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IN THIS ISSUE

MX Fatigue *focus*

A Labor View of the Challenges of Worker Fatigue*

About the Author: Mr. Robert Gless, Assistant Director, Transport Workers Union of America, Air Transport Division. The TWU is dedicated to bettering the lives of working families. The TWU works to safeguard, protect and improve working conditions and living standards of all workers and demand respect, dignity and equality for all. Our active and retired members, numbering over 200,000, make airplanes fly, subways run, buses drive, and casinos play.

Robert Gless

Dave Supplee

About the Author: Mr. Dave Supplee, Secretary Treasurer, International Association of Machinists and Aerospace Workers, District 142. The IAM is a large and diverse organization, representing 720,000 members across North America. Each member makes a significant contribution to the success of the union. The mission of the IAM Headquarters is to help individual members realize that potential. The departments of the IAM mirror the diversity of the members that form the union.

We represent our respective organizations on the FAA's Maintenance Fatigue Risk Management Working Group. This letter represents the feelings of our union workers in the aviation industry. Rather than tell you our shared plans on the issues surrounding worker fatigue, we offer you this letter that represents the sentiment of our members.

I am a proud American union worker in the aviation maintenance industry. While I will comment about my situation as a certified airframe and powerplant mechanic, many of my feelings are also shared by my thousands of union brothers and sisters that hold other positions in supporting industries world wide (i.e., aviation maintenance, ramp, manufacturing, etc.).

Before talking about fatigue, I want to start by saying that I am tired, stressed, and continuously challenged by the economic conditions that have altered our industry over the past decade. The flying public has become fixated on the lowest cost ticket and too much of that cost reduction has fallen on the backs of labor. Many airline maintenance operations have closed or consolidated. Large percentages of our pensions have diminished or disappeared. Those of us lucky enough to have escaped a layoff are faced with thousand mile weekly commutes to perform our job, which means we must spend extended time away from home at our own expense. When we work in cities like San Francisco, Chicago, or New York our daily drive is necessarily long so that we can afford decent housing and provide good schools for our families. Today, in 2010, we are working for less than our 2001 hourly wages. There has been no similar reduction in the price of groceries, housing, raising children, or life's other necessities. The result is that we must increase our work hours, either with our current employer or another.

I am a trained and federally certified aviation mechanical expert. The time I have spent in school exceeds the hours of an undergraduate degree as well as many post graduate professional programs. I take satisfaction and pride knowing that my combination of knowledge, skill, and constant attention to safety keeps our industry as safe as it is. Without my talent and my signature the airplane does not fly! My skill, working with the procedures from the company and the FAA, ensures that the 30-year old aircraft looks

and operates as well as the 2010 model. Did you ever think about driving your 25 year-old car across the country? Our products do that every day - across the country, across the ocean, and around the clock. Our workforce makes that happen. We are maintenance experts and we want to continue the job that we love, but we struggle for reasonable financial comfort and quality of life. This situation sets up many of the challenges associated with worker fatigue.

As workers we want our union, the company, and the FAA to arrive at fatigue management solutions that are feasible and reasonable. We all share the goal of having a technically qualified workforce available and able to maintain the aircraft at the current high level of reliability and safety. That means that the mechanic's position has to be structured with reasonable compensation and working conditions. Important in those working conditions is a work schedule matched to the company, the work demand, and to the strengths and limitations of the worker.

No one wants to have unacceptable answers regarding their knowledge of an individual's fatigue status after a job injury, serious equipment damage, or a condition affecting the flight safety of the aircraft. For that reason, the topic of worker fatigue is really a matter of physical and mental fitness for duty. The company, the worker, and the government must cooperate to develop practical solutions for addressing potential hazards related to worker fatigue. None of these parties is the single-source solution. I caution that the burden cannot be place solely on the worker, who is too often held responsible for the consequences of poor company policy or government regulation (represented as safety advice).

I know that our union leadership has joined a working group comprised of labor, management, FAA, and scientists. They have already taken some positive steps, like providing a 2010 pocket calendar that reminds us about fatigue survival. They are also planning other educational efforts, such as specific tools to help us identify when we are too tired to work safely. The fact that the initial products don't look like boring FAA Advisory Circulars is encouraging, but we must wait to see how such efforts will continue and how they will educate the company and government in addition to the worker.

