Bientôt une nouvelle maquelle au Centre de Formation à la manœuvre des navires de Port Revel

Après la maquette de l'OTELLO baptisée en avril 2009 (modèle réduit du CMA CGM OTELLO, un "8 500 boîtes", ce sera au tour du **Q-Max** d'entrer en service en avril prochain. Il s'agit de la reproduction, toujours au 1:25, du LNG **MOZAH**, que l'on voit ci-dessous à droite. Il s'agit d'un méthanier Qatari à cuves intégrées, à membranes, de type "Q-max" justement, "Q" pour "Qatar" et "Max" car c'est l'un des métnaniers les plus larges au monde (près de 54 m), taille d'ailleurs maximale compatible avec les terminaux gaziers du Qatar. La coque du modèle réduit est en polyester stratifié et rigidifiée par une armature métallique. Nouveauté : deux moteurs, deux lignes d'arbres.De plus, pour la première fois, la maquette est munie d'une double commande, avec possiblité pour le commandant de manœuvrer de l'arrière (comme on le voit sur la deuxième photo ci-dessous). Les caractéristiques du MOZAH sont données ci-après. *FM 21.10.2010.*

MOZAH (Majuro) - IMO 9337755 - Indicatif d'appel V7PD7 - MMSI 538003212 - LNG - 345,28x53,83x27,00 m - TE 12,20 m - JB 163 922 - JN 51 596 - PL 130 102 t - Ptot 37 880 kW (deux moteurs MAN-B&W-Doosan 7S70ME-C / deux hélices à pas fixe à cinq pales) - V 19 nds - Cap. 261 988 m^3 (gaz liquéfié – 163 °C) - Constr. 2008 (Samsung Heavy Industries, Geoje, Corée du Sud) - Propr. Qatargas Liquefied Gas (Qatar) - Gérant Stasco Ship Management (Londres, Grande-Bretagne) - Pav. MHL. *Sisterships* : **AL MAFYAR** (IMO 9397315) - **AL MAYEDA** (IMO 9397298) - **BU SAMRA** (IMO 9388833) - **MEKAINES** (IMO 9397303) - **SHAGRA** (IMO 9418365) - **UMM SLAL** (IMO 9372731) - **ZARGA** (IMO 9431214).


Q-Max


Q-Max
OTELLO

PORT REVEL
Shiphandling

PORT REVEL
SHIPHANDLING

TECHNICAL DOCUMENTATION

SOGREAH
CONSULTANTS

WHY TRAINING … ?!

Because human error is still the main cause of accidents.

WHY MANNED MODEL TRAINING … ?

Because this is still the best way to acquire certain reflexes which, when the time comes, will make all the difference between being good and being the best. Training on the scale models provides experience that could never be gained on real ships for the simple reason that neither ship-owners nor local authorities would allow such risks to be taken. Scale models allow the shiphandler to make mistakes. Scale models allow experimentation on ship behaviour to explore unknown fields beyond the limits of safety.

