

Life Extension of DART 8100 Fleet

Advisory Note

1 OBJECTIVE

This document provides an overview of the investment required to life extend and retain the 8100 DART fleet in operational service for a further 10 years until 2030.

2 INTRODUCTION

The DART 8100 fleet entered service from 1982 onwards and vehicles underwent a mid-life refurbishment program in 2007. The fleet is now approaching 37 years in service. This document considers the key drivers that will ultimately determine the viability of retaining the DART 8100 fleet in operational service beyond 2024 which is the current limit for operation as set by the CRR Letter of Acceptance following the 2007 refurbishment.

The document will describe the following areas:

- Heavy Maintenance
- Essential Upgrades
- CRR Letter of Acceptance (CRR LoA)
- Train Protection System

3 HM COSTS

In order to retain the 8100 fleet in service beyond the current proposed end of operational life date of 2024 up to 2030 it would require further cycles of heavy maintenance (HM) of the various systems and components. The current HM costs are described below and will give an indication of what an additional HM cycle is likely to cost. It should also worth noting that additional HM cycles will be more expensive due to obsolescence of material and the inevitable additional work required to overhaul an ageing asset. The overhaul intervals for the majority of systems on the DART 8100 fleet fall broadly into 4 or 8 year intervals. The table below indicates the major systems requiring HM and the number of interventions to extend the fleet life to 2030.

8100 System and HM requirements for Extended Operating Life			
Task	Cost per car	Cost per fleet overhaul	* No Interventions
Batteries	██████	██████	1
Servotrol & Brake	██████	██████	3
Pantograph	██████	██████	1
Chopper fans	██████	██████	2
HSCB	██████	██████	1
Main Compressor	██████	██████	1
M/A Change	██████	██████	2

2 Year KB Valve	██████	██████	5
Auto Couplers	██████	██████	1
Inter Couplers	██████	██████	1
Doors (mono bloc)	██████	██████	2
Doors (elec & mech)	██████	██████	1
Bogies	██████	██████	1
Paint a two car set	██████	██████	1
Seat covers	██████	██████	1
Gangways	██████	██████	1

██████	██████
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Total costs	
HM and maintenance	██████
Train protection	████
Essential upgrades	████
Grand Total	██████

4 ESSENTIAL UPGRADES FOR LIFE EXTENSION

Door Systems:

Recent assessment indicates that replacement of key passenger door electrical, pneumatic and mechanicals components such as relays, proximity switches, rams, guide rollers etc. will be require replacement in addition to the scheduled HM if a life extension is required. The cost of the pneumatic and mechanical overhaul is estimated at ██████.

Brake Systems:

Component assessment would again indicate that the Servotrol brake control equipment will need to be upgraded to modern brake control unit. This work is required to ensure reliable operation up to 2024 in any case. A contract to the value of ██████ for this work has been awarded and will commence in 2020.

Siemens Traction Equipment

Obsolescence of parts may pose a risk when it comes to determining the potential extended life of this particular critical component and is under review, it is not possible at this time to quantify the level of risk or cost of traction equipment overhaul.

Motor Alternator (MA)

The current Motor Alternator equipment is nearing the end of life, the component is one of the most unreliable parts of the train it is highly unlikely that this component can be overhauled again. If DART 8100 life extension is required then replacement of the MA with a modern static inverter (SIV) will be required. The cost of this upgrade has been estimated at ██████.

Compressor

The compressor that is currently fitted to the 8100 fleet is extremely unreliable and will need to be replaced with a more modern alternative if DART 8100 life extension to 2029 is required. The cost of this upgrade has been estimated at ██████ for the fleet.

Painting

There is currently no planned program to paint or repair corrosion to the vehicle exteriors of the DART 8100 fleet. The condition of paint work has degraded significantly due to continued Graffiti attacks in service and at Fairview and Bray. If the fleet were to remain in service up to 2029 a painting and corrosion repair program will be required. Based on the cost of paint and corrosion repairs on other fleets this is likely to be in the region of ██████ per vehicle or ██████ for the fleet. Capacity issues at the Inchicore paint shop are also a major factor in determining the ability to do this work.

