

GroundEffects

Reporting Maintenance and Groundcrew Error Reduction Efforts

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Safety First Don't Take Chances

The Big Picture or is Human Factors Training the complete answer?

by Gordon Dupont

Maintenance Errors are, unfortunately, not some new phenomenon but with the advent of more reliable aircraft and CRM for pilots, the maintenance component has come to the forefront. The Aloha accident placed before the world just what the consequences of a maintenance error can do.

Maintenance Error, which once was thought about but rarely mentioned, has now become the number one fear of passengers flying today. We perhaps can give Hollywood part of the credit for that but the concern of the public is real. No one really has a handle on the true cost of maintenance errors but it isn't cheap and it isn't disappearing. So what can we do to reduce the incidence of Maintenance Error? That is the BIG picture we are looking at.

Human factors training is one of the key parts of this picture. Without this training we are asking the AME to avoid making a human error without giving him the
(Con't pg 3)

From the Editor!

Hello and welcome to the ninth issue of GroundEffects. From this point forward GroundEffects will slowly start to change. The original editor, Wayne Glover has stepped down and passed his baby on to me. Due to an over worked life, he will be unable to keep up with the busy Groundeffects schedule but will continue to provide articles for our enjoyment and interest. I would like to thank Wayne for all his hard work and constant dedication to the Aviation Industry. He is one of the best and I know I will not be able to fill his shoes in quite the same way but hopefully I will be able to babysit the newsletter with the same quality as Wayne.



My name is Renee Dupont and I have
(Con't pg 7)

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A Near Death Experience

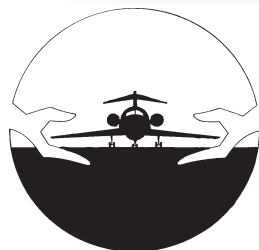
by Larry O'Brien
- YVR Ramp Safety Coordinator

During the loading of the rear compartment of an MD11 aircraft, a ramp attendant had a near-death experience.

One of the pallets being transferred from the loader to the aircraft would not go in properly, i.e. it kept jamming. After several attempts by the loading crew, two cargo agents were summoned to provide assistance in restraining the load on the pallet.

The apparent problem was rectified and a further attempt was made to load the pallet, however, in the meantime, a ramp attendant bent down, on the opposite side of the loader/pallet from the operator, to fix a loose strap.

Not "seeing" any reason not to proceed, the loader operator moved the pallet forward. The pallet again became jammed but this time the problem was not with the load, the obstruction was the ramp attendant head which was being crushed between the pallet and the compartment doorway.
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GroundEffects is the official newsletter of MARSS. Please give us your opinion on our website and the Groundeffects newsletter.

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Help us to prevent accidents before they happen!



GroundEffects (ISSN 1094-0146) is the official newsletter of **MARSS** and is published four times per year to discuss issues affecting maintenance safety. We offer practicable solutions to maintenance managers, regulatory authorities, and unions charged with improving safety and reducing costs.

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CINDERELLA IN THE FLIGHT DEPARTMENT

by Gisele Richardson

Editor's Note:

Cinderella in the Flight Department has become a "classic" article in the aviation industry. Since this article first appeared we have come a long, long way but there is still a ways to go. Due to popular demand we have reprinted this famous article. Look for more information about the author at our website www.marss.org

Some years ago, flight operations began to discover the value - indeed, the need for - training in the human element for their managers and staff. This activity has evolved from being a rarity to a regular feature in most flight departments and focuses mainly on flight crews and management. Although the seminars we offer are advertised as being useful for flight and ground crews alike, invariably, in our sessions, pilots outnumber mechanics by about five to one. How come? Why is this type of training not made available to nearly the same degree in the maintenance departments? Aren't mechanics people too? Don't maintenance directors, crew chiefs, supervisors need skills to communicate and to manage and to motivate? Don't mechanics too need to learn to deal with stress? Why aren't they getting the same attention the flight groups get?

