

# Applications of Free Piston Engine Linear Generator

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# PRESENTATION OUTLINE

**BACKGROUND**

**PRESENTATION OBJECTIVES**

**OPERATION PRINCIPLE OF FPELG**

**APPLICATIONS**

**CONCLUSION**



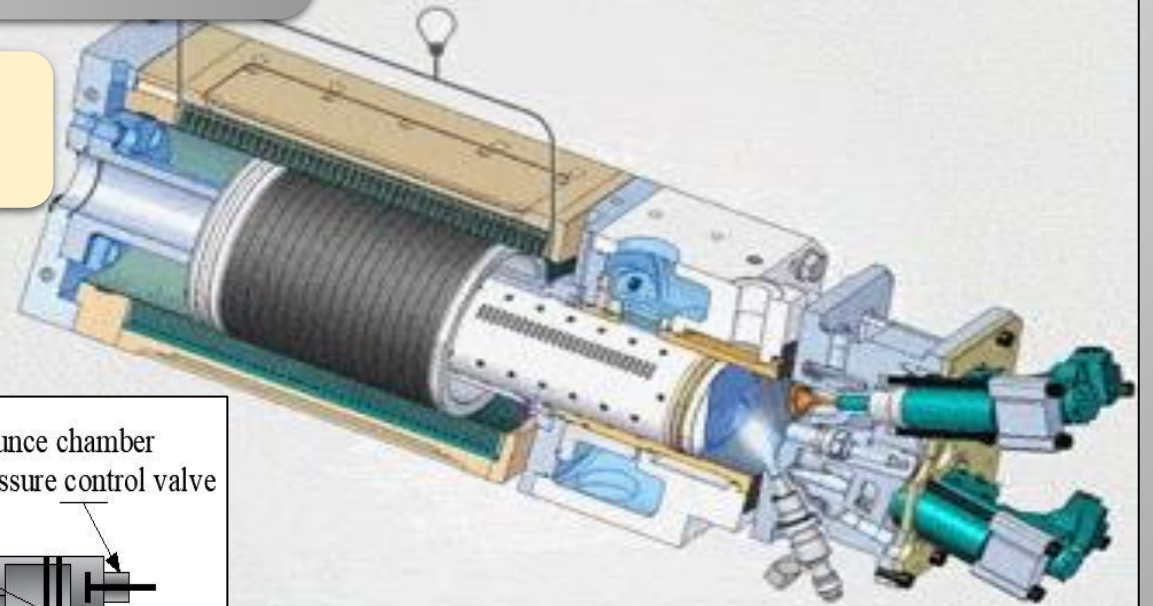
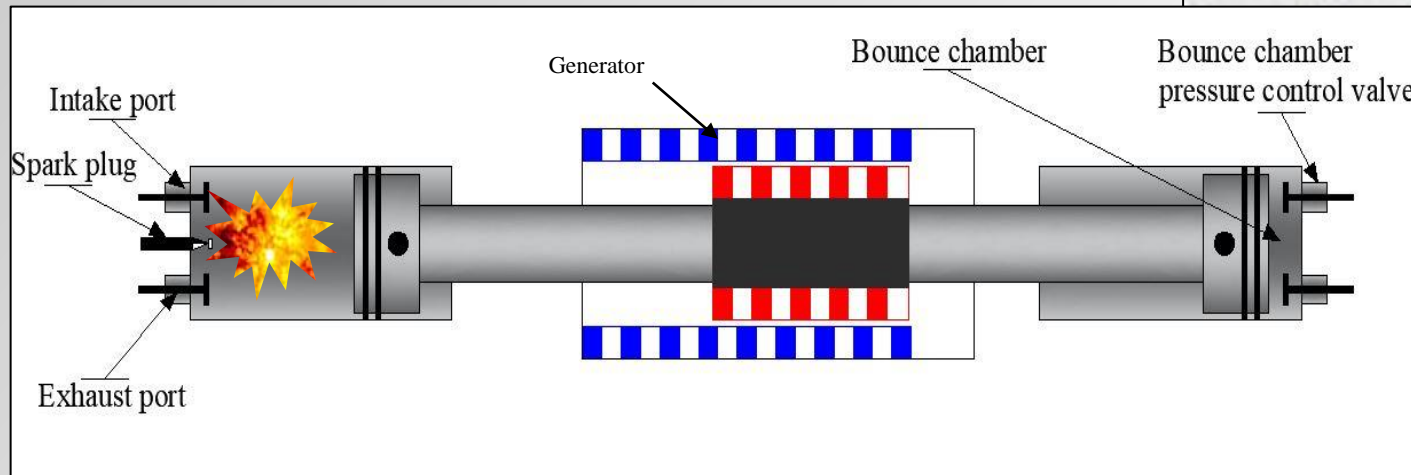
# BACKGROUND

