



جامعة بيروت العربية
BEIRUT ARAB UNIVERSITY

Safety Related to Wind Turbines

Supervisor: Dr. Nagham Ismail

Eng. Hussein Ghorayeb

Done By : Amir El Moghrabi

Abbass Hijazi

Sadek Moughrabel

Zamzam Hijazi



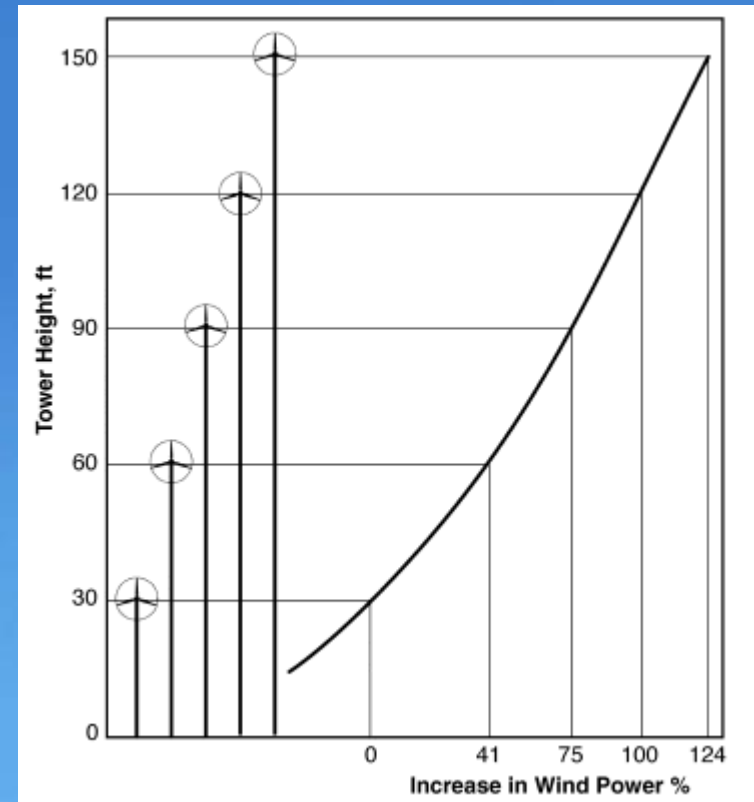
1 INTRODUCTION

Electric power is generated by the means of wind turbines. Although wind turbines are considered as an efficient energy production sources as well as green energy producers they might threaten the environment by their resulting hazards such as failure, collapse and fire.



2 FACTS ABOUT RESIDENTIAL WIND TURBINES

- Minimum height: 30 -165 ft
- Blade length: 4 – 50 ft
- Minimum cost: 48000 \$



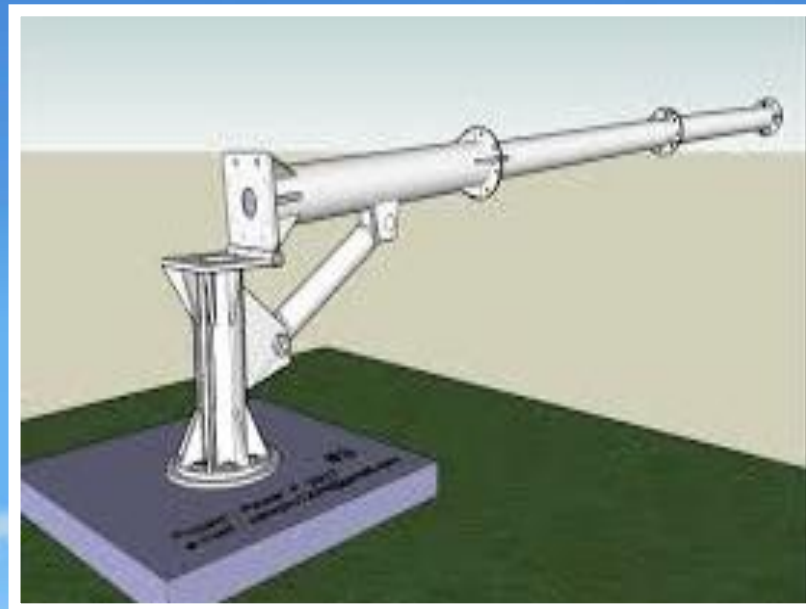
3 PROBLEM IDENTIFICATION

- A reoccurring problem with wind turbines is that they tend to catch fire where an average of 118 wind turbine catches fire each year.
- Wind turbines collapse and thus threaten the environment and neighboring citizens.
- An average of 14 workers from the maintenance team fall from the top of the wind turbines annually.



4 SOLUTIONS SUGGESTED IN THE LITERATURE

- Automatic fire suppression systems are currently available for wind turbines.
- Hydraulic systems are used to push down horizontally commercial wind turbine towers.

