CMAL
Caledonian Maritime Assets Ltd
Stèras Mara Caledonach Eta

Consultancy Report

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Project brief from client

Concerns have been raised at the relatively high number (5%) of sailings cancelled on the Brodick Ardrossan ferry service against the (2%) cancellation rate experienced throughout the rest of the extensive Calmac ferry routes.

The client CMAL is in the process of having built two new, larger and more powerful ferries one of which is designated for the Arran service, and has asked the author to consider the relative merits of the ports of Ardrossan and Troon from a navigational and ship handling perspective and in doing so give an opinion as to which port offers the better option for a more reliable service whilst maintaining (or enhancing) the efficiency of the existing service.

The new-build yard number 801 has been designed to be able to hold station in almost 50 knots of wind pressure on the beam which equates to a force 9 known as a strong gale.

Due to the confidential nature of this report it was agreed that I would not interview any of the masters or travel on-board. I have however used this service a number of time, albeit a number of years ago and generally in good weather conditions.

N.B.
Since the introduction of the RET (Road Equivalent Tariff), the ferry operator has seen an unprecedented rise in the volume of vehicles using the route (62%) and this will no doubt lead to a corresponding rise in passenger complaints during periods when services are cancelled. If this upward growth continues, then one imagines that the ferries will be running nearer capacity at peak times and therefore on the resumption of normal service the vessel may not have the capacity to take the vehicles left stranded in addition to the ones booked for the current service thereby exacerbating the situation.

2. Background considerations.

Traditionally the ferry service to Arran has operated from the port of Ardrossan and whilst there is some suggestion in Calmac circles that a number of cancellations could be down to the configuration of the port a detailed study by the owners of the port is reported in a local publication as stating, "Bad weather and unsuitable Calmac vessels are the reason for Arran's frequent ferry cancellations and not the harbour at Ardrossan". *(a)*

The owner of the Port has said that "They are continually investing in shore side facilities at Ardrossan" *(a)*

When the port of Ardrossan has been 'weather bound' the Arran vessels can be redirected to the port of Gourock however there are reports that doing so can cause disruption to the services normally operated from that port thus compounding an already unfortunate situation. *(b)*

Calmac vessels have already conducted berthing trials at the port of Troon perhaps indicating that the operator has already given some thought to using Troon as a safe haven in bad weather as an alternative to Gourock or indeed as a permanent alternative to Ardrossan as the mainland base for the Arran service.

Whilst I can obtain details of each cancelled sailing and Calmac will have knowledge of any contact berthing damage, I have no knowledge of the number of times vessels have 'struggled' to berth in bad weather and therefore the number of times the potential for delay and or damage occurs.

(a) June 21st Arran Banner.
(b) Ferry committee minutes.

Approach to the project.

- Collect as much weather data as may be necessary to establish what conditions adversely affect both the ports of Ardrossan and Troon.
- Consider tidal conditions and whether they impact on the service.
- Consider berth orientation and the ease of approach to the berth(s).
- Consider the size and power of the vessels currently in use against the ones under construction.

Additional Observations

Whilst it is not necessarily within my remit I feel it would be wrong (considering part of my working life was operating a very busy ferry port) not to comment on the facilities available at each of the ports as they can have a great effect on the ability to berth and turnaround safely and efficiently.

Additional input

I have visited both ports accompanied by the CEO of CMAL Mr K P Hobbs. In the case of Troon, we were accompanied by [redacted] (Port Manager Ayr and Troon) and [redacted] (Engineering manager for Associated British Ports in the north west) and am duty bound to inform you that all three gentlemen have been known to me in the past whilst I was Director and General manager at the Port of Heysham in Lancashire.

Video

Videographic evidence readily available on YOUTUBE shows the current vessel the "Caledonian Isles" entering Ardrossan harbour and, during a sharp turn whilst broad on to the waves and swell, rolling quite rapidly.
Other video shows similar manoeuvres in good weather.

3. Report and findings.

Weather

Both ports are situated in Ayrshire on the eastern shore of the lower reaches of the river Clyde and being within 6 miles of each another it is safe to assume (in the absence of local records) that they are both subject to the same weather influences and therefore there is no need to look for differences in any detail. Suffice it to say that the prevailing winter winds (when most cancellations take place) are from the west and in particular the south west.
HMS Gannet have provided information to the Met Office which can be accessed FOC online.
Whilst the same winds will blow over both ports the orientation of the berths and the physical layout of the harbour will affect the vessels ability to berth as will the built infrastructure which can disrupt the wind flow in certain areas of each harbour.

Tides

Both ports are affected by the same tidal influences and as tidal rise and fall in this area is not great then it can be said that tidal streams do not have any significant part to play in the manoeuvring of the vessels on the approaches to either port.

Tidal ranges are, for	Ardrossan	Springs 2.8m	Neaps	1.5m
	Troon	2.9m		1.6m

The Ferry

This report is to consider the suitability of the ports in question in relation to the ship currently under construction however there needs to be some comparisons made with the ferries currently operating the Arran service so as to understand the potentially different requirements for the new-build.