## Free Piston Engine

A Free Piston Engine (FPE) is a new kind of an internal combustion engine without crank shaft, compared with a conventional internal combustion engine

FPE was constructed for the first time around 1928, several designs have been proposed utilizing the FPE concept

### Components

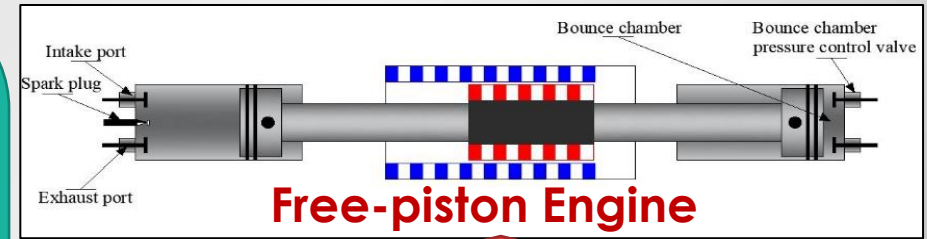


# BACKGROUND

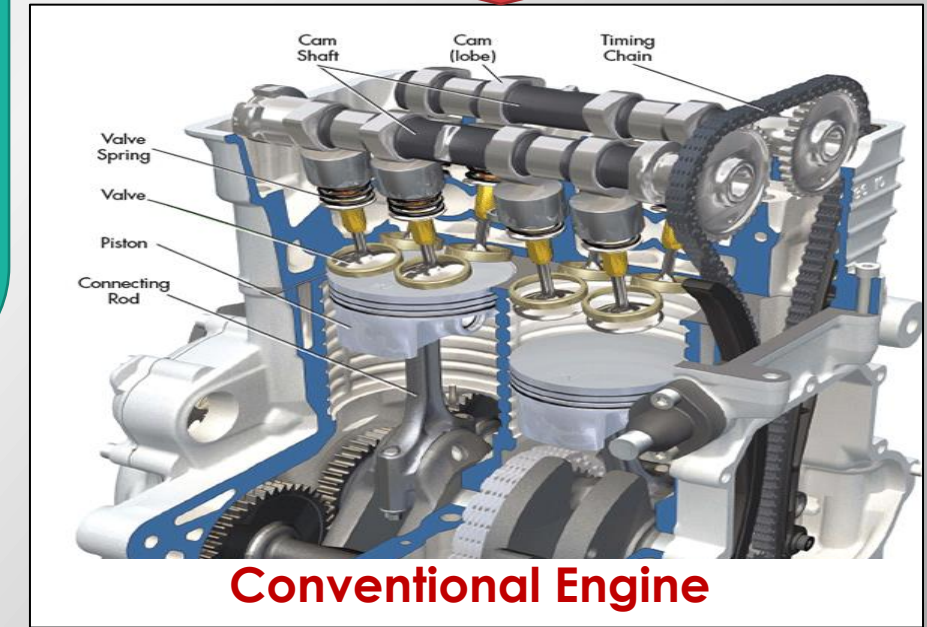
## Advantages

Free Piston Engine Linear Generator (FPELG) is an alternative of a conventional engines, and it is a **promising** power generation system due to its simplicity and high thermal efficiency. which is **expected** to become an alternative auxiliary power unit for the next generation of hybrid vehicles series.

