

advanced air mobility

drones



urban air mobility

air
taxis

STEM LEARNING:

Advanced Air Mobility:
Air Taxi Design Challenge
Student Guide

www.nasa.gov

AIR TAXI DESIGN CHALLENGE

BACKGROUND

When most people think of aircraft, they usually think about airplanes that travel at great speeds and cover long distances while flying routes between airports. More and more, however, new types of aircraft are transporting people and equipment to urban and rural locations where traditional airplanes cannot access. These new aircraft range in size from small cargo carrying drones to passenger-carrying air taxis, and carry out short range missions.

NASA is leading the nation to quickly open this new era in air travel called Advanced Air Mobility, or AAM. The vision of AAM is that of a safe, accessible, automated, and affordable air transportation system for passengers and cargo capable of serving previously hard-to-reach urban and rural locations.

In this activity, you will design an air taxi, work with a group to refine the design, create a model of it, and share your model with the class.

DESIGN CHALLENGE

Your goal:

Create a model of an air taxi that meets all requirements assigned.

Criteria:

Your design effectively meets all requirements.

Constraints:

- Your model must be constructed of the materials provided.
- Your model must be no larger than 30 centimeters (about 12 inches) in height, width, or length.
- Your design must meet all requirements.



Figure 1. Some taxis in the future will carry passengers through the air. Credit: Public domain

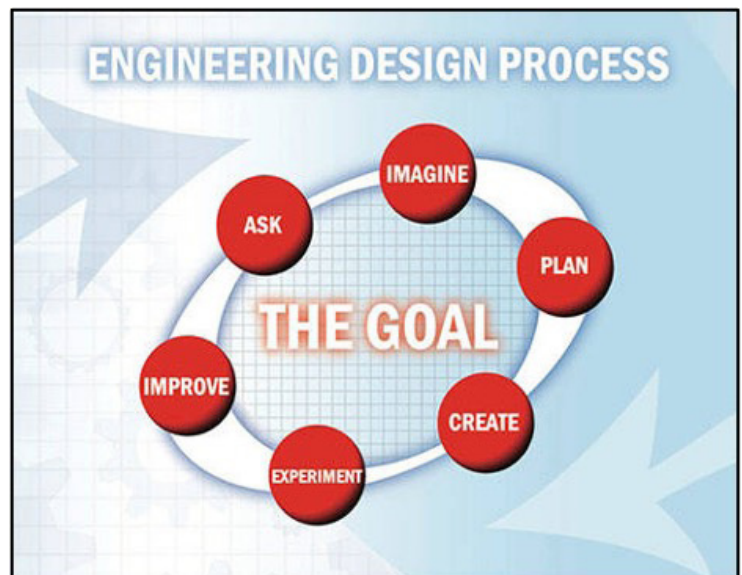


Figure 2. Engineering design process is visually represented. Credit: NASA

PART 1: INDIVIDUAL DESIGN

Ask

As a class, you will develop a list of requirements that your air taxi design must meet. Once completed, copy the list below so that you may refer to it at any time:

- Passenger capacity: _____
- Source of power: _____
- Other requirements:
 1. _____
 2. _____
 3. _____
 4. _____
 5. _____

Imagine

Your company sees the potential money to be made creating and selling air taxis. As an engineer, your job is to design an air taxi for them.

Review the air taxi requirements that the class came up with. Then, create a design for your company's air taxi that meets all the requirements. Think about where it will be operating (urban area, rural area, or between the two). What weather or other obstacles might you encounter there? What technology could be used in your design? Keep in mind that you will need to build the design model using the materials provided.

Plan

Sketch and label your design in the space provided below. You will be sharing this design with others and must be able to explain your reasoning and how your design meets the requirements.

