

## 16. ROSCOs

angel <sup>Trains</sup>



EVERSHOLT  
RAIL GROUP



*GE Rail Services*

*Lombard*



porterbrook



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## 16 ROSCOs

ROSCOs are key suppliers to TOCs and fleet performance depends on ROSCOs delivering effectively. Generally:

- ROSCOs own the vehicles as assets and need to take a proactive lead on reliability issues with a whole-life element;

**Example:** Auto-sanders which operate during braking were only fitted on Class 390s for performance reasons (not safety reasons). The VTWC franchise only had 6 years to run, but Angel funded the installation over 12-15 years to reflect the design life of the equipment.

- ROSCOs procure most of the heavy maintenance that is responsible for a train's reliability (for the TOC to sustain for the duration of the maintenance cycle);
- ROSCOs manage critical spares pools for most fleets (which create or destroy a TOC's ability to deliver its fleet reliably).

There are various ways that ROSCOs can facilitate reliability improvement at different stages. These are typically:

- during procurement and build of new vehicles (*see Section 14*)
- during operation of a particular fleet with a particular TOC (*in fleet management plans, see 16.1*),
- by taking a lead in the improvement of components/systems and issues/challenges which apply across several or even all fleets (*see 16.3*)
- by working with the supply chain to resolve parts issues (*see Section 13*)
- by developing and implementing step change modification packages at key stages in the vehicle's life, e.g. C6X near the end of a franchise.

ROSCO support can help prevent reliability deterioration:

- when fleets are transferred between franchisees but continue the same duty (*see fleet management plans and aspirations around refranchising in 16.1*);
- when fleets are moved between TOCs with different duty cycle requirements (*see 16.4*); and
- when stock is transferred between TOCs at other times (*see 16.5*).

This Section looks at these specific issues and explores what they mean, setting out current practice (including some examples of good practice) and aspirations improvement.

### 16.1 Each fleet with each TOC and ROSCO: fleet management plans (FMPs)

Fleet management plans are one of the most important tools for ROSCOs to facilitate long-term reliability improvement, provided that the TOC is engaged appropriately.

The common core information for FMPs was agreed between ROSCOs as follows:

- Executive summary
- Purpose and scope, e.g. relationship plan
- Fleet technical data
- Operations and maintenance policy, e.g. overhaul documents history, concessions, VOs, whole life maintenance and modification plan
- Regulatory compliance, e.g. certification and limitations

- Materials supply and obsolescence, e.g. obsolescence plan (*see Section 13.1*), key spares
- Management of safety, e.g. live NIR matrix
- Fleet performance, e.g. performance improvement plans
- Overview of projects, modifications and enhancements, e.g. 18-month unit plan, change control and configuration matrix

One of the explicit purposes of the FMP is to facilitate reliability growth. TOCs need to share emerging performance issues with ROSCOs, so the FMP performance improvement plans can be re-evaluated, and appropriate actions identified (cost-benefit analysis and plan-do-review cycles).

FMPs are live working documents, which must be kept confidential to reduce the risk of incumbent blight at re-franchising. They should be updated at least annually and signed off by functional directors from both the TOC and the ROSCO. The detail should be reviewed regularly (e.g. at the 4-8 weekly technical review) and used as part of the lease review process.

Note: ownership of the content of FMPs varies, e.g. dry lease FMPs are updated by TOCs with their suppliers, wet lease FMPs are updated by ROSCOs/their suppliers.

Example: ScotRail FMPs with Eversholt and Angel. The implementation of the joint ScotRail-Eversholt through-franchise FMPs was considered particularly successful because 1. The FMP was constructed as a single overarching document that includes all Eversholt rolling stock on lease to ScotRail and clearly set out the high-level objectives of the franchise. Separate appendices address the specific aspects of each individual fleet, facilitating updating and day-to-day management. 2. The agenda for the regular ScotRail-Eversholt contract review meetings was constructed around the FMP template, and an action tracker was used to monitor progress and ensure comprehensive and timely follow-up. This makes the implementation of the FMP central to the relationship rather than a one-off activity.

Example: Angel and ScotRail FMPs worked well as the two businesses integrated their high-level requirements and day-to-day interaction. Ongoing lease and technical reviews were focused around deliverables within the plan. The direct link between the ScotRail Reliability Action Plan (RAP) enables buy-in between the TOC and ROSCO long-term reliability growth initiatives. The sharing and real-time use of the process deliver much greater alignment between the two businesses.

