LOCALLY DESIGNED AND BUILT FERRIES
ENTER SERVICE ON TWO NEWFOUNDLAND ROUTES

In 2007, Oceanic Consulting Corporation was contracted by Poseidon Marine Consultants (PMC) Limited to evaluate different hull and propulsion configurations for a 42-meter design of a 16-car RO/RO ferry. Oceanic completed various physical experiments and numerical assessments to provide guidance and supporting information that subsequently was used by PMC to determine the final configuration of the design. The new design was intended for use in the northern coastal waters of the island of Newfoundland and the work was undertaken by PMC on behalf of Marine Transportation Services, Transportation and Works, Government of Newfoundland and Labrador (GNL). Continued on page 3...
Some time ago we made the decision to give others in the firm, who had particular topic or market segment knowledge, the opportunity to address our readers directly via this introductory article. Today, I am writing this letter because our company recently has undergone a significant change and I am the one who has been most directly involved. This is a particularly important introductory address for me. It not only represents the first time in quite a while that I have written such a prologue, but it also marks my final commentary contribution to this newsletter as President.

On June 30, 2011, I am pleased to say, Oceanic Consulting Corporation became a subsidiary of Fleetway Inc., and a part of the J.D. Irving, Limited (JDI) group of companies. Headquartered in Saint John, New Brunswick, Canada, JDI is one of Canada’s largest business conglomerates with diverse interests domestically as well as around the world.

Oceanic will continue to operate in its core business area of commercial research in hydrodynamics and Arctic engineering as we work to assist our clients in improving the way marine systems perform in their environments. For over 18 years our focus has been on customer service, continuous improvement, and providing solutions and reliable results to our clients. Rest assured that these pledges will remain as our company’s fundamental values. Oceanic Consulting Corporation has been a capable provider of research services to the global marine marketplace. Now, as a member of the J.D. Irving, Limited group of companies and with access to a greater pool of resources, we are a much stronger company with much greater depth.

It’s been a great privilege to have served as President of Oceanic Consulting Corporation for nearly two decades. However, I am very proud to now be a part of the JDI group of companies and will continue to serve Oceanic as its Executive Director of Business Development & Marketing. As you know, the President is just one person. It’s really the people of this company that have made it successful, so I would like to take this opportunity to recognize the contributions of each and every member of the Oceanic team for their dedication to the company and their belief in its potential.

Speaking for both myself and on behalf of everyone at Oceanic Consulting Corporation, we look forward to continuing to serve you, our clients, as we evolve into an even greater organization.

For Oceanic Consulting Corporation, and with best regards,

Dan Walker
Executive Director of Business Development & Marketing
Continued from cover...

Given that the vessels in the provincial ferry fleet were fairly old and in need of replacement, GNL had initiated a vessel replacement strategy and this 42-meter design was the first of various designs that were under consideration in the fleet renewal process.

In the second quarter of 2011, the provincial government took delivery of two vessels that were constructed to this design. Both vessels were constructed at the Peter Kiewit Sons Co. Cow Head Fabrication Facility located in Marystown, NL, with one being launched in late 2010 and the other in early 2011. These ships, the first ferry vessels to be built in this province in 20 years, have since entered service on two separate provincial routes. On Newfoundland’s north-east coast, the M/V Grace Sparkes services the Burnside to St. Brendan’s run with a crossing time of about an hour, while the M/V Hazel McIsaac provides service between Little Bay Islands and Shoal Arm on the island’s north coast with a crossing time of approximately 45 minutes. The vessels are classed to Lloyd’s Register of Shipping, Ice Class 1A, and are propelled by twin Aquamaster US155 azimuthing thrusters. Service speed is 10.5 knots. The vessels can carry 80 passengers and up to 16 passenger vehicles, or a combination of 1 tractor trailer plus 11 passenger vehicles.

Both vessels were named after women who were political pioneers in the province. Grace Sparkes was born in Grand Bank in 1908 and her life’s work spanned teaching, journalism and acting, as well as volunteer contributions to numerous organizations. Although never elected, she was the first woman to run for election to the provincial House of Assembly following Newfoundland’s entry into Confederation with Canada in 1949. She also ran in elections both federally in 1949 and again provincially in 1951. Hazel McIsaac was born in Robinsons in 1933 and, in 1975, was elected as the first female member of the House of Assembly following Confederation. During her time in office, she was devoted to environmental and social issues. In 1980, Ms. McIsaac returned to her role of town clerk in her home of St. Georges and later was elected mayor. She was devoted to her community and contributed to various local organizations.

The entry into service of these vessels was the culmination of a process which saw the vessels designed and built in Newfoundland and Labrador, using local expertise and maximizing the impact on the local economy. Both ferries replaced much older vessels and, by all accounts, the local populations that are serviced by these new ships are quite pleased with the comfort and operation of the new vessels. Oceanic takes satisfaction in having been involved with this project and is pleased to continue its working relationship with the provincial government on various aspects of the fleet renewal strategy.

