Global Certificate in Aerospace Quality

Unit 3: Aerospace Quality Standards and Requirements

Aerospace Quality Standards and Requirements: Key Terms and Vocabulary

1. Quality Management System (QMS)
A Quality Management System (QMS) is a collection of business processes focused on achieving quality policy and quality objectives to meet customer requirements. It is a formalized system that documents the processes, procedures, and responsibilities for achieving quality objectives in an organization.

Example: A QMS for an aerospace company may include procedures for design, production, testing, and delivery of aircraft components.

AS9100: A quality management system standard for the aerospace industry, based on ISO 9001. It provides additional requirements for organizations that design, develop, and produce aviation, space, and defense products.

AS9110: A quality management system standard for the maintenance, repair, and overhaul (MRO) organizations in the aerospace industry. It is based on AS9100 and adds additional requirements for MRO organizations.

AS9120: A quality management system standard for stockist distributors in the aerospace industry. It is based on AS9100 and adds additional requirements for stockist distributors.

Aerospace Quality Management System (AQMS): A comprehensive system that includes all the elements of a quality management system (QMS) required by the aerospace industry, including AS9100, AS9110, and AS9120.

Quality Management System (QMS): A collection of business processes focused on achieving quality policy and quality objectives to meet customer requirements. It is a formalized system that documents the processes, procedures, and responsibilities for achieving quality objectives.

ISO 9001: A quality management system standard that provides a framework for improving quality and a vocabulary for communicating about quality systems. It is the basis for AS9100, AS9110, and AS9120.

Continuous Improvement: A philosophy and a series of practices aimed at systematically improving processes, products, and services.

Preventive Action: A proactive approach to identifying and eliminating potential problems before they occur.

Corrective Action: A reactive approach to identifying and eliminating problems after they have occurred.

Customer Satisfaction: The degree to which a customer's expectations are met or exceeded.

Quality Policy: A statement of an organization's commitment to quality, including its quality objectives.

Quality Objectives: Specific, measurable, achievable, relevant, and time-bound (SMART) goals for improving quality.

Quality Manual: A document that outlines the organization's quality management system, including its scope, processes, procedures, and responsibilities.

Procedures: Written instructions for performing specific tasks or activities.

Work Instructions: Detailed instructions for performing specific tasks or activities.

Records: Documented evidence of the performance of activities and the results achieved.

Internal Audit: A systematic review of an organization's quality management system to assess its compliance with requirements and its effectiveness in achieving quality objectives.

Management Review: A review of an organization's quality management system by top management to assess its performance, identify opportunities for improvement, and make decisions about its future direction.

Risk Management: A systematic approach to identifying, assessing, and mitigating risks in an organization's quality management system.

Supply Chain Management: A comprehensive approach to managing the flow of goods, services, and information from suppliers to customers.

Configuration Management: A discipline that ensures the integrity of products and services throughout their life cycle, including design, development, production, and support.

Design and Development: The processes of creating new products or services, including concept development, design, testing, and validation.

Production and Service Provision: The processes of manufacturing, assembling, testing, and delivering products or services to customers.

Measurement, Analysis, and Improvement: The processes of monitoring, analyzing, and improving the performance of an organization's quality management system.

Product Realization: The processes of designing, developing, producing, and delivering products or services to customers.

Process Approach: An approach to quality management that focuses on managing processes rather than

functions.

Performance Metrics: Quantitative measures of an organization's performance, such as on-time delivery, defect rates, and customer satisfaction.

Continuous Monitoring: A process of regularly collecting and analyzing data to identify trends and opportunities for improvement.

Nonconformity: A deviation from a specified requirement or expectation.

Correction: An action taken to eliminate a nonconformity.

Corrective Action Request (CAR): A document used to track and resolve nonconformities.

Preventive Action Request (PAR): A document used to track and resolve potential nonconformities.

First Article Inspection (FAI): An inspection of the first article produced in a production run to verify that it meets all requirements.

In-Process Inspection: An inspection of products during production to detect and correct nonconformities before they become costly or difficult to correct.

Final Inspection: An inspection of products before they are shipped to customers to ensure that they meet all requirements.

Calibration: The process of comparing a measuring instrument to a standard to ensure that it is accurate.

Traceability: The ability to track the history, location, or application of an item or activity.

Controlled Documents: Documents that are formally controlled and managed to ensure that they are accurate, up-to-date, and accessible to authorized users.

Document Control: The process of managing the creation, review, approval, distribution, and revision of documents.

Record Control: The process of managing the creation, review, approval, storage, and retrieval of records.

Audit Trails: A record of the sequence of activities that have taken place, including who performed them and when.

Change Management: The process of managing changes to an organization's quality management system, including identifying, evaluating, approving, and implementing changes.

