

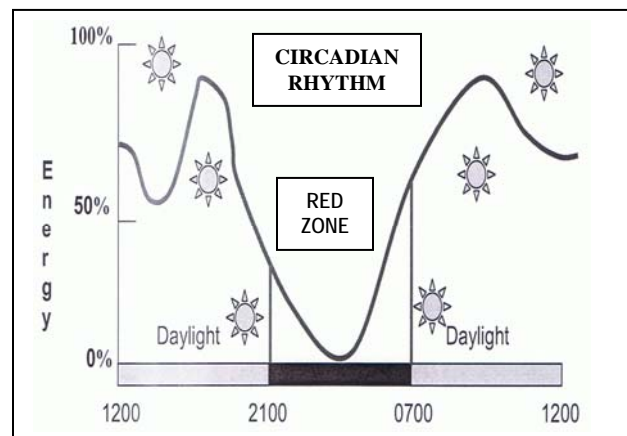
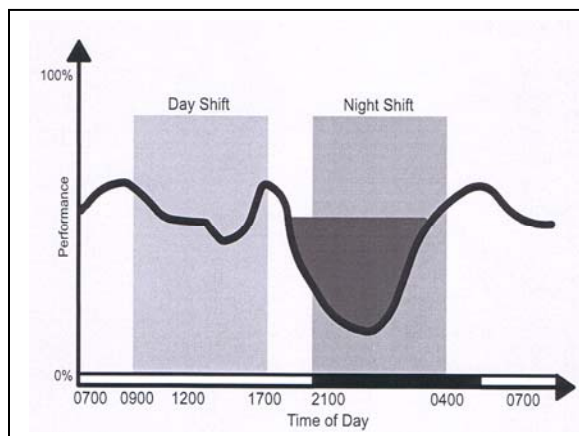
ALERTNESS GUIDE... Watch Schedules

Guide Objective: Use discussion topic to educate on how some watch schedules can support endurance while others can reduce endurance. Review standard industry schedules and how some of them are healthy while others may contribute to reduced endurance and increased fatigue.

Discussion:

With the 24/7 operations of the maritime industry someone will always be working during the night. Work and watch schedules have more influence on sleep behavior, and ultimately endurance, than any other operational factor. In fact our sleep timing and duration are determined by our work requirements. If you work at night, you have to sleep during the day. Also, the amount of time you have off watch determines how much sleep you have available.

The human body is naturally oriented toward expending energy during daylight hours and resting (restoring energy) during nighttime hours. The amount of energy available over a 24 hour period, therefore, normally peaks in daylight and bottoms out in darkness. Because performance tends to correlate with available energy, the human body tends to function most efficiently in daylight, when the energy level is highest, and least efficiently in darkness, when the energy level is lowest. Note that the Red Zone, daily period of lowest energy, is at night while the night shift is on duty.



Changing the schedule without utilizing the recommended steps of CEMS (1. Education, 2. Environmental and Operational Improvements, 3. Light Management, 4. Coach, 5. Schedules) could cause more fatigue and less endurance. Even though an individual has the opportunity to get more sleep with a schedule change if they aren't able to get a better quality / quantity of sleep, whether through their own time management or operational / environmental issues, working the additional 1 or 2 hours would be more frustrating and exhausting. That's why it's important to have a trained CEMS coach work with the crew when implementing a CEMS process and, specifically, during discussions about changing schedules.

Work and watch schedules can be evaluated, and changed if necessary, to help increase endurance and reduce fatigue. In order for these changes to be effective and successful, crewmembers need to have a thorough understanding of their behavioral choices and lifestyles that contribute to its success. Additional considerations on environmental and operational issues that affect these behavioral choices and lifestyles, as well as risk factors identified, will also play a role in the success or failure of a schedule change.

For this reason a schedule change shouldn't be made until all crewmembers understand why the schedule needs to be changed and how a new schedule should be chosen.

The following are the fundamental criteria recommended by CEMS that should be considered for an effective schedule:

