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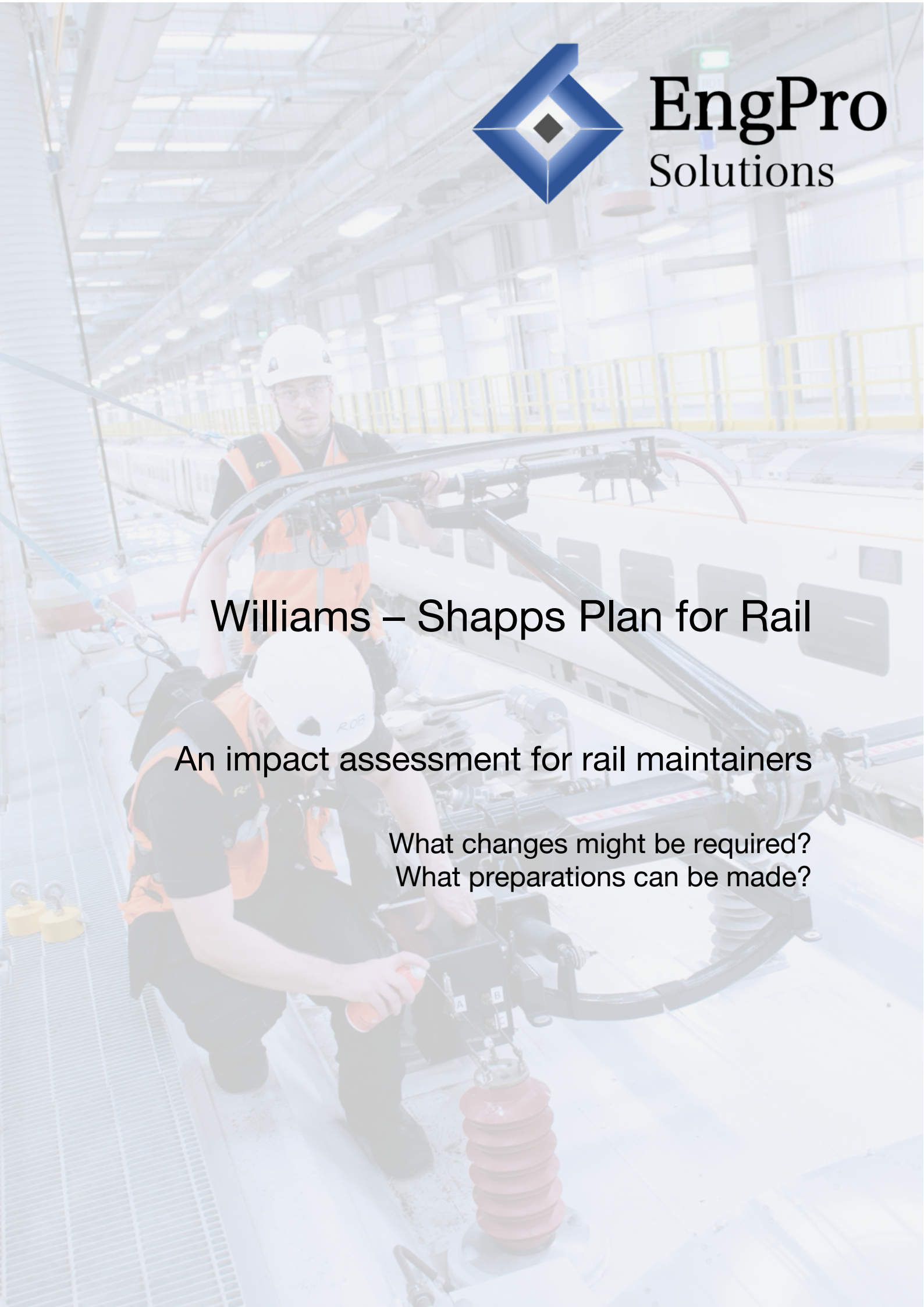


Williams – Shapps Plan for Rail

An impact assessment for rail maintainers

What changes might be required?
What preparations can be made?

