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Safety Culture Awareness in Aviation Maintenance: Foundations to Present

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Abstract

Safety Culture awareness in aviation maintenance organizations is necessary for the performance of effective maintenance and the safe operation of aircraft. Maintenance organizations that promote a strong culture of safety encourage honesty and integrity within the workplace. The environment where maintenance is performed differs from other aviation related operations. The promotion of safety in maintenance operations has been proven over time in publications written by the earliest pioneer in aviation safety, Jerome Lederer. The awareness of safety culture in aviation maintenance has evolved with the industry to the present day.

Introduction

Positive safety culture in any organization allows for employees to recognize and assess risks in an environment without fear of punishment or retribution. Open communication and the shared goal of safety can reduce errors in aviation maintenance organizations. The beliefs and moral values held by an organization determine the culture of the employees and the policies held by the company are often defined simply as “how we (the organization) do things”.

Aviation maintenance organizations which typically operate under a Part 121 scheduled air carrier typically follow the policies and culture set by their airline or carrier. Many maintenance organizations which fall under a contract and operate as independent Part 145 Repair Stations carry the responsibility to create their own policies and guidance for employees and to encourage the growth of their own safety culture.

Aircraft maintainers are entrusted with the tasks that ensure aircraft operate safely and within standards set by the Federal Aviation Administration. These federal regulations often provide the motivation for safety policies and an awareness of safety culture within repair stations. The workload and nature of the work performed in a maintenance environment create hazards and risks that are unique to the industry. The work performed by aircraft maintainers can often be sensitive and demand concentration. A strong and productive organizational safety culture can provide maintenance technicians with the environment to perform effectively.

Aviation maintenance is often viewed as a separate entity regardless of the relationships between repair stations and air carriers. This divide does not mean the safety culture should be any less positive in a maintenance environment than it is in a flight operation. Early awareness of safety culture in maintenance operations dates back as far as Jerome Lederer’s early efforts with

the flight safety foundation. The awareness for the need of a positive safety culture is still present today in publications provided by the Federal Aviation Administration.

Jerome Lederer's *Aviation Mechanic's Bulletin*

Jerome Lederer was a mechanical engineer hired by the United States Postal Service in 1926 to overlook aircraft maintenance and designed changes to the aircraft being operated to reduce pilot fatalities and accidents. He was a longtime friend of Charles Lindberg's and had inspected his aircraft, the "Spirit of St. Louis". He was appointed a position as the Director of Safety for the Civil Aeronautics Board and 1947 founded the Flight Safety Foundation.

In 1953 the Flight Safety Foundation established a bi-monthly magazine called the *Aviation Mechanics Bulletin*. It was dedicated to informing mechanics on maintenance issues, accidents, and fostering a strong safety culture. This publication is dated as the earliest safety publication in the Flight Safety Foundation Collection. The Flight Safety Foundation's founder, Jerome Lederer, contributed his own essays and articles. (FlightSafety.org, n.d.)

He also wrote the "Mechanic's Creed" published in the first volume of the *Aviation Mechanics Bulletin*. This creed was popular with mechanics around the world. Jerome Lederer urged mechanics to use the creed as a promise to themselves to remain honest and to perform aircraft maintenance with integrity. Lederer used the creed to inspired aircraft maintainers to perform their work to the best of their ability and knowledge (Lederer, 1953). He wanted to inspire strong ethics and skill. Lederer understood the importance of recognizing when one could not achieve a task, and supported the decision of admittance.

The Aviation Maintenance “Dirty Dozen”

This concept, developed by Gordon DuPont for Transport Canada in 1993, refers to the twelve most common human error preconditions to accidents and incidents. DuPont was appointed with the task of developing a safety seminar called the “Human Performance in Maintenance”. Dupont’s “Dirty Dozen” concept is now featured on posters which are typically found in aircraft maintenance facilities globally. It is now the basis for human factors in maintenance training all over the world. The list is as follows: 1. Lack of communication, 2. Distraction, 3. Lack of resources, 4. Stress, 5. Complacency, 6. Lack of teamwork, 7. Pressure, 8. Lack of awareness, 9. Lack of knowledge, 10. Fatigue, 11. Lack of assertiveness, and 12. Norms. For each of these human error preconditions, a counteractive measure is also listed.

Although listed this way, the preconditions are not listed by priority. This list is not considered comprehensive by ICAO, and according to ICAO circular 240-AN/144, over 300 human error precursors exist. The dozen listed by Gordon DuPont serve as an introductory list to aircraft maintainers. The Dirty Dozen list has helped increase awareness among maintainers of the human contribution to accidents and has helped bring focus to reducing human error.

Safety Management Systems (SMS)

In aviation, safety management systems are used as an approach to manage the safety program of an operation. The process and guidelines set by safety management systems allow operators to assess risk and mitigate those risks accordingly. Aircraft maintenance is a fundamental and necessary element in any aviation operation. In order to be considered safe and airworthy, operators must be diligent in the way aircraft are maintained and how employees are

performing. A safety management system (SMS) is an organized approach by management to include every employee of a company that standardizes the procedures a company will follow to improve safety. The structure of SMS was designed by the International Civil Aviation Organization in order to be standardized across different countries and types of operations. Currently, only part 121 U.S. commercial airlines are mandated by the Federal Aviation Administration to have a safety management system in place (Federal Aviation Administration, 2017).

The risks and hazards involved are unique to the climate of aviation maintenance and therefore require a safety program to fit. The implementation of an SMS into aviation maintenance organizations is intended to improve safety culture and ensure all employees, from the top managers to junior maintainer participate in the safety program.

Conclusion

The beliefs and values held by an organization make up the safety culture. The promotion of this culture must be enforced by managers and supervisors, but it must be carried out by all employees. Every member of an organization has an active a role in a positive and strong safety culture. The awareness of this has been proven by safety pioneers like Lederer and DuPont and over time as the aviation industry has grown, the promotion of safety culture has been recognized by the Federal Aviation Administration. A modern approach to promotion of safety in maintenance organizations is the implementation of a Safety Management System. Though it is not a regulation for independent repair stations, those that choose to voluntarily create an SMS for their employees choose to promote the policies and assurances created by an SMS. A strong safety culture is necessary for effective maintenance. Aircraft maintenance

technicians who are employed within a positive culture can approach management with safety concerns without the fear of retribution or punishment.

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