

Predictive Asset Management

Keeping Railway Assets Operational

With transport networks under increasing pressure to provide continuous and efficient service it is vital that assets are well-maintained and do not fail. Downtime must be minimised and planned.

The challenge is not simply to monitor the condition and performance of assets but to predict their degradation and plan intervention (maintenance and renewal) to prevent failure and achieve best whole-life cost.

How do you know what to monitor and how to make best use of the data generated from the monitoring?

Are you:

- ▶ Data-rich but unable to prioritise or forecast work effectively. *(I have loads of data and reports; I have a large number of defects in my workbank; I have limited resource; which faults should I fix first).*
- ▶ Looking to change your asset management regime but don't know where to start? *(How can I invest and take real benefit? How can I push out my overhaul from eight to 10 years and provide the assurance that it is safe to do so?).*
- ▶ Able to monitor a range of parameters and metrics but uncertain what the results are telling you. *(I am offering a range of monitoring and measuring equipment. I can tell you if something is measuring above or below a threshold but do not understand the assets to know what this really means).*

Frazer-Nash has a proven track record working across many safety-critical industries including defence, nuclear, oil, gas and transportation supporting clients optimise their maintenance and renewal strategies and plans. We can help you with your data and asset management challenges.



PREDICTING ASSET FAILURE

Frazer-Nash brings together experts in asset management, risk, asset life assessment, condition monitoring, safety and more to solve your particular performance challenges.

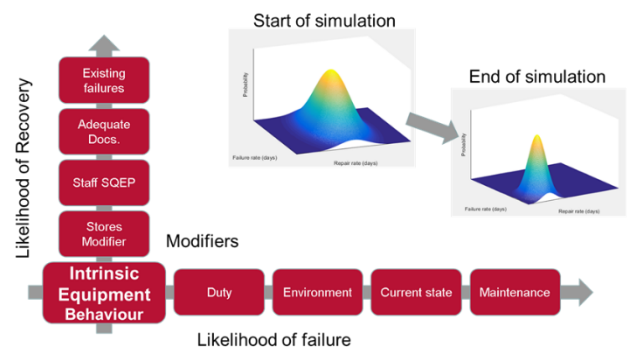
We can help you identify what is important to measure on your systems and help predict failures by measuring the

right things from day 1 and feeding these into whole-life models.

We have successfully developed risk-based models of high-end assets for clients with long life, safety critical assets.

EXAMPLE MODEL: PRIME

PRIME is a risk-based model for long life, high value assets we developed for the Ministry of Defence (MoD). The model provides a framework and software platform that can be applied to predict asset failure in railway systems.



Support staff are using PRIME to provide insight into future asset unavailability and the potential mitigations available for UK warships. They can identify the optimum support (correct person, level and timing) required and optimise engineering decision-making based on cost/availability trade-offs:

The approach used in PRIME has a number of advantages:

- ▶ The framework used within PRIME is setup to work regardless of the level of quantitative data available, with good agreement shown in validation for both high and low data models.
- ▶ For assets where little quantitative data is available, predictions have been made which agree well in validation;
- ▶ The compiled bespoke model can be used without license cost;
- ▶ It is validatable, providing predictions at the level data is available, and benefits from continual learning.

CONDITION MONITORING

Accurate real-time data on the status of assets combined with periodic inspection techniques and strong knowledge of the asset duty-cycle are all essential to provide the insight needed for predictive asset management to deliver efficient operations.

For more information about Frazer-Nash, please visit our website.

www.fnc.co.uk

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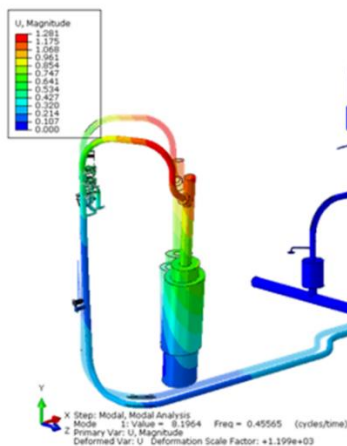


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Keeping Railway Assets Operational

At Frazer-Nash, we deploy a range of condition monitoring techniques to provide information about the performance and condition of your assets. These include:

- ▶ Short-term asset monitoring to support better understanding of baseline asset performance, the selection of what measurements to perform as part of a long-term campaign and support the validation of modelling.
- ▶ Long-term asset condition monitoring to support the identification of trends over time, and allow pro-active interventions to be planned.
- ▶ Integration and retrofitting of sensor technology into assets design to support long-term asset condition monitoring and life prediction.



Frazer-Nash have delivered a range of bespoke monitoring systems to support the understanding of asset performance in the most demanding environments.

Our condition monitoring engineers have a sound understanding of asset life prediction and modelling techniques, allowing appropriate sensors and conditioning monitoring approaches to be selected. We work with a range of hardware suppliers to provide a complete integrated solution to support your requirements.

ACHIEVING PRO-ACTIVE ASSET MAINTENANCE

End to end (E2E) RAMS analysis is critical to building an optimised proactive maintenance regime. It combines traditional and innovative approaches to maintenance, and can be applied throughout the asset portfolio of systems and equipment. The key areas are:

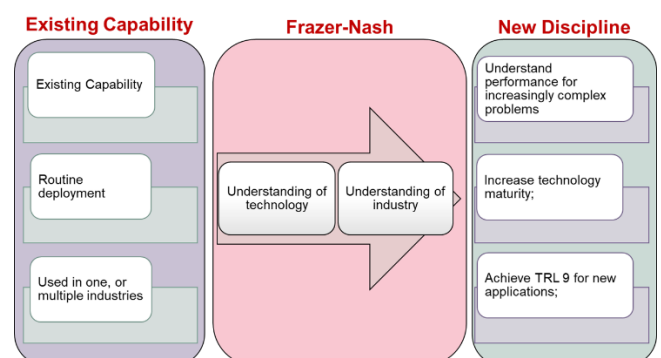
- ▶ Strategy: define the Maintenance Strategy based upon the Strategic Asset Management Plan.
- ▶ Planning: determine the RAMS requirements, approaches and technical methods required in order to enact the Maintenance Strategy.

- ▶ Analysis: Formal analysis techniques tailored to the individual customer end requirements, reviewing existing maintenance approaches with new/innovative approaches. This builds on knowledge gained through PRIME and Condition Monitoring.
- ▶ Reporting: Deliver an optimised asset maintenance regime, with associated time, cost and asset availability benefits analysis.
- ▶ Review: Continuous through life monitoring, data collection and analysis to provide proactive refinement of the maintenance regime, in particular for asset upgrade and replacement.



WHY FRAZER NASH?

Working across many safety-critical industries including defence, nuclear, oil, gas and transportation, we are able to identify best practises and capabilities from other sectors and bring them to the railway market.



We merge this cross-industry experience with our key railway industry experts in both Rolling Stock and Infrastructure assets including Electrification, Communications and Command, Control & Signalling to deliver new ideas to the industry.

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