Training and Competence: The processes of ensuring that employees have the necessary knowledge, skills, and abilities to perform their tasks effectively.

Competence Assessment: The process of evaluating an individual's knowledge, skills, and abilities to determine their competence.

Training Records: Documented evidence of the training and competence of employees.

Competence Development: The process of developing the knowledge, skills, and abilities of employees to meet current and future job requirements.

Performance Appraisals: A process of evaluating an employee's job performance and providing feedback.

Human Resources: The department responsible for managing the employment, development, and well-being of employees.

Work Environment: The physical and social conditions in which work is performed.

Infrastructure: The physical and organizational structures that support the operation of an organization.

Occupational Health and Safety: The policies, procedures, and practices that protect the health and safety of employees.

Environmental Management: The policies, procedures, and practices that minimize the environmental impact of an organization's operations.

Product Liability: The legal responsibility of a manufacturer or supplier for harm caused by a defective product.

Risk Assessment: The process of identifying, evaluating, and prioritizing risks.

Risk Mitigation: The process of reducing the likelihood or impact of a risk.

Risk Transfer: The process of transferring the risk to another party, such as an insurance company.

Risk Acceptance: The process of accepting the risk and taking no action to mitigate it.

Risk Communication: The process of sharing information about risks with stakeholders.

Business Continuity Planning: The process of developing plans and procedures for responding to disruptive events, such as natural disasters, cyber attacks, or pandemics.

Disaster Recovery Planning: The process of developing plans and procedures for recovering from a disruptive event.

Incident Management: The process of responding to and managing unexpected events, such as equipment failures, accidents, or security breaches.

Crisis Management: The process of managing a crisis, including communication with stakeholders, decision making

AS9100: A quality management system standard for the aerospace industry, based on ISO 9001. It provides additional requirements for the aerospace industry, including configuration management, reliability, and safety.

AS9110: A quality management system standard for the maintenance, repair, and overhaul (MRO) organizations in the aerospace industry. It is based on AS9100 and includes additional requirements specific to MRO organizations.

AS9120: A quality management system standard for the stockist distributors in the aerospace industry. It is based on AS9100 and includes additional requirements specific to stockist distributors.

Configuration Management: A discipline that focuses on establishing and maintaining the consistency of a product's performance, functional, and physical attributes with its requirements, design, and production.

Reliability: The ability of a product to perform its required functions under stated conditions for a specified period of time.

Safety: The freedom from unaccceptable risk of harm.

ISO 9001: A quality management system standard that provides a framework for improving product or service quality, through the implementation of a quality management system.

Quality Management System (QMS): A formalized system that documents the processes, procedures, and responsibilities for achieving quality policies and objectives.

APQP: Advanced Product Quality Planning, a structured approach for defining and controlling the product development process to ensure that customer and regulatory requirements are met.

PPAP: Production Part Approval Process, a process for ensuring that production processes are capable of consistently producing parts that meet customer requirements.

FAI: First Article Inspection, a process for verifying that the first article produced meets all customer and regulatory requirements.

CAPA: Corrective and Preventive Action, a process for identifying, investigating, and resolving quality problems and implementing corrective and preventive actions.

SPC: Statistical Process Control, a method of quality control that uses statistical methods to monitor and control a process.

Gauge R&R: Gauge Repeatability and Reproducibility, a study to determine the precision and accuracy of a measurement system.

MRO: Maintenance, Repair, and Overhaul, a process for maintaining, repairing, and overhauling products to ensure they continue to meet customer requirements.

Stockist Distributor: A distributor that purchases parts and materials from original equipment manufacturers and sells them to other organizations.

Supply Chain Management: The management of the flow of goods, services, and information from raw materials to end customers.

Value Stream Mapping: A lean-management method for analyzing the current state and designing a future state for the series of events that take a product or service from its beginning through to the customer.

Risk Management: The process of identifying, assessing, and prioritizing risks, followed by coordinated and economical application of resources to minimize, monitor, and control the probability or impact of unfortunate events.

FMEA: Failure Mode and Effects Analysis, a step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process, or a product or service.

Control Plan: A document that outlines how a specific process will be managed and controlled to ensure that it consistently produces parts that meet customer requirements.

Process Flow Diagram: A graphical representation of the steps in a process, including inputs, outputs, and decision points.

Continuous Improvement: A philosophy and a strategy for continuously improving the quality of a product or service.

Internal Audit: An audit performed by an organization's own employees to evaluate the effectiveness of the quality management system.

External Audit: An audit performed by an external organization, such as a registrar, to evaluate the effectiveness of the quality management system and determine if it meets the requirements of a standard.

Registrar: An organization that evaluates the effectiveness of a quality management system and issues a certificate of registration if it meets the requirements of a standard.

