TECHNOLOGY MANAGEMENT

GUIDELINE TO MAINTAINING

TRAIN CONDITION ASSESSMENT SYSTEMS

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Revision Sheet

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INDEX

1 Scope

1.1 This document covers the required guidelines issued by Technology Management to ensure that the maintenance procedures are clearly defined to assist and support the corridor depots. These instructions shall ensure that all train condition technologies installed in Transnet Freight Rail corridors are always available and operational and the equipment is maintained to perform as expected. These guidelines shall be used when doing a technical review when procuring new technologies for Transnet Freight Rail (TFR).

1.2 Maintenance standards are vitally important to ensure that all TFR engineering technicians working on wayside measurement equipment have the technical knowledge, skills and capability to perform their duties safely within the railway environment. Secondly, that the trainers are affiliated with the latest installed technologies. The corridor Rail Network depots and the Technical Support Office direct involvement to maintain these systems is a vital key to the availability and performance of the condition measurement systems. These systems provide the Locomotive and Wagon Maintenance Departments with usable and accurate train condition data to perform their duties in keeping the Rolling stock in a healthy service condition.

2 Transnet documents and requirements

2.1 Applicable referenced documents

All the listed documents below are stored in the Transnet Documentation Office. The Documentation Office shall issue the documents only once the requester has filled in and submitted the necessary application form.

2.1.1 Transnet technical specification

The following specifications, standards and drawings of the latest version form a part of this specification to the extent shown herein. In the event of conflict between the referenced document and this specification, the contents of this specification shall be considered a superseding requirement.

BBB0481	Manual for Track Maintenance
BBB2029	WPMS - Wheel Profile Measurement System
BBB0788	LPM – Load Profile Measurement System
BBB8129	ABE – Railbam Measurement System
BBB0493	HBED – Phoenix & HTK, THDS system
BBB0807	SBD – Skew Bogie System
BBB0804	WIM-WIM – Wheel Impact Monitor Weigh In-Motion
BBB8162	DEDS – Dragging Equipment Detector
BBC1635	VIS – Vehicle Identification System
BBC1769	AWIM – Assized Weigh In-Motion (Weighbridge)
BBD8058	WTM - Wheel Temperature Monitor
CSE1154-001 CAT48	Environmental specification
BBH1091	Surge and lightning protection for track side equipment

3 Requirements

3.1 Relevant documents (NOTE: the OEM shall supply the following documentation toTransnet Freight Rail when delivering a new technology)

3.1.1 Maintenance manual
3.1.2 Training manual
3.1.3 Operations manual
3.1.4 Calibration manual
3.1.5 Fault finding tree
3.1.6 Wiring diagrams
3.1.7 Equipment housing drawings

3.2 **Types of Maintenance Strategies to be adopted in Transnet Freight Rail corridors**

3.2.1 **In-House Maintenance Strategy**

3.2.2.1 Skilled technicians (T3 / S4) or semi-skilled maintainers shall do first line maintenance.

3.2.2.2 The maintenance maintainer will generally not be computer-literate. The maintainer shall clean the system equipment under supervision of the maintenance technician.

3.2.2.3 The maintenance technician shall ensure the equipment building/enclosures and track side equipment is free from rodents and reptiles.

3.2.2.4 The maintenance technician shall ensure that the measurement equipment and cables are free of vegetation.

3.2.2.5 The Original Equipment Manufacturer (OEM)/Contractor shall do second and third line maintenance during the guarantee period of 12 months.

3.2.2.6 The CAPEX project shall endorse a 12-month fault free functionality and availability of the system before final approval.

- Subsequent maintenance contracts may be put in place by Transnet following the lapse of the initial contract period.

3.2.2.7 After the lapse of the initial contract with the OEM, second line maintenance shall be conducted by TFR-RN Technical office and third line maintenance shall be conducted by TFR-TM.

3.2.1.1 A maintenance team consisting of an Engineering Technician (skilled) and an Infra Worker (maintainer) shall be responsible for the first line of maintenance of the system.

3.2.1.2 Any required preventative maintenance shall be clearly defined in the maintenance documentation provided by the OEM.

3.2.1.3 Preventative maintenance interventions on all wayside equipment shall not be required more than once in 3 months.

3.2.1.4 During preventative maintenance, any component on site shall not require more than 30 - 60 minutes of work, averaged over one maintenance cycle.

3.2.1.5 An engineering technician shall execute first line maintenance with specific training in the functional operation of the system.

3.2.1.6 An engineering technician shall execute second line maintenance with specific training in fault finding of the system.

3.2.1.7 Calibration of the measurement system shall be executed once every 12 months by 3rd line support executed by TFR-RN Technical or TFR-TM.