#### 16.1.1 ROSCOs would like FMPs to

1. start sooner (engaging with DfT in the refranchising process) and
2. develop more details (engaging more with the TOC in reliability improvement). TOCs would like FMPs to contain explicit targets for reliability, availability and cost of operation.

#### Starting sooner during refranchising

The following timeline for a fleet management plan is desirable.

#### -24 to -12 months (i.e. up to 24 months before refranchising):

ROSCOs would like DfT to engage with them in optioneering, considering key issues to resolve or improve with specific fleets. DfT should make requirements visible to ROSCOs as soon as they are published. The overview of franchise commitment does not contain enough information; ROSCOs would like to understand the context and concept from DfT (rather than restricting them to preferred bidders) in good time to get a full picture of what DfT wants to achieve.

This should enable ROSCOs to compete more effectively and provide better offers to TOCs. Perhaps 70% of the ROSCO offer would be common and 30% bespoke to the bidder, whereas the current limited information and timescale process drives bland ROSCO input.

#### -6 months to 0 months (i.e. during the 6 months before refranchising):

ROSCOs would like any new franchise to be signed 6 months prior to franchise commencement (instead of the shorter timescales often available), so that they can:

- Identify and elaborate franchise deliverables, working towards an outline FMP
- Identify risks and agree how to manage them, fleshing out the FMP
- Prime the supply chain, dealing with any set-up and float control issues, exploiting repeat business leverage opportunities, etc.

Although franchise requirements can change prior to the actual start date, more opportunity for set-up work would increase the likelihood of a successful and reliable franchise start. It should also enable front-end deliverables to be better supported.

ROSCOs also believe the incoming franchisee should have access to existing franchisee staff to facilitate a smooth handover and effective start-up.

#### 0 months to 12 months (i.e. during the first year of a new franchise):

- Ratify the outline FMP (developed during the 18 months prior to franchise start, see above), i.e. what the plan is and what the agreed milestones are
- Hold technical/lease reviews on the detail and mechanisms to achieve agreed milestones
- Hold an interim review at 6 months
- Hold a formal review at 12 months, including measurement data in a feedback loop to modify the plan

This contrasts with spending the first year of a franchise putting an initial plan together and would be facilitated by more time and data sharing in DfT's re-franchising process.

#### Steady state (mid-franchise)

Develop and evolve the FMP to improve performance and pick up on more detailed issues, [see 16.1.2](#).

#### Last 12 months (to franchise end or stock transfer):

Take the opportunity to avoid stop-start by continuing existing programmes, subject to support from DfT and the new franchisee, once announced. A handover plan needs to be agreed, detailing arrangements to clarify configuration of vehicles and provide all support information, e.g. NIR resolution status, [see 16.5](#) below.

Sometimes FMPs have been written to maximise the effectiveness and smoothness of a relatively short TOC/ROSCO relationship.

Example: Eversholt agreed short-term (12-month) FMPs in 2005 with National Express London Lines for the Silverlink and WAGN franchises on Class 313, 321 and 365 fleets. The well-established process was used successfully and carefully to ensure the commercial confidentiality of potential improvements, given the ongoing franchise competitions. A joint fleet planning workshop established stakeholder priorities and agreed joint targets and action plans for performance improvement. The limited timescale available for implementation meant that only 'quick wins' could realistically be taken forward.

### 16.1.2 More details during the life of the FMP

ROSCOs would like to have more detail in FMPs to better support TOC performance improvement:

- Generally, improve interfaces for data transfer and communications (primarily from TOCs to ROSCOs)

Example: AGA has good data flows agreed with both Porterbrook and Eversholt including delay minutes, cancellations, miles-per-5-minute technical delay (MTIN) and trends every period. They also share with the ROSCOs their specific targets such as PPM during Challenge 90, which prioritised some service quality issues over reliability.

Example: EMT holds monthly performance meetings for all their fleets attended by Angel and Porterbrook engineers who obtain all the data and participate in reviewing performance and determining actions.

