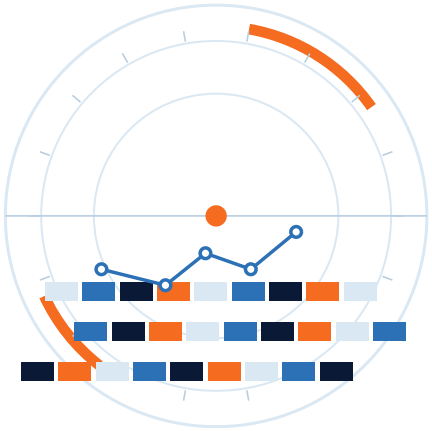
GILBRETHX | Insights
HUMAN ENGINEERING FOR CONTINUOUS OPERATIONS

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IS YOUR SHIFT SCHEDULE COMPLIANT? BUT DOES IT ALLOW RECOVERY?



Why meeting working-time requirements is only the starting point for understanding fatigue exposure in 24/7 operations.

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A schedule can look right on paper

In a hospital, a railway control room, a logistics hub or an industrial facility, operations continue while much of the world sleeps. People must be present, critical positions covered and applicable rules followed.

Yet a completed roster leaves a different question unanswered: **what does this arrangement mean for the people expected to remain alert, make decisions and perform safely?**

IN BRIEF

- Legal compliance is essential, but is not a complete fatigue assessment.
- Equal working hours can create different patterns of exposure.
- Recovery opportunities depend on timing, sequences and context.

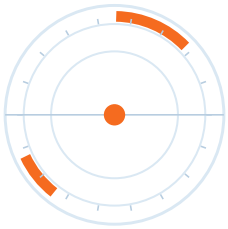
The same hours. Different patterns.

Consider two hypothetical rosters with the same number of shifts but different distributions of day, evening and night duties. Neither pattern reveals how fatigued an individual actually feels.



D Day E Evening N Night R Rest day

Compliance is a foundation, not a fatigue assessment



Working-time protections are essential. Directive 2003/88/EC generally establishes an entitlement to **11 consecutive hours of daily rest within each 24-hour period**, with defined derogations and sector-specific arrangements [1].

But rest time recorded on a roster is not the same as sleep obtained. Travel, caring responsibilities and time to unwind compete for that interval. After a night shift, sleep may need to occur during the biological day, when circadian rhythms and environmental conditions can make it more difficult.

The UK Health and Safety Executive explicitly warns that compliance with working-time regulations alone is insufficient to manage fatigue risk [2]. This is not an argument against regulation; it recognises that **legal requirements and comprehensive fatigue assessment answer different questions.**

What the science supports — and where it urges caution

Kecklund and Axelsson describe acute sleep loss associated particularly with night and early-morning work, alongside evidence linking shift work to health and safety outcomes [3]. Mechanisms are plausible, but outcomes also depend on the individual, the task and the working environment.

Finland provides an instructive example of systematic evaluation. The Working Time Traffic Light recommendations use objective records to examine characteristics of working hours. A 2026 review reported associations between regular use of the tool, improvements in working-time patterns and fewer occupational accidents in Finnish health and social care [4].

These findings are observational associations, not proof that identical effects will occur in every organisation. A 2023 Cochrane review also found that evidence for many specific roster adaptations improving sleep or sleepiness was limited or very uncertain [5].

There is **no single shift pattern proven to be optimal** for every organisation or worker. This is an argument for context-specific evaluation, not against thoughtful schedule design.

> Compliance defines important boundaries. Fatigue management asks which exposures remain.

Use the data you already have — with clear limits



Many organisations already hold information that supports an initial structural assessment: planned rosters, actual hours, night duties, overtime, swaps, absences and staffing requirements.

The starting point may be less about collecting new personal data and more about asking better questions of the operational information already available.

WHAT ROSTER DATA CAN SHOW

- Timing and concentration of night work
- Sequences of duties and rest days
- Intervals between shifts
- Differences between planned and actual work

WHAT IT CANNOT SHOW

- How long an individual actually slept
- How sleepy a person feels on duty
- Whether a particular error will occur
- An individual clinical fatigue diagnosis

From patterns to feasible decisions

The questions are practical: Where do shorter recovery intervals cluster? How often does the actual schedule differ from the planned one? Which roles carry demanding shift sequences? Could another arrangement preserve essential coverage while distributing recovery opportunities more predictably?

Answers can identify organisational patterns worth investigating. But **schedule analysis is one component of fatigue risk management**, not a substitute for understanding workload, working conditions, personal circumstances or workers' experience.

Feasible improvements must balance continuity, staffing, skills, fairness, costs and employment rules. Workers and managers should be involved, and changes should be evaluated rather than assumed to work.

> Roster data describe exposure; they do not measure individual fatigue.

A different question for operational leaders



When your organisation reviews a roster, what is discussed first: staffing coverage, hours, cost, compliance? **Where in that review are night-work exposure, demanding sequences and realistic opportunities for recovery examined systematically?**

FOUR QUESTIONS WORTH ASKING

01 What must the operation deliver?

Define staffing, competencies, continuity and the legal and practical constraints. Human factors cannot be separated from the work that has to be done.

02 What does the available information show?

Distinguish planned schedules from hours actually worked. Interpret exposure indicators carefully, without treating them as personal fatigue measurements.

03 Which alternatives are feasible?

Compare scenarios against transparent criteria. A change that improves one dimension may create costs or difficulties elsewhere.

04 How will the change be evaluated?

Involve affected workers and operational managers, document assumptions and monitor outcomes after implementation.

> **The aim is not an ideal timetable. It is accountable, evidence-informed decisions.**

From managing hours to understanding exposure

Working-time compliance remains indispensable. So does meaningful worker participation. Neither should be dismissed, but neither removes the need to examine how work is structured.

The wider opportunity is to integrate what science tells us about sleep, fatigue and recovery into routine decisions about staffing and schedules — **not to predict individual mistakes from a timetable, and not to transfer systemic responsibility to workers.**

A schedule is more than a timetable. It records how an organisation distributes demands and opportunities for recovery over time. The critical question is not only whether a schedule can be implemented, but what it asks of the people who must work it.

> Making exposure visible is the beginning of better operational decisions — not the end of the assessment.

References & further reading

[1] European Parliament and Council. Directive 2003/88/EC concerning certain aspects of the organisation of working time.

[2] UK Health and Safety Executive. Fatigue — Human Factors.

[3] Kecklund G, Axelsson J. Health consequences of shift work and insufficient sleep. BMJ. 2016;355:i5210.

[4] Härmä M, Karhula K, Turunen J, et al. Working time traffic light recommendations: development, use, and implementation in Finnish social and healthcare. Industrial Health. 2026;64(3):214–232.

[5] Hulsegge G, Coenen P, Gascon GM, et al. Adapting shift work schedules for sleep quality, sleep duration, and sleepiness in shift workers. Cochrane Database of Systematic Reviews. 2023;9:CD010639.