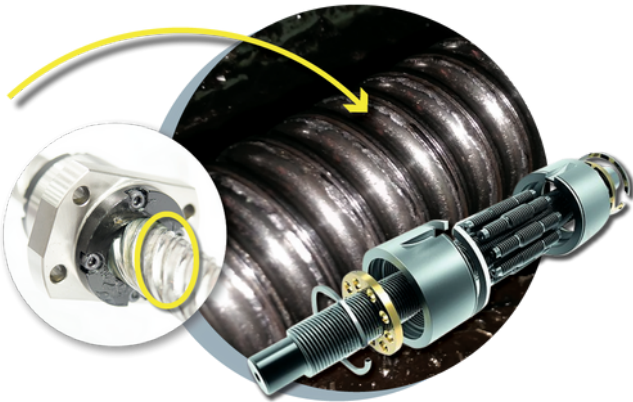


Kyntronics SMART Electro-Hydraulic Actuators (SHA) Compared to Electro-Mechanical Screw-Type Actuators (EMA)

Kyntronics SMART Electro-Hydraulic Linear Actuators (SHA) are a robust “electric” alternative to screw-type actuators. This Technical Bulletin compares the features and benefits of these two actuation technologies.

Ball Screw / Roller Screw Electro-Mechanical Actuators (EMA)

Ball Screw and Roller Screw actuators (EMAs) are a commonly-used linear motion solution. These systems are deployed where precision control is required and often as a replacement for hydraulic cylinders in some higher force applications.



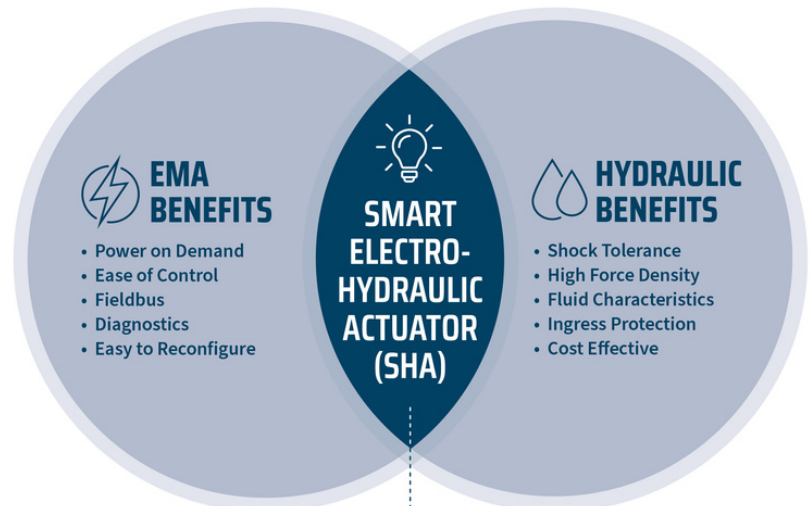
Screw-Type actuators are susceptible to damage from shock loads and premature wear causing unplanned downtime and reliability issues.

Screw-Type EMA Challenges

- Gears, roller and ball screws and other mechanical components wear out from metal-to-metal contact from repetitive concentrated loads.
- Shock loads and Side loading can cause significant damage and premature failure.
- EMAs require regular lubrication and have a finite life (see L10 chart on Page 2).
- EMAs require expensive load cells for accurate force control.
- EMAs require a brake to hold position, can be back-driven and have backlash.
- Are large & very costly at higher loads (>5,000lbf).
- Have limited stroke length (24”) without incurring expensive premiums.

SMART Electro-Hydraulic Actuator (SHA)

The SHA is an “electric linear actuator” that looks similar to a screw-type actuator but rather than using gears, drive screws and driven nuts, the all-in-one SHA uses an integral hydraulic cylinder with minimal amount of fluid and no hoses or leak points.



THE SHA ELIMINATES

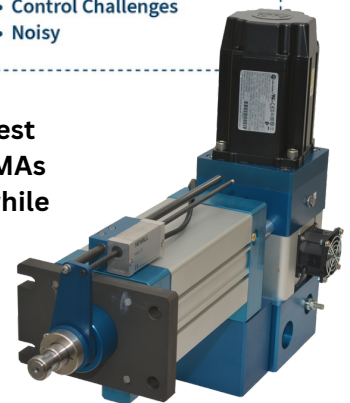
EMA SHORTCOMINGS

- Side Loading
- Shock Loading
- Limited Life
- Metal to Metal Wear
- Ingress Protection
- Limited Force & Stroke

HYDRAULIC SHORTCOMINGS

- Leaks / High Maintenance
- Network Integration
- High Energy Consumption
- Difficult to Reconfigure
- Control Challenges
- Noisy

The SHA combines the Best Features of Screw-Type EMAs and Hydraulic Actuators while Eliminating their Shortcomings

