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## Technical Methodology for the Implementation of the ISO 9001: 2015 Norm in the Armored Vehicle Maintenance Center of the Galápagos Armored Brigade of Riobamba-Ecuador

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### Abstract

The objective of this document is the development of a technical methodology for the implementation of ISO 9001-2015 in the Armored Vehicle Maintenance Center "CEMAB" of the city of Riobamba, focused on satisfying the current needs of the Armed Forces of Ecuador, taking into consideration that the application of the requirements based on the proposed rule helps to reduce problems in administrative procedures and maintenance, which results in a standardized and efficient working method within the service area that is institution offers; With the application of this system, the current internal structure of the organization is improved, through standardization, process control and continuous improvement based on the best practices, policies, objectives, procedures, instructions, formats and applicable records, important factors in the coordination of quality management.

### Article Info

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Document, Methodology, Processes, Service, Quality Management, ISO 9001 - 2015.

### Introduction

The continuous improvement is a fundamental entity in quality management, which invites public and private organizations to timely update in this system, where the high competitiveness of the markets has required many of them to change their strategies to adapt To the new tendencies that implies a development in the way to carry out its production and service processes, precisely with the need to satisfy the requirements of the clients, this

has caused the organizations to generate new models of management systems that allow address the demands of quality improvement.

The ISO standards are a contribution to the world in which we live, since they provide solutions and benefits for almost all economic sectors, generating a practical guide that allows the fulfillment of fundamental requirements that are required in the implementation of a Quality Management System for an optimal use of the

resources that are assigned to it, thus achieving that the industry remains in efficient and competitive conditions. The ISO 9001-2015 standards are applied in this activity, through the execution of the different requirements that this regulation indicates for the implementation of a Quality Management System in the organization, where the different work procedures necessary for the maintenance are established of armored vehicles, as well as their respective registration documents, in order to monitor, measure, analyze and evaluate the tasks performed.

The Armored Vehicle Maintenance Center "CEMAB", is a military unit belonging to the Armored Cavalry Brigade 11 "Galápagos" located in the city of Riobamba, which specializes in carrying out maintenance work for armored vehicles owned by the army Ecuadorian, this unit has a qualified technical staff that has several years of experience in different areas of mechanical, industrial and electrical engineering, whose primary function has always been to maintain an optimum standard of functionality for the entire vehicle fleet, through the execution of the maintenance, preventive, predictive and corrective, for its correct use in emerging situations; such as conflicts, medical emergencies, routine patrolling tasks among others, carried out by the staff of the institution,

The needs and requirements of this organization have allowed to work a quality manual that covers these requirements in the area of vehicular maintenance, which consists of workshops, spare parts warehouse, tool warehouses, spare parts purchases, reception and delivery area and area of QA.

This methodology is based on the main principles of quality management as shown in graph No. 1.

### **Diagnosis of the current situation of the organization**

The organization has developed a notable growth in its work activities since 2009, since it has been assigned a series of projects especially related to the maintenance of armored vehicles owned by the Armed Forces, as well as specializing in work of repowering vehicles that have fulfilled their service life in the institution.

At present the Armored Vehicle Maintenance Center "CEMAB" is considered an elite unit of the Ecuadorian Army, because this institution has entered a stage of modernization and repowering of its combat equipment, ordered by the Ministry of Defense National, since they must meet certain minimum technical characteristics of

functionality to be taken into account within the security plans and protection of national sovereignty.

The "CEMAB" is immersed in maintenance service activities for several years and so far does not have a Quality Management System that suits your needs, due to the progressive growth in the time it has been offering its services to the institution, has caused this military unit to lose the proper follow-up of the maintenance of the mentioned vehicles, as well as the execution of various projects in which it is linked, that is why in this chapter we will determine the initial guidelines for the development of a QMS.

### **Location**

The location of the Armored Vehicle Maintenance Center "CEMAB" corresponds to the province of Chimborazo, in the canton Riobamba, this organization is forming part of the Armored Cavalry Brigade 11 Galápagos, located in the city of Riobamba, Av. De los Héroes de Tapi (Fig. 1).

### **Theoretical foundations**

#### **Definition of ISO**

The International Organization for Standardization, ISO for its acronym in English (International Organization for Standardization), is a global federation that brings together representatives of each of the national standardization bodies, and which aims to develop international standards that facilitate trade international. (ISO 9001, 2015)

#### **ISO 9001-2015 standards**

The ISO 9001 standard is a working method to improve the quality and satisfaction required by the consumer. The current version is from 2015, which has been adopted as a model to follow to obtain quality certification. The regulation improves the organizational aspects of a company, which is a social group formed by individuals that interact with each other, so that a bad organization, would generate a deficient product, which does not follow the specifications of the management.

