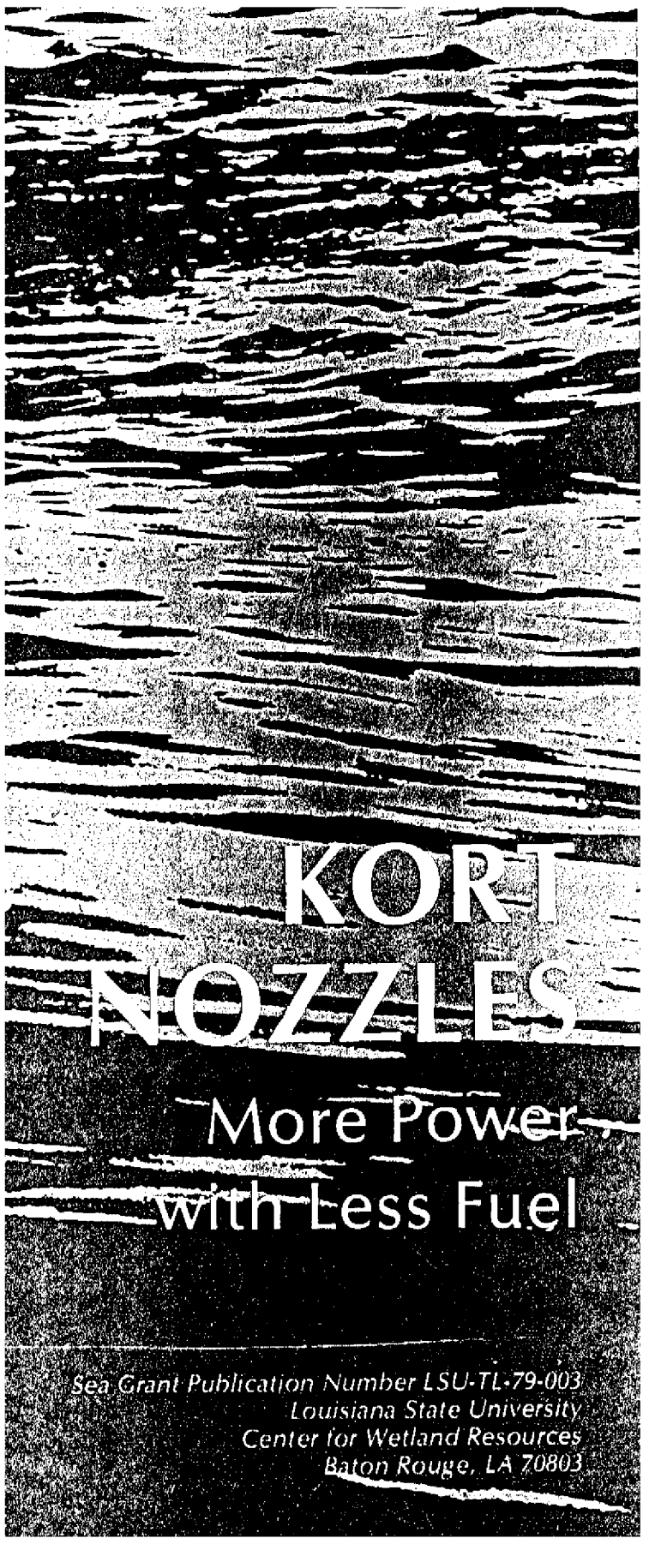

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What is a Kort Nozzle?

A Kort nozzle is a specially designed steel cylinder that fits around the propeller of a boat. It is installed to make a boat more efficient: with a properly designed nozzle a boat can get the same towing power with less fuel or more power from the same amount of fuel.

