



ADDRESSING THE QUESTION OF FATIGUE

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AGENDA

- **Introduction**
- **Background**
- **Methodology / Results**
- **Conclusion**

BACKGROUND

CONTEXT

- Bringing Total E&P UK and Maersk Oil UK together in 2018 required a unification of rota patterns for all sites
- Total worldwide operates site using equal time rotation
- Principles for reviewing the rota pattern to be implemented:
 - Safe staffing levels
 - Reduce the risk of safety critical communication breakdown
 - Manage the fatigue risk
 - No swing shifts
 - Management of overtime
 - Reducing numbers on night shift where possible
 - Extra recovery from night shift rotation period
 - Staggered rotation
 - Sustainable rotation pattern for our operations
 - Same at all sites

WHAT IS FATIGUE

- **Energy Institute definition**

- Reduced mental & physical functioning caused by sleep deprivation &/or being awake during normal sleep hours. This may result from extended work hours, insufficient opportunities for sleep, failure to use available sleep opportunities, or the effects of sleep disorders, medical conditions or pharmaceuticals which reduce sleep or increase sleepiness

- **IOGP (international Oil & Gas producers) definition (pre 2019)**

- Fatigue (mental fatigue) is a progressive decline in alertness and performance caused by insufficient quality or quantity of sleep, excessive wakefulness, or the body's daily circadian rhythm.

- **IOGP (international Oil & Gas producers) definition (2019)**

- Fatigue is a lack of mental alertness, drowsiness, arising from lack of sleep. It does not include the effects of physical effort, exposure to heat, or stress.

- **HSE Definition (HSG256)**

- Fatigue is the decline in mental and/or physical performance that results from prolonged exertion, lack of quality sleep or disruption of the internal body clock. The degree to which a worker is prone to fatigue is also related to workload

- **Total - procedure definition – L2-SE-07-024**

- Fatigue is defined as “the decline in mental and/or physical performance that results from prolonged exertion, lack of quality of sleep or disruption to the internal body clock.

METHODOLOGY

METHODOLOGY



DATA GATHERING

- **OBJECTIVE**

- Gather information on the sources of fatigue, using the following guidance:-
 - Fatigue Risk Management Framework within Energy Institute Guidance (2014)
 - IPIECA/IOPG 626 – Managing Fatigue in the Workplace (2019)
 - HSG 256 – Managing Shift Work (2006)

- **FATIGUE DATA**

- QUALITATIVE

- Rota workshops – structured workshops to assess fatigue risks for existing and new rota patterns
- COMAH Critical Tasks – review and map the influence of fatigue PIFs on CCTs

- QUANTITATIVE

- Readiband trial – deployment of Readiband to objectively assess alertness levels across existing and new rota patterns
- FAST modelling
- Comparison of circadian disruptions and psychosocial factors

