Department of Mechanical Engineering
Academic Year 2021 – 2022 (Odd Semester)

Degree, Semester & Branch: VII Semester B.E. Mechanical
Course Code & Title: ME8072 Renewable Sources of Energy
Name of the Faculty member(s): Mr.R.Arun Kumar, AP/Mechanical

Innovative Practice Description

- **Unit / Topic:** Unit III / Wind Energy
- **Course Outcome:** CO3
- **Topic Learning Outcome:** TLO9
- **Activity Chosen:** Virtual Laboratory Utilization
- **Justification:** For explaining the concept of site selection parameters and to compare the performance of a same turbine at three different locations and to analyze the performance of a turbine by adjusting parameters for same location the virtual lab was used
- **Time Allotted for the Activity:** Spent first 10 minutes in explaining the virtual lab and the comparison parameter was spent with 10 minutes and then the theoretical concept was correlated with theoretical content. Then a week time was given to the students to execute the task given and submit the same as a report
- **Details of the Implementation:**

  For the topic "Site selection criteria for Wind farm installation", to make the students to understand better, the virtual laboratory "3M Wind Energy" developed by Young Scientist Laboratory was used. The tool enabled to design a wind farm in three different locations: a. Off – shore b. On – shore plains c. Hills

  The virtual lab also enabled to select the other design parameters including blade length, blade pitch, blade twist, tip shape, airfoil shape, height of turbine and 3M materials. Selection of these parameters at different locations helps to understand the impact of selection criteria in installing a wind turbine.

  To make the students to understand better, an assignment was given in which the students have to submit a report by practicing the experiment. The practicing was in such a way that the students have to keep 7 parameters fixed and alter any one parameter to generate three different results. This makes them to have a better clarity in selection criteria.

- **PO / PSO mapping:**

Innovative Practice	**PO5 (Modern Tool Usage)**	**PO7 (Environment and Sustain.)**	**PO10 (Communication)**	**PO12 (Lifelong learning)**	**PSO3 (Design thermal system)**
	3	2	3	2	3
Justification for correlation	Timely submission and plagiarism were checked for the report submitted	Role of wind turbine in environment protection is explained to the students	In report technical information will be interpreted in basic level and the same will be presented as a report. So, PO is mapped at level 3	Report enables students to analyze viability through technical content	Students will design a wind system for the given location by analyzing various implementation parameters

(1 – Low 2 – Moderate 3 – High)

- **CO – PO / PSO mapping:**

CO	**PO1**	**PO2**	**PO5**	**PO7**	**PO8**	**PO9**	**PO10**	**PO12**	**PSO3**
CO3	2	1	3	2	1	3	3	2	3

(1 – Low 2 – Moderate 3 – High)

- **Images / Screenshot of the practice:**

- **Reflective Critique:**
  - ***Feedback of practice from students and other stakeholders:***

    Based on the oral feedback collected from the students, they felt easy to understand the different parameters and the site location for installing a wind turbine
  - ***Benefit of the practice:***

    Students analyzed different parameters of consideration for designing a Wind Turbine

References: 3M Wind Energy Virtual Lab developed by Young Scientist Lab
https://www.youngscientistlab.com/sites/default/files/interactives/wind-energy/

CO3: Student will be able to analyze different parameters of consideration for designing a Wind Turbine

