

14 No Fault Found Warranty Claims

This chapter focuses on rolling stock component warranty claims where the supplier cannot find a fault with the returned component.

There is a perception in the industry that these events occur too often, taking up limited time / resource across a number of different companies, without ever reaching a satisfactory conclusion as to why the train fault occurred in the first place. It is difficult to quantify the service impact of these events due to the way data is currently collected and stored. Whatever the actual impact it is good practice to try to reduce the number of No Fault Found (NFF) events to as low as reasonably possible.

In order to understand why this issue occurs it is necessary to understand the process which underpins warranty claims, the stakeholders involved and the environment in which this process is implemented. Once these things are fully understood, it is possible to identify the individual issues which cause NFF diagnoses to be made. From this understanding, it is possible to develop good practice guidance which if implemented will help to reduce the number of warranty claim NFF diagnoses.

14.1 The Process

Table 1 is a simplified representation of the warranty return process for components where the supplier finds no fault. N.B. this process is not completely standardised across the rail industry.

Occasions where the TOC disputes the outcome of the warranty claim and repairs outside of warranty are separate processes which are not detailed in this chapter.

Table 1: The High Level Warranty Claim Process

Step	TOC Operations	TOC Fleet or Train Maintainer	Logistics Company	Supplier or Overhauler
1	Train Defect Occurs			
2		Faulty Component Alleged		
3		Receive New Component	Organise Component Assessment	
4		Fitted to Affected Train		Component Tested OR Component Stripped & Inspected
5			Organise	
			Component Return	
6		NFF Report Accepted	Component Placed in Common Pool	
7		Component Fitted to a Vehicle		

It is important to consider the impact of stakeholder interfaces as there are multiple stakeholders involved in the warranty process which increases the opportunities for silo working.

Commercial agreements between companies and fleets differ, making the detailed application of the process more complex, but commercial agreements should ideally identify the information which needs to be shared up and down the supply chain.

It is important to consider the wider context of managing component failures and how they can affect other parties not involved in managing the specific failure. For example, use of common component pools mean that the TOC which eventually receives the returned component may not be the same TOC who sent it for testing and will not have a full understanding of the component’s reliability history.

14.2 The Issues and Good Practice

By understanding the specific issues which cause warranty claim NFF diagnoses to occur, it is possible to identify good practices which will reduce these events. These are described below in more detail.

14.2.1 Behaviours and working practices.

- ✦ Warranty management is not applied in a consistent way across the industry and may sometimes get overlooked. It is good practice for companies to place sufficient emphasis on warranty management and ensure it is a critical part of managing fleet reliability (e.g. ensuring warranty related issues are routinely discussed at reliability meetings).
- ✦ Whilst warranty terms in contracts are all different, it is important to review these prior to the start of a new franchise to ensure that terms and conditions are optimised and that old ones aren't simply copied across to a new contract.
- ✦ Mistrust between the TOC and Supplier can encourage parties to engage in a strictly contractual relationship. This may lead to more NFF diagnoses as companies do not openly share all failure information for fear of being held responsible for the failure. It is critical for TOCs and suppliers to develop positive collaborative working relationships in order to improve the quality of failure investigations. This can be achieved by having regular joint meetings which are focussed on a common goal of identifying and resolving technical issues.
- ✦ Pressures to deliver a reliable service may lead to components being replaced as a preventative measure. These may then returned to the supplier for further investigation without having validated whether the component was faulty. If possible, it is good practice to quarantine suspected components to see if the fault re-occurs, prior to returning it to the supplier.
- ✦ TOCs should avoid having a 'change it' culture (n.b. this may not be a culture throughout the whole fleet team but could be shift or depot specific). Efforts should be made to ensure that technical flow charts used for fault finding do not exacerbate this issue. Warranty managers should work to identify those teams who are quick to change and return components by analysing the volume of claims they process and the number of components being returned for an individual failure.

Example: VTEC hold monthly joint technical and commercial meetings with their major suppliers in order to discuss the top issues which are affecting the fleet. This provides a regular forum to discuss issues and work together towards resolution.

