



**UNIVERSIDAD TÉCNICA DEL NORTE**  
**FACULTAD DE INGENIERÍA EN CIENCIAS APLICADAS**  
**CARRERA DE INGENIERÍA INDUSTRIAL**

**Work of previous grade to the obtaining of industrial engineer's title**

**FEAR:**

**“TIME AND MOTION STUDY FOR PRODUCTIVITY IMPROVEMENT IN DAILY PRODUCTS COMPANY DEDICATED TO THE MANUFACTURING OF POULTRY BALANCED DIET.”**

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## “TIME AND MOTION STUDY FOR PRODUCTIVITY IMPROVEMENT IN DAILY PRODUCTS COMPANY DEDICATED TO THE MANUFACTURING OF POULTRY BALANCED DIET.”

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### SUMMARY

The study of times and movements carried out in the company Products of the day are of vital importance, to improve their production processes and to increase their productivity having in consideration the main general causes of the unproductive process.

When establishing the standard time of the operations, the necessary time is identified to carry out the total production. When determining the productivity we can use all the resources to our disposition, this way to avoid the delays among the internal clients to satisfy the necessities required by the external client.

Once calculated the securities of the standard time, productivity and evaluation of machines, it is necessary to carry out an exhaustive analysis of the obtained results, for not to create more unproductive times and to incur in unjustified expenses.

### a. Selection of the operation.

It is necessary to consider the specific operation that will measure, keeping in mind the saving possibility in time and estimated cost.

### b. The worker's selection.

It should be chosen a worker that has the knowledge and the necessary training, to carry out their work to normal march.

To carry out the study of times, it should be considered:

- **Ability.** To choose a worker with ability average.
- **I want of cooperating.** Never to select a worker that opposes you.
- **Temperament.** It should not be chosen a nervous worker.
- **Experience.** It is preferable to choose a worker with experience.

### REQUIREMENTS



**c. Analysis of factors that intervene in the process.**

It is indispensable all the specifications of:

- Materials
- Methods
- Machinery
- Tools
- Environment
- Security

**d. Analysis of confirmation of the working method.**

Never debit side to time an operation that has not been normalized. The normalization of the working methods is the procedure by means of which notices written form a norm of working method for each one of the operations that are carried out in a factory. In these norms the working place and their characteristics, the machines and tools are specified, the materials, the safe-deposit team the requirements of quality of this operation (tolerances or finish) and an analysis of the movements of hand right and left hand.

**e. To observe the environmental conditions.**

The physical circumstances in those that the employee is when it occupies a position in the organization like temperature, humidity, noise, foot operations or seated and condition of floor.

**f. Execution of the study of times.**

It is important that the analyst registers all pertinent information obtained by means of direct observation, in forecast that I/you/he/she is need to consult the study of times later on.

Therefore, it is necessary to make a systematic study of the product and of the process to facilitate the production and to eliminate inefficiencies, that which constitutes the analysis of the operation.

**g. Calculation of number of cycles of the sample.**

Abacus of Lifson. It is a graphic application of the statistical method for a fixed number of mensuration  $n=10$  the typical deviation it is substituted by a factor B that is calculated this way:

$$B = \frac{S - I}{S + I}$$

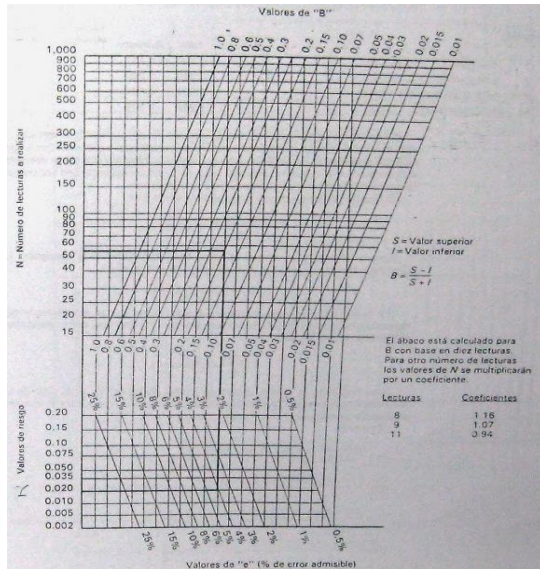
Where:

S = superior Time.