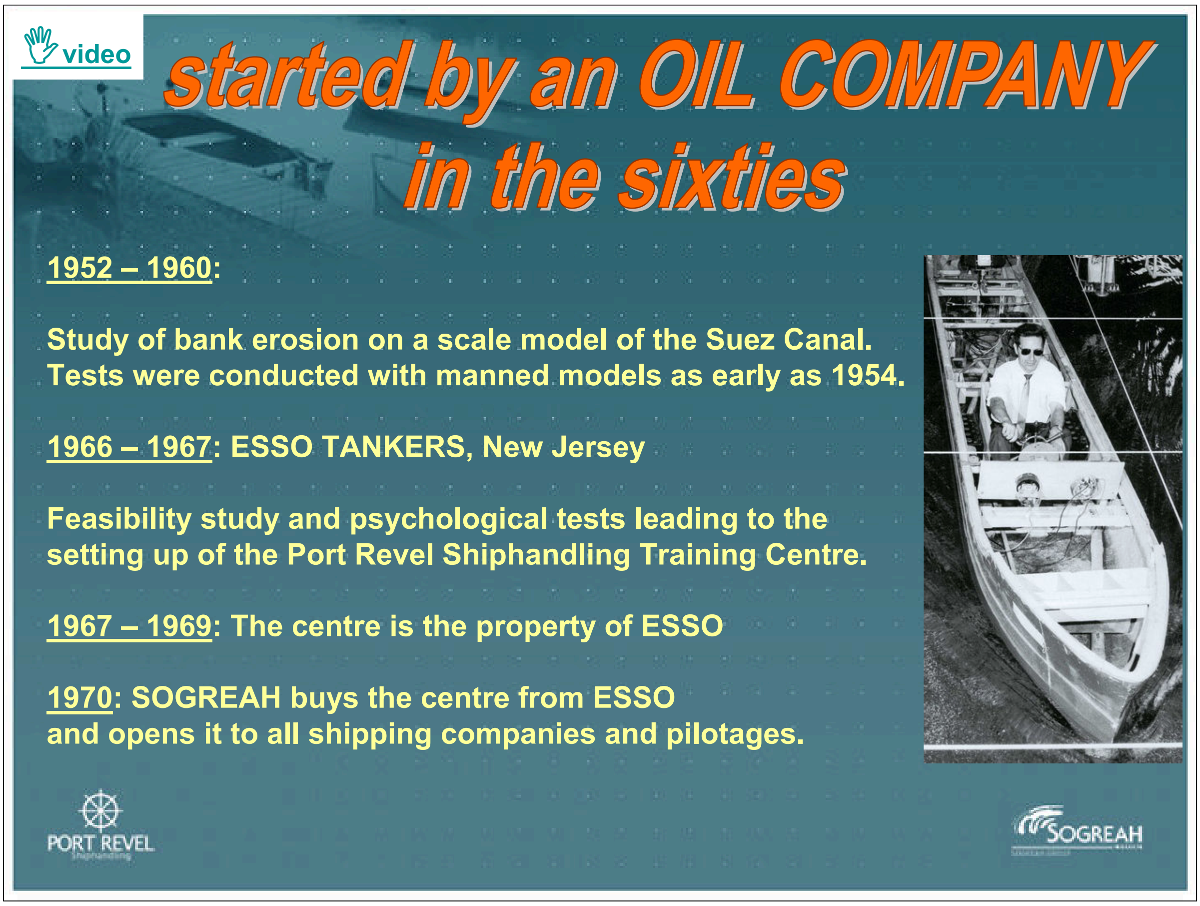
Training on the manned 1:25 scale models is a complement to training on electronic simulators as it provides **additional experience** through a feeling of **"déjà vu"**.

Safety at sea is our common aim

Nature is at work on scale models, with random effects that are similar to those of real-life situations. The unforeseeable nature of squalls, shallows, currents and waves calls for an immediate, appropriate reaction, without any repeat or automatic response … and no “reset” switch.

For the same reason (natural phenomena) hydrodynamic effects are correctly reproduced on scale models and it is therefore unnecessary to transpose them in the form of complex equations. This gives a **better simulation of hydrodynamic effects** such as interactions between ships (for example in a canal), interactions between the ship and berth, small under-keel clearance (such as 10% of the ship's draught) and the use of anchor dredging in various operating situations.

The scale effect of wind on a manned model is well known, but it is also well known that this is in no way detrimental to the use of manned models for serious and effective shiphandling training. Wind is a factor in the everyday life of pilots throughout the world. The design of our manned model lake is such that **the wind element will vary in different parts of the lake**. This allows a course to be structured in such a manner as to introduce wind as and when required. Extreme wind conditions are encountered in the real world. If they occur at a manned model centre, with care they can be used in various scenarios to demonstrate how well control can be maintained.



The ship models behave exactly like real ships, only much faster. In carrying out a given operation with the model, such as mooring alongside a wharf for instance, **exactly the same instructions are given** to the engine room and helm as on a real ship, but there is only one fifth of the time available in which to give them.

Over 40 years of experience have shown that students quickly get the feel of their models in the same way as the real ships they are accustomed to handling.

Reality will be much slower than the model, thus leaving quite a lot more time to react. Manned models **sharpen the shiphandlers' natural senses** of perception and anticipation and enable an appreciation of the ships' behaviour as a whole.