3.2.1.8 All specialised tools, calibration and alignment rigs/equipment shall be supplied with the system. The calibration and alignment equipment shall be evaluated by TFR-TM and TFR-RN to determine the level of skills required to perform corrective maintenance of the system.

3.2.1.9 All maintenance and calibration procedures shall be provided by the OEM and supplied with the system. The procedures shall be evaluated by TFR-TM to determine their suitability.

3.2.1.10 A toolbox equipped with all the necessary high quality hand tools to maintain the system equipment shall be provided to the responsible maintenance technician.

3.2.1.11 The supplier shall guarantee continued local availability of all components of the system, as well as frequently used spares of the components, for a contractually specified period of at least 10 years (replacement of obsolete components will require OEM endorsement and relevant documentation shall be provided).

3.2.1.12 The supplier shall inform TFR-TM 12 months in advance of any component, operating system or software licence approaching obsolescence.

3.2.1.13 The supplier shall provide a compatible component to replace an obsolete component at their own cost for testing by TFR-TM/TFR-RN. The manuals and part list in all documentation shall be updated.

3.2.1.14 The supplier shall provide TFR-TM with any future system changes i.e. in upgrading and enhancing the measurement technology.

3.2.1.15 The supplier shall notify TFR-TM of PC/operating systems or related changes every 3 year for life cycle management of the system.

3.2.1.16 The supplier shall guarantee delivery of any critical system spares within 4 weeks of placement of a purchase order.

3.2.1.17 The supplier shall provide a repair and refurbishment process of its in-house developed embedded (OEM) PC boards. Refurbished and repaired OEM PC boards to be charged at market related prices.

3.2.1.18 A comprehensive “recovery” procedure with “ghost” memory sticks/disks where applicable, shall be delivered with each installed system to enable the TFR maintenance personnel to repair the system after a catastrophic failure, for example a SSD/hard disk crash.

3.2.1.19 The CAPEX project shall include the supply of a minimum amount of spares (at least 20%) per system, which shall be supplied to TFR-RN after the 12 month guarantee period.

3.2.2 **Outsourced Maintenance Strategy (TFR shall own the measurement equipment)**

Outsourced maintenance refers where the contractor takes full accountability for the maintenance,data integrity, spares, calibration and repairs.

3.2.2.1 Outsourcing shall be decided on a case-by-case basis and a SLA shall be put in place between TFR-RN and the OEM.

3.2.2.2 The SLA shall be drafted and signed by TFR-RN Technical Office, Technology Management and other relevant parties.

3.2.2.3 Should there be a decision for outsourcing maintenance to change to in-house maintenance all clauses and sub clauses of 3.2.1 shall be applicable before hand over can occur.

3.2.2.4 An initial outsourced maintenance contract shall not last longer than 2 years after completion of the guarantee (12 month) period.

3.2.2.5 Transnet reserves the right to review any SLA with the Contractor at any time within reason.

3.2.3 **Hybrid Maintenance Strategy**

Hybrid maintenance strategy refers to a combination of maintenance strategies from section 3.2.1(In-House) and section 3.2.2 (Outsourced).

3.2.3.1 Should there be a decision for hybrid maintenance to change to in-house maintenance all clauses and sub clauses of 3.2.1 shall be applicable before hand over can occur.

3.2.4 **OEM full ownership Strategy (OEM shall own the entire measurement equipment)**

3.2.4.1 This strategy refers to the OEM or local South African agent (certificate of MOU issued) taking full responsibility for the installed measurement system.

3.2.4.2 The OEM shall be responsible for the following:

3.2.4.2.1 OEM shall be totally accountable for the equipment installed in TFR i.e. against theft & vandalism.

3.2.4.2.2 1st, 2nd and 3rd line maintenance of system.

3.2.4.2.3 Replacement of faulty parts.

3.2.4.2.4 Calibrations as and when required.

3.2.4.2.5 Supplying accurate and reliable data to an allocated TFR department.

3.2.4.3 A SLA shall be undertaken with the OEM by SCM and the contract shall be renewable every 2-3 years based on the performance and deliverables supplied to TFR.

3.2.4.4 A penalty agreement shall be part of the SLA to manage the availability, quality and performance of the delivered data to TFR.

3.3 **OEM design for Maintainability**

3.3.1 Vibrations caused by the movement of trains/poor track conditions and poorly maintained rail vehicles shall always be taken in consideration in the system design. The system shall make provision for all components used in design to have the relevant anti-vibration mechanism installed. See referenced document in section 2.1.1 CSE 1154-001-CAT48**.**

3.3.2 Theft and vandalism protection shall be part of the OEM system design to ensure that access to the wayside enclosures and on-track equipment is theft and vandal proofed as far as possible.