- **Uninterrupted sleep**
 - o **Crewmembers should have enough time off to obtain 7-8 hours of uninterrupted sleep per 24-hour period.** *(Sleep research indicates that the average human needs 7-8 hours of uninterrupted, quality sleep to recover, both mentally and physically. In the maritime industry it's not possible to get this amount of sleep on a regular basis, if ever, but the goal of a schedule is to allow for as much uninterrupted sleep as possible. i.e. – 5 hours sleep is better than 4 hours sleep, 6 hours sleep is better than 5 hours sleep, etc.)*
- **Continuity**
 - o **Crewmembers working at night should be able to maintain the same work-rest schedule for at least 2 continuous weeks.** *(It takes about one week to acclimate to a new circadian rhythm, and once they are adjusted, it's better not to switch shifts again too soon. If possible, keep on same schedule the entire hitch.)*
- **Night to day / day to night avoidance**
 - o **Changes in work schedule from day to night, or from night to day, should be minimized in order to avoid a condition similar to jet lag.** *(If a person has to do this rapid rotation it's better to change from day to night instead of night to day. If possible, allow 24 hours between this schedule change or at least an opportunity for the individual to take a nap in the afternoon prior to starting the night shift.)*
- **Length of work periods**
 - o **Work periods should be no longer than eight (8) continuous hours, particularly when prolonged exposures to extreme temperature or humidity levels are involved.** *(If a crew is working 12 hour shifts, recognize the need for breaks and allowances when necessary due to high workload, weather, etc.)*
- **Environmental light-management techniques should be used to adapt crewmembers to night watch.**
 - o **Use as much light as possible up to 3 hours before the normal sleep period.**
 - o **Watch out for getting too much light getting off watch.** *(Review the Alertness Guide on Light Management.)*

EVALUATING WATCH SCHEDULES FOR LIVE-ON VESSELS

Square 6 Watch - Traditional Hours (6, 6, 6, 6)

| | <u>Forward Watch</u> | <u>Aft Watch</u> |
|------------------------------|-----------------------------|----------------------------------|
| <u>2400 – 0600</u> (6 hours) | * average main sleep period | ** getting off watch in daylight |
| <u>0600 – 1200</u> (6 hours) | on watch | ** average main sleep period |
| <u>1200 – 1800</u> (6 hours) | short sleep or nap period | on watch |
| <u>1800 – 2400</u> (6 hours) | on watch | short sleep or nap period |

* Good sleep quality because it's in the Red Zone but not enough uninterrupted sleep (average 4.5 – 5 hours).

** Getting off watch after daylight will affect the back watch's ability to fall asleep & quality of sleep (average 4.5 – 5 hours).

Square 6 Watch – Alternate Hours (6, 6, 6, 6)

| | <u>Forward Watch</u> | <u>Aft Watch</u> |
|------------------------------|-----------------------------|--------------------------------------|
| <u>2300 – 0500</u> (6 hours) | * average main sleep period | ** getting off watch before daylight |
| <u>0500 – 1100</u> (6 hours) | on watch | ** average main sleep period |
| <u>1100 – 1700</u> (6 hours) | short sleep or nap period | on watch |
| <u>1700 – 2300</u> (6 hours) | on watch | short sleep or nap period |

* Good sleep quality because it's in the Red Zone but not enough uninterrupted sleep (average 4.5 – 5 hours).

** Getting off watch before daylight & using light management techniques will help the back watch's quality of sleep but still not enough uninterrupted sleep (average 4.5 – 5 hours).

Alternate Schedule – (7, 7, 5, 5)

| | <u>Forward Watch</u> | <u>Aft Watch</u> |
|------------------------------|-----------------------------|--------------------------------------|
| <u>2200 – 0500</u> (7 hours) | * average main sleep period | ** getting off watch before daylight |
| <u>0500 – 1200</u> (7 hours) | on watch | ** average main sleep period |
| <u>1200 – 1700</u> (5 hours) | short sleep or nap period | on watch |
| <u>1700 – 2200</u> (5 hours) | on watch | short sleep or nap period |

* Good sleep quality because it's in the Red Zone & the opportunity to get 5.5 – 6 hours of uninterrupted sleep.

** Getting off watch before daylight & using light management techniques will help the back watch's quality of sleep & the opportunity to get an average of 5.5 – 6 hours of uninterrupted sleep.

Alternate Schedule – (8, 8, 4, 4)

| | <u>Forward Watch</u> | <u>Aft Watch</u> |
|------------------------------|-----------------------------|--------------------------------------|
| <u>2100 – 0500</u> (8 hours) | * average main sleep period | ** getting off watch before daylight |
| <u>0500 – 1300</u> (8 hours) | on watch | ** average main sleep period |
| <u>1300 – 1700</u> (4 hours) | short sleep or nap period | on watch |
| <u>1700 – 2100</u> (4 hours) | on watch | short sleep or nap period |

* Good sleep quality because it's in the Red Zone & the opportunity to get an average of 6.5 – 7 hours of uninterrupted sleep.

** Getting off watch before daylight & using light management techniques will help the back watch's quality of sleep & the opportunity to get an average of 6.5 – 7 hours of uninterrupted sleep.

Most individuals, on average, get their main sleep during the noted times. Usually, these individuals sleep a shorter period of time, possibly a 2-hour nap, during their other off period which would give them recreational time. Keep in mind that these time durations for sleep may vary by individual, vessel or operation.

