

# Gearboxes

A gearbox is a system that connects a motor to the part of a robot that needs to move, like the wheels or an arm. In FRC, motors spin very fast but aren't strong enough on their own. The gearbox addresses this issue by utilizing gears or chains to slow the motor down and increase its power.

In simple terms, a gearbox turns speed into strength. For example, if your robot needs to lift something heavy, the gearbox gives it more torque (force). If it needs to move fast, the gearbox gives it more speed instead.

Gearboxes are made of parts such as:

- Gears: Wheels with teeth that control speed and power.
- Chains and sprockets: They transfer power between gears that are farther apart.
- Input and output shafts: The input comes from the motor, and the output goes to the part you want to move.

## How They Work

A gearbox changes how fast and how strong the output shaft spins compared to the motor's input. This is done through gear ratios:

- High gear ratio (for example, 10:1) → more torque, slower speed
- Low gear ratio (for example, 3:1) → less torque, faster speed

So, if your robot needs to climb or lift heavy objects, you'll want a higher gear ratio. However, if a part needs to move quickly, you'll use a lower gear ratio.

## Main Parts of a Gearbox

1. Input Shaft: Connected to the motor; sends power into the gearbox.
2. Gears: Interlocking wheels with teeth that control how speed and torque are changed.

3. Output Shaft: Transfers the adjusted power to the mechanism (like wheels).
4. Bearings and Housings: Keep everything aligned and spinning smoothly.

**In FRC robots, they are mainly used for elevators, arms, and shooters, etc.**

