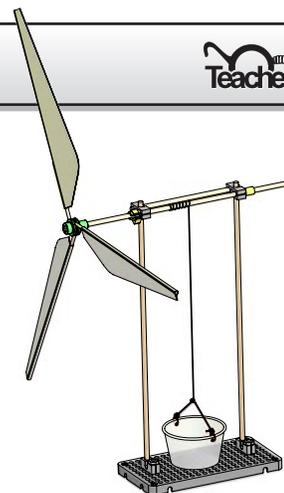




THE ACTIVITY

This guide will take you through the process of creating a wind powered lift. You'll start by creating the stand. The lift mechanism, hub and blades are then added. Before long you will be experimenting with blade design and loading.



The following TeacherGeek materials are needed to build one wind lift:

 Perpendicular Blocks Quantity: 4	 300mm (~12in) Dowels Quantity: 3	 Hole Plate Quantity: 1	 100mm (3in) Slide Stop Cut to 6mm (1/4in) Sections Quantity: 1	 5/8 Screw, #10 Quantity: 2	 Nut, #10 Quantity: 2
 5/8 Screw, #6 Quantity: 1	 Mini Hub Cover Quantity: 1	 Mini Hub Base Quantity: 1	 150mm (10in) Skewers Quantity: 10	 Wire Roll or 4.5in Wire Quantity: 1	 Portion Cup Quantity: 1

You will need to supply the following materials:

 Tape	 String or thread 450mm (~1.5ft)	 Material for Blades	 Material to Lift
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The following tools will be needed:

 Cutters	 Reamer	 Screwdriver	 Pliers
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HOW THE SYSTEM WORKS

Built it, test it, change it. TeacherGeek™ components allow you to design and engineer your most imaginative mechanisms. Combine them with other materials.

DOWELS

Dowels vary in diameter. Some may be too large or small to use.

The ends of dowels may taper and need to be cut off to fit tightly into holes.

CUTTING

Dowels and Connector Strips can be cut with a multi-cutter (best method), saw, side cutters or pruning shears. Wear safety glasses when cutting.



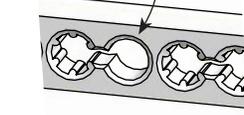
Multi-Cutters



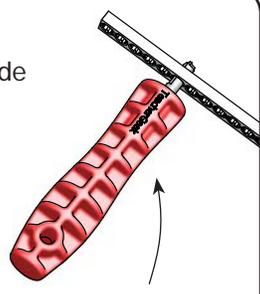
HOLES & REAMING

Components come with holes that dowels press securely into.

Reaming holes to allow dowels to rotate and slide freely.



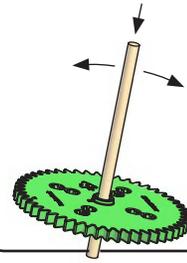
Turn a reamer back and forth through a hole.



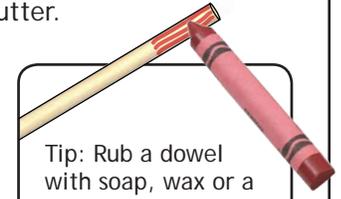
PUSH, WIGGLE, TAP

Push dowels into holes by:

1. Wiggling and pressing with your hands
2. Tapping dowels with a hammer or the side of your cutter.



Tip: Rub a dowel with soap, wax or a crayon to allow it to slide easier into and out of holes.



START BUILDING!!!



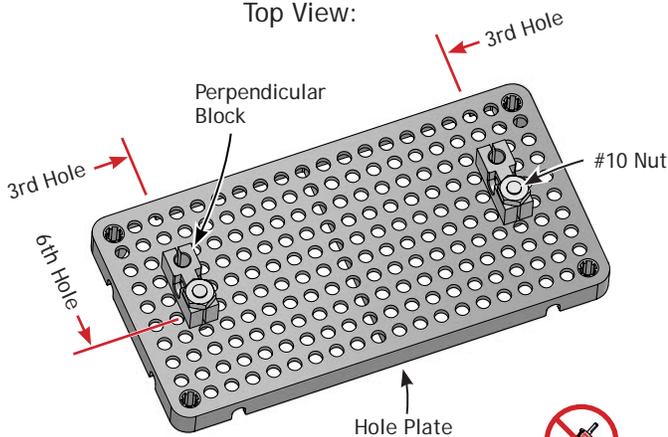
WARNING!!!