The time scale also means that it is possible to perform **five times as many manoeuvres**. In other words, it is possible to perform as many manoeuvres in 35 hours on the models as in 175 hours on the real ship. If you then consider the cost of training on scale models compared to computer models as a **cost per manoeuvre and per pilot**, scale models might turn out to be even cheaper than computer models!!

THE PORT REVEL FLEET

SHIP		BERLIN Tanker (fully loaded)		GRENOBLE Tanker (fully loaded)		GILDA Tanker (variable load)		BRITTANY Tanker (variable load)		EUROPE Tanker (fully loaded)		ANTIFER Tanker (variable load)		BEN FRANKLIN LNG Carrier		Q-Max LNG Carrier		NORMANDIE 4 400 TEU		OTELLO 8 500 TEU (variable load)		NORMANDIE Cruise ship	
Size :		38 000 dwt		43 000 dwt		125 000 dwt		190 000 dwt		255 000 dwt		400 000 dwt		125 000 m^3		266 000 m^3		53 000 dwt		102 000 dwt		900 ft	
	Unit	Real	1/25	Real	1/25	Real	1/25	Real	1/25	Real	1/25	Real	1/25	Real	1/25	Real	1/25	Real	1/25	Real	1/25	Real	1/25
Lpp	m	201	8.05	191	7.62	269	10.75	305	12.2	329	13.17	337	13.47	256	10.24	332	13.28	261	10.45	319	12.76	261	10.45
Beam	m	28.8	1.15	29.5	1.18	42	1.68	47.2	1.89	51.8	2.07	70	2.8	41	1.64	53.8	2.15	37.1	1.48	42.8	1.71	37.1	1.48
Loaded Displ.	ton	51 000	3.26	55 000	3.52	149 000	9.55	225 000	14.4	291 000	18.6	471 000	30.13	90 000	5.79	180 000	11.52	75 000	4.67	135 000	8.64	-	-
Ballast Displ.	ton	29 000	1.83	31 000	1.95	88 000	5.61	131 000	8.39	144 000	9.23	219 000	14.05	-	-	132 000	8.45	-	-	87 000	5.57	-	-
Loaded Draught	m	10.92	0.43	11.54	0.46	15.52	0.62	18.45	0.74	19.98	0.8	21.96	0.88	11.10	0.44	12.00	0.48	12.40	0.5	14.50	0.58	12.40	0.5
Aft	m	7.70	0.3	7.32	0.23	11.59	0.46	11.90	0.48	11.59	0.46	12.81	0.5	-	-	9.30	0.37	-	-	10.20	0.41	-	-
Ballast Draught																							
Fwd	m	5.00	0.2	5.80	0.29	7.37	0.3	10.37	0.41	9.15	0.37	8.24	0.34	-	-	9.30	0.37	-	-	10.20	0.41	-	-
Actual Draught	m	10.90	0.43	11.50	0.46	12.50	0.5	13.00	0.52	19.50	0.78	17.40	0.7	11.00	0.44	12.00	0.48	12.40	0.5	13.00	0.52	12.00	0.48
Shaft H.P.	S.H.P.	17 500	0.224	17 500	0.224	24 000	0.308	32 000	0.41	32 000	0.41	45 000	0.57	32 000	0.41	52 000	0.66	52 000	0.66	93 000	1.19	57 000	0.72
Engine type	Turb / Mot	-	T & M	-	T & M	-	M	-	T & M	-	T & M	-	M	-	T & M	M	M	M	M	M	M	2 pods	2 pods
Rudder type	-	-	Norm	-	Norm	-	Norm & Becker	-	Norm	-	Norm	-	Norm	-	Norm & Schilling	Twin	Twin	Norm	Norm	Norm	Norm	-	-
Rudder RoT	Deg/s.	3.1	15.5	2.6	13	3.5	17.5	2.5	12.5	2.6	13	2.1	10.5	2.6	13	2.6	13	2.8	14	2.5	12.5	7.5	37.5
Anchor	-		Manu		Manu		Electr.		Electr.		Electr.		Electr.		Electr.		Electr.		Electr.		Electr.		Electr.
Bow Thrust.	S.H.P.	1 500	0.019	1 100	0.014	1 500	0.019	3 000	0.038	3 000	0.038	6 000	0.077	1 500	0.019	-	0.077	3 000	0.038	3 500	0.045	3 000	0.038
Stern Thrust.	S.H.P.	-	-	-	-	1 500	0.019	3 000	0.038	3 000	0.038	3 000	0.038	1 500	0.019	-	0.077	-	0.038	-	0.021	-	0.038
Block Coeff.	-	0.79		0.82		0.83		0.83		0.83		0.89		0.76		0.79		0.60		0.67		0.60	