Unfortunately, workers cannot drastically reduce hours and remain in this industry. We need the overtime wages to survive. We need the scheduling flexibility to have some semblance of quality time with our family, yet we recognize that such flexibility must permit adequate periods of daily rest. We also know that certain parts of our jobs require higher mental awareness. We must find a way to apply science and fatigue management to flexibly schedule work and ensure that the most rested are available for the toughest jobs. No one wants a fatigued worker having sole responsibility for safety critical tasks, like flight controls or electronic navigational equipment. The company can make this work with commitment and the appropriate resources. If the company can demonstrate that it has a way to manage fatigue, then the best government solution is not likely a "one size fits all" limit on duty time. For instance, some new cars can now detect driver fatigue which suggests that a more individualized approach to assessing and addressing worker fatigue may be appropriate. Regardless, we are running out of time talking about worker fatigue. Most of us in the know are aware of serious hazards and risks that occur daily.

We are starting to see civil and criminal penalties for individuals and for corporate executives that are responsible for accidents. In Europe they use the word "corporate manslaughter" when something goes wrong and company leaders know about the hazard. Worker fatigue is not a secret to anyone in our industry. Our unions want to help the accountable executives or the FAA Administrator who must explain to Congress and to the press the fatigue situation in aviation maintenance. Labor, management, and FAA must move wisely and swiftly to address this issue so that together, we can develop means to manage fatigue.

**** IAMAW and TWU represent over 1.5 million members working in the aerospace industry.***

Do We Need Rules to Apply Common Sense About Worker Fatigue?

By Dr. Bill Johnson

About the Author: Dr. Bill Johnson is the FAA Chief Scientific and Technical Advisor for Human Factors in Aircraft Maintenance Systems. He has been a pilot and mechanic since the sixties and has worked in applied human factors disciplines for nearly thirty years.

The idea that employers are waiting for regulations before taking steps to address worker fatigue reminds me of lyrics from Bob Dylan…... "*you don't need a weather man to know which way the wind blows.*" It seems fitting doesn't it? It seems to suggest that we don't need a lot of rules and regulations to address fatigue in aviation; instead, we can come to reasonable solutions simply with some common sense and applied science. Let's consider four examples where common sense and basic applied science are the only requirement for positive change.

Lighting and Your Body Clock

Our internal body clock is controlled by time of day and light. It tells us to be awake when it's light outside and to sleep when it's dark. This is a natural process and one that cannot be readily changed, though Thomas Edison did his best to add additional light to our lives. This means that although artificial lighting makes it possible for us to work through the nighttime hours, we are still vulnerable to fatigue based on the body's natural rhythms. When we work especially early or late hours, we are forced to fight our body clock each step of the way and it can be hazardous to our health, as well as the health of those around us. Common sense says: When you must work the midnight shift, beware of the challenges from your internal clock. Arrive rested, rely on teamwork, use caffeine as appropriate, and beware of the risky 3-5 AM timeframe.

Sleep and Obesity

Many studies have linked unhealthy sleep to obesity. Some argue that obesity affects sleep, leading to sleep disorders such as obstructive sleep apnea, while others have shown that poor sleep or too little sleep results in increased appetite and calorie intake. Research shows that people often confuse fatigue as a sign of hunger which leads to eating when they are in fact sleepy. Sleep loss can also inhibit weight loss in people who are otherwise eating well and exercising. In other words, chronic fatigue actually sets you up to gain weight! Common sense says: More sleep leads to less weight gain and increased likelihood for successful weight loss.

Driving and Fatigue

According to the National Sleep Foundation's *Sleep in America* poll, 60% of Americans have driven while feeling sleepy and 37% admit to actually having fallen asleep at the wheel in the past year (the risk is double for shiftworkers). The US Department of Transportation reports that sleep deprivation leads to approximately 100,000 sleep-related vehicle crashes each year, 71,000 injuries, and results in 1,500 deaths. These numbers are staggering when you consider how easy the "fix" is. Research also shows that after being awake for 20 hours, cognitive performance is similar to someone with a blood alcohol level of .10 which is considered legally drunk. In other words, fatigued drivers are just as dangerous as drunk drivers. Common sense says: To be safe on the road, you must get adequate sleep.

