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CIVIL AVIATION ACCIDENTS AND INCIDENTS DIVIDED ACCORDING TO THE GROUPS OF MANAGING AVIATION PERSONNEL

INCIDENTI UN NELAIMES GADĪJUMI CIVILAJĀ AVIĀCIJĀ, KURI IEDALĪTI ATBILSTOŠI AVIĀCIJĀ STRĀDĀJOŠO SPECIĀLISTU GRUPĀM

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Introduction

Human factor (HF) – one of the main concepts used when considering flight maintenance issues. This concept is extremely commodious and serves for characteristic of all phenomena in aviation practice connected with many-sided human activities.

The term HF comprise set of moral, social, psychological, physical, professional and other qualities of the person who is influencing results of ones activity. In aviation all processes of the organization, maintenance and performance of flights are carried out by people – aviation experts of various profiles and each category influences security of flights.

During the operational process the activity is realized through ordered sequence of certain actions united by unified motive. Actions can be simple and complex. Simple actions cannot be spread out to the elements having independent objectives. Complex actions can be presented in the form of set of simple actions. If the logical organization of this set is opened, complex action can be described as an algorithm consisting of simple actions. That means various kinds of operational activities develop from the same simple and typical actions, but in various sequence. The mistake of person's activity is always generating from more elementary performed mistake of an action. From here

follows that mistakes of action are that primary parameter universal for any kind of activity of the aviation experts which can serve as a measure of an estimation of negative influence of HF. Aviation personnel comprise groups of experts from various profiles with different functional specialization and working in various services of civil aviation. It is obvious, that their influence on condition is also unequal and is defined by a degree of interaction with process of flight performance. Typical distribution of heavy aviation accidents (HAA) at fault of various groups of aviation personnel is described in the table below (Table 1). The aviation personnel is divided into 9 groups.

Aviation occurrences applying to the engineering personnel comprise only 4 % (Table 2) of the aviation accidents and up to 30 % of the incidents According to researches [1] from 25 up to 35 % occurrences during the summer and incidents in civil aviation during last 20 years occur at fault of aviation engineering services basically because of the poor quality of maintenance service.

Therefore this is the element of HF to be addressed further in the text.

Role of the human factor during repair and service of air engineering

The role of the human factor grows at repair and service of complex air engineering. From the experts, which serve air engineering, depends not only safety and regularity of starts, but also economic parameters of the enterprises dependent on idle time of an air vessel for service, control, repair.

Table 1

Aviation accidents and incidents classification by leading aviation groups

Aviation personal groups	Number of assurance	
	Aviation accidents, %	Aviation Incidents, %
Personnel management	29	6
Crew	59	37
Air Traffic control dispatcher	5	5.5
Engineering personnel	4	30
Airport staff	0.5	8
Technical light insurance	-	1.3
Fuel/grease refuel	0.5	1.6
Transport service	-	0.1
Dedicated motor depot	-	7

Table 2

Parity of incidents with the basic reasons and types of planes

Aircraft	For 105 aircraft fly hours		
	Engineering defect, %	Technical service's mistakes, %	Others, %
Il-86	88,6	3,4	8
Il-62	88,8	6	5,2
Tu-154	77,9	11,7	10,4
Tu-134	68,1	21,1	10,8
Jak-42	86,6	8,1	5,1
An-24	73,9	15,9	10,2

In a maintenance time approximately 87 % of times are necessary on failure detection and only 13 % on its elimination. On the data of research, from 25 up to 30 % of air accidents for last 20 years, have taken place on fault of technical services, basically owing to low maintenance service. On the American data 30 % from general failure of computer facilities are necessary on the insufficiently qualified attendants.

From the table it is visible, that the plenty of incidents concerns on planes TU – 154, TU – 134 and AN-24.

The human mistakes in general can be divided into four categories:

- Default of necessary works;
- Inexact performance of necessary works;
- Performance of unnecessary works;
- Delayed performance of necessary works.

All the same analysing mistakes of the people, there is a number of collateral, additional complexities, which occur for the reasons not during open mistakes and excluding them, the deviations of the considered conditions of working systems are admitted, it is heavy to determine the first reason etc.