### **Materials and Methods**

For the elaboration of a quality management system within an organization it is essential to follow the methodology described in the international standard ISO

9001-2015, where the following aspects are considered as fundamental requirements:

### **Requirements of the ISO 9001-2015 Standard**

- Alcance
- Normative references
- Terms and definitions
- Context of the organization
- Liderazgo
- Planificación
- Soporte
- Operaciones
- Performance evaluation
- Mejora (ISO 9001: 2015)

### **The organization to be able to undertake this work must:**

- Determine the processes required for the quality management system and its application through the organization.
- Determine the sequence and interaction of these processes.
- Determine the criteria and methods necessary to ensure that both the operation and control of these processes are effective,
- Ensure the availability of resources and information necessary to support the operation and monitoring of these processes,
- Carry out the monitoring, the measurement when applicable and the analysis of these processes.
- Implement the necessary actions to achieve the planned results and the continuous improvement of these processes.

The fulfillment of these requirements by the organization, will allow you to manage your procedures according to an International Regulation which, not only guarantees the efficiency in the processes described above but also includes those necessary for the management activities, the provision of resources, the realization of a service, the measurement, the analysis and the continuous improvement.

### **Phases of the technical project**

The development of the study includes the following phases that are described below:

### **Analysis of the current documentation**

The current situation of the documentation of the organization is determined, in order to compare what exists with the requirements of the quality management system ISO 9001-2015 that are necessary to comply, this work was carried out through the collaboration of the senior management and the heads of the different areas, with the review of its content and the scope of these documents, it was possible to clearly determine the current situation of the organization.

### **Identification of processes**

Basic observation tasks will be performed to identify and determine the sequence and interaction of the processes that are executed within the organization to carry out their maintenance tasks of the armored vehicles, this is developed through the support of the personnel in charge of carrying out each of these identified procedures.

### **Survey of documentation**

The existing documentation was elaborated, analyzed and organized, which allowed to identify the types of documents required by the organization; such as the Manual of Quality and Procedures to guarantee that the processes are carried out under controlled conditions, fulfilling the requirements of the client (Armed Forces) and the applicable regulations under the ISO 9001-2015 standard.

In this way, the main focus of this research work is to design a technical methodology to implement the ISO 9001-2015 standard, in the Armored Vehicle Maintenance Center "CEMAB", in the city of Riobamba; documentation used by the organization to provide armored vehicle maintenance services with short response times and the best quality, ensuring customer satisfaction.

### **Technical procedure**

1. **Reception of the unit.** -In this initial stage, a qualified operator performs the reception of the units for maintenance, the work order lists the customer's requirements, and is sent to the corresponding mechanic.
2. **Execution of the order.** - The mechanic executes the activities according to the work order, prior to a quality inspection of the unit.

3. **Diagnosis.** - In the diagnostic stage the spare parts and parts to be replaced are determined.
4. **Request for spare parts.** - The mechanic fills out a request for spare parts and accessories to be required for maintenance, and enters the warehouse.
5. **Delivery of spare parts and accessories.** - The warehouse manager makes the delivery of the requested if available in stock, otherwise the order is made accordingly.
6. **Quality audit.** - After performing the respective maintenance, a qualified technician conducts a quality audit of the unit, where two results are determined.
7. **Unit OK.** - If the maintenance has been carried out correctly, the unit is prepared and placed for the respective delivery.
8. **NOK unit.** - If the maintenance has not been carried out correctly or if there is any nonconformity, the anomaly is recorded on the worksheet and the responsible mechanic is returned for correction, then point 6 is repeated.

At the end of maintenance, the worksheet is archived and registered in the digital system for its statistics.

### Use of the quality manual

#### Objective

The aim of the Quality Manual is to demonstrate a generalized vision of the Quality Management System, in addition to publicizing the quality policies and objectives established in the CEMAB Armored Vehicle Maintenance Center, determining the different responsibilities of the personnel in the procedures to follow, for the execution of the maintenance work of armored vehicles, in such a way to obtain quality works and continuous improvement within their process.

#### Scope and responsibility

The scope of this quality manual will be applied exclusively to the maintenance service activities of the armored vehicles, which are executed by CEMAB, and the effective application of this system will be the responsibility of the head of planning and quality control.

