Implementing JAR-145 in PIA Engineering

Author
Zafar Ahmed Khan
Manager Engineering,
Jar-145 Project / Quality Audit
Engineering & Maintenance Department
Pakistan International Airlines Corporation
Karachi Airport, Karachi - Pakistan
E-mail: zakhan@cyber.net.pk; jar145audit@piac.com.pk
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INTRODUCTION

This paper is based on actual work that was carried out for a service organization i.e., Engineering Department of our national flag carrier, Pakistan International Airlines, for acquiring an International Quality Approval, namely JAR-145. The project is still on and approaching towards its completion. This paper covers following subjects:

• A brief introduction and history of an international aviation Quality Approval, the JAR-145, its requirements for an Approved Maintenance Organization, with an overview of JAR-145 issuing authorities.

• A detailed description of the difficulties and progress of the project.
  
  o It covers the background, need and realization for change, the documentation of processes, bringing the aspects of quality into these processes by making them based on new meaning of Quality, and ensuring their implementation, through audits.
  
  o In any service organization, the processes are equally important as in a production unit, but documenting and implementing quality into these processes is a tedious job, especially if you want these to be quantifiable standards.

• In the last section, all efforts and planning for the project, has been analyzed, in the light of various Quality approaches of TQM.

WHAT IS JAA AND JAR?

JAR-145 is a set of requirements to approve / accept maintenance organizations to maintain any aircraft used for commercial air transport.

The Joint Aviation Authorities (JAA) is an associated body of the European Civil Aviation Conference (ECAC) presently representing the civil aviation regulatory authorities of 38 (thirty
eight) European States who have agreed to cooperate in developing and implementing common safety regulatory standards and procedures.

Joint Aviation Authorities (JAA) is responsible for the production and publication of Joint Aviation Requirements (JAR) and the associated guidelines.

**JAA – OBJECTIVES**

Joint Aviation Authorities’ (JAA) objectives are summarized as follows:

- **Aviation Safety:** To ensure, through cooperation amongst member states, that JAA members achieve a high, consistent level of aviation safety.
- **Transition from JAA to EASA:** To ensure, establishing a European Aviation Safety Agency (EASA) that would absorb all functions and activities of the JAA in a period, as short as possible, and would ensure full participation of the JAA Non-EU Member States.
- **Business Effectiveness:** To achieve a cost effective safety system so as to contribute to an efficient civil aviation industry.
- **Consolidation of Common Standards:** To contribute to fair and equal competition within Member States, through the uniform application of common standards and regular review of existing regulatory situation.
- **Worldwide Aviation Safety Improvement:** To cooperate with other regional organizations or national authorities of States, who are playing an important role in Civil Aviation, in order to reach at least the JAA safety level and to foster the worldwide implementation of harmonized Safety Standards and requirements through the conclusion of international arrangements.

**JAA - BACKGROUND**

JAA’s work started in 1970 (when it was known as the Joint Airworthiness Authorities). Originally its objectives were only to produce common certification codes for large airplanes and for engines. This was to meet the needs of European industry, particularly for products manufactured by international consortia (e.g. Airbus). Since 1987, its work has been extended to operations, maintenance, licensing and certification / design standards for all classes of aircraft, and JAA got new name of Joint Aviation Authorities.

Although JAA originated as the Authorities’ response to the technical and economics needs of the European Aviation Industry, however, since 1st January 1992, JAA codes, as they are completed, are referenced in the EC Regulations and have become law in the EC States.

**HARMONIZATION OF JAA WITH FAA**

In 1992, the JAA and the Federal Aviation Administration of the United States (FAA) made a commitment to harmonize the FARs and JARs, regarding:

- Design and manufacture, operation and maintenance of civil aircraft and related products and parts.
- Noise and emissions from aircraft and aircraft engines.
- Flight Crew licensing.

Later Transport Canada Civil Aviation joined this activity.
JOINT AVIATION REQUIREMENTS (JARS)

Following are the few JAR requirements, which are product or organisation based. Detailed listing can be obtained from their website, [www.jaa.nl](http://www.jaa.nl).

