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The Workboat Edition



Propulsion:
Moving Ahead with Innovation

**Commercial
Fishing Vessels:**
The Ultimate Workboats

Inland Waterways:
Funding Infrastructure & Ecosystems

Powerful by Design

Signaling the end of a one-size-fits-all propulsion approach, Karl Senner's collaborative effort with the Shearer Group employs a Steerprop solution designed for a built-for-purpose hull design.

By Joseph Keefe

If there is but one trend that has permeated the inland propulsion markets in recent years, and for all the right reasons, then that would be the proliferation of thrusters and/or so-called z-drives for inland vessels. Taking that trend one giant step further is the notion that installing thrusters for the sake of efficiency can be largely a wasted exercise unless all aspects of the vessel and associated equipment are taken into consideration. And that, in a nutshell, is what the industry propulsion veterans at Karl Senner LLC have done in their latest project involving not only naval architects and marine engineers at the Shearer Group, but also the Steerprop azimuth thruster company.

In a unique pushboat design intended to accommodate the Steerprop solution and also maximize the utility of the thrusters / z-drives, Karl Senner, the Shearer Group and Steerprop all look to leverage deep experience with the U.S. inland markets as well as proven success and experience with Steerprop in the offshore markets, starting back in 2001.



According to Chris Senner, reliability is a key aspect of the Steerprop design. Transitioning that success to the inland markets takes attention to size, design of equipment and the demands of inland waterways. Senner adds, "We work closely with all parties during all stages of the design, build, and operation to ensure the best solution for the application. We aim to minimize downtime and maintenance for the life of the vessel."

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Over time, Karl Senner has worked with several naval architects to properly integrate the use of z-drives on the inland waterways in terms of performance, reliability, cost, and service. Chris Senner explained, “We often work with multiple naval architects to assist in the design of the propulsion package. For this particular project, a mutual customer requested that we work with Shearer, using our industry experience and their design capabilities relating to z drive applications to create a new towboat, designed specifically for the use of z-drive propulsion for brown water applications”

UNIQUE DESIGN – BUILT-FOR-PURPOSE

The new propulsion package is just that – a package. It fits well into a built-for-purpose newbuild scenario – especially the new inland pushboat design produced in conjunction with partners Steerprop and the Shearer Group. On the other hand, retrofitting existing vessels, says Chris Senner, is considered only on a case-by-case basis. He adds, “We have repowered several offshore vessels in the past and converted them to Steerprop propulsion; similar projects can be accomplished for inland vessels as well.” That said, the towboat designed specifically with Steerprop in mind is the best candidate for this concept and provides the best returns in terms of performance, safety and efficiencies.

For their part, this design package that involves z-drive propulsion is not the first that the Shearer Group has undertaken. Each project, says the Shearer

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Group’s Joshua Sebastian, is different and involves a lot of analysis and many variables to take into consideration. In contrast, he says, “Many times, designers never revisit the hull shape to ensure the best flow into the propulsion on a hull designed for another propulsion system.” The Shearer Group designs each hull to a client’s specific needs, tailoring the hull shape for the desired propulsion configuration and operating areas.

While converting an existing standard configuration vessel with z-drives is possible, it isn’t necessarily practical. The Shearer Group has completed such conversion designs for clients, but Sebastian adds, “That kind of job represents technical challenges and is never an easy task.” This hull, in contrast, was designed from the ground up to match the Steerprop solution, maximize the efficiencies of a z-drive boat and to reduce vibration.

For example, the collaboration between the three groups incorporates an 8’-6” draft, with attention towards the 9’ controlling depth on inland waterways (but not always achieved by USACE dredging). That lets the boat do its job in today’s real waterway conditions. Senner told MarineNews, “For a vessel designed to operate in the ‘ditch’ between New Orleans and Houston, the operator and naval architect both agreed that we should keep draft to a minimum, and target under 8’-6” to stay off the bottom.” But, that’s just one of the many advantages that the new towboat offers.

Steerprop’s fabricated steel housing is typically stronger and lighter than cast versions. They are also

A Built-for-Purpose Towboat at a Glance ...

Length: 90'	Design Draft: 8.5'	Fuel: 50
Breadth: 39'	Berthing: 7	Potable Water: 10
Depth: 10.5'	Lube Oil: 1,500 Gallons	Slop Oil: 1

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easier to repair if needed, and have shown no signs of corrosion or erosion. These features are a sure benefit for Inland Operators.

Many factors come into play when selecting the appropriate thruster for the application: operating profile of the vessel, operating environment, thrust demand, depth restrictions, bottom composition, risk of impact, and even ‘tier’ emissions requirements can come into play. These factors, say Senner, are all critical when selecting the most appropriate unit for the job.

Senner also told *MarineNews* in October, “Once the unit is integrated into the vessel design, Karl Senner and Steerprop technicians analyze shafting arrangement

The Steerprop Advantage at a glance ...

