

# SUSTAINABLE CAPSTONE PROJECTS ( SCAP )

## Stirling engine design and construction

### GROUP [ 8 ] MEMBERS



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### INTRODUCTION

#### "Unleashing Power from Scrap: Introducing Our Stirling Engine

Discover the incredible potential hidden within discarded materials. Our project presents a Stirling engine ingeniously built from salvaged parts. Witness the transformation of scrap into a powerful energy source as we repurpose waste materials, demonstrating the essence of sustainability and resourcefulness. Join us on this inspiring journey towards a greener future through innovation and renewable energy solutions."

A Stirling engine is a heat engine that is operated by the cyclic compression and expansion of air or other gas (the working fluid) between different temperatures, resulting in a net conversion of heat energy to (Work output ) .

### FINAL PRODUCT

Our project consists of a simple idea using the following tools: a syringe, small connecting tube, metal spray can, discs, generator and wooden stands .

#### HOW IT WORKS ?

By burning the bottom of the metallic spray can until there is a temperature difference between the bottom and top of the can, this temperature differential will cause an expansion, resulting in a movement of the syringe plunger. The syringe plunger is already connected to a linkage, which is further connected to a flywheel (CD). As a result, the CD will rotate, and this rotation will compress the plunger. The cycle will repeat as long as there is a temperature difference between the two surfaces. Each rotation of the CD will generate electricity because it is connected to a generator that converts mechanical energy into electrical energy.

### RESULTS AND DISCUSSION

In the results of our experiment, we found out that our project has demonstrated the main theory behind the temperature change principle which is the compression and expansion theory, and it changes the heat energy into Mechanical Energy, which is the basic function of a Stirling engine.

During our experiment, we found out that analytical experimentation is slightly different from real-life experimentation, as we faced a lot of friction issues which were kept as an assumption in our experiment, there is a human error while making the pieces and since these are scrap material we faced difficulties in measuring the exact values of the parts, but in the end after a lot of trial and error, we are successfully able to prove the theory.

### MATERIALS USED IN CONSTRUCTION

Since we found some difficulties in finding all materials in the scraps ,warehouse ,computer center and our homes even ,these two lists represent the most important things we used in our project .

#### Re-Used/Recycled Materials:

- Shaft
- Bicycle wheel
- CD-R
- Cans
- Deodorant spray can
- Wood blocks
- Generator
- Wood plates .
- Toys

#### Other Materials:

- Led testing lights
- Epoxy glow
- Medical Syringe
- Wires
- Machinery oil (Lubricant )
- Medical Syringe
- Wires

### CONCLUSIONS

in conclusion, the SCAP is project brilliant program that supports us as students to discover a lot of solutions to build a green future, as well as that we notice the difficulty of converting the theoretical part of engineering into real engineering projects nevertheless we will keep looking for a green future besides improving our skills as future engineers to fill the gap between the two parts.