QUALITATIVE

● ROTA WORKSHOPS

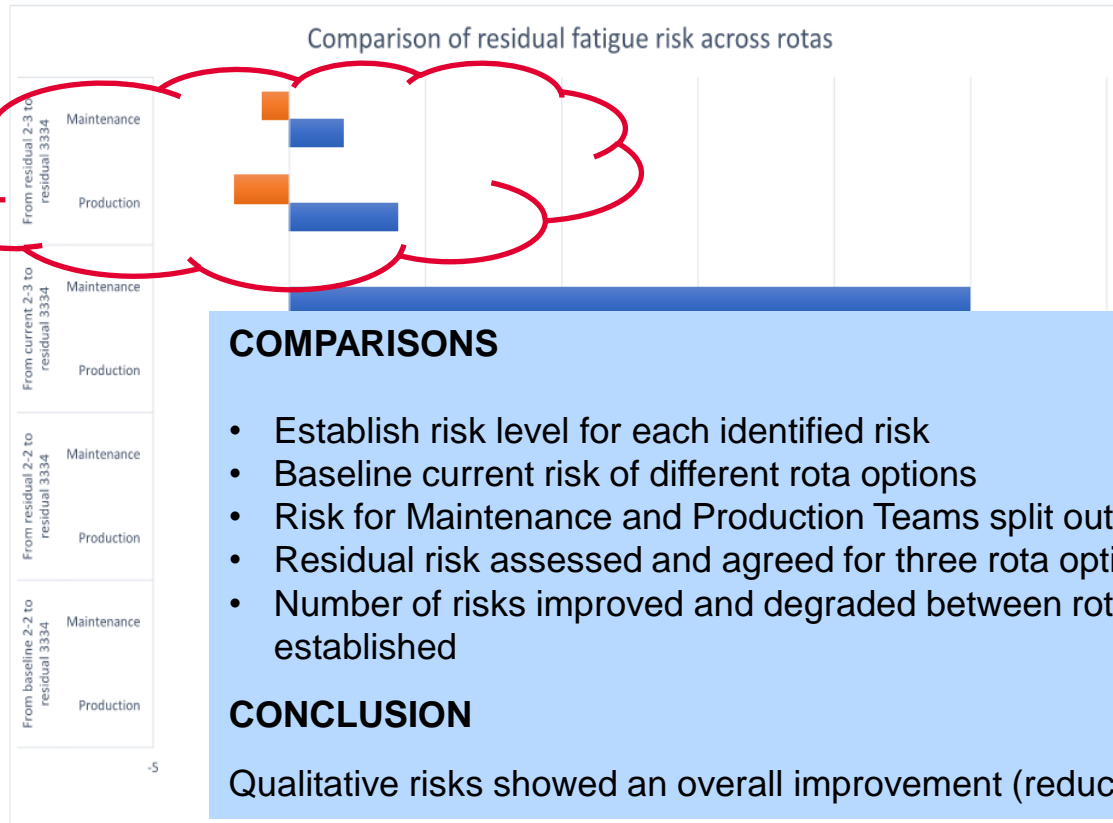
- Aim

- Identify and assess fatigue hazards taking into account existing controls & proposed new controls for existing and new rota pattern.
- Review new control measures proposed for each guideword, using Hierarchy of Control, agree which ones to be implement for existing and new rota pattern.

- Process

- Risk assessment workshops completed at site.
- Separate workshop completed to review all control measures proposed for each guideword.
- Workshop teams comprised of non residential /residential personnel, personnel on existing & new rota & mixture of different roles / different departments.

QUALITATIVE



QUALITATIVE

● COMAH CRITICAL TASKS

- Aim

- Map of CCT against Fatigue PIFs to identify the which CCTs are more sensitive to fatigue.
- Develop list of controls to manage CCT and Identify CCT tasks that can be removed from nightshift.

- Process

- Workshops completed with mixture of site personnel to map fatigue PIF's against CCT.
- Impacts rated as low, medium or high for each Fatigue related PIF.
- Separate workshop completed to identify controls, using hierarchy of control, to minimise the impact of fatigue on CCTs

- Conclusion

- List of CCT tasks that can be removed from nightshift
- Identified additional controls to minimise the impact of fatigue on all CCT

QUANTITATIVE

● READIBAND TRIAL

- Aim

- To gather objective alertness data for existing and new rota pattern
- Assess impact of alertness data between existing and new rota pattern
- Comparison between FIFO and Locals, day and nightshift.

- Process

- Original assessment consisted of 20 volunteers over a 30 day period.
- Assessment period was extended to 90 days to gather additional data
- Assessment period extended again to 120 days and 47 volunteers to capture further data.
- A total of 17,619 working hours assessed across day and nightshift.
- Volunteers comprise of a mixture of existing and new rota, as well as non residential and residential personnel across a mixture of roles / departments, days and nights.
- Alertness scores of <77 chosen as the benchmark – more conservative than <70 score which is the standard approach.