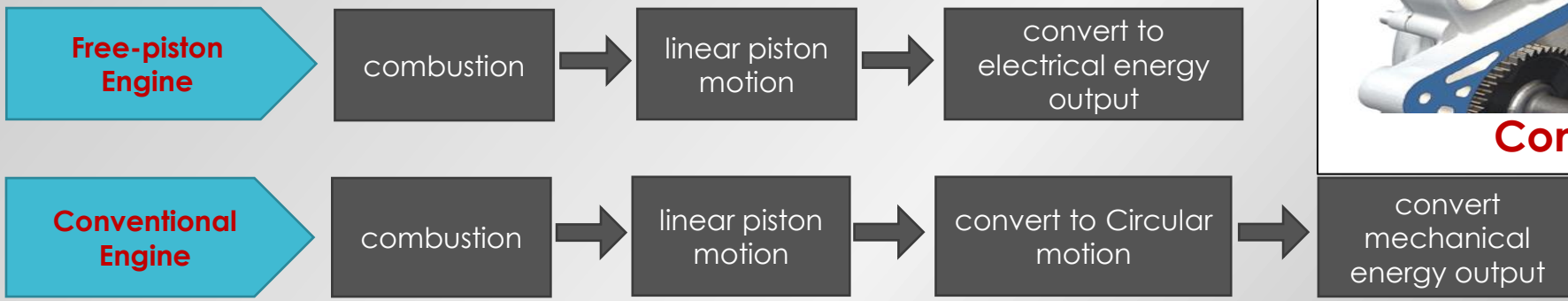
**Less parts.. less friction, Multi fuel type engine, less emission and high efficiency compare with conventional engine**