TO UNDERSTAND THE EFFICIENCY OF WIND TURBINE BY CHANGING AIRFOIL SHAPE

ME8072

RENEWABLE SOURCES OF ENERGY

ASSIGNMENT WORK

Submitted by

J R JERLIN NAFEL

In partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

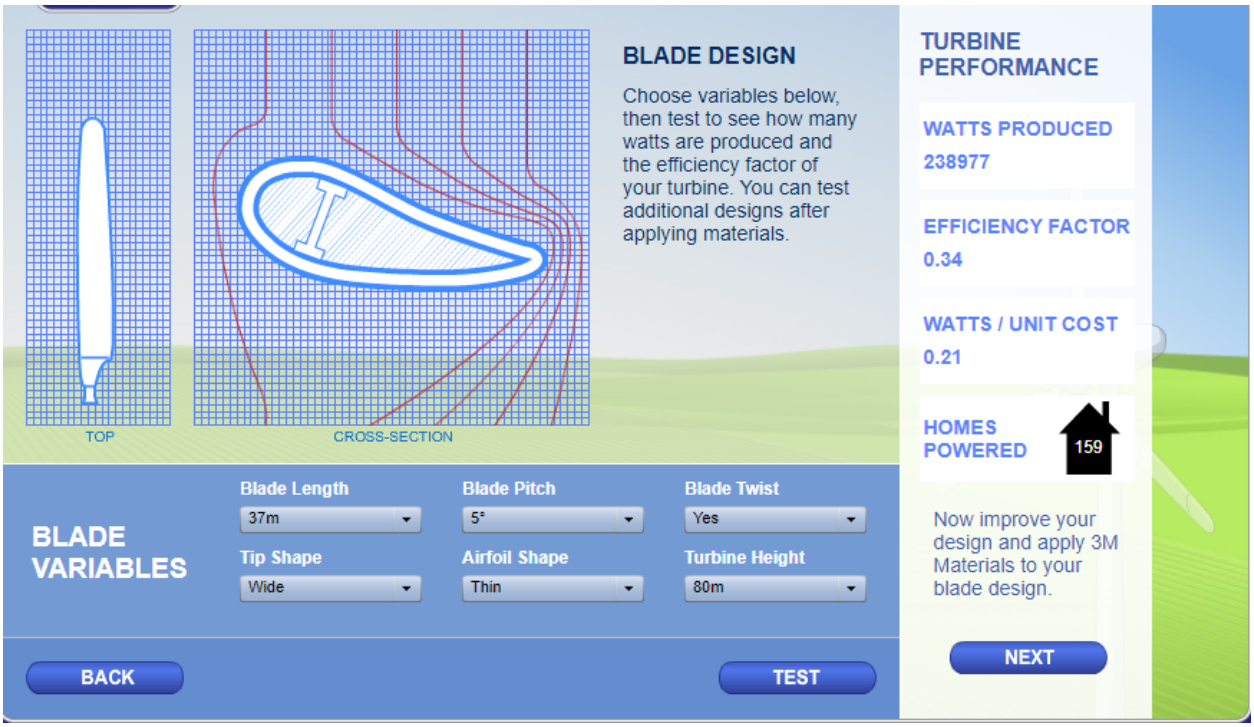
RAMCO INSTITUTE OF TECHNOLOGY, RAJAPALAYAM