3.3.3 The system shall be protected from any power surges from the rail side i.e. traction currents, track cables as well as from the incoming power supply. The surge protection must be able to protect against momentary high surges (as with lightning strikes provided not a direct hit) as well as longer durations of surges (such as with regenerative breaking).

3.3.4 The system wayside and on-track equipment shall be designed and installed in such a way to ensure that the Perway/Civils maintenance rail vehicles do not easily damage the equipment while passing over the system.

3.3.5 The system shall be immune to any rail track current interferences caused by the removal or installation of electrical mast to rail bonds in the section.

3.3.6 The installed system shall have the relevant “A” boards installed as well as 3 sleepers either side of system which shall be painted yellow to warn Perway/Civil maintenance vehicles operators not to do tamping and ballast profiling directly over the CAS system without the presence of a depot CAS Engineering Technician on site.

3.3.7 The OEM shall clearly define the conditions under which Perway/Civil track and sleeper maintenance and any other civil track maintenance interventions may reduce the performance and data integrity of the system.

4 Reliability and Availability

4.1 Mean time between failures for any electronic sub-system shall not be less than 12 months. The contractor shall provide data, which proves these figures.

4.2 Mean time to replace a faulty module/s shall be less than 30 minutes (actual working time only).

5 Workmanship

5.1 Qualified OEM personnel shall do the CAS installation and commissioning of the system.

5.2 Qualified OEM personnel shall be inducted by trained TFR personnel before access to TFR rail track shall be granted.

5.3 Qualified TFR personnel shall manage the site preparation works as per Scope of Work

5.3.1 Power installation to building/enclosure

5.3.2 Communication to building/enclosure

5.3.3 Security. E.g. perimeter fence & gate

6 Materials, processes and parts

6.1 All materials used in the CAS system shall be at least industrial grade.

6.2 Where possible, materials used shall be SABS approved.

6.3 Parts shall be supplied with a certificate of origin.

6.4 All parts shall be available from two independent manufacturers for at least ten years.

6.5 For critical parts where a second manufacturer cannot be found, stock to allow for production and maintenance for ten years shall be purchased.

6.6 All dimensions and bolt and nut sizes shall use the Metric standard.

6.7 All names and labels used on the CAS equipment and documentation shall be in English.

7 Portability

7.1 All spare replacement modules shall be small enough to be handled by one technician. If special packaging is required for any module in the rail environment, it shall be supplied as part of the system.

8 Transportability

8.1 All spare replacement modules shall be small and light enough so that it can be transported to site in the back of a one ton light delivery vehicle with a canopy on a gravel service road. If special packaging is required for any module in this environment, it shall be supplied as part of the system.

9 Fail-safety requirements

9.1 Although the system is not viewed as a fail-safe system, the mission of the system is critical in the operations of Transnet Freight Rail operations.

9.2 A Failure Mode Effects and Criticality Analysis down to sub-system level shall be supplied by the OEM.

10 Mandatory: CAS systems acceptance into TFR

10.1 The following TFR department representatives shall be required at the end of 12 month evaluation period for the final handover to depot:

- TECHNOLOGY MANAGEMENT
- RAIL NETWORK TECHNICAL
- RAIL NETWORK – PERWAY
- RAIL NETWORK – ELECTRICAL
- RAIL NETWORK TELECOMS
- TRANSNET ENGINEERING
- END USER
- FACULTY OF RAIL – TRAINER
- OPERATIONAL READINESS
- CORPORATE SAFETY

- OPERATIONAL DEVELOPMENT PERFORMANCE (ODP)

11 Abbreviations/glossary/definitions

FOR – Faculty of rail
OEM – Original Equipment Manufacturer (Supplier of system)
TFR – Transnet Freight Rail
TFR-TM – Technology Management
TE – Transnet Engineering
TFR-RN – Rail Network
PM – Project Manager
SOW – Scope of Work
ITCMS – Integrated Train Condition Monitoring System
TCO OAT – Train Control Office Operational Alarm Terminal
SOP – Standard Operational Procedure
SLA – Service Level Agreement
MOU – Memorandum of Understanding
SCM – Supply Chain Management
CAS – Condition Assessment Systems

Definitions:

FLM - First-line maintenance (FLM) calls are considered standard support tasks, including basic device troubleshooting (fault finding). More specifically, FLM calls do not include replacing hardware, resolving software bugs or defects, or using advanced tools or techniques.

SLM - Second-line maintenance (SLM) requires advanced support from experienced technical support technicians or teams. These repairs typically involve advanced diagnostic tools and evaluations, device interactions and troubleshooting, and on-site equipment repairs.

TLM – Third line maintenance relates to when second line support staff are unable to resolve a problem and require additional assistance from higher specialists, such as our Technology Management office and systems OEM.