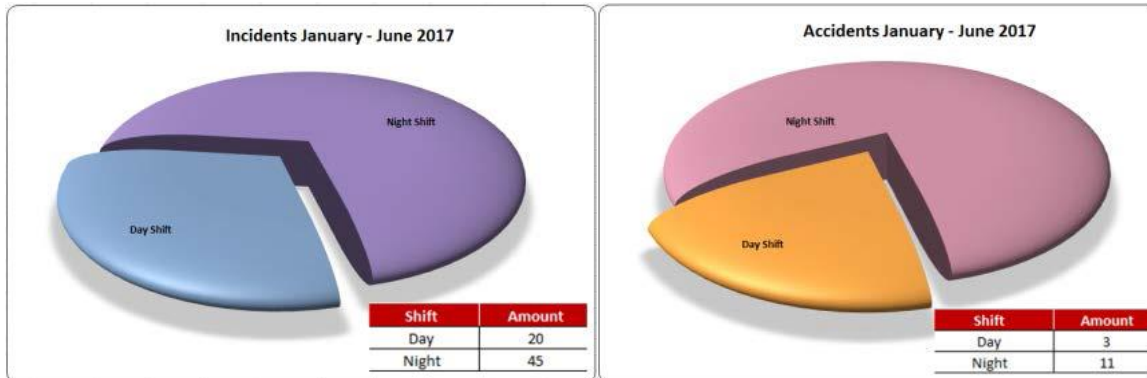


## Purpose

Morgan Sindall's Rail & Electrification team identified fatigue as one of the key hazards to its business and included it as one of the top five risks.

Following a series of low level, incidents during the delivery of the EGIP (Edinburgh to Glasgow Improvement Programme) project, there seemed to be a correlation between these incidents and teams that were working a pattern of six night shifts per week. Although none of the incidents listed fatigue as a root cause, the Morgan Sindall's safety team highlighted that it was likely to have been a cause.



## Initial Solution

In early 2017, the team commenced a fatigue monitoring project scheme with 100 people on the EGIP project, in partnership with Fatigue Science. This pilot programme ran for sixty days in order to establish fatigue baselines and trends for use across the wider business. Participants were equipped with Readibands that used movement and algorithms to monitor and predict fatigue.

Participants had the ability to access their own data via an app and webpage, allowing for self-education on fatigue state and sleep patterns. The pilot was coupled with a programme of education on fatigue and medical interventions, where required.

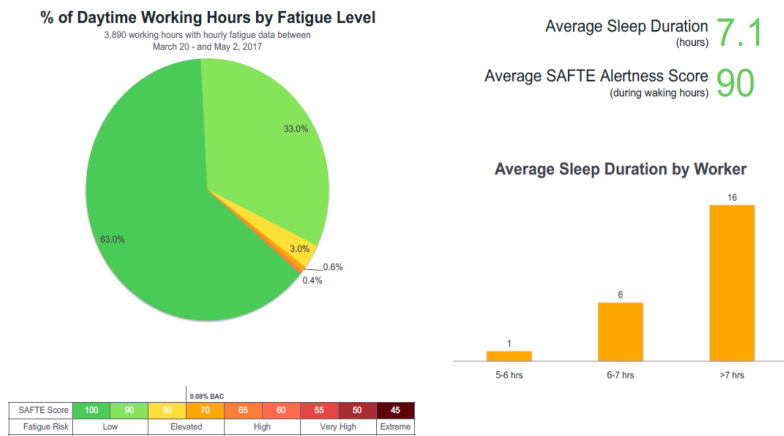


Wearing a Readiband for three days generates a SAFTE™ score where 100 is the highest score available. A lower score is a result of cumulative poor sleep quality and quantity, or from being awake for a long period. The effects of fatigue are similar to those of alcohol, although not identical.

