

# SUSTAINABLE CAPSTONE PROJECTS ( SCAP )

## Mini Steam Power Plant Design and Construction

### GROUP MEMBERS

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### INTRODUCTION

A mini steam power plant is a fascinating project that allows you to harness the power of steam to generate electricity. It combines engineering principles with hands-on fabrication, offering an exciting opportunity to learn about thermodynamics, energy conversion, and mechanical systems.

By designing and manufacturing a mini steam power plant, you can experience the thrill of creating a functional system that converts heat energy into mechanical work and, ultimately, electrical power.

Steam can be used for electricity generation using very low power using some heat from a candle using this mechanism. Our system demonstrates the use of this concept using a smartly designed mechanical generator. Our generator consists of a narrow funnel based container that is used to store water. This container is treated as a boiler. The heated boiler boils the water and pushes out steam with this pressure. Now we use a motor generator with a custom designed propeller blade. This blade moves due to the pressurized steam force and in turn runs the generator motor. Thus an electric current is generated in this motor and is available at output

### FINAL PRODUCT

#### Working Principle of the Steam Turbine

A Steam Turbine is a mechanical device that extracts thermal energy from pressurized steam and transforms it into mechanical work. As the name implies, a steam turbine is powered by steam. As hot, gaseous steam flows past the turbine's spinning blades, steam expands and cools, giving off most of the energy it contains. This steam spins the blades continuously. The blades thus convert most of the steam's potential energy into kinetic energy. The turbine is then used to run a generator, producing electricity

#### System Design and Final Product

The cylindrical box we used in the project will serve as our water storage and boiler. By cutting the radio antenna as a nozzle, we ensured that the hot steam formed is transmitted to the turbine blades. A computer fan is used as turbine blades and is connected to a mini dc motor to generate electricity from it. We used candles as the heat source, the heated boiler boils the water and gives out the steam with this pressure. The fan we use moves with the help of this pressurized steam, and in return, it starts the generator motor and an electric current is produced.

### RESULTS AND DISCUSSION

After designed the mini steam power plant when we testing it we saw that the pressurized steam was given out but could not rotate the turbine. Possible reasons for this, There may be reasons such as insufficient thermal source, wrong fan design, small diameter of the nozzle. We've done a lot of fan designs and boiler replacements, but we haven't been able to get enough pressurized steam to turn the turbine.

### MATERIALS USED IN CONSTRUCTION

#### Re-Used/Recycled Materials:

- Cylindrical steel perfume box
- Wood Plate
- Radio Anthena
- Screws
- Supporter

#### Other Materials:

- DC Motor
- Fan/Propeller
- Candles

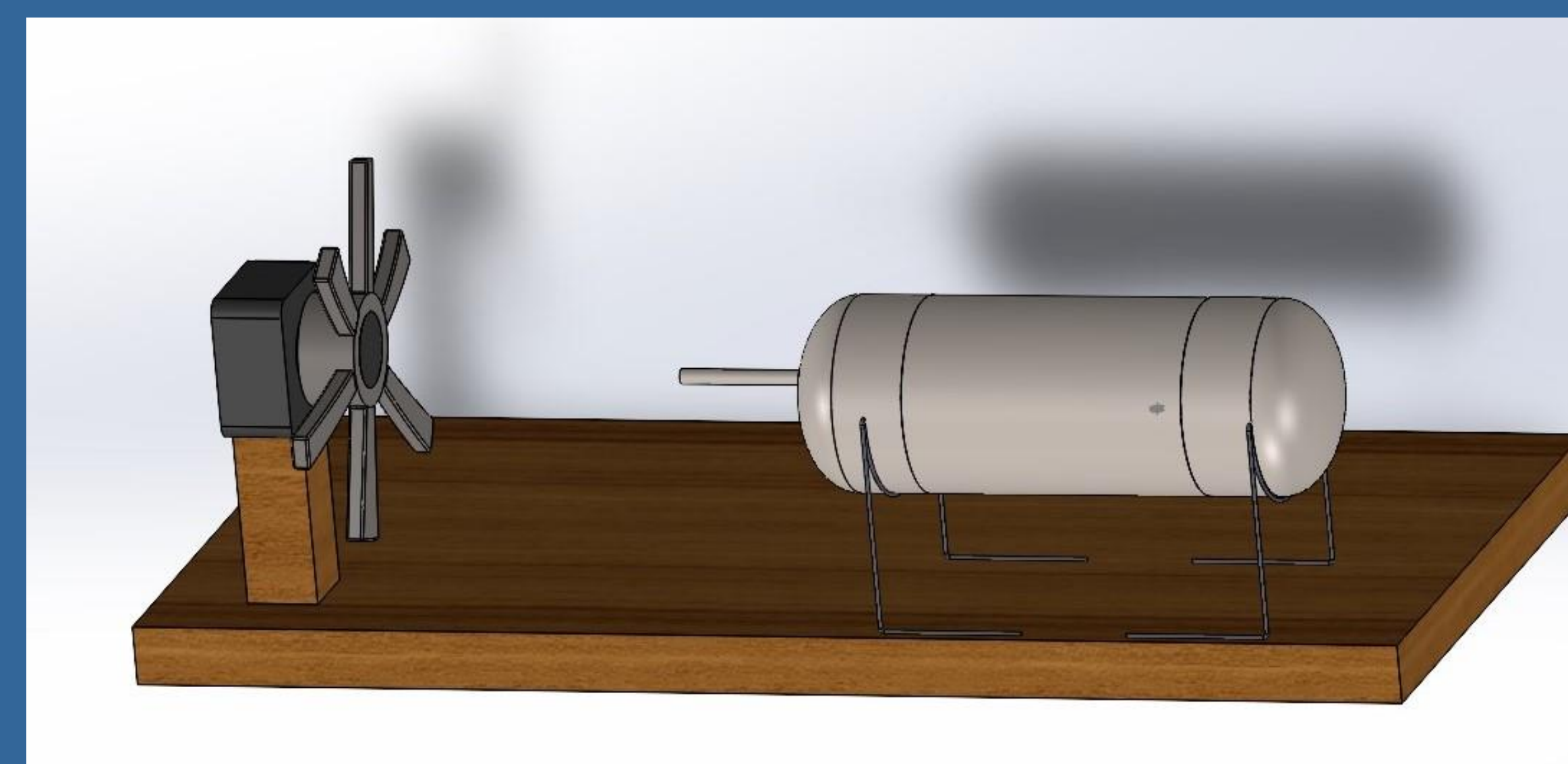


Figure 1. Cad design of the Mini Steam Power Plant.



Figure 2. Real Design of the Mini Steam Power Plant.

### CONCLUSIONS

As stated in the discussion section, the designed project could not turn the turbine blades because it could not produce enough pressurized steam and therefore no electricity was produced. Possible reasons for this are again explained in the discussion section. As graduate students, we have gained a lot of experience thanks to this SCAP project, the cooperation of many groups has improved our teamwork direction, the use of sustainable materials, which is the main purpose of the project, has given us experience in using recyclable materials better and more accurately. At the same time, thanks to this project, practicing the lessons we have seen theoretically in the past has again added experience to us. That's why we would like to thank our doctors who thought about organizing this project..

### REFERENCES

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