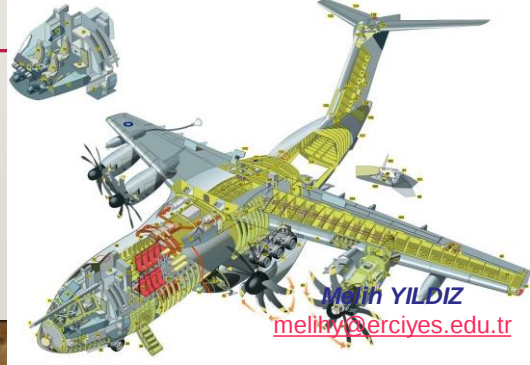


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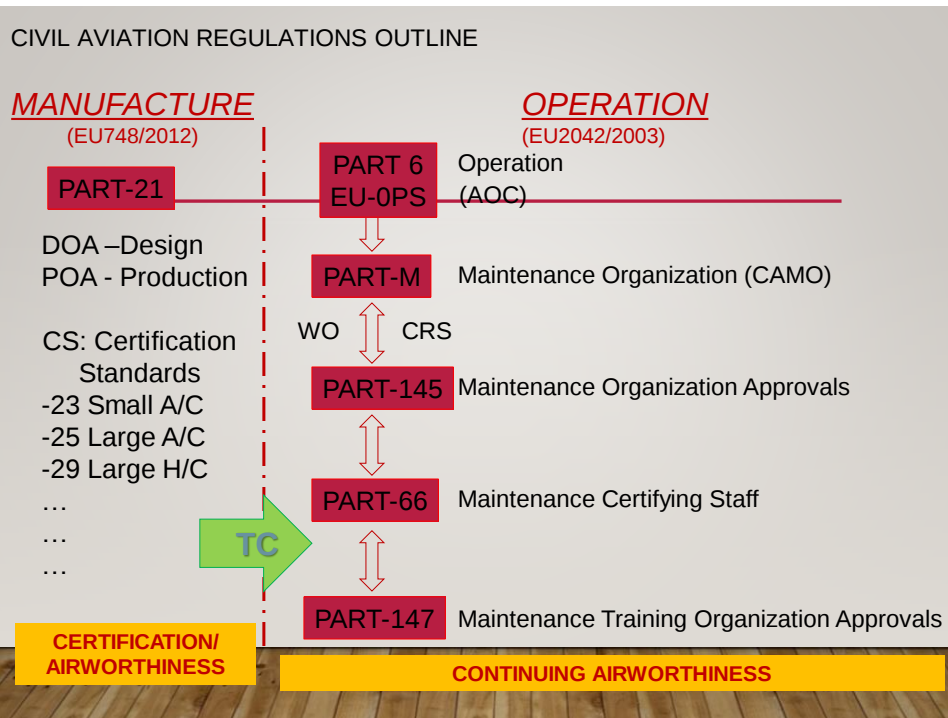
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OUTLINE

