The Larry R. Glosten Firm: From Workboat to Marine Structure Design

By William (Bill) Hurley, P.E.

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On January 1, 1958, Larry Glosten started his one-person business as a naval architect and marine engineer. He rented a tiny office space on the second floor of the old Polson Building on the corner of Western Avenue and Columbia Street in downtown Seattle.

By agreement with former employer Phil Spaulding, Larry had left the firm with two clients: Upper Columbia River Towing Company and W.R. Chamberlin, Inc.

Upper Columbia, which evolved into Pacific Inland Navigation (PAC), later being absorbed by Crowley Maritime, then had BARGE 539 under construction at Todd Shipyard in Seattle. This vessel, which had been designed at Spaulding under Larry's direction, was touted as "the largest barge in the world." During construction, Larry was to represent the owner and that project involved enough work to get the firm started.

Larry Glosten during his early professional years.

In his first year with his own business practice, Larry received a few small assignments to do stability studies, most notably from Foss Launch and Tug Co. Since 1958, the Glosten organization has done work for Foss in every single year; even though by mid-year, of that first year, their work load was falling off and prospects did not seem promising.

Late in 1959, an event occurred which turned the tide for Glosten's faltering venture. A gentleman walked in to Larry's office and introduced himself as Lew Johnson, representing the management that had taken over Upper Columbia River Towing on behalf of its new owner. He talked to Larry about some minor problems they were having with BARGE 539. The barge was then in port in Los Angeles and Larry said he would check in on her on an upcoming trip. Over the next decade, Pacific Inland Navigation Co. became Glosten's most important client.

Much of Larry's early work was the design of tugs and barges for operation at sea and in river systems as widely separated as the Columbia, the Yukon and the Nile. He designed barges to transport bulk cargo, liquid cargo, containers, drilling support modules and large diameter pipe.

One of the barge innovations in which he was involved was the "dry tow" of very large floating structures such as offshore drilling platforms. In these operations, a barge was submerged by flooding internal compartments, the floating cargo was brought over it and the barge pumped dry, lifting the cargo out of the water for transport. Over time, Glosten engineered over 40 loadouts and discharges of drilling platforms and other large floating structures on submersible barges of their design.

The Glosten organization has specialized in tugs for both river and seagoing service including small shallow draft vessels for Northern Alaska, Columbia River towboats, ocean towing vessels, harbor assist and escort tugs. Ben Jensen was working for Larry at one point, and when Ben wanted to split off, form his own practice, and focus on fishing vessels, he and Larry agreed by handshake that Ben would specialize in fishing vessel design, Larry would focus on towing vessels, and they would not compete in those business sectors. This handshake was an important landmark for two of the key marine industries in the Pacific Northwest.

The 1960's: Research Vessel Design Innovation

In the early 1960's, and now with a few employees, Glosten was brought in by the Gunderson shipyard in Portland, Oregon to consult on and prepare the construction plans for a unique oceanographic research platform being constructed for the Scripps Institution of Oceanography. FLIP (FLoating Instrument Platform) is a slender spar structure intended to float with its axis vertical when conducting research in the ocean. It consists of two coaxial cylindrical sections, joined end-to-end by a conical tapered section, having the upper section of smaller diameter than the lower. By evacuating ballast water from internal tanks, it can rotate (flip) to a horizontal attitude for towing. FLIP marked the beginning of a long and mutually beneficial relationship between the Glosten organization and Scripps. Glosten designed another Scripps research platform named ORB for Offshore Research Buoy, Glosten's first

self-propelled vessel the research ship ALPHA HELIX, and was also involved in upkeep and major refits of other ships of the Scripps fleet. In later years the work for Scripps expanded to other oceanographic research organizations including Woods Hole Oceanographic Institution, the University of Washington, University of Alaska, and the Monterey Bay Aquarium Research Institute. "In retrospect, 1968 seems to be the year during which things fell into place and we became a firm with a clear future ahead of us," Larry noted in his memoirs.

Larry invented the "Sea-Link" articulated tow system by means of which the barge could be pushed ahead of the tug, a more efficient system than the conventional means of towing behind on a long towline. Efforts started in 1961 and extended to 1978, representing an important chapter of the Glosten history. Sea-Link provided a degree of motion flexibility and relief from wave induced loads between tug and barge while still maintaining directional control of the barge. It was a two-pin articulated system for which Larry received a patent. Systems were built in the Philippines for San Miguel beer for distributing their product among the islands. Sea-Link was the kernel idea that has eventually evolved to the Articulated Tug and Barge systems that are so prevalent and successful today. The following quote from Larry's memoirs give us insight into this remarkable man:

"The Sea-Link episode, with its trials, disappointments and successes, was a difficult experience that I value highly and would not like to have missed. It brought worldwide exposure to our organization and gave us invaluable experience in the engineering business. We earned more friends than money, but that is not an unsatisfactory outcome."

