TRANSITION OF THE QUALITY MANAGEMENT SYSTEM TO THE AVIATION SAFETY MANAGEMENT SYSTEM IN ORGANIZATIONS DEALING WITH BASE AIRCRAFT MAINTENANCE

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ABSTRACT: *The paper deals with the transition from the quality management system to the aviation safety management system in organizations dealing with aircraft maintenance. For all activities and changes in an organization, the risk of endangering flight safety is assessed and preventive activities are determined according to the risk category.*

The transition to the aviation safety system is based on the requirements stated within ICAO Annex 19 document - Safety Management. EU regulatory norms (including the EASA norm that regulates organizations for basic technical maintenance of aircraft - Part 145 norm) require organizations to comply with new regulatory requirements by the beginning of December 2024.

The transition includes comprehensive organizational, documentation and procedural changes in organizations and is essentially deregulatory in nature, increasing the responsibility of management structures in organizations for the outcomes of technological activities affecting flight safety (safe use of aircraft).

KEYWORDS: *ICAO Annex 19, Safety Management System (SMS), EASA Safety, EASA Part 14, Safety culture*

1. INTRODUCTION

ICAO Annex 19, "Safety Management," is a crucial document issued by the International Civil Aviation Organization (ICAO) with a sole purpose of enhancing global aviation safety. Transition in accordance to this Annex involves several key components and stages to ensure that aviation safety management practices are robust, comprehensive, and uniformly applied across the globe.

Transition to ICAO Annex 19 represents a significant step forward in enhancing global aviation safety. It requires a coordinated effort from States, regulatory authorities, and organizations within aviation field to implement robust Safety Management Systems (SMS) and programs. By focusing on continuous improvement and fostering a proactive safety culture, the aviation industry can achieve higher safety standards and reduce risks effectively.

Key Components of ICAO Annex 19:

1. Safety Management Systems (SMS):

- Framework: Requires States to implement an SMS, encompassing policies, procedures, and practices to manage safety.
- Implementation: Organizations involved in aviation activities (e.g., airlines, maintenance organizations, air navigation service providers) must establish an SMS.

2. State Safety Programmes (SSP):

- Framework: Mandates States to establish an SSP, integrating safety activities, including SMS oversight.
- Integration: Ensures harmonization between SSP and SMS for cohesive safety management.

3. Safety Data Collection and Analysis:

- Reporting Systems: Establishes requirements for safety data collection and analysis to support risk management.
- Analysis and Sharing: Promotes the use of safety data to identify hazards and share information globally.

4. Safety Performance Measurement:

- Indicators: Requires States and organizations to develop safety performance indicators and targets.
- Monitoring: Emphasizes ongoing monitoring and review of safety performance to ensure continuous improvement.

2. TRANSITIONING WITHIN EASA REGULATORY ENVIRONMENT

EASA's transition to safety, in accordance with ICAO Annex 19, is crucial for maintaining and improving aviation safety standards across Europe. By prioritizing safety in all aspects of its operations, EASA aims to prevent accidents, protect lives, strengthen regulatory oversight, build trust, promote competitiveness, and facilitate innovation within the aviation industry. Ultimately, the transition to safety is essential for ensuring the continued growth and sustainability while prioritizing the safety and well-being of all those involved in aviation operations.

Transitioning an EASA Part 145 organization (organization dealing with aircraft base maintenance) within EASA regulatory environment to meet ICAO Annex 19 requirements involves significant planning, resource allocation, and cultural change. By systematically implementing Safety Management System (SMS), fostering a proactive safety culture, and ensuring continuous improvement, maintenance organizations can enhance their safety performance and comply with international standards. This transition not only improves safety outcomes but also enhances organizational efficiency and regulatory compliance.

Transitioning an EASA Part 145 maintenance organization to align with ICAO Annex 19's safety management requirements involves several structured steps to ensure compliance and

enhance overall safety performance. Recognized steps on how an EASA Part 145 organization can transition effectively:

Thorough understanding of EASA Part 145 and ICAO Annex 19

- EASA Part 145: This regulation sets the requirements for the maintenance of aircraft and aircraft components by approved maintenance organizations within the European Union.
- ICAO Annex 19: This Annex provides the framework for implementing a Safety Management System (SMS) and outlines State Safety Programs (SSP) to globally manage aviation safety.

Transition Steps

1. Gap Analysis:

   - Assessment: Conduct a thorough gap analysis comparing current EASA Part 145 practices with the requirements of ICAO Annex 19.
   - Identify Gaps: Identify areas where the current system does not meet Annex 19 requirements, focusing on SMS integration, safety performance measurement, and safety data management.

2. Establishment of Safety Management System (SMS):

   - SMS Framework: Develop an SMS framework that includes safety policies, objectives, risk management processes, and safety assurance.
   - Documentation: Create and maintain comprehensive documentation outlining the SMS, including manuals, procedures, and safety reports.

