

Importance of MRM Training

The pilot community has been aware of the importance of human factors for a long time. Since 1978 Cockpit Resource Management or Crew Resource Management (CRM) training has become a valuable asset to aviation by creating an increased awareness of Human Factors and the role of Human Factors as it affects the judgment of flight crews.

Richard Komarniski assesses the importance of CRM training, or Maintenance Resource Management Training (MRM), as it has begun to be called, for maintenance personnel.

The benefits of CRM training have been well documented, and in some well publicised cases, CRM training has been credited with reducing or preventing catastrophic accidents. The success of Cockpit Resource Management has led to CRM becoming a regulatory requirement in Canada. Generally, when we read, see on the nightly news, or hear about aviation incidents the focus is on the cockpit. It seems that innovations, including those involving training, start first in the cockpit and then move to other areas such as maintenance.

Only during the past few years have we even heard the words "*Human Factors Training*" mentioned within the maintenance department. Most companies in the aviation industry provide their maintenance personnel with excellent technical training, including periodic recurrent training. But, very few companies provide any form of Human Factors training to their maintenance personnel despite human factors causes accounting for nearly 80% of their maintenance errors.

As we in the aviation community continue to address the human errors which still occur all too frequently in aviation accidents, we have to move next to the aircraft technicians. These highly skilled personnel, who can be thought of as second in line behind the flight crews in terms of the potential for making an error which could lead to catastrophic consequences, frequently work under severe pressure and with tight deadlines.

Their work requires the highest levels of quality 100% of the time, or an error may occur which impacts the safety of flight. An in-depth review of aviation incidents reveal time and again that a series of human errors, as part of a chain of events, accumulated until the accident occurred. If a maintenance technician was involved in making an error that became a link in the chain of events leading to the accident, and if we can determine what affected the technicians judgment, then we have the opportunity to learn from these incidents in order to prevent the accident from happening again.

Originally focusing on the pilot community, human factors has now spread into the training sphere of maintenance technicians as maintenance resource management (MRM). As we work with maintenance staff to provide awareness training in human factors, we need to avoid the mistake of merely adapting the existing company CRM program from the cockpit to the maintenance environment. The human factors program for maintenance requires a different approach just as pilots and maintenance personnel are very different. For example, pilots are more open with their communications and freely express their feelings and opinions while maintenance personnel, in general, keep to themselves and are reluctant to express themselves as often as they should.

MRM has to be totally relevant to the maintenance function and to the maintenance support staff. With tight budgets, large workloads, and very tight turn around times, it seems that maintenance is only getting one chance to demonstrate the effectiveness of MRM and we have to get it right the first time around. The commitment from management to support and fund this training is critical since it can consume scarce and valuable resources. Scheduling a group of sixteen people for a two day MRM training class (out of a total crew of sixty maintenance personnel, for example) requires substantial effort to reschedule aircraft and the remaining maintenance staff, for two days in order to enable the maintenance staff participating in the training to be focused on the class. It can be an expensive undertaking, but MRM training can and is being done with dramatic results.

The companies that have moved forward with MRM must be commended. With the predicted increase in air travel and the predicted increase in aviation incidents, we cannot lose site of our goal - zero incidents in our industry by achieving it one day at a time.

The importance of providing human factors training to maintenance personnel is starting to be accepted by senior management, especially when they can see the impact on reduction of maintenance errors and the potential benefits of human factors or MRM training. The technicians realize the importance of human factors awareness training as a means to help them understand themselves and why maintenance errors occur. The training helps technicians understand the concept of "safety nets" and how to create these safety nets in their own work habits to prevent the start of the chain of events that leads to accidents.

Human factors training for maintenance personnel presented in a MRM class should focus on understanding the most common human factors causes of maintenance error, how they occur, and the safety nets that can be used by maintenance technicians to prevent these types of errors. Case studies, tailored to the maintenance environment, presented in an interactive workshop have been shown to be effective and well received by maintenance personnel. In these workshops, an interesting phenomenon occurs: *technicians start talking about how they can personally take steps to prevent maintenance errors from occurring in their own work environment.*

How the subject and the teaching has developed

The most successful programs that are used to date are the programs developed with human behavior styles in mind. What causes us to become less vigilant when we are tasked to look for cracks on a wing strap containing 400 rivets? Psychologists explain it by saying "the emotional mind creates complacency, while it should be the rational mind who is in control to find the cracks." Routine or repetitious tasks are governed by the emotional mind while more difficult tasks that challenge the technician are controlled by the rational mind.

Boeing studied the causes of 276 in-flight shut downs due to maintenance errors. 93% of these investigations revealed that the contributing cause was probably the technician's state of mind (emotional mind) while they were completing the task which resulted in a incomplete or improper installation of a component, damage on installation, or equipment not installed. But only 7% of the errors were created when the technician was trouble shooting, which is a task requiring more attention, may be more challenging, and occurs under the control of the rational mind state.

Today, more than ever, with the stress, pressures and demands for performance of individuals, the Maintenance Department has to be recognized for its professional level of work. We must be given the tools to work with, especially in regard to the Human Factors. We have the Regulations giving us the regulatory structure to comply with, and the Labour Code to provide a

safe workplace. We need the Human Factors training and the insight it provides to help us understand our own work habits and those of our co-workers. Otherwise, we as technicians have a tendency to keep to ourselves and not to communicate our thoughts and concerns. Communication is a key factor in aviation, yet the more stress we are under the more we tend to keep to ourselves. Just when we should be communicating more, we communicate less. Why do we do this?

Human Factors Training begins with human behavioural analysis: why do we react to the same situations differently? Consider the following scenario. Bob, an AMT comes up with a new idea to make life better in the hangar. Andy, his fellow AMT thinks it is a great idea and sets out to try it. Bill, another AMT in the same hangar thinks he should have thought of it and wonders why he can never come up with good ideas. And, Charley, an AMT thinks Bob is out to show him up and sets out to make sure it will not work.