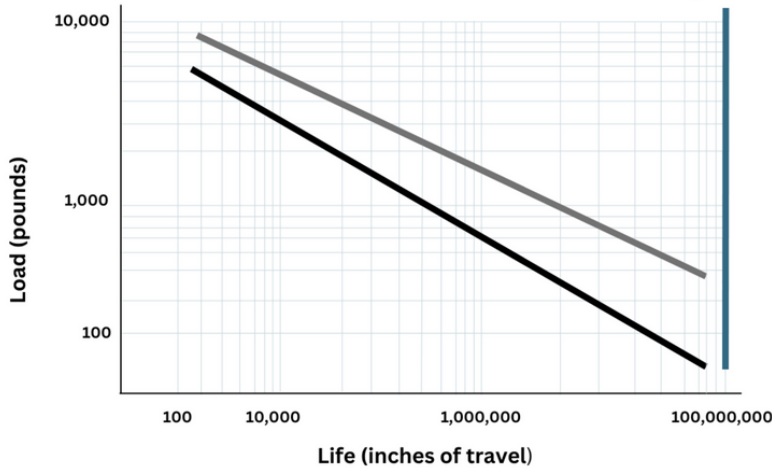


ACTUATOR RELIABILITY COMPARISON

Kyntronics SMART Electro-Hydraulic Actuator (SHA) vs. Electro-Mechanical Ball Screw / Roller Screw Actuator (EMA)

Lifetime Comparison (L_{10})

Note: Life of SHA is NOT Affected by Load



- Ball Screw Actuator
- Roller Screw Actuator
- Kyntronics SMART Electro-Hydraulic Actuator (SHA)

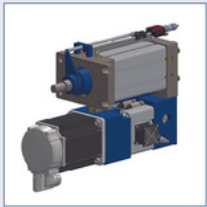
Electro-Mechanical Actuator (EMA)

- EMA life span is load dependent. Improving EMA life requires larger and more expensive size screws
- EMA metal-to-metal wear further decreases reliability and requires regular lubrication
- EMAs are highly susceptible to damage from shock loads and side-loading.

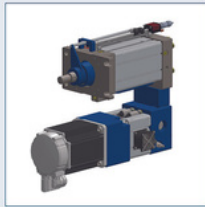
Kyntronics SMART Electro-Hydraulic Actuator (SHA)

- SHA is rated at 50,000,000 inches of travel (before a simple rod seal change) regardless of load
- No metal-to-metal contact leads to increased reliability (load independent)
- The SHA provides 10X-100X better reliability compared with Ball Screw / Roller Screw Actuators

The SHA is available in many flexible configurations unlike screw-type EMAs



Parallel Standard



Parallel with Spacer Block



90° Centered



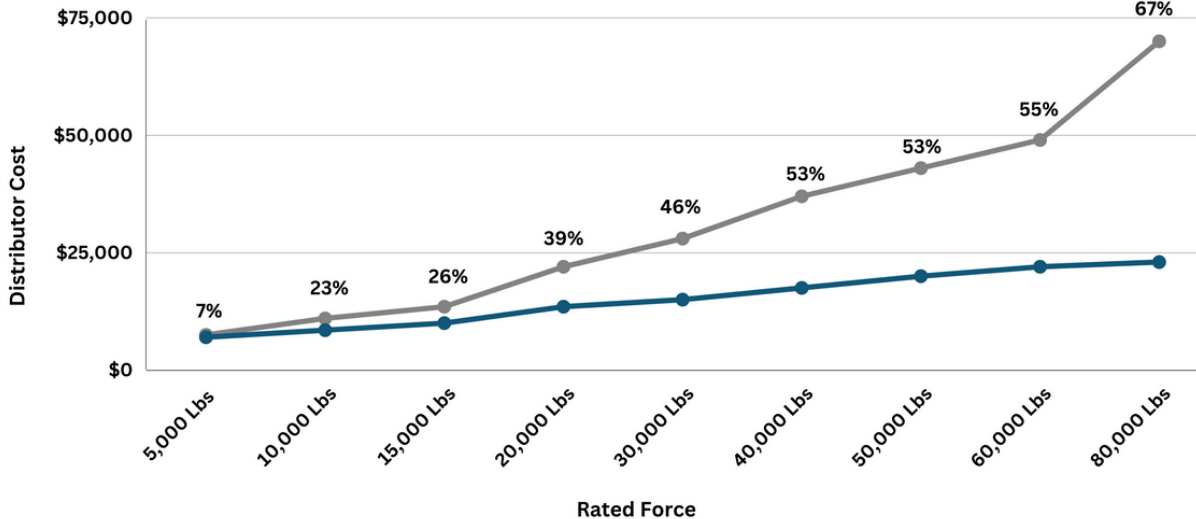
Inline



90° Behind Power Unit

COST COMPARISON AT DIFFERENT FORCE RATINGS

Kyntronics SMART Electro-Hydraulic Actuator (SHA) vs. Electro-Mechanical Roller Screw Actuator (EMA)



Roller Screw EMA

Kyntronics All-in-One SMART Electro-Hydraulic Actuator

Cost Assumptions:

- Includes actuator, servo motor, servo drive
- 24" stroke length, add 15% premium to roller screw if longer
- standard configuration, standard L10 roller screw life
- cost amounts are approximate distributor net cost.

To discuss your application with an Engineer and learn how the SMART Electro-Hydraulic Actuator (SHA) can help to eliminate hydraulics from your business, [contact Kyntronics](https://www.kyntronics.com).