

MAKER RACER ACTIVITY

Day 1

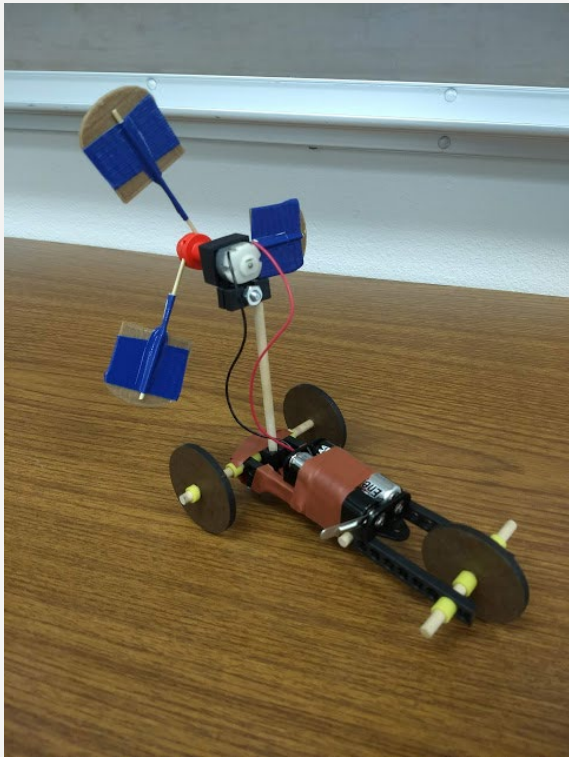
INTRODUCTION/MOTIVATION

We are going to combine a relatively new technology (3D printing) with an older, more established engineering application (wind power) to make air car racers! We will use the engineering design process to guide our discovery. Wind turbines harness clean renewable energy and help reduce our dependence on fossil fuels. Using your knowledge of wind turbine blades, 3D printing, and motors, can you create a vehicle that uses wind energy to travel the furthest distance in the shortest period of time?



**TODAY WE WILL
DESIGN OUR
BLADES**

MAKER RACER CAR DESIGN – SKETCH YOUR PROPELLERS!



CRITERIA AND CONSTRAINTS

Criteria:

- Maximum of three blades
- The blades must be made out of filament and printed on the MakerBot (Note: if a 3D printer is not available, use recycled materials such as plastic, paper, or aluminum.)
- You must use the battery and leads to move the vehicle
- You may not push your vehicle at any point
- You must race at least three times

Constraints:

- Vehicle cannot be more than 10 inches long and 8 inches wide
- Blade sizes cannot exceed 110 millimeters by 25 millimeters
- Blades cannot be thicker than 1 millimeter
- Once your blades are printed or built, those are the only blades you can use
- Any modifications made will be on the car itself

WHAT IS TINKERCAD?

- A 3D design and modeling tool
- Learn about Tinkercad here: <https://www.tinkercad.com/>

WHAT IS A MAKERBOT?



- A 3D printer
- [First Look: MakerBot Desktop 3D Printer](#)

MAKER RACER ACTIVITY

Day 2



**TODAY WE WILL
BUILD AND TEST
OUR CARS**

VOCABULARY TERMS

constraint	The limiting factors that come into any design; this may include materials, time, budget, or scope.
criteria	Required specifications in a given design such as size, mass, or material.
iteration	A process by which an engineer evaluates a current design and makes modifications to better suit the criteria, constraints, or to simply improve upon the prototype.
Tinkercad	An app for 3D design, electronics, and coding.
working plane	The platform on which things are built in Tinkercad.

MATERIALS

Each group receives a kit of materials:

(Maker tool set via [TeacherGeek](#))

- roll of duct tape
- roll of electrical tape
- pair of scissors
- pairs of safety glasses
- multi-cutter
- screwdriver
- pair of pliers
- hammer
- slider block
- reamer
- maker racer kit

RACING RUBRIC

3	2	1
Students designed most of their blades in TinkerCAD	Students have a partial design in TinkerCAD	Students did not design blades in TinkerCAD
Students collaborated and worked with one another effectively	Students collaborated and worked okay with one another	Students did not work collaboratively and disagreed consistently
Students redesigned and tested at least 3 times	Students redesigned and tested 2 times	Students redesigned and tested 1 time