I = inferior Time

e =% of acceptable error

R = value of risk



## I EQUIP NECESSARY

The necessary implementos to carry out the taking of times is:

- Chronometer
- Machine inspector of times
- You form printed for study of times
- Video Chambers
- Auxiliary equipment
  - Boards of observations
  - You form printed
  - Tachometer
  - Calculator
  - Flexómetro

## TECHNIQUE IN THE TAKING OF TIMES

They exist different technical that can be used in the taking of times:

- Estimates based on historical data.
- I study chronometric of times.
- Decomposition in micro movements of predetermined times by means of. Mensuration of times and methods (MTM), I Fix to

Modulate of Predetermined Standard Times (MODAPTS), technique of Sequence of Operations Maynard (MOST).

- Samplings of the work
- On-line summary of data

You Program characteristic of the companies

Each technique will be able to be applied under certain conditions. The analyst of times debit side of determining how technical to use after the analysis peculiar of the company in study.

## Calculation of the time type or standard

The standard time is obtained adding all the times assigned to each element understood in the study of times, you proceeds to calculate the study of times and the standard time of the operation is obtained like it continues:

**Time (You) standard.** It is obtained adding at the normal time a% of tolerances.

**Time Average or observed (Tp).** Summation of the timed times and divided by the number of taken times.

**Normal time (Tn).** It is obtained taking out him an average of the timed times (TP) and multiplied by its (Fv) Factor of valuation.

## LIMITS OF TOLERANCE



**Factor of valuation (Fv).** He/she is called valuation of the effort or qualification of the effort that he/she made the operator when he/she carried out the operation or the work. One generally works with a range from 50% to 150%.

If a work was made with a speed considered by the analyst like normal it is qualified with 100%

If he/she made it quicker 105%, 110%, 115%.

If he/she made it slower 95%, 90%, 85%, 80%.

**Supplements (S).** Margin of time that is added at the calculated normal time as a concession for the necessities of the operator.

It tires (5%-10%), personal necessities (5-15%), machinery and instructions (5%-15%).

We have this way a general range that oscillates of 15% 40%.

The most used is of the 20-25%.

### Equation of the standard Time

$$Te = Tp * Fv * (1 + S)$$

Where:

Te = standard Time

Tp = Time average

Fv = Factor of valuation

S = Supplements

### STUDY OF MOVEMENTS

It can be defined as the study of the movements of the human body that you/they are used to carry out a certain work.

The study of the movements implies the careful analysis of the corporal movements that are used to carry out a task. Their purpose is to eliminate or to reduce inefficient movements, to facilitate and to accelerate the efficient movements.

### TECHNICAL OF STUDY

The techniques for the observation of the movements in the work can be through:

1. Film technique or of micro movements
2. Technique of film slow projection for movements
3. Technique of analysis cycle graph (half electric photographic I continue)
4. Technique of analysis cronociclográfico (half electric photographic off).
5. Direct observation



## FUNDAMENTAL MOVEMENTS

Gilbreth denominated “therblig” to each one of the fundamental movements, and it concluded that all operation is composed of a series of 17 basic divisions (to reach, to move, to hold or to take, to liberate, to press, to use, to assemble, desensamblar, to look for, to select, to position, to inspect, to plan unavoidable delay, I retard avoidable, I rest to counteract the fatigue and to stop).

## COMPANY PRODUCTOS DEL DÍA GENERALITIES

Company Products of the Day is believed in 2008 by its proprietor Engineer Andrés Mena, it is located in Natabuela. Beginning like a company of own consumption, to reduce the costs of production of their poultry farm. Company productos del Día is constituted for:

- According to their artificial constitution: Unipersonal.
- According to the size: Small Company.
- According to the property: Private Company.
- According to the objective market: Regional Company.
- Products that it manufactures: Balanced poultry

## PROCESS OF PRODUCTION

The elaboration of the food balanced for corral birds is carried out whereas clause the parameters and nutritional requirements of the species and productive stage, keeping in mind the critical points in the selection of the raw materials, formulation, mixes and elaboration.

Next each process is described:

**I enter of the raw material.** The materials enter through trucks, it is weighed and it stores in a manual way in the designated areas.