**Free-piston Engine**



**Conventional Engine**





Novel energy system



1

Benefits to the economy

2

Benefits to the engine efficiency

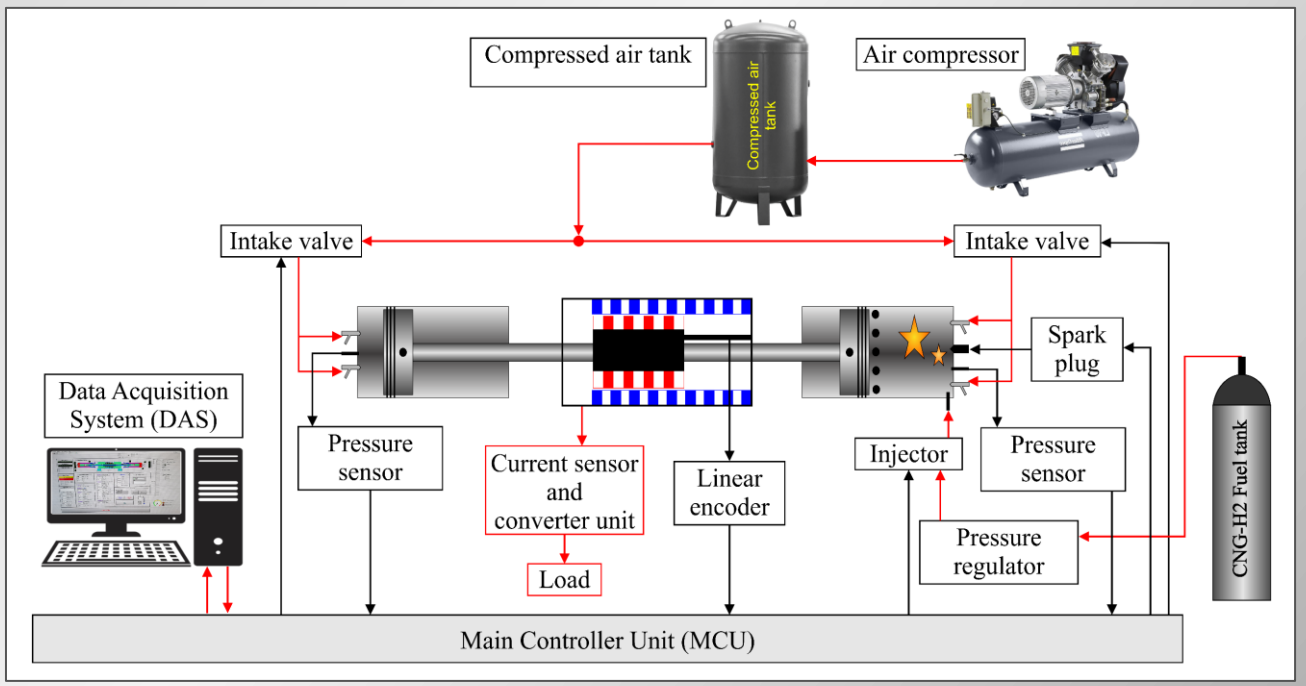
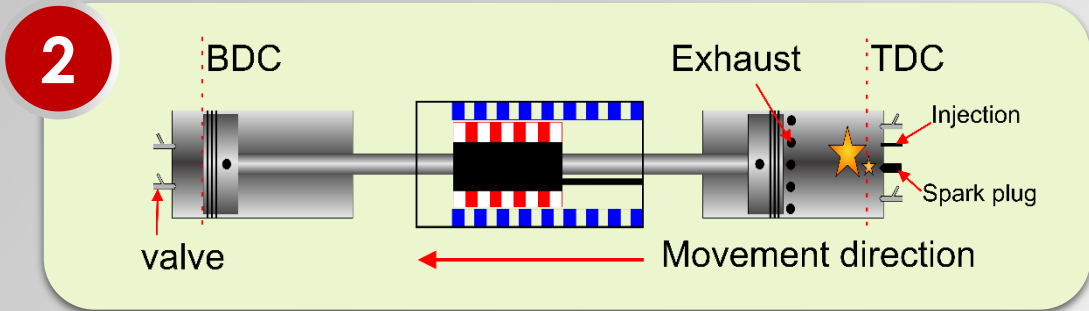
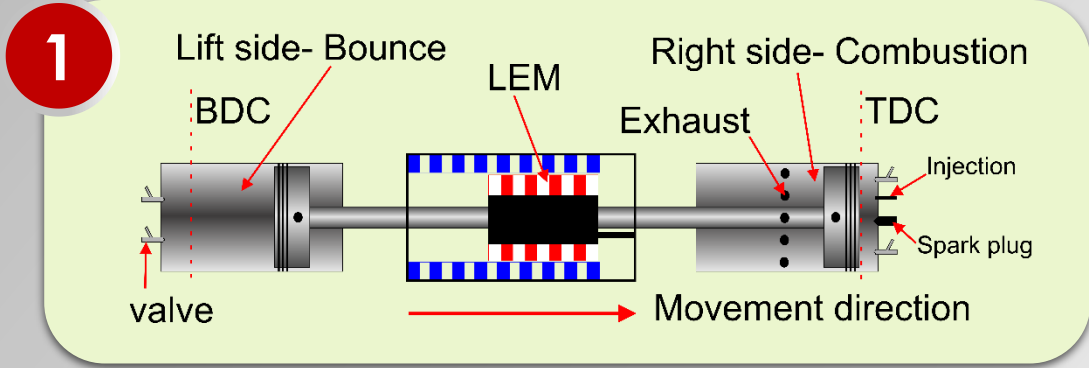
3