1. Regulations
2. Maintenance Program Requirements
3. Scheduled Maintenance Programs
4. Continuous Airworthiness

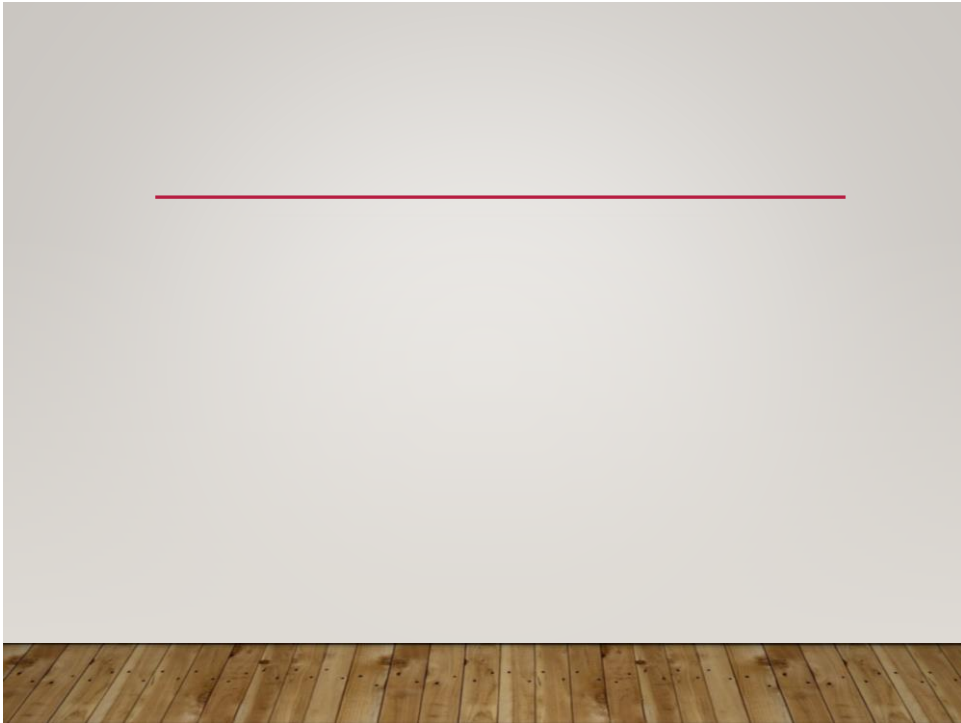


REGULATIONS

- All aircraft operations and maintenance activities are subject to regulations.
- Regulations are developed on national basis.
- National regulations are in agreement to international regulatory requirements.
- ICAO (International Civil Aviation Organization) is the common ground for most of the nations agreed on.
- FAA in USA SHGM in Turkey are some national examples. EASA acts as a regulatory requirements body in EU, which SHGM is also agreed to act in parallel.

REGULATIONS

- The regulations prescribe rules governing the maintenance, preventive maintenance, rebuilding, and alteration of any of the following: (1) aircraft having an **airworthiness certificate**, and (2) airframe, aircraft engines, propellers, appliances, and component parts of such aircraft .
- The rules also prescribe the manner in which these activities will be carried out, as well as the processes and the manner in which all activities will be recorded and approved.



REGULATIONS

- **Specifically the certificate holder is responsible for the following: (1) the airworthiness of its aircraft, including airframes, aircraft engines, propellers, appliances, and parts thereof, and (2) the performance of the maintenance, preventive maintenance, and alteration of its aircraft, in accordance with its manuals and the regulations.**
- These regulations require that each certificate holder must have an agreement with an organization adequate to perform the work and must organize the functions to separate the required inspection functions from the other maintenance, preventive maintenance, and alterations functions.



REGULATIONS

- Separation must be below the level of administrative control at which the overall responsibility for the required inspection functions and other maintenance, preventive maintenance, and alteration functions are exercised.
- The maintenance organization must ensure that all work is performed by competent personnel in accordance with the certificate holder's manual and have adequate facilities and equipment.



MAINTENANCE PROGRAM REQUIREMENTS

- With the advent of jet transport category aircraft, it was necessary to establish reliability maintenance programs adjusted to the requirements of large, technically advanced airplanes incorporating complex interrelated systems.
- The advent of the Boeing 747 in the 1960s precipitated the industry to initiate a new approach to continuous maintenance based on decision tree analysis.

MAINTENANCE PROGRAM REQUIREMENTS

- The analysis was used to define the following in some detail:
 - The objectives of an efficient maintenance program
 - The content of an efficient maintenance program
 - The process by which an efficient maintenance program can be developed

MAINTENANCE PROGRAM REQUIREMENTS

- The objectives of an efficient maintenance program are as follows:
 - To prevent the deterioration of the inherent design levels of reliability and operating safety of the aircraft
 - To accomplish this protection **at the minimum practical cost**



MAINTENANCE PROGRAM REQUIREMENTS

- The maintenance program itself consists of **two** types of tasks:
 - 1. A group of scheduled tasks to be accomplished at specified intervals. The objective of these tasks is to **prevent deterioration** of the inherent design levels of aircraft reliability.
 - 2. A group of nonscheduled tasks that result from any of the following:
 - The scheduled tasks accomplished at specific intervals
 - Reports of malfunctions (usually originated by the flight crew)
 - Condition monitoring
 - The objective of these nonscheduled tasks is to **restore** the equipment to its inherent level of reliability.



