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## Flywheel takes off in ports

**Cerritos-based company sells fuel-saving device to port crane operators.**

**By Kristopher Hanson, Staff writer**

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LONG BEACH - This is one small business that may just be in the right place with the right product at the right time.

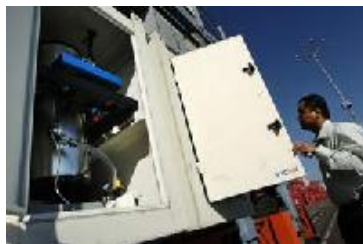
A small Cerritos company is marketing a flywheel device to port crane operators that claims to save fuel, reduce dangerous emissions and improve efficiency and power.

With high fuel prices, public pressure to clean port-generated emissions and the always-present effort to streamline operations, shipyard managers are taking a close look at Vycon Energy and its new machine.

The \$150,000 flywheel regenerator works by capturing kinetic energy wasted when a crane lowers containers. The regenerator uses that energy during lifting operations.

By supplementing power to the crane's diesel motor, the high-speed magnetic flywheel conserves fuel up to 25 percent while reducing the level of toxic emissions spewing into the air as much as 67 percent.

Inventors say it pays for itself within a few years, has a 20-year lifespan and requires little maintenance, if any.



Octavio Solis, the product manager for VYCON, talks about the REGEN system, an energy storage device attached to this RTG crane at the ITS Terminal in the Port of Long Beach. (Scott Smeltzer / Press-Telegram)

Despite its enormous potential at shipyards, the flywheel device only took off in recent months.

"In the U.S., fuel is still relatively cheap, so we were spending a lot of time in Europe and Asia

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selling the system for its fuel-saving benefits," said Octavio Solis, a Vycon product manager. "Then the ports made the decision to get serious about air pollution, and we stepped up to prove we can help in that area, too."

#### Pottery to ports

Invented by a group of curious electrical engineers, Vycon's "Regen" flywheel system is a cutting-edge version of an ancient system.

Flywheels, or pottery wheels, were used to make pottery in Egypt during the reign of the

Great Pharaohs and later helped fuel steam engines during the Industrial Revolution.

Still in use, the pottery wheel is a spinning round surface, usually powered by a foot pedal, on which clay is shaped into ceramics. The simple concept works by permitting the energy stored in the wheel to be directed to where it's required - the point where the potter's hand meets the clay.

In the 1990s, Vycon employees began tinkering with a much more complex flywheel using a magnet motor/generator, magnetic bearings and integrated control mechanisms.

To beat the competition, engineers had to develop a working flywheel capable of recharging every minute without overheating - making it practicable for machines with heavy cycles - like trains and cranes.

On cranes, the flywheel works by capturing energy from AC hoist motors regenerated when the motors are used as brakes during lowering cycles.

Typically, that regenerated energy is directed to the crane's resistor banks, where it's wasted as heat.

With Vycon's Regen, the power is directed to the flywheel, which works in sync with the diesel motor to provide peak power during lifts.

It took about four years for the system to be perfected and ready for market, said Louis Romo, Vycon's vice president.

"We basically worked on it for free those years because we knew there was a big potential market for these systems if we got it right," said Romo, an electrical engineer by training.



The VYCON REGEN system is an energy storage device that attaches to RTG cranes similar to this at the ITS Terminal in the Port of Long Beach. (Scott Smeltzer / Press-Telegram)



The Vycon Regen is an energy storage device attached to this crane at the ITS terminal in the Port of Long Beach. (Scott Smeltzer / Press-Telegram)

The system was first sold to supply temporary power to hospitals during power outages. The company's flywheel regenerator replaced or complemented a hospital's battery backup power. The system proved valuable because it didn't need to be replaced every few years and didn't present the environmental problems lead batteries pose.

During a visit to an Italian port, a Vycon engineer realized the technology's potential for the giant cranes used to lift cargo containers onto trucks and trains.

"We realized with these cranes there was a lot of energy being wasted during lowering and braking and that could be captured in the flywheel and used during lifting," said Romo. "Our guy kind of stumbled upon it."

Earlier this year, flywheels were installed at two terminals in the ports of Long Beach and Los Angeles, where commissioners are jointly pushing to replace old technologies with environmentally friendly equipment.

In their draft "San Pedro Bay Ports Clean Air Action Plan," both ports set a goal of reducing emissions by 50 percent within five years.

The ports' 400 shipyard cranes are responsible for a small but growing percentage of overall emissions.

Together, the sprawling port complex is listed as the single largest fixed source of air pollution in the Los Angeles Basin, according to the South Coast Air Quality Management District.

Port cranes can reach heights of 80 feet or more and work around-the-clock loading and unloading containers from trucks, trains and ships as often as once a minute.

Worldwide, there's an estimated 8,000 shipyard cranes in use, with numbers growing by the month.

### **Growing market**

Needless to say, there's a big market for Vycon to tap.

"For a young company, we're well-positioned with two products to serve the market," said Tony Aoun, Vycon president and CEO. "We've done some good things positioning ourselves in the past couple years."

In Long Beach, the regenerator was mounted on an existing Rubber Tyred Gantry crane used to load and unload containers from trucks at the ITS Terminal. A regenerator was also mounted on an RTG crane at the Port of Los Angeles' Evergreen terminal.

"The device is pretty darn seamless, it doesn't affect steering or maneuverability and actually increases handling," said Chris Rapp, ITS director of maintenance and repair. "Our ultimate goal here is to reduce emissions. We want a green facility, but we also want to reduce fuel costs and maintenance costs, and this helps in all three areas."

Vycon's own emissions testing, performed by a third party, shows it reduces particulate matter 66 percent, nitrogen oxides 26 percent and hydrocarbons 23 percent.

The California Air Resources Board is currently testing the product as well.

Outside local ports, the regenerator's dual benefits are being used at seaports from Great Britain to Hong Kong.

In Europe, where diesel can cost \$7 a gallon or more, its fuel-saving capabilities are a key selling point.

In the United States, where diesel is about \$3 a gallon, the flywheel's environmental benefits are the hot ticket.

The company has about 25 flywheels currently in production at its 40,000-square-foot Cerritos facility.

"Sometimes businesses are overly criticized for spending money on clean technologies, but I think we're one of those companies that make economic sense and environmental sense," Aoun said.

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## Vycon Energy

**Location:** Cerritos

**Founded:** 2002

**Executive:** Toni Aoun, president/  
CEO

**Business:** Flywheel regeneration  
and UPS systems adaptable to  
power grids, shipyard cranes and  
trains.

**Employees:** 23

**How the flywheel works:** The  
flywheel captures a machine's  
wasted energy (such as during  
braking) and uses it to supplement  
the machine's main motor.

**System dimensions:** 5,200  
pounds, 64 inches high, 63 inches  
wide, 59 inches deep

**Web site:** [www.vyconenergy.com](http://www.vyconenergy.com).



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