Most holes should not be reamed. Do not ream holes which dowels should stay pressed into.

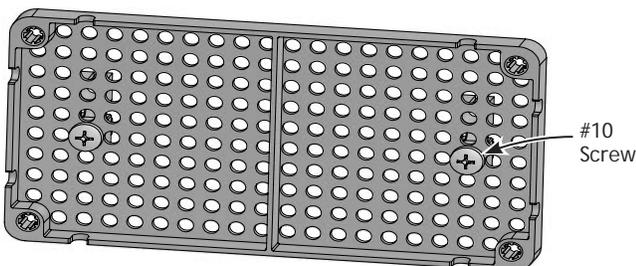
STEP #1

Attach two perpendicular blocks to a hole plate using two #10 screws and two #10 nuts.

Top View:



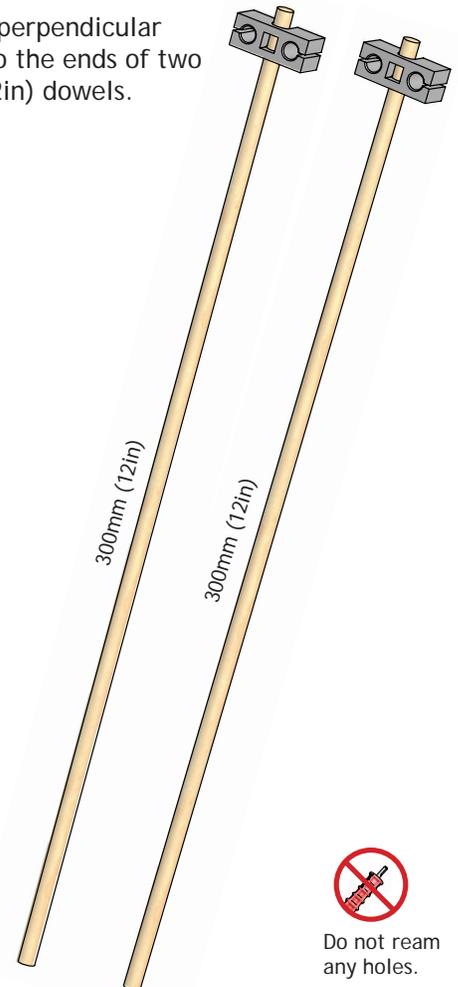
Bottom View:



Do not ream any holes.

STEP #2

Place two perpendicular blocks onto the ends of two 300mm (12in) dowels.

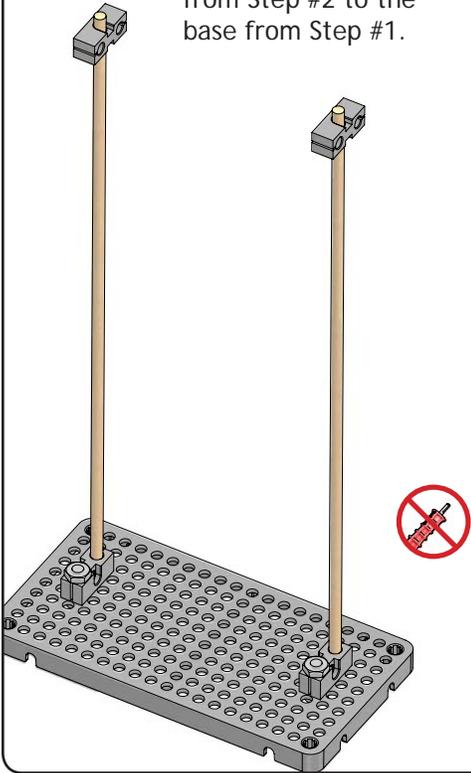


Do not ream any holes.