3. Training and Competency Development:

   - Training Programs: Implement training programs to ensure that all staff, including management and frontline workers, understands SMS principles and practices.
   - Competency Assessments: Regularly assess staff competency in SMS-related tasks to ensure ongoing proficiency.

4. Safety Risk Management:

   - Hazard Identification: Develop processes for identifying hazards in maintenance activities through reports, inspections, and staff feedback.
   - Risk Assessment: Implement risk assessment methods to evaluate and prioritize identified hazards.
   - Mitigation Strategies: Establish mitigation strategies to address and manage risks effectively.

5. Safety Assurance:

- Performance Monitoring: Develop key safety performance indicators (SPIs) to monitor and measure safety performance.
- Audits and Inspections: Conduct regular internal audits and inspections to ensure compliance with SMS procedures and identify areas for improvement.
- Continuous Improvement: Use audit findings and performance data to continuously improve safety practices and procedures.

6. Safety Promotion:

- Communication: Promote safety culture through regular communication, safety meetings, and bulletins.
- Reporting Systems: Establish a non-punitive safety reporting system to encourage staff to report safety concerns without fear of retribution.

7. Integration with State Safety Program (SSP):

- Alignment: Ensure that the organization's SMS aligns with the national SSP requirements set by the respective civil aviation authority.
- Collaboration: Collaborate with the national aviation authority to ensure consistent safety practices and data sharing.

Recognized Implementation Challenges

- Cultural Change: Fostering a safety culture that embraces proactive safety management and open reporting can be challenging.
- Resource Allocation: Ensuring adequate resources, including skilled personnel, funding, and technology, for effective SMS implementation.
- Regulatory Compliance: Keeping up with evolving regulatory requirements and ensuring ongoing compliance with both EASA and ICAO standards.
- Data Management: Developing robust systems for collecting, analyzing, and sharing safety data while protecting data integrity and confidentiality.

Recognized Best Practices for a Successful Transition

- Leadership Commitment: Ensure top management is committed to the transition and leads by example in promoting safety culture.
- Stakeholder Involvement: Engage all stakeholders, including staff, management, and regulatory authorities, in the transition process.
- Incremental Implementation: Roll out the SMS in phases to allow time for adjustment and refinement based on feedback and performance data.
- Regular Reviews: Conduct regular reviews and updates of the SMS to adapt to new challenges and regulatory changes.

2.1. PRACTICAL EXAMPLE OF COMPANY'S STEPS TO REACH TRANSITIONAL GOALS

1. Gap Analysis

   EASA issued a document called "Management System Assessment Tool" and Civil Aviation Authority (CAA) of each EU member state, within EASA regulatory environment, defines and issues "EASA Part 145 Compliance List", stating regulatory goals (per each element requested by the norm) each company has to reach to be certified.

   Using mentioned documents, "Gap Analysis" within each company is performed and transitional steps are defined.

   Upon reaching satisfactory results (meaning, analysis and predicted transitional steps are based on reality), "Gap Analysis" is approved by CAA.

2. Establishment of Safety Management System (SMS)

   Thorough description of company's management and safety system has to be established in a written form within comprehensive documentation outlining the SMS, including manuals, procedures, and safety reports.

   Fundamental document, containing SMS framework and associated procedures is Maintenance Organization Exposition (MOE).

   MOE is approved by CAA.

3. Training and Competency Development

   Robust training and individual competency development program has to be established with initial trainings performed within certified training institutions.

   Procedures for competency assessments of all personnel have to be established.

   Key personnel, training and competency development programs are approved by CAA.

4. Safety Risk Management

   As an example, one of the important transitional steps for companies is establishment of database called "Hazard Log". Within it company initially states and defines recognized hazards and, more importantly, defines steps of dealing with recognized hazards and perceived risks. Recognized hazards are initially defined within company using known and previously recognized root causes of critical events, bearing in mind that critical events are events with direct influence on flight safety. Root causes may be in three general areas: human factors, environmental factors and/or design and manufacturing factors.

   "Hazard Log" entries are then defined analyzing root causes of critical events ("Risk

Assessment") using Failure Modes and Effects Analysis (FMEA) and/or "Ishikawa" analysis (for more complex critical events) or "5 Why" analysis (for simpler ones).

All negative outcomes (defined as perceived risks) are then predicted and used to develop barriers within company, preventing negative safety outcomes. To define and establish barriers, for each of the elements of critical event (perceived risks), companies usually use tool called "Bow Tie diagram".

Methodology used to create "Hazard Log" and its content is subject to overview of CAA.

5. Safety Assurance

Robust system of company's performance monitoring, internal auditing, inspections and continuous improvements methodology has to be established and approved by CAA.

6. Safety promotion

Establishment of non punitive voluntary reporting system within company is of paramount importance for safety promotion.

Furthermore, regular safety meetings and briefings are planned and held with the intention to share safety information horizontally and vertically within organization.

7. Integration with State Safety Program (SSP)

If all aforementioned steps are satisfactorily passed and confirmed by CAA audit we are assured that company is aligned with requirements of national State Safety Program.