**Cleaning.** The manufacturing process begins with the revision of the raw materials, if these they contain sludges they are eliminated in a manual way, in the annex 3 are shown the parameters to be controlled, as humidity, ash, sludges, acides and date of expiration according to the product.

**Grind.** The mill pulverizes to the grain to 3600 rpm leaving to the raw material in the size wanted 1200 microns.

The mill is since one of the restrictive steps in the elaboration of the product it is necessary to load the machine previously with grain for its respective decrease of the size, this process represents 50-60% of the factory costs due to the time that takes a long time in being processed.





**Heavy of matters inputs.** It is weighed all the components exactly and he/she separates for each mixture in a manual way.

**Transport to the area of blended.** As much the ground raw material as the heavy inputs are transported to the area of blended in a manual way.

**Blended.** In this step they are placed in the screw without end all the raw materials and heavy inputs for each batch (corn, soya, calcium, phosphate, salt, toxin secuestrante, methionine, lysine, threonine, premezcla, promoter, hill, anticoccida, AC. Propionic, ROVABIO, fitaza and anti-rust).

**Addition of Lipids.** This type of ingredients for its nature hydrophobic should be added at the end of the other components of the product.

After finishing the addition of all the liquids it should be allowed to mix at least another minute to make sure that they have been dispersed in the mixture.

**Sacked.** The sack is placed in the chute the product it is liberated and 45,45 kg of ended product is weighed.

**Storage.** After weighing is the sack is taken to its respective storage place.

## DIAGRAM OF THE OPERATIVE PROCESS

The diagram of operations indicates the general flow, whereas clause the main operations. It can pick up the flow of the process of different departments, until ending up completing the ended product

The careful study of this graph suggests, you improve substantial in:

### h. The operation process:

- To eliminate completely certain operations.
- To combine an operation with another.
- To simplify some operations.
- To eliminate delays in the operations.

### i. In the plant distribution:

- Use of the space.
- Better journey for the spaces.

### j. To drift and to program:

- The opportune dates of arrival of the bought materials.
- The dates in that the manufactured pieces should end.
- The operations of you assemble intermediate.
- The offices.