Benefits to Emissions

4

Benefits to fuel types

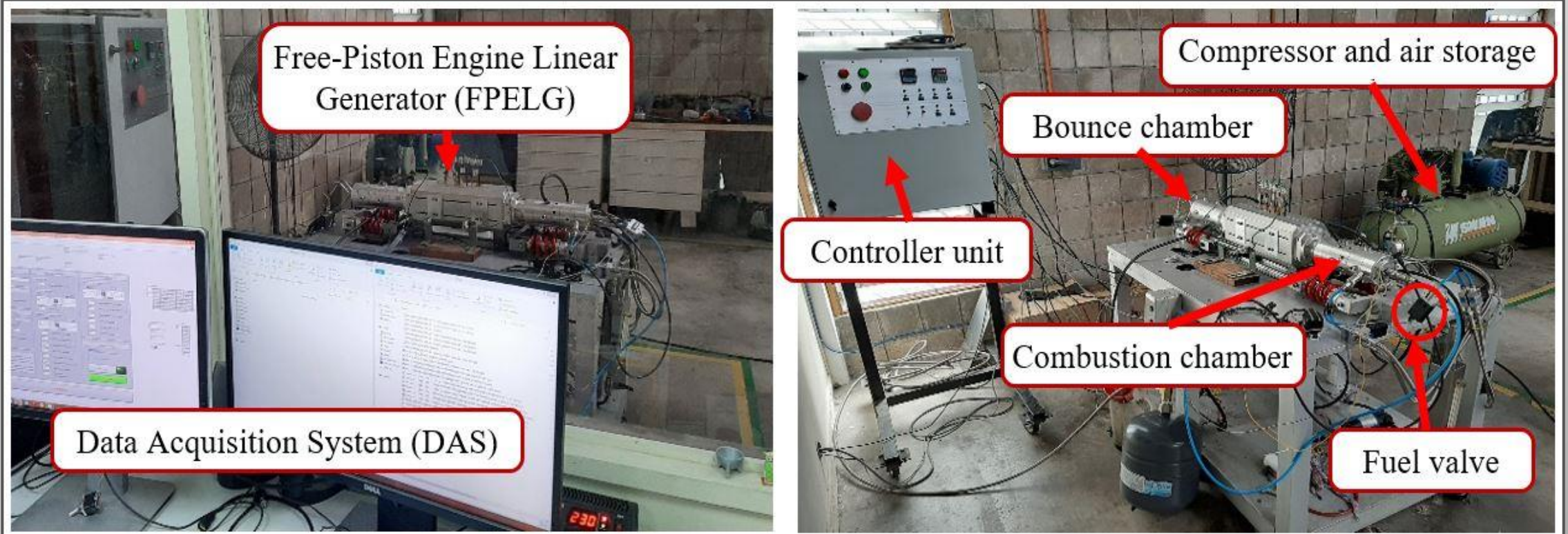
# OPERATION PRINCIPLE OF FPELG



- During movement from BDC to TDC
- 1- In bounce side: main controller gives signal to open valve and the air pressure (5 bar) will be provided
  - 2- In comb. Side: main controller gives signal to open valves and injector, the air-fuel will be provided and mixed
  - 3- At TDC: all valves will be closed, and the mixture has been compressed
  - 4- At TDC: ignition signal will be provided, and combustion will be happened
  - 5- The combustion force will push piston from TDC to BDC again and this process will repeat
  - 6- During resonance movement the current will be generated from LEM