#### References

Reference is made for the preparation of this quality manual, mainly to the International Standard ISO 9001-2015 Quality Management Systems - Fundamentals and Vocabulary

### Terms and definitions

In addition to the definitions of ISO 9001-2015, the following clarifications are applicable:

- **Organización.** In the context of this guide and the standards of the ISO 9000 family, it should be understood as a construction company.
- **Interest groups:** Person or organization that may affect, be affected or perceive themselves affected by a decision or activity.
- **Requisito:** Necessity or expectation established, mandatory or implicit generally.
- **Management system:** Set of interrelated elements of an organization, which interact to establish policies, objectives and processes to achieve those objectives.
- **Top management:** Person or group of people who direct and control an organization at the highest level.
- **Eficacia:** Degree to which the planned activities are carried out and the planned results are achieved.
- **Política:** Intentions and direction of an organization, as formally expressed by senior management.
- **Competencia:** Ability to apply the knowledge and skills to achieve the expected results.
- **Documented information:** Information required to be controlled and maintained by an organization and the medium in which it is contained.
- **Proceso:** Set of mutually related or interacting activities, which transform input elements into results.
- **Externalizar:** Make an arrangement where an external organization performs part of the function of an organization or process.
- **Monitoreo:** Determine the state of a system, a process or an activity.
- **Auditoria:** systematic, independent and documented process to obtain evidence of a process and evaluate them objectively, in order to determine the degree to which the established criteria are met
- **Compliance:** Compliance with a requirement.
- **Inconformidad:** Non-compliance with a requirement.
- **Mejora continues:** Recurring activity to improve performance.
- **Corrective actions:** action to eliminate the cause of a nonconformity and to prevent recurrence.

The Armored Maintenance Center, has the necessary material resources and human talent, which are dedicated to provide efficient maintenance support specialized I, II, III and IV level of armored; in this organization the processes have been identified and their respective

interactions, for the development of the Quality Management System, as can be seen in Table 1, which will allow us to identify the processes that have the

greatest influence on the quality of the maintenance performed (Table 2 and 3).

**Table.1** Maintenance areas

<b>TO</b>	<b>Maintenance of I, II, III and IV chassis step</b>
	Preventive and corrective maintenance of armored vehicles
	Repair and maintenance of sets and groups of different systems of the vehicle
	Repair of III and IV step of engines of armored vehicles.
<b>B</b>	<b>Maintenance of I, II, III and IV tower step</b>
	Canyon gymnastication
	Assembly and disassembly of the armored vehicle tower
	Repair and maintenance of the electric pump unit
	Repair and maintenance of the hydraulic system of the tower
<b>C</b>	<b>Maintenance of the electrical system of armored vehicles</b>
	Repair and maintenance of the vehicle's electrical system
	Electromechanical maintenance
<b>D</b>	<b>Maintenance of the aiming system (SOPTAC) of vehicles armored</b>
	Maintenance and cleaning of the optical system
	Calibration and adjustment of the aiming system
	Change of silica gel in the laser system filters
	Nitrogen scavenging of the SOPTAC firing system
<b>AND</b>	<b>Industrial workshop works</b>
	Electric solder
	Weld weld
	Plasma
	TIG-MIG welding
	Aluminum solder
	Straightening and painting
	Chapters
	Adaptations and modifications of various systems

Made by: Kleber Carrera, 2017

**Table.2** Strengths, Opportunities, Weaknesses and Threats of CEMAB

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> <li>● Excellent work environment.</li> <li>● Employment stability.</li> <li>● Own Machinery</li> <li>● High degree of Experience in execution of projects.</li> <li>● Suitable machinery for work</li> <li>● Continuous training.</li> </ul>	<ul style="list-style-type: none"> <li>● Lack of records of the work executed.</li> <li>● Lack of a definition of the policy quality</li> <li>● Lack of a quality manual and procedures.</li> <li>● Lack of differentiation departmental.</li> </ul>
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> <li>● Venture into different projects of great importance for the FF. AA</li> <li>● Form supply agreements with new providers international</li> <li>● Acquire new technologies by part of other armies allied to the region.</li> </ul>	<ul style="list-style-type: none"> <li>● Availability from spares specific to the armored material in the international market</li> <li>● Frequent rotation of staff trained (military passes).</li> <li>● Reduction of the annual budget granted by the Government.</li> </ul>