Locally designed and built ferries enter service on two Newfoundland routes.

M/V Hazel McIsaac in service on Newfoundland’s north-east coast.
In 2010, Oceanic Consulting Corporation was contracted by Marine Transportation Services, Transportation and Works, Government of Newfoundland and Labrador (GNL), to undertake a physical experimental program and various numerical assessments to evaluate a new design for an 80-meter coastal RO-RO ferry. The proposed vessel is intended to operate on the Fogo Island – Change Island route on Newfoundland’s north-east coast. The preliminary design for the vessel was developed for GNL through Fleetway Inc. of St. John’s, NL, and is based on the design experience of Knud E. Hansen of Denmark. Since the vessel will operate in ice-covered waters for a few months of each year, it is expected to be classed to ABS Ice Class 1AA. Service speed is anticipated to be 14 knots and the design specifies that the vessel will be propelled with twin azimuthing pod units. The vessel will carry up to 200 passengers and will have the ability to carry up to 60 passenger vehicles with 190m of tractor lanes.

The overall goal of Oceanic’s project was to provide supporting information to GNL that would confirm the suitability of the preliminary design to operate on the intended coastal route. Given this, an experimental program was developed to examine vessel performance in calm water, in a seaway, and in ice.

The experiments that were conducted in open water included flow visualization, resistance and powering in calm water, speed loss / head seas seakeeping at speed, zero speed seakeeping, and maneuvering on a planar motion mechanism. In ice, experiments were conducted that examined resistance and powering, both in level ice and in pack ice of varying concentrations. Performance while moving astern in ice was also examined.

Following the design and construction of the model hull, experiments were completed in three separate experimental facilities that are located at the Institute for Ocean Technology in St. John’s, NL. The vessel was evaluated at a single load condition which corresponded to a draft of 4.10m and a salt water displacement of approximately 3300 tonnes. Experiments in waves considered nominal Sea State 4 and Sea State 5 conditions. For experiments in ice, ice thicknesses of 40cm and 60cm were examined based on first-year ice having an average strength of 500kPa. A model scale of 14.46 was used. Appendages included a bow thruster tunnel and bilge keels, but the bilge keels were only used in decay experiments in order to ascertain their influence on roll damping.

An important aspect of this work was to assess the vessel’s seakeeping performance over a range of conditions in order to determine the design’s suitability for operation on the Fogo Island route. During the physical experiments, seakeeping runs were conducted in head seas at speed, and at zero speed over a range of headings. Additionally, seakeeping predictions were required to verify the expected performance for a range of conditions that were beyond those which were examined in the physical experiments. Oceanic used its time-domain panel method seakeeping code MOTSIM to complete the full seakeeping assessment. The first phase of the numerical seakeeping study required that the conditions which were examined in the physical experiments be modeled with MOTSIM. This was done to demonstrate the suitability of the code for predicting the vessel’s response for a set of known inputs.

The second phase of the study involved completing a set of predictions over a range of speeds, headings, and sea states in order to round out the full operational picture for the vessel.

Continued on page 5...
Motions and accelerations were determined for the center of gravity, and local accelerations were calculated for the Wheel House Lookout, the Forward Passenger Lounge, and the Aft Passenger Lounge locations.

Using the acceleration statistics generated from the seakeeping analysis, a habitability analysis was completed to assess the comfort level of the design for the sea conditions examined. Habitability was assessed at each of the locations identified above using four methods: the Motion Sickness Incidence, the Vomiting Incidence, Tolerance Limit plots, and Severe Discomfort Boundary plots.

Finally, another important component of this work was to assess the maneuvering performance that could be expected and to check for compliance with established standards for vessel maneuverability. Using the results of the planar motion mechanism experiments, the vessel’s non-dimensional maneuvering coefficients were determined. Using these coefficients, a numerical assessment was completed to provide an indication of the vessel’s maneuvering performance. Oceanic used its in-house maneuvering code SML (Ship Maneuvering Laboratory) to perform various standard maneuvers. The International Maritime Organization (IMO), through Resolution MSC.137(76), has prescribed certain criteria which defines the standards of ship maneuverability. These standards were developed for ships which have traditional propulsion and steering systems (i.e., shaft driven vessels with conventional rudders). In general, vessels that are over 100m in length, or gas carriers and chemical tankers of any length, normally are expected to meet the prescribed maneuvering requirements.