The 1970's: Marine Risk Analysis and Special Vessel Projects

An important part of Glosten's work has been marine risk analysis and included such diverse considerations as dynamic loads and sea fastenings for extraordinary sized deck cargo, the transportation by barge of radioactive materials, and the safe passage of tankers in restricted waters. An early application began in 1970 with the first Arctic Sea Lift in support of the Alaskan North Slope and the Alyeska Pipeline. Barges were used to transport a variety of material to the North Slope ranging from thin-walled pipe to large pre-constructed industrial modules, weighing up to 3000 tons each and standing up to 150 feet high. It was necessary to determine the randomly varying loads and sea fastening requirements to secure such cargoes during the voyage from US West Coast through the stormy Gulf of Alaska to the North Slope.

In 1974, Glosten designed the Hughes Mining Barge – a submersible barge that was a critical part of the covert CIA operation that raised a sunken cold war era Russian submarine. It was designed in secret for the US Navy, under the guise of being a barge to mine manganese nodules from the ocean floor. It never did any mining. The barge later served as a floating drydock for construction and sea trials of the experimental stealth SWATH vessel SEA SHADOW, and today the HMB is alive and well working as a covered drydock at Bay Ship and Yacht in Alameda.

The 1980's: Floating Bridges and Structures Work

Not only did the 1980's bring a new president to Glosten, this decade also brought firm growth and increasing project diversity. Duane Laible succeeded Larry Glosten as the second president, he was responsible for the management of the firm, and Tom Bringloe was placed in charge of engineering.

On Feb. 13, 1979 wind gusts of up to 120 mph helped sink the Hood Canal Bridge, the one and one-fifth mile floating pontoon bridge that connected the Kitsap and Olympic peninsulas. The floating bridge is a unique marine/civil structure, consisting of a number of interconnected floating modules or pontoons,

R/P FLIP (FLoating Instrument Platform) is an open ocean research platform owned by the U.S. Office of Naval Research (ONR) and operated by Scripps Institution of Oceanography. The platform is 108 meters (355 ft) long and is designed to partially flood and pitch backward 90 degrees, resulting in only the front 17 meters (55 ft) of the platform pointing up out of the water, with bulkheads becoming decks.

The Sea-Based X-Band Radar (SBX-1) is a floating, self-propelled, mobile active electronically scanned array early-warning radar station designed to operate in high winds and heavy seas. It was developed as part of the Missile Defense Agency's Ballistic Missile Defense System. The radar is mounted on a fifth generation CS-50 twin-hulled semi-submersible oil platform. Conversion of the vessel was carried out at the AmFELS yard in Brownsville, Texas; the radar mount was built and mounted on the vessel at the Kiewit yard in Ingleside, Texas. It is nominally based at Adak Island in Alaska (though, as of April 2015 has never put into port at Adak). It has spent significant time at Pearl Harbor in test status.

SEA SHADOW resting under cover of HMB-1.

As shown in the photo on the previous page, Glosten designed the HMB barge/ floating drydock for the experimental stealth vessel SEA SHADOW (IX-529). She was designed and built by Lockheed for the United States Navy to determine how a low radar profile might be achieved, and to test high stability hull configurations which have been used in oceanographic ships. The SEA SHADOW had a SWATH hull design. Below the water were submerged twin hulls, each with a propeller, aft stabilizer, and inboard hydrofoil, and the superstructure above the water was connected to the hulls via the two angled struts. The SWATH design helped the ship remain stable in rough water up to Sea State 6, a wave height of 18 feet (5.5 m) or a very rough sea. In its aviation work, Lockheed also designed the U-2 and SR-71 Blackbird spy planes, and the F-117 Nighthawk stealth ground attack fighter.

Larry Glosten.

anchored in place to support a roadway crossing a body of water. Glosten was engaged by the State and proceeded to analyze the response to short crested waves, and in the process pioneered the application of hydro-elastic analysis. In 1983, the Washington State Department of Transportation commissioned Glosten to evaluate the wind and wave forces for the new I-90 bridge design and two existing Lake Washington bridges.

In 2017, Glosten continues to be a "go-to" consultant for floating bridges, and is engaged in wind and wave analyses of the SR-520 Replacement Bridge, and the re-evaluation of the Interstate 90 Homer Hadley Bridge for light rail traffic. Glosten has been involved in analyzing all the floating bridges in Washington State, as well as the Okanagan Bridge in British Columbia, and we continue work in this area today supporting Sound Transit as they are the first to put light-rail over a floating bridge.

