

# Closed Loop Stepper

versus

# AC-Servo



Door:



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(directeur/mede-eigenaar)

**ONDERNEMERSPRIJS**

Genomineerd Onderneming van het Jaar MKB 2018

MIDDEN HOLLAND

**Machine  
bouw**

7 december 2017  
1931 Congrescentrum  
Den Bosch

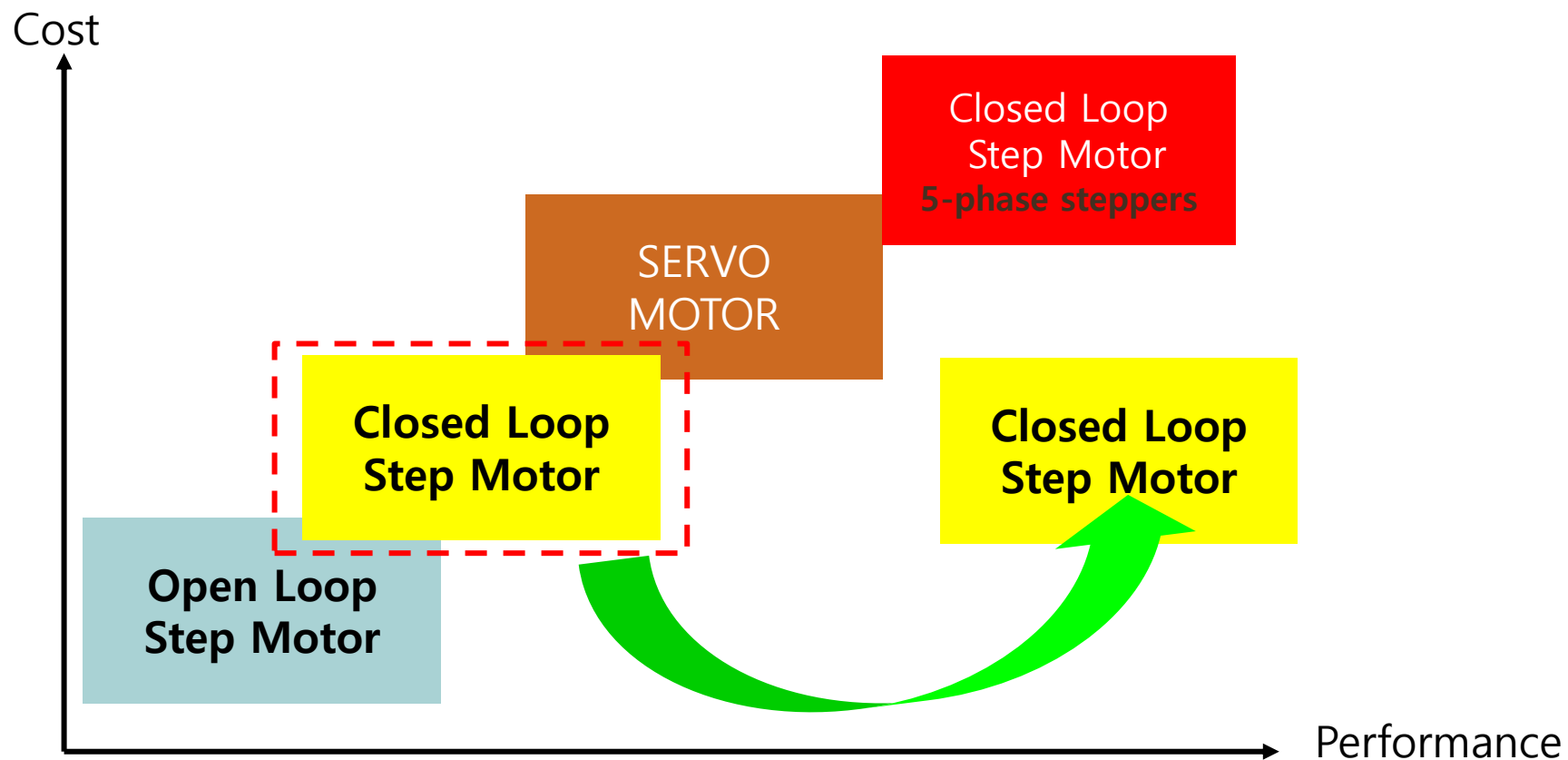


Closed Loop Stepper  
**better**  
than AC-Servo !?