This is all at scale 1:25

The fleet encompasses 11 ships reproducing 20 vessels at scale 1:25:
>> 7 tankers from 17 to 400 000 dwt with diesel motor and steam turbine
>> 2 LNG carriers
>> 2 container ships, one being also: a car carrier, a cruise ship with pods and a twin screw ship with single rudder
and 3 escort tugs: an ASD (Azimutal Stern Drive) and two VSP (Voith Schneider Propulsion)
and 3 types of rudder: conventional, Becker and Schilling

PORT REVEL Shiphandling

Shown above: 7 oil tankers and 1 LNG tanker.

The 125 000 dwt tanker has an optional Becker rudder,

The 125 000 m^3 LNG tanker has a Schilling rudder,

The 125 000 dwt tanker has a variable draught from 10 to 12 m,

The 190 000 dwt tanker has a variable draught from 13 to 16 m,

The 400 000 dwt tanker has a variable draught from 15 to 19 m,

The other tankers are fully loaded.

All ships at 1:25 scale. We strongly believe it is better not to change scales during the course, as getting used to several time scales (= square root of length scale) may be confusing for the students.

Obviously, **escort tugs will be used more and more around the world** in the future to increase safety at sea for some types of ship in some dangerous areas.

Introduction of the model tugs in our courses is a major advance as it allows experimentation with emergency shiphandling when mechanical failures occur on ships:

- rudder failures
- engine failures

Two tugs were introduced in 2000 at the request of several US pilotages. A third tug was introduced in 2006 and includes the Voith Schneider **Turbo Fin**.

One of the tugs is an Azimutal Stern Drive (ASD) with a Z-peller propulsion system. Two tugs have Voith Schneider propulsion (VSP). They can provide a bollard pull of over 100t, but are usually set to 50 to 70t. This is decided every morning with the students before starting the manoeuvres.

The tugs are remote-controlled by a professional tug master at the pilot's orders.

This is not reproduced on numerical simulators … nor are the typical tug manoeuvres: pure and powered indirect modes, jacknife, push-pull, driving and flying to steering position, etc.

The ships are accurately constructed to conform with the principles of similitude and are fitted with indicators showing the ship's parameters. Information given by the indicators is at **full scale**.

Most models are fitted with **diesel motor and steam turbine**, and the Normandie can be controlled from the front deck like a car carrier and a cruise ship, so that the fleet in fact reproduces over **20 different vessels**.

One ship is fitted with an optional **Becker** rudder and another ship has a **Schilling** rudder.

On two ships, it is possible to have the **bridge forward**.

One ship can be fitted with **optional "pods"** in order to reproduce the behaviour of a 900 ft cruise ship. This means that the ship can be fitted either with a conventional rudder/propeller or with two pods.

All but one are fitted with a bow thruster. Most ships are fitted with **bow and stern thrusters**.