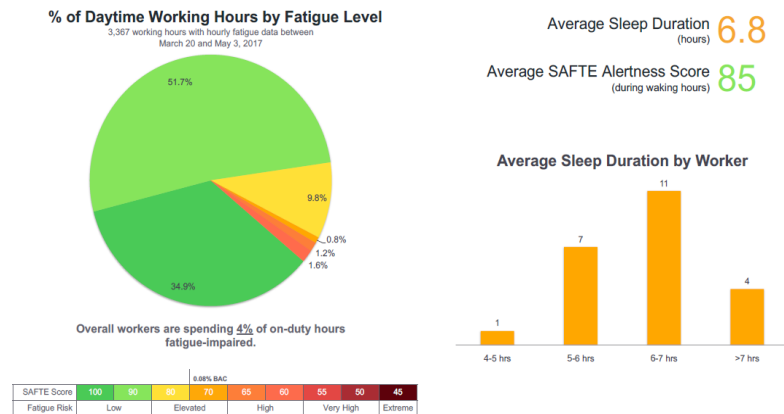
Readiband score	100	90	80	70
Reaction time slowed by	0	10%	25%	43%
Like being awake for				21hr
Blood alcohol equivalence				0.08

Results from the pilot came from three working patterns: an office based dayshift; a site based dayshift; and a site based nightshift with the following results.

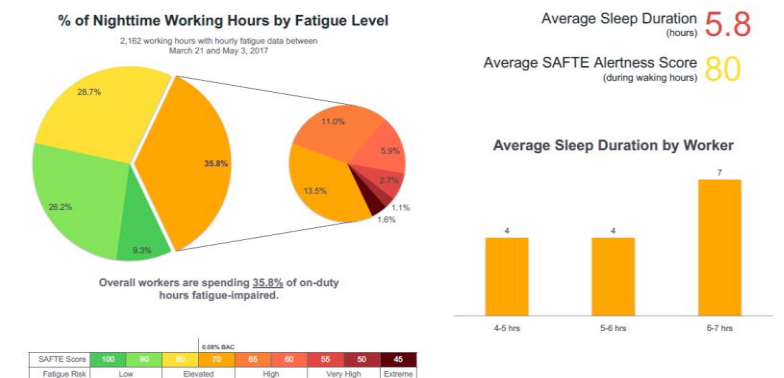
## Office based dayshift



## Site based dayshift



## Site based nightshift



The results highlighted that groups working in an office or on site during the day were at a low risk of fatigue in the main. However, they clearly demonstrated that groups working at night were at a much higher risk of fatigue, with almost 36% of the workforce in a state of fatigue requiring intervention during working hours. This correlated with the low-level accident data.

## Ongoing Solution

The team developed a Fatigue Intervention Strategy for use across the whole of Morgan Sindall's Rail & Electrification team:

- Eliminate the most extreme occurrences of fatigue with daily predictive monitoring
- Establish Cease Work Thresholds for day and night shifts based on risk tolerance and impact to operational continuity
- Development of a Fatigue Intervention Plan with intervention tactics tied to specific Readiband (SAFTE) scores
- Provide training and change management support to supervisors and workers

As the rollout of Readibands continues, the team has set KPIs relating to the percentage of safety critical staff and drivers (over 2,500 miles per month) working whilst fatigued.

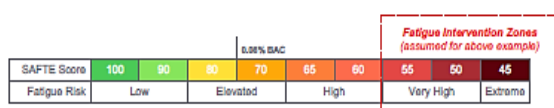
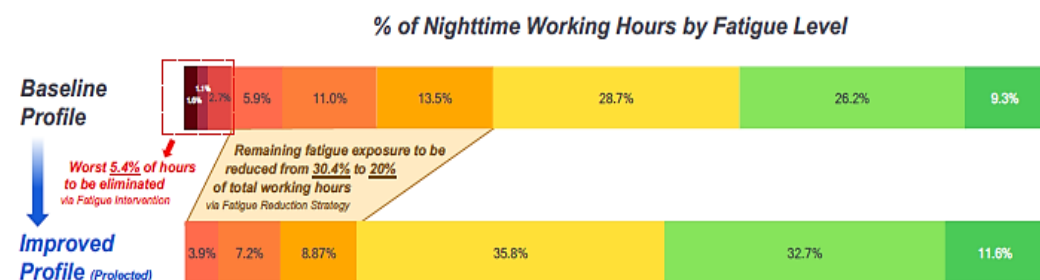
The workforce are engaged in the scheme through the training provided; health consultations; and accessing their own data through the Fatigue Science app - allowing them to take responsibility for their own fatigue from a more informed position.