MAINTENANCE PROGRAM REQUIREMENTS

- Maintenance programs generally include one or more of the following to determine the appropriate maintenance action:
 - **Hard-time limit.** This is the maximum interval for performing maintenance tasks. This interval usually applies to overhaul, but also applies to the total life of parts or units.
 - **On condition.** These are repetitive inspections or tests to determine the condition of units or systems or portions of the structure.
 - **Condition monitoring.** This is for items that have neither hard-time limits nor on-condition maintenance as their primary maintenance process. Condition monitoring is accomplished by appropriate means available to an operator for finding and resolving problem areas. These means range from notices of unusual problems to special analyses of unit performance.



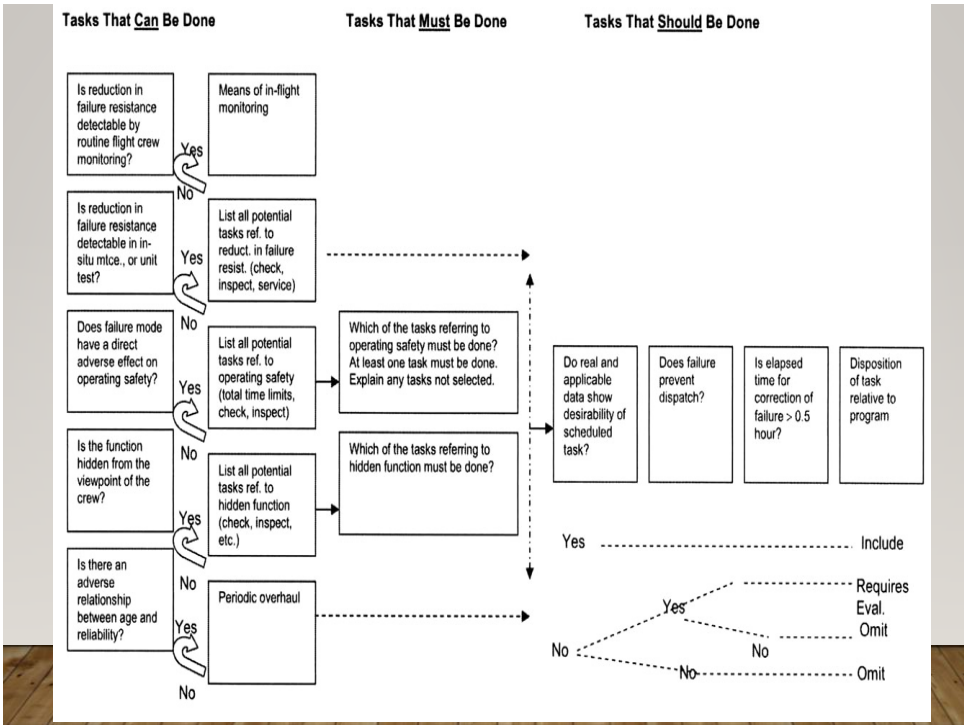
SCHEDULED MAINTENANCE PROGRAMS

- The tasks in a scheduled maintenance program may include servicing, inspection, testing, calibration, and replacement. An efficient program is one that schedules **only those tasks necessary** to meet the stated objectives. It does not schedule additional tasks that will increase maintenance costs without a corresponding increase in reliability protection.
- The method for determining **the content of the scheduled maintenance program** for systems and components uses decision tree diagrams.
- These diagrams are the basis of an evaluation process applied to each system and its significant items, **using technical data provided by the manufacturers based on functions and failure modes.**



SCHEDULED MAINTENANCE PROGRAMS

- Three decision tree diagrams are utilized. The first is used to determine scheduled maintenance tasks having potential effectiveness relative to the control of operational reliability. This determines tasks that can be done.
- The second and third diagrams are used to assess the desirability of scheduling those tasks having potential effectiveness. The second diagram defines tasks that must be done to prevent direct adverse effects on operating safety and to ensure detection of hidden functions. The third diagrams are tasks that should be done for economic value. Each of the elements of the airplane (e.g., structure, powerplant, components) is analyzed individually utilizing the decision tree diagrams



SCHEDULED MAINTENANCE PROGRAMS

- The original document was developed from a proposal to the Boeing Company in 1966/1967 by carriers (Industry Steering Committee) that had B747 aircraft on order. This Industry Steering Committee rapidly expanded to more than 160 airline representatives divided into task groups to analyze the maintenance requirements for all of the B747 aircraft structure, components, and systems. The FAA participated in these task groups. The completed document was then provided to the FAA as MSG-I (Maintenance Steering Guide). It was used by the Maintenance Review Board (MRB) to develop the B747 maintenance program.