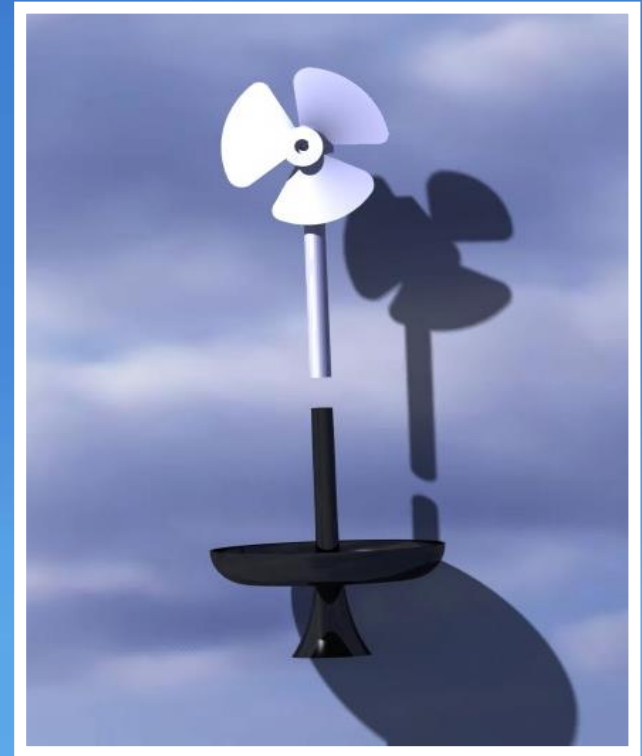


5 PROPOSED SOLUTION

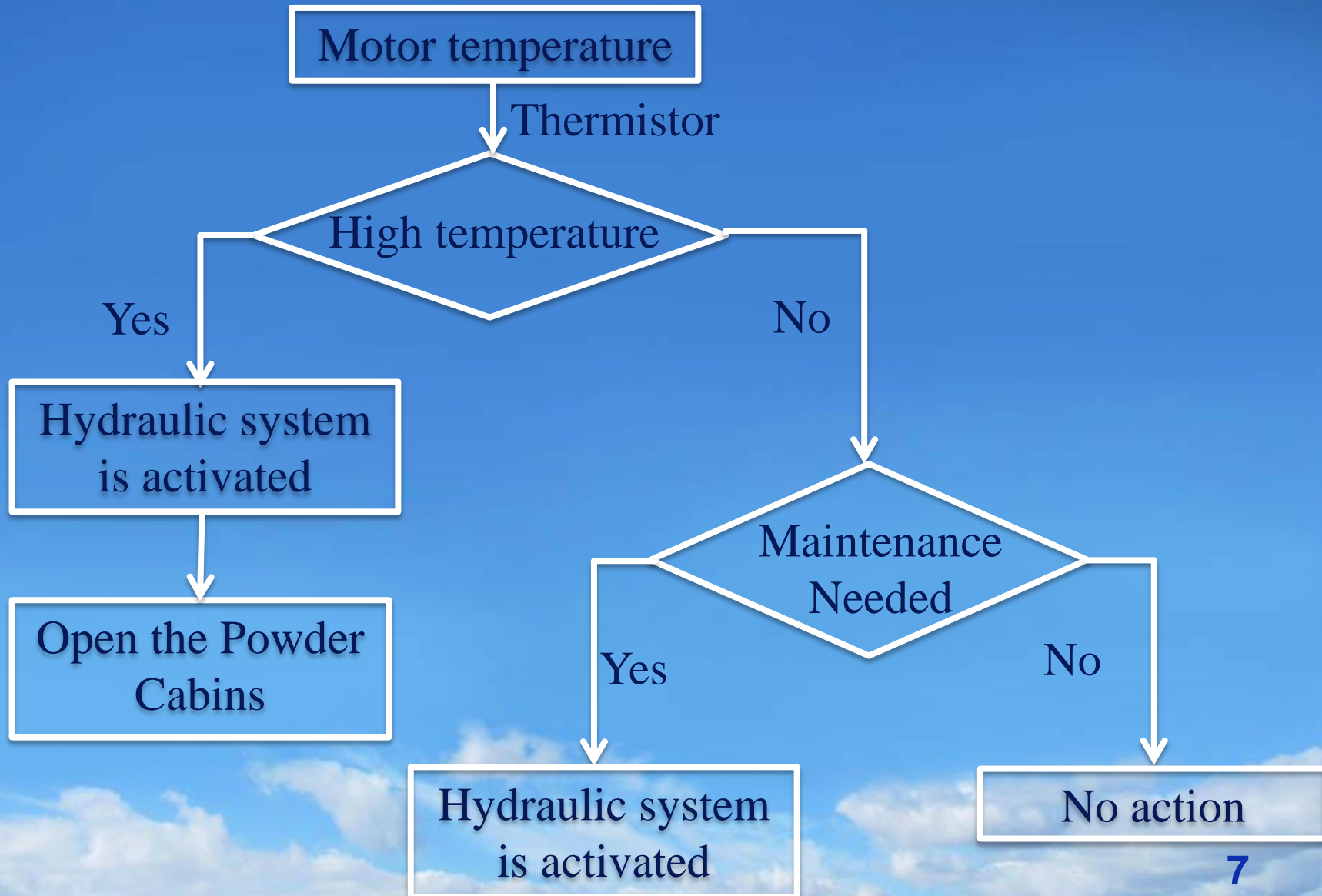
→ Starting from this point we propose:

- Placing a fire system in the nacelle of the wind turbine.
- Controlling the tower's length by the means of a hydraulic system.
- Placing a metallic plate on the tower.

