Means of Vertical Circulation: Elevators traction verse hydraulic types, sizes, speeds and finishes, escalators.

<http://www.elevator-world.com/Extras/GreenArticles/March%2089.pdf>

This is an article that describes the functions of the hydraulic and traction elevators as well as their respective advantages and disadvantages.

Marketing Statistics:

Approximately 70 % of all elevators sold for the newer buildings in the United States are of the hydraulic type. About 70 % of these elevators for the newer buildings are used in in constructions of four floors or less. Approximately 95% of all hydraulic elevators currently working in the United States function with what’s known as a conventional direct connected type. A hydraulic elevator differs from a Traction elevator in that it has a single plunger jack installed directly under the elevator car.

Hydraulic Elevator Advantages:

1. Significantly lower initial expenses in equipment’s and in its maintenance. (Ex: maintenance cost for a hydraulic elevator is about $1,200 and $2,400 for a traction elevator.
2. The traction elevators will cost about twice as much as the hydraulic equipment. (Economical)
3. The hydraulic elevators take up a substantial lower amount of space in a building. (allow for efficient space usage)
4. An overhead machine room is not required for hydraulic elevators; nevertheless, some extension above the roof line is usually required in order to cope with the required clearances above the top of the elevator car.
5. Hydraulic elevators don’t enforce vertical loads on the building structure meaning that the columns can be significantly reduced in the shaftway area.
6. Hydraulic elevators have only one mechanical connection between the machine room and the shaftway referred to as a pipe and conduit. This allows for more flexibility in the machine room, usually anywhere within a 40 foot radius from the shaftway.
7. More effective for high load capacity requirements. The hydraulic elevator allows for much greater lifting forces with higher mechanical efficiency and with a lower cost.

Hydraulic Elevator Disadvantages:

1. Hydraulic elevators are rarely capable of exceeding 150 feet per minute. The elevator performance becomes unpredictable as the oil in the system varies in temperature. Oil temperatures can drop in the systems of hydraulic elevators which are lightly used. Temperature will rise in installations subject to heavy use. The operating temperatures must be controlled in order to help reduce the inconsistent temperatures.
2. The underground pressure system of the hydraulic elevator cannot be accessed for visual safety and leakage inspections; this may be problematic because chemical and electrolytic erosion can accumulate unnoticed.
3. The hydraulic elevators don’t have a safety device to prevent it from falling so it solely depends on the pressure in the system to maintain its position in the shaftway. A malfunction in the underground system may result in a free fall of the elevator car.
4. If leakage occurs in the underground system it may very well result in oil being injected into the ground surrounding the leakage point causing possible pollution of a public water supply.
5. The hydraulic elevator’s motor only run in the up direction so its energy consumption is at least twice that of a traction elevator.
6. Requires more electrical service compared to the traction elevators but the concern is in the possibility of a voltage drop in the building power supply.
7. Unknown costs of installation and maintenance are the greatest concern with the Hydraulic elevator system. The drilling of the hole necessary for the hydraulic jack assembly involves risks of facing underground obstacles.
8. The hydraulic elevator is a high heat producing device because the required energy is converted to heat and higher oil temperatures.

<http://www.blain.de/pdf/article/Why_hydraulic_elevators_are_so_popular-Part2.pdf>

This article closely examines the pros and cons of both traction and hydraulic elevators in order to determine which one is more economically beneficial.

Hydraulic Elevators are the most reliable in today's market:

When the Hydraulic elevators are properly installed they will then work fairly well and are quite economical. The required maintenance will be more economical compared to the traction elevators. These elevators are of a high demand so they regularly undergo innovative changes in order to meet with the safety and environment requirements.

Underground Hydraulic System:

1- The underground pressure system of the conventional hydraulic elevator is vulnerable to chemical and mechanical problems. The most common precaution to reduce corrosion underground consists of special wrapping placed on the metal components of the system to isolate them from ground fluids or soil which might result in corrosion.

2- A plastic support casings and high dielectric strength back-fill compounds have been used successfully for jack protection.

Traction Elevators Disadvantages:

\*Installation costs can be 15-25% higher than the hydraulic elevators. Traction elevators might be initially offered at a low and convenient price and then skyrocketed with outrages service charges.

\*Maintenance is difficult because the machine is located in the headroom of the shaft and reaching it can be a challenge. Serious accidents during construction and servicing of the elevator are highly probable. If the car is stuck, the machine cannot be serviced from the top of the car, and insecure methods may then be needed.

\*Traction elevators are initially offered at reasonable prices and the low income is later attained through frequent servicing and high-priced spare parts. Obtaining the spare parts can be a nightmare since servicing may only be performed by the original installer or by their service partners.

\*Disregard of Safety Requirements: Rescue of passengers during an emergency situation can be challenging, because the traction elevators require special knowledge and the machine is difficult to reach in the shaft. Temperature and humidity conditions inside the shaft may be tragic and can easily affect the electronic components which might cause more frequent break-downs and servicing. A short circuit to the motor or fire can result in entrapped passengers in the elevator. The fire itself might not be deadly but rather the smoke within the shaft.

<http://www.aaceiatlanta.com/2010%20AIA%20Presentation%20-%20Elevator%20101.pdf>

This website exclusively focuses on the pros and cons of the traction elevators alongside with reasonable predictions for why in a couple of year’s traction elevators will be replacing hydraulic elevators.

Conclusion:

The manufacturers are not completely reflecting the reality of the energy consumption and environmental issues. It seems as though the hydraulic elevators are being targeted but it shouldn’t be that way because the energy consumption is not too different from the traction elevators. The number of floors and elevator traffic has not been carefully examined in both these elevators. If the travel time is balanced out then the hydraulic elevator’s energy consumption will level-up with the traction level. The bottom line is the hydraulic elevators have unbeatable properties such as low initial cost and easy installation. Hydraulic elevators also possess the best record in safety and servicing costs.

Summary of what I have discovered and learned during the process of researching:

After consulting with three different websites I have begun to understand the fact that both the traction elevators and hydraulic elevators have their respective benefits and drawbacks, so picking one over the other will just be a matter of personal choice. The Hydraulic elevators rely on a plunger jack system that is located directly under the elevators which then facilitate the vertical movement. The problem with that is that the underground pressure system cannot be accessed for leakage and safety inspections. Not only that but if leakage was to occur underground then it may result in possible contamination with the public water supply. In addition, the hydraulic elevators don’t even have a safety device that can help prevent it from falling, so it relies on the pressure in the system to sustain its position. If there is a problem with the underground system then it may very well result in an elevator free fall. In transition, traction elevators don’t seem the most ideal choice due to the fact that there are extremely high initial maintenance and installation costs, but it’s a long term investment. The traction elevators rely on a pulley type mechanism and with all the innovative inventions these elevators continue to revolutionize. The Magnet Synchronous Motor (PMSM) saves energy, replaces the machine room, allows for superior control and allows for visibility of the hoisting process. The fact that the hoisting process is visible gives me a better understanding that the traction elevators are the more convenient long term choice. But if the client wishes to save money and doesn’t mind future unexpected expenses then hydraulic elevators are the ideal choice. On the other hand, if the client wishes to invest on a much more expensive elevator they will be saving themselves from unexpected future expenses and possible headaches.