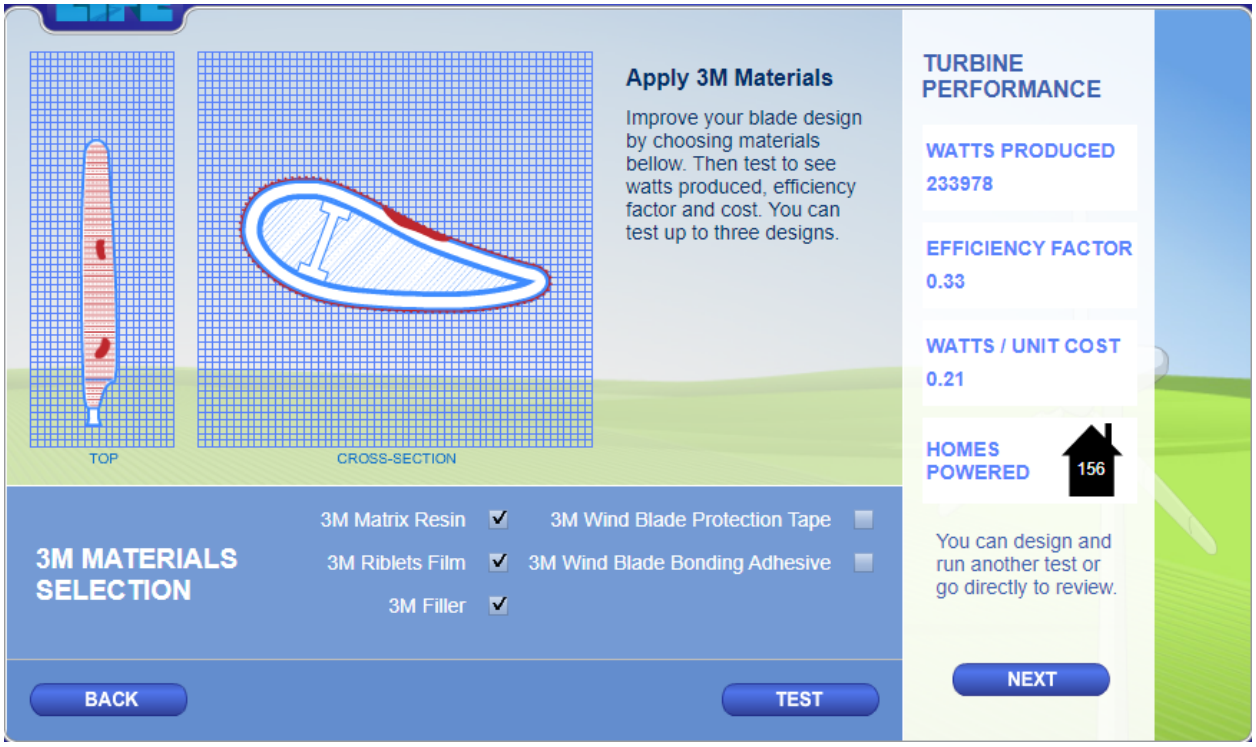
PROBLEM STATEMENT

To understand the efficiency of wind turbine by changing airfoil shape

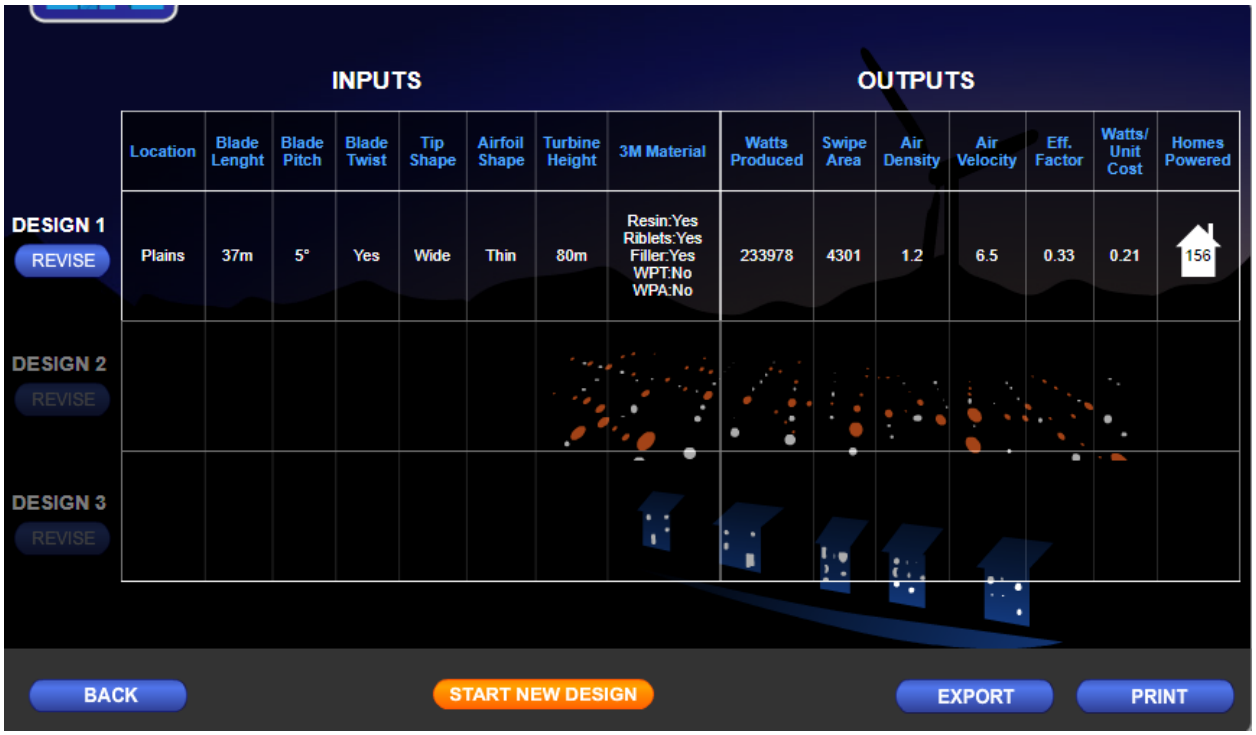
INPUTS IN DESIGN 1

- Location :Plains
- Blade Length: 37m
- Blade Pitch : 5°
- Blade Twist : Yes
- Tip shape : wide
- **Airfoil Shape: Thin**
- Turbine Height:80m
- 3M Material: resin, riblets, filler



