New Kalmar Hydraulic Hybrid System leading the way

Kalmar’s new hydraulic hybrid technology is part of Cargotec’s Pro Future™ concept and is the best solution to your economic and environmental challenges. Hydraulic hybrid technology enables up to 75% of the energy being transferred, thus reducing fuel consumption and exhaust emissions without impairing performance. We deliver top performance to our clients combined with sustainable technological solutions.

Most hybrids use some form of electricity to generate savings. A smaller engine (either diesel or alternative fuel) will recharge batteries, or the vehicle can be plugged in, causing downtime and creating the additional cost of alternative fuel and charging stations. Because of the current initial high investment of these technologies, it is felt that there will be four generations before these types of hybrids become stable and cost efficient. On the other hand, hydraulic energy is a proven and mature technology, transfers the highest percentage of energy, and offers the lowest initial investment and shortest return on investment of any of the hybrids.

WHAT ARE THE BENEFITS OF A HYDRAULIC HYBRID TERMINAL TRACTOR?

- Protects the environment by reducing greenhouse gas emissions and their environmental footprint.
- 20% Fuel savings in typical applications
- Regenerative braking stores power while reducing brake wear
- Engine operates in optimum power range improving engine life
- Flexible power train configuration
- Proven hydraulic technology
- Up to 150,000 lbs GCW pulling power

SUSTAINABLE SOLUTIONS
Cargotec’s Pro Future™ is a special brand for environmentally friendly equipment that passes set criteria with regard to energy efficiency, power source, emissions, noise pollution and recyclability. With the help of Pro Future™ solutions, clients can genuinely develop more sustainable operations and reduce fuel consumption.
Hydraulic hybrid vs electric hybrid

The advantages of hydraulic hybrid operates more efficiently than the electric hybrid. The key differences of these two systems are demonstrated here.

**GAS/ELECTRIC HYBRID**

Four stages of electric energy transfer required with an electric hybrid.
1. Generator (mechanical energy to electrical energy)
2. Battery charging (electrical to chemical)
3. Battery discharging (chemical to electrical)
4. Motor (electrical to mechanical)

50% efficient energy use based on max energy transfer at each stage.

**HYDRAULIC ENERGY HYBRID**

Two stages of hydraulic energy transfer:
1. Pump (mechanical energy to hydraulic energy)
2. Motor (hydraulic to mechanical)

75% efficient energy use based on max energy transfer at each stage.

How the system works

**Launch Cycle:** During the launch cycle the hydraulic hybrid drive system will solely provide power to accelerate the vehicle while charge is available in the high pressure accumulators. The hydraulic hybrid drive system will meet power demands so long as charge is available. If charge enough is not available, power will be provided from the engine.

**Regeneration/Recovery Cycle:** During the regeneration cycle the hydraulic hybrid drive system utilizes regenerative braking to recover a portion of the vehicles kinetic energy; this continues until the maximum state of charge is reached in the accumulators.

What separates Kalmar from the rest of the hybrids

- Continuous regeneration with no re-charging downtime.
- No investment in special refueling equipment
- No battery pack replacement and no polluting disposal.
- The parallel system affords flexible operation.
  No downtime—period!
- Kalmar has the largest sales and service network in the industry.
North American presence and local service bring our solutions closer to our customers.