The answers to these questions, I am afraid, come to roost squarely on the shoulders of those responsible for the maintenance departments. **THEY MOSTLY DON'T ASK FOR WHAT THEY NEED.**

You may know that different professions are characterized by different predominant personality profiles. If you doubt it, the next time you go to the NBAA annual show, pause in the aisles and look about you: use your intuition and you will very quickly be able to pick out the pilots from the salesmen (well, not always!), the salesmen from the design engineers, and the mechanics from all the others.

Why? What characterizes the mechanic? We have worked now for more than ten years in aviation departments, and in our experience, these traits at

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(The Big Picture con't pg 1)

knowledge to help him do so. Most aviation companies have come to realize that some form of human factors training is needed to reduce maintenance error in their company. Unfortunately, this realization, all too often, occurs after an aircraft has fallen off the jacks to the hanger floor or some other expensive lesson. Some still feel that this is the price of doing business. They find and fire the responsible persons and go on until another error occurs. All too often they fire some of their best workers and certainly the workers who will never make that particular mistake again.

Sine the error which occurred is a human error is begins to make sense to train the person on how to avoid making that human error. Up until that point, companies depended on the AME's "common sense" to avoid making an error. Common sense tells us we must always tighten up a B nut or never cross control cables, yet these type of errors continue to occur and often to the most experienced workers. Human factors training can help give the AME an awareness to help him avoid that error in judgement which results in a maintenance error.

But is that all that is required to prevent maintenance errors? No. While it is a basic and essential part, a company has to look at a bigger picture. This picture is like a jig saw puzzle with Human Factors training in the middle. Let's look at putting the puzzle together and observe the complete picture. The complete picture is made up of: Employee Feedback, Human Factors Incident Investigation, Human Factors Training, Incident Data Analysis and Company Culture.

Some companies are doing part of the puzzle, but few, if any, have the complete picture.

Many are working on a true safety culture with their **Company Culture**.

Many are beginning to carry **Human Factors Investigations of Maintenance Incidents** in an effort to understand what is really causing them.

An **Incident data bank** of these errors is being compiled by a few in an effort to analysis the data in order to find trends and common causes.

Feedback to the persons working on the floor is provided by a few companies as they work to keep their employees informed. This can be a good morale booster and is a valuable tool when used properly.

Yet, **all** of these are required to provide maximum relief from maintenance error.

The Human Factors training is in the middle of the picture because it interfaces with the other pieces of the puzzle and is a very important piece. This training will have a positive impact on the rest of the picture but it's only one piece of the complete picture. By itself training will assist the person on the floor to avoid an error but we have to look at the other factors which come together to provide armor against the maintenance error dragon.



Human Factors Training

The human factors training has to relate to the AME and what he does. This has been accomplished with incorporation of the Human Performance in Maintenance Part 1

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workshop and now Part 2.

HPIM Part 1 covers the "Dirty Dozen" and provides the AME and others who work around the aircraft, with a basic knowledge of how to avoid making a "human" error. This workshop promotes "safety nets" as part of the means to avoid error. This training must be given to all personnel from the top down in order to have a maximum benefit.

HPIM Part 2 covers a review and then new material in the form of communication the written word, company culture and norms. The workshop promotes the AME as a professional as a means to reduce the errors in judgement, which result in a maintenance error. Again all personnel including management should receive this training.

