

## Kyntronics SMART Electro-Hydraulic Actuators (SHA) Compared to Hydraulic Actuation Systems (HPU)

Kyntronics SMART Electro-Hydraulic Linear Actuators (SHA) are an alternative to traditional hydraulic cylinders. This Technical Bulletin compares the features and benefits of these two actuation technologies.

### Hydraulic Actuators / HPUs

Hydraulic Actuators connected to Hydraulic Power Units (HPUs) are a commonly-used motion control solution. These systems are used in high force applications where robust performance is required.



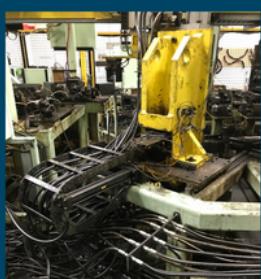
Hydraulic actuators / HPUs require many components including:

- Pumps and Motors
- Cylinders, Hydraulic Lines and fittings
- Fluid reservoir, accumulators and filters
- Servo control valves
- Electrical components / controls
- Pressure transducers and position sensors
- A significant volume of hydraulic fluid

**Hydraulic Actuators are complex, high maintenance, expensive to operate and have a large footprint**



Space Consuming HPU



A Mess of Hoses



Complex Servo Valves



Inevitable Leaks

### SMART Electro-Hydraulic Actuator (SHA)

The (SHA) is an All-In-One, totally sealed, self-contained linear actuator consisting of a cylinder, pump, manifold and servo motor with optional drive/control system.

There are no hoses or leak points on the SHA vs. a traditional hydraulic cylinder / HPU system and the SHA contains minimal fluid (generally measured in ounces).



**The SHA combines the Best Features of Screw-Type EMAs and Hydraulic actuators while eliminating their shortcomings**



#### EMA BENEFITS

- Power on Demand
- Ease of Control
- Fieldbus
- Diagnostics
- Easy to Reconfigure



#### SMART ELECTRO-HYDRAULIC ACTUATOR (SHA)



#### HYDRAULIC BENEFITS

- Shock Tolerance
- High Force Density
- Fluid Characteristics
- Ingress Protection
- Cost Effective

#### 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

## FEATURE AND BENEFIT COMPARISON

### Kyntronics SMART Electro-Hydraulic Actuator (SHA) vs. Hydraulic Cylinder / HPU

Comparison Category	SHA	Hydraulic Cylinder / HPU
Environmental Waste	 <p>The SHA is a totally-sealed system. Does not require fluid changes or replenishment. SHA Fluid volume measured in ounces for most applications.</p>	<p>HPUs require regular fluid changes and fluid replenishment which is expensive and creates environmental impact.</p>
Energy Usage	 <p>SHA uses power-on-demand to save energy. The All-In-One SHA design is more efficient by eliminating energy losses associated with hoses, connections and other components.</p>	<p>HPUs run constantly consuming significant mounts of energy. Hydraulic systems on average are 22% efficient due to energy losses from hoses, connections and other components.</p>
Maintenance Cost	 <p>SHA does not require regular maintenance other than a rod seal change (field replacement) after 50,000,000 inches of rod travel.</p>	<p>Hydraulic systems require regular maintenance including repair of fluid leaks, changing fluid, replacing filters and other components.</p>
Ergonomics Safety	  <p>The totally-sealed design of the SHA eliminates leaks. SHA operates quietly and generates far less heat waste compared with HPUs</p>	<p>Hydraulic system leaks create safety hazards that can result in lost-time accidents. Hydraulic systems are noisy and generate excessive heat due to inefficient operation.</p>
Unplanned Downtime/ Product Spoilage	 <p>The sealed design of the SHA eliminates fluid contamination, often the cause of unplanned downtime, and eliminates the risk of fluid leaks that can spoil product and create scrap.</p>	<p>Fluid contamination is often the root cause of unplanned downtime. Leaky hydraulics can contaminate products resulting in scrap and spoilage.</p>

## ANNUAL OPERATING COST COMPARISON

### Kyntronics SMART Electro-Hydraulic Actuator (SHA) vs. Hydraulic Cylinder / HPU

Comparison Category	SHA	HPU	Assumptions / Cost Basis (April 2023)	Scan QR Codes for Reference Links
Environmental Waste	 <p>\$0 \$0</p>	<p>\$33,600 \$16,000</p>	<p>200 Gallon HPU Tank Hydraulic Fluid Index (HFI) = 4.1 SHA is sealed - no fluid replacement or disposal is required \$42/gal X 800 gallons (4:1 HFI) \$20/gal X 800 gallons (4:1 HFI)</p>	
Energy Usage	 <p>\$1,642</p>	<p>\$16,429</p>	<p>SHA Uses Power on Demand SHA is 70% efficient (Kyntronics testing) 30 HP Hydraulic Power Unit that Runs Continuously HPU 22% is efficient (based on IFPE paper) Using \$0.17 per KWh (average US rate - Feb 2023)</p>	
Floor Space Utilization / Maintenance	 <p>\$0 \$1,760</p>	<p>\$2,000 \$5,250</p>	<p>SHA is All-In-One, no floor space required HPU requires space of 10'x10' = 100 Sq-Ft @ \$20 per sq-ft. SHA @ 1 hr/week @ Labor \$35/hr HPU @ 3 hrs/week @ Labor \$35/hr</p>	
Ergonomics / Safety	  <p>\$0</p>	<p>\$2,000</p>	<p>HPU oil leaks create hazardous conditions and safety risk SHA is totally sealed, no oil leak risk Lost days + Medical costs + Legal costs</p>	
Unplanned Downtime / Product Spoilage	 <p>\$0 \$0</p>	<p>\$10,000 \$10,000</p>	<p>SHA is totally sealed, no oil leak risk, minimal downtime risk. \$4k-\$6k average downtime costs per incident. Assuming two downtime events. 1% scrap from product contamination due to leaky connections</p>	
Annual Operating Costs	<p>\$3,392</p>	<p>\$95,279</p>	<p>An \$91,887 Annual Savings Opportunity!</p>	

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](#).