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Implementation of quality tools in the analysis of automotive electric harnesses

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Summary - ***The*** purpose ***of this study is to identify the causes that cause failures in the parts used in the production of automotive electric harnesses of an industry*** of ***the state of Zacatecas, through the use of*** quality ***tools such as Pareto, cause-effect diagram, among others, seeks to determine the frequency of the same and implement alternatives that can be applied to correct these defects and prevent*** future ***situations. Among the results obtained, it was possible to change to*** the ***inline to dash*** connector to attack the intrusion of water into the harness at the ***root, in*** addition to training ***employees more to avoid errors in the production*** of ***harnesses.***

Index of Harness Terms, *quality, tool, strategy*

I. INTRODUCTION

The present investigation seeks to know if the cause of the defects presented in the harnesses returned to the warranty department, is caused bya sequence of problems with the assembly of the product, because the process is manual.

Using quality tools such as Pareto and Ishikawa diagrams will seek to identify the different causes that affect the problem under analysis and, in this way, avoid the error of directly looking for solutions without questioning what the true causes are. [1].

It is recognized that more than 80% of the problems in an organization are due to common causes, problems or situations that act permanently on the processes. [2]

The research offers relevant information to the warranty department to generate strategies that correct failures and thus reduce the return of parts for failures.

II. MÉTODOGÍA

A. Type of study

The scope of the research is explanatory, considering that an analysis is carried out on each piece that enters to be integrated into the harness Fig. 1, identifying the cause of the failures in the pieces, it is a study that aims to establish the causes of the events, events or phenomena that are studied [3].

Fig. 1 Harnesses

B. Localization

The research was developed in an industry of electric harnesses of automotive vehicles, in the state of Zacatecas.

Fig. 2 Map of Zacatecas

C. Population

The analysis is carried out in the warranty department (see figure 3) 529 harnesses are observed that correspond to all the harnesses manufactured and returned to the company Planta Zacatecas 1 in a period of 4 months.

The verification is carried out using a database in the Excel computer program, where you can consult the part numbers, ticket, the type such as a wiring or a wiring kit, depending on the condition in the that this is and family to which each piece to be examined belongs,the distance that the car has traveled before presenting problems, it is worth mentioning that the distance is represented in miles.

Knowing the comments made by customers, allow that the analysis is developed more directly and taking into account a little more notion of the condition in which it is foundEnter the harness that has been returned, for example: track link broken or the water intrusion, in this case it is more likely to find them defects the identify where it What herself Find exactly.

After verifying that the parts correspond and none are missing, essential tools are used to carry out the analysis of the properties of each piece, this varies according to the type of harness and the narratives of the client

D. Tools

Among the most used tools in these cases are the pikes Fig. 3, which allow it to be easier to detach the PLR's from the connectors, open locks, as well as to remove the terminals so that it is clearer and more precise to be able to learn how they are

Fig. 3. Pikes that are used depending on the type of connector

The multimeter Fig. 4 is one of the tools that allows the electrical test to be carried out by joining its ends to the terminals of the harness, which allows to detect if there is continuity between the circuits, but this only if the piece requires it, it is worth mentioning that it applies only when it comes to wiring

Fig. 4 Multimeter to perform electrical tests

The micrometer Fig. 5 is a tool to perform measurement in the terminals, it allows to know if the dimensions of the CCH OR CCW are those indicated for the terminal part number.

Fig. 5
Micrometer

As soon as the work tools are available, the analysis begins through the observation and capture of the evidence; however, it is important to review the customer's narrative

Steps to perform the analysis

1. It begins with the general observation of the harness, this in order to detect the conditions in which the harness arrives at the plant.

2. Review each of the connectors to identify which are the ones that suffer the most damage to their structure, in addition to knowing s i theclient's narrative agrees with the condition in which the harness is located and if there is no other damage that has gone unnoticed.

3. After locating the most affected connectors they are analyzed step by step, before removing the PLR the evidence is captured.

4. The PLR is removed with the help of the pikes, in addition to removing one by one the terminals allowing a deeper observation and in order to be able to document these facts in a more detailed way.

5. At last to the culminate the revision of the properties The physical health of the harness and each of its components must place each of them in its place, to be able to move to the test electric the Which one herself Takes a corporal with help of the multimeter or at the station where it was manufacturedada in the section in which the electrical test is carried out on each of the pieces that are elaborated, and to do it this way is necessary print one barcode (code of bars) What Corresponds to the number of series of the piece What herself is Reviewing. This can be done only when the line is stopped so as not to interrupt operators during the production.

It is important to note