

A Wake-up Call for Fatigued FedEx Fliers

By Capt. Wayne Koide (FedEx)
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"[A]fter 4 layovers of less than 24 hours, we were scheduled to fly Subic-Shenzhen-Beijing.... Subic [GOC] eventually gave us a bowl of cereal for our 9-hour duty day (the ovens in the a/c were deferred.)... The effects of inadequate rest for days became apparent at the end of the day on our arrival at Beijing.... Safety became an issue...."

"[B]oth crew members felt extremely exhausted departing Subic, flying to and arriving in HKG; ... our judgment and reaction time were seriously degraded. The human body cannot switch time zones and be forced to sleep on demand because of a schedule...."

"This pairing is onerous due to inadequate crew rest prior to the Narita-Anchorage leg.... After three long days with short layovers in between and working hard each day, the crew was firmly adjusted to the local time zone.... The 24-hour layover prior to the Narita-Anchorage leg needs to be at least 36 hours (ideally) or an RFO on board for the last leg...."

". . . Pairing comprised two 3-leg trips in Asia—the first Narita-Beijing-Seoul-Osaka, 12+13 scheduled duty day; ... the second Osaka-Seoul-Taipei-Hong Kong, 11+50 scheduled duty day.... What with going into China and all the extra mental attention that [it] entails plus bag drags to swap a/c in Seoul plus delays on deck exceeding 1 hour due to weather at destination plus multiple turns in holding at Seoul, the entire day turned exceptionally exhausting and draining. [P]lease, no more 3-leggers in Asia, especially into and out of China, and please no more a/c swaps. I've done plenty of 3-leggers stateside in the [B-]727—this is enormously more complex, involved, and exhausting. By leg 3 in both cases, we were flying around like zombies; my mental alertness by leg 3 was certainly well below what I think it needs to be over here...."

"After spending a week in Asia, we flew the Osaka-Memphis trip—no problem there; however, neither crew member had sufficient rest for the last leg of the pairing, Memphis-Anchorage. Because our circadian rhythm had adjusted to UTC+8, we were unable to sleep before the trip to ANC. Arrive MEM 2230L. Asleep by 0300L. Wake at 1100L. Unable to fall asleep at 2000L. Hotel pickup at 0155L. Scheduled departure at 0325L. Scheduled arrival ANC 0715L. Arrive in ANC after

being awake for 23h 45m...."

These comments from our fellow pilots point to an increasingly important, yet often neglected, aspect of pilot scheduling: circadian disruption. Circadian disruption is a term that describes the breakdown of our normal sleep/wake cycle. The human body is extremely resilient, but when it is subjected to a work/sleep regimen resulting in multiple disruptions to the "normal" daily cycle (i.e., "circadian rhythm"), fatigue and reduced performance are often the result.

Former NASA Ames researcher Dr. Mark R. Rosekind, who conducted the now (in)famous sleep study on FedEx pilots a few years ago, has stated, "Loss/disruption of sleep degrades every aspect of human capacity.... [C]ognitive errors are of great concern; it means degradation of judgment decision-making capability by 50 percent, memory by 20 percent, communication by 30 percent, attention by 75 percent. If you get two hours less sleep than required, two of four decisions could be 'bad.'" (*Aviation Week*, July 16, 2001)

What kind of state do you suppose our pilots were in after being "awake" for nearly 24 hours? I have been there more times than I would like to admit, and, I'm sure, so have many of you.

The bulk of FedEx's future growth appears to be in the international arena. We have seen, recently, the introduction of two-leg flights (in a single duty period) from our Anchorage domicile to Asia in the form of ANC-NRT-PVG (Anchorage-Tokyo-Shanghai), ANC-KIX-NRT (Anchorage-Osaka-Tokyo), and ANC-NRT-ICN (Anchorage-Tokyo-Seoul). A few years ago, Memphis wasn't even an MD-11 base; now it will be bigger than ANC and LAX combined. Recent announcements by FedEx flight management point to an increase to the number of crews in both ANC and LAX domiciles. FedEx's highest-revenue flights are international ones, not domestic. The point of all of this is that our international flying is growing, and with this growth will be an increased exposure of more of our pilots to this kind of flying. So regardless of what type of airplane they currently fly, the chances remain good that, at some point in a pilot's career at FedEx, international work rules will become very important to that pilot and to those who care about that pilot.

