

IMPACT OF NEGLIGENCE IN THE OPERATION OF AIRCRAFT MAINTENANCE

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The work deals with the influence of neglect in the operation of aircraft maintenance. The main objective of this work is to examine and analyze the current status of accidents caused by negligence in the operation of aircraft maintenance and develop proposals for measures aiming at reducing aircraft maintenance neglect. The individual chapters of the work deals with theoretical bases of human factors and methodology of the study. A study by the available information points to the influence of human factors in neglect of maintenance and offers the possibility to avoid them, is developed based on their own knowledge and the sources quoted.

K e y w o r d s: Negligence maintenance, Maintenance of aircraft, Aircraft maintenance technician, Human factor

1 INTRODUCTION

The work focuses on the human factor and the problems that entails their negative impact. Objective of this work is to analyze the present state and to propose solutions to reduce accidents vplyvom neglect.

In the present work, in the first chapter, we focus on the formulation of the main objectives and targets and the methodology of work.

In the second chapter a more detailed human error, Reason model errors and factors Dirty Dozen.

The third chapter of work devoted to the influence of human factors engineers maintenance. We analyze the current state of accident caused by negligence and failure aircraft maintenance.

The last chapter is devoted to a major objective work. We propose measures to reduce the accident rate in view of the dependence of negligence aircraft maintenance in terms of human factors. Draft measures summarize and completed within the Dirty Dozen.

2 OBJECTIVES AND METHODOLOGY OF WORK

2.1 The main and partial objectives

The main objective of this work is to examine and analyze the current status of accidents caused by negligence in the operation of aircraft maintenance and create a draft of the measures to reduce aircraft maintenance neglect.

To achieve the main objective of the work we have identified several sub-conclusions, which include brief characterization of the human factor and its impact on neglecting maintenance.

2.2 Methodology of work

Subchapter describes the sequence of steps that lead us from partial objectives to the main objective of work.

In the introductory part we work theoretical basis. The necessary data were obtained through literature, internet, textbooks and other available resources. Available information and data, which deal with solving the issues we have collected, studied, were sorted and subsequently evaluated. At the end of the chapter, we selected information and data processed into final form.

In the next chapter, through analytical methods aimed at examining the failures and accidents caused by negligence aircraft maintenance.

In the final chapter of the study uses data from theory and focuses on designing measures leading to a reduction in aircraft maintenance neglect.

3 HUMAN FACTOERS AND AIRCRAFT MAINTENANCE

3.1 Human factors in aircraft maintenance

Since the first flight-powered the heavierthan air Wright brothers, Orville Wright made that, in 1903, the aircraft FLYER, passed a lot of time. Since then, there has been significant progress in the field of aviation technology.

Along with the progress and aircraft were also lead to an accident. Number of collisions that occurred in the last century, was caused by a technical failure, and other factors that were not caused by a defective human action.

As the procedure time, progress in the development of aviation technology got to such a high level of quality and assurance about what the early days of aviation only argued against. There was an improvement of the design of aircraft, development of more efficient and environmentally friendly engines, navigation systems and improvement of meteorological equipment, but the only factor that has not changed for years, human.

Human is the most valuable, most flexible, most adaptable part of the airline's structure, but is most susceptible to creating errors.

In the early days of aviation was the main culprit of accidents technical factor. Technology progress in aviation began slowly to show that probably the weakest link in civil aviation, as evidenced by the historical development of the causes of air accidents is just the human factor. Currently not only the estimates, but statistics show that 70-80% of air incidents can be attributed to human error.

Mass media and reports on accidents, given as the cause of the accident pilot error, but it is preferable to use the concept of human error. These two expressions take the general public often synonymously, as is naive and wrong, as well as check pilot error as the only cause

of the accident. Aviation accidents are the result of many factors, one of the last activities of the crew.

3.2 Human error

Human error can be defined as the implementation of human activity with unintended consequences. Error alone doesn't necessarily mean disaster, but if the aircraft maintenance accumulates a number of errors at the same time, this has resulted in negative consequences. Training, risk assessment and safety checks therefore serve to identify and avoid such mistakes. Simply put, human error can not be avoided, but it can be controlled.

Types of errors, which people use to make, can be divided into unintentional and intentional. Inadvertent error means a deviation from accuracy, i.e. error in the decision or action, the result of bad thinking, confusion, carelessness or lack of knowledge.

This type of error occurs unconsciously and body do not really realize that she has committed.

For maintenance of aviation equipment also happens to deliberate mistakes. Into this category incorporating the decision by which the entity knowingly or intentionally deviated from security standards, procedures, processes or regulations.

In terms of the type of errors divided the active and latent. Active fault is clearly apparent. Latent errors pose problems hidden in the system non-compliance with quality standards, inadequate training or inadequate equipment and lead to the creation of hidden problems.

