

E.Y.E. Marine was the principal designer of the Denman Island Ferry, a Lloyd's classed ferry that operates on the longest cable ferry route in the world using a three cable system.

ASSUMING THE WATCH

For a half-century, E.Y.E Marine's leading naval engineering design has shaped Canada's marine industry.

By Lindsay Luminoso

If you've ever ridden a ferry in Canada, E.Y.E. Marine Consultants of Bedford, Nova Scotia was probably involved in its design, one way or another. For the past 50 years, the company has been designing some of the most technologically advanced vessels of all types and operations but have found their sweet spot with passenger vessels and ferries.

And as more federal shipbuilding mandates come down the pipeline, this eight-person operation expects that they will have more work than they know what to do with.

"The main thing we provide is a really practical solution to a sometimes-com-

plicated problem," explains senior naval architect and president of E.Y.E. Marine, Tony Thompson, P.Eng. "We try to keep our solutions as economical as possible but also an elegant design that costs less to operate or uses fewer people."

The company averages about six to seven projects at any given time. However, as of late, has been commissioned to do a significant amount of stability work on ferries and fishing vessels.

The team is composed of naval architects and marine engineers, most of whom have had some sort of training through Newfoundland and Labrador's Memorial University. Thompson explains

that there are not a lot of naval architects in Canada, but for obvious reasons, the existing firms are located in the coastal regions. In the East Coast, he notes three additional firms that do similar work providing support to the Halifax Shipyard and engineering services.

"At E.Y.E. Marine, we design the ships and provide detailed design schematics to clients," add Thompson. "We don't actually build the ships; we take care of owner-supervised construction and help in the contract process where shipyards can tender on our processes."

For the naval architects and marine engineers at E.Y.E. Marine, any given

vessel project follows a standard process that begins with an initial conceptual design. This general plan includes basic calculations on hydrostatics and powering to ensure the idea can actually be achieved. The customer then provides feedback and, once the concept is nailed down, the team gets into the more detailed structural, weight, stability, speed and power calculations and regulatory regime that the vessel is required to operate under.

“In Canada, we work under the Canada Shipping Act and we need to meet all of their regulations when we put a vessel in services,” Thompson explains. “It requires a whole stream of drawings to be sent in to Transport Canada for approval. That process starts almost immediately.”

Beyond this, the engineers then develop a detailed plan of every steel component necessary to build the vessel. This enables the company to deliver the



E.Y.E. Marine designed this glass bottom, triple water-jet propelled boat for tours around Georgian Bay’s Flowerpot Islands.

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E.Y.E Marine's Abnaki II double-ended ferry provides service between L'Etete and Deer Island, NB.

components to a shipyard in a box with instructions for easy assembly.

"We call this nesting and lofting," Thompson explains. "It's done in 3D modelling in the computer—every steel part in the vessel is defined. It is then all laid out and numerically cut out." This is an extremely tedious and detailed part of the process, he adds, which can take upwards of seven to eight manned months of work to complete.

One thing is certain, shipbuilding is not a fast operation because it's all manual. And there are so many engineering specifications to consider that are unique to this industry.

"Obviously, ships are unique because everything you put on them needs to be held up by the vessel itself," Thompson says. "The weight and buoyancy balance on the ship is a critical thing that doesn't really apply in any other industry or engineering. We can't just load it up with gear; we need to load it up with gear and then make sure it floats properly."

Thompson says that designing a ship is like designing a small city, since all of the infrastructure has to be self-contained on board. This includes sewer processing, power generation and lighting systems, as well as medical facilities and fire fighting equipment.

"All of these pieces of equipment have to be incorporated into the ship to make it pass regulations and make it a workable vessel," Thompson explains. "Weight estimating is a large part of our job. We sit down with spreadsheets and work out the weight of every piece that goes on and

ensure it is accounted for."

The team is able to do a lot of the calculations and analysis through 3D CAD modelling. When Thompson began at the company, drawing plans were drawn by hand. Now, everything is 3D modeled, which allows for 2D drawings to be taken from every aspect of the vessel.

According to Thompson, the team is able to reach a much higher level of accuracy and detail than ever before, provide better reliability and fewer errors in the design process because they are able to see details and potential for error in 3D much more easily than in 2D. There is a much higher consistency in models, which marine engineers had little access to before.

Employing 3D modeling software has also enabled an evolution in design as well. For example, Thompson says the team recently started designing vessels that use Voith Schneider propellers, rather than the more common rotatable thruster units. These propellers provide instantaneous thrust in any direction, unlike rotatable units that have to be turned around before thrust is applied.

Since most of the ferries E.Y.E. Marine designs are double ended, the team started using this type of propeller on ferries where rotatable thruster units were previously used. The engineers were required to adapt the propellers for the specific hull type, offering the ferry more manoeuvrability and better operations.

Over its 50-year history, E.Y.E. Marine has had the opportunity to work on some unique projects. In 2012, the company

began designing the world's longest cable ferry, which runs from Vancouver Island to Denman Island. The project took about three years to complete and the vessel entered service in February 2016. The ferry operates using a three-cable system with a 1.9km single drive cable fitted along the centreline with a guide cable on either side.

"It's a super efficient method to run a ferry," Thompson explains. "You don't need the navigational equipment or skill because it's essentially on a track. A cable is an efficient way of propelling a ferry because propellers are usually at 50 per cent efficiency but the drive system on a cable is 90 per cent efficient. It goes right back to the installed horsepower, amount of fuel you burn and pollution you pump into the air."

E.Y.E. Marine was also responsible for designing the tugboats operating in Come by Change, NL that escort the tankers in and out from Hibernia. The project began in 1997 but the vessels are still in operation today.

Four years ago, the City of Dartmouth decided to do a full replacement of their ferries. The marine engineering firm redesigned the ferries, implementing a more modern drive system and updating the control system and overall design. Three of the five are currently in service, with the remaining two under construction.

The team is currently working on a battery powered ferry that will operate just outside of Ottawa. While not involved in the design of the vessel, the company is rather retrofitting it to be more fuel-efficient.

It is projects like these that help the company push design innovation to the limits, Thompson says.

"We are even looking at some electric solutions on cable ferries—tethered electric," he says. "We are hoping to put one of those in service soon."

Because there are few naval architect firms in Canada, oftentimes, clients bring their vessels back to retrofit them with the latest technology. And for Thompson, that's the interesting thing. "You get to see the vessel evolve," he says.

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