The Irish Air Line Pilots' Association

PRESS RELEASE - Pilot Fatigue

Pilot Fatigue continues to be a contentious and emotive issue within the Aviation Industry. In recent years, in particular since 9/11, airlines have increasingly improved their ability to maximise the usage of all assets, including pilots. Whereas in the past pilots enjoyed levels of work that maintained a healthy margin to state fatigue limits, often protected by labour contracts that limited the total amount of flying, this is no longer the case. New lo-cost airlines have developed models that circumvent normal labour relations and use legal limits as targets for performance. They operate on the premise that if it is legal, in full compliance with applicable legislation, then it is de facto safe.

With the rapid expansion of the lo-cost sector in the past few years, Industry commentators such as Flight International, are now calling on Regulators to examine these airlines, to determine if the regulations are sufficiently robust to protect their pilots from fatigue, and by extension the public from risk. The industry response is to point out that they consistently operate within the constraints of those regulations, therefore are legal and safe, and that on average, airline pilots only work 18 ½ hours of flying per week, or a total of 900 hours per year (the legal maximum) . How could pilots be tired working so little?

Let us begin by looking at that figure of 18 ½ hours per week. What this figure refers to is the time spent at the controls of an aircraft, as against the time spent at work, which is usually considerably longer. It is of course reasonable to assume that if that total flying time is spread over a number of days, then one should not be overly burdened with fatigue. This is certainly true if those hours are predominantly during daylight hours with no very early or very late shifts. This however immediately leads us to wonder if the same is true if those hours occur outside normal working hours, or indeed if they are not spread out evenly over the weekly period. Now we can begin to explore whether there is any value in the statement that pilots do not experience fatigue due to their low average working hours.

Simply stated, if those 18½ hours are concentrated into a very short period, for example two successive through the night holiday charters from the UK to the Canary Islands and back, it is very possible that the pilots will be exposed to some degree of fatigue at the end of that period. In another example if all those hours are accumulated by a pilot who starts work at around 5am each day, there is ample evidence to suggest that there will exist a significant risk of fatigue by the latter part of the week. Moreover if those patterns are repeated over prolonged periods, ie. weeks or months, without adequate recuperation periods, then cumulative fatigue and even health risks begin to become a factor. It is becoming increasingly common in the low-cost sector for planners to create rosters which cram the work into shorter and shorter periods, resulting in pilots reaching the maximum limits for 28 day and annual periods well ahead of schedule, ie 100 hours in as little as 21 days, or 900 hours in just 10 months.

To understand better what constitutes a pilot's work, we will attempt to break the normal work patterns down into their constituent parts, and then reconstruct those parts into a broad overview of the demands that modern airline pilots must cope with in the course of their normal work.

To illustrate, let us examine how a pilots work could be distributed over a year long period. If we take a year of 365 days and from that subtract the legal minimum annual leave of 20 days (28 days in total- 5 days leave plus weekends) plus the allowance given to compensate for bank holidays- 9 days (13 days in total). This leaves 326 days available for work. Now subtract 8 days off per 28 days across the remaining year. 326-93=233 days available to work.

Finally reduce the available days by the average number of non-flying duties that a pilot must complete every year. 4 days simulator checks & training. 1 day groundschool, 1 day safety/security training. 233-6=227

This leaves an average daily flight total of 4 hours or 20 hours per week. Bear in mind that these are minimum figures. Average pilots employed for 5 years plus would expect annual leave of 35 – 40+ days (49-56 days free of duty) and average of 9 days of per 28 days. This increases the daily average to 4.19 or just shy of 21 flight hours per week. Of note the older, more senior a pilot is, the harder he must work to achieve his max productivity during his available period.

In order to achieve the approximate total of 4 hours of flight time per day, we can assume 4 flights of 1 hour duration (scheduled times) Add to this a minimum of 45 minutes pre-flight preparation time, a minimum of 25 minutes between flights (75 minutes total) and a minimum of 20 minutes to complete post duty paperwork, you get an average duty time of 6 hours and 20 minutes. If you work on 6 sectors of 50 minute duration, the total duty is 8 hours 10 minutes. Operations through busy hub airports such as Heathrow or Schiphol turnarounds can increase up to 1 hour, further extending the duty period. No allowance is included for breaks of any kind. It is normal for pilots to grab refreshments during quiet periods in flight or in their seat during turnarounds. So you can see that 5 days work an average can range from as little as 31 hours up to 40+hours. These calculations are also only to be compared to planned schedules. In reality pilots must regularly endure ground and air congestion which can result in delays, which can accumulate over a period of days to a significant sum.

