

APPROACH TO ASSESSING THE CONDITION OF A RAILWAY SYSTEM



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To restore corridor capacity a risk-based condition assessment approach is required to prioritise remedial effort.

There is a common challenge amongst major freight owners, infrastructure owners and operators/maintainers in South Africa, being the diminishing capacity to rail goods and commodities. Since 2018, freight volumes have decreased by 24% across the three major heavy haul corridors due to deteriorating infrastructure assets, theft and vandalism, and an aging rolling stock fleet (refer to Figure 1). Significant freight volumes therefore moved to road, increasing costs and business risks to commodity owners and South Africa losing market share.

To restore the capacity of these corridors, a major shift towards increased private stakeholder involvement in the operating models of corridors is expected. However, to address the deteriorated infrastructure and rolling stock issue within a possible future public private operating model, a structured approach to assess and determine asset condition related risks is required.

This paper aims to share a risk focussed condition assessment approach that has been developed and successfully applied over the last 8 years within PPP and state-owned rail enterprises to facilitate identification and risk-based prioritisation of remedial work.



Competing stakeholder objectives create challenges in prioritising remedial work

The challenge in navigating and facilitating remedial programs within public private operating models are competing interests amongst the main stakeholders of freight rail corridors. (1) Freight owners want to get their product to market at lowest price.

(2) Rail operators want maximum utilisation of the installed rail system capacity and (3) Infrastructure owners/maintainers strives for the preservation of the asset to ensure long term economic benefit.

However, regardless of the conflicting interest, reliable capacity is a common objective amongst these three stakeholders. To ensure reliable capacity, continuous assessment of the asset condition is required to ensure a) early detection of reliability risks and b) timely interventions and c) translating condition outcomes to business and asset integrity risk to prioritise effort and spend.

From multiple engagements with public and private stakeholders in the rail environment, key success factors for asset condition assessments are:

- a) Assessor independence
- b) Holistic multi-disciplinary team with deep technical knowledge and experience and
- c) A risk-based approach to objectively assessing the condition of the asset. These success factors help ensure constructive collaboration amongst stakeholders towards the common objective of securing reliable capacity of freight corridors.



An objective risk-based assessment approach facilitates robust prioritisation of remedial work

A four staged approach has been successfully applied on multiple initiatives that includes both quantitative and qualitative assessment of condition to holistically determine risks to asset life. Table 1 provides a summary of the approach activities and outcomes across the four stages.



Successful applications

This approach was successfully applied to various engagements with different business objectives and multiple stakeholders including the following examples.

- Asset performance turnarounds engagements,
- Routine asset assessment towards valuations and
- To enable concession agreement mechanisms for preserving assets in a PPP

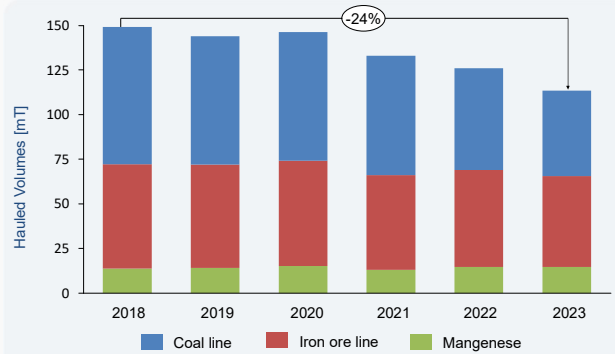


Figure 1. Across the three major heavy haul corridors, volumes have decreased by 24% over the past 5 years

Table 1: Four stage approach summary

#	Stage	Activity	Outcome
1	Desktop Assessment	<ul style="list-style-type: none"> • Quantitative analysis 	<ul style="list-style-type: none"> • Preliminary view on asset condition • Identification of inspection sample
2	Field Inspection	<ul style="list-style-type: none"> • Physical inspection • Qualitative assessment 	<ul style="list-style-type: none"> • Identify imminent risks • Asset condition scorecard against <ul style="list-style-type: none"> - Physical condition - Maintenance best practices / OEM - Modification history - Asset environment
3	Remaining Life Risk modelling	<ul style="list-style-type: none"> • Quantitative modelling to determine RUL • Qualitative Identification of individual risks 	<ul style="list-style-type: none"> • Useful life probability considering both desktop and field inspection results • List of business and preservation risks
4	Prioritisation of interventions	<ul style="list-style-type: none"> • Synthesis of business and preservation risks • Development of remedial interventions 	<ul style="list-style-type: none"> • Interdependencies of risks determination • Prioritisation of interventions aligned with stakeholder objectives

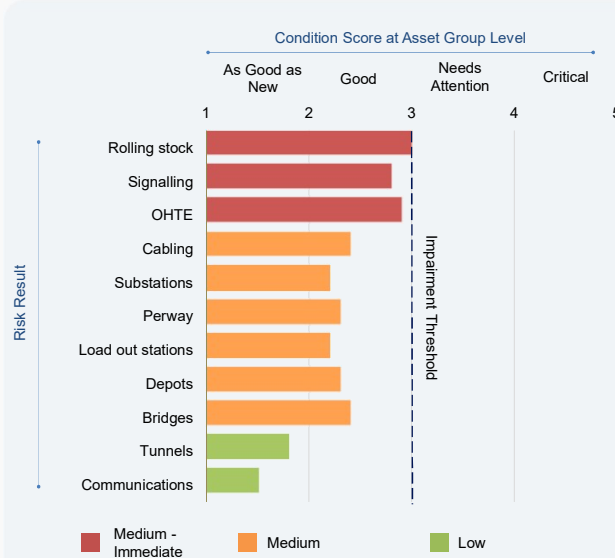


Figure 2: Example of a condition assessment outcome (Not Transnet)

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