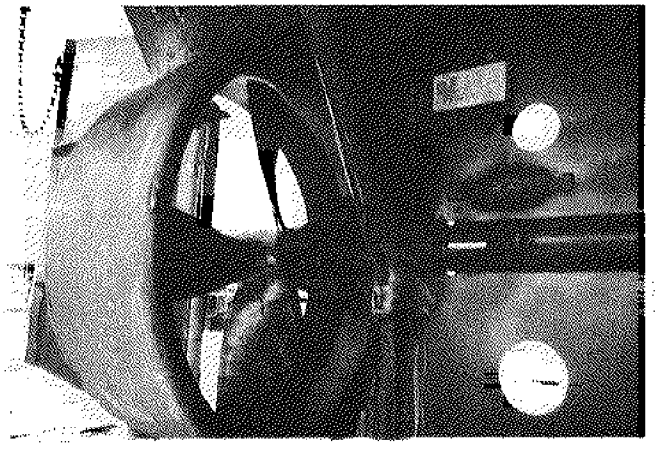
Why is it Called a Kort Nozzle?

The name comes from its inventor, Ludwig Kort, who first experimented with nozzles on river tugs and push boats in the 1930s. Today almost all such boats are equipped with nozzles.

Are Nozzles Practical for All Kinds of Boats?

No. Nozzles are practical only for boats that develop high thrust at slow speeds, such as the river boats for which they were developed. They are practical for offshore shrimp boats, which pull large nets at slow speeds.

At high running speeds, the nozzle creates additional drag that slows the boat. Nozzles are not practical for boats that need to cover long distances rapidly en route to fishing grounds.



A propeller fitted with a Kort nozzle. The system has two functions: it draws more water through the propeller and it directs the force of the propeller in a single direction. Better fuel efficiency results. Photo courtesy of Bollinger Machine Shop and Shipyard, Inc.

How Much Fuel Can a Nozzle Save?

This depends on how the boat is used once the nozzle is installed. An operator has two choices. He can run the engine at a slower speed and get the same pulling power he had before the nozzle was installed. This way he will save fuel. A Texas shrimper pulling four 65-foot trawls found that after a nozzle was installed on his boat the fuel consumption was reduced by a total of six gallons per hour. He could trawl at an engine speed of 1,522 rpm as opposed to 1,700 rpm before the nozzle was installed.

The other choice is *not* to reduce engine speed after a nozzle is installed, but to use the same rpm to pull wider nets. No savings in fuel are realized in this option, but more area can be fished for the same amount of fuel.

Does a Nozzle Affect Engine Maintenance?

Yes, in a significant way. Because the nozzle increases the engine's efficiency, less power is needed to pull the same load. The result is a saving on wear and tear of the engine. So there are two economies with a nozzle: fuel savings and savings in engine maintenance. One shrimper who had to overhaul his engine every four years before a nozzle was installed estimates that he will be able to put off an overhaul for nine or ten years.

What Difference Does a Nozzle Make in Bollard Thrust?

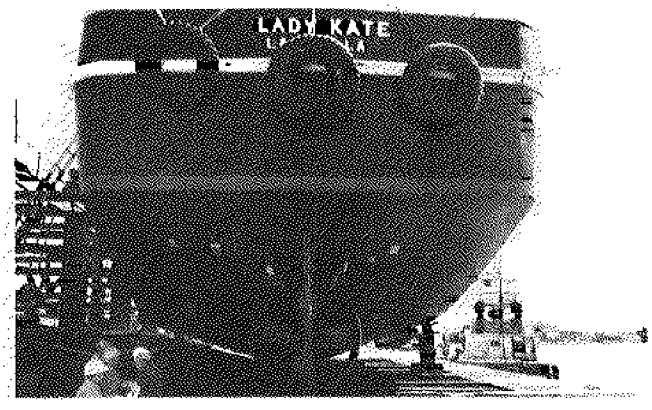
A company that manufactures nozzles compared a boat with a nozzle to one with an open propeller. Both boats had the same horsepower at the same rpm: 354 horsepower at 1800 rpm, 6:1 gears. The boat with the nozzle had a bollard thrust of 13,700 pounds; the boat without a nozzle had a bollard thrust of 9,500.

Can a Nozzle be Added to a Boat Already in Service?

