



PlantGUARD – a new level of assurance from your plant, machinery & equipment supply chain

Mathew Sekulitch
BEng, CEng
Metro Trains Melbourne (**Metro**)
General Manage Safety Environment & Quality

1 SUMMARY

The paper is an account of the journey Metro undertook to improve the governance, compliance and risk position associated with the registration, maintenance and through life management of track vehicles registered for use on Metro's rail network.

The paper also provides an insight into Metro's previous system, landscape on how other rail networks manage the same process, the need for harmonisation, a review of the IT landscape of comparable systems and the benefits Metro has realised with the introduction of the locally developed SAAS based solution called PlantGUARD.

2 INTRODUCTION

Coupled with the introduction of the new Rail Safety National Law in Victoria in 2014, announcement from the new 'Office of the Rail Safety Regulator' (**ONRSR**) that a key regulatory focus would be on track vehicles, in particular road rail vehicle¹ safety, an existing track vehicle registration system that was struggling to provide the necessary assurance; significant rail construction work commencing in 2016 with the removal of 50 level crossings and ever increasing demand from suppliers for harmonised systems, Metro undertook the first step towards developing a harmonised system for the rail sector to manage track vehicles.

After preliminary research uncovering no cloud based system existed that could meet the sector's needs, MTM approached its supplier assurance and prequalification company, called Avetta, and presented an opportunity that would add to their assurance platform and therefore benefit the rail sector further.

In 2015, Avetta, Metro and a local SAAS based company called Streaka went about automating Metro's paper based 'Track Vehicle Registration Process'. To support this process, Metro had already reviewed its existing assessment form in conjunction with V/Line, Victoria's regional passenger train operator, which paved the way for implementing an automated and harmonised outcome for both operators.

After completing the necessary requirements analysis, many months of development, including logic to remove human error during the assessment, industry beta testing and feedback, and 4-months of industry communications and transition, the cloud based system call PlantGUARD went live in April 2017.

¹ Road rail vehicles are purpose-built or modified vehicles which are used in 'rail mode' for maintaining and inspecting track but can also be used in 'road mode' to drive between worksites

3 BODY

3.1 Pre PlantGUARD

3.1.1 Background

Prior to introducing PlantGUARD, Metro's registration system was 100% paper based, administered by one person and supported by a local password protected excel spreadsheet.

Applying for registration required the supplier to contact Metro and request an application form. The scanned application would be emailed along with all supporting documentation for review. The 'Metro Plant Manager' would review the assessment and if approved it would be emailed to one of Metro's Independent Competent Persons (ICP)². The supplier and ICP would negotiate a rate and once complete, the assessments would be emailed back to the Metro Plant Manager for review, approval and allocation of applicable restriction codes, ie. due no scrubber or the track vehicle not being EURO 5 standard compliant, the track vehicle would not be permitted in a tunnel. Once approved, the supplier would be emailed a 'pdf' letter approving it for use on Metro's rail network, which the supplier in turn simply printed off and stowed within the track vehicle for later inspections.

3.1.2 Records and Site Transparency

All records associated with the through life support of the track vehicle, ie. initial assessment and reassessment, maintenance, modification, gauge changes were all not fully transparent to Metro, or site personnel, and relied on the supplier complying with Metro's requirements and their duties under the state occupational health and safety law.

Whilst the existence of maintenance systems and associated records were checked during initial assessment and during recertification, these records also remained invisible to Metro unless requested via audit or post incident through the investigation. Moreover, with newer track vehicles only requiring a 3-year assessment, a track vehicle could be on the rail network in a different state, or unsafe due to a lack of maintenance, without Metro or site personnel being fully aware.

Similarly, where a track vehicle was involved in a rail or road incident, all correspondence was via email, and as previously stated, there was nothing to prevent the track vehicle being on another site under the original registration letter. Whilst the publication of a 'live' list on the internet of approved track vehicles would resolve this issue, it still requires site personnel to check the list.