QUANTITATIVE

Day Shift

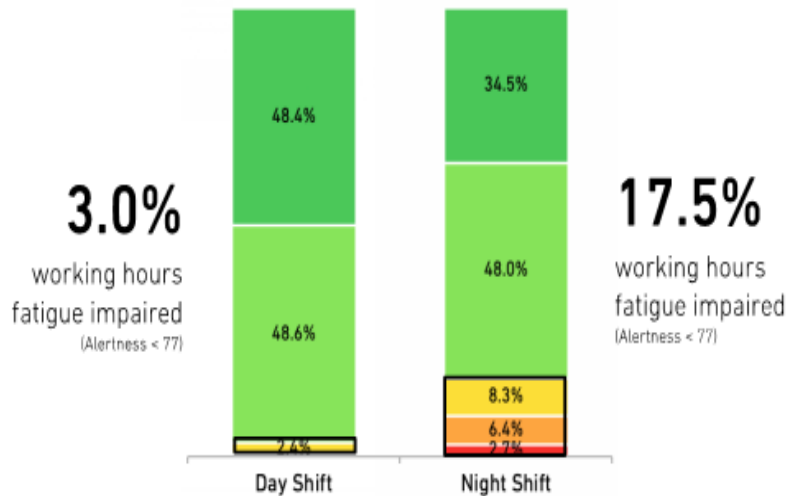


6:30-18:30⁵, n = 11,658 working hours.



Night Shift

18:30-6:30⁵, n = 5,961 working hours.



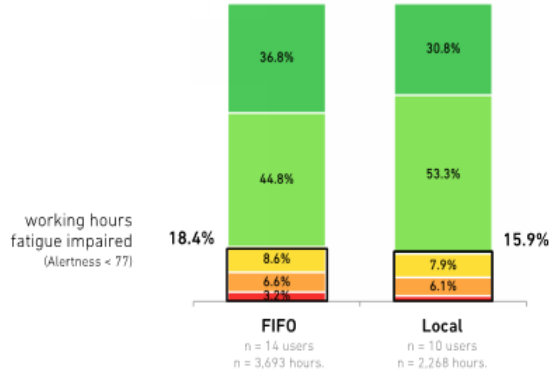
Alertness Score:	0 - 60	60 - 70	70 - 77	77 - 90	90 - 100
Fatigue Risk:	Very High	High	Elevated	Low	Optimal

QUANTITATIVE



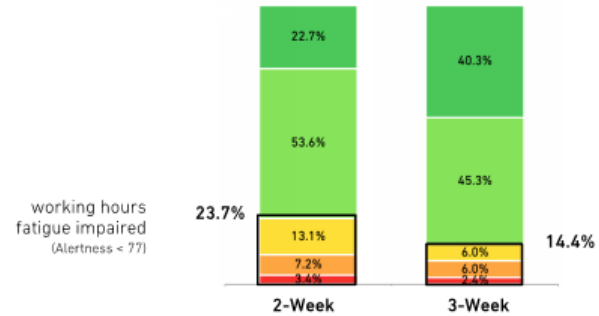
Night Shift

18:30-6:30^h, n = 6,187 working hours.



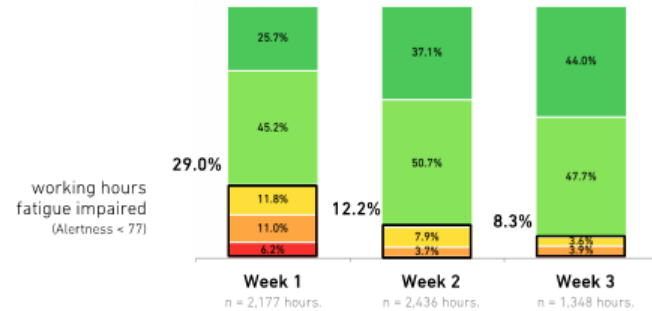
Night Shift

18:30-6:30^h, n = 5,961 working hours.⁴



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18:30-6:30^h, n = 5,961 working hours.