Hi-Performance Nozzle	The HJ3 High Performance / High Efficiency Nozzle’s hydrodynamic shape provides 5-6% increased bollard pull, with 10% higher efficiency at speed – when compared to a conventional 19A type nozzle.
Durability	The HJ3 Nozzles come with a stainless steel inner surface, from the leading to trailing edge of the nozzle. Rolled and attached in one single piece, with no weld seams on the inner diameter, the lining can be up to 1” thick to allow for minimum service and repair to nozzles.
Unit Sizing	An over-sized “brown water rating” is used when sizing Steerprop units for Inland Waterways, similar to an ice class rating. The blade’s design utilizes strengthened stainless steel propellers that maintain optimum performance, but allows to run through the inevitable debris.
Overhaul Intervals	Steerprop units are designed for 75,000 to 100,000+ hours between overhauls. This reduced maintenance interval provides Steerprop with a low cost of operation.
Housing design	Steerprop’s housings are steel-fabricated (not cast); more resilient to impacts, more likely to bend than crack upon impact, easier to repair and have shown no signs of corrosion or erosion.
Short Stem Height	A shorter stem height (distance from propeller shaft to input shaft) minimizes the distance from the propeller shaft to the slewing ring. A reduced distance between components reduces axial forces on the slewing ring, creating a stronger unit.
Seal Design	Steerprop uses IHC Supreme 4 lip Seals on the propeller shaft seal, creating 4 separate barriers between lubrication and outside water. Each seal is designed for high silt/sand environments. The steering seal is a triple lip seal, does not require major disassembly or overhaul for service. Condition monitoring is offered on both propeller and steering seals.

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options, and evaluate waterflow into the unit. Even small hull changes to optimize waterflow and hydrodynamics can greatly decrease fuel consumption and increase performance.”

Karl Senner touts the 15 year service time between overhauls for Steerprop units as opposed to the typical, more frequent overhauls of other options. In fact, the first Steerprop units put into operation in 2001 have been running as scheduled, 14 years later. Performing as designed, with only routine maintenance based around regulatory 30-month dry-dockings, these Steerprop units have required no major work throughout their 14 years in operation. And, when service or repairs need to be done, the standardized Steerprop product reduces costs as well as the number of parts needed to be stocked to get that done.

When it comes to inland propulsion, geography can mean everything. And because Steerprop (Finland) has significant experience in ice, these thrusters promise to be especially robust in inland waters that can be heavy with debris (and sometimes ice) in the northern U.S. rivers at the beginning of each navigation season. Separately, Steerprop thrusters have also seen much service in the demanding inland waterways of South America, where demanding performance regulations can only be met with the use of z-drives.

ONE STOP SHOPPING

Competition is a good thing, and there are other propulsion packages on the market. A recent trade show had three or four offerings on display, some with as many as five involved parties in the installation. In contrast, the Karl Senner turnkey inland towboat would be a one-stop-shop. Chris Senner adds enthusiastically, “We can work with anyone at any stage of a given project, from new concepts to re-powers. We can supply all drive components from the fly wheel back, including Reintjes Gearboxes, Steerprop z-drives, and electrical components for diesel electric systems from EPD out of Houston. Furthermore, on the inland side, customers can still utilize Karl Senner for their conventional vessels equipped with gearboxes, as well as for their next generation z-drive vessels, and diesel-electric packages. This allows our customers to have one source for all their propulsion needs.” Post-delivery, Karl Senner provides hands-on training to operators both on board vessels and in their New Orleans-based facility, where

curriculum includes both theoretical training as well as hands on training with real equipment from mechanical to control systems. A spare parts inventory of more than USD \$20 million in assets and service centers in New Orleans, Paducah, Seattle and Houston (coming in 2016), rounds out the turnkey Karl Senner Service package.

WHY STEERPROP?

Way back in 1967, Karl H. Senner sold the very first Reintjes Gearbox in the North America to Dickie Gonsoulin of LeBeouf Towing. Since that time, the inland waterways have always been a core focus of the Karl Senner business model. But, the company’s inland success led then into the offshore markets, as well. As the demands of offshore changed, and technology evolved, Karl Senner, LLC adapted its product offerings to grow with the industry. Karl Senner continues, “We found a partner in Steerprop that shared a very similar ideology to Reintjes – both companies solely focus on one component of Marine Propulsion, and both offer products known for their robust construction, reliability, and longevity – we knew that Steerprop would be a good fit for inland customers, as well.”

Steerprop knows ‘impact.’ Among the world’s most experienced OEM’s in the field of ice class azimuth propulsion, Steerprop’s product portfolio offers units designed from 800-to-25,000kW, and the company’s only focus is azimuth propulsion. Steerprop delivered the main propulsion thrusters on three of the largest azimuthing ice breakers built in the world to date – vessels that operate in the harshest marine environments on earth. And, according to Chris Senner, many of the design features that differentiate the Steerprop product, should be extremely advantageous to the US Inland Operators. Steerprop’s HJ3 High Performance Nozzle design provides increased fuel savings, higher bollard pull, increased thrust at speed, and minimal nozzle maintenance. With a 15 year TBO (time between overhaul) design, Steerprop provides low cost of operation combined with safer maneuvering than conventional shaft lines, especially for crash stops, and maneuvering around river traffic. But all of that comes only when the vessel’s design is matched to take full advantage of the equipment that propels it through the water. That because – on inland waters – one size does not fit all, any longer.