

## Hydraulic Elevators...The Economic Low-Rise “GREEN” Solution

Hydraulic Elevators have been the backbone of the US elevator industry since the 1940's. Now with the push of “GREEN” building, sustainability, and energy efficiency trickling down to our industry the hydraulic elevator seems to be taking most of the negative blows. The question is why? Older traction elevator systems are just as likely to be less efficient, less GREEN, and less sustainable as older hydraulic elevators. If an elevator, no matter the type, is not new or near new then it is likely to be less efficient, less GREEN and less sustainable. That's the nature of product evolution. So let's not throw out the baby with the bath water with regard to hydraulic elevators and focus on how to build, retrofit, and modernize this dependable and cost effective workhorse of our industry.

So what makes a hydraulic elevator the economic low-rise GREEN solution? Let's start with the understanding that no one component or aspect will be the complete answer to a “greener” hydraulic elevator. You must look at the entire package or system as a whole while considering the application for use. Then answer the question as to which options suit the GREEN goal, costing, use and performance of the system?

### Your Current Hydraulic Elevator – Make It Greener

Let's look at your current hydraulic elevator and review “GREEN methods” that have been available to the industry for years, but are often not applied.

- Regular scheduled maintenance
- Substituting bio oil
- Proper control valve adjustment
- Ventilation of machine room, tank placement and tank heaters

Everyone should know that the cost savings of regular maintenance trumps the run to failure method, however this is the most overlooked and ignored solution. Using common sense tells you that knowing your monthly scheduled maintenance cost, catching problems early, making proactive adjustments during off peak use, and optimizing efficiency of the elevator system pays dividends over the alternative. A reactive elevator owner ends up paying more for major part replacements, energy use, increased downtime, angry tenants, and emergency labor rates. It's an economic and GREEN choice, proactive vs. reactive. **\*Lower Cost Option**

Substituting [bio hydraulic fluid](#) (bio oil) is another helpful GREEN alternative that has a much better environmental impact than the standard petroleum product. Many bio oils are fully biodegradable, can reduce oil spill remediation costs, are less flammable, are based on renewable and recycled resources, produced from US grown crops, and reduce dependence on imported petroleum oil. The best part is that all these GREEN benefits come with increased oil performance factors like higher lubricity, higher viscosity index, heat reduction, and reduced energy usage during operation in some cases. The aforementioned positive benefits do come with a \$4-\$5.00 higher per gallon cost, but in the big picture as a percentage of total cost it's a viable option. **\*Low - Moderate Cost Option**

When it comes to having your elevator run more efficiently I want you to think about proper control valve adjustment. I thought valve adjustment had to do with the ride of the elevator? Yes, it does, but it also has a great deal to do with eliminating wasted energy usage. When a valve is set properly you minimize oil bypass time, minimize pump and motor run times while reducing heat in the system and surrounding environment. Each of these factors contributes to unnecessary wasted energy on the elevator as well as increasing cooling costs for HVAC to counter the heat released from the elevator system. **\*Low Cost Option**

Other contributing factors that are overlooked are the ventilation of the machine room and tank placement. Done incorrectly and you may contribute to a compounding heat problem. Notice for a minute that many systems have gone to submersible vs. dry pumps in power units that allow for less heat dissipation by design. This is where many go down the costly path of an oil cooling unit or air conditioning treating the symptom and not the problem. Exhausting/ventilating heat from the room and moving air around the tank makes for cooler system operating temperatures at a much lower cost and reduced energy usage. The tank should be at least 2-3 inches from the wall on all sides. This allows for heat dissipation naturally and a small fan can be added to move the air between the wall and tank increasing the cooling affects. Believe it or not adding a tank heater vs. a viscosity control device to maintain an optimal oil temperature can actually cool a hydraulic system and reduce energy use when you have large temperature swings from hot to cold. **\*Low Cost Option**

Have you considered GREEN materials for your hydraulic elevator? I'm talking about rapidly renewable materials, regional wood types local to your area, urea-formaldehyde free (UF free) cab panels, recycled steel products, and even the adhesives and sealants used with low VOC's that contribute to better air quality in the elevator and building. You can even take a look at the product packaging used by the supplier to ship and protect the products for beneficial GREEN, reused or recycled materials. **\*Low - Moderate Cost Option**

## **GREEN Retrofit & Modernization**

Now let's go into some of the technological advancements that will make your current hydraulic elevator GREEN through a retrofit or modernization. The list of options available includes:

- New Controller with Auto-Shutoff for lighting and fans during stand by
- LED Lighting
- New Packing
- New Control Valve
- New power unit (AC/VVF technology)
- Double bottom jacks & leak detection

Note: Don't forget to incorporate the basics mentioned above as they apply for all applications.

