Public Transport Services

Government of South Australia

Engineering Instruction

Management of Wheel Impact Forces

Under Review

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Document Control

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Prepared By:	Name: Peter Lindqvist Title: Rollingstock Engineer		05/08/14
Reviewed By:	Name: Kuldeep Zala Title: Rail Engineer		06/08/14
Approved By:	Name: Peter Haskard Title: Manager Rollingstock Engineering		6/8/14
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1. Introduction

On 3 December 2013 an "ATLAS FO" Wheel Monitoring System was installed at 13.5km on the Gawler UP track. The Wheel Monitoring System measures forces that rolling stock wheels apply to the rail. Data generated by the system will be analysed by Rollingstock Engineering and used to:

- identify wheels that have the greatest need for maintenance
- monitor the performance of the rollingstock maintenance provider
- improve passenger comfort
- reduce deterioration of track and rollingstock

2. Purpose

This document outlines the process that will be used to manage data generated by the wheel monitoring system.

3. Scope

This instruction applies to the following rolling stock;

- 2000/2100 Class railcar
- 3000/3100 Class railcar
- 4000 Class railcar

This instruction applies to staff working in:

- PTS Engineering and Maintenance, Rollingstock Engineering functional area
- PTS contractors to the extent specified in their contract.

4. Related Documents

DOCUMENT NAME	DOCUMENT NUMBER
Railcar Wheel Inspection and Defects Standard	PTS-MS-10-XM-STD-00000084
GEN.D20483 General Introduction ATLAS FO	KNet #8173216
72100194.D19722 ATLAS FO CMS User Interface Manual	KNet #8295613
PTS Automatic Equipment Identification	KNet #7285833

5. References

Field Manual of the AAR Interchange Rules (2008)

6. Acronyms

ACRONYM	FULL NAME
AAR	Association of American Railroads
AEI	Automatic Equipment Identification
ATLAS FO	Fibre Optic wheel monitoring system produced by SST
CMS	Condition Monitoring System used to display ATLAS FO data
PTS	Public Transport Services
RMA	Railcar Maintenance Agreement between PTS and Maintenance Provider
SST	Signal and System Technik gmbh
TPS	Transit Performance System

7. Definitions

TERM	DEFINITION
Dynamic Force	Force that is applied to the rail by a wheel, as a result of vehicle motion. It is sometimes referred to as "Impact Force"
Peak Force	The sum of Static Force and Dynamic Force
Static Force	Force that would be applied to the rail by a stationary wheel. When measured on a wheel in motion, it is sometimes referred to as "Quasi-Static Force"

8. Roles and Responsibilities

8.1. Rollingstock Engineering

The Rollingstock Engineering functional area is responsible for the following:

- Using Condition Monitoring System (CMS) to monitor data generated by ATLAS FO on a fortnightly basis
- To monitor railcars in service
- To raise repair cards in Transit Performance System (TPS)

8.2. Rollingstock Maintenance Provider

The Rollingstock Maintenance Provider is responsible for the following:

- To inspect wheels identified in repair cards
- To repair or replace wheels in accordance with PTS standards

8.3. Manager Rollingstock Engineering

The Manager Rollingstock Engineering is responsible for considering the cases of corrective maintenance that may not be covered by Railcar Maintenance Agreements (RMA)

9. Forces for Passenger Perception

Wheel impacts are often reported by drivers, and sometimes by passengers. Vehicles measured with a dynamic force of 165kN or more will be flagged with warnings in CMS.

If a consistent measurement is demonstrated by 10 or more such warnings on the same vehicle in the last 28 days, staff of the Rollingstock Engineering team may ride the train to determine whether the wheel impact is affecting passenger perception. The type of rollingstock will be taken into consideration when making a judgment on whether a repair card should be raised in TPS.

10. Forces for Asset Damage

A peak force of 400kN is a typical limit used by many railways; this is based on Association of American Railroads (AAR) interchange rules and was initially developed for freight railways. Peak Force includes Static Force, which cannot be controlled in PTS operations.

A dynamic force excludes static force and is a better measure of the wheel condition, which can be controlled by PTS through wheel maintenance. A dynamic force approximately equivalent to the AAR peak force limit for PTS operations at a maximum axle load of 21t is 300kN. Vehicles measured with a dynamic force of 300kN or more will be flagged with alarms in CMS.

If a consistent measurement is demonstrated by 10 or more such alarms on the same vehicle in the last 28 days, a repair card will be raised in TPS.

11. Inspections Triggered by Forces

When a repair card is raised in TPS, the maintenance provider will carry out detailed wheel inspections at or before the next service. Particular attention must be given to wheel defects such as skids, spalls, scale and fractures. Out of Round will be measured on all wheels of a bogie identified with high dynamic forces. The Automatic Equipment Identification (AEI) tags must be removed and checked at the time of inspection to ensure the correct vehicle has been identified.

Wheel condition shall be maintained in accordance with the PTS Standard *PTS-MS-10-XM-STD-00000084: Railcar Wheel Inspection and Defects Standard*. If a wheel is inspected and found to meet this standard, additional corrective maintenance may be required at the discretion of the Manager Rollingstock Engineering.