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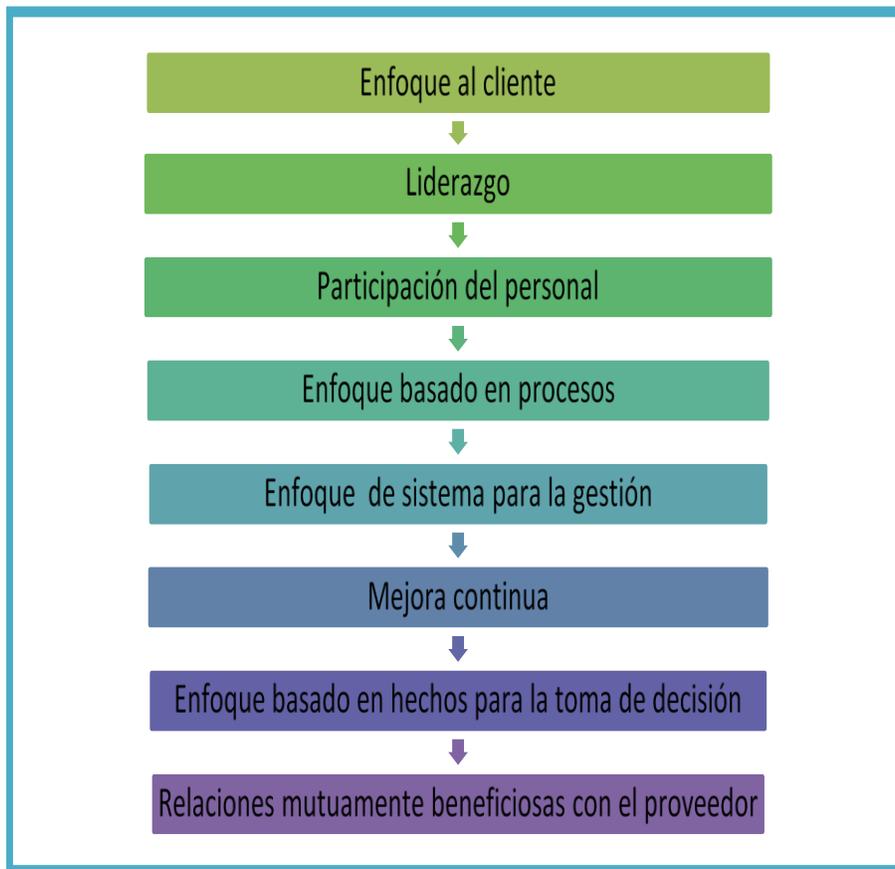
**Table.3** Revisions to the procedures manual conducted by Kleber Carrera (2017)

**Procedures manual**

Revisión	Fecha	Descripción de las modificaciones	Capítulo
00	21/01/2016	Edición Original	-

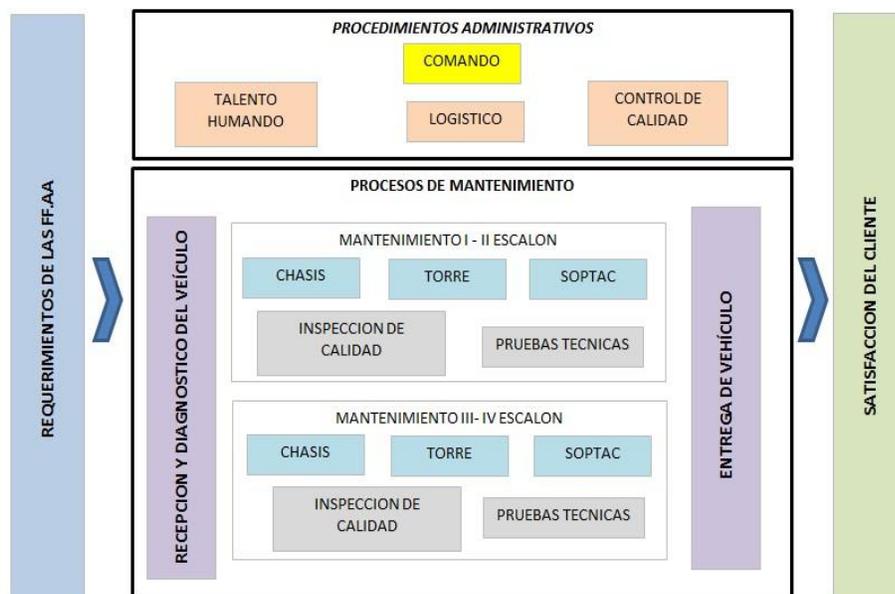
Realizado por: Kleber Carrera, 2017

Graphic No. 1.-Principles of quality management



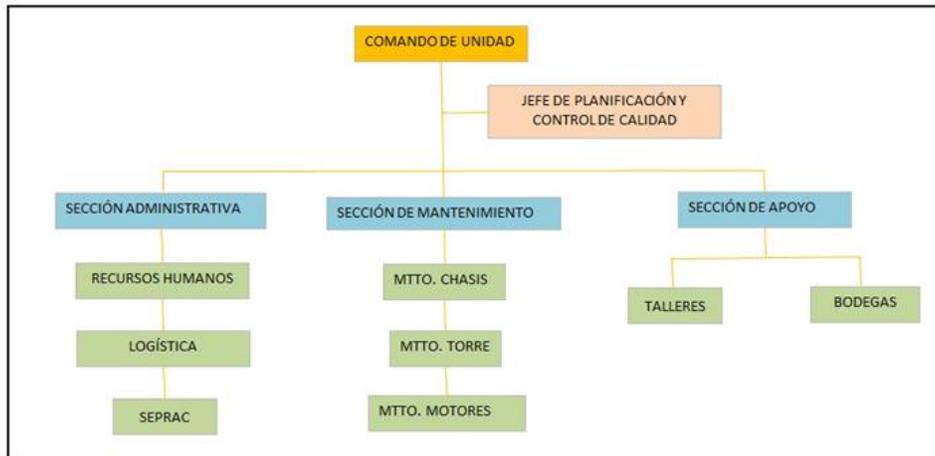
Source: (ISO 9001:2015)