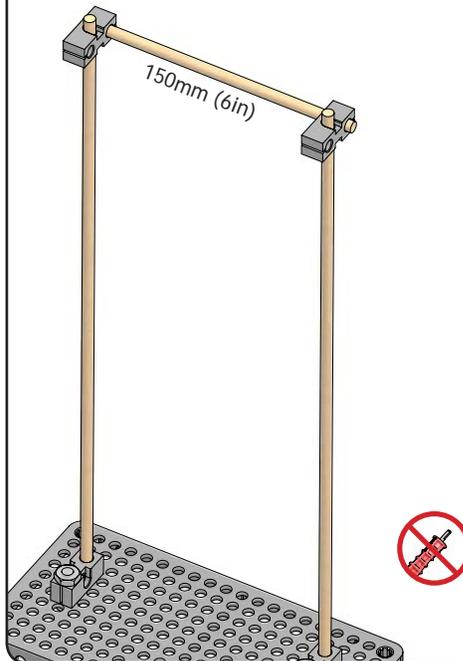
STEP #3

Push the uprights from Step #2 to the base from Step #1.



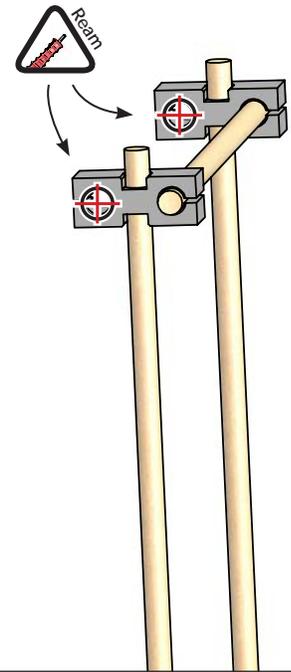
STEP #4

A. Cut a dowel to 150mm (6in).
B. Place it into the uprights from step 2 as shown:



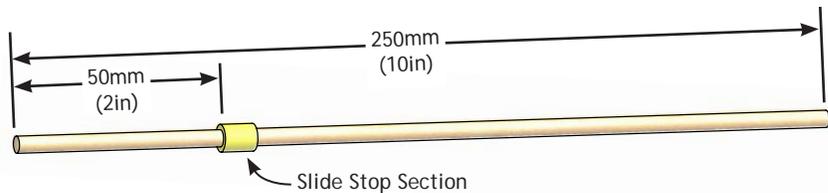
STEP #5

Ream the 2 holes marked with a



STEP #6

A. Cut a 250mm (10in) dowel.
B. Slide a section of slide stop 50mm (2in) onto the dowel.



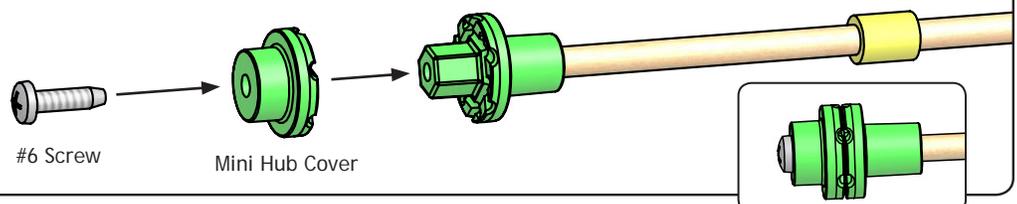
STEP #7

Insert the dowel from Step #6 into the mini hub base.



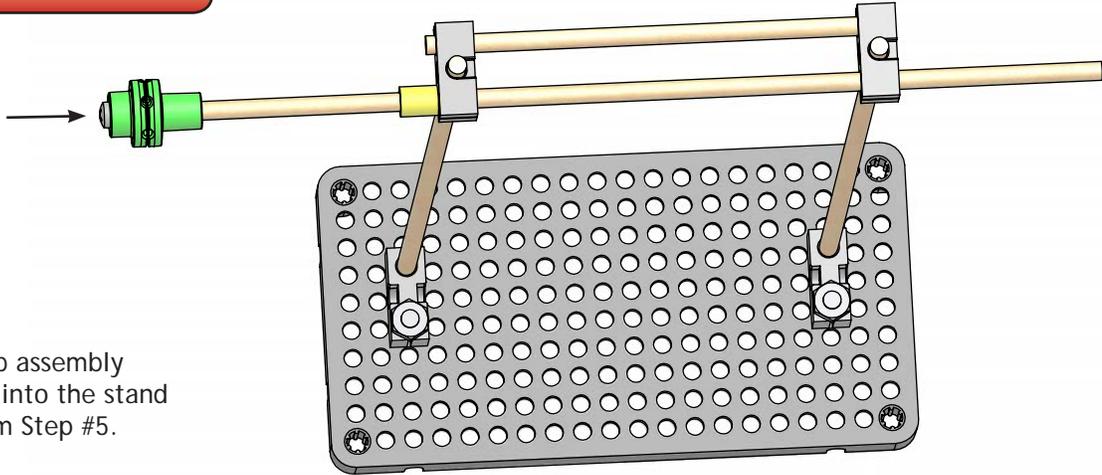
STEP #8

Attach the mini hub cover to the base using a #6 screw.





