

01 Outline of Servo Hybrid System

An optimized fusion system of hydraulic and electric technologies developed for the machines based on hydraulic systems, such as injection molding machine, hydraulic press, rubber molding machine, and die casting equipment. The system can save up to 75% of energy, higher responsibility and reproducibility, and enhanced working environment compared to conventional systems.

02 Configuration of Servo Hybrid System



Servo Motor

- AC Servo Motor · Low inertia, Dynamic high responsibility
- Low noise, high torque control



Servo Drive

- Speed, torque control by PID
- Various communication means with controller, high durability



Servo Pump

- Low noise, high efficiency & speed
- High responsibility performance, high pressure

03 Advantages and Application of Servo Hybrid System



Energy saving

Power saving by 35~75% compared to conventional systems



High quality

Faster response time (40ms). Improved reproducibility for higher parts quality



Low noise

Reduced more than 10dB, improved working environment



Low heat generation

Hydraulic oil temperature can be lowered by 10°C or more, using less cooling water, extending service lives of packing and hydraulic oil



Environment Friendliness

Reduced CO2 & carbon emission

Application

Injection molding machine, Hydraulic press, Rubber molding machine, Blow molding machine, die Die casting / Extruder, Cutter, Bending machine, Packing machine, Marble cutter, Factory automation

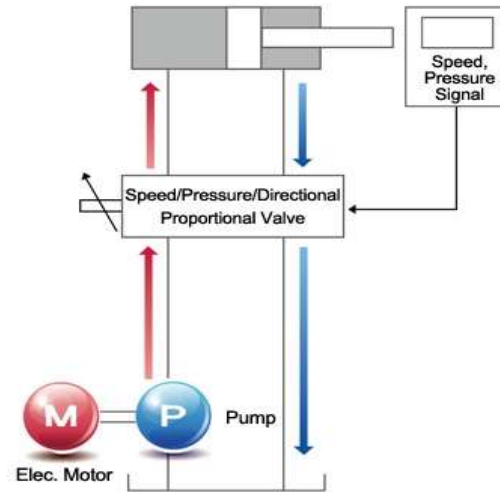
Servo Hybrid System

Outline of Servo Hybrid System

Comparison of Servo Hybrid System

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01 Comparison



Conventional Hydraulic System

Command

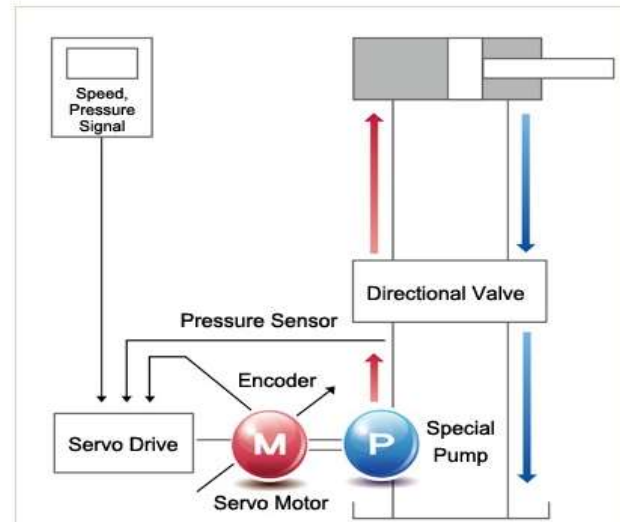
- Controller ▶ Proportional control valve command
- Controller ▶ Pump operation command

Driving Principle

- Continuous motor and pump operation
- Proportional control valve delivers only necessary flow to the operating mechanism
- The rest of the flow is bypassed (loss)

Feature

- Motor operating ratio more than 50% under no load condition
- 1200rpm motor, large capacity pump are used
- Electronic proportional control valve response time 80ms or above



Servo Hybrid Hydraulic System

Command

- Controller ▶ Servo Drive ▶ Servo Motor ▶ Pump rotation

Driving Principle

- Servo Motor and pump make a Optima necessary flow and pressure for operation
- Only Directional control valve controlled the operating mechanism
- Flow and pressure feed-back control

Feature

- Motor was no operating under no load condition
- 0~2500rpm variable speed control, make a large flow using small displacement pump
- Response time 40ms(simila as Electric Machine)
- Precision machine control using servo system

02 Remodeling Procedure

01 Machine Diagnosis

- Measure power consumption, examine the specification and performance of the machine to be remodeled
- Refer to technical data (hydraulic & electric circuit drawings)
- Work Environment

03 Agreement

- Discuss and set the delivery terms
- Delivery schedule according to financing method

05 Installation completion report

- Power consumption rate testing
- Training and machine transfer

02 Quotation

- Quotation of the servo hybrid system based on the machine specification
- Consult financing

