UiA

A Method for Smoothly Disengaging the Load-Holding Valves of Energy-Efficient Electro-Hydraulic Systems

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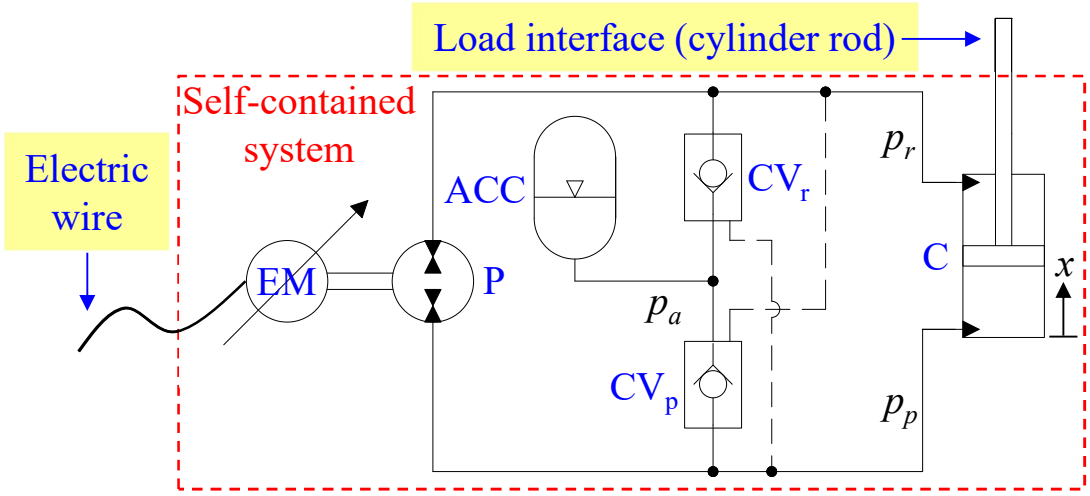
Background

Energy efficiency and **plug-and-play installation** are becoming crucial
→ **self-contained electro-hydraulic cylinders**



Example with a single-pump

A few solutions exist based on **throttleless systems** (no functional power dissipations) with 1* or 2** pumps

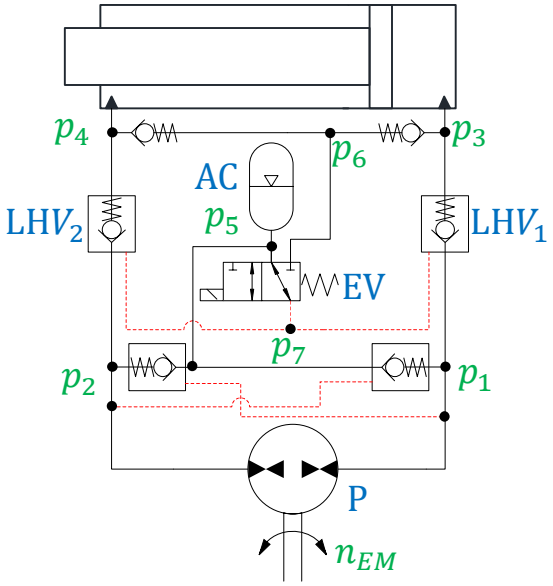
* Michel et al.: *"Energy-Efficient Electrohydraulic Compact Drives for Low Power Applications," 2012.*

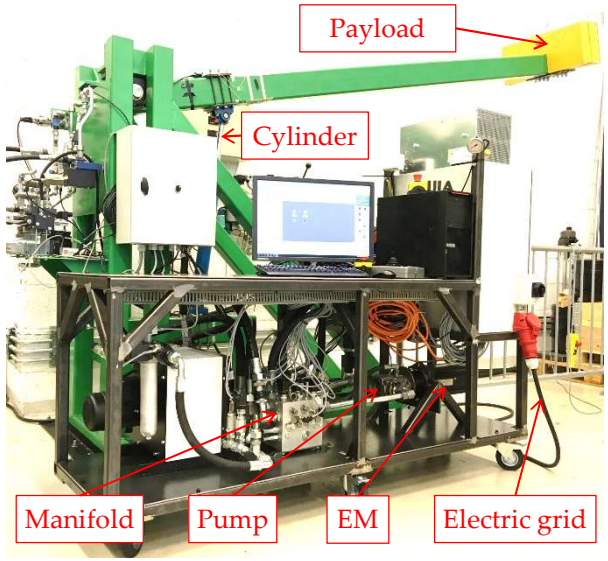
** *Minav* et al.: *"Direct-Driven Hydraulic Drive Without Conventional Oil Tank," 2014.*