Graphic No. 2 Map of general processes CEMAB Carried out by: Kleber Carrera, 2017



CEMAB Carried out by: Kleber Carrera, 2017

**Graphic No. 3** Structural chart of the "CEMAB



Source: (CEMAB Command, 2015)

**Graphic No. 4** Letterhead document management procedure **Performed by:** Kleber Carrera, 2017

	<b>MANUAL DE PROCEDIMIENTOS</b>	<b>Código:</b> MDP-PA-GD01
		<b>Edición:</b> 01
	<b>Realizado por:</b> Andrés Carrera R.	<b>Fecha:</b> 2016-01-21
		<b>Páginas</b>
<b>GESTIÓN DE DOCUMENTOS</b>		

**Graphic No. 5** Internal Audit Registry

	<b>AUDITORÍAS INTERNAS</b>		
	<i>REGISTROS – MDR –AI –003</i>		
<b>PROGRAMA DE LA AUDITORÍA INTERNA</b>			
Número de auditoría:		Hoja de ruta	
Alcance de la auditoría:		Fecha de ejecución	
Auditor			
<b>Programación de la auditoría</b>			
Di / hora	Actividad	Documentos / registros requeridos	
<b>APROBADO</b>			
Jefe Administrativo	Jefe de Mantenimiento	Comandante de Unidad	
Firma:	Firma:	Firma:	
Fecha:	Fecha:	Fecha:	
Observaciones			

**Made by:** Kleber Carrera, 2017





"CEMAB". Source: <http://www.ubicacuena.com/ubicacae/lugar/p1296894912>

**Figure.2** CEMAB work hangers



**Made by:** Kleber Carrera, 2017

**Figure.3** CEMAB Tool Warehouses



**Made by:** Kleber Carrera, 2017

**Figure.4** Warehouses of Repuestos of the CEMAB



**Made by:** Kleber Carrera, 2017

## **Quality management system**

### **General requirements**

Within the elaboration of the Quality Management System of CEMAB, all the requirements of the international standard ISO 9001-2015 have been established, to be continuously maintained and improved by the organization.

The CEMAB quality manual details the activities and actions carried out. This manual covers the quality control of the procedures carried out, in the maintenance of the armored vehicles, as well as a record of all the administrative procedures, referring to the handling of the necessary documentation for a correct development of the tasks executed within unit.

The Armored Vehicle Maintenance Center has identified the processes and their respective interactions for the development of the Quality Management System, represented in a process map that is displayed in figure 2.

### **Requirements of the documentation**

#### **Generalities**

The documentation required for the System of Quality Management Center

Armored Vehicle Maintenance is made up of:

- Manual, Policy and Quality Objectives.
- Documented procedures
- Technical instructions.
- Records.

The control of this documentation is indicated in the Document Management Procedure and Records Management Procedure.

### **Quality manual**

The quality manual is the written expression of the quality system and aims to

- Properly describe the quality system to guide its implementation.
- Provide evidence to the management of the organization, that a quality system has been developed and implemented.
- Providing evidence to the client or consumer and external auditors that a quality system has been developed and implemented in the organization.

### **Politics**

The policy of CEMAB is to provide all its services with the necessary quality, in order to optimize the operation, maintenance and correct use of all the Armored Vehicles of the Ecuadorian Army, to assist in complying with the quality standards assimilated by the Command of the CEMAB.

This quality policy has the following objectives:

- Carry out maintenance, supply and transport, complying with the standards established by the manufacturers.
- Perform maintenance, supply and transportation at the lowest possible cost.
- Comply with the clauses imposed by ISO 9001-2015.

### **Control of documents**

The documentation of the quality management system is controlled according to the document management procedure. This procedure defines the methodology for:

- Ensure the veracity of the documents issued.
- Check that documents are made under the regulations established before they are issued.
- Ensure the identification of the changes and the current status of the document review.
- Remove obsolete copies from the organization's records and ensure that the required documents are always available.
- Verify the readability and accessibility of documents by authorized personnel
  - Ensure that external documents that are necessary for the planning and operation of the quality management system are correctly identified and that their distribution is controlled.