The team has revised and updated all of its fatigue management documentation and rolled this out to all projects whilst also informing customers and supply chain of the benefits. The revised Fatigue Management Plan includes an intervention plan for those wearing Readibands as well as new rest periods and shift durations.

In addition to the Fatigue Intervention Strategy, Morgan Sindall has implemented a Fatigue Reduction Strategy to:

- Improve the fatigue risk profile by supporting the workforce in getting better sleep
- Support trained staff by Fatigue Science to analyse results in order to identify those who are chronically fatigued and refer them for Occupational Health screening
- Provide individualised guidance and fatigue management training for all

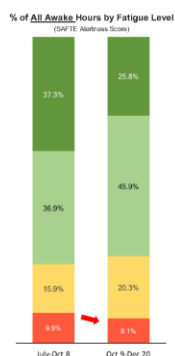
By putting these strategies in place, the team estimate a material improvement in the overall Fatigue Risk profile for the business. The ultimate goal is to have no safety critical resource working in a fatigued state and to be able to demonstrate this by using Readibands.



KPI Summary	Baseline	Target
% of working hours below Fatigue Intervention Threshold (SAFTE < 65)	5.4%	0%
% of working hours below Fatigue Risk Threshold (SAFTE < 70)	35.8%	20%

To date the following improvements have occurred:

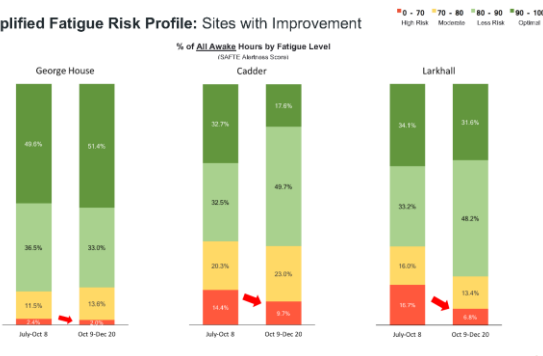
## Simplified Fatigue Risk Profile: All-Site Average



Averaged across all 5 locations, Morgan Sindall's Simplified Fatigue Risk Profile indicates a **reduction in exposure to fatigue impairment from ~10% to ~8%** of waking hours in the 3-month period of October – December, as compared to the preceding 3-month period.

Note: This analysis accounts for all awake hours and does not use time & attendance data to exclude non-working hours or split results by day and night shift. Additionally, it's been noted that participation into December has been reduced. As a result, these results may portray differences from the actual underlying trends if any significant variation exists on account of those factors.

## Simplified Fatigue Risk Profile: Sites with Improvement



## Awards

In November 2017, Morgan Sindall received an award of High Commendation from the Institution of Occupational Safety and Health (IOSH). The award, presented at IOSH's annual Rail Industry Conference 2017 in Nottingham, was in recognition of the company's work in the area of fatigue risk management.

In February 2018, IOSH asked the team to share our programme through a webinar with very positive feedback and questions generated through the industry.



## About Fatigue Science

Fatigue Science combines wearable tech with bio mathematical science from the US Army Research Lab, validated by the US Department of Transportation. SAFTE™ is exclusive to Fatigue Science and processes inputs related to sleep and circadian rhythm to generate an easy to understand, predictive alertness score.

Fatigue Science's validated technology enables fatigue risk reduction strategies via a suite of software tools including a personal app. This provides a Readiband wearer visibility into their sleep patterns and daily-predicted levels of fatigue.

By combining their Readiband wearable device, which collects objective sleep information, with the SAFTE™ Fatigue Model, Fatigue Science empowers individuals to manage and improve daily alertness with:

- Visibility into daily and weekly detailed sleep metrics
- Current and predicted fatigue levels
- Goal setting tools to improve on baseline fatigue measures
- In-app education modules related to individual sleep and fatigue management

Optional web-based tools for managers are also available to help understand historic fatigue trends or review upcoming fatigue risks for early intervention.