



Technical Bulletin - Impact of Actuators on Total Cost of Ownership (TCO) and Sustainable Manufacturing

SMART Electro-Hydraulic Actuators (SHA) Support Sustainable Manufacturing

Environment Friendly:

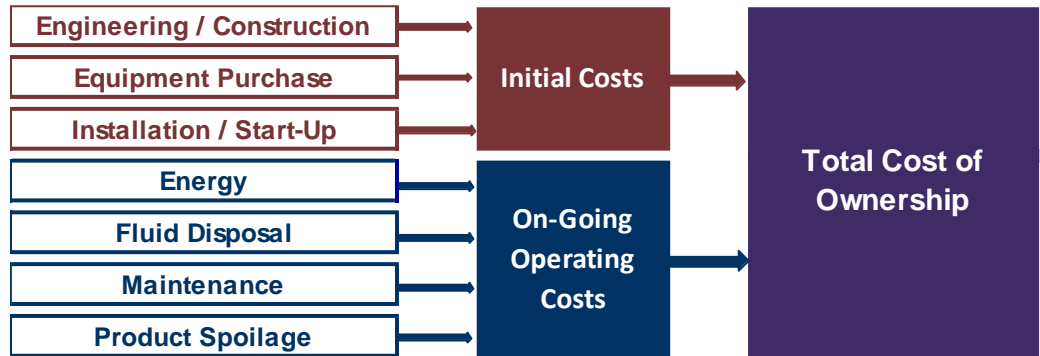
- Leak-Free and Clean
- Minimal Fluid or Lubrication
- No Fluid Disposal Required
- Saves Energy

Employee Safety & Ergonomics:

- Facilitates a Safe Working Environment
- Quiet
- Uses Minimal Space
- Air Quality

Cost Reduction:

- Saves Energy
- Minimal Maintenance
- Avoids Product Spoilage
- Minimal Scrap & Rework
- Minimal Machine Design, Build and Commissioning Time



Fluid Power Statistics

- *A one drop/second hydraulic leak equates to nearly 405 gallons/year lost
- **Nearly 100 million gallons of hydraulic fluid is lost every year in North America
 - Recent environmental studies show that a portion of this leaked fluid ends up in ground water, rivers, lakes, and in the soil itself, causing untold damage to the environment, fish and wildlife
- The Average Hydraulic Fluid Index (HFI) [total fluid used/total site capacity] is ~4:1 in the US
- Hydraulic Fluid should be changed every 6 months – used oil must be disposed of carefully.
- Every day in North America, a machine operator or technician slips and falls on the remnants of a leaking hydraulic system.
 - Lost wages, medical costs, workman's comp claims, legal risk
- ***80% of hydraulic equipment stoppages and component failures are caused by contaminated lubricants.
 - At \$4,000 to \$6,000 per minute cost for downtime, this equates to nearly \$10 billion lost per year in unplanned downtime

References: *[Drops - lost gal / year](#) **[Oil consumption - costs](#) ***[cost-of-downtime](#)
(visit online for links)

Sustainable Manufacturing

A large and growing number of manufacturers are realizing substantial financial and environmental benefits from sustainable business practices.

Sustainable manufacturing is the creation of manufactured products through economically-sound processes that minimize negative environmental impacts while conserving energy and natural resources. Sustainable manufacturing also enhances employee, community and product safety.

The SMART Electro-Hydraulic Actuator (SHA) offers a compelling Actuation System choice to support your Company's Sustainable Manufacturing Strategy.

Additional Resources Available

- Webinar - [Learn how to Maximize the Benefits of Actuator Performance to help achieve your "Sustainable Manufacturing" goals](#)
- Article featured in [Fluid Power Journal - Sustainable Solution: A Versatile Hydraulic Option](#) focusing on sustainable manufacturing as it relates to hydraulics. In the article, read about the different hydraulic options available today and why the Kyntronics SMART electro-hydraulic actuator (SHA) is an ideal long-term solution for sustainable manufacturing.



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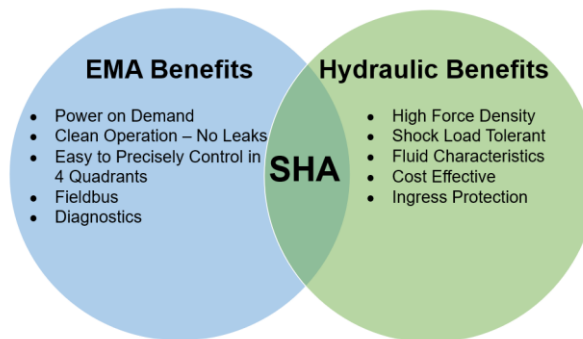
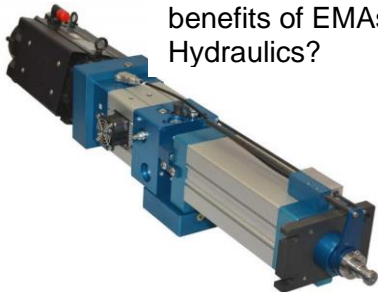
Annual Operating Cost Comparison Kyntronics SMART Electro-Hydraulic Actuators (SHA) vs. Traditional Hydraulic System (HPU)