<table>
<thead>
<tr>
<th>Organizations</th>
<th>Products</th>
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<tbody>
<tr>
<td>♦ JAR-OPS – Commercial Air Transportation Operators.</td>
<td>♦ JAR-25 – Large Airplanes.</td>
</tr>
<tr>
<td>♦ JAR-66 – Qualifying maintenance personnel to issue CRS to service for JAR-145 AMO.</td>
<td>♦ JAR-E – Engines</td>
</tr>
<tr>
<td>♦ JAR-145 – Approved / accepted Maintenance Organization to maintain any aircraft for commercial air transport.</td>
<td>♦ JAR-P – Propellers</td>
</tr>
<tr>
<td>♦ JAR-147 – Approved Maintenance Training Organization for JAR-66.</td>
<td>♦ JAR-APU – Auxiliary Power Units.</td>
</tr>
<tr>
<td>♦ JAR-VLA – Very Light Airplanes</td>
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EVOLUTION OF JAR – 145

JAA maintenance policy states that “No aircraft, when for commercial air transport, may fly, unless a Certificate of Release to Service (CRS) has been issued by an approved / accepted maintenance organization (AMO)”.

JAR-145 are the Joint Aviation Requirements for approval of maintenance organization, for commercial aircrafts. It concerns with activities related to maintenance of aircraft and / or aircraft component.

- Change – 1 issued in August 1995.
- [Amendment – 5 in final stage, expected in the beginning of 2003] [Under NPA 145-12]

JAR-145 LISTED ORGANIZATIONS

There are some 3233 organizations approved / accepted throughout the world out of which 1700 are in Europe, 1283 are in North America and 250 in the rest of the world. The list is updated every 4 months. On the average, every other day one organization is added to the list.
Organizations located within the JAA Countries may be granted approval when in compliance with JAR-145.

Organizations located outside JAA Countries may ONLY be granted approval if the JAA is satisfied that there is a need.

In our region, almost all major airlines have acquired JAR-145 approval e.g. Emirates, Air India, Qatar, Uzbekistan, Malaysia, Singapore, Royal Jordanian etc.

**JAR-145 REQUIREMENTS AT A GLANCE**

The requirements contain 2 sections:

- Section – 1 Applicable regulations
- Section – 2 AMC and IEM.

AMC is Acceptable Means of Compliance, illustrates a means, or several alternative means, but not necessarily the only possible means by which a requirement can be met. IEM is Interpretative / Explanatory Material, helps to illustrate the meaning of a requirement.

Following is the contents of requirements:

- General and Presentation
- JAR-145.1 General
- JAR-145.3 Affectivity
- JAR-145.5 Definitions
- JAR-145.10 Applicability
- JAR-145.15 Application of Issue
- JAR-145.20 Extent of Approval
- JAR-145.25 Facility Requirements
- JAR-145.30 Personnel Requirements
- JAR-145.35 Certifying Staff
- JAR-145.40 Equipment, Tools and Material
- JAR-145.45 Maintenance Data
- JAR-145.50 Certification of Maintenance
- JAR-145.55 Maintenance Records
- JAR-145.60 Reporting of Un-airworthy Conditions
- JAR-145.65 Maintenance Procedures and Quality System
- JAR-145.70 Maintenance Organization Exposition
- JAR-145.75 Privileges of the Approved Maintenance Organization
- JAR-145.80 Limitations on the Approved Maintenance Organization
- JAR-145.85 Changes to the Approved Maintenance Organization
- JAR-145.90 Continued Validity of Approval
- JAR-145.95 Equivalent Safety Case
- JAR-145.100 Revocation, Suspension, Limitation or Refusal to Renew the JAR-145 Approval Certificates.

Requirements from JAR-145.25 to JAR-145.70 are auditable requirements, against the procedures elaborated in Maintenance Organization Exposition (MOE).
JAR-145 concerns maintenance of aircraft and/or aircraft components.

- Main characteristics of JAR-145 are
  - Approved management,
  - Approved maintenance schedule,
  - Approved maintenance procedures, and
  - Adequate facilities.

- Competence of personnel involved in maintenance and in quality audits must be established and controlled. Details of maintenance work and audit findings and follow up corrective actions must be recorded.