Example: Virgin Atlantic has a system whereby if a failure occurs which could be caused by a number of different components, they first change the component most likely to have been at fault and place it in quarantine for a set length of time. If the failure does not reoccur in that time, the component is returned to the manufacturer for diagnosis. If the failure does reoccur then the component is assumed to have not caused the failure and the next most likely component is removed and placed in quarantine.

14.2.2 Time taken to resolve issues.

- ✦ There is a perception that it takes too long to investigate alleged component failures. It is difficult to quantify the validity of this perception due to the diversity of warranty SLAs in existence. It may be that TOCs and suppliers having a slightly different interpretation of an SLA (e.g. whether the clock start ticking on the SLA from the moment the TOC sends off the faulty component or when the logistics company or supplier receives it). It is also important

to understand that not all components are treated equally by logistics companies. Those with immediate demand or safety stock levels set will be returned for repair immediately, otherwise the broken component may be stored in a warehouse awaiting future repair. It is therefore good practice for TOCs and Suppliers to agree a common definition of the terminologies used and to measure compliance against a standard set of agreed KPIs.

- ✦ The length of time to agree a failure diagnosis where there is a limited shared float available can result in availability / reliability issues at other TOCs who are not involved in the original failure. Pressure to conclude investigations on these assets may result in basic failure investigations taking place and more NFF diagnoses being offered in order to return the component to the common pool. RoSCos should know overhaul spares floats and Logistics companies should know maintenance spares float. Limited floats become a greater issue at times of overhaul and need to be proactively managed. **See Section 16 Overhaul Management.**
- ✦ Logistics companies can identify limited floats through knowledge of critical spares and obsolescence forecasting. Logistics companies should forecast maintenance activities to identify peaks and troughs so that limited floats can be managed proactively.
- ✦ When fleets are cascaded among different TOCs it is good practice to consider the impact this may have of component floats.
- ✦ It is good practice to identify required component floats upfront when introducing new fleets.

14.2.3 Trend identification and information sharing.

- ✦ There isn't a common view of component failures across all involved companies. Each company will maintain their own asset management systems which only show part of the story. Therefore no one has an overview of the complete picture from NFF component diagnoses to impact on the train service. Poor flow of information from end supplier back to the TOC can result in a component being returned to a common pool without the new TOC being aware of its history or the TOC who returned the component finding out the failure diagnosis. By using shared systems, it can help to create a more joined up asset history with a clearer view from root cause to passenger impact.
- ✦ TOCs routinely analyse their failure data to identify their worst performing units, worst performing systems and repeat failures. However, issues may be identified sooner if these types of analyses are routinely shared with other TOCs who operate similar fleets. Therefore, TOCs with common fleets should take part in regular fleet user groups in order to identify common faults and to work together to reduce their occurrence.
- ✦ It is difficult for TOCs to identify repeat NFF for some components as not all components have serial numbers and generally no one TOC has a complete view of the component's reliability history. Component failures and equipment issues are generally identified by TOCs as they cause problems with reliability and availability, however Logistics Companies and Suppliers could also work proactively to identify issues which may affect train service delivery and should be proactive about sharing this information.
- ✦ Failures caused by a faulty batch may not be correctly diagnosed straight away (or initially assumed to be random failures caused by bad luck) as the onus is on the TOC to identify reliability issues. Suppliers are in the best position to identify batch issues and component

NFF diagnoses. These issues should be relayed to Logistics Companies who can work with affected TOCs to manage the impact of these issues.