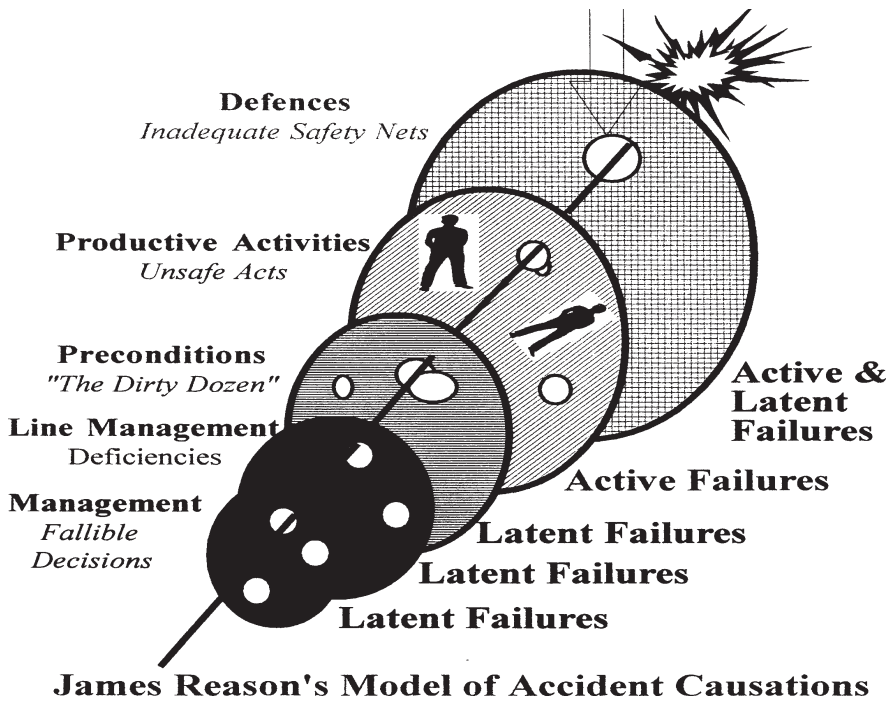
HPIM Part 3 is envisioned as bringing the AME, the pilots and others together to a one day workshop, which promotes teamwork and risk management. Each will list what their expectations are of the other and from this will come a better understanding of what the others role is. Again this must be done in an interesting and informative way.

After Part 3 the awareness level is maintained by means of a series of case study videos which challenge the viewer to spot the chain of events and work out some safety nets to prevent the accident from ever reoccurring. These videos will be based on actual accidents, which have occurred but will be deidentified to the extent possible. (How do you deidentify the Aloha accident?)

An industry group called "Maintenance and Ramp Safety Society" or MARSS are working on this series of videos and hope to see at least a dozen of them available to the industry. This same group is responsible for the Dirty Dozen Posters as well as the "Magnificent 7" which are designed to be a follow up on Part 2.

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James Reason's Model of Accident Causations

This schedule of training will provide the initial and follow on training required to maintain awareness. This training will also assist in helping personnel with the other parts of the puzzle.

Company culture is defined as the reflections of the values and styles of the leader(s) of the company. These values and styles are then interpreted by the middle management and acted upon by the balance of the employees. A look at Reason's Model can help us understand.

Company Culture is a powerful motivator in the reduction of maintenance error. It influences the norms, which if negative can result in maintenance error.

Jim Reasons's now famous model highlights how management can make the fallible decisions, which can lead to an error. Today, as never before, the regulatory body is looking beyond the "active failure" to possible "latent failures." The Civil Aviation Authority in the United Kingdom has successfully fined a company 300,000 pounds after their employees left two covers off which resulted in a twin engine aircraft losing all the oil from both engines. The active failures were readily apparent but the latent failures were what resulted in the fine and very bad publicity for the

company.

Company culture has to be seen as a safety culture. This should start with a very prominent "Safety Policy". It should reflect the company's goals and ambitions regarding safety and be placed where ever personnel work. It should be also more than a scrap of 8 1/2 "X 11" paper on a bulletin board but be at least as large as the companies goals and mission statements. It must be a policy, which is not only widely distributed but also one, which is lived up to. Therefore it must be realistic and achievable.

This policy should be signed by the CEO and be revised and resigned by each succeeding CEO.

The policy should be signed by the CEO and be revised and resigned by each succeeding CEO.

The policy will spell out the fact that every single employee is responsible for the company's safety policy and they have responsibility not only to adhere to the policy but to a responsibility to report anything which will serve to improve the safety of the company.

It must also tie in with the next piece of the puzzle, which is the human factors incident investigation.

Human Factors Incident Investigation
We have become very proficient at

tracing the history and time between overhauls (TBO) of components on an aircraft. This has resulted in our being able to extend the useful life of many components very significantly.

Today, thanks in no small part to our tracking of component TBO's, we have very reliable aircraft. We can extend the useful time of a component knowing from past history that it is unlikely to fail. This was worked so well that "Human Error" is the most likely cause of a failure and not the equipment.