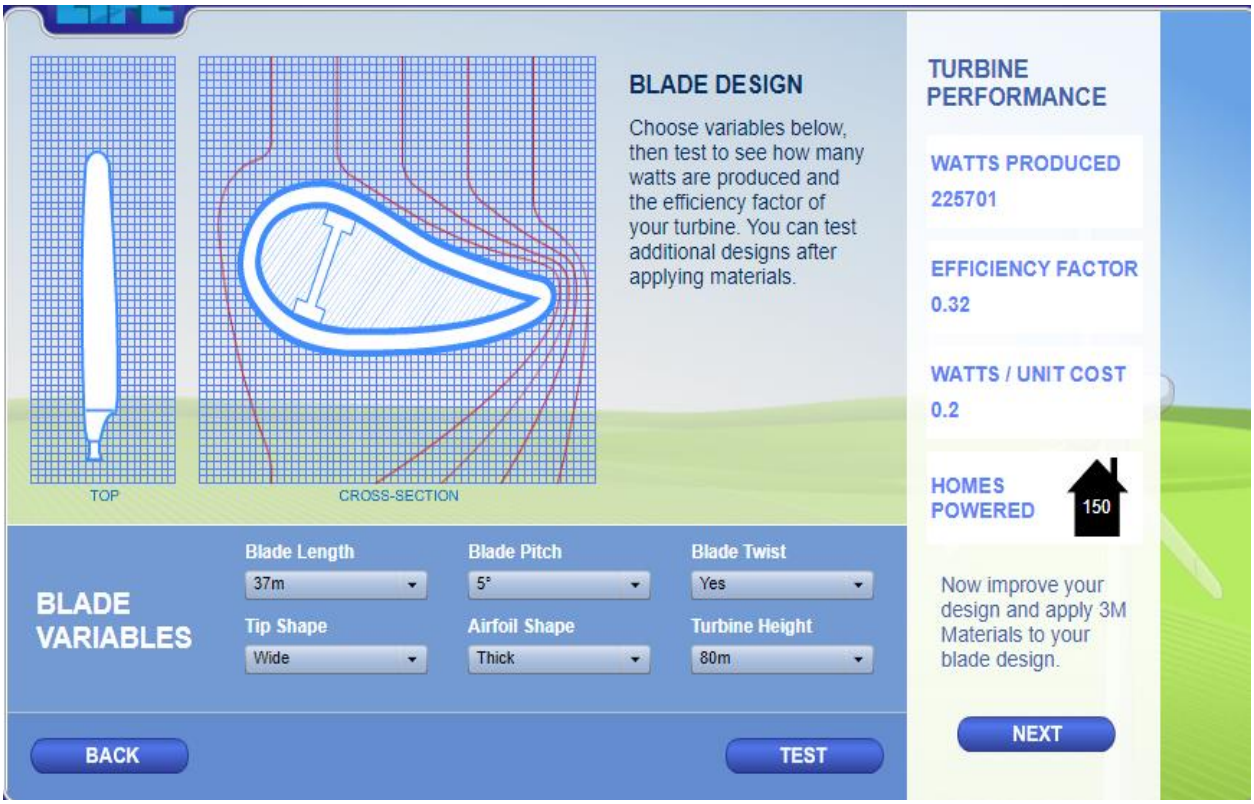


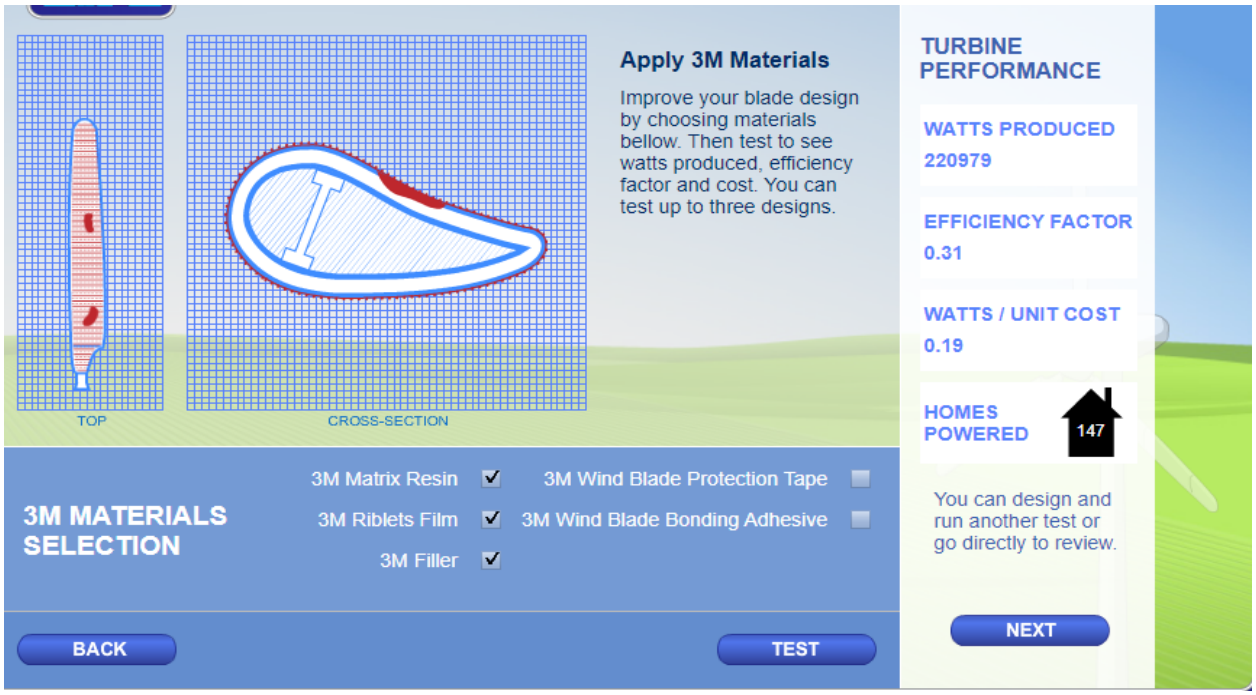
OUTPUT OF DESIGN 1



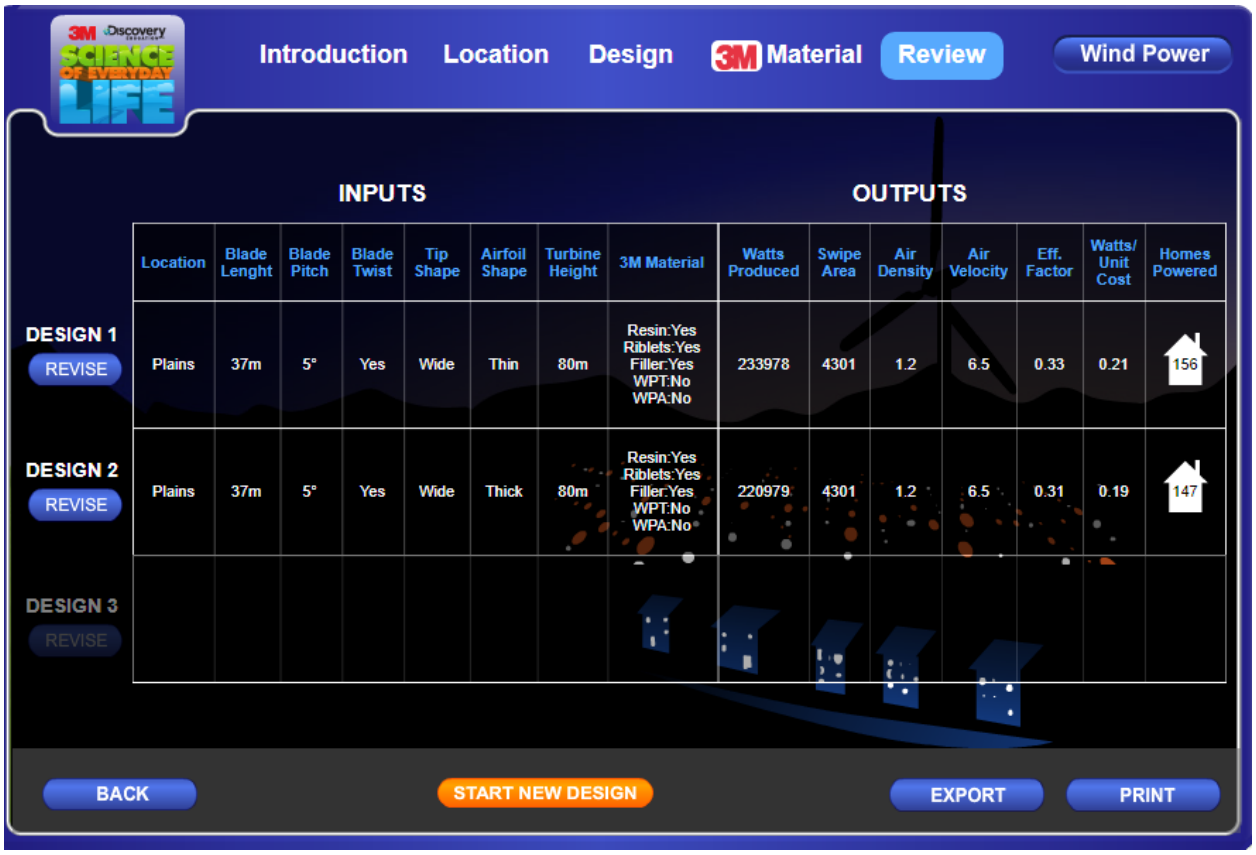
INPUTS IN DESIGN 2

- Location :Plains
- Blade Length: 37m
- Blade Pitch : 5°
- Blade Twist : Yes
- Tip shape : wide
- **Airfoil Shape: Thick**
- Turbine Height:80m
- 3M Material: resin, riblets, filler