3.3 Reason model errors

Model context, causes of accidents, also called Swiss cheese model, was originally designed by James Reason. Professor James Reason in their models based on the hypothesis that the formation of incidents based on the interconnection of individual errors at different levels in a coherent, but an imperfect system.

Reason cheese is a defense system against adverse events or failure and it consists of a set of barriers, represented by slices of cheese. Holes in the cheese slices represent some gaps in the system are different sizes and arrangements in all sections.

Model shows us clearly that if at one time linking errors and omissions in the form of holes in cheese slices and create a direct path along which hazard can smoothly prejt', the effect is the formation aviation accidents. The basic objective is to prevent, to avoid conjunction errors in each level of the model, that could be avoided if any article that is part of this system, the right decision to stay the chain of errors.

On the basis assumption that the majority of accidents are caused by serious misconduct Reason created four levels of human failure:

- organizational impacts,
- assumptions dangerous procedure,
- acts dangerous,
- lack of control.

If we want to create your own levels Reason for a particular model of aircraft maintenance workers, we could mention:

- lack of knowledge and experience to carry out all maintenance
- non-compliance with regulations and guidelines in the process of maintenance,
- misunderstanding or incorrect decision and related procedures are inadequate solution,
- poor working environment and working conditions.

3.4 Dirty Dozen

Dirty Dozen represents the twelve factors that most often affect the formation of air incidents. Twelve of these factors negatively affects people and as a result are subject to errors. It is a concept that evolved Gordon Dupont in 1993, while working for Transport Canada and participated in the creation of the basic educational program Human Performance in Maintenance. This training program is subsequently became the basis for the course Human Factors in Maintenance worldwide.

Dirty Dozen is not a complete list of the factors responsible for causing the accident. There are more than 300 factors that affect human activities. Are dealt with in ICAO document Circular 240-AN/144. It is therefore very important to identify the symptoms Dirty Dozen and most importantly, know how to avoid these mistakes.

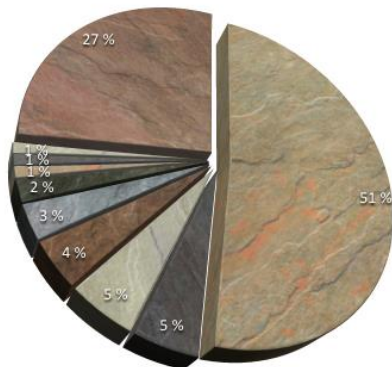
Since 1993, all the aviation industry realized the importance of the Dirty Dozen and for the prevention of human errors then apply a security policy and in their businesses, organizations and individual workplaces.

Dirty Dozen list contains 12 factors:

- Lack of communication,
- Distraction,
- Lack of resources
- Stress,
- Complacency
- Lack of teamwork,
- Pressure,
- Lack of awareness,
- Lack of knowledge,
- Fatigue,
- Lack of assertiveness
- Destructive standard working environment.

4 ANALYSIS OF THE CURRENT FAILURES AND ACCIDENTS CAUSED DUE TO NEGLECT AIRCRAFT MAINTENANCE

4.1 Analysis of the primary factors of accident

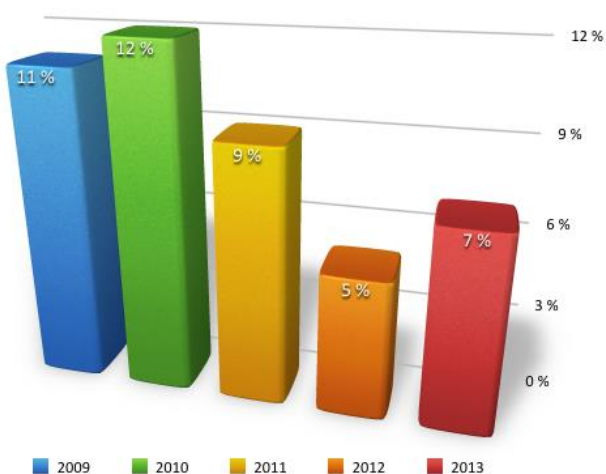


The graph clearly shows that the largest share of exceptional events should airline. There were errors and omissions as intentional non-adherence, spatial disorientation and unprofessional judgment of the crew, which caused 130 accidents, 52% of the total.

Another factor that affects statistics was the weather, which caused 12 accidents, one reason was the formation of ice on the aircraft. Less important agents who caused 5% of the accidents were aircraft systems, specifically the failure of systems or components and also the problems of maintaining speed, altitude, or achieving planned performance.

