12 The Supply Chain

Not having the right parts when you need them can be a reason for non-availability of vehicles for service (as the analysis described in Section 6.5 may show). It is a false economy to reduce the value of accessible spares holding down to a level which increases the likelihood of a vehicle having to wait for a part.

The best approaches to spares holding involve hard thinking (about how the parts are used by people) and analysis (about what the vehicles need when), in order to produce the right mix of location and accessibility for different items. It also involves trust (if you keep all the parts under lock and key, it will be at best less efficient for staff to access them). Best practice is to create trolleys of materials, tools and instructions for each type of routine activity (e.g. each B Exam). Trolleys include shadow boards for location of items. Parts used can be automatically booked to the vehicles.

12.1 **What is the rail industry supply chain?**

The rail industry supply chain is complex and includes organisations which may not be primarily regarded as suppliers, for example TOCs and ROSCOs. Essentially the whole railway supply chain consists of a huge network of many smaller supply chains which are linked or integrated to varying degrees. The length and complexity of an individual supply chain is dependent on the product and/or service being provided. Figure 1 below illustrates a typical supply chain for undertaking maintenance on a soggy lease fleet.

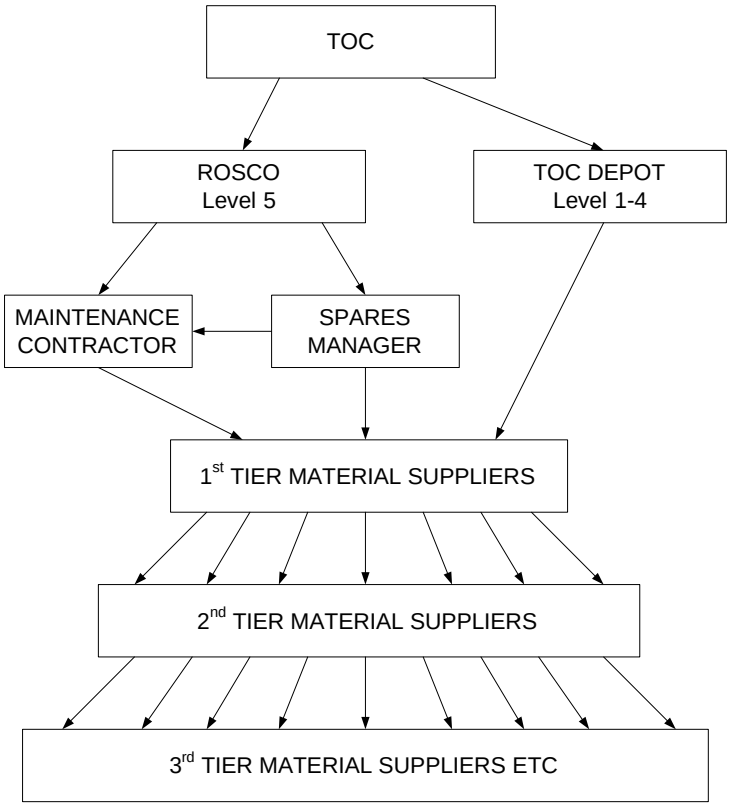

Figure 1 – Typical supply chain for undertaking maintenance on a soggy lease fleet

Most organisations within the rail industry are either customers or suppliers, or both, at some level within supply chains, implying that most organisations have a role to play in supply chain management.

12.2 **How does the supply chain affect fleet performance?**

Supply chain activities can significantly influence national fleet performance, via the reliability, availability and performance of the rail vehicle components, products or services being provided. There are challenges for suppliers in establishing and managing successful supply chains in the privatised railway, and an overriding need for other industry stakeholders reliant on the supply chain to work with suppliers to achieve common goals.

It is essential to understand the interdependencies and interfaces between different supply chains particularly those that involve common sub-systems and equipment that is used across multiple fleet types, and affects multiple TOCs, owners and OEMs and maintenance providers. An example of interdependency is a brake actuator which is common to a number of fleets.

12.3 What are the characteristics of an effective supply chain?

An effective supply chain will:

- Understand, provide for and anticipate the needs of current and future rolling stock operations across the UK
- Have the capacity and skills to deliver targeted asset enhancements that will underpin and improve fleet performance
- Provide effective and efficient through-life material supply
- Have a culture of continuous improvement that seeks and adopts best practice from other railways and industries as appropriate
- Understand the wider implications of its decisions and actions
- To enable this, a supply chain must be cohesive in its nature i.e. a linked chain with aligned interfaces, management processes, priorities and objectives throughout the chain.