**YES !**

But not always 😊



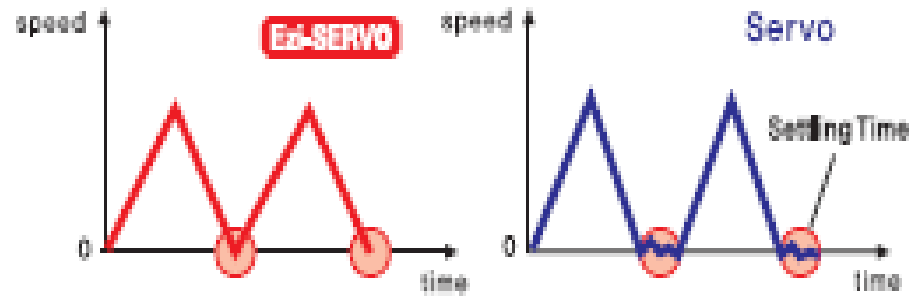
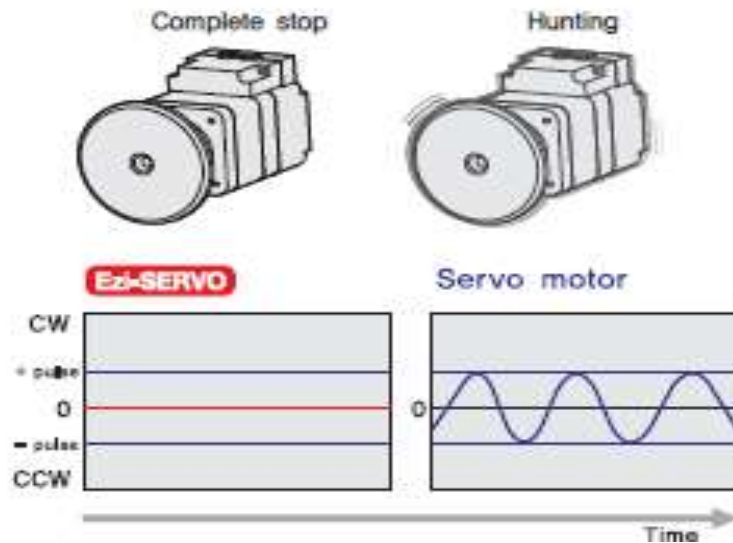


✘ Better Performance and Cost Reduction are achieved

# Why Closed Loop Stepping ?

No Hunting at stop

Fast Response High Holding Torque  
against external disturbance



# Why and How?

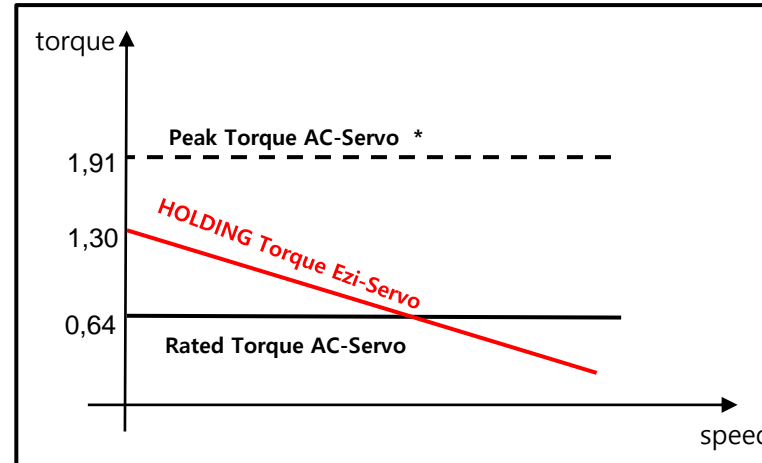
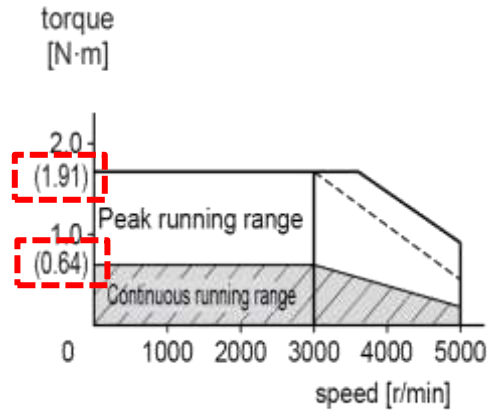
Is it possible to replace a AC servo ?