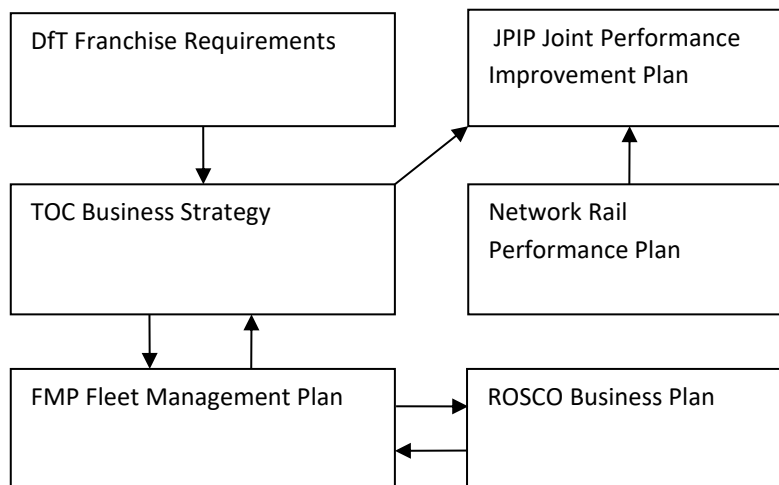
- Specifically, agree reliability targets with TOCs based on aligned strategies so stakeholder priorities can be aligned, i.e. agreeing activities and resources required (people, training, depot improvements).

The heavy maintenance programmes delivered by the ROSCOs are fundamental to creating the capability for the rolling stock to perform reliably over the rest of the maintenance cycle. TOCs therefore often seek to establish reliability targets for fleets undergoing heavy maintenance or other ROSCO-led programmes.

ROSCOs recognise that TOCs want *optimum* reliability for their business model/DfT requirement, not necessarily *maximum*. For example, TOC priorities might be their bigger fleets, longer-term vehicles or perhaps even passenger environment and security (rather than reliability) in the first instance. DfT priorities might preclude TOC investment in depot improvement. The FMP should reflect these stakeholder priorities, but also note opportunities for reliability improvement beyond the current plan. ROSCOs should consider facilitating the work required.

It is important to note that changes to vehicles may be only a small part of a TOC's reliability growth plan, e.g. Northern's plan for only 15% of improvement from vehicle modifications.

Incorporating the TOC/Network Rail relationship, the performance improvement model for TOCs is typically [\(Figure 16.1\)](#):



*Figure 16.1 Vehicle level comparisons and user groups*

ROSCOs can help join up thinking and make constructive comparisons between different TOCs and ROSCOs with the same/similar vehicle classes (on new/recent builds, this involves engaging the manufacturer in ongoing issue resolution).

Specific comparisons can facilitate understanding, which in turn drives productive change.

Example: Eversholt holds joint technical reviews with TOCs from different owning groups on Classes 313 and 321. The review includes: discussion (and development of people/relationships), comparing trends, identifying best practice, pre-empting issues on particular fleets, smoothing any fleet/vehicle transfers. Variation in Class 313 performance across different TOCs was positively correlated when successful compressor modifications were implemented.

All user groups should be linked to the RDG web page to facilitate the sharing of knowledge and engagement with and between groups. They should have clear remits and agreed levels of attendance from all invited stakeholders. They should all cover reliability improvement and risk mitigation issues as well as sharing safety concerns and advice.

Example: Northern led the setting up of a refreshed mid-life DMU user group in 2008, modelled on the new Electrostar user group. It is now more effective, with a proactive approach to reliability issues and better engagement from key players.

Example: Eversholt led the set-up of a new user group for Electrostars in 2007, with the following terms of reference:

- To provide a forum for periodic stakeholder high-level review of Electrostar fleet performance
- To identify emerging issues and trends and ensure that action plans are in place to address identified areas of concern
- To provide strategic direction and guidance on these issues to the TOC, ROSCO and Bombardier teams responsible for delivering Electrostar fleet performance
- To identify and encourage the implementation of industry best practice and lessons learned from other fleet programmes to the benefit of overall Electrostar performance.

Example: Porterbrook coordinates the Turbostar user group, which was re-launched in 2008. Each meeting now focuses on no more than two train systems, sharing best practice in maintenance, operations and reliability initiatives.