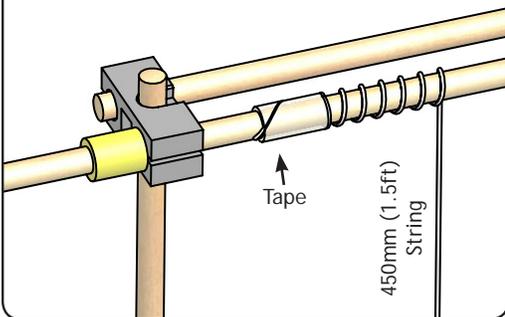
STEP #9



Insert the hub assembly from Step #8 into the stand assembly from Step #5.

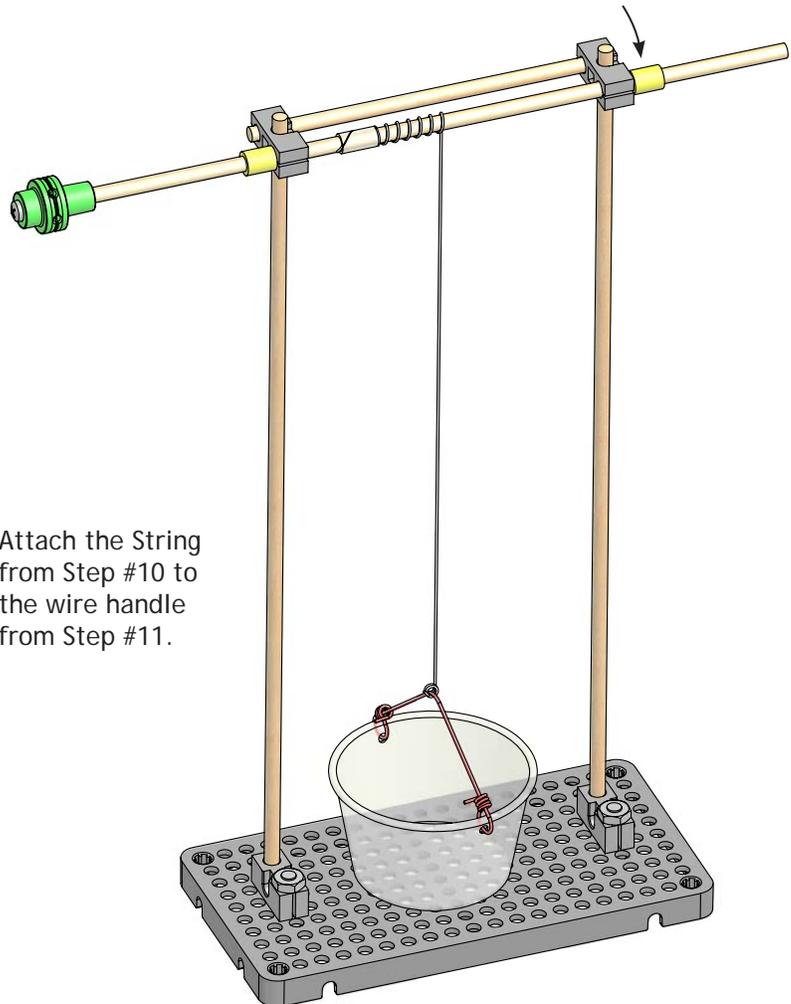
STEP #10

Tape a 450mm (1.5ft) string onto the hub assembly dowel.



STEP #12

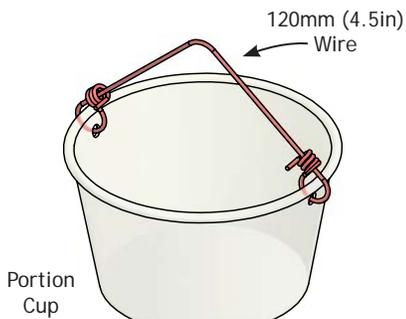
Use a section of Slide stop to secure the hub dowel.