**COMPARISON BETWEEN JAR-145 AND ISO-9001**

<table>
<thead>
<tr>
<th>JAR-145</th>
<th>ISO 9001 – 2000</th>
</tr>
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<tbody>
<tr>
<td>1) JAR-145 is set of requirements for Approval to be granted by European Authorities to only Commercial Aircraft Maintenance Organization, located in their member countries, and if the organization is located outside EC, need for JAR approval has to be justified.</td>
<td>1) An international standard based on 8 Quality management principles, specifies requirements for a Quality Management System to be complied, for any organization, for its customer satisfaction.</td>
</tr>
<tr>
<td>2) Purpose of JAR-145 is to allow an organization to perform maintenance of aircraft to a specified scope of work according to JAA approved procedures. (Not necessarily an indicator of level of Quality)</td>
<td>2) Purpose of ISO is to demonstrate that organization has reached to a certain level of Quality Management. (An indicator of level of Quality)</td>
</tr>
<tr>
<td>3) JAR-145 restrict the approved organization to ONLY carry out approved / allowed activity within approved scope of work.</td>
<td>3) ISO never restrict you to perform any operation in your business scope.</td>
</tr>
<tr>
<td>4) JAR-145 does not call for establishing a certain specific QMS for compliance. It states only requirements to be complied.</td>
<td>4) ISO describes the specific QMS to be established and complied with in detail.</td>
</tr>
<tr>
<td>5) JAR-145 is stringent in requirements and means of their compliances. Moreover, it is industry specific.</td>
<td>5) ISO is relatively liberal in requirements and not industry specific.</td>
</tr>
<tr>
<td>6) JAR-145 Approval audit is conducted only by JAA’s nominated auditors.</td>
<td>6) ISO Certification audits may be carried out by any ISO Certification agency.</td>
</tr>
<tr>
<td>Continued…</td>
<td>ISO 9001 – 2000</td>
</tr>
<tr>
<td>7) JAR-145 Requirements are revised and updates issued even twice a year and not after a specified period, compliance to latest updates in almost immediate.</td>
<td>7) ISO-9001 Standard updates are issued after a specified period of every 5 years and for conversion from an older version to the latest, a very comfortable grace period is allowed.</td>
</tr>
</tbody>
</table>
8) JAR-145 Maintenance Organization Exposition (MOE), which is its Quality Manual has to fulfill very specific and stringent requirements and it is to be approved by JAA nominated Authorities.

For the long-term goal of Quality improvement, the standards such as JAR-145 are going to be the aviation standards of the future. Unlike ISO 9000 or MBNQA, JAR-145 is an industry specific standard, its scope is narrow and it applies only to organization engaged in the maintenance of commercial aircraft or its components.

INTRODUCTION OF PIA ENGINEERING

The history of PIA goes back to inception of Orient Airways in British India and after the formation of Pakistan, shifting from Calcutta to Karachi. The size of the fleet increased from 2 to 11 DC-3 aircraft.

On 11th March 1954, Pakistan International Airlines Corporation was formed and Orient Airways was merged into it and 3 Convair 240 and later Lockheed L1049 Super Constellation aircraft were added.

The Engineering base at Karachi took shape and the first Wright Cyclone engine of the Super Constellation aircraft was overhauled in PIA’s own workshop.

Starting its jet aircraft operation by a leased Boeing 707 aircraft in 1960, in coming years PIA acquired variety of aircraft, such as turboprops Viscounts, Fokker F-27, De Havilland Trident, DC-10, Airbus A-310, Boeing 737, Boeing 747-200, Boeing 747-300 and now Boeing 777 aircraft.

At present PIA’s fleet composition is as follows:

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>No. of Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twin Otter DHC-6</td>
<td>02</td>
</tr>
<tr>
<td>Fokker F-27</td>
<td>11</td>
</tr>
<tr>
<td>Airbus A300B4</td>
<td>08</td>
</tr>
<tr>
<td>Airbus A310-300</td>
<td>06</td>
</tr>
<tr>
<td>Boeing 737-300</td>
<td>07</td>
</tr>
<tr>
<td>Boeing 747-200</td>
<td>04</td>
</tr>
<tr>
<td>Boeing 747-300</td>
<td>05 (6th expected in Nov. 2002)</td>
</tr>
<tr>
<td>Boeing 777-200ER</td>
<td>03 (Expected in Feb. 2004)</td>
</tr>
</tbody>
</table>

ORGANIZATIONAL STRUCTURE

PIA Engineering is a leading provider of maintenance services to commercial aircraft, offering maintenance, overhaul, repair, replacement, modification, testing and inspection of aircraft and/or its components. PIA Engineering with strength of around 5000 employees is a fairly large organization.

PIA Engineering is an organization with a hybrid design, incorporating the tall (vertical) and functional structures, as evident from the Organization chart, shown below. The Organization is functioning with almost 5000 permanent and contractual employees, headed by a Director,
8 Chief Engineers / General Managers and 75 Managers. Decision making in the organization is more controlled and fairly centralized.