Factor to be signed on statistics 7 accidents, namely 3%, was maintenance. Common errors can be attributed to the process of repair, inadequate maintenance and lack of control. Risk factors at least in terms of accidents were failure and cabin aircraft structures and staff misconduct air traffic control, each of these factors reached 1%.

4.2 Analysis of accidents due to neglected maintenance of aircraft



Disturbing period of neglect of maintenance is the year 2009, which occurred the 9 accidents, representing a total of 11%. The highest proportion aviation accidents due to aircraft maintenance misconduct occurred in 2010, where the final number stabilized at the value of 10.

The year 2011 marked reduction in the accident rate in this area by 3% when it was 8 accidents. The best period for the decline in accidents caused by maintenance represents the year 2012, where the value stopped at 5%, representing a total of 4 accidents. Compared to 2011 comes to 55% improvement in this indicator.

The slight increase in accidents caused due to maintenance was 7% in 2013. Accident rate due to neglect of maintenance staff work so led to the formation of 6 accidents. Compared to 2012, this represents an increase of 40%. The graph clearly shows that, despite a slight increase in values over the period from 2010 and 2013, a gradual reduction of accidents caused by the influence of errors in aircraft maintenance.

5 PROPOSALS FOR MEASURES TO REDUCE THE BACKLOG OF MAINTENANCE ON AIRCRAFT OPERATIONS

5.1. Proposal to improve communication and assertiveness aircraft maintenance technicians

To improve communication between maintenance technicians and other technical staff to propose the introduction of training courses. Training should focus on scenarios and simulation in the communication and assertiveness, which may occur in the course of carrying out work on aircraft. After implementation scenarios maintenance workers would follow the processing and evaluation of results.

Any misconduct, which, in the context of situations occurred, would be processed in the form of manuals. These guides would be subsequently sent in the form of circulars to all enterprises engaged in aircraft maintenance license to the misconduct on factors such as the lack of communication and assertiveness, avoid further.

5.2 Proposal to reduce the dispersion of aircraft maintenance technicians

If the distraction maintenance, we propose that within the working procedure back five steps back from the time of his side losing concentration and continued to work from that point.

There are cases when a distraction that remain unnoticed. In this case, we propose the use of detailed checklists describing all the steps that need to be met before the end of the work. On this basis, it is possible to determine in which step was interrupted work or deviation from the established procedure.

Furthermore, we propose clear indication of unfinished work tasks on aircraft to reduce the backlog of

maintenance due to distraction. An example can be seen disconnecting connectors or other components, which point to the fact that the installation has not yet been completed.

5.3 Proposal to improve resources

In the lack of funds and resources where we can include spare parts and tools to carry out maintenance work, we propose to maintain a sufficient supply of necessary parts before they occur deficit.

The task of leading the implementation of warehouse inventories. To maintain adequate stocks of spare parts, we propose that the store manager made a more thorough inventory, and at regular intervals to ensure the same between what actually provided in the documentation.

If there is any lack of resources or funds needed for the proper completion of work on the aircraft, we propose to suspend the maintenance of the moment.

5.4 Proposal to reduce stress of aircraft maintenance technicians

If the maintenance technician during the working day gets into stressful situations, we used a short break, which may be helpful to reduce stress levels. If for maintenance technician there are frequent flushing anxiety caused by stress, we suggest that you set foot in their own interest extensive time off if the employer and the current situation allows.

For airlines, employing maintenance staff, we suggest checking compliance with the maximum period of service and the same respect for the minimum rest provided to aircraft technicians.

5.5 Proposal to reduce of complacency aircraft maintenance technicians

Reduction factor for complacency, which can present with arrogance or a sense of perfection, we propose to maintenance technicians regularly recurring training, focused on mental exercises. The proposed training would focus on combating indifference, where they honed techniques and learned that in the course of his work can be expected when an error occurs.

Another proposal is to avoid complacency double self-control worker after completion of the work to increase the percentage of detecting any errors. With this proposal, adding the recommendation to sign the writing techniques of inspection, if not on his part fully completed.

5.6 Proposal to improve teamwork

To appreciate the synergy of team work we propose the implementation of seminars where should emphasize the need for teamwork and warns that any lack of it can affect maintenance. We also recommend that organizations within the workshops focused on building team unity, by eliminating the formation of potential bias arising from differences (racial, ethnic eventually intergenerational) between workers.

We believe that to improve teamwork company could implement corporate events, teambuilding form. We think that such a form can be improved channels of communication between technicians of maintenance, which would ultimately lead to improved relations in the workplace and develop teamwork.

5.7 Proposal to reduce the pressure of aircraft maintenance technicians

To reduce the effect of phenomena such as pressure affecting the maintenance technician, we propose by the company, to improve planning system revisions with regard to the personnel performing maintenance on aircraft.

