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## Seattle's Foss Maritime develops "hybrid" tugboats

Foss Maritime has developed the Prius of tugboats, which consumes less diesel and generates less pollution by using batteries for all the vessel's low-power needs.

By **Ronald D. White**  
*Los Angeles Times*

LOS ANGELES —

For all of its 21st-century advancements, the shipping industry drags a lot of old technology around.

Giant vessels are so sophisticated that they require only a handful of crew members. But the ships still burn a thick, dirty sludge called bunker fuel while at sea and slurp diesel to keep the lights and air conditioning running while in port.

Inefficient yard tractors and cranes guzzle fuel and spew exhaust as they stack containers. And tugboats, pound for pound the most powerful vessels on the water, waste most of that idling or cruising.

Now, as seaports try to raise their environmental standards, some companies are finding business opportunities.

Foss Maritime, of Seattle, for instance, has developed the Prius of tugboats, which consumes less diesel and generates less pollution by using batteries for all the vessel's low-power needs.

Foss calls it the world's first hybrid tug and expects to deliver it to the Port of Los Angeles later this month. The tugboat currently is undergoing testing, said Foss spokesman Dave Hill.

The tugboat, which is being built at the Foss shipyard in Rainier, Ore., across the Columbia River from Longview, will be based at Southern California's twin ports for five years in exchange for the funding help.

Outwardly, it looks much like other tugboats. Inside, the tug is so different that it will be able to operate like a regular work boat while using less fuel and expelling less exhaust.

The stakes are high for the Port of Los Angeles, said William Lyte, co-founder of Technoplex Group in Los Angeles, a consulting company that helps entrepreneurs market new technology.

"The ports have about \$5 billion in expansion projects they want to do, and they can't do it without mitigating the impact of pollution. Green systems will have to be in place to get these projects approved," Lyte said. "Companies from all over the world will be trying to sell that kind of technology here, so California businesses have to be prepared to compete."

### Testing grounds



**PHOTO: FOSSE**  
This diesel-electric hybrid tugboat, believed to be the first of its kind in the world and is being made for the ports of Los Angeles and Long Beach, is being built by Seattle-based Foss Maritime at its shipyard in Rainier, Ore.

Those companies will discover what Foss learned. The ports of Los Angeles and Long Beach, the largest cargo-container ports in the nation, are willing to serve as testing grounds, business incubators and venture capitalists. About \$1.35 million in development costs for the Foss hybrid tug came from the two ports and the South Coast Air Quality Management District.

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"We asked for help to offset the increased capital costs of doing this," said Susan Hayman, vice president of environmental and corporate development for Foss.

Geraldine Knatz, executive director of the Port of Los Angeles, said she hoped other businesses would bring their best ideas to the busy harbor.

"The concept of a hybrid tug really gets to the heart of our technology advancement program, where both ports have set aside a funding pool for the development of clean-technology applications in a maritime environment," she said of the \$15 million, five-year program. "So it's very exciting for us to see

this concept that Foss brought to us come to fruition."

#### Ruminating on idea

The idea had been kicking around Foss' offices since 2006, based on the knowledge that tugboats tend to run on full power only 7 percent of the time and waste their 5,000-plus horsepower by idling 50 percent of the time. Knowing that railroads were moving to electric propulsion, Foss initially looked at switching locomotives, which are used to move trains inside rail yards.

There was one big problem.

"The batteries were too heavy. They would have sunk the boat," Foss Chief Engineer Rick McKenna said.

The solution came from the oil industry.

Canada's Aspin Kemp & Associates had expertise with "ultra-deep-water" drilling rigs that are held in position with "dynamic positioning thrusters" instead of anchors. The thrusters have to power up quickly to keep the rig in place.

#### New design

The engineering company designed a way to run the diesel engine and the electrical motor generator through the same drive shaft, McKenna said, enabling Foss to switch to smaller batteries and smaller diesel engines.

"It drives like a normal tug," McKenna said. The system's design would enable most existing tugboats to switch to the diesel-battery setup through a retrofit. Foss is hoping that will be a key selling point.

Tests have raised expectations that turning hybrid would cut a tug's particulate and nitrogen-oxide emissions as much as 44 percent. That's enough to impress environmental groups that have been some of the ports' harshest critics.

"Moving the ports' tugboat fleet toward hybrid technology is a benefit to both local residents and companies who do business at the ports," said Jessica Lass, a spokeswoman for the Natural Resources Defense Council. "It shows it's entirely possible to move the ports toward greener, hybrid technology that cuts down on toxic greenhouse emissions and diesel fuel that fouls our local waterways and bodies."

Foss has been in the tugboat business since 1889. But Heather Tomley, senior environmental specialist at the Port of Long Beach, said companies don't have to have a maritime background to gain the ports' attention.

Yorba Linda, Calif.-based Vycon has developed a flywheel technology that attaches to yard cranes. The flywheel system collects energy as cargo containers are lowered and then releases it, helping lift containers. That reduces the power the diesel engine has to supply, cutting fuel consumption and the release of pollutants.

Tomley said Vycon achieved more than a 25 percent reduction in particulate emissions in California Air Resources Board testing.

Vycon has been watching sales of the \$150,000 devices grow. "This year we have sold 38 machines," said Louis Romo, vice president of sales. "We sold five during all of 2007, so that is a nice jump for us."

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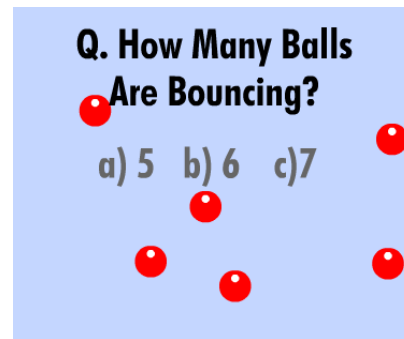
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