



Understanding the Benefits

of Choosing Electric Steering
Systems Over Hydraulic Systems

Hydraulic Steering - Pros and Cons

If you're in need of a steering system for a new product or a specialized piece of equipment, you may be wondering whether an electromechanical or hydraulic steering system is right for your needs.

While hydraulic steering systems have been used widely for decades, today's marine OEMs and other companies are beginning to replace their hydraulic systems with electromechanical systems – and enjoying a number of different benefits. In this article, we'll discuss the pros and cons of both electric steering systems and hydraulic systems, so that you can understand the benefits of choosing an electromechanical system for your next project.



Hydraulic Units – Time-Tested and Widely Used (But Outdated)

Let's start by talking about hydraulic steering units. Hydraulic steering is a very old technology – and it has been widely used by top companies for decades. Why?

Well, hydraulic steering units do have some key advantages, such as:

- **High power density** – A relatively small hydraulic unit offers the potential to do a lot of power and work, meaning that even the largest steering systems can usually be built with just a few hydraulic motors and components.
- **Low component cost** – The process of manufacturing hydraulic steering components is quite inexpensive, allowing steering units to be procured and installed, and resulting in a lower overall price for OEM equipment that uses hydraulic systems.
- **Commonly-used, easy to repair** – Due to how common they are, it's easy for customers to maintain and repair hydraulic systems, as most of them use the same principles of operation, and similar parts.

However, there are a few reasons that hydraulic units are becoming outdated in the modern world, including:

- **Hydraulic leaks** – Hydraulic leaks are always a concern, even in equipment that's relatively new. A hydraulic leak can compromise steering systems, and potentially even lead to a dangerous situation if steering or control is lost.
- **Lower efficiency** – Hydraulic units are simply not as efficient as modern electromechanical systems, and require more power to operate.
- **Lower precision and accuracy** – Hydraulic steering units are typically not a great choice when extremely high precision and accuracy are required.

Overall, hydraulic systems still offer a number of benefits, but are slowly being phased out by newer, electric-based systems.

Electric Steering and Wainbee Solution

Electric and Electromechanical Steering – the Future of Steering Solutions

Electromechanical systems use a “steer-by-wire” connection, and a number of electric motors to achieve steering and operation of mechanical systems. There are a few reasons why they are becoming so popular, compared to hydraulic systems:

- **Lower installation cost** – Electromechanical systems cost less to install, compared to hydraulic systems, as they are simpler and do not involve working with high-pressure, dangerous units.
- **Less maintenance required** – Compared to a hydraulic unit, an electromechanical unit requires almost no maintenance, other than regular checks for proper lubrication and operation – resulting in lower operational costs.
- **High efficiency** – Modern electric steering units are much more efficient than hydraulic units – with documented energy savings of 15-20%. This helps maximize fuel savings and also reduces operational costs.
- **Minimal environmental impact** – Beyond the immediate fuel and energy savings, electromechanical systems do not require the use of any hydraulic fluid, which can be toxic and harmful to the environment.

In addition to these benefits, electromechanical systems tend to be more accurate and precise, and because the price of electric motors and components continues to sink, they will only become more prevalent over time. A study by [Adroit Market Research](#) indicates that the electronic power steering market will account for more than 1/3 of the total steering market by 2023, with an 8.7% CAGR (Combined Annual Growth Rate).

Replacing Hydraulic Steering Systems in Practice – the Wainbee Approach

In most cases, you don't need to purchase new equipment to enjoy the benefits of an electromechanical steering system. At Wainbee, we can replace your entire hydraulic steering system with a brand-new electromechanical power steering solution – let's talk about an example project that we've worked on relatively recently.

Here's how the solution works. First, the hydraulic system is totally replaced with an AC vector drive, as well as a motor and a gear reducer. The actual steering control system remains intact, allowing for direction and speed signals to be sent to the AC vector drive.

Then, a specialized encoder on the motor provides position feedback to the steering control system, allowing fine-tuned control to be maintained. One of the benefits of this system is that a powerful vector duty AC motor can easily produce 100% torque on demand – and these units can often maintain a 150-200% overload capacity for a minute or longer.

In addition, this system has a much smaller physical footprint, as well as lower noise levels. Repair is also much simpler – with each critical steering part being completely field replaceable and swappable in just 15 minutes to an hour, increasing equipment reliability, and ensuring breakdowns can be solved quickly.

Electric Steering – the Future for Marine OEMs and Other Equipment Manufacturers

In the coming years, we would not be surprised if electric units completely replaced hydraulic units on major marine vessels – and their benefits also make them ideal for other heavy equipment manufacturers.

Whether you're interested in using a Wainbee system while building a new vessel, or retrofitting an existing marine vessel with a brand-new electric steering system, we're here to help. Learn more about what we do on our website, or contact us today for more information.



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