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Human Factors and Design Failures in the British Airways Flight 5390 Incident: Lessons for Medical Error Reduction and Healthcare Safety Systems

British Airways 5390 Olayında İnsan Faktörleri ve Tasarım Hataları: Sağlık Hizmetlerinde Tıbbi Hataların Azaltılmasına Yönelik Çıkarımlar

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called British Airways Flight 5390.

Özet - 10 Haziran 1990 tarihinde, British Airways'in 5390 Sefer Numaralı İngiltere'nin Birmingham şehrinden İspanya'nın Malaga şehrine 07.20 UTC saati ile gerçekleştirilmesi planlanan uçuşunda, 17.300 feet, -17 derecede Kaptan Pilot Tim Lancaster'ın kokpit camından dışarıya fırlayıp yaralanması sonucunda meydana gelen kırım olayının incelenmesi, kazaya sebebiyet veren tasarım hatası ve havacılıkta insan faktörlerinin önemi hakkında bilgi verilmiştir.

Anahtar Kelimeler: Havacılıkta İnsan Faktörleri, Hava Aracı Tasarım Hatası, British Airways

Abstract— On 10th June 1990, British Airways Flight 5390 was a flight from Birmingham in England to Malaga in Spain at 07.20 UTC. In this flight, Captain Pilot Tim Lancaster was blown out and was injured from the cockpit window at 17.300 feet, -17 Celcius. Information was given about the investigation of the crash, the faulty design, and the importance of human factors in aviation.

Index Terms—Human Factors In Aviation, Aircraft Design Error, British Airways

I. GİRİŞ [INTRODUCTION]

As you all know, although airplanes are one of the safest transportation in the world, most aviation accidents end with blood [1]. So, aviation rules are written in blood, but today an aircraft incident which is painful without loss of life will be examined and will be analyzed about the flight

II. UÇUŞUN TARİHÇESİ [HISTORY OF FLIGHT]

British Airways Flight 5390 was a flight between Birmingham in England and Malaga in Spain

and the aircraft was the British Aircraft Corporation One-Eleven (BAC-111 or BAC1-11) on 10th June 1990. The aircraft also carried six crew and 81 passengers. Pilots performed walked around check and they controlled its maintenance logbook, but they did not encounter any abnormal situation. It was taken-off at 08.20 a.m. The airplane had climbed through about 17.300 feet for reaching 20.000 feet. When the cabin crew was preparing for meal service for pilots, pilots got an auto-pilot position after two minutes. At 17.300 feet, number 1 of the wind stood out and the sound of a huge explosion was heard. After that captain pilot blew out and he stuck on the roof of the airplane because of the air pressure difference between the cockpit and the atmosphere [7]. Fogs felt inside of an airplane and the body of the airplane started shaking. He suffered physical violence because of lack of oxygen. Also, the weather was – 17 degrees (2 degrees decreases per 1.000 feet.). Therefore, the air smashed and hit him. The first

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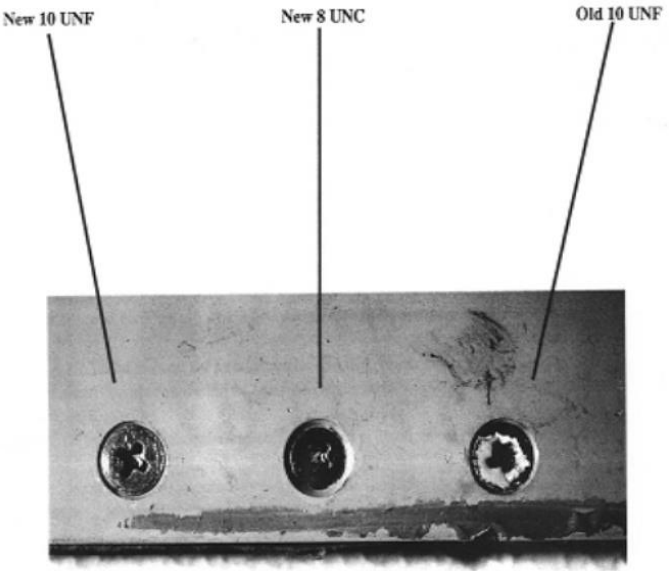
officer was trying to control the flight. Control was getting more difficult because the captain held the control column with his legs, the auto-pilot was disconnected and it pushed down the aircraft. When the cabin crew held their captain, they thought to release his body. However, they renounced due to damage to the engines, wings, or its body. The first officer made a decision and he communicated an air traffic controller in Southampton for an emergency landing. He successfully landed the plane at 08.55 despite the maximum landing weight. He was taken to the hospital, saved and recovered. He was starting to fly again after 5 months.



According to the documentary and the investigation report, recently the glass was changed and the aircraft maintenance engineer used different bolts which were different lengths and diameters with low torque because he worked at 05.00 a.m. and ignored maintenance procedure. Also, a person who works at the warehouse did not check the bolts and a functional control mechanism was not performed. Furthermore, according to Figure 1, the main reason is that the human factors issues raised by the fitting of incorrectly sized bolts to the windscreen of this aircraft. The importance of human factors has proven itself once again [2]. Module 9 for aircraft maintenance engineers should be given periodic training called Human Factors after this incident [3]. The design of fitting glass screws could be improved and double-check could be required in maintenance. Commercial flight pilots were started to give pressure training after this incident. In addition to this, the fuel drain system could be improved due to the maximum landing weight. Since, if the speed of fuel drain system was increased, they could be landing easily.