Yes, and many shrimp fishermen have them installed when they have seen how effectively

they work on other shrimp boats. The addition of a nozzle sometimes requires the installation of a smaller propeller and may require an adjustment in the position of the rudder, but it can and is being done.

Nozzles are most easily put on steel hulls, but they can be added to wood and fiberglass hulls too. The job with wood and fiberglass hulls is slightly more complicated and expensive. Before a nozzle can be attached to a wooden hull a rigid steel frame has to be secured to the boat. The nozzle is then attached to the steel.



A newly installed Kort nozzle on a boat already in service. With the nozzle, the boat's owner found he could maintain the same pulling power with 200 rpm less, a saving not only in fuel but also in engine maintenance. Photo courtesy of Bollinger Machine Shop and Shipyard, Inc.

How Much Does a Nozzle Cost on a Boat Already in Service?

When changing from an open propeller to a nozzle, it is often necessary to change the size of the propeller, which adds to the cost of installation. In 1978, the following approximate cost was incurred when an 85-foot, steel hull shrimp boat was fitted with a nozzle:

60-inch nozzle	$6,600
Bronze propeller	2,600
Installation	6,000
Total	$15,200

Included in installation costs were rudder modifications and lengthening of the shaft.

How Much Does a Nozzle Cost on a New Boat?

A standard 60-inch nozzle costs from $6,000 to $8,000. That price is for the nozzle itself, not the cost of installation.

There are other factors of cost to consider besides the cost of the nozzle itself. Because a nozzle increases the efficiency of the engine—gives more thrust with the same horsepower or the same thrust with less horsepower—a smaller engine could take the place of an engine required by an open propeller system. The initial cost of the smaller engine would be less and the boat would use less fuel. Both of these factors should be weighed against the cost of the nozzle.

How Long Does Installation Take?

Most boat owners plan for the installation of a nozzle at the same time a boat needs to be hauled out for general maintenance. At least a week is required in the boat yard for the installation of a nozzle.

Does a Nozzle Create Problems?

The same principle that makes the nozzle work—creating suction that pulls more water through the propeller—accounts for its major drawbacks and limitations.

Nozzles are not yet practical for use in shallow, inshore waters. The suction created by a ducted system can pick trash off the bottom as far as 20 feet away and pull it into the nozzle. In bad cases, objects can actually get stuck between the propeller and the nozzle.

Nozzles may complicate certain kinds of fishing like purse seining because there is the danger that nets will be pulled into the propeller when the boat is backing around.

Nozzles make a boat somewhat harder to steer, a problem also related to suction. As the water is pulled into the nozzle it passes by the rudder. Because it is pulled into the nozzle with a great deal of pressure, that pressure asserted on the sides of the rudder makes it more difficult to turn. Shrimp boat operators have not found this to be a significant problem, however.

How Does a Nozzle Work?

