ADVISORY CIRCULAR FOR AIR OPERATORS

Subject: CREW RESOURCE MANAGEMENT TRAINING PROGRAMME

Date: xx.xx.2013

Initiated By: Republic of Korea

AC No:

1. PURPOSE

This advisory circular (AC) presents guidelines for developing, implementing, reinforcing, and assessing Crew Resource Management (CRM) training programs for flight crew members and other personnel essential to flight safety. These programs are designed to become an integral part of training and operations. All air operators are required by regulations to provide CRM training for pilots and cabin crews. AOC holders and other individuals operating apart from commercial air transport operations should find these guidelines useful in addressing human performance issues. This AC presents one way, but not necessarily the only way, that CRM training may be addressed. CRM training focuses on situation awareness, communication skills, teamwork, task allocation, and decision-making and error management within a comprehensive framework of standard operating procedures (SOP's).

1.1 Background

Investigations into the causes of air operator accidents have shown that human error is a contributing factor in 60-80% of all air operator incidents and accidents. Long term research has demonstrated that these events share common characteristics. Many problems encountered by flight crews have very little to do with the technical aspects of operating in a multi-person cockpit. Instead, problems are associated with poor group decision making, ineffective communication, inadequate leadership and poor task or resource management. Pilot training programs historically focused almost exclusively on the technical aspects of flying and on an individual pilot’s performance; they did not effectively address crew management issues that are also fundamental to safe flight.

2 DEFINITION & CONCEPTS

2.1 Crew Resource Management (CRM)

As used in this AC, CRM refers to the effective use of all available resources: human resources, hardware, and information to achieve safe and efficient operation. Other groups routinely working with the cockpit crew, who are involved in decisions required to operate a flight safely, are also essential participants in an effective CRM process. These groups include but are not limited to aircraft dispatchers, cabin crews, maintenance personnel and air traffic controllers.

2.2 Crew Resource Management (CRM) Training

CRM training is one way of addressing the challenge of optimizing the human/machine interface and accompanying interpersonal activities. These activities include team building and maintenance, information transfer, problem solving, decision making, maintaining situation awareness, and dealing with automated systems.

CRM training is **CRM training is for the development of knowledge and skills related to human performance** and **is** based on awareness that a high degree of technical proficiency is essential for safe and efficient operations. Demonstrated mastery of CRM concepts cannot overcome a lack of proficiency. Similarly, high technical proficiency cannot guarantee safe operations in the absence of effective crew coordination. Coordinated efforts by representatives from the aviation community have produced valuable recommendations for CRM training programs.

The recommendations contained in this AC provide a useful reference for understanding and applying the critical elements of CRM training.

2.3 Basic concepts of CRM

While there are various useful methods in use in CRM training today, certain essentials are universal:

(1) CRM training is most effective within a training program centered on clear, comprehensive standard operating procedures.

(2) CRM training should focus on the functioning of crewmembers as teams, not as a collection of technically competent individuals. Whenever possible, pilots should be graded as a crew, rather than as an individual.

(3) CRM training should instruct crewmembers how to behave in ways that foster crew effectiveness

(4) CRM training should provide opportunities for crewmembers to practice the skills necessary to be effective team leaders and team members.

2.4 Error Management.

It is now understood that pilot errors cannot be entirely eliminated. It is important, therefore, that pilots develop appropriate error management skills and procedures. It is certainly desirable to prevent as many errors as possible, but since they cannot all be prevented, detection and recovery from errors should be addressed in training. Evaluation of pilots should also consider error management (error prevention, detection, and recovery). Evaluation should recognize that since not all errors can be prevented, it is important that errors be managed properly.

3 RELATED CIVIL AVIATION REGULATIONS

(Insert appropriate States Regulations)

4 RELATED READING MATERIALS

a. ICAO Human Factors Training Manual, Document 9683, Part 2 Chapter 2, Crew Resource Management (CRM) Training.

b. (Any additions)

5 COMPONENTS OF CRM TRAINING

The topics outlined below have been identified as critical components of effective CRM training. No matter how effective each curriculum segment is, one-time exposures are simply not sufficient. The attitudes and norms that contribute to ineffective crew coordination may have developed over a crewmember's lifetime. To be maximally effective, CRM should be embedded in every stage of training, and CRM concepts should be stressed in line operations as well.

5.1 Commitment from Management

CRM programs are received much more positively by operations personnel when senior managers, flight operations managers, and flight standards officers conspicuously support CRM concepts and provide the necessary resources for training.

Flight operations manuals and training manuals should embrace CRM concepts by providing crews with necessary policy and procedures guidance centered on clear, comprehensive SOP's. A central CRM concept is communication. It is essential that every level of management support a safety culture in which communication is promoted by encouraging appropriate questioning. It should be made perfectly clear in pilots' manuals, and in every phase of pilot training, that appropriate questioning is encouraged and that there will be no negative repercussions for appropriate questioning of one pilot's decision or action by another pilot.

5.2 Initial CRM training (Indoctrination/Awareness.)

Initial CRM training shall be completed before commencing unsupervised line flying unless the crewmember has previously completed an initial operator's CRM course. Initial CRM training addresses the nature of the operations of the company concerned, as well as the associated procedures and the culture of the company. This will include areas of operations, which produce particular difficulties or involve adverse climatic conditions and any unusual hazards.

When a flight crewmember has not previously completed an Operator's Initial CRM training (either new employees or existing staff), then the flight crewmember shall complete an initial CRM training course. The Initial CRM Training should be completed within a specified period of time after a new employee joins the operator. If the flight crew member has not previously been trained in Human Factors then a theoretical course, based on the human performance and limitations program for **the Airline Transport Pilot License(ATPL)** (see the requirements applicable to the issue of Flight Crew Licenses) shall be completed before the initial Operator's CRM training or combined with the initial Operator's CRM training.

5.3 Recurrent CRM Training

CRM training must be included as a regular part of the recurrent training requirement. Recurrent CRM training should include modular classroom or briefing room CRM training to review and amplify CRM components, followed by practice and feedback exercises. All major topics of CRM training shall be covered over a period not exceeding 3 years.

Topics:

(A) Human error and reliability, error chain, error prevention and detection;

(B) Company safety culture, SOPs, organizational factors;

(C) Stress, stress management, fatigue and vigilance;
(D) Information **monitoring,** acquisition and processing, situation awareness, workload management;
(E) Decision making;
(F) Communication and coordination inside and outside the cockpit;
(G) Leadership and team behavior, synergy;
(H) Automation and philosophy of the use of Automation (if relevant to the type);
(I) Checklist and Briefing
(J) Specific type-related differences;
(K) Case based studies; and
(L) Additional areas which warrant extra attention, as identified by the accident prevention and flight safety programme. CRM elements should be integrated into all the phases of the recurrent training – by all the personnel conducting recurrent training. The operator shall ensure that all personnel conducting recurrent training are suitably qualified to integrate elements of CRM into this training.

5.4 Change of aircraft type or class Training
If a pilot changes aircraft type or class, elements of CRM training are integrated into the conversion training. In planning training on aeroplanes with a flight crew of two or more, particular emphasis should be placed on the practice of Line Orientated Flying Training (LOFT) with emphasis on Crew Resource Management (CRM). Training involving communications and the use of automation can be developed for crews operating aircraft with advanced technology cockpits, or for crews transitioning into them.

5.5 Upgrade training
Training for upgrading to captain provides an opportunity that deals with the human factors aspects of command. Such training can be incorporated in the upgrade process.

5.6 Joint CRM Training.
More and more carriers are discovering the value of revising CRM training to reach various employee groups, and sometimes to combine those groups during training. Their objective is to improve the effectiveness and safety of the entire operations team as a working system. Reinforcement can be accomplished in many areas. Training such as joint cabin and cockpit crew training in security can deal with many human factors issues. **The training by Line Operational Simulation (LOS), if it appropriately adressses the CRM skills, can be equivalent and replaced for CRM training course regarding changing aircraft type or class.**

6 SUGGESTED CURRICULUM TOPICS

6.1 CRM integration
CRM performance requirements or procedures need to be integrated into the SOP's of air operators. Specific callouts, checks, and guidance need to be included in normal checklists, quick-reference handbooks, abnormal/emergency procedures, manuals, and job aids. This integration captures CRM principles into explicit procedures used by flight crews.

6.2 CRM & Culture Issues

While individuals and even teams of individuals may perform well under many conditions, they are subject to the influence of at least three cultures - the professional cultures of the individuals themselves, the cultures of their organizations, and the national cultures surrounding the individuals and their organizations. If not recognized and addressed, factors related to culture may degrade crew performance. Hence, effective CRM training must address culture issues as appropriate in each training population.

6.3 Course Curriculum

<table>
<tr><th>Core Elements</th><th>Initial CRM Training</th><th>Changing aircraft type</th><th>Changing operator</th><th>Command course</th><th>Recurrent training</th></tr>
<tr><td>Human error and reliability, error chain, error prevention and detection</td><td rowspan="10">In depth</td><td>In depth</td><td>Overview</td><td>Overview</td><td rowspan="10">Overview</td></tr>
<tr><td>Company safety culture, SOPs, organizational factors</td><td rowspan="2">Not required</td><td>In depth</td><td rowspan="9">In depth</td></tr>
<tr><td>Stress, stress management, fatigue & vigilance</td><td rowspan="4">Not required</td></tr>
<tr><td>Information <u>monitoring,</u> acquisition and processing situation awareness, workload management</td><td rowspan="5">Overview</td></tr>
<tr><td>Decision making</td></tr>
<tr><td>Communication and coordination inside and outside the cockpit</td><td rowspan="2">Overview</td></tr>
<tr><td>Leadership and team behavior</td></tr>
</table>

synergy					
Automation, philosophy of the use of automation (if relevant to the type)	As required	In depth	In depth	As required	As required
Specific type-related differences			Not required		
Case based studies	In depth	In depth	In depth	In depth	As appropriate

7 CRM TRAINING & EVALUATION

7.1 The critical role of instructors and check pilots

The success of any CRM training program ultimately depends on the skills of the people who administer the training and measure its effects. CRM instructors check pilots, supervisors, and course designers must be skilled in all areas related to the practice and assessment of CRM. These skills comprise an additional level to those associated with traditional flight instruction and checking. Gaining proficiency and confidence in CRM instruction, observation, and measurement requires special training for instructors, supervisors, and check pilots in many CRM training processes. Instructors, supervisors, and check pilots also ~~require~~ are required special training in order to calibrate and standardize their own skills. The best results occur when the crews examine their own behavior with the assistance of a trained instructor who can point out both positive and negative CRM performance. Whenever highly effective examples of crew coordination are observed, it is vital that these positive behaviors be discussed and reinforced. Debriefing and critiquing skills are important tools for instructors, supervisors, and check pilots.

Feedback from instructors, supervisors, and check pilot is most effective when it refers to the concepts that are covered in the initial indoctrination/awareness training. The best feedback refers to instances of specific behavior, rather than behavior in general.

7.2 CRM evaluation

Any human factors program should include appropriate evaluation criteria as an integral component. Detailed behavioral measurement is integral to any evaluation, since it is the best index of how individuals apply what they have learned. Behavioral measurement requires the development of objective behavioral markers, which can be externally judged and are relevant to the operating environment. Behavioral markers can be measured both during training as a marker of progress, and subsequently as an indicator of how well training has transferred.

The flight crew must be assessed on their CRM skills in accordance with a methodology acceptable to the Authority and published in the Operations Manual. The purpose of such assessment is to provide feedback to the crew collectively and individually and serve to identify retraining. The assessment can also be sued to improve the CRM training system.

7.3 APPROPRIATE TRAINING INTERVENTIONS

The most effective CRM training involves active participation of all crew members.LOFT sessions give each crew member opportunities to practice CRM skills through interactions with other crew members. If the training is videotaped, feedback based on crew members' actual behaviour, during the LOFT, provides valuable documentation for the LOFT debrief.

CRM training can be presented using a combination of the following training interventions:
(1) Operator in-house courses.
(2) Training center courses.
(3) Special Purpose Operational Training.
(4) LOFT sessions.
(5) Computer Based Training courses.

8 CRM INSTRUCTORS

All personnel conducting recurrent training are suitably qualified to integrate elements of CRM into this training;

9 ADDITIONAL AVIATION SAFETY INFORMATION

Aviation safety information is readily available through the World Wide Web. Many websites contain valuable source materials and reference materials that may be helpful in developing CRM training. Websites commonly link to other websites containing related material. Some of the aviation related websites are included in the following:

(1) International Civil Aviation Organization (ICAO)
http://www.icao.org
(2) National Aeronautics and Space Administration (NASA),
http://www.nasa.gov
(3) National Transportation Safety Board (NTSB),
http://www.ntsb.gov
(4) Federal Aviation Administration (FAA),
http://www.faa.gov.
(5) Civil Aviation Safety Authority of Australia (CASA)
http://www.casa.gov.au
(6) Transport Canada
http://www.tc.gc.ca/en.menu.htm

10. SUMMARY

Effective Crew Resource Management begins in initial training and is strengthened by recurrent practice and feedback. It is sustained by continuing reinforcement that is part of the corporate culture and embedded in every stage of training.

Signed by: (Appropriate CAA Official)