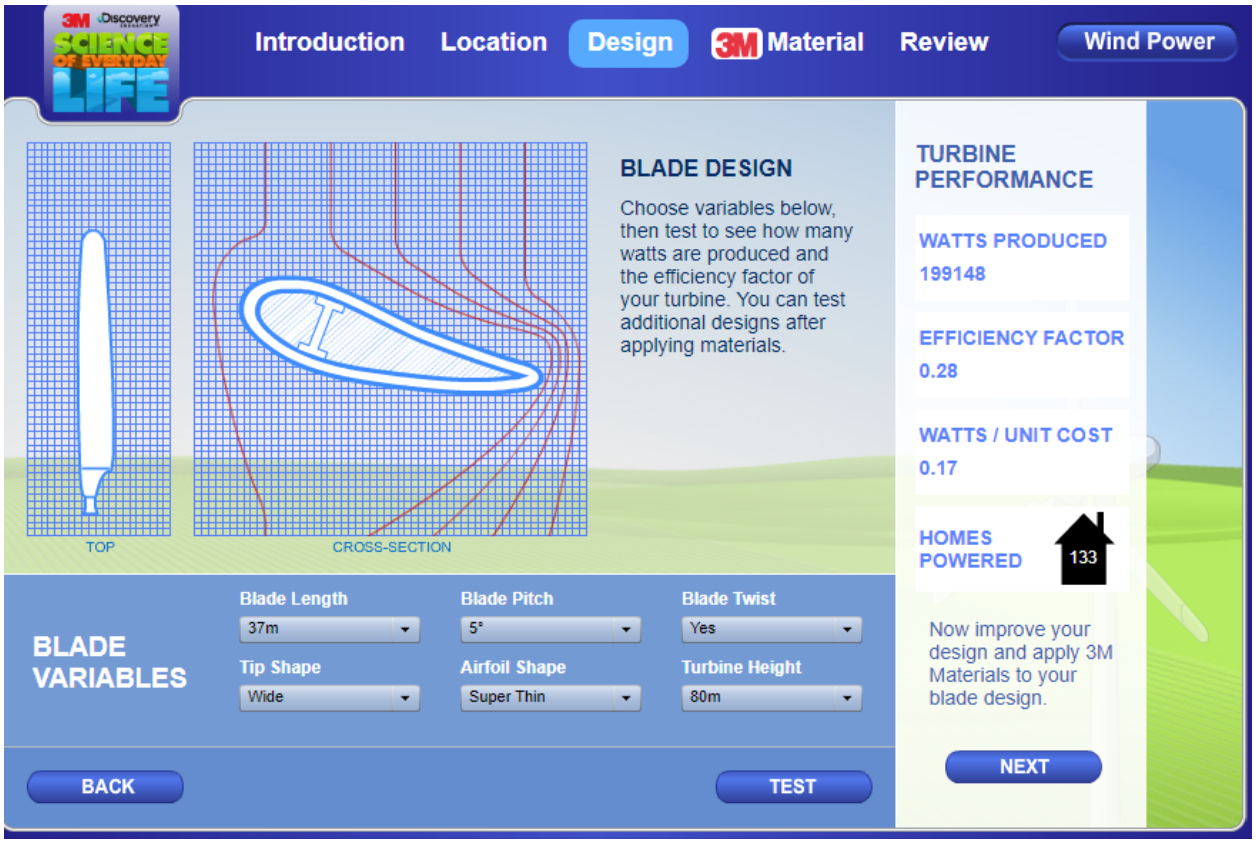


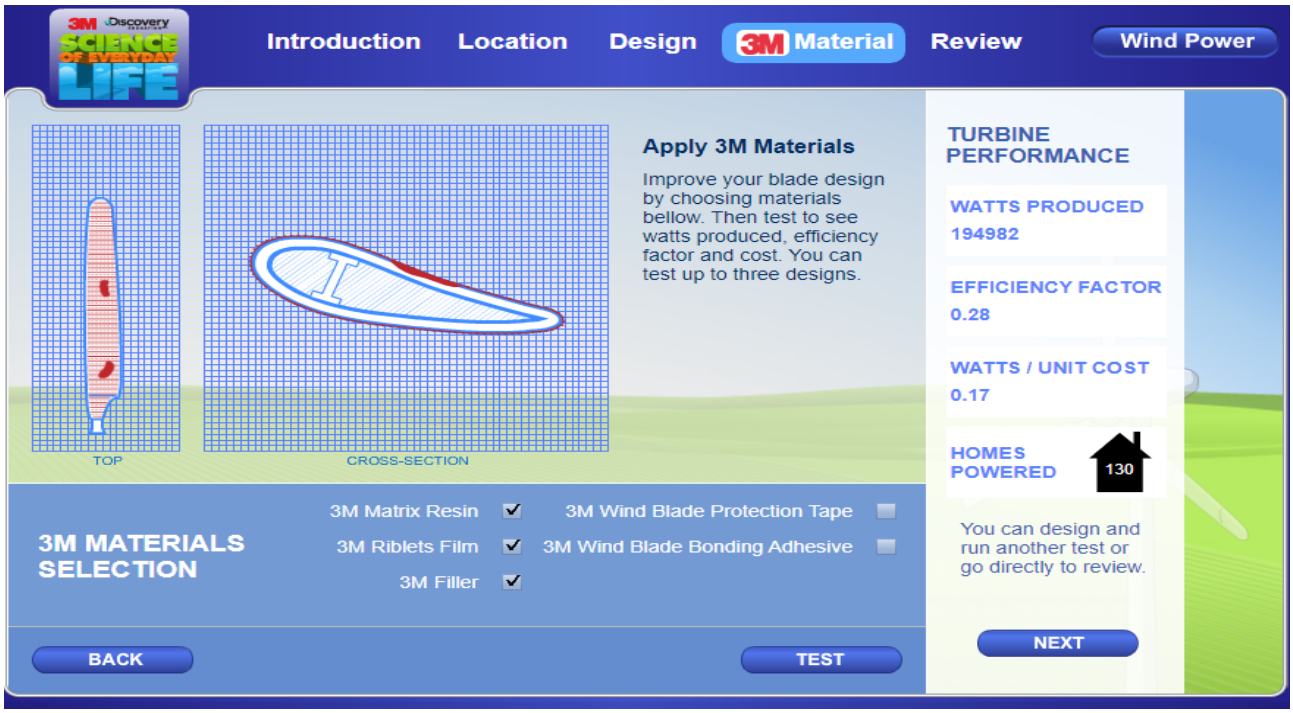
OUTPUT OF DESIGN 2



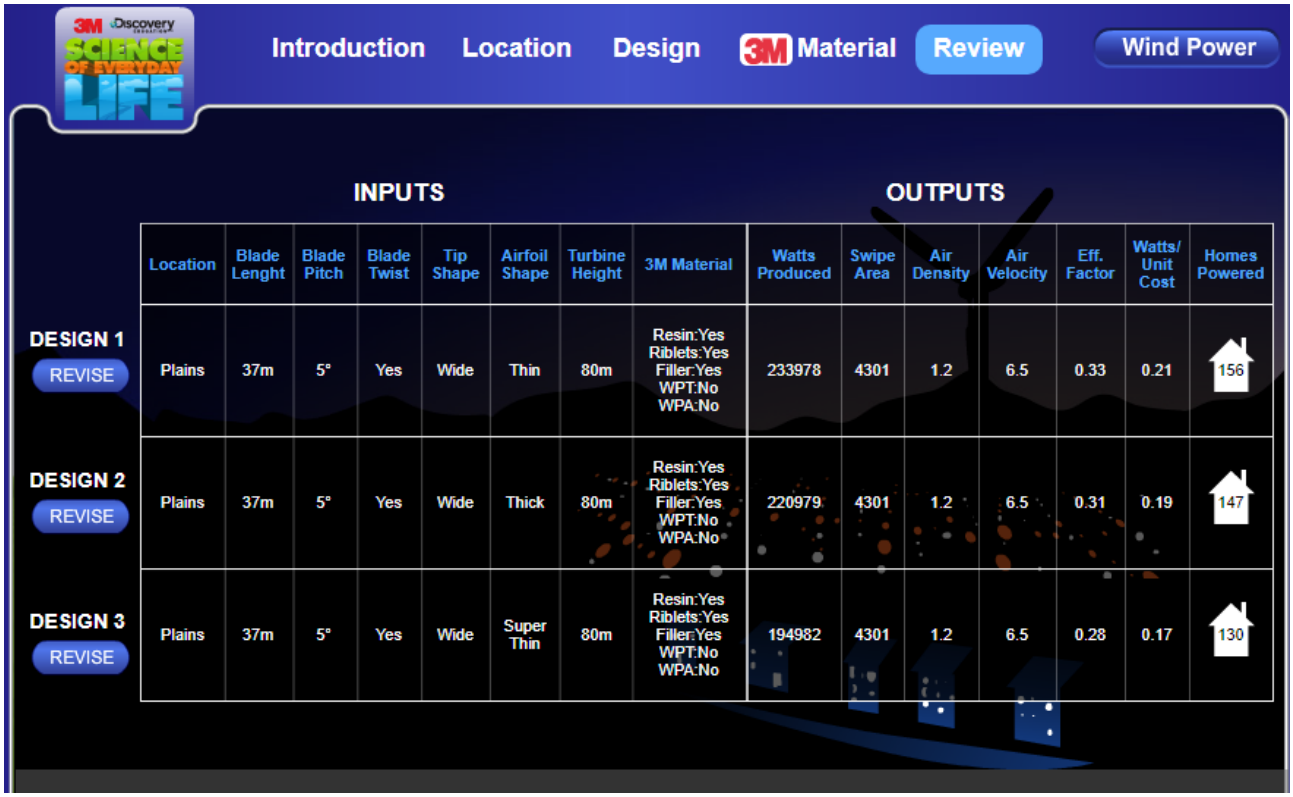
INPUTS IN DESIGN 3

- Location :Plains
- Blade Length: 37m
- Blade Pitch : 5°
- Blade Twist : Yes
- Tip shape : wide
- **Airfoil Shape: Super Thin**
- Turbine Height:80m
- 3M Material: resin, riblets, filler





OUTPUT OF DESIGN 3



INFERENCE

When comparing the three different airfoil shapes, the **THIN AIRFOIL** has the highest efficiency.

In Thicker airfoils do not experience flow separation until considerably higher angles of attack, resulting in more lift and less drag as the angle of attack increases but Thin airfoils encounter flow separation over the top surface, resulting in significantly increased drag and a loss of lift.