Williams – Shapps Plan for Rail: Impact on rail maintenance

Introduction

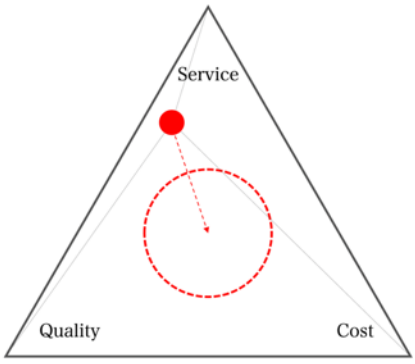
Those who work around rail have for many years realised a change to the franchising model was required and the recent announcement certainly seems to be well received across various industry platforms and it's most definitely a model we can work from. At EngPro we have the privileged position of having worked with many maintenance organisations in rail and aviation, but also with bus operators who are running concession arrangements, that on face value, seem very similar to the proposed Passenger Service Contracts (PSC).

Given our unique insight, we thought it would be useful for our team to analyse some of the opportunities and challenges that probably will lie ahead for rail maintenance organisations as they transition from the present status into the new PSC environment. Our objective assessment is presented here, with some generalisations, and is offered to help rail maintenance organisations ask relevant questions internally, to test their readiness.

The main change will be a drive on ***improving efficiency and reducing cost***, unlike anything seen before. Margins in rail, although not fat, are more generous than in the aviation sector, or bus operators who work on the slimmest of margins. In a tightening commercial landscape, a robust control of costs may well be the only way to make the margins work. To improve efficiency and reduce cost without damaging service availability, enhanced ***planning and control of maintenance*** will be required. Planning already happens in rail, but the strongly focussed plan-led approach seen in the bus and aviation sectors will likely be required in the future rail PSC to ensure the firm control of maintenance is achieved.

These changes might sound subtle but are likely to drive the business from the current reactive model to a proactive space. In maintenance, where you have a service target to meet, you can't manage cost on the day, it must be managed in the future. This will require a ***cultural shift in the organisation***.

Efficiency and cost reduction



A couple of key words that came out of the report were 'efficiency' and 'cost', followed closely on their heels by 'reliability'. In a naturally competitive landscape with multiple players on the pitch, cost and efficiency automatically surface as one strives to slim down an organisation to achieve competitive advantage in some way or another. Reading the government white paper on the (present) franchising model this was always the aspiration desired, but the reality is that competition is only felt during the bidding phases. Many who have gone through franchise changes know that the basics don't change much, only the colour of the badge.

Assuming the PSC model follows a similar approach to the bus operator concessions, then the 'basics' will have to change. With the service level being more tightly specified and controlled the only way to make profit running the service is to manage costs more effectively. But with the need for reliability, we can't become a slave to costs alone; we need a balanced approach to maintenance management. This change has happened in bus operators due to the tight service provision and in aviation due to unforgiving competition; it seems likely it will happen in rail as the PSC evolves.

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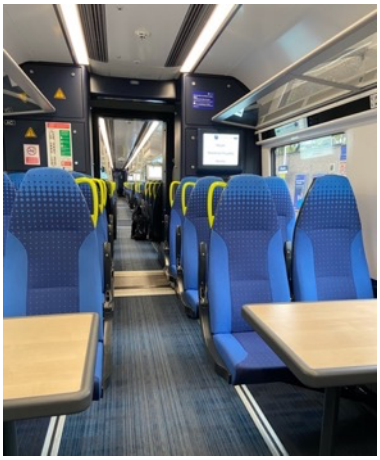

In rail, EngPro witness a strong service focus whereby the maintenance organisation achieves the morning service start requirements often at the cost of lesser defects. 'Availability is King' is the mantra often heard in train depots. However, under PSCs there will be significant penalties for passenger related defects such as Wi-Fi not working. The Williams report indicated that only 37% of passengers are happy with the Wi-Fi on trains, clearly this (with many others) will become a *penalty service metric* specified in the PSC. Train Presentation is another great example; following release from maintenance, time to clean is often reduced, meaning standards often fall short. Train cleanliness will be another *penalty service metric* in any PSC, and so will need to take higher priority than it does presently.

Planning and control of maintenance

Control of maintenance quite clearly exists in rail, if it didn't there would be trains parked all over the place awaiting maintenance. What EngPro have noticed, however, is that although some pockets of excellence exist, the lack of leanness of franchising has allowed some of the focus and sharpness to be dulled. Often, the control of maintenance is dispersed, across several individuals, making the control less effective and the business vulnerable to periods of absence. As a general recommendation, a ***review of the clarity and effectiveness of control of maintenance*** would be advised.