04 Remodeling and commissioning

- Components involved (servo motor, servo drive, servo pump, Hydraulic block, hydraulic piping and electric box)
- No need to edit the program of the existing controller (Use existing electric signals)

03 Installation details

◆ Mechanical Change

- Servo Motor + Pump
- Manifold (Remove sub plate, valve, etc.)
- Auxiliary pump, if necessary
- Replace hydraulic hose (according to the mechanism and manufacturer)
- Inlet line change

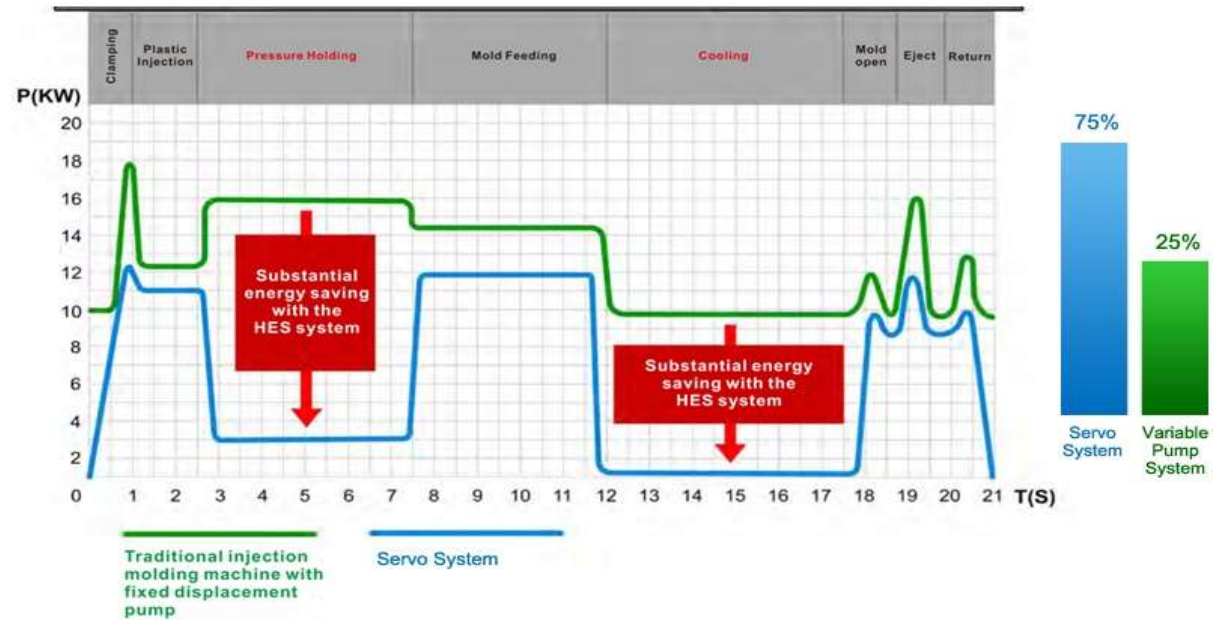


◆ Electrical Change

- Analog output, Additional drive box
- Hydraulic, current / voltage outputs, electric wiring
- SMPS, additional relays, drive signal wiring
- Secure box space (extension card position, additional parts)



04 Energy Saving – compare power consumption rate (injection molding machine)



◆ Power Saving with Servo Hybrid System in Injection Molding Machine (up to 75% of saving)

- Save energy by optimizing oil flow and pressure according to the machine operation.
- During holding step, maintain pressure at minimum speed
- During cooling step, no operation, using no energy

05 Case Study of Energy Saving

Clamping Force (Ton)	Clamp Type	Part Weight (g)	Cycle Time (sec)	Before (Kw)	After (Kw)	Saving (Kw)	Saving Ratio (%)	Savings years (KRW/year)
L Co. 1300	2 PLATE	1485	77.0	72.9	33.2	39.7	54.4	32,871,600
W Co. 900	2 PLATE	781.5	72.6	64.1	29.4	34.7	54.1	28,731,600
W Co. 650	Toggle	566	58.0	50.3	20.3	30.0	59.7	24,840,000
D Co. 450	Toggle	709	50.0	46.1	20.3	25.8	56.0	21,362,400
H Co. 350	Toggle	125.4	57.5	19.5	10.2	9.3	47.7	7,700,400
H Co. 250	Toggle	243.1	55.7	20.1	9.2	10.9	54.2	9,025,200
H Co. 150	Toggle	155.7	49.2	13.0	5.9	7.1	54.6	5,878,800

- Operating Hours : 24 Hrs/day, 25 days/month, 12 months/year
- Power Cost : KRW 115 / KwH