New Vessels for the Clyde and Hebrides: Follow-up information from Jim McColl, Former Director, Ferguson Marine Engineering Limited, by email, 24 June 2022

During my recent appearance before the Public Audit Committee, there were two questions asked by Colin Beattie which I would like to follow up with information which is included in the attachment.
Mr. Beattie asked a question about the stage payments claimed by FMEL and quoted from the RECC report suggesting that work had been done out of sequence purely to trigger payments. This is an important question that was raised by Mr. Beattie and it is very important that the committee understand the true position.
I stated at the evidence session that there was no prescribed sequence for building the sections of the vessel or indeed for any aspect of building the ship. This is entirely up to the builder to decide. FMEL did however have to change the sequence in which they had planned to build the vessels due to changes to the specification and delays in decisions from CMAL . These changes and delays are outlined on pages 8 and 9 of the attached HKA report.(Weights and Draft, Main Engines and choice of propeller). As I stated at the evidence session, Block 1 was the stern-most block which should have been the first to be fabricated and placed on the slipway. You will see from para 50 on page 9 that FMEL were not able to start fabrication of this block until April 2017 , 50% through the contract period. To allow work to proceed on the vessel construction and to mitigate delays , work was started on the fabrication of other blocks in the mid-section of the ship where drawings had been approved by Lloyds. The changes to the sequence of works is clearly explained on page 19 and 20 of the report.
It is clear from the milestone payments schedule shown on pages 24 and 25 that these payments were based on % of fabrication against which FMEL made a claim for payment. The fabrication % were completed by FMEL and confirmed by CMAL before the payment for each milestone was made.
It was two very important questions that Mr. Beattie asked that I felt I had not answered clearly. I hope this further information provides sufficient clarity. The attached report also provides a detailed breakdown breakdown of the additional costs incurred for 801.

Best Regards

Jim McColl

FERGUSON MARINE AND ENGINEERING LTD

CONSTRUCTION OF HULL 801

Claim for Additional Payment

HKA
3200 DARESBURY PARK
WARRINGTON WA4 4BU

CDA-03801.00 / December 2018

CONTENTS

APPENDICES

APPENDIX DESCRIPTION

PART 2 – INTRODUCTION AND BACKGROUND

PART 3 – DELAY AND DISRUPTION

3 - 032	E mail from [redacted] to [redacted] 27 October 2016 15:00 hrs
3 - 033	E mail from [redacted] to [redacted] 31 October 2016 17:44 hrs
3 - 034	E mail from [redacted] to [redacted] 2 December 2016 09:31 hrs
3 - 035	E mail from [redacted] to [redacted] 2 December 2016 17:46 hrs
3 - 036	E mail from [redacted] to [redacted] 5 December 2016 06:53 hrs
3 - 037	Minutes of Project Meeting No 13 of 6 December 2016
3 - 038	E mail from [redacted] to [redacted] 11 December 2016 15:02 hrs
3 - 039	E mail from [redacted] to [redacted] 12 December 2016 09:31 hrs
3 - 040	E mail from [redacted] to [redacted] 16 December 2016 11:58 hrs
3 - 041	E mail from [redacted] to [redacted] 20 December 2016 13:09 hrs
3 - 042	E mail from [redacted] to [redacted] 20 December 2016 15:16 hrs
3 - 043	E mail from [redacted] to [redacted] 21 December 2016 09:40 hrs
3 - 044	SVA test report 2684/05
3 - 045	Minutes of Project Meeting No 14 of 12 January 2017
3 - 046	Minutes of Project Meeting No 15 of 2 February 2017
3 - 047	E mail from [redacted] to [redacted] 27 February 2017 18:48 hrs
3 - 048	Figure 3-4: units/blocks which could not be finalized due to hull design changes
3 - 049	E mail from Jim Anderson to [redacted] 15 March 2017 10:28 hrs
3 - 050	Figure 3-5: delays arising from tank tests and ducktail approvals
3 - 051	Figure 3-6: summary of delays window 2
3 - 052	Specification - outfitting
3 - 053	Cardinal dates programme 28 June 2018
3 - 054	Left Blank
3 - 055	Email [redacted] to [redacted] 10 March 2017 10.39 hrs
3 - 056	Email [redacted] to [redacted] 9 Jan 2018 16.44 hrs
3 - 057	Email [redacted] to [redacted] 6 Nov 2018 10.27 hrs
3 - 058	Email [redacted] to [redacted] 6 Nov 2018 15.07 hrs
3 - 059	Email [redacted] to [redacted] 6 Nov 2018 16.43 hrs
3 - 060	Email [redacted] to [redacted] 9 Nov 2018 13.07 hrs
3 – 061	Email [redacted] to [redacted] Nov 2018 13.37 hrs
3 – 062	Contract Specification Annex B 10 Main Particulars 100 General
3 – 063	Minutes of Project Meeting 1 10 December 2015
3 – 064	Email [redacted] to [redacted] 5 May 2016 16.27hrs
3 – 065	Email [redacted] to [redacted] 23 June 2016 13.52hrs
3 – 066	Email [redacted] to [redacted] 27 June 2016 09.42 hrs
3 – 067	Email [redacted] to [redacted] 5 June 2016 19.27hrs
3 – 068	Email [redacted] to [redacted] 6 July 2016 09.52 Hrs
3 – 069	Emai [redacted] to [redacted] 7 July 2016 09.53 Hrs
3 - 070	Email [redacted] to [redacted] 6 July 2016 09.55 Hrs
3 – 071	Email [redacted] to [redacted] 23 Aug 2016 16.14 Hrs
3 – 072	Email [redacted] to [redacted] 12 Jan 2017 11.37Hrs
3 - 073	Email [redacted] to [redacted] 12 Jan 2017 12.31 Hrs
3 - 074	Email [redacted] to [redacted] 3 February 2017 12.50 Hrs
3 – 075	Email [redacted] to [redacted] 22 Feb 2017 17.25 Hrs
3 – 076	Email [redacted] to [redacted] 22 Feb 2017 20.38 Hrs
3 – 077	Email [redacted] to [redacted] 23 Feb 2017 09.40 Hrs
3 – 078	Email [redacted] to [redacted] 27 Feb 2017 10.54 Hrs
3 – 079	Email [redacted] to [redacted] 19 April 2017 21.24 Hrs
3 - 080	Email [redacted] to [redacted] 25 April 2017 19.24 Hrs
3 – 081	Emai [redacted] to [redacted] 2 May 2017 10.50 Hrs

3 – 082	Email [redacted] to [redacted] 8 May 2017 18.48 Hrs
3 – 083	Email [redacted] to [redacted] 15 May 2017 17.09 Hrs
3 – 084	Email [redacted] to [redacted] 15 May 2017 19.55 Hrs
3 – 085	Email [redacted] to [redacted] 15 May 2017 19.55 Hrs
3 – 086	Email CMAL100 to [redacted] 16 Sept 2016 08.44 Hrs
3 – 087	Email [redacted] to [redacted] 7 Oct 2016 07.33 Hrs
3 – 088	Email [redacted] to [redacted] 10 Oct 2016 17.09 Hrs
3 – 089	Email [redacted] to [redacted] 14 Oct 2016 10.23 Hrs
3 – 090	Email [redacted] to [redacted] 14 oct 2016 10.47 Hrs
3 – 091	Email [redacted] to [redacted] 14 Oct 2016 13.07 Hrs
3 – 092	Minutes of Project Meeting 14 12 Jan 2016
3 – 093	Minutes of Project Meeting 15 2 Feb 2016
3 – 094	Email [redacted] to [redacted] 14 April 2017 13.27
3 – 095	Email [redacted] to [redacted] 20 April 2017 06.22 Hrs
3 – 096	[redacted] to [redacted] 10 May 2017 08.43 Hrs
3 – 097	Email [redacted] to [redacted] 14 Nov 2018 10.30 Hrs
3 – 098	Email [redacted] to [redacted] 14 Nov 2018 10.45 Hrs
3 – 099	Email [redacted] to [redacted] 14 Nov 2018 10.55 Hrs
3 - 100	Email [redacted] to [redacted] 14 Nov 2018 16.11 Hrs
3 – 101	Email [redacted] to [redacted] 15 Nov 2018 09.48 Hrs
3 – 102	Email [redacted] to [redacted] 13 Feb 2018 22.01 Hrs
3 – 103	Email [redacted] to [redacted] 14 Feb 2018 09.15 Hrs
3 – 104	Email [redacted] to [redacted] 19 Feb 2018 11.07 Hrs
3 – 105	Email [redacted] to [redacted] 19 Feb 2018 12.03 Hrs
3 - 106	Email [redacted] to [redacted] 19 Feb 2018 13.44 Hrs
3 – 107	Email [redacted] to [redacted] 13 June 2018 17.49 Hrs
3 – 108	Email [redacted] to [redacted] 23 July 2018 09.56 Hrs
3 – 109	Email [redacted] to [redacted] 23 July 2018 09.28 Hrs
3 – 110	Email [redacted] to [redacted] 23 July 2018 09.41 Hrs
3 – 111	Email [redacted] to [redacted] 23 July 2018 09.45 Hrs
3 – 112	Email [redacted] to [redacted] 23 July 2018 09.56 Hrs
3 - 113	Drawing Comment Sheet for drawing 801_2-511-4 rev 4

PART 4 – MONETARY CLAIMS

4 - 001	Hull 801 delay costs and damages for delay to hull 802
4 – 002	Extension of Refund Guarantee Bond
4 – 003	Outfitting and block fabrication disruption costs
4 – 004	[redacted] costs
4 - 005	[redacted] costs
4 – 006	Purchase of steel stockholder
4 - 007	Increase in steel material wastage
4 – 008	Mitigation measures for propellers, shafts, tubes and rudders etc.
4 – 009	Additional storage costs
4 - 010	Increased dry dock costs
4 – 011	Installation of the LNG tank
4 – 012	Abortive steelwork mid-ships
4 – 013	Lloyd's Register requirements
4 – 014	Strengthening mid-ships for ducktail

PART 1 - EXECUTIVE SUMMARY

1. This is a claim for additional payment under the contract between Caledonian Maritime Assets Limited (CMAL) and Ferguson Marine Engineering Limited (FMEL) for the construction of hull 801: a first in class duel fuelled passenger ferry.

2. The Contract is a design build contract under which FMEL is responsible for the design. FMEL not only has the obligation to design, it has the right to do so, unhindered by CMAL.

3. CMAL, for its part, must:

   - not hinder or prevent FMEL from carrying out its obligations including its design in accordance with the terms of the contract and from executing the works in a regular and orderly manner; and
   - take all steps reasonably necessary to enable FMEL to discharge its obligations and to execute the works in a regular and orderly manner in accordance with the terms of the Contract and in accordance with good international shipbuilding and marine practice.

4. In breach of these obligations CMAL has interfered in the design process causing delay and disruption. FMEL is entitled to damages in the form of its delay and disruption costs arising from this interference.

5. Further delay and disruption and additional costs have arisen from modifications or changes requested by CMAL. These modifications comprise:

   - those which have been agreed in principal by CMAL but which it has declined to formalize; and
   - those which are pending agreement.

6. FMEL is entitled to payment for the works which it has carried out in relation to these modifications (whether agreed or otherwise) and its associated delay and disruption costs.

7. The amounts to which FMEL is entitled and which are the subject of this claim are as follows:

Item	*£*
Delay (prolongation) costs	12,358,639.33
Disruption costs - outfitting and block fabrication	15,048,609.90
Disruption costs - design	617,379.47
Disruption costs - procurement	1,984,156.99

Item	*£*
Disruption costs - other elements of the works	485,916.09
Variations to the contract (VTC's) agreed in principle by CMAL	776,410.00
Modifications or changes pending agreement by CMAL	836,868.72
Claims from subcontractors and suppliers	3,042,035.12
Other claims	8,432,305.60
Professional fees	650,000.00
TOTAL	**44,232,321.22**

RESERVATION OF RIGHTS

8. FMEL fully reserves its rights to submit further claims for hull 801 (and 802) whether arising from matters detailed in this claim or otherwise.

PART 2 - INTRODUCTION AND OVERVIEW

INTRODUCTION

1. This is a claim for additional payment under the contract for construction of hull 801 (a first in class duel fuelled passenger ferry) as a result of changes/modifications under the contract together with a claim for damages for breach of contract by the Buyer, CMAL.

2. The purpose of this part of the claim is to provide a general overview of the claims which are detailed in other parts of this document.

3. The claims arise primarily as a result of the following:

    - The conceptual design was inadequate. Many fundamental design issues were not addressed or resolved by CMAL at award of the Contract and had to be resolved thereafter.

    - CMAL instructed changes to the engines and hull draft. These are fundamental design issues which should have been resolved at conceptual design stage but were not finally decided upon until well into the contract period.

    - CMAL interfered in the design process. It:

        ◊ involved itself in design matters in which it had no right to do so;

        ◊ required alternative designs to be investigated (in particular the propellers); and

        ◊ delayed decisions and approvals.

4. As a result of these matters FMEL had to make radical changes to the way it planned to carry out the works:

    - hulls 801 and 802 had to be constructed consecutively rather than concurrently; and

    - outfitting and block fabrication works to hull 801, which should have been carried out in the workshop or pre-launch were carried out post launch.

5. These two fundamental changes altered the entire nature of the 801 (and 802) project(s). An onerous project, for a first in class vessel, became even more so, resulting in long delays and considerable extra expense.

6. In addition there were numerous other changes and acts and omissions on the part of CMAL which caused delay, disruption and additional cost. These are detailed in part 3 of this claim.

THE CONTRACT AND THE PARTIES

The Contract

7. On 16 October 2015 the Parties entered into contract under an amended NEWBUILDCON form of contract for the construction of hull 801. The Contract Price was £48,500,000. (On the same day the Parties entered into a contract in identical terms for an identical vessel, hull 802.)

8. The Contract was subject to the law of Scotland.

The Parties

9. The Parties are as follows:

- the Buyer is Caledonian Maritime Assets Limited of Municipal Buildings, Fore Street Port Glasgow ("CMAL");
- the Builder is Ferguson Marine Engineering Limited of 1 Redwood Crescent, Peel Park, East Kilbride, G47 5PA ("FMEL").

The works

10. The works (for hull 801) comprised inter alia the design, construction and delivery of a duel fuelled passenger and car ferry with an overall length of 102.4m. (Hull 802 was identical.)

Contractual Dates of Delivery

11. The Contractual Date of Delivery of Hull 801 was 25 May 2018. (Hull 802 was to be delivered a little over two months later on 26 July 2018.)

THIS CLAIM

12. This claim comprises the following parts:

- Part 1 – the Executive Summary
- Part 2 – this Introduction and Overview
- Part 3 – Delay and Disruption
- Part 4 – Monetary Claims
- Part 5 – Contractual and Legal Basis of FMEL's Claims
- Appendices

13. References to Appendices in this claim are shown in square brackets – e.g. [Appendix 3 – 001] is Appendix 001 to part 3 of this claim. Larger copies of various figures found in this document are also included as Appendices.

14. In this claim, delays and additional costs up to 31 August 2018 are actual delays and actual costs, whereas those after 31 August 2018 are based upon forecasts.

TERMINOLOGY

15. Unless otherwise stated:

- the terminology used in this claim follows that in the Definitions part of the Contract;
- references to "clauses" are to those in the Contract;
- "day" means calendar day

RESERVATION OF RIGHTS

16. FMEL fully reserves its rights to submit further claims for hull 801 (and 802) whether arising from matters detailed in this claim or otherwise.

FMEL'S DESIGN OBLIGATIONS

The conditions of contract

17. The first part of clause 1 says (in part):

> *It is mutually agreed between the Builder and the Buyer that:*
>
> *(a) The Builder **shall design**, construct, test and survey, launch, equip, complete, sell and deliver the Vessel to the Buyer all **in accordance with good international shipbuilding and marine practice**.* [emphasis added]

18. It is acknowledged from the outset that FMEL (as the Builder) is responsible for the design, although that design is based on a conceptual design provided by CMAL.

19. Clause 1 (a) requires FMEL to design and build "in accordance with good international shipbuilding and marine practice". This begs the question what constitutes "good international shipbuilding and marine practice" ?

Good international shipbuilding and marine practice

20. The USA Government Accountability Office (GAO) is the audit, evaluation and investigative arm of the US Congress. In May 2009 it produced an informative and authoritative report (GAO-09-322) Best Practices – High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding ("GAO-09-322"). [emphasis added]. [Appendix 2 – 001]

21. Whilst the aim of the report was to recommend how the US Navy might better its shipbuilding programme, the report details and provides a good summary of best practices in commercial international shipbuilding.

22. The authors of the report visited most of the world's largest shipyards in Germany, Denmark, Finland and South Korea. The representatives of leading ship buyers and shipbuilders were interviewed.

23. GAO-09-322 is not a Contract document. Nevertheless, the practices set down in this report fairly reflect good international shipbuilding and marine practice, an obligation with which FMEL must comply. Consequently references to this report have been made to determine whether, in relation to clause 1(a):

- FMEL has complied with its obligations (as to good international shipbuilding and marine practices); and
- CMAL has prevented FMEL from complying with those obligations

CMAL's obligations not to hinder FMEL

24. Under clause 1(a) of the contract, FMEL not only has an obligation to design, it has a right to do so, unhindered by the acts and omissions of CMAL. The contractual/legal basis part of this claim (part 5) will explain that CMAL must:

- not hinder or prevent FMEL from carrying out its obligations including its design in accordance with the terms of the contract and from executing the works in a regular and orderly manner; and
- take all steps reasonably necessary to enable FMEL to discharge its obligations and to execute the works in a regular and orderly manner in accordance with the terms of the Contract and in accordance with good international shipbuilding and marine practice.

25. From the very start of the contract and thereafter CMAL has consistently failed in these obligations.

THE TENDER PROCESS AND THE ADEQUACY OF THE CONCEPTUAL DESIGN

26. On 10 December 2014 CMAL issued invitations to tender (ITT) to design and build two identical dual fuelled ferries. Each vessel was to be capable of carrying 1,000 passengers and 127 cars (or 16 articulated lorries).

27. The conceptual design was prepared by CMAL. It sets out the main design criteria of the vessel. Conventionally, it should be reasonably well developed before issuing the ITT. It is understood that only about 6 months was allocated to develop the conceptual design and in view of the shortage of time the specification was prepared on the basis of merging two previous design concepts. This rather rushed design process, to enable ITT's to be issued, stored up problems for the future.

28. GAO-09-322 makes a number of observations about the need to properly develop the conceptual design prior to award of contract.

> *Commercial shipbuilding programs are characterized by the high levels of knowledge that ship buyers and shipbuilders insist upon at key junctures throughout the acquisition process. This knowledge enables leading commercial shipbuilders to deliver innovative new ships within cost and schedule estimates. Buyers and builders are willing to take the steps necessary to minimize the risk that a ship will deliver late or exceed its budget. Most important, commercial*

> *shipbuilders and buyers retire all major risk posed by technological advances or novel design features prior to signing a contract for a ship* [GAO-09-322, page 12]
>
> *Leading commercial ship buyers and shipbuilders insist upon identifying and retiring all major program risks early. This analysis occurs during the pre-contract phase, which can be as long as 5 years or more depending on the complexity of the ship and the novelty of the proposed design and systems on board. …*
>
> *In the commercial model, a program will only move forward to contract signing once the ship buyer and shipbuilder reach agreement that potential showstoppers have been mitigated so as to not jeopardize the planned cost and delivery schedule for the ship. If the shipyard fails to resolve program risks or showstoppers before committing to a firm, fixed-price and a fixed delivery schedule, it could encounter problems later in the construction process that will require the diversion of additional, unplanned resources to the project.* [GAO-09-322 page 15]

29. Inadequate consideration was given by CMAL to many of the fundamental issues required to establish the feasibility of the conceptual design, both in terms of accuracy and detail. The result was that CMAL's requirements were not adequately set out in the tender documents (which of course included the conceptual design) and subsequently changed throughout the contract period. Although FMEL was expressly required to follow good international shipbuilding and marine practice, this requirement was undermined by the inadequacy of the conceptual design.

30. By way of example the following issues (which are not by any means exhaustive) reflect the problems which arose as a result of the inadequate conceptual design and CMAL's attempts to develop it after contract award..

- general arrangement drawings
- weights and increased draft
- selection of the main engines
- choice of propeller
- LNG bunkering arrangements
- passenger layout
- innovative design and new technologies
- classification society rules and regulations

31. These are expanded upon below.

The general arrangement drawings

32. The general arrangement (GA) drawings accompanying the ITT conspicuously lacked detail for such a complex and innovative vessel. FMEL had to make significant changes to the GA's in the preparation of its bid.

33. One example is that a large number of important tanks and spaces below the main deck were not shown.

34. There have been numerous revisions to the general arrangement drawings since Contract award. Whilst FMEL acknowledges that it is responsible for some of these revisions, there are nevertheless many changes which have been made at the instigation of CMAL.

Weights and increased draft

35. The lightship weight includes the weight of the completely outfitted vessel with inventory according to the list of inventory spare parts required by the class society along with liquids in engine room systems. The deadweight is effectively the cargo carrying capacity. The lightship weight and deadweight were specified by CMAL in the ITT.

36. CMAL says (in its project update of April 2017, found on its web-site) that it increased the lightship weight and the deadweight with only a small increase in dimensions [Appendix 2-002]. This is true, but the increase was made well after award of the contract and only when CMAL realized its conceptual design was unachievable.

37. The ITT specified the principal dimensions and draft of the vessel together with a deadweight capacity of 900 tonnes, Achieving the draft and maintaining the deadweight within the specified hull dimensions was challenging.

38. Ultimately CMAL had to concede that the specified requirements could not be met without a change to the draft. On 27 April 2016 (some 6 months after contract award and about 20% into the contract period) CMAL agreed to an increase in draft from 3.4m to 3.45m.

39. Even now, meeting CMAL's specification requirements within the constraints of the hull dimensions is proving to be troublesome. Many of the non-passenger areas are congested with access for maintenance and repair likely to be an issue in the future. The engine room is particularly crowded. Again, later on in the Contract CMAL have recognized this problem and decided to omit some back up pumps and equipment in an effort to ease the situation.

Selection of the main engines

40. The Contract required two eight cylinder engines to be provided. However, clause 49 of the Contract permitted CMAL to change these to two six cylinder engines and issue an Addendum to the Contract to reflect this change.

41. The notion that such an important change could be made after award of the Contract, was fundamentally flawed, particularly in view of the relatively short construction period. The selection of engines has major implications on the design of the propellers, gearboxes, engine room layout and associated mechanical systems. In addition it potentially affected the final design lines of the hull.

42. CMAL did not select an engine until 27 April 2016. As with the hull draft (which was changed on the same day) the engine selection was made some 20% into the contract period.

Choice of propeller

43. This is a major cause of delay and is explained fully in part 3 of this claim.

44. Once CMAL had decided upon the engine specification (on 27 April 2016) FMEL should have progressed with the detailed propeller design, construction of a model and carrying out tank tests.

45. However, it was unable to do this because CMAL was considering two different propellers for hulls 801 and 802 rather than a single propeller design for both vessels. (This rather belied the concept that hulls 801 and 802 were to be identical.)

46. The propeller specification was of fundamental importance. Until it was selected by CMAL the final lines of the hull could not be established, in particular the lines of the bow and stern blocks. It also affected the selection of gearboxes and layout of the engine room area.

47. CMAL did not decide upon the propeller specification until 3 August 2016. In the end it chose not to use either of the alternative propellers which it instructed FMEL to investigate. Three months were wasted on this futile exercise. At this point, FMEL were about 9 months into the contract and some 30% of the contract period had elapsed.

48. Subsequent model making, tank testing and yet further prevarication by CMAL on the use of a duck tail meant there were long delays to the start of fabrication of the stern and bow blocks. (The details are fully explained later in part 3 of this claim.) The delays to start of fabrication are shown in figure 2-1 below.

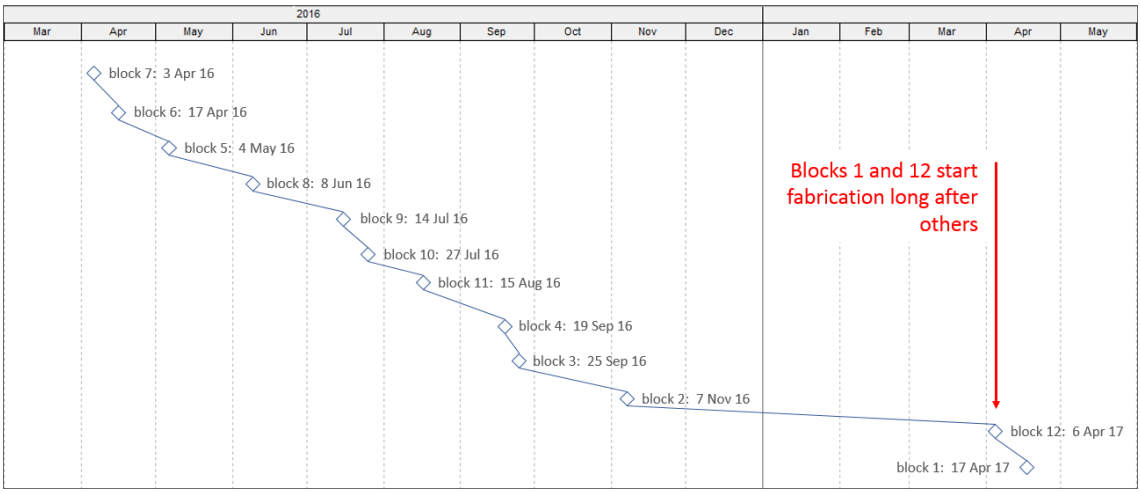


figure 2-1 block fabrication start dates

49. Block 1 is the stern-most block at the rear of the vessel. Its design is heavily dependent upon the propeller design. Block 12 is the bulbous bow. Again, its final design relies on calculations derived from the performance of the selected propeller.

50. Figure 2-1 shows that the fabrication of blocks 1 and 2 started only in April 2017, some 50% of the way through the contract period and five months after other blocks had started fabrication.

LNG bunkering arrangements

51. The vessels' bunkering location/arrangements were not finalized pre contract. Reliable and safe bunkering arrangements are crucial for LNG fuelled vessels. This is not merely an operational issue but a major design issue.

52. In January 2016, CMAL instructed FMEL to consider designing to allow bunkering on board, from a tanker truck on the vehicle deck. The following month, CMAL requested that this option be "kept open". This prevented FMEL from finalizing the design.

53. To allow some flexibility of choice for CMAL, on 4 April 2016, FMEL revised its general arrangement drawings to show bunkering at the stern (the rear). In the absence of any final decision from CMAL, by July 2016 FMEL was proceeding on the basis of bunkering from shore. Even in October 2016, CMAL continued to investigate bunkering options. It has still never formally advised that bunkering on board should be abandoned.

Passenger layout

54. The specification calls for 1,000 passenger seats – 650 inside and 350 outside. FMEL's general arrangement drawings have always shown this. However, on 16 May 2018 CMAL requested the removal of seats to "improve accessibility".

55. The passenger numbers are closely allied with the provision of sufficient lifeboats. On 11 July 2018, CMAL asked to what extent the passenger numbers could be reduced if one lifeboat was removed from the design. FMEL promptly re-assessed the layouts and reported that passenger numbers could be reduced to 924.

56. Later that month CMAL said it would prefer 950 seats. By 31 August 2018, CMAL was still prevaricating over passenger numbers and layouts, a matter which should have been resolved at conceptual design stage.

Innovative design and new technologies

57. The dual fuel ferries are capable of operating on liquefied natural gas (LNG) or marine gas oil. CMAL has acknowledged that these are the first vessels in the UK that can run on both fuels. As such they incorporate a great deal of innovative design and new technologies.

58. For example, the ITT sets out ambitious operating performance requirements with two primary service speeds: 16.5 knots and 14.5 knots. This presents a number of design difficulties not least that a controllable pitch propeller can only be optimized for one vessel speed and rpm. The problem is exacerbated because of the dual fuel requirement. There are limitations on the range of powers at which duel fuel engines can operate efficiently on LNG with low pollution levels. Operational modelling for such a complex system should have been carried out at conceptual design stage to ensure the engines could meet the performance, economic and environmental requirements.

59. GAO-09-322 says this about new technologies and innovative designs:

> *According to commercial shipbuilders and buyers, new technologies are vetted through a similar process of extensive testing, modelling, and analysis. One buyer told us that among other considerations, a new technology has to earn its way*

onto a ship through the form of significant savings to operations and maintenance costs. However, despite the allure of innovative technologies within the competitive marketplace, if a novel technology cannot be matured to a level that provides the buyer and builder with confidence that it will not impede delivery of the ship and will perform as expected, it will be discarded to maximize the chances of program success. [GAO-09-322, page 17]

Leading commercial shipbuilders may test new technologies aboard existing ships prior to installing them on a new ship to validate the performance of the technologies in a lower-risk environment for both the buyer—since the existing ship has redundant systems—and the shipyard— since it will not accept responsibility for installing and integrating an untested prototype under a firm, fixed-price contract. Shipbuilders and larger ship buyers maintain an in-house or contracted capability to conduct technical research to evaluate the maturity and expected performance of new technologies during the pre-contract phase. [GAO-09-322, page 18]

60. These dual fuelled vessels were of an innovative design and required significant new technology. Many of the problems which have arisen post contract could and should have been investigated and resolved by CMAL prior to ITT - for example CMAL's decision, post-contract, to investigate two different propeller designs.

61. For both vessels, the Contract specifies a propeller of single design capable of optimum operation at two speeds. If CMAL wanted different propellers for vessels 801 and 802, this fundamental issue should have been decided during the conceptual design stage, before tender, rather than passing the burden of research and investigation on to FMEL which was committed to designing and building the two vessels within a relatively short contract period.

Classification society rules and regulations

62. The International Maritime Organization (IMO) requires all vessels under design and construction to comply with various standards.

63. The IMO requires a ship's design and construction to be approved by ship classification societies. These societies:

- establish and maintain standards for the construction and classification of ships and offshore structures;
- supervise construction in accordance with these standards; and
- carry out regular surveys of ships in service to ensure the compliance with these standards.

64. Box 8 on page 2 of the Contract specified Lloyd's Register of Shipping ("LR") as the preferred classification society.

65. LR had no specific rules for LNG fuelled vessels so hulls 801 and 802 were required to comply with procedures set out in LR's Assessment of Risk Based Design (ARBD) This was applicable to "novel or complex designs for which prescriptive rules and regulations do not currently apply".

66. LR had no previous experience with the classification of innovative LNG fuelled ferries and as a result the entire classification process stalled. Design decisions were made on an ad hoc basis often very late in the detailed design process to the detriment of progress. One example is crew access alongside the LNG fuel tanks.

67. At an ARBD group meeting FMEL was told that crew movements along the sides of the LNG tank to gain access would not be permitted. This was not a requirement of the rules but merely a decision of the ARBD group. As a consequence large areas of the upper decks had to be redesigned to permit access via hatches and side casings.

68. The vessels will operate in UK waters, so another important aspect of regulation is the need to gain UK Maritime Coastguard Agency (MCA) approval. This approval will be based upon a draft international standard and inevitably there are uncertainties as to how this will be interpreted by the MCA.

69. CMAL should have consulted with LR (its specified classification society) and MCA at the conceptual design stage. Design critical issues should have been identified and resolved then rather than on an ad hoc basis as the works proceeded.

70. GAO-09-322 describes some steps taken to mitigate risk in construction of a highly innovative vessel the Emma Maersk prior to contract award. The vessel required special grades of steel to that previously used for this class of ship.

> *The ship classification societies American Bureau of Shipping and Lloyd's Register were brought in to assist in the technical calculations of required steel grade and thickness and special class society approval was obtained.* [GAO-09-322, page 19]

71. The GAO-09-322 report continued at page 20:

> *In addition, the shipyard identified other lesser, but still important, concerns to resolve prior to contract signing, including (1) the need to identify the rules under which the ship would be classified because classification rules or requirements for a ship as large as Emma Maersk did not exist and (2) the design's ability to meet the desired speed, manoeuvring, and weight capacity requirements. Ultimately, two ship classification societies were brought into the project early to assist with the technological evaluations.*

72. CMAL has acknowledged the difficulties of the regulatory process in the United Kingdom. Its web site (http://www.cmassets.co.uk/project/100m-dual-fuel-ferries/) includes a project update at April 2017 [Appendix 2-002] in which CMAL says:

> *LNG fuelled ferries are not new to the marine industry but are new to the UK, new to CMAL, Calmac, Pot* (sic) *authorities, Regulatory Bodies and the public.*
>
> *Working with Class, Flag and Regulatory Authorities* [is necessary] *to understand all the requirements to build both vessels*.

73. Good international shipbuilding and marine practice (in the form of GAO-09-322) suggests that classification societies should have been introduced into the project early, at conceptual design stage.

74. CMAL failed to do this and the regulatory framework for this new class of vessel was being developed at the same time as it was being built. It is no surprise that the regulatory approval process stalled and long delays ensued.

75. Since this type of vessel was new to CMAL, it is not entirely clear when CMAL became aware that this was something new for the regulatory bodies too. However, CMAL must have been aware of this fact at conceptual design stage and should have done something about it. It defies belief that CMAL would commission the construction of a first in class vessel without being aware of such an important fact.

76. Many of the problems which FMEL suffered and which arose from classification society approvals could and should have been addressed and resolved at conceptual design stage. Under the Contract FMEL is not responsible for changes arising from LR and MCA rules and regulations or their application.

77. Similarly if CMAL wanted exemption from any of the applicable rules and regulations, this should have been sought early too. An example is the belting and pilot ladders. The belting is a protective bumper that runs around the outside of the vessel to prevent damage when mooring. The MCA rules require that where a pilot's ladder is fixed to the outside of the hull, there should be a gap in the belting.

78. On 16 September 2016 FMEL submitted its design in accordance with the specification and the MCA rules. CMAL instructed FMEL to look at the belting arrangements on another of its vessels, the *Hebrides* although the specification made no mention of this. CMAL said ideally it would prefer to have continuous belting with no break for the pilot ladders and instructed FMEL to check with the MCA to see if this was acceptable.

79. When FMEL reported that continuous belting would not be permitted by the MCA, even that was not enough for CMAL. It told FMEL that it now should look at the arrangement on yet another of its vessels, the *Lord of the Isle*. CMAL also asked "CFL" (Caledonian MacBrayne Limited) the operating company, to comment on the continuous belting. CFL supported the regulatory position adopted by the MCA and FMEL and said continuous belting would not be acceptable. Nevertheless it suggested that LR be contacted to see whether it might grant an exemption.

80. Tiring of this time wasting, FMEL re-submitted drawings for approval showing a break in the belting in the areas of the pilot ladders in compliance with the MCA rules and the specification. CMAL eventually approved these drawings, on 14 November 2018, two months after they were submitted. It took over two years to resolve this simple matter: a matter which CMAL should simply not have had to involve itself in at all. Full details of this matter can be found in part 3 of this claim.

81. To summarize, the conceptual design provided by CMAL was inadequately developed at ITT stage. Many fundamental issues should have been addressed prior to tender. To use the terminology of GAO-09-032, the "showstoppers" (principal risks) should have been "retired" (eliminated) but they were not.

> *By the time a leading commercial shipyard signs a contract to build a new ship, the builder and buyer have fully defined upon the ship concept, required performance and contract terms.* [GAO-09-032, page 21]

82. It is acknowledged that FMEL is responsible for design. However, as a result of the conceptual design inadequacies, FMEL found itself in the middle of something more akin to a research and development project rather than a conventional shipbuilding design and build contract. Technologies and standards which were new or innovative to the UK were being advanced as the works proceeded and this led to inevitable changes by CMAL, requirements by the classification bodies and in turn delays, disruption and additional cost.

DESIGN CHALLENGES ACKNOWLEDGED BY CMAL

83. CMAL has acknowledged that the design and construction of hulls 801 and 802 were particularly challenging. Its web site includes a project update at April 2017. [Appendix 2-002] The following is taken from that update under the heading "Design Challenges".

> 1. *The Increased deadweight and lightship weight requirements, yet only a small increase in the principal dimensions compared with the existing vessels on the routes, due to port limitations*
>
> 2. *Deadweight requirements, over 200 tonnes more than existing vessel*
>
> 3. *Equipment requirements: additional weight compared to existing vessels*
>
>   - *LNG Tank*
>   - *LNG Tank connection space*
>   - *additional hoistable car deck*
>   - *larger bow thrusters and stern thruster*
>   - *allowance for equipment for additional passengers*
>   - *allowance for additional passenger lifts*

84. Of course these were not the only design challenges in such an innovative and technically advanced vessel. Yet, despite these challenges, CMAL failed to adequately staff its team to deal with them. GAO-09-322 describes the usual role of the buyer's shipyard representatives.

> *Leading buyers we interviewed maintain in yard representatives to supervise construction and ensure the quality of the final product during ship construction. Buyer representatives usually have high levels of technical, design, production, and operations knowledge, and thus are capable of solving problems with the ship while it is being built.*

85. Although CMAL was well aware of the very significant challenges posed by this first in class vessel, it failed to employ representatives at the shipyard with "high levels of technical, design, production … knowledge" to deal with day to day issues as they arose, particularly in the context of a design build contract. This no doubt led to CMAL's unwarranted and unnecessary involvement in all aspects of the design process.

INTERFERENCE IN THE DESIGN PROCESS BY CMAL

86. Notwithstanding the inadequacies of the conceptual design, after contract award, simply put, the parties had to "live with it". FMEL should have been allowed to develop the

detailed design (based on the concept) and CMAL should have permitted FMEL to do this without interfering or hindering the process. It has been explained earlier that not only has FMEL the obligation to design, it has the right to do so, unhindered by CMAL.

87. On 26 September 2018, before the Rural Economy and Connectivity Committee of the Scottish Government, Kevin Hobbs (CEO, CMAL) has said that CMAL had "a team embedded in the yard". Whilst this might seem to be of benefit to the project, it has in fact been a hindrance.

88. It is common knowledge that some of CMAL's "embedded team" are ex- employees of FMEL. This has resulted in a breakdown of formal contractual boundaries with many day to day requests received by FMEL from the CMAL team. This has caused significant uncertainty and delay and disruption in the design process.

89. It is unfortunate that CMAL never seemed to truly grasp the concept of a design build contract and insisted upon meddling with the design. Not only has CMAL involved itself in design matters in which it had no real business, but where it has reviewed various designs, it has taken an unreasonably long time to do so and approve, and on many occasions even made further revisions thereafter.

90. The instances CMAL has interfered in the design process are detailed throughout this claim. Some have already been described above (for example the pilot's ladder and belting). Two further prime examples are given here. One relates to interfering in FMEL's right to design and the other the time taken to grant approvals to a submitted design issue.

Interference in FMEL's right to design

91. CMAL unjustifiably insisted that the standards of design and construction which should be followed are those used in another of CMAL's fleet, the Loch Seaforth.

92. There is absolutely no mention of such a requirement in the Contract Specification. FMEL's obligation was merely to comply with the standards set out in that Specification (to the extent that they were set out at all). CMAL's dogged adherence to the *Loch Seaforth* standard was a totally unjustified interference in FMEL's right to design as it saw fit within the parameters of the Specification and amounted to a change.

Delays in approval by CMAL

93. In March 2017 FMEL submitted drawings and specifications to CMAL for the lube oil purifiers. Only ten months later (in January 2018) did CMAL request technical handbooks from the manufacturers. It took a further ten months, until November 2018, for CMAL to form a view that the purifiers were oversized, despite having had the design information (since March 2017) and being involved in the selection process.

Summary of CMAL's interferences

94. In summary, occasions where CMAL has interfered in the design process are as follows. The list is not exhaustive. Details of each item and further examples can be found in part 3 of this claim.

- change of engine specification and hull draft 20% into the contract period

- instruction to investigate alternative propeller designs and failure to make a decision until 30% into the contract period (also see above)
- LNG bunkering layout (also see above)
- passenger numbers and deck layouts (also see above)
- freshwater tank
- belting and pilot's ladders (also see above)
- hazardous zones
- external windows
- the *Loch Seaforth* issue (also see above)
- lube oil purifiers (also see above)
- windows
- Panama eyes

95. GAO-09-322 describes the Buyer's role in the design approval process.

> *These firms* [leading buyers and shipbuilders] *stated that generally the owner does not review and approve all drawings, but the owner identifies at the outset the key drawings it will want to review. Further, the ship buyer typically has 10 to 15 days to review and approve a drawing.* [GAO-09-322, page 22]

96. CMAL has insisted in becoming involved in nearly every aspect of the detailed design. Whilst it undoubtedly has right of review and approval, this does not and should not extend to what has effectively become preference engineering on its part and should not hinder the progress of the works.