It is now time to begin to record and tract the history of our human errors. We know from Heinrich's ratio that there are about 600 incidents for every fatal accident. We have to begin to record and reduce the incidents in order to prevent the accident.

This will call for a "Human Factors" investigation to every significant incident which occurs. A threshold must be set and a team of trained investigators must be ready and able to find the "root causes" of the incident. By threshold we mean, at what point do we investigate. The aircraft on the hanger floor is obvious but some criteria must be set which triggers the investigation. This point can be moved up or down at a later date as required.

Ideally the persons doing the investigation should be fellow trusted employees. These employees are trusted by both the line workers and the management to get to the facts and leave politics our of the report. It can consist of a member from management and an employee.

The report finding and recommendations should be given wide distribution and acted upon where required. The instigator of the incident should be part of the solution.

"Company culture is defined as the reflections of the values and styles of the leader(s) of the company."

Some of the models that can be adapted for your use include MEDA (Boeing's Maintenance Error Decision Aid)

There is also Aurora which is an update of MEDA. And there is a computer assist system in use by TRAMCO which holds great promise.

This point brings up the question of discipline. Where does it fit into the equation?

Discipline

Let's start first with what is the purpose of discipline. Most would agree that discipline is used to help ensure that the offence does not occur again. If this is true than our prison system has not exactly been a roaring success.

Gisele Richardson a very respected psychologist, says that the aviation industry is one of the most punitive she has ever worked in. She is right! Only the Mafia might have a stricter code of errors.

Discipline has a purpose and is required but we need to look carefully as what it is actually going to achieve and act accordingly. Too often it has had the reverse effect and resulted in an excellent employee becoming the most troublesome. An example of this is a very motivated, hard working employee, takes a short cut in order to get an aircraft out on time. He does this thinking that it is what the company wants and has not personal gain from his action. At the time the decision is made, he believes it is the right thing to do for the company. He is given two weeks off without pay as a lesson to him and others. He comes back as a bitter person who no longer thinks for the company but is determined to look after his behind. He will never repeat that error but he may never put in any extra effort to assist the company again. What can be worse, this same feeling can spread to the rest of the crew. Did discipline achieve its goal? Yes, one could argue it has, but at what cost? It is likely that the same result would have occurred without any discipline being administered and the negative feelings would have been avoided.

There are three important questions to be asked to determine whether discipline is required.

1. Was the ace deliberate? If it was, the discipline is definitely warranted. But

one still must find out what is behind this deliberate act in order to determine appropriate action.

2. Does the person accept responsibility for his actions? If the person has every excuse as to why it was not his fault then perhaps discipline is appropriate.

3. Is he likely to do it again? If he has accepted responsibility then discipline will serve no useful purpose as he has no intentions of doing it again.

What can serve a very useful purpose is to involve the employee in the solution or safety net. If he assists in this then we move from a lose/lose situation to a win/win.

For the above to work there has to be a bond of trust. This can come with time.

Incident Data Analysis

"Information is power" is a common saying these days. This is equally true when we come to human factors. Without this information, a change in upper management or financial situation may result in the program being cancelled. Today we have to go beyond the "gut feeling" that this is the right thing to do to proving that it is a worth while investment.

The analysis will also serve to plot that the proposed safety nets are working or need to be revised. This is an ongoing situation as circumstances change.

For the first time, a company will have a handle on the one thing which costs him the most money and until now he knew the least about.

The company will now know where more training is required and where the training is succeeding.

It is hoped that one day we will have a giant data base shared by all aviation companies which will function much like our Service Difficulty Report (SDR), to enable us to develop global strategies to reduce the worse of the maintenance errors.

When an airplane crashes (anyone's) with a loss of life, we all lose a little of the flying public's confidence.

By working together with a common safety goal we can maintain or enhance that confidence and reduce that risk.

(Cinderella in the Flight Department can't pg 3)

least are found to predominate in the maintenance area: commitment to excellence, willingness to put in effort and hours, integrity, distrust of words, dependability, the tendency to be a loner, modesty (no desire to be in the spotlight), doesn't like to ask for help, tends to be self-sufficient and so to think things through on his own and not share his thought too frequently or thoroughly. (We have not met many mechanics whose wife says, "I wish that man would shut up and let me get a word in edgewise".)