## 16.2 Common issues

ROSCOs are in a unique position to take a lead in the improvement of components/systems and issues/challenges which apply across several or even all fleets.

Some of this will be achieved most effectively in ongoing user groups (e.g. Cummins user group, Voith steering group). Other challenges are better addressed with a specific working party. The ROSCO role can be one of pump-priming to resolve specific issues.

Example: Oil carry-over on Sprinters and Pacers. Angel and Porterbrook led the development of a design solution and set up a project-based TOC/ROSCO group. They then progressed to installation designs for each vehicle class, and trial fits, cooperating with candidate TOCs. Roll-out is progressing, although some delays have been caused by stock transfers between TOCs and refranchising, and some business cases may not be viable.

It would be much easier to make effective comparisons and spot trends sooner if it were possible to collate data more consistently, e.g. if there were agreed vehicle models and cause codes. This would facilitate the sharing of ReFocus data at a layer below vehicle performance and was recommended in NFRIP's January 2008 Pacer Benchmarking report for all fleets.

## 16.3 Optimising for duty cycle

ROSCOs facilitate the transfer of maintenance plans. If well-documented and understood, these can be particularly useful when fleets are moved to undertake different duty cycle requirements, whether within the same franchise, or TOC to TOC.

ROSCOs are well placed to observe practical examples of duty cycle-related maintenance and share best practice.

Example: Class 317 fleet maintained at Hornsey depot. Most of the fleet operated frequent stopping services whilst a small, dedicated Stansted Airport fleet ran faster, longer-distance services with only limited intermediate stops. Door maintenance frequency of the Stansted fleet was reduced relative to miles run to reflect the reduced number of door operations per unit mile; traction motor maintenance was also adjusted to reflect the higher-speed running and the reduced number of high-current starts. To help maximise DMU availability and avoid changing wheels between bogie overhauls, C4 mileages were related to wheel life. Where wheel life was driven by tread wear caused by braking, this related to stopping patterns in service. For example, at Newton Heath in the mid-1990s, Class 150 C4 mileage was 325,000, whilst Classes 153 and 156 were 350,000 miles, reflecting the different duty cycles.

Three recent examples of duty cycle-related maintenance are:

- NX East Coast Class 91 (Eversholt)
- NX East Anglia Class 170 (Porterbrook)



- Desiro fleets (Angel)

Example: Eversholt commissioned a strategic maintenance review to identify the theoretical maximum exam periodicity for each element. This involved extensive condition assessments, gathering data and using failure modes and effects analysis (FMEA).

The output is an integrated maintenance regime involving some time-based elements (e.g. things inside the vehicle, such as contactors, relays) and some mileage-based elements (e.g. bogies, running gear, traction motors). This is all contained in one document including all level 1-4 and level 5 maintenance. The same document is used by Eversholt, Bounds Green and Wabtec.

The result is that periodicities are optimised based on the current duty cycle of the fleet. The TOC's 'little and often' policy means a lot of exams, although if two larger exams are due around the same time, they are combined to reduce downtime. If, in future, fewer larger exams were preferable for the service, or duty cycles were to change, the data is available to inform relevant maintenance plan adjustments.

VTEC agree that the result is good but believe it could have been achieved more quickly if the ROSCO had engaged more with the TOC initially.

Angel have since supported Siemens' unified maintenance manual drive, where core maintenance requirements are identified, reflecting the various sub-fleet mileages and duty cycles. Condition assessments are being conducted to increase knowledge of wear patterns and deterioration to determine optimum life for different components. This is seen as a continuous process: SWT and Siemens are aiming to achieve 1 million miles between component overhauls.

Example: A Value Improvement Programme (VIP) was carried out on the Class 170 fleet at Norwich Crown Point, involving Porterbrook, Bombardier and depot staff. The VIP brings together a group of people and, in a structured way, encourages obvious actions. The behaviour of the senior people from each company can make the difference. VIPs generally solve relationship and process problems; this one contributed to a maintenance regime review too. The review in turn led to some reduction in planned workload and released resources for fault-finding. The refreshed Turbostar user group is now sharing duty cycle optimisation for 170/171 fleets, building on the work Bombardier, Porterbrook and AGA have been doing.

