Software scheduling tool fights crewmember fatigue

by Chad Trautvetter

Flight operations are fertile grounds for fatigue, sleep deficit and circadian disruption, and these physiological factors can result in decreased flight-deck performance and alertness–in other words ingredients for an accident.

As a general rule pilots constantly monitor themselves for signs of fatigue and make their own go/no-go decision on a flight-by-flight basis, regardless of whether they're covered under Part 91K, 121 or 135-duty limits. However, the pilot must feel fatigued before sounding the alarm.

But the Fatigue Avoidance Scheduling Tool (Fast) provides a proactive, rather than reactive, approach to fatigue monitoring. In short, Fast is Windows-based fatigue analysis and forecasting software developed by NTI and Science Applications International (SAIC) for the U.S. Air Force and Army, with support from the DOT.

SAFTE Model

The tool derives fatigue predictions from the sleep, activity, fatigue and task effectiveness (SAFTE) model invented by Dr. Steven Hursh of SAIC. Hursh is also a professor of behavioral science at Johns Hopkins University School of Medicine.

According to Hursh, the SAFTE model has received a broad scientific review and the Department of Defense considers it to be the most complete, accurate and operationally practical fatigue model available to aid operator scheduling. The DOT is currently in the second phase of a three-phase project to validate and calibrate the model for avoiding excessive fatigue in transportation operations. Additionally, SAIC and NTI have conducted extensive user testing in the transportation and military aviation communities.

Hursh said the scheduling tool, which is now available for commercial applications, uses his model to compare schedules in terms of predicted performance effectiveness. Fast allows easy entry of proposed schedules and generates graphical predictions of performance, as well as tables of estimated effectiveness scores for objective comparison. The user can select optimal schedules based on average effectiveness for proposed work periods or mission-critical events.

Hursh added that the tool can also be used for retrospective analysis of fatigue-related factors that might have contributed to an accident, error or safety-related incident. In this role, the software tool could determine a projection of performance effectiveness at the time of the accident or incident based on information on the work and sleep schedules of operators before the event.

In combination with other information, this analysis can project and quantify the combined effects of time of day and sleep history as a contributing factor to accidents or incidents. This could help to expand many accident/incident findings beyond the catch-all "pilot error" cause.

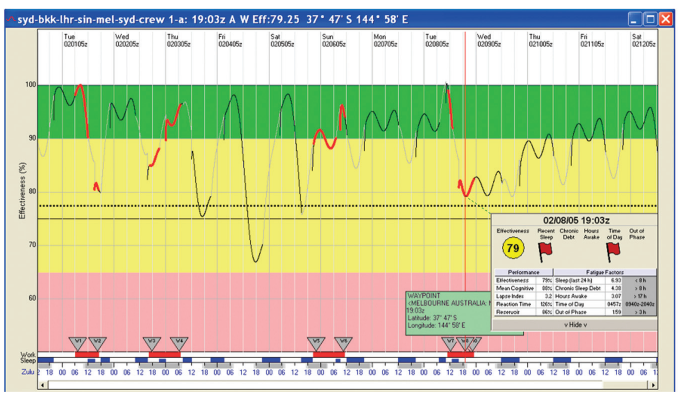
But used as a predictive tool, Fast could prevent, or severely curb, fatigue-related safety lapses. According to Hursh, pilot data collected to date has validated that low levels of effectiveness predict an increased risk of accidents.

An algorithm that can infer likely sleep patterns when only the work schedule or mission demands are known is included with Fast. This AutoSleep feature uses adjustable rules to insert reasonable sleep patterns into a regular or irregular work schedule. Using AutoSleep, Fast can project performance under any anticipated work schedule or estimate performance at the time of an accident based on work history.

Specialized features for flight operations are included that allow entry of waypoints and computation of location and sunlight conditions. Critical mission events can be entered for point estimates of effectiveness, such as a midpoint refueling stop. The user can print a mission timeline of effectiveness, waypoints, interpolated locations at each point in the schedule, sunlight conditions, critical events and projected sleep/nap times.

Hursh said Fast now includes a fatigue indicator "dashboard" that calculates five fatigue factors–chronic sleep debt, recent sleep in the past 24 hours, time since awaking, time of day and circadian desynchronization–at any point in a schedule that contribute to the predicted performance score. The scheduling tool also includes a scale that provides levels of rough equivalence to 0.05 percent and 0.08 percent blood-alcohol levels.

For additional information, e-mail hurshs@saic.com or call (443) 402-2701. ❑



The Fatigue Avoidance Scheduling Tool (Fast) takes a proactive approach to pilot fatigue.