MODIFICATIONS AND CHANGES ACCEPTED IN PRINCIPLE BY CMAL

97. For hull 801 there have been 98 separate Variations to the Contract ("VTC"). The value of these is a little over £707,000. (A list of the VTC's is attached at Appendix 2-003.) There has similarly been 98 VTC's for hull 802 at a total cost of about £697,000.

98. The VTC's have been accepted in principle by CMAL. An example is the winch bollard. In an exchange of e mails between [redacted] (FMEL) and Jim Anderson (CMAL) on 29 May 2017 and 2 June 2017, agreement was made on changes to winch bollards (see Appendices 2-004 and 2-005).

99. [redacted] (FMEL) had provided a quotation for these works in the amount of £393,504 per vessel. Jim Anderson's reply was "please proceed with this change". Whilst Jim Anderson (CMAL) avoided the use of the word "agree", agreement was, as a matter of fact, reached and FMEL has been paid for these works.

100. CMAL has nevertheless refused to formalize the VTC's which have been agreed in principal. It has tried to use this refusal to its own advantage, by offering threats, ultimatums and intimidation. Some examples now follow.

101. On 17 October 2018 at 08:43 hrs Jim Anderson (CMAL) emailed [redacted] (FMEL) explaining why he refused to formally confirm agreement of the "change orders" [Appendix 2-006]

> *To avoid any misunderstanding, it is <u>not</u> that we will not confirm agreement of the change orders, it is that we <u>cannot</u> confirm the complete list until FMEL process the technical addendum, as you know it is over 2 years since the proposed addendum was issued by FMEL.* [emphasis as original]
>
> *When can you arrange for the contract addendum to be processed from your side?*
>
> *Best Regards,*
>
> *Jim*

102. The refusal to formalize the change orders until a contract addendum was signed is wholly unjustified.

103. Firstly, there is no contractual or legal requirement for such an approach. Secondly, the contract addendum prepared by CMAL did not reflect the agreement made between the Parties. An agreed Permissible Delay suddenly appeared in the addendum as a non-permissible delay. Under the circumstances, FMEL quite rightly refused to sign the addendum. (This is explained below and in part 3 of this claim.) Thirdly, CMAL's position (at least in regard to the winch bollard – see above) is ridiculous as CMAL has already paid FMEL for these works.

104. The likely reason why CMAL refused to formalize the changes was that it wanted to induce FMEL to withdraw requests for additional payment or use the formalization to leverage other concessions from FMEL.

105. FMEL had prepared and submitted to CMAL a list of VTC's in July 2017. It was met with hostility. On 7 July 2017 at 13:00 hrs Kevin Hobbs (CEO of CMAL) e mailed Gerry Marshall (CEO FMEL) [Appendix 2-007].

> *Gerry*
>
> *I have just spent the last hour with Jim Anderson in our offices discussing the meeting that he attended this morning with you and your team.*
>
> *I am absolutely astonished at the contents and I can barely believe that FMEL could even contemplate presenting CMAL with such a list with attached costs.*
>
> *I believe that Jim and [redacted] have made it abundantly clear that we will methodically go through this with a 'fine tooth comb" and prove without doubt that the vast majority of the items that you have listed a complete nonsense.*

I do not intend to share this with TS [Transport Scotland] *at this stage because the consequences would not bear thinking about. I suggest that you take a long and hard look at what you are saying and urgently review your thoughts and opinions, it is shambolic.*

As recently as yesterday you asked me 'how FMEL may stand in regard to future orders" and all I can say at this stage is that you do not need an answer from me or us in that regard as it is obvious.

If this is the way that either FMEL or CBC go about their business 'it speaks volumes".

Any business relationship relies upon mutual trust and understanding – this has been destroyed in one instant.

…

Best Regards,

Leis gach deagh dhùrachd,

Kevin Hobbs

106. FMEL is perfectly entitled to submit a list of changes for which it seeks payment and this should not elicit from CMAL hostility and veiled threats of exclusion from future contracts.

107. Gerry Marshall (FMEL) responded to Kevin Hobbs (CMAL) e mail above offering to go through the list with CMAL line by line. This did not appease CMAL. It merely elicited a further hostile e mail from Kevin Hobbs (CMAL) to Gerry Marshall (FMEL) at 15:04 hrs on 7 July 2017 [Appendix 2-008]. It said in part:

If you feel that this list stands then so be it but this will be escalated to our Board and Scottish Government on Monday morning.

You will have to live with the consequences of that and it will not be taken well.

108. A further e mail was sent by Kevin Hobbs (CMAL) to Gerry Marshall (FMEL) on 10 July 2017 at 09:04 hrs [Appendix 2-009].

Gerry

In continuation of our correspondence I have spoken to our Chairman (Erik Østergaard) , Transport Scotland and our Lawyers.

They are aware of the contents of the spreadsheet that you handed to Jim Anderson – this matter is not being taken lightly.

I request that you withdraw the Variation to Contract Sheet that was handed to Jim on Friday (7/7/17) by close of business today; that being 1700hrs.

In the event that this does not happen then we will hand this matter to our lawyers.

In the meantime we are methodically working through the list and preparing papers in relation to each element.

Best Regards,

Leis gach deagh dhùrachd,

Kevin Hobbs

109. It appears that rather than engaging in the conventional approach of discussing changes under the contract, CMAL preferred the use of ultimatums and the threat of the involvement of lawyers to try and persuade FMEL to withdraw the additional charges.

CHANGES IN THE SEQUENCE OF WORKS

110. The delay and disruption summarized above and described in detail later in this claim caused such delay and disruption that FMEL had to make two radical changes to the sequence of its works:

- hulls 801 and 802 had to be constructed consecutively rather than concurrently; and
- outfitting and block fabrication works to hull 801, which should have been carried out in the workshop or pre-launch were carried out post launch.

Concurrent construction of hulls 801 and 802

111. The Contractual Dates of Delivery of hulls 801 and 802 were 25 May 2018 and 26 July 2019 respectively. The only way that these dates could be met was to construct the vessels concurrently, side by side on the slipway.

112. The slipway at FMEL's yard is fairly narrow at the Clyde riverbank end which presented access problems, although these problems were not insurmountable. If the vessels were to be built concurrently, the blocks for each vessel had to be laid on the slipway and consolidated (for both vessels) from the stern. This meant that the stern blocks had to be designed and fabricated first.

113. The design of the stern blocks are heavily dependent upon the specification of the engines and in particular the propellers. It has been explained that there were long delays by CMAL in finalizing the design of these two elements of the works.

114. Had FMEL waited for the stern blocks to be designed and fabricated before consolidating the blocks, bearing in mind that the only way the vessels could be built concurrently was by starting from the stern, then there would have been extremely long delays to both vessels. In effect both hulls would have been virtually at a standstill until the stern blocks were ready (which was eventually in June 2017).

115. In view of this FMEL decided the most economic and appropriate course of action to mitigate delays, was to start building hull 801 from the mid-ship. These blocks were

thought to have the least risk of further design change by CMAL. Whilst this enabled work to be progressed, placing the mid-ship blocks for hull 801 created access problems in subsequently placing the stern blocks to 801 and 802. The concurrent construction of the two hulls effectively became impossible once the 801 midship blocks were placed on the slipway.

116. This major change in the sequence of working is fully explained in part 3 of this claim.

Outfitting and block fabrication works

117. Outfitting works comprise the installation of pipework, valves, cable trays, etc.

118. If good international shipbuilding and marine practice is to be followed, and this is an express requirement of the contract, then outfitting works should be carried out in the workshop at block fabrication stage. This is known as advance outfitting. It depends on equipment specifications and layouts, and pipework and other system routes being well defined at an early stage.

119. FMEL was prevented from carrying out advanced outfitting as a result of CMAL's failure to "retire all major risks" before award of the contract and its ongoing interference in the design process. CMAL failed to bring the conceptual design to a reasonable standard of completion such that advance outfitting could be carried out and continued to request changes and modifications after contract award. For example:

- A large number of important tanks and spaces below the main deck were not shown in the conceptual design. These areas were the very locations where a large amount of outfitting needed to be designed and installed.
- The selection of the engine was not made until 26 April 2016, by which time 20% of the contract period had elapsed. There are numerous systems which serve the engines and these systems involve a considerable amount of outfitting.
- CMAL insisted on investigating alternative propeller designs. It never chose a propeller until 2 August 2016, one third of the way through the contract period. The propellers and associated gear boxes are also fed by a number of systems which again involve substantial outfitting.
- Bunkering arrangements were not finalized by CMAL until mid-2016. The routing of the cryogenic pipe which feeds the LNG tank has (in October 2018) only recently been agreed by CMAL. There are design restrictions associated with this type of pipe – for example, bends must be kept to a minimum. This has meant that other system pipes must be carefully designed to accommodate the cryogenic pipe layout.

120. As a consequence of the above delays, advance outfitting which should have been carried out at block fabrication stage had to be carried out on the slipway or after launch.

121. GAO-09-322 describes the internationally recognized "1-3-8 rule" whereby work that takes 1 hour to complete in a workshop, takes 3 hours on the slipway and 8 hours after launch. The additional time taken to undertake outfitting outside of the workshop (i.e. out

of sequence) caused considerable delay and disruption to FMEL. This is described fully in part 3 of this claim.

CMAL'S STATED POSITION ON DELAYS AND ADDITIONAL COST

122. CMAL's stated position is that all additional costs and delays are attributable to FMEL.

123. On 26 September 2018 Kevin Hobbs and Jim Anderson, who are CEO and a director of CMAL respectively, appeared before the Rural Economy and Connectivity Committee of the Scottish Government. They were asked various questions about the contracts for hull 801 and 802. The answers which CMAL provided are illuminating.

124. Jim Anderson was asked about design changes and cost over-runs.

Colin Smyth, MSP:

... why has there been a need to significantly change the design?

Jim Anderson, CMAL:

There has been no significant changes in the design, that is clear.

Colin Smyth, MSP:

So why has the cost increased and why are there delays ?

Jim Anderson, CMAL:

You will have to ask Fergusons.

Colin Smyth, MSP:

... and none of the cost over runs has anything to do with the design?

Jim Anderson, CMAL:

None what so ever

125. Kevin Hobbs (FMEL) was asked about the likely final cost and who was responsible for over-runs.

Jamie Greene, MSP:

... and do you know what the final cost of the delivery of these two vessels might be as the customer and who is liable for the over runs?

Kevin Hobbs, CMAL:

... because we have a team embedded at the yard anyway we knew well in advance that things were not going according to plan.

> *I think we need to be very clear on the type of contract which we tendered for and eventually signed – it was a design and build contract, number 1 - and number 2, it was a fixed price.*
>
> *They signed up to that contract knowingly and willingly and as far as we are concerned £97M is what we have to pay.* [£97M is the original Contract Price for both vessels 801 and 802].

126. It is evident that CMAL's view is that this is a design and build contract, there have been no changes which are to the account of CMAL and that FMEL is not entitled to be paid any more than the original Contract Price.

Additional costs

127. CMAL's stated position is untenable. It is difficult to understand why Kevin Hobbs should say that it has no obligation to pay more than the Contract Price when over £700,000 of changes have been instructed and approved in principle by CMAL on hull 801 (with a not too dissimilar amount on hull 802). Some £393,000 has already been paid by CMAL for the changes to the winch bollard.

128. Jim Anderson says there have been "no significant changes" which of course is a matter of subjectivity. However, to suggest the sum of £393,000 for a single change is "not significant" would seem to be somewhat stretching the limits of credibility.

129. Regardless of whether these changes are significant or not, the bigger issues are the fundamental design matters which have been described in this overview: the late decision on the main engines and the draft; the three months wasted on investigating different propeller designs; issues with the LNG tanks; the passenger numbers; the ducktail, etc.

130. It is simply incorrect that FMEL is not entitled to payment of any more than the original Contract Sum.

Delays

131. CMAL's position in regard to delays is again wrong. In response to a question from Colin Smyth, MSP as to why the cost has increased and why are there delays, Jim Anderson answered "you will have to ask Fergusons". This is a surprising answer from CMAL, a company which had its own team "embedded at the yard" and who "knew well in advance that things were not going according to plan".

132. Jim Anderson has also overlooked the Permissible Delays that he personally sanctioned. Part 3 of this claim includes a series of e mails in relation to delays arising from the change in engine specification. In response to a request for confirmation of agreement to a 35 day Permissible Delay, Jim Anderson wrote (on 29 April 2016 at 17:11 hrs] "we confirm our agreement".

133. For reasons best known to CMAL, it subsequently tried to renege on that agreement.

134. CMAL's current position in regard to delay appears to be that FMEL is not entitled to a single day Permissible Delay. In view of the many acts and omissions described in this claim, that position is clearly incorrect.

CONCLUSION

135. This overview has set out the difficulties which FMEL has faced in constructing hull 801 (and to a degree, hull 802).

136. Firstly, the conceptual design was inadequately prepared. FMEL is obliged to follow good international shipbuilding and marine practices. It was starting from a greatly disadvantaged position when the standards it had to meet were not being adopted by CMAL in the preparation of its conceptual design.

137. Secondly, FMEL has not only an obligation to design but a right to do so. FMEL should have had free reign to develop the inadequate conceptual design within the parameters of the specification and regulations as it saw fit, but CMAL has interfered in the process. It has involved itself in matters when it had no right to do so, engaged in preferential engineering and it has taken an unreasonably long time to undertake reviews and grant approvals.

138. Thirdly, despite CMAL's denial, there have been many changes to the contract. The selection of the engines and the hull draft were very major changes instructed some 20% of the way into the contract. There are also nearly 100 variations to the contract (VTC's) which have been agreed in principal by CMAL (although CMAL has issued threats and ultimatums in an effort to get them withdrawn). CMAL overlooked all of these matters when it appeared before the Rural Economy and Connectivity Committee of the Scottish Government.

139. All of these matters have caused delay and disruption and as a consequence FMEL has had to change its sequence of working. The Contractual Date(s) of Delivery have been very badly delayed and FMEL has incurred considerable additional expense which it is entitled to recover. The remainder of this claim sets out in detail the issues which have been summarized in this overview.

PART 3 – DELAY AND DISRUPTION

GENERAL APPROACH TO ASSESSMENT OF DELAY

INTRODUCTION

1. This is a claim for additional payment. A portion of the amounts claimed are in the form of delay costs. Hence it is necessary to identify the delays and the periods of those delays for which CMAL is responsible.

2. This part of the claim will identify the baseline programme and the dates by which various parts of the works should have been completed to meet the Contractual Date of Delivery. It will explain the source of as built data, the method of delay analysis and the periods in which the analyses have been carried out.

3. The specific periods of delay for which CMAL is responsible are analysed later within this part of the claim.

THE BASELINE PROGRAMME

4. Delay is relative. It must be measured against some objective baseline. Customarily this baseline is the as planned programme.

5. Project Meeting No 2 [Appendix 3 - 001] on 12 January 2016 records the following:

- Cardinal Date Program

  The provisional Cardinal Dates Programmes for Ships 801 & 802 were issued on 12-Jan-2016. These show initial Milestones of 10% Fabrication complete in April and 25% complete in June. CMAL questioned FMEL's ability to meet these targets, in addition to peak volume during the 2016 Festive Season.

  Andrew Duncan clarified that the payment milestones are "not before dates" and that the trigger for payment is achieving the requirements of the milestone, not the date.

6. The programme for hull 801 issued on 12 January 2016 [Appendix 3 - 002] was called "100m CMAL Boat 1 Cardinal Dates Programme", dated 7 January 2016. With the exception of one milestone (13), this programme ("the baseline programme") complied with the Contract Milestones (for construction activities) as described in clause 50 of the Contract.

	Milestone	*Contract*	*Baseline*
3	Cutting of steel	15 Dec 15	15 Dec 15
5	10% fabrication	18 Apr 16	18 Apr 16
6	25 % fabrication	14 Jun 16	14 Jun 16
7	35% fabrication	15 Aug 16	15 Aug 16

	Milestone	Contract	Baseline
8	50% fabrication	14 Oct 16	14 Oct 16
10	75% fabrication	15 Dec 16	15 Dec 16
11	100% fabrication	16 Jan17	16 Jan17
12	Berth join up	14 Mar 17	14 Mar 17
13	Hull Inspection prior to paint	17 Apr 17	27 Mar 17
14	Launch	14 Aug 17	14 Aug 17
15	Delivery	25 May 18	25 May 18

7. The minutes of Project Meeting No 2 [Appendix 3 - 001] record CMAL's reservations as to whether the 10% and 25% fabrication milestones could be met. These are essentially payment milestones and in any event (and as recorded) they are "not before" dates.

8. It is acknowledged that the Cardinal Dates Programme is not a detailed construction programme.

9. Despite the absence of a detailed baseline programme, it is not unreasonable to conclude that if the Contractual Date of Delivery (25 May 2018) was to be met, then:

   - berth join up (or consolidation of blocks) must be completed by 14 March 2017; and
   - launch must occur by 14 August 2017

10. The above dates have been taken from the baseline programme.

11. On 22 May 2017 the Parties entered into Addendum No 2 to the Contract. It dealt *solely* with payment and set down certain revised dates by which instalments were to "become individually due and payable in consideration of achieving certain progress milestones".

12. The payment milestone for berth join up was originally 14 March 2017 but was revised in the Addendum to 15 August 2017. Launch was originally 14 August 2017 but amended to 24 August 2017.

13. This Addendum was signed on 22 May 2017. At that time the works had already suffered significant delay and the Addendum to some extent reflected those delays. Nevertheless, it does not reflect the full extent of the delays. The milestones merely reflect payment dates in the same manner as described in Project Meeting No 2 – see above. They are "not before dates". Clearly, CMAL would not have paid (and did not pay) FMEL on the dates stated in the Addendum if the works had not been completed by those dates.

AS BUILT DATES

14. As built dates have been taken from:

- contemporary documents identified in the narrative of this claim; and
- dates recorded in the Primavera update programme with a data date of 31 July 2018.

THE METHOD OF DELAY ANALYSIS

15. The baseline programme was prepared in Microsoft Project. Leaving aside the inherent flaws in this software, the programme comprised only 59 lines/activities, showing what were effectively summary bars. Consequently it is not possible to distil from this programme a conventional logic linked critical path.

16. Nevertheless, although unhelpful for the most rigorous forms of delay analysis, it does not preclude some form of analysis being carried out.

17. In *City Inn Limited v Shepherd Construction Limited, 2007 (ScotCS CSOH 190)* Lord Drummond Young addressed a situation where a properly logic linked programme was not available thereby preventing a reliable form of critical path analysis from being carried out . He said (at paragraph 29):

> *In my opinion the pursuers clearly went too far in suggesting that an expert could only give a meaningful opinion on the basis of an as-built critical path analysis.*
>
> *...*
>
> *That seems to me to invalidate the use of an as-built critical path analysis to discover after the event where the critical path lay, at least in a case where full electronic records are not available from the contractor. That does not invalidate the use of a critical path analysis as a planning tool, but that is a different matter, because it is being used then for an entirely different purpose. Consequently I think it necessary to revert to the methods that were in use before computer software came to be used extensively in the programming of complex construction contracts. That is essentially what Mr Whitaker did in his evidence. Those older methods are still plainly valid, and if computer-based techniques cannot be used accurately there is no alternative to using older, non-computer-based techniques.*

18. What then are "older non-computer based techniques" ? The Society of Construction Law (UK) has produced a Delay and Disruption Protocol, Second Edition, February 2017 (the "SCL Protocol"). This widely accepted Protocol describes various methods of delay analysis. After making the point that analysis of delay depends on various factors, including the "nature, extent and quality of the programme information available", it goes on to say (at paragraph 1.4 (c) on page 33):

> *Critical path analysis is not limited to analysis conducted through the use of specialist programming software. While such software can provide a powerful analytical tool, the critical path to completion may on occasion be more reliably established through a practical analysis of the relevant facts or by analysis of production and/or resource data.*

19. One of the accepted methods of assessing delay in the SCL Protocol is the "as planned v as built windows analysis". It is described as follows:

The as-planned versus as-built windows analysis method is the second of the 'windows' analysis methods. As distinct from a time slice analysis, it is less reliant on programming software and usually applied when there is concern over the validity or reasonableness of the baseline programme and/or contemporaneously updated programmes and/or where there are too few contemporaneously updated programmes. In this method, the duration of the works is broken down into windows.

***Those windows are framed** by revised contemporaneous programmes, contemporaneously updated programmes, milestones or **significant events**. The analyst determines the contemporaneous **or actual critical path in each window by a common-sense and practical analysis of the available facts**. As this task does not substantially rely on programming software, it is important that the analyst sets out the rationale and reasoning by which criticality has been determined. The incidence and extent of critical delay in each window is then determined by comparing key dates along the contemporaneous or actual critical path against corresponding planned dates in the baseline programme. Thereafter, the analyst investigates the project records to determine what delay events might have caused the identified critical delay. The critical delay incurred and the mitigation or acceleration achieved in each window is accumulated to identify critical delay over the duration of the works.* [emphasis added]

20. In this instance the baseline programme is not detailed, nor is it a logic linked network which would permit some form of analysis in which the critical path is determined by the software. Furthermore until mid-2017 there were no contemporaneous update programmes which could reliably be used for analysis. Under the circumstances the critical paths have had to be determined by a common sense approach.

21. "Windows" have been selected at the following points.

Window 1	16 October 2015	Date of Contract
	27 April 2016	On this date CMAL reached a significant degree of certainty on the design parameters of the hull and the specifications of the engines and agreed a Permissible Delay.
Window 2	27 April 16	
	21 November 2017	On this date the hull was launched and it was just 6 days after the last of the steel hull blocks were consolidated or joined up.
Window 3	21 November 2017	
	21 June 2019	Forecast Date of Delivery taken from the 28 June 2018 cardinal dates programme

22. There are long delays to the Contractual Dates of Delivery for hulls 801 and 802. FMEL recognizes that not all of these delays are the responsibility of CMAL.

23. The parts of the claim which follow show the delays for which FMEL hold CMAL responsible.

WINDOW 1: 16 OCTOBER 2015 TO 27 APRIL 2016

INTRODUCTION

1. This part of the claim deals with delays and disruption in window 1 as follows:

Window 1	16 October 2015	Date of Contract
	27 April 2016	On this date CMAL reached a significant degree of certainty on the design parameters of the hull and the specifications of the engines and agreed a Permissible Delay.

2. At the date of the Contract (16 October 2015) the choice of main engines had yet to be finally decided. Clause 49 of the Contract anticipated a change and provided a mechanism for subsequently implementing that change by an Addendum to the Contract.

3. In addition, during the early part of the works there were problems incorporating all CMAL's specified requirements within the design parameters of the hull and achieving the necessary stability. Eventually the draft of the hull was increased from 3.40m to 3.45m.

4. There is little need to dwell on the details of the changes to main engines and the hull draft, since the Parties agreed the time consequences of those changes – i.e. a Permissible Delay of 35 days. This part of the claim will explain that agreement and why a formal Contract Amendment was not finalized.

THE 27 APRIL 2016 MEETING BETWEEN CMAL AND FMEL

5. On 27 April 2016 a meeting was held between:

- Jim Anderson – CMAL Director of Vessels
- [redacted] – FMEL [redacted]
- [redacted] – FMEL [redacted]

6. Jim Anderson recorded and circulated notes of the meeting to various parties. [e mail 27 April 2016, 18:50 hrs] [Appendix 3 - 003]

7. The headnote to the recorded minutes said:

> *I have listed below my recap of the meeting held this morning 27 April 20016 (sic) to discuss the required contract amendments from 2 Wartsila 8L 34DF main engines to 2 x Wartsila 6L 34DF main engines.*

8. In fact the "required contract amendments" were not limited to the change in engine specification. The minutes also dealt with the hull draft increase from 3.40m to 3.45m as follows:

NEWBUILDCON	Original	Proposed Change
Box 4A Main Dimensions		
(iv) Mean draft in salt water (m)	3.4	3.45

9. At the foot of the meeting note is recorded the following:

> *Schedule*
>
> *35 day extension to programme. Please advise new schedule and milestone details and suggested change to newbuildcon.*

10. [redacted] (FMEL) responded to Jim Anderson's e mail of 27 April 2016 the next day. [e mail 28 April 2016, 13:35 hrs] [Appendix 3 - 004]

> *Hi Jim,*
>
> *We confirm technical information as per the minutes is our understanding.*
>
> *The extension would be 60 days on both vessels and this would impact all current milestones as written in the newbuilding contract.*
>
> *We agree to further discuss possible price reduction for the engines.*
>
> *We await confirmation from the lawyer on the boundaries of the refund guarantee.*
>
> *Br*
>
> [redacted]

11. There were evidently further discussions between [redacted] and Jim Anderson because the following day [redacted] (FMEL) wrote to Jim Anderson (CMAL). [e mail 29 April 2016, 16:59 hrs] [Appendix 3 - 005]

> *Hi Jim,*
>
> *As per our discussions* ***and agreement****, FMEL can confirm the following;*
>
> *We have informed Wartsila to proceed with the 2 x 6L34DF main engines.*
>
> *We agree to the* ***35 day permissible delay****.*
>
> *We agree to an increase in credit to CMAL of £175,000 per ship*
>
> ***Please confirm your agreement to above****.*
>
> *Br*
>
> [redacted] [emphasis added]

12. This elicited a response from Jim Anderson (CMAL) some ten minutes later [e mail 29 April 2016, 17:11 hrs] [Appendix 3 - 006]

> [redacted]
>
> *Thanks for confirmation,* ***we confirm our agreement****.*
>
> *If you can send updated milestones next week that will be great.*
>
> *Everyone have a great weekend,*
>
> *Jim* [emphasis added]

13. The Parties had clearly reached agreement to a 35 day Permissible Delay. Clause 49 of the Contract then required an appropriate Addendum to the Contract to be prepared.

DRAFT CONTRACT ADDENDUM 3

14. On 4 May 2016 CMAL prepared and sent in draft form a proposed Addendum to the Contract [email 4 May 2016, 07:47 hrs] [Appendix 3 - 007]. Subsequent drafts passed between the Parties culminating in Addendum 3 which FMEL has declined to sign as it does not properly reflect the agreement made between [redacted] and Jim Anderson described in the emails above. Furthermore, other discussions overtook events such that the Addendum was no longer fully relevant.

15. Addendum 3 dealt with the specification of the main engines and increased draft to the hull. There is little need to comment further on these matters in this claim. However, it also purported to deal with the agreed 35 day Permissible Delay.

16. Clause 13 *of the Contract* deals with late delivery for ***non-permissible delays*** as follows:

> *If delivery takes place more than 45 days after the Delivery Date then for each day thereafter the Contract Price shall be reduced by the amount stated in Box 18(i)(a) per day and if the Builder has not given the Buyer no less than 45 days' notice in writing of the date on which the Vessel is to be delivered to the Buyer in terms of clause 28, in addition to the amount stated in Box 18(i)(b) per day as liquidated damages up to a maximum period of 120 days (comprising a 45 day grace period plus 75 days).*

17. Clause 1.2 *of the draft Contract Addendum 3* described an amendment to clause 13 of the Contract. It proposed increasing the 45 day grace period for late delivery by 35 days to 80 days. This did not reflect the agreement between [redacted] and Jim Anderson. Clause 13 of the Contract deals with *non-permissible delays*, whereas the agreement between [redacted] and Anderson was on the basis of *Permissible Delays*. For this reason (amongst others) FMEL declined to sign the Contract Addendum.

18. Despite the clear and unambiguous agreement to a 35 day Permissible Delay, CMAL continued to assert that the delay was non–permissible. In its unreferenced letter of 13 July 2017, CMAL says (at the foot of page 2 of the Appendix to the letter):

> *End of April 2016, Engine ratings confirmed. CMAL agreed to accept the reduced deadweight and* ***generously extended the number of days for non-permissible days*** *(sic) from 45 days to 80 days to assist FMEL in the project.* [emphasis added]

19. Presumably CMAL meant non-permissible "delays" rather than non-permissible "days".

20. CMAL's actions were far from "generous" since it misrepresented the agreement made between [redacted] and Jim Anderson. The agreed 35 day Permissible Delay recognized an entitlement under the Contract. It was not merely "to assist FMEL in the project".

21. Furthermore, in representing the delay as a Non-Permissible Delay, CMAL denied FMEL's rights to recover its costs arising from that delay.

Back to Contents Page

22. The changes to the main engines were anticipated and provision made under clause 49 of the Contract. This explains that the change shall be treated as a Modification under clause 24 (Modifications and Changes) and clause 24 expressly provides for an adjustment to the Contract Price. Such an adjustment must necessarily include for the cost of the 35 day delay.

CONCLUSION

23. At the expiry of the first window, on 27 April 2016, FMEL's position is clear. It had suffered an actual and Permissible Delay of 35 days. On 29 April 2016 this was agreed by [redacted] on behalf of CMAL. FMEL is therefore entitled to recover its delay costs for that 35 day delay. These costs are set out in the Monetary claims parts of this claim.

WINDOW 2: 27 APRIL 2016 TO 21 NOVEMBER 2017

INTRODUCTION

1. This part of the claim deals with delays in window 2 as follows:

Window 2	27 April 16	[end of window 1]
	21 November 2017	On this date the hull was launched and it was just 6 days after the last of the steel hull blocks were consolidated or joined up.

2. The narrative will explain that the critical works up to launch were the fabrication and consolidation of blocks and that those blocks to the bow and stern of the hull were delayed as a result of CMAL's vacillation over the propeller design.

3. The propeller design is of fundamental importance. Until the hull form is substantially agreed, it is not possible to start designing the propeller. Model and tank tests then enable the propeller design to be refined to achieve the specified speed(s). This in turn may result in amendments to the lines of the hull, particularly at the bow and stern. In simple terms the bow and stern blocks cannot be designed and fabricated until the propeller design is finalized.

4. The Permissible Delays which FMEL have incurred in this window have been analysed in two parts as follows:

   - delays in finalizing the propeller design by CMAL: **98 days**
   - delays arising from availability of testing tank - caused by delays in finalizing propeller design (14 days) and delays arising from CMAL's failure to promptly decide upon the ducktail to 801 (48 days): **62 days**

5. Within this window FMEL has incurred Permissible Delays of 160 days. In window 1, a Permissible Delay of 35 days was agreed. The total Permissible Delay at the close of window 2 is therefore 195 days.

6. The Cardinal Dates Programme and the payment milestones refer to block "join ups". The later Primavera programmes (which are relied upon in this part of the claim for as built data) refer to block "consolidation". The terms are synonymous.

7. Model tests were carried out by FMEL's consultant Schiffbautechnische Versuchsanstalt in Wien GmbH - Vienna Model Basin Limited ("SVA").

8. The propeller was designed by Wartsila Netherlands B.V. ("Wartsila") a subcontractor and consultant to FMEL.

9. Alnacon carried out final refinements to the hull design (production fairing) after completion of the open water tank tests as a prelude to the preparation of steel fabrication production drawings.

10. Vera Navis Lda, a Portuguese marine design office, provided the production drawings on behalf of FMEL.

THE CRITICAL PATH IN WINDOW 2

11. It has been explained earlier that the method of delay analysis used in this claim is an as planned v as built windows analysis. This is recognized in the SCL Protocol and is reliant upon determining the "actual critical path in each window by a common sense and practical analysis of the available facts".

12. Window 2 concludes on the launch date. Launch cannot take place until the steel hull is substantially complete and entirely watertight. It therefore follows that in all probability the fabrication and consolidation of the steel hull blocks must have been critical throughout this window.

13. Below is a table showing the dates that the consolidation of the steel blocks finished. For the sake of completeness the works to the inside of the hull to accommodate the car deck fixings are shown in italics. These did not affect launch of the vessel.

Block	*Consolidation*			
	Start	*Units*	*Finish*	*Units*
1	19-Jun-17	Units 82, 83, 84	18-Aug-17	Units 82 - 86, excluding poppets
2	2-May-17	Unit 76	11-Aug-17	Units 77-81
3	2-Apr-17	Units, 68, 69	18-Aug-17	Units 70, 71, 72
4	15-Mar-17	Units 60, 61	6-Sep-17	Units 62, 63, 64
			19-Nov-17	*Units 65,66,67 rev B*
5	15-Aug-16	Units 52 - 56	14-Jul-17	Units 57, 58, 59
			19-Nov-17	*Units 57, 58, 59 rev*
6	15-Aug-16	Units 1 - 5	8-Apr-17	Units 6, 7, 8
			19-Nov-17	*Units 6, 7, 8 rev*
7	15-Aug-16	Units 9 - 13	6-May-17	Units 14, 15, 16
			19-Nov-17	*Units 14, 15, 16 rev*
8	22-Aug-16	Units 17 - 21	3-Jun-17	Units 22, 23, 24
			19-Nov-17	*Units 22, 23, 24 rev B*
9	19-Dec-16	Units 25, 26	17-Jun-17	Units 30, 31, 32
			19-Nov-17	*Units 30, 31, 32 rev B*
10	31-Oct-16	Units 33, 34	20-Oct-17	Units 38, 39, 40
11	8-May-17	Units 41, 42	13-Oct-17	Units 45, 46, 47
12	**14-Aug-17**	**Unit 48**	**15-Nov-17**	**Units 49, 50, 51**

14. Block 12 was the last to be consolidated, finishing only 6 days before launch. Figure 3-1 below shows as built fabrication and consolidation of block 12 [Appendix 3 - 008].

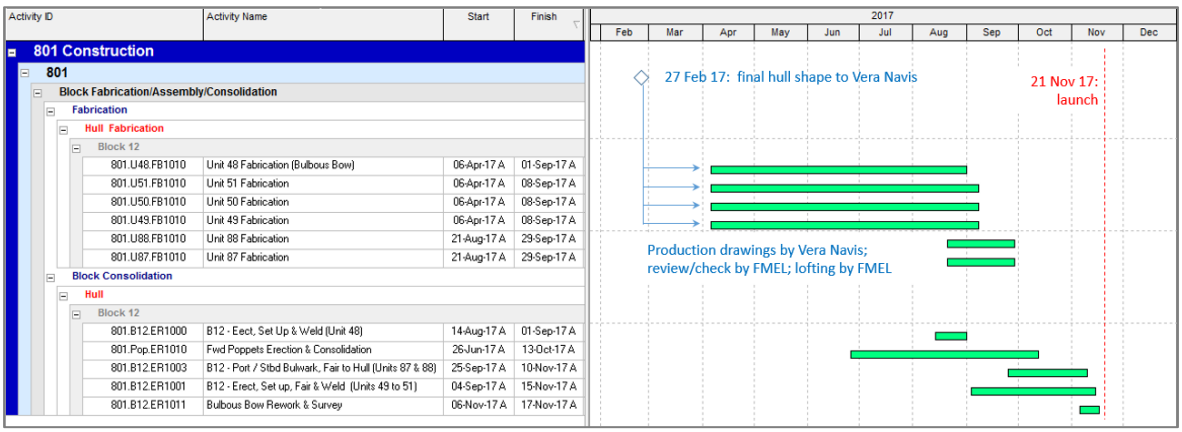


figure 3-1 as built fabrication and consolidation of block 12 units

15. The continuous and traceable chain of events from the start of window 2 through to fabrication of block 12 unit 48 are described in detail in the narrative which follows. It starts with FMEL awaiting a choice of propeller from CMAL and then moves through the subsequent detailed design, testing and final design processes before the final lines of the hull could be determined, and in particular those to block 12. This then is most probably the critical path through window 2.

16. The narrative which follows can conveniently be explained under the following headings:

- the position at 27 April 2016
- critical delays arising from finalizing the propeller design by CMAL
- critical delays arising from tank tests and further design amendments

THE POSITION AT 27 APRIL 2016

17. It has been explained (under window 1) that at 27 April 2016 CMAL decided on the engine specification and an increased draft for the hull which resulted in a 35 day Permissible Delay.

18. In an effort to mitigate delay, on 3 February 2016, FMEL commissioned a computational fluid dynamic (CFD) test to be carried out. It was based on the later revised engine and hull draft because it was anticipated that CMAL would agree to those revisions, as in fact it subsequently did.

19. A CFD test aims to reproduce theoretically the flow around the vessel. It provides key information about the forces acting on the vessel, its motions, power consumption and hydrodynamic performance in general. Once this test is complete, the first model test can be arranged from which the required thrust can be determined.

20. SVA carried out a CFD test (reference 2684/3) on hull design revisions L and M and a report on the results of this was received by FMEL on 27 April 2016 [Appendix 3 - 009].

DELAYS ARISING FROM FINALIZING THE PROPELLER DESIGN BY CMAL

21. In the early months of 2016, neither the engine or the hull form had been finalized. (They were not in fact finalized until 27 April 2016.) The design of the propeller could not be started until CMAL made decisions on these matters. However, even in February 2016 (some two months before the engine and hull form were resolved) CMAL was considering different propeller designs for each of 801 and 802 (see minutes of Project Meeting No 3 of 11 February 2016). This option, if instructed, would mean that 801 and 802 would no longer be identical vessels. The engines would have different rpm's and different gearboxes in addition to the different propellers.

22. A decision from CMAL on the propeller was urgently needed. Project Meeting No 6 of 28 April 2016 [Appendix 3 – 010] records under minute 4:

> *4. Powering*
>
> - *CMAL to respond by 29-Apr-16*

23. On 29 April 2016 [redacted] (FMEL) explained to [redacted] (Wartsila) the design solutions FMEL was seeking from Wartsila. [e mail 29 April 2016, 09:37 hrs]

> *Contractually we are obliged to deliver 16.5 knots, including 15% sea margin, this is looking to be around 2522kW per shaft. We are also contractually obliged to design the propeller to operate at 14.5 knots, 100%rpm, and this looks to be 1504kW, although in normal service at a normal lighter draught and less sea margin, 14.5 knots will occur with significantly less than 1500kW per shaft.*

24. In order to achieve these contractual requirements, there were acknowledged reductions in efficiency. This (contractually required) propeller was subsequently called the "intermediate propeller" by Wartsila – see Wartsila's report of 23 June 2016 (below).

25. [redacted]'s e mail of 29 April 2016 continued by explaining CMAL's oral request for two other optional propeller designs: one to achieve 14.5 knots (for hull 801) and one two achieve 16.5 knots (for hull 802).

> *We have previously discussed whether we deliver different propeller geometry for the 2 ships:*
>
> *Ship A: Normally operating at 14.5 knots but capable of 16.5 knots for 2 weeks/yr. Prop Optimised towards 14.5 knots*
>
> *Ship B: Normally operating at 16.5 knots but capable of 14.5 knots for 2 weeks/yr. Prop Optimised towards 16.5 knots, but also capable of boost power up to 3500kW per shaft.*

26. At this point, had CMAL not been considering alternative propeller designs, FMEL would have proceeded with those works it was contractually obliged to carry out:

- finalizing the detailed design of the propeller
- building a scaled down model of the hull and propeller

- carrying out tank tests and prepare reports
- refining the hull design based on the tank test results
- preparing production drawings.

27. Unfortunately, the next few months were to be wasted whilst FMEL arranged for the design and testing of the alternative propellers requested by CMAL. Ironically at the end of the process, CMAL selected a propeller fundamentally the same as that which would originally have been used.

28. On 6 May 2016 Jim Anderson (CMAL) confirmed in writing to [redacted] (FMEL) the need for two optional propeller designs. [e mail 6 May 2016, 14:56 hrs] [Appendix 3 - 011]

> *Is there an option to optimise the propeller design for one ship at 14.5 knots and the other ship at 16.5 knots. If yes, how would the 14.5 knots optimised propeller perform at 16.5 knots?*

29. Following completion of the model, SVA's first available dates for tank tests were 23 May and 27 May 2016.

30. On 17 June 2016, SVA issued its report 2684/04 [Appendix 3 - 012] based on the tank test for hull designs N and O. These were essentially the same hull designs as L and M which formed the basis of SVA's test report 2684/03 of 27 April 2016 [Appendix 3 - 009].

31. The 2684/03 report was based on the CFD computer modelling, whereas the 2684/04 report relied on tank testing with the use of a stock propeller. Once the thrust could be determined from the use of a stock propeller this provided sufficient information for Wartsila to proceed with the detailed design for the intermediate and two optional propellers.

32. The 2684/04 report was dated 17 June 2016. However Wartsila was given an earlier preliminary copy such that it was able to mitigate delay and prepare its own report for the three propeller designs by 23 June 2016 [Appendix 3 - 013]. Wartsila's report described the three options at paragraph 2.5 as follows:

1. 14.5 knots propeller design
   This design is for the vessel (ship A) which will mainly be operated at 14.5 knots and occasionally need to go up to 16.5 knots. The booster mode is not taken into account into the design.