These times are simply clock times and in no way reflect any effects that the time of day may have on the real impact of that duty. Studies such as the CAA Review of Aircrew Fatigue 2005 have shown that when a duty starts before a certain time, then it must be assumed that a certain amount of sleep has been missed, and consequently the effect of a duty on the body will feel longer by up to several hours. For example a 9 hour duty starting at 6am will have the equivalent effect on the body of approx 12 hours. Sleep value was observed to reduce by 30 minutes for every hour before 0900 report time. Similarly, studies have shown that the effect of consecutive early starts is to increase the duty period experienced. Each successive day was associated with an increase in fatigue which was equivalent to an extra 40 minutes of duty per day. Finally, in order to estimate the actual impact of a duty on a pilot's body, you must also factor in an allowance to compensate for the effects of multi-sector flying. The increase from one to four sectors was equivalent to an additional 2.77 hours on duty.

In summary, it is clear that the cumulative effect of modern lo-cost, short haul operations on a pilot's fatigue levels is extremely complex, difficult to calculate and bears little resemblance to that envisaged by the simplistic FTL rules that are currently used. Whereas it is possible that if the pilot's workload is evenly spread over a year, he may actually achieve average weekly flight totals of approximately 18-20 hours, this is not a true reflection of how hard modern airline pilots work. It should be noted that both major Irish airlines, Ryanair and Aer Lingus have applied for and been granted extensions to the weekly Duty limits for pilots, which currently stand at 60 hours of duty in any 7 days…….

A Typical day

A typical multi-sector day for a European short haul pilot begins with check-in at a crew base. Normally this occurs a minimum of 45 minutes prior to departure. With first flights now departing regularly as early as 6 am, pilots on the early shift will typically report between 0510 and 0700. During the 45 minute period, the crew will collect all the necessary paperwork for their intended duty, check computers for airport, aircraft and company messages, and conduct a briefing of the days plan. They must also conclude this process (which may have to suffice for up to six individual flights) in sufficient time to allow for transport to the aircraft (which may entail a security check) and arrive at the aircraft typically 20 minutes prior to departure. The remaining 20 minutes are spent checking the aircraft, loading navigation computers, liaising with cabin crew, ground staff and engineers. The crew will also conduct a formal briefing on the take-off and departure from the airport, and complete several checklists. At departure time the aircraft will move away from the gate, start engines and depart.

Having landed and taxied to a parking gate, the flight concludes when the engines are switched off. This is immediately followed by checklists, completion of required paperwork, loading of regularity data to company computers, and then pre-planning for the next flight. Fuel must be loaded under the direct supervision of one pilot (ie. he must stand out at the wing-fuelling point) whilst the other pilot loads the navigation computers and records relevant data. During this time the crew must also liaise with cabin crew, ground staff and sometimes engineers, as well as police, customs and airport agents. Finally they must again complete a formal briefing together and execute checklists. Typically the time on the ground is no more than 40 minutes, sometimes as short as 25 minutes. It would not be unusual for one pilot to remain in his seat for the entire duration while the other completes all the external functions. No time for refreshments or physiological breaks is allowed for.

This process is repeated after each landing. After the last arrival the crew must complete checklists, essential paperwork, download regularity data to company computers and fill out voyage reports for the day's activity. They must then return all the paperwork and company documentation to a central collection point at the airport, typically the crew base from where they started.

The workload at each point in this process is normally such that continuous steady application is required at all times. Any interruptions at all will upset the time-line and will lead to either a delay or a tendency to rush (see "hurry up syndrome"@ google). Factors which may upset the process are adverse weather, technical problems, passenger handling issues, ramp transport delays, security delays and a host of other events beyond the control of the crew. Any of these factors in isolation or in combination can lead to a rapid increase in workload and stress, and consequently lead to increases in fatigue levels.

A typical day will be followed by a rest period, defined as a period free from all duty. This does not include travel time to and from the airport. It can be as little as 10 hours, and is typically a function of time on duty previously, ie 10 or 12 hours or the length of preceding duty, whichever is longer. Bear in mind that these rules have existed from long before the concept of a commute to work existed. Where once pilots lived predominantly close to the airport at which they were based, it is now common for young pilots to live in many of the new suburban centres around Dublin, Limerick and Cork. Travel times of 1 hour by car are quite normal. Car parking at the airport has always been a major issue also. Given the lack of adequate public transport (particularly before 6 am and after 2330, it is normal for pilots to need to arrive at the airport up to 30 minutes early to ensure time to park and get to their crew base. None of these factors are taken into consideration when looking at the issue of fatigue in airline pilots, despite the obvious impact such factors have on the length of a pilots day, and his resultant time during which to avail of a sleep opportunity.

Why the need for fully alert pilots?

Lorry drivers are required to stop and rest at regular intervals. The consequences of a driver nodding off, even momentarily, are obvious. Many people assume that because of the level of automation in modern aircraft that fatigue is not such a critical issue for pilots. It is true that a large proportion of the routine operation of modern jet aircraft has been automated, reducing the required number of pilots in the cockpit in the process This automation has in turn dramatically increased the amount of monitoring activity that pilots must engage in, often for long periods. It has been shown in studies that such passive activity is tiring due to the need to maintain constant high levels of brain activity, in order for the brain to maintain its ability to recognise and compute messages from indicators and warning systems. Once fatigue begins to set in, the brain becomes less able to compute, and the pilots become more reliant on warning systems associated with nonnormal operation or deviations from planned trajectories. Bear in mind that almost all of these warning systems evolved from needs that were discovered in the process of accident investigations in years gone by. It is not the manufacturers intent that the pilots rely exclusively on the warning systems to operate the aircraft safely. Safety systems do work by and large. Accidents though are allowed to happen when a number of factors all occur simultaneously or in precise consecutive order. The alertness of the pilots is a major safety buffer in that process.

