

# ■ WIND TURBINE

## STUDENT QUICK-START

### SCENARIO

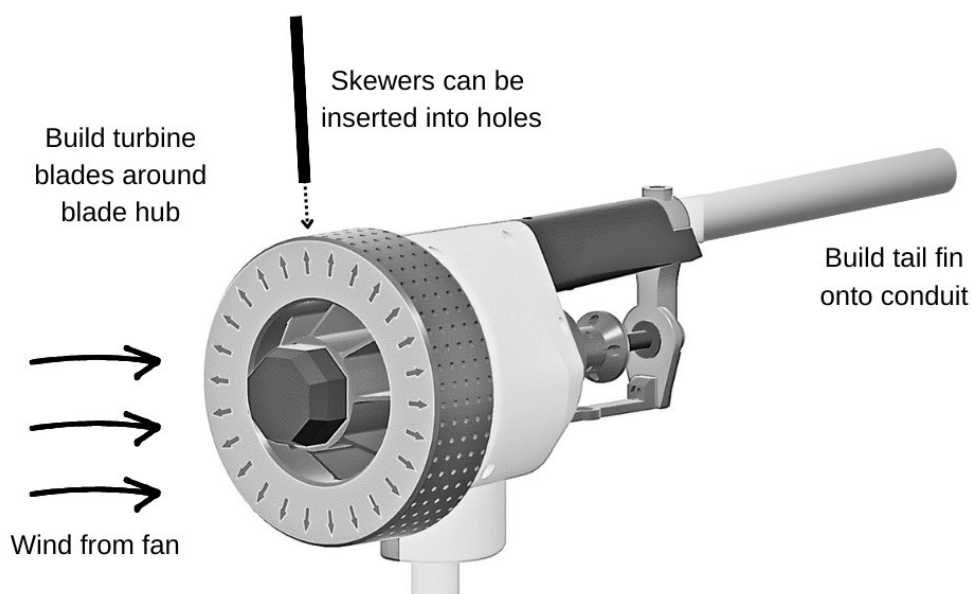
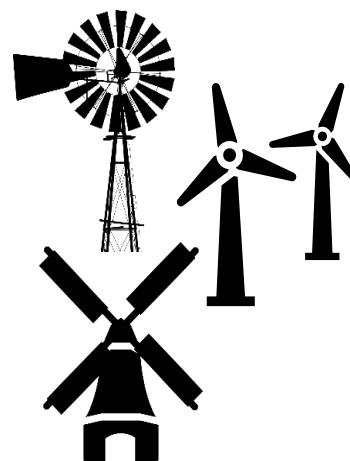
Your team has been employed as consultants by a leading engineering firm to design and build wind turbines to be used in the wind farms across the country.

### AIM

Design and build a model wind turbine (including tail) that will generate the greatest amount of speed and power as wind from a fan pushes the blades.

### WHAT TO DO

Your team needs to construct a simple, robust, and efficient turbine (including tail) from a fixed quantity of masking tape, wooden skewers, wooden sticks and cardboard. Masking tape will be dispensed by the Activity Personnel. A ruler, scissors, saw and cutting block are provided to use as tools for your construction. You will receive a reusable blade hub and tail conduit for the turbine to be mounted onto the turbine rig for testing.



### TIMETABLE

Half Day Activity	
<b>Session</b> (1h 45m)	5 mins = briefing 25 mins = planning and building 30 minutes = testing with fan and adjusting 40 minutes = official scoring, with time in between tests to make modifications. 5 mins = pack up

## RULES

The turbine blades must be firmly attached to the blade hub provided. The tail fin must be attached to one end of the conduit provided.

The saw is provided to cut wooden sticks and skewers but must be used with the cutting block.

The turbine must fit inside the safety cage of the testing rig.

One team member is responsible for fitting the completed turbine into the test rig and adjusting placement of the turbine. Once the turbine has been positioned, it cannot be touched whilst the test is being conducted. Only the Activity Personnel may operate the test rig.

In order to receive bonus points, the team must make a serious attempt at building and testing a turbine design. This is at the discretion of the Activity Personnel.

## SCORING

Each team's turbine is placed onto a special rig placed in front of a fan for test 1 and 2. There are bonus points for returning unused consumables and cleaning up your area.

### Test 1 – Speed

The display unit attached to the test rig automatically determines the score for each test by calculating the number of revolutions as it spins over time. Teams may have multiple attempts, subject to the timing constraints of the activity.

### Test 2 – Power

Mass is attached to the winch mechanism to be wound to the top using the power of the wind turbine. The mass must reach the top within 30 seconds. The more mass that can be lifted with the turbine, the higher the score. Teams may have two attempts at the power test.

**In order to receive a score, the reusable blade hub and tail conduit must be separated from the turbine and returned to the Activity Personnel at the conclusion of testing.**

**⚠ At the end, ensure your team's score sheet is with the Activity Personnel.**

## TIPS

Spend some time making a plan for your turbine. It is very important to ensure your turbine is balanced and this will require careful measuring and construction.

Do not be wasteful with your cardboard, skewers and wooden sticks. You will get bonus points for returning undamaged consumables.

Plan a lot of time for testing and adjusting before official scoring. It is important to test and improve your design as soon as possible to ensure your team records at least one successful result during official testing.