

Caledonian Maritime Assets Limited



Project: New Vessels 1 & 2
102.4m Dual Fuel Ro-Pax Ferries
Yard Numbers: 801 & 802

Manoeuvring and Berthing simulation tests
Carried out at City of Glasgow College
On the 23rd Jan and 20th Feb 2017

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Manoeuvring and Berthing Simulation Tests

1. Manoeuvring and Berthing simulation tests

A requirement of the ship specification for the 2 new vessels is for FMEL; the shipbuilder to carry out Manoeuvring and Berthing simulation tests. The tests to include realistic modelling of the vessel hull form, windage, propeller/thruster forces, response rates and the operating ports.

An initial set of simulation trials for Ardrossan and Tarbert (Harris) were carried out at the state of the art simulator suite at the City of Glasgow College on the 23rd January 2017, followed by tests for Troon and Ardrossan on the 20th February 2017. The testing was undertaken on these days by three Masters from Calmac Ferries. Pre-testing was carried out by Capt. Phillip Taylor from the College. Arrival and departure manoeuvres to each port under a variety of weather conditions were undertaken to assess the vessels manoeuvring response and capability.

1.1 Comments from Simulator trials on 23rd January 2017

1. Propulsion, combinator controls are to be set up for constant maximum RPM with variable pitch.
2. Ramp rates to be reviewed.
3. Propeller combinator curve to be representative of Wartsila and tank test results.
4. Combinator lever positions did not align with readout display (i.e. 50% demand 75% delivered)
5. Ramp rate of thrusters relative to turning circles to be reviewed, current model would appear to be much slower than Hebrides.
6. Orientation of bridge wing view should be closer to side shell of vessel.
7. Handrails to be reduced / removed from graphics.
8. Model shows only one full length window facing forward on the bridge wing, there should be two full length windows as per Loch Seaforth.
9. Three variant models for draft to be made available for simulation of handling in load conditions, Light Load Arrival Condition, Full Load Departure Condition and Mean Load Condition.
10. Ardrossan Harbour control tower traffic lights to be reviewed for accuracy of representation also leading lights to be checked for accuracy of vector representation.
11. Tarbert Harris Harbour perch lights to be included in representation also leading lights to be checked for accuracy of vector representation.
12. Tarbert Harris Harbour departure line requires representation of street lights on the Island of Scalpa.
13. Vessel passage plans for Ardrossan, Tarbert Harris and Troon to be provided by CFL.

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14. Next visit scheduled for week beginning 20th February, at this next visit, Troon Harbour simulation to be available and if achievable all modifications as detailed above to be implemented.

Table 1 – Simulations carried out on 27th January and 20th February 2017

	Port		Manoeuvre	Wind kts	Direction	Master	Comments
1	Ardrossan	Bow in	Arrive/Depart	15	SW	LW	Ok
2	Ardrossan	Bow in	Arrive/Depart	45	SW	LW	Difficult arriving. Ok departing. Sluggish not having full RPM.
3	Ardrossan	Bow in	Arrive/Depart Irish Berth	45	E	LW	Difficult achieving with sluggish set up. Should be ok with correct set up.
4	Tarbert	Bow in	Arrive/Depart	15	SW	LW	Ok
1	Troon	Stern in	Arrive/Depart	25	SW	LW	Ok
2	Troon	Stern in	Arrive/Depart	25	NW	EB	Ok
3	Troon	Stern in	Arrive/Depart	40	SW	MT	Ok
4			Station Holding	40	SW	MT	In these conditions we made 0.5 to 0.7knots beam speed into the wind. Worth noting this was also against an open water sea state. Would have achieved greater in harbour conditions (40knots wind but no waves).
5	Troon	Stern in	Arrive/Depart	40	NE	LW	The dolphin closest to linkspan position would need moving due to flare of bow

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	Port		Manoeuvre	Wind kts	Direction	Master	Comments
6	Troon	Bow in	Arrive/Depart	25	SW	EB	Fixed RPM would improve ease of berthing
7	Troon	Bow in	Depart	40	SW	EB	Required a bit more caution as would be expected. Acceleration away was slower than ideal, which should be improved greatly with fixed rpm
8	Troon	Bow in	Arrive/Depart	25	NE	MT	Ok
9	Troon	Bow in	Arrive/Depart	40	NE	LW	Departure was successful in that we made it out without damaging the ship. Stern not lifting. Not something we would care to intentionally repeat. Manoeuvre considered to be unsuccessful in that respect.
10	Ardrossan	Bow in	Arrive/Depart	20	NW	EB	Ok.
11	Ardrossan	Bow in	Arrive/Depart	40	NW	MT	West Kilbride cant carried out, tricky but ok. Much rougher conditions observed at the simulation for Ardrossan at 40 knots, than at Troon with 40 knots at any direction. Difference in conditions both visibly and physically were very noticeable. Wave height inside basin appeared unrealistically high. Seemed to take no account of shelter from breakwater.
12	Ardrossan	Bow in	Arrive/Depart	40	NW	LW	Normal berthing operation, not successful arriving, to be tested when max RPM is

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	Port		Manoeuvre	Wind kts	Direction	Master	Comments
							available at the next visit (27 th March 2017).