Attach the String from Step #10 to the wire handle from Step #11.

STEP #11

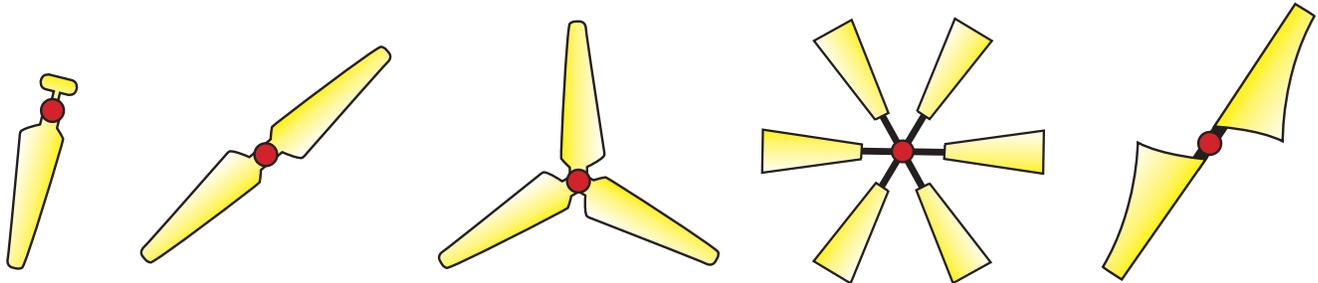
- A. Punch two holes on opposite sides of a portion cup
- B. Attach a 120mm (4.5in) wire through the portion cup holes to create a handle





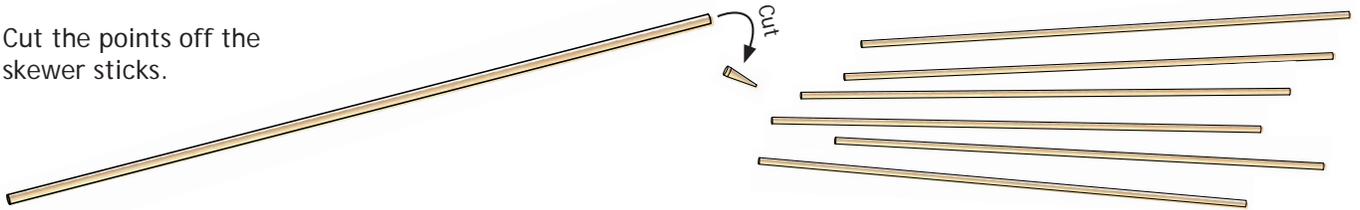
BLADES

It is now time for you to experiment with blade configurations. You will be able to change the shape of your blades, the number of blades used (between 1 and 6), and the blade angle.



STEP #13

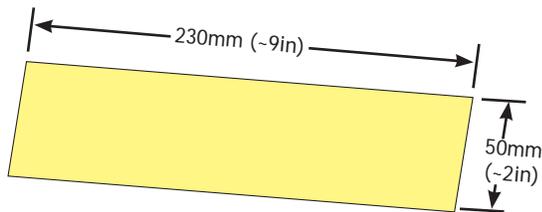
Cut the points off the skewer sticks.



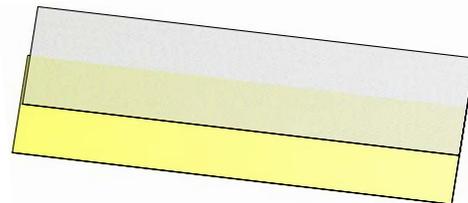
STEP #14

You will need materials for your blades (poster board, cardboard, plastic, aluminum flashing, etc). You will also need tape. Duct tape works best.

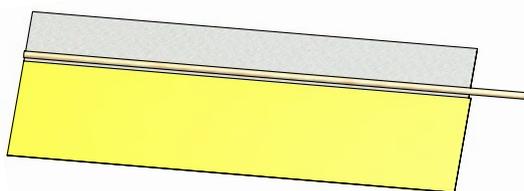
Below is one of best methods used to create a blades. You will need to create 3 blades to start.