In the case of this ferry design, the IMO criteria are not strictly applicable since the vessel is under 100m in length and it has a non-traditional propulsion and steering arrangement (i.e., it is propelled and steered with azimuthing pods). However, as the IMO criteria represents a reasonable starting point for defining vessel maneuverability, this maneuvering study was completed such that the predicted results were compared against the standard IMO criteria to provide an appropriate benchmark for assessing maneuvering performance. Based on this assessment, the Fogo ferry design passed all identified IMO maneuverability criteria.

Overall, the design’s performance was shown to be appropriate and suitable for vessel operation on the Fogo Island route. Following confirmation of the design’s performance, GNL has since entered into a second contract with Reefway Inc. to undertake the detailed design and engineering for the vessel. Present plans call for one vessel to be constructed for the Fogo Island route, but it has been determined that a variation of this design could be utilized on other routes within the provincial ferry system. The provincial government is also engaged in various stages of design and engineering work to further renew the provincial ferry fleet. To that end, Reefway Inc. has also been engaged to provide a preliminary design for six small ferries that will operate on Newfoundland’s south coast.
In Canada’s Arctic and sub-Arctic regions, there are large reserves of iron ore and other minerals which can only be exploited economically if shipping systems are capable of operating year round. Examples of these large reserves include the Voisey’s Bay nickel project in Labrador and the proposed ‘Baffinland’ iron ore mine on Baffin Island.

Since the deposits are located in regions which experience heavy winter ice conditions and the smelters required for processing the ore are further south in regions with ice free water, even in winter, the ships will encounter a wide variety of environmental conditions in the course of a year. In summer, the route likely will be ice-free, but in winter the ships must be able to proceed at speeds of 6 knots or more in land fast ice that is up to 1.7m thick, as well as through pack ice, rubble ice and pressure ridges. An economic analysis of suitable sizes for ore carriers suggested that the ship should be approximately 190,000 DWT with an open water service speed of 15 knots.

There are relatively few ships in service that transport natural resources of any kind through ice covered waters, so there is no widely accepted hull shape for this type of service. The challenge for ship operators is to provide an economical service with guaranteed delivery through a very hostile environment. This means that capital and operating costs must be minimized, as well as the degree of support required from external agencies such as the Canadian Coast Guard, which charge large scale shipping operators for ice-breaking services on a user pay basis. As a result, it is necessary to minimize the ice loads that will be experienced by the hull, thus minimizing the steel weight for the structure and also aiding in minimizing the vessel’s powering requirements. The resulting vessel must also have a high degree of maneuverability. In order to keep capital expenses as low as possible, it is desirable to make ice capable ships mirror conventional merchant ship design and construction as much as possible.

With this objective in mind, Oceanic Consulting Corporation worked with Hyundai Heavy Industries (HHI) of Korea to develop the concept design for a large ice breaking ore carrier. Three bow designs were considered, all matched with the same stern consisting of a twin screw ducted propeller arrangement combined with twin rudders. This research was part of HHI’s long term strategy to respond to the expected increase in demand for ships and offshore structures that can operate in Polar Regions.

Resistance and propulsion predictions for different ice thicknesses were made for each bow, as part of the design process, based on empirical methods that were developed from Oceanic’s database of model resistance and propulsion data. The next stage included a more detailed analysis of the ice forces that would act on the ship, which was carried out using Oceanic’s proprietary discrete element computer program for predicting ice-structure interaction (DECICE). This code has been used for analysis of different types of ships and offshore structures in pack ice, level ice and pressure ridges. The results have given valuable insights on the induced loads and ice flow around the proposed ship, even before results of physical model experiments in ice were available.

As a further step in the design development, one of the candidate hull designs was evaluated by Oceanic’s personnel using physical model experiments in the ice tank at the National Research Council’s Institute for Ocean Technology in St. John’s. Based on the experimental results, the selected bow design was refined further and additional discrete element simulations were completed. These simulations showed that the resistance of the new design was reduced relative to the three initial concepts. Further model experiments were completed on the revised design and the results showed that the ship achieved the required performance for operation over the proposed route. When the 190,000 DWT iron ore carrier is built, it will be the world’s largest ice-breaking commercial ship and will possess impressive capabilities. It will carry twice as much cargo as any existing ice-breaking commercial ship, will move twice as fast, and will offer a 5 percent increase in fuel efficiency.
Oceanic Consulting Corporation is pleased to announce that on September 6, 2011, Mr. Paul Herrington was appointed as the company’s Director of Operations.

Since joining Oceanic in 2002, Mr. Herrington has gained extensive experience in a wide range of model research methods and techniques. His experience has included the evaluations of America’s Cup sailing yachts, gravity-based offshore structures, floating offshore oil and gas terminals and production platforms, marine riser VIV, luxury motor yachts, articulated tugs/barges, cargo vessels, and high-speed military vehicles.

Mr. Herrington holds a Bachelor of Engineering (Naval Architecture) degree from Memorial University.