2. Comments and General Observations from Simulation Trials

For the second trials carried out on the 20th February 2017, not all of the comments from the trials carried out on the 27th January 2017 were addressed. The main item which was not addressed being the Propulsion, combinator controls to be set up for the maximum propeller RPM (225 RPM). This will be corrected for the next simulator trials scheduled for Monday 27th March 2017. Not having fixed max RPM does not give a true reflection of the vessel. When this has been resolved, this will improve vessel performance at both Ardrossan and Troon.

It is difficult to give an accurate compare and contrast between the ports as the true dynamic responses for the vessel has not been fed into the simulator model. Similar weather conditions were tested for both ports (further testing will be carried out on the 27th March 2017). Berthing in both locations was relatively similar, although in more difficult conditions Troon was marginally better.

In weather conditions of 40 + knots, it is unlikely that the vessel would sail in such conditions, passenger safety being paramount consideration.

Troon

Troon will require upgrade (additional fenders) to allow vessel to pivot for berthing stern in. And additional fenders for berthing bow in.

Troon, from simulation, Calmac Master's preference would be to berth stern in, in adverse weather.

The gap between the two outermost dolphins in Troon is too great. If we were to land on the one closest to the lighthouse in strong NE winds to pivot round onto the face of the berth, the stern can fall in between these as they currently stand.

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3. Photographs from Simulator Tests

Figure 1 – Troon 40 Knots NE arriving

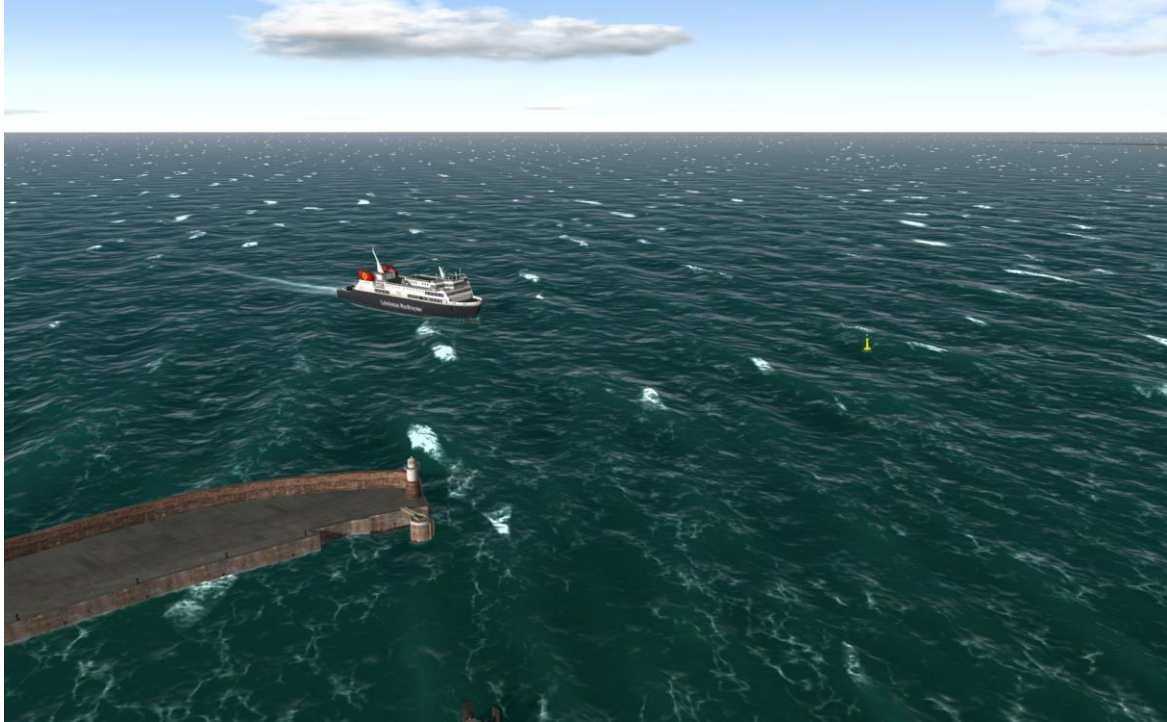


Figure 2 – Troon 40 Knots NE arriving



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Figure 3 – Troon 25 Knots NE arriving



Figure 4 – Troon Stern In



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Figure 5 – Ardrossan 40 Knots NW arriving



Figure 6 – Ardrossan 40 Knots NW arriving



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Figure 7 – Ardrossan View from Simulator Bridge



Figure 8 – Tarbert Arriving

