

# **TECHNICAL UNIVERSITY OF NORTH**



## **FACULTY OF APPLIED SCIENCE**

### **CAREER INDUSTRIAL ENGINEERING**

#### **EXECUTIVE SUMMARY**

##### **TOPIC:**

**“MAINTENANCE PROGRAM IMPLEMENTATION THROUGH INTEGRATED SYSTEM SAFETY AND HEALTH AT WORK UNDER THE MODEL APPROACH IN ECUADOR INSTITUTE OF TECHNOLOGY SUPERIOR JOSE CHIRIBOGA GRIJALVA.”**

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## **I. Abstract**

This draft program implementation predictive, preventive and corrective maintenance is performed at the Instituto Tecnológico Superior José Chiriboga Grijalva. Is an institution of higher education by the end of 2013 moved to its new facilities located in the home gardens of the city of Ibarra. Through a self-audit of safety management and Health at Work diagnosed structure organizational, risk factors, inventories of machinery and equipment, status and conditions of physical infrastructure subsystem (building), programs and basic operating procedures. The implementation of the maintenance program has a comprehensive maintenance unit, design of maintenance programs, maintenance procedures manuals based on safety standards, formats records and records for the maintenance plans. The integrated maintenance program to have optimal performance was based on the following relationships: Reliability regarding the operation of facilities, machinery, equipment, which are at a satisfactory level without failure, under specific technical characteristics and performance. Availability concerning the time conditions of use of the elements of infrastructure, machinery and equipment. Maintainability for teams to be repaired in

certain time periods the resources allocated, fulfilling the actions of the security system and health at work, to minimize incidents and accidents of personnel and to improve environmental conditions. The evaluation process of comprehensive maintenance program allows a qualitative and quantitative assessment of specific operational objectives of the program and measure organizational process performance and maintenance plans by establishing parameters corrective actions for continuous improvement managing maintenance programs.

## **II. Introduction**

Institutions, public or private organizations for their operational and administrative processes have fixed assets of physical infrastructure, machinery and equipment that are important resources for management to fulfill their responsibilities, services or products to a market of active users.

It is up to the senior management of each entity or organization to project an atmosphere of trust and credibility regarding the technical capacity to safeguard the management and wise use of these resources (non-current assets), applying a maintenance management.

The programs developed under principles, conceptions, theories and

practices which modern maintenance management rests with the prospect of achieving the effective and efficient performance of these assets in organizations. Maintenance programs are a set of processes, procedures, human talent, material resources, economic, financial, acting in combination to achieve the goals and objectives defined in a maintenance organization.

The ITSJCHG (Instituto Tecnológico Superior José Chiriboga Grijalva) is an institution of higher academic training to develop their curriculum, technical, practical processes, has noncurrent assets physical infrastructure, machinery and distributed in different areas of education academic and administrative teams. Currently has the Department of Safety and Health at Work and is relevant to maintenance management is established through the maintenance unit, it is important to structure, lifting procedures, establishing maintenance programs and develop a process evaluation.

This document is divided into the following chapters:

In the first chapter, conceptual context of safety and health at work, maintenance programs, their advantages and benefits referential framework is established.

In the second chapter a situational analysis of ITSJCHG in order to contextualize the organizational aspects was conducted to analyze their physical infrastructure, identify risk factors for the most relevant academic occupational positions using machinery and equipment, inventory thereof is performed and his current condition is evaluated.

In the third chapter the integrated maintenance program defined by the system of safety and health at work, formulating its organizational, functional, structuring procedures predictive, preventive and corrective maintenance structure. Besides the programs scope, forms and documents that enable maintenance management under the principles of availability, reliability, durability and efficient asset management costs of assets it is established.

### **III. Results**

#### **Diagnostic results**

An audit was performed by the parameters of the Audit System of Workplace (SART) the Ecuadorian Social Security Institute established in the Management System for Safety and Health at Work for all companies, organizations and institutions of public employment service deprived of Ecuador.

#### **Variable 1: Organizational Structure**

Administrative and organizational description of the institution.

**Philosophical framework of the Technological Institute Superior José Chiriboga Grijalva (ITSJCHG)**

**Mission ITSJCHG**

The Higher Technological Institute "José Chiriboga Grijalva" form of technological level professionals with ethical values, quality improvement of skills and know-how skills with entrepreneurship, generating solutions to the problems and needs of the country in Zone 1 around the development of the productive matrix in the areas of: Education, personal, business and administration, industry and production, information technology and environmental protection. (Dirección Académica ITSJCHG)

**Visión ITSJCHG**

Superior Technology "José Chiriboga Grijalva" Institute for the next five years will be an institution of higher education system with recognition and prestige in the formation of professional technological level, leading the changes required by society, based on the codes of modernity, teamwork, sustainability and the practice of values. (Dirección Académica ITSJCHG)

**Structural ITSJCHG flowchart.**

See Figure 2-3 Organizational Structural ("MAINTENANCE PROGRAM IMPLEMENTATION THROUGH INTEGRATED SYSTEM SAFETY AND HEALTH AT WORK UNDER THE MODEL APPROACH IN ECUADOR JOSEPH SUPERIOR TECHNOLOGY INSTITUTE CHIRIBOGA GRIJALVA")

### Variable 2: Identifying risk factors

To this point matrix identifying risk factors by which we know the work environment in which the activities are performed in: Cooking workshops, department and workshop systems design, fashion and catwalk of the institution, to which the general method for the identification and initial risk assessment INSHT matrix that is currently validated by the Ministry of Labour Relations and the IESS, through the General Labour risk Insurance was used.