### REFERENCES

1. <https://www.explainthatstuff.com/how-stirling-engines-work.html>

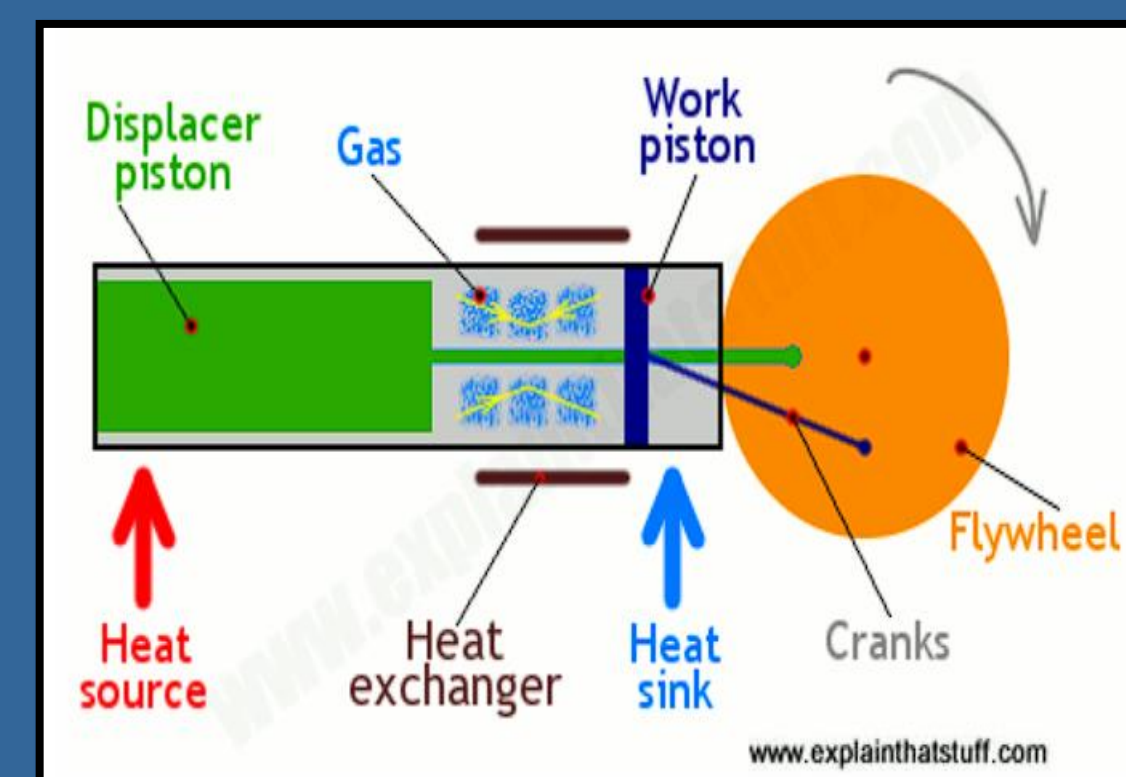


Figure 1. Shows how the engine works.