Is it possible to have better performance than AC servo ?

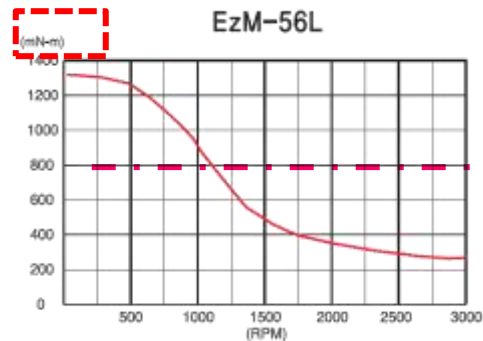
- + Closed Loop Stepper have a shorter settling time than AC-Servo motor, what results in shorter cycle time and more production output.
- + Closed Loop Stepper have a price advantage
- + Closed Loop Stepper have compacter building in dimensions (mostly no gearbox required)
- + Maximum (Holding) torque at target position
- Only a solution up to 250Watt mechanical output



## 200W (60mm AC Servo motor)

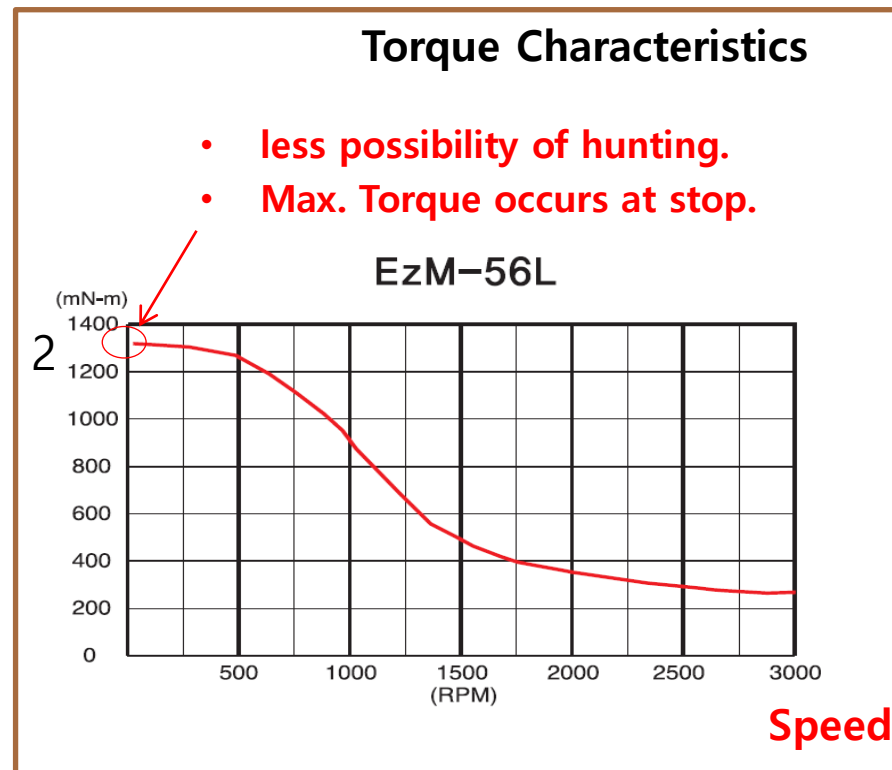
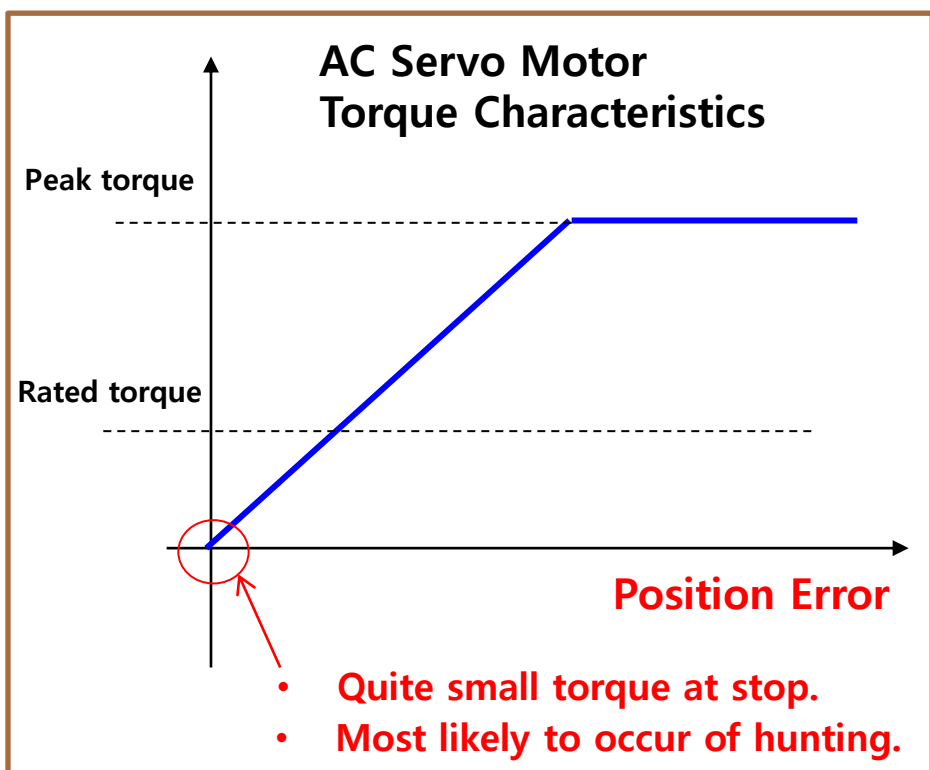


