

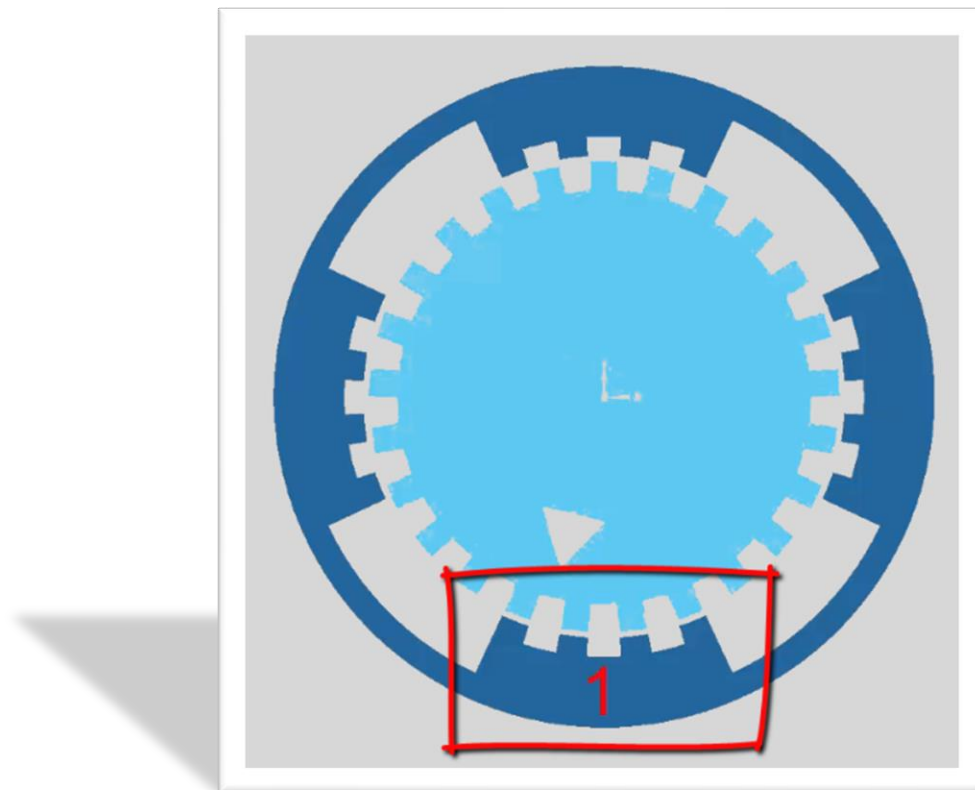
Stepper Motors

A stepper motor is a brushless DC electric motor that divides a full rotation into a number of equal steps.

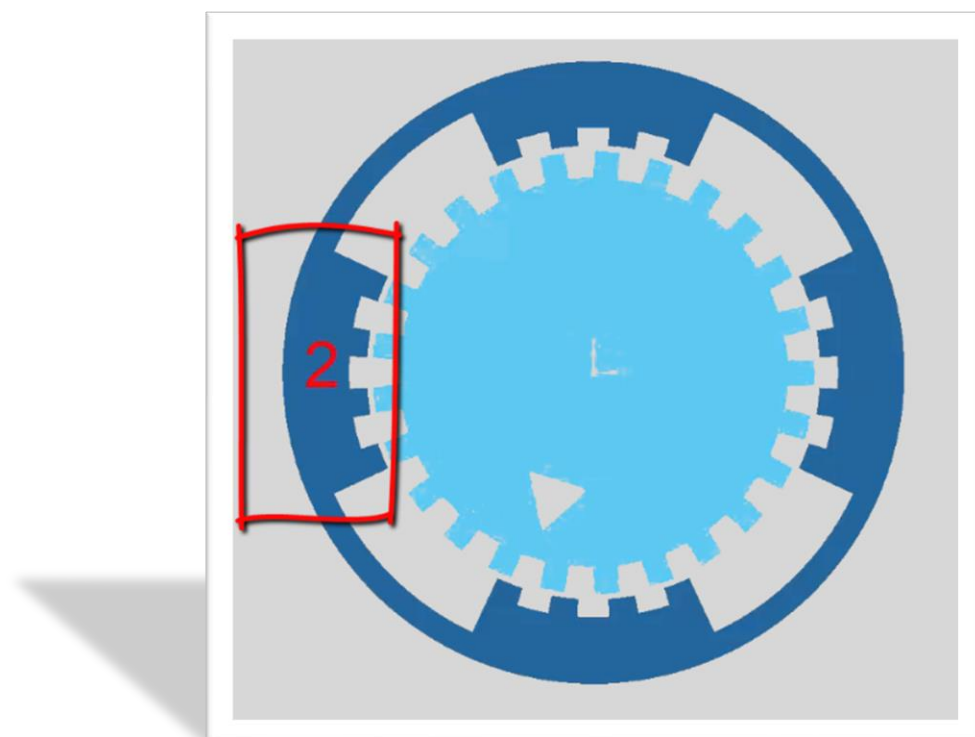
The motor's position can then be commanded to move and hold at one of these steps without any position sensor for feedback.

This is known as an open-loop system.





One part of the stator is deactivated and the next part is activated



This stator has 25 lobes, movement by one lobe would give.

$$\mathbf{360 / 25 = 14.4 \text{ Degrees}}$$

There are four parts to the stator

$$\mathbf{14.4 / 4 = 3.6 \text{ degrees}}$$

Therefore, each movement would move the rotor 3.6 degrees

It would require 100 movements to make a full rotation of 360 degrees.

$$\mathbf{3.6 \times 100 = 360}$$

The stator and rotor can be figured in any way to give more or less accuracy.

The motor can also be made to move in half steps which would make it even more accurate.

Open Loop System

These are known as open loop systems. The motor is told how much to move but there is no feedback to say that the motor did as it was told.

Therefore, if the motor was obstructed or for some reason did not move the machine would carry on.

Closed Loop System

Once we introduce feedback into the system. This means that feedback is sent to confirm that the movement is as commanded, then we have a closed loop system.

Closed loop systems usually have servo motors. Servo motors have built in encoders. These encoders monitor the motors movement and feedback the results.

This creates a closed loop system.

Controller

Tells it to move

Amplifier

Sends electrical signal to motor

Servo Motor

Built in encoder sends back signal to say OK

Adjusts itself to correct position