SCHEDULED MAINTENANCE PROGRAMS

- The MRB is the regulatory group by which the National Aviation Authority (FAA, EASA etc) develops the minimum required maintenance requirements for a specific type of aircraft, in compliance with applicable NAA regulations. The manufacturer then converts the MRB document to its Maintenance Planning Document (MPD/OAMP [On Aircraft Maintenance Program]), **which the airlines (Part-M) then use to establish their own programs**, including the development of task cards and other documents for the actual work accomplishments.

SCHEDULED MAINTENANCE PROGRAMS

- Each maintenance organization utilizes the MSG and MRB documents specific for its type aircraft to establish its initial aircraft maintenance program for submission to the regulatory authority. When the authority has approved the document, the maintenance organization, based on subsequent operating experience and requirements, initiates amendments to serve its needs. Until it successfully puts into position a satisfactory reporting and continuous reliability assessment program, a maintainer must apply to the regulatory authority for changes to the maintenance program.



SCHEDULED MAINTENANCE PROGRAMS

- To maintain the credibility of the maintenance and reliability programs, the certificate holder must establish and maintain a system for the continuing analysis and surveillance of the performance and effectiveness of its inspection program and the program covering other maintenance, preventive maintenance, and alterations, and for the correction of any deficiencies in those programs, regardless of whether those programs are carried out by the certificate holder or by another entity.



CONTINUOUS AIRWORTHINESS

- The development and approval of maintenance programs is only one element of the mandate of the authority to ensure the continuous airworthiness of aircraft. The requirements for the preparation of instructions for continued airworthiness are also required.
- The instructions must include information for each engine and each component, and their interface with the airplane.
- The maintainer program must also include how changes to the instructions for continued airworthiness for units and components installed in the airplane will be communicated.
- The instructions must be in the form of a manual or manuals.



INSPECTIONS AND AUDITS

- **The regulatory authorities in all nations are mandated to carry out any and all inspections to ensure absolute compliance with all regulatory legal requirements and operational orders.** In Turkey, this function is carried out by the SHGM, which utilizes many procedures to accomplish its mandate.
- It also has the legal authority to enact civil penalties for infractions, enforce cease and desist orders, and such other procedures as may be required to ensure the safety of aircraft.



MATERIALS

- It is of extreme importance to recognize that **the regulatory authority of the country of manufacture must certificate each and every part that is on or installed in an aircraft.** These are the parts that are designed by the original manufacturer and approved by the regulatory agency for installation. No part may be installed which is not an approved part by the regulatory agency.
- As a result of an increasing number of unapproved parts that do not meet design criteria coming into the supply chain, it is mandatory for all aircraft maintainers and operators to report suspected unapproved parts (SUP) to the regulators.



MATERIALS

- In the event that a carrier wishes to manufacture detailed parts or have detailed parts manufactured on its behalf, it must obtain a parts manufacturer approval (PMA) from the regulator to do so.



MATERIALS

- Should a carrier wish to make a modification to a system, component, or part of an aircraft, which will affect the design, operation, or mission of the aircraft, it must obtain a supplemental type certificate from the regulatory authority and certify that changes do not affect the regulatory requirements for safety of flight or airworthiness of aircraft (e.g., aircraft cargo conversions, noise suppressor installations, in-flight entertainment systems).



MATERIALS

- In summary, from the time the design of an aircraft is conceived, the design must be in accordance with the many regulatory design requirements. The aircraft must be produced in accordance with a specification that has been approved by the national aviation authority. All materials for the aircraft must meet a specification established to ensure their capability of meeting the design purpose and requirements. Once in service, the aircraft is required to be operated and maintained within a very specific set of legal requirements. In addition, continuous monitoring, as defined by specific regulatory documents, permits the authority to inspect for compliance and to penalize noncompliance at any time. All of the activities - from the initiation of aircraft design to its retirement - are carried out by organizations and personnel approved by the regulatory authorities.



- QUESTIONS