Examining this in more detail, there are three controls that need to be considered:

- Control of rolling stock – stabilising the maintenance plan input lines. If we want high-quality cost-effective maintenance, a critical success factor is stabilising the input line, so that all staff, tools, materials can be ready and waiting for the unit to arrive.

- Control of maintenance – ensuring compliance and prioritisation. Making sure all the company resources, both people and depots, are utilised fully. Building a plan that matches load and capacity and affords the production teams the time and space to perform. Ensuring the right work is undertaken, so that the often overlooked or 'squeezed' passenger defects have sufficient priority.

- Control of production line – high focus on the production process and output to ensure that high-quality and cost-effective maintenance is consistently delivered.

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Some key questions to 'test' your organisational readiness:

- **Control of rolling stock** – what is the input line stability percentage, measured over (for example) a 72-hour period? A good benchmark would be roughly 80%.

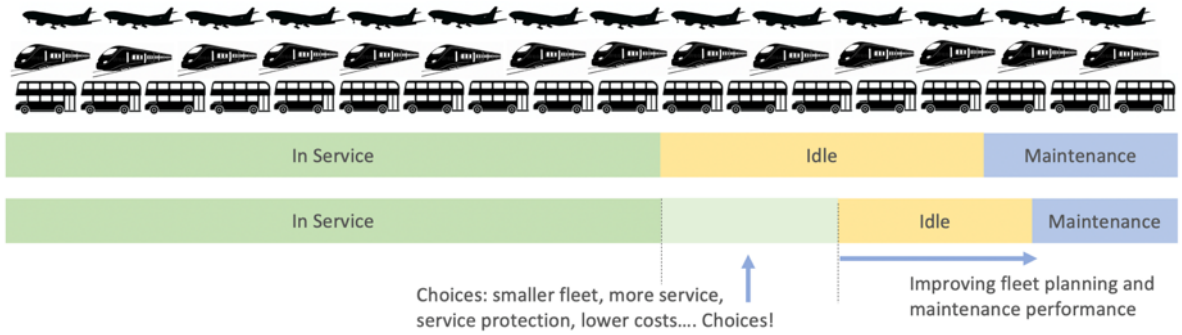
- **Control of maintenance** – the best tests here are around repeat defects, deferred work, passenger defects, concessions for exam over-runs, modification status ambiguity etc. Can you put your hand on the shoulder of the person who is the guiding mind for this? No? This tends to suggest there are control of maintenance issues that will probably need addressing.

- **Control of production line** – most metrics focus on the service output (Availability etc.). To test your control of the production line itself ask, what is the productivity figure? Where a good benchmark for rail running maintenance will be 55-70%.

Building a department (or sub-department) that controls maintenance, affords the organisation a ***single guiding mind*** and opens the door to improving performance and reducing costs.

Maintenance efficiency

Maintenance efficiency is a factor of overall fleet management and control. The process of determining a fleet size is understood and requires an analysis of how many vehicles are required to deliver the service how many will be idle at various times, catering for things like peak travel, and what the maintenance allocation will be.



As can be seen in the figure above the number of vehicles required for service is fixed, however, if through effective fleet planning and better maintenance performance we can reduce the time allocated to idle and maintenance activities we can run the same service with less fleet and so significantly reduce costs. In its simplest form this is the prize for maintenance efficiency. Increasingly EngPro see bus and aviation maintenance organisations placing higher management focus in the following areas:

- **Defect management** - the overall management of defects has a marked impact on the number of vehicles that are stood down from service at any one time. Effective and rapid fault diagnosis competence is an essential ingredient. This when combined with a prioritisation and control mechanism affords the organisation the best opportunity to keep defective vehicles to a minimum.

- **Structured Production Engineering** – this is using tools such as LEAN, 5S, Value Stream Mapping etc., in a manner to reduce waste. Waste labour hours, waste materials, waste critical asset

usage etc. Although we witness these sorts of activities in most rail organisations the difference in a bus maintenance organisation is that these activities form part of a structured and relentless drive to reduce costs. It seems likely that rail maintenance in a PSC world will need to adopt a similar approach.