By increasing the airfoil thickness, the leading edge radius increases becoming smoother, and leading the laminar bubble to resist to full flow separation at higher angles of attack. So thin airfoil is high efficiency

Submitted: Nov 27 at 6:10pm

Student Viewed Document: Nov 30 at 2:51pm

Submitted Files: (click to load)

J R JERLIN NAFEL_RSE_ASSIGNMENT.pdf

Assessment

Grade out of 15

15

View Rubric

Some Rubric

Criteria	Ratings	
Timely Submission	**Excellent** Submitting on or before time **Comments** Good efforts Jerlin.	2 / 2 pts
Utilizing the 3M lab and including screenshots (PI 5.2.2)	**Excellent** Presenting all the three conditions' screenshots **Comments** Great efforts	4 / 4 pts
Plagiarism (PI 8.1.1)	**Excellent** Students not copying content of others **Comments** Excellent efforts pa	1 / 1 pts
Content of the assignment (PI 9.3.1 & 12.3.1)	**Excellent** Justification for all three conditions is given in an understandable way with result screenshot **Comments** Justification is pleasing and convincible. Excellent	5 / 5 pts
Presentation (PI 10.1.3)	**Excellent** Impressive presentation with properly aligned content with title page **Comments** Impressive presentation with good alignment	3 / 3 pts
		Total Points: 15

Assignment Comments

Good efforts Jerlin

(javascript:void 0;)

Arun Kumar R, Dec 1 at 4:08pm

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Add a Comment

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