Alertness Score:

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Very High	High	Elevated	Low	Optimal

Fatigue Risk:

QUANTITATIVE

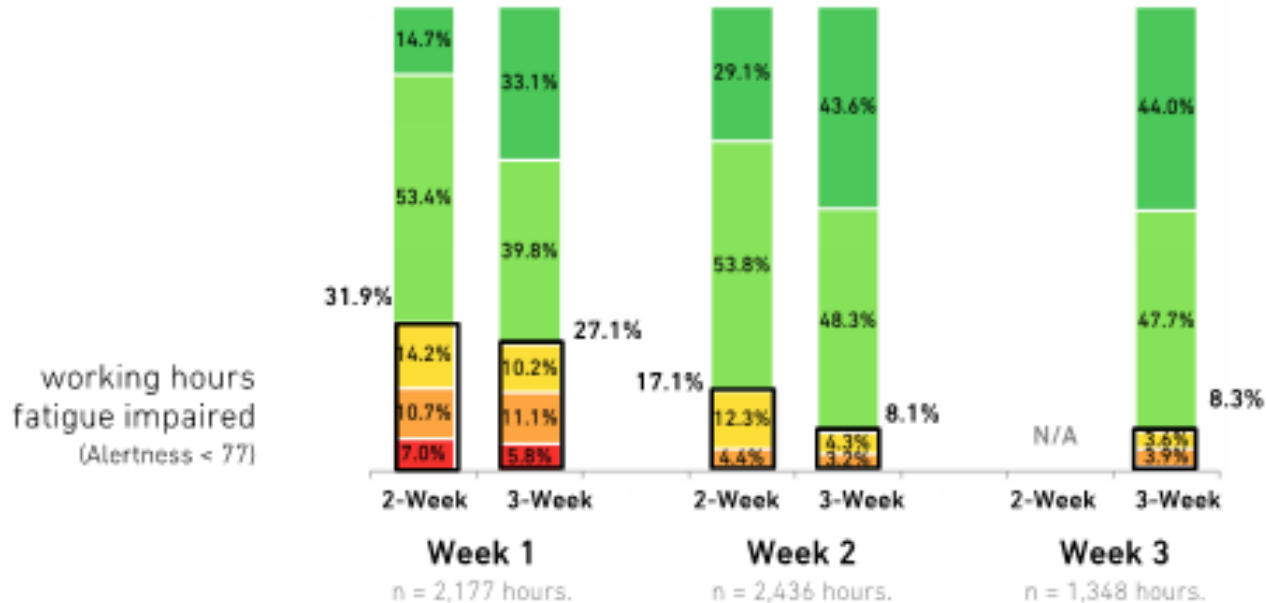
Alertness Score:
Fatigue Risk:

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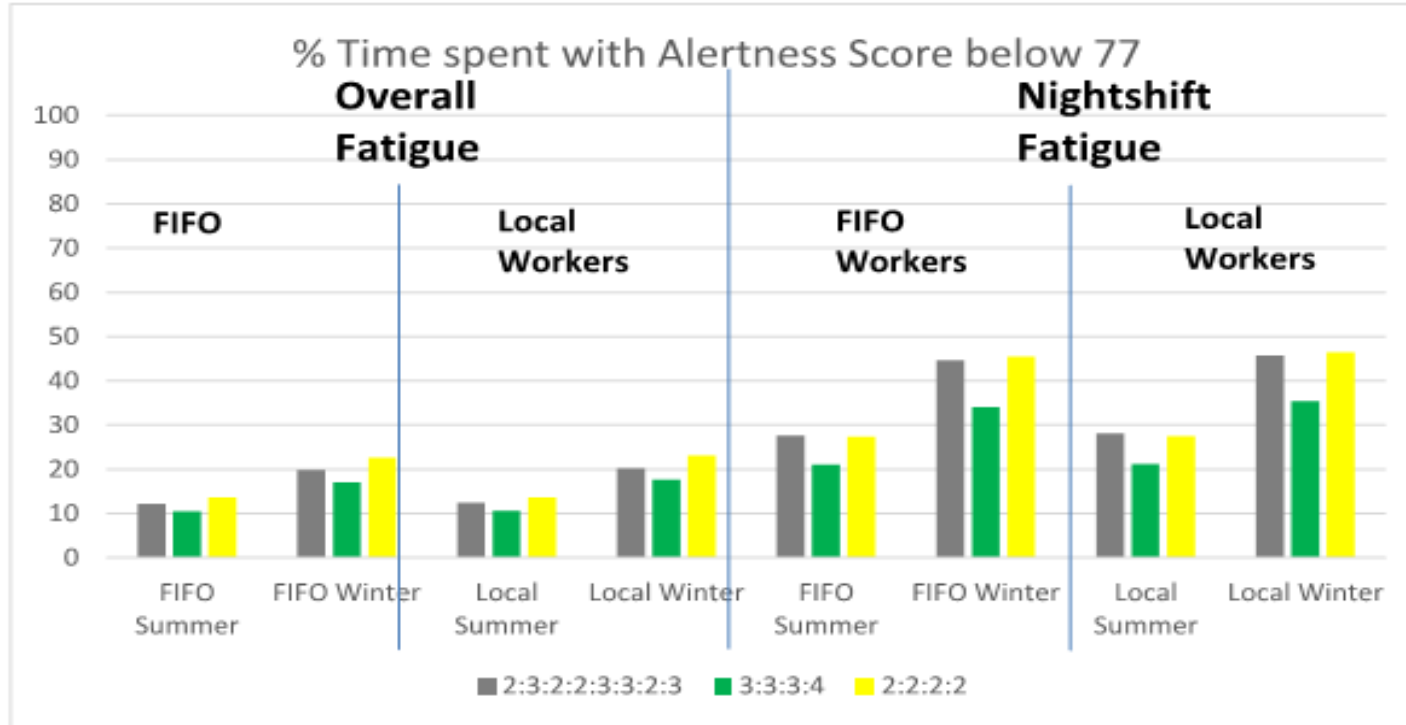
Night Shift

18:30-6:30⁵, n = 5,961 working hours.⁶



QUANTITATIVE

- FAST – Fatigue Avoidance Scheduling Tool
- Same model as used in the Readiband (SAFTE – Sleep, Activity, Fatigue and Task Effectiveness)



QUANTITATIVE

COMPARISON OF CIRCADIAN DISRUPTIONS AND PSYCHOSOCIAL FACTORS

Circadian Disruption	
Issue: circadian disruption is a prime contributor to fatigue and should therefore be minimised.	
	Number of Disruptions
2:2 rota	12.8
2:3 with 2 additional weeks	10.4
3:3:3:4 with 2 week bump	8.4

Flights per year	
Issue: due to timing and the effect on sleep, flights are associated with increased fatigue risk and should therefore be minimised.	
	Number of flights
2:2 rota	26
2:3 with 2 additional weeks	20.8
3:3:3:4 with 2 week bump	16.8

Days Away from Home	
Days away from home contribute to poor wellbeing and fatigue and should therefore be minimised.	
	Number of days
2:2 rota	208
2:3 with 2 additional weeks	180.4
3:3:3:4 with 2 week bump	186.2

Social Weeks	
Issue: social weeks are of most benefit for recovery and improved wellbeing and should therefore be maximised.	
	Number of Social Weeks
2:2 rota	19.6
2:3 with 2 additional weeks	24
3:3:3:4 with 2 week bump	23.6

CONCLUSION

CONCLUSION OF FATIGUE RISK REVIEW

- The overall qualitative risk assessments, coupled with quantitative approach (Readiband & FAST analysis) show no increase in fatigue risk resulting from the implementation of the new rota.
- Reduction of circadian disruptions & flights per year in moving to the new rota
- Readiband data clearly highlights that the highest risk area for nightshift is the 1st week – likely the result of workers requiring to acclimatise to a different sleep / wake routine.
- Implement a robust Fatigue Risk Management Plan, with the identified risk reduction measures and appropriate training

NEXT STEPS

- Take the learnings from the work carried out at SGP and see what is also relevant to apply offshore
- Improve the fatigue risk assessment tool
- Improve the data analysis and dashboard
- Improve the investigation of fatigue impacts in incident investigations

- Lingering questions:
 - What are, and how do we manage, the mental and physical health impacts of shiftwork?

QUESTIONS