Sleep and Life

Most Americans don't get enough good quality sleep, and although this doesn't come as a surprise, some of the facts might. For instance, 37% of Americans are so sleepy that it interferes with daytime activities and 29% have actually fallen asleep on the job (shiftworkers are 2 to 5 times more likely to fall asleep on the job). Approximately 14% report missing family events or leisure activities due to sleepiness. Common sense says: If you want to enjoy your life, get more sleep!

When will the FAA Pass a Regulation on Fatigue Risk Management for Maintenance?

I don't know the answer to this but "stay tuned." In the mean time, there's no need for a regulation before we take action against fatigue. We need to help educate and prepare our workforce to deal with fatigue's consequences and I hope that I have offered a clear explanation regarding how common sense can be used to justify your actions or inactions with regard to fatigue.

Burned By Fatigue?

By
Dr. Katrina Avers & Erica Hauck

About the Authors: Dr. Katrina Avers is a research psychologist in the Human Factors Research Lab at the Civil Aerospace Medical Institute. She currently chairs a multidisciplinary maintenance fatigue workgroup and leads a congressionally-mandated project investigating flight attendant fatigue. Focal research activities include organizational assessment, fatigue education, fatigue reporting systems, and fatigue risk management programs for flight crew, cabin crew, and maintenance technicians. Erica Hauck is a graduate student intern in the Human Factors Research Lab at the Civil Aerospace Medical Institute. She is a member of the multi-disciplinary maintenance fatigue workgroup and is currently completing her dissertation on the benefits of fatigue countermeasure training in the aviation industry.

The old adage says "If you play with fire, you're gonna get burned." A mechanic surveyed by the FAA describes the aviation maintenance approach to playing with fire:

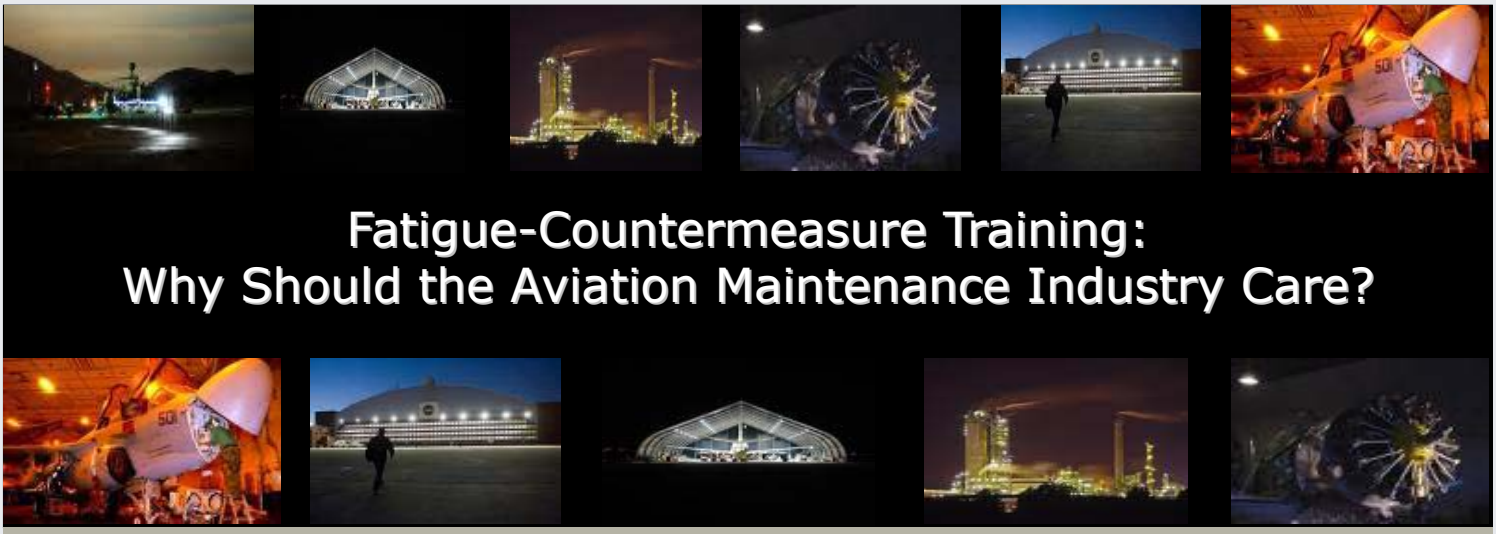
"I have been a lead mechanic for over 25 years for the airlines. Have I ever worked tired when I shouldn't have or seen others who worked tired when they shouldn't have? *Yes*. Do other mechanics, leads, and management know about it? *Yes*. Have mistakes been made due to fatigue? *Yes*."