5 CRR APPROVAL

The DART 8100 fleet had a major mid-life refurbishment in 2007 and on completion of the project the fleet was issued a CRR Letter of Approval for passenger operation limiting the operational life to 40 years.

There may be a potential to increase this operating life of the fleet with an extension to the current LoA out to 2030. The potential to do this has not yet been fully explored with the CRR. Further work will be required to establish the viability of this option.

6 TRAIN PROTECTION SYSTEM

The DART 8100 fleet are currently part of the scope of delivery of the Train Protection System (TPS) replacement project. They are currently scheduled to be the last fleet to be fitted. Indicative dates are for the head of series development to commence in September 2026 and be completed by February 2027. Full fleet roll out is to start in September 2027 and finish by September 2028. Note this schedule is premised on the proposed Alstom TPS installation going ahead.

If a life extension of the fleet up to 2030 is to be considered, then the cost and complexity of fitting the new TPS system to this fleet is a very important factor in any decision. The capital cost to fit TPS to the 8100 is at least €6m with associated development and approval costs.

7 RETENTION OF FAIRVIEW

The New Depot is being designed to accommodate the Class 8500 & new fleet only, it would not make sense to have the depot optimisation compromised to accommodate the 8100 fleet. If the 8100 fleet was to transfer to the new facility it would result in additional cost and complication in the design of layouts and equipment to accommodate a 3rd fleet type

It is therefore not envisaged that the 8100 fleet will be maintained at this new facility and it would be necessary to retain Fairview as a fully operational facility with all the associated cost to maintain just the 8100 fleet.

8 DISCUSSION ON RETENTION OF FLEET COMPARED TO NEW EMU

The Class 8100 EMU is a 2 car set with a cab at each end of each vehicle. The cab and equipment space takes up approximately 6m² per vehicle. For an 8 car train set of Class 8100 that equates to 6 empty cabs of 36m² of passenger space that could be utilised for passenger spacing. Based on passenger occupancy projections from the new fleet it is assumed that passenger density estimate of

6 passengers can occupy per m² therefore a nominal passenger capacity of 216 passengers cannot be accommodated because of the cab areas. A busy DART train can accommodate 1200 passengers so compared to a new fixed 8 car set in service this is the equivalent of an additional 8 car trainset for every 6 Class 8100 trainsets in service. Separately the lack of a through gangway which prevents passenger movement between vehicles is a problem for passenger safety and security.

From a reliability perspective the 8100 fleet is likely to deteriorate further from its current low reliability status where the fleet is 4 x times less reliable than equivalent more modern Class 8500 EMUS and also what can be expected for newer EMU types. This situation will deteriorate as the fleet ages further and other systems become more unreliable.

9 CONCLUSIONS

HM tasks are completed in order to ensure safe and reliable operation of the fleet, the tasks described in section 3 above are well understood and have been in place for many years now. The CME department have the knowledge, competence and supply chain in place, it should not pose any major difficulty to continue to carry out these tasks up to 2030.

The essential upgrades described in section 4 are component / system upgrades that are currently not planned for completion but would be required if a vehicle life extension out to 2030 was required. This package of work is estimated to cost █████ to complete.

Any proposed potential to increase the operating life of the fleet would require an extension to the LoA issued by the CRR. The potential to increase the operating life to 2030 has not yet been fully explored with the CRR and it is not possible to comment further on the likelihood of achieving a life extension at this time. Neither is it possible to estimate the cost associated.

The minimum █████ cost and complexity of fitting the new TPS system to this fleet is a very important factor in any decision particularly given the age of the asset, the challenges of fitting a 40-year-old vehicle with a new TPS system are not to be underestimated.

A consequence of extending the operating life of the 8100 fleet will be the need to keep Fairview depot open to carry out the maintenance of this fleet as it makes no sense to compromise the design of the new depot just to accommodate the 8100 fleet for such a short time frame.

In conclusion the life extension of the 8100 fleet is not supported based on the investment cost required for heavy maintenance and the new Train protection system and the limited passenger capacity and amenity offered compared to new trains.

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