Not all operations of the aircraft can or have been automated. The take-off is always manually executed. During the take-off a very precise calculation determines the safety speed, that speed beyond which it is too fast to stop, yet just fast enough to continue to get airborne before the end of the tarmac. On every single take-off the pilots must be able to react to a critical failure within 2 seconds. This means that they must recognise, compute and decide on action within 2 seconds. This 2 second allowance is a 100% increase on the actual time given during certification by test pilots. Ordinary pilots are given a whole extra second to make this safety critical decision. Any slowness or lack of coordination on the pilot's part, may lead to a runway overrun, or in the aircraft failing to leave the ground safely in the case of an engine failure.

Once in the air the aircraft must climb to its optimum cruising level. This height is calculated based on factors such as length of flight, aircraft weight and ambient weather conditions. Typically it is in the region of 35000 feet for a modern jet aircraft. It is rare that a pilot can climb up there without restriction, due to the influence of conflicting traffic. Usually the crew must coordinate a number of step climb instructions from Air Traffic control. Each of these manoeuvres involves increasing engine power, climbing several thousand feet and then levelling off whilst awaiting a further climb instruction. At each juncture is the potential to mis-hear the instruction given or to mis-set the autopilot system. Compounding the risk factor is the potential for the Air Traffic controller to give an incorrect instruction or for another aircraft to make an error. The threat from such routine operations is that two aircraft will come into a conflict situation, either laterally or in the vertical plane. On board Airborne Collision Avoidance Systems (ACAS) monitor the aircraft position relative to other known traffic. Should a potential conflict arise, instructions are given to the pilots automatically, both aurally in the cockpit and on the instrument displays. In order to eliminate spurious or annoying warnings due to the normal close proximity of aircraft in our skies, the system is very sensitive. In the event of a real threat of collision (Resolution Advisory instructions given to pilots), the time given to the pilots to hear, see, assimilate and take action can be as little as 7 seconds, or as much as 30 seconds. In either case, pilots need to be fully alert and situationally aware at all times in order to pre-empt such drastic actions. Industry statistics show that the incidence of Traffic Advisories and Resolution Advisories continues to be a significant threat to Air Safety.

"*….in the event of a sudden change of cabin pressure, an oxygen mask will drop down on front of your face….*" All passengers will be familiar with that line in the cabin crew safety briefing. In the cockpit, a sudden loss of cabin pressure, known as a rapid decompression, will afford the pilots only seconds of useful consciousness before oxygen starvation will render them unconscious. At 35000 feet, a normal healthy non-smoker will have only 10 seconds of useful consciousness. At 41000, this time can be as little as 3 seconds. There is no time for delay. Any failure to get oxygen masks on can result in catastrophe, the Helios crash in Greece being the latest example.

Having navigated their way successfully to their intended destination, the pilots must then land the aircraft safely. It is true that modern jet aircraft can land and roll down the runway automatically. What is less known is that in order for this to happen, numerous onerous conditions must be met every time. From crew training requirements to airport equipment standards, from strict weather criteria to aircraft separation standards, the net result is that such auto-lands usually only occur in times of fog. Such are the restrictions in place before auto-land is allowable, it would be almost inconceivable that normal aviation business could continue if auto-land standards were to be employed at all times. So, the pilots must land the aircraft manually the vast majority of times. A modern jet aircraft is certified to land at up to 660 feet per minute at touchdown. Any faster a rate of closure and maintenance action is required. The international standard for instrument approaches used at almost all airports, employs an approach descent rate of between 700 and 850 feet per minute. Some airports, such as London City have approach rates of up to 1200 feet per minute. The transition from approach to landing requires exact and consistent coordination and anticipation. Too early, and the aircraft will “float” down the runway several feet above the tarmac. Most runways are on average 10000 feet or 2 miles. Normal landing speeds are in the region of 150 miles per hour, or 2½ miles per minute. Any miscalculation on touchdown dramatically increases the risk of the aircraft overrunning the runway. If the transition is left too late, it may result in a hard landing or worse a bounce which leaves the aircraft in a dangerously precarious state close to the ground. In order for a pilot to land his aircraft safely and consistently, it requires not just skill and judgement, but full alertness. Both the handling pilot and the monitoring pilot must be vigilant to detect any deviations from the intended flight path, the failure of any landing system equipment, as well as any incapacitation of the other pilot close to the ground. All of this requires both pilots to be fully alert for the entire descent, approach and landing phase of every flight.