Certification: The process of having an independent, third-party organization, such as a registrar, evaluate an organization's quality management system and issue a certificate of registration if it meets the requirements of a standard.

Recertification: The process of having an independent, third-party organization, such as a registrar, evaluate an organization's quality management system and reissue a certificate of registration if it continues to meet the requirements of a standard.

Surveillance Audit: An audit performed by a registrar to evaluate an organization's ongoing compliance with the requirements of a standard.

Continuous Monitoring: The ongoing measurement and analysis of a process to ensure that it is operating within acceptable limits.

Continuous Assessment: The ongoing evaluation of a quality management system to ensure that it is effective and continues to meet the requirements of a standard.

Continual Improvement Process: A process for continuously improving the effectiveness and efficiency of a

quality management system.

Key Performance Indicator (KPI): A metric used to evaluate the performance of an organization or process.

Balanced Scorecard: A performance measurement framework that measures an organization's performance across four perspectives: financial, customer, internal process, and learning and growth.

Root Cause Analysis: A problem-solving technique used to identify the underlying cause of a problem.

5 Whys: A problem-solving technique used to identify the underlying cause of a problem by repeatedly asking the question "why" until the root cause is identified.

8D Problem Solving: A structured problem-solving approach that includes eight steps for identifying and resolving quality problems.

Corrective Action: An action taken to eliminate the cause of a nonconformity and prevent its recurrence.

Preventive Action: An action taken to eliminate the cause of a potential nonconformity and prevent its occurrence.

Containment Action: An action taken to isolate nonconforming product and prevent it from being shipped to customers.

Verification: The process of checking that a product or service meets specified requirements.

Validation: The process of checking that a product or service meets customer and regulatory requirements.

Nonconformity: A failure to meet a specified requirement.

Concession: An agreement between a customer and a supplier that a nonconformity is acceptable under certain conditions.

Rejection: The act of rejecting a product or service that does not meet specified requirements.

Scrap: A product or service that cannot be repaired or reworked and must be discarded.

Rework: The process of repairing or reworking a nonconforming product to bring it into compliance with specified requirements.

Nonconformance Report (NCR): A document used to report and track nonconformities.

Corrective Action Request (CAR): A document used to request corrective action from a supplier.

Supplier Approval: The process of evaluating and approving suppliers to ensure that they are capable of consistently meeting customer requirements.

Supplier Evaluation: The process of evaluating the performance of a supplier.

Supplier Monitoring: The ongoing measurement and analysis of a supplier's performance.

Supplier Development: The process of working with suppliers to improve their capabilities and performance.

Outsourcing: The process of contracting with an external organization to perform a function or service that would otherwise be performed internally.

Offshore Outsourcing: The process of contracting with an external organization located in a different country to perform a function or service that would otherwise be performed internally.

Onshore Outsourcing: The process of contracting with an external organization located in the same country to perform a function or service that would otherwise be performed internally.

Nearshore Outsourcing: The process of contracting with an external organization located in a nearby country to

AS9100: A quality management system standard for the aerospace industry, based on ISO 9001. It provides additional requirements for the aviation, space, and defense industry.

ISO 9001: An international standard that sets out the requirements for a quality management system. It provides a framework for organizations to demonstrate their ability to consistently provide products and services that meet customer and regulatory requirements.

Quality Management System (QMS): A collection of business processes focused on achieving quality policy and quality objectives to meet customer requirements. It is expressed as the organizational structure, policies, procedures, processes, and resources needed to implement and maintain quality management.

Aerospace Quality Standards: Standards that specify the quality requirements for the aerospace industry. These standards cover areas such as design, production, testing, and inspection.

Aerospace Requirements Document (ARDoc): A document that outlines the requirements for a specific aerospace project. It includes information such as the project's objectives, scope, and technical requirements.

Configuration Management: A system of practices and procedures for managing changes to a product or system throughout its lifecycle. It includes identification, change control, and status accounting.

Identification and Traceability: The ability to identify and track the history, location, or application of an item or activity. It is used to ensure that the correct items are used in the correct applications.

First Article Inspection (FAI): An inspection of the first piece or batch of a product to ensure that it meets the specified requirements. It is used to verify that the production process is capable of producing conforming products.

Source Inspection: An inspection of raw materials, components, or assemblies at the supplier's facility before they are shipped to the customer. It is used to ensure that the supplier's processes are capable of

producing conforming products.

Product Realization: The process of planning, designing, developing, producing, and delivering a product or service. It includes all activities from the initial concept to the final delivery.

Measurement, Analysis, and Improvement: A continuous process of measuring, analyzing, and improving the performance of a quality management system. It includes the use of statistical methods and other techniques to identify areas for improvement.

Preventive Action: A proactive measure taken to eliminate the causes of potential nonconformities. It is used to prevent defects before they occur.