We believe that better planning of maintenance of aeronautical products would result in efficiency gains. The decrease of pressure at work, we recommend to increase the number of engineers assigned to individual tasks, thus the degree of responsibility allocated to several entities.

In case, maintenance technicians required to complete the work on the aircraft more time or additional help, we recommend that their needs acquainted maintenance management. Otherwise it could happen that the techniques work in haste, which would be reflected in its design and quality.

All of these recommendations can be put into practice only in cases where maintenance management prepared such proposals, concerns and complaints maintenance technicians take and deal without any sanctions (reprimand, salary cuts and suspension).

5.8 Proposal to increase awareness of aircraft maintenance technicians

To reduce errors mentioned problem, we propose the organization of staff training through case studies. Studies should focus on specific situations which course participants tackled in smaller teams. Would be aimed at raising modeling technique in which would gradually create a trend of increased control over their actions.

A desirable outcome of such studies would be the engineer after the constant repetitive actions does not acquire a sense of complacency, but expected in their dealings possibility of errors.

It equally important consider that the maintenance technician checking not only the the work for which he is responsible, but also workflow colleagues.

If it is part of the work on the aircraft carried one work shift and the rest of completing another shift we propose that occurred inspection work at Aeronautical this moment. This ensures that in the context of acts performed so far there were no deviations that should an undesirable impact on completion.

5.9 Proposal to improve the knowledge of aircraft maintenance technicians

Occurring in the world each day to the development of technology and it is not any different in the field of aviation. Factor by which ignorance is important to address maintenance technicians.

We believe that on this issue can be made different training courses, maintenance technicians should be acquainted with the changes that have occurred in the area of maintenance. Together with this information, they would instilled principles (for example, carrying out activities in the range of their competence).

According to our view, the organization should take care to maintenance technicians in their work use the latest documentation. We also propose to his signature proved to be the latest maintenance procedures acquainted. This step can cause engineers with positive psychological effect when their signature feel responsible for the work.

5.10 Proposal to reduce fatigue of aircraft maintenance technicians

Fatigue is one of the factors Dirty Dozen, which requires increased attention and appropriate solution. One of us proposed solutions to prevent fatigue of workers from the perspective of the working time and shorter work shifts. If this possibility within the company is not possible, we believe that the introduction of smaller work breaks could reduce fatigue in the workplace.

Also proposes the workplace vending machines for soft drinks (coffee, tea, energy drinks) for aircraft maintenance technicians for free.

5.11 Proposal to eliminate destructive standards

Air transport is the sector in which it depends on every second. Any, even the slightest delay means a loss for the airline and otherwise it isn't in aircraft maintenance. As a result, create different ways to save time and lead to the implementation of certain maintenance activities outside the established standards.

The greatest problem is the fact that companies that promote such destructive standards do not see a problem. Companies don't understand or don't want to understand that something that seems to them obvious and normal, is not really correct.

Many of these destructive standards are often taken by the airlines, we propose that above them greatly increased supervision.

In the event that the airline can find evidence of use of the described practices suggested imposing high sanctions to act as a deterrent such activities. At the same time there was a temporary prohibition on flying the aircraft on which the destructive use of standards.

We believe that the benefit would be the increased rate of participation of international organizations working in the area of civil aviation. You should focus your attention to the fact that airlines followed the same standard and do not create destructive

methods that are undesirable impact on safety maintenance.

6 CONCLUSION

Study of human factors in aircraft maintenance since the end of the last century to the present devotes considerable attention. The result of these occurred in this area for application of policies and measures that will significantly reduce the impact of aviation maintenance neglect.

In the thesis we examined the list of "Dirty Dozen", which represents the factors affecting aircraft maintenance. On the basis of the description, we came to the conclusion that many of them act as trivial. Despite the fact that in the past led to the introduction of the measures, we propose that the problems to which the list responds, addressed more thoroughly with more emphasis. True even though the maintenance technician is familiar with all requirements and rules of maintenance it is still only a man and as such has its own nature, characteristics and problems, it is therefore prone to create errors.

The largest percentage of accidents are caused due to human error. The simplest statement would be that a majority of accidents related to maintenance, is responsible aircraft maintenance technician. He should be aware that any work and facilitate a move away from a practice or work often meant reasoning can easily be far resorted consequences.

The other side of the coin are the airlines that knowingly create the pressure maintenance technicians who may at some point reach dangerous levels and leads to errors. It is striking that even at present (when the negative impacts of such factors already well known) is for airlines that are trying to increase their profits, such action often natural. The worst and saddest is the impact of such action on specific passengers.

On the basis mentioned, we develop proposals for measures that its content should reduce the percentage of errors and omissions in maintenance. As already but air transport is often, even the simplest measures are usually introduced only after the impact of errors and mistakes occur extinction of human life.

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