

PROJECT TWO: MILESTONE 2 – COVER PAGE

Team Number: 26

Please list full names and MacID's of all *present* Team Members

| Full Name: | MacID: |
|-----------------|----------|
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MILESTONE 2 (STAGE 1) – REFINED PROBLEM STATEMENT FOR A WIND TURBINE

Team Number: 26

The Title of The Assigned Engineering Scenario

EWB Humanitarian Aid Mission

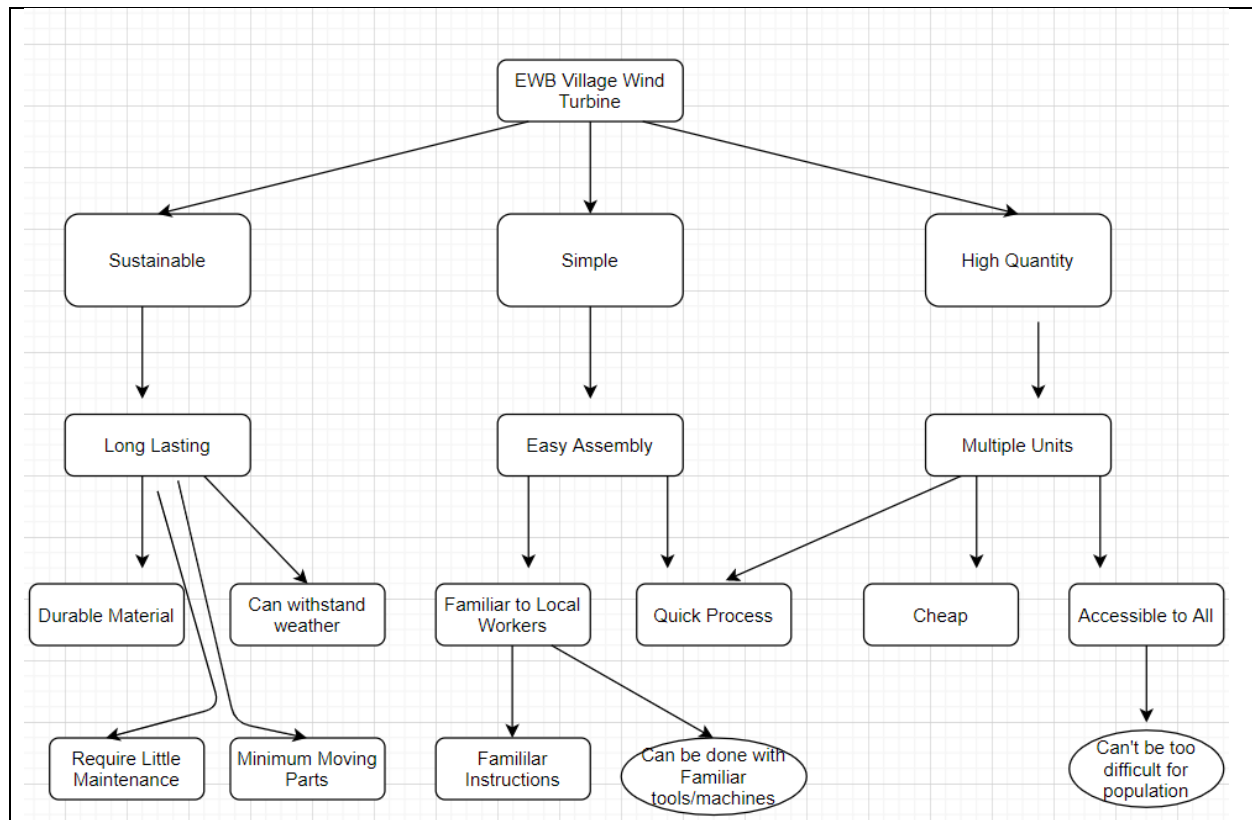
Write the Initial Problem Statement Below

→ This is a *copy-and-paste* submission of what you submitted for Milestone 1

The objective of this project is to create the ideal wind turbine. In order to achieve this, the design must be cost-effective and must maximize the efficiency of a turbine. The design should harvest the most amount of energy from the wind with optimal angles, materials, and motor functions given the environmental factors.