Fatigue – a feeling of tiredness, exhaustion, or lack of energy – has been repeatedly identified as a dangerous contributor to aviation maintenance errors – errors that have lead to incidents, accidents, and loss of life. In the maintenance hangar, fatigue is often battled with a continuous supply of coffee and a false belief that you can work through any fatigue challenges without consequence. Do these kinds of efforts contribute to a healthy lifestyle, high quality work, or safety in the skies? The answer is …NO. Science tells us that individuals working more than 17 hrs straight begin to make decisions and perform like an individual that is considered legally drunk (.05-.10 BAC). What does this mean? It means the aviation industry needs to change its approach to managing fatigue in the maintenance environment.

To avoid getting burned by fatigue, regulators, operators, and labor must take a shared responsibility and implement science-based preventive action. The FAA has sponsored a multi-disciplinary work group that includes representatives from industry, labor, research, and government to do just that. The goal of the work group is to identify the real-life issues (e.g., economy, pay, family life) surrounding fatigue and develop a practical, scientifically-based approach to managing fatigue risk in the maintenance environment.

With these goals in mind, the work group is developing a fatigue risk management system (FRMS) that has the flexibility to be a win-win for everyone involved. Ultimately, fatigue management can improve quality of life, quality of services, and overall aviation safety. For a FRMS to work, everyone (top leadership, middle management, and mechanics) must be on board and doing their part.

The working group has strived to improve fatigue awareness and provide easy, short-term solutions for managing fatigue. Some of the recent tools developed by the work group include the "Fatigue Survival Toolbox" calendar, the "MX Fatigue Focus" newsletter, fatigue awareness posters and the Maintenance Fatigue Website (hfskyway.faa.gov/HFSkyway/FatigueHome.aspx OR mxfatigue.com). Next, the work group will develop a toolbox to provide mechanics, middle management, and top leadership with all of the necessary information and tools for implementing a successful fatigue risk management system. Keep checking the Maintenance Fatigue Website for updates and newly released tools – this is your opportunity to avoid getting burned by fatigue!



Fatigue-Countermeasure Training: Why Should the Aviation Maintenance Industry Care?

By
Erica Hauck

About the Author: Erica Hauck M.S., ABD is currently a human factors researcher at the Federal Aviation Administration. She is a member of the Maintenance Fatigue Work Group, a multidisciplinary work group assembled to address fatigue in aviation maintenance, and is in the process of developing a fatigue countermeasure training program for flight attendants and maintenance personnel.

"On his first shift back from vacation and after being awake for nearly 24 hours, an aviation maintenance technician signed off on a second technician's oil filter change. The first technician was later notified that the engine shut down in flight due to loss of oil."

Aviation maintenance technicians (AMTs) are often expected to work long shifts, unpredictable hours, and lots of night work. Most AMTs frequently work overtimes hours beyond 8 hrs/day or 40 hrs/week. Unfortunately, all of these factors contribute to fatigue, which leads to reduction in decision making, memory, reaction time, and performance in general. The fact of the matter is that long hours and night shifts are a reality for maintenance technicians. The good news is that many industry experts believe fatigue-countermeasure training is one step forward in the fight against fatigue!

Through training, we can provide technicians and corporations with knowledge about the dangers of fatigue and strategies for preventing and managing them. The key is to educate employees and their supervisors about the things they have control over, so they have the power to make positive changes.

Training is a powerful tool and has demonstrated benefits across industries and in many areas, including job performance and employee health and safety.

For instance, in 2005, a survey[1] was conducted of truck drivers who had previously participated in a fatigue-countermeasure training course. The vast majority found the training useful, and nearly half of all respondents reported that, following the training, they had improved their fatigue-countermeasure strategies at home (47%) and at work (47%).