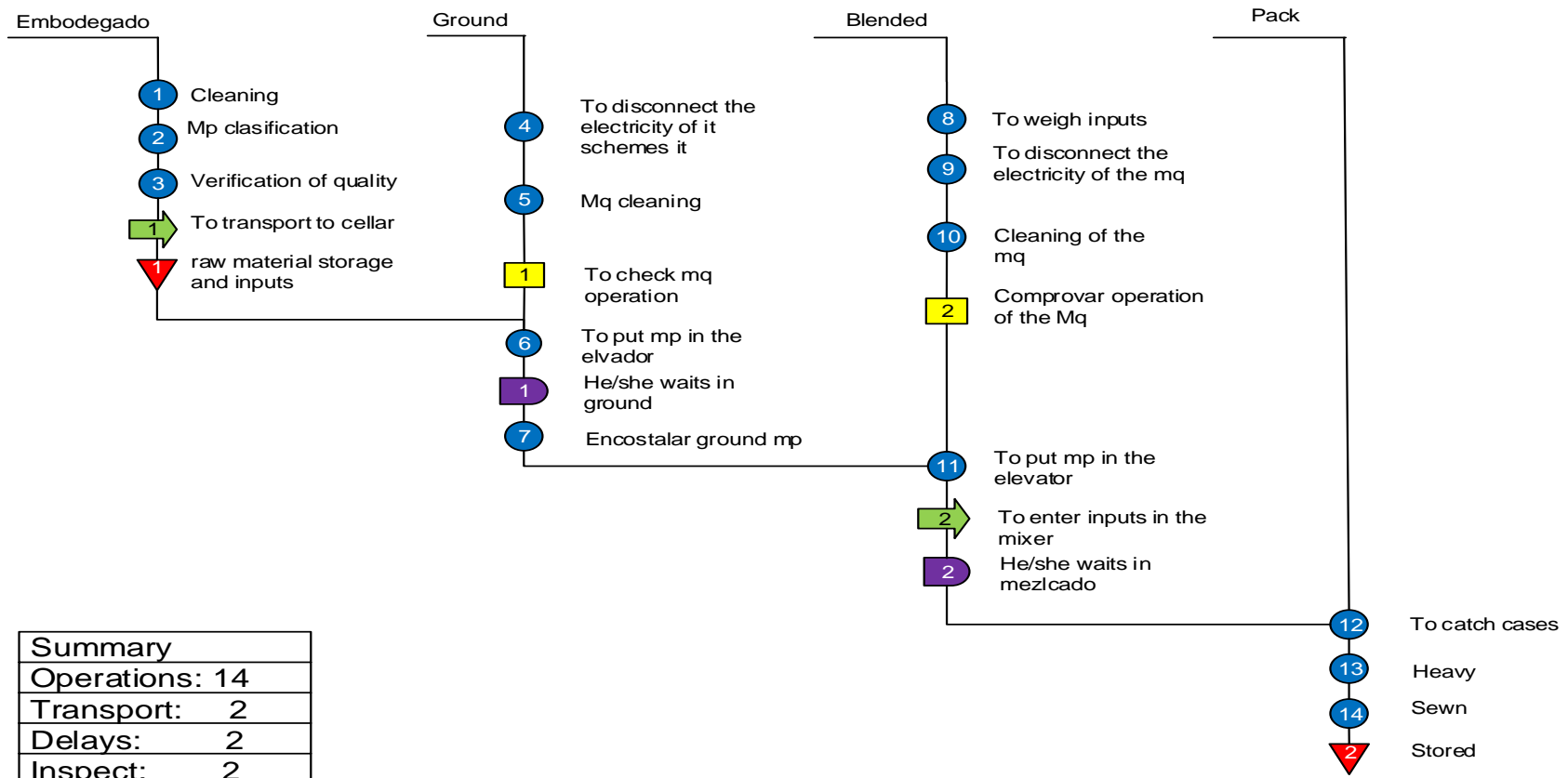


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DIAGRAM OF OPERATIVE PROCESSES

Company: Productos del día  
Area: Production  
Diagram: current

Date: 01-05-2014  
Elaborated: Edison Montesdeoca  
Revised: management



| Summary     |    |
|-------------|----|
| Operations: | 14 |
| Transport:  | 2  |
| Delays:     | 2  |
| Inspect:    | 2  |





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## SUMMATIONS

With the establishment of the theoretical foundations of the study of times and movement's one could understand the necessary parameters to determine the processes and the activities of the workspace to measure the times, to take advantage of the manpower and the costs that intervene in the production to settle down.

In the initial analysis of this company it shows that it doesn't have a method of mensuration of the work, for what the realization of the study of times and movements contribute to reduce 0,33 seg/und of the standard time of production increasing the productivity in 1,6%.

The standards of established times allowed to measure the established results in a positive way generating a saving of 0,26 \$/ und, obtaining a monthly saving of 695,5 (\$/ month) increasing the utility at 3360.

The biggest quantity in reduced time is due to the change of the shortening for the palm oil that reduced the time of production notably of 1 hour with 45 minutes to 20 minutes, eliminating all the activities of cooking of shortening that retarded the manufacturing process. The reduction of the remaining time owes to the classification and the cleaning that he/she has been carried out in the workspace, reducing a time of 13 minutes of a total of 1 hour 38 reduced minutes of the day of 8 Hr/día.

It was determined in the analysis of the aspects that influence in the production that the company doesn't have the safe-deposit teams and hygiene, creating psychological insecurity and physics in the worker, what causes unproductive times creating unnecessary movements as covering himself the hearings with the hands for excessive noise, etc.

## RECOMMENDATIONS

To execute the stocks of improvement to maintain the clean and organized working place because most of unproductive times are so much of disorder and cleaning in the area of processes and cellar.

To carry out studies of times and annual movements that he/she allows to settle down standard of new times, to be able to them to compare with the standards of established times and to check the yield of this company.

To implement quality control programs like laboratory tests or tests with micro plotters that you/they are small particles that mix in the one balanced, allows to count these particles and to identify the quality of the blended one.

It is necessary to fulfill the established legal technical regulatory scheme as regards security and occupational health, for forewarn the physical and mental integrity of the workers, likewise you can avoid tickets settled down by the government.



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