2. 16.5 knots propeller design
   This design is for the vessel (ship B) which will mainly be operated at 16.5 knots and can be used with the booster up to 3500 kW. This design also has to be operated occasionally at 14.5 knots.

3. Intermediate propeller design
   This design should be suitable for both vessels, meaning that it will be designed as a compromise between the 14.5 and 16.5 condition. The design should also be able to be used with the booster up to 3500 kW.

33. The speed/power predictions were set down under paragraph 3.2 of Wartsila's report.

		14.5 knots propeller design	16.5 knots propeller design		Intermediate propeller design	
Required power at 14.5 knots, trial condition	[kW]	1148	1280	*11.5%*	1224	*6.6%*
Required power at 16.5 knots, trial condition	[kW]	2247	2196	*-2.3%*	2196	*-2.3%*
Maximum vessel speed at 3500 kW power	[knots]	17.28	17.42	-	17.36	-

As can be seen in the table and the graph of appendix D, the 14.5 knots propeller design has the lowest power for the 14.5 knots condition. Both the 16.5 knots design and the intermediate propeller design have a significant higher power in this condition. The main reasons for this are the higher propeller speeds at which they are operating and the significantly higher blade area ratio of these designs.

34. In summary, this then (above) was the various propeller designs from which CMAL wanted to choose.

35. Paragraph 5 of Wartsila's report set down its conclusions and recommendations. It contained this qualification:

> *It has to be noticed that all designs are preliminary but give a clear impression of what can be expected from the designs. More detailed design work has to be done to fine tune the designs and check more in detail the propeller strength and hub calculations.*

36. Wartsila's report was sent by [redacted] to [redacted] (FMEL) on 24 June 2016 at 09:10 hrs [Appendix 3 – 014]. The email alerted FMEL of the prospect of additional cost and delay. It said:

> *Please find attached the Propeller design study as promised. We hope it will provide you with sufficient information on the decision of the design(s) to be used.*
>
> *Please note that the current contract is based on the intermediate solution, if chosen for 2 different designs, it will have financial consequences, which we unfortunately don't have present yet. This is due to (but not limited to): additional engineering, classification costs, elimination of production series effect.*
>
> *Next to this* ***we've to highlight the design decision is effecting multiple Wartsila products and their exw date(s). Most slack is already consumed and some parts are in delay. A swift decision would be beneficial.*** [emphasis added]

37. The same day, [redacted] (FMEL) sent Wartsila's report to Jim Anderson (CMAL). [e mail 24 June 2016, 09:59 hrs] [Appendix 3 - 015]

> *Please see attached Wartsila's propeller design study looking at 3 alternate propellers namely:*
>
> *(1) 14.5 knots propeller design*
>
> *This design is for the vessel (ship A) which will mainly be operated at 14.5 knots and occasionally need to go up to 16.5 knots. The booster mode is not taken into account into the design.*
>
> *(2) 16.5 knots propeller design*

This design is for the vessel (ship B) which will mainly be operated at 16.5 knots and can be used with the booster up to 3500 kW. This design also has to be operated occasionally at 14.5 knots.

(3) Intermediate propeller design

This design should be suitable for both vessels, meaning that it will be designed as a compromise between the 14.5 and 16.5 condition. The design should also be able to be used with the booster up to 3500 kW.

In all cases the propeller will be operated at constant propeller speed.

There is a lot of information here, and I think we need to talk this through once you've had a chance to digest.

38. Later on 24 June 2016 [redacted] (FMEL) contacted [redacted] (Wartsila) thanking him for the comprehensive report. [e mail 24 June 2016, 11:13 hrs] [Appendix 3 - 016]

We are studying [the report] *now and have started discussion with CMAL.*

39. Also on 24 June 2016 [redacted] (FMEL) e mailed [redacted] (SVA) asking about tank tests. [e mail 24 June 2016, 14:19 hrs] [Appendix 3 - 017]

What are your timescales between receiving the propeller and appendage detail and being able to run the next series of tests – and can you advise on potential available slots.

40. [redacted] (SVA) replied a few days later. [e mail 27 June 2016, 19:53 hrs] [Appendix 3 - 018]

With regards to the test slot for model tests, we need about 3 weeks to manufacture a new set of design propellers. Provided that we will receive the drawings on Friday 8 July [2016] *we are able to re-test the model of August 4 or 5* [2016].

41. Despite FMEL's efforts to extract a decision from CMAL (see below) CMAL continued to prevaricate on the propeller choice and the 4/5 August 2016 test slot was missed.

42. On 4 July 2016 [redacted] (FMEL) chased Jim Anderson (CMAL) for a decision. [e mail 4 July 2016, 13:58 hrs] [Appendix 3 - 019]

Jim,

Keen to bottom out the propeller choice discussion to allow Wartsila to proceed. It also impacts on the ongoing Noise & Vibration study.

Appreciate it's a difficult issue, but do you think this is one that we can close out this week?

Happy to sit down and talk through it again if required.

43. During discussions CMAL raised further queries and [redacted] (FMEL) passed these on to [redacted], (Wartsila). He said that CMAL favoured the intermediate propeller, but there were two further scenarios to consider. [e mail 11 July 2016, 10:57 hrs] [Appendix 3 - 020]

> 1. *An Intermediate propeller, but limited to 3000kW maximum. As mentioned below, we'd like to quantify efficiency gains for this when compared to the Intermediate propeller capable of 3500kW.*
>
> 2. *CMAL are interested whether there could be efficiency gains opting for 2 different propeller designs (1 for 14.5knots with occasional 16.5knots, 2 for 16.5knots with occasional 14.5knots) but this time not varying the rpm. i.e. 225rpm, but differing blade designs on each of the two vessels?*

44. Wartsila investigated these possibilities and replied on 14 July 2016 enabling [redacted] (FMEL) to summarize the position for Jim Anderson (CMAL) the same day. [e mail 14 July 2016, 16:51 hrs] [Appendix 3 - 021]

> *Hi Jim,*
>
> *As per recent discussions, we have requested some further feedback from Wartsila on the Intermediate propeller option. We asked for two further scenarios:*
>
> 1. *An Intermediate propeller, but limited to 3000kW maximum rating to quantify efficiency gains for this when compared to the Intermediate propeller capable of 3500kW.*
>
> 2. *Potential efficiency gains opting for 2 different propeller designs (1 for 14.5knots with occasional 16.5knots, 2 for 16.5knots with occasional 14.5knots) but this time not varying the rpm. i.e. 225rpm, but differing blade designs on each of the two vessels?*
>
> *Wartsila have responded with the following information.*
>
> *The top table are the results as presented in the report dated 23 June. The second table are the estimations for the new options above. No dedicated propeller designs are made for the second table but only simple corrections on the required power levels. These should give a sufficient indication of the effects.*
>
> *For the 14.5 knots propeller design it is assumed that it is still allowed to have higher pressure pulses for the 16.5 knots condition. In this design the effect of the different propeller speed and the required increase of blade area is taken into account.*
>
> *For the 16.5 knots propeller design the effect of the different propeller speed is taken into account. Also the effect of the reduced MCR power on the blade area ratio is taken into account.*
>
> *For the intermediate propeller design the effect of the reduced MCR power on the blade area ratio is taken into account.*

		14.5 knots propeller design @ 200 rpm	16.5 knots propeller design @ 250 rpm MCR = 3500 kW		Intermediate propeller design @225 rpm MCR = 3500 kW	
Required power at 14.5 knots, trial condition	[kW]	1148	1280	*11.5%*	1224	*6.6%*
Required power at 16.5 knots, trial condition	[kW]	2247	2196	-2.3%	2196	-2.3%

		14.5 knots propeller design @ 225 rpm		16.5 knots propeller design @ 225 rpm MCR = 3000 kW		Intermediate propeller design @ 225 rpm MCR = 3000 kW	
Required power at 14.5 knots, trial condition	[kW]	~ 1185	*3.2%*	~ 1220	*6.3%*	~1215	*5.8%*
Required power at 16.5 knots, trial condition	[kW]	~ 2200	*-2.1%*	~2185	*-2.8%*	~2180	*-3.0%*

From this it is clear that limiting the maximum power to 3000kW will give around 0.8% reduction in power required for 14.5 knots and 16.5 knots. Given the lack of margin in the contract speed requirement, we are still considering your request for 3500kW total power (engine + PTI). Limiting to 3000kW helps.

Maintaining a common 225 rpm, there is a 2.6% reduction in power at 14.5 knots between the Intermediate propeller blade design and the 14.5 knots propeller design. We are waiting for Wartsila to confirm whether this is as straightforward as only the blades being affected, i.e. 14.5 knot blades could easily be swapped in future for 16.5 knot blades.

Balancing costs and likely schedule implication of designing, model testing and delivering two different blade designs, we believe that a 225 rpm Intermediate Propeller, common for both ships is the way to proceed.

Please come back with your feedback.

Best regards,

[redacted] [emphasis added]

45. Four days later on 18 July 2016 Jim Anderson (CMAL) sent [redacted] (FMEL) an indecisive reply. [e mail 18 July 2016, 10:37 hrs] [Appendix 3 - 022]

[redacted]

There is not much of a difference between the figures for 225 rpm with differing blade designs on each of the two vessels compared with the original figures.

Our thoughts are to stay with the Intermediate propeller option, MCR = 3500 kW.

Best regards, Jim

46. This was hardly an unequivocal choice. In an effort to get CMAL to make a firm decision on the propeller, [redacted] (FMEL) contacted Jim Anderson specifically

reminding CMAL of the Contract specification. [e mail 18 July 2016, 12:31 hrs] [Appendix 3 - 023]

> *Thanks Jim,*
>
> *There is still some difference (0.8%) in required power when opting to design for 3500kW propellers. We don't believe that any part of the contract or spec requires us to deliver 3500kW. We can deliver additional power through the PTI, but we interpret this as 450kW on top of 85% engine MCR, i.e. a total of 3000kW.*
>
> *With such tight margin on the contractual 16.5knots condition we are reluctant to take on any additional limitation to this, however small.*
>
> *As mentioned previously there still remains the mismatch to the 15% sea margin in the Contract and 5% in the Spec.*

47. Oblivious to the urgency of the matter Jim Anderson (CMAL) responded within the hour, but suggested the matter could wait until after [redacted] returned from his forthcoming holiday. [e mail 18 July 2016, 13:22 hrs] [Appendix 3 - 024]

> [redacted]
>
> *Rather than me reply with lots of references to the shipbuilding contract, the contract technical specification, emails on this subject etc., if ok with you I will wait till you return from holiday to discuss.*
>
> *That said, to assist we are happy to keep with the power of 2 x 2600 kW (5200 kW) in the shipbuilding contract, which is the highest of all figures. We could then get the contract addendum sorted.*
>
> *Best regards*
>
> *Jim*

48. [redacted] (FMEL) then took up the chase for a decision, writing to Jim Anderson (CMAL) on 27 July 2016. He asked for a meeting to discuss the propeller. [e mail 27 July 2016, 15:44 hrs] [Appendix 3 - 025]

> *Would it be possible to set up a meeting between us to discuss the issue of the propellers to be supplied on 801 & 802?*
>
> *Apart from Tuesday next week and tomorrow afternoon, my diary is clear right now.*

49. Jim Anderson (FMEL) still indifferent to the urgency, replied two days later, on Wednesday 29 July 2016. Whilst saying he was happy to meet "as early as you like" he nevertheless suggested meeting after [redacted] (FMEL) returned from leave. [e mail 29 July 2016, 07:04 hrs] [Appendix 3 - 026]

> *I'm due to be off all next week but happy to come in to discuss as early you like. Once* [redacted] *is back and you have discussed with him, give me a call and I will make myself available.*

50. Eventually at a meeting on 2 August 2016 CMAL confirmed the use of an intermediate propeller and on 3 August 2016 [redacted] (FME) was able to confirm this to Wartsila. [e mail 3 August 2016, 08:51 hrs] [Appendix 3 - 027]

> *We now have agreement with CMAL to proceed on 1 propeller design for both vessels optimised for 14.5knots , 16.5knots and capable of absorbing 3500kW via PTI Boost. This is based on the 'Intermediate Propeller Design" highlighted below, and described in the Wartsila Report 'TDH000005404_0" dated June 23rd 2016.*

51. To recap, it was in February 2016 that CMAL started considering optional propeller designs. Wartsila should have started its design on receipt of SVA's CFD test on 27 April 2016. FMEL wasted over three months investigating and testing alternative propeller designs at the instruction of CMAL. Only on 3 August 2016 did CMAL decide upon a propeller which was fundamentally the same as that which would have been used before CMAL's fruitless search for an alternative design started.

52. Only now could Wartsila embark on detailed design and testing safe in the knowledge that it would not be carrying out abortive works. These works (after 3 August 2016) would have been required in any event under the contract. The principal events and critical delays up to 3 August 2016 are shown diagrammatically in figure 3-2 below [Appendix 3 – 028].

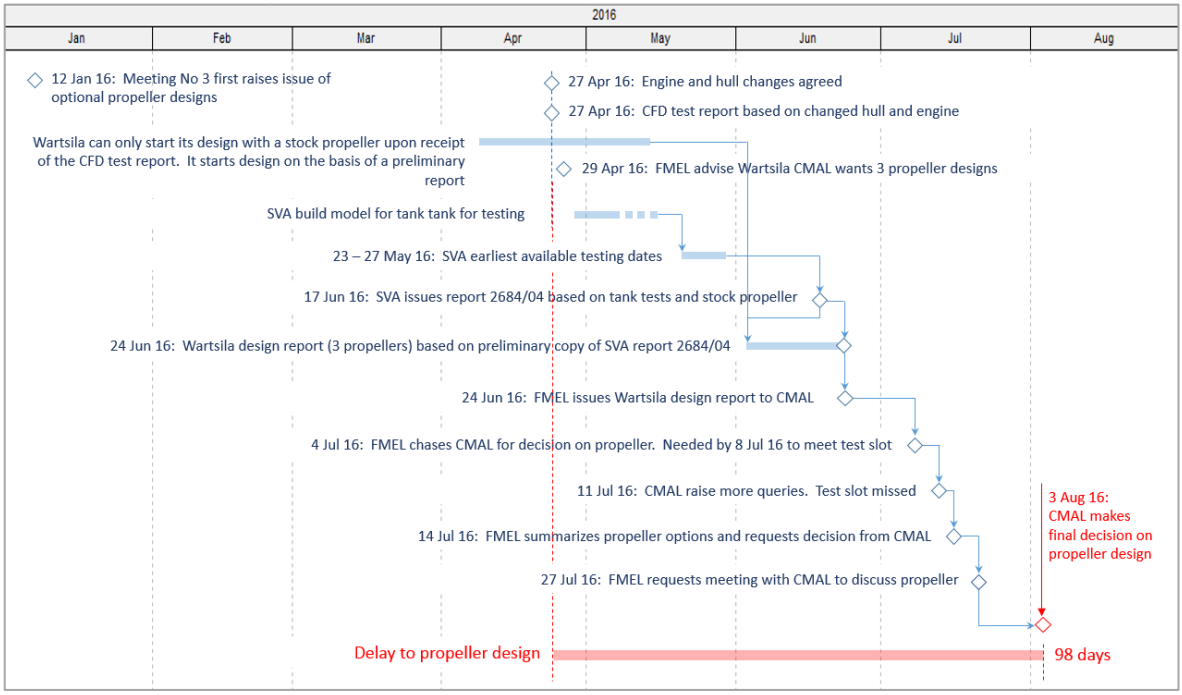


figure 3-2 delays to propeller design

53. CMAL must:

- not hinder or prevent FMEL from carrying out its obligations in accordance with the terms of the contract and from executing the works in a regular and orderly manner; and

- take all steps reasonably necessary to enable FMEL to discharge its obligations and to execute the works in a regular and orderly manner.

54. These obligations are explained more fully in part 5 of this claim (contractual/legal basis of the claims).

55. In breach of these obligations, CMAL failed to promptly decide upon the design of the propeller causing 98 days critical delay to the completion of hull 801. FMEL is entitled to damages in the form of its delay costs for this 98 day delay. These are set out in part 4 of the claim (monetary claims).

DELAYS ARISING FROM TANK TESTS AND FURTHER DESIGN AMENDMENTS

56. On 3 August 2016, CMAL made a final decision on the choice of propeller. The next steps were principally:

- Wartsila to finalize the design of the propeller;
- SVA to build a scaled down model of the propeller and fix it to the model;
- SVA carry out tank tests and report;
- Alnacon to produce fairing details to refine the hull lines; and
- Vera Navis to prepare production drawings for fabrication purposes.

57. These works were part of FMEL's obligations under the contract. In the analysis which follows, no delays have been claimed for carrying out these works. What has been claimed are delays due to:

- availability of the propeller model maker and the tank for testing – these delays would not have arisen had there not been a futile search for alternative propeller design; and
- unreasonably long approval period by CMAL of the ducktail for 801.

58. At the very outset it is acknowledged that the November 2016 tank test results were disappointing. Modifications to the hull were subsequently required to achieve the specified speed.

59. Whilst these modifications caused delay, this is not the basis of any claim in this window.

60. Wartsila issued its propeller design report and [redacted] sent it to [redacted] FMEL) on 12 September 2016. [e mail 12 September 2016, 20:35 hrs] [Appendix 3 - 029]

61. There were then a number of technical issues to resolve between FMEL and Wartsila including the issues of cavitation and the general arrangement of the propeller, the shaft and gearbox. These were substantially settled by 5 October 2016 when [redacted] (FMEL) was able to contact [redacted] (SVA) about the tank tests. He said that FMEL had now received most of the information necessary to undertake the remaining

tank tests with the design propeller. He asked that SVA issue its revised technical proposal and time schedule. [e mail 5 October 2016, 20:37 hrs] [Appendix 3 - 030]

62. At the Project Meeting No 11 on 7 October 2016 [Appendix 3 - 031] the minutes, under item 5, record that:

- *Model tank testing expected early November*

63. Discussions then took place between FMEL and SVA, dealing with a number of commercial and design matters resulting in a Purchase Order being given to SVA on 24 October 2016.

64. This was acknowledged by [redacted] (SVA) in an e mail to [redacted] (FMEL) a few days later, on 27 October 2016. Unfortunately by this time there were availability problems with the propeller model maker and the test tank such that the tank testing had to be postponed from early November 2016 to 28 November 2016. [e mail 27 October 2016, 15:00 hrs] [Appendix 3 - 032]

65. On 27 October 2017 [redacted] (SVA) advised FMEL that there were delays in producing the model propeller since its manufacturer was now fully booked. Whilst SVA had been able to mitigate the delay somewhat, unfortunately the tank tests had to be put back until late November 2016. [e mail 27 October 2016, 15:00 hrs] [100-000]

> *Our propeller model manufacturer seems to be fully booked and is only able to deliver the propeller blades in week 49* [5 December 2016]*. This is way too late for us. Therefore we contacted our alternative manufacturer who is able to deliver the blades in week 47* [21 November 2016]*. This is why we ended up in the unfortunate situation to postpone the model tests to the period between November 28 and November 30.*

66. By the end of October 2016, [redacted] (FMEL) was able to tell [redacted] (Wartsila) about the model test dates. [e mail 31 October 2016, 17:44 hrs] [100-171]

> *The latest dates for this model test are 28th – 30th November. There will be no cavitation testing conducted however Wartsila are more than welcome to attend.*

67. In early December 2016, Wartsila asked how the tank tests were progressing. On 2 December 2016 [redacted] (FMEL) wrote to [redacted] (Wartsila) telling him of the results. [e mail 2 December 2016, 09:33 hrs] [Appendix 3 - 034]

> *Initial results this week did show poorer than expected results (power @ 16.5knots).*
>
> *…*
>
> *Some adjustment of bulbous bow lines and hull lines aft of the propeller is being looked at as a way to improve this.*
>
> *We hope to have results for you soon.*

68. In view of the poorer than expected results, FMEL proposed the addition of a ducktail at the stern of the vessels to achieve the required speed.

69. FMEL kept CMAL fully informed of the test results. In an e mail to Jim Anderson (CMAL) [redacted] set down the suggested way forward. [e mail 2 December 2016, 17:46 hrs] [Appendix 3 - 035]

> *Our recommendation is to proceed with a 2.4m ducktail and modified bulbous bow (model 2684W)* ***and seek your approval to do so****.* [emphasis added]

70. Three days later, on 5 December 2016, Jim Anderson (CMAL) replied. [e mail 5 December 2016, 06:53 hrs] [Appendix 3 - 036]

> *I will consult with relevant stakeholders and get back to you as soon as possible.*

71. Meanwhile, Project Meeting No 13 [Appendix 3 - 037] on 6 December 2016, at minute 27, recorded the on-going situation.

> [redacted] FMEL] *provided update on recent model tests.*
>
> *JA* [Jim Anderson CMAL] *advised that CMAL are investigating the impact of a 2.4m ducktail. AJ (sic)* [Jim Anderson ?] *advised that is (sic)* [if ?] *CMAL agree to a 2.4m ducktail then FMEL must accept responsibility for ensuring the vessel will be able to meet berthing requirements at all ports that the vessels are contracted to work in.*

72. It was evident that some amendments to the hull lines would be needed at the bow and stern of the vessel. On 11 December 2016 [redacted] (FMEL) contacted [redacted] (Alnacon) about carrying out the fairing refinements to the hull design. [e mail 11 December 2016, 15:02 hrs] [Appendix 3 - 038]

> *Unfortunately our final model test has required a further modification to the bulbous bow and lines aft of the propeller.*
>
> *Would you have availability over the next two weeks to look at this for us.*

73. Upon receiving an affirmative reply from Alnacon, the revised bow details were sent the next day by [redacted] (FMEL). [e mail 12 December 2016, 09:31 hrs] [Appendix 3 - 039]

> *The bow modification is as per the attached CAD file.*
>
> *The stern lines are still being finalized but the attached photo also gives you an idea of the change – dropped buttocks aft plus ducktail.*

74. A further email from [redacted] (FMEL) to [redacted] (Alnacon) followed four days later. [e mail 16 December 2016, 11:58 hrs] [Appendix 3 - 040]

> *Can you please proceed as a first priority with the bulbous bow modification in accordance with the CAD file 2684W-body plan,dwg I sent on Monday.*
>
> *Since the last hull form you provided (7 June 2016) we made one subsequent modification to the 'scoop" above the propellers. I attach this hull and ask that you use this as the starting point for this final update. Worth a quick check that this does match your last hull except the propeller scoop.*

We should be able to confirm the final requirements for stern lines and ducktail by the middle of next week.

75. As it turned out, FMEL was unduly optimistic in hoping to have the final requirements for the stern hull lines and ducktail "by the middle of next week". The decision whether to use a ducktail or not was still with CMAL.

76. By 20 December 2016 Wartsila was chasing FMEL to provide the results of the tank tests so as its propeller blade design could be validated. [redacted] (FMEL) told Wartsila of the progress. [e mail 20 December 2016, 13:09 hrs] [Appendix 3 - 041]

Model testing is still under way today. SVA tried one more iteration of ducktail form. This has given the desired results and testing will be complete this week. I will forward the test results as soon as I get them.

77. Later the same day, [redacted] (FMEL) sent a second e mail to Wartsila attaching the results of SVA's tests on hull models W and AA. [e mail 20 December 2016, 15:16 hrs] [Appendix 3 - 042]

Over the last 2 weeks we have further optimised the bulbous bow and designed a 2.4m long ducktail.

Please find attached 2 sets of results:

1. *2684W – full range of draughts and speeds on last but one ducktail iteration*

2. *2684AA – final optimisation of ducktail completed today. Trials prediction at 3.45m draught.*

Also attached is a photo to give an indication of the modification to the aft lines

78. The photograph attached to the email is shown in figure 3-3 below.

figure 3-3 amendments to stern lines of hull and ducktail

79. This photograph shows the ducktail (modelled in wood) and the revisions to the hull lines (shown in grey/white) needed to accommodate the propeller design.

80. On 21 December 2016 [redacted] (FMEL) was able to send [redacted] (Alnacon) the final modifications to the hull. [e mail 21 December 2016, 09:40 hrs] [Appendix 3 - 043]

> *Now see attached the required modification to the aft hull, including the 2400mm ducktail.*

81. FMEL was progressing the design incorporating a ducktail even though it still awaited a decision from CMAL on whether this would be permitted. Although FMEL was proceeding at risk, its financial exposure to Alnacon was nevertheless fairly modest at this stage.

82. The modifications requested of Alnacon were based upon an advanced copy of SVA's test report 2684/05 [Appendix 3 - 044] which was formally issued a few days later on 23 December 2016. The executive Summary of that report recommended changes to the bulbous bow.

> *Assessing the results of the model tests it is recommended to install a 2.4m stern appendix with a 50mm interceptor. Additionally more volume should be added on top of the bulbous bow while the volume in the lower part of the bulb should be reduced.*

83. Although investigations largely revolved around the ducktail at the stern of the vessel, they had implications on the bulbous bow too.

84. Project Meeting No 14 [Appendix 3 - 045] on 12 January 2017 showed no change in status of the ducktail from the previous meeting. CMAL was still investigating despite the fact that a full study of the implications of the ducktail had been sent to CMAL early in December 2016. [e mail [redacted] (FMEL) to Jim Anderson (CMAL) 2 December 2016, 17:46 hrs] [Appendix 3 – 035]. Item 26 of the minutes said:

> *JA* [Jim Anderson CMAL] *advised that CMAL are investigating the impact of a 2.4m ducktail. JA advised that if CMAL agree to a 2.4m ducktail then FMEL must accept responsibility for ensuring the vessel will be able to meet berthing requirements at all ports that the vessels are contracted to work in.*

85. In the following Project Meeting No 15 [Appendix 3 - 046] on 2 February 2017 Jim Anderson (CMAL) advised a ducktail would not be acceptable for vessel 801. Minute 3 records:

> *Model tests – ducktail*
>
> *JA advised this is not possible for #801. JA is investigating if possible that #802 can be built with ducktail.*

86. Until such time as CMAL made a decision on the ducktail, FMEL could not progress confidently with the production drawings. CMAL's prevarication over the ducktail caused delay to the start of the production drawings for the stern and aft blocks.

87. Now that CMAL had decided no ducktail was to be used on hull 801, FMEL was able to send Alnacon's fairing details to Vera Navis who was to provide the production drawings from which the various bow and stern blocks were to fabricated. This was done on 27

February 2017 when [redacted] (FMEL) emailed [redacted] (Vera Navis) with the final shapes for the bow and stern parts of the hull. [e mail 27 February 2017, 18:48 hrs] [Appendix 3 - 047]

> *It has taken a long time, but we now finally have the hull shape for the forward and aft ends. Unfortunately they are in two different models – we will join them together into one surface, but in the meantime this should give you everything you need to push on.*
>
> *The forward end is from surface:* *hull26022017.igs*
>
> *The aft end is from surface:* *hull23022017.igs*
>
> *Both are attached to this email.*
>
> *Based on this are you able to give us a projection of when you are planning to deliver the updated production packs for the following:*
>
> - *B2, units 77, 78, 79 (all but shell members of unit 79 already in production as it is mostly unaffected by hull shape)*
> - *B12, unit 48*
> - *B12, units 49, 50, 51 (we understand there is still some information on mooring equipment and structure still outstanding)*
> - *B11, units 45, 46, 47 (pending outstanding info on anchor pocket and recent internal arrangement changes)*
> - *B1, units 82, 83, 84*
> - *Ducktail (we need to develop scantlings for this)*
> - *Funnels / casings*
> - *Emergency generator room*
>
> *We need to provide you with a response to Remark 178, if we can do that this week can you predict when you will be in a position to start issuing production packs for aluminium? There is clearly a lot of work to be done and a lot of discussions to be had, but we need to understand the timescales involved from your side so we can plan our deliverables to production over here.*

88. This is an important e mail. It lists the blocks and units within those blocks, to the stern and bow of the hull, which were effectively on hold pending a decision on the ducktail. These blocks and units are shown below in figure 3-4, highlighted in yellow [Appendix 3 – 048].

Back to Contents Page

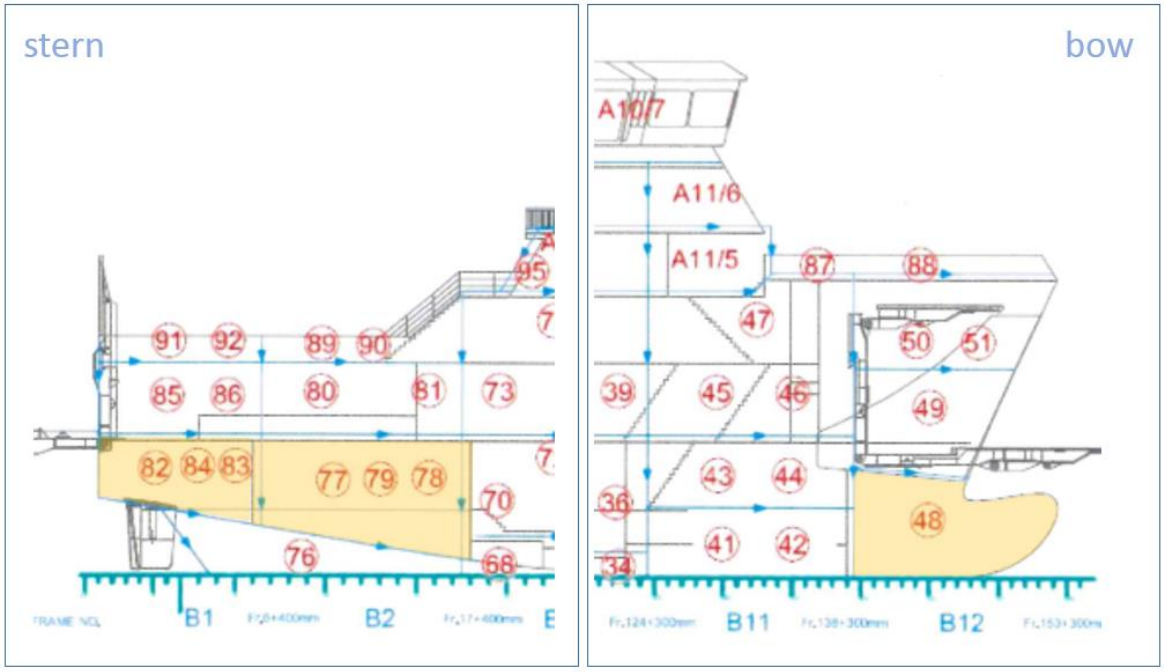


figure 3-4 units/blocks which could not be finalized due to hull design changes

89. On 15 March 2017 Jim Anderson (CMAL) then wanted to investigate the possibility of easily adding and removing ducktails to both vessels. He emailed [redacted] (FMEL) saying no ducktail was to be fixed to 801 and a decision whether to have a ducktail fitted to 802 was still pending. [e mail 15 March 2017, 10:28 hrs] [Appendix 3 - 049]

> *We are finalising our impact assessment for fitting a ducktail to hull 802. Can you advise/confirm the following:*
>
> 1. *Other associated changes with changing the length of the vessel from 102.4m to 104.8m.*
> 2. *As advised previously, hull 801 cannot be fitted with a ducktail. Provision for easily adding a ducktail is required when the ship is deployed to a route where a service speed of 16.5 knots is required.*
> 3. *If a ducktail is installed for 802, to be easily removed and vice versa easily added.*
> 4. *Please provide technical details, approximate time and materials to remove/add a ducktail.*

90. FMEL had to carry out some significant studies to respond to CMAL's e mail. The following matters, amongst others, had to be considered:

- global longitudinal bending
- intermediate scantlings
- increased tonnage/weight

Back to Contents Page

- position of the collision bulkhead

91. The dates upon which drawings for various units within the bow and stern blocks (1 and 12 respectively) were received and the corresponding dates upon which fabrication started are shown in the table below.

Block	*Unit*	*Vera Navis drawing received*	*Fabrication started*
B1	82	7 April 2017	17 April 2017
	83	7 April 2017	17 April 2017
	84	7 April 2017	17 April 2017
B2	77	21 March 2017	15 March 2017
	78	21 March 2017	15 March 2017
	79	21 March 2017	20 February 2017
B11	45	29 March 2017	30 March 2017
	46	29 March 2017	30 March 2017
	47	29 March 2017	30 March 2017
B12	48	29 March 2017	6 April 2017
	49	7 April 2017	6 April 2017
	50	7 April 2017	6 April 2017
	51	7 April 2017	6 April 2017

92. Once the production drawings were delivered by Vera Navis they had to be reviewed/checked by FMEL. Only then could "lofting" take place. This involves planning the layout of various components of the units such that they can most economically be cut from a steel sheet to minimize wastage. The components of the units are then cut from the sheets with a plasma cutter.

93. The block 1 drawings were by far the most significant since about ten weeks work was required after consolidation and before launch. During this period the propeller shafts had to be aligned and fixed and the propellers and rudders installed.

94. It is evident that, in an effort to mitigate delay, FMEL started some fabrication works at its own risk before receiving final production drawings from Vera Navis.

95. To summarize, it was on 3 August 2016 that CMAL made a decision on the propeller design. FMEL was then required to test that propeller and refine the design of the hull prior to developing production drawings. These were matters which FMEL was required to do under the contract in any event.

96. It was as a result of prevarication over the propeller choice that FMEL ran into difficulties with the availability of a propeller modeller for the tank test, and the availability of the tank itself. FMEL lost 14 days as a consequence.

97. The tank tests did not provide the results which were expected. To overcome the difficulties, FMEL suggested the addition of a ducktail. Until CMAL decided whether this was to be permitted, FMEL could not proceed with the production drawings for the stern

and bow blocks. CMAL took 62 days to make that decision (48 days longer than permitted under the Contract). This caused delay to start of the production drawings.

98. These matters are shown diagrammatically below in figure 3-5 [Appendix 3 – 050].

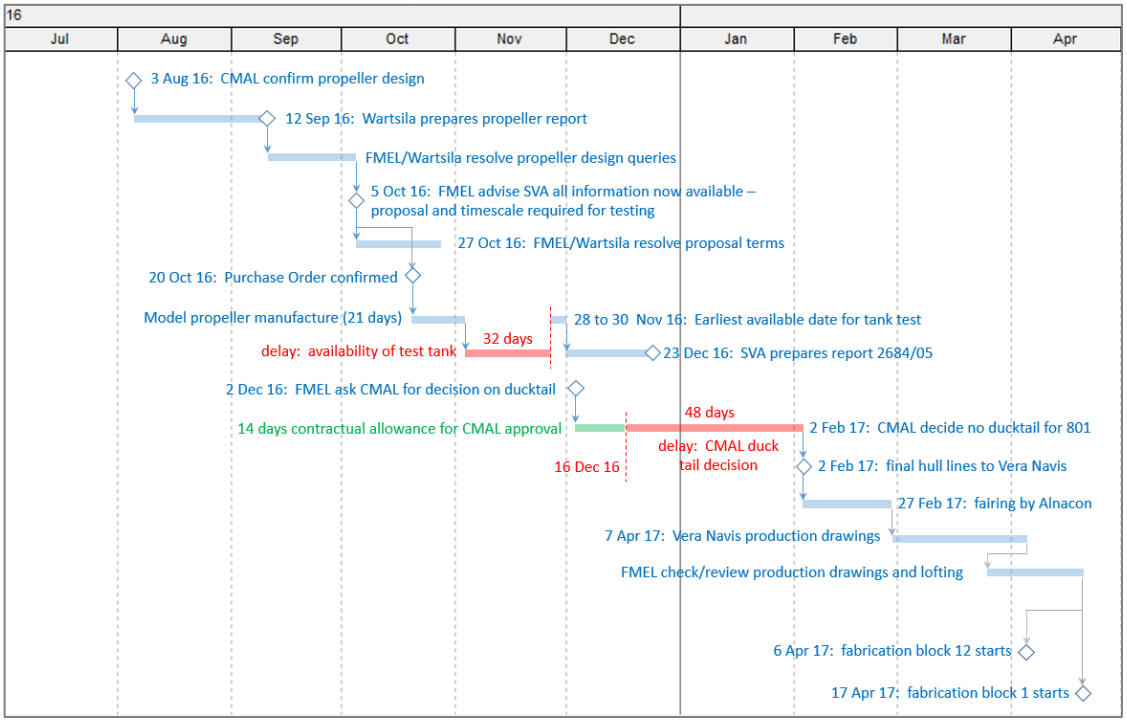


figure 3-5 delays arising from tank tests and ducktail approvals

99. This claim does not include any delays in carrying out those works which formed part of FMEL's contractual obligations. Figure 3-5 above shows, in red, only those delays arising from availability of the propeller model maker and testing tank and the unreasonably long time which CMAL took to approve the ducktail.

100. CMAL must:

- not hinder or prevent FMEL from carrying out its obligations in accordance with the terms of the contract and from executing the works in a regular and orderly manner; and
- take all steps reasonably necessary to enable FMEL to discharge its obligations and to execute the works in a regular and orderly manner.

101. These obligations are explained more fully under contractual/legal basis of the claims in part 5 of this document.

102. In breach of these obligations, CMAL failed to promptly decide upon:

- the design of the propeller causing 14 days critical delay to the completion of hull 801 as a result of availability of the tank for testing; and
- whether a ducktail was to be used or not causing 48 days delay to completion of hull 801.

103. FMEL is entitled to damages in the form of its delay costs for (48 + 14 =) 62 days delay. These are set out in part 4 of the claim (monetary claims).

SUMMARY OF CRITICAL DELAY IN WINDOW 2

104. FMEL has suffered critical delay for which CMAL is responsible as follows:

Finalizing the propeller design		98 days
Availability of tank for testing		14 days
Decision on the ducktail		48 days
	TOTAL	**160 days**

105. These delays are shown diagrammatically in figure 3-6 below [Appendix 3 – 051]:

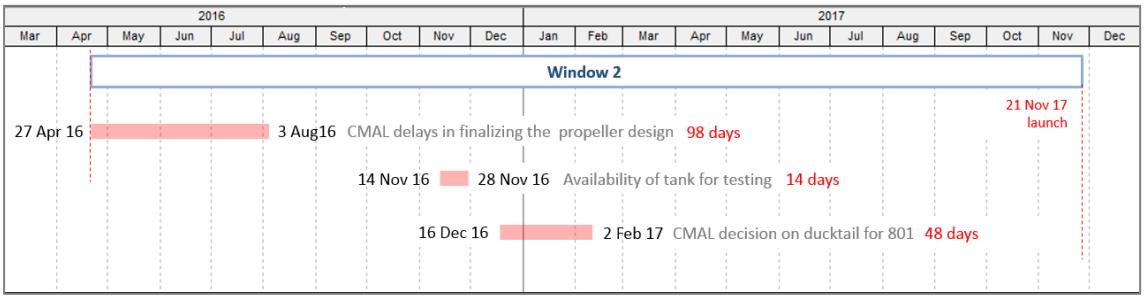


figure 3-6 summary of delays window 2

WINDOW 3: 21 NOVEMBER 2017 TO 21 JUNE 2019

INTRODUCTION

106. This part of the claim deals with delays in window 3 as follows:

Window 3	21 November 2017	[end of window 2]
	21 June 2019	Forecast Date of Delivery taken from the 28 June 2018 cardinal dates programme

107. The narrative will explain that the critical works after launch through to the start of sea trials were the outfitting works.

108. In the cardinal dates programme of 7 January 2016 (the baseline programme) FMEL planned to complete most of its outfitting before launch.

109. As a result of delays which were suffered early in the project (and explained in the introduction and overview and in windows 1 and 2 of this claim) little outfitting was carried out in the workshop. Although some outfitting was done on the slipway most of it was unable to progress until after launch and this took considerably longer than planned. It is acknowledged that hull 801 was launched before outfitting was complete, but this was done to vacate the slipway for construction of hull 802 in order to mitigate the very long delays which would otherwise have arisen (to hull 802).

110. The delays incurred in this window therefore substantially arise from events which happened before launch (i.e. before the start of this window) and which caused a necessary change to the sequence of the outfitting works. It is the effect of those earlier delaying events which become apparent in this window 3. However, outfitting was also delayed by CMAL's interference in the design process. This caused FMEL to suffer a Permissible Delay of 321 days in this window.

111. In windows 1 and 2 the total Permissible Delay was 195 days. The total Permissible Delay at the close of window 3 is therefore (195 + 321 =) 510 days.