### **Control of records**

The CEMAB shall keep records of all activities carried out, which provide tangible evidence of the compliance of the operations required by the Quality Management System.

For the execution of this activity, the record management procedure is created, which defines the methodology to perform the control, storage, protection, identification, and management of the same.

### **Roles, responsibilities and audit**

CEMAB is committed to complying with the quality policy described above, through its commander, who is in charge of disseminating it at all levels, through talks or visible means, anywhere in the unit and to all the people who make up the organization.

In addition, the CEMAB commander is responsible for the implementation and maintenance of the Quality Assurance System, for which he must comply with the following activities:

- Maintain the stipulated specifications of the quality system, in accordance with what is stated in the ISO 9001-2015 Standards.
- Initiate actions to avoid the appearance of nonconformities in the service.

- Identify and correct any problem related to the service and Quality System.
- Start, recommend or provide solutions through the established procedures.
- Verify that action plans are put into practice

### **Actions to address risks and opportunities**

The quality system adopted to satisfy the requirements of this standard will be reviewed by the CEMAB Commander, at least once every six months, documenting all the correction or maintenance decisions of the system in order to minimize the risk of an incorrect application of the same, which can generate non-conformities in the maintenance process of the armored vehicles, which would be a very serious act, since it not only puts at risk the physical conditions of the vehicle, but also the integrity of its operators.

The reports of each revision should be filed conveniently by the unit's Maintenance Manager.

### **Infrastructure**

CEMAB has all the necessary infrastructure to carry out its maintenance work; Within the physical equipment that allows you to perform your tasks, you can indicate that it is made up of 2 hangars, one for the maintenance of I-II step and another for the maintenance of III and IV step, each equipped with all the tools and machinery

necessary for the execution of the tasks entrusted, taking into account all safety regulations to avoid exposing unnecessary personnel to risks.

In addition, this organization has two storage warehouses, the first is for exclusive use for tools, supplies and personal protective equipment. The second warehouse, is used to store all kinds of spare parts of armored vehicles, it should be noted that these areas are highly controlled by the internal security personnel of the Brigade and their access is restricted to a select number of people who are authorized to enter and work within these facilities (Fig. 3 and 4).

### **Design and development**

The CEMAB plans in a timely manner, the development of maintenance work in each particular case, for armored vehicles that enter the workshop, determining:

- The phases of the execution of the works corresponding to the maintenance type that is required to be carried out.
- Planning of different stages
- The technical work group responsible for performing the tasks entrusted by the unit command.
- The estimated time of each maintenance job and its cost.

### **Development control**

In accordance with the plan, systematic inspections are carried out of each work executed in armored vehicles, in order to:

- Evaluate the capacity of the unit's personnel to comply with the development requirements of the installed maintenance.
- Identify problems that may arise during the corrective process, from the failures and needs presented by the armored vehicle that has entered the workshop, in order to propose the necessary improvement actions.
- Verify that the results of the maintenance development meet the requirements set at the beginning of the work.

### **Activity control**

The organization is committed to conducting a thorough review of compliance with the necessary quality requirements, so that the maintenance of armored vehicles can perform as reliably as possible, for which your staff of inspectors will verify before the formal delivery of the vehicle, that its operation is in optimal conditions, and that all its systems, motor, chassis, tower and optics can ensure a correct performance in the activities entrusted, providing not only a high level of functionality, but also safety for its crew.

### **Nonconformities of the service**

For the detection and control of non-conformities, the conformity is monitored and measured by work stages.

In the event that non-conforming maintenance work occurs in accordance with quality requirements, CEMAB will take elimination and control measures through the following steps:

- Elimination of non-conforming jobs, (corrective action)
- Analyze the causes that caused the nonconformity.

- Registration of non-compliance
- Notification to the quality control area of non-conforming work.
- Treatment of non-conforming work, taking the necessary improvement actions to eliminate non-compliance. (action plan)
- Verification of the effectiveness of the actions taken to demonstrate their compliance (Deming circle).

### **Monitoring, measurement, analysis and evaluation**

The reception of the information is made with respect to the perception of the client, according to the fulfillment of the maintenance work performed on the Armored Vehicles. To measure this parameter it is considered:

- Complaints
- Suggestions
- Direct communication with the client
- Collection and analysis of operation data of the armored vehicle after the maintenance carried out.

### **Process audit**

The audits are carried out internally, which is carried out once a year, this procedure being planned and coordinated with the command of the Galápagos Armored Brigade.