Which one of these individuals sounds like you? For the same event, we see three different reactions from three individuals all with differing life experiences. Which reaction you choose depends on early life decisions that shaped the ways in which you think and react today. Behavior analysis is a good start to understanding our own behavior as well as the behavior of those around us. It also helps us to become more comfortable with open communication, learning how to deal better with the inevitable stresses of life, and how to handle conflict.

As Steve Covey says in 7 HABITS OF HIGHLY EFFECTIVE PEOPLE *"we have to seek first to understand ourselves before we can help ourselves"*. That is why human behaviour analysis is important.

The quality of the working relationships on the shop floor and the level of co-operation and support within the maintenance team, are as important to safety as are relationships in the cockpit among the flight crew. We cannot emphasize enough the requirement for teamwork. One individual's weakness is compensated by another individual's strengths. Communication creates teamwork, synergy, and better decision-making.

Our experience indicates that the MRM program is best received by the aviation maintenance technicians if the training class is delivered by a peer. The program is best facilitated by a knowledgeable and trained technician or by two facilitators - one with management experience and the other with a strong maintenance background.

The current thinking on the subject

The response we have received after facilitating the human factors program for the last three years across many different aviation industry companies has been an overwhelming *"Where were you 20 years ago?" "This type of training is long overdue", "You have changed my attitude towards my life, thank you!!!"*

An increased understanding of the role of human factors and the positive actions that professional aviation maintenance personnel can take has been shown to have a lasting effect beyond the end of the workshop. Improved communications, increased assertiveness, ways to cope with pressure and stress, and how to recognize the onset of fatigue and deal with it are just a few of the "tools" technicians acquire during the workshop.

An overall increased awareness of the importance of human factors in maintenance personnel and the safety nets they can personally use to reduce maintenance error is perhaps the largest benefit. This translates into a work force with a much sharper focus on preventing minor errors which can lead to a significant incident or even catastrophic events. In general, MRM training

can lead to improved quality, a safer environment, and a more involved and responsible work force. More specifically, the reduction of even minor errors can provide measurable benefits including cost reductions, fewer missed deadlines, reduction in work related injuries, reduction of warranty claims and reduction in more significant events which can be traced back to maintenance error.

Human Factors awareness helps us to get away from finding blame and disciplining apparently responsible parties, whether they are an individual or a group. The knowledge gained from MRM helps us determine the root cause of an incident and to identify ways that we can prevent these incidents in the future.

Ways of teaching MRM

The workshop includes a behaviour analysis which is critical in helping the technician to understand how he got to where he is today, and what he has to do to maintain or improve his level of good judgment. The program is interspersed with numerous case studies, each one specifically chosen to illustrate specific human factors that have been identified as contributing to accidents and incidents. The class is highly interactive and encourages individuals as well as small group participation. Examples are tailored to the company receiving the training, and if possible, actual examples from the company are included in the discussions.

Integrating Human Factors into training today

The Human Factors in Aircraft Maintenance Workshop has been recognized as a must in industry today. It has to be integrated as a voluntary requirement by progressive companies. If it is done right the organization will be able to identify the recurrent training needs after the initial awareness training, which is important for the long term. We have to use the tools available to measure the success or failure of the training programs in order to be able to create a relevant recurrent training program. We cannot afford to waste our technician's time and bore them with irrelevant information. The information presented during MRM training has to be precise, relevant and applicable for the technicians in this industry!

Our experience has lead us to the following conclusions: The organization's Maintenance Human Factors program should have the attributes listed below.

1. Have 100% support and participation from management and maintenance personnel.
2. Become part of the culture and work ethic.
3. Focus on improving communication skills.
4. Be tailored to the work environment, include identification and correction of potential problems.
5. Include behavioral analysis for those attendees participating in the program.
6. Incorporate a team approach.

A human factors program requires senior management participation, support and monitoring. It is a continuous program that requires a champion, such as the Quality Assurance Department, to ensure that it continues to remain effective. MRM training for managers and technicians, recurrent training, and training the trainers are all ongoing efforts necessary to ensure that the human factors training program remains effective and targeted to maintenance technicians.

If management does not become involved in the human factors training, they will not understand the paradigm shifts we create with the maintenance technicians thought process. Without management support and participation, we may be wasting the organization's time and money. We do create a paradigm shift in both the technicians thought process and management thought process. Both groups need to be involved in order for everyone to be synchronized with the same language that is taught and used in the workshop. If we are honest with ourselves and ask "What are we doing wrong in the present system that creates the 80% Human errors figure"? then we have to go through a major cultural change in the organization.

This cultural change initiated during our MRM program will produce excellent results when everyone within the organization embraces the same thought process. After all, we want to improve professionalism in our industry and ultimately reduce incidents.

You will not see an immediate return on investment or dramatic overnight changes. We are dealing with changing attitudes and behavior in employees, which are the most difficult attributes to change in individuals. But, with a little perseverance, as more people complete the program they begin to speak a common language. Soon, you will start to see a behavioural change within the organization that will provide long-term and lasting benefits.

Besides endorsing the training, senior managers also should participate in the classes and take the message to heart. The most senior person at the top of the organization needs to go through the training, needs to support it, and needs to model the behavior taught in the class in their own working environment. If senior management does not model the behaviors that are taught in the class, the change in attitude and culture will not carry throughout the organization. But, with the active participation of management and the technician workforce, benefits of human factors training will start to be realized, including a reduction of incidents that can be the start of a catastrophic chain of events.

Safety is not an event but a journey and regardless how you address the Human Factors Awareness Program in your company, we wish you all the best with your journey.

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