## Name 23 (56mm Closed loop stepper)

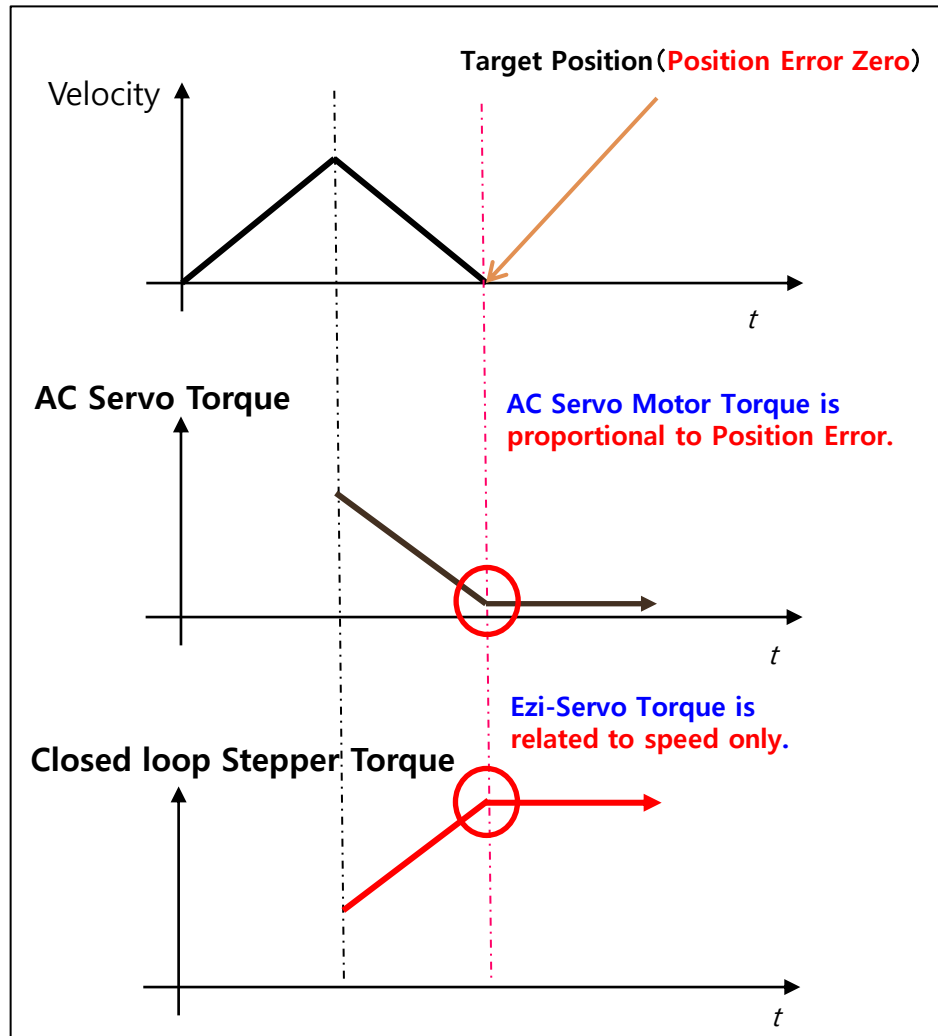


\* Peak torque of AC Servo can only be used at a Short period of time.  
In case of multiple positioning in a short time, motors are only accelerate and de-accelerate all the time.  
So,... needed peak torque becomes continue required torque!

