

MEASURING FATIGUE

MATTHEW VAN WOLLEN, CO-FOUNDER OF PULSAR INFORMATICS

Flight operations frequently involve long duty hours, night flying, restricted sleep opportunities and crossing time zones. All of these factors contribute to fatigue. And they are especially visible when flying ultra-long range sectors, where duty periods extend overnight. Dr Daniel Mollicone, Chief Scientist and CEO of Pulsar Informatics explains: “Humans are not nocturnal. This is not a choice—it is a biological fact we cannot change. When we are awake at night we are working against our own biology. And fundamentally that’s what drives fatigue risk.”

Fatigue manifests itself in slowed reactions, greater impulsivity, and lower situational awareness. Do these symptoms remind you of the effects of alcohol? In fact, one study compared the effect of sleep deprivation to that of alcohol consumption, using the PVT (see below) to measure the impairment resulting from each. The results are quite sobering.

Lack of sleep mimics blood alcohol concentration



Figure 1 - Lack of sleep mimics blood alcohol concentration. Source: Dawson, et al. 1997.

While fatigue cannot be eliminated, it can be managed. As a pilot you are familiar with checking the weather forecast against a flight plan—and modifying the plan if inclement weather poses a threat to the safety of the flight. Fatigue risk can now be mitigated using the same general approach.

The science of fatigue has seen great advances. We now have tools to quantitatively assess fatigue, forecast fatigue risk for upcoming schedules, and apply practical interventions that reduce fatigue risk.

Unlike body temperature or blood alcohol level, fatigue cannot be measured directly. Originally scientists had to rely on subjective survey responses to gauge fatigue. More recently, objective measures of fatigue have emerged. One such measure is based on the observation that fatigue is closely associated with alertness deficits. This measure is called the Psychomotor Vigilance Test, or PVT.

Pulsar Informatics, a leading fatigue risk management technology company, has developed multiple versions of the PVT, working with the original inventor of the test. The PVT has now been validated in hundreds of scientific studies, deployed to NASA operations on the International Space Station, and adopted by companies around the world to measure and manage fatigue risk. Today it is the gold standard means of quantifying fatigue.



Figure 2 - Screen shot of the PVT. At random intervals, a yellow time display starts counting up in milliseconds inside the red box. The task is to tap anywhere on the screen as soon as this visual stimulus appears.

The PVT is a simple, computerized test that measures response times to visual stimuli over a sustained period of several minutes. It is simple to do, and there are no learning effects or individual aptitude differences. These characteristics make the PVT a highly effective tool to evaluate the alertness deficits of one individual at several points in time over the span of several hours or days, or to pool results from multiple individuals tested at a specific point in time.

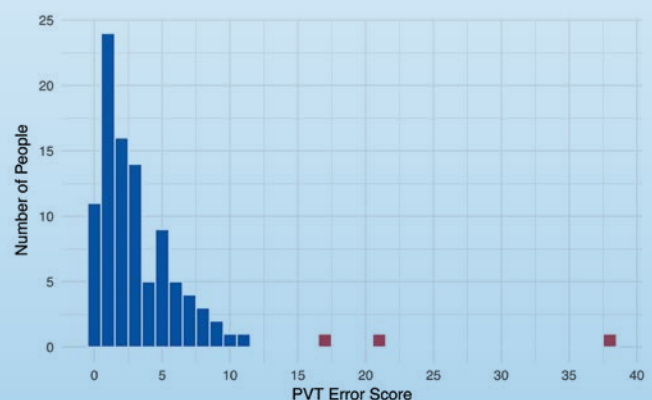


Figure 3 - PVT output data from a screening of N=97 workers at a petrochemical refinery operation. Most workers have a score of under 10. However, three individuals (represented by the red squares) scored above 12—a high level of fatigue impairment.

Source: Lerman, S., Mollicone, D., Coats, S. (2017)

“

The B787 Fatigue Study aims to identify whether Qantas Long Range and Ultra Long Range sectors as currently operated, are safe from a fatigue perspective. It will also seek to learn about the quality and quantity of rest obtained by pilots on the new 787-900 airframe.

”

The PVT is scored by counting the total number of false starts and lapses during a test session. A false start occurs when you jump the gun and tap the screen before the time stimulus starts counting. A lapse, on the other hand, happens when you tap the screen very late—beyond a certain time threshold. Adding the number of false starts and lapses together yields the PVT error score.

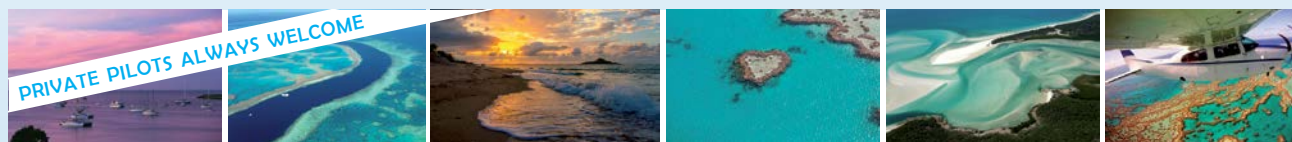
So what does the PVT error score mean? Healthy individuals with no sleep debt will usually achieve a score of less than 6. The PVT error score of moderately fatigued individuals ranges from 7 to 12. And scores of above 12 indicate a high level of alertness deficit.

Pulsar Informatics has created a custom version of its Aviation Fatigue Meter technology to deliver the PVT as part of the B787

Fatigue Study. Originally instigated by AIPA, the project is now jointly funded by AIPA and the Qantas Group and is managed by the Alertness Cooperative Research Centre. Participants in the study will see first-hand how the PVT works and what PVT error scores can be achieved at various points during a Ultra Long Range sector.

The B787 Fatigue Study aims to identify whether Qantas Long Range and Ultra Long Range sectors as currently operated, are safe from a fatigue perspective. It will also seek to learn about the quality and quantity of rest obtained by pilots on the new 787-900 airframe.

Fatigue risk management is a shared responsibility between the airline and individual employees. You can do your part by making it a priority to get adequate sleep each day.



Whitsunday Airport Shute Harbour Fly In & Runway Dinner

Whitsunday Airport Shute Harbour would like to extend a warm invitation for all pilots and flying clubs to attend our 2018 Fly In and Runway Dinner.

Fly In commencing 22 June 2018

Runway Dinner 23 June 2018

Enjoy flying and exploring the Whitsunday Islands, then relax with a 7 course dinner on our runway, live music, amazing food and childrens entertainment.

Day 1, Friday 22 June - Arrive at Whitsunday Airport Shute Harbour YSHR.

Day 2, Saturday 23 June - OzRunways Demonstration, Scenic Island Flight. Our **RUNWAY DINNER** commences at 5.30. **Day 3**, Sunday 24 June Lay day in Airlie Beach, relax or get out and explore what the Whitsundays has to offer - explore the water on a charter boat, get some action with a local fishing charter, bush walks, skydive. A day trip to Hamilton Island where you can take in a spot of golf on Dent Island, or simply relax by our stunning lagoon and enjoy lunch at one of our delicious restaurants.

Day 4, Monday 25 June - Depart Airlie for home.

For more information please call Lee on 0430 172 325.