The carried out analysis by the main mistakes of the personnel during maintenance service shows the different description of the external phenomena. As the example is possible to result a lot of mistakes, which were admitted by the attendants during work above the plane TU – 154. After landing there was no back bottom cover motogondola of the engine. In result punched fuselage of the plane and forward part of Kiel of the plane. The reasons – not closed forward locks cowl, that has resulted in its vibration during flight. The plane AN-24. the compelled landing in connection with not cleaned the chassis after rise. The reason – in hydrosystem was not enough liquid. The plane TU – 154. The rise owing to knock in the engine is interrupted, in the inlet channel of the engine the tool is left. The plane TU – 154. At start of the engine the crew has noticed before rise, that in the second hydrosystem there was no pressure. The reason – in the second hydrosystem was not of the hydropump, which was taken off in with the bulletin and was not established. The plane TU – 154. The compelled landing in connection with not cleaned the left chassis. The reason – was not pressure of nitrogen in the stabilizing gas shock-absorber. The reason – during maintenance service the shock-absorber was filled by the new expert, which work was not supervised.

The mentioned examples show, that, in spite of the fact that in civil aircraft there are systems, which provide quality of a technical care, having the basic principles: the constant control in all operation phases; elasticity of the control – cooperation, periodicity, choice of the inspector etc.; in the multilevel control the mistakes of the experts are still admitted during maintenance service.

In Table 1 the division of incidents is shown according to systems of the plane TU – 154 (according to results of the assembled data), which have taken place as a result of unsatisfactory maintenance service of an air vessel by the engineer by the expert. The plenty of admitted mistakes by the personnel occurs in maintenance service the chassis of the plane – 34 %, in the engine and units – 18,5, in aircraft of the plane – 22,4, in lubricant systems of the engine – 11,6. It in what that is explained to a degree by constructive complexity of the listed systems, with association of units, units and elements in these systems, for which it is necessary to execute concrete works during maintenance service. Besides at systems insufficient technical, which determines heavy availability to the review, narrow field of vision insufficient conditions for use of the equipment on illumination and control at definition of defect.

Analyze concrete errors of serving personnel during prepare the airplanes with GTD for flight can to choose engineer and other technical workers breaches group. Typical errors:

- Construction breach during prepare aircraft engine for flight, start up an aircraft engine and check-up that led to exceeding permissible temperature result, non-observance working conditions, breakage being at close by them aircraft after transference.
- Imperfect open and imperfect closing of cover, engine-room hatch; instruments, leave parts of controlling and measuring apparatus in inlet of aircraft engine; ice not to take off from aircraft cover; small articles leaving on the ground under aircraft engine that led to articles hit in aircraft engine and led to aircraft engine breakage testing time and during flying.
- Snow and ice not to take off from aircraft leadership system elements and mechanism from air oil radiators, that led to separate part of aircraft skidding
- Instructions breach when drive to aircraft by land transport and dragging GL that led to separate part or whole aircraft breakage.
- Wrong regulation job execution that led to appear breakage's of unit and system aircraft
- Damages and refusals imperfect and qualitative eliminate, that disclosure during flying and technical service and led to repeated breakage GK system.

- Aggregates, knots dismantling and assembly technology breach, filter rinsing different aircraft systems, unmark tools use;
- Wrong control or not control after job finish in knots, aggregates, that led to bolt turn off during subsequent exploitation and taxed system and screw bolt in mechanism disconnect;
- Air board systems incomplete filling (petrol, oil, hydro systems), by petrol, oil, special liquid and gas, that led to aircraft system disable.
- Technical service job execution full volumes in conformity with regulations and technology refusals because service bad quality control;
- Technical service exploitation technical documentation not in time and qualitative mounting that led to maiden trip delay.

Conclusion

The analysis of mistakes of the attendants during maintenance service has allowed to reveal the main reasons. Hardly unequivocally to determine all reasons of occurrence of mistakes of the experts, owing to ambiguous records in the accounting documentation, shortage of statistics insufficient industrial documentation, and owing to complexity of filling etc. the Mistakes of the attendants display researches in more detail to Russia, they are connected to different types of air courts. (3). The data of the plane TU – 154 are displayed in figure 2. Where it is visible, that the reasons of the most part of the attendants are connected to an indiscipline – 57,6 % (among them 57 % – non-observance of technical discipline; 15,8 % – poor-quality performance of works on strengthening; 13,8 % during dragging an air vessel and bad management of the tractor; 13,9 % hit of substances in the motor and other systems of an air vessel). Unfortunately, the most part of incidents occurs owing to a low level of knowledge of the experts – 25,9 % (from them 63 % – mistake the works, connected to poor-quality performance, at change of units; 10,9 – with poor-quality performance of adjusting work and 21,8 – with insufficient professional knowledge of the experts). Occurrence of incidents cause lack of the engineering specifications, which are connected to inferiority of technology of technological service, with discrepancy in the administrative documents.