Example: The Desiro fleets include the Class 350 at London Midland and TPE, 360 at AGA, 380 at ScotRail, 185 at TPE as well as the SWT 444 and 450. Angel was particularly supportive in facilitating Siemens' performance on 360 introductions, providing powerful technical support, insisting on modifications and escalating issues where appropriate.

## 16.4 Fleet transfer/cascade

### 16.4.1 Smooth transition of rolling stock transfer/cascade and introduction to service



When a transfer of rolling stock takes place from one TOC to another, there are many elements to consider, which cross many business functions including engineering, operations and commercial. Good management of these elements will lead to a successful transfer of rolling stock in either receiving or returning vehicles.

Whatever the reasons for transferring stock between TOCs, a handover plan should be agreed by all stakeholders. The following details some of the key areas which must be considered in order to manage the initial planning and introduction/transfer stages as well as the introduction of units into service.

Required timescales vary depending on the type of cascade. For example, introducing a fleet of unfamiliar units to the new TOC will require significant preparation time for training and possibly depot enhancements whilst a short-term emergency hire of one unit can be arranged swiftly if it is familiar to the receiving TOC and subject to a similar maintenance regime to those already carried out on other fleets. Even where the unit type is known to the receiving TOC, it is important to recognise that there may be detailed differences with the specific unit(s) being transferred.

This section provides guidance on aspects related to the preparation and planning of any stock transfer. It is not a complete plan. All stock transfers will have their own unique elements that must be considered and managed. It should also be emphasised that good communication and collaboration with the delivering/receiving TOC and other key stakeholders is critical to a successful transfer.

#### 16.4.2 **Type of cascade**

- Small fleet versus whole fleet
- Short-term versus long-term

#### 16.4.3 **Initial planning phase of stock transfer (time prior to receiving/transferring rolling stock)**

Outline plan development:

- Identify key milestones and the critical path to achieve the project timescales
- Identify fleet compatibility and special requirements
- Consider inclusion of TOCs, ROSCOS and OEMs, e.g. stock transfer support teams (small short-term teams with access to specific fleet experts)

Initial pre-delivery condition survey:

- Establish and agree with the leasing company the condition of the unit(s) being transferred, including position in heavy maintenance cycle(s) and any non-standard equipment
- Establish what the impact on current fleets operated is:
  - Adequacy of spares
  - Ownership of spares (split fleets and/or different ROSCOS)
- Involve key stakeholders such as:
  - TOCs (sending and receiving)
  - Operations:
    - Simulators
    - Driver/guard training
    - Software (interactive/system)
    - Sanding system configuration

- Through gangways (operational safety and revenue protection implications)
- Commercial:
  - Lease type (wet/dry)
  - Hand-back condition
- Seating configuration and passenger reservation requirements
  - Can current booking systems be changed to accommodate new fleets with different seating configuration?
- Train planning:
  - Sectional running times
  - Station dwell times (including door control configuration and method of door operation)
- Network Rail (route/station suitability)
- Passenger focus (service expectations)
- ROSCO (maintenance plans and spares)
- Department for Transport (are the trains suitable and timescales for stock transfer achievable?)
- RSSB (derogations)
- RVAR (derogations)
- Local community (short-term increase in noise levels, etc)
- Rolling stock library (train configuration)
- Rebranding
- Changing the livery of rolling stock can be a very time-consuming process and will require considerable planning as a separate project. Consideration should be given to the length of time, i.e. short-term vs. long-term transfer. Rebranding of rolling stock can also have implications with regard to PRM TSI regulations (contrasting colours, etc.)

#### 16.4.4 Preparation of stock transfer and stock introduction

- Service introduction path for new stock
- Service level introduction of rolling stock (whole fleet or staggered introduction); even the best planning and preparation will not preclude some initial introduction failures
- NIR resolution
- Are there outstanding NIRs?
- Are there outstanding fleet checks to be completed prior to transfer?
- Maintenance support planning
  - What maintenance support comes with the vehicles (OEM support, warranty support, etc.)?
  - Are special tools required for maintenance of systems/components?
  - Is special test equipment required to maintain systems/components?
- Maintenance documentation
  - VMI, VMP, COI, VOI, etc.
  - Unit history files
  - Exam and overhaul history
- Materials planning and additional spares
  - OEM support
  - Second tier supplier support
  - Modification levels of spares
  - Special tools required to fit spares

