

Shift, Roster Design and Risk Assessment

The design of shifts and rosters are a crucial component for any business. The organisational design of a shift pattern and roster cycle can determine the level of risk that is inherent to a workplace. For those organisations, operating on a 24 hr/7-day shiftwork operation, those working irregular hours, managing large scale maintenance shutdowns and for athletes who travel to compete in elite competition.

To support organisations to **objectively quantify risk and assess their rosters**, Melius Consulting provides strategic advice and design of shifts and rosters using biomathematical modelling using the **Sleep, Activity, Fatigue and Task Effectiveness (SAFTE™)** model.

The SAFTE™ algorithm incorporates a homeostatic sleep reservoir, circadian oscillator and a sleep inertia function to predict alertness and the likelihood of an accident occurring¹. The algorithm allows the input of variables such as geographical location (longitude and latitude) for the calculation of natural light and dark cycles, duration of shifts, and sleep variables measured by wrist-activity monitors including sleep duration, time at sleep onset and time at wake².

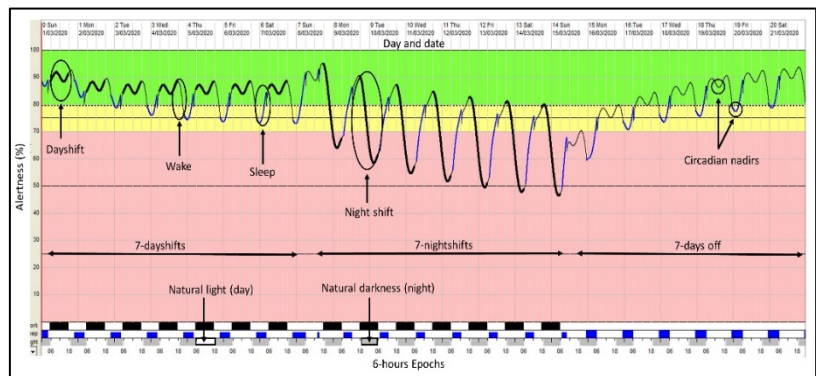


Figure 1: An example of a SAFTE™ model output

Measures of effectiveness (0-100%) derived from the SAFTE™ algorithm have been correlated with and validated against reaction time testing. The **SAFTE™ algorithm has been scientifically validated** and is used widely by the US Department of Defence, the US Army, the US Air Force, the US Navy, the US Marine Corps, and the Federal Railroad Association. At Melius Consulting we have utilised SAFTE™ in Rail with Metro Trains Melbourne, mining with BHP, Karara mining, Anglo Gold Ashanti Australia, oil and gas platforms with Fugro, Agriculture with CBH Group, Super Rugby, Formula 1, and Combat Sport Athletes to mitigate fatigue risk, manage schedules, enable performance and alertness and to perform root cause error analysis as part of accident investigations^{1,3}.

As part of this service, organisations receive a scientific report detailing the methodology, results, and recommendations for minimising risk. This approach allows an organisation to compare rosters to work with Human Resources, Employees and Unions to select the best roster based on fatigue risk, operational requirements, local legislation, and other requirements.

Prices for the assessment of shifts and rosters using SAFTE™ start at \$2,000 and will vary according to the requirements of an organisation.

For more information, contact:

Dr Ian C Dunican PhD | MBA | MMineEng | GradCert(ASc) | BA
Director/Chief Adviser
+61 409 680 867 or email ian.dunican@meliusconsulting.com.au

References

1. Hursh S, Raslear T, Kaye S, et al. Validation and calibration of a fatigue assessment tool for railroad work schedules, summary report 2006.
2. Hursh S, Redmond D, Johnson M, et al. Fatigue models for applied research in warfighting. *Aviation, Space, and Environmental Medicine* 2004;75(3):A44-A53.
3. Roma PG, Mead AM, Nesthus TE. Flight attendant work/rest patterns, alertness, and performance assessment: Field validation of biomathematical fatigue modeling. In: Administration OoAMFA, ed. 800 Independence Ave., S.W. Washington, DC 20591, 2012.