Watch Schedules...

Dinner Bucket Boats

The following recommendations are for crewmembers working on vessels but leaving the vessel after their shift ends. Whether they go home everyday or stay in company furnished quarters their work and watch schedules should follow the same fundamental criteria as the live-on vessels to help increase endurance and reduce fatigue. One additional factor for individuals going home after each watch is travel time.

The following are the fundamental criteria recommended by CEMS that should be considered for an effective schedule:

- **Uninterrupted sleep**
 - **Crewmembers should have enough time off to obtain 7-8 hours of uninterrupted sleep per 24-hour period.** *(Sleep research indicates that the average human needs 7-8 hours of uninterrupted, quality sleep to recover, both mentally and physically. In the maritime industry it's not possible to get this amount of sleep on a regular basis, if ever, but the goal of a schedule is to allow for as much uninterrupted sleep as possible. i.e. – 5 hours sleep is better than 4 hours sleep, 6 hours sleep is better than 5 hours sleep, etc.)*
- **Continuity**
 - **Crewmembers working at night should be able to maintain the same work-rest schedule for at least 2 continuous weeks.** *(It takes about one week to acclimate to a new circadian rhythm, and once they are adjusted, it's better not to switch shifts again too soon. One example of a work schedule where this may be a factor is the 7 days, 7 nights, 7 off or similar type schedule. If possible, keep on same schedule for the 14 day. i.e. - 14 days, 7 off, 14 nights, 7 off.)*
- **Night to day / day to night avoidance**
 - **Changes in work schedule from day to night, or from night to day, should be minimized in order to avoid a condition similar to jet lag.** *(If a person has to do this rapid rotation it's better to change from day to night instead of night to day. If possible, allow 24 hours between this schedule change or at least an opportunity for the individual to take a nap in the afternoon prior to starting the night shift.)*
- **Length of work periods**
 - **Work periods should be no longer than eight (8) continuous hours, particularly when prolonged exposures to extreme temperature or humidity levels are involved.** *(The 12 hours on / 12 hours off is a typical dinner bucket boat schedule. Although this schedule affords the crewmember travel time if going home and time for 7-8 hours of uninterrupted sleep considerations still need to be made when necessary due to high workload, weather, etc.)*
- **Environmental light-management techniques should be used to adapt crewmembers to night watch.**
 - **Use as much light as possible up to 3 hours before the normal sleep period.**
 - **Watch out for getting too much light getting off watch.** *(Review the Alertness Guide on Light Management.)*

The following recommendations are for shore tankerman that leave the job site when they are finished their job. Their unique situation is that there is usually no set schedule for them and this can result in challenges with their work environment, travel time and time at home.

The work/home schedules of a shore tankerman aren't conducive to the fundamental criteria, listed for live-on vessels and dinner bucket boats, recommended by CEMS that should be considered in a 24/7 environment. The following are recommendations for shore tankerman:

- **Communicate to dispatchers information that can be used to assist in timing**
 - **Distance for travel time.**
 - **Time issues with certain docks as far as leaving after finishing a job or starting delays after you get to the job site.**
 - **If you're rested when you get a call for your next job.**

- **Time management**
 - **When getting home from a job schedule sleep on the "front end" of your off time to ensure that you're rested for the next job and you'll feel better for the quality time with your family.**
 - **Sleeping on the "front end" of your off time will also ensure that you're rested if you get called out for a job after your allotted time off.**

- **Education for shore tankerman, and their support personnel, to evaluate risks when assigning and planning jobs.**
 - **Review the fundamental criteria recommended by CEMS for ways to incorporate them into the operation.**
 - **Review the alertness guides on Light Management, Stress, Caffeine/Nicotine and Environmental and Operational Improvements.**

Summary:

Before changing a schedule it's important to look at all risk factors that could compromise alertness and endurance before making this change. Just changing a schedule and not addressing environmental or operational issues, healthier diet and exercise and use of light management could actually contribute to increased fatigue and reduced endurance.

Each company, operation, vessel and employee is unique and there is no "one size fits all" watch schedule. Different circumstances may require different schedules whether the crew is on a live-on vessel, dinner bucket boat or working shoreside. Education on choosing an alternative schedule is essential to benefit all crewmembers. These changes need to be monitored to continually improve the maritime industry for all employees.

Resources for additional information on Watch Schedules:

Crew Endurance Management Practices -

A Guide For Maritime Operators

A Guide For Maritime Operations ADDENDUM

These manuals are available for downloading on the Crew Endurance Management System section of the USCG Human Element & Ship Design Division Web Site:

<http://www.uscg.mil/hq/cg5/cg5211/>