HELICOPTER TRAINING TOOLKIT

U.S. JHSIT

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FORWARD

The 2005 International Helicopter Safety Symposium marked the beginning of an international effort by the helicopter industry to reduce the accident rate by at least 80% by 2016. The International Helicopter Safety Team (IHST) was formed to lead efforts toward reaching the objective.

The IHST formed two teams, first the Joint Helicopter Safety Analysis Team (JHSAT) to analyze the accident history and provide recommendations to reduce the accident rate. The second team, the Joint Helicopter Safety Implementation Team (JHSIT) uses the recommendations to develop cost-effective strategies and action plans to reduce accidents.

IHST includes associations such as Helicopter Association International (HAI), European Helicopter Association (EHA), European Helicopter Operators Committee (EHOC), Cooperative Development of Operations, Safety and Continuing Airworthiness Project (COSCAP) of the International Civil Aviation Organization (ICAO), Helicopter Association of Australasia, Centro de Investigação e Prevenção de Acidentes (CENIPA) of Brazil, American Helicopter Society International (AHS), Airborne Law Enforcement Association (ALEA), Air Medial Operators Association (AMOA), Association of Air Medical Services (AAMS), International Association of Oil and Gas Producers (OGP), Tour Operators Program of Safety (TOPS), military organizations, aircraft and engine manufacturers, the insurance industry, helicopter industry customer base, and line personnel.

The JHSAT's initial report provided recommendations directed at specific missions as well as the worldwide helicopter fleet. One of the key JHSAT findings was a need to develop and implement a standard for pilot training focusing on operational specific scenarios, human factors, and the use of simulators and flight training devices (FTDs).

This document represents a JHSIT implementation tool designed to assist organizations in understanding the fundamentals of effective training and serves as a guide in implementing a functional training department for small to medium size organizations. This document also provides a list of resources for outsourcing effective training for all sizes of operations.

Examples, tools and resources are accessible on the IHST website http://www.ihst.org.

Refer to the Resource Guide in Appendix 5 of this document for an itemized list of available resources.

EXECUTIVE SUMMARY

Based on the findings of the U.S. Joint Helicopter Safety Analysis Team (USJHSAT) report issued in 2007, there is a need to improve training programs to reduce accidents. This toolkit addresses some of the issues uncovered in the report and serves as a guide to establishing, developing and maintaining an effective training program. It also provides guidance in identifying and utilizing training aids, training devices, and simulators to improve aircraft and mission specific proficiency. Implementing the Training Toolkit will improve training effectiveness and improve safety by both preventing accidents and mitigating the severity of accidents.

Chapter 1 outlines the standards for pilot training in various types of operations from the original helicopter rating through the various career paths to mission-specific operations. The recommendations are a result of the 2007 JHSAT reports.

Chapter 2 outlines the procedures and requirements for establishing a professional training department within an operation. The procedures are appropriate for any type of dedicated training department. The process summarizes the organizational structure and the required elements for building, developing and maintaining a training department that goes beyond the recommendations in FAA Part 135.

Chapter 3 discusses the specific courses and an outline of what material should be included in each course. The chapter describes the subject matter and procedures for teaching human factors, technology and aircraft specific courses. There is also discussion on instructing both flying and non-flying crew, as well as maintenance and dispatch personnel. The method for developing scenario based training is also described.

Chapter 4 provides insight into different strategies for conducting training to maximize learning. It is based on proven techniques used by professional educators. It provides strategies for improving the quality of training and techniques for train the trainer programs.

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INTRODUCTION

The JHSAT analyzed reported helicopter accidents as recorded in the NTSB's U.S.A. database. The JHSAT found that contributing factors in many accidents were the *lack of standardized training, lack of simulator availability for single engine operations, lack of operational specific training scenarios and a lack of human factors training.* Due to the deficiency in effective training, including standardization and availability, operators did not adequately provide training and training opportunities to their pilots.

This toolkit will help small and medium size operators develop an effective training program that will show a return on investment, and/or cost effectiveness from both financial and safety perspectives. It will help organizations develop effective training that is designed to fit the size, nature and specific operation of their organization. This toolkit provides easy-to-use guidance and methods that will assist in developing an organized approach to pilot training that are proven to prevent accidents. Organizations that adopt the processes outlined in this toolkit will benefit from the increased skill level of the pilots, reduced costs associated with incidents and accidents, and benefit from improved retention of personnel. The training recommendations in this document are economically viable and operationally appropriate to the individual operating environment and mission.

This toolkit is meant to assist in establishing, developing and maintaining a training department, and enhancing an existing training department and/or effectively utilizing third party training options.

CHAPTER 1
TRAINING TOPICS

Academic Topics

The following are academic subject areas, for which pilots must have a fundamental knowledge and understanding of to conduct safe and efficient ground, pre-flight, and flight procedures in the helicopter. The pilot should be able to list operating limitations, describe the operation and function for each of the helicopter's systems, use the Aircraft Flight Manual (AFM) to obtain necessary information for safe and efficient operation of the helicopter, including charts:

1. aircraft operating systems
2. performance planning (takeoff, cruise, landing and special missions)
3. emergency procedures (including memory required procedures)
4. standard operating procedures
5. basic instrument procedures
6. aircraft regulations specific to helicopter operation
7. operating procedures in the national air traffic control system
8. weather analysis for safe flight operations
9. minimum equipment list use (MEL)
10. proper use of helicopter avionics
11. special avionics and communication systems installed (supplements)
12. risk analysis/avoidance
13. principles of crew or single pilot resource management (CRM/SRM)
14. Airmanship, judgment & decision making fundamentals

Flight Skills

The following are flight operations skills that the pilot must master to safely operate the helicopter throughout all types of missions.

1. safe helicopter control in all phases of flight
2. application of performance planning into flight operations
3. knowledge and use of emergency procedures
4. use of standard operating procedures (SOP)
5. flying with reference to flight instruments (IFR flight)
6. use of MEL to determine if flight may be conducted or continued
7. use and testing of helicopter avionics: communications and navigation equipment
8. risk analysis in flight
9. in flight application of crew or single pilot resource management (CRM/SRM) principles
10. in flight application of airmanship, judgment & decision making principles

Special Emphasis

The areas of special emphasis during training have been identified as those areas where accidents can occur if the pilot is not appropriately trained. These areas should be emphasized during training and require proficiency at the initial certificate training and all recurrent and flight review training.

- Autorotation
- LTE -Loss of tail rotor effectiveness
- Aircraft performance capabilities & limitations

- Helicopter emergencies & emergency procedures as outlined in the aircraft flight manual
- Inadvertent flight into instrument meteorological conditions (IIMC)
- Make & model transition training
- Aeronautical Decision Making (ADM) & risk management
- Model-specific power & energy management
- Quick stop maneuvers
- Landing practice in unimproved areas, on landing platforms & pinnacle approaches

In-flight Emergencies
Extensive initial & recurrent training includes helicopter emergencies as outlined in the FAA Rotorcraft Flying Handbook and Emergency Procedures as outlined in the aircraft-specific Rotorcraft Flight Manual. Specific areas for emergency training must include:

- Autorotation
- Vortex ring state (settling with power)
- Dynamic rollover
- Systems and equipment malfunctions
- LTE – Loss of tail rotor effectiveness

Initial & Recurrent Training
Extensive initial & recurrent training includes recommended procedures and airspeeds for emergency situations as outlined in the aircraft-specific Rotorcraft Flight Manual. The use of simulators and ground instruction is highly recommended to improve the effectiveness of emergency training. The use of risk analysis tools and crew resource management skills are necessary components in human factors training.

Human Factors
Training programs are expanded to include Aeronautical Decision-Making (ADM) and Risk Management as outlines in the FAA Rotorcraft Flying Handbook.

Aircraft Performance and Limitations
Comprehensive training focuses on aircraft performance, capabilities and limitations as per the aircraft specific Rotorcraft Flight Manual. Initial and recurrent training should include the use of that information in preflight planning and in-flight decision making.

Inadvertent Instrument Meteorological Conditions (IIMC)
Comprehensive training on inadvertent flight into instrument meteorological conditions (IIMC) is necessary for all rotorcraft training. This training includes:

- Determination of enroute weather
- Avoidance of inadvertent flight into instrument meteorological conditions
- Recovery from inadvertent flight into instrument meteorological conditions
- In-flight weather abort procedures

The use of simulators and ground instruction is highly recommended to improve instrument flying skills and proficiency. The training in instrument skills is a necessary component of all levels of rotorcraft training as these are considered to be perishable skills.

Aircraft Make and Model
Each make and model transition training includes extensive training on power and energy management, aircraft performance, capabilities and limitations, and emergency procedures specific

to the make and model of the aircraft. Systems and equipment differences training should also be included if there are various models available under the same make and model.

The use of aircraft-specific simulators and ground instruction on systems and procedures are highly recommended to improve the effectiveness of make and model training. The use of current and apporved checklists and familiarization with the aircraft Rotorcraft Flight Manual are necessary components.

Preflight Preparation

Comprehensive training in preflight preparation includes:

- Flight risk assessment
- Personal risk assessment
- Flight planning
- Weather planning
- Performance, capabilities, and limitations

Preflight performance training identifies the importance of conducting a thorough preflight inspection, and the use of a preflight inspection checklist.

Specialized Mission Training

Mission specific training should focus on familiarization of the standards and procedures associated with specific mission segments as well as the use of specialized equipment unique to mission.

The use of simulators and ground instruction is highly recommended to improve the effectiveness of mission specific training. The use of mission specific scenarios and the decision making skills particular to the type of operation will enhance the training experience by providing lifelike locations and circumstances unique to each type of mission. Some of the missions that can be simulated include: air medical, law enforcement, offshore, tour and news gathering.

Safety Management Systems

Comprehensive training in the policies, procedures and safety culture associated with safety management systems is critical to the success of a SMS program. Education and guidance is required for all personal within an organization, large or small. Effective SMS programs incorporate an ongoing educational process to insure compliance within the program. For details on the elements of an SMS program, please refer to the IHST SMS Toolkit at **http://ihst.org**

CHAPTER 2
ESTABLISHING AND MAINTAINING TRAINING PROGRAMS

This chapter describes the various components of a training manual and organizational structure of a formal training department. For many medium to large organizations all of the documents and sections below will apply. For small to medium organizations the organizational structure will be condensed and one person may have multiple roles in the training department.

A small operator may feel the cost structure for a formal training department is not feasible and may elect to utilize a training provider. Professional training providers conduct quality training and provide all the training records and document control required by government agencies and recommended by the insurance providers.

Documents and Control

To develop a training program for any size flight department, the following documents should be written as aircraft specific. These documents can be presented to the regulatory body (local, state, federal) for approval as the flight department's Approved Training Program. The training lesson plans and scenarios should be written to include the specific type of mission (i.e. EMS, Offshore, Law Enforcement, Corporate, Private etc…). These documents are the base or core curriculum of the training program. They establish the content and standards for the entire training program.

- General Operating Procedure Manual – This control document specifies:
  - how to deliver the training program
  - how to change the training program
  - establishes leadership responsibility for delivery of the training

- Flight Scenario Handbook
  - training scenarios (simple tasks leading to more complex special mission tasks)
  - details training conditions and focuses on individual pilot tasks

- Classroom Handbook
  - general "broad based" discussion of the curriculum covering aircraft systems and procedures
  - Any regulatory agency can inspect content for compliance

- Instructor Notes
  - detailed notes to provide the instructor with information to support class room delivery
  - organizes all tasks and objects (images) in a detailed system
  - facilitates a system for documenting corrections

- Pilot Training Guide
  - pilot task lists with detailed description for the pilot to determine and perform to standards
  - includes single pilot resource management procedures throughout each task

- Instructor Pilot Training Guide
  - all of the pilot tasks listed in the Pilot Training Guide with instructor pilot tasks for each

- provides a "single source" training guide for the instructor to utilize containing the pilot tasks as well as the instructor task responsibilities
- facilitates a system for evaluating the instructor's delivery performance enabling a quality assurance check
- standardizes training between all instructors enabling multiple instructors to train the same pilot throughout training

- Courseware curriculum – Includes lesson plans for:
  - all helicopter systems subjects
  - normal procedures to include preflight
  - abnormal procedures
  - emergency procedures
  - instrument procedures
  - annual updates and changes to the courseware

- Manual(s) Amendment & Revision
  - the amendment procedure shall be stated and properly controlled
  - issued upon the authority of the Accountable Manager
  - accountable manager will authorize all amendments & revisions as required
  - proposed changes shall be forwarded to the Accountable Manager for approval using an approved document or form for tracking
  - amendments or revisions will be in the form of replacement pages with a change tracking form in the beginning of the manual(s)
  - amendments or revisions shall have the date of issue, affectivity and the revision number.
  - urgent or emergency amendments or revisions for flight safety reasons will be distributed via email/electronic means

- Organization and Responsibilities

This can be developed based on the staffing plan and mission of the flight department. The most important element is to have clearly defined duties and responsibilities for each individual in the aviation department and a training policy that is clearly supported by the executive leadership of the organization.

Training Records

It is important to maintain proper records associated with the training program, such as:

- Copies of pilot certification of any course prerequisites
- Pilot critiques and assessments of the course prior to, during and after completion
- Copies of any previous course completion certificates that are required
- Details of each pilot's experience, and qualifications
- Copies of each pilot's certificates and medical documents including any waivers
- TSA documentation if required (copies of passport proving citizenship and picture ID)

- Format for records - Examples of all training records and associated documentation are typically included in the training program manual(s).

- Training Records Auditing - The Director of Aviation, or equivalent position, holds the overall responsibility for the content and accuracy of training records. This audit should be conducted at LEAST annually.

- Course Completion Documentation - Course completion certificates will be developed and examples for each included in the training program Flight Scenario and Classroom Handbook documents.

- Monitoring Client Progress - During the course, instructors will continuously assess each client to ensure that he/she is receiving maximum benefit from the instruction.

- Course Completion - Upon completion of the course a recommendation must be recorded that the training pilot has competed all of the required training and is considered to have met the standard for the course.

Conduct of Training

It is important that training be conducted in a standardized fashion with defined procedures for the various situations encountered in a training program. The following are processes and procedures to be established when setting up a training program:

- Client Discipline – Process for action when a training pilot exhibits an attitude towards the training program, department, company not conducive to efficient or safe operation of the training department, a report will be forwarded to the accountable manager immediately for action or review.

- Poor performance, slow progression or standards not being met – Process for managing poor performance

- Sickness or injury – Process for when a training pilot becomes sick or sustains an injury that he/she is unable to continue training

- Interruption of training – Process for when training is interrupted and the training pilot has to return to flying a revision course appropriate to the time delay shall be developed and recorded in their training records.

- Duty Time – duty time limitation plan shall be developed and documented in this training program.

- Ground School Training - The maximum duty period for ground school training is 9 hours in any one day. Start times should not begin earlier than 0600 and not extend beyond 1800 hours.

- Flight Training - Initial clients should not report for flight duty more than 90 minutes prior to beginning training/briefings. The flight time should not exceed 6 hours in any 24 hour period with a rest period between flights no less than 9 hours beginning upon the end of scheduled training/debriefing.

- Instructional Methods - Standardization is required throughout the training program to achieve optimum and consistent results. All briefings and debriefings are to be conducted in accordance with the standards developed in the training documents.

- Written or oral testing - Testing will only be administered when the training syllabus included in the training program has been completed and the training pilot has attained the standards required to successfully complete the test.

- Flight Test Tolerances - The training pilot shall perform and demonstrate the ability to operate the helicopter within the standards outlined in the training manuals for each maneuver or task.

- The training pilot shall:
    - Operate the helicopter within the limits of the AFM
    - Complete all maneuvers with smoothness and accuracy
    - Exercise good judgment and airmanship
    - Apply aeronautical knowledge
    - Maintain control of the helicopter at all times in such a manner that the successful outcome of the procedure or maneuver is never in doubt
- Retesting requirements - Additional training may be required and is recommended after a failed test or check flight

Quality Control of Training

Feedback and continuous evaluation of the training program is essential. Techniques for evaluating the quality of the training program are:

- Establish a Flight Data Monitoring (FDM) Program. The purpose of FDM is to provide a formal method that:
    - Identifies the training policy and maintains flight safety standards
    - Assigns responsibilities within the FDM
    - Identifies systems to ensure that all standards and rules are complied with
    - Identifies and documents corrective actions to be taken to ensure that all deviations are dealt with
    - Evaluates the training policy and safety standards
    - Enhances safety of aviation department by:
        - Accurate identification of risks with empirical data
        - Just culture management of safety issues
        - Due to the protections afforded by an FAA-approved HFDM/FOQA program, a more open dialogue is possible between Pilots and management based on digital data to determine how to improve operations and safety.
        - Evidence-based decision making
        - Enhanced training-scenarios
        - Risk mitigation possible with empirical data

Complete training in the policies, procedures and just culture associated with the use of flight data management is part of an effective SMS program. Education and guidance is required for all personal on the technology and use of the data that is gathered from the equipment. Effective FDM programs incorporate an ongoing educational process to insure a just culture. For details on the elements of an FDM program, please refer to the IHST FDM toolkit at **http://ihst.org**

- Feedback or critique forms - Upon completion of the course, each training pilot shall be offered a feedback form for them to complete and the forms are reviewed by the Quality Manager and the Director of Operations. Trend analysis shall be performed to determine which areas of the training program are not performing to standard and may need improvement.

- Audit Quality Assurance - A full quality audit or quality assurance audit should be conducted annually to ensure compliance with the standards outlined in the training program.

- Ground School and Flight Training Audits - A quality assurance audit should be conducted for all ground school and flight instructors at least annually and the results of the audit and the corrective actions is kept in the training records for each instructor.

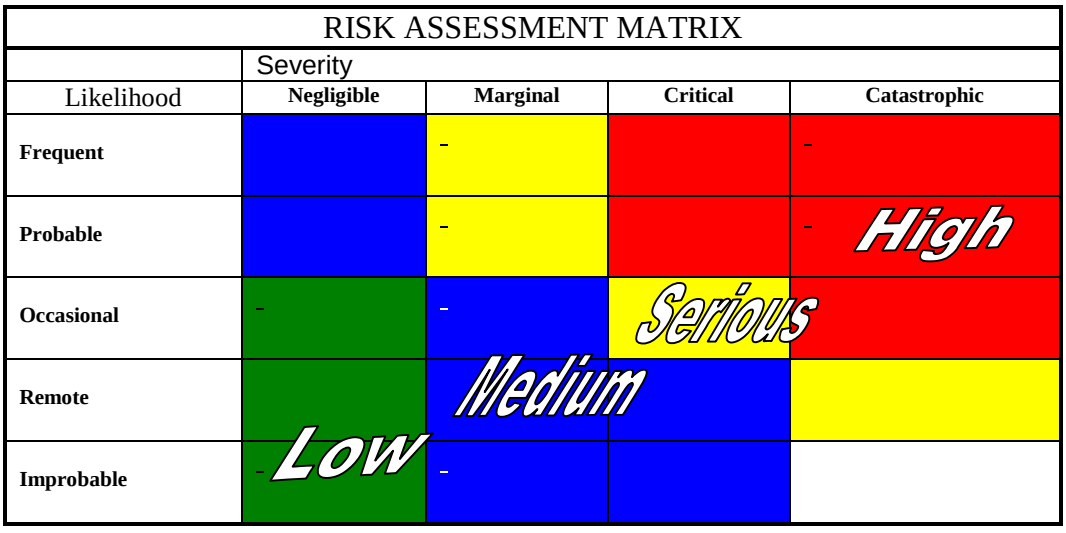
CHAPTER 3
TRAINING PROGRAMS

Human Factors, Risk Management, and Decision Making

Training in human factors, risk management and decision making is crucial to providing quality effective training. Analysis of accidents has continually shown that these elements were deficient. It is imperative that all training includes these elements in great detail and that the training in these factors contains current realistic scenarios to reinforce the concepts. These are considered "soft skills" and are often difficult to instruct as well as learn unless effective visual training aids are used. Simulators and flight training devices are the most effective tools for instilling these principles. Role playing, teamwork and communication exercises are also very effective for use in the classroom environment.

- **Human Factors** involves gathering information about human abilities, limitations, and other characteristics and applying it to tools, machines, systems, tasks, jobs, and environments to produce safe, comfortable, and effective human use. In aviation, human factors is dedicated to better understanding how humans can most safely and efficiently be integrated with the technology. That understanding is then translated into design, training, policies, or procedures to help humans perform better.

- **Risk Management** describes the culture, processes and structures that are put in place to effectively manage potential opportunities and adverse effects. As it is not possible or desirable to eliminate all risk, the objective is to implement cost effective processes that reduce risks to an acceptable level, reject unacceptable risks and mitigate risk by employing an effective Safety Management System (SMS) and train to properly recognize and handle the potential threat. Training in the use and discipline of risk assessment matrix models develops a foundation for educated decision-making prior to taking a flight.

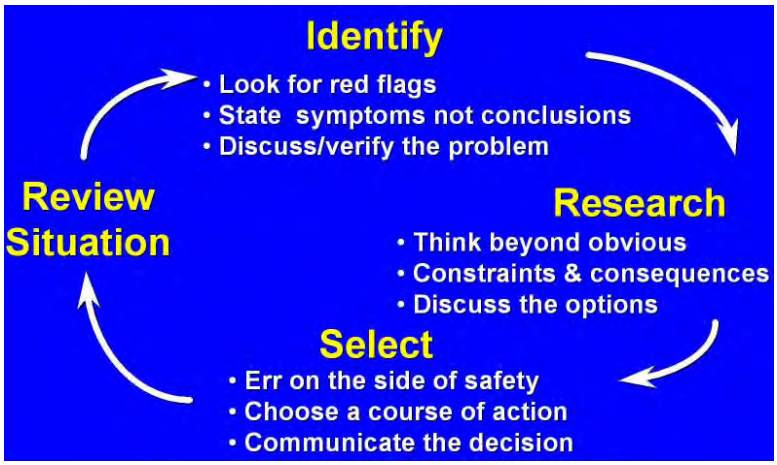


OPERATIONAL RISK ASSESSMENT PROGRAMS FOR HELICOPTER, FAA N8000.301 http://fsims.faa.gov/WDocs/Notices/N8000-301.htm

- **Decision-Making** is the process of selecting from several choices, products or ideas, and taking action in order to bring about a desired result.

  The decision-making process includes the following steps:

  - Define the situation and desired outcome
  - Know your strengths, weaknesses and skills
  - Identify options, alternatives and consequences
  - Manage resources to insure adequate information
  - Evaluate options then select the best option
  - Develop a plan of action and/or implement option
  - Evaluate results
  - Start again if results are not acceptable



- **Aeronautical Decision Making** is a systematic approach to the mental process used by pilots to consistently determine the best course of action in response to a given set of circumstances.

- **Aeronautical Decision Making in a primary training environment:**
  A flight instructor can combine educational principles to the decision making concepts to improve a student's judgment and decision making. By giving the student a series of practical, "hands-on" lessons in which the instructor can observe performance and response to specific tasks. Errors or misjudgments by the student should be viewed as opportunities for learning, not as occasions for criticism. While on routine training flights, the instructor should give the students "activities" designed to further develop their appreciation for the decision making concepts based upon an actual preflight or in-flight "hands-on" experience. The lessons should start when the student has the ability to control the aircraft confidently during the most basic maneuvers. A suggested starting point is about three flight lessons before the student is expected to solo.

The training scenarios are situations that are setup to stimulate the student's decision making process, and the instructor responds to student behavior in a manner that encourages safe judgments and decisions. The scenarios should create circumstances that may actually encourage the student to make an unsafe judgment or decision. It is important for the student to become skilled at recognizing and replacing hazardous attitudes and unsafe tendencies with good judgment and safe behavior.

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New Technology Applications (GPS, NVG, HTAWS, TCAS, ADS-B):

Training in technology is crucial to a safe flight environment especially in the current high tech aircraft. Original equipment installed by the aircraft manufacturer usually comes with detailed training materials that can be used by both the instructor and the student.

New technology added to the aircraft at a later time can provide more of a training challenge. The "learn in flight" practice should be avoided due to the high risk of distraction and loss of situational awareness. A ground school segment or computer/web based training segment should always precede any in-flight training or operation of new technology such as HTAWS, TCAS, GPS and ADS-B. Look to the technology manufacturers and third party training facilities for additional training materials and guidance with this technology.

Night Vision Goggle training requires specific certification. This must be conducted under the guidelines set by the FAA for this purpose. Training should be conducted by one of the third parties designated for NVG training. Some simulators are also configured for NVG practice but not for initial certification.

Aircraft Specific Preflight, Performance, Systems, Abnormal and Emergency Procedures

Training in aircraft systems, performance and procedures is part of becoming qualified in a specific aircraft. The training consists of an initial course for pilots with a rotorcraft rating with little or no experience in the specific make and model. Pilots with experience in the make and model as well as those currently operating the specific aircraft should receive annual recurrent training.

Initial training includes a comprehensive description of all **systems** and components.

Individual systems training (hydraulic, electrical, power plant etc.) includes a complete portrayal of all the **normal, abnormal and emergency procedures** as outlined by the aircraft manufacturer.

Aircraft preflight inspection is taught using the procedure outlined in the aircraft flight manual. A handheld preflight inspection checklist, developed from the aircraft flight manual, is most effective and convenient for both training and operations.

Aircraft performance training includes a review of the charts provided in the aircraft flight manual. Various exercises should be performed and sample problems developed based on the type of environment and operation to be conducted with the aircraft.

Training in a simulator, flight training device or aircraft should include start procedures, normal operations and shut down procedures until the pilot shows proficiency in all normal operations. At that point abnormal and emergency operations should be instructed one system at a time, carefully to developing proficiency rather than confusion. Careful, methodical use of **checklists** and procedures lead to good decision-making in the flight environment. Multi-system failures should be practiced after the pilot has demonstrated the ability to handle the individual emergencies. Using realistic scenarios helps commit the procedures to memory. Review of instrument procedures and inadvertent IMC recovery should be included for both VFR and IFR operations.

Testing and check rides are used to insure the pilot has adequate knowledge of the systems, performance and procedures for specific aircraft. During check rides, pilots should also be observed for their "soft skills" proficiency such as cockpit organization, communication, decision making, and resource management.

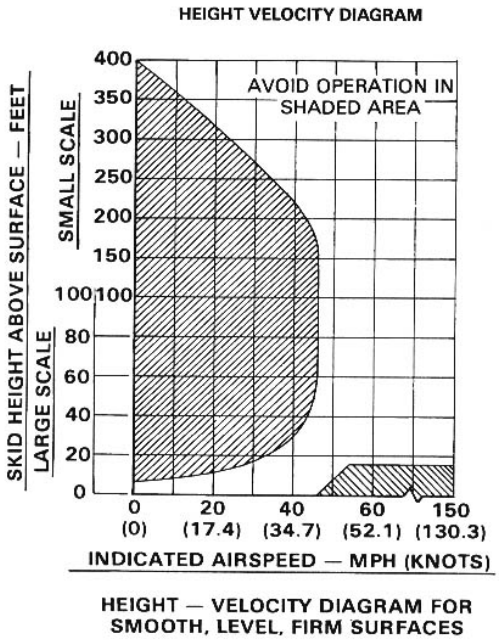
Recurrent training includes a review of all the systems and components. Individual systems training (hydraulic, electrical, power plant etc.) includes operational scenarios based on the abnormal and emergency procedures as outlined by the aircraft manufacturer.

Aircraft preflight inspection is reviewed using the procedure outlined in the aircraft flight manual. A handheld preflight inspection checklist developed from the aircraft flight manual is most effective and convenient for both training and operations.

Aircraft performance training includes a review of the charts provided in the aircraft flight manual. Various exercises should be performed and sample problems should be developed based on the type of environment and operation to be conducted with the aircraft.

Training in a simulator, flight training device or aircraft includes scenarios specific to the type of operation. Review of instrument procedures and inadvertent IMC recovery should be included for both VFR and IFR operations. Careful, methodical use of checklists and procedures leads to good decision-making in the flight environment. Using realistic scenarios helps commit the procedures to memory.

Testing and check rides are used to insure the pilot has adequate knowledge of the systems, performance and procedures for the specific aircraft. During check rides, pilots should also be observed for their "soft skills" proficiency such as cockpit organization, communication, decision making, and resource management.



HEIGHT — VELOCITY DIAGRAM FOR SMOOTH, LEVEL, FIRM SURFACES

Checklists

Checklists have been the foundation of pilot standardization and cockpit safety for years. The checklist is a memory aid that helps to ensure that critical items necessary for the safe operation of aircraft are not overlooked or forgotten. Pilots and crew who develop strong cockpit discipline, foster team work, and make a concerted effort to comply with tried and tested operational procedures are seldom surprised by an occurrence that was not anticipated. The checklist provides a convenient method of complying with the manufacturer's operating requirements, makes the flight safer, and is often required by regulation. Some of the check lists to be used during training and all other operations:

- Preflight Inspection
- Starting Procedures
- Normal Operations
- Abnormal Operations
- Emergency Operations
- Shutdown and securing the aircraft

Scenario Based Training

Scenario-based training, specific to the type of operation, is a powerful tool. It incorporates real-world experiences to address flight training objectives. While maneuver-based training is critical in learning the basics of controlling the aircraft, specific scenarios appropriate for the type of operation are more effective in learning actual operations. Scenario-based training provides an opportunity to experience the situations that may occur during a routine flight and teaches systematic risk reduction and critical thinking skills. When paired with abnormal or emergency scenarios this is the most effective way to prepare a pilot to make safe decisions during flight. Scenario-based training is effective in both aircraft and simulators or flight training devices; however, simulators and flight training devices provide a medium for adding real world situations that would be too risky to practice in an aircraft.

Mission Specific based training:

Some of the types of missions that would benefit from scenario-based training include:

- Offshore
- HEMS – air medical operations

- Airborne Law Enforcement
- Fire Fighting
- Tour operations
- ENG – electronic news gathering

Location Specific based training:

Some location operations that would benefit from scenario-based training include:

- Mountainous terrain
- Over water
- Cold weather
- High and hot

Environment Specific based training:

Some environment operations that would benefit from scenario-based training include:

- High and hot
- White out, brown out, flat light
- Decreasing visibility

Instrument and Flight into Inadvertent IMC Training

All helicopter pilots receive training in avoidance and recovery from inadvertent IMC with emphasis on avoidance. An unplanned transition from VFR to IFR flight is an emergency that involves a different set of pilot actions. It requires the use of different navigation and operational procedures, interaction with air traffic control and crew member resource management. Consideration should be given to the local flying area terrain, air space, air traffic facilities, weather (including seasonal effects such as icing and thunderstorms), and available airfield/heliport approaches.

Training emphasizes the identification of circumstances conducive to inadvertent IMC and a strategy to abandon continued VFR flight into deteriorating conditions. This strategy should include minimum altitude/airspeed combination that provides for an off-airport/heliport landing, diverting to better conditions, or initiating an emergency transition to IFR. Pilots should be able to readily identify the minimum initial altitude and course in order to avoid controlled flight into terrain.

Training for an emergency transition to IFR includes full and partial panel instrument flight, unusual attitude recovery, ATC communications, and instrument approaches. Based on the equipment in the aircraft and the available approaches, ILS and GPS approaches should be trained.

Instrument Procedures Handbook, FAA-H-8261-1
http://www.faa.gov/library/manuals/aviation/instrument_procedures_handbook/media/CH-07.pdf

Train the Trainer

Qualified training personnel are critical to quality learning. Certified Flight Instructors and Instrument Instructors are required for the instruction of basic and advanced pilot ratings. Qualified trained instructors should also be used in the instruction of aircraft specific models, technology, and soft skills including human factors, resource management, risk management, safety management systems, and aeronautical decision making.

Training the trainer is more than just providing a person familiar with the subject to be taught. The potential instructor should participate in a training program with a qualified instructor preferably

more than once. The instructor candidate should have an opportunity to learn the material and practice teaching it prior to instructing. If the instructor is writing new material or does not have an opportunity to participate in a training program for the subject to be taught, then he or she should practice teaching it to a person who is familiar with the subject. Feedback from learners is important and evaluations should be used to improve the quality of the training. Many manufacturers, operators and third party training professionals offer a variety of train the trainer programs. For details on training the trainer techniques and strategies, see Chapter 4.

Maintenance Training for Helicopters

Maintenance personnel normally receive airframe and power plant certification by training on fixed-wing aircraft. Additional training should be provided for personnel on helicopter and turbine maintenance. Most equipment manufacturers provide training on specific models of aircraft and power plants, avionics and technology including items such as field maintenance, component repair, overhaul, electrical, avionics, and troubleshooting. Annual training in these subjects will help reduce the number of human factor mistakes made by maintenance personnel.

Non-Rated Crew Members

Non-pilot crew members account for more than half the crew in air medical, law enforcement and ENG operations. Training non-pilot crews should include aircraft safety procedures specific to the type(s) of aircraft flown as well as engine and rotor shut down procedures specific to the aircraft. Personnel should also be trained in human factor courses including crew or team resource management, survival, evacuation, use of fire extinguishers and flight physiology.

Communication Centers

Communication and dispatch personnel used for air medical as well as those used in aircraft specific programs in law enforcement, tour operations, off shore and other operations using an operational control center should provide annual training for the communicators. Training should include courses in aviation terminology, human factors, aviation weather, aircraft performance, lost communication procedures, emergency notification and new technology.

CHAPTER 4
DEVELOPING QUALITY TRAINING

Training Perspective

Training provides a gateway skill set that opens and invigorates virtually every function of life and touches every segment of society. Learning occurs within each individual as a continual process throughout life as humans seek out new and better ways to accomplish tasks or to learn or achieve at higher levels. The more integrated the learning, the more connected old and new learning can be. The more active the learning, the better new learning can be transferred from short-term to long-term memory. Integrated and active learning practices increase training quality and accelerate learning. The effectiveness of training is dependent on the quality of that training. This chapter of the toolkit is an attempt to address improved training quality.

Improving Instructional Quality

Once, not too long ago, individuals completed education in a field and then, with experience, they became experts in that field. Viewing an education as something that can be "accomplished" is an antiquated idea and employers have recognized that a regular and ongoing training program is the key to personal, professional and organizational growth. Knowledge and information grows at exponential rates and exemplary, regular and ongoing training keeps organizations at the cutting edge and employees updated in their evolving careers. Clint Swindall, author of Engaged Leadership tells us that once a company hires an employee it is imperative to train them. "Do not assume since employees came to the table with the skills you need that you won't need to provide professional development. An untrained employee is a disengaged employee." [1] So how do we establish criteria for training that will lead us into greater and greater accomplishments without spending an inordinate amount of time and money?

There is no doubt that training is expensive, but a lack of training or poor quality training is much more costly. An emphasis must be placed on improving the **quality of training** to get the most benefit for each training dollar. The following are some considerations for getting the most out of the training budget by improving quality.

- Training is timely, that is, it is proactive and planned rather than reactive. Training is provided for employees immediately before it is needed and new learning is applied promptly in the work environment yielding higher productivity and increasing effectiveness and efficiency of the organization.

- Training programs are not created in a vacuum they are informed by regular program evaluations, training evaluations, individual evaluations and needs-assessments to understand what employees know and are able to do. Once needs have been identified, goals are prioritized and resources are identified. A list of resources can be found in appendix 5 of the Training Toolkit.

- Training is predetermined, curriculum is identified, goals are targeted and instructional objectives are focused. Goals explain an organization's purpose and vision (main single aim) and may contain regulatory requirements or components of those requirements. Objectives are

[1] Swindall, Clint, Engaged Leadership, John Wiley & Sons, Inc 2007 ISBN 978-0-470-13532-7

the means by which, together, the goals are accomplished; that is, the goals are found at the end of the road while objectives are stopping points along the way. Objectives are stated as active verbs and are outcome-based.

- To improve training quality, a major shift must take place in the minds of trainers and trainees alike. That shift takes place when the emphasis on "what the trainer says and does" is replaced by an emphasis on "what the learner knows and is able to do". It is a subtle shift, but very powerful in identifying goals and objectives as it refocuses instruction to a learner-centered rather than a teacher-centered approach. Learner-centered instruction promotes and accelerates active learning and changes the learning culture. It also serves to create learners that are motivated and actively participate in training. This shift is illustrated by the following sample objectives:

Trainer-Centered Objectives The trainer will …	Learner-Centered Objectives The learner will…
• show the fire exits in the hangar	• identify four emergency exits in the hangar
• show where fire extinguishers are located	• locate 4 fire extinguishers
• demonstrate how to operate a fire extinguisher	• operate a fire extinguisher

- Quality trainers are effective communicators and practitioners. They are skilled representatives of the "vision," competent presenters and connect with trainees. They understand learning theory and prepare active, accelerated learning experiences to engage and involve learners. Learning progresses from the lowest levels of understanding, knowledge and comprehension to the ever- increasing levels of complexity of application, analysis, synthesis, and evaluation.

Trainer Competencies

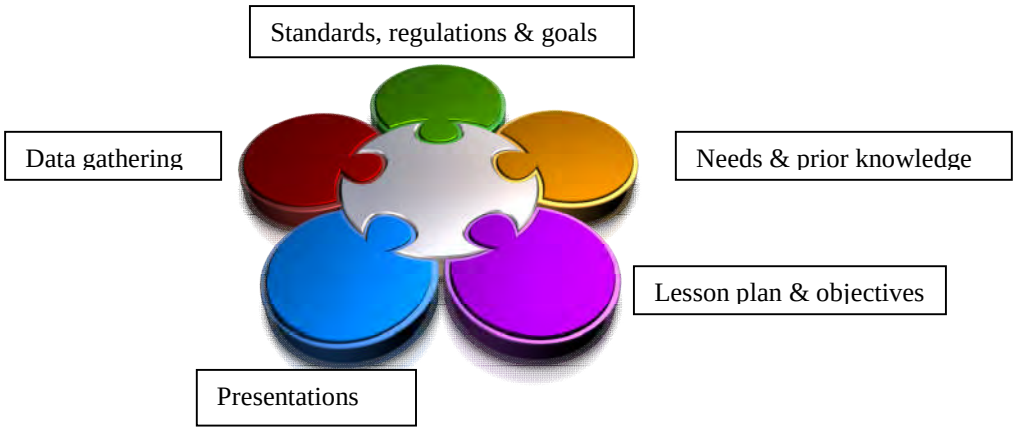
Quality instruction requires that trainers possess specific competencies. They must be good architects of instruction. The ability to reach each member of a class, recognize the readiness of the learner and connect to his/her learning styles is essential to good teaching. Trainers must be good communicators; actively listening and making connections with trainees. Good trainers build interest and engage participants in learning. Instruction is differentiated in that the information trainers need to deliver is balanced with learner styles and preferences. Trainers are knowledgeable and skilled in the content of the training. The trainer is responsible for clarifying and moving the discussion forward with the assurance that all trainees have learned the course objectives and can apply them in the workplace. Trainers also possess a clear understanding of lesson design, lesson planning, lesson delivery and lesson evaluation.

Quality Lesson Design

Good lesson design requires extensive pre-planning, and data-gathering to identify the needs of the audience as well as the goals of the organization. Design takes into account the alignment of standards, regulatory requirements with instructional goals in addition to the prior knowledge and experience of the audience. Lesson planning provides objectives aligned with authentic and realistic applications and data gathering for subsequent instruction. This up-front planning enhances presentations and improves learning outcomes. Planning for training requires that certain technical decisions also be made well in advance, such as:

- Which format will best meet the goals and objectives identified?
- Should the training be on-site, in classrooms, at conferences, online, web-based or simulations and/or purchased program?
- What materials or tools are needed for training?
- How much training is needed, how long will it take, where should it take place, when can it be scheduled and what is the staff availability?

Lesson design is circular in nature…



Lesson Planning

A lesson plan includes the topic and standards addressed by the lesson. If you are training for regulatory or corporate compliance, that can be noted as well. Subsets of a lesson plan are:

- Overarching goals are identified
- Objectives are identified to align with and achieve each goal. Lesson objectives are stated in specific learning terms and to be effective, training objectives are SMART. That is, they are Specific (concrete, detailed), Measurable (numbers, quantifiable), Achievable (within reach, actionable), Realistic (practical) and Time-Bound (a defined time line that ends within a reasonable time).
- The lesson delivery includes the following:
  1. Introduction (connection with audience),
  2. Instruction (new learning based on objectives)
  3. Guided practice (active opportunities for learners to apply new learning)
  4. Assessment (objectives learned are assessed) determines whether or not students have mastered the objectives in empirical terms (data measured against the objectives.)
- Closure (summary with additional tasks to be completed or applied)
- Materials needed for the presentation are identified.
- Evaluation of the lesson

A sample format for lesson planning is in Appendix 1 of the Training Toolkit.

Lesson Delivery

In addition to the delivery plan, trainers know the characteristics of the audience build audience engagement, probe for understanding, monitor audience participation and reduce distractions to learning.

Lesson Evaluation
The organization must be confident that goals and objectives have been met and that training was effective. Evaluation is a consistent follow-up to all training. The evaluations and subsequent performance reviews are analyzed to provide feedback for continuous improvement. A sample format for uniform lesson evaluation is available in Appendix 2 of the Training Toolkit.

Considerations for Learner-Centered Instruction
The trainer is responsible for clarifying and moving instruction forward while assuring that all trainees have learned and are able to apply, analyze, synthesize and evaluate course objectives in the workplace. The four considerations vital to learner-centered instruction are motivation, reinforcement, retention, and transference. Strategies are provided at strategic, optimum times for each area to motivate, guide, reinforce, retain and transfer new learning.

- Motivation – Learner inspiration and priorities tends to dictate motivation, but trainers have strategies that are effective motivators as well. Reasoning, connectivity and timeliness in training can all impact motivation. The following chart identifies motivation, barriers to motivation, and ways to enhance motivation and reduce barriers.

Motivating Adult Learners	***Barriers to Motivation:***	***Trainers Enhance Motivation and Decrease Barriers***
• Social relationships: associations and friendships. • External expectations: fulfill regulatory or company compliance or complete recommendations/directives of an authority. • Social welfare: serve/participate in community. • Personal advancement: secure professional advancement, status, gain promotion, or advance over competitors. • Escape/stimulation: to relieve boredom, provide a break in the routine of home or work • Cognitive interest: to learn for the sake of learning, seek knowledge, satisfy an inquiring mind.	• Lack of time, • money, • confidence, • interest, • lack of information about opportunities to learn, • scheduling problems and conflicts, • more pressing work objectives • "red tape," • child-care and transportation	• Consider purpose • Reduce learning anxiety • Design strategies to motivate based on learner needs • Align the relationship between training and learner goals. (compliance, promotion, licensing, etc.)

- Reinforcement is a necessary part of the teaching/learning process to help learners retain what they have learned. Using reinforcement instructors encourage correct modes of behavior and performance. It is also used on a frequent and regular basis to maintain consistent, positive behavior. Negative reinforcement is best used to extinguish behaviors (used until the "bad" behavior disappears) and positive reinforcement is used to enhance learning. When instructors are trying to change old practices, they should apply both positive and negative reinforcement. Guided practice, strategy applications, manipulation of information and simulations reinforce learning.

- The amount of learner recall/retention will be directly affected by the degree of original learning. If participants did not learn the material well initially, they will not retain it over time. The trainers' job is not complete until he/she has assisted the learner in retaining the information. Trainers should emphasize retention through active over-learning, scaffolded support and practice in application, analysis and synthesis. Retention is also affected by the amount of independent and guided practice during learning. In order to increase the chances of remembering and applying new learning, stimulate as many senses as possible to aid in the transfer of information from short-term to long-term memory.

- Transference relates to the portability of learning; that is, the ability to use the information taught in a course in a new setting. Transference improves using the following techniques:

Technique	Description
Association	associate the new information with information already known.
Similarity	the information is similar to material already known; that is, it revisits a common, logical framework or pattern.
Critical Attribute Elements	the information learned contains elements that are extremely beneficial (critical) on the job.

Characteristics of Adult Learners and Trainer Responsibilities: [2]

Adults are *autonomous* and *self-directed.* Adults want to be the origin of their own learning and will resist learning activities they believe are an attack on their competence. Thus, training needs to give participants some control over the "what, who, how, why, when, and where" of their learning. The trainers' responsibility:

- Actively involve participants in the learning process and serve as facilitators.
- Elicit participants' perspectives about what topics and projects reflect their needs and interests. Allow the participants to assume responsibility for presentations and group leadership.
- Act as facilitators, guide participants to their own knowledge rather than supplying facts. Transfer of learning for adults is not automatic and must be facilitated.
- Support small-group activities. These activities provide an opportunity to share, reflect, and generalize their learning experiences while simultaneously reducing anxiety.

[2]Lieb, Stephen. Principles Of Adult Learning, *Vision*, Fall 1991

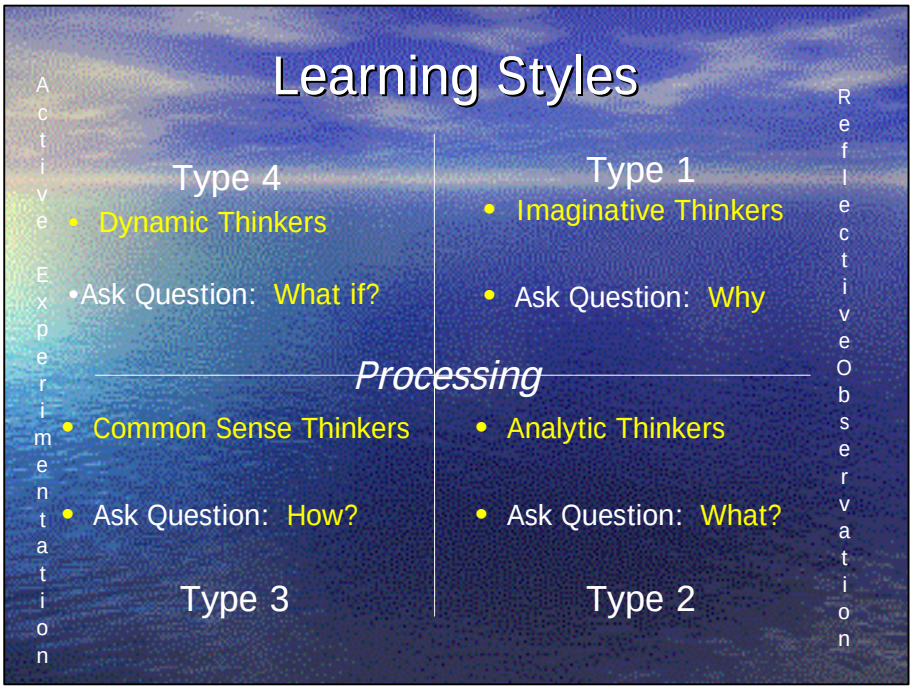
Adults have accumulated a foundation of *life experiences* and *knowledge.* Adult learners have invested ego and enter into learning with a wide range of previous experiences, knowledge, self-direction, interests, and competencies in addition to attitudes to learning. The trainers' responsibility:

- Acknowledge diversity and the wealth of experiences that adult participants bring to training. Treat participants as equals in experience and knowledge and allow them to voice their opinions freely in class.
- Connect new learning by accessing prior knowledge/experience relevant to the topic.
- Build opportunities that allow learner to practice the learning and receive structured, helpful feedback as to the results of their efforts.
- Structure training to provide support from the instructor and peers. Coaching and other kinds of follow-up support help transfer learning into practice so that it is sustained
- Relate theories and concepts to the participants' experience.
- Reduce the fear of judgment while learning

Adults are *practical, goal- and relevancy-oriented*. Authentic and real-world applications allow participants to see that the training and their day-to-day activities are related and relevant. Adult learners need direct, concrete experiences to move them beyond understanding to application, analysis, synthesis, and evaluation. Adults commit to learning when it is realistic and important to them. They know what goals they want to attain and they generate their own reasons for learning something. The trainers' responsibility:

- Identify course goals and objectives, in writing, early in the course. Theories, concepts and strategies are aligned with goals and objectives.
- Presentations are organized and target higher levels of achievement.
- Demonstrate how the training will help attain their goals and be useful on the job.
- Let participants choose projects that reflect their own interests

Adults have well defined and long practiced *learning styles*. The styles are identified in the chart below and there are several mechanisms to measure preferred styles as defined by McCarthy, Kolb, Gregoric, and others.



Adults have well-defined and long-practiced *learning modalities*. Modality preferences can be used to develop additional, effective strategies for learning and for improving trainer-learner communication skills. Trainers can capitalize on modalities to accelerate learning. Modalities assist learners in taking in information; using information for effective learning; communicating more effectively; retention and improving performance on tests and examinations. The modalities and study strategies align to reinforce learning.

Modality	Learning Activity
Visual (V)	Demonstration, watch an action or video…
Auditory (A)	Listen to lecture, podcast, song…
Read/write (R)	Read and take notes on a manual or blueprint…
Kinesthetic (K)	Act out the steps to a process…
Multi-modal (MM)	A combination of the above…

Train the Trainer: Specific Instructional Strategies that Constitute Excellence in Training [3]

Adults learn best by doing. Active learning is constructive. The most effective training takes place when learners are motivated and actively engaged in their own learning. The trainer needs to monitor the physical and mental climate of the group; effective instruction takes place in an environment that is comfortable, collaborative and supportive. Strategies are provided at optimum times to improve understanding, guide, and reinforce new learning. Augmented lectures, discussions, tests, group work, individualized instruction, observations, case studies, experiments, and many other kinds of experiences may be necessary for learners to master the objectives and gain higher-order thinking. The content and audience best determines which mode of instruction and which instructional strategies apply; that is, to be effective, the type of activity needs to match the purpose or objectives stated.

Guidelines for Instructional Strategies

Lecture Mode

Limit lectures time to 4-8 minute bursts – attention and assimilation drops off after 10 minutes. To keep interest, attention and retention, add preplanned questioning strategies between bursts to foster participant engagement in lectures. Each instructional strategy application re-starts the attention clock. Instructional strategies to apply:

- KWL: Identify what the audience knows, what they want to know and what has been learned using a chart.
- Survey & Pause: ask directly for a show of hands: "Raise your hand if you agree/disagree, etc." (1 minute)
- Turn to Your Partner and…: Pause, ask participants to turn to the person next to them and share examples of, paraphrase the point just made, or complete a given question. (What do you think about…?) A few partners can share with the whole group (4-5 minutes)
- Paraphrase: Learners participate in small discussion groups to paraphrase the lecture with pertinent supporting data, the instructor monitors and joins discussion to clarify. (5-10 minutes)

[3] Revised for training programs based on the college teaching research compiled by Tom Drummond North Seattle Community College, 1994, 2002.

- Immediate Quiz: Design a follow-up quiz for the end of a lecture. Learners retain twice as much material with a quiz than without. Clarify and resolve questions that arise. (4 multiple choice questions can be answered in 1 minute on average)
- Anecdotes and Personal Asides: Imbed within lectures to build connections and increase experiences – time limits do not apply to stories. Limit stories to 2 or 3 per lecture and keep them to about 2-5 minutes – chose only the most pertinent stories to relate.
- Trainers ask specific, thoughtful, questions. Allow ample wait time (10-20 seconds) for participants to process and formulate an answer. (1-3 minutes) A few sample questions are:
  - Description: *What did you see? What happened? What is the difference between…?*
  - Purpose: *What is the purpose or function of…?*
  - Procedures: *How was this done? What will have to be done?*
  - Possibilities: *What else could …? How could we…?*
  - Prediction: *What will happen next?*
  - Justification: *What makes you think that? What evidence led you to…?*
  - Rationale for reality: *Why? What is the reason?*
  - Generalization: *What could you generalize from these events?*
  - Definition: *What does … mean?*
- Inquiry/Q & A: Individual participants ask questions that are meaningful to them, and may not have easy answers; trainers avoid giving direct answers in favor of asking more questions. The larger group joins the discussion. (1-5 minutes)

Modelling Mode

Modelling provides time to relate authentic experiences or to teach by example. Trainers provide realistic events to be learned and apply strategies. (5-20 minutes)

- Problem-Solving: Trainers 'Drill Down' to break a large and complex problems down into component parts and develop a plan to comprehend the parts. Apply a process to such as:
  - Scientific method: state the problem, form an hypothesis, test the hypothesis, collect the data, analyze the data, draw conclusions
  - Business solutions: define the problem, research potential causes, identify alternative approaches to resolve, identify the approach to use, create an action plan for implementation, monitor the implementation, verify that the problem has been resolved
- Demonstrations: show how to… complete a form, paint a blade, or operate a cyclic.
- Experiments: Learners try an activity or process …put on a respirator or helmet.
- Samples: Trainers provide events or activities, to exemplify a point…sample accident or incidents.

Co-operative, Collaborative Group Discussion Mode

Takes place in 5-20 minute time segments. Participants are given realistic questions or authentic tasks. An instructional strategy is applied as an equitable format to share ideas on a common goal. Sample instructional strategies:

- Think – Pair - Share: Provide a question, problem or idea. Participants are given thinking time (1 minute), then pair up with a partner and share their ideas (2 minutes). Certain pairs share their ideas with the larger group (3 minutes). (5-6 minutes total)
- Pair Summarizing/Checking: Information is delivered and a problem is posed to the whole group. Participants pair up and one partner paraphrases, summarizes or applies an approach to a problem. The other partner listens, questions and comments. Problems can be broken into sections so each partner has an opportunity to switch roles. (10 minutes total)

- Brainstorming: groups use productive thinking to generate ideas and solutions (Hint - no ideas are "bad" in brainstorming) (5-10 minutes)
- Jigsaw: Divide participants into groups to complete an activity, then the participants are re-grouped to discuss the findings of the first group. Participants then re-join their original groups to discuss what they have learned. Finally, representatives of the groups share findings with the entire group. (15-20 minutes total)
- Sticky-Note Discussions: Allows participants to jot down information on post-it notes from an activity, experience, or discussion and then bring the notes to an alternate group for discussion. The groups then share the information gained. (15-20 minutes total)
- Case Studies: Are prepared in advance and consist of a brief overview of the situation, a description of what happened, possible ramifications and a probe for solutions to the problem. A specific case is cited and individuals are given time to consider possibilities. Groups discuss the case studies to understand cause/effect, problem/solution, or to develop the capacity to solve other problems. (20 minutes total)

Individual or Group Mode

Decision Making Matrix: Participants prepare a matrix to clarify their own thinking about a topic, problem, or event.

- Webquests: guided search for information using the internet and specific sites identified in an assignment
- Podcasts: video and audio recordings of topical lessons that are available on CD or downloaded from the web.

Train the Trainer Strategies for Active Learning

As you consider various modes of instruction, keep in mind that learning depends primarily on what the learners do, both in and out of class, rather than what the teacher does. Your task is to select activities through which learners can master course objectives (which are stated in learner- rather than teacher-terms). Your choice of strategies is affected by a number of considerations: the level of the objectives, the abilities of the learners, your teaching skills and preferences, and the size of the class to name a few. However, since training is supposed to help learners sharpen their skills, strategies that promote higher-order thinking and active involvement in learning is the goal of every trainer. Basic tenets of inquiry-based learning such as questioning & problem solving and interactive-learning, such as paraphrasing & summarizing, guide practices that develop active learners.

Guidelines for Peer-Teaching

Research has shown that learners who are required to teach something learn concepts better than if they are taught the material in conventional ways. In other words, teaching is a more effective learning strategy than being taught, and it makes sense to use this principle during training to increase learning. During a peer-teaching session, trainers move from group to group, giving feedback and asking and answering questions. Learners are more willing to share their views in small groups and often develop deeper insights about the material than they would working alone.

- Pairing learners for tasks is more effective than having learners work alone. For example, you could identify a task in which learners must prepare their own responses, questions, or solutions on the main points of a training issue either before or during training. Then have learners work in pairs or small groups, considering the level of expertise among your students, alternately asking and answering questions they have prepared.
- Questioning or problem posing allows individual learners to construct a solution for a particular problem or concept, and then exchange ideas with partners/groups to reach

consensus. Problems can be broken up into several short steps or a concept can be broken into similar and dissimilar elements to allow participants to solve, analyze, and evaluate complex problems in a simpler way.

- Best Practice Strategies: Think-Pair-Share, Pair Summarizing/Checking (see directions on page 13 – Best Practices)

Guidelines for Collaborative/Cooperative Learning

"Ninety years of research and 600 studies show cooperative learning results in more high-level reasoning, more frequent generation of new ideas and solutions, and greater transfer of what is learned within one situation to another." Trainers create random or controlled groups of 4-7 people for intensive, active learning using discussion, problem solving, data analysis, or to task completion. Students discuss, paraphrase, and summarize new information and eventually plan or prepare a solution or conclusion. Groups then share their solutions/ conclusions with the larger group. With careful planning, cooperative learning groups increase the efficiency and effectiveness of learning.

- Core components of cooperative learning are: positive interdependence, group processing, face-to-face interaction, and individual and group accountability.
- To work successfully, groups require a wide variety of viewpoints and intellectual skills, so it is important to make the group as heterogeneous & diverse as possible; i.e., it is best to look at ability, learning styles, prior knowledge and experience to set up groups.
- Clearly written instructions are vital to the success of this kind of exercise, which means the trainer must analyze the task carefully and break it down into its component parts.
- Collaborative/co-operative technique forces learners to apply the concepts that have just been taught, and usually produce questions they didn't think to ask during a lecture (and also provides a powerful antidote to boredom).
- Group exercises can be designed for 15- to 20-minute periods and during the exercise, the teacher moves from group to group, answering questions, clarifying instructions, giving advice, and observing the group process.
- Small groups can be used with a variety of other techniques, such as peer teaching, case studies, and simulations.
- Best Practice Strategies: Jigsaw, Turn-To-Your-Partner and Sticky-Note Discussions Brainstorming (see directions on page 13 – Best Practices)

Case Studies

Case studies are appropriate for learning about information analysis, decision making, or problem solving. The method requires the development of a set of cases that reflect problems or topical issues. The learners, as a group, would be expected to infer information based on prior knowledge, techniques and prior experiences. Participants work in groups to analyze, synthesize, evaluate or apply new learning from the case study. Trainers circulate among the groups to facilitate the process. Individual groups share their findings with the larger group.

- Cases must provide enough information to elicit analytical thought, but not so much that the solutions are obvious.
- Remember that learners need to master a common knowledge base as well as the steps in the analytical process they will use. So managing the discussion of case studies may require techniques that differ from generalized discussion methods.
- Best Practice Strategies: Jigsaw, Turn-To-Your-Partner and Sticky-Note Discussions (see directions on page 13 – Best Practices)

Simulations

Like case studies, simulations provide learners with practice in application and decision making, but in a different, more engaging, format. Since simulations are based on real-life situations, they present learners with choices and constraints that reflect real-world problems. Simulations improve learner engagement and advance higher-order thinking skills as they allow trainees to synthesize instruction without the danger of an actual application. Simulations can be very effective in teaching problem-solving and in developing learners' self-confidence. Simulations are representative of authentic application and may be assessed on an individual rather than a group basis.

- Individual earners are given particular roles to play or tasks to complete; e.g., members of the different departments, institutions or associations. The task is to come to agreement about a topic or solution.
- The instructional objectives are designed to provide practice in technical applications, engage in problem solving, and negotiation skills to discover techniques for reaching compromise.
- Simulations are more difficult and time-consuming to write than case studies, and they usually take more time in class, although the trainer's role is less directive than in the case study method.
- They require more explanation before the exercise and, when completed, a careful explanation of what has been learned by relating learners' experiences to the general principles involved.
- Best Practice Strategies: Questioning or Inquiry, Problem-Solving, Decision Making

Using New Technology to Aid Learning

Podcasts, webcasts, and games build independent skill, interest, engagement in a topic at an individual pace and in a safer setting than on-the-job training. Podcasts are audio or video recordings posted on a website that can be downloaded and played later. Webcasts are media files distributed over the Internet using streaming media technology. Computer games allow learners to experience new learning in a non- threatening way.

- Technologically-based instruction should be explored as an effective format for instruction. Tailored, self-guided distance learning options should also be explored.
- Presentations can be videotaped for later presentations in podcasts.
- Best Practice Strategies: webquests, podcasts

Note: According to studies conducted by the U.S. Department of Labor, 30 to 40 percent of the present workforce does not have the necessary prerequisite skills to learn tomorrow's globally competitive skills. For this reason, and because people have different learning styles, each adult learner may acquire knowledge at a different pace. Most traditional programs offer the same content at the same pace to all trainees. For adults who need an individualized learning pace, e-learning may be a better alternative.

Train the Trainer: Best Practice Strategies To Improve Quality

Use Partners

- Think-Pair-Share: Trainers pose a question, problem or an idea and learners individually think for a moment, then, they pair up with a classmate to discuss their thoughts. Finally, a few participants are called on to share their ideas with the entire class.

- Turn-To-Your-Partner Discussions: A less-formal variation of Think-Pair-Share that allows collaboration and problem solving followed by a sharing process with a larger or the whole group.
- Pair Summarizing/Checking: Learners work in pairs. One summarizes a concept, applies a technique or an approach to a particular problem. The other listens and checks for errors, correcting each other as they arise. Parts can be broken into sections so each partner has an opportunity to switch roles.

Use Cooperative Groups

- Jigsaw: Divide participants into groups to complete an activity, then the participants are re-grouped to discuss the findings of the first group. Participants then re-join their original groups to discuss what they have learned. Finally, representatives of the groups share findings with the entire group.
- Sticky-Note Discussions: Allow participants to jot down notes from an activity, experience, or discussion and then bring the notes to an alternate group for discussion. (This allows time to process new information.) Then the groups share the information gained.

Use Individual or Group Applications

- Questioning or Inquiry: Individual students ask questions that are meaningful to them, and that do not necessarily have easy answers; trainers are encouraged to avoid giving direct answers in favor of asking more questions.
- Problem-Solving: 'Drill Down' to break a large and complex problem down into its component parts, so that a plan is developed to deal with these parts. Apply a process to problem/solution such as:
    - Scientific method: state the problem, form an hypothesis, test the hypothesis, collect the data, analyze the data, draw conclusions
    - Business solutions: define the problem, research potential causes, identify alternative approaches to resolve, identify the approach you will use, create an action plan for implementation, monitor the plan implementation, verify that the problem has been resolved
- Decision Making Matrix or T Graphic: Individuals use graphics to make decisions or weigh answers.
- Webquests: guided search for information
- Podcasts: video and audio recordings of topical lessons available on CD or web.

Train the Trainer: Principles of Quality Practice Applied to Adult Training Programs

- **Connection and Visibility** encourages motivation and involvement. Knowing trainers as mentors enhances trainees' intellectual commitment and encourages them to think about personal and corporate values. The relationship between trainer/trainee recognizes that each others' experience is accepted as valid and acknowledged as an essential aspect influencing change.

- **Collaboration and Cooperation Among Participants** - Learning is enhanced when it is more like a team effort than a solo race. Good learning, like good work, is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing one's own ideas and responding to others' reactions sharpens thinking and deepens understanding**.**

- **Active Learning** - Learning is not a spectator sport. Trainees do not learn much just by sitting in classes listening to trainers, memorizing pre-packaged assignments, and spitting out answers. Effective learning requires an active search for meaning in which new tasks are related to earlier activities or prior knowledge. Learners need opportunities to formulate and explain their hypotheses and conclusions.

- **Feedback and Thinking Time** - Knowing what you know and don't know focuses learning. When getting started, trainees need help in assessing existing knowledge and competence. During training sessions, trainees need frequent opportunities to perform and receive suggestions for improvement. Experienced trainees need time to connect the new learning with what they already know and engage in problem solving. At various points, trainees need opportunities to reflect on what they have learned, how they have learned it, what they still need to know, and how to assess themselves.

- **Time on Task** - Time plus energy equals learning. There is no substitute for time on task. Learning to use one's time well is critical for trainees and trainers alike. Learners need help in effective time management, i.e. allocating realistic amounts of time for learning. How an institution uses time transforms culture and establishes the basis of high performance for all.

- **Communicate High Expectations** - Expect more and you will get more. High expectations are important for everyone -- for the poorly prepared, for those unwilling to exert themselves, and for the well motivated. Expecting trainees to perform well becomes a self-fulfilling prophecy when trainers and institutions hold and make extra efforts for high expectations for everyone. Trainers use objectives and assessments with rubrics to identify expectations.

- **Respects Diverse Talents and Ways of Learning** - There are many roads to learning. People bring different talents and styles of learning to every learning situation. Learners, rich in hands-on experience, may not do as well with theory. Learners need the opportunity to show their talents and learn in ways that work for them. Then they can be pushed to learn in new ways that do not come so easily.

Train the trainer concepts and adaptations are based on the works of: Chickering, A.W., and Gamson, Z.F. (1991). Applying the Seven Principles for Good Practice in Undergraduate Education. New Directions for Teaching and Learning. Number 47, Fall 1991. San Francisco: Jossey-Bass Inc. Last changed 25 May 2005 *(Document started on 10 Mar 2005.)*

This is a WWW document maintained by *Steve Draper*, installed at
http://www.psy.gla.ac.uk/~steve/best/chickering.html. You may copy it.

Appendix 1

IHST Sample Lesson Plan

Created:
Implemented:
Review Date:

Topic:
Standards:

Goal:

Lesson Objectives	

Instructional Plan
Introduction:
Instruction:
Guided Practice:
Assessment:
Closure:

Materials		

Evaluation

Appendix 2

IHST Sample Training Evaluation Form

Program name:	**Date:**
Instructor(s):	

Strongly disagree = 0
Disagree = 1
Neutral = 2
Agree = 3
Strongly agree = 4

Place a check (✓or x) in the column ((0, 1, 2, 3, 4) that most applies to your experience in this training. Total your score in the last row and return to the presenter.

Course Evaluation	**0**	**1**	**2**	**3**	**4**
Lesson objectives were clearly stated and met.					
The objectives and course apply directly to my work performance or safety.					
The pace and level of instruction was appropriate for the course.					
Instructors were prepared and responsive to the audience.					
Presentation and content met or exceeded my expectations.					
Materials were organized and understandable.					
Sufficient time was allowed for discussion and practice.					
I am confident that I will be able to apply this course's learning in my work environment.					
My overall satisfaction with this course is positive.					
Totals					

Comments:

Name *(optional)*

Appendix 3

IHST EXAMPLE

RISK ASSESSMENT MATRIX: NIGHT OPERATIONS

RISK ASSESSMENT MATRIX: NIGHT OPERATIONS				
Use this tool to assess the potential for links in the safety chain.				
	Applicable Weather for Flight			
Apply Operational Factors	**WEATHER Well Above Minimums and Stable**	**CEILING Within 1000' of Minimums**	**VISIBILITY Within 3 mi. of Minimums**	**CEILING & VIS Within 3 mi. and 500' of Mins.**
NIGHT **Normal ops**				
AIRCRAFT **Performance near max** **Back-up or different A/C** MEL items				
ENVIRONMENTAL **Extreme heat or cold** **High winds** **Storms in area**				
FATIGUE **Late in shift?** **Consecutive shifts?**				

Risk Assessment Value:

	Normal Ops
	Caution
	Extreme Caution
	Critical Safety Decision Required

Appendix 4

Training Resources and Training Aids

There are many training resources and training aids available for helicopter operators of all sizes. As indicated in the JHSAT's 2000 year report - 7.2 Training Recommendations: it states in part, *Promote increased use of training aids, training devices, and simulators in training programs.* Through the use of training aids, training devices and simulators, more effective training can be achieved. Training areas that would benefit significantly include, but are not limited to:

- Autorotation
- Loss of Tail Rotor Effectiveness (LTE)
- Aircraft performance capabilities and limitations
- Helicopter emergencies and emergency procedures outlined in the rotorcraft flight manual
- Inadvertent Flight into Instrument Meteorological Conditions (IIMC)
- Make and model transition training
- Aeronautical Decision Making (ADM) and risk management
- Model-specific power and energy management
- Quick-stop maneuvers
- Landing practice in unimproved areas, on landing platforms, and from pinnacle approaches.

Accordingly the following resources are available to assist all operators with effective training programs.

- **Media/Computer Based Training**

  - Avstar Media, LLC
    PO Box 458
    Addison, TX 75001
    www.avstarmedia.com
    Office: 972-980-9300

- **Manuals:**

  - Schweizer Helicopter Textbook & Pilot Exercise Manual – Jeppesen-JS312502
  - Rotorcraft Flying Handbook – FAA Manual # H-8083-21
  - Flight Manual specific to the make and model of aircraft (available from OEM)

- **Books/DVD/Reference Documents:**

  - FITS (FAA Industry Training Standards– Jeppesen –JS280109
  - IFR for VFR Pilots - ASA
  - Instrument Flying Handbook – FAA H-8083-15A
  - Instrument Procedures Handbook – FAA H-8261-1A
  - Robinson R-22 Helicopter Handbook – ASA-PG-R-22
  - Helicopter Association International
    Resources and Training Materials
    www.rotor.com

- FAA
  Training Resources & Guides
  www.faa.gov/training_testing/training/
  Maintenance Human Factors
  https://hfskyway.faa.gov/HFSkyway/index.aspx

- **Aircraft Manufacturers:**

  - Agusta Aerospace Corp.
    3050 Red Lion Road
    Philadelphia, PA 19114
    www.agustausa.com
    Office: (215) 281-1400

  - American Eurocopter
    2701 Forum Drive
    Grand Prairie, TX 75052-7099
    www.eurocopterusa.com
    Ph: 972-641-0000

  - Bell Helicopters Training Academy
    13901 Aviator Way
    Ft. Worth, TX 76177
    www.bellhelicopter.com
    Office: (800) 368-2355

  - MD Helicopters Training Center
    4555 East McDonald Road, Bldg 615
    Mesa, AZ 85215
    www.mdhelicopters.com
    Training Office: (480) 346-6393

  - Robinson Helicopter Company
    2901 Airport Drive
    Torrance, CA 90505
    www.robinsonheli.com
    (310) 539-0508

  - Sikorsky
    General Information (800) 946-4337
    Sikorsky/Flight Safety International
    West Palm Beach Learning Center
    3887 Southern Blvd
    West Palm Beach, FL 33406
    www.sikorsky.com
    Ph: (561) 515-2900

- **Simulator and Flight Training Device Manufacturers:**

  - CAE
    8585 Cote de Liesse
    Montreal, Quebec
    Canada H4T 106
    www.cae.com
    Ph: +1-514-341-6780

  - Flight Safety International
    Marine Air Terminal
    Flushing, NY 11371
    www.flightsafety.com
    Corp. Office: (718) 565-4100
    Flight Safety Simulation: (918) 259-4000
    Flight Safety Academy: (772) 564-7600

  - Frasca International
    906 E. Airport Road
    Urbana, IL 61802-7407
    www.frasca.com
    Office: 217-344-9202

  - SimCom Training Centers
    6989 Lee Vista Blvd
    Orlando, FL 32822
    www.simulator.com
    (800) 272-0211

- **Aircraft Manufacturers and Training Providers using Simulation:**

  - Agusta Aerospace Corp.
    3050 Red Lion Road
    Philadelphia, PA 19114
    www.agustausa.com
    Ph: (215) 281-1400

  - American Eurocopter
    2701 Forum Drive
    Grand Prairie, TX 75052-7099
    www.eurocopterusa.com
    Ph: 972-641-0000

  - Bell Helicopters Training Academy
    13901 Aviator Way
    Ft. Worth, TX 76177
    www.bellhelicopter.com
    Ph: (800) 368-2355

- CAE
  8585 Cote de Liesse
  Montreal, Quebec
  Canada H4T 106
  www.cae.com
  Ph: +1-514-341-6780

- Era Training Center
  960 West Lincoln Road
  Lake Charles, LA 70607
  www.eratrainingcenter.com
  Ph: 800 655 1414

- Flight Safety International
  Marine Air Terminal
  Flushing, NY 11371
  www.flightsafety.com
  Corp. Office: (718) 565-4100
  Flight Safety Simulation: (918) 259-4000

- Sikorsky
  General Information (800) 946-4337
  Sikorsky/FlightSafety West Palm Beach Learning Center
  3887 Southern Blvd
  West Palm Beach, FL 33406
  www.sikorsky.com
  Ph: (561) 515-2900

- **HOMP/Avionics**

  As an integral part of the Safety Management Systems (SMS) Flight Data Monitoring (FDM) or Helicopter Operations Monitoring Program (HOMP) will enhance the ability to collect and analyze flight data to monitor and verify flight operations, safety and training standards through the use of Flight Data Recorders (FDR).

  - Sagem Avionics Inc.
    2802 Safran Drive
    Grand Prairie, TX 75052
    www.sagemavionics.com
    Ph: (972) 314-3600

  - Appareo Systems LLC
    1854 NDSU Research Circle North
    Fargo, North Dakota 58102
    www.appareo.com
    Ph: (701) 356-2200

- Flight Data Services
  2375 E. Camelback Rd., 5th Floor
  Phoenix, AZ 85016
  www.flightdataservices.com
  Ph: (602) 387-4961

- Honeywell MyAerospace
  Customer Help Desk:
  US and Canada
  Ph: 800-601-3099
  https://portal.honeywell.com/wps/portal/aero

Appendix 5

Acronyms

- AAMS – Association of Air Medical Services
- ADS-B – Automatic Dependent Surveillance-Broadcast
- ALEA – Airborne Law Enforcement Association
- AMOA – Air Medical Operators Association
- AMPA - Air Medical Physicians Association
- AMRM – Air Medical Resource Management
- AMSAC – Air Medical Safety Advisory Council
- ASTNA – Air & Surface Transport Nurses Association
- ATC – Air Traffic Control
- CAMI – Civil Aerospace Medical Institute (FAA)
- CAMTS – Commission on Accreditation of Medical Transport Systems
- CVR – Cockpit Voice Recorder
- CRM – Crew Resource Management
- ENG – Electronic News Gathering
- FAA – Federal Aviation Administration
- FDM – Flight Data Management
- FDR – Flight Data Recorder
- FITS – FAA Industry Training Standards
- FOQA – Flight Operations Quality Assessment
- FTD – Flight Training Device
- GPS – Global Positioning System
- HAI – Helicopter Association International
- HEMS – Helicopter Emergency Medical Services
- HSAC – Helicopter Safety Advisory Council
- HTAWS – Helicopter Terrain Awareness Warning System
- IFR – Instrument Flight Conditions
- IHST – International Helicopter Safety Team

- ILS – Instrument Landing System
- IMC – Instrument Meteorological Conditions
- IIMC – Inadvertent Instrument Meteorological Conditions
- JHSAT – Joint Helicopter Safety Analysis Team
- JHSIT – Joint Helicopter Safety Implementation Team
- NAACS – National Association Air-medical Communications Specialists
- NEMSPA – National EMS Pilots Association
- NFPA - National Flight Paramedics Association
- NTSB – National Transportation Safety Board
- NVG- Night Vision Goggles
- OEM – Original Equipment Manufacturer
- OGP – Oil and Gas Producers
- NVG – Night Vision Goggles
- SBT – Scenario Based Training
- SMS – Safety Management System
- TCAS – Traffic Collision Avoidance System
- TOPS – Tour Operators Program of Safety
- VFR – Visual Flight Conditions