- Control of labour costs (productivity) – most rail organisations either don't record, or record incorrectly, productivity. An accurate productivity measure is a great barometer of the health of the maintenance organisation as failures in any system will ultimately display as reduced productivity. The more mature organisations tend to look at two productivities; output productivity which measures the output from the number of labour hours attended, and deployed productivity which measures the output against the overall headcount of the business unit. Labour costs are always the biggest single cost component.

- Standard Operating Procedures (SOPs) - most highly efficient maintenance organisations use some form of SOP. As part of the production engineering process analysing which tasks in maintenance require fully skilled and which can be done by semi-skilled staff is important. The SOP approach allows more flexible use of semi-skilled staff.

Maintenance reduction (Optimisation)

As with most things in this paper, many rail organisations are already undertaking Maintenance Optimisation. The key difference with the high efficiency organisations found in bus and aviation maintenance is that there is evidenced a relentless drive to reduce maintenance safely, so much so that it forms a key business metric. Not many rail managers can state how long a task is authorised to take – contrast that with a bus operator, where tasks are recorded to the nearest five minutes.

- Reliability centred maintenance – the most efficiency conscious organisations employ a dedicated team of technical experts focused on looking at reliability and condition of components. Constantly analysing how to extend maintenance schedules to reduce the maintenance burden. This is a good example as many rail maintenance organisations do look at reliability centred maintenance but perhaps it isn't fully part of the fabric of "how we do business." More structured use of RCM will likely be required.

- MSG(3) - maintenance steering group. Several rail companies recently have adopted the aviation-based MSG(3) approach to reducing maintenance. This is a taxonomy which allows a technical expert to evaluate the impact that maintenance is having, or not, on the serviceability of a system. A well applied analysis can have a profound impact on reducing the amount of maintenance required to be performed. There are not too many systems on rail vehicles that wear-out, many have random failure modes, and the MSG(3) taxonomy allows different approaches to maintaining these systems to be taken. The taxonomy is quite complex to apply and some baseline software such as SOROS® is typically required.

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Proactive use of technology

It could quite easily be argued that rail is the most technologically advanced passenger transport industry, it is certainly more advanced than bus technology and probably on a par with aviation, if not slightly ahead. The challenge that EngPro witness in many rail organisations is that the culture to apply the technology and leverage the advantage it brings is not present, a point we shall discuss more in the section on culture.

- Automatic Vehicle Inspection Systems (AVIS) and MRX Video Inspection Systems (MVIS/MRX) – are both examples of technology (one laser, one video) to measure the wear on certain components such as brake pads and tyre treads typically. Quite simply, this technology is world leading in the transport sector and over the coming years grasping the advantage it affords will be critical. It is entirely possible by using maintenance optimisation techniques that train maintenance schedules can be pushed out to double, or even treble, the present expectations, except for those few wear-out items which this technology is designed to measure. Linking the technology to a mature plan led system will enable trains to remain in service, safely, for longer.

- Remote Train Monitoring (RTM) - most new trains have some form of RTM sensors fitted as standard, and some older trains have been retrofitted with RTM. The use of RTM has been explored for many years by Rolls Royce (RR) Aero Engines at Derby (called Engine Health Monitoring, EHM). Engines are the part of an aircraft where the most critical maintenance is required, this coupled to the fuel burn commercials makes managing them effectively an airlines critical success factor. RR, with 55,000 engines world-wide, has developed an approach with a team of specialists which allows predictive maintenance to be accomplished on their worldwide fleet of engines. The team monitor the engines and develop work scopes based on the data analysis, significantly reducing shop visits and aircraft downtime. Effective use of EHM has allowed the average 'engine on wing' time to rise to 8.5 years. Terry Ingman at Greater Anglia was able to remove routine door maintenance using a similar innovative approach (full case study on website).

- Delay reduction - in the organisations that are embracing RTM the use of the technology in preventing or reducing delays is becoming increasingly apparent. The traditional Maintenance Controller (MC) role is refocusing to that of Service Support Engineer, a role dedicated to supporting the effective running of a service. With stronger planning capability in the business improving the control of maintenance the planning aspect of the MC role is effectively removed. Training this group of professionals to use the RTM traces effectively means they can be analysing a defect before the driver has even detected it in the cab. This allows resource to be deployed ready to meet the arriving train.