Passive Load-Holding

A particular **self-contained cylinder** was recently proposed* → load-holding valves + 4-quadrant + energy recovery

Main features: variable-speed pump (P), sealed reservoir (AC), load-holding valves (LHVs) operated electro-hydraulically (EV)

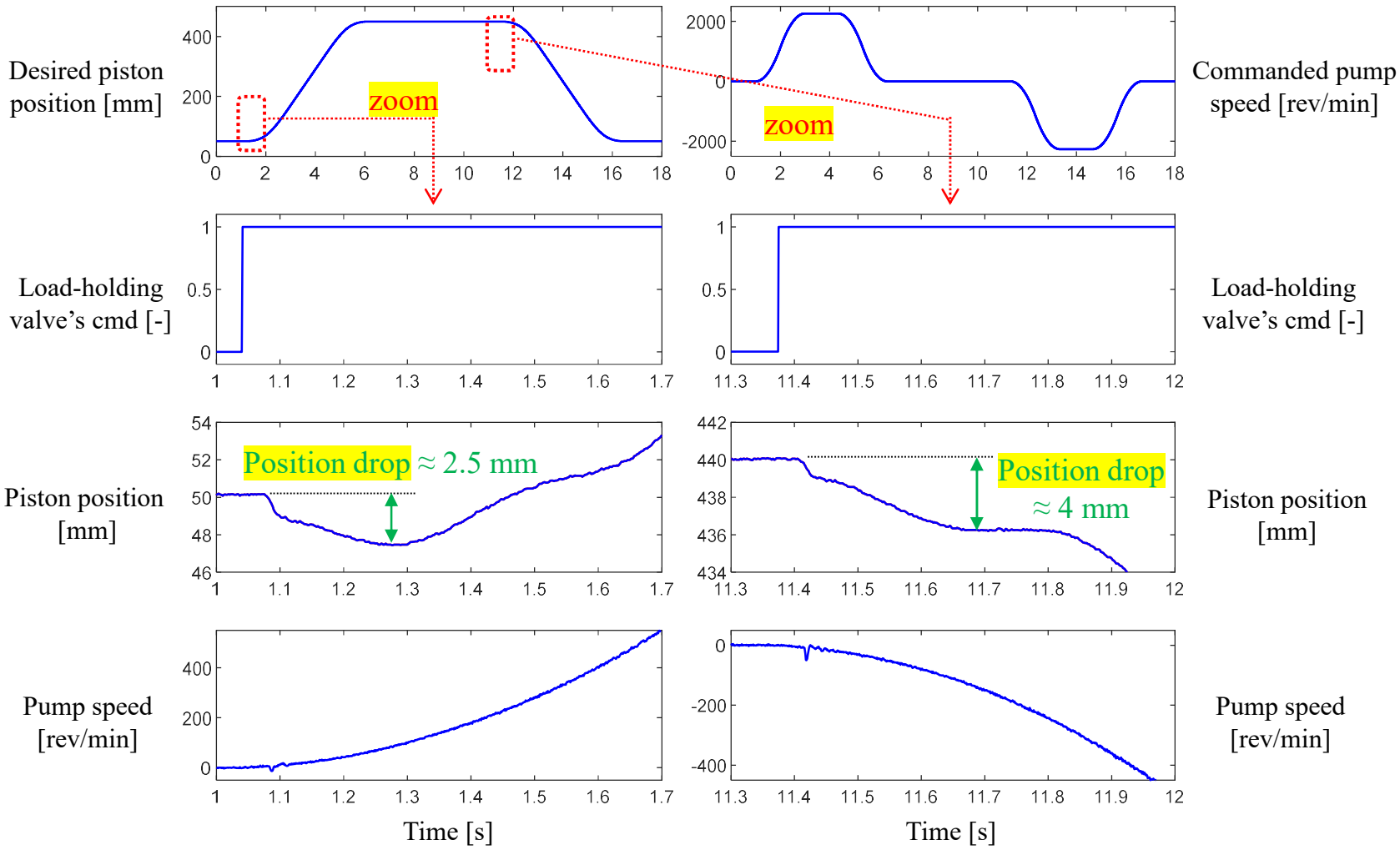




* *Padovani* et al.: *"A Self-Contained Electro-Hydraulic Cylinder with Passive Load-Holding Capability," 2019.*

The Issue (Position Drop)

Driving the actuator requires **disengaging the load-holding valves** → **piston drop** during this operation (system controlled in open-loop position control)



The Solution (Pressure Control)

The **2-stage pressure control** builds up the pump pressure by running the pump before disengaging the load-holding valves → **position drop eliminated!**