"Training is a powerful tool and has demonstrated benefits across industries …"

In a similar study conducted with mining workers[2], researchers found that six weeks following fatigue countermeasure training:

Training Results

- **Workers' sleep increased by an hour on average (from 4.8 to 5.8 hr).**
- **Workers reported a reduction in excessive caffeine use (32% vs. 8%).**
- **Workers made changes in their sleeping environment to make it more conducive to sleep (54%).**
- **Fewer workers reported difficulty fulfilling domestic responsibilities (41% vs. 23%).**
- **Fewer workers reported difficulty finding time for entertainment and recreational activities (46% vs. 23%).**
- **Fewer workers reported believing that their health would improve with a different schedule (77% vs. 50%).**
- **Reports of gastrointestinal symptoms even declined (17.9 to 13.6%).**

It seems clear that fatigue-countermeasure training had a very positive effect for these workers – both on the job and at home.

Research suggests that organizations may also benefit from fatigue-related training. Large-scale surveys of shiftwork facilities have linked fatigue and shiftwork training to reduced turnover, reduced absenteeism, fewer fatigue problems, and fewer morale issues for organizations. The use of fatigue-countermeasure training has also been shown to predict worker perceptions of safety and fewer accidents and injuries. A follow-up survey for one training program indicated that over half of the respondents surveyed reported that the educational materials were the basis for positive change as related to fatigue in their organizations. Even seasoned workers had very positive responses to fatigue training, with as many as 96% reporting they have applied the strategies presented during training and intend to continue using them.

Managing fatigue in maintenance operations is a daunting challenge, but it is clearly an issue that deserves more attention. The evidence presented here suggests that one important part of a company's overall plan for managing fatigue should be a fatigue-countermeasure training program. Training is a viable and effective method for managing fatigue that aids both the individual and the organization.

To find out more about fatigue training visit:

www.mxfatigue.com
or
www.hfskyway.faa.gov.

References

[1]Gander, P.H., Marshall, N.S., Bolger, W., & Girling, I. (2005). An evaluation of driver training as a fatigue countermeasure. *Transportation Research Part F, 8,* 47-58.

[2]Kerin, A., & Aguirre, A. (2005). Improving health, safety, and profits in extended hours operations (shiftwork). *Industrial Health, 43*, 201-208.

Sleep and Fatigue Science 101

By Dr. Hans P. A. Van Dongen, Dr. Melinda L. Jackson & Susan Raj

About the Authors: Dr. Van Dongen is Research Professor and Assistant Director of the Sleep and Performance Research Center at Washington State University Spokane. His research focuses on basic and applied aspects of fatigue risk management, and he has made seminal contributions to the understanding and prediction of changes in fatigue over time. Dr. Jackson is a postdoctoral fellow in the Sleep and Performance Research Center at Washington State University Spokane. Her expertise is in the neurocognitive effects of sleep and sleep disorders. Susan Raj is an undergraduate student of the University of Surrey, England. She is currently in a one-year training placement program at Washington State University Spokane.

It seems inevitable that irregular work shifts and working the backside of the clock are associated with fatigue. However, knowledge of the main biological mechanisms underlying fatigue, and the nature of its effects on the brain, may help to manage fatigue and its adverse consequences on performance and safety.

Sleep regulation—specifically the natural timing and duration of sleep—is governed by two key biological processes. One of these processes is called the homeostatic process, and its function is to balance the amount of wakefulness and sleep. Simply put, the longer one is awake, the greater the pressure for sleep becomes, and the longer one sleeps, the more that pressure is reduced. Thus, staying up late makes one sleepy, and getting up early leaves a person with leftover sleep pressure (still tired).

The other process is called the circadian process, which is a 24-hour internal rhythm produced by the biological clock. It promotes sleep during the night and wakefulness during the day. This is the reason why getting enough sleep is more difficult during the day than during the night and why staying awake through the night continues to be a challenge, even if one manages to get enough sleep beforehand.

The homeostatic process and the circadian process together determine the level of fatigue and how it changes over time. This means that fatigue is a function of both time awake and time of day, and that knowledge of a person's sleep/wake history and the time of day on his/her biological clock makes fatigue predictable. This is illustrated in figures 1 and 2.