The organization had been provided the logistics support by the Stores & Purchases Department, being a separate organization. Similarly, the Finance Department of the airline was handling financial aspects without proper collaboration with the management of the Engineering organization.

In the recent organization restructuring, the logistics function was integrated with other engineering functions and the senior management of the Engineering organization has been authorized for the financial approvals.
BUSINESS FUNCTIONS

1. **Line Maintenance Services:**
   Line Maintenance Services performed maintenance in two sub sections
   In Line Maintenance – 1, all Boeing aircraft.
   In Line Maintenance – 2, all Airbus, Fokker F-27 and Twin Otter aircraft.
   Its services include pre-flight inspection before every departure, post flight checks after arrival of every flight. Transit checks, Turn-around, Lay over, Daily and Weekly checks after specified flying hours, up to the level of check - 'A'.

2. **Major Base Checks of Aircraft:**
   The Base Maintenance of PIA Engineering is equipped with the basic infrastructure for heavy maintenance of all of its aircraft, such as FA-Checks, Check-C, Check-D, Aircraft extensive and specialized structure inspections / repairs and modifications recommended by the manufacturer from time to time.

3. **Overhauling of Aircraft Components:**
   Overhaul shops of PIA Engineering play a key role in economizing maintenance cost through in-house repair, overhaul and modification of aircraft components. The set up consists of Avionics Overhaul Complex of Electrical, Instruments and Radio Equipments Overhaul facilities as well Components / Accessories and Hydraulic / Landing Gear Shops.

4. **Repair / Refurbishment of Heavy Machinery Parts:**
   In the facility of Power plant Overhaul Shop, repair and refurbishment of heavy-machinery parts for local industry and outside parties such as PAF and Pakistan Navy. The repairs available are of very sophisticated nature and are beyond the economical viability of the local market.

QUALITY FUNCTIONS

1. **Inspection:**
   Inspection, an appraisal activity in general, is carried out in heavy maintenance areas.

2. **Metrology:**
   The calibration of both mechanical and electronic test equipment is being carried out, in house, by the Standard Laboratories as per standards equivalent to national standards.

3. **Fleet Performance Monitoring and Reliability:**
   A well-organized monitoring system exists in the organization to gauge the entire fleet performance. Comprehensive reports are generated for engines trend analysis, components performance and reliability on monthly basis.

4. **Procurement Quality:**
   The Logistics Division is being provided Quality Control Inspectors to ensure the serviceability and completeness of the incoming material.
5. **Quality Control:**
Prime function of Quality Control is performance monitoring through Delay item investigations, premature failure investigation, Reliability report review, product audits and holding Type certification examinations for certifying staff.

6. **Product Audits:**
Audits of aircraft and aircraft components are performed focusing inspection of compliance of procedures and precautions as per manufacturer’s manuals and checking qualification and work performance of staff involved in the certification process. All maintenance documentation used and completed during major checks of aircraft is also audited.

**WHY PIA ENGINEERING NEEDS JAR-145 APPROVAL**

In the past, PIA Engineering had been holding Quality approvals of two major and internationally accredited organizations i.e.

- The Approved repair station by FAA (USA), and
- The Approval of Civil Aviation Authority (UK)

These were in addition to the approval granted by local regulatory body i.e. Civil Aviation Authority, Pakistan.

1. In early 90’s, FAA did not renew PIA’s Approval Certificate, on the reasons that PIA Engineering is not maintaining any US registered aircraft / equipment, anymore. Finally in Feb 1993, CAA (UK) informed PIA that their all-overseas approvals being revoked, which was due to CAA (UK) being the member of ECAC and JAA.

2. A very strong factor pushing this decision is that, in 1997, it was decided in airlines rotatable spares pool meeting, that any maintenance organization, which is non JAR-145 approved, would not be entitled for rotatable pool arrangements / facilities after Dec.31st 1999.

3. During the deal with Cathy Pacific (CX) Boeing 747-300 aircraft, in 1998, it was badly felt, that the cost of the dry lease of these 5 Jumbos could have been reduced, if PIA Engineering could acquire maintenance task of CX aircraft for major checks C & D at its Karachi Base. Hong Kong regulatory authority was reluctant to grant the approval of maintenance of their leased aircraft to PIA Engineering in the absence of JAR or FAA approval.