A new controller can provide...solid state starters vs. contact starters allowing for less maintenance of contact replacement and soft starting of the elevator using less energy. Another option is an auto-shutoff mechanism (sleep mode) controlling lighting, signals and ventilation during standby saves energy

and costs. There are Energy Calculators out there that show the annual savings this feature offers. You could be saving over \$500 per year in some scenarios. The range for a new hydraulic controller would be from \$2,500.00 - \$3,500.00 depending on options. **\*Moderate Cost Option**

LED lighting is a simple item that gives on several GREEN points. When compared to incandescent and compact fluorescents LED lights reduce KWh and operating cost by at least 50% while increasing life span by as much as 40 times. Plus, the LED bulbs contain no mercury which is a toxic hazard that requires special disposal consideration so as not to harm the environment. This is the lowest cost and simplest corrective action to making your hydraulic elevator greener. **\*Low Cost Option**

New packing is something most would not think about, but there are new materials surfacing that offer lower breakaway friction which requires fewer amps and therefore less energy used by the pump to move the piston in the up direction. Every run by the elevator using this packing saves you money. In addition, some of these new materials have extended operating life, increased operating temperature tolerances and therefore reduce maintenance costs vs. standard packing seals. All together that makes for a greener hydraulic elevator. **\*Low Cost Option**

The control valve is an integral component that will provide benefits with an upgrade. This upgrade can be done with a [new valve](#) replacement. Over time products evolve and become better with continuous improvements. One example would be a post- 1998 Maxton UC4 control valve. At that time a UT (up transition) compensation circuit was added that softened the transition, increased leveling speed in a loaded condition, reduced time in leveling and the overall flight (floor to floor) time. So in short these improvements reduced pump run times and the additional heat created which decreases the elevator energy usage on every run and need for HVAC cooling. **\*Low Cost Option**

A new power unit will GREEN up your elevator by incorporating more advanced motor technology, increased pump efficiency, and a new valve increasing the overall elevator performance. This upgrade is the most common hydraulic modernization method when it comes to improved operation, energy savings and ride of the elevator. Costs will average from \$3500 – \$6,000 for passenger elevators depending on the specifications of the power unit options and system. If your power unit is over 15 years old you could see an ROI in less than three years from reduced energy usage alone. **\*Moderate Cost Option**

Double bottom jacks have become part of a code change to prevent environmental contamination and are required in most areas within the US. This soil and water contamination preventative action helps to address the leaking of oil through in ground jacks that have deteriorated over time as a result of electrolysis. Another method to catch oil leakage can be achieved through leak detection devices that monitor oil levels to account for loss over time or when an emergency line break occurs. As a rule the accountability of oil should be logged manually tracking every gallon added and taken out of a system, however this only tracks slow oil loss events. **\*Jacks: Mod- High Cost Option, \*Leak detection: Free to Low Cost Option**

## Go GREEN with A New Installation

- Most economical initial package costs
- Lower maintenance & repair costs
- Lower energy demand (During lift & standby)
- Hole-less jack option

Lastly, is the new construction scenario for all the latest and greatest hydraulic elevator system advancements and costing. As you might expect, all of the current, retrofit and modernization basics mentioned above also apply for new hydraulic elevator installations.

The cost of a new hydraulic installation vs. traction or MRL traction can be a sticky subject and there are several factors to consider. However, more often than not you will find through quotations from elevator suppliers nationwide that the hydraulic elevator will be the more economical choice for a new 2-4 stop installed package.

When looking at maintenance and repair costs over the life of the elevator the hydraulic model is less expensive and requires less work. One of the majors in the elevator industry published a Life Cycle Analysis study and brochure comparing the hydraulic and MRL traction on several levels. In a 2-3 stop application they found the hydraulic elevator to have fewer callbacks and fewer annual calls over the life of the unit. That translates to money saved.

When it comes to economic energy usage that same study found that on 2-3 stop applications the example MRL traction used 10% more primary energy than a hydraulic elevator. Not until you reach a 6 stop application did their MRL traction gain the advantage. Another aspect not to overlook is standby energy usage. That's right...up to 80% of the total elevator energy usage happens during standby and is a huge factor to account for with low-rise low use applications according to a Swiss study. Hydraulic elevators tend to present a very low standby energy consumption which benefits the low-rise application. So you must look at the application, number of stops and overall use closely to pick the correct capital investment. There is no one size fits all if you want to make a wise economic and GREEN decision.

The final option we will talk about is the hole-less jack. The biggest GREEN benefit here is the elimination of drilling a hole and placing the oil filled vessel in the ground. Other benefits include the reduced amount of oil required to operate a hole-less hydraulic elevator vs. an in-ground unit. This means less oil volume to spill, leak and replace. Finally, the hole-less type jack provides the ability to visually inspect the jack(s) for possible seal leaks and or wear more easily. So take a close look at what options make sense for your 2-4 stop passenger/freight low-rise application where hydraulic is the winning economic low-rise GREEN solution over traction and MRL traction. \* **High Cost Option**

## Conclusion

The hydraulic elevator has many positives when it comes to being the economic low-rise GREEN solution. Whether you have a current hydraulic elevator that needs help, you're looking at repairs and

modernization, or a new elevator is in your plans, the work horse of our industry still has a great deal to offer going forward.