Figure 1 shows fatigue predictions and vigilance performance data from a laboratory study involving 62 hours of total sleep deprivation.

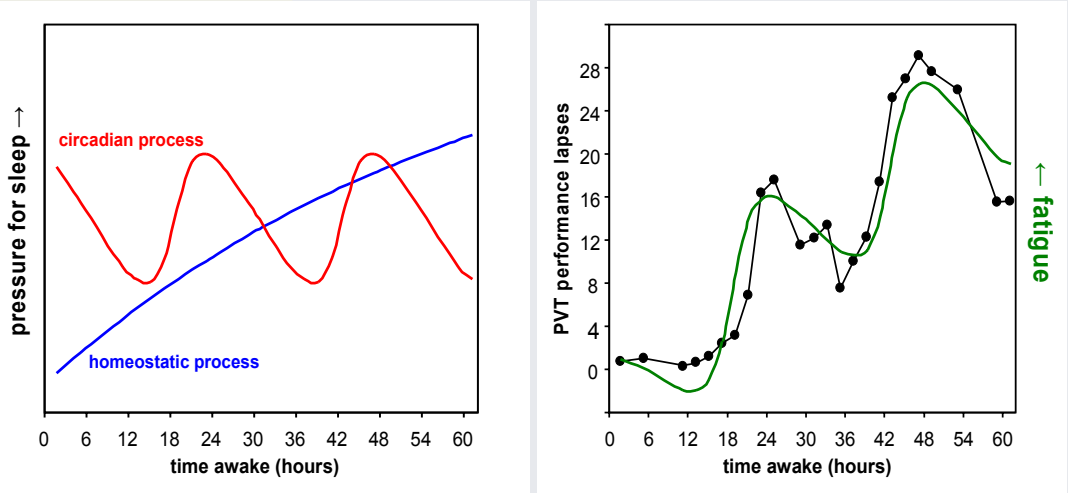


Figure 1: Changes in fatigue levels over time due to the homeostatic and circadian processes, as illustrated across 62 hours of continuous wakefulness. In the left panel, the blue curve shows the gradual increase of pressure for sleep from the homeostatic process over time awake, and the red curve shows the waxing and waning of pressure for sleep from the circadian process over the 24 hours of each day. In the right panel, the green curve shows how these two processes combine to predict fatigue (green curve = sum of blue and red curves). These predictions are a close match to actual observations of performance impairment, as measured on a 10-minute psychomotor vigilance test (PVT) administered multiple times during a laboratory study of 62 hours of continuous wakefulness—the black dots represent performance lapses (defined as reaction times > 500 ms) averaged over 12 individuals. Adapted from Van Dongen & Belenky, *Industrial Health*, *47*, 518–526.

Although most workers would not stay awake for this length of time, the study reveals that a simple calculation of adding up the pressures for sleep from the homeostatic process and from the circadian process yields a good prediction of the effects of fatigue on performance over time.

Figure 2 shows the interplay of the two processes in a night shift worker. In this particular example, the person wakes up at 20:00, at which time the homeostatic process begins to increase the pressure for sleep with each passing hour of wakefulness. Also, at the beginning of the night, the circadian process increases its pressure for sleep. The net result is that whereas fatigue is relatively low at the beginning of the night shift, there is a steady increase of fatigue through to the end of the night and into the early morning. Indeed, fatigue may peak around the time of the commute back home, putting the individual at increased risk of a car accident.

However, later in the morning, the circadian process begins to promote wakefulness, and fatigue is reduced despite the increasing time awake. This may make it difficult to get sleep until later in the afternoon; in the example of figure 2, the person finally goes to bed at 16:00.

During the sleep period, the pressure for sleep from the homeostatic process is dissipated, but the pressure for wakefulness from the circadian process is still high and soon becomes the dominant force (the so-called "wake maintenance zone" in the early to late evening). This situation results in awakening prematurely, which is the reason why most shift workers manage to get only about 5 hours of sleep per day.

In the example of figure 2, the person wakes up spontaneously at 20:00, and the pattern then repeats itself. Recent studies have shown that over time, repeated loss of sleep like that associated with night and shift work enhances the sensitivity to sleep loss, resulting in a further build-up of fatigue across days and weeks. Interestingly, perhaps because this is such a slow process, the build-up of fatigue over sustained periods of sleep loss is not accurately reflected in self-reported levels of fatigue.