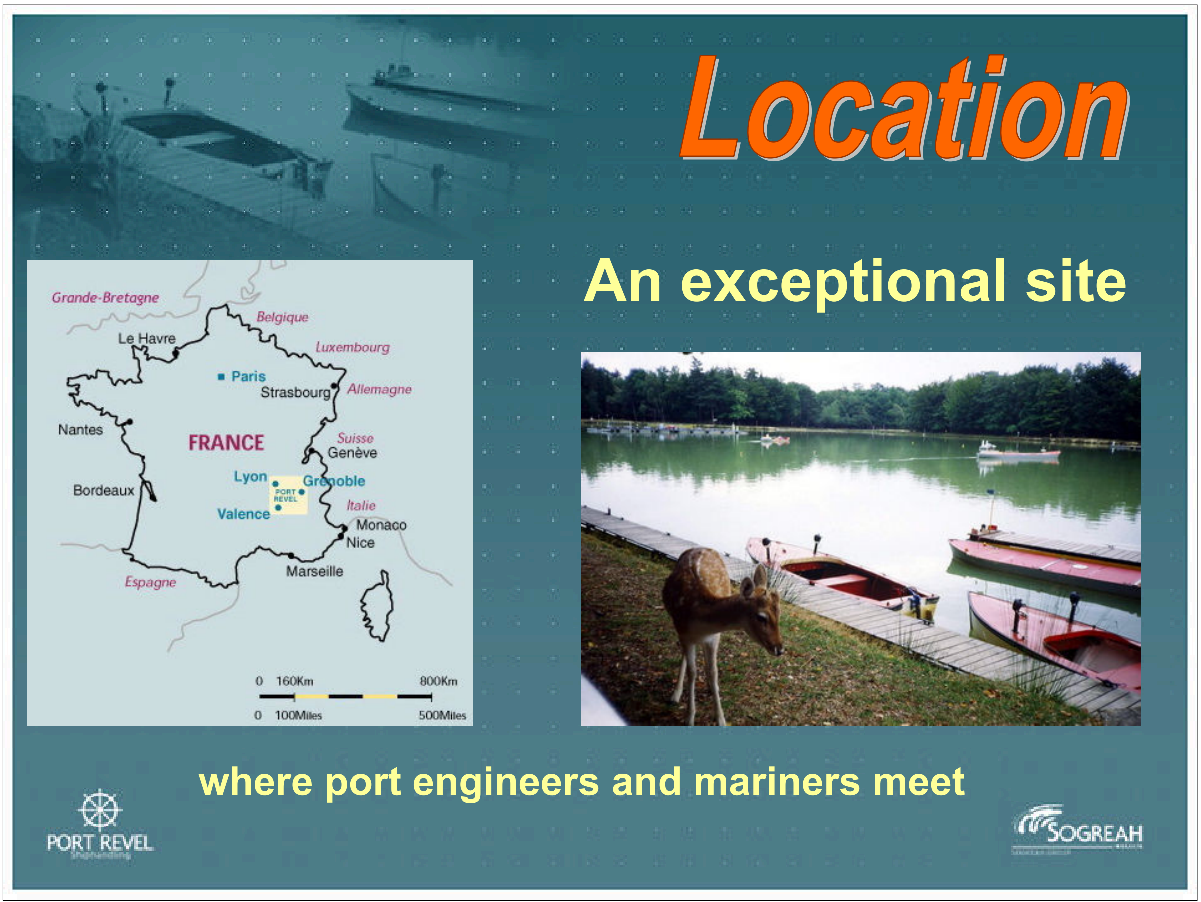
All ships but one have fully operational **anchors.**

Several ships have **variable draught.**

Each model is designed so that **the Master is at bridge level**. He calls out his instructions to the "crew", i.e. the helmsman, who steers the ship and operates the engine room telegraph. An instrument panel gives continuous **full scale** indications of propeller rpm, rudder angle, ship's heading and speed, and wind velocity and direction.

The sliding cover is positioned to correctly reproduce the effect of wind.