12.4 What factors influence supply chain performance?

If the supply chain does not function effectively, there will be an adverse knock-on effect on fleet performance.

A number of generic rail industry factors also affect supply chain performance and the supply chain may not have full control or influence over them. Such factors include:

- Franchise change management
- Configuration management
- Component robustness, testing and component tracking
- Material support contracts and material availability
- Economies of scale
- Adoption of relevant best practice from rail and other industries

A detailed list of issues that need to be considered within these areas is provided in Appendix B. This is intended to be used as a checklist for stakeholders in their management of supply chains, to assess their applicability and determine opportunities and priorities for improvement.

Businesses that demonstrate best practice in supply chain management will undertake regular reviews of their process effectiveness, staff competency and customer / supplier interfacing arrangements to ensure that these are appropriate to the inevitably changing environment in which the supply chain operates.

12.5 **What are the cross-industry priorities for improvement?**

Whilst stakeholders within an individual supply chain can achieve worthwhile improvements, there are some key cross-industry enabling factors which need to be in place for supply chains to function effectively and consistently.

There are a number of recognised cross-industry issues which require resolution to allow further improvements to be made. An illustration of best practice as detailed below, could be a way forward to improve the operation of the supply chain:

1. The train operator to provide Information of the volume of materials (both train borne and nontrain borne) that are used by the depot to give an accurate measure of actual consumption to a supplier that will help the forecasting of future demand level.

2. The correlation of material issued to what level of maintenance work (i.e. Level 1 to 4 or Level 5) and to which fleet, would further enhance the quality of the information provided to a supplier to better forecast future demand. Maintenance schedules and seasonality factors to also be shared with suppliers to provide advance notice of requirements would help the forecasting of future demand patterns. In a planned maintenance schedule, the creation of a "review point" to analyse the actual percentage of on-condition replacement levels used part way through the programme, would enable suppliers to replenish stocks of replacement parts to appropriate levels for future deliveries.

3. Lists of Critical Parts (that could cause a Stopped Vehicle) and Service Critical Parts (to ensure continued customer service) to be shared with suppliers by each TOC to create a Master List of parts that require buffer stocks

4. Parts supplied in Kits that are to be repaired and are time critical for the repair to be achieved, are to be highlighted to the customer so that these are returned in time for the repair to be completed and returned to the customer.

5. The supplier to aggregate data from multiple users of the materials to establish trends and to set appropriate stocking levels for the benefit of all users to increase availability levels and reduce lead-times. First Tier suppliers are responsible for communicating customer's maintenance and demand schedules to sub-suppliers to ensure that the requirements are aligned across the supply chain.

6. The Supplier to communicate to the customer as early as possible if a part is not to be available due to a delay in the supply chain and the impact on train availability to be minimised by remedial actions taken the supplier.

7. The Supplier to provide feedback at regular intervals to TOCs where current demand levels are not matching historical trends which is causing over or under stocking.

Additional areas targeted for improvement are:

- Management of 'rogue' components (repeat offenders)

- Configuration

The work streams being developed are detailed in Appendix C.

12.6 **How does the industry manage obsolescence?**

This is an important issue which is not exclusive to the rail sector and we aim to seek and disseminate best practice in obsolescence management from other industries.

In the rail sector, there are a number of different reasons why a component may become obsolete:

- Technical obsolescence, where the technology once used has been superseded by a more modern equivalent and the original design can no longer be made. An example would be 1980s microprocessors where only newer versions are available.
- Supplier obsolescence, where the manufacture or repair of a component is no longer possible. This could be due to a supplier going out of business or removing a component from their product range.
- Commercial obsolescence, where it is technically possible to make a spare component, suppliers are available but the cost becomes prohibitively expensive.
- Substance obsolescence, where a material has been designated as obsolete through regulation or best practice for safety, environmental or other reasons.

Regardless of the cause of obsolescence, best practice is to actively manage obsolescence throughout the life of the vehicle.

Principle 1: Agree ownership for obsolescence. Technical and Design Authority as well as commercial responsibility for obsolescence should be clearly defined from the start. This could reside with the ROSCO, TOC, maintainer or first or second tier supplier, depending on the fleet, material type or component.