- Torque of AC Servo Motor is **proportional to Position Error**.
- Torque of a Closed loop Stepper has no relation to position error, but only has relation to velocity.







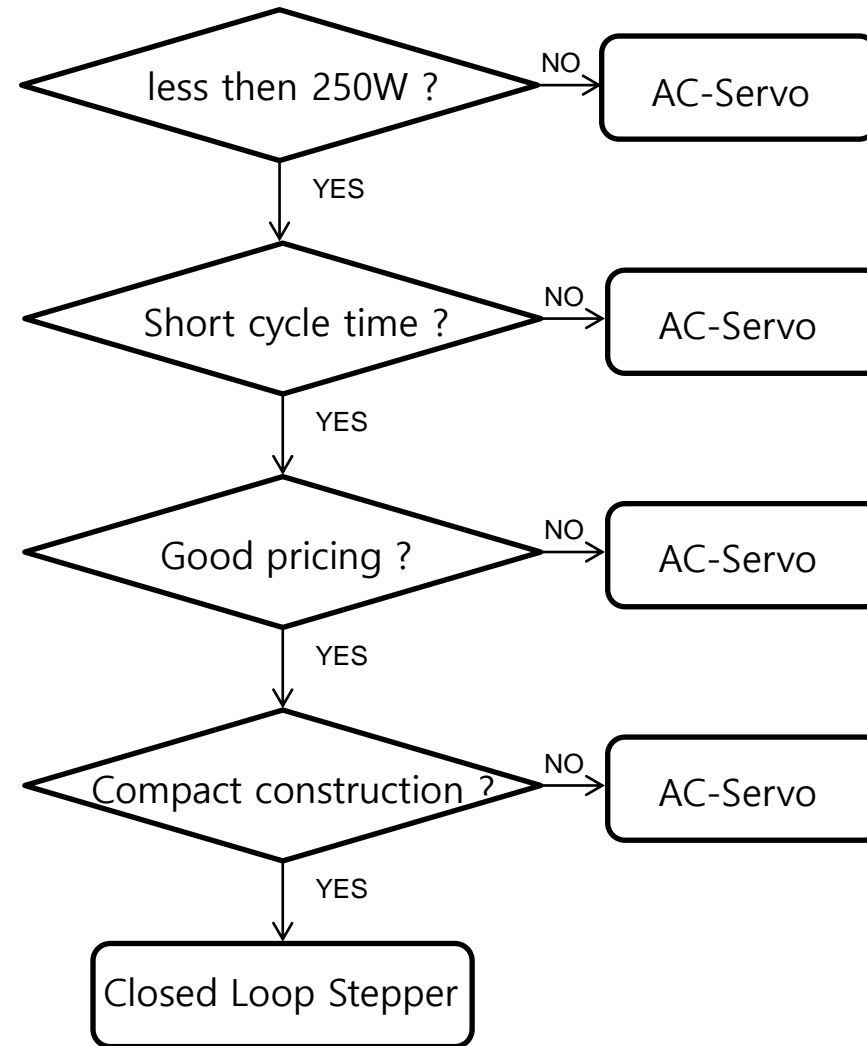
Torque of AC Servo Motor near target position is very small, so it must be very weak to external force ( Ex. ; Vibration of belt)