3.1.3 ONRSR Compliance Inspection

In June 2014, ONRSR conducted a compliance inspection on Metro's system to manage the risks associated with track vehicle so far as is reasonable practicable (SFAIRP). In summary, the system was not compliant with the new rail law and was found wanting with its ability to provide Metro the necessary assurance.

As part of the compliance inspection, several site visits occurred to see the system working in practice. Unfortunately for Metro but fortunate for the development of PlantGUARD going forward, two non-conformances and therefore opportunities were identified.

- Metro outsourced 'tree lopping' and 'vegetation control' and on this particular site visit, the tow vehicle owned by company 'x' was registered for use on Metro's rail network but the towed 'wood-chipper' owned by company 'y' was not. In addition, the wood-chipper had been sold to company 'y' and that company was unaware of any registration requirement. Unfortunately, Metro's system did not adequately support this type of transaction and a non-conformance was issued to Metro.
- Two of Metro's own track vehicles had reached their end of useful life and were to be decommissioned as road rail vehicles and gifted to a local not for profit tourist and heritage operator and used as a road vehicle. Unfortunately, Metro's system also did not adequately support this type of transaction and a non-conformance was issued to Metro.

As a result of the compliance inspection, Metro commenced a full review of the track vehicle registration system over the 2014/2015 period.

² As per AS 7502 an ICP is a person holding the relevant with the relevant competencies to design, construct, certify or maintain road rail vehicles.



Just prior to the compliance inspection, Metro had already embarked on an aggressive program to improve, and where possible, automate systems. One such system was to implement a supplier prequalification system using Avetta. Metro then approached Avetta and suggested a platform to manage track vehicles or civil plant that would add value to their existing platform and in turn improve the compliance of the rail sector suppliers.

3.2 The Development of PlantGUARD

3.2.1 The Need for Harmonisation

Prior to the new law being passed in South Australia in 2012, recognition that a safety issues existed with road rail vehicles was well known, as was the effort being imposed by state regulators to apply additional requirements to mitigate the reoccurrence of incidents within their respective jurisdiction.

With the new law adopted by four states in 2012, ONRSR chaired a forum in late 2013 to draw on industry work to date and the lessons learned from the 2009 Rail Industry Accident Board (**RIAB**) investigation report into runaways of road rail vehicles, and tabled their expectations on rail operators with managing their road rail risks SFAIRP.

Whilst several documents were produced by the ONRSR, the major milestone occurred on the 15th June 2016 with the introduction of the new Rail Industry Safety and Standards Board (**RISSB**) Standard – ‘Australian Standard 7502 Road Rail Vehicles’ and later 22nd June 2017 with the release of the RISSB Guideline – ‘Operating Road Rail Vehicles’.

Whilst the standard was published in 2016, there has been little harmonisation with mutual recognition of assessment outcomes between operators; meaning, a track vehicle needed multiple assessments to operate on multiple rail networks and this in turn means more down time and cost for the supplier. The only adjunct to this was if an ICP was recognised by both rail operators and therefore a gap assessment could be done by the ICP rather than two full assessments.

3.2.2 The Harmonisation Landscape in the State of Victoria

Metro had already started the harmonisation of systems with the introduction of its supplier prequalification system, Avetta, where to date here in the state of Victoria, Metro, V/Line and the Australian Rail Track Corporation (**ARTC**) use the system. Meaning for a supplier to work on all three rail networks, they do not have to replicate the same level of compliance effort 3-times.

In addition, previously in 2012, Metro and ARTC partnered to roll out a competency management system, via a smart card, that was later adopted by the Australasian Railway Association and rolled out nationally to all rail operators.

With respect to track vehicle registration, prior to Metro embarking on automating the registration process, Metro had already worked on harmonising the main assessment tool with V/Line. This effort naturally assisted the automation process and uptake of the new software by industry under the premise of ‘one assessment for two rail networks’.

During the development of PlantGUARD and engagement with suppliers and ICPs, the feedback received supported Metro position to consider a scalable and configurable system that could meet the needs of further rail operators at a later stage.