The FARs aren't hacking the program

Why do I state that the issue of circadian disruption is often neglected? Take a look at our federal aviation regulations, and you will have the answer. Some improvements to the flight time/duty time regulations have helped the flight crews of our passenger-carrying counterparts in domestic flight operations, but FedEx is considered a supplemental carrier for both domestic and international flight time limitation and rest requirements. However, not one section of the regulations

considers the human factors aspect of circadian disruption in flight operations. Merely specifying maximum hours for duty and minimum required crew rest does not begin to address the real and more complex factors such as at what time within the normal wake/sleep cycle we are operating or what additional rest is required as a result of multiple time-zone travel. The assumption not stated, but inherent, in these FARs, is that each pilot should be prepared to work and sleep within the given duty/rest parameters without consideration being given to any other factors. Essentially, we are being asked to sleep and work on command.

FedEx international work rules

Thankfully, due to the collective bargaining process, many pilot groups have mitigated the deficiencies of the FARs by negotiating certain restrictions to flight time/duty time based on, among other things, when the flight is operating. At FedEx, we have defined a "critical duty period" for domestic operations wherein scheduled duty is limited to something less than would be limited by the FARs. Unfortunately, no such provision currently exists for our international fliers. In fact, surprisingly few limitations are placed on scheduling our international pilots. Examples of this are a maximum scheduled duty period of 13+30 and a minimum "legal rest period" of 12 hours. With the exception of the SIG (Scheduling Improvement Group) international parameters, many of our international work rules simply parrot the FARs. Very little exists in our set of international work rules to protect our pilots from the ill effects of circadian disruption. Now would be a good time to review the comments of our pilots at the beginning of this article. Keep in mind that every pairing that these pilots flew fell within the contractual and SIG parameters.

Table A: Two or More Flightcrew Members—Acclimatized

Local Time of Start	Sectors (Legs Flown)			
	1	2	3	4
0600-0759	13+00	12+15	11+30	10+45
0800-1259	14+00	13+15	12+30	11+45
1300-1759	13+00	12+15	11+30	10+45
1800-2159	12+00	11+15	10+30	9+45
2200-0559	11+00	10+15	9+30	9+00

(Max duty times in hours + minutes)

Does a better way exist?

One of the projects that I undertook while a member of the PSIT (Pilot Scheduling Improvement Team) was to research other carriers engaged in international flying to find out how their pilots were scheduled. To my surprise, I found fewer differences in the area of work rules between our operation and other U.S. carriers (Northwest, United, American, Delta) than I had expected. What I did find was a huge difference in the type of flying that we were doing compared to the other U.S. carriers.

Because the other carriers (save Northwest) fly the bulk of their international trips from the United States directly to their destinations, lay over for an average of 30 hours, then fly back to the United States, their crews would "time out" (maximize block flying to equal pay cap) after flying as few as three roundtrips (9 to 12 workdays) per month. Compare this to FedEx's international operation in Asia, which, at present, requires our pilots to fly to the international destination and, thereafter, fly through a hub-and-spoke system for a number of days before returning home. Obviously, FedEx pilots' exposure to circadian disruption is far greater than that of our counterparts elsewhere due to this major difference in type of flying. This is further exacerbated by our lack of a pay/credit hour cap, which has contributed to an ever-increasing number of days worked (hence, greater exposure to the effects of circadian disruption) in any given bid period. Adopting another U.S. carrier's international work rules would not adequately address our concerns because of these differences.

CAD 371

Not until I expanded the search to carriers from other countries did I hit "pay dirt." After speaking to members of the Hong Kong Pilots Association, I learned of a document entitled "CAD 371: The Avoidance of Fatigue in Aircrews," which is an official document of the Civil Aviation Department (CAD) of Hong Kong. The CAD is analogous to our FAA and establishes regulations as they pertain to (among other things) aircrew flight time/duty time. This regulation has its roots in findings of the NASA sleep study conducted on "long haul" operations. To me, it represents a big leap forward in finally incorporating human-factors concerns into a reasonable set of guidelines.

CAD 371 states clearly, "This document contains standard provisions on which Hong Kong operators' 'Approved Flight Time Limitation Schemes' are to be based from 1 March 1999." Like our FARs, CAD 371 is regulatory and represents minimal criteria for the Hong Kong air carriers (Cathay Pacific and DragonAir, the most notable) to follow. I have summarized some of the provisions of CAD 371 in Table A (page 25).