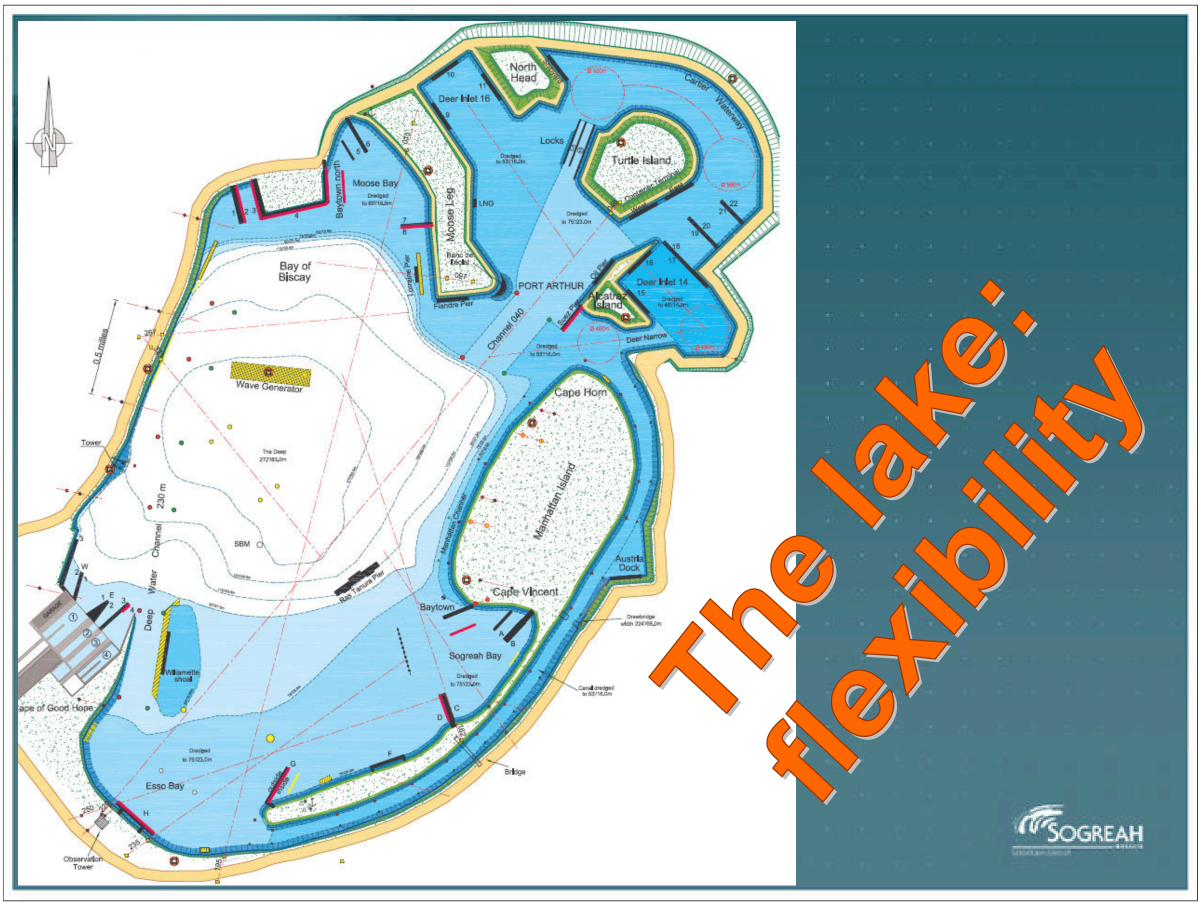
Nothing virtual at Port Revel



The lake is located near Grenoble (France), in a beautiful site in the middle of the forest of a natural park where the wind regime is very mild. Hence uncontrolled **wind effects** on ships are reduced to a minimum: no course has ever been stopped because of too much wind.

Port Revel is **a permanent forum of ideas**, an ideal meeting place where information and experience can be exchanged, or as a pilot once pointed out: “In regular life, a practising pilot is always alone. He has no-one around to comment on or discuss a particular manoeuvre. The only times when a manoeuvre is analysed and commented on is after an accident, when there is an inquiry. And that always takes place in a mood of tension. What I appreciate at Port Revel is that pilots observe your work in a calm, dispassionate and therefore constructive climate.”

As a member of a consulting firm of a world-wide renown specialising in port and coastal engineering, Port Revel is also a place where port engineers and experienced mariners meet. The centre inherited Sogreah's **near-century of experience with scale models**, numerical simulation, port planning, design & construction.



A major lake extension to NE was commissioned in 2009. The physical dimensions of the lake are now approximately **5 miles x 2 miles** at a 1:25 scale, and any of **your local conditions** can be reproduced.