Finalized Objective Tree of Wind Turbine for Your Assigned Engineering Scenario

→ Please have a copy of your finalized team objective tree of wind turbine for your assigned engineering scenario.



Refined Problem Statement:

→ Write the refined problem statement for the design of wind turbine based on your assigned scenario.

The objective of the turbine in the following scenario is to create a design that should be long lasting and require little maintenance. The amount of energy produced should be just enough to power simple electrical devices. The turbine must be simple enough to assemble by local villagers in Quetzaltenango, Guatemala, and other inexperienced individuals. The materials used must be easily accessible and durable enough to withstand harsh weather conditions.

MILESTONE 2 (STAGE 2) – DESIGN REQUIREMENTS FOR A TURBINE *BLADE*

Team Number: 26

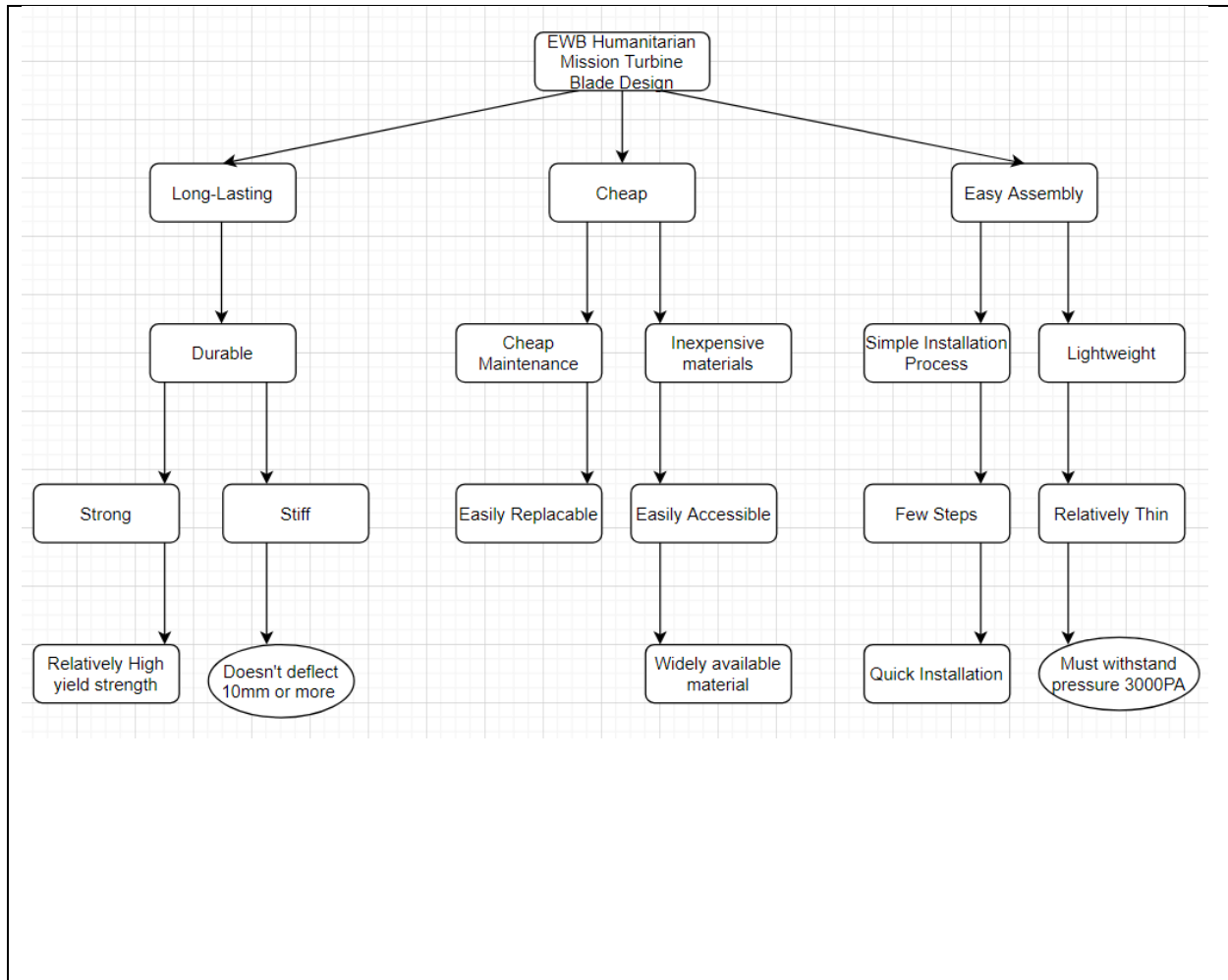
Turbine Blade Problem Statement:

- Write a complete problem statement for the design of turbine *blade* based on your assigned engineering scenario.

The objective of the turbine blade is to convert wind pressure into mechanical movement of the rotor. The blade should be strong enough to withstand high wind pressures of 3000Pa caused by windstorm. The maximum deflection the blade can withstand must be less than a threshold of 10mm.

Objective Tree of turbine blade for assigned engineering Scenario

- Please have a copy of your team objective tree for the design of turbine blade of your assigned engineering scenario.



MILESTONE 2 (STAGE 3) – SELECTION OF TOP OBJECTIVES FOR A TURBINE BLADE

Team Number: 26

List the top three objectives of a turbine blade for your assigned engineering scenario

- 1: Long-lasting
- 2: Quick Installation
- 3: Inexpensive material

Include a rationale for selecting each of these objectives

→ Write *maximum* 100 words for each objective

Objective 1: Long-lasting

Rationale:

The village requires an efficient power source that does not require a lot of maintenance. By prioritizing a long-lasting turbine blade this would allow the villagers to have a reliable power source. A long-lasting design will also consider the factors of high-pressure environments, deflection, internal bending stress and ensuring easy maintenance.

Objective 2: Quick Installation

Rationale:

Since the turbines are being installed by members of the villages, they are inexperienced with installation. With a quick installation process, it will allow for them to install multiple turbine blades in a short span of time which allows for more power to be harvested.

Objective 3: Inexpensive material

Rationale:

The turbine is being installed in a third world country, limiting the type of material used. By using an inexpensive material that is widely accessible, it will allow for numerous blades to be installed across villages.

MILESTONE 2 (STAGE 4) – METRICS

Team Number: 26

For your selected top three objectives fill out the table below with associated metrics (including units) for each objective.

| | |
|--------------|--------------------------------------|
| Objective 1: | Long-lasting |
| Unit/Metric: | 0: Failure – Breaks after first use. |

| | |
|--|---|
| | <p>1: Unsatisfactory - Breaks within a few months of use.</p> <p>2: Satisfactory - Lasts at least 6 months</p> <p>3: Good – Lasts one year.</p> <p>4: Excellent – Lasts a couple years.</p> |
|--|---|

| | |
|--------------|---|
| Objective 2: | Quick installation |
| Unit/Metric: | <p>0: Failure – Very difficult to understand and unable to install</p> <p>1: Unsatisfactory – Difficult to understand but able to install in a month</p> <p>2: Satisfactory – Able to install with a little difficulty but able to install in a week</p> <p>3: Good – Easy to understand and assemble within a few days</p> <p>4: Excellent – Very easy to understand and assemble within a day</p> |

| | |
|--------------|--|
| Objective 3: | Inexpensive material |
| Unit/Metric: | <p>0: Failure- Does not produce any blades</p> <p>1: Unsatisfactory- Barely produces enough blades for the village</p> <p>2: Satisfactory- Produces enough blades to supply energy for half a village</p> <p>3: Good- Produces enough blades for the village</p> <p>4: Excellent- Produces enough blades to supply energy for entire village with excess materials</p> |