Mr. Herrington is a member of the Professional Engineers and Geoscientists of Newfoundland and Labrador (PEG-NL). He is a member of the Society of Automotive Engineers and a member of the Society of Naval Architects and Marine Engineers (SNAME) where he serves as an Executive Officer for the its Canadian Atlantic Section. Mr. Herrington also holds a Project Management Certificate from the Centre for Management Development (Memorial University) and is currently pursuing a Master’s in Business Administration from Memorial.

ANNOUNCEMENTS

Appointments: Mr. Paul Herrington and Mr. Randy Cheema

Oceanic Consulting Corporation is pleased to welcome Mr. Randy Cheema to its Numerical Modeling department. Mr. Cheema brings over 10 years of professional practice as a Project Manager and Senior Business Analyst in information technology. He is experienced with the design and development of large-scale software systems, software cost estimation, software specification requirements, software design, design methodologies, programming techniques and environments, and software validation.

As the department’s Software Project Manager, Mr. Cheema will be responsible for overseeing the development of several computer codes from their present academic state to commercial application, including Oceanic’s software to predict the environmental loads on offshore oil and gas production and transportation systems; this comprises loads due to wind, waves and ice on floating and gravity based structures.

Mr. Cheema completed both a Bachelor of Science (1984) and a Bachelor of Commerce (1990) at Memorial University in St. John’s, NL, and is a Microsoft Certified Professional.

Mr. Randy Cheema, Software Project Manager

Oceanic Consulting Corporation: A Proud Member of The J.D. Irving, Limited Group of Companies

On June 30, 2011, Oceanic Consulting Corporation was acquired by Fleetway Inc., a member of the J.D. Irving, Limited group of companies. It is planned that the operations of Oceanic will continue as usual.

“We believe that the combined expertise and strength of both Fleetway and Oceanic will provide new opportunities to grow and prosper both in our traditional markets and in the oil and gas arena both at home and internationally”, comments Mr. W. Brent Holden, General Manager.

“We are anticipating an orderly transition and looking forward to working collaboratively with our new colleagues”, says Oceanic founder, Dr. Dan Walker.

With a strong foundation established over 25 years, Fleetway offers a comprehensive capability of engineering, technical, logistics and management services.

Today, the company is Canada’s largest provider of naval architectural and maritime engineering services and has offices located in Halifax, Nova Scotia, Saint John, New Brunswick, St. John’s, Newfoundland & Labrador, Ottawa, Ontario, and Victoria, British Columbia.
SML - Ship Maneuvering Laboratory:

SML (Ship Maneuvering Laboratory) is a PC-based computer code used to simulate the maneuvering of a ship or any floating body. It solves rigid body motion in three (surge, sway, and yaw) or four (including roll) degrees of freedom using a time step solver. The program has three basic modules: SML-Engine, SML-Environment, and SML-Bridge that communicate through a shared simulation database. The software allows single or multi-vessel simulations to be completed for a range of environmental and bathymetric conditions.

**Maneuvering Assessments**
- Turning circle, initial turning ability, 10/10 and 20/20 zig-zag maneuver, crash stop, Dieudonne spiral maneuver, and maneuvering in restricted waterways with wind and current.

**Machinery Configuration**
- Conventional shafts with fixed or controllable pitch propellers, standard rudders, high lift rudders, podded propulsion units, bow and stern tunnel thrusters, and drop-down thruster units.

**Data Required**
- Hydrodynamic maneuvering coefficients, resistance data, principal vessel particulars and load conditions, machinery configurations and characteristics, control surface data, windage for hull and superstructure, and topographic and navigational charts for port maneuvering studies.

**Data Outputs**
- Plots of vessel track, engine and helm commands, environmental conditions imposed during the maneuvers, and vessel condition data.

**SML-ENGINE**
- Solves for the motion of the vessel based upon external forces and Newtonian mechanics.

**SML-ENVIRONMENT**
- Controls the vessel’s environment, which may include wind speed and direction, current speed and direction, ice characteristics, and seabed bathymetry.

**SML-BRIDGE**
- Provides a graphical user interface (GUI) representing the controls on the bridge and display of the current ship position and its environment.

Specification Sheets are Available for All Major Facilities, Including:
- Offshore Engineering Basin
- 200-meter Wave/Towing Tank
- 58-meter Wave/Towing Tank
- 90-meter Ice/Towing Tank
- Cavitation Tunnel
- 22-meter Flume Tank
- MOTSIM
- Centre for Marine Simulation
- Ice Engineering
- VIV Test Apparatus

Specification sheets can be obtained from the Oceanic website or by contacting our office.

Meet us at:
- **Apr 30 - May 3**
  - Houston, TX
- **June 20 - 21**
  - St. John’s, NL
- **Oct 24 - 26**
  - Providence, RI
- **Dec 5 - 7**
  - New Orleans, LA