

# Is Your HPIAM Programme Really Effective? (Part I)

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“Maui tower Aloha two forty three, we’re inbound for landing, we’re just ah to the west of Mekena, just to the east of Mekena, descending out of thirteen and we have rapid depr - we are unpressurised – declaring an emergency” [National Transportation Safety Board (NTSB), 1989, p. 164]. On 28 April 1988 approximately one-third of the upper fuselage forcibly separated a Boeing 737 whilst at 22,000 feet, resulting in the rapid depressurisation and emergency landing of Aloha Airlines Flight 234 (NTSB, 1989). This accident heightened concern over human performance issues in aviation maintenance (inspections, operational pressures, effects of shift-work), sparking the development of training to increase awareness of such issues in aviation maintenance. A further push for such training came less than one year later with the crash of Air Ontario Flight 1363 at Dryden, Ontario Canada. This training became known as Human Performance in Aviation Maintenance (HPIAM) or sometimes Human Performance in Maintenance (HPIM). Like Human Factors training on the pilot front, HPIAM contains modules examining such topics as stress, fatigue, body rhythms, information processing and decision making, effective crew co-ordination, communication and leadership. HPIAM training is aimed at reducing human error in aircraft inspection, repair and overhaul (McKenna, 2002). Since maintenance incidents have the potential to affect the airworthiness of aircraft as well as threaten the Occupational Health and Safety (OH&S) of workers, managing human error becomes paramount. But how do we know if HPIAM and other safety training is working? Is the organisation getting what it paid for? Are participants benefiting from such training? Perhaps most importantly, is training going to transfer to the line and how do we measure safety?

## **How do we measure Safety?**

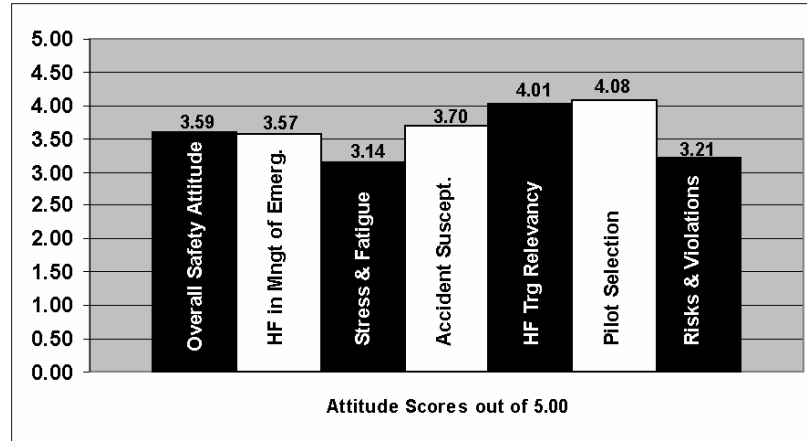
Customer satisfaction, economic goals, etc. are easy to measure (i.e. how much fuel are we saving?); but what about safety (Dekker, 2001)? Traditionally, organisations present their safety record as their pledge of alliance to safety and the health of the organisation. This method of safety measurement assumes that because an organisation has a low occurrence rate of accidents and incidents, it is safe. But is a “good” safety record a true reflection of sound training, flight safety programmes and practices, or luck? Many safety experts argue that because accidents are relatively infrequent, accident figures make a poor scientific criterion for the effectiveness of training programmes (Diehl, 1991). Since attitudes are major determinates of behaviour and performance, attitudinal measurement may be a good gauge for the evaluation of true flight safety.

## **Results from the Field**

In 2001, the authors conducted research examining pilot attitudes toward such flight safety issues as: the recognition of the effects of stress and fatigue on performance; the use of Human Factors in the management of flight emergencies; risks and violations; pilot selection; the relevancy of Human Factors training; and accident susceptibility. The voluntary study sought participants who were flight personnel during 1995 and 2000 at one representative flight school of a Canadian para-military organisation, which recently received a prestigious award for its outstanding safety record. Attitudes were measured using a customised mainstay questionnaire frequently used for research in the commercial airline industry (Helmreich, Wilhelm, & Gregorich, 1984; Helmreich, Merritt, Sherman, Gregorich, & Wiener, 1996).

### Overall Attitudes

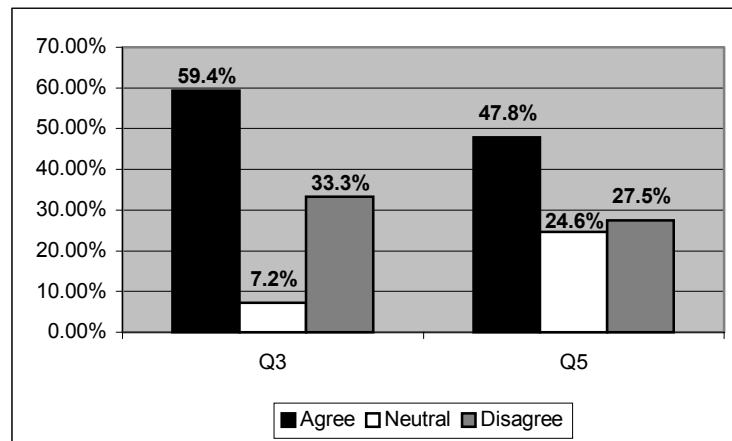
Through the analysis of information gathered, the mean overall score in terms of attitudes to safety (see Figure 1) indicated a reasonably 'good' score (3.59 out of a maximum of 5.00). Analysis of sub-totals (see Figure 1) revealed a generally positive response to questions about the usefulness of Human Factors concepts and training in flight operations. However, more detailed analysis of statistical data and participant comments revealed a number of issues in relation to attitudes that are counter-productive to flight safety and the organisational culture.



**Figure 1. Flight Safety Attitude Scores**

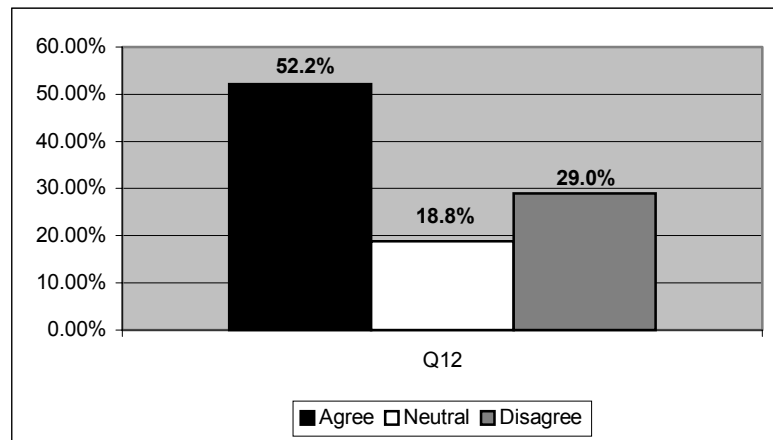
### Attitudes Toward Stress

To gain a greater insight to each sub-total, individual questions were examined. An analysis of the level of agreement to Flight Safety Attitudes Questions number 3 and 5 was examined and is presented in Figure 2. Question 3 -- "Effective aviation personnel can leave personal problems behind when in the operational environment" -- asked participants to consider the ideal standard for handling stress. A majority (59.4%) of participants believed that the professional standard, the standard to aspire to, was one of invulnerability to stress. Similar findings from research using the same question have been reported by Merritt and Helmreich (1996) and Orr and Nendick (2000). Nearly half (47.8%) of participants agreed with Question 5 -- "I can always deal with my stress." These results lend support to the possible existence of a macho and invulnerability attitude towards stress at the school.



**Figure 2. Stress: The Professional Pilot and Me**

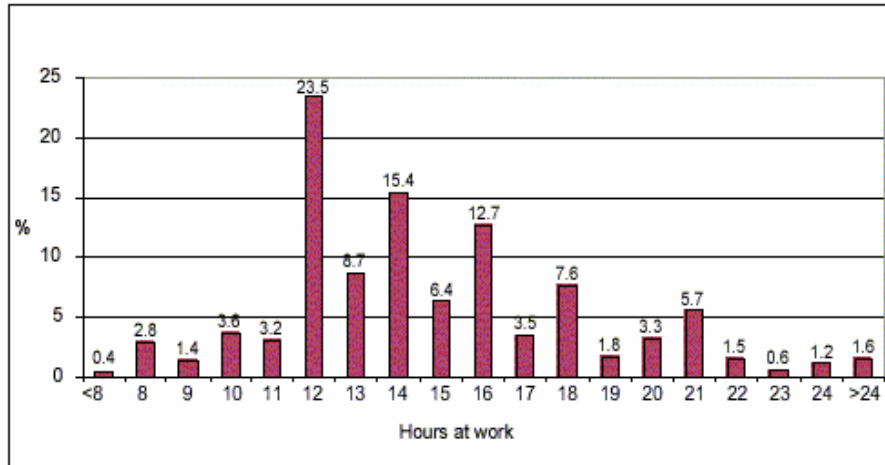
The majority of participants (52.2%) agreed with Question 12 -- “I would easily be able to tell if I were suffering from a physical problem that may affect my performance” (see Figure 3). It has been established that humans are not reliable and effective evaluators of their own stress and fatigue levels (Transport Canada, 1996; Transport Canada, 2000; Wilson, 1993), thus this result raises a level of concern. More detailed statistical analysis uncovered that pilots who were more apt to take risks and commit violations had a greater recognition of the effects of stress and fatigue on flight performance. This correlation suggests that these individuals may hold that while most people’s performance is affected by stress and fatigue, their’s is not. These results lend further support to the possible existence of macho and invulnerability attitudes present at the school.



**Figure 3. Stressors and the Pilot**

Aircraft maintenance is often a continuous 24-hour operation in the airline industry, which can often breed stress and fatigue due to pressures, etc. in the workplace and elsewhere, and complacency (due to daily repetitive tasks). A recent Australian Transport Safety Bureau (ATSB) study of regional aircraft maintenance personnel revealed that 29% of respondents reported that they were sometimes so tired at the end of a long shift “that they could not perform their tasks properly” [Civil Aviation Safety Authority (CASA), 2000]. Furthermore, a recent Federal Aviation Authority (FAA) study revealed, “More than 50 percent of respondents said they “sometimes felt fatigued at work, but only 30 percent of respondents said that fatigue had a negative effect on their job performance” [Flight Safety Foundation (FSF), 2001, p. 4-5]. These results present stress and fatigue as a major issue in aviation maintenance. When combined with the fact that many maintenance personnel do not fully recognise the impact of stress and fatigue on performance, this issue presents as a serious threat to both airworthiness and OH&S in aviation maintenance, which must be addressed.

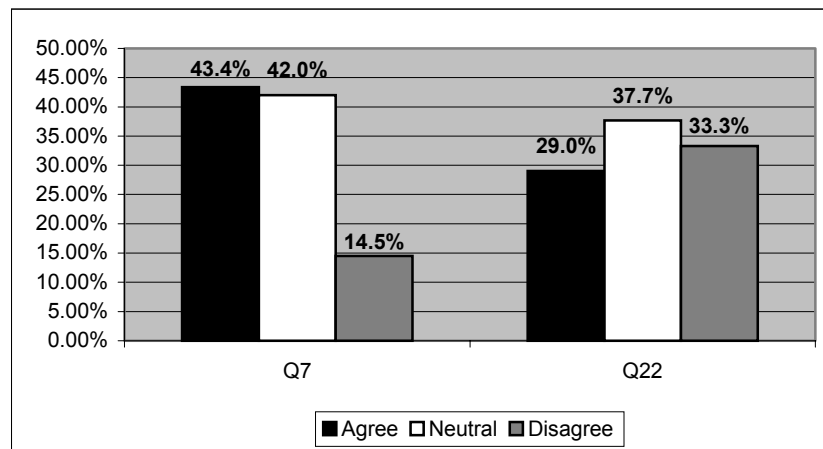
Though flight and duty times are regulated on the pilot front, this is not the case in aviation maintenance. A study for the ATSB indicated the most commonly reported duration of work was 12 hours; reported by over 23% of respondents (see Figure 4) (Hobbs and Williamson, 2000). Figure 4 also indicates that over 10% of respondents indicated that they had worked for over 20 hours at a stretch at least once in the last year. With the incentives of overtime pay and perhaps being seen as a ‘good worker’ it becomes extremely difficult to effectively manage stress and fatigue in the workplace. Along with scheduling to effectively reduce stress and fatigue in the workplace, awareness of one’s limits is a vital aid to managing stress and fatigue.