4. Recently CAA (PAK) has informed PIA Engineering, that they are actively considering adopting the JARs as its regulatory requirements operative under CARs/CAA Regulations. The advantage of adopting JARs is that while it would satisfy the ICAO, it would also be an accepted recognized Standard in Europe, USA and rest of the world. When initiated by CAA (PAK), the adopted of JARs will be implemented over a period of time, in parts.

5. Last, but certainly not the least reason for PIA Engineering to go for JAR-145 approval was, for interaction with the aviation world, need for adopting to some Aviation Quality Approval was increasing day by day. Whereas all the benefits of ISO 9000 or any other industry Quality Standard would be available in JAR-145.
Realization of need of JAR-145 and PIA Engineering decision to go for it can be understood by the following SWOT Analysis.

**SWOT ANALYSIS**

**STRENGTHS:**
- Skilled, experienced and competent workforce.
- Qualified and Knowledgeable Certifying Staff.
- Well-equipped Overhaul Shops.
- Established Base Maintenance set up for major checks.
- An organized Training Center of International repute.

**WEAKNESSES:**
- Insufficient resources for development.
- Non-conducive working atmosphere.
- Integrated Stockrooms.
- Improper work attitude / Organizational culture.

**OPPORTUNITIES:**
- Huge potential business opportunities in the region.
- Availability of established Engineering facilities.
- Goodwill of PIA’s expertise in Engineering Sector.
- Conducive regulatory requirements.

**THREATS:**
- Un-stable political conditions of the region.
- Country’s poor economy.
- Open sky aviation policy.
- Unpredictability in commitment due to frequent top management changes by Government.

**JAR-145 PROJECT & PROGRESS**

**INITIAL JAR-145 PROJECT PLAN (FIRST PHASE)**

1. **Appointment of Project Team and Project Manager:**
   The Project was formally launched in October 1998, when Director Engineering, formed a ‘Project Working Team’, from entire Engineering.
   The project team has started working on the assigned task.

2. **Appointment of Consultants:**
   Inviting Airbus industry’s experts to perform assessment of PIA Engineering, in view of JAR-145 requirements.
   In coordination with Airbus, developing Quality Manual, named as ‘Maintenance Organization Exposition’ (MOE).

3. **Defining Scope of Work for the Project:**
   In March 1999, Working Team was successful in identifying the major issues, problems and pre-requisites to fulfil JAR-145.
4. **Concept of Accountable Manager:**
   In JAR-145 Approved Maintenance Organizations, a new concept of Accountable Manager, has been introduced who has the corporate authority for ensuring that all the maintenance required by the aircraft operator can be financed and carried out to the standards required by the authority.

5. **Developing Maintenance Organization Exposition Manual (MOE):**
   Purpose of MOE is to set forth procedures, means and methods of Organization. Compliance with its contents is pre-requisite and audited by JAA to issue JAR-145 Approval.
   
   (i) Management: Which includes duties & responsibilities of Management Personnel, Organization Charts, Manpower resources, details of facilities, premises and certifying staff listing
   
   (ii) Maintenance Procedure: Policy outlined in MOE for all 24 maintenance procedures, detailing them in AMP (Associated Maintenance Procedures). Addition seven mandatory Line Maintenance Procedures are outlined in section L 2 of the MOE.
   
   (iii) Quality Systems Procedures: Which includes procedures defining product and system audits, Qualification of auditors, Quality inspectors and mechanics, training and authorization system of Certifying Staff etc.
   
   (iv) Contracted JAR-OPS Operator: Containing operator’s procedures and operator record completion.
   
   (v) General – Appendices:

6. **Procedural Changes related to approval of suppliers / subcontractors / Vendors:**
   Chief Engineer (Planning & Parts Control) has been assigned to finalize the approved list of suppliers and vendors to submit it for the approval of Chief Engineer (Quality Control).

7. **Major improvement in Technical Stores area** with regards to storage, handling and environmental considerations

8. **Improvement in work area and office accommodation** of Certifying Staff and operatives, to make it conducive to carry out designated task in a manner that contributes to good quality and better aircraft maintenance standards.

9. **Organizational change in Quality Control division** whereby Chief of Quality Systems is to report to the Accountable Manager rather than Production Head.

10. **Set up of continuation training** for Certifying Staff and recurrent training for all level of staff, as per JAR-145 requirements.

11. **Introduction of internal Quality audit** based on JAR-145. In January 2000, Chief Engineer (Quality Control) nominated a group of eight part-time auditors.