Most of these qualities are assets - PROVIDING THEY ARE NOT CARRIED TOO FAR. Let's look at self-sufficiency, plus the habit of doing your thinking without checking it out with others. It's my contention that both contribute to the one-down role than maintenance too often holds in the flight department. In other words, one of the reasons the maintenance group so frequently finds itself in the position of the second-class citizen in the flight department is because, in a way, it is asking for it.

Speaking to an aviation group some time ago, I said, "When things go wrong, pilots bitch and mechanics sulk". You have all heard about the squeaky wheel. Those who suffer in silence are less likely to get attention. The business of not asking has become a habit for some of you. Let me give you an example. Not very long ago, we were conducting Team Effectiveness programs in a large corporate flight department. The company is one that does not cut corners, and generally responds to reasonable requests from its manager. To our amazement, we found out that whenever pilots and mechanics went

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*(A near Death Experience
con't pg 1)*

to ground school (even when they were there together!!), mechanics received a lower allowance for meals, etc., than did the pilots! We made loud and indignant noises about this to the Aviation Manager, only to learn that it was the Chief of Maintenance who established the cost-of-living allowances for his people when they were traveling. The Aviation Manager had no objection to increasing the allowances to match those of pilots; he was simply going along with the Chief of Maintenance's preference!

With that kind of behavior, is it any wonder that Cinderella is pushing out cinders and garbage in the maintenance area while her pilot sisters go to the ball in their brocade gowns? This attitude invites others to see mechanics as less important than other members of the department. If you invite people to kick you, there is bound to be someone who will accommodate you.

This article is an invitation to mechanics, and especially to the managers in the maintenance area, to start rethinking how they perceive their role in the department, the contribution their people make to the company, and the ways they have at their disposal to make sure that they are duly recognized.

Space available prevents our detailing the myriad of instances where some clarity and assertiveness would serve the maintenance group well: salaries, working hours, technical training, and (given our bias) the fact that mechanics - like other human beings - can benefit from assistance as they find their way in life, just like the rest of us, whether or not they are currently in a period of professional or personal or family crisis. That is to say that employees in the maintenance area require systematic psychological maintenance like the rest of us, and will benefit from any kind of training that enables them to understand human behavior better, to see how they unwittingly contribute to some of their problems, and - most important - to ensure that they find some ways to become comfortable with more appropriate behavior.

The first step, of course, is for the management group of the maintenance area to upgrade their own people skills, to get to understand how they limit their ability to use their talents, their experience, their wisdom, their compassion for the benefit of their people. They need to recognize that they have two roles to play in the organization; to contribute to the success of the flight department, but also to stand up for, to defend, to represent, to develop their own staff. The two are sometimes in apparent conflict. More important, the second role too often conflicts with the manager's personal style as described above. Too often, he opts for the first at the expense of the second.

The mechanic has his 50% of the deal too. Does he swallow his frustrations, give up too easily ("I mentioned it to him once five years ago, but he didn't do anything, so what's the use of bringing it up again?"), does he assume - like the wife who enjoys being a victim - that "if he really loved me, he'd know what I want", or does he state his point of view clearly, does he make his frustrations and satisfactions and preferences known? Does he give his boss the kind of feedback the boss needs to do his job properly and easily?

Bear in mind that what I am recommending is not revolution but equity and responsibility. It's a psychological coming-of-age of the maintenance people in the aviation industry that I am pushing for. It's time to have a bonfire and get rid of what a friend of mine calls "the humbleshit" and give to this excellent group of professionals the position they deserve in the industry. **IT'S LARGELY UP TO YOU!**

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The problem could not be seen by the operator but was seen by one of the cargo agents positioned inside the compartment who alerted the loader operator to stop the forward movement of the pallet which allowed the attendant to be freed.