**Figure 4. Hours at work: Aviation Maintenance Personnel**

*Attitudes Toward Human Factors and Flight Emergencies*

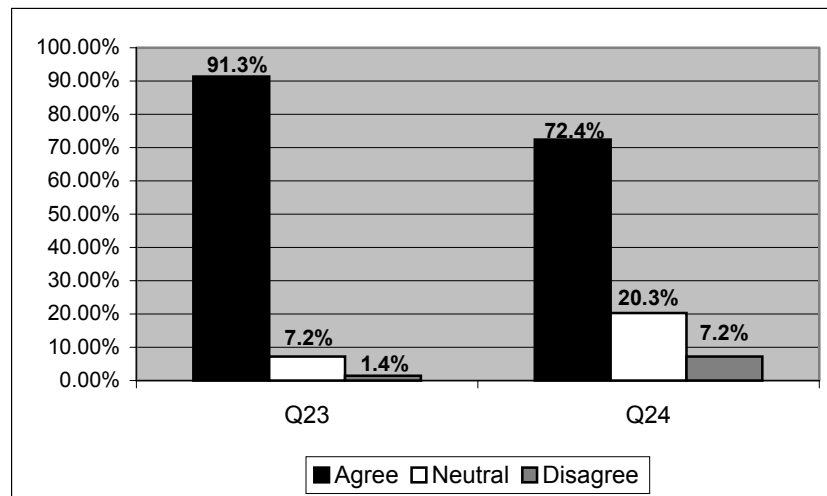
An analysis of the level of agreement to Flight Safety Attitudes Questions 7 and 22 was examined (see Figure 5) to uncover how pilots view themselves in relation to other pilots. It was observed that 43.4% of participants agreed with Question 7 -- “In a critical situation, most people forget Human Factors training and revert back to old, well-practiced ways”. However, only 29% agreed with Question 22 -- “In critical situations, I would probably forget Human Factors training and revert back to my old, well-practiced ways.” Despite the high level of neutrality in responses to both questions the results suggest that some participants held that most people would forget Human Factors training and revert back to old, well-practiced ways but that they would not. These findings suggested a possible overconfident or macho attitude present at the school. An example of a possible overconfident or macho attitude in the aviation maintenance industry is reported in a recent study by the US National Institute for Aviation Research. “Sixty-two percent of aviation maintenance personnel surveyed said they had completed a procedure in a way they considered better than the method that was described in the manual” (McKenna, 2002).



**Figure 5. Human Factors and Flight Emergencies**

### *Attitudes Toward Human Factors Training Usefulness*

An analysis of the level of agreement to Flight Safety Attitudes Question 23 -- “Overall, I feel that Human Factors training is useful” -- was examined (see Figure 6), and showed an overwhelming 91.3% of participants agreed. An analysis of Flight Safety Attitudes Question 24 -- “Most people overall, feel that Human Factors training is useful” -- was also examined (see Figure 6). 72.4% of participants agreed with Question 24, however, 18.9% fewer participants felt that most people perceived Human Factors training as useful as they did. This may indicate a visible attitude amongst a portion of the sampled population that Human Factors training is important but that some in the organisation do not perceive it as being as important as they do. Lending support to this interpretation of results, one participant commented, “I think that many people don’t consider Human Factors as big [of] an issue as I do, as I know I have flown when I probably shouldn’t have, mostly because of what an instructor would’ve said or what other students would have said.” An analysis of the level of agreement to Flight Safety Attitudes Question 13 -- “Human Factors are more important to the Unit Flight Safety Officer (UFSO) and officers in senior management positions than it is to people at the operational level” -- was also conducted and revealed an encouraging 85.5% of participants disagreed with the statement. The respondents self-report as highly favourable towards Human Factors training, but it is not a universal feeling within the organisation. Combined with participant comments, this suggests that there may be an element within the organisation with a disregard for the Human Factors aspects of flight operations, possibly displaying a macho, overconfident attitude.



**Figure 6. Human Factors Training Usefulness**

### *Attitudes Toward Regulations*

Responses to open-ended questions indicate some respondents had a concern about the violations of Canadian Aviation Regulations (CARs) and the organisation’s Standard Operational Procedures (SOPs), by undertaking manoeuvres at low altitude and the consumption of alcohol by instructors. This suggests the possible presence of an anti-authority attitude component at the school. A similar result in the aviation maintenance industry was revealed in a recent study when 34% of maintenance technicians surveyed said they had completed maintenance tasks using a method other than that specified by the maintenance manual. Ten percent said they had complied with the maintenance manual but had not consulted the manual before performing the tasks (McKenna, 2002).

**So Why the Attitudes? Look for the final part of “Is Your HPIAM Programme Really Effective?” in the next MARSS GroundEffects newsletter.**