Whilst Metro developed the system in conjunction with V/Line, at the time of writing this paper V/Line were still in the final implementation phase. Similarly, discussions with ARTC are ongoing as Metro attempts to simplify the administrative burden for the rail sector’s track vehicle supply chain here in Victoria.

With the latter collaboration in mind PlantGUARD has been built based around a scalable assessment, meaning, a supplier selects the rail operator they wish to register for and the assessment builds based on the selection of operators and the number of electronic approvals builds along with this selection.

3.2.3 System Benchmarking

Research conducted during the requirements analysis phase identified no rail Australian rail operator had moved into the cloud and fully automated their track vehicle registration process. All had robust in-house or outsourced assessment functions; however, processes were still primarily paper based assessments. All managed static lists of approved track vehicles with only a small number providing a live list of approved track vehicles on the internet/intranet.

Prior to PlantGUARD, Metro also managed a static list of approved rolling stock and other track vehicles for the purpose of allowing these non-MTM track vehicles to transit across, or be stabled on the Metro's rail network; these lists identified the supplier, unique registration details, maximum speed, weight, length etc.

Initial research of potential software systems concluded that solutions existed for a one-client type application but none existed on the shelf to address multiple operators across different borders and boundaries. As a result Avetta partnered with a local SAAS based company to develop a configurable solution specific for the rail sector.

3.3 Requirements Analysis

Following on from the review into the registration process, the combined Metro and V/Line assessment form was updated and areas identified where decision logic could be used within PlantGUARD to reduce human error.

In addition, all other areas were reviewed to ensure appropriateness of the assessment; however, Metro acknowledged that whilst minor differences existed between AS 7502 and the revised assessment, a decision was made to realise an immediate assurance improvement and engage an external consultant to review and benchmark the system in the first 12-months. In doing so, this would also allow for sufficient time to determine if ARTC and other rail operators would use the system and therefore defer further changes until this point or at the 12-month mark, whichever comes first.

3.3.1 PlantGUARD and the Track Vehicle Registration Process Flow

Consistent with the plan for PlantGUARD to be scalable, the registration process is as follows:

- A supplier pays for a software licence to register and use PlantGUARD;
- The supplier then applies to register a track vehicle on a rail network (or multiple). This involves the supplier completing an online form plus uploading supporting information;
- The supplier selects an ICP from the list within PlantGUARD and then the user submits the application;
- The relevant Metro point of contact reviews the request and then forwards it onto the ICP;
- The ICP receives a notification and arranges for the track vehicle to be assessed with the supplier;
- Once the ICP completes the online assessment, the assessment is submitted back to Metro for final approval; and
- Once approved, the supplier receives notification and then orders a registration sticker and locally prints off an interim registration letter to support immediate use of the track vehicle.

3.3.2 Additional Functionality

As previously stated, decision logic had been built and an example of some of these include:

- Application of speed restrictions based on the results of break testing,
- Track vehicle height in transit not to exceed 4120mm above the top of rail,
- Track vehicle is not permitted under live overhead conductors,
- Track vehicle not fitted with slew limiting controls and all moveable elements must be stowed in the rest position to travel, and
- Track vehicle is not permitted in tunnel.

Other functionality includes:

- As with Avetta, coloured flags are used to indicate compliance status; Green – fully compliant and permitted on the rail network, Amber (orange) – track vehicle is under assessment and Red – indicating non-compliance and not permitted on the rail network;
- Mobility – PlantGUARD is available via tablet and mobile phone supported by a QR-code as well as standard desktop access;