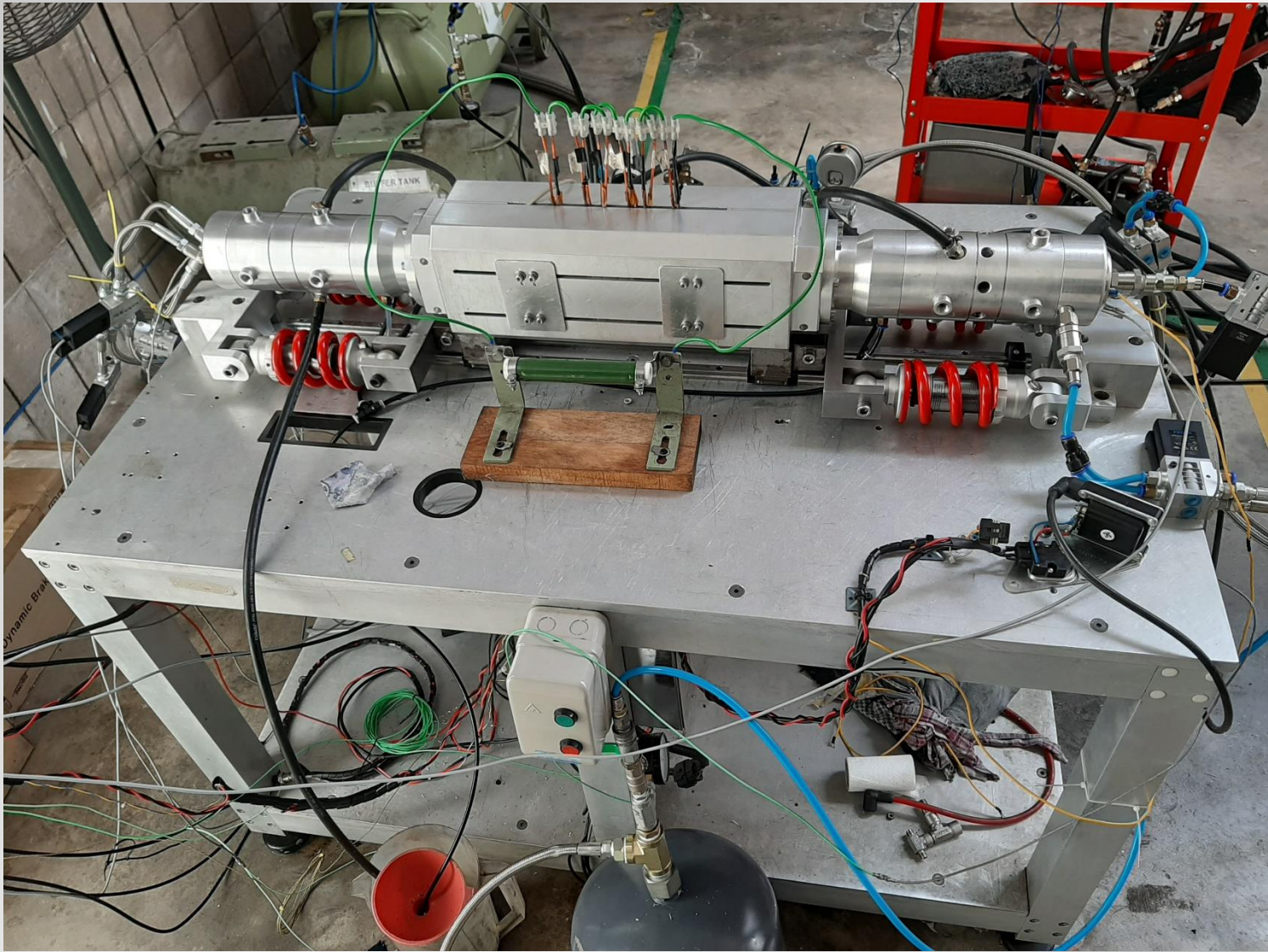


# OPERATION PRINCIPLE OF FPELG





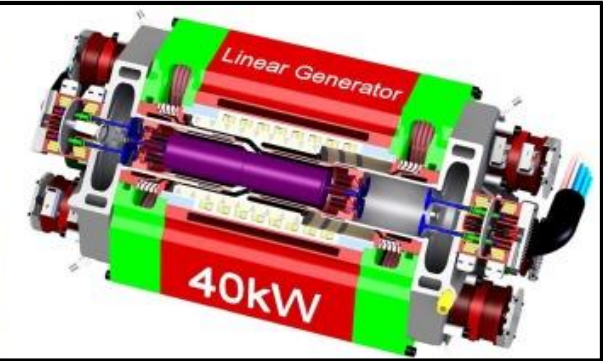
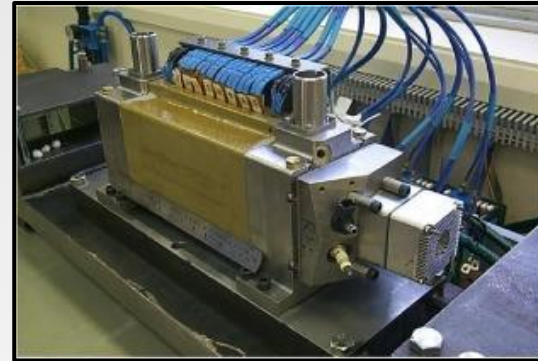
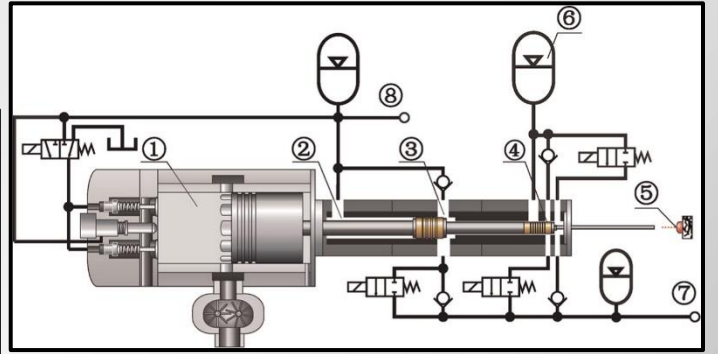
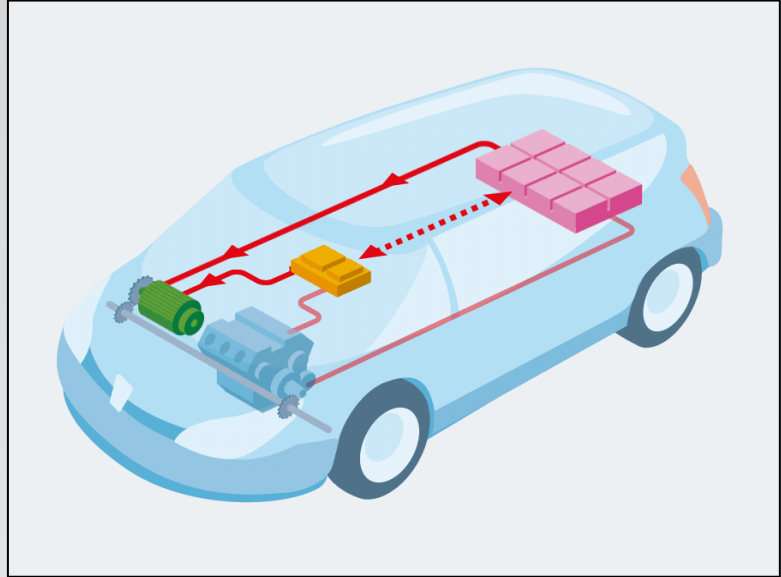
# OPERATION PRINCIPLE OF FPELG





# APPLICATIONS OF FPELG

- 1 Hybrid car
- 2 Generator
- 3 Hydraulic tools
- 4 Compressor



## Conclusion

The widespread use of internal combustion engines (ICE) in a variety of applications, including automobiles, trains, and power plants, has prompted researchers to develop new systems and address engine issues, particularly those related to air pollution and energy

FPELG is an alternative of a conventional engines, and it is a **promising** power generation system due to its simplicity and high thermal efficiency. Which is **expected** to become an alternative auxiliary power unit for the next generation of hybrid vehicles series.

Wide range of applications starting with the micro engine until powerplant engine size. The Applications include medical, space, hybrid cars, generators, and hydraulic tools.



Thank You

**VERY MUCH FOR YOUR ATTENTION**

Q&A