The auditors who carry out this activity must be appointed by the brigade command,

the same ones that are made up of a specialist officer and three troop mechanics

independent to the audited unit, who will be responsible for carrying out the following actions:

- Verify the level of compliance of the quality management system implemented under the international standard ISO 9001: 2015.
- Verify if the work schedule planned by the unit is met.
- Check that the supply of supplies and spare parts were used optimally.
- Verify the continuous improvement application in the quality management system.

The organization is obliged to apply the corrective actions resulting from the audits.

### **Mission**

The Armored Cavalry Maintenance Center No. 11, will plan, organize, direct and use the Unit in Support of Maintenance of III and IV Armored Step to the Operative Units of the 11-BCB, to achieve and maintain the combative efficiency of the Armored Units, in order to collaborate with the fulfillment of the mission of the 11-BCB "Galápagos".

### **View**

Make CEMAB a reference unit within the Ecuadorian Army, recognized for its quality and efficiency in the development of projects and maintenance work, as well as a high degree of social responsibility and respect for the environment.

### **Values**

- Honesty: Responsibility and compliance when honoring our commitments with the internal and external client.
- Team spirit: We work for a shared goal and we help each other to achieve it all together.
- Commitment: identify and make the company's goal its own, maintaining social responsibility to achieve satisfied customers.
- Leadership: Ability to communicate and direct the actions of all towards a common goal.
- Efficiency: Reaching the goal with initiative and enthusiasm, adding quality and taking advantage of resources in the most optimal way.

### **Organizational structure**

This maintenance area of the military vehicle fleet is headed by the commander of the military unit, as shown in graph No. 3.

### **SWOT Analysis**

The following SWOT analysis that is presented below, allows us to identify the most relevant characteristics that

the "CEMAB" has, for the development of the Quality Management System, that we wish to implement, we take into account mainly the technical and organizational aspects of the institution.

### **Determination of the procedures of the CEMAB**

The manual of the procedures within the CEMAB, is carried out with the purpose of documenting the activities that are developed within this military organization, because currently there is only undocumented and empirical information on how to carry out their work.

The procedures outlined here are determined as a fundamental part of the respective compliance with the proposed Quality Management System, developing in detail the processes that directly intervene in the quality of the maintenance services provided by this unit, which are derived from the Map of general processes of the CEMAB that is established in the Quality Manual.

### **Document management procedure**

#### **1. Objective**

The objective is to ensure that the documentation of the quality management system is developed, approved, published, and distributed according to what is specified in this procedure.

#### **2. Reach**

This document applies to the entire CEMAB organization that is involved in the quality management system, and that is responsible for the preparation, updating and control of the documents of each procedure.

#### **3. Responsible**

The commander of the military unit and the different heads of the CEMAB area will be responsible for the implementation and compliance of this procedure and for the conservation of the records generated by it, within the institutional file of documents and records.

#### **4. References**

**ISO 9001-2015.** Quality management system-Requirements.

## 5. Definitions

**Effectiveness:** Extension in which they carry out the planned activities and the planned results are achieved.

**Efficiency:** Relationship between the result achieved and the resources used.

**Formats:** They are the supports on which the four previous types of documents are registered

**Controlled copy:** The one that needs to be updated when changes are made in the original document.

**Uncontrolled copy:** That which does not need to be updated when changes are made in the original document.

**Preventive action:** Action taken to eliminate the cause of a potential non-conformance or other potentially undesirable situation.

**Corrective action:** Action taken to eliminate the cause of non-compliance or other undesired situation detected. Corrective action is taken to avoid repeating a problem.

**SGC:** Quality management system.

## 6. Policy

The unit commander, the heads of the different areas and the personnel of the maintenance workshop of CEMAB, have the obligation to comply with the procedure, taking into account the potential or existing non-conformities that affect the normal development of this procedure, as well as they must generate the pertinent corrective actions that allow them to be within the regulations required by the Quality Management System.

### Methodology

#### Internal documents control procedure.

- Carry out the identification of the need to prepare a document, when this is necessary to comply with the requirements, both legal and regulatory of the Quality Management System.
- For the elaboration of documents of the quality management system, it must be done under the established format, for the elaboration and identification of documents within the QMS, where its content must be submitted for approval by the person responsible for the procedure.

- After the document has been reviewed, if it is approved, it must be signed by the person responsible, otherwise it is returned for correction and revision.

- After being approved, the document is published or delivered to the area of interest of the same, by means of notifications to the pertinent personnel and if this is of importance for the whole unit, a meeting will be convened to read it; In addition, it must be recorded in the unit's documentary file, as well as the document prepared electronically. In the case of unapproved copies of the document, they must be eliminated immediately.

- In case a modification of the elaborated document is necessary, another additional document must be executed, where all the modifications of the original are recorded, and its registration must be in conjunction with the initial document.