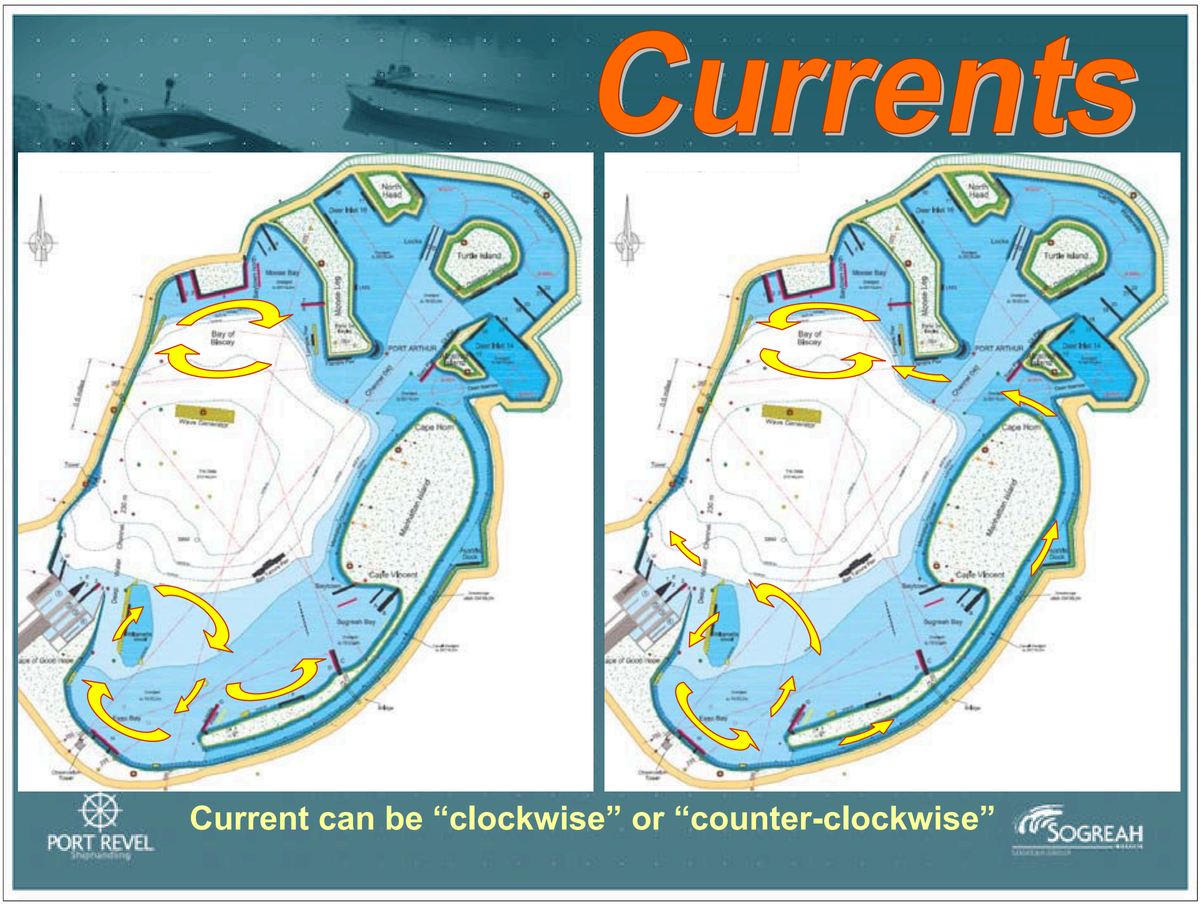
We have been there …

A **Suez-sized canal** with bends has a length of 4 miles and includes a drawbridge.

The lake features extensive **shallow water areas**, channels and many berths.

Other features are **locks**, **offshore** platform and SBM.

It also includes **wave, current and wind generators,** and a very accurate **track recording system** is also available.