Sketch:

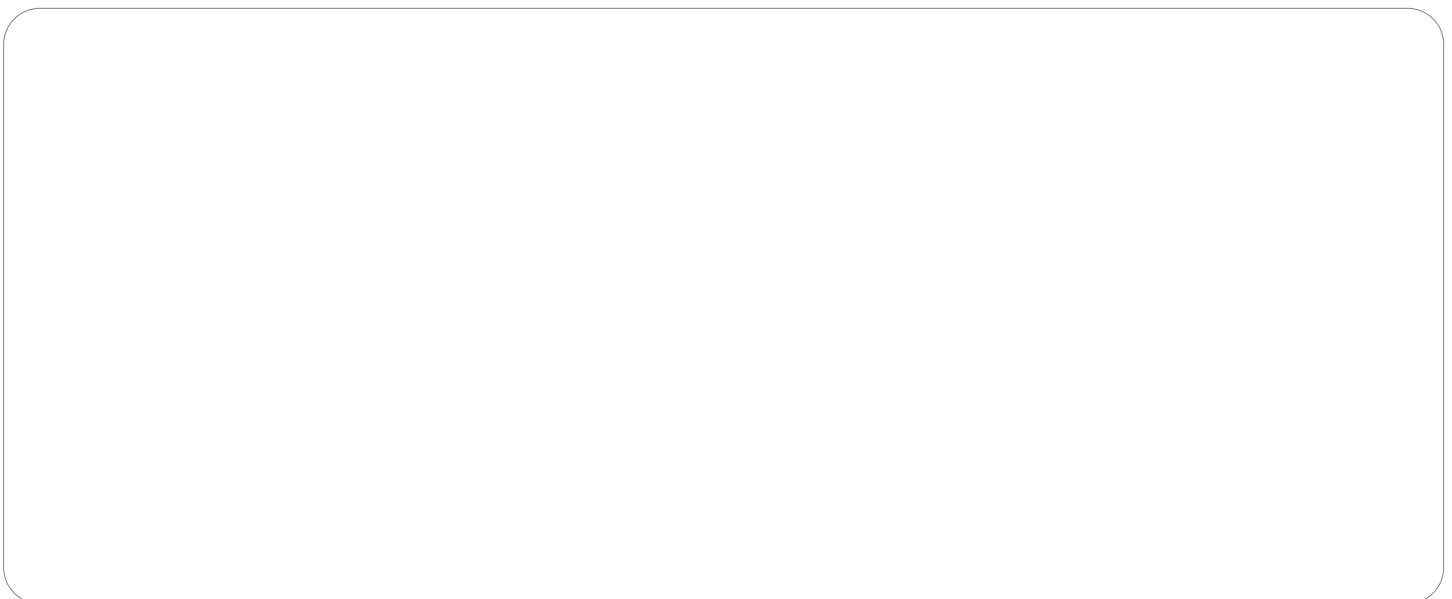


PART 1: GROUP DESIGN

Plan/Create

Have each member of the group share their created design and explain how it meets the requirements. After everyone has shared, discuss the advantages and disadvantages of each design. Working together, create a design that meets all requirements, incorporating aspects of the individual designs. Create a sketch of the group's design, **labelling what material(s) will be used for each part.**

Sketch:



Explain why the team chose this design:

Experiment

Your group will be paired up with another group. The first group should present their sketch, explain how the design meets the requirements, and identify how the model will be built with the provided materials. The second group should ask questions and provide feedback. The second group should then present their design and receive feedback from the first group. After this has been completed, break back up into separate groups.

Improve

As a group, discuss the feedback you received from the other group. Decide on any changes you wish to make to your design. Annotate any changes on the sketch, preferably using a different color.

Create

Working together as a group and using the materials provided, build a model of your group’s air taxi. The completed model must be no more than 30 centimeters (about 12 inches) high, wide, or long.

Share

You will be presenting your model to the class. In preparation for sharing, discuss these questions with your team and answer them in the space provided. Decide who will be the spokesperson for your group.

How does your design meet the requirements? Are there any requirements it doesn't meet?

What aspects of your design do you believe to be unique?

What would you improve if you had more time?

REFLECTION

After seeing each group's design, individually answer the following questions.

Directions:

If engineers were to build your model into a full-size, operational air taxi, what specific challenges would they encounter?

How difficult do you think it would be for air taxis to operate in large cities? What about rural areas?

There are many functions for the small electrified aircraft controlled by AAM. Aside from carrying passengers, what else could your design be modified to do?

How do you feel about the possibility of using air taxis to move around?

After seeing the other groups' designs, name one thing you would change about your group's design to make it better.

National Aeronautics and Space Administration

Headquarters

300 E Street SW
Washington, DC 20546

www.nasa.gov