Cost Component	SHA	HPU	Basis / Comments	Assumptions • 30 HP Hydraulic Power Unit (HPU) • Hydraulic Fluid Index (HFI = 4:1) • 200-gallon HPU / System Capacity • Continually running HPU • 30% duty cycle
Environmental				
Oil Replenishment	\$0	\$27,200	\$34/gal X 800 gallons (4:1 HFI)	
Used Oil Disposal	\$0	\$16,000	\$20/gal X 800 gallons (4:1 HFI)	
Energy				
Power on Demand	\$966	\$9,664	SHA 70% efficient @ \$0.10 / KWh HPU 22% efficient @ \$0.10 / KWh	
Maintenance Time / Floor Space				
Floor Space	\$0	\$2,000	SHA is All-In-One HPU-10'x10' @ \$20 per sq-ft	
Maintenance Time	\$1,750	\$5,250	SHA @ 1 hr/week @ Labor \$35/hr HPU @ 3 hrs/week @ Labor \$35/hr	
Human Factor				
Time off / Medical / Legal	\$0	\$2,000	oil leaks that create hazardous conditions lost days + medical costs + legal costs	
Machine Downtime/Product Qty				
80% of unplanned machine downtime is caused by contaminated lubricants	\$0	\$10,000	SHA is totally sealed, no leak risk \$4k-\$6k average downtime costs per incident	
Product Spoilage	\$0	\$10,000	1% scrap due to product contamination	
Annual Operating Costs	\$2,716	\$82,114		

What If...

You could combine the benefits of EMAs and Hydraulics?

The Ideal Actuation Solution



And...
eliminate their Disadvantages!



The Kyntronics SMART Electro-Hydraulic Actuator Accomplishes This and More

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In a Sustainable Manufacturing Environment - How Different Actuator Types Compare

	Traditional Hydraulics	Electro-Mechanical	SMART Electro-Hydraulic (SHA)
Environment			
Leak-Free and Clean	✗ Leaks are common and frequent	✓ Leak-free and clean	✓ Sealed system, leak-free and clean
Minimal Fluid and/or Lubrication	✗ Requires a significant amount of fluid	⊖ Requires lubrication	✓ Minimal fluid, no lubrication required
Fluid Replenishment and Disposal	✗ Fluid must be changed and disposed of regularly. EPA considerations	✓ Not required	✓ Self-contained unit; no fluid replenishment required
Energy Consumption	✗ HPUs run continuously using significant amounts of energy	✓ Power on demand	✓ Power on demand
Efficiency	✗ Fluid flow through hoses, fittings, valves, etc. reduce efficiency. Significant amount of heat is generated	⊖ Metal-to-Metal contact; gearing, screws, ball nuts, etc. reduce efficiency	✓ No Metal-to-Metal contact and limited heat generation make the SHA the highest efficiency actuator available
Employee Safety & Ergonomics			
Working Environment	✗ Frequent leaks and dirty operation create slippery, unsafe conditions	✓ Clean operation	✓ Facilitates a clean and safe working environment
Noise Level	✗ HPUs run continuously and are very noisy	✓ Quieter; reduces occupational noise exposure	✓ Quieter; reduces occupational noise exposure
Space Requirements	✗ High force density but the HPU and ancillary components require a lot of space	⊖ EMAs are large at higher loads	✓ Has the force density of hydraulics without the HPU and related components
Air Quality	✗ HPUs and blowers on coolers are oily and dirty	✓ Good	✓ Does not add to indoor manufacturing pollution
Economic Considerations			
Energy Usage	✗ HPUs run continuously using significant amounts of energy	✓ Power on demand	✓ Power on demand, plus the highest efficiency
Maintenance Requirements	✗ Must replace oil, filters, leaky hoses and other components regularly	⊖ Regular lubrication required to prolong screw life	✓ No maintenance (other than a rod seal replacement after extensive use)
Product Spoilage	✗ Leaky and unreliable hydraulic hoses and connections can contaminate product; high risk of spoilage	✓ Sealed other than risk of lubrication on screw contaminating the product	✓ Sealed system, minimal fluid used - minimum risk of spoilage
Scrap & Rework	✗ Precise control is very expensive and complex	✓ Programmable with precise control provides good repeatability and minimal scrap	✓ Programmable with precise control provides good repeatability and minimal scrap
Machine Design, Build and Commissioning Time	✗ Many components must be engineered, assembled and debugged	⊖ Some motor and controls integration required	✓ All-In-One system, plug-and-play
Fluid Disposal Costs	✗ Fluid must be changed and disposed of regularly. EPA considerations	✓ None Required	✓ None Required, Sealed system, no replenishment required
Reliability	⊖ Robust operation, shock tolerant but require regular maintenance	⊖ Shock loads, side loads, concentrated wear and metal-to-metal contact shorten life. Ingress protection a negative.	✓ Withstands shock loads and side-loading, no metal-to-metal wear
Total Cost of Ownership (TCO)	✗ Poor - Up-front costs can be lower, but operating costs are the highest	⊖ Expensive at higher forces. Requires a brake to hold position.	✓ Comparable or lower up-front costs vs. EMAs. Lowest operating costs makes SHAs a solid investment

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Rating Key ✗ Poor ⊖ Fair ✓ Good