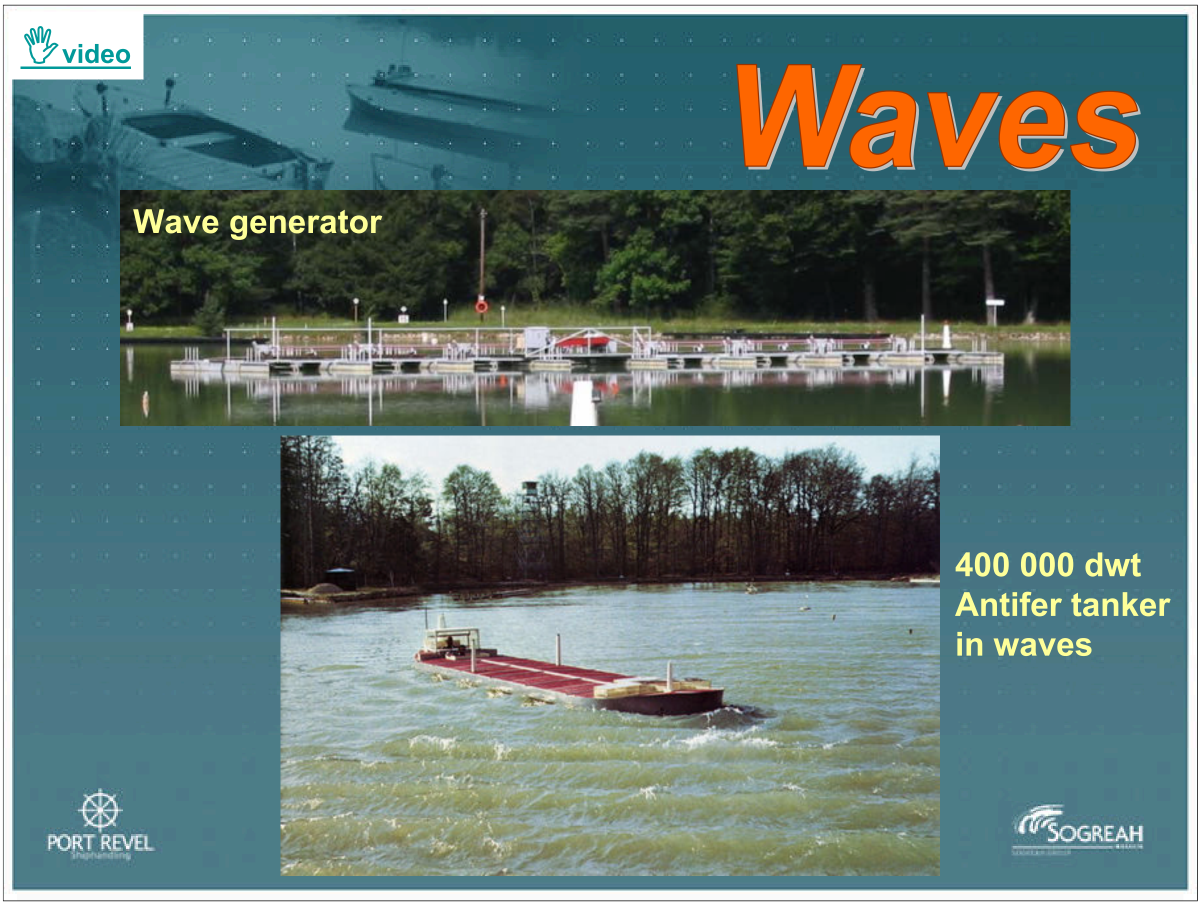


Currents are a main feature at Port Revel as **3.5 days out of 5** in the Shiphandling Course are conducted with currents: 2.5 days with clockwise current and 1 day with counter-clockwise current.

It can be seen above that **about half** of the lake is subjected to currents, i.e. currents are not confined to a small area where no manoeuvres can be done, or to a canal.

Currents reach speeds of up to 3 kn near Pier H at the south end of the lake, and up to 1 kn in the canal. New current fields in the North of the lake were commissioned in 2009.

Most of our docking exercises are done with current ahead, astern or abeam.



A unique feature at Port Revel is the wave generator. It is the only one of its kind in the world.

It generates **a wave front of 750 m**, i.e. around 3 ship lengths. This front propagates towards the south of the lake where it may encounter the current field.

It is generally set on H = 3 m and T = 8 s, as this values induce heavy rolling of the ship. However, these settings can be changed.