12. **Initial assessment of Engineering facilities and Gap analysis:**
    Internal Quality Auditors, conducted informal internal Quality audits of the whole engineering area, and their reports were generated for the Gap analysis. Based on those reports, Civil, Electrical, Air-conditioning Work, Mechanical repair and automation needs were identified by area heads / manager works, for the improvement
of housekeeping, face uplift, environmental and dust control, to comply with JAR-145 requirements.

13. **Infrastructure Improvement Process**: Budgetary proposals amounting a Capital Sanction of Rs.55 millions was approved, by Chairman PIAC, in October 2000. The funds were required mainly for the following:

- Civil works related to improvements in general conditions of aircraft hangars, Overhaul shops, Technical stores / stockrooms and Engineering offices,
- Electrical works, such as earthing of hangars and provisioning of standby power etc.
- Provisioning of adequate furniture in engineering offices etc.
- Air-conditioning of Technical Stores / Stockrooms, Shops and Offices.
- Provisioning of LAN and other automation equipment in Engineering.

14. **JAR-145 Familiarization training**: Introductory training to familiarize with JAR-145 requirements was imparted in PIA Training Center, for Managers, Engineers, technicians, and Technical Stores personnel. Approximately 750 persons attended the course up to October 2001.

**CURRENT JAR-145 PROJECT PLAN (SECOND PHASE)**

JAR-145 Project had been mainly decelerated due to:

- Poor financial condition of the airline during 2000 to 2001.
- Frequent changes in top management resulted lack of its commitment to the project.

However, with Airline and Engineering new top management, the whole project has been rejuvenated and its commitment to Quality has resulted a boost in the spirits of the new Project working team and new Project Manager.

None of above-mentioned 14 tasks were completed to there fullest at the time when the new project working team took over in October 2001.

- Since October 2001, under the leadership of new Director Engineering, JAR-145 Project team reviewed the project progress so far and evolved a new strategy for Second Phase, to yield the results in a more efficient manner.

**NEW PROJECT STRATEGY**

1. **Defining & implementing new organization structure**: Director Engineering must be declared as the “Accountable Manager” for the JAR-145 approved maintenance organization, having the corporate authority / independence for ensuring that all resources and facilities are financed to carry out all the maintenance required by aircraft operator as per JAR-145 standards.

2. **Liaison with consultants**: Close liaison with the project consultant M/s Airbus and the JAA authorities established for better understanding of requirements and justification of need to issue JAR-145 approval to PIA could be ascertained.
3. **Developing / finalizing Quality manuals:**
   Re-writing of MOE & AMP in the light of newly issued Amendments 3 & 4 of the JAR-145 requirements, after getting adequate professional training for technical / Quality procedure writing.

4. **Developing Quality Policy & Objective:**
   The Quality Policy and the Quality Objectives of PIA Engineering be developed, approved, declared, displayed and thus established.

5. **Re-establishing Project Coordination Team:**
   A dedicated working team to be formulated for coordination of various project assignments and activities.

6. **Campaign for Understanding of Requirements:**
   Basic understanding of JAR requirements and the advantages and real need for JAR-145 approval must be awakened among all levels of management, specifically at the senior level.

7. **Monitoring by middle management:**
   Senior and middle management heads must communicate and monitor, regularly and proactively, the implementation process, in their respective area.

8. **Quality Awareness Program:**
   Development of JAR awareness program to be implemented on campaign basis through various means and artefacts, for the management till the lowest level of work force. The aim of this program is to introduce various Quality slogans and concepts, which may be helpful generating motivation in all level of employees.

9. **Understanding & Changing organization culture:**
   Planning and implementation of various Quality Tools to initiate a change in organizational culture leading towards a Quality-conscious working environment.

10. **Further Improvement of Technical Stores:**
    Instead of number of integrated Technical Stores / Stockrooms, developing few segregated Stores / Stockrooms, like centralized Chemical Store, Rubber Store.

11. **Independent & Dedicated Internal Auditors:**
    A section for JAR-145 project having dedicated and full time project coordinators cum internal Quality Auditors to be established. They should be trained for audit skills to professional level and responsible to facilitate and coordinate in various activities of project implementation.

12. **Audits: Corrective Action Cycles**
    To gauge and analyze gap, in all eight divisions of PIA Engineering, internal auditors shall execute a program of preliminary audits. Based on their reports, Corrective / Preventive actions should be implemented with target dates. In this way the organization culture will conform to this basic principle, “Write, whatever you are doing & Do, whatever is written”.