The correctly organized and qualitatively executed maintenance service of air engineering enables to exclude different occurrences constructive difficulties, which conduct to incidents. That it to realize, it is necessary for the enterprises of civil aircraft together with company of a message the appropriate measures on improvement of maintenance service.

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Saldeniece E., Galeev T., Šestakovs V. Incidenti un nelaimes gadījumi civilajā aviācijā, kuri iedalīti atbilstoši aviācijā strādājošo speciālistu grupām

Lidmašīnas tehniskās apkalpošanas ražošanas process tiek realizēts, veicot virkni secīgi sakārtotu darbību, turklāt šīs darbības vieno kopīgs motīvs. Darbības mēdz būt gan vienkāršas, gan sarežģītas. Vienkāršās darbības nav iespējams sadalīt elementos, kuriem atbilstu patstāvīgie mērķi. Sarežģītās darbības iespējams prezentēt kā vienkāršo darbību kopu. Ja ir skaidra šīs kopas loģiskā uzbūve, sarežģīto darbību iespējams aprakstīt kā algoritmu, kura soļus veido vienkāršās operācijas. Iespējams uzskatīt, ka dažādi darbības veidi visumā formējas no vienām un tām pašām vienkāršām tipveida darbībām, kuras atšķiras tikai ar darbību secību. Līdz ar to cilvēka kļūdainās rīcības pamatā, kā likums, paslēpta elementārā darbības komponenta kļūda. No tā izriet, ka elementārās darbības kļūdas arī ir tas primārais un jebkurā darbošanās jomā universālais rādītājs, ko

var uzskatīt par cilvēciskā faktora negatīvās ietekmes mēru, aplūkojot aviācijas lidojumu drošību. Izmantojot šādu pieeju, tika analizēta aviācijas personāla, kas nodarbojas ar gaisa kuģu uzturēšanu lidošanas stāvoklī, darbība. Piedāvājamajā rakstā tika analizēti incidenti ar civilās aviācijas lidmašīnām, kas notikuši inženieru tehniskā personāla vainas dēļ. To vidū bija tehniskās kļūmes, kas pieļautas gan tehniskajā lidmašīnas apkalpošanā, gan sagatavoto to lidojumam, proti, gan uz zemes, gan gaisā.

Saldeniece E., Galeev T., Šestakovs V. Civil aviation accidents and incidents divided according to the groups of managing aviation personnel

During the operational process the activity is realized through ordered sequence of certain actions united by unified motive. Actions can be simple and complex. Simple actions cannot be spread out to the elements having independent objectives. Complex actions can be presented in the form of set of simple actions. If the logical organization of this set is opened, complex action can be described as an algorithm consisting of simple actions. That means various kinds of operational activities develop from the same simple and typical actions, but in various sequence. The mistake of person's activity is always generating from more elementary performed mistake of an action. From here follows that mistakes of action are that primary parameter universal for any kind of activity of the aviation experts which can serve as a measure of an estimation of negative influence of human factor (HF). Aviation personnel comprise groups of experts from various profiles with different functional specialization and working in various services of civil aviation. It is obvious, that their influence on condition is also unequal and is defined by a degree of interaction with process of flight performance. Шт ершы фкешсду the results of the analysis of air incidents on fault aviation of technical services are offered. The classification of the factors is considered is brave, connected with human factor, and as possible (probable) failures (refusals) of various functional systems air transport to fault of technicians.

Салдениеце Э., Галеев Т., Шестаков В. Инценденты с самолетами гражданской авиации и деление инцендентов согласно группам обслуживающего авиационного персонала

Производственный процесс технического обслуживания самолета реализуется через упорядоченную последовательность определенных действий, объединяемых единым мотивом. Действия могут быть простые и сложные. Простые действия не могут быть разложены на элементы, имеющие самостоятельные цели. Сложные действия можно представить в виде совокупности простых действий. Если раскрыта логическая организация этой совокупности, то сложное действие может быть описано как алгоритм, состоящий из простых действий. Можно сказать, что различные виды деятельности складываться из одних и тех же простых и типовых действий, но в различной последовательности. Поэтому, ошибка деятельности человека всегда порождается, более элементарной составляющей ошибкой действия. Отсюда следует, что ошибки действия являются тем первичным показателем, универсальным для любого вида деятельности авиаспециалиста, который может служить мерой оценки негативного влияния человеческого фактора на безопасность полетов. С позиций такого подхода проанализирована деятельность авиационного персонала, участвующего в поддержании летной годности воздушных судов. В данной статье рассматриваются результаты анализа инцидентов с самолетами гражданской авиации по вине инженерно- технического персонала, которые имели место при техническом обслуживании, подготовке самолета к вылету, на земле и в воздухе.