Hard to stop at target position without Hunting. ( In worst case, need to attach Reducer )

Closed loop stepper has Max. torque near goal position (Velocity zero), so **strong** to external Forces (e.a. Vibration of belt)

Possible to stop without hunting, even in the situation that the belt tension is changing from time to time.

At last



# Success stories

- In combination with Vision/Camera systems  
(no hunting=> stable image)
- In combination with fast and accurate  
dispensing / soldering  
(no hunting=> short cycle time)
- Fast and short positioning systems  
(holding torque at target point)



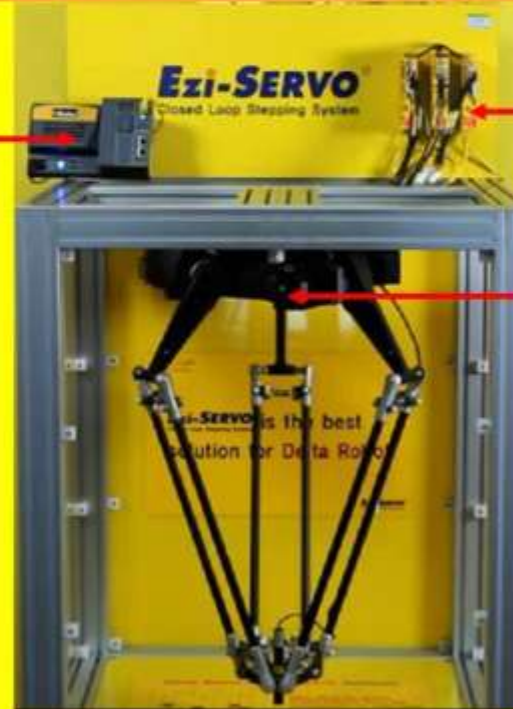
## Short Pitch Motion (Ezi-SERVO vs. AC Servo)



## **Ezi-SERVO<sup>®</sup> II** EtherCAT<sup>™</sup> Closed Loop Stepping System

Conformance tested

**EtherCAT Master**  
- Maker : Parker  
Hannifin Corporation  
- Model : PAC

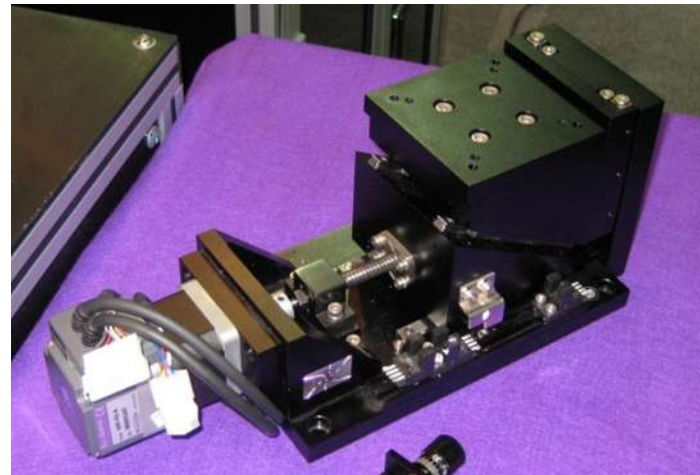


**Ezi-SERVOII EtherCAT**  
- Drives : EzS2-EC-60L -A

**Ezi-SERVOII EtherCAT**  
- Motors : EzM2-60L-A  
- Size : 60mm(NEMA24)  
- Encoder : 10,000[ppr]







# Bedankt!

voor uw aandacht  
namens het Zilvertron team!

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