13. The Supply Chain

Having the right parts when and where required (spares holding, floats, forecasting measures, change control, obsolescence, and improving the quality of the parts through effective closed-loop relationships.

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Not having the right parts results in non-availability of vehicles for service and reducing the volume of accessible spares to a level which increases the likelihood of a vehicle having to wait for a part is a false economy.

The best approaches to spares holding involves hard thinking (about how parts are used) and analysis (what the vehicles need when) to produce the right combination of location and accessibility for different items. It also involves trust (keeping all the parts under lock and key is at best less efficient in terms of access). Best practice is to create trolleys of materials, tools and instructions for each type of routine activity (e.g. B exam).

13.1 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 it consists of a huge network of 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. *Figure 13.1* below illustrates a typical supply chain for undertaking maintenance on a soggy lease fleet.

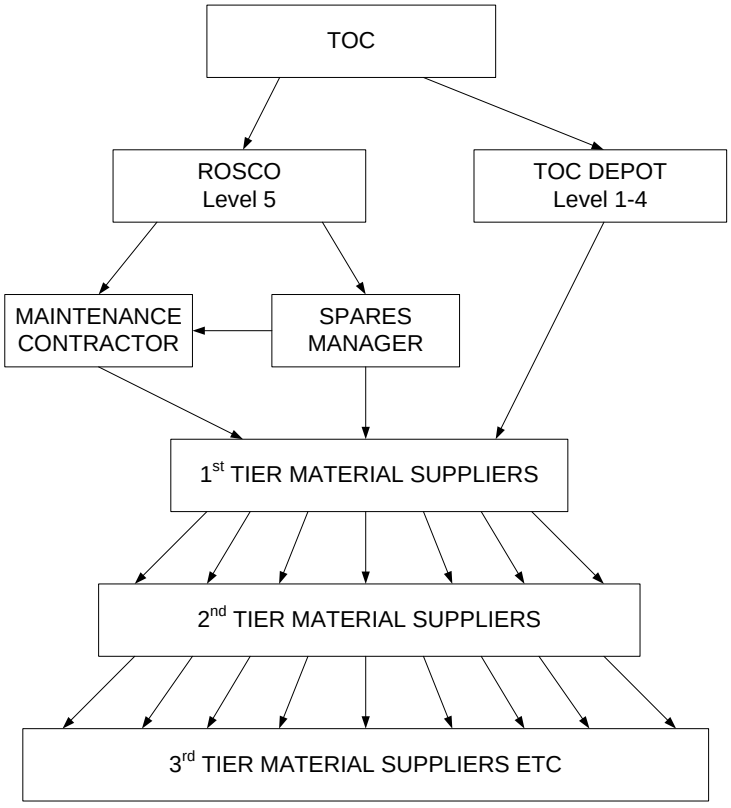

Figure 13.1 – Typical supply chain for undertaking maintenance on a soggy lease fleet

Most organisations within the rail industry are either customers or suppliers (or both) within supply chains and thus have a role to play in their management.

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

Supply chain activities can significantly influence national fleet performance in terms of the reliability, availability and performance of the rail vehicle components, products or services.

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

13.3 **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 to adopt best practice from other railways and industries as appropriate
- Understand the wider implications of its decisions and actions
- Be cohesive, i.e. a linked chain with aligned interfaces, management processes, priorities and objectives.

13.4 **What factors influence supply chain performance?**

A supply chain that does not function effectively will have an adverse effect on fleet performance.

A number of generic rail industry factors also affect supply chain performance, such as:

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

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

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

13.5 **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.

Some factors do however require resolution for further improvements to be made, as detailed below:

1. Train operator should provide Information on the volume of materials (both train- and non-train-borne) used by the depot to give suppliers an accurate measure of consumption to help forecast future demand.

2. Clear allocation of material for maintenance work level (i.e. level 1 to 4 or level 5) to further enhance the quality of information for a supplier to better forecast future demand. Likewise, maintenance schedules and seasonality factors should also be shared with suppliers to provide advance notice of requirements. A planned maintenance schedule should have a review point to analyse the actual percentage of on-condition replacement levels used part way through the programme, to enable suppliers to replenish stocks 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) should be shared with suppliers 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, should be highlighted to the customer so that they are returned in time for the repair to be completed.

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

6. The supplier should communicate to the customer as early as possible if a part is not available due to a delay in the supply chain; the impact on train availability should be minimised by remedial action on the part of the supplier.

7. The supplier should provide feedback at regular intervals to TOCs where current demand levels do not match historical trends, causing over- or understocking.

Additional areas for improvement are:

- Management of ‘rogue’ components (repeat offenders)
- Configuration

The work streams are detailed in *Appendix D.*

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

This is an important issue, not exclusive to the rail sector, and we seek out 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 has been superseded by a new design, e.g. 1980s microprocessors.
- 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 for a supplier to make a spare part, but the cost is prohibitive.
- 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, 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 ownership for obsolescence in a TOC-specific fleet management plan that 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. For a soggy lease, Porterbrook will continue to manage obsolescence for major components on the fleet. For 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) hardware originally installed in the Class 313, 507 and 508 EMUs became obsolete and was no longer supported by the original manufacturer.

Unipart Rail redesigned the CCU to be a direct replacement for the original unit incorporating modern relay components that are more reliable, have lower power consumption and weight as well as 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 specifications of the train operator and their maintenance teams.

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

Example: Porterbrook's fleet technical reviews include obsolescence as standard. 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 increasingly expensive to maintain. Angel and Porterbrook invested in a solution with a new supplier and a trial was conducted in 2014/15.

Principle 4: Create a plan to manage and prioritise risks. Agree a governance approach.

Example: Unipart Rail has an obsolescence risk register for specific TOCs which is reviewed regularly and features new and priority products. This ensures the controlled progression of obsolescence issues, the tracking of samples, trial fits and the ability to assign projects to internal development teams.

Unipart Rail uses it as part of its supply chain and logistics reviews with both second- tier suppliers and customers to progress the timely replacement of the product prior to the obsolete part causing operational issues.

Principle 5: Tell everyone. Best practice includes communicating obsolescence risks to engineering groups, suppliers and materials managers across the supply chain, e.g. via user groups, PADS, NIR close out or the RISAS website.

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

13.7 **What are the various roles?**

Optimising the supply chain to underpin and improve fleet performance involves many people and many organisations across the industry. No one individual or organisation has all the answers.

All parties must:

Reflect on the principles and sentiments described in this section

Evaluate their role within the supply chain(s)

Question whether their approach is supportive and aligned to the principles and sentiments outlined in this section

Discuss and implement opportunities for improvement internally and with respective supply chain(s) stakeholders

Keep abreast of and participate in ongoing work by ReFocus to agree on industry-wide supply chain priorities for improvement

Where can I find examples of good practice?

Appendix E provides some current examples of best practice in supply chain management and will be updated on a rolling basis to include the results of current workstreams.