Predictive use of IT

In several rail organisations the asset management system (AMS) is seen and used merely as a compliance tool. In the more maintenance efficient organisations, they are adopting a more productive use of the AMS to allow better planning and protection of maintenance and defects. If for example an

organisation understands that in September it uses more brake pads than in March, the forward loading of brake pads can increase in the month of September. Some of the trends EngPro witness in the matured efficiency-driven organisations are:

- Strong AMS discipline – If meaningful information is to be extracted from the AMS, this is essential. As an example, at one organisation the word tyre has been spelt in two ways the correct way and 'tire.' This sounds a simple error however data mining software meant that some of the tyre turning was getting missed. Training people in the use of the AMS and how to input correctly will be increasingly important. A planning team can only effectively plan if the task has been fully engineered with labour hours, materials and, scope of work.

- Proactive materials control – making sure that materials are issued against the correct work order is another example of where the data discipline will need improving. Organisations will need to find methods to help inform, guide and, where necessary, police data input accuracy.

- Data mining and analysis - by making sure defects are correctly system-coded and using common English language (correctly spelt) etc., means that data mining becomes possible. The planning team can use previous defect data to anticipate the forthcoming needs to make sure sufficient resources are available to rectify the problems without unduly burdening the headcount. Having a good data set in the AMS means that future maintenance strategies can be based on known past performance.

- Fleet management software - as well as controlling the assets accurately, better management of the fleet also allows efficiency savings. Being able to control Train Presentation accurately and quickly, through to allowing better control of modifications and restrictions. Even knowing where the fleet is and its orientation enables maintenance locations to ready themselves for the train, as well as enabling drivers to find trains in various yards. Some AMS offer a degree of fleet management capability but there is purpose designed software such as SOROS® available.

Culture shift

Many readers of this document may be thinking they have tried some of the IT and technological solutions listed above, and many have, but the advantages have never been fully realised. The main reason that EngPro observe for this 'want got gap' is that with every technological change there needs to be an associated cultural shift to allow the technology to deliver to its full potential. Without this cultural shift the introduction of the IT system or the technology becomes almost like a plaything for one or two individuals in the organisation.

Therefore, the biggest challenge that most rail maintenance organisations will face is a ***cultural shift from reactive to proactive maintenance***. In a plan led world where we desire consistency and repeatability, the variability that people quite like is no longer there, the challenge has changed, and so must people's attitude and approach. Just fixing trains is not going to be enough.

In a PSC the need to fix passenger facing defects no matter how trivial they may seem takes on a new level of priority. The need to find the time to perform good quality cleaning, and proper rotation of periodic heavy cleans will be essential. The rail maintenance professional of tomorrow will need to understand the passenger experience and how that impacts on the maintenance they undertake, and they will have to understand the commercial parameters of a maintenance organisation.

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New metrics such as:

- productivity,
- staff utilisation,
- passenger defect clearance times,
- serviceability to schedule,
- forward loading spares,
- perished hours,
- maintenance road utilisation and,
- list of work completion will be required.

The ***plan – do – review – learn*** cycle will need reinforcing, especially the review and learn elements which are often neglected due to time or other pressures. Weekly performance reviews, looking at metrics in all corners of the service, cost, quality triangle will doubtless be required to ensure organisational learning.

With sharpened planning and stronger control of maintenance the depot staff will be more driven to manage quality and cost as well as service outputs.

It is a known demographic that the age profile of rail maintenance is getting older so the industry of tomorrow with its fleet maintenance will need to be a modern and inclusive environment. An environment which attracts young and diverse groups of people. 87% of rail staff are presently male, and in the engineering disciplines that figure rises to 93%. The need to attract female engineers to bring a panoply of different ideas and stimulate innovation in maintenance is a critical success factor.

In conclusion there are challenges ahead, but many rail organisations are already starting to embrace the changes needed; a refocus of management energy will accelerate those changes, enabling the opportunities to be unlocked.

Editorial note: we hope you found this article of interest and informative. If you want further information on the analysis, or to take advantage of our free half day session, please don't hesitate to contact Howard Leach at EngPro

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