

# MODEL WIND TURBINE CHALLENGE

TRADE LINK: AUTOMATION & CONTROL

## TEACHER BACKGROUND

**Duration:** three (3) 45 minute classes  
**Group Size:** groups of four grade 9 or grade 10 students (teams must be mixed and at least one person on the team must be of the opposite gender)  
**Setting:** indoors – classroom



## RATIONALE

Energy exists in several forms and is essential to modern life. Wind power is one of the fastest growing sources of electricity in the world. It is a completely sustainable, clean form of energy that does not rely on finite fuel sources for daily operation.

Students should have an opportunity to explore properties of energy through discovery. Students will experience the conversion of kinetic energy to mechanical energy or electricity.

In this exercise, students will use their knowledge, skills, leadership, teamwork and ingenuity. This challenge is also designed to test problem-solving skills.

## METHOD

In this activity, students will be asked to design and construct a model wind turbine which will produce electrical power. Students will be given the materials to construct the turbine. Turbine voltage-generating capacity will be measured electronically and competitively in a head-to-head challenge. The design, the construction and the voltage-generating capacity of the model will be judged by a panel of expert judges.

## MATERIALS

- Small DC motor with mounted LED
- Poster board, sheets
- Balsa wood, sheets
- Particle board base, piece
- Tape, masking, roll
- Adhesive, tube
- Wood, circles for propeller hubs
- Utility knife, retractable
- Scissors, Pair
- Geometry set
- Pencils
- Sandpaper

## GETTING STARTED

In this activity, students will explore how energy is created and measured. The goal is to produce a solidly constructed wind turbine that will be able to generate electrical power.

## THE ACTIVITY

1. Your teacher advisor will provide direction as you decide on a design for your model wind turbine.
2. You will create a blueprint or a sketch for this design.
3. Once this is completed, each team will receive the standard list of materials and equipment and have 2 hours to construct their model.
4. Remember: the model wind turbine must survive the entire one minute voltage generation test procedure intact to be eligible to win this category.

## BRANCHING OUT (EXTENSIONS AND VARIATIONS)

- a. Try using different materials or improving on your design by combining the best ideas generated in various students designs.
- b. Try working with a CAD (computer assisted drawing) program to develop your design.

## SKILLS FOR SUCCESS

1. What is the length of the propeller hubs? (Numeracy)
2. Does the size of the propellers affect the height of the turbine? (Numeracy)
3. What missing piece of material would cause the turbine to malfunction? (Problem Solving)

## INFORMATION BITE

Wind power is the fastest growing form of energy in the world. Although a relative newcomer to wind farm development, Canada's energy industry has grown rapidly since 2000, with installed capacity increasing by an average of 51% annually. Automation and Control requires strong numeracy skills in the area of calculation and measurement, data analysis, and estimation.