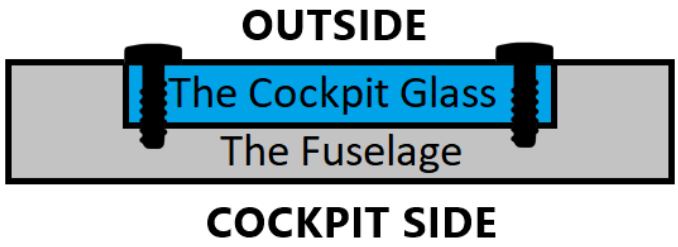


Fig. 2. Design of BAC-111's windshield

When the incident is examined for the faulty manufacturer, removing or installation of the windshield has to perform at outside because of designing and it poses difficulties for aircraft maintenance engineers, so

it increases the risk of making mistakes during maintenance in Figure 2. Besides, the strength was reduced due to the positioning of the glass in front of the fuselage.

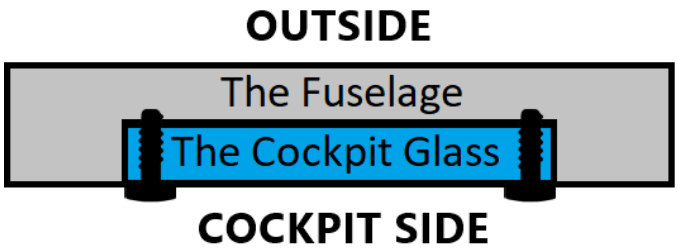


Fig. 3. Recommended design of BAC-111's windshield

If the design was as in Figure 3, windshield mounting could be easily done. Since location of screw slots and rechanging the glass from inside the cockpit provide convenience for aircraft maintenance personnel without the need for a ladder. The windshield which was between the fuselage and cockpit creates more durableness.

III. SONUÇ VE DEĞERLENDİRME [CONCLUSION]

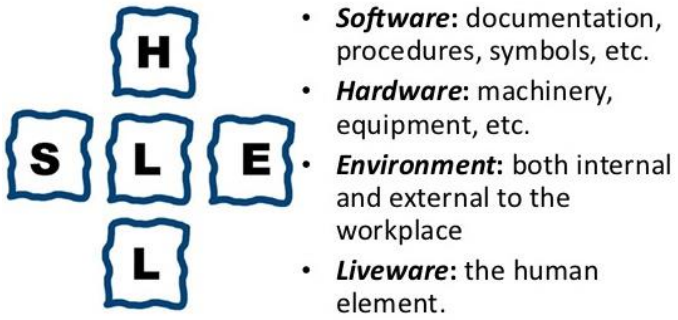


Fig. 4. The Hawkins Model

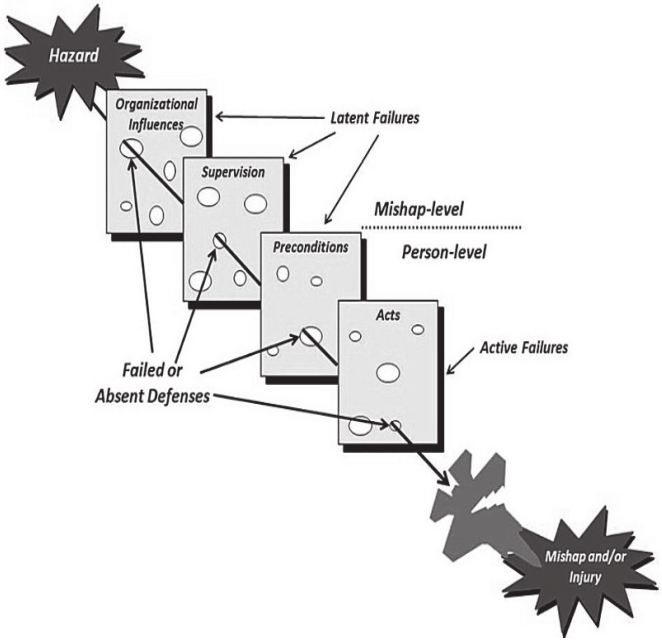


Fig. 5. The Swiss Cheese Model

Finally, we can reach the following conclusion from this. The importance of human factors has been demonstrated for production and maintenance because of decision errors [4]. We should be very careful while performing the maintenance and we should not do anything without maintenance booklets such as aircraft maintenance manual, illustrated part catalog, and system schematic or wiring catalog. The imperfect design was made in the manufacture, which is a decision error and unfortunately passed through all the holes of Swiss Cheese Model by successfully passing the flight tests with faulty maintenance. The Shell Model in Figure 4 [5] and the Swiss Cheese Model in Figure 5 [6] which are Human Factors Analysis and Classification Systems, should be well understood.

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