THE CRITICAL PATH IN WINDOW 3

112. This window starts on the date of launch, 21 November 2017.

19 October 2017 cardinal dates programme

113. The programme closest in proximity to the launch date is the cardinal dates programme of 19 October 2017. It shows a forecast launch of 21 November 2017, so it might reasonably be said to reflect the situation at about the time of the launch.

114. An extract from this programme is shown below in figure 3-7 [Appendix 3 – 052].

115. The 19 October 2017 programme is not logic linked. It is not possible to determine the critical path (i.e. the longest path) from the native Primavera version of the file. As

explained earlier in this claim, in such situations the critical path can be determined from a common sense and practical analysis of the facts.

116. The outfitting is shown at the very top of the programme extract where, under the heading of "Engineering", are the various outfitting installation items. Outfitting passenger and crew areas is shown about half way down in figure 3-7 but this relates to fittings and furniture outfitting (rather than mechanical services).

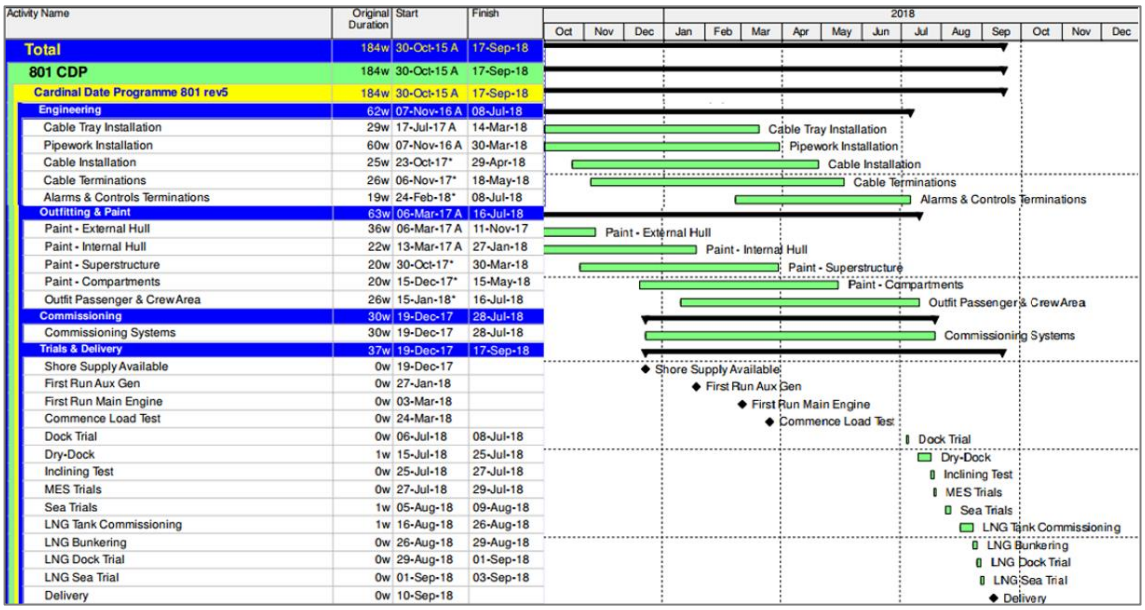


figure 3-7 cardinal dates programme 19 October 2017 (extract)

117. The critical path in the 19 October 2017 programme appears to run through the outfitting works as follows:

- cable tray installation
- pipework installation
- cable installation
- cable termination
- alarms and controls terminations

118. It then appears to move to the outfit passenger and crew area, commissioning of systems before moving on to dry dock works and sea trials. This is reasonably consistent with the baseline cardinal dates programme of 7 January 2016 (which is shown and described below).

119. The delivery date in the 19 October 2017 programme is forecast to be 10 September 2018.

Back to Contents Page

28 June 2018 cardinal dates programme

120. The cut-off date for this claim (in terms of actual data compared to forecast data) is 31 August 2018. The cardinal dates programme nearest to the cut-off date is that of 28 June 2018. An extract from this programme is shown below in figure 3-8 [Appendix 3 – 053].

121. The activities within this programme are not identical to those in the 19 October 2017 programme above. Nevertheless, the outfitting is still divided between that for the mechanical services (pipework, cable trays and pull cables) and accommodation outfitting.

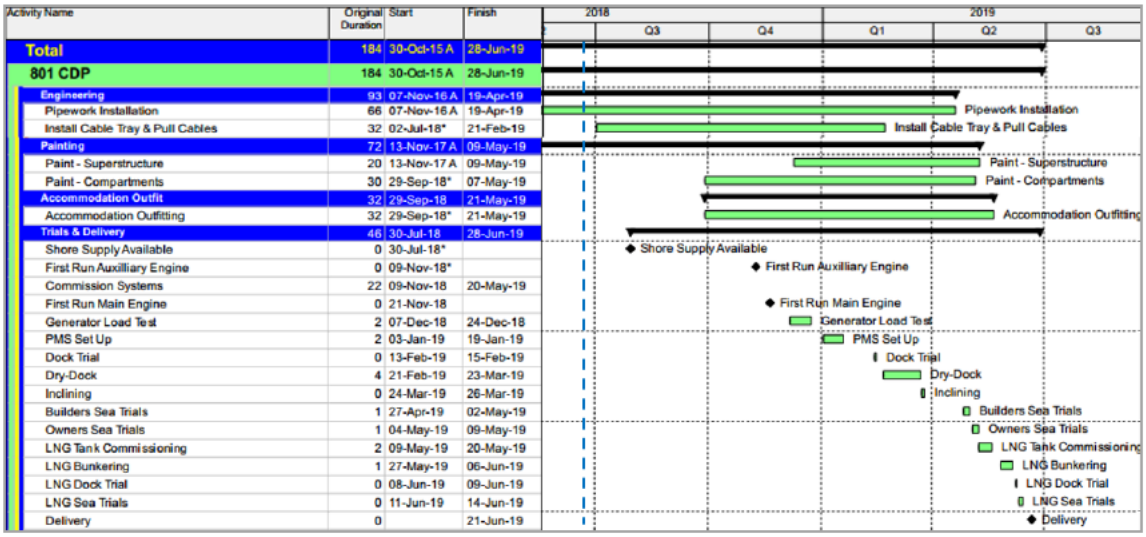


figure 3-8 cardinal dates programme 28 June 2018 (extract)

122. Again, the critical path appears to run through the outfitting. A logical construction sequence would be first installing the cable trays, cables and pipework for mechanical systems, before finishing off the accommodation outfitting. Although painting is being carried out in parallel it is difficult to envisage this being critical, and even if it is, it can only be so, for a short period after the pipework and cabling is finished.

123. The critical path then moves to sea trials, eventually finishing with a forecast delivery date of 21 June 2019.

124. It is evident outfitting is driving completion. A comparison between the 19 October 2017 and 28 June 2018 programmes for pipework, cable trays and cables is shown below.

Item	***Planned finish dates***		***Delay (days)***
	19 Oct 17 programme	***28 Jun 18 programme***	
Pipework	30 Mar 18	19 Apr 19	385
Cable trays	14 Mar 18	21 Feb 19	344
Cable installation and termination	18 May 18		279

125. The longest delay is to completion of pipework.

126. It should be remembered that the dates in the table above (taken from the programmes) were forecasts made at the time the programmes were prepared. In October 2017 the full implications of outfitting after launch may not have been wholly appreciated. There has clearly been a very long critical delay to the pipework, cable trays, cables and terminations.

DELAYS TO OUTFITTING

Advance outfitting

127. It is first helpful to briefly explain the concept of advance outfitting. Outfitting is usually carried out at block fabrication stage. This is called advance outfitting. If this cannot be done and has to be carried out on the slipway or after launch, the time taken to outfit increases quite substantially. This is explained more fully later in this claim under disruption.

128. GAO-09-322 (and the disruption part of this claim) make reference to the internationally recognized "1–3–8 rule". Something which takes 1 hour to carry out in the workshop (at fabrication stage) takes 3 hours on the slipway and 8 hours after launch. Extending this on a daily basis, a programmed activity which takes 30 days in the workshop will take 90 days on the slipway and 240 days post launch. CMAL's acts and omissions prevented FMEL from carrying out advance outfitting and this had a severe effect on progress.

129. The delays in this window stem from earlier causative events before launch. These have been explained in detail throughout this claim but the delays are primarily caused by:

- inadequacies in the conceptual design; and
- interference in the design process by CMAL.

130. To some extent these two issues overlap. This is a design build contract and FMEL not only has the obligation to design, it has the right to do so unhindered by CMAL. Notwithstanding the inadequacies of the conceptual design, FMEL should have been allowed to develop that design, the best it could, without interference from CMAL.

131. CMAL must:

- not hinder or prevent FMEL from carrying out its obligations in accordance with the terms of the contract and from executing the works in a regular and orderly manner; and
- take all steps reasonably necessary to enable FMEL to discharge its obligations and to execute the works in a regular and orderly manner.

132. These obligations are explained more fully in part 5 of this claim (contractual/legal basis of the claims).

133. In breach of these obligations CMAL's acts and omissions prevented FMEL from advance outfitting in the workshop and/or on the slipway. This forced FMEL to change the

sequence of the outfitting works such that it was carried out after launch causing considerable delay and additional cost.

Inadequacies of the conceptual design

134. Part 2 of this claim (introduction and overview) describes some of the problems of the conceptual design and the major issues which should have been resolved before award of contract. The details are not repeated here. They can be found throughout this claim, but include:

- general arrangement drawings (many important tanks and spaces below main deck were not shown);
- weights and increased drafts (this was subject of a Contract Amendment some 20% of the way through the project);
- selection of main engines (this too was subject of a Contract Amendment some 20% of the way through the project)
- choice of propeller (this was only resolved by the time about a third of the contract period had elapsed)
- LNG bunkering arrangements
- passenger layout
- innovative design and new technologies
- classification society rules and regulations

135. Each of the above items (and the list is not exhaustive) impacted the outfitting. For example the engines, propellers and associated gearboxes prevented the layout of many important areas of the vessel being finalized. This in turn affected the design of the mechanical systems (i.e. the outfitting pipework, cable trays, etc) which served the equipment.

Interference in the outfitting design process

136. Throughout this claim there are numerous examples of CMAL's interference in the design process. Again, they are not recited in detail here, since as explained above, there is a degree of overlap between this and the inadequacies of the conceptual design. The propellers, engine selection and LNG bunkering are good examples of CMAL's interference.

137. After award of the contract, CMAL's insistence on becoming involved in nearly every aspect of the development of the inadequate conceptual design amounted to interference. It caused considerable delay to the design of the mechanical systems to which much of the outfitting relates. This is reflected in the status of the design approval of the 40 mechanical systems as at 5 August 2018:

- 22 were approved by Lloyds Register

- 27 were submitted to CMAL, whereas; only,
- 2 were approved by CMAL; and,
- 13 were yet to be submitted to CMAL

138. Furthermore, CMAL's iterative review and approval process, which often masked an exercise in preferential engineering on the part of CMAL, added to the delay.

139. It is self-evident that neither the pipework nor the cable trays can be installed until the design of the mechanical systems to which they relate is approved.

Mitigation measures

140. Good international shipbuilding and marine practice dictates that outfitting should be carried out in the workshop, at block fabrication stage (advance outfitting). As a result of CMAL's acts and omissions (generally described above) FMEL was prevented from doing this.

141. Some outfitting was carried out on the slipway before launch and this took longer than had it been done in the workshop.

142. The period of analysis, in this window 3, is after launch through to completion during which much of the outfitting was (or will be) carried out. GAO-09-322 and the 1-3-8 rule explains that outfitting after launch will take even longer than if carried out in the workshop or on the slipway.

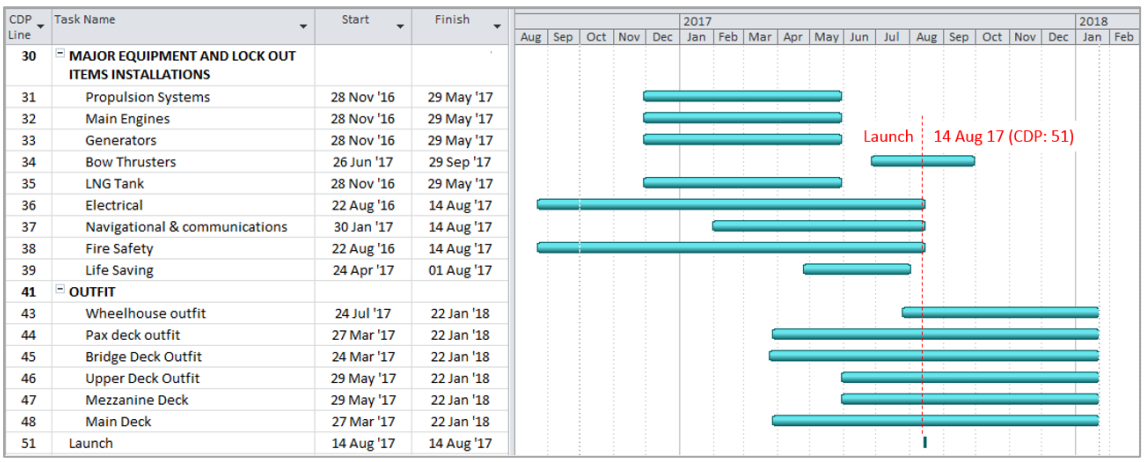
143. Hull 801 was launched on 21 November 2017 with much of the outfitting still to complete. Why did FMEL launch so early when it knew that the outfitting would then take longer to finish and involve additional expense ? The reason is that FMEL needed to vacate the slipway to enable the block consolidation of hull 802 to start. This mitigated what would otherwise have been a very long delay to the completion of hull 802 along with attendant delay costs. These mitigation measures are explained later in this part of the claim under hull 802 delays.

ASSESSMENT OF DELAY TO THE OUTFITTING

144. It has been explained that outfitting is critical between launch and start of sea trials and that delays to outfitting have been caused by the acts and omissions of CMAL in preventing FMEL from advance outfitting and delaying the approval of many of the mechanical systems.

Outfitting - as planned

145. Most of the outfitting was planned to have been carried out before launch. An extract from the cardinal dates programme of 7 January 2016 (the baseline programme) is shown in figure 3-9 below.



CDP Line	Task Name	Start	Finish
30	MAJOR EQUIPMENT AND LOCK OUT ITEMS INSTALLATIONS		
31	Propulsion Systems	28 Nov '16	29 May '17
32	Main Engines	28 Nov '16	29 May '17
33	Generators	28 Nov '16	29 May '17
34	Bow Thrusters	26 Jun '17	29 Sep '17
35	LNG Tank	28 Nov '16	29 May '17
36	Electrical	22 Aug '16	14 Aug '17
37	Navigational & communications	30 Jan '17	14 Aug '17
38	Fire Safety	22 Aug '16	14 Aug '17
39	Life Saving	24 Apr '17	01 Aug '17
41	OUTFIT		
43	Wheelhouse outfit	24 Jul '17	22 Jan '18
44	Pax deck outfit	27 Mar '17	22 Jan '18
45	Bridge Deck Outfit	24 Mar '17	22 Jan '18
46	Upper Deck Outfit	29 May '17	22 Jan '18
47	Mezzanine Deck	29 May '17	22 Jan '18
48	Main Deck	27 Mar '17	22 Jan '18
51	Launch	14 Aug '17	14 Aug '17

figure 3-9 baseline programme outfitting items

146. The programme includes a heading "OUTFIT". Beneath this are several activities but they do not represent the full extent of the outfitting works. These activities represent the fitting out works to passenger and crew areas. They are analogous to the "outfit passenger and crew area" activity in the 19 October 2017 programme and the "accommodation outfitting " activity in the 28 June 2018 programme. (See figures 3-7 and 3-8 respectively above.)

147. The pipework outfitting, serving for the mechanical systems, is included under the heading "MAJOR EQUIPMENT AND LOCK OUT ITEMS INSTALLATIONS". (There is a separate activity in the baseline programme for ordering materials.)

148. The baseline programme shows that almost all outfitting (except that to the bridge and accommodation areas and the bow thrusters) should have been finished before launch.

Outfitting – actual

149. The longest delay revolves about pipework installations (see above).

150. The 28 June 2018 programme shows pipework installation dates (excluding accommodation outfitting) as follows:

Pipework installation	start	7 Nov 16 (actual)
	finish	19 Apr 19 (forecast)
	duration	893 days

151. Launch of hull 801 was on 21 November 2017. The 28 June 2018 programme shows the duration of pipework outfitting after launch to be (21 November 2017 to 19 April 2019 =) 514 days. Part of this duration is actual and part forecast.

152. The baseline programme (see figure 3-9 above) does not have a separate activity for piping outfitting. Nevertheless it is quite reasonable to assume that there is very little pipework associated with the bow thrusters (activity 34) and outfitting to crew and accommodation areas (activities 43 to 48). These are the only outfitting activities (in the baseline programme) carrying on after launch.

153. The comparative post launch pipework outfitting durations are therefore as follows:

- planned duration (baseline programme) – 0 days
- actual/forecast duration (28 June 2018 programme) – 514 days

154. The internationally recognized 1-3-8 rule says that any outfitting works carried out after launch would have been installed far quicker had they been carried out before launch. The principle underlying the 1-3-8 rule is as follows:

outfitting in the workshop	1 hour
outfitting on the slipway	3 hours
outfitting post launch	8 hours

155. Outfitting after launch is forecast to take 514 days. Using the 1-3-8 rule, this would have taken (514 days ÷ 8) x 3 = say, 193 days, had it been done on the slipway. The additional time for outfitting after launch rather than on the slipway is therefore (514 days – 193 days =) **321 days**.

156. This of course takes no account of the delays in design approvals to the various mechanical systems. Since only 2 of 40 were approved at 5 August 2018 the full effect of the delays for this cannot and have not been fully reflected in the 28 June 2018 cardinal dates programme. It is likely that there will be further delays to the Contractual Date of Delivery and FMEL fully reserves its rights in the matter.

157. As a consequence, of CMAL's acts and omissions and breaches of its obligations not to hinder FMEL, FMEL has had to re-sequence its outfitting works and suffered a delay of 321 days. FMEL is entitled to damages in the form of its delay costs. These are set out in part 4 of this claim (monetary claims).

SUMMARY OF DELAYS

1. The analysis of delay has been broken into three windows:

   - window 1: 16 October 2015 to 27 April 2016
   - window 2: 27 April 2016 to 21 November 2017 (launch)
   - window 3: 21 November 2017 to forecast completion

2. The delays in each window (which have been described in detail earlier in this part of the claim) are shown below in figure 3-10.

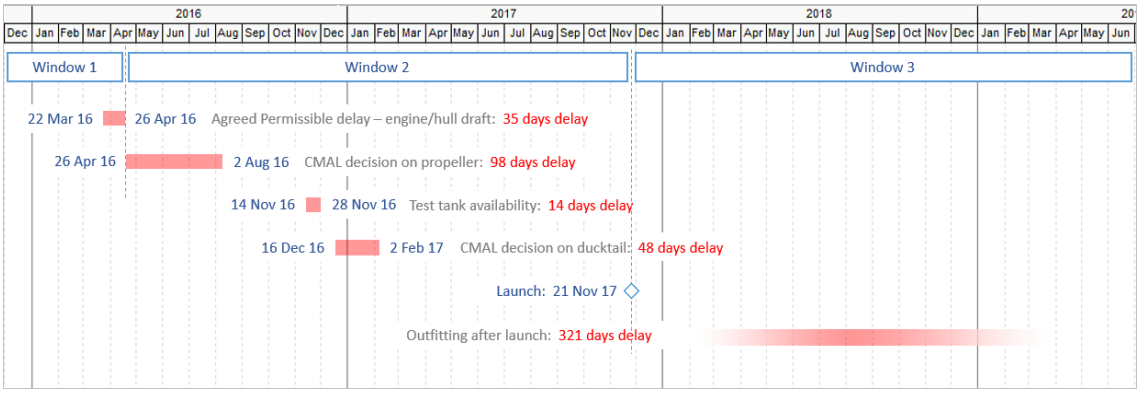


figure 3-10 summary of delays

3. Whilst it has been possible to identify the precise start and finish dates of each delay in windows 1 and 2, it has not been possible to do so in window 3. The delays in the third window arise from outfitting between launch (21 November 2017) and forecast completion of outfitting on 19 April 2019.

4. During this period *all* outfitting took longer than it should have done as a result of it being carried out after launch rather than before. It is therefore simply impossible to assign a precise period of delay for every single activity of outfitting which took place after launch.

5. This is a claim for additional payment substantially framed on the entitlement to damages for breach of contract. It is acknowledged that the basis of damages should be losses actually incurred or likely to be incurred. The claim is current as at 31 August 2018 and losses after that date are based upon a forecast. This must necessarily be the case since pipework outfitting (which is the cause of delay costs in window 3) continue beyond 31 August 2018 through to 19 April 2019.

HULL 802 DELAYS

INTRODUCTION

1. CMAL and FMEL entered into two separate contracts for the construction of two ferries: hull 801 and 802. The Contractual Date for Delivery of hull 802 was some two months after that for hull 801. The only way that this could be achieved was if the vessels were constructed concurrently. The intention was to build them side by side on the slipway.

2. This part of the claim will explain that the delays on hull 801 prevented the concurrent construction of hull 802. Long delays to hull 802 arose because the consolidation of its blocks on the slipway could only take place once 801 had been launched.

3. FMEL has suffered delays and incurred additional costs on the hull 802 works. These have arisen from breaches of the hull 801 contract by CMAL, which caused delay to 801 and, as a direct result, delay to 802. FMEL is entitled to recover its additional costs (for 802) in the form of damages for breach of contract under the hull 801 contract.

4. This part of the claim does *not* deal with any separate claims arising under the hull 802 contract. FMEL reserves its rights to make separate claims under the hull 802 contract.

THE PLANNED CONSTRUCTION METHODOLOGY

5. Contractual Dates of Delivery of the two vessels were as follows:

    - hull 801: 25 May 2018
    - hull 802: 26 July 2018

6. It was impossible to achieve these Dates of Delivery unless the vessels were constructed concurrently, side by side, on the slipway.

7. The parties entered into the two contracts on the same day: 16 October 2015. At that date, CMAL knew that the vessels could only be constructed concurrently. It is simply inconceivable that CMAL could have thought otherwise. Once CMAL were possessed of that knowledge it was incumbent on CMAL not to do anything that would prevent concurrent construction from taking place.

8. Concurrent construction of hulls 801 and 802 would involve some constraints as the slipway is relatively narrow. At its north end, where the slipway falls into the Clyde, its width is 46m. This left very little working space either side of the hulls – see figure 3-11 below.

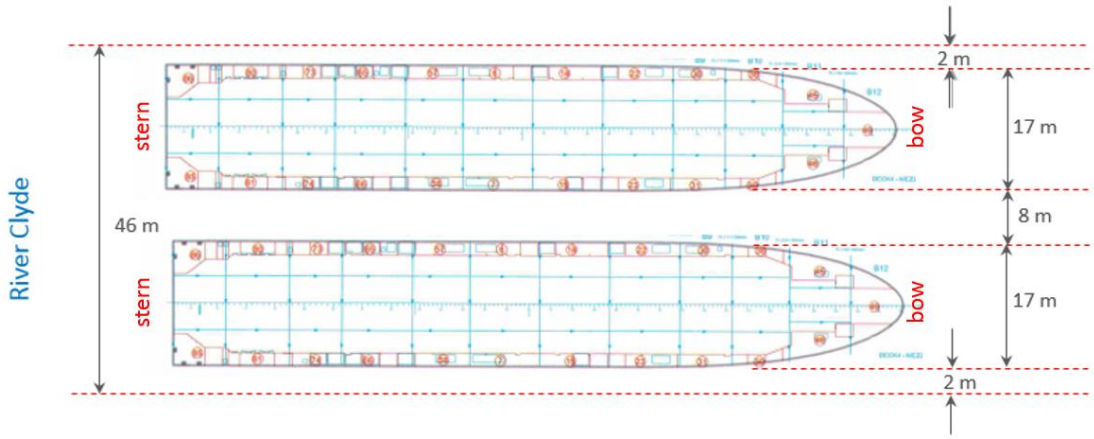


figure 3-11 hulls concurrently constructed on slipway

9. Each hull is 17 m wide. The residual space available for access would be 8m between the hulls and 2m either side. Even with this limited access, concurrent consolidation of the hulls was possible provided that they were built from the stern forwards.

10. The fabricated blocks would be moved by self-propelled modular transporters (SPMT's) which would only have sufficient access from the bow area of the vessel. Hence the need to consolidate starting with the stern blocks – see figure 3-12 below.

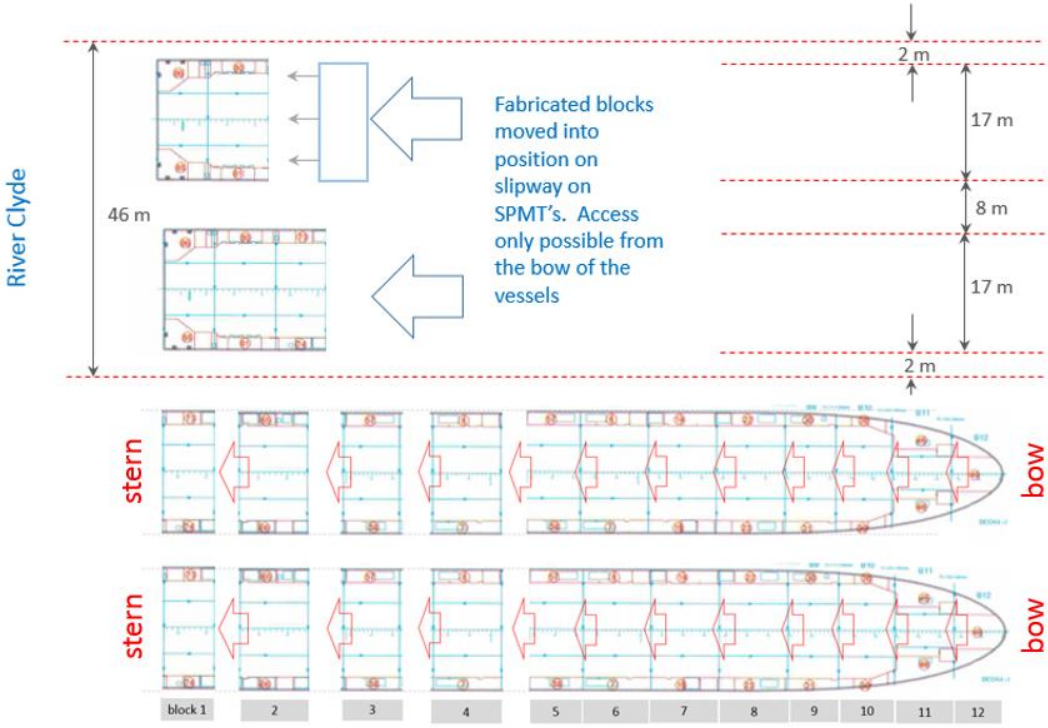


figure 3-12 block consolidation process from the stern

11. In theory it was would have been possible to significantly advance the consolidation of the 801 blocks before even starting consolidation of the 802 blocks, *provided* both vessels were consolidated from the stern. For example, blocks 1 to 6 of hull 801 could have been

placed on the slipway without affecting the construction of hull 802. Hull 802 could then progress starting with blocks 1, 2, 3, etc in that order.

CHANGE IN SEQUENCE OF WORKING

12. It has been explained earlier in this claim (see windows 1 and 2) that the fabrication and erection of the stern blocks were badly delayed as a result of CMAL's breaches in delaying the choice of propeller. This left FMEL in an impossible position since it needed to build both vessels from the stern forwards if it was to meet the Contractual Dates of Delivery.

13. The midship blocks were least likely to be affected as a result of the propeller design and FMEL chose to consolidate the 801 midship blocks 5 to 8 first on the slipway. This step was taken to mitigate CMAL delays and at least allow construction of 801 to be progressed.

14. The start dates of the consolidation were as follows:

- blocks 5, 6 and 7 on 15 August 2016
- block 8 on 22 August 2016

15. FMEL could not however adopt the same approach for hull 802 as if it did so this would prevent access for consolidation of the 801 stern blocks. This is shown in figure 3 - 13 below.

figure 3-13 consolidation of blocks for 801

16. Similarly, starting 802 consolidation with the midship blocks would prevent access for the stern blocks of 802. This is shown in figure 3-14 below:

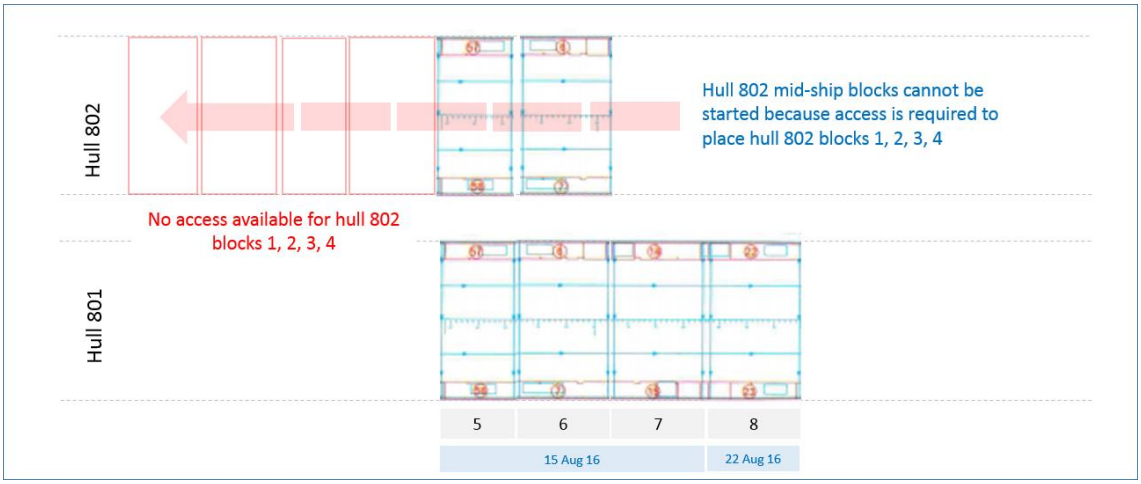


figure 3-14 hull 802 midship blocks obstruct 802 stern blocks

WERE FMEL'S MITIGATION MEASURES REASONABLE ?

17. Why then did FMEL place the 801 midship blocks on the slipway first, when it knew that this would likely prevent the hulls from being consolidated concurrently and thereby cause considerable delay to hull 802 ?

18. The propeller design was of fundamental importance. Only when it was designed, was it possible to build a scaled down version, attach it to a model of the hull and carry out the tank tests. The results of those tank tests would determine the final lines of the hull and in particular the design of the stern blocks.

19. Earlier in this claim (window 2) the narrative describes the tortuous process of eliciting a decision on the final design of the propeller from CMAL. As early as February 2016, CMAL was considering different propellers for hulls 801 and 802. It was not until 3 August 2016 that CMAL eventually chose a single propeller design.

20. By that date it was patently clear that the design of the stern blocks was likely to be very badly delayed, since model making and tank tests still had to be carried out before detailed design could even start. Without the design of the stern block, fabrication could not start. In the end the only sensible option was to start consolidating the midship blocks of hull 801 and carry out the construction of the vessels consecutively rather than concurrently.

21. The first 801 midship blocks (6, 7 and 8) were placed on the slipway on 15 August 2016 and from that point on concurrent construction became impossible.

22. So, under the circumstances were FMEL's mitigation steps reasonable ?

23. The implications of a lengthy wait for the design and fabrication of the stern blocks were considerable:

- if the hulls were to be consolidated concurrently, no consolidation of either hull could start until blocks 1 were fabricated;
- work at FMEL's yard would be significantly reduced;

- labour would have to be laid off with no guarantee that it could easily be recruited again;
- cash flow would dwindle with potentially catastrophic consequences for FMEL; and
- both vessels would be very significantly delayed.

24. With this in mind, FMEL took the considered decision that the most economic and appropriate course of action was to get on as quickly as it could with hull 801 and start consolidating the midship blocks. This would avoid very lengthy delays to the Contractual Date of Delivery of both vessels. Hull 801 could be launched before all outfitting works had finished to vacate the slipway for hull 802, albeit that carrying out works quayside (on 801) rather than on the slipway would be more expensive.

25. As it turned out, FMEL's decision to proceed in this manner was justified by subsequent events. Figure 3-15 below shows the start dates of fabrication of the hull 801 blocks.

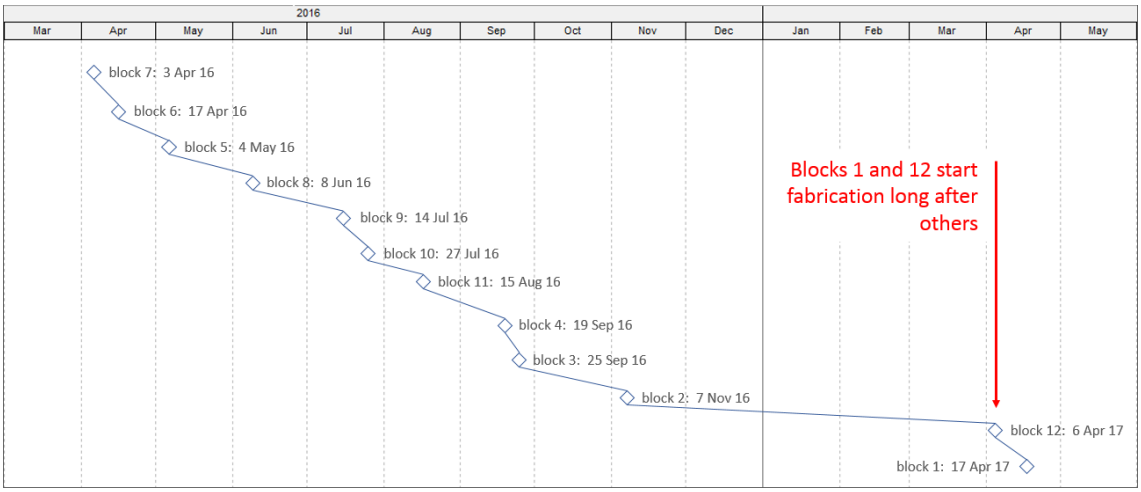


figure 3-15 hull 801 block fabrication start dates

26. The last block to be started on hull 801 was block 1 (the stern-most block) on 17 April 2017. This was due to delays caused by CMAL in deciding on a propeller and delay in deciding whether a ducktail would be permitted. (This is fully explained in window 2). Block 1, units 82, 83 and 84 were placed on the slipway on 19 June 2017. If FMEL had waited until this date before consolidating the blocks forward of this (i.e. blocks 2 -12) the launch and delivery date of both hulls 801 and 802 would have been far more severely delayed than is presently forecast.

27. It has long been the position that mitigation measure should not be critically scrutinized in minute detail long after the event. In *Banco De Portugal v Waterlow & Sons Ltd [1932] AC 452* at page 506 it was said:

> *Where the sufferer from a breach of contact finds himself in consequence of that breach placed in the position of embarrassment, the measures which he may be driven to adopt in order to extricate himself ought not be weighed in nice scales at the instance of the party whose breach of contract has occasioned the difficulty. It is often easy after an emergency has passed to criticise the steps which have*

been taken to meet it, but such criticism does not come well from those who themselves created the emergency. The law is satisfied if the party placed in a difficult situation by reason of the breach of a duty owed to him has acted reasonably in the adoption of remedial measures, and he will not be held disentitled to recover the costs of such measures merely because the party in breach can suggest that other measures less burdensome to him might have been taken.

28. In view of the delays described in window 2 and CMAL's indecision over the choice of propeller, CMAL's decision to mitigate delay and build the vessels consecutively, was in all the circumstances, reasonable. This is ultimately borne out when viewed in the light of the long delays to fabrication of the stern blocks which was dependent upon CMAL's decision on the propeller and duck tail.

ASSESSMENT OF DELAY

29. There were lengthy internal discussions within FMEL about constructing hulls 801 and 802 on the slipway consecutively rather than concurrently. On 15 August 2016 when the midship blocks for hull 801 were placed on the slipway, concurrent construction of 801 and 802 was no longer feasible.

30. For the purposes of this claim, the delays to hull 802 have been taken from 15 August 2016 although the delay was no doubt somewhat longer than this. The baseline programme showed that consolidation of the 802 blocks should have started on 27 June 2016, so potentially there was a delay on hull 802 from that date.

31. FMEL fully reserves its rights to make claims in respect of any hull 802 delays arising before 15 August 2016.

32. Hull 801 was launched on 21 November 2017. However, the blocks for 802 could not be consolidated immediately. The slipway needed to be prepared.

33. Figure 3-16 (below) is a section through the slipway and hull showing the structures needed for the launch. The hull blocks are consolidated on concrete keel blocks at the centre and bilge blocks either side. Between these are a series of blocks running the full length of the hull upon which sits the sliding way and standing way.

34. Once hull 801 had been launched all these temporary structures and associated supports and equipment had to be stripped back to the bare concrete of the slipway. Anchors, pins and angle bars, etc drilled and bolted to the slipway were burnt away and ground flush with the concrete surface since they formed slip hazards.

35. The surface of the slipway was then thoroughly cleaned of excess grease and tallow which had been liberally applied to the sliding way for launch. It is only at this point the blocks for 802 could start to be laid on the keel/bilge blocks.

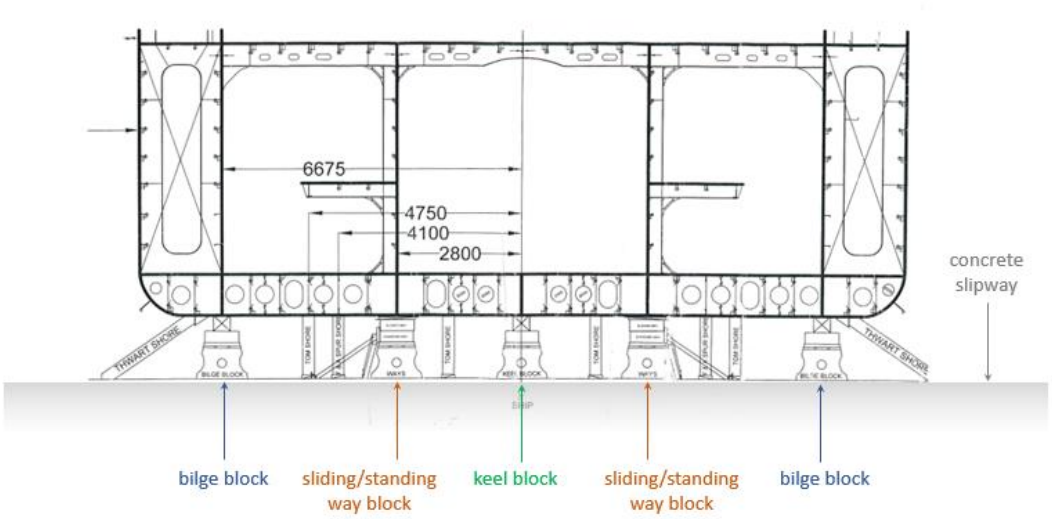


figure 3-16 section through slipway showing launch gear

36. The slipway was eventually cleared and prepared, ready for hull 802, on 31 January 2018. These works extended over the Christmas and New Year holiday period.

figure 3-17 clearing the slipway post launch

37. Consequently, the total delay to hull 802, caused by the delays on 801, was 533 days as shown below in figure 3-18.

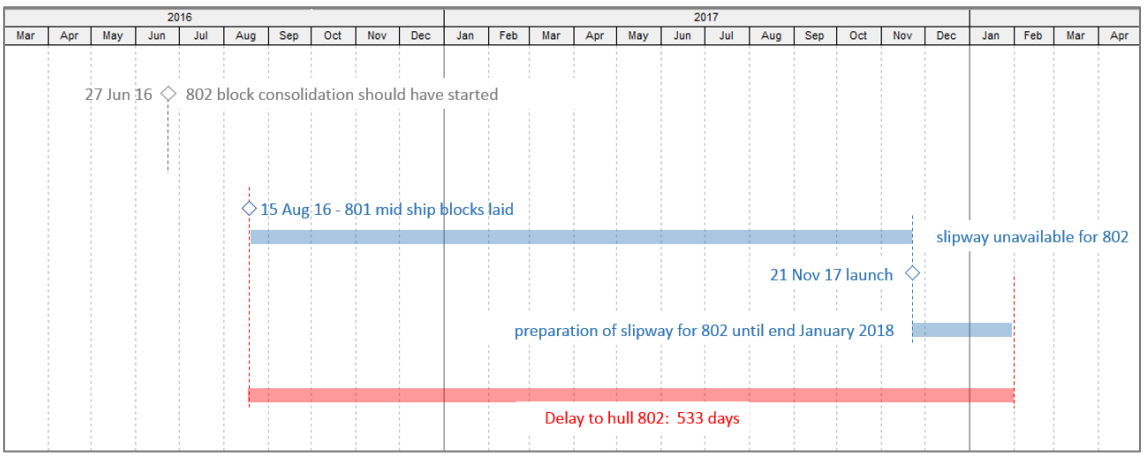


figure 3-18 delays to hull 802

CONTRACTUAL/LEGAL BASIS OF CLAIM

38. As a result of breaches by CMAL under the hull 801 contract, FMEL suffered severe delays under the 802 contract and incurred associated delay costs. FMEL is entitled to recover its delay costs as damages for breach of the hull 801 contract. These damages also included the Late Delivery Compensation (liquidated damages) potentially due for late completion of hull 802.

