

# **Design and Assembly of a Vertical Stirling Engine**

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Entry no. - 2023meh1363

**Objective** - To design and assemble a vertical stirling machine to demonstrate the structural and mechanical aspects of engine functionally.

**Problem statement-** The project aims to create a detailed model of vertical stirling engine which serves as a practical representation of internal combustion engine. This model aids in understanding the assembly and operational principles of multi cylinder engines used in automobiles.

**Description-** This project involves the CAD modeling and assembly of a vertical stirling engine designed to showcase the core components power piston, hot cylinder, cold cylinder, flywheel, Heat source, seals and bearings. This engine model serves as a visual and functional reference for analyzing engine mechanics. This report includes the assembly's core elements and references to support the design and assembly methodologies.

**Design and Assembly process** The project's design and assembly phases involve several steps each crucial for achieving a realistic engine model. Using CAD software the design was approached in modular phases to simplify complex assemblies. The following steps were involved:

1. Component Modelling - Each part was individually designed in CAD to scale using measurement based on actual engine specifications. Accurate modeling of each component ensured that they could fit together seamlessly during assembly.

2 Assembly phase - once the components were designed, they were assembled in the CAD software. Constraints were applied to ensure correct alignment and

moment stimulation .Testing was performed to verify that each part functions as intended.

3 Trouble shooting - Throught the assembly, minor adjustments were required to achieve the best fit . This is to create a smooth working engine model.

### **Applications -**

#### Small-Scale Power Generation

- Used to generate electricity in off-grid areas with renewable heat sources like solar or biomass.
- Can power low-energy devices or charge batteries.

#### Renewable Energy Integration

- Converts solar thermal energy or waste heat into mechanical energy.
- Enhances the efficiency of hybrid energy systems.

#### Heat Recovery Systems

- Captures and converts waste heat from industrial processes into usable energy.

**Conclusion** - The vertical Stirling engine project demonstrates efficient energy conversion using a compact, precise design developed through CAD tools. It highlights the engine's potential for educational and renewable energy applications, showcasing sustainability and practicality. This project serves as a foundation for future advancements in energy systems.