13. **Resources for infrastructure improvements:**
    An exclusive amount must be sanctioned, for the improvement of the work areas in respect of civil work and facilities development.
14. **Other Documentation:**

Developing work instructions and procedures for floor level workers in the light of MOE / AMP / EMPM. Also a controlled list of identified tags and forms, used in various sections of Engineering Organization shall be developed.

15. **Continuous Management Reviews:**

Continuous review by the top management through project coordination meetings, JAR internal audits statistical analysis presentations and audit reports.

16. **Preparation for the certification audit**

A detailed stepwise target action plan has been developed for the pre-certification and JAA Certification audit, in consultation with the consultant. Accordingly formal application on JAA Form-2 has been submitted to French authorities, who will conduct PIA Engineering audit for JAA, to issue JAR-145 Approval.

**PROJECT PROGRESS SO FAR & PRESENT SCENARIO**

- With the help of the effective strategic planning, PIA Engineering has achieved a satisfactory progress towards the target of getting prepared fully for the final phase of Certification audit, or at least a Pre-certification audit by the consultants.
- Our Quality Manual “MOE / AMP” has been revised totally for its second edition to comply with additional / changed requirements of JAR, as advised by our consultants.
- Process of internal audits has been established successfully, which is resulting two major advantages, first areas needing improvements for compliance to JAR-145 are highlighted and due attention is being focused, secondly, change in organization culture towards Quality mindedness has been accelerated.
- After consuming Rs.55 million, for improvements in various areas of PIA Engineering, need is generated to sanction more funds to be spent on further improvements, pointed out as a result of internal audits.
- Emphasis on Training needs, Documentation, Procedure adherence, and awareness to new Quality concepts has been increased tremendously, as a result of the new project strategy.
- PIA Engineering has started exploring new horizons in its work areas, such as establishing central control of human resources planning and training, man-hour planning, production planning, during major checks in base maintenance, automation in planning section, Engine overhaul section and Quality audit section.
- As a result of JAR-145 Project, PIA Engineering is enhancing itself from Quality Control to Quality Assurance, also.
- Now it can be stated with sufficient confidence that after going through one more cycle of internal audits to major divisions, and completion of corrective / preventive actions, PIA Engineering will be prepared and fully ready to face JAA audit, as planned mutually with our consultants for early next year.

**CRITICAL ANALYSIS**

**DIFFICULTIES**

1. Although there are variety of reasons for the slow progress of JAR-145 Project in PIA Engineering, but the foremost is the frequent changes in the upper management of the organization, which has resulted in hampering top management’s involvement and commitment to the project.
Moreover the objective of the project needed to be well defined to upper management. During the initial phase of the project, apparently the perceived objective by the management was merely acquiring the approval certificate from JAA, rather than the long-term quality enhancement and system improvement.

2. Initially, there was no awareness amongst most of the management functions about their role in JAR-145. A number of senior management functions refused to accept the requirements under JAR-145. For some, it was resistance against change, while for others; it was a resistance against accountability. Still there are people in upper echelon of the organization, who believe that JAR-145 approval will be granted easily, when PIA will purchase new European aircraft. This approach is similar to the approach of many companies in the country, whose interest in getting ISO 9000 certification is merely for image enhancing and market compulsion, not the quality improvement.

3. Fulfilment of JAR requirements implied practical implementation of MOE, which was not accomplished in true spirits, due to following reasons:
   i) Lack of participation by the management in the implementation processes, especially during the phase of development of documents and procedures. Giving low priority to JAR as compared to their other responsibilities was the reason.
   ii) Lack of training and awareness of personnel and management of the Engineering organization, regarding requirements of JAR-145.
   iii) The Engineering management was totally occupied in meeting day-to-day flight schedule targets, due to ageing fleet, scarcity of spares and manpower problems. Thus consuming its total time, efforts and engines, and was unable to give due attention to matters of quality enhancement, like JAR-145 Project.
   iv) Raising non-compliance reports, during internal quality audits, were usually taken as a personal complaint against the auditee. This occasionally resulted in offensiveness, making the corrective / preventive action quite difficult.
   v) Implementation of MOE Procedures also calling for more resources, facilities and funds for their provisioning, and PIA, like the whole country passing through a bad patch of poor economic conditions.