14.2.4 Information flow through supply chain.

- ✦ Poor flow of fault information from TOC to end Supplier can hinder the failure investigation from making a positive diagnosis. Failure information is either not provided with useful detail or can be lost in process of returning the faulty component to the Supplier. This results in the Supplier being unaware of any symptoms, diagnostics undertaken by the TOC or other useful information regarding the failure which may help them reaching a positive failure diagnosis. Sometimes TOCs may not be able to provide useful or complete failure mode information to the Supplier (e.g. part of a component may have been broken and fallen off the train or the component may be an electrical box which has stopped working). This may impact on the quality of the investigation undertaken by the Supplier as the testing undertaken may not consider the correct issue and therefore result in a NFF diagnosis. In order to do a thorough investigation, a systems approach should be taken with all involved parties understand what information is required and what information is available. TOCs and Suppliers should work together to identify components where better information about the failure symptoms could be supplied by the TOC and agree a minimum standard for returns information on the fault. Logistics Companies should be aware of this to ensure that all relevant information is passed on to the Supplier. Warranty claims reporting templates / documentation should be updated to reflect any agreed changes to ensure that good practice becomes embedded. TOCs should aim to have a dedicated warranty manager to ensure that claims are well managed (i.e. returned with the agreed information) and that outcome reports are followed up.
- ✦ Poor change control practices can result in components' serial numbers being replaced or renewed by the Supplier without the TOC being aware that this has occurred. This impacts trend analysis as repeat failures are harder to identify. In order to ensure component history is easily traceable, a robust change control process should be applied to managing serial numbers and a consistent use of tracking common pool components should be made through the use of component tracker. To reduce the occasions when a serial number needs to be changed, components should be uniquely identified and fitted with robust serial numbers which are unlikely to fall off or become damaged through the component's life.
- ✦ Sometimes a Supplier may miss the warranty investigation SLA and credit is given to the TOC. If the component is being returned to a common pool, the TOC who returned the component may lack the incentive to chase for an outcome report especially as this can be time consuming. It is difficult to quantify how often this happens because each warranty contract has a different SLA for investigating faulty components. It is assumed that there will be a higher level of NFF diagnoses in these situations. It is important that outcome reports are followed up by the Logistic Company and their results are shared with affected TOCs. In order to better manage outcome reports where SLAs have been missed it would be good practice to introduce standardised component SLAs across the industry.

14.2.5 Testing regimes and specifications.

- ✦ It is important for all parties to agree component testing specification upfront (e.g. at the start of a new relationship) to reduce the number of NFF diagnoses and to provide a greater understanding of why faults occur and the way in which components are required to perform.

This is especially important for the introduction of new fleets and should also be considered prior to overhaul. **See Section 16 Overhaul Management.**

- ✦ Logistics companies can help to ensure that investigations result in a positive diagnosis by encouraging systems based approach to be taken to fault finding (rather than a component based approach).
- ✦ The testing practices of TOCs and Suppliers are not aligned which can lead to there being different views of whether a component is faulty or not because Supplier specifications may not represent how the component is actually used. Testing on depot may rely heavily on subjective events being observed whereas testing at a Supplier's facility may provide more ideal conditions. It is good practice to align Suppliers' and TOCs' testing practices as far as is practical.
- ✦ Joint investigations between TOCs and Suppliers can be very productive in providing a common understanding of what causes a component to fail and the steps that need to be taken in order to achieve a positive failure diagnosis, however they can be difficult to organise due to being regarded as symptomatic of a break down in the process / relationship. This may be improved if TOCs and Suppliers work to develop better relationships and find a way to organise joint investigations more easily when they are required. It is also critical to ensure that learning from joint investigations becomes embedded in routine practices. Learning from joint investigations should be shared with other TOCs to prevent the need for a similar joint investigation to be repeated elsewhere, failure to do so may not help when trying to build a positive TOC / Supplier relationships.
- ✦ Asset data can be lost through testing. Some testing regimes cause asset history to be wiped prior to the test being taken, thereby losing potentially useful information about the asset's performance. It is critical to identify components which are at risk of losing failure data either through the testing process (e.g. the testing procedure for door control units wipes their failure data first) or because data is only stored for a limited time (e.g. if the asset is unpowered for a certain amount of time the data can be lost). Methods for data download or backup need to be in place to ensure that potentially useful information is not lost prior to testing.
- ✦ Testing methods do not typically recreate vehicle conditions (e.g. Suppliers may only undertake an electrical test, not a mechanical one) which does not provide a complete picture of the failure environment. It is good practice to undertake component tests which more accurately recreate the operational environment in which the failure occurred (e.g. putting electronic equipment through 'shake and bake' tests in which vibration plates simulate train movement and climate chambers which simulate real life weather extremes).