Factors to be considered when constructing crew rosters (schedules) should include

- the undesirability of alternating day/night duties,
- no scheduled rest periods of between 18 and 30 hours,
- the effects of consecutive flights through, or ending within, the window of circadian low,
- the effect of consecutive transmeridian flights, and
- notification of crews well in advance of days off.

Assumptions used in developing the scheduling constraints include the following:

- The body clock moves at 1 hour per day when its circadian rhythm is disrupted.
- The body clock moves at 1 hour per day when it resynchronizes to local time.
- Maximum circadian disruption (12 hours) requires seven nights' recovery.

Definitions (Cathay Pacific—Operations Manual Volume 1, Appendix D)

Acclimatized—To be acclimatized, a flightcrew member must have three consecutive local nights free of duty within a time zone band that is 3 hours wide. The flight-crew member will remain acclimatized thereafter until a duty period finishes at a place where local time differs by more than 3 hours from that at the point of departure.

Local Night—A period of 8 hours falling between 2200 hours and 0800 hours local time.

Limitations on single-flying duty periods

To apply this to FedEx's flight operations, a pilot who started out at home base and had a minimum of three consecutive local nights off before the start of the next flight would be acclimatized. The only other scenario would be, after having arrived at a given destination, our pilot(s) would have to lay over such that they would have three consecutive local nights off (roughly a 72-hour layover) before being considered acclimatized; they would then remain acclimatized as long as they stayed within 3 hours of that local time zone.

How does this compare to FedEx's current international max scheduled duty period of 13+30? Hong Kong rules allow an extra half hour of duty time when duty starts between 0800 to 1259 local (one leg only), but in every other category, their max duty limits are less than FedEx's. Applying this to our FedEx ANC-NRT-PVG example above (scheduled duty 13+30), this sequence would exceed the 13+15 duty limit and would not be permitted.

An unacclimatized crew is any crew who has not had three consecutive local nights off in the applicable time zone. *This "non-acclimatized" state characterizes nearly all FedEx crews on international flights who have departed home base unless they have had a super-long layover (>72 hours).* Please note that there is a built-in bias against the "dreaded 24-hour layover," which, no surprise to us, is a prime contributor to circadian disruption and was an important finding of the NASA study. This explains why the maximum duty times following layovers between 18 and 30 hours (in essence, 24 hours) are lower than those for layovers of less than 18 or more than 30 hours. Does this mean that anything less than or equal to 18 hours would be preferable to a 24-hour layover? The answer is (theoretically) yes, *provided the pilot can get sleep within this shorter layover period.* We have found this sleep stipulation to be somewhat problematic, as short layovers work only when the body is ready to sleep, and if it isn't, it gets no other sleep opportunity (layovers of less than 18 hours afford only one sleep opportunity).

Table B: Two or More Flightcrew Members—Not Acclimatized

Length of Preceding Rest (Hours)	Sectors (Legs Flown)			
	1	2	3	4
Up to 18 or over 30	13+00	12+15	11+30	10+45
Between 18 and 30	11+30	11+00	10+30	9+45

(Max duty times in hours + minutes)

The point again is that every category in this non-acclimatized state restricts maximum duty time to something less than FedEx's current limit of 13+30. How would this apply to some of our flying? The three-leg flight NRT-ICN-TPE-HKG with a scheduled duty of 11+44 following a 45+23 layover in NRT (prng #85 June 2002 ANC bidpack) would not be permitted, as it would exceed the maximum allowed duty time of 11+30. Another three-legger, KIX-NRT-TPE-HKG with a scheduled duty of 12+44 following a 21+05 layover in KIX (prng #53 June '02 ANC bidpack), would also exceed the stated limit of 10+30 and could not be scheduled this way.

Conclusions

Please understand, I am not suggesting that we at FedEx adopt someone else's work rules. I am suggesting that we can structure our work rules in a different way to account for circadian disruption and thereby minimize its ill effects on our health and performance. The knowledge is there and we have the technology; what is missing is the overwhelming desire of our entire pilot group to make such changes to our international work rules a priority in our next contract. We cannot

rely on the FARs or, more importantly, the FAA's "political rulemaking process," used in making changes, to provide any relief in this area.

Our flight operations now encompass what is probably the most extensive international route structure in the world. Shouldn't our work rules reflect equally "leading edge" thinking as well? Only we can decide that.

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