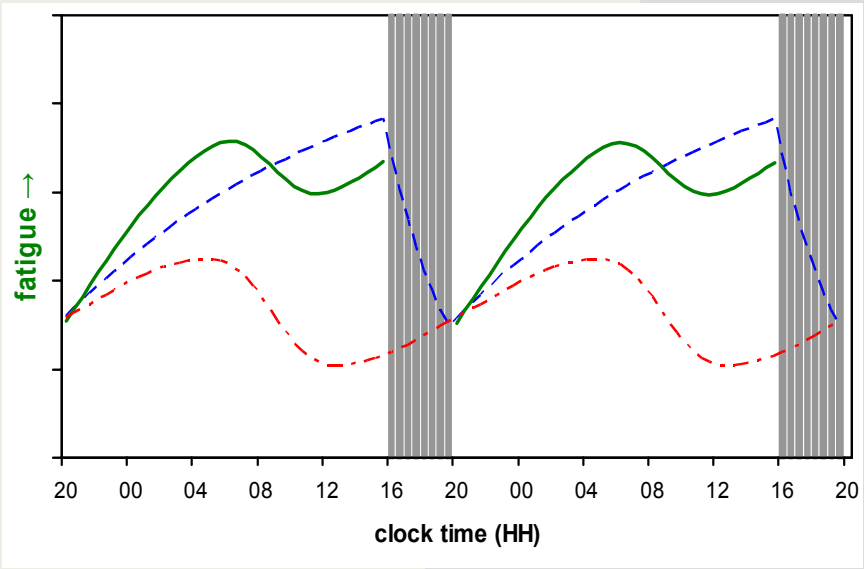


Figure 2: Changes in fatigue levels over time, as illustrated over two days with night shift work. The blue curve shows the gradual increase of pressure for sleep from the homeostatic process during wakefulness (white periods), and the dissipation of that pressure during sleep (gray hatched periods). The red curve shows the waxing and waning of pressure for sleep from the circadian process over the 24 hours of each day. The green curve shows these two processes combined, predicting the level of fatigue during wakefulness. Based on Van Dongen, *Chronobiology International*, *23*, 1139–1147.

Importantly, even short-term increases in fatigue may not be readily noticed. This is due to how fatigue affects brain functioning, which is illustrated in figure 3 (below) with an example of an individual who stayed up all night and into the next day. Performing a simple, 10-minute psychomotor vigilance reaction time task, the person showed both errors of omission (lapses of attention) and errors of commission (false starts) owing to fatigue. However, these errors occurred in the midst of otherwise normal, fast responses (less than 500 ms).
This is a hallmark of the effects of

DANGER

"A significantly fatigued person can continue to work without problems most of the time, but at an unexpected moment may experience performance instability and thus cannot be fully relied upon."

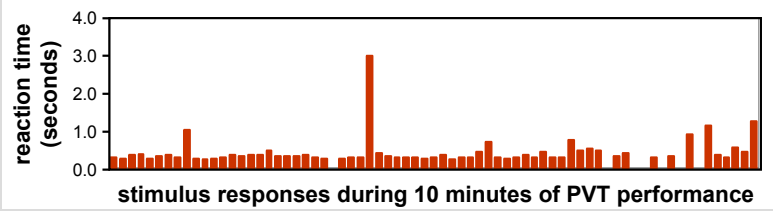


Figure 3: Reaction times to individual stimuli over the 10-minute duration of a psychomotor vigilance test (PVT) for an individual who has been awake for 36 hours. Notice the random occurrence of lapses of attention (long reaction times) and false starts (gaps). Adapted from Doran, Van Dongen & Dinges, *Archives of Italian Biology*, *139*, 253–267.

fatigue on performance: the brain functions well most of the time, but at random moments there are sudden failures—in other words, performance becomes unstable. Therein lies a particular danger: a significantly fatigued person can continue to work without problems most of the time, but at an unexpected moment may experience performance instability and thus cannot be fully relied upon. Moreover, because performance may return to normal just moments later, the fact that a fatigue problem occurred briefly could well go unnoticed. This is one of many reasons why in safety-sensitive operations it is important to have one's work signed off on by others.