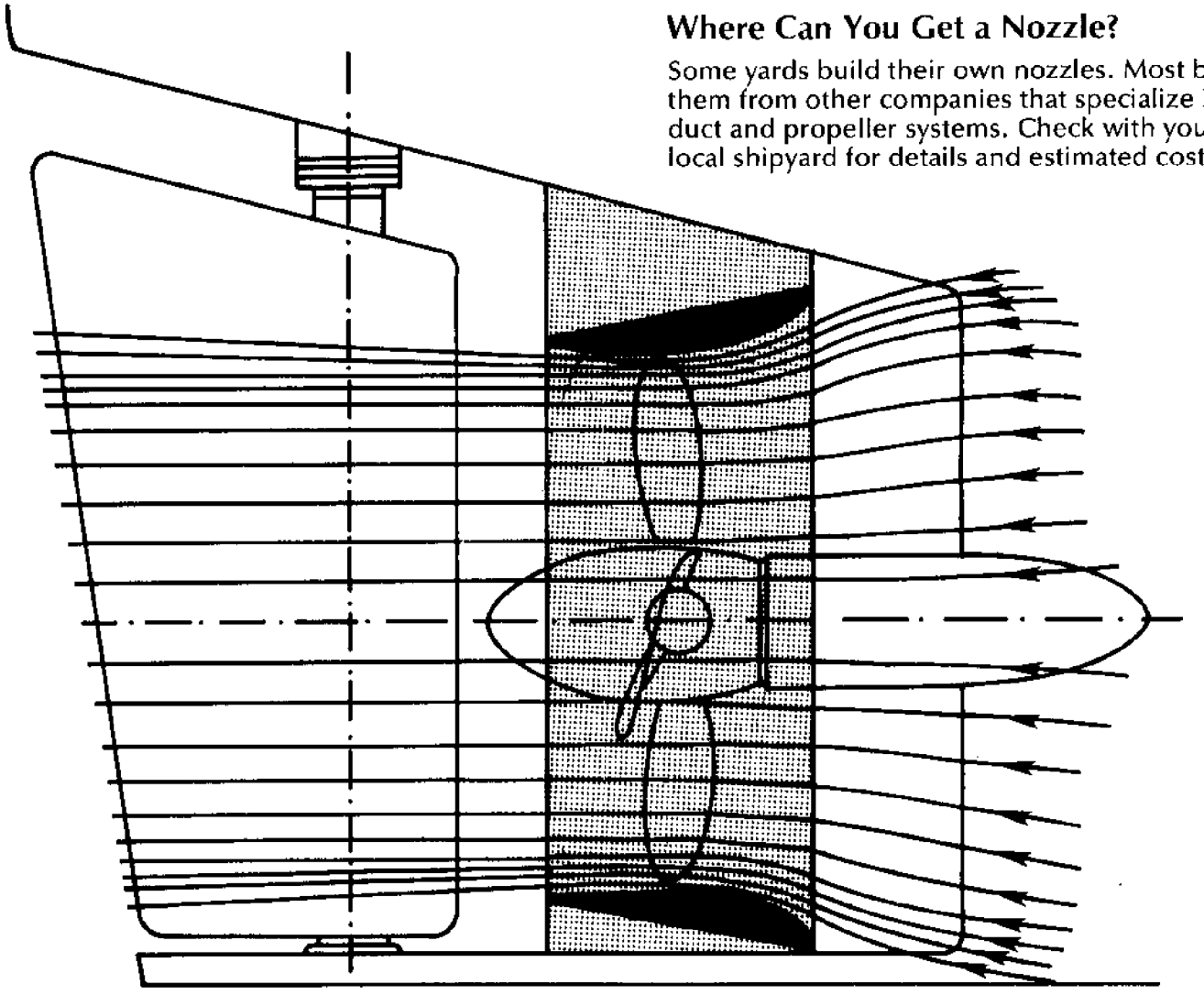
A Kort nozzle has two functions. It draws more water through the propeller than would otherwise pass through it, and it concentrates more of the propeller's force in the direction of desired thrust.

The nozzle is not just a uniform cylinder. The leading end of the nozzle—where the water enters—is larger than the trailing end. Inside, the nozzle constricts opposite the propeller and flares to the trailing edge. This design causes pressure to drop inside the nozzle, resulting in suction from front to back. This is called the venturi principle, the same principle on which an air foil operates.

The other function of a nozzle involves directing the propeller's force. Without a nozzle, the propeller's motion produces eddies and dissipates energy at right angles to the vessel's direction of travel. But with a nozzle, most of the force is concentrated in one direction parallel to the propeller shaft.

Where Can You Get a Nozzle?

Some yards build their own nozzles. Most buy them from other companies that specialize in duct and propeller systems. Check with your local shipyard for details and estimated costs.



A Kort nozzle in profile: the area shaded grey is the steel cylinder that fits around the propeller. Inside, the nozzle constricts opposite the propeller, shown here by the two black areas above and below the propeller. This design causes pressure to drop inside the nozzle. Suction is created, which draws more water through the propeller than would otherwise be the case. Drawing courtesy of Trans Gulf Technical Sales, Inc., Brownsville, TX.

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