39. The entitlement to recover these damages is explained more fully in part 5 of this claim (contractual/legal basis) of the claims.

DISRUPTION

INTRODUCTION

40. There has been major disruption to the construction of hull 801. Whilst most elements of the works have been affected, outfitting and block fabrication suffered the most. The disruption has arisen as a result of:

- CMAL's failure to resolve major conceptual design issues which prevented FMEL from designing mechanical systems and install outfitting at block fabrication stage;
- CMAL's interference in the design process including failing to promptly review and approve design submissions; and
- changes and modifications instructed by CMAL.

41. In many instances the above matters are inextricably linked and assigning an event to one or more of the above categories is somewhat academic. For example, an inadequacy in CMAL's conceptual design may result in CMAL's unwarranted interference in FMEL's right to develop that design unhindered by CMAL. This may bring about an instruction from CMAL to amend the design (or even amend already constructed works) which amounts to a change or modification.

42. This part of the claim will first explain the conventional sequence of outfitting and how this was reflected in FMEL's cardinal dates programme (the baseline programme). Some of the main causes of disruption to the outfitting and block fabrication will then be described although these often affected other parts of the works too.

- conceptual design issues
- approval of mechanical systems
- port fit – designing the vessel for all prospective ports to be serviced
- LNG tanks
- relocation of LNG bunkering
- relocation of other bunkering stations
- belting and pilot ladders
- passenger seats
- modifications or changes pending agreement

43. Finally, the consequences of outfitting after block fabrication will be set out.

GAO-09-322

44. Reference is again made to *GAO-09-322 Best Practices – High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding*. This is a report prepared by the USA Government Accountability Office for the US Congress in May 2009 [Appendix 2 – 001]

OUTFITTING

The usual construction approach

45. GAO-09-322 (at page 3) illustrates the various phases of the shipbuilding process. Outfitting is one of those phases.

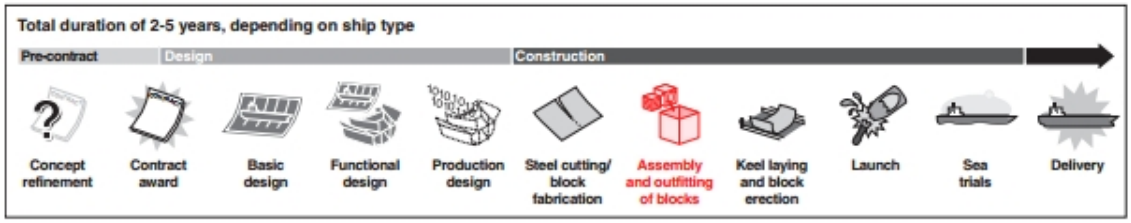


figure 3-19 typical shipbuilding process

46. GAO-09-322 explains the outfitting process as follows:

> *Once any planned doorways or holes are cut into the block units, the blocks are ready for equipment installation, a process called block outfitting. Block outfitting is partially performed while the block is positioned upside down, as figure 3 shows. This approach enables shipyard workers to install equipment more efficiently by lowering it into the block instead of hoisting the equipment into place. Building blocks in the inverted (upside down) position also enables more down-head welding, rather than less efficient overhead welding.*
>
> *Blocks are generally outfitted with pipes, brackets for machinery or cabling, ladders, and any other equipment that may be available for installation at this early stage of construction. This allows a block to be installed as a completed unit with connectors to adjacent blocks. Installing equipment at the block stage of construction is preferable because access to spaces is not limited by doors or machinery, unlike at later phases. [GAO-09-322 page 5]*

47. In the extract above, the reference to "figure 3" is a picture of the upside down blocks showing the outfitting elements installed. It is reproduced below:

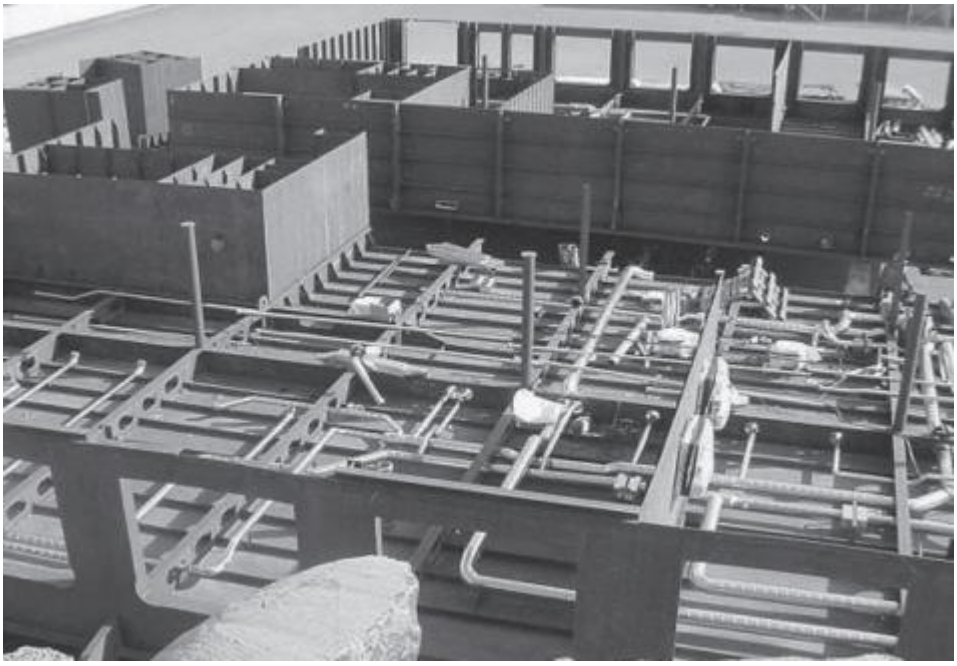


figure 3-20 extract from GAO-09-322 showing block outfitting

The scope of outfitting in the 801/802 contracts

48. The principal elements of outfitting in the hull 801 contract are detailed in the Specification at pages 36 to 40 [Appendix 3 – 054] as follows:

- machinery outfitting
- fire-fighting / safety outfitting
- accommodation ventilation
- electrical outfit /navigation
- electrical common systems
- electrical distribution system
- electrical outfit

49. Each of the above elements are sub-divided into components. They are not all set out here, but for example, machinery outfitting (the first in the list above) comprises:

- engines
- generator sets
- control room equipment
- steering gear
- shafting
- bow thruster compartment
- workshop equipment
- hydraulic rooms
- machinery removal routes
- small tanks
- pipes
- bilge system
- valves
- potable water system

- sanitary water system
- black and grey water system
- fire extinguisher system
- deck drainage
- LNG loading and gas fuel system
- nitrogen system
- fuel oil system
- lubricating oil system
- sea water cooling system
- freshwater cooling system
- hot and cold water system
- exhaust pipes
- mounting of main engines

50. By any standards, the outfitting is extensive. This can be seen from the isometric layout of the piping shown below in figure 3-21.

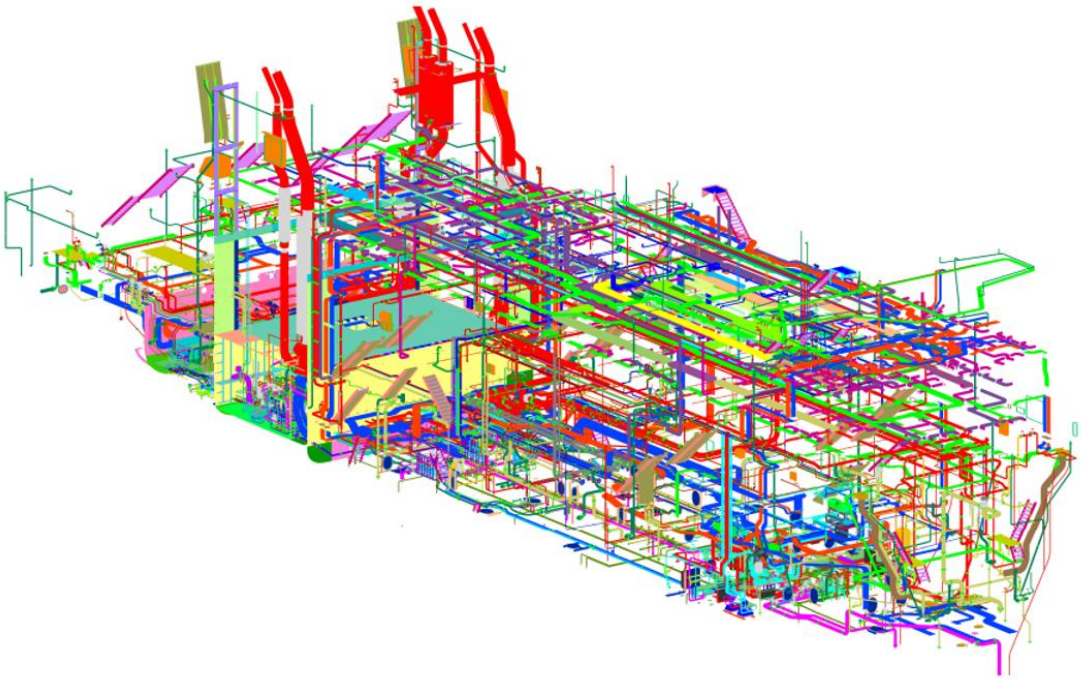


figure 3-21 piping layout isometric

51. Cable trays also have to be fitted in and around the pipework and this is shown in figure 3-22 below.

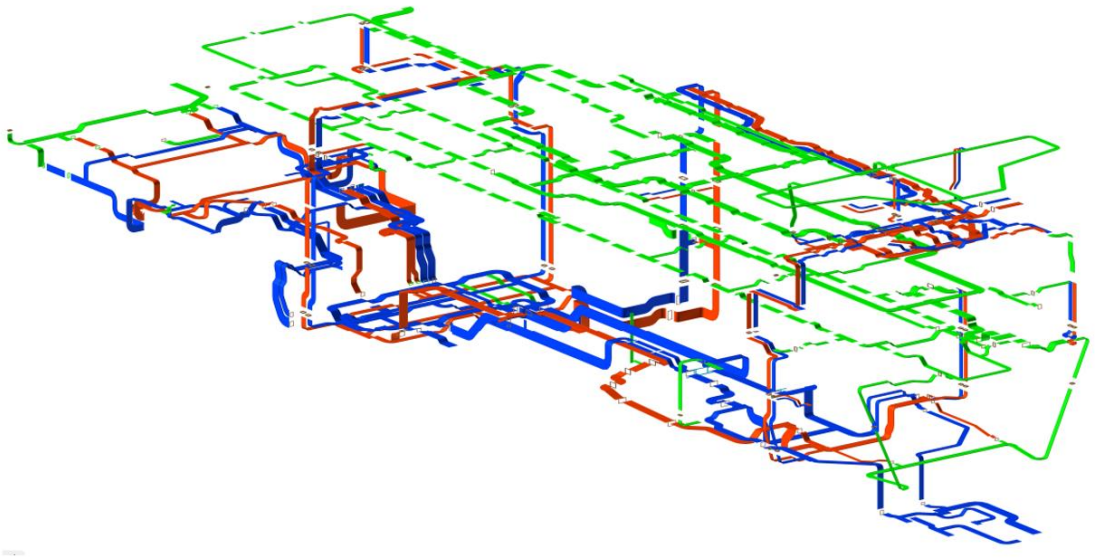


figure 3-22 cable tray layout isometric

52. Both the pipework and the cable trays have to pass through steel bulkheads, decks and stiffeners, etc and there is obvious merit in facilitating this at block fabrication stage rather than during or after block consolidation.

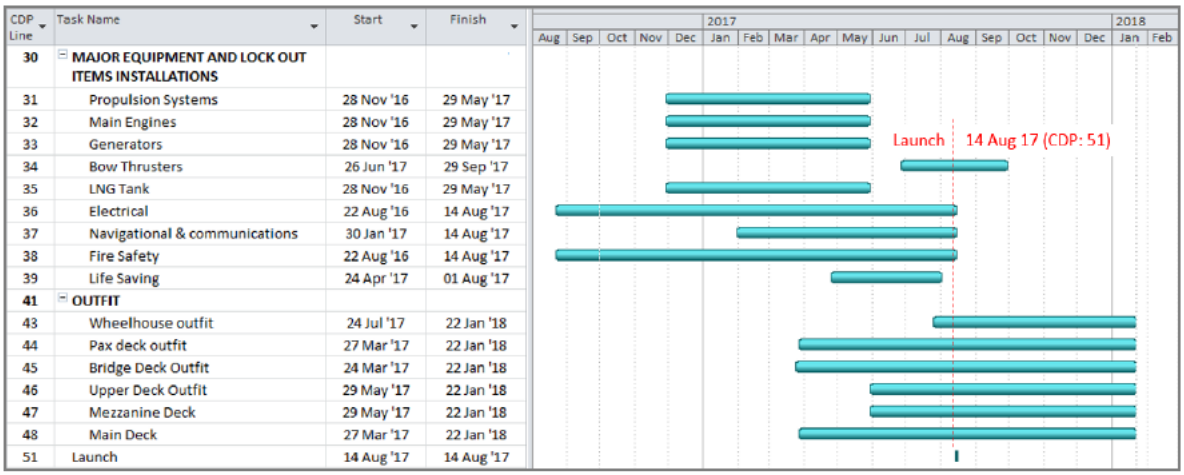
FMEL's planned outfitting methodology

53. GAO-09-322 says that pipes, brackets, ladders and equipment are conventionally installed at the block fabrication stage (see above). It goes on to say:

> *Shipyards we visited tended to have a high degree of outfitting completed prior to launch, and one Korean shipyard typically has close to 95 percent of the ship completed at the time of launch.* [GAO-09-322 page 8]

54. For ease of reference this has been called "advance outfitting" in this claim.

55. Figure 3-23 below shows the outfitting activities extracted from the cardinal dates programme of 7 January 2016 – the baseline programme. A full copy of the programme is attached at Appendix 3-002.



CDP Line	Task Name	Start	Finish
30	MAJOR EQUIPMENT AND LOCK OUT ITEMS INSTALLATIONS		
31	Propulsion Systems	28 Nov '16	29 May '17
32	Main Engines	28 Nov '16	29 May '17
33	Generators	28 Nov '16	29 May '17
34	Bow Thrusters	26 Jun '17	29 Sep '17
35	LNG Tank	28 Nov '16	29 May '17
36	Electrical	22 Aug '16	14 Aug '17
37	Navigational & communications	30 Jan '17	14 Aug '17
38	Fire Safety	22 Aug '16	14 Aug '17
39	Life Saving	24 Apr '17	01 Aug '17
41	OUTFIT		
43	Wheelhouse outfit	24 Jul '17	22 Jan '18
44	Pax deck outfit	27 Mar '17	22 Jan '18
45	Bridge Deck Outfit	24 Mar '17	22 Jan '18
46	Upper Deck Outfit	29 May '17	22 Jan '18
47	Mezzanine Deck	29 May '17	22 Jan '18
48	Main Deck	27 Mar '17	22 Jan '18
51	Launch	14 Aug '17	14 Aug '17

figure 3-23 baseline programme outfitting items

56. The programme shows several items under the heading of "OUTFIT" but these clearly do not represent the full extent of outfitting works. Pipework outfitting serving the equipment is included under "MAJOR EQUIPMENT AND LOCK OUT ITEMS INSTALLATIONS". (There is a separate activity in the baseline programme for ordering materials.)

57. FMEL's planned hours for outfitting (which are shown below) diverge somewhat from the baseline programme. The hours exclude joinery and painting works which are sometimes classified as outfitting.

Works location	***Planned manhours***		
	hrs	*%*	*Cum %*
Workshop hours (i.e. during the block fabrication process)	38,020	36.91	36.91
Slipway hours	65,000	63.09	100.00
Quayside hours	-	-	
TOTAL	**103,020**	**100.00**	

58. The planned manhours, somewhat over-optimistically, did not allow for any outfitting after launch, whereas the baseline programme showed the following was to be carried out at the quayside:

- the bow thrusters;
- final fix type items to passenger areas (i.e. fittings, furniture and equipment); and
- the bridge/wheelhouse.

59. Despite the inconsistency between the baseline and the planned manhours, the point is that most of the outfitting was planned to be complete before launch.

The advantages of advance outfitting

60. Advance outfitting brings many advantages. Some of these are described below. If a shipbuilder is prevented from advance outfitting then not only do those advantages merely disappear, the shipbuilder in fact becomes disadvantaged. The disadvantages are inverse (often exponentially so) to the lost advantages.

- Shorter construction period : If outfitting is carried out in parallel with the hull fabrication, the time in dry dock (or on a slipway, as the case may be) is reduced along with the overall vessel construction period.

- Better working conditions: Outfitting at block stage is carried out in a workshop environment. The efficiency of the work force is greater because of the improved working space, access, lighting, ventilation. etc. Workshops are designed and built with a view to achieving optimum productivity.

- Open sky access for installation of equipment: With advanced outfitting, equipment can be installed at the block fabrication stage. It can be lifted into the blocks with open sky access and there are no obstructions above such as decks. The LNG tank on hull 802 was installed with open sky access whereas the tank on hull 801 was installed after upper decks had been fitted. The installation cost and time was significantly less on hull 802. This is explained later.

- Fewer crane lifts: If machinery, equipment and piping, etc are installed at block fabrication stage, the fabricated block along with the outfitted components can be lifted as one. Later installation of outfitting requires multiple lifts.

- Less overhead welding**:** Overhead welding, where the welding torch has to be held in an overhead position, is inconvenient, time consuming and potentially more dangerous. When outfitting is done at block stage, the blocks are turned upside down and the majority of the outfitting can be welded in a down-hand position. This greatly reduces welding time and the need for scaffolding and staging.

figure 3-24 overhead and down-hand welding

FMEL was prevented from carrying out advance outfitting

61. Unfortunately delays to the works prevented FMEL from advance outfitting at the block fabrication stage and this caused severe disruption. Yet further disruption was caused by the matters now described below.

CAUSES OF DISRUPTION

CMAL's obligation not to interfere

62. In part 2 of this claim it was briefly explained that FMEL not only has an obligation to design it has a right to do so, unhindered by CMAL. CMAL must:

- not hinder or prevent FMEL from carrying out its obligations (including design) in accordance with the terms of the contract and from executing the works in a regular and orderly manner; and
- take all steps reasonably necessary to enable FMEL to discharge its obligations and to execute the works in a regular and orderly manner and in accordance with the terms of the Contract and in accordance with good international shipbuilding and marine practice.

63. These obligations are explained more fully in part 5 of this claim (contractual/legal basis of the claims). The events which caused disruption (some of which are now described below) arose as a result of CMAL's breaches of these obligations.

Disruption arising from conceptual design issues

64. CMAL singularly failed to "retire all major risks" before award of the contract. This has been explained in part 2 of this claim. This caused major disruption from the very start of the construction process. Outfitting could not be installed at block fabrication stage and uncertainty as to the location of major items of equipment and pipework disrupted block fabrication and resulted in considerable abortive and remedial works.

65. Outfitting eventually had to be installed out of sequence (on the slipway or after launch) in increasingly congested and inaccessible areas. In effect the disruption increased as the job progressed.

66. The initial causes of disruption related to the conceptual design are not all recited here. Some examples are given below, others are found throughout this claim.

- A number of important tanks and spaces below the main deck were not shown in the conceptual design and CMAL continued to interfere in the design of these areas throughout the works. These areas were the very locations where a large amount of outfitting needed to be designed and installed.
- The selection of the engine was not made until 26 April 2016, by which time 20% of the contract period had elapsed. There are numerous mechanical systems which serve the engines and these systems involve a considerable amount of outfitting.

- CMAL insisted on investigating alternative propeller designs. It never chose a propeller until 2 August 2016, one third of the way through the contract period. The propellers and associated gear boxes are also fed by an number of mechanical systems which again involve substantial outfitting.

- Bunkering arrangements were not finalized until mid 2016. The routing of the cryogenic pipe which feeds the LNG tank has (in October 2018) only recently been agreed by CMAL. There are design restrictions associated with this type of pipe – for example, bends must be kept to a minimum. This has meant that other system pipes must be carefully designed to accommodate the cryogenic pipe layout.

67. As a result of these issues the design of many mechanical systems was badly delayed. The problem was exacerbated by the fact that CMAL over-specified to the extent that FMEL struggled to fit everything into the rigidly defined space constraints of the hull. Even now the engine room is overcrowded such that designing for maintenance access is extremely challenging. CMAL subsequently omitted a number of standby systems to ameliorate the congestion, but this resulted in yet further design changes to the systems, delaying outfitting.

Approval of mechanical systems

68. There are 40 mechanical systems which form a significant part of the outfitting. These systems are closely linked to one-another and any delay to one system is likely to delay many other systems. Below is an extract from the Piping Status Sheet as at 5 August 2018.

Pipe system	*Pipe system reference*	*Sent to CMAL*	*Rev.*	*CMAL approved*
Air and sounding (vent pipes)	AP	Y	1	
Air and sounding (sounding pipes)	SP	Y	1	
Air and sounding (draught sensing)	DS			
Bilge system (clean bilge)	CB	Y	4	
Bilge system (oily bilge)	OB	Y	4	
Ballast system	BA	Y	2	
Heeling system	HS	Y	2	
Sea water cooling system	SW	Y	2	
Fresh water cooling system	FWLTHT	Y	3	
Domestic fresh water system	DF	Y	3	Y
Domestic fresh water system	CDF	Y	3	Y
LNG system (ME & generators)	LNG			
LNG (bunker and transport)	LNG			
Fire and wash deck system (sea water)	FF	Y	B	
Fire and wash deck system (fresh water)	FFW	Y	B	
Sanitary system (grey water)	GW	Y	1	

Pipe system	*Pipe system reference*	*Sent to CMAL*	*Rev.*	*CMAL approved*
Sanitary system (black water)	BW	Y	1	
Nitrogen system (including compressed air)	NI			
Exposed deck suppers and drains	SD			
Fuel oil system (gen sets)	FO	Y	5	
Fuel oil system (bunker & trans)	FO	Y	2	
Lube oil system (ship systems)	LO	Y	2	
Lube oil system (ship systems)	LO	Y	3	
Lube oil system (purification)	LO	Y	1	
Lube oil system (transfer)	LO	Y	2	
General drainage	Gen Drains			
Sludge and waste oil system	SL			
Exhaust gas system	EX			
Deck drenching system	DR	Y		
NOVEC 1230 and dry chemical powder	NV	Y		
Water mist system	WM	Y		
Bow and stern ramps and doors hydraulics	HY (Rm)			
Shell doors and hatches hydraulics	HY(D)			
Ships hydraulics (miscellaneous)	HY(M)	Y	1	
Start, control and working air system	CA	Y	1	
Remote valve system	RMV			
Overboard discharge pipe stubs	OVB			
GLYCOL	GL	Y	1	
Heating system	BHS	Y	2	
Chilled water system	CHW			

69. As at 5 August 2018 the status of approval for the 40 systems can be summarised as follows:

- 22 have been approved by Lloyd's Register
- 27 have been submitted to CMAL, whereas; only,
- 2 have been approved by CMAL; and,
- 13 have yet to be submitted to CMAL

70. The order of design is dictated by the layout of the principal items of equipment and then the order in which the pipework needs to be installed. First come the systems with "lock in" pipes (those pipes of large diameter) followed by those systems with smaller diameter pipes.

71. This logical sequence is crucial to an efficient design and installation process. It minimizes the amount of re-work by avoiding removal /adjustment of installed pipework and fittings to accommodate others.

72. Many of these systems should have been resolved at the time of block fabrication to enable advance outfitting to take place. Yet, on 5 August 2018 some 8 months after launch only 2 of the 40 systems (5%) are approved.

73. Many of the delays have arisen from the protracted, iterative approval process introduced by CMAL above and beyond that required by the Contract. This has interfered with FMEL's right to design. The lube oil purifiers, the belting and pilot ladders and cryogenic pipes are good examples of the prolonged approval process.

74. Clause 20 of the Contract requires CMAL to approve design submissions within 14 days of receipt.

75. CMAL has in many instances embarked on a long process of preferential engineering packaged as an approval process. In this manner it has introduced changes which are outside the specification under the guise of refusing to approve contract compliant submissions. The process was typically as follows:

- FMEL would submit a design which complied with the specification.
- Continuous requests from CMAL followed to enhance the design in accordance with other ships in the CMAL fleet.
- CMAL would argue that its requests reflected, "good ship building practice", However, CMAL's interpretation usually represented further enhancements to the specification or merely simple design changes.
- CMAL would interfere in the design process by informally liaising direct with FMEL's own design team and even FMEL's subcontractors and suppliers.
- CMAL commented on the design by way of a scatter gun approach. Different and often conflicting comments were received from different CMAL personnel. There was no co-ordinated system of review and approval from CMAL. CMAL has had 10 persons in its team at the shipyard, although the number has varied from time to time. The Contract permits one representative with a reasonable number of assistants.
- Notwithstanding the fact that CMAL should not have been in discussions with FMEL's subcontractors, CMAL adopted an inconsistent approach with the advice it received from those subcontractors. For example, CMAL would follow or ignore Wartsila's advice depending upon CMAL's desired objective.

Interference in the design process

76. FMEL's works have been badly disrupted by CMAL re-visiting already approved items, even after works have already been carried out. This affects FMEL in a number of ways.

- The design team are distracted from progressing with its works in an orderly manner and diverted on to matters which have previously been resolved.

- Where components have been installed they have to be removed, adapted (or scrapped, increasing wastage) and re-installed.

- The whole process is prolonged because of CMAL's inability to quickly make decisions. The very fact that a matter is being re-opened reflects that inability.

77. One example of CMAL re-opening matters which have already been approved and after installation works have been carried out on the vessel is the lube oil purifiers.

Lube oil purifiers

78. The time line of events in connection with these purifiers is as follows:

- 10 March 2017 (10:39 hrs) - FMEL submits all drawings, dimensions and the specification to CMAL [Appendix 3 – 055] (Alfa Laval letter dated 20 October 2015. Alfa Laval is the manufacturer of the purifiers.)

- 9 January 2018 (16:44 hrs) - Ten months after submission CMAL requests technical/manufacturer's handbooks for fuel and lube oil purifiers. [Appendix 3 – 056]

- 6 November 2018 (10:27 hrs) [Appendix 3 – 057] - CMAL informs FMEL:

  I have been looking into the sizing of the lube oil purifiers fitted to 801 and I consider them to be oversized for both main and aux engines and would like to pass the following by you …

  Going by the calculations both sets of purifiers are well oversized and therefore taking up unnecessary space. Would FMEL please check this out and comment.

- 6 November 2018 (15:07 hrs) – FMEL immediately replies to CMAL confirming that CMAL's calculations reflect those of FMEL and concludes. [Appendix 3 – 058]

  … the decision to proceed was taken after a review of alternative options in the market, and in consideration of the technical specification and schedule requirements.

- 6 November 2018 (16:43 hrs) – CMAL responds. [Appendix 3 – 059]

  we would have expected the decision to proceed and the background informing such decision would have been discussed in the first instance with CMAL …

  We look forward to your review given that space within the machinery areas is at a premium and that weight considerations are critical.

- 9 November 2018 (13:07 hrs) [Appendix 3 – 060] – FMEL replies to all the technical aspects raised by CMAL, by assuring CMAL that,

the selection decision for the purifiers was thoroughly considered at the time, and we do not believe it needs to be revisited. However, we are happy to elaborate on the decision …

- FMEL also confirms that what had been supplied was in full compliance with the specification. Moreover the supplier Alfa Laval:

  … was the only supplier given in the technical schedule. We also understood CMAL and CFL's preference for Alfa Laval themselves reinforced this point.

  …

  CMAL were involved in the selection process and made aware of what we were proposing. The Alfa Laval Specification was shared with you on the 10 March 17. The proposed purifier output was clear on this submission.

  I trust we have given you sufficient background to this issue, and that we have offered the smallest and lightest solution to meet the specification requirements.

- On the same day, 9 November 2018 (13:37 hrs) [Appendix 3 – 061] - CMAL acknowledges FMEL's response and says, in regard to the purifiers which were originally specified 18 months earlier that they are:

  … accepted with regard to the selection of equipment.

  …

  I guess what needs to be concentrate (sic) on is achieving a suitable location of the purifier which is currently encroaching on the hatch access and lifting area within the machinery space.

79. CMAL took from 10 March 2017 to 9 November 2018 (which is 168 days after the Contractual Date of Delivery) to finally approve the lube oil purifiers re-opening a previously approved submission along the way.

80. This is not an isolated example. CMAL persistently intervened in the design process and questioned:

- equipment supplied in accordance with the Specification; and
- even after installation, the position equipment had been fixed.

81. In summary, disruption has been caused by the inadequacy of the conceptual design, interference in the design process by CMAL and numerous changes and modifications instructed by CMAL.

Port fit (embarkation door positions)

82. Section 100 of the Specification [Appendix 3 – 062] deals with the general requirements of the vessel. The fourth paragraph (on page 8 of the Specification) explains that the vessel may be used for services to multiple ports.

> *The vessel is designed as a 'Euro-B" Class , specifically suited for operating on multiple West Coast of Scotland routes, with particular emphasis on efficient operation on medium distance routes (transit duration from 30 minutes to 5 hours), including multi-port routes. Dimensional analysis of the following ports will be carried out within six weeks of contract signing as a joint project between Buyer and Builder* ***in order to evaluate the linkspan/ramp and passenger door interfaces****.* [emphasis added]

83. The evaluation by CMAL and FMEL was to assess the "linkspan ramp and passenger door interfaces". These are essentially the dimensions of the passenger access systems. They need to be evaluated to ensure that the design of the passenger doors and ramps on the vessel are suitably aligned, as best they can be, with the port facilities.

84. The Specification then lists the various ports from which the vessel may operate:

- Ardrossan
- Uig
- Tarbert
- Lochmaddy
- Oban I Oban II
- Coll
- Tiree
- Castlebay
- Craignure
- Lochboisdale
- Colonsay
- Brodick
- Gourock (refuge)
- Ullapool (relief)
- Stornaway (relief)

85. Unfortunately, the evaluation exercise turned into something much more than that. CMAL's view of the Specification was that the vessel should be capable of being aligned with all the ports, in both orientations (bow in and stern in). CMAL was looking for a universal design solution for the vessel. It wasted many months reviewing designs in a futile attempt to do this.

86. It was simply impossible to design the vessel to achieve what CMAL wanted. The gangway locations in many of the ports are located to suit smaller ships than 801 (or 802)

and there is a smaller distance between the car ramp and the passenger access door than at the ports which serve larger vessels.

87. FMEL spent many abortive hours in search of a solution which would meet CMAL's unattainable requirements. This diverted valuable design resources away from other matters which FMEL was therefore unable to progress. The following is a time line of some of the main events related to the port fit issue.

- 10 December 2015: FMEL advises CMAL of the impossibility of attaining a universal solution- i.e. alignment of ramps and passenger doors in all ports, in all orientations (bow in or stern in) . [Appendix 3 – 063]
- December 2015 to June 2016: CMAL and FMEL visit main ports for survey.
- 5 May 2016 (16:27 hrs): FMEL issues a matrix summarizing the ports and indicating the feasibility/constraints of whether the vessel's passenger doors and the bunker doors align with the ports. The matrix is shown below (see Appendix 3-064):

Port	Ship position in port			Passenger door accessible when Bow or Stern in	Passenger door accessible with Starboard PAX Door moved aft by 10m	LNG Bunker*		MGO Bunker*	
	Normal Operation Bow or Stern in	Normal Operation Alongside Port or Starboard	Houlder drawing	Bow/Stern	Bow/Stern	Required	Possible Bow/Stern	Required	Possible Bow/Stern
Ardrossan	Bow	Port	Bow/Stern	Yes/No	Yes/Yes	Yes	Yes/Yes	Yes	Yes/Yes
Uig	Stern	Stbd	Bow/Stern	Yes/Yes	Yes/Yes	Yes	No/Yes	Yes	Yes/Yes
Tarbert	Bow	Stbd	Bow/Stern	Yes/No	No/No	No	-	No	-
Lochmaddy	Bow	Stbd	Bow/Stern	Yes/Yes	Yes/Yes	No	-	No	-
Oban I	Bow	Port	Bow/Stern	Yes/No	Yes/Yes	Yes	Yes/(Yes**)	Yes	Yes/(Yes***)
Oban II	N/A		N/A	N/A	N/A		-		-
~~Coll~~	N/A		N/A	N/A	N/A	No	-	No	-
~~Tiree~~	N/A		N/A	N/A	N/A	No	-	No	-
Castlebay	Stern	Port	Bow/Stern	Yes/No	Yes/(Yes****)	No	-	No	-
~~Craignure~~	Bow	Port	Bow/Stern	No/No	No/Yes	No	-	No	-
Lochboisdale	Stern	Port	Bow/Stern	Yes/No	Yes/(Yes****)	No	-	No	-
~~Colonsay~~	N/A		N/A	N/A	N/A	No	-	No	-
Brodick	Stern	Port	Bow/Stern	Yes/Yes	Yes/Yes	No	-	No	-
Gourock [r]	Bow	Stbd	Bow/Stern	Yes/Yes	Yes/Yes	No	-	No	-
~~Ullapool [r]~~	N/A		N/A	N/A	N/A	Yes	-	Yes	-
~~Stornaway [r]~~	N/A		N/A	N/A	N/A	No	-	No	-

figure 3 – 25 port fit matrix

- In its e mail of 5 May 2016, FMEL highlight the following points:
  - ◊ *This considers fore & aft location, not height of doors. We have stated what we believe to be normal now/stern in for each port.*
  - ◊ *Houlder's are continuing to work on the port fit drawings, significantly improving the detail on what they last delivered to us. However, in the meantime can you please confirm our assumed normal ship orientation in port, and also whether the port/ship orientations where gangway alignment isn't possible are acceptable.*

- ◊ *To move the starboard door aft (~10m) to make Stern in work for Oban 1 would then mean normal Bow In at Tarbert wouldn't work – this clearly won't be acceptable. So the only solution to make both work is to have 2 doors on the starboard side, which we think will be fairly undesirable since this would take away more free window space from the passenger lounge.*

- 23 June 2016 (11.50 hrs and 13.52 hrs): FMEL requests data from CMAL in order complete port fit drawings. [Appendix 3 – 065]

- 27 June 2016 (09.42 hrs): FMEL issues port fit drawings to CMAL. [Appendix 3 – 066]

- 5 July 2016 (19.27 hrs): FMEL informs CMAL that vital design information supplied by CMAL for Brodick in incomplete. [Appendix 3 – 067]

- 6 July 2016 (09.52 hrs): CMAL responds and attaches Brodick bathymetric survey. [Appendix 3 – 068]

- 6 July 2016 (09.53 hrs): CMAL advises that the information supplied is pre-dredge and that until the dredging at the new pier is complete CMAL do not yet have a revised survey and, "it might be a while before they get one". [Appendix 3 – 069]

- 6 July 2016 (09.55 hrs) [Appendix 3 – 070] : FMEL responds as follows:

  - ◊ *I was just about to reply to say that what you sent is for the old pier. Maybe we leave it for now and once the data is available for the new pier it could be added to the port fit drawing at a later date. I assume there should be no water depth concerns at the new pier?!*

- 23 August 2016 (16.14 hrs): CMAL provides further information from the ports and harbours team specifically tide and pier deck levels at Craignure. [Appendix 3 – 071]

- 12 January 2017 (11.37 hrs): CMAL provides latest drawings for Brodick Pier and Linkspan facility. [Appendix 3 – 072]

- 12 January 2017 (12.31 hrs): FMEL notes that the drawings supplied fail to show the position of the passenger access systems (PAS). [Appendix 3 – 073]

- 3 February 2017 (12.50 hrs): FMEL again pursues the outstanding information in the absence of any response from CMAL. [Appendix 3 – 074]

  - ◊ *Any progress on getting the PAS info for Brodick. We are finalising our production details of the TTS passenger access doors and need to be sure all is ok with Brodick.*

  (At that time Brodick was a brand new port being built by CMAL and the information requested by FMEL should therefore have been readily available.)

- 15 February 2017: CMAL and FMEL meet at Brodick to discuss alignment challenges. (See Minutes of Meeting issued on 23 February 2017 below.)

- 22 February 2017 (17.25 hrs): CMAL issues partial CAD drawing of the new Brodick Gangway system, but it is incomplete. [Appendix 3 – 075]

- 22 February 2017 (20.38 hrs): FMEL responds to the receipt of incomplete information. [Appendix 3 – 076]

    - *Thanks for this. We will add to the Port Fit drawing. Note that while it does include the PAS operating window, there is no detail of the PAS. If you can get this as well in dwg format this would make the port fit drawing more complete, and help to clarify where the PAS may or may not foul with mooring arrangements.*

- 23 February 2017 (09.40 hrs): CMAL issues minutes of meeting in connection with Brodick visit on 15 February 2017. [Appendix 3 – 077]

    ◊ Minute 4: *New vessel won't get stern in @ Oban (it is about 10m out and so you would need a 3rd Door*.

    ◊ Minute 5: [FMEL says] *Contract spec does not actually specify that FMEL have to make the ship fit-just to evaluate however the intention of the specification has been addressed by FMEL in the design of the door positions.*

    ◊ Minute 8: [redacted] [FMEL] *advised that the Ardrossan PAS will be replaced therefor the positioning of the PAS may be able to be altered, therefor assisting in the overall size requirements for the opening.*

    ◊ Minute 9: *FMEL do not have Brodick CAD drawings,* [redacted] *will provide*.

- 27 February 2017 (10.54 hrs): CMAL issues correction to the minutes of meeting. [Appendix 3 – 078]

    ◊ Item 8: *Please replace with the following. " Following on from item 7 (FMEL advised most challenging port fit requirements relate to Ardrossan and Craignure),* [redacted] *suggested that the door location was optimised for Ardrossan, including FMEL preferred width, and the 'mis fit' with Craignure was established/shown on drawings for all to consider"*

- 19 April 2017 (21.24 hrs) [Appendix 3 – 079]: FMEL submits port fit drawings to CMAL for review, and highlights the following:

    ◊ *The key change made is that the gangway doors are reduced in size to 2.5m wide by 2.3m height clear opening, both P&S. After a thorough review I believe this will work in all ports.*

    ◊ *Did you get any feedback from Ports & Harbours on my comments on Brodick below?*

- ◊ *Can I suggest we sit round the table with Ports & Harbours as soon as possible to talk through each port fit drawing, and hopefully reach final agreement of the proposed gangway door size.*

- 25 April 2017 (19.24 hrs): FMEL submits CAD information for Brodick for review and request a round table review for all port fits. [Appendix 3 – 080]

- 2 May 2017 (10:50 hrs): FMEL contacts CMAL in order to expedite the matter. [Appendix 3 – 081]

  - ◊ *Any feedback on this so far?*

  - ◊ *We're keen to reach an agreement on whether the proposed gangway doors will be acceptable to allow TTS to move forward, and also for us to prepare the superstructure on the basis of a final door design?*

- 8 May 2017 (12.32 hrs): FMEL again requests decision from CMAL on passenger doors. [Appendix 3 – 082]

  - ◊ *I don't like doing this – but is there any way you can push this on?*

  - ◊ *I heard today that* [redacted] *will be offsite for the next 3 weeks. We really need a decision on whether CMAL will accept the reduced door width for the main passenger doors as soon as possible to allow us to conclude the order for these at TTS. Is there any way this can be pushed on in* [redacted] *absence?*

- 15 May 2017 (17.09 hrs) [Appendix 3 – 083]: Internal CMAL email copied to FMEL as email tail, sets out the following:

  - ◊ *As discussed, I can confirm that the new door dimensions, of 2300 mm height and 2500 mm width, will fit against the operational window of the Passenger Access Systems with the passenger doors positioned as shown on the new vessel in the attached drawing, FMEL Brodick - Port Fit at the below locations and with the restrictions noted, (other Port drawings used also attached for reference).*

  - ◊ *Fits at Ullapool, except close to* [highest astronomical tide] *HAT*

  - ◊ *Fits at Stornoway, except close to HAT*

  - ◊ *Fits at Oban 1, Bow in only*

  - ◊ *Fits at Oban 2, Bow in only*

  - ◊ *Does not fit at Craignure, but with the touch down point of the Ramp positioned approximately 1500mm on to the Linkspan, it may fit stern in, but it is not certain to*

  - ◊ *Does not fit at Ardrossan, but is close at stern in*

  - ◊ *Does not fit at Wemyss Bay*

- ◊ *Does not fit at Armadale*
- ◊ *I have also noticed that the door width on the Port side of the new vessel has been drawn as 2500 mm wide across the outside of the coaming, i.e. only 2300 mm wide inside the coaming. Perhaps this is a drawing error as we are expecting both doors to be 2500 mm wide inside the coaming.*
- ◊ *Please let me know if you require any additional information related to this.*

- 15 May 2017 (19.55 hrs): CMAL forwards its internal email to FMEL and gives tacit approval. [Appendix 3 – 084]
  - ◊ Please see below the comments from our Ports and Harbours team following review of the Port Fit Drawings with the revised door opening. As can be seen in general they are in agreement that the reduction in door opening will still allow the new vessels to berth at the designated ports. We would however still remind FMEL that the responsibility to satisfactorily demonstrate compliance with the contract remains with your good selves. Trust this allows you to progress accordingly.