Our design combines the two solutions that are currently available and discussed in the literature in addition to some improvements.

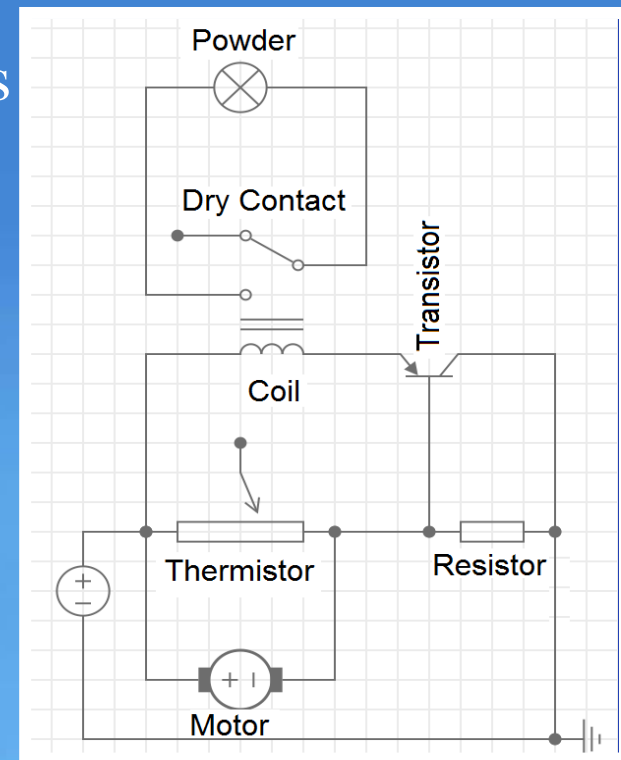


6 CONTROL SYSTEM FLOW CHART



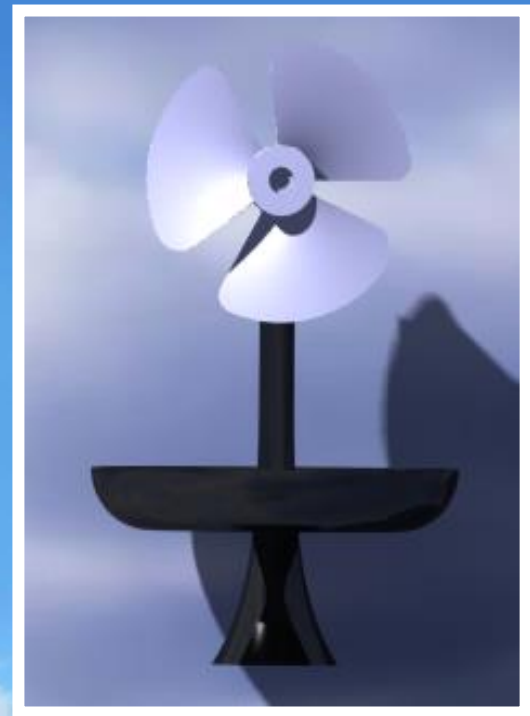
7 DESCRIPTION OF THE FIRE SYSTEM

- A thermistor is placed on the motor where it records the motor's temperature and its resistance varies accordingly.
- Another resistor with a specified resistance is connected to it.
- When the temperature increase a voltage is elaborated.
- This voltage is transmitted to the transistor and starts it up and thus causing the coil to work.
- Therefore, this would produce a contact causing the powder cabins to open.



7 DESCRIPTION OF THE HYDRAULIC SYSTEM

- The fan of the wind turbine is basically placed at a high altitude during its normal function.
- When fire occurs or when maintenance is needed the hydraulic system moves the fan downward to lower altitude.



8 SPECIFICATIONS OF THE DESIGN

- Fire suppression is maintained.
- In the case when fire isn't suppressed, falling bodies (blade parts..) are captured by the metallic plate placed around the tower body and thus protecting the surroundings from damage and fire .
- Maintenance processes are carried out in a safer and more comfortable environment since the maintenance team are able to control the height of the tower and they are protected by the surface supplied by the metallic plate.

8 SPECIFICATIONS OF THE DESIGN

PROBLEM	SOLUTION DELIVERED IN OUR DESIGN
fire	The fire system is activated whenever it detects fire.
Collapse	The hydraulic system is able to move the tower vertically near to the plate and the falling parts are captured by the plate.
Workers' death	The hydraulic system is able to move the tower to a lower altitude and thus ensuring a safer and easier maintenance process.

THANK YOU