The new-build is longer, wider and deeper than any of the existing vessels which means she will occupy a greater 'footprint' within a harbour area however she has been designed with more power, bigger thrusters and high-lift style rudders all of which will go towards better manoeuvrability whilst within said harbour area.
However, her problems will start on the approach to the harbour and the already confined space available to turn within the confines of the harbours thus restricting the speed with which manoeuvres are conducted.

The difference in dimensions are as shown; -

Caledonian Isles	L 94.0	B 15.8	D 3.2	cars 110
New Build	L 102.4	B 17.0	D 3.4	132

Ardrossan

The port of Ardrossan is protected to the north by a low breakwater running approximately north and south. Its height is such that at high water it will do little to disturb the wind within the harbour however as the prevailing winds are from the southwest then it cannot be seen to help in any way to reduce the wind at the berth. The southern end of the entrance is defined by a stone built roundhead which forms the northwest tip of the harbour, this is a much higher structure which offers some shelter from westerly winds.

There are three berths within the port namely; -

'Arran berth'	lying at the west end,	aligned 333/152	95 m long.
'Irish berth'	lying at the east end,	aligned 343/163	140 m long.
'Winton Pier'	lying at the north,	aligned 041/221	160 m long.

Both the Arran berth and Irish berth are served by linkspans whilst the Winton pier can only be considered as a layby berth. The Brodick service operates from the Arran berth whilst the Irish berth is sometimes used by the Campbeltown ferry when the Arran berth is occupied. All the berths are well fendered.

The approach to Ardrossan is from the South west along a line of 055 degrees however I am advised that on the very final approach when strong westerly winds are blowing the vessel may keep as far to the north as it is safe to do so such that the course through the breakwater is more to the East thus reducing the amount of turn still to be executed once within the harbour confines.

Traditionally the vessels berth bow in at Ardrossan and that being the case the following is written with that in mind. The alternative would be to land starboard side to on the Winton berth or at least parallel that pier and swing the stern to starboard and go stern in on the berth. This would take more time than the bow in approach and would make the departure more difficult in westerly winds.

The entrance between the southern tip of the breakwater and the roundhead is some 125 metres wide and from the roundhead to the northwest tip of the Arran berth is 100 metres wide so that a ferry entering the harbour has a mere 100 metres in which to turn through 100 degrees to align with the berth.
Whilst not able to be on the bridge to witness how this is achieved I have assumed that the rudder is put hard over swinging the vessel rapidly to starboard and at the same time the starboard engine (or both engines) may be put astern to slow the forward motion.

Ardrossan cont....

When the speed has dropped sufficiently the bow thruster will come into play and the engines can be reversed to stop the swing and screw the stern back to Starboard ready to approach the berth. It is when the bow has passed inwards of the north tip of the berth that the visor can be raised and the passengers sent to their vehicles. *(c)*

The Masters have to be commended for the speed and efficiency with which this manoeuvre is conducted however I am almost certain that when strong winds are experienced from the west and southwest then the stern could be carried far to the east so that the vessel instead of ending the initial swing heading roughly south and towards the berth will instead be heading much more to the west and perhaps in extreme case may swing far enough to almost parallel the Winton Pier. It would appear from the internet that on one occasion contact was made which resulted in the vessel ~~the vessel~~ being out of service for 6 days. *(d).*

When the vessel is carried around like this it probably happens quickly and then involves the Master having to work the ship onto the corner of the Arran / Winston berths and round onto the Arran berth and eventually the linkspan. How often this happens is not known to me and may not be known to anyone other than each individual Master. It may be disingenuous to suggest that 'near misses' or 'berthing problems' may rarely be reported however my own experiences have shown that these things are shared amongst the crews but not necessarily with the 'Management'. In other words, these are things that the Master copes with knowing that little can be done, in general, to mitigate the circumstance. That said the same Masters will by experience know when the risk of damage outweighs the safety required from him and will take the decision not to undertake the passage.

From my own experiences, the decision to sail rarely depended on the sea state on passage but rather the ability to berth at the end of the passage.
Leaving the berth is relatively straight forward in that the vessel is driven astern swinging the stern to port around the Winton berth and, when far enough back, driven forward under power and through the breakwater. (in good weather this all happens in less than 3 minutes)

I have never seen a vessel on the Irish berth and therefore cannot comment on how approaches are made to this berth but would suggest that the approach in strong south-westerly winds would be quite difficult unless the vessel were to land first on the Winton pier and 'work' her way around the corner onto the berth.

(c) Marine Guidance note, (MGN 341(M)
(d) Arran Banner.

Troon

Troon lies some 6 miles to the south of Ardrossan and is 3.6 NM miles further from Brodick. It has a considerable number of buildings to the west end which offer a great deal of protection from the prevailing westerly and in particular south westerly winds.
There is, at the northwest tip of the harbour, a stone roundhead and along the northern side a long breakwater come pier which initially provided protection but more recently was used as a base to construct a RO-RO ferry berth.

Troon has four berths namely: -

'West Pier'	lying at the west	aligned 015/195	125m long.
'Wee Hurry'	lying to the south	aligned 132/312	170m long.
'Portland Quay'	lying to the east	aligned 054/234	125m long.
'East Pier'	lying to the north	aligned 130/310	150m long.

Both the West Pier and East Pier have been, in the past, been used by two different ferry operators both of whom managed to run fast ferry services. *(e)* These fast ferries were not fitted with bow thrusters but instead used directional waterjets to transfer power such that the bow or stern could be made to 'Lead' when manoeuvring and in my opinion this is less efficient than conventional bow thrusters when strong winds are experienced on the beam. *(e).*

In addition to the above, P&O Irish Sea operated from the West Pier a conventional freight ferry M.V. European Mariner L 116m B18.2m D 5.41m.
To the best of my knowledge she provided a reliable year round service.
The same vessel had operated from Ardrossan where she once grounded.

If Troon is considered for the Arran ferry route, then the most sensible berth would be the relatively new ferry terminal on the East Pier. This berth is approached from the North West and if bow in (which would be my preferred option) a vessel would simply steam towards the linkspan opening its visor once passed the West Pier and pushing the bow to starboard would 'screw' the stern into the dolphins where she can berth.
To depart the vessel would be driven astern and 'screwed round to port with the bow thruster(s) keeping the bow close to the dolphins as the visor is lowered.

The approach to this pier would virtually be the same in all weather conditions excepting that the distance off the roundhead and pier itself would likely be different. In strong South Westerly winds a reasonable amount of shelter will be afforded by the built infrastructure however as the vessel will always be beam onto the wind and has no dramatic directional changes to perform then the manoeuvre can be conducted in a much more controlled fashion with plenty of 'downwind' sea room.

Troon cont....

All of the other berths have to be approached from the North North East and stern first if using the West Pier and bow in if using the Wee Hurry or Portland Quay.
Only the East and West piers have linkspans therefore the others can only be considered as layby berths.

Whilst my preference would be to go bow in to the East Pier, the European Mariner was a stern loader and at 116m long had plenty of room to turn and approach stern first.

(e) It has to noted that these services failed commercially due to the high operating costs of the vessels.

Conclusion

The reliability of the Arran ferry service (mechanical failure aside) will be dependent on the vessel employed on the route being able to berth in all but the most extreme weather conditions and whilst it would be totally wrong to expect 100% reliability it would not be unreasonable to expect the service to at least match the reliability of the rest of the Calmac fleet i.e. 2%.

There are two important changes that can be made that will go a great way to improve that reliability. The first is to provide a more powerful and more manoeuvrable vessel and that is already underway with Yard 801 due to enter service in 2018.
The second is to select berths that are either more sheltered or provide more sea room to manoeuvre in and provide sufficient length to allow the vessel again more room to run moorings etc.

It is my opinion that the Port of Troon provides such a berth in the form of the East Pier.

Whilst it is not in my remit it would be remiss not to compare the facilities available at the two ports. Ardrossan offers two exposed fenders piers both accessed via rather old linkspans, limited car marshalling space and an open exposed gangway. Which the vessel reaches through a relatively narrow gap.

Troon offers a modern well fendered berth with a long, wide and much more modern linkspan with clear access from the north west. As far as I could glean ABP are prepared to fund the construction of a passenger terminal, vehicle check-in facility, enclosed gangway and if necessary fuel storage facilities and long term car parking all of which being new would to some extent replicate the facilities at Brodick and match the standards reflected in the new build. I have no idea of the figures behind such a deal or for that matter the current charges at Ardrossan.

It should also be noted that Troon has a ship repair yard.

On the down side there is no direct rail head into the port of Troon as there is in Ardrossan and whilst past figures indicate 100k rail passengers per annum it may well be that the RET will alter these numbers as passengers opt to take cars back and forth.

[redacted] *Master Mariner retired*

Additional considerations

If the port of Ardrossan is still considered to be the mainland base for the Arran service it would be far better if the 'Arran' berth were lengthened and whilst the easy and cheaper option would be simply to extend to the north by building a small mooring dolphin it would be far better to excavate the land to the south and replace the existing linkspan.

If this was the case I would highly recommend a floating linkspan for the following reasons; -

- They have no exposed mechanical parts.
- They automatically follow the tide.
- They have nowhere to fall.
- They can be set remotely for different heights of vehicle deck.
- They do not need an operator whilst in use.

Regardless of which port is chosen it is worthwhile considering the use of lightweight mooring lines which are easier handled making the operation quicker and safer.
Size for size they offer considerably more strength than a conventional rope. I had introduced these lines at Heysham and saw a dramatic reduction in back injuries and in the time taken to tie up and let go. They are particularly useful on dolphin berths where space is limited. *(e)*

Also regardless of which port is chosen I would consider that, where it is possible, windbreak fencing be erected to provide shelter in the approach and immediate vicinity of the berth, these can be built high enough to reduce the wind considerably. *(f)*

All three of these considerations come at a cost but would in my opinion greatly enhance the entire operation and once installed have little maintenance costs.

(e)These ropes are made from 'Dyneema' and are readily available from a number of manufacturers and in "made to order" lengths.

(f)These fences have been in use for some time the more noticeable being alongside the Eurotunnel tracks at Folkestone.

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