Example: Porterbrook sets out the ownership for obsolescence in a TOC specific Fleet Management Plan. This document is agreed with the TOC at the start of the lease and forms the basis for ongoing commercial and technical reviews throughout the lease period. Responsibility for obsolescence is contractually documented and will depend on the type of lease in place. Typically, if a soggy lease is adopted, Porterbrook will continue to manage obsolescence for major components on the fleet. If there is a dry lease, this becomes the responsibility of the operator. In all cases, the operator will manage obsolescence on Level 1 to 4 items. Porterbrook has retrospectively put in place a Design Authority agreement with Bombardier related to Electrostar and Turbostar fleets to ensure continued access to the fleet manufacturer's knowledge base.

Principle 2: No one party has all the answers to obsolescence. Good management requires input from a number of stakeholders: TOC, FOC, OEM, ROSCO, maintainer, first and second tier suppliers.

Example: The Brake Code Conversion unit (CCU) originally installed onto the Class 313, 507 and 508 EMUs became obsolete and no longer supported by the original manufacturer. This was due to obsolete hardware fitted to the original design.
Unipart Rail redesigned the CCU to be a direct replacement for the original unit which incorporates modern relay components that are more reliable and require lower power consumption than the original unit and has a lower weight and reduced failure modes.
Throughout the development of the product, Unipart Rail worked closely with First Capital Connect (now GTR) to ensure that the final design met the expectations and specification required by the train operator and their maintenance teams.

Principle 3: Establish a process for identifying obsolescence risks as part of the day job of good fleet management. This can be done through fleet user groups, supply chain reviews, maintenance or overhaul planning or as a result of an NIR investigation.

Example: Porterbrook's fleet technical reviews include obsolescence as a standard agenda item. This gives Porterbrook or the TOC a chance to share any concerns and identify obsolete components early on. In one example, the Class 150 alternator was becoming an obsolescence problem and increasingly expensive to maintain. Angel and Porterbrook invested in developing a solution with a new supplier and a trial is currently underway in 2014/15.

Principle 4: Create a plan for how to manage the risks and prioritise them. Agree a governance approach.

Example: Unipart Rail has an obsolescence risk register for specific TOCs which is reviewed regularly and has sections for new and priority products. The use of a risk register provides controlled progression of obsolescence issues, the tracking of samples, trial fits and the ability to assign projects to internal development teams to resolve the obsolescence issues.
Unipart Rail uses this register as part of its supply chain and logistics reviews with both 2nd tier suppliers and its customers to progress the timely replacement of the product prior to the obsolete part causing operational issues for the TOCs.

Principle 5: Tell everyone. Best practice includes communicating the obsolescence risks between engineering groups, suppliers and materials managers across the supply chain. Methods of doing this across the industry could include the RDG Engineering portal, user groups, PADS, NIR close out or the RISAS website.

Example: The HST User Group meets quarterly and the attendance includes the relevant ROSCOs, TOCs and Unipart Rail. In total, 12 different organisations are represented. As part of the meeting agenda, which covers incidents, technical issues and NIRs, solutions to obsolescence issues are also discusse. The aim is to identify issues early and to develop a common approach. For example, a component overhaul company had identified an obsolescence risk on some equipment they were repairing due to a lack of spares. Solutions including injecting more float material, by either manufacturing some new spares or pooling some spares held by other parties were considered. The issue of the IPR of the equipment was also discussed.

12.7 **What role do you have to play?**

Optimising the supply chain, to underpin and improve fleet performance, is about the small actions of many people and many organisations across the industry in pursuit of some common goals. No one individual or organisation has all the answers or the whole solution.

The role you have to play is to:

- Reflect on the principles and sentiment contained in this section.
- Evaluate the role of your organisation within supply chain(s)
- Question whether your approach and that of your organisation is supportive and aligned to the principles and sentiment outlined in this section
- Discuss and implement opportunities for improvement within your organisation and with its respective supply chain(s) stakeholders
- Keep abreast of, and participate in as appropriate, ongoing work by ReFocus in facilitating the resolution of industry-wide supply chain priorities for improvement

12.8 **Where can I find examples of good practice?**

Appendix D provides some current practical examples of best practice in supply chain management. This appendix will be updated on a rolling basis to include the result of current workstreams.