*” handout, one
  - Copy paper, five pieces
  - Art supplies (at least three different colors of markers, crayons, or colored pencils)
  - Timer

### Procedure

- 1. Warm-Up:** After showing the [King Lam, Manufacturing Engineer](#) video...
  - Encourage students to summarize the main responsibilities that King Lam has in his job as a manufacturing engineer.
  - Be sure students understand that manufacturing engineers plan, design, and engineer processes and facilities that produce products. They tend to work closely with industrial engineers. Whereas industrial engineers focus on how workers perform their jobs, manufacturing engineers design the equipment and machines that workers use to perform their jobs. Together, they make sure factories and manufacturing facilities are as efficient as possible.
  - Ask students: What do you do in your everyday life to increase your personal efficiency? If needed, define efficiency as the ability to produce a desired result while not wasting materials, money, time, and/or energy.
- 2.** Explain that today, students will become manufacturing engineers as they plan out the most efficient way to “manufacture” a paper airplane. But before they do, they must design the plane!
- 3.** Divide students into groups of four, and pass out one “Design an Airplane” handout, a piece of copy paper, and the art supplies to each group. Review the instructions provided on the handout, and then give groups about 10 minutes to design and construct their plane.
- 4.** Next, give groups four more pieces of copy paper, as well as one “Manufacturing Design” handout. Review the instructions on this handout and be sure students understand that their goal will be to design a “machine” (or a series of steps) that constructs their airplane as efficiently as possible. For now, the group members will play the role of the machine(s).
- 5.** Once groups have completed their trials, pair groups together and instruct them to demonstrate their most efficient manufacturing process to each other. As one group manufactures their plane, encourage the observers to act as manufacturing engineers called in to optimize the manufacturing process. Challenge each group of observers to offer at least one suggestion to improve the process’s efficiency.
- 6. Wrap-Up:** Before the session comes to a close, bring the class back together and encourage groups to reflect on the experience. Discuss:
  - What recommendations were made to increase the efficiency of your manufacturing process?
  - As a manufacturing engineer, do you think it’s best to assess a process’s efficiency at the beginning of the manufacturing process, at the end of the process, or throughout? Why?

### National School Standards

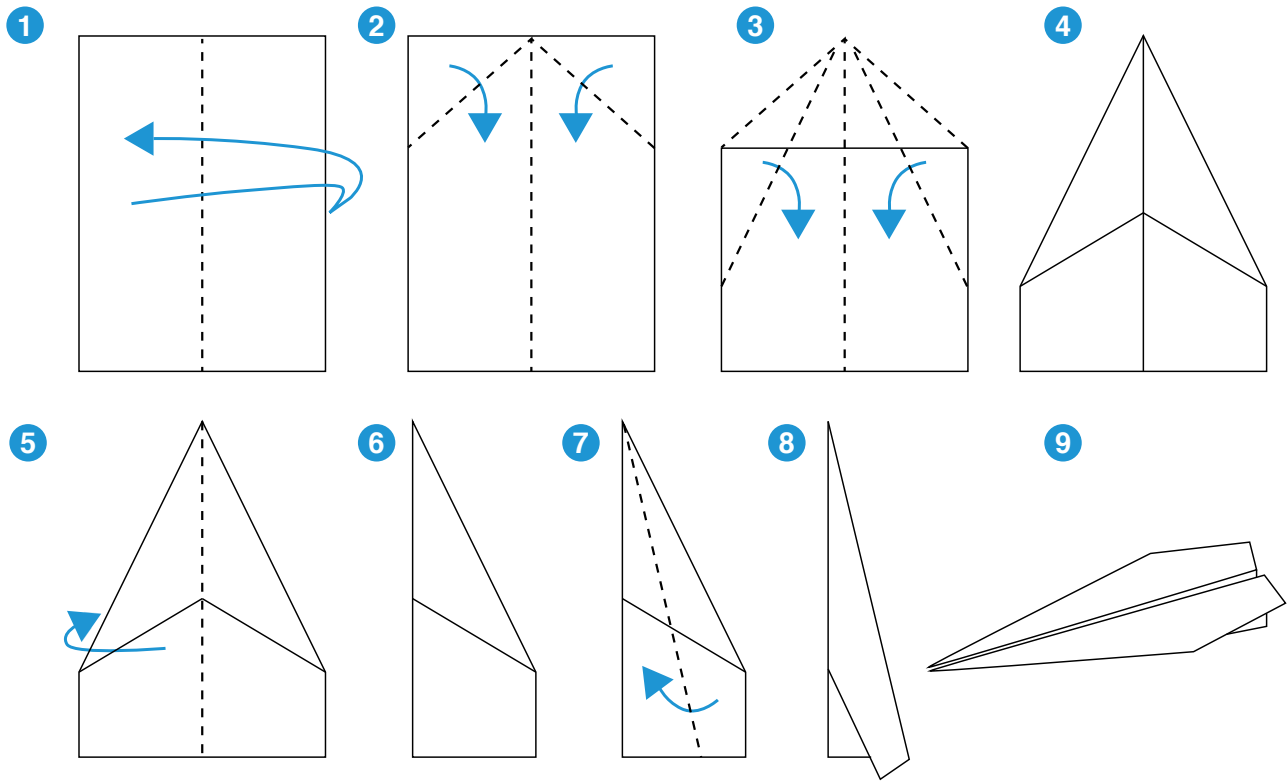
#### Next Generation Science Standards

##### M.S. Engineering Design

- MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

**Directions:** Use the instructions below to create a model airplane. Your airplane design must include:

- At least three different colors
- A logo of your choice
- At least 4 illustrated windows
- At least 2 illustrated doors



**Directions:** If you were to create a series of machines to manufacture the airplane you just designed, what would be the most efficient manufacturing process?

- 1. Develop one manufacturing process and outline the steps in the boxes under Trial #1. Then work with your group to simulate this manufacturing process and time how long it takes to produce one airplane.
- 2. Consider how to make the process more efficient. Outline the revised process in the boxes under Trial #2. Then work again with your group to simulate this new manufacturing process and time how long it takes to produce one airplane.
- 3. Finally, consider what you learned from both trials and develop one final manufacturing process. Simulate this third process and time how long it takes to produce one plane.

Trial 1	Trial 2	Trial 3

Total Time:

Total Time:

Total Time: