11.0 HUMAN FACTORS TRAINING IN THE TRAINING SCHOOLS

Gordon Dupont
Special Programs Coordinator
Transport Canada, System Safety Pacific

INTRODUCTION

Human Factors (HF) training for aviation maintenance personnel (often referred to as Maintenance Resource Management or MRM) is finally being looked at seriously by the aviation industry. The International Civil Aviation Organization (ICAO) has proposed an amendment to Annex 6 Chapter 8 that would require all member countries to include *"training in knowledge and skills related to human performance, including coordination with other maintenance personnel and flight crew"* as part of the continuation training required within an approved maintenance organization.

As we are finally beginning to provide maintenance personnel with the training they require to avoid making maintenance errors then it is time to extend this training to those in training to become part of the maintenance work force. This paper will look at this next step in the effort to reduce maintenance error.

A BRIEF HISTORY

A brief history of MRM in Canada doesn't have to go back very far and, as is so often the case in our industry, it starts with an accident in which 24 people died. The Dryden accident on March 10, 1989 was Canada's wake up call. This accident occurred less than a year after the American wake up call in Maui, Hawaii with the infamous Boeing 737 "convertible". However unlike the Aloha accident, the Air Ontario crash at Dryden had only a small maintenance component. Maintenance contributed to the accident by forming a link which caused the F28's auxiliary power unit (APU) to be unserviceable (U/S). It is felt that the APU being U/S was a contributing factor to the Captain's decision to attempt a take off with ice on the wings. Out of the 191 far reaching recommendations, in the 1992 final report, one called for the extending of HF training to dispatchers, air traffic controllers and aircraft maintenance engineers (AMEs). As a result, Transport Canada (TC), in March 1993 established the position of "Special Projects Coordinator" with the task of developing, in cooperation with the industry, a HF workshop for maintenance personnel. An Industry Liaison Committee (ILC) was struck with representing members from the FAA, the major airlines, general aviation, the helicopter sector, the component overhaul sector and the Canadian military. A "test flight" (trial run and evaluation) of the

resulting two day “Human Performance in Maintenance”(HPIM) workshop was held in January of 1994 with great success.

Instead of disbanding, the ILC worked with Transport Canada to develop and produce the now well known “Dirty Dozen” posters. They then worked to actively promote HF training within their industry sponsoring the three Canadian conferences which helped give birth to this Symposium. This small industry group still exists today under the name of “Maintenance And Ramp Safety Society” (MARSS). Transport Canada remains an active member of this group who are working, as they did since their inception: *to reduce aviation maintenance and ground crew human errors.*

In August 1995, TC ran a “test flight” of a two day Human Performance for Ground Crew workshop. The workshop was well received, however it was felt that no company would be willing to expend two days of lost productivity to train its ground crew in Human Factors at this time. The program was put on the “back burner”, however the industry committee, MARSS, endeavored to produce a series of “Dirty Dozen” posters for ground crew which I understand is still awaiting sufficient funding in order to proceed.

Transport Canada has also developed a follow up HPIM Part 2 workshop which was released after a “test flight” in September , 1996. Many of the participants have said that this workshop is better then Part 1, but I suspect that it is more likely they come into Part 2 with a much more positive outlook towards the material presented.

THE PRESENT

Since its release in January 1994, HPIM Part 1, this workshop has been presented all across Canada, from Victoria, BC to St. Johns Newfoundland. It has been warmly received by all who have participated. Richard Komarniski, Grey Owl Aviation, an aviation consultant, has presented both HPIM Part one and two across Canada and the United States. Several major airlines and regional carriers have adopted the workshop to train their personnel. Two thousand sets of the “Dirty Dozen” posters have been distributed all around the world, from the Falkland Islands to New Guinea. These posters were designed to be a follow up reminder of material learned in HPIM Part one, but have developed into a standard of their own. They are in the process of being translated and printed in French. Permission was granted to have them printed in Chinese. MARSS is in the process of doing a third reprint.

MARSS, working with Transport Canada, is right now working on a second set of posters to be a follow up to HPIM Part two. They will be called “The Magnificent Seven” These posters will be all positive in nature and promote the AME as a professional.

Work is ongoing in developing a HPIM Part three which would see the AME, the pilots and company personnel together in a one day workshop which would cover risk management and personnel interaction. MARSS will provide industry input into the content and carry out a “test flight”, on behalf of the industry, later this year.

Transport Canada is presently working with the Canadian Aviation Maintenance Council (CAMC) in developing a HF training program to be presented as part of the training curriculum utilized by the aviation maintenance training schools across Canada. CAMC is a Canadian industry supported organization which in coordination with the various divisions of the industry, develops and maintains national standards in aviation maintenance. They work closely with the training schools with the objective of ensuring that common training curricula are utilized by all accredited training organizations.

THE NEXT STEP

Both TC and CAMC recognize that HF training must be introduced in the training schools and that there are two important issues to be addressed.

One The course material must provide the best possible benefit to the student to enable an individual to enter the work force with a knowledge of how to avoid maintenance human errors. .

Two How to ensure the standard of training is consistent across Canada so that every student receives the same basic training.

DELIVERY METHOD

The traditional method of lecture with a textbook and test at the end does not lend itself to efficient training of HF. This method works reasonably well when the material to be learned is finite and has only one correct response. HF is not finite and there is often more then one correct response. Because we are dealing with humans and human situations, we often find that the correct response can vary. This method is not recommended for young students who will have a lot of questions and “but what ifs” to ask.

Some thought was given to providing this initial training on a CDROM as computer based training (CBT) which would ensure the consistency of the training. The majority of today's students are very familiar with computers and comfortable with this form of training as long as it is presented in an interesting and informative way. However CBT has some drawbacks. The computer has no way of detecting when the respondent is in disagreement with what is being presented. Students become very adapt at providing the correct response to any question without even being sure of the question. Should a natural leader of a student group have a negative reaction to the CBT training then it would be possible for the majority in his sphere of influence to also reject the program. Therefore total reliance on CBT used for abinitio training in HF is not recommended. However some video clips and a form of interesting follow up in the form of case studies are useful as long as they provide real life situations which the student can relate to.

The ideal way to provide HF training to students is a team situation with experienced AMEs as part of the team. This has been done on a test basis with very positive results both from the students but also from the AMEs on the team. The main reason for this is, what the student may lack in knowledge, he often makes up for in enthusiasm. With experienced AMEs as part of the team, the student more readily accepts what is being presented and most, coming from a learning environment, are ready participants of the exercises.

While the student/experienced AME mix may be the optimal, it may not be the most practical or even possible. This leaves the last option, which is a training package designed for the student. This training package would be delivered by using the team concept and a series of modules which actively encourage interaction and provide for team exercises.

TIME AND TIMEFRAME

"How much is enough and can I do the training during coffee breaks?" Experience has shown that maximum benefit can be obtained with a two day workshop provided as a block. Splitting the modules up results in a lot of time being spent in review to get everyone back up to speed. If there is extra time for this review/reinforcement, then that could be an effective way to train. However if the total time allocated is finite then I recommend the two day back to back workshop. The "sleep on it over night" appears to have a positive effect on the final outcome. More then two days would be excellent as it would allow for more case studies to reinforce what is being presented. It would allow for more team exercises and it would allow for a more in-depth presentation of the material. However, this extra time would likely have to be at the expense of some other portion on the course and may not prove to be practical.

THE WORKSHOP MATERIAL

Most will have little difficulty in agreeing that the “dirty dozen” messages should be covered in a simple, basic, and interesting way. I would envision an ab initio introduction to human performance in maintenance could contain the following modules.

1. An introduction and brief history to set the tone and provide the purpose of the workshop.

Time allocation 1 hour

2. What determines a persons characteristics and a simple behavioural analysis should follow to set a foundation for the balance of the workshop.

Time allocation 1 ½ hour

3. The “Dirty Dozen” messages beginning with Lack of Knowledge, specially as it applies to a new person on the job which the student will one day be.

Time allocation ½ hour

4. Next should come its close cousin, Lack of Awareness.

Time allocation ½ hour

5. Lack of Assertiveness is going to be a problem for the students when they obtain that first job and are not comfortable with the norms of the company. To speak up against a norm could mean job loss.

