

These activities and questions have been designed for you to have engaging discussions with your student about the STEM jobs they are encountering in their Learning Blade schoolwork. Here is an overview of what is included.



**Table Talk:** These are questions you can ask your student without having any background knowledge in STEM. These will be easy conversation starters.



**Dig Deeper:** These are questions with suggested links to learn more about different STEM careers to explore with your student.



**Home Lab:** This is an easy, hands-on activity to do with your STEM student.

## What Has Your Student Been Learning?

In the online Lightweight Aircraft mission, your student will become familiar with various aspects of aircraft design and construction. Along the journey, students will need to determine what tools (aircraft, metals and alloys, innovative materials, automation mechatronics, and recycling metals) and teammates/experts (industrial designer, welder, machinist, mechanical engineer, and manufacturing technician.) are needed to develop the new aircraft. It is up to the student to determine what help is required based on the clues provided.

## TABLE TALK

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### Starter Question:

In this mission, your student may have taken a lesson about a solar powered airplane called Solar Impulse 2. The Solar Impulse 2 flew around the world with only solar power. Talk with your student about how amazing that is. Then discuss how you think lightweight materials manufacturing played a role in its success.

“The airframe of Solar Impulse 2 is constructed with lightweight thin materials, such as carbon fiber and honeycomb sandwich panels that reduced the weight from 80g/m<sup>2</sup> to 25g/m<sup>2</sup>”

Check out this video to see what the Solar Impulse is - [www.youtube.com/watch?v=VHwy2ABbo6Q](http://www.youtube.com/watch?v=VHwy2ABbo6Q)

What other industries would benefit from using lightweight manufacturing technologies?

Can you think of anything in your home you wish were more lightweight or would benefit from being equally strong but weigh less?

## DIG DEEPER

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### Resources for More Information:

In this section, we provide a series of links and associated questions to DIG DEEPER on individual careers addressed in the Lightweight Manufacturing Mission. Feel free to explore these with your STEM student as you model curiosity and lifelong learning.

**An article in CNN Money notes that many factory jobs once considered back-breaking and low-paying have become high-tech and high-salaried. Stereotypes about factory jobs still persist. And the media isn't helping, factory owners complain.**

On TV, kids don't see many positive images of manufacturing," said Bill Mach, president of Mach Mold, a manufacturer of plastics molds in Benton Harbor, Mich. A show will have a scene with "an old dark building with a bird flying out of it, and something bad happens." Scott Paul, executive director of the Alliance for American Manufacturing, agreed. "Pop culture has a big impact on young people,"

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**Aircraft** allow us to get from point A to point B in a matter of hours. Flying can be the fastest way to travel. How does an airplane go from parts in a factory to flying through the sky?

The careers discussed in this mission play a role in building airplanes. Watch this video and see if you can spot any of the jobs that have been discussed. If you were to join the team for building and creating airplanes, what part would you like to play?

[www.thekidshouldseethis.com/post/minute-physics-how-an-airplane-is-made](http://www.thekidshouldseethis.com/post/minute-physics-how-an-airplane-is-made)

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**Welding** can be an incredibly rewarding and high paying career. Where do you think professional welders are employed? Brainstorm what jobs in your community might need welders.

This website provides resources for students to learn more about welding. Its page includes some great videos spotlighting welders. What objects in your home do you think a welder played a role in making? [www.careersinwelding.com/students.php](http://www.careersinwelding.com/students.php)

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**Machinists** set up and operate a variety of computer-controlled and mechanically controlled machine tools to produce precision metal parts, instruments, and tools.

This video is about machinist careers and discover what skill sets are needed to be a machinist. This video interviews a machinist and what a typical day in this career looks like.

[www.youtube.com/watch?v=IFTIGBjxwfs](http://www.youtube.com/watch?v=IFTIGBjxwfs)

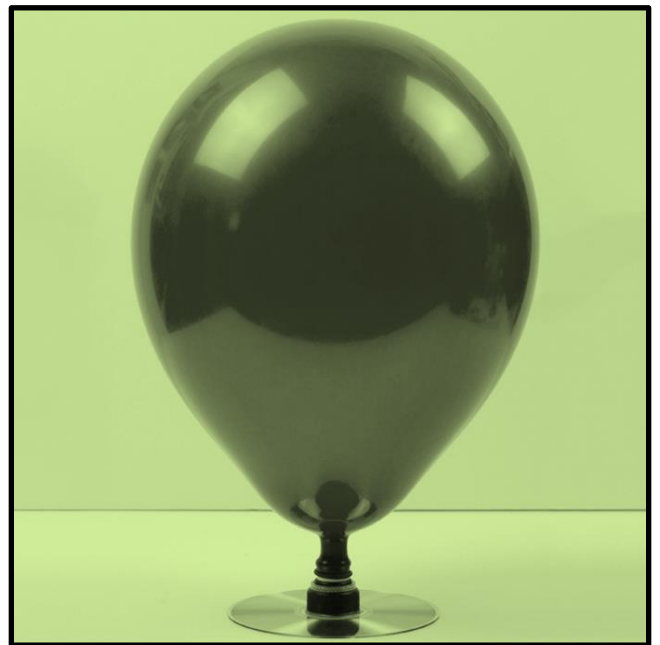


In the Lightweight Aircraft Mission, students learn about advanced manufacturing using composite materials to make airplanes more fuel-efficient. Did you know the speed you drive can change your fuel efficiency, as well as properly inflating your tires. Another interesting aspect of fuel efficiency is reducing friction. Friction is the resistance that one surface or object encounters when moving over another.

### Experiment with Friction by Building a Balloon Hovercraft:

Hypothesize how adding a balloon to a CD will help it moved across a smooth surface when pushed.

1. Gather Supplies:
  - Balloons of different sizes
  - Ruler or tape measure
  - Plastic CDs
  - Hot glue gun or craft glue
  - Water bottle squirt top or the likes
2. Lay the CD flat on a table, glue the water bottle squirt top over the CD hole, and wait for glue to dry.
3. Inflate a large balloon and pinch the neck so no air escapes.
4. Make sure the squirt bottle top is closed.
5. Stretch the neck of the balloon over the top of the pop top bottle lid.
6. With the CD on a flat surface, open the squirt top as you give the balloon hovercraft a push across the table.
7. Measure the distance the hovercraft traveled with the ruler or tape measure.
8. Repeat the experiment multiple times to establish an average distance travelled.



### Further Hovercraft Experiment:

Use common items like cardboard, rubber bands, pencils, etc. to build a launcher for the balloon hovercraft. Measure and record the effect the launcher has on the distance and the consistency the hovercraft travels in each trial.



# #STEM4Parents Lightweight Aircraft

**Dear Parent/Guardian,**

I kindly ask that you fill out and sign this piece of paper so I can provide your student with a completed grade for this #STEM4Parents homework assignment.

I discussed with \_\_\_\_\_ the Lightweight Aircraft Mission in Learning Blade.  
(Student name)

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date



\_\_\_\_\_  
Parent/Guardian Name (print)

\_\_\_\_\_  
Parent/Guardian Signature