- Configurable notifications and alerts exist to support suppliers in managing their track vehicles as well as push notifications originated by Metro in the event of a rail incident;
- The ability for the supplier to monitor the track vehicle throughout the entire registration process;
- User access is secure and tiered, ie. different levels of access see and can perform different functions both remotely or locally and in some cases the user interface is configurable;
- Search functionality – the ability for a user to search on any attribute associate with the track vehicle, ie. registration number, VIN etc.;
- Activity Log – all transactions/events associated with the track vehicle are stored against the track vehicle. To date, these include basic functions ‘application submitted’, ‘assessment passed’, ‘assessor nominated’ to other transactions like ‘cases’ and ‘tasks’; a case being an action that affects the compliance status and requires resolution before a track vehicle’s flag can be green again and a task being an activity that can be resolved during the next maintenance and has no bearing on the track vehicle’s compliance/flag status;
- Assessments cannot be sent back to Metro unless all non-compliances are resolved and the assessment fully complete;
- Ability to send safety bulletins to PlantGUARD registered suppliers (and users) rather than rely on continually maintaining email distribution lists; and
- All documentation that supports the safe operation of the track vehicle can be stored online and accessible by the operator.

Other functionality has been added since PlantGUARD went live in April 2017; however, most of this has been developed by an interstate rail operator in Queensland called Aurizon, where they deployed PlantGUARD for their suppliers of non-road rail plant, ie. cranes, excavators, truck etc.

Metro has been privy to this development to ensure the functionality is ready for deployment in Victoria during the first major update as mentioned in paragraph 3.3. This functionality includes full use of the prestart checklists linking back to the supplier, audit/inspection records, servicing based on hours or kilometres and addition decision logic that impacts the vehicle’s flag status. In addition, suppliers in Queensland have expanded the use of PlantGUARD for other equipment that requires certification.

Discussion with ARTC and V/Line over the first 6-months of PlantGUARD being live, other improvement considerations have already been identified for the next update; these include:

- Suppliers providing an ‘annual confirmation’ that the track vehicle has been maintained as per the confirmed maintenance schedule confirmed during the assessment and that the track vehicle has not been altered away from the ‘assessed configuration baseline’;
- Improve the existing ‘gauge change process’ that allows track vehicle suppliers to confirm the track vehicle has been returned to the ‘assessed configuration baseline’ to an ICP confirming the gauge change; and
- Consider a more formal process with the use of ICP that would simplify the registration process and remove the ‘gate keeping’ function performed currently by Metro and move to more of a monitoring/auditing function.

3.4 Beta Testing & Industry Involvement

As part of the beta testing, Metro held forums with suppliers and ICPs to run through the updated registration process flow, beta test the software and explore what other features do the suppliers believe could add value to the software, improve their experience and make managing the track vehicles easier.

In addition, during the latter stages of development and testing, ICPs were involved with functional testing to confirm notifications and alerts, logic outputs and overall usability of the assessment process.



3.5 Deployment

A 4-month transition window was used due to the sheer volume of work here in Victoria and effort required on some large suppliers. During this time the approach was as follows, and this was supported by constant communication with suppliers:

- A 'csv' file of the dataset at the time was provided and a script run to prepopulate the PlantGUARD dataset and Metro commenced data integrity testing;
- Registrations and assessments continued via the old paper process; however, new 'interim registration letters' were issued so suppliers and end users could become familiar with the interface/interaction. As each manual assessment occurred Metro would update the PlantGUARD dataset to maintain the baseline data;
- In parallel to the latter, suppliers were required to register, confirm track vehicle ownership³ and take a photo of the track vehicle for uploading (instructions were provided to ensure consistency); which all allowed
- PlantGUARD to go live on 30 April 2017.

4 CONCLUSION

To the reader, whilst the journey Metro embarked on to improve track vehicle compliance and is not revolutionary, the RAIB report issued in 2009 and work conducted here in Australia by RISSB and ONRSR since pre- and post 2012, suggest improvements in the way rail operators manage track vehicle safety are non-negotiables and PlantGUARD has been a huge step for Metro in achieving this and in turn improve its risk profile.

In addition, in an age where we rail operators are time precious and resource poor, what the power of collaborating with other rail operators and your supply chain can do to improve your compliance, your safety and the suppliers experience, cannot be under estimated.

³ This step identified a small number of track vehicles had changed ownership and Metro was unaware, highlighting a weakness in the previous system.