Time allocation ½ hour

6. Pressure is one which they will soon be exposed to and they will already be familiar with as they strive to succeed in their studies. They will learn how to recognize when the pressure is self induced and when it is excessive.

Time allocation ½ hour

7. Lack of Resources should follow with plenty of examples to illustrate the problem.

Time allocation ½ hour

8. Lack of Teamwork should be covered. There are a number of exercises which help illustrate the value of synergy.

Time allocation ¾ hour

9. Complacency is one which the student will not have to deal with for awhile but must be covered in order to become aware of what it is, how to recognize it and what to do about it so it doesn’t cause a problem.

Time allocation ½ hour

10. Distraction is a common problem which they will relate to well.

Time allocation ½ hour

11. Fatigue may not appear to be a big problem for the young student but must be empathized and understood.

Time allocation ¾ hour

The next 3 messages are very important to cover adequately as they are likely to be the big 3 for a new person on the job.

12. Lack of Communication both verbal and written.

Time allocation 1 hour

13. Stress is an insidious contributor to the unintentional maintenance error.

Time allocation 1 hour

14. Norms are one of the most important as new employees will come across them soon after beginning any job. Company culture must be tied into the norms as it is a major influencer of Norms.

Time allocation 1 hour

15. At least 2 case studies, and more if time permits, which illustrate what has been covered should be incorporated.

Time allocation 2 hours

16. A wrap up must be provided at the end for the student to focus on what he is going to do different and to provide feedback on the training received. The wrap up will center on the student writing a letter to himself which he will receive back in 6 months

Time allocation ½ hour

THE FACILITATOR

The facilitator is critical to the success of the training. There are a number of things which should be in place to ensure a successful human factors facilitator.

1. The facilitator must be a strong believer in human factors and the benefits of positive thinking. A negative person will have great difficulty in presenting the concepts in the workshop.

2. The facilitator must have creditability with the participants. This means that he/she must have experienced working with aircraft and preferably not be limited to a background in psychology or flying. He/she has to have "walked the mile" to be an effective facilitator.

3. The facilitator must receive proper training on both what is in the workshop but also how to present the material.

4. The facilitator has to know the material well and be able to provide his own experiences in appropriate places to add creditability to the material. This can be difficult for some persons.

5. The facilitator must be willing to listen to, as well as ask, questions of the participants in order to sense their acceptance of the material. The more the participants can discover for themselves the better.

6. Two facilitators working together are the ideal as more material can be effectively covered in the same time frame, they are able to carry out demonstration skits to vary the training method and they are able to assist each other to ensure that all points are covered. This concept also helps ensure consistency of the material taught.

7. The facilitator should have access to the latest training material in order to keep up to date with the latest techniques and concepts.

8. The facilitator should have a means of obtaining answers to any problems or questions he is unable to find answers for. Knowledge of Human factors can not be bluffed for any length of time before the facilitators creditability is gone.

SUMMARY

By providing quality human factors training in the maintenance training schools we will turn out persons who have a basic knowledge of what causes maintenance errors and how to avoid them. We will also have personnel in the industry who have accepted the concept that human factors training is worth having. If their training is done right, they will "spread the word" and be willing to participate in further training in that field.

Thus it is critical that we get it right the first time if we are to benefit in the future. By working together I know we can do just that.

CONTACTS

Transport Canada, System Safety, Pacific
Gordon Dupont
Special Programs Coordinator
Phone: 604 526-8367
Fax: 604 666-9507
Email: dupontg@tc.gc.ca

Maintenance And Ramp Safety Society (MARSS)
John Braund
Secretary
Phone: 604 207-9100
Fax: 604 207-9101
Email: MARSS@MARSS.org
Website: WWW.MARSS@MARSS.org

Canadian Aviation Maintenance Council (CAMC)
William Weston
Executive Director
Phone: 613 727-8272
Fax: 613 727-7018
Email: wweston@camc.ca
Website: WWW.CAMC@CAMC.CA

Grey Owl Aviation Consultants
Richard Komarniski
Phone: 204 848-7353
Fax: 204 848-4605
Email: richard@greyowl.com
Website: www.greyowl.com