Near death? Yes. Had the cargo agent not seen what was happening and reacted quickly, the attendant could have had the life "squeezed" out of him or could have been "toppled" over the edge of the loader to the ground. The load could have been solid, such as wooden crates etc., but was, fortunately, mostly soft cardboard boxes which softened the pressure to his head. This incident could easily have ended with a fatality, but as it turned out, apart from a good scare and pressure to his head caused by his earmuffs, the attendant did not sustain physical injury.

Why did this happen?

Improper tie-down of the load in the first place began the chain of events. This was then compounded by the loader operator not "visually" seeing the other members of the loading crew and assuming he could proceed safely.

Oh yes, remember the second cargo agent... he was positioned such that he could clearly see both the ramp attendant, the loader operator but failed to alert either person when he saw what was happening and in actual fact "froze" when the attendant became pinned.

Concise, positive communication has to be the key to a safe operation. Everybody has their part to play and coordination between all involved in any operation has to be paramount before the operation commences.

Look for the following articles in future issues:

- Work is being done to extend Human Factors Training for the Ground Crew (it is intended to look at what this entails and its success to date)
- The line between a Human Factors Investigation of an incident and disciplined for the error that caused the incident will be examined in greater detail.
- What should the regulatory bodies role be in the furtherance of Human Factors Training for Maintenance.

Go'en over the line!

In early May 1997 a ground collision occurred in LAX when a taxiing B747-400 came into contact with a baggage container.

After landing the aircraft had traveled a short distance on the taxiway when the lower surface of the number one engine contacted the top of a baggage container that being towed on an adjacent service road. At the time of the accident it was dusk with good visibility and initially the flight crew was not aware of the collision. They only ground out about it at the gate when the maintenance staff informed them of the accident. Damage to the lower engine cowling and the top of the baggage container was minimal.

The accident investigator noted that the service road adjacent to the taxiway was clearly marked with a traffic stop line painted on the road and a "Stop for Aircraft" warning sign for vehicles. The signage and stop marker was a control necessitated by the close proximity of the taxiway and service road. The investigator also noted that vehicles tended to stop beyond the stop line.

The truck towing the baggage train in this accident was seen to have stopped some 50 ft. beyond the stop line! The number one engine struck the second container in the baggage train so the driver would have had a very close look at the number two engine. There was a report that he was "frozen" after the collision and had to be coerced into moving off the service road/taxiway!

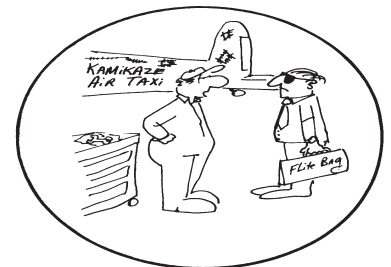
Driving on LAX airport is a fairly 'hair raising' experience due to the close proximity of aircraft to vehicles and the inability of vehicle drivers to anticipate an aircraft's change in direction. With the minimal clearances provided in most areas of this airport, considerable vigilance and caution is required by everyone.

(Letter for the Editor con't pg. 1)

been involved in the Aviation Industry since I was very little. My father is an AME and pilot. Always being daddy's girl, I decided to seek out the Aviation Industry and impress him. I am not sure that I have accomplished that but it has led me to GroundEffects. I have worked for (PAMEA) the Pacific Aircraft Maintenance Engineers Association, worked with the board for the World Conferences on Human Maintenance Errors and their Prevention (now called "Symposiums") and am now the webmaster for the MARSS website (marss.org).

I must also apologize to you the readers for the delay in issues. I have been very busy trying to organize the newsletter and get the website up and running properly. The issues of Groundeffects will now be published four times a year (instead of 6). Again I apologize for any inconvenience this may cause you.

I am new at editing and would greatly appreciate any feedback or ideas that you might have. All letters addressed to the editor will be answered and I am hoping to have a "Letters to the Editors" column. I will also be looking for anyone who is interested in providing articles for future newsletters. You can reach me at webmaster@groundeffects.org or write me at 5750 Cedarbridge Way Richmond, B.C. Canada V6X 2A7 Phone: (604) 207-9100 Fax: (604) 207-9101



"Are you familiar with Murphy's Law?"

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