Although specific instances of fatigue-related error are difficult to anticipate because they can occur so randomly, fortunately, the overall increase in a person's risk due to fatigue can be predicted as long as the homeostatic and circadian processes can be tracked. There are a number of mathematical models of fatigue and performance that can be used for this purpose, several of which require only information about a person's sleep/wake history and the time of day. Such mathematical models are at the heart of model-based fatigue risk management systems (FRMS), which allow for risk evaluations of work schedules and may guide the deployment of fatigue countermeasures. Several different countermeasures could be considered, including shift changes that result in less predicted fatigue, rest breaks to avoid working at times of greatest fatigue, strategic napping to reduce sleep pressure, and a variety of other options such as caffeine.

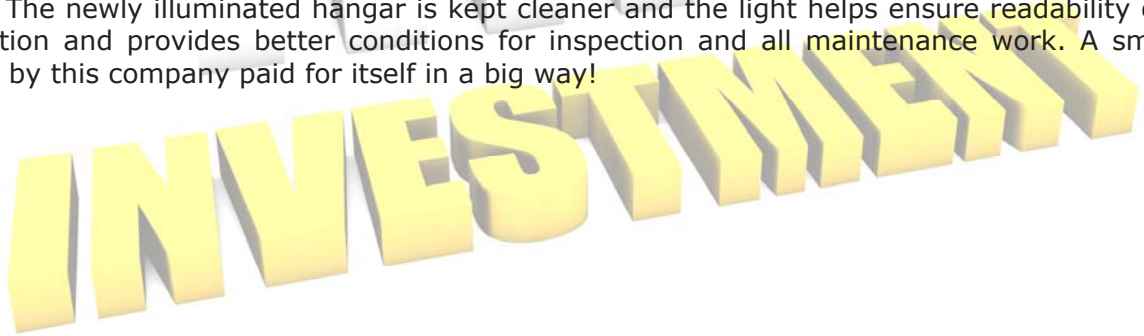
Model-based FRMS tools can be used as part of the shift scheduling process to minimize fatigue risk and promote safety while maintaining efficiency and productivity. This idea is currently under consideration in the rule-making process for new hours of service regulations governing flight crew in commercial aviation. It would be fruitful and relatively straightforward to extend the approach to aviation maintenance operations. Until such time, approved maintenance organizations may want to obtain a license for a mathematical model of fatigue and performance, or join forces to have one developed that can be freely distributed to all aviation maintenance workers, so that they may begin to explore new ways to mitigate fatigue-related safety risks based on the science of sleep and fatigue.

An Update on ROI

By Dr. Bill Johnson

In Issue 1, Volume 1, of MX Fatigue *focus* I made the case that it is easy to determine the return on financial investment of human factors programs. A simple model to calculate return on investment (ROI) was offered and using examples, I showed that many investments can be recovered within the first year of operation. I am pleased to report that I have received positive feedback from managers who are using the ROI model to justify investments in human factors.

The best story came from a small air cargo maintenance operation in Canada that justified new light fixtures for a portion of the hangar. The area in question was always somewhat dark, especially during the long Canadian winters. The initial calculation was based on tangible numbers, like the cost of new fixtures and subsequent electric bills. The installer also suggested motion detectors that lowered the light when no one was in the area. The ROI was so well-prepared that the new lighting was applied throughout the hangar. However, there were also unexpected intangible benefits as a result of the improved lighting conditions. The newly illuminated hangar is kept cleaner and the light helps ensure readability of technical documentation and provides better conditions for inspection and all maintenance work. A small lighting investment by this company paid for itself in a big way!



NEW Fatigue Posters!

FREE!

The Federal Aviation Administration has produced a series of educational posters designed to bring awareness to human fatigue in aviation maintenance (MX).

Each poster is part of a MX fatigue themed series designed to improve awareness of fatigue related issues. The posters provide information on how MX personnel can change their lifestyle and work habits to improve safety and quality of life. These eye-catchy posters provide helpful and practical tips to battle the problem of human fatigue.

Click on a poster to download (high resolution PDF format) FREE.
Print as many as you'd like to display in work and rest areas.

While supplies last, you can contact your local FAAST team representative for paper copies.