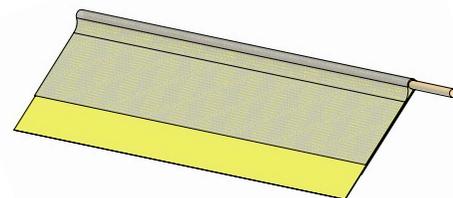
A. Cut a section of blade material.



B. Place tape half over the edge of the blade material.



C. Place a skewer stick at the edge of the blade material, overhanging to one side.

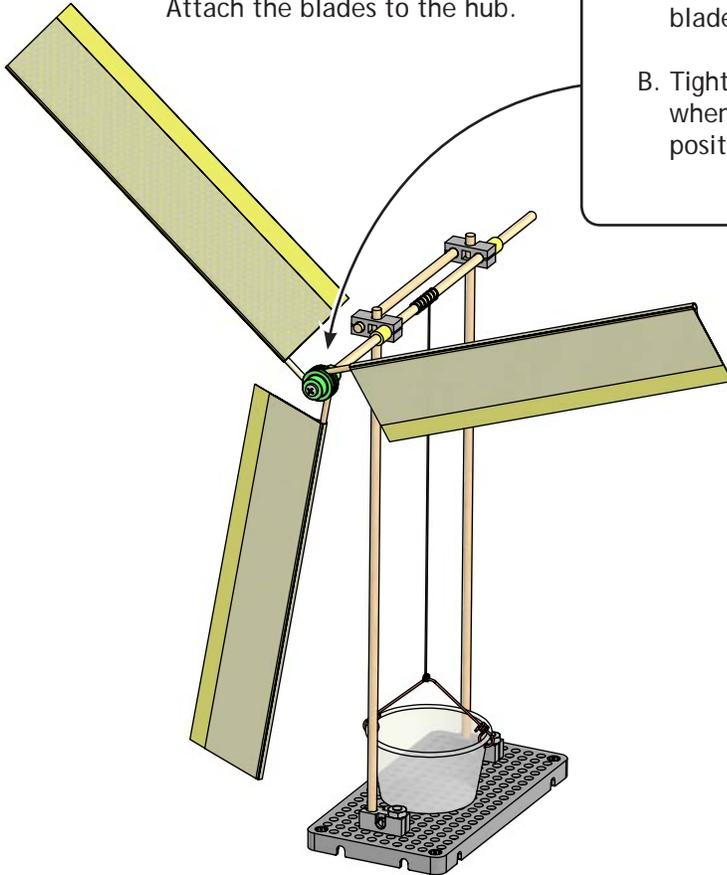


D. Fold the tape and skewer stick over onto the blade material. Press to secure the tape.

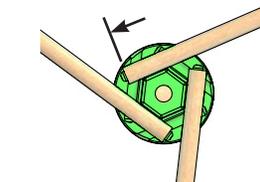
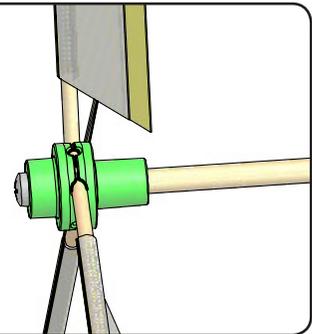


STEP #15

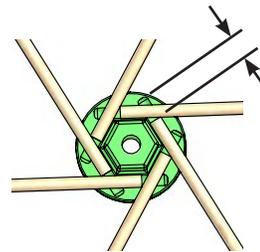
Attach the blades to the hub.



- A. Loosen the hub screw 1/4 turn to allow blade skewers to slide in.
- B. Tighten the screw when blades are positioned properly..



Three or fewer sticks can be inserted all the way into the hub holes.

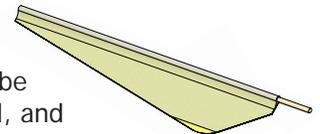


Six Skewer sticks can be inserted in a hub as shown.

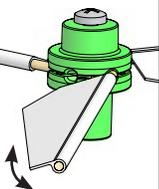
EXPERIMENT & INNOVATE!!!



Blades can be cut, shaped, and redesigned.



Blades pitch can be changed when the hub screw is loose.



Load it up...

How much weight can your wind lift pick up? How does the weight effect the blade speed? Can your configure blades for a heavy or fast lift?

Measure RPM, Torque, Work & Energy. Engineer it for load/blade optimization.