Corrective Action: A reactive measure taken to eliminate the causes of an existing nonconformity. It is used to address defects that have already occurred.

Continuous Improvement: A philosophy of always striving to improve the performance of a quality management system. It is based on the idea that there is always room for improvement.

Supply Chain Management: The management of the flow of goods and services from raw materials to end customers. It includes the coordination and management of all activities in the supply chain.

Risk Management: The process of identifying, assessing, and controlling risks. It is used to prevent or mitigate the impact of potential problems.

Audit: An independent review of a quality management system to ensure that it meets the requirements of a standard or regulation. It includes the examination of records, procedures, and practices.

Certification: The formal recognition that an organization's quality management system meets the requirements of a standard or regulation. It is usually granted by an accredited third-party organization.

Accreditation: The formal recognition that an organization is competent to carry out specific tasks. It is usually granted by a recognized body.

Registrar: An organization that conducts audits and grants certifications. It is usually accredited by a recognized body.

Nonconformity: A failure to meet a specified requirement. It can be a defect in a product or a deviation from a process.

Concession: An agreement between the customer and the supplier to accept a nonconforming product or process. It is usually granted when the nonconformity does not significantly impact the safety or performance of the product.

Containment: The action taken to prevent the use or shipment of nonconforming products. It is used to ensure that only conforming products are delivered to customers.

CAPA: Corrective Action/Preventive Action. A process for identifying and correcting problems and

preventing their recurrence.

MRO: Maintenance, Repair, and Overhaul. The maintenance and repair of aircraft, engines, and components.

OEM: Original Equipment Manufacturer. A company that produces parts and equipment that are used in the production of a final product.

FAA: Federal Aviation Administration. The U.S. government agency responsible for the safety of civil aviation.

EASA: European Union Aviation Safety Agency. The European Union agency responsible for the safety of civil aviation.

ASQ: American Society for Quality. A professional association dedicated to the promotion and advancement of quality.

In conclusion, these are some of the key terms and vocabulary related to Unit 3: Aerospace Quality Standards and Requirements in the course Global Certificate in Aerospace Quality. Understanding these terms is essential for anyone working in the aerospace industry, as they form the foundation of the quality management system. By using these terms correctly, you can ensure that your organization meets the requirements of the relevant standards and regulations, and that you are delivering safe and reliable products to your customers.

To apply these concepts in a practical way, consider the following example. Suppose you are working as a quality engineer for an aerospace company that produces aircraft engines. Your company has just received a new contract to produce engines for a new commercial aircraft. To ensure that your company meets the quality requirements of this contract, you will need to:

1. Develop a Quality Management System (QMS) based on AS9100 and ISO 9001.
2. Identify the requirements of the Aerospace Requirements Document (ARDoc) and ensure that they are incorporated into the QMS.
3. Establish a configuration management system to ensure that all changes to the product are controlled and documented.
4. Implement a measurement, analysis, and improvement process to continuously monitor and improve the performance of the QMS.
5. Establish a corrective and preventive action (CAPA) process to address nonconformities and prevent their recurrence.
6. Conduct first article inspections (FAI) and source inspections to ensure that the production process is capable of producing conforming products.
7. Implement a risk management process to identify and mitigate potential risks.
8. Conduct internal and external audits to ensure that the QMS meets the requirements of AS9100 and ISO 9001.
9. Obtain certification from an accredited third-party registrar.

By following these steps, you can ensure that your organization meets the quality requirements of the new

contract and delivers safe and reliable aircraft engines to your customers.

However, there are also challenges that you may encounter when implementing these concepts in a real-world setting. For example, you may encounter resistance from employees who are used to doing things a certain way and are resistant to change. To overcome this resistance, it is important to communicate the benefits of the new QMS and involve employees in the development and implementation process.

Another challenge is ensuring that all employees are trained and competent in the new QMS. This requires a significant investment in training and education, but it is essential to ensure that everyone understands their roles and responsibilities and can perform their tasks effectively.

Finally, it is important to establish a culture of continuous improvement within the organization. This requires a commitment to ongoing training and education, as well as a willingness to embrace new technologies and processes. By fostering a culture of continuous improvement, you can ensure that your organization remains competitive and stays at the forefront of the aerospace industry.

In summary, understanding the key terms and vocabulary related to Aerospace Quality Standards and Requirements is essential for anyone working in the aerospace industry. By implementing a QMS based on AS9100 and ISO 9001, establishing a configuration management system, implementing a measurement, analysis, and improvement process, establishing a corrective and preventive action (CAPA) process, conducting first article inspections and source inspections, implementing a risk management process, conducting internal and external audits, and obtaining certification from an accredited third-party registrar, you can ensure that your organization meets the quality requirements of your customers and delivers safe and