4. During the initial phase of the project, the project working team was assigned the task alongwith their already existing assignment and not being trained to the level so that they could plan the project more professionally. Neither internal auditors, duly trained, had been assigned dedicatedly the task of assessing the gap between the existing system and the JAR-145 requirements, such as facilities requirement, personnel shortfall, adherence to maintenance procedures and restructuring of Quality systems requirements.

5. JAR-145 is essentially a Quality Management concept and quality is everybody’s responsibility. Therefore, appropriately trained personnel are the key for effective fulfilment of the JAR requirements. Adequate familiarization / training about JAR-145 requirements translated into organisation procedures (MOE / AMP) must be imparted to concerned staff of various divisions / sections of the organisation.

Implementation of JAR requirements / MOE procedures call for a fundamental change in organisation culture. Instead of following the norms, everybody has to start referring to procedures and it should be made a habit. A positive attitude towards how they perform work and commitment for continual Quality improvement are the key factor for PIA Engineering to obtain JAR-145 approval.
The challenge of change in the organizational culture in case of PIA Engineering, becomes more difficult, due to the fact that though it is one of the huge independent Corporations of the country, but still governed by the Ministry of Defence in a typical manner like other Government departments.

The size of PIA Engineering, with nearly 5000 permanent and contractual employees and enormous scope as well as area of work activities, it is performing, making it as one of the biggest Aviation Engineering & Maintenance facilities of the region. So in a semi-government organisation, which is as huge as PIA Engineering is, changing organisation culture needs some time and strong commitment to Quality by all levels of management.

6. It is worth to mention that most of difficulties, mentioned above, were caused due to the company’s administrative / financial policies and procedures, scarcity of funds for provisioning of facilities, organisation culture, ignorance and lack of knowledge about JAR-145 and vested interests. However, they were overcome with consistency in hard work, effective planning, tactics and training / counselling.

LESSONS LEARNT

Summarizing the above, we have learnt many lessons, during our ongoing Quality journey, for acquiring JAR-145 approval, few are worth mentioning here:

(i) The pace of the project will be directly proportional to the involvement and commitment of the Top /management.
(ii) Select and assign the project to a mature, competent, committed and aggressive QA team.
(iii) Company’s Quality Policy and objectives must be realistic and achievable. Senior management’s functions involvement prior to finalization is essential, if they are to be established and achieved.
(iv) Arrange various trainings such as training for auditors, procedures training, requirements training, with the consultant, so that the project team, auditors, management personnel all are at the same frequency and mindset as of consultant.
(v) Include all employees in the initial training, orientation, specially the senior management. Training is formal, but counselling is personal, and it works.
(vi) Keep the Quality document hierarchy logical and simple. Consciously avoid over-documentation and unnecessary paperwork. In addition to usual official correspondence, keep personal contact / telephonic liaison and it expedites responses.
(vii) Keeping the duration and number of review meetings short, will protect the participants from boredom and annoyance. It will help sustaining the interest and commitment with the Quality.
(viii) Be vigilant during internal audits, slight unprofessional handling of the auditee and minor lapse on the part of the auditor may hamper the very basic purpose of the audit i.e., compliance through improvement.
(ix) The corrective and preventive action cycles are difficult to establish. Be persistent and tolerant, a little more personal attention and counselling of the auditee will bring miraculous improvements.
(x) Analyze the organisation culture, and keep it in perspective while forming a strategy.
(xi) Being consistent and persistent is a must; a slight lapse means a fresh start.
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AUTHOR’S SYNOPSIS

Zafar Ahmad Khan is a graduate in Electrical Engineering, from N.E.D. Engineering College, University of Karachi. Serving Pakistan International Airlines since last 27 years, in various positions, in Commercial aircraft engineering and maintenance. He is qualified and licensed from Civil Aviation Authority (Pakistan), in Avionics Systems, to carryout maintenance for a number of Airbus and Boeing aircraft. He has been working at Karachi, Lahore and New York, on various assignments of aircraft maintenance and Quality departments of the airline. Presently he is serving PIA as Manager Engineering JAR-145 Project / Quality Audit establishing Quality Assurance setup.

A certified Quality Professional from Pakistan Institute of Quality Control, he is also a Qualified Auditor / Lead Assessor from British Standard Institute and supervising internal audit function at PIA Engineering.

He is a life member of Royal Aeronautical Society of Pakistan (MRAeS), member of the Institute of Engineers, Pakistan (MIE) and member of Institutions of Electrical and Electronics Engineers, Pakistan (MIEEP).