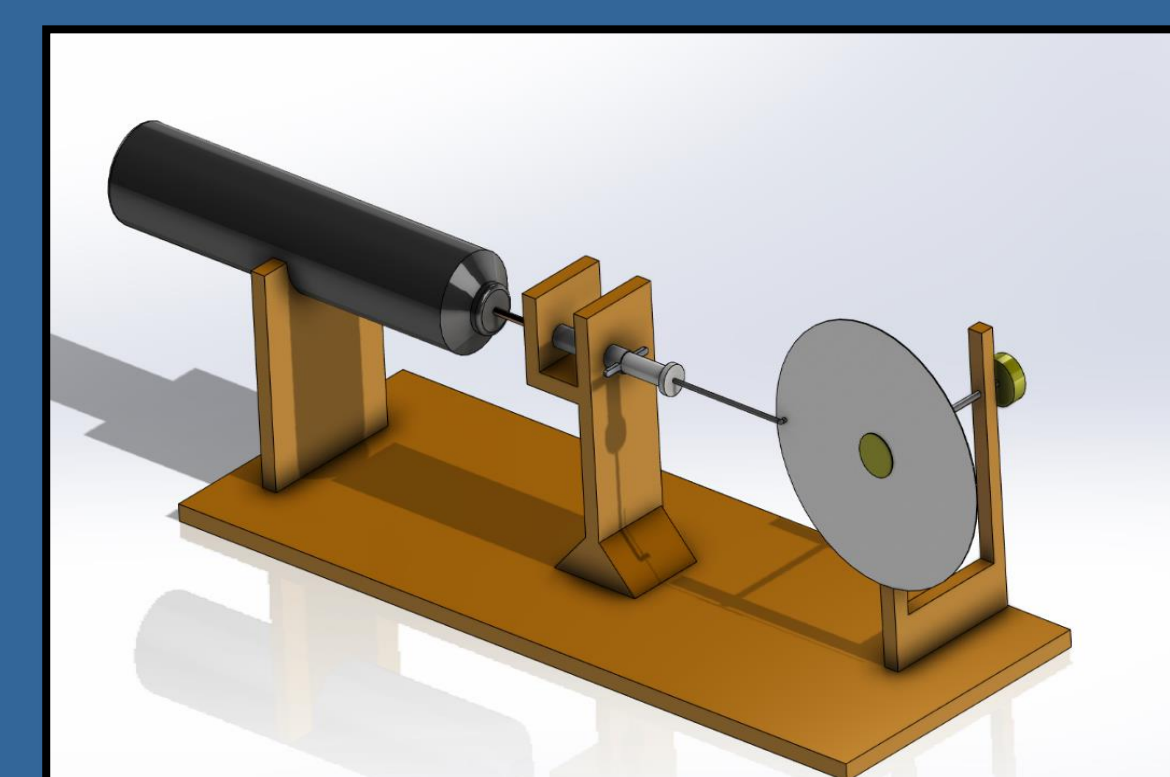


Figure 2.Final design .

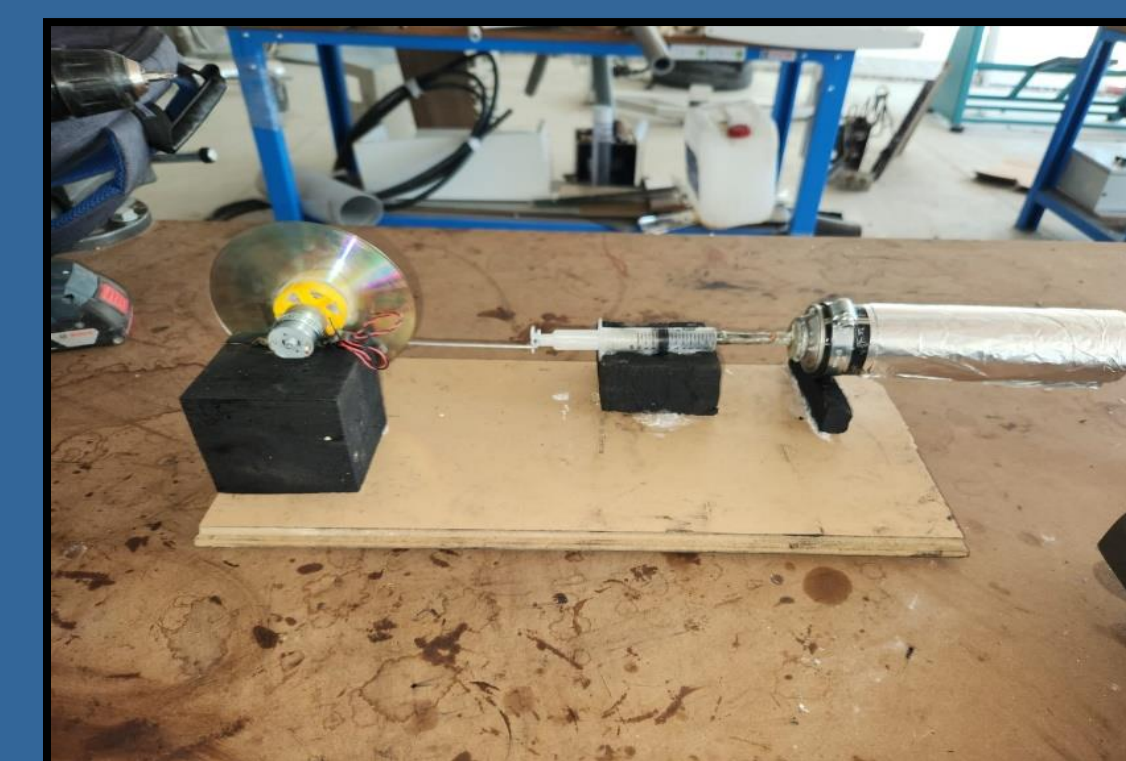


Figure 3. Back view for the engine .



Table 1. Label in 24pt Arial.