



Federal Aviation  
Administration

# Operator's Manual

## Human Factors in Airport Operations

*September 2007*

- Procedural Compliance
- Injury Prevention
- Human Factors Training
- Fatigue/Alertness Management
- Shift/Task Turnover
- Event Investigation
- Auditing and Assessment
- Sustaining and Justifying an AOHF Program



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# INTRODUCTION

## Human Factors as Part of Your Safety Management System

Industry asked for a simple and manageable list of actions to assist with airport operations human factors (AOHF) issues. This manual is an airport operations-specific follow-up to a similar document published for maintenance. Airport operations includes, but is not limited to, ramp operations personnel, baggage and freight handlers, fuelers, deicing operators, and personnel involved in other activities happening on the ramp area, excluding maintenance.

A panel of experts selected the following important eight topics for this manual:

1. Procedural compliance
2. Injury prevention
3. Human factors training
4. Fatigue/alertness management
5. Shift/task turnover
6. Event investigation
7. Auditing and assessment
8. Sustaining and justifying an AOHF program

For each of the topics that contribute to the success of any AOHF program, this manual offers the following:

- Why the topic is important
- How to set up the program component
- How to know the program component works
- Key references and links

Like any good operator's manual, this document tells you what to do without excessive description of why you should do it. This manual recognizes that you already know the importance of human factors — a science that pays attention to physical, psychological, and other human attributes to ensure that we complete work safely and efficiently with minimal risk to personnel and equipment. The chapters contribute to the goal of creating and reinforcing a safety culture where employees practice safe habits both at work and at home. For detailed information, see the key references and website links at the end of each topic.

Operational data and practical experience from the U.S. and other countries are the basis of the eight critical topics we have selected for this manual. The U.S. Occupational Safety and Health Administration, Transport Canada, United Kingdom Civil Aviation Authority, the European Aviation Safety Agency regulations, the International Air Transport Association, and information from other entities contributed to this manual. A panel of industry and government contributors developed the topics, or steps, included in this manual. The contributors have worked in aviation maintenance and ramp operations for an average of 25 years. The contributors characterized these eight topics and related steps as "information they wish they had known years ago."

These straightforward suggestions provide the key components for setting up a successful AOHF program that will benefit your company, business partners, external customers, employees, and the entire industry. The user should keep in mind the following points when using this manual:

- These are eight topics, from many, that an AOHF program may consider.
- Topics are not necessarily in order of importance.
- You may apply any or all of the topics; however, they should be coordinated.

## INTRODUCTION

- Base your AOHF activity on the identified requirements and resources of your organization. One size does not fit all.
- The role of company leadership is critical in establishing and sustaining a human factors program.
- It is likely and encouraged that you supplement this operator's manual with additional references.
- Human factors is part of your safety management system.
- This document satisfies the industry request for a short and straightforward list of important actions.

### Why Use the Manual?

You may ask, "What is in it for me?" to use this manual. Below are some of the many reasons for using the information in this manual.

- The majority of ramp accidents and incidents involve some type of human error or violation of company policies, processes, or procedures.
- The U.S. Bureau of Labor Statistics reports that one out of 10 aviation employees suffers injuries each year, making it one of the most dangerous occupations, with a costly impact on the industry.
- Flight Safety Foundation estimates that the annual cost of employee injuries alone is \$5.8 billion for the aviation industry worldwide, with an additional \$4.2 billion in costs for ground accidents and incidents.
- The National Safety Council reports that every one dollar invested in a safety program will save a company six dollars.
- Effective human factors training improves work performance and promotes workforce physical and mental health.
- The National Sleep Foundation found that the average American worker is sleep-deprived, which can cause performance decrements similar to those caused by alcohol.
- The FAA reports that 83% of respondents to an international study on human factors reported fatigue as a safety challenge.
- Human factors programs promote necessary written and verbal communications to minimize errors resulting from task interruptions and shift turnovers.
- We learn from our actions and errors. You must establish a system to report, track, address, and monitor errors. That is the essence of a safety management system.
- Event investigation is essential to customize your human factors program to company-specific needs.
- Effective human factors programs and safety management systems require an auditing process to ensure that corrective actions are comprehensive, completed, and working.
- Cost justification helps ensure ongoing support for a human factors program.

# PROCEDURAL COMPLIANCE

## Chapter 1



# PROCEDURAL COMPLIANCE

## Chapter 1

Humans play a central role in ramp activities. They do a wide variety of jobs necessary for safe and efficient ramp operations. Occasionally, however, a worker does not or is not able to do his or her job correctly or in the required time. These human performance failures can result in a number of unwanted consequences, such as personal injury, aircraft damage, equipment damage, or flight delays.

Two major categories of human performance failures associated with ramp operations are errors and violations of company policies, processes, or procedures. We often refer to these violations as procedural non-compliance. Although errors are *unintentional* deviations from the expected action or behavior, the worker who violates policies, processes, or procedures, does so *intentionally*. Well-intentioned individuals often commit violations trying to finish a job, and not simply for comfort or to reduce workload. During ramp operations, there is an assumption that workers will follow the policies, processes, and procedures as written. When this assumption is broken, it places the whole basis of the safety system at risk.

In some cases, workers may commit violations because of factors dictated by his or her immediate situation, such as time pressures, insufficient staff, or unavailability of tools or equipment. In other cases, violations have become common practice and have become almost automatic. These routine types of violations have become the work group's normal practice, or norms — “everybody does it.” Management knows about and unofficially condones routine violations, making these violations more of a management issue than an individual worker issue. In rare cases, a worker will break rules while disregarding the consequences. Event investigation data show that violations are often contributing factors to errors, but that sometimes errors and violations work together to cause an event. For example, a worker makes an error and then violates a procedure by not conducting a final check designed to find the error.

We must eliminate violations in order to ensure safe and efficient ramp operations—regardless of the type of violation.

### 1.1 Why a procedural compliance program is important

- A. The basis of a ramp safety system is the assumption that workers will follow the ramp safety policies, processes, and procedures.
- B. The majority of ramp accidents and incidents involve some type of human error or violation, or a combination of both.
- C. Worldwide ramp accidents that result in aircraft/equipment damage cost approximately \$5 billion annually.
- D. Procedural compliance leads to the increase of personal safety and efficiency of the ramp worker and to the reduction of ramp events.
- E. The U.S. Navy found that violations were causal in 40% of maintenance-related events.
- F. A consistent procedural compliance program increases worker satisfaction through an increased perception of “fairness” in the performance evaluation process.

### 1.2 How to set up a procedural compliance program

- A. Develop and communicate a company policy that specifically states that personnel must follow all company and regulatory authority policies, processes, and procedures at all times.

# PROCEDURAL COMPLIANCE

## Chapter 1

- B. Develop and employ a reasonable, written company discipline policy to deal with procedural non-compliance and apply the policy consistently.
- C. Modify all company job descriptions to include procedural compliance as a job performance expectation, and use procedural compliance as one measure of management and worker performance.
- D. Develop and carry out human factors training specifically for front line supervisors. At a minimum, key topics should include:
  - 1. Common routine and situational violations and the reasons they occur
  - 2. The speed versus accuracy trade-off
  - 3. Error principles
  - 4. Task planning
- E. Investigate ramp incidents and accidents, identify the routine and situational violations that are causal, and develop corrective actions to prevent future violations.
- F. Develop and put into practice a procedural compliance audit program, such as the line operations safety audit (LOSA) for the ramp.

### 1.3 How to know the procedural compliance program works

- A. Injury rates decline.
- B. Aircraft and equipment damage decrease.
- C. Incident investigation findings with procedural non-compliance as a contributing factor decrease.
- D. Audit findings show a high level of procedural compliance.
- E. Worker satisfaction increases.

### 1.4 Key references and links

- A. Schmidt, J., Schmorow, D., and Figlock, R.; "Human factors analysis of naval aviation maintenance related mishaps." Proceedings of the XIVth Triennial Congress of the International Ergonomics Association and 44th Annual Meeting of the Human Factors and Ergonomics Society, July 20 - August 4, 2000, San Diego, CA. Available from <http://www.hfes.org/Publications/>.
- B. Hudson, P. T. W., Verschuur, W. L. G., Parker, D., Lawton, R., and van der Graaf, G.; *Bending the Rules: Managing Violation in the Workplace*. Leiden University and Manchester University. Available at <http://www.energyinst.org.uk/heartsandminds/docs/bending.pdf>.
- C. Energy Institute; Managing Rule Breaking tool. Available at <http://www.energyinst.org.uk/heartsandminds/rule.cfm>.
- D. Library of LOSA materials at University of Texas. Available at <http://homepage.psy.utexas.edu/homepage/Group/HelmreichLAB/Aviation/LOSA/LOSA.html>.

# INJURY PREVENTION

## Chapter 2



# INJURY PREVENTION

## Chapter 2

Injury prevention is a critically important part of an airport operations human factors program. Many of the causal factors for employee injuries are similar to those contributing to aircraft damage. Generally, preventing one also will prevent the other. Ergonomics is the name for the component of human factors related to the physical body and associated task and equipment design. Sprains and strains make up the majority of injury types for baggage and freight handlers. Establishing an ergonomics program as part of your human factors program will significantly reduce the number of injuries.

### 2.1 Why injury prevention is important

- A. Employees are the key resource in operating an airline.
- B. The 2005 U.S. Bureau of Labor Statistics report on workplace injuries and illnesses indicates that for air transportation:
  - 1. 41,000 workers were injured. This is a rate of 9.9 per 100 workers versus a private industry average of 4.6 per 100 workers.
  - 2. 30,900 workers either had a day away from work or restrictions because of injury. This is a rate of 7.5 per 100 workers versus a private industry average of 2.4 per 100 workers. The rate for scheduled air transportation workers alone was 8.0 per 100 workers.
- C. The Flight Safety Foundation estimates that the annual worldwide cost of worker injuries in aviation is \$5.8 billion.
- D. When a worker misses work due to injuries, other workers have to make up for the absent employee. This puts more stress on the remaining workers, thus increasing the chance of injury.
- E. Industry experts estimate that the direct workers' compensation costs are approximately \$1,000 per worker, per year, in a commercial aviation company.
- F. Estimates indicate that the overall cost to a company for workers' injuries is at least four times the workers' compensation direct cost.
- G. Costs do not take into account impacts to the quality of life for injured workers.

### 2.2 How to set up an injury prevention program

- A. The organization's safety policy should emphasize that employees are a key resource and that preventing injuries is critical.
- B. Integrate human factors considerations into the accident prevention program.
- C. Establish an ergonomics program.
- D. Train employees on the importance of human factors in preventing accidents.
- E. Train employees in the principles of ergonomics and proper material handling, including baggage and freight.
- F. Establish a site safety committee involving management and workers. The committee must:
  - 1. Involve the top manager at the site
  - 2. Have labor involvement

# INJURY PREVENTION

## Chapter 2

3. Include key managers from each department
4. Include key employees from each department
- G. Establish key measurements.
  1. Injury rates may include:
    - a. Number of lost days due to injury per 100 employees
    - b. Number of lost day cases per 100 employees
    - c. Number of OSHA recordable injuries per 100 employees
  2. Number of regularly scheduled safety inspections and observations, which may include:
    - a. The physical plant
    - b. Process and behavior
  3. Establish an accident investigation program involving employees to determine contributing factors. Use accident investigation findings to establish rules and procedures that reduce or eliminate hazards from the job.
- H. Communicate employee injury risk as a part of other elements of a human factors program.
- I. Include human factors in injury investigations.

### 2.3 How to know the injury prevention program works

- A. Periodically review key measurements:
  1. Employee injury rates decrease.
  2. Employee absence rates decrease.
  3. Injury investigations look at contributing human factors with sufficient detail.
- B. Management and employees discuss human factors issues in crew meetings.
- C. Safety committee minutes reflect human factors considerations in discussions.
- D. Program objectives focus on both employee injury reduction and prevention of equipment damage.

### 2.4 Key references and links

- A. U.S. Department of Labor, Bureau of Labor Statistics (2006); *Workplace Injuries and Illnesses in 2005*, "Table 1. Incidence rates (1) of nonfatal occupational injuries and illnesses by industry and case types, 2005." Available at <http://www.bls.gov/iif/oshwc/osh/os/osnr0025.txt>. "Table SNR02, Highest incidence rates of nonfatal occupational injury and illness cases with days away from work, restricted work activity, or job transfer, private industry, 2005". Available at <http://www.bls.gov/iif/oshwc/osh/os/ostb1476.pdf>.
- B. National Safety Council; *Accident Prevention Manual, Administration & Programs, 12th edition*. Available at <https://secure.nsc.org/onlinecart/searchresults.cfm>.
- C. U.S. Department of Labor (2003); Ergonomics eTools on Baggage Handling. Available at <http://www.osha.gov/SLTC/etools/baggagehandling/index.html>.

# HUMAN FACTORS TRAINING

## Chapter 3



# HUMAN FACTORS TRAINING

## Chapter 3

Research and experience have shown that human factors training can address many of the issues that contribute to events. Training provides the knowledge to understand important principles and procedures and to integrate them into the work environment. Training can promote awareness and affect attitude. It reduces costs associated with human performance issues.

### 3.1 Why human factors training is important

- A. Human factors training contributes to the goal of creating and reinforcing a positive safety culture where employees practice safe habits at work and at home.
- B. Human factors training for leadership and the workforce is a critical and cost-effective first step in identifying methods to recognize, understand, and manage human performance issues.
- C. Effective human factors training improves work performance and promotes workforce physical and mental health.
- D. Initial and recurrent training on new regulations, procedures, and equipment are opportunities to reinforce awareness of the human factors issues that affect job performance. Business partner (for example, service providers, contractors) personnel also require this training.
- E. Human factors training is essential to understanding the contributing factors to events.
- F. When equipment and procedures are complicated, the human is the last line of defense for safety, efficiency, and injury prevention.

### 3.2 How to set up a human factors training program

- A. Human factors experts have identified the following key topics often introduced in a human factors training program:
  - 1. General introduction to human factors
  - 2. Safety culture and organizational factors
  - 3. Human error—error principles, event investigation, and case studies
  - 4. Human performance and limitations, to include ergonomics
  - 5. Environmental considerations
  - 6. Procedures, information, tools, and task sign-off practices
  - 7. Planning for tasks, equipment, and spares
  - 8. Communication
  - 9. Teamwork
  - 10. Professionalism and integrity
  - 11. Shift and task turnover
  - 12. Fatigue management and fitness for duty
- B. Determine training requirements and company priorities to map to the key topics listed above. Data from event investigations are an ideal means to define training requirements.

# HUMAN FACTORS TRAINING

## Chapter 3

- C. Work to ensure cooperation among workforce, management, and service provider personnel.
- D. Integrate training with a system-wide human factors plan.
- E. Decide on content and delivery technique matched to audience requirements.
- F. Decide on whether to use an internal or external provider.
- G. Deliver initial training and begin planning for recurrent training.
- H. Measure the effects of training, provide feedback to the instructors and management, improve training, and measure the effects again.

### 3.3 How to know the human factors training program works

- A. Management and the workforce accept and approve the training.
- B. Pre- and post-training evaluations and workplace discussions from trainees show positive trends.
- C. Event investigations show a reduction in the number of human factors-related contributing factors. However, you can expect an increase in reported events at first because of improved awareness.
- D. Injuries and equipment damage show a reduction.
- E. Targeted areas show improvement of work performance.
- F. Demonstrated employee behavior change regarding safety awareness and practices.
- G. Increased requests for more/recurrent training.

### 3.4 Key references and links

- A. Air Transport Association (1989); *Spec 104: Guidelines for Aircraft Maintenance Training*. Washington, DC: Air Transport Association. Available from <http://www.airlines.org/products/pubs/>.
- B. Federal Aviation Administration (2000); Advisory Circular 120-72, *Maintenance Resource Management Training*. Available at [http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/0/3E5EC461ECF6F5E886256B4300703AD1?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/3E5EC461ECF6F5E886256B4300703AD1?OpenDocument).
- C. International Civil Aviation Organization (1998); *Human Factors Training Manual Doc 9683-AN/950*. Available from <http://www.icao.int/anb/humanfactors/Documents.html>.
- D. Weener, E., Flight Safety Foundation; "Ground Accident Prevention – The Foundation's Answer." Presentation by Flight Safety Foundation at EASS Amsterdam, March 13, 2007. Available at [http://www.flightsafety.org/ppt/gap\\_eass07.ppt](http://www.flightsafety.org/ppt/gap_eass07.ppt).

# FATIGUE/ALERTNESS MANAGEMENT

## Chapter 4



# FATIGUE/ALERTNESS MANAGEMENT

## Chapter 4

Proper rest contributes to your health and emotional well-being. Proper rest is a critical prerequisite to safe and efficient performance in all aspects of airport operations. Whether you are lifting bags, operating ramp equipment, or interacting with customers, proper rest is important.

Many factors can cause fatigue, including physical and mental exertion, and lack of proper sleep. We can also call fatigue issues "alertness" issues, because alertness includes a wide range of factors associated with human fitness for duty.

Airport operations personnel who have worked extended hours recall that they were fatigued more than they remember the work they performed. The entire workforce is susceptible to errors induced by fatigue. The National Sleep Foundation found that the average American sleeps only 6.9 hours on weeknights and that a sleep problem affects close to 70 million people. To make matters worse, the workforce does not recognize being fatigued and compensate their work behavior accordingly.

Fatigue/alertness management programs are generally voluntary. Nevertheless, fatigue/alertness management is an important component of a human factors program.

### 4.1 Why fatigue/alertness management is important

- A. Longer commutes, extended shifts, double and triple shifts, shift swapping, and second jobs impose greater demands on the workforce and reduce the amount of available time to sleep.
- B. Reduced numbers of airport operations personnel, with growing demands, result in increased workload on remaining workers.
- C. Fatigue affects emotional, physical, and mental capabilities.
- D. Fatigue causes performance decrements similar to those caused by alcohol.
- E. Few regulations adequately address the issue of alertness.

### 4.2 How to set up a fatigue/alertness management program

- A. Seek expertise to develop, set up, and measure the effectiveness of the program.
- B. Fatigue/alertness management programs must adjust to shift rotation patterns, worker schedules, and local circumstances.
- C. Encourage workforce participation and input.
- D. Consider fatigue issues during event investigations.
- E. Design and use fatigue/alertness management awareness training.

### 4.3 How to know the fatigue/alertness management program works

- A. Absenteeism and sickness lessen, and there are fewer injuries.
- B. Rework and errors decrease.
- C. Self-awareness of fatigue increases.
- D. Events related to fatigue/alertness show a reduction.

# FATIGUE/ALERTNESS MANAGEMENT

## Chapter 4

### 4.4 Key references and links

- A. International Civil Aviation Organization (2003); "Possible fatigue management interventions," *Human Factors Guidelines for Aircraft Maintenance Manual, Doc 9824*, Appendix H, Chapter 3. Available from <http://www.icao.int/anb/humanfactors/Documents.html>.
- B. Johnson, W. B., Mason, F., Hall, S., and Watson, J. (2001); *Evaluation of Aviation Maintenance Working Environments, Fatigue, and Human Performance*. Washington, DC: Federal Aviation Administration. Available at <http://www.hf.faa.gov/hfmaint/Default.aspx?tabid=195>.
- C. Dawson, D., Fletcher, A., and Hussey, F. (2001); "Beyond the midnight oil." Proceedings of the 15th Annual FAA Symposium on Human Factors in Aviation Maintenance and Inspection. Available at <http://www.hf.faa.gov/hfmaint/Default.aspx?tabid=195>.
- D. National Sleep Foundation. Information available at [www.nationalsleepfoundation.org](http://www.nationalsleepfoundation.org).
- E. Rosenkind, M.R., et al (1996); "Managing fatigue in operational settings 1: Physiological considerations and countermeasures" and "Managing fatigue in operational settings 2: An integrated approach", *Behavioral Medicine, Vol. 21, Winter 1996*.

# SHIFT/TASK TURNOVER

## Chapter 5



# SHIFT/TASK TURNOVER

## Chapter 5

Shift and task turnover are critical periods in all airport operations activities because workers relay crucial information for ending a shift or task and starting another. Efficient and effective turnovers require adherence to policies, procedures, planning guidelines, teamwork, and effective communication practices. In fact, the arrival and departure of aircraft throughout the day represents the potential for multiple turnovers that can result in a communication breakdown.

The classic challenges associated with fatigue, distraction, false assumptions, personnel conflicts, cultural prejudices, and failure to properly document can negatively affect the quality of shift turnover as well as task turnovers within shifts. Event investigations have shown that inadequate information exchange during shift and task turnovers can have serious consequences such as personnel injury and equipment damage.

### 5.1 Why a shift/task turnover process is important

- A. Data show that a poor shift/task turnover process is a common contributing factor to events.
- B. Challenges related to shift/task turnover include:
  - 1. High demand for teamwork and interpersonal communication skills, which are often lacking
  - 2. Shared responsibilities among airline departments and service provider personnel, increasing the potential for gaps in communication
  - 3. A high risk and complex physical environment, with many tasks and short timeframes
  - 4. Difficulty of establishing structured and standardized policies and procedures
  - 5. Use of a location that is conducive for discussion and planning
  - 6. Inadequate verbal or written communication
  - 7. Workers finishing their shift are tired and want to depart the airport property
  - 8. Lack of adequate shift overlap to provide time to give one-on-one briefings between the team leaving and the team coming on
  - 9. Minimal training on procedures for shift/task turnover
- C. High-quality shift/task turnover procedures improve safety and accountability to all involved in the work.

### 5.2 How to set up a shift/task turnover process

- A. Create and instill standard policies, procedures, and protocol.
  - 1. Formalize policies and procedures that make the turnover as important as the work.
  - 2. Develop, improve, and enforce policies and procedures.
  - 3. Use event investigation results to show workforce errors in shift/task turnover.
  - 4. Communicate policies and procedures to all personnel.
  - 5. Consider best practices documents for shift/task turnovers.
  - 6. Ensure that all service provider personnel receive training on company procedures.

# SHIFT/TASK TURNOVER

## Chapter 5

- B. Provide a time and place for formal shift/task turnover that accounts for normal and irregular operations.
  - 1. Dedicate a location for shift turnover meetings that is clean, comfortable, and relatively free of distractions. Provide access to computers and data sources, if appropriate.
  - 2. Include a dedicated time for a proper shift turnover within the employee's shift.
  - 3. Carry out the task turnover as close as possible to the task site.
- C. Ensure the quality of shift/task turnover information.
  - 1. Standardize verbal and written communications.
  - 2. Ensure consistent level of detail in the turnover process.
- D. Deliver initial and recurrent training on how to conduct a good shift/task turnover.
  - 1. Emphasize the criticality of shift/task turnover and its impact on continuing safety.
  - 2. Emphasize use of checklists, shift status reports, and applicable shift/task turnover documents.
  - 3. Define and train for acceptable communication practices.
  - 4. Describe how to conduct and participate in turnover meetings.

### 5.3 How to know the shift/task turnover process works

- A. Audit findings show fewer errors and increased positive performance.
- B. Amount of personnel injury and rework show a reduction.
- C. There is an improvement in the quality of the documentation for describing both the shift and task turnover processes.
- D. Employees and management notice improvement in communication and cooperation between and among shifts. There is less "blaming the other shift."

### 5.4 Key references and links

- A. Maddox, M. E. (1998); *Human Factors Guide for Aviation Maintenance – Chapter 4: Shiftwork and Scheduling*. Washington, DC: Federal Aviation Administration. Available at <http://www.hf.faa.gov/hfmaint/Default.aspx?tabid=195>.
- B. Jiang, X., Master, R., Kelkar, K. and Gramopadhye, A. K. (2002); "Task analysis of shift change activity in aviation maintenance environment: Methods and findings," *Human Factors and Aerospace Safety*, 2(1), 45-69. Available at <http://www.hf.faa.gov/hfmaint/Default.aspx?tabid=195>.
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# EVENT INVESTIGATION

## Chapter 6



***Investigation showed failure to comply with procedures.***

# EVENT INVESTIGATION

## Chapter 6

The purpose of an event investigation process is to manage the risks from events caused by human actions that may affect flight safety, personal injury, and equipment damage. An error is a human action that unintentionally deviates from the required, intended, and expected action. A violation is a human action that intentionally deviates from company or regulatory policies or procedures.

Event investigations help organizations identify and understand multiple contributing factors to errors and violations. Examples include hard-to-understand procedures, time pressures, task interruptions, poor communication, and a variety of additional workplace and life conditions. The identification of contributing factors provides an organization with a specific focus to prevent future events. Often, event investigation systems are part of a company's overall safety management system.

### 6.1 Why event investigation is important

- A. Flight Safety Foundation estimates that the cost of employee injuries alone is \$5.8 billion a year for the aviation industry worldwide, with an additional \$4.2 billion in costs for ground accidents and incidents.
- B. Effective event investigation programs help identify and communicate threats or contributing factors to errors and violations in order to create corrective actions to prevent future events.
- C. Event investigation is a primary requirement for identifying and communicating human performance issues within the organization.
- D. Event investigation is a key part of a safety management system, required by many national aviation authorities.

### 6.2 How to set up an event investigation process

- A. Clearly identify ownership of the process by selecting a manager or department to be responsible and have authority for the process.
- B. From the beginning, ensure that the program is a cooperative endeavor of labor, management and, if appropriate, the regulator.
- C. Select an investigation process that systematically determines the threats or contributing factors to events, and based on these findings, develop and monitor a comprehensive fix.
- D. Write and communicate policies and procedures needed for the event investigation process.
- E. Consult applicable guidance on voluntary reporting systems.
- F. Develop and conduct a reasonable and consistent disciplinary policy (a "just culture").
- G. Determine which events to investigate based on best value to your safety management system.
- H. Establish training for the investigative process to ensure consistent and accurate data collection.
- I. Establish a team to review the investigation findings, select areas for improvement, and create an action plan for each area. Communicate the findings and proposed action plans to the workforce. Follow up to address needed improvements.
- J. Use newsletters, company or labor websites, e-mail, crew meetings, and posters to communicate the status of improvements in progress and to show that the team is tracking progress to completion.

# EVENT INVESTIGATION

## Chapter 6

- K. Create a database for documenting investigation information and measures of change. Classify events and contributing factors according to a standardized system in order to analyze, summarize, and trend data.
  - 1. The ramp error decision aid (REDA) is an example of an existing classification tool.
  - 2. An example of a tool to measure behavior change is the ramp operations safety audit, where peers rate peers on the manner in which they conduct work. This tool reveals both good practices and poor ones.
- L. Use risk assessment techniques to quantify specific event likelihood and severity.
- M. Evolve the system to include reporting of potential events, often called “near misses.”

### 6.3 How to know the event investigation process works

- A. Event investigations help identify and understand the threats (contributing factors), and the necessary improvement strategies or countermeasures for these threats.
- B. The error management process manages and reduces the consequences and likelihood of future occurrences.
- C. The investigation system detects and corrects deviations from existing procedures.
- D. There is a decrease in the number of events caused by human performance factors.
- E. The operator saves time and money by reducing personnel injuries, interruptions to revenue flights, and equipment damage.
- F. Throughout the airport organization, personnel discuss events, threats and error management, and corrective actions.
- G. Results from an internal audit are positive and there is greater adherence to regulatory guidelines.
- H. All parties increasingly accept voluntary reporting systems.

### 6.4 Key references and links

- A. Federal Aviation Administration (2002); Advisory Circular 120-66B, *Aviation Safety Action Program (ASAP)*. Available at [http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/ACNumber/61C319D7A04907A886256C7900648358?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/ACNumber/61C319D7A04907A886256C7900648358?OpenDocument).
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# AUDITING AND ASSESSMENT

## Chapter 7



# AUDITING AND ASSESSMENT

## Chapter 7

A human factors program will yield numerous benefits to any organization. To gain the full value of such a program, the organization needs a system to measure its effectiveness or evaluate its internal processes, or both. Audit programs are a means to measure an organization in a proactive way, independent of a specific event that would trigger an investigation. The audit process is an essential element of a safety management system.

There are many types of programs for conducting audits with various names. A quality assurance department, whose sole purpose is to audit the compliance of the organization's procedures and processes, is one example. Some organizations have safety departments, which conduct surveys or audits, or both, to measure the effectiveness of human factors programs. A line operations safety audit (LOSA) is a program used mostly by flight departments that use peer auditors to note strengths and weakness in job/task performance.

### 7.1 Why auditing and assessment are important

- A. Internal audits are an important part of a safety management system, which is an International Civil Aviation Organization (ICAO) requirement by 2009.
- B. Understanding of best practices and potential risks increases.
- C. The assessment can uncover and correct deviations from existing procedures.
- D. Motivate personnel to discuss events, contributing factors, and corrective actions.
- E. Encourage participation and reporting in voluntary disclosure programs.

### 7.2 How to set up an auditing and assessment program

- A. Use the appropriate department's audit process.
- B. Use safety department's survey or audit process.
- C. Establish a line observation safety audit program.
- D. Establish a voluntary reporting program.
- E. Assess everyday processes to understand the potential risks and develop corrective actions to reduce the likelihood of future occurrences.
- F. Establish a comprehensive tracking program to collect, report, and trend audit data.

### 7.3 How to know the auditing and assessment program works

- A. Safe behaviors improve.
- B. Productivity increases.
- C. Employee injuries show a reduction.
- D. Mishaps decrease.
- E. The operator saves time and money by decreasing interruptions to revenue flights, rework, personal injuries, and equipment damage.
- F. Internal assessments show positive results and there is greater adherence to policies and procedures.

# AUDITING AND ASSESSMENT

## Chapter 7

### 7.4 Key references and links

- A. Federal Aviation Administration (2002); Advisory Circular 120-66B, *Aviation Safety Action Program (ASAP)*. Available at [http://www.airweb.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rqAdvisoryCircular.nsf/ACNumber/61C319D7A04907A886256C7900648358?OpenDocument](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rqAdvisoryCircular.nsf/ACNumber/61C319D7A04907A886256C7900648358?OpenDocument).
- B. The Boeing Company; *Ramp Error Decision Aid (REDA) Users Guide* and *REDA Results Form*. Available at <http://www.hf.faa.gov/hfmaint/Default.aspx?tabid=392>.
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# SUSTAINING AND JUSTIFYING AN AOHF PROGRAM

## Chapter 8



***Collaboration ensures airport operations human factors success.***

# SUSTAINING AND JUSTIFYING AN AOHF PROGRAM

## Chapter 8

The first seven topic areas of this document recommended specific actions. The topics of sustaining and justifying are general and apply to all aspects of an AOHF program. AOHF programs may get off to a good start but then struggle over time. Challenges to sustaining a program include:

- Changes in management policies and projects
- Lack of cost justification
- Limited program integration

The ideas presented here help sustain multiple AOHF initiatives and provide a straightforward consideration of cost justification.

### 8.1 Why sustaining an AOHF program is important

- A. Benefits of an AOHF program are seldom immediate. You need to have a long-term commitment to the program to see results.
- B. A long-term sustained program is necessary to create and maintain culture change.
- C. Motivation and enthusiasm for programs will subside if programs are constantly changing like a “flavor of the month.”
- D. You must sustain programs long enough to collect measurement data and demonstrate a return on investment (ROI).

### 8.2 How to sustain an AOHF program

- A. Start with a program plan that has sufficient detail to secure a policy-level commitment from leadership in addition to workforce buy-in.
- B. Establish an interdepartmental steering committee to develop and monitor planning and establishment of the AOHF program. The steering committee is a collaborative effort between labor and management.
- D. Ensure that the program plan is consistent with corporate mission, values, policies, procedures, and corporate viability.
- E. Ensure that all parties can share one another's success stories. Communicate and celebrate these successes.
- F. Build an individual-level and team-level recognition system that acknowledges everyone's efforts to improve the system.
- G. Prepare for occasional setbacks. Examine each setback seriously and develop timely recovery strategies so that it does not jeopardize the entire program.
- H. Conduct regular meetings (not one-way briefings) between leadership and workforce to share goals, successes, and lessons learned.
- I. Have more than one human factors champion to ensure a smooth transition in the event of staff promotions, reductions, and leadership changes.
- J. Establish the programs on a reasonable, consistently applied, written company disciplinary policy.
- K. Organize and participate in human factors seminars and workshops to keep the program fresh and energized.

# SUSTAINING AND JUSTIFYING AN AOHF PROGRAM

## Chapter 8

### 8.3 How to know the AOHF program works

- A. There is an increase in employee attitudes toward safety, months after the initial training.
- B. Leadership supports system-wide improvements by consistent follow up.
- C. Trust between the workforce and leadership increases.
- D. The workforce is more involved and shares ideas for improvement.
- E. Voluntary workforce error disclosures increase. Note that increased reporting may appear to increase "errors." Be sure not to equate these two.
- F. Repetitive errors and rework decrease.
- G. There is high interest in event investigation results and AOHF initiatives.
- H. There is an increase in positive feedback on the AOHF initiatives from all levels of the organization.
- I. Positive responses on annual employee surveys increase.

### 8.4 Why cost justification is important

- A. Since AOHF programs are not regulatory, they must demonstrate safety and cost payback.
- B. When cost reduction is a factor, AOHF programs will only continue with demonstrated results.
- C. Continued injury and damage reduction will lower costs, but you must present these cost savings.

### 8.5 How to quantify AOHF investments for cost justification

- A. Useful cost justifications must be straightforward and easy to understand. They do not require an economist.
- B. Use small examples to calculate the return on human factors. Many small improvements add up and translate to big savings on big human factors projects.
- C. Use data from the event investigation system described in chapter six.
- D. How to calculate a return on investment (ROI) of a specific airport operations-related event:
  - 1. The basic equation for ROI is simple: merely divide benefit by cost.
  - 2. Estimate the annual cost of a particular type of event, personal injury or equipment. Call this "cost."
  - 3. Determine the contributing factors to the event and estimate the cost to mitigate these factors. Keep it simple and call this "cost to fix."
  - 4. Estimate a reasonable "probability of success" that the interventions will be successful. Say, for example, that you estimate an 80% success rate.
  - 5. Multiply "cost" by "probability of success." The result is the "return."
  - 6. Divide ("return" minus "cost to fix") by "cost to fix." This is the ROI.It may not be possible to achieve a positive ROI (>1.0) within the first year.

# SUSTAINING AND JUSTIFYING AN AOHF PROGRAM

## Chapter 8

### 8.6 Key references and links

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## ACKNOWLEDGMENTS

The following individuals participated in the working group:

**William R. Carlyon**

Program Manager, EH & S Support, Commercial Aviation Services  
The Boeing Company

**Jennifer M. Ciaccio**

Management and Program Analyst  
Federal Aviation Administration

**J. L. Cole**

ATA Executive Planner and Liaison for JPDO  
Air Transport Association

**Pierre C. Dugan**

Management Consultant  
F & H Solutions Group

**Doc Garrett**

**Senior Manager, Maintenance Human Factors**  
Continental Airlines

**Kenneth R. Hutcherson**

Manager Air Operations, Maintenance & Ground Safety  
FedEx Express

**William B. Johnson, Ph. D.**

Chief Scientific and Technical Advisor  
Federal Aviation Administration

**Gerald B. McGill**

Regional Manager, Corporate Safety  
Continental Airlines

**Miguel Pumariega**

System Safety Chairman  
Transport Workers Union of America, AFL-CIO and American Airlines

**Robert Royal**

Manager, Safety & Regulatory Compliance  
DAL Global Services

**Guy Schroeder**

Director Ground Safety, Safety & Regulatory Compliance  
Continental Airlines

**Steven Sogg**

Associate Technical Fellow, Maintenance Engineering Technical Services  
The Boeing Company

## ACKNOWLEDGMENTS

The committee acknowledges the contributions of the following individuals:

**John J. Hiles**

Aviation Safety Inspector  
Federal Aviation Administration

**William L. Rankin, Ph. D.**

Technical Fellow, Lead, Maintenance Human Factors  
The Boeing Company

The committee appreciates photographic contributions from the following organizations:

The Boeing Company

Continental Airlines

FedEx Express