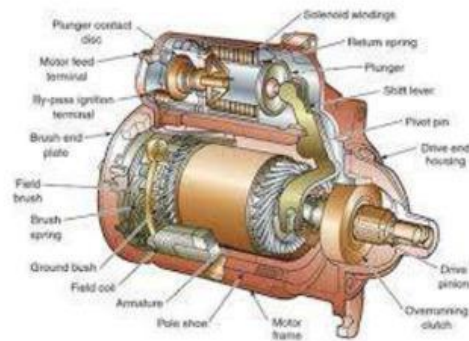


# Electric Engine

## Students' worksheet



An electric engine, also called an electric motor, is a machine that converts electrical energy into mechanical energy. Today, electric motors are widely used in electric vehicles (EVs), buses, trains, and even industrial machines. They are becoming more popular because they are efficient, quiet, and environmentally friendly.

An electric motor works based on the interaction between electricity and magnetism. When electric current passes through the motor, it creates a magnetic field. This magnetic field pushes and pulls on the motor's rotor, the part that spins. As the rotor turns, it creates mechanical movement that rotates the wheels of the vehicle. Because of this simple and clean process, electric motors do not need fuel, oil, or complicated mechanical parts like pistons or crankshafts.

Electric vehicles use a large battery pack to store energy. The battery sends electricity to the motor through a power controller. This controller adjusts the amount of electricity the motor receives. For example, when the driver presses the accelerator pedal, the controller increases the power. When the driver slows down, the controller reduces it.

One important benefit of electric motors is regenerative braking. When the driver presses the brake, the electric motor changes its function. Instead of using electricity, it starts producing electricity, like a generator. This electricity is sent back to the battery. In this way, the car recovers energy that would normally be lost as heat.

Electric motors are also highly efficient. While internal combustion engines usually convert only 25–30% of fuel into useful power, electric motors can convert up to 90% of electrical energy into movement. They also produce no exhaust gases, which helps reduce pollution in cities.

There are several types of electric motors used in vehicles. The most common are:

- **DC motors** – simple and easy to control
- **AC induction motors** – durable and powerful
- **Permanent magnet motors** – efficient and compact

Each type has advantages depending on the design of the vehicle.

Electric engines require less maintenance than traditional engines. There is no oil to change, and fewer moving parts mean fewer mechanical problems. However, the battery must be checked regularly, and the cooling system must work properly to prevent overheating.

Understanding how an electric motor works is essential for future mechanics. As electric vehicles become more common, specialists in this field will be in high demand.

## EXERCISES

### 1. Matching Vocabulary (Match the word to the definition)

|                           |  |
|---------------------------|--|
| 1. Rotor –                | a. Electricity flow                      |
| 2. Battery pack –         | b. Stores electrical energy              |
| 3. Controller –           | c. Rotating part of a motor              |
| 4. Regenerative braking – | d. Sends power to the motor              |
| 5. Efficiency –           | e. System that recovers braking energy   |
| 6. Current –              | f. Produces electricity                  |
| 7. Magnetic field –       | g. Works on alternating current          |
| 8. Generator –            | h. Works on direct current               |
| 9. AC motor –             | i. Ability to convert energy effectively |
| 10. DC motor –            | j. Force created by magnets              |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|----|
|   |   |   |   |   |   |   |   |   |    |

### 2. Fill in the Gaps

(Use: electric, battery, rotor, controller, generator, braking, motor, magnetism, efficient, pollution)

1. An \_\_\_\_\_ motor converts electricity into movement.
2. The energy is stored in the \_\_\_\_\_ pack.
3. The \_\_\_\_\_ controls how much electricity the motor receives.
4. The \_\_\_\_\_ spins when the motor works.
5. Electric motors use \_\_\_\_\_ to create movement.
6. During regenerative \_\_\_\_\_, energy is recovered.
7. The motor becomes a \_\_\_\_\_ when braking.
8. Electric motors are very \_\_\_\_\_.
9. They help reduce \_\_\_\_\_.
10. A \_\_\_\_\_ motor does not use fuel.

### 3. True or False

1. Electric motors need fuel.
2. Electric cars can recover energy when braking.
3. The rotor is the part that spins.
4. Electric motors produce exhaust gases.
5. A controller sends electricity to the motor.
6. Batteries store mechanical energy.
7. Electric motors are quieter than combustion engines.
8. Permanent magnet motors are used in EVs.
9. Electric motors have fewer moving parts.
10. Regenerative braking wastes energy.

### 4. Multiple Choice Choose the correct answer.

1. What powers an electric motor?
  - a) Gasoline
  - b) Electricity
  - c) Oil
  - d) Steam
2. What part stores electrical energy?
  - a) Transmission
  - b) Battery pack
  - c) Fuel tank
  - d) Exhaust pipe
3. What creates movement inside the motor?
  - a) Pistons
  - b) Gears
  - c) Magnetic forces
  - d) Water pressure
4. What does regenerative braking do?
  - a) Heats the motor
  - b) Wastes energy
  - c) Produces electricity
  - d) Stops the battery

5. What controls electricity flow?
  - a) Radiator
  - b) Controller
  - c) Headlights
  - d) Starter
6. Electric motors are...
  - a) Noisy
  - b) Complex
  - c) Very efficient
  - d) Slow
7. When braking, the motor works as a...
  - a) Generator
  - b) Pump
  - c) Chimney
  - d) Filter
8. Electric vehicles produce...
  - a) Exhaust gases
  - b) No tailpipe emissions
  - c) Diesel fumes
  - d) Carbon smoke
9. The rotor is the part that...
  - a) Stores energy
  - b) Spins
  - c) Cools the motor
  - d) Lights the dashboard
10. Electric motors need...
  - a) Oil changes
  - b) Fuel filters
  - c) Very little maintenance
  - d) Carburetors

## 5. Word Formation

(Form verbs or adjectives from the nouns)

1. energy → \_\_\_\_\_



2. magnet → \_\_\_\_\_
  3. power → \_\_\_\_\_
  4. movement → \_\_\_\_\_
  5. electricity → \_\_\_\_\_
  6. control → \_\_\_\_\_
  7. efficiency → \_\_\_\_\_
  8. rotation → \_\_\_\_\_
  9. generation → \_\_\_\_\_
  10. charge → \_\_\_\_\_
- 

## 6. Rewrite the Sentences (B1.1 level)

Rewrite using the word in brackets.

1. Electric motors are very efficient. (more)
2. They do not need fuel. (never)
3. EVs reduce pollution. (help)
4. The rotor turns the wheels. (used to)
5. Batteries store electrical energy. (can)
6. Regenerative braking recovers energy. (able to)
7. Motors are quiet. (much)
8. The controller manages the power. (responsible)
9. EVs are popular. (becoming)
10. Mechanics must understand electric engines. (have to)

## 7. Short Answer Questions

1. What does an electric motor do?
2. What powers an electric car?
3. What happens when you press the accelerator?
4. What is the rotor?
5. How does regenerative braking help?
6. Why do electric motors need less maintenance?
7. Name one type of electric motor.
8. Why are electric motors quiet?
9. What role does the controller play?
10. Why are electric engines important today?