The 1990's: Research Vessel and Escort Tug Design

By the 1990's, the firm had grown to a staff of 40. This decade brought a significant amount of work in both oceanographic research and passenger transportation, as well as the development of the tanker escort regulations and subsequent escort tug design. Design work for the US Oceanographic Fleet really took hold with the mid-life refit of the research vessels MELVILLE and KNORR, replacing the Voith Schneider propulsion systems with Z-drive thrusters, which were still a novel application beyond the workboat sector.

On the heels of the EXXON VALDEZ oil spill disaster, Glosten was involved with the regulators and stakeholders in the development of new tug escort requirements for tankers transiting Prince William Sound, north Puget Sound, and San Francisco Bay. Concurrently the firm carried out the engineering to support the design and construction of the LINDSEY and GARTH FOSS, landmark

vessels that set the standard for tanker escort tug design.

Not quite fitting into either of those sectors was the design of the 14th hole at Coeur d'Alene Golf Resort in Idaho – the only floating golf green in the world. In 1990, Glosten designed this floating green and its adjustable, four-point mooring system, which allows the tee distance to vary from 100 to 270 yards.

The 2000's: Retirement and Transition

After serving the marine industry for over 50 years, Larry Glosten retired on December 31, 2000, and Duane took Larry's place as Chairman of the Board, electing the author, William (Bill) L. Hurley, Jr., as its third president. A graduate of the University of Michigan and an employee of the Glosten firm since 1977, I served on many of Glosten's new design programs and major vessel conversions.

A pivotal project for the Glosten firm developed in 2007. SBX-1 is a self-propelled semi-submersible platform that serves as a radar station for the U.S. Missile Defense Agency. Glosten served as the project engineering integrator and designer for all marine aspects of this $900 million project, working with several major companies including Boeing, the client and prime contractor, Raytheon, and Kiewit Construction.

The 2010's: Acquisition and Innovative Growth

This new decade brought a new president and significant company growth. John (Jay) Edgar III was elected as Glosten's fourth president. Jay brought technical expertise in the development of specialized marine platforms ranging from research vessels, tugs, and barges to unique dredging, marine construction, and offshore support systems. As president, he brought his broad engineering background to the day-to-day operations of the growing firm, as well as to the development of its production design and renewable energy initiatives. Jay spearheaded the acquisition of Noise Control Engineering, a Boston firm focused on marine acoustics, expanding Glosten both in size and geography.

In addition, in 2011, Glosten announced plans to commercialize PelaStar, a tension leg platform solution for offshore wind turbines. Two years later, PelaStar LLC was formed and progress towards a commercially-viable deep-water offshore wind farm continues.

The launch of the R/V (Research Vessel) SIKULIAQ in 2014 was a major achievement for Glosten's research vessel team. Glosten designed the research vessel to accommodate up to 26 scientists and students to conduct a myriad of cross-disciplinary studies in the Alaska region, year-round.

SIKULIAQ is equipped for broadband, real-time virtual participation of classroom students and remote researchers during its expeditions. She allows scientists to collect seafloor sediment samples, conduct water column and sea floor surveys, utilize a diverse suite of winches to handle scientific equipment, and control remotely operated vehicles to gather additional data, samples, and images during research expeditions. The ice-breaking SIKULIAQ design represents extensive participation and input from the scientific community. In developing the initial design package, Glosten engineers worked closely with the steering committee and the National Science Foundation (NSF) to resolve conflicting requirements into a modern and flexible research ship.

RV SIKULIAQ is an American research vessel owned by the National Science Foundation and operated by the University of Alaska Fairbanks School of Fisheries and Ocean Sciences. Built in 2014 by Marinette Marine Corporation in Marinette, Wisconsin, it is home ported in Seward, Alaska. The vessel, called Alaska Region Research Vessel (ARRV), was designed by The Glosten Associates, a Seattle-based group of naval architects, in 2004.

Throughout the firm's history, Glosten has established a reputation for integrity and adherence to the highest ethical standards that has become well-known in the marine industry. Today John Springer leads the company as its fifth president, striving to uphold the same principles of innovation and integrity that guided Larry Glosten when he founded the firm almost six decades earlier.

ABOUT THE AUTHOR: WILLIAM (BILL) HURLEY

Bill Hurley joined Glosten in 1977, after graduating from the University of Michigan with a B.S.E. in Naval Architecture and Marine Engineering. Bill has served the marine industry for 40 years, specializing in commercial vessel design and construction. He has participated in all aspects of naval architecture work with projects including the Foss Voith Schneider Tractor Tugs and Escort Tugs LINDSEY and GARTH FOSS, the Delta Mariner rocket transport ship, and numerous projects involving oceanographic research vessel design.

Bill is the Education Vice President for the Society of Naval Architects and Marine Engineers, and was President of Glosten from 2000 to 2010.

He is currently Glosten's Chairman and also supports Glosten's Marine Renewable Energy business sector. This sector applies Glosten's engineering and analysis capabilities to the challenges of offshore wind and marine hydrokinetic energy.