3. EXPECTED TRANSITIONAL BENEFITS FOR ORGANIZATIONS

Transition to a safety-centric approach within EASA, based on ICAO Annex 19, has significant implications for EASA Part 145 organizations. This shift emphasizes risk management, safety culture, and compliance, impacting various aspects of these organizations' operations. In summary, the transition to emphasize proactive safety management, regulatory compliance, and the integration of advanced technologies. These changes not only enhance safety but also improve operational efficiency and stakeholder confidence.

Here are the key impacts:

1. Enhanced Safety Management Systems (SMS):

- Implementation and Integration: EASA Part 145 organizations must implement comprehensive Safety Management Systems (SMS) that integrate safety into all maintenance activities. This includes hazard identification, risk assessment, and the development of safety performance indicators.
- Continuous Monitoring: SMS requires ongoing monitoring and review of safety performance, encouraging a proactive approach to identifying and

mitigating risks before they lead to incidents.

2. Data-Driven Safety Decisions:

- Data Collection and Analysis: Part 145 organizations are expected to collect and analyze safety data, including maintenance error reports and near-miss incidents. This data-driven approach helps in identifying trends and implementing corrective actions.
- Performance-Based Oversight: EASA's oversight has shifted towards performance-based regulations, where compliance is assessed based on safety performance data rather than solely on procedural adherence.

3. Regulatory Compliance and Oversight:

- Stricter Compliance Requirements: Enhanced focus on safety means stricter compliance with EASA regulations. Part 145 organizations must ensure all procedures, documentation, and practices align with the latest regulatory requirements.
- Regular Audits and Inspections: EASA conducts rigorous audits and inspections to ensure continuous compliance. Part 145 organizations must be prepared for these evaluations and demonstrate effective safety management.

4. Safety Culture and Training:

- Promoting a Safety Culture: A strong emphasis on safety culture encourages all employees to prioritize safety in their daily tasks. This involves fostering an environment where safety concerns can be reported without fear of reprisal.
- Ongoing Training and Development: Regular training programs are essential to keep staff updated on the latest safety practices and regulatory changes. Part 145 organizations must invest in continuous professional development for their workforce.

5. Risk Management Practices:

- Risk Assessment and Mitigation: Part 145 organizations need to conduct thorough risk assessments for all maintenance activities. This involves identifying potential hazards, evaluating risks, and implementing mitigation strategies.
- Emergency Response Planning: Developing and maintaining effective emergency response plans is crucial. These plans should be regularly tested and updated to ensure readiness in case of an incident.

6. Stakeholder Engagement and Communication:

- Collaborative Approach: Part 145 organizations must collaborate closely with EASA, airlines, and other stakeholders to enhance safety. This includes sharing

safety information and participating in industry-wide safety initiatives.

- Transparent Communication: Clear and transparent communication channels are necessary to keep all stakeholders informed about safety issues and developments.

7. Technological Integration:

- Adoption of New Technologies: The transition to safety involves integrating advanced technologies such as predictive maintenance tools, digital inspection techniques, and data analytics to enhance safety and efficiency.
- Compliance with Technological Standards: Ensuring that all new technologies and systems comply with EASA standards is crucial for maintaining safety and regulatory adherence.

Direct benefits for EASA Part 145 Organizations

- Improved Safety Outcomes: With a robust SMS and risk management practices, Part 145 organizations can achieve better safety outcomes, reducing the likelihood of maintenance-related incidents.
- Operational Efficiency: Data-driven decision-making and advanced technologies streamline maintenance processes, improving efficiency and reducing downtime.
- Regulatory Alignment: Compliance with EASA's enhanced safety regulations ensures that Part 145 organizations remain in good standing with regulatory authorities, avoiding penalties and disruptions.
- Reputation and Trust: A strong safety record enhances the reputation of Part 145 organizations, building trust with clients, stakeholders, and the public.

4. CONCLUSION

Transition initiated by ICAO Annex 19 is a result of thorough understanding that Quality Management is not enough anymore in today's operations in aviation industry environment.

Quality Management Systems (QMS) are geared towards customer expectations and contractual/regulatory obligations. Safety Management System (SMS) is all about identifying hazards and managing risks. Processes designed to produce a solely product or service quality will not guarantee safety (safety is a systems property, not a component property).

EASA Part 145 organizations play a critical role in ensuring airworthiness and safety of operations of aircraft operating within Europe. By adhering to stringent regulatory requirements, these organizations help maintain high standards of maintenance, contributing to the overall safety and reliability of the aviation industry. The focus on robust safety management systems, quality and competent personnel, ensures that maintenance activities are performed effectively and safely, protecting both passengers and crews.

5. REFERENCES

ICAO Annex 19, Second Edition (2016)
ICAO Safety Management Manual (Doc 9859), Fourth Edition (2018)
EU Commission Directive No.: 1321/2014, Annex II (PART 145)
EASA MSAT (Management System Assessment Tool)