The diagnosis of risk factors was conducted under the direction of technical equipment Safety and Health at Work and the specialist engaged in the topic of Industrial Hygiene and Occupational Safety and Health, which was responsible for reviewing and approving the matrix. (Department of Safety and Health at Work. ITSJCHG)

### Variable 3: Equipment and machinery Assessment of the condition of machinery and equipment

In this case an average of inspections and proceeds to evaluate according to the score obtained will be obtained.

The score for evaluation is given as follows:

DAMAGE	0-3
GOOD	4-6
VER GOOD	7-9
EXCELLENT	10

### Implementation of the maintenance program integrated system of safety and health at work at the Instituto Tecnológico Superior José Chiriboga Grijalva (ITSJCHG)

I proposed establishment of the maintenance unit, described in the manual functions, organizational structure and its dependencies.

Preparation of manuals of procedures for facilities maintenance and ITSJCHG different areas under the rules of safety and health at work.

#### Predictive maintenance program

Predictive maintenance is applied to physical infrastructure systems such as sewerage, electricity, heating, general civil works, machinery and equipment functional areas: Systems Department, laboratories, classrooms comprehensive kitchen design fashion and catwalk. This type of maintenance includes internal and external cleaning, testing, adjusting, replacement,

relocation, considering as a basis the updated machinery and equipment with which the Institute has inventory.

### **Preventive maintenance program**

#### **Politics**

- The user of the machine, equipment should review the bimonthly or annual program to fund preventive maintenance
- The user must report immediately and in writing to the maintenance unit abnormality or failure of the machine or equipment
- All users of machinery or equipment shall answer the relevant questionnaire format
- Cleaning the machine or equipment will be provided by user and perform it at least once a week
- The user of the equipment or machinery for preventive maintenance carried out on schedule preventive maintenance demand for the machine to receive it.

### **Corrective maintenance program**

Is considered corrective maintenance (considering the depletion of the useful life of machinery and equipment) which gives immediate solution to any unforeseen circumstance which consists of repair and /

or replacement of damaged parts allowing recovery, restoration or renewal.

If you can not provide an immediate solution for lack of parts, equipment is assigned on loan with the same and / or similar characteristics in order not to affect the continuity of work, having to act on emerging form and, the best under a contingency plan of the Department of Systems ITSJCHG.

For computers that are under warranty corrective maintenance will be performed by company personnel where the property is acquired, and the corresponding track will be made by authorized personnel to be labeled according to the procurement contracts signed.

### **Comprehensive maintenance Budget**

The comprehensive maintenance budget was structured based on two components: the first concerning the administrative expenses of the maintenance unit, which is represented by staff salaries, utilities, office supplies, depreciation of equipment and furnishings. The second component is related to authorized repair workshops, spare parts in general, supplies, maintenance materials.

### **Comprehensive maintenance budget.**

Maintenance Type	Allocated budget	Porcentage
Predictive maintenance	12.687,00	29.51
Preventive maintenance	15.938,00	37.07
Corrective maintenance	14.370,00	33.42
<b>Total</b>	<b>42.995,00</b>	<b>100%</b>

**Source:** Finance Department ITSJCHG

**Elaborated for:** Jonnathan Ubilluz

### **Assessment system maintenance program integrated**

The evaluation system of the maintenance program is based and supported by the operational objectives of the plans maintenance (predictive, preventive and corrective), so it is measured: availability, reliability, service life of systems physical infrastructure, machinery and equipment , compliance with budget.

The evaluation system is to measure the organizational process performance and maintenance plans to ensure that the facts adhere to planned maintenance plans; based on goals (preventive maintenance - corrective). The performance measurement approach is applied in reference to indicators containing the four operational objectives are: availability, reliability, lifetime physical infrastructure systems, machinery and equipment, compliance with budget so as to assess quantitative and qualitative management of planned maintenance, measuring achievements, forecasts are

compared to determine the deviations and their causes.

### **IV. Conclusions**

The maintenance program integrated with the System Safety and Health at Work allowed to fulfill 16.6% of parameters required in the programs and basic operating procedures, and the 5% compliance in the system audit of Occupational Risks.

The maintenance program allowed defining an administrative framework, the structure of procedures predictive, preventive and corrective maintenance, defined to standardize and systematize the relevant activities in order to monitor and evaluate comprehensive maintenance procedures.

### **V. Recomendations**

The system administration and operation of comprehensive maintenance program should be carried out and articulated model approach Ecuador, which are defined in this document in detail and objectively, and use formats and tools to enable optimal management, planning , control and evaluation activities for comprehensive, predictive, preventive and corrective maintenance adapted to its institutional resources.



Consider the evaluation process as a tool to identify potential nonconformities and corrective actions to establish parameters for the continuous improvement of the management of maintenance programs.

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