

TRAIN SEPARATIONS

Purpose: To prevent recurrence, not place blame.

Report Date: 12-01-2014

Start Date: 03-01-2014

Report Number: NC20150708

I. Problem Definition

What: Train Separations

When: Current

Where: Rail Network

Significance: High

Safety: Some potential for runaway wagons and collisions at rail crossings

Environment: N/A

Revenue: \$15,000 average per event for product not delivered

Cost: Parts and labour and associated expenses = \$1800/event

Frequency: 1/wk

II. Report Summary

Train separations are being caused when the critical attachment between train wagons called a knuckle breaks. The investigation, which is continuing, revealed that the knuckles break because a fatigue fracture exists and is placed under stress in further train operations. The fatigue fracture is caused by either excessive cyclic forces or the fact that the knuckle life was exceeded or the fact that the knuckles delivered for use are of variable quality or some combination of all three, depending upon the event. Some of the causes indicated in the chart have not yet been substantiated but are 'reasonable' suppositions.

The excessive cyclic forces are caused by some combination of either sudden acceleration or deceleration or normal operations over time. Sudden acceleration occurs when the throttle is applied aggressively in contravention of the stipulated strategy for reasons which may include an intention to catch up time after delays. Another possible cause is that drivers are not aware of the maintenance and cost implications of this aggressive throttle control. Sudden braking is more explicable given a number of hazards which can arise on tracks but the effect is the same.

The knuckle life has been exceeded because knuckles have not been changed out in a timely fashion. This is because of the combination of limited workshop capacity, which has adversely affected the ability to service the 10,000 wagons in service, and also the fact that the change-out interval is too great because the maintenance strategy has not been adjusted to acknowledge the recent frequency.

The original variable knuckle integrity has been identified by the surface imperfections of the knuckles which have been imperfectly finished and have not been recognised as imperfect by the inspection regime at the OEM.

III. Solutions

Causes	Solutions	Solution Owner	Due Date
Maint. Strategy not adjusted to frequency	Adjust maintenance strategy for knuckles to reflect current frequency	Lenny Ulrich	31-01-2014
Drivers unaware of maintenance implications	Instruct train drivers in the importance of driving within limits by demonstrating the effects on the knuckles	Lenny Ulrich	31-01-2014
Limited space provided	Create an additional spur/work bay in workshop to increase throughput	Malcolm Sargeant	31-03-2014
Inspections not done effectively	Apply more stringent QA/QC requirements on supplier and reinforce our own receiving processes so as to detect out-of-spec knuckles	Johanna Yorke	14-02-2014

IV. Team Members

Name	Email	Member Info
Lenny Ulrich	lulrich@ausrail.com	Maintenance Superintendent
Johanna Yorke	jyorke@ausrail.com	Mechanical Engineer
Ron Spirt	rspirt@ausrail.com	Train Driver
Malcolm Sargeant	msargeant@ausrail.com	Rolling Stock Controller
Justin Hardhat	jhardhat@investigate.com	Consulting Metallurgist
Randall Lorne	rlorne@ausrail.com	Regional network Manager/Facilitator

V. Notes

1. Realitychart Status: The Realitychart is in draft form and the Incident Report has not been finalized.
2. Some cause phrases contain conjunctions and may not be clear, feel free to question them.
3. Rules Check Status: Conjunctions Resolved.
4. Rules Check Status: Some causes have been purposefully left off the Realitychart.

VI. References

1. Metallurgical evaluations
2. Schedule interruptions 09/2011 - 01/12/13
3. Maintenance strategy for knuckles
4. Current knuckle spec