- CMAL implies (above) that it is a contract requirement that the vessel should universally fit all ports. FMEL responds to CMAL's partial approval as follows [Appendix 3 – 085]:
  - ◊ *We do not agree with the statements below referring to Craignure and Ardrossan.*
  - ◊ *The comment below infers that Craignure fit only works with a 1.5m overlap in stern in configuration, implying that bow in does not work. In our opinion the 801&2 DO fit in to Craignure, bow in (normal configuration). This does not need 1.5m overlap. We do not believe 801&2 will align with the gangway in stern in configuration.*
  - ◊ *The comment below states that Ardrossan does NOT fit (bow in), and is close to fitting stern in. We believe that 801&2 DO fit bow in (normal configuration) and do not align with the gangway stern in.*
  - ◊ *We have not considered Stornoway, Ullapool, Armadale or Wemyss Bay*
  - ◊ *We intend to proceed with passenger access doors 2.5m x 2.3m (clear width x clear height).*

88. It is clear from the above that the universal solution sought by CMAL was never practical or achievable. The simple fact is that one ship cannot physically fit multiple ports unless those ports are specifically designed for that particular ship.

89. This is merely an example. The time line above shows that CMAL's rigid and incorrect application of the Specification interfered with FMEL's design process. Months were lost, expense incurred and vital resources diverted from more pressing matters.

LNG tanks

90. For vessel 801, it was not possible to drop the tank directly into its final location on deck 1 since deck 3 had been partially closed in. (There was no "open sky" access.) The reason for this was that as a result of delays and disruption FMEL mitigated delay by consolidating blocks out of sequence.

91. The 801 installation sequence was as follows:

- The tank was transported by ship to the quay side at Newark Quay, FMEL's yard.

figure 3-26 lifting the tank on to the slipway upon delivery

- The tank was removed from the ship on to the quay side by crane and transported to slipway on SPMT's (self-propelled modular transporters).
- The tank was lifted by crane on top of a cradle to the bow of deck 3.

figure 3-27 801 lifting the tank on to the bow of deck 3

- The tank then had to be transported along deck 3, from the bow towards the stern using SPMT's (which were hoisted on to the vessel for that purpose).
- The LNG tank was positioned over a purpose made opening on deck 3 immediately above the tank's final position on deck 1 below.
- A 400 tonne crane was positioned alongside the vessel adjacent to the final location of the tank to enable the tank to be lowered.
- Rigging/ lifting wires were needed for the lowering operation. These were passed through purposely made openings in deck 3. The tank was then hoisted slightly from the SPMT's allowing them to move away along deck 3 so as not to obstruct the lowering operation.

figure 3-28 positioning tank over opening at deck 3 showing cradle and removal of SPMT's

- The tank was finally lowered to its correct position on deck 1 and the crane demobilized after being on hire for four days.

92. The disruption that this all caused can be illustrated by comparing the LNG tank installation for vessel 801 with that on 802, where the installation of the tank was not disrupted.

93. The installation of the tank for vessel 802 was a far simpler operation. It could be lifted from the quayside and lowered directly through an opening in deck 3 immediately above its final position on deck 1. In other words, there was "open sky" access which, because of delays, disruption and out of sequence working, was not available on hull 801.

figure 3-29 tank being hoisted on deck 3 of hull 802

94. The principle of the 1-3-8 rule has been explained earlier in this claim. Whilst this is an internationally accepted principle, it is not the only method of assessing disruption. Another method is the "measured mile" approach which was judicially approved in *Whittal Builders Co. Ltd. v Chester le Street District Council (1985)*. This method compares the output on an undisrupted part of the works against output on the same type of works which have been disrupted.

95. The installation of the LNG tanks on 801 and 802 provides a fine example of the measured mile approach.

96. A comparison of the man-hours needed to install the tanks on vessels 801 and 802 reflects the difficulty and disruption which FMEL suffered.

LNG tank installation	***Manhours***
hull 801	1,274
hull 802	61

Relocation of LNG bunkering

97. Figure 4-2 below shows the original location of the LNG bunkering stations, mid-ships, between frames 44 and 48, close to the LNG tank.

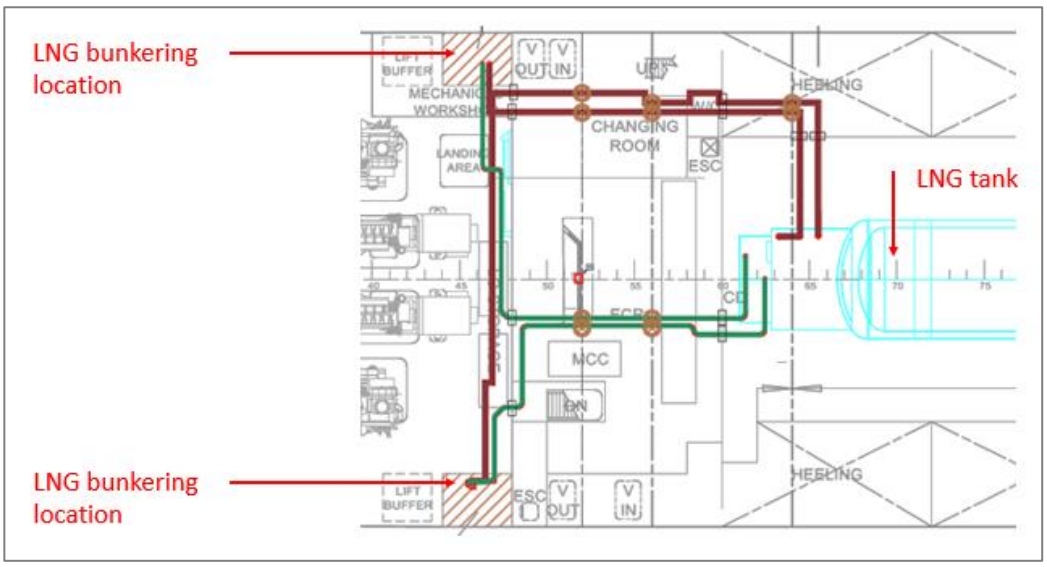


figure 3-30 original LNG bunkering locations

98. CMAL was unable to confirm that a shore side LNG road tanker could be accommodated in all ports and it asked FMEL to consider LNG bunkering from on-board the vessel. Because of safety concerns, this would need the tanker to park on the open rear vehicle deck in the dangerous goods zone.

99. After lengthy discussions with CMAL, the only feasible design solution was to locate the bunker station to the rear of the vessel, between frames 68 and 76 further from the LNG tank. This is shown in figure 4-3 below.

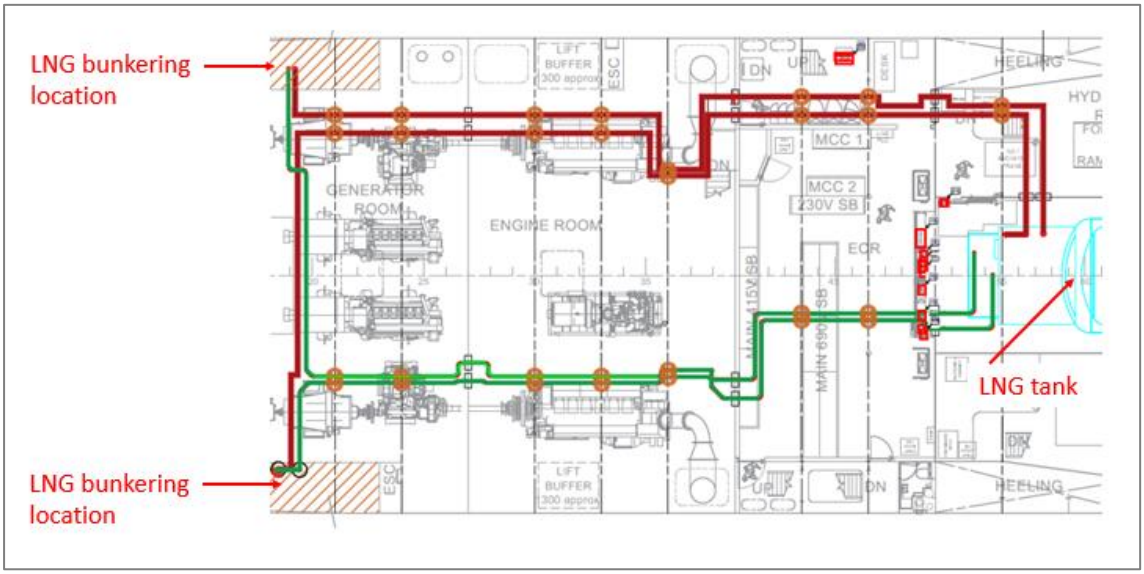


figure 3-31 revised LNG bunkering locations (dangerous goods zone)

100. This revised location necessitated longer cryogenic pipes, additional deep beam penetrations and additional bulkhead penetration glands.

Re-location of other bunkering stations

101. Figure 4-4 below shows the original location of the bunkering stations for MGO , fresh water, lube oils. The station also houses discharge connections for the vessel's waste oils and black water (sewerage) systems These stations were located mid-ships, between frames 44 and 48, close to the LNG tank.

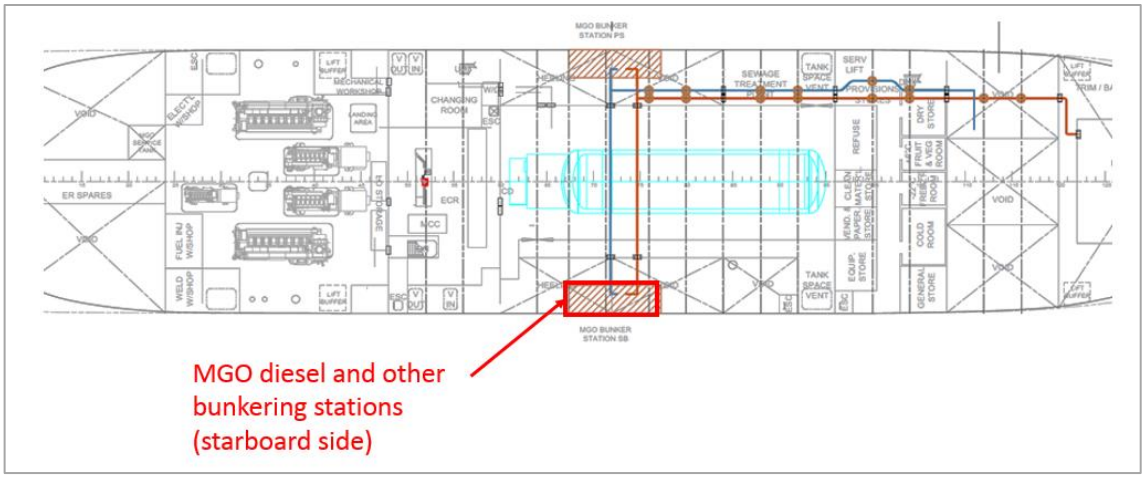


figure 3-32 original MGO diesel and other bunkering locations

102. CMAL was unable to confirm that a shore side MGO diesel road tanker could be accommodated in all ports and it asked FMEL to consider diesel bunkering from on-board the vessel. Because of safety concerns, this would need the tanker to park on the open rear vehicle deck in the dangerous goods zone.

103. After lengthy discussions with CMAL decided to re-locate the starboard bunker station to the rear of the vessel, between frames 68 and 76 further from the LNG tank. This is shown in figure 4-5 below.

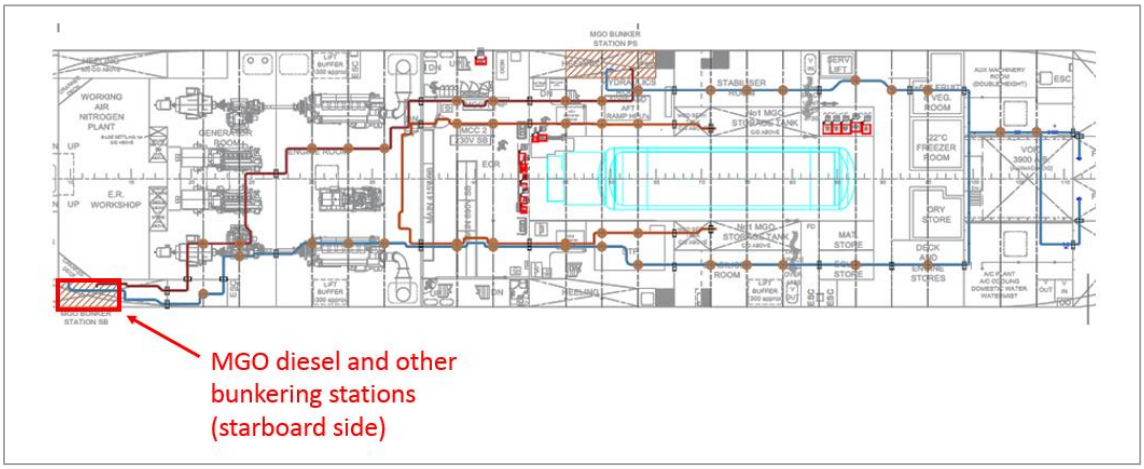


figure 3-33 revised MGO diesel and other bunkering location (starboard side)

104. This revised location significantly increased the length of pipework and required penetrations and stiffeners to be provided through main structural members. Considerable difficulties had to be overcome with the routing of these systems since they are gravity fed.

Belting and pilot ladders

105. The belting is a protective bumper which runs around the outside of the vessel to prevent damage when mooring. The Maritime Coastguard Agency (MCA) rules require that where a pilot's ladder is fixed to the outside of the hull there should be a gap in the belting. The belting then protrudes beyond the line of the hull and ladder and the ladder is prevented from being damaged if the vessel touches the side of the dock.

106. FMEL submitted its design for the belting to CMAL under transmittal 801-802-CMAL-0070 on 16 September 2016 at 08.44 hrs by email. [Appendix 3 – 086]

107. On 7 October 2016 CMAL replied by way of email on 7 October 2016 at 07.01hrs. [Appendix 3 – 087]

> *At* [the] *meeting today, can we discuss belting, how does arrangement on 801/802 compare to Hebrides?*

108. FMEL's design submission was compliant with the Contract. Section 264 of the Specification which expressly requires a gap in the belting for the pilot's ladder is shown below.

> 264 FENDERS
>
> Belting of trapezoidal section will be provided around the Vessel for protection at 03 and 04 Deck as indicated on the General Arrangement.
>
> The Belting will have a longitudinal bulb flat stiffener as well as webs (unconnected to shell) at each frame.
>
> Additional fairing plates will be added top and bottom to the Belting to ensure a smooth surface for LSA equipment in all portions of the fender located below LSA equipment.
>
> The belting in way of the pilot ladder is to have a suitable gap to allow safe deployment of the pilot ladder.

109. There is no requirement within the Contract that the belting should be comparable to the *Hebrides* or any other vessel in CMAL's fleet.

110. Minute 2 of Project Meeting No 11 on 7 October 2016 [Appendix 3 – 088] records the status of the belting as follows:

> *Belting lines and locations reviewed.*

111. FMEL and CMAL met to discuss the belting but it was not until 14 October 2016 that CMAL gave its views. [Appendix 3 – 089]

> *Regarding the belting, there is a gap in the belting iwo* [in the way of] *of the pilot ladder (which we also have on other vessels). Ideally we would wish to have continuous belting, as with the gap there is more chance of damaging the pier fenders. Can you look into this and ask MCA if gap is required.*

112. FMEL sought advice from the MCA as instructed by CMAL. In an e mail of 14 October 2016 (at 10:47 hrs) to the MCA, FMEL set out the position. [Appendix 3 – 090]

> *Basically it is a requirement of the contract to have a smooth side in way of the pilot ladder or is it acceptable to run the belting continuously through it – Please can you advise on MCA'a position with this issue in regard to safe access for the pilot?*

113. At the same time (on 14 October 2016 at 13:07 hrs) FMEL wrote to CMAL saying that CMAL's requirements were a departure from the Contract Specification and not in accordance with the applicable regulations. [Appendix 3 – 091]

> *Good Afternoon* [redacted],
>
> *I have had a quick look through the regulations with regards to pilot ladders and I came up with this one. It would seem that the belting would not be able to go all the way along the vessel in way of the pilot ladders if it prevents the ladder resting against the ships side.*
>
> > *7.—(1) every pilot ladder shall be so positioned and secured—*
> >
> > *(a) That it is clear of any possible discharges from the ship;*
> >
> > *(b) That it is within the parallel body length of the ship and, as far as is practicable, within the mid-ship half section of the ship taking into consideration paragraphs 7 and 8 of Merchant Shipping Notice No. 898;*
> >
> > *(c)* ***That each step rests firmly against the ship's side, and, if belting is fitted in way of this position, such belting shall be cut back sufficiently to comply with this requirement****;*
> >
> > *(d) That the person using it can gain safe and convenient access to the ship after climbing not less than 1.5 metres and not more than 9 metres.*
>
> [redacted] *is on holiday until Monday. I will give him a call next week and see how MCA interpret and apply the rule as I seem to remember we used to install a doubler plate in way of pilot ladder accesses on previous builds.* [emphasis added]

114. The MCA never responded to FMEL until 8 November 2016 at 16.48hrs. It quoted the EU directive "which would prevent the implementation of this provision". Thus the gap as originally specified could not be circumvented and the MCA would not agree to a continuous belt as requested by CMAL.

115. Project Meeting No 14 took place on the 12 January 2017. The minutes [Appendix 3 – 092] recorded under the heading of *Belting IWO* [in way of] *Pilot Ladder* that:

- the MCA response was forwarded to Jim Anderson (CMAL) by [redacted] (FMEL) at the meeting, and
- FMEL was to issue a sketch to CMAL for review.

116. In summary, despite having clarified the specification requirements and the MCA rules, CMAL was reluctant to let the matter rest there. It continued to introduce tangential and irrelevant requirements. Whilst initially CMAL requested a detail similar to the *Hebrides* be considered, it now turned its attention to another vessel in the fleet. Project Management Meeting No 15 of 2 February 2017 records under section 22 that [redacted] (CMAL) was to forward a photograph of the "*Lord of the Isle*" pilot's ladder. [Appendix 3-093]

117. Despite the fact that it was contrary to the Specification and the MCA rules, on 14 April 2017 (at 13.27 hrs) at CMAL's request, FMEL submitted a proposed design with a continuous belting. [Appendix 3-094]

118. In the meantime CMAL continued in its crusade to seek alternative views. It sent an email on 20 April 2017 (at 06.22 hrs) to "CFL" (Caledonian MacBrayne Limited) asking for comment on a system already denigrated by the MCA. [Appendix 3 – 095]

119. CFL responded to CMAL on 10 May 2017 (at 08.43 hrs). [Appendix 3 – 096]

> *CFL do not believe that it is possible to obtain a letter of acceptance from Clyde port for this purpose, as one administration would not want to take responsibility for a decision which could affect other pilots - eg Clyde would not wish to technically allow a breach of regulations that could be deemed unsafe by say Liverpool pilots, or take responsibility to "authorise" a departure from IMO rules (this was discussed briefly with one Clyde pilot).*
>
> *With this in mind, we contacted the International Marine Pilots Association and received a similar, non-committal response;*
>
> > *Thank you for your email. IMPA represents pilots at IMO. We do not have a formal regulatory role and as a result cannot give exemptions or formally advise on variations to IMO requirements. The bottom line is that the arrangements must satisfy class who in turn must be able to comply with the letter and spirit of IMO requirements.*
> >
> > *Having said that, I can give you some comments on your issue about the gap in the belting. This was introduced in the 2012 Revision of SOLAS V Reg 23 and was specifically to protect pilot cutters , several of which had been involved in serious incidents in the period running up to IMO considering the change. This included one accident in 2008 in the Canary Islands where the pilot boat was capsized by the rubbing belt and the Coxswain lost his life. Short sea ferries in our experience often operate under exemption certificates and on the occasion that a pilot is required it's often simply better for that person to be over-carried and/or landed by another means. Certainly we are unaware of 'lower value' gaps in belting but do appreciate the difficulties this brings to the protective belting on the vessels which make frequent use of jetties and piers.*
>
> *Would it be possible for FMEL to contact LR and check whether they are open to any 'exemptions' before investing time on solutions, as it appears Class will have the final decision? MCA can be consulted if necessary however, this may not be a quick decision.*

120. Evidently even Calmac Ferries Limited was alive to the difficulties of departing from the MCA rules and regulations and the likely delays seeking exemption would incur.

121. On 14 November 2018 (at 10.30 hrs) FMEL submitted its updated drawings showing the belting to CMAL for approval. [Appendix 3 – 097] Ostensibly these were the same as those submitted on 16 September 2016. The delay (up to that point) was over two years and was solely attributable to CMAL's desire to depart from the Contract Specification and MCA rules.

122. CMAL responded to the submission on the same day and asked for a CAD drawing of the belting in in order to consider a larger tapered section leading into the gap. [Appendix 3 – 098]

123. FMEL said that it would try and accommodate CMAL's eleventh hour request for further changes and in an e mail to CMAL on 14 November 2018 (at 10.55 hrs) pointed out the difficulties that this was presenting. [Appendix 3 – 099]

- *Hopefully you can appreciate that we are trying to minimise and re-work.*
- *The original drawings were issued and the majority of the fender (sic) installed to this* [detail].
- *I have attached the .dwg files to aid any mark-up.*
- *Please only change if you believe it's necessary in particular in way of any that have been previously installed.*

124. CMAL finally conceded and agreed to FMEL's submitted drawings later on the 14 November 2018 (at 16.11 hrs) saying "happy with your proposals". [Appendix 3 – 100]

125. The next day on 15 November 2018 (at 09.48 hrs) FMEL confirmed in an email to CMAL that it could "now get the work actioned to the yard". [Appendix 3 – 101]

126. It is evident from the above that CMAL sought to test every aspect of the Specification and challenge the rules of various regulatory authorities with which FMEL must comply .

127. Ultimately FMEL provided that which was specified in the Contract. Two years of interventions by CMAL were nothing other than a disruptive and unhelpful intrusion into the design process.

128. The gaps in the belting were not the only issue. CMAL also required extra belting to be provided and took about 18 months to decide precisely what it wanted. It is understood that this particular issue was raised following observations from CMAL's civil engineering contractor at Uig. The time line of events is briefly as follows:

- 13 February 2018: CMAL makes reference to re-instating a short portion of belting. [Appendix 3 – 102]
- 14 February 2018: CMAL confirms investigation of bumper upgrades. [Appendix 3 – 103]

- 19 February 2018: CMAL submits proposals to FMEL and requests discussions. [Appendix 3 – 104]
- 19 February 2018 FMEL expresses concern as to the added weight of modifications to belting required for 801 (and on 802). [Appendix 3 – 105]
- 19 February 2018: CMAL requests meeting with FMEL. [Appendix 3 – 106]
- 7 June 2018: FMEL says that the current instruction from CMAL represents a late addition to the Contract. [Appendix 3 – 107]
- 23 July 2018: CMAL asks if there is a new drawing showing the final belting arrangement. [Appendix 3 – 108]
- 23 July 2018: FMEL advises that production of drawings is subject to agreement of VTC (Variation to Contract). [Appendix 3 – 109]
- 23 July 2018: CMAL responds saying "We have received you proposal, the commercial part we can agree. Can we arrange a meeting to discuss the weight". [Appendix 3 – 110]
- 23 July 2018: CMAL advises that its understanding is that the Change Notice schedule originally advised of the removal of the double arrangement of belting "without detail of cost rebate". [Appendix 3 – 111]
- 23 July 2018 CMAL submits drawings which are "modified with regard to the belting arrangement". [Appendix 3 – 112]

129. FMEL's position is that the above works constitute a VTC (variation to Contract). Be that as it may, the time taken for CMAL to resolve this fairly simple issue is symptomatic of the problems faced by FMEL.

Passenger areas

130. The number and layout of passenger areas is a fundamental issue which should have been resolved at conceptual design stage.

131. General Arrangement Drawing (drawing No 101, sheet 1 of 1) which formed part of the Contract, specifies the *Principal Particulars* as follows:

LENGTH O.A.	102.4m
BREADTH (MOULDED)	17.0m
DEPTH - MAIN DECK	5.95m
DESIGN DRAUGHT	3.70m
NORMAL OPERATIONAL DRAUGHT	3.45m
POB	1032
DEADWEIGHT (AT 3.45m DRAUGHT)	900T
DEADWEIGHT (AT 3.7m DRAUGHT)	1273T
SERVICE SPEED	14.5 / 16.5 Knots
TOTAL OF SEATS	1000
INTERNAL:	650 (65%)
EXTERNAL:	350 (35%)

132. Until May 2018, FMEL's design (up to revision 4) consistently included 1,000 seats as specified. At CMAL's request, and over a five month period, from May to September 2018, the passenger numbers have varied from the specified 1,000 as follows:

- 1,000
- 935
- 963
- 955
- 915
- 994
- 924
- 950
- 1,006
- 975
- 961

133. These are not insignificant changes. They have major design implications on the internal layout of the vessel.

134. On 16 May 2018 CMAL issued its sketches 3, 4A and 4B revising the layout in order to allegedly improve accessibility. Within these sketches the passenger numbers fluctuated from 935, to 963 and finally 955. [Appendix 3 – 113]

135. On 28 May 2018 and relying on the instructions and sketches received from CMAL, FMEL issued revision A of its seating plan based upon the available as built area of the vessel. This showed a total of only 915 seats. [Appendix 3 – 114]

136. This was clearly unacceptable, so in order to design more in line with the specification, FMEL tried to include more seats and issued revision B of its layout which showed 994.

137. On 11 July 2018 there was a change of direction from CMAL. Ignoring the Specification and its previous sketches, CMAL instructed FMEL to investigate the number of passengers which could be accommodated if one life raft was removed. [Appendix 3 – 115]

138. FMEL responded to CMAL's request advising that if a life raft was removed the capacity would be reduced to 924 passengers. [Appendix 3 – 116]

139. On 19 July 2018 a meeting was held between CMAL and FMEL. Revision B of the seating plan had been rejected by CMAL on the basis that the number of seats and aesthetics of the settees proposed by FMEL were unacceptable. Whilst it is not entirely relevant at this point, FMEL denies that the settees did not comply with the Specification. [Appendix 3 – 117]

140. In the 19 July 2018 meeting, CMAL said although they had asked FMEL to target 924 seats (achieved by omitting one life raft) CMAL now thought that 950 seats would be an easier number to sell to CalMac (the operator of the ferry). [Appendix 3 – 118]

141. Consequently on 24 July 2018 FMEL issued to CMAL revision 01 of its drawing to now including 950 seats. Further dialogue with and instructions from CMAL resulted a further revision (03) of its drawing including 1,006 seats. [Appendix 3 – 119]

142. CMAL continued to prevaricate over the number of passenger seats and on 27 September 2018 in a QA/QC approval/verification comments sheet [Appendix 3-120] advised FMEL:

> *Taking into consideration the above comments about these seats gives a total of 975 seats on the vessel which we are happy to accept. In addition to this please remove the bar stools from the 2 aft lounge PAS staircases and the fwd lounge port PAS staircase. This therefore gives a total of 961 seats. Please provide a selection of seat types as spares to make up the 1,000 seats required.*

143. As it presently stands the number of seats requested and approved by CMAL rests at 961.

144. In summary, CMAL's changing requirements and interference in the design process has significantly delayed and disrupted FMEL. This has not only affected the seating, associated works such as finishings, lighting and power installations have been delayed and disrupted too.

Modifications or changes pending agreement

145. Part 4 of this document (monetary claims) describes a number of modifications or changes which are pending agreement. Many of these caused disruption to the outfitting. They also affected the steel blocks to the extent that openings and adjustments to already installed steel beams, bulkheads, etc were necessary.

146. The items are only given in summary form here and further details are found in part 4 of the claim and the associated appendices. The list below is not exhaustive. Some items which fall under the category of modifications or changes pending agreement have already been described above and are therefore not repeated in the list which follows.

- Modifications to circular windows: CMAL instructed additional stiffeners to be provided.
- Changes to passenger windows: CMAL instructed an increase in size.
- Strengthening mid-ships for ducktail: CMAL advised that a ducktail might ultimately be used on hull 801. This required additional strengthening (scantlings) to be installed mid-ships.
- Freshwater tank framing: CMAL insisted upon the structure of the tank being placed outside the tank itself.
- Deck strengthening for enhanced mooring requirements: CMAL increased the mooring rope specification and this required strengthening to the decks around the windlasses.

- Watertight doors: CMAL instructed additional watertight doors to the auxiliary machine areas and stabilizer rooms.
- Additional shower room: An additional shower room was added on deck 6 at CMAL's request requiring water and waste services to be provided.
- Increase in galley size: CMAL instructed an increase to the size of the galley .
- First aid and patient transfer area: CMAL instructed the addition of these areas on the main deck.
- Fast rescue craft store: This store was added at CMAL's request.
- Rope store: This store was also added at CMAL's request.
- Tourist information and games areas: CMAL instructed and office area to be re-configured.
- Alternative lounge: CMAL instructed an alternative lounge to be provided on deck 6.
- Carpenter's store: This store was added at CMAL's request.
- Relocation of coffin store: CMAL instructed the coffin store to be relocated towards the front of the vessel and for a mock-up to be built.
- Office within control room: CMAL required a new office to be provided within the control room.
- Reposition pillars throughout passenger areas: CMAL required relocation of pillars throughout the passenger areas to "improve the finished look of the vessel".
- Panama eyes: Additional Panama eyes were instructed by CMAL.

CONSEQUENCES OF OUTFITTING AFTER BLOCK FABRICATION

147. Delays to outfitting and block fabrication resulted in FMEL having to depart from the conventional method of shipbuilding. This can be explained by relation to three distinct phases of construction.

- In the fabrication workshop: Advance outfitting is usually carried out at block fabrication stage. The two activities become an integrated process, being executed in parallel. The delays and disruption to the block fabrication inevitably caused delay and disruption to the outfitting too. This resulted in outfitting having to be carried out on the slipway(or after launch at the quayside) rather than in the workshop.
- On the slipway: As outfitting was unable to be carried out fully at block fabrication stage, much more had to be done on the slipway. This in itself caused further disruption because of the greater amount of works being executed within the confines of the hull.

- After launch: Hull 801 was launched early to vacate the slipway for construction of hull 802. At launch, because of earlier delays during the block fabrication and slipway phases, a large amount of outfitting was still to complete. Outfitting became even more difficult to carry out because of access restrictions on working upon a moored vessel and again working in increasingly congested areas.

148. In summary, the later in the process outfitting was carried out (from workshop, to slipway to quayside) the more difficult it became. Work limitations and costs increased whilst productivity decreased.

149. The problems associated with outfitting in a confined area are illustrated in the photographs of the engine room below, in which much of the pipework outfitting was carried out after launch.

figure 3-34 engine room outfitting

150. The photographs show that the areas in which to work became extremely congested. Fixing pipes around installed equipment and other pipe systems is difficult and time consuming. Bringing in pipes, valves and welding gear involved hoisting them on to the vessel and then transporting them below decks, often through narrow openings and down ladders which were ill suited for such a purpose.

151. Clause 1 (a) of the Contract requires FMEL to carry out the works in accordance with good international shipbuilding and marine engineering practice. Such practice requires a significant part of the outfitting to be carried out at block fabrication or consolidation stages. As a result of the matters described above, this could not be done.

152. Advance outfitting brings considerable advantages to the shipbuilder. These advantages have been set out above. Failure to outfit in advance, not only dissipates those advantages, it badly impairs the progress of the outfitting works themselves and the project as a whole.

153. GAO-09-322 explains the consequences of outfitting at various stages of the shipbuilding process by reference to the internationally recognized “1-3-8 rule”.

> *Shipbuilders often describe a ”1-3-8 rule,” where work that takes 1 hour to complete in a workshop takes 3 hours to complete once the steel panels have been welded into blocks, and 8 hours to complete after a block has been erected*

and/or after the ship has been 'launched," or conveyed from its building site to the water. [GAO-09-322 page 6]

154. As a footnote to this paragraph, GAO-09-322 says:

Some shipbuilders identify slightly different numbers of hours for the second and third phases (block and post-erection/post-launch construction) cited in the rule. These numbers of hours tend to increase as the complexity and outfitting density of a ship increase.

155. In summary, the 1-3-8 rule can be represented as follows:

- work which takes **1 hour** to complete in the workshop;
- will take **3 hours** to complete on the slipway; or
- **8 hours** to complete at quayside

Pipes, cable trays, equipment

156. Much of FMEL's outfitting work which should have been done in the workshop at block fabrication stage, was carried out either on the slipway, at block consolidation stage, or after launch at the quayside. This is reflected in a comparison between FMEL's planned outfitting hours and actual outfitting hours. The planned hours again exclude joinery and painting works which are sometimes classified as outfitting.

Phase	***Planned outfitting hours (advance outfitting)***			***Actual outfitting hours***		
	Hrs	*%*	*Cum %*	*Hrs*	*%*	*Cum %*
Workshop	38,020	36.91	36.91	26,249	5.03	5.03
Slipway	65,000	63.09	100.00	209,467	40.11	45.14
Quayside				286,453	54.86	100.00
TOTAL	**103,020**	**100.00**		**522,169**	**100.00**	

157. FMEL planned to have about 37% of the outfitting finished in the workshop. It achieved only 5%. Perhaps somewhat optimistically, all outfitting was planned to be achieved by the time the vessel left the slipway. In the event, only 45% was achieved.

158. This resulted in an appreciable increase in manhours on the slipway: 65,000 hours to 209,000 hours. After launch at the quayside there was an extra 286,000 hours, although it is acknowledged there should reasonably have been some small allowance for planned quayside hours.

159. Whilst the exact differentials of the 1-3-8 rule are not present, the picture is clear. Manhours which should have been spent in the workshop increased substantially when outfitting works were moved to the slipway or quayside. These hours are shown in the chart below at figure 3-35.

figure 3-35 as planned and as built outfitting hours

Block fabrication

160. GAO-09-322 explains the 1-3-8 rule as it applies to outfitting. However, the principle is equally applicable to other elements of the work. It does not require a great deal of imagination to see that block fabrication works can more easily and productively be carried out in the workshop rather than at consolidation stage.

161. GAO-09-322 does not apply the 1-3-8 rule to block fabrication simply because good practice expects *all* fabrication work to be carried out in the workshop prior to consolidation.

162. The reasons for delays and disruption to the block fabrication have been set out earlier in this part of the claim.

163. FMEL fabricated blocks out of sequence when the design could not be finished. Midship blocks were fabricated first because it was though that these carried least risk of design change. During the block consolidation process (on the slipway) and even after launch, FMEL were fabricating and altering steelwork to accommodate CMAL's shifting design requirements as the conceptual design developed.

164. FMEL's planned and actual manhours for fabrication are shown below. Again, the hours exclude joinery and painting works which are sometimes classified as outfitting.

Phase	Planned fabrication hours			Actual fabrication hours		
	Hrs	*%*	*Cum %*	*Hrs*	*%*	*Cum %*
Workshop	225,520	83.37	83.37	255.829	58.63	58.63
Slipway	45,000	16.63	100.00	141,708	32.48	91.11
Quayside				38,822	8.89	100.00
TOTAL	**270,520**	**100.00**		**436,359**	**100.00**	

165. These figures speak for themselves. Slipway fabrication has increased from 45,000 hours to over 141,000 whereas there are nearly 39,000 fabrication hours after launch at the quayside when there should have been none. These hours are shown in the chart below at figure 3-36.

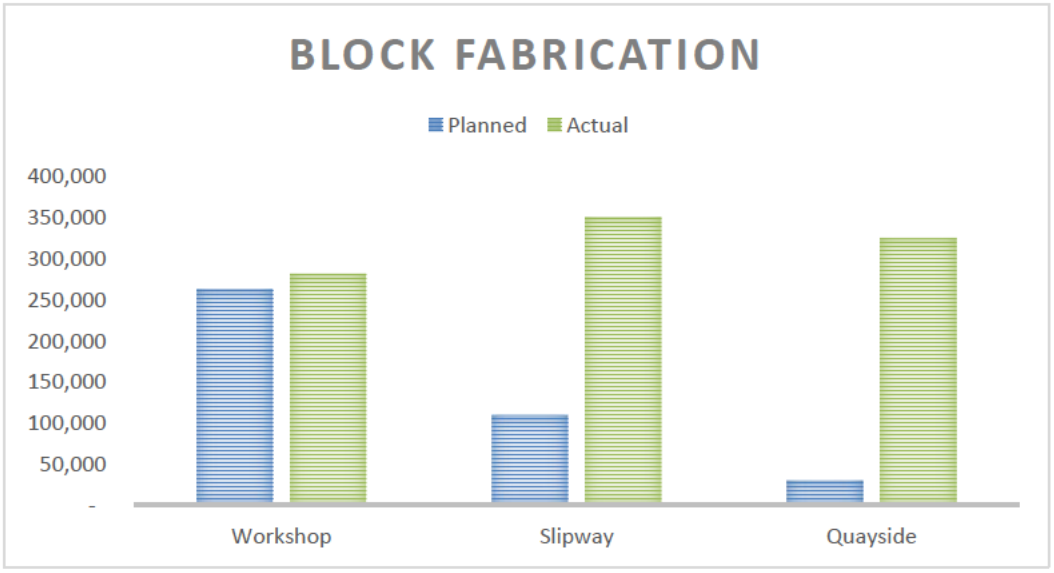


figure 3-36 as planned and as built block fabrication hours

PART 4 - MONETARY CLAIMS

INTRODUCTION

1. This part of the claim will explain the quantum in support of FMEL's monetary claims.

2. The Contractual Date of Delivery for hull 801 was 25 May 2018 and hull 802 26 July 2018.

3. The works have been delayed and disrupted as a result of:

   - modifications and changes instructed by CMAL; and
   - CMAL's breaches of the express and implied terms of the contract not to hinder or prevent FMEL from executing the works in a regular and orderly manner and in accordance with the terms of the Contract and good international shipbuilding and marine practice.

4. Full details of the delays and disruption are set out in part 3 of this claim.

5. FMEL is entitled payment for modifications and changes which have been carried under instruction from CMAL. Some of these changes have been agreed in principle by CMAL, for others, agreement remains outstanding.

6. As a result of the breaches, FMEL has suffered damages in the form of additional costs arising from the delay and disruption which it is entitled to recover.

7. In summary, the amounts claimed are shown in the table below. An explanation of each individual claim is found in the narratives which follow which is arranged in in the same order as the items in the table. Further details (where appropriate) are included in the appendices which are referenced in the narratives.