#### Procedure for controlling external documents

- All external documents that enter the unit must be included in the general documentation file, prior knowledge of the unit's commander of its existence.

- If any modification of the same is necessary, this can only be done by the issuing body of the document, which is done at the request of the unit commander.

- All external documents must be classified in a different place from internal documents.

#### Internal audit procedure

##### Objective

The objective of this document is to establish the procedures for the execution of internal audits, which allow controlling and verifying compliance with the requirements, which is required by ISO 9001-2015, on which the Quality Management System of the CEMAB.

##### Scope

This document applies to all processes generated within the CEMAB quality management system.

##### Responsible

It is the responsibility of the head of planning and quality control, to ensure compliance with this procedure, in addition to determining the frequency in which internal audits are executed and to participate in them, together

with the audit team that is appointed by the command of the Galápagos Armored Brigade.

## References

ISO 9001-2015 standard.- Quality management system- Requirements.

## Definitions

**Internal audit.** Audits carried out by the organization at planned intervals, to determine if the Quality Management System, on the one hand, is in accordance with the planned provisions, with the requirements of the standard and with the system requirements established by the organization; and, on the other hand, if the Quality Management System has been implemented and maintained efficiently.

**Audit.** The quality audit is a methodical examination, which is carried out to determine whether the activities and results related to quality meet the previously established provisions and that they are actually carried out, in addition to verifying that they are adequate to achieve the proposed objectives.

**Auditor.** Person qualified to perform audits of management systems.

## Politics

The head of planning and quality control, has the obligation to comply with this procedure, taking into account potential or existing non-conformities that affect the normal development of this procedure, as well as generating the pertinent corrective actions, allow to be within the regulations required by the Quality Management System.

## Methodology

- The responsibility for the execution of the internal audits will be in charge of an evaluation team appointed by the Brigade command, which has the qualities necessary for the execution of a good audit work.
- The frequency of completion of internal audits is once a year and will be planned by the head of planning and control, in collaboration with the unit command.
- The internal audit will be carried out under the evaluation criteria specified in ISO 9001-2015.
- The brigade command will notify the CEMAB with a period of at least one week prior to the completion of

an internal audit, which must be planned by the unit and brigade command as a whole.

- On the date that the internal audit is established, the auditor, together with the head of planning and quality control, will verify and evaluate compliance with each requirement of the quality management system, with the help of a record sheet where you can write down any existing news.

After the audit is completed, the auditor is obliged to issue a report of the work done and in which must be recorded if the disagreements exist within the process, this document must be delivered to the unit command and in turn also to the brigade command, for the respective analysis by the high military leadership of the Brigade.

## Results and Discussion

### Quality records

To carry out the survey of the respective registers for each procedure within the CEMAB, the existing records with which the organization works were analyzed in the first instance to verify if its content fulfills the function required for each process.

In addition, new records were created for some procedures that did not have them and some existing ones were modified, which are indispensable and should be applied for the proper functioning of the quality management system under the ISO 9001: 2015 standard.

## Conclusions

Through the execution of the analysis of the current situation of CEMAB, it was determined that the documentation it has is not adequate to control the functioning of the organization, since it does not have tools such as the quality manual,

- procedures, and records that are indispensable within a Quality Management System focused on customer satisfaction.
- The Quality Manual for the CEMAB was prepared, which describes in a structured way all the requirements of the Quality Management System under the ISO 9001-2015 standard applicable to this organization.
- Complementary documentation was prepared, such as the Organizational Procedures and Registers Manual,

which allows the maintenance of the Armored Vehicles in a controlled and efficient manner, since they provide the mechanic with a base of work to be performed, while At the administrative level, better control of the execution of the entrusted works can be carried out.

- The Quality Management System applicable to CEMAB allows defining the quality policy of the organization with which all the processes necessary for the correct execution of the maintenance of the Armored Vehicles are based.

### Recommendations

- Carry out the immediate implementation of the Quality Management System within the organization, in turn, disseminate among the personnel of the unit and the high commands of the Brigade the characteristics and requirements of the ISO 9001-2015 standard that will be adopted by the CEMAB for the development of the work executed in the unit.

- The unit command must perform a periodic evaluation of the management system by means of the application of internal audits, reporting on its results and defining the needs and weaknesses found within the system, in order to make the necessary adjustments within the processes of planning of the activities to be executed by the organization.

- Train the staff that works in the workshops of CEMAB on issues related to the management and quality control in their work, to make them aware of the requirements that the ISO 9001-2015 standard specifies necessary to

apply for the correct use of the Management System of Quality

- The application of this technical work is recommended, since it is a tool that will improve the development of maintenance activities within the military unit, which will guarantee a high degree of quality in them.

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