- Reliability growth plans. With the introduction of unfamiliar/new rolling stock, it should not be expected for the units to work out of the box. With this in mind, reliability growth plans should work towards steady growth.
  - Review process (regular and detailed reviews of defects)
  - Trend analysis (by system and component)
  - Sharing reliability data between the existing and the new TOC will help develop reliability growth plans
- Stabling of additional units and overnight berthing arrangements
- Is sufficient capacity available? Passenger information systems
  - Uploading new route information
- Training programmes for staff to maintain unfamiliar rolling stock (consider where a limited number of initial units are available or where training must take place prior to stock transfer)
  - Conflict may become apparent between the requirements of engineering and operations where unit availability is required for engineering/driver training at the same time
  - What training manuals and other aids are available from the previous operator and can these transfer with/ahead of the stock?
- Rolling stock configuration
  - Selective door opening
  - Mandatory modifications
  - GSM-R
  - Modifications for route compatibility
  - Driver only operation (DOO), etc.
  - Driver cab configuration
  - Defect log books
  - Aide-memoires (fault rectification)
  - Other modifications, experiments and trials, specifically non-standard equipment
- Route compatibility
  - Are stopping boards in the correct position?
  - Monitors/mirrors for DOO
  - Signalling distances
  - Stepping heights and distances (raised platforms) may vary for different stock

#### 16.4.5 Rolling stock reconfiguration/re-formation

There may be instances where the rolling stock being received by the TOC, whilst suitable, is not in the correct configuration to meet the business need. For example, Northern Rail received 3-car Class 150 units. This did not fit with the Northern Rail diagrams and planning requirements. The units were therefore reconfigured to 2-car 150 units. This must be implemented with the full co-operation of the train owners (ROSCOS). Reconfiguration/reformation also introduces many other aspects previously mentioned but consideration must be given to the introduction of systems which have not been enabled for an extended period of time. For instance, class 150s have a driving cab in the middle of a three-car formation. When a re-formation takes place to convert to a two-car unit, the middle vehicle will be used as a driving cab in a 2-car train. This will require all the cab functions and other systems to be enabled which had previously been isolated. There is also a requirement to inform the rolling stock library of any re-formations so unit numbers and mileages can be changed and tracked. Maintenance plans and documentation must also be aligned with the new train configuration.

#### 16.4.6 Facilities

In order to maintain the transferred rolling stock, it is critical that the maintenance facilities are suitable. A compatibility check against current stock maintained is an ideal position to start from. Where non-compatibility is identified, detailed assessment will identify possible maintenance facility changes:

- Space envelope
  - Length of vehicle
  - Maximum length of train set
  - Height of vehicle
  - Weight of vehicle
- Lifting and jacking equipment
- CET facilities
- Wash plant/roads
- Primary power source
  - AC traction
  - DC traction
  - Diesel
    - Fuel station and rigging
    - Extraction (exhaust fumes)

#### 16.4.7 ROSCO

Arrangements to clarify the configuration of vehicles should be detailed, including all supporting information for each vehicle, such as:

- NIR resolution status
- stage in maintenance plan, e.g. last balanced B exam
- any deferred work
- any outstanding defects or open repairs
- any known problems or special control measures

The ROSCO is responsible for eliciting and transferring the above data from all maintenance providers. In the past, third-party maintainers have not always been asked to supply the information they hold. In practice, the ROSCO may actively arrange for direct data flow between depots, but it retains responsibility for the completeness and quality of the data provided to the receiving TOC. Obviously, with dry leases, the outgoing TOC has a greater obligation to provide details compared with wet or soggy leases.

Negative examples exist to underline that an agreed TOC/ROSCO FMP can be effective in preventing reliability drop-off as stock is transferred to another operator. They also highlight the benefit of having 'headroom', i.e. additional stock and/or time. There are positive examples too within TOCs such as First and NX, and Porterbrook and ATW. A risk workshop can be an effective tool to manage smooth stock transfer and minimise potential impact on reliability.

#### 16.4.8 Checklists

Checklists can be a very useful tool to ensure that all elements of the task have been completed. Northern Rail has developed several key checklists from numerous fleet transfers. Appendix F contains examples of such checklists. They are only to be used as guides and should be adapted for the individual TOC and type of rolling stock.