Item	*£*
DELAY (PROLONGATION) COSTS	
Hull 801 delay costs	5,056,336.81
Damages for delay to hull 802	5,008,571.34
Recovery of Late Delivery Compensation for hull 802	750,000.00
Extension of guarantee/warranty period	200,000.00
Extension of refund guarantee	896,368.49
Insurances	447,362.69
DISRUPTION COSTS - OUTFITTING AND BLOCK FABRICATION	
Outfitting and block fabrication	15,048,609.90
DISRUPTION COSTS - DESIGN	
[redacted]	33,500.00
[redacted]	583,879.47

Item	*£*
DISRUPTION COSTS - PROCUREMENT	
Purchase of steel	280,010.81
Increased wastage of steel	457,203.84
Propellers, shafts, tubes, rudders, etc	133,524.55
Additional storage costs	1,113,417.79
DISRUPTION COSTS - OTHER ELEMENTS OF THE WORKS	
Repainting	100,413.60
Increased dry docks works	42,000.00
Installation of LNG tank	54,630.16
Abortive steelwork mid-ships	275,647.93
Lloyd's Register requirements	13,224.40
VARIATIONS TO THE CONTRACT (VTC'S) AGREED IN PRINCIPLE BY CMAL	
VTCs agreed and paid	393,504.00
VTCs agreed and not paid	382,906.00
MODIFICATIONS OR CHANGES PENDING AGREEMENT BY CMAL	
Modifications to circular windows – deck 5	6,420.64
Changes to passenger windows – decks 5 and 6	27,000.00
Strengthening mid-ships for ducktail	103,925.00
Freshwater tank framing	26,412.60
Relocation of LNG bunkering	222,935.73
Relocation of other bunkering stations	57,489.09
Hazardous zones	37,940.40
Nitrogen bottle storage	6,949.28
Windlasses	4,124.40
Deck strengthening for enhanced mooring requirements	19,309.80
Passenger area toilet door	1,185.68
Additional stores deck 2	10,732.84
Watertight doors	15,800.00
Shower room	5,153.24
Increase in galley size	11,106.60
First aid and patient transfer area	14,597.40
Fast rescue craft store	9,942.58
Rope store	9,942.58
Replace office with tourist information and games areas	3,678.40
Door to changing area and gymnasium	1,421.36
Lobby between recreation room and upper passenger lounge	1,739.20
Improvements to officer and crew recreation and mess rooms	10,955.24
Alternative lounge	5,473.80
Sliding door to toilet	1,130.68
Carpenter's store	9,942.58
Relocation of coffin store	3,880.04
Office within control room	3,007.04

Item	£
Reposition pillars throughout passenger areas	21,036.56
Additional Panama eyes	16,205.36
Changes to passenger layout	4,713.60
Port fit (embarkation door locations)	1,473.00
Non-standard steel sizes	41,244.00
Lightweight insulation	120,000.00
CLAIMS FROM SUBCONTRACTORS AND SUPPLIERS	
[redacted]	[redacted]
[redacted]	302,946.00
Subcontract claims to completion	500,000.00
OTHER CLAIMS	
Financing charges on delay and disruption costs	1,679,466.00
Financing charges on modifications and changes	27,837.60
Interest on loans	6,725,002.00
PROFESSIONAL FEES	650,000.00
TOTAL	**44,232,321.22**

8. Amounts claimed up to 31 August 2018 are based on actual costs whereas amounts claimed after that date are necessarily based on forecasts. FMEL reserves its right to amend these claims or make further claims, whether arising from matters in this claim or otherwise.

DELAY (PROLONGATION) COSTS

Prolongation costs for hull 801 and damages for delay to hull 802

9. Part 3 of this claim details the delays which FMEL has suffered as a result of CMAL's acts and omissions.

10. The table below summarizes the periods of delay for **hull 801.**

Period of Delay		
From	***To***	***Duration***
22 March 2016	26 April 2016	35 days
26 April 2016	2 August 2016	98 days
14 November 2016	28 November 2016	14 days

Period of Delay		
From	***To***	***Duration***
16 December 2016	2 February 2017	48 days
Between launch and completion		321 days
	TOTAL	**516 days**

11. The first period of delay of 35 days arises from changes to the main engines and the hull draft. All other periods of delay arise from CMAL's breaches and the delay costs which FMEL is entitled to recover is in the form of damages.

12. It has not been possible to identify precisely the start and finish dates of the 321 day delay between launch and completion. The reason for this is explained in part 3 of this claim.

13. Part 3 of this claim also explains that the long delays to the completion of **hull 802** arise from breaches of the hull 801 contract. FMEL is entitled to recover its 802 delay costs as part of its damages for breaches of the hull 801 contract.

14. The periods of delay on hull 802 are set out below.

Period of Delay		
From	***To***	***Duration***
15 August 2016	21 November 2017	463 days
21 November 2017	31 January 2018	71 days
	TOTAL	**534 days**

15. The prolongation costs comprise:

- production overheads
- sales, general and administration overheads, and
- finance costs and other items

16. Within FMEL's accounts, each of the above items are broken down into smaller cost coded items. In the lists which follow the cost codes (where they exist) are shown in brackets.

17. Production overheads include:

- indirect payroll - indirect head office staff e.g. supervisors
- consumables (600) - hand tools, vehicle fuel
- repairs and maintenance (610) - to buildings, plant and machinery

- utilities (620) - gas, electricity, fuel oil and water
- facilities costs (630) - rates, security, cleaning, pest control and waste disposal
- fixed asset depreciation (640) - depreciation on buildings, plant and machinery
- rent and operating leases (660) - buildings, porta cabins, vehicle rental, cranes and plant, and gas bottles
- insurance (670) - employer's liability, public liability and product insurance
- health, safety and training - protective clothing, first aid and other health and safety equipment
- information technology costs (690) - software and software maintenance
- travel and entertainment (700)
- professional fees (710) – Lloyds Register of Shipping fees
- marketing (720) - conference and marketing visits;
- other expenses (730) - stationery and sundry materials
- internal allocations (760) – miscellaneous

18. Sales, general and administration (S, G & A) overheads include:

- S, G & A payroll - management and non-direct staff
- indirect external contractor costs (300) - business development
- training costs (590) - training seminars
- repairs and maintenance (610) - office equipment
- fixed asset depreciation (640) - office equipment
- rent and operation leases (660) - office equipment, telephone lines, and photocopiers
- insurance (670) - employer's liability, public liability and product liability
- health and safety costs (680) - health and safety assessments
- information technology costs (690) - software maintenance and support
- travel and entertainment (700)
- professional fees (710) - audit fees, legal fees and outsourcing
- marketing (720) - conference and marketing visits
- other expenses (730) - stationery and sundry materials
- internal allocations (760) - miscellaneous
- foreign exchange gain/loss (770) - currency balances at month end

19. All of the prolongation cost items set out above apply to both hulls 801 and 802. However, some of the periods of delay for hulls 801 and 802 are concurrent whilst others are exclusive to hull 801 or 802, as the case may be. The periods of delay for each vessel are shown below in figure 4-1

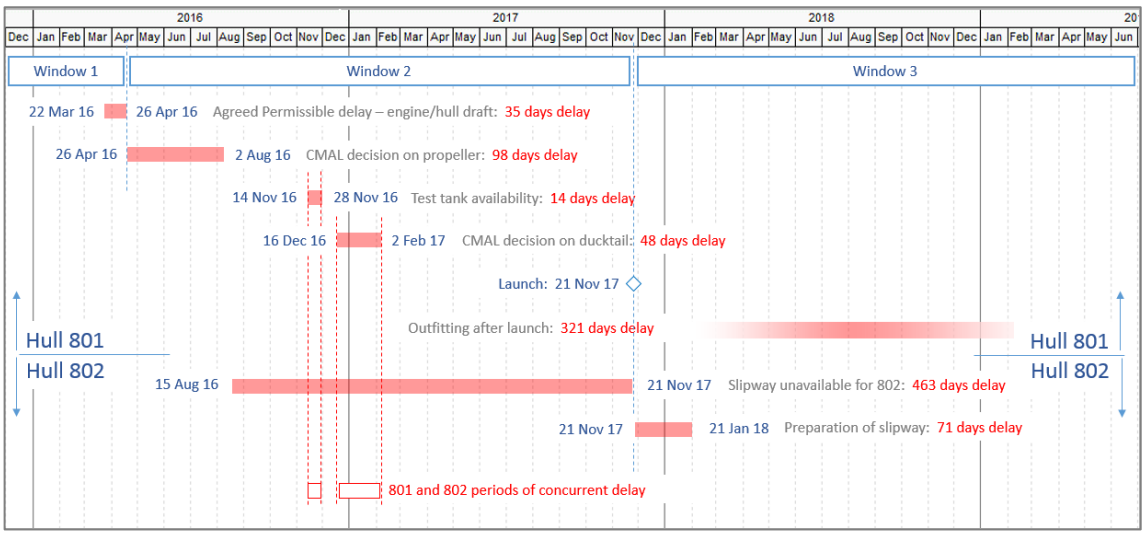


figure 4-1 periods of delay for hulls 801 and 802

20. FMEL's accounts do not show any apportionment of costs between hulls 801 and 802 during the periods of delay (or indeed at any other time). Nevertheless, FMEL believes that it is reasonable to make some apportionment to arrive at a fairer valuation of its delay costs. Consequently the 801 and 802 delay costs have been apportioned as follows:

- where there are concurrent periods of delay, FMEL has claimed 100% of the recoverable delay costs;
- where a delay occurs, which is exclusive to either hull 801 or 802, FMEL has claimed 50 % of the recoverable delay costs.

21. Based on apportionment as described above, FMEL's delay costs are as follows:

	Item	**£**
1	Hull 801 delay costs	5,056,336.82
2	Damages for delay to hull 802	5,008,571.34
	TOTAL	**10,064,908.15**

22. FMEL is entitled to recovery its delay costs on hull 801 and damages for delay to hull 802 in the amount of **£10,064,908.15**

23. Details of the amounts claimed are included in Appendix 4-001.

Recovery of Late Delivery Compensation for hull 802

24. Hulls 801 and 802 were planned to be built concurrently, side by side on the slipway.

25. The only way this could be achieved was to build both vessels from the stern forwards. It has been explained in part 3 of this claim that CMAL caused significant delays which

prevented stern blocks from being designed, fabricated and consolidated first, as originally planned by FMEL.

26. In order to mitigate the impact of CMAL's acts and omissions and resulting delay, and in order to make some progress on at least one of the vessels, FMEL decided to fabricate and consolidate the mid-ship blocks for hull 801 first.

27. Once the first midship block (for hull 801) was placed on the slipway, concurrent construction of the vessels became impossible.

28. The contract for hull 802 contains a provision for Late Delivery Compensation (liquidated damages). These are capped in the amount of £750,000. As a result of the long delays to completion of hull 802, FMEL is likely to be liable for the full amount of £750,000.

29. The 802 Late Delivery Compensation stems from breaches of the 801 contract and are therefore recoverable from CMAL as part of the hull 801 damages for those breaches. This is explained in parts 3 and 5 of this claim.

30. FMEL is entitled to recovery of the Late Delivery Compensation for hull 802 in the amount of **£750,000.00** for which it may eventually be liable.

Extension of guarantee/warranty period

31. Clause 35 of the Contract says FMEL:

> *... shall guarantee the vessel against any Defects (see Definitions) provided such Defects are:*
>
> *(i) discovered within the number of months stated in Box 20 (hereinafter "the Guarantee Period) after delivery of the Vessel in accordance with Clause 28 (Delivery) . . . .*

32. The Guarantee period is stated in Box 20 is 12 months.

33. Section 140 of the Specification requires FMEL to provide equipment and machinery warranties and in-service support. It says:

> *Builder will ensure that all equipment, machinery and systems selected for this vessel have a manufacturer's or supplier's written warranty and will endeavour to facilitate discussions between the buyer and the supplier that the equipment in question will remain supportable by the Original Equipment Manufacturer (OEM) for at least a minimum period of twenty-two (22) years from delivery of the vessel by Builder to Buyer.*

34. Section 141 of the Specification identifies the equipment and systems that require a warranty:

- underwater coating
- ro-ro cargo equipment

- main propulsion train (comprising main engines, reduction gears, power input motors, transmission shafting and bearings, CPP, all connecting couplings and clutches and propulsion control systems).
- transverse thrusters and control systems
- stabilizer fins and controls
- electrical power generators and prime movers
- electrical switchboards including power management system
- integrated control alarm and monitoring system
- LNG fuel system (tanks, evaporators, bunkering system and control system)
- marine evacuation system
- water mist system
- passenger elevators
- HVAC system and controls
- fire and gas detection systems
- integrated bridge equipment

35. Where possible FMEL tries to ensure the early delivery of machinery and equipment. This is particularly so where there are potential difficulties in securing production slots from busy suppliers. Most of these manufacturers and suppliers provide guarantees or warranties for their equipment for a prescribed period starting from the date of delivery.

36. It is in the interest of suppliers and manufacturers to deliver equipment to site at the earliest possible time since this frees up space in factories, workshops and stores, ensures the earliest possible payment and improves cash flow.

37. As a result of the long delays for which CMAL is responsible, some items of machinery and equipment which have been delivered, have been (and are being) kept in storage until the vessel is ready for its it installation. In other instances, machinery and equipment is installed on the vessel but because of the long delays, it is many months before it is put into operational use. So whilst the delays continue to accrue the guarantees and warranties are running down.

38. By the time the vessel comes into service, some of the guaranties or warranties have expired (or are near expiry) and neither FMEL or the user CMAL have derived any benefit from them during any operational periods. Nevertheless, FMEL is not released from its obligation under clause 35 of the contract to guarantee any Defects for 12 months after delivery.

39. This presents a dilemma for FMEL. It can either pay the suppliers to extend their guarantees or warranties or it can carry the risk of repair and breakdown itself. Whichever approach it adopts, FMEL is likely to occur additional cost.

40. As at the date of this claim, FMEL is unable to accurately define the cost of extending guaranties or warranties or paying for repair once they have expired. For the purposes of this claim an allowance for hull 801 has been included in the amount of £200,000.00.

41. FMEL is entitled to recover its forecast costs for hulls 801 and 802 for extending guarantees or warranties for the hull 801 contract, or alternatively bearing the cost of repairs in the amount of **£200,000.00**

Extension of refund guarantee

42. Clause 14 (b) of the Contract requires FMEL to provide a Builder's Refund Guarantee. The clause says, in part:

> *In the event that either*
>
> *(a) the Vessel is not delivered by 31 August 2018;*
>
> *...*
>
> *then no later than 1 December 2018 the Builder shall provide a replacement Refund Guarantee, valid for 180 days from 1 January 2019 and thereafter extendable if necessary for such additional period or periods as may be required to extend the term of the said replacement Refund Guarantee ...*

43. The vessel will not be delivered by 31 August 2018 as a result of matters for which CMAL is responsible – see part 3 of this claim - and FMEL must therefore provide a replacement Refund Guarantee.

44. FMEL has incurred additional costs in providing the replacement Refund Guarantee and is entitled to payment of **£ 896,368.49**. (Appendix 4-002)

Insurances

45. As a result of the delays for which CMAL is responsible, FMEL has had to extend its marine insurances for hulls 801 and 802. The delay to hull 802 arises as a result of breaches of the hull 801 contract. (This has been explained in part 3 of this claim.) Hence the cost of extending the insurances for hull 802 may be recovered as damages for those breaches.

46. FMEL is entitled to recovery its insurance costs for hulls 801 and 802 in the amount of **£447,362.69**

DISRUPTION COSTS – OUTFITTING AND BLOCK FABRICATION

47. In part 3 of this claim it was explained that disruption to the outfitting and block fabrication was caused by the inadequacy of the conceptual design, interference in the design process by CMAL and numerous changes and modifications instructed by CMAL.

48. Also in part 3 of the claim, the following planned and actual hours for outfitting and block fabrication were set out:

Phase	Outfitting hrs		Block fabrication hrs		Total hrs	
	Planned	Actual	Planned	Actual	Planned	Actual
Workshop	38,020	26,249	225,520	255,829	263,540	282,078
Slipway	65,000	209,467	45,000	141,708	110,000	351,175
Quayside	30,360	286,453		38,822	30,360	325,275
TOTALS	133,380	522,169	270,520	436,359	403,900	958,528

49. Of course not all of these additional hours are attributable to disruption caused by CMAL. Allowances must be made for the hours expended on changes and modifications (whether approved in principle or otherwise) attendance on subcontractors and those matters for which FMEL is responsible. Also, to avoid duplication, some allowance must be made for the hours which have been recovered in the delay costs In the monetary assessment of the disruption below, allowances have been made for these items.

Phase	Planned hours	Actual hours	Difference hours	Rate (£)	£
Workshop	263,540	282,078	18,538	29.46	546,129.48
Slipway	110,000	351,175	241,175	29.46	7,105,015.50
Quayside	30,360	325,275	294,915	29.46	8,688,195.90
					16,339,340.88
Less			hrs		
Modifications and changes approved in principle and pending agreement(VTC's)			12,425		
Attendance on subcontractors			3,472		
Disruption for which FMEL is responsible			15,000		
Disruption hours for other elements of the works already recovered elsewhere in this claim			12,916		
			43,813	29.46	1,290,730.98
				TOTAL	**15,048,609.90**

50. As a result of disruption caused by the inadequacy of the conceptual design, interference in the design process by CMAL and numerous changes and modifications instructed by

CMAL, FMEL is entitled to payment of its costs of disruption to outfitting and block fabrication in the amount of **£15,048,609.90**

51. Details of the amounts claimed are included in Appendix 4-003.

DISRUPTION COSTS - DESIGN

52. The works are being carried out under a design-build contract. Not only does FMEL have the obligation to design, it has the right to do so, un-hindered by CMAL.

53. Throughout parts 2 and 3 of this claim many instances of CMAL interfering in the design process have been described. They are not repeated here. FMEL's own additional design costs have been included elsewhere in this claim. However, there have been claims from FMEL's subcontractors for additional design works which are now set out below. These claims relate to additional design works and/or prolonged involvement by the various design subcontractors as a result of delay.

[redacted]

54. The primary design of the hull was subcontracted to [redacted]. It has claimed additional design costs as follows:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Re-design of foundations for main engine subsequent to instructed change on 3 August 2016	1	sum	7,500.00	7,500.00
2	Checking the scantling requirements as a result of an increase in hull length of 2.4m (ducktail)	1	sum	2,000.00	2,000.00
3	Further checks on the scantling design as a result of an increase in hull length of 2.4m (ducktail)	1	sum	4,000.00	4,000.00
4	Additional supervision and sundry delay costs due to delays and prolonged involvement in the project.	1	sum	10,000.00	10,000.00
5	Stress analysis to fit remaining superstructure after launch	1	sum	10,000.00	10,000.00
	TOTAL				**33,500.00**

55. FMEL is entitled to recover the amount of **£33,500.00**

56. Details of the amounts claimed are included at Appendix 4-004.

Vera Navis Lda

57. The preparation of production drawings for the hull was subcontracted to [redacted].

58. Part 3 of this claim explains that there were long delays for which CMAL was responsible. This caused delay and disruption to [redacted]' work and it ended up carrying out additional works, abortive works and the period of its involvement in the project was greatly prolonged. As a result, [redacted] incurred additional costs.

59. [redacted] has claimed payment of £583,879.47 for the additional works it has carried out.

60. FMEL is entitled to recover the amount of £**583,879.47**

61. Details of the amounts claimed are included at Appendix 4-005.

DISRUPTION COSTS – PROCUREMENT

Purchase of steel

62. Parts 2 and 3 of this claim explain the inadequacy of the conceptual design and CMAL's interference in the design process. As a consequence FMEL was compelled to develop the detailed design in a fragmented and piecemeal manner. This affected the way in which FMEL was able to buy its steelwork.

63. Instead of making bulk purchases direct from steel mills, steelwork had to be bought in smaller lots and at higher prices from stockholders. The average increase in purchase price was 15%.

64. FMEL is entitled to recover its additional costs for the purchase of steelwork in the amount of **£ 280,010.81**

65. Details of the amounts claimed are included at Appendix 4-006.

Increased wastage of steel

66. FMEL has incurred considerable steel wastage. This has arisen primarily for the following reasons:

- During the early parts of the project FMEL was unable to finalize the design of many of the blocks because fundamental design issues had not been resolved. This has been explained in parts 2 and 3 of the claim. To mitigate the delays, FMEL started fabricating those blocks which it thought carried least risk of design changes. Even though this was a prudent mitigation measure, significant changes were subsequently required by CMAL resulting in wastage of steelwork.

- There have been many changes requested by CMAL which have resulted in re-works. Some of these are found below under modifications and changes.

- CMAL's interference in the design process has resulted in abortive works which had either been carried out in anticipation of approval or had been approved and then subsequently revised by CMAL.

67. As a result of the above, steel wastage was abnormally high, well above that customarily expected on a vessel of this nature.

68. FMEL is entitled to recover its costs for additional steel in the amount of **£457,203.84**

69. Details of the amounts claimed are included at Appendix 4-007.

Propellers, shafts, tubes, rudders, etc

70. In part 3 of this claim, the very long delays in resolving the specification of the propellers was explained. The design of the propellers also caused long delays to the design of the shafts and bearings, tubes, and rudders. Along with the propellers themselves, these were all being manufactured in China with a shipment period of upwards of 6 weeks.

71. In order to mitigate these delays, FMEL took the following steps to reduce the shipping times:

- the manufacture of the stern tubes and the rudders were transferred from China to Europe; and
- the propeller shafts and bearings were air-freighted from China.

72. As a result of these mitigation measures FMEL incurred additional cost of **£133,524.55** which it is entitled to recover.

73. Details of the amounts claimed are included at Appendix 4-008.

Additional storage costs

74. In the narrative earlier in this part of the claim dealing with extension of the guarantee/warranty periods it was explained that in some instances equipment has been delivered to site earlier than it was in fact needed or could be installed. Not only did this cause problems with guarantees, it also caused problems with storage.

75. Where equipment could not be installed on the vessel, and where there was inadequate suitable storage available at FMEL's yard, additional storage space had to be rented. These storage facilities also became necessary because of the long delays to progress.

76. Additional storage was required to store the following equipment:

- main engines
- auxiliary engines
- HVAC ducting
- piping
- electrical equipment including switchboards, distribution boards, UPS, etc
- cable trays
- parts for the sewerage system
- purifiers

- boilers
- SAPA panels
- pumps
- capstan and windlasses
- compressors
- rudders
- hydrophone equipment
- hydraulic modules and control panels
- consoles
- thrusters
- toilet modules
- stabilizers
- propeller blades
- bilge items
- life rafts
- powered bollards

77. FMEL incurred the following storage and warehousing costs:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Warehouse 1 at Westway	1	sum	349,968.10	349,968.10
2	Warehouse 2 at Westway	1	sum	600,039.69	600,039.69
3	Storage at Ocean Terminal - Greenock	1	sum	22,500.00	22,500.00
4	Forklift required	156	week	175.00	27,300.00
5	Additional jigs and tooling for the aluminium panels	1	sum	75,000.00	75,000.00
6	Additional transport trips	78	nr	495.00	38,610.00
	TOTAL				**1,113,417.79**

78. FMEL is entitled to recover its costs for additional storage in the amount of **£1,113,417.79**

79. Details of the amounts claimed are included at Appendix 4-009.

DISRUPTION – OTHER ELEMENTS OF THE WORK

Repainting

80. Blast primers are applied to the surface of the steelwork. Good practice requires that over-coats are applied on top of these primers within a prescribed time otherwise the primers begin to degrade.

81. As a result of the long delays for which CMAL is responsible FMEL carried out additional works in touching up primers and making good the paint system in areas of degradation (and in other areas to avoid degradation). The additional cost involved is as follows:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Labour	3,010	hrs	29.46	88,674.60
2	Materials	1	sum	11,739.00	11,739.00
	TOTAL				**100,413.60**

82. FMEL is entitled to recover its additional costs for painting in the amount of **£100,413.60**

Increased dry dock works

83. The baseline programme [Appendix 3 – 002] showed that launch was to take place on 14 August 2018 (line item 51). It also shows that hull 801 was to spend a period in dry dock starting on 4 December 2017 (line item 55). The vessel was planned to spend a little under four months in the water, at the quayside, before its dry dock visit.

84. The time in dry dock was to be used for cleaning and routine maintenance before the start of sea trials.

85. Launch of hull 801 in fact took place on 21 November 2017. The cardinal dates programme of 21 June 2018 shows that dry docking of the hull is planned to start on 21 February 2019. This means that the vessel will have spent 15 months in the water at the quayside. This will have taken its toll on the hull and more works will be required in the dry dock to make the vessel ready for sea trials.

86. Part 3 of the claim has explained, the reasons for the early launch of hull 801 and the prolonged duration at the quayside. They rest entirely with CMAL.

87. Although it is difficult to be precise until the vessel is dry docked, the following additional works are likely to be required before sea trials as a result of its prolonged duration moored at the quayside:

- sea chest anode replacement (if required)
- tunnel thruster anode replacement (if required)
- anti-fouling coating touch up and one coat of anti-fouling

- welding and painting of UWILD markings
- all underwater internal and external paint systems to be brought up to “as new” standard as required by CMAL paint specification
- draft marks to be surveyed and brought up to standard as required
- zero adjustment to the vessel speed log
- rework to forward thruster header tank pipework
- temporary stern tube oil system to be replaced
- stern tube oil system to be flushed and refilled

88. FMEL now faces the cost of a longer hire period for the dry dock than would have been required had delays not occurred.

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Rent of dry dock	4	days	500.00	2,000.00
2	Generator	4	days	2,000.00	8,000.00
3	Security	4	days	250.00	1,000.00
4	Access	4	days	500.00	2,000.00
5	Fire safety	4	days	500.00	2,000.00
6	Labour	600	hrs	45.00	27,000.00
	TOTAL				**42,000.00**

89. FMEL is entitled to recover its costs for additional hire charges of the dry dock which is forecast to amount to **£42,000.00**

90. Details of the amounts claimed are included at Appendix 4-010.

Installation of LNG tank

91. In part 3 of this claim it was explained that as a result of the delay and disruption there was no “open sky” access available for the installation of the LNG tank. It was initially loaded on to the bow of deck 3, even though its final position was mid-ship on deck 1. The tank was then manoeuvred along deck 3 and eventually lowered into its correct position two decks below. (By comparison, the LNG tank for hull 801 could be lifted directly into position on deck 1.)

92. The delay and disruption prevented direct access to deck 1 for installation of the LNG tank. As a result FMEL incurred the following costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	20	hrs	29.46	589.20
2	Drawing office	20	hrs	29.46	589.20
3	Materials for support cradle	4	tonnes	1,150.00	4,600.00
4	Fabrication	40	hrs	29.46	1,178.40
5	Installation	1,216	hrs	29.46	35,823.39
6	Miscellaneous - cranage		sum		11,850.00
	TOTAL				**54,630.16**

93. FMEL is entitled to recover its additional costs for installing the LNG tank in the amount of **£54,630.16**

94. Details of the amounts claimed are included at Appendix 4-011.

Abortive steelwork mid-ships

95. The blocks should have been designed, fabricated and consolidated starting from the stern. This was the only feasible way of constructing hulls 801 and 802 concurrently, side by side on the slipway.

96. It has been explained in part 3 of this claim that in order to mitigate the long delays to the stern blocks FMEL started fabrication and consolidation of the mid-ship blocks. At that time the design of the hoistable car deck support structure had not been finalized. Under normal circumstances, had the midship blocks been fabricated in the planned sequence, the car deck design would not have been needed until some months later.

97. In order to make some progress with the fabrication and consolidation, FMEL had little option other than to proceed with the blocks and incorporate the car deck structure as best it could as the works proceeded. This eventually led to large quantities of steelwork having to be modified or replaced. Approximately 11 tonnes of fabricated steel had to be removed and 23 tonnes installed. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Detailing	330	hrs	29.46	9,721.80
2	Production detailing [redacted]	(included)			-

	Item	Qty	Unit	Rate (£)	Total (£)
3	Removal of previously installed work	1,100	hrs	29.46	32,406.00
4	Materials	29.649	tonnes	850.00	25,201.73
5	Fabrication/installation	6,840	hrs	29.46	201,506.40
6	Painting	200	hrs	29.46	5,892.00
7	Miscellaneous - paint		sum		920.00
	TOTAL				**275,647.93**

98. FMEL is entitled to recover its additional costs for abortive steelwork installations midship in the amount of **£ 275,647.93**

99. Details of the amounts claimed are included at Appendix 4-012.

Lloyd's Register requirements

100. As a result of the long delays to the block fabrication and consolidation, at the time of launch the hull had not been fully completed, nor had the entire superstructure been installed on the hull. This gave concern to Lloyd's Register.

101. It wanted assurance that upon launch the bending moment of the entire vessel was close to zero. As a consequence FMEL engaged Houlder Limited to carry out a series of finite element analysis checks.

102. Lloyd's Register also required strain gauges to be fitted to the vessel to monitor stress before and after launch. These gauges would not have been necessary but for the delays and inability to complete the structure before launch.

103. As a result of these requirements FMEL has incurred the following costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	60	hrs	29.46	1,767.60
2	[redacted] – stress analysis	(included)			-
3	[redacted] – strain gauges	1	sum	8,400.00	8,400.00
4	Installation	80	hrs	29.46	2,356.80

	Item	Qty	Unit	Rate (£)	Total (£)
5	Miscellaneous – travel, etc	1	sum	700.00	700.00
	TOTAL				**13,224.40**

104. Clause 26 of the Contract requires an adjustment to the Contract Price to be made in the event that there are any changes to the application of the Rules and Regulations. FMEL is therefore entitled to recover its additional costs of complying with the requirements of for Lloyd's Register in the amount of **£13,224.40**

105. Details of the amounts claimed are included at Appendix 4-013.

VARIATIONS TO THE CONTRACT (VTC'S) AGREED IN PRINCIPLE BY CMAL

106. There have been 98 variations to Contract (VTC's) for hull 801 which have been approved in principle by CMAL. The value of these VTC's is £776,410.00. (There are a similar number of VTC's for hull 802, also approved in principle, amounting in value to £765,910.) A list of these VTC's is included at Appendix 2-003.

107. CMAL has refused to formalize these VTC's. Details are set out more fully in part 2 of this claim. However, it is worth repeating here the content of an e mail from Jim Anderson (CMAL) to [redacted] (FMEL) on 17 October 2017 at 08:43 hrs [Appendix 2-006].

> *To avoid any misunderstanding, it is not that we will not confirm agreement of the change orders, it is that we cannot confirm the complete list until FMEL process the technical addendum, as you know it is over 2 years since the proposed addendum was issued by FMEL.* [emphasis as original]
>
> *When can you arrange for the contract addendum to be processed from your side?*
>
> *Best Regards,*
>
> *Jim*

108. The refusal to formalize these VTC's until a contract addendum was signed is wholly unjustified. (This is explained in part 2 of this claim.) CMAL's position is untenable because it has already paid £393,504.00 for the winch bollards (see Appendices 2-004 and 2-005).

109. FMEL is entitled to payment of the VTC's agreed in principal (for hull 801) in the amount of **£776,410.00** (which includes and amount already paid of £393,504.00).

MODIFICATIONS OR CHANGES PENDING AGREEMENT BY CMAL

110. There have been many modifications and changes to the works. These have rarely been formally instructed by CMAL since it has chosen to use informal routes or reflect them in comments on drawings.

Modifications to circular windows - deck 5

111. There are a number of circular steel windows towards the front of deck 5. These were designed, supplied and installed in accordance with the Specification and the manufacturer's recommendations. On this basis they were approved and signed off by Lloyd's Register of Shipping ("LR").

112. Towards the end of March 2018 CMAL expressed its disapproval of the method of fixing, notwithstanding the fact that the fixings complied with the Specification, were in accordance with the manufacturer's recommendations and had been approved by LR.

113. Despite FMEL's protests, CMAL insisted that additional stiffeners be fixed to the outside of the windows. Consequently FMEL started its design for these stiffeners on 5 June 2018. This was submitted to CMAL on 29 June 2018 at which time a mock-up of the additional stiffener reinforcing ring was prepared for CMAL's review and approval. Approval was given by CMAL on 29 June 2018.

114. CMAL simply had no right to interfere in the design process. This is a purely a matter of preferential engineering on its part. As a result FMEL incurred additional costs as follows:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design	20	hrs	29.46	589.20
2	Detailing	20	hrs	29.46	589.20
3	Mock up	40	hrs	29.46	1,178.40
4	Paint and other materials	1	sum	1,000.00	1,000.00
5	Installation	80	hrs	29.46	2,356.80
6	Painting - touch up	24	hrs	29.46	707.04
	TOTAL				**6,420.64**

115. FMEL is entitled to recover its costs for modifications to the circular steel windows in the amount of **£6,420.64**

Changes to passenger windows – decks 5 and 6

116. FMEL designed the passenger windows on decks 5 and 6 to the sizes shown on the general arrangement drawings which formed part of the Contract. CMAL nevertheless

required them to be increased in size (by about 16%) to match those on the *Loch Seaforth*. As a result FMEL incurred additional cost.

117. FMEL is entitled to recover its costs for changes to the passenger windows at decks 5 and 6 in the amount of **£27,000.00**

Strengthening mid-ships for ducktail

118. Part 3 of this claim explains that it was proposed to fix a ducktail to the sterns of hulls 801 and 802. Whilst CMAL permitted this for hull 802 it would not allow one to be fixed for hull 801. However, it wanted the ability to be able to fix a ducktail to 801 at a later date.

119. The addition of a ducktail not only affects the stern. The mid-ships of the vessel needs to be strengthened to handle the additional bending moment of the vessel as a whole. FMEL incurred the following costs as a consequence of this strengthening.

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Model tank testing	1	sum	58,326.00	58,326.00
2	Investigation report for the additional strengthening	(included)			-
3	Midship design work including liaising with Lloyd's register	20	hrs	29.46	589.20
4	Drawing office including liaising with Lloyd's Register	30	hrs	29.46	883.80
5	Material costs	1	sum	1,198.00	1,198.00
6	Fabrication and installation labour	400	hrs	29.46	11,784.00
7	Re-work painting	400	hrs	29.46	11,784.00
8	Lloyd's Register and MCA additional fees	1	sum	18,860.00	18,860.00
9	Materials - paint	1	sum	500.00	500.00
	TOTAL				**103,925.00**

120. FMEL is entitled to recover its costs for strengthening the mid-ships of vessel 801 to accommodate a duck tail in the amount of **£103,925.00**

121. Details of the amounts claimed are included at Appendix 4-014.

Freshwater tank framing

122. On the 8 March 2016 a technical submission was made by FMEL to replace the stainless steel lining to the freshwater tank with an epoxy alternative. This was agreed by CMAL on the 18 April 2016.

123. At the end of June 2016 revision F of the scantling drawings (which identified and detailed the freshwater tank) were submitted for approval. Clause 30 of the Contract requires CMAL to approve the drawings or make comments, amendments or reservations within 14 days of receipt.

124. On 21 September 2016 CMAL eventually issued its comments (Owner's Observation 9) saying:

> *We must highlight that structural drawings have not been submitted to CMAL for review and therefore comment and approval.*

125. FMEL initially stopped all works on the tanks pending approval of the drawings by CMAL, but quickly re-started after telling CMAL that production could not be delayed any further and the works would be recommenced. Clause 20 allows FMEL to proceed with the works in the absence of any comments and/or approval within 14 days.

126. Following a meeting between FMEL and CMAL on 22 November 2016, CMAL issued a drawing varying the design of the tanks, reducing the internal structural members and adding external supports, requiring FMEL to further develop the design.

127. On 2 February 2017 FMEL formally issued Change Notices 36 and 37 to CMAL. They included for the abortive work and extensive re-work required in order to incorporate the design issued by CMAL on 22 November 2016.

128. As a result of the changes to the fresh water tank, the following additional costs were incurred by FMEL:

	Item	***Qty***	***Unit***	***Rate (£)***	***Total (£)***
1	Design	60	hrs	29.46	1,767.60
2	Material costs - new stiffeners	2	tonnes	1,025.00	2,050.00
3	Fabrication and Installation labour	670	hrs	29.46	19,738.20
4	Painting labour	80	hrs	29.46	2,356.80
5	Materials - paint	1	sum	500.00	500.00
	TOTAL				**26,412.60**

129. FMEL is entitled to recover its costs for changes to the fresh water tanks in the amount of **£26,412.60**

Relocation of LNG bunkering

130. Part 3 of this claim explains that CMAL instructed the relocation of the LNG bunkering from mid-ships to the stern of the vessel to potentially allow on board refuelling. As a result FMEL incurred additional costs for design, longer pipe runs, deep beam penetrations and bulkhead penetration glands, all as follows:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design work related the location of the bunkering station	50	hrs	29.46	1,473.00
2	Design/production detailing work related to final routing of the cryogenic pipes through the engine and generator rooms	(included)			
3	Materials - cryogenic pipes	1	sum	106,279.00	106,279.00
4	Cutting and stiffening of holes with new material to allow the cryogenic pipes to pass through beams and bulkheads	1,510	hrs	29.46	44,484.60
5	Installation costs of cryogenic pipes	1	sum	64,557.13	64,557.13
6	Removal and refitting of existing pipes to allow the installation of the cryogenic pipes	100	hrs	29.46	2,946.00
7	Painting altered steelwork	100	hrs	29.46	2,946.00
8	Material - paint	1	sum	250.00	250.00
	TOTAL				**222,935.73**

131. FMEL is entitled to recover its costs for relocating the LNG bunkering in the amount of **£222,935.73**

Re-location of other bunkering stations

132. The bunkering station for MGO , fresh water and lube oils was originally located mid-ships, close to the LNG tank. The station also housed discharge connections for the vessel's waste oils and black water (sewerage) systems

133. CMAL was unable to confirm that a shore side MGO diesel road tanker could be accommodated in all ports and it instructed FMEL to consider diesel bunkering from on-board the vessel. Because of safety concerns, this would need the tanker to park on the open rear vehicle deck in the dangerous goods zone.

134. After lengthy discussions CMAL decided to locate the starboard bunker station to the rear of the vessel.

135. This revised location significantly increased the length of pipework and required penetrations and stiffeners to be provided through main structural members. Considerable difficulties had to be overcome with the routing of these systems since they are gravity fed. FMEL has incurred the following additional costs:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Detailing (penetrations)	188	hrs	29.46	5,538.48
2	Design/production detailing for final routing of the cryogenic pipes through the engine and generator rooms	(included)			-
3	Materials - piping	1	sum	7,569.53	7,569.53
4	Fabrication of spools	402	hrs	29.46	11,842.92
5	Cutting and stiffening of holes to allow the pipes to pass through beams and bulkheads	376	hrs	29.46	11,076.96
6	Installation costs - pipes	670	hrs	29.46	19,738.20
7	Painting altered steelwork	50	hrs	29.46	1,473.00
8	Material - paint	1	sum	250.00	250.00
	TOTAL				**57,489.09**

136. FMEL is entitled to recover its costs for relocating the MGO diesel bunkering in the amount of **£57,489.09**

Hazardous zones

137. In mid-June 2018 FMEL sought clarification from Lloyd's Register on the interpretation of certain aspects of the hazardous zones rules. This affected a number of areas and in particular the ventilation of stores around the LNG bunkering stations.

138. It was not until 7 September 2018 that Lloyd's gave an appropriate direction. As a result the progress of FMEL's works were disrupted and it incurred the following costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	40	hrs	29.46	1,178.40
2	Co-at Marine (FMEL specialist subcontractor)	1	sum	36,762.00	36,762.00
	TOTAL				**37,940.40**

139. FMEL is entitled to recover its costs for associated with the hazardous zones in the amount of **£37,940.40**

140. Details of the amounts claimed are included at Appendix 4-015.

141. (Whilst this head of claim is made under modifications and changes, it could equally be made under clause 26 – changes in the application of Rules and Regulations.)

Nitrogen bottle storage

142. FMEL planned to locate the storage of nitrogen bottles next to the generator in the workshop area below deck 3. Lloyd's Register initially approved this location and FMEL proceeded on that basis.

143. Lloyd's subsequently changed its mind requiring the nitrogen bottles to be stored in a separate room. As a result FMEL incurred additional costs as follows:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	40	hrs	29.46	1,178.40
2	Fabrication	128	hrs	29.46	3,770.88
3	Materials - piping	1	sum	1,500.00	1,500.00
4	Materials – paint and galvanizing	1	sum	500.00	500.00
	TOTAL				**6,949.28**

144. FMEL is entitled to recover its costs for associated with the nitrogen bottle storage in the amount of **£6,949.28**

Windlasses

145. CMAL's specified equipment requirements were so extensive that it was a constant struggle to fit them all within the dimensions of the hull. CMAL recognized this by omitting some of the standby systems.

146. One area in which FMEL faced difficulties was the deck space around the windlasses. FMEL raised the issue of lack of work space in July 2016. CMAL acknowledged that there was a problem but took until December 2016 to make a clear decision to use double drum windlasses.

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design	140	hrs	29.46	4,124.40
	TOTAL				**4,124.40**

147. FMEL is entitled to recover its costs for associated with the windlasses in the amount of **£4,124.40**

Deck strengthening for enhanced mooring requirements

148. Clause 3 of the Contract says:

> *3. Classification, Rules and Regulations*
>
> *(a) The Vessel shall be designed, constructed, surveyed, tested and delivered in compliance with the applicable laws, rules, regulations and requirements* ***of the Classification Society stated in Box 8****, and the Regulatory Authorities.* [emphasis added]

149. Box 8 of the Contract (at page 3) shows that the Classification Society is Lloyd's Register ("LR").

150. Clause 1 (b) of the Contract requires FMEL to design and build the vessel in accordance with good international shipbuilding and marine practice.

151. FMEL designed its mooring equipment based upon ropes with a 23 tonne breaking strain. This meets the requirements Lloyd's Register and is in accordance with good international shipbuilding and marine practice.

152. CMAL advised FMEL that it usually used mooring ropes of 43 and 50 tonne breaking strain and pointed out that section 430 of the Specification requires FMEL to show that OCIMF (Oil Companies International Marine Forum) criteria have been met for design loads on all mooring fittings. The OCIMF requirements are normally used for oil tankers, and not ferries.

153. Clearly there is an ambiguity in the contract. On the one hand the Contract conditions require FMEL to design to good international shipbuilding practice and Lloyd's Register rules, whereas on the other hand OCIMF criteria is stated to apply. There is no order of precedence of documents stated in the Contract so which is to prevail?

> *Where there is doubt about the meaning of a contract the words will be construed against the person who put them forward.*

154. This is known as the *contra proferentem rule*. The above quotation was taken from *The Interpretation of Contracts (sixth edition)* by Sir Kim Lewison and was referred to with approval in *Lexi Holdings Plc v Stainforth* [2006] EWCA Civ 988.

155. The Specification was prepared by CMAL and should therefore be construed against CMAL. Consequently, the requirement to design to Lloyd's Register's approval will satisfy the Contract requirements.

156. Clause 3 (ii) of the Contract goes on to say:

> *All such laws, rules, regulations and requirements of the Classification Society and the Regulatory Authorities shall be complied with without qualification (see Clause 26 (Changes in Rules and Regulations)).*
>
> *(b) The final decisions of the Classification Society or Regulatory Authorities shall be binding on the Parties as to the Vessel's compliance with their respective applicable laws, rules, regulations and requirements.*

157. CMAL subsequently relented somewhat on its requirement to use ropes of 43 tonne or 50 tonne breaking strain, reducing the limit to 40 tonnes. However, even this had major implications on the design of the mooring equipment and surrounding structures.

158. Equipment rated for 40 tonne requires the supporting structure to be designed to carry 1,180kN instead of 288kN under Lloyd's Register - i.e. an increase of more than four times.

159. In the end and after more than nine months of discussions CMAL made further reductions to the breaking strain, permitting mooring system and supporting structure to carry 527kN - i.e. still 83% more than Lloyd' Register required.

160. As a result of CMAL's interference in the design process, FMEL was delayed and disrupted, and incurred the following additional costs related to the strengthening of the deck for the enhanced mooring requirements:

	Item	***Qty***	***Unit***	***Rate (£)***	***Total (£)***
1	Design	40	hrs	29.46	1,178.40
2	Detailing	60	hrs	29.46	1,767.60
3	External and internal design and detailing (Selman Marine)	1	sum	6,045.00	6,045.00
4	Materials	1	sum	1,220.00	1,220.00
5	Fabrication and installation hours for the supporting steelwork	200	hrs	29.46	5,892.00

	Item	Qty	Unit	Rate (£)	Total (£)
6	Painting altered steelwork	80	hrs	29.46	2,356.80
7	Materials - paint	1	sum	850.00	850.00
	TOTAL				**19,309.80**

161. FMEL is entitled to recover its costs for additional works related to the mooring equipment in the amount of **£19,309.80**

Passenger area toilet door

162. This change arises as a result of CMAL's comments on the revision A general arrangement drawings which existed at tender stage. The change was subsequently incorporated in the revision B general arrangement drawing.

163. CMAL requested an additional door into the passenger area toilet from the crew accommodation on deck 6. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Detailing	4	hrs	29.46	117.84
2	Material costs	1	sum	950.00	950.00
3	Installation labour	4	hrs	29.46	117.84
	TOTAL				**1,185.68**

164. FMEL is entitled to recover its costs for providing an extra door passenger toilet in the amount of **£1,185.68**

Additional stores – deck 2

165. This change arises as a result of CMAL's comments on the revision B general arrangement drawings which were subsequently reflected on the revision C drawings.

166. CMAL requested that additional store rooms and shelves be provided on deck 2 between deck frames 6 and 9. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	4	hrs	29.46	117.84
2	Drawing office time	30	hrs	29.46	883.80
3	Materials (including wooden shelving)	1	sum	2,750.00	2,750.00
4	Fabrication	160	hrs	29.46	4,713.60
5	Installation	(included)			-
6	Painting	40	hrs	29.46	1,178.40
7	Outfitting	20	hrs	29.46	589.20
8	Miscellaneous	1	sum	500.00	500.00
	TOTAL				**10,732.84**

167. FMEL is entitled to recover its costs for providing additional stores and shelving in the amount of **£10,732.84**

Watertight doors

168. This change arises as a result of CMAL's comments on the revision C general arrangement drawings which were subsequently reflected on the revision D drawings.

169. At CMAL's request, watertight doors to the LNG space were omitted and watertight doors were added to the auxiliary machine areas and stabilizer rooms (outboard of the LNG tanks). As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Drawing office time	40	hrs	29.46	1,178.40
2	Materials (including wooden shelving)	2	nr	6,177.00	12,354.00
3	Fabrication	50	hrs	29.46	1,473.00
4	Painting	10	hrs	29.46	294.60

	Item	Qty	Unit	Rate (£)	Total (£)
5	Miscellaneous materials	1	sum	500.00	500.00
	TOTAL				**15,800.00**

170. FMEL is entitled to recover its costs for changes to the watertight doors in the amount of **£15,800.00**

171. Details of the amounts claimed are included at Appendix 4-016.

Shower room

172. This change arises as a result of CMAL's comments on the revision C general arrangement drawings which were subsequently reflected on the revision D drawings.

173. At CMAL's request, an additional shower room was added on deck 6. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Drawing office time	40	hrs	29.46	1,178.40
2	Materials	1	sum	2,384.00	2,384.00
4	Installation and outfitting	54	hrs	29.46	1,590.84
	TOTAL				**5,153.24**

174. FMEL is entitled to recover its costs for providing an additional shower room in the amount of **£5,153.24**

Increase in galley size

175. This change arises as a result of CMAL's comments on the revision C general arrangement drawings which were subsequently reflected on the revision D drawings.

176. At CMAL's request, the galley was increased in size from 57.3 m2 to 77m2. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Drawing office time	100	hrs	29.46	2,946.00
2	Materials	1	sum	3,920.00	3,920.00
3	Outfitting	60	hrs	29.46	1,767.60
4	Painting	50	hrs	29.46	1,473.00
5	Miscellaneous materials	1	sum	1,000.00	1,000.00
	TOTAL				**11,106.60**

FMEL is entitled to recover its costs for increasing the galley area in the amount of **£11,106.60**

First aid and patient transfer area

177. This change arises as a result of CMAL's comments on the revision C general arrangement drawings which were subsequently reflected on the revision D drawings.

178. At CMAL's request, a first aid room and patient transfer area was added on the main deck between frames 100 and 108. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Drawing office time	40	hrs	29.46	1,178.40
2	Materials	1	sum	8,000.00	8,000.00
3	Fabrication	50	hrs	29.46	1,473.00
4	Installation	50	hrs	29.46	1,473.00
5	Painting	50	hrs	29.46	1,473.00
6	Miscellaneous materials	1	sum	1,000.00	1,000.00
	TOTAL				**14,597.40**

179. FMEL is entitled to recover its costs for the first aid and patient transfer area in the amount of **£14,597.40**

Fast rescue craft store

180. This change arises as a result of CMAL's comments on the revision D general arrangement drawings which were subsequently reflected on the revision E drawings.

181. At CMAL's request, a fast rescue craft store was added on deck 6 between frames 37 and 39 (starboard side). As a result FMEL incurred the following additional costs:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design	4	hrs	29.46	117.84
2	Drawing office time	15	hrs	29.46	441.90
3	Materials	1	sum	1,200.00	1,200.00
4	Fabrication	180	hrs	29.46	5,302.80
5	Installation	24	hrs	29.46	707.04
6	Painting	50	hrs	29.46	1,473.00
7	Miscellaneous materials	1	sum	700.00	700.00
	TOTAL				**9,942.58**

182. FMEL is entitled to recover its costs for the fast rescue craft store in the amount of **£9,942.58**

Rope store

183. This change arises as a result of CMAL's comments on the revision E general arrangement drawings which were subsequently reflected on the revision F drawings.

184. At CMAL's request, a rope store was added to the stern of the main deck between frames -4 and 0. As a result FMEL incurred the following additional costs:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design	4	hrs	29.46	117.84
2	Drawing office time	15	hrs	29.46	441.90
3	Materials	1	sum	1,200.00	1,200.00
4	Fabrication	180	hrs	29.46	5,302.80

	Item	Qty	Unit	Rate (£)	Total (£)
5	Installation	24	hrs	29.46	707.04
6	Painting	50	hrs	29.46	1,473.00
7	Miscellaneous materials	1	sum	700.00	700.00
	TOTAL				**9,942.58**

185. FMEL is entitled to recover its costs for the rope store in the amount of **£9,942.58**

Replace office with tourist information and games areas

186. This change arises as a result of CMAL's comments on the revision E general arrangement drawings which were subsequently reflected on the revision F drawings.

187. At CMAL's request, an office was replaced by a tourist information area and games area on deck 5. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	40	hrs	29.46	1,178.40
2	Materials including fitting	1	sum	2,500.00	2,500.00
	TOTAL				**3,678.40**

188. FMEL is entitled to recover its costs for replacing the office with a tourist information and games areas in the amount of **£3,678.40**

Door to changing area and gymnasium

189. This change arises as a result of CMAL's comments on the revision E general arrangement drawings which were subsequently reflected on the revision F drawings.

190. At CMAL's request, a door was added between the changing area and gymnasium on deck 6. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	4	hrs	29.46	117.84
2	Materials	1	sum	950.00	950.00
3	Installation	12	hrs	29.46	353.52
	TOTAL				**1,421.36**

191. FMEL is entitled to recover its costs for providing a door between the changing area and gymnasium in the amount of **£1,421.36**

Lobby between recreation room and upper passenger lounge

192. This change arises as a result of CMAL's comments on the revision F general arrangement drawings which were subsequently reflected on the revision G drawings.

193. At CMAL's request, a lobby was added between the recreation area and upper passenger lounge on deck 6. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	4	hrs	29.46	117.84
2	Materials	1	sum	1,150.00	1,150.00
3	Installation	16	hrs	29.46	471.36
	TOTAL				**1,739.20**

194. FMEL is entitled to recover its costs for providing a lobby between the recreation area and upper passenger lounge on deck 6 in the amount of **£1,739.20**

Improvements to officer and crew recreation and mess rooms

195. This change arises as a result of CMAL's comments on the revision F general arrangement drawings which were subsequently reflected on the revision G drawings.

196. CMAL requested some improvements to be made to the officers and crews' recreation and mess rooms. This involved amendments to a full height bulkhead, an additional two doors, partitioning and provision of a TV unit. FMEL incurred additional costs as follows:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	10	hrs	29.46	294.60
2	Drawing office time	40	hrs	29.46	1,178.40
3	Materials	1	sum	8,186.00	8,186.00
4	Installation	44	hrs	29.46	1,296.24
	TOTAL				**10,955.24**

197. FMEL is entitled to recover its costs for providing partitions and doors to the crew's recreation area on deck 6 in the amount of **£10,955.24**

Alternative lounge

198. This change arises as a result of CMAL's comments on the revision F general arrangement drawings which were subsequently reflected on the revision G drawings.

199. At CMAL's request, an alternative lounge was added on deck 6. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	30	hrs	29.46	883.80
2	Drawing office time	(included)			-
3	Materials	1	sum	4,590.00	4,590.00
	TOTAL				**5,473.80**

200. FMEL is entitled to recover its costs for providing an alternative lounge on deck 6 in the amount of **£5,4,73.80**

Sliding door to toilet

201. This change arises as a result of CMAL's comments on the revision G general arrangement drawings which were subsequently reflected on the revision H drawings.

202. At CMAL's request, a sliding door was added to the toilet on deck 6. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	4	hrs	29.46	117.84
2	Drawing office time	(included)			-
3	Materials	1	sum	895.00	895.00
4	Installation	4	hrs	29.46	117.84
	TOTAL				**1,130.68**

203. FMEL is entitled to recover its costs for providing a sliding door to the toilet on deck 6 in the amount of **£1,130.68**

Carpenter's store

204. This change arises as a result of CMAL's comments on the revision G general arrangement drawings which were subsequently reflected on the revision H drawings.

205. At CMAL's request, a carpenter's store was added on deck 3 between frames -4 and 0 (on the port side). As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	4	hrs	29.46	117.84
2	Drawing office time	15	hrs	29.46	441.90
3	Materials	1	tonne	1,200.00	1,200.00
4	Fabrication	180	hrs	29.46	5,302.80
5	Installation	24	hrs	29.46	707.04
6	Painting	50	hrs	29.46	1,473.00
7	Miscellaneous materials	1	sum	700.00	700.00
	TOTAL				**9,942.58**

206. FMEL is entitled to recover its costs for the carpenter's store in the amount of **£9,942.58**

Relocation of coffin store

207. The coffin store was originally located at the stern of the vessel between frames -4 and 0. This was shown on revision F of the general arrangement drawings. On 4 April 2016, as part of its review process, CMAL commented on the doors to the store but not its location.

208. On 16 May 2016 CMAL asked for the store to be reduced in size but again made no comment about its location. However on 26 May 2016, CMAL stated it would prefer a forward location for the store, as it would be more discreet for passengers on the open decks nearby. CMAL sent a sketch confirming their preferred location towards the front of the vessel.

209. In addition, CMAL requested a mock-up be built to ensure manoeuvrability of a coffins into the new area. This is not a requirement of the specification, nor did CMAL request such a mock up for the store in its original location.

210. As a result of these requirements FMEL incurred the following additional costs:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design	10	hrs	29.46	294.60
2	Drawing office time	14	hrs	29.46	412.44
3	Materials	1	sum	1,200.00	1,200.00
4	Installation	20	hrs	29.46	589.20
5	Mock-up to ensure manoeuvrability	30	hrs	29.46	883.80
6	Miscellaneous materials	1	Sum	500.00	500.00
	TOTAL				**3,880.04**

211. FMEL is entitled to recover its costs for relocating the coffin store in the amount of **£3,880.04**

Office within control room

212. This change arises from an email request from [redacted] (FMEL) to [redacted] (FMEL) dated 27 September 2016 in which CMAL requested an office to be added within the control room. The office was eventually shown on revision 1 of the general arrangement drawing dated 16 February 2017.

213. As a result of this requirement FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	8	hrs	29.46	235.68
2	Drawing office time	(included)			-
3	Materials (desk: £800 chair: £200 shelving: £500)	1	sum	2,300.00	2,300.00
4	Installation	16	hrs	29.46	471.36
	TOTAL				**3,007.04**

214. FMEL is entitled to recover its costs for providing an office within the control room in the amount of **£3,007.04**

Reposition pillars throughout passenger areas

215. This change arises from an email request from Jim Anderson (FMEL) to [redacted] (FMEL) dated 18 May 2017 at 17 58 hrs in which CMAL instructed pillars throughout the passenger areas to be relocated to "improve the finished look" of the vessel.

216. FMEL's original design was fully in compliance with the Contract and CMAL's requirement to re-arrange the pillars is a simple matter of preference engineering. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	100	hrs	29.46	2,946.00
2	Drawing office time	100	hrs	29.46	2,946.00
3	Additional production design work by Vera Navis	(included)			-
4	Additional material costs for strengthening existing beams and introducing new pillars	1	sum	2,200.00	2,200.00
5	Fabrication and installation of stiffening to existing beams	200	hrs	29.46	5,892.00
6	Installation	220	hrs	29.46	6,481.20
7	Painting	16	hrs	29.46	471.36

	Item	Qty	Unit	Rate (£)	Total (£)
8	Miscellaneous materials	1	sum	100.00	100.00
	TOTAL				**21,036.56**

217. FMEL is entitled to recover its costs for relocating pillars within the passenger areas in the amount of **£21,036.56**

218. Details of the amounts claimed are included at Appendix 4-017.

Additional Panama eyes

219. The ropes which moor the vessel must pass from the windlasses at deck level, through the hull of the ship. The holes in the hull (at deck level) are known as Panama eyes. They are illustrated below in figure 4 – 2.

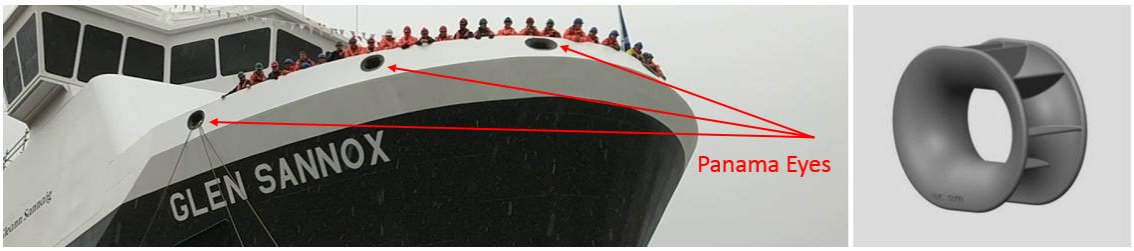


figure 4 – 2 Panama eyes

220. FMEL's submitted design was in accordance with good international shipbuilding and marine practice and it was therefore Contract compliant. Nevertheless, during discussions between [redacted] (CMAL) and [redacted] (FMEL) on 23 February 2018 CMAL requested the introduction of an additional two Panama eyes.

221. As a result FMEL incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	24	hrs	29.46	707.04
2	Drawing office time - Vera Navis	(included)			-
3	Materials	1	sum	5,323.00	5,323.00
4	Fabrication	96	hrs	29.46	2,828.16
5	Installation	216	hrs	29.46	6,363.36

	Item	Qty	Unit	Rate (£)	Total (£)
6	Painting	30	hrs	29.46	883.80
7	Miscellaneous materials	1	sum	100.00	100.00
	TOTAL				**16,205.36**

222. FMEL is entitled to recover its costs for providing additional Panama eyes in the amount of **£16,205.36**

Changes to passenger layout

223. The specification calls for 1000 passenger seats – 650 inside and 350 outside. FMEL's general arrangement drawings have always shown this. CMAL has instructed various studies to be carried out varying these numbers

224. For example, the passenger numbers are closely allied with the provision of sufficient lifeboats. On 11 July 2018, CMAL asked to what extent could the passenger numbers be reduced if one lifeboat was removed from the design. FMEL promptly re-assessed the layouts and reported that passenger numbers could be reduced to 924.

225. Later that month CMAL said it would prefer 950 seats. By 31 August 2018, CMAL was still prevaricating over passenger numbers and layouts, a matter which should have been resolved at conceptual design stage. Only on 27 September 2018 did CMAL eventually settle with a requirement for 961 seats. Full details of the numerous changes are set out in part 3 of this claim.

226. As a result of CMAL's changing passenger layout requirements, FMEL has incurred the following additional costs:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	40	hrs	29.46	1,178.40
2	Drawing office time	120	hrs	29.46	3,535.20
	TOTAL				**4,713.60**

227. FMEL is entitled to recover its costs in association with changing the passenger layouts in the amount of **£4,713.60**

Port fit (embarkation door locations)

228. The Specification lists the various ports which the vessel may serve. The Contract requires CMAL and FMEL to jointly evaluate the linkspan, ramp and passenger door interfaces in each port.

229. CMAL took this to mean that the vessel should be designed such that it was capable of being docked and aligned in all ports, in both orientations (bow and stern in). This was simply impossible because many of the ports were designed for smaller vessels. Full details are set out in part 3 of this claim.

230. As a result of CMAL's unachievable demands a considerable amount of abortive design and drawing office time was wasted by FMEL. As a result FMEL incurred the following costs:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design	50	hrs	29.46	1,473.00
2	Drawing office time	(included)			-
	TOTAL				**1,473.00**

231. FMEL is entitled to recover its costs in association with the location of the embarkation doors in the amount of **£1,473.00**

Non-standard steel sizes

232. Part 2 of the claim explained the difficulties in achieving the required lightship weight within the specified dimensions and draft of the hull. CMAL tacitly recognized this difficulty and issued an instruction increasing the draft of the vessel. However, this only partially solved the problem. FMEL was left to save further weight wherever it could best be achieved although the process was hindered by CMAL's numerous changes, (which also increased weight) and interference in the design process.

233. The most economical way of designing and building a vessel is to use steel plates of as few thicknesses as possible. Whilst this might result in the use of plates very marginally thicker than they need to be, it nevertheless reduces the time taken to store, select and handle plates of many differing thicknesses during the fabrication process.

234. In order to help achieve the specified lightship weight FMEL decided to use steel plates of minimum thicknesses to ensure that the weight was reduced as much as possible. As a consequence there were many different thicknesses of plates to store and handle. This involved FMEL in additional costs as follows:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Fabrication (1,400 tonnes @ 1hr per tonne)	1,400	hrs	29.46	41,244.00
	TOTAL				**41,244.00**

235. FMEL is entitled to recover its additional costs arising from using multiple non-standard thicknesses of steel plates in the amount of **£41,244.00**

Lightweight insulation

236. The non-standard steel sizes (above) were used to reduce the required lightship weight. Further weight savings were made by the use of lightweight insulation at additional cost.

237. FMEL is entitled to recover its costs for lightweight insulation in the amount of **£120,000.00**

CLAIMS FROM SUBCONTRACTORS AND SUPPLIERS

238. Throughout parts 2 and 3 of this claim many examples of CMAL interfering in the design process have been described. In addition this part of the claim has set out the many modifications or changes requested by CMAL. All these have caused delay, disruption and additional cost for FMEL's subcontractors and suppliers.

239. As a consequence, FMEL has received claims from its subcontractors (or have been told that claims will be submitted) the details of which are now given below.

[redacted]

240. [redacted] is a subcontractor to FMEL providing and installing the engine control room equipment and associated works. It was particularly badly affected by delays in selecting the engine and resolving the layout of the engine room. [redacted] has yet to give a formal claim to FMEL but has said that it will seek to recover the following because of delays, disruption and additional works:

	Item	Qty	Unit	Rate (£)	Total (£)
1	Design	3,272	hrs	29.46	96,393.12
2	Drawing office time	(included)			-
3	Forecast prolongation costs associated with the electrical design and installation	1	sum	1,900,000.00	1,900,000.00
	TOTAL				**1,996,393.12**

241. Within this claim FMEL has made provision for settling the claims from [redacted] for delay, disruption and additional works in the amount of **£1,996,393.12**

[redacted]

242. [redacted] is a subcontractor to FMEL carrying out HVAC installations. It has submitted a claim to FMEL for delay, disruption and additional works and seeks to recover the amount of £220,477.00 as follows.

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design	100	hrs	29.46	2,946.00
2	Drawing office time	(included)			-
3	Prolongation and disruption costs associated with the HVAC installation	1	sum	239,750.00	239,750.00
	TOTAL				**242,696.00**

243. Within this claim FMEL has made provision for settling the claims from [redacted] for delay, disruption and additional works in the amount of **£242,696.00**

244. Details of the amounts claimed are included at Appendix 4-018.

[redacted]

245. [redacted] is a subcontractor to FMEL carrying out fitting out works. It has yet to give a formal claim to FMEL but has said that it will seek to recover the following because of delays, disruption and additional works:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Design	100	hrs	29.46	2,946.00
2	Drawing office time	(included)			-
3	Forecast prolongation and disruption costs associated with the design and installation of outfitting work by Blu Marine	1	sum	300,000.00	300,000.00
	TOTAL				**302,946.00**

246. Within this claim FMEL has made provision for settling the claims from [redacted] for delay, disruption and additional works in the amount of **£302,946.00**

Subcontract claims to completion

247. There are still significant works to be carried out to complete hull 801. It is highly likely that between now and completion new claims will be submitted. Furthermore, those claims already made are likely to be revised or increased.

248. Under the circumstances FMEL has made a provision within this claim for further subcontract claims as follows:

	Item	*Qty*	*Unit*	*Rate (£)*	*Total (£)*
1	Forecast subcontract delay and disruption costs associated with the completion of works.	1	sum	500,000.00	500,000.00
	TOTAL				**500,000.00**

OTHER CLAIMS

Financing charges generally

249. Many of the costs which FMEL now claim have been incurred long ago. Being costs *incurred* and paid, FMEL has had to finance these payments. These finance charges are recoverable. The position was explained in the English case of F.G. Minter v Welsh Health Technical Services Organisation, 1980 [CA 13 BLR 1].

> *'In the building industry cash flow is vital to the contractor and delay in paying him for the work he does naturally results in the ordinary course of things in his being short of working capital, having to borrow capital to pay wages and hire charges and locking up plant, labour and materials capital, which he would have invested elsewhere. The loss of interest which he has to pay on the capital he is forced to borrow and on the capital which he is not free to invest would be recoverable for the employer's breach of contract within the first rule of Hadley v Baxendale (1854) . . . . . and would accordingly be direct loss, if an authorised variation of the works, or the regular progress of the works having been materially affected . . . . . has involved the contractor in that loss.* (Stephenson LJ)
>
> *. . . . . what the appellants here are seeking to claim is not interest on a debt, but a debt which has one of its constituent parts interest charges which have been incurred . . . . . the finance charges paid by the appellants, or the interest which they lost by reason of using their own capital, is part of the direct loss and expense.* (Acker LJ).

250. All financing charges in this claim have been calculated to 31 August 2018 and will continue to accrue until payment. FMEL reserves its right to update the claimed amount until such time payment is made.

Financing charges on delay and disruption costs

251. Financing charges on delay (prolongation) costs should be calculated against the periods of actual delay and not the period beyond the original Contractual Date of Delivery.

252. In *Costain Limited v Charles Haswell and Partners Limited*, 2009 128 [Con LR 154 TCC] judge Richard Fernyhough QC said:

> *The damages claimed as a result of that alleged delay were calculated on the basis of the weekly cost of the whole site overheads referable to the actual period of delay and not to the alleged prolongation of the Treatment Works at the end of the project.*
>
> *. . . . . They* [the expert witnesses] *both considered, correctly in my view, that the period to be assessed was the period during which the delays occurred and that is what they did.*

253. The financing charges on delay and disruption which FMEL has incurred and is entitled to recover is **£1,679,466.00**

254. Details of the amounts claimed are included at Appendix 4-019.

Financing charges on modifications and changes

255. Clause 15(b) of the Contract says:

> *(a) Payment for Modifications and other items*
>
> *(i) The sums due or refundable as a result of modifications and changes, and changes in Rules and Regulations under Clause 24 (Modifications and Changes) and Clause 26 (Changes in Rules and Regulations) shall be added to or deducted from the Final Instalment.*

256. The Contract Date of Delivery was 25 May 2018 and FMEL would have expected to receive payment for changes or modifications in the Final Instalment due sometime mid-2018. However, there have been long delays which have arisen substantially as the result of breaches by CMAL and FMEL now faces the prospect of the Final Instalment being made only in the Autumn of 2019. Consequently FMEL must finance the cost of the changes or modifications until then.

257. These financing costs apply to modifications or changes agreed in principle by CMAL and those pending agreement.

	Item	*Total (£)*
	Financing charges on:	
1	Modifications and changes agreed in principle (VTC's)	
	For the period to 31 August 2019 (and continuing)	8,738.65
2	Modifications and changes pending agreement	
	For the period 31 August 2019 (and continuing)	19,098.95
	TOTAL	**27,837.60**

258. The above figures are, at present, fairly modest since the financing charges have been calculated to run from three months after the original Contractual Date of Delivery. (The Contract provides for payment of modifications and changes to be added to the final instalment.) The financing charges are presently calculated up to 31 August 2018 (the cut-off date of the claim) but will continue to accrue until the final instalment is paid by CMAL.

259. FMEL is entitled to recover these financing costs which amount to **£27,837.60**

Interest on loans

260. FMEL has taken out loans to finance this project. Had the project not been delayed FMEL would have been in the position to repay the loans earlier than it will now be able to do so. Consequently, FMEL has incurred additional interest charges as a result of the delays for which CMAL is responsible.

261. FMEL is entitled to recover these interest charges in the amount of **£6,725,002.00**

262. Details of the amounts claimed are included at Appendix 4-020.

PROFESSIONAL FEES

263. CMAL has refused to formalize modifications and changes which it has agreed in principle. Furthermore, it has refused to engage in meaningful discussions over other amounts claimed by FMEL. It instead gave a deadline to FMEL, demanding that the claims be withdrawn failing which CMAL would place the matter in the hands of its legal team.

264. Under the circumstances FMEL has had little option other than to seek its own professional advice on how its claims might reasonably be advanced. FMEL has incurred legal and professional fees of **£650,000** which it is entitled to recover.

SUMMARY OF AMOUNTS CLAIMED

265. The following is a summary of the amounts now claimed by FMEL as a result of modifications or changes or breaches by CMAL.

Item	*£*
DELAY (PROLONGATION) COSTS	
Hull 801 delay costs	5,056,336.81
Damages for delay to hull 802	5,008,571.34
Recovery of Late Delivery Compensation for hull 802	750,000.00
Extension of guarantee/warranty period	200,000.00
Extension of refund guarantee	896,368.49
Insurances	447,362.69
DISRUPTION COSTS - OUTFITTING AND BLOCK FABRICATION	
Outfitting and block fabrication	15,048,609.90
DISRUPTION COSTS - DESIGN	
[redacted]	33,500.00
[redacted]	583,879.47
DISRUPTION COSTS - PROCUREMENT	
Purchase of steel	280,010.81
Increased wastage of steel	457,203.84
Propellers, shafts, tubes, rudders, etc	133,524.55
Additional storage costs	1,113,417.79
DISRUPTION COSTS - OTHER ELEMENTS OF THE WORKS	
Repainting	100,413.60
Increased dry docks works	42,000.00
Installation of LNG tank	54,630.16
Abortive steelwork mid-ships	275,647.93
Lloyd's Register requirements	13,224.40
VARIATIONS TO THE CONTRACT (VTC'S) AGREED IN PRINCIPLE BY CMAL	
VTCs agreed and paid	393,504.00
VTCs agreed and not paid	382,906.00
MODIFICATIONS OR CHANGES PENDING AGREEMENT BY CMAL	
Modifications to circular windows – deck 5	6,420.64
Changes to passenger windows – decks 5 and 6	27,000.00
Strengthening mid-ships for ducktail	103,925.00
Freshwater tank framing	26,412.60
Relocation of LNG bunkering	222,935.73
Relocation of other bunkering stations	57,489.09

Item	*£*
Hazardous zones	37,940.40
Nitrogen bottle storage	6,949.28
Windlasses	4,124.40
Deck strengthening for enhanced mooring requirements	19,309.80
Passenger area toilet door	1,185.68
Additional stores deck 2	10,732.84
Watertight doors	15,800.00
Shower room	5,153.24
Increase in galley size	11,106.60
First aid and patient transfer area	14,597.40
Fast rescue craft store	9,942.58
Rope store	9,942.58
Replace office with tourist information and games areas	3,678.40
Door to changing area and gymnasium	1,421.36
Lobby between recreation room and upper passenger lounge	1,739.20
Improvements to officer and crew recreation and mess rooms	10,955.24
Alternative lounge	5,473.80
Sliding door to toilet	1,130.68
Carpenter's store	9,942.58
Relocation of coffin store	3,880.04
Office within control room	3,007.04
Reposition pillars throughout passenger areas	21,036.56
Additional Panama eyes	16,205.36
Changes to passenger layout	4,713.60
Port fit (embarkation door locations)	1,473.00
Non-standard steel sizes	41,244.00
Lightweight insulation	120,000.00
CLAIMS FROM SUBCONTRACTORS AND SUPPLIERS	
[redacted]	1,996,393.12
[redacted]	242,696.00
[redacted]	302,946.00
Subcontract claims to completion	500,000.00
OTHER CLAIMS	
Financing charges on delay and disruption costs	1,679,466.00
Financing charges on modifications and changes	27,837.60
Interest on loans	6,725,002.00
PROFESSIONAL FEES	650,000.00
TOTAL	**44,232,321.22**

PART 5 - CONTRACTUAL/LEGAL BASIS OF FMEL'S CLAIMS

INTRODUCTION

1. This part of the claim will explain the contractual/legal basis of FMEL's claims. In many instances the claims are founded on the same contractual/legal basis and it is convenient to consider these together to avoid repetition.

2. CMAL and FMEL have various obligations and rights under the contract. These obligations and rights (insofar as they relate to the claims in this document) will first be set out.

3. Secondly, FMEL is entitled to damages arising from CMAL's breaches and the extent of those damages will next be explained.

4. Finally, some of CMAL's heads of claim are simple modifications or changes, or relate to the application of Rules and Regulations under the Contract. For the sake of completeness, the contract provisions for these will be described.

THE OBLIGATIONS AND RIGHTS OF FMEL AND CMAL UNDER THE CONTRACT

5. CMAL (as the Buyer) and FMEL (as the Builder) entered into separate contracts for the design and construction of hulls 801 and 802 using the NEWBUILDCON standard newbuilding contract. Clause 1 of that contract says:

> 1. *Builder's and Buyer's obligations*
>
> *It is mutually agreed between the Builder and the Buyer that:*
>
> (a) *The Builder **shall design**, construct, test and survey, launch, equip, complete, sell and deliver the vessel to the Buyer **all in accordance with good international shipbuilding and marine engineering practice**;*
>
> ... [emphasis added]

FMEL's design obligations

6. Not only does FMEL have the obligation to design, it has the right to do so, unhindered by CMAL. However, that right is tempered somewhat by CMAL's right of review and approval.

7. Clause 20 (Approvals) requires Plans and Drawings to be submitted by FMEL to CMAL for "approval or approval with comments, amendments or reservations". Any such comments, amendments or reservations, may potentially be treated as modifications or changes. Whether they amount to modifications/changes or not, CMAL is obliged to proceed with its review and approvals within prescribed timescales and in many instances CMAL failed to do this.

8. There is a degree of overlap between interfering with the design process and approving (with or without comments, amendments or reservations). Often the boundaries are blurred. Whichever side of the line they fall, there is an overriding requirement that:

- CMAL should not hinder or prevent FMEL from carrying out its obligations in accordance with the terms of the contract and from executing the works in a regular and orderly manner; and

- CMAL should take all steps reasonably necessary to enable FMEL to discharge its obligations and to execute the works in a regular and orderly manner.

9. These are implied terms which are found in every construction contract (whether shipbuilding or otherwise) – see:

- *London Borough of Merton v Stanley Hugh Leach Limited (1985) 32 BLR 51;* and

- *Scottish Power plc v Kvaerner Construction (Regions) Limited (1998) 199 SLT 721.*

Good international shipbuilding and marine engineering practice

10. Clause 1 (a) requires FMEL to design, construct, launch, equip, complete, and deliver the vessel in accordance with good international shipbuilding and marine engineering practice ("good shipbuilding practice" for short).

11. As with design, not only must FMEL follow good shipbuilding practices, it must be allowed to do so.

12. Good shipbuilding practice is not exclusively to the benefit of CMAL. It is of benefit to FMEL too. It enables FMEL to carry out its works efficiently, keep costs to a minimum and quickly move vessels under construction through the shipyard so that it may take on more work.

13. It follows that CMAL's obligation not to hinder FMEL must necessarily extend into the territory of good shipbuilding practice.

14. This claim has detailed many acts and omissions where CMAL has delayed or interfered in matters which have subsequently prevented FMEL from following good shipbuilding practices.

CMAL'S BREACHES OF ITS OBLIGATIONS

15. CMAL is in breach of the implied terms of the contract as described above. Those breaches comprise:

- preventing FMEL from carrying out its obligations and rights to design in accordance with the terms of the Contract; and

- preventing FMEL from carrying out its works in accordance with good international shipbuilding and marine engineering practice.

DAMAGES ARISING FROM CMAL'S BREACHES

16. CMAL is in breach of contract for the reasons set out elsewhere in this document and FMEL is entitled to recover damages for those breaches. What then is the extent of those damages ?

17. The starting point is that FMEL entitled to be put in the position it would have been in but for CMAL's breaches of contract.

18. The seminal authority on recovery of damage is *Hadley v Baxendale (1854) 9 Exch 341* in which damages were said to occur under two branches:

- when they are "such as may fairly and reasonably be considered arising naturally, i.e. according to the usual course of things from the breach"; or
- when they are "such as may reasonably be supposed to have been in the contemplation of both parties at the time they made the contract".

19. Where, as a result of CMAL's breaches under the 801 contract, FMEL has suffered delay or disruption to the construction of hull 801, then FMEL's associated delay costs arose naturally according to the usual course of things and are recoverable.

20. In addition FMEL is also entitled to recover the cost of delay and disruption caused to the construction of hull 802 as a result of CMAL's breaches of the 801 contract. These losses were clearly in the contemplation of both parties.

21. The two separate contracts for hull 801 and 802 were signed by the same parties on the same day. The vessels were to be identical in design and constructed in the same shipyard. The Contractual Dates of Delivery were only some two months apart. The only way which the Dates of Delivery could be met were if the hulls were constructed concurrently.

22. It was clearly within the contemplation of both parties at the time they entered into the hull 801 contract that any breaches on the part of CMAL under the hull 801 contract could prevent the concurrent construction of the hulls and would result in delay and disruption (including delay costs) to hull 802. These costs are recoverable from CMAL.

23. In addition, there will be very long delays to the Date of Delivery of hull 802 and FMEL will be liable for Late Delivery Compensation (liquidated damages) under the contract for hull 802. Since the delays have been caused due to breaches of the 801 contract by CMAL, this is not a Permissible Delay *under the hull 802 contract.* Consequently FMEL will not be relieved from its liability for the maximum amount of Late Delivery Compensation under the hull 802 contract.

24. Unless CMAL undertakes to waive the Late Delivery Compensation under the hull 802 contract, this Late Delivery Compensation is a foreseeable head of damages which is recoverable by FMEL as a result of CMAL's breaches under the 801 contract.

25. In the event that FMEL's delay costs for hull 802 are not recoverable as damages for breach of the 801 contract (which is denied), FMEL fully reserves its rights to recover these under the 802 contract.

MODIFICATIONS

26. Clause 24 deals with Modifications and Changes. In broad terms the procedure is:

- If FMEL is of the view any comments, amendments or reservations to the Plans and Drawings constitute a modification or change, it shall give written notice to CMAL in accordance with clause 20(d).

- FMEL is required to provide CMAL with a written proposal of the consequences of implementing a modification and/or change.

- CMAL may agree to the proposal. Alternatively, CMAL may not agree to the proposal but nevertheless require the modification or change to be implemented.

- If CMAL:

  ◊ does not agree that a comment, amendment or reservations to the Plans and Drawings as notified by FMEL constitutes a modification and/or change; or

  ◊ does not agree to FMEL's proposal but implements a modification or change;

  then the consequences of the comments, amendments or reservations, or the modification or change, as the case may be, are decided in accordance with clause 42 (disputes).

CHANGES IN RULES AND REGULATIONS

27. Clause 26 deals with change to Rules and Regulations or their application as follows:

> *If, after the date of Contract, there are any changes in applicable laws, rules, regulations or requirements (or their application) of the Classification Society or Regulatory Authorities, the following shall apply:*
>
> *(a) Upon receipt of notice of such changes either Party shall promptly notify the other Party thereof.*
>
> *(b) If such changes will be compulsory for the Vessel at the time of delivery, the Builder shall, unless the Buyer at its sole discretion seeks and obtains a waiver from the Classification Society or Regulatory Authorities (as appropriate), incorporate such modifications and/or changes into the construction of the Vessel. The Parties shall endeavour to agree on such adjustments to the Contract Price, Delivery Date or other Contract terms as are a direct consequence of the change in applicable laws, rules, regulations or requirements. If the Parties fail to agree on the adjustments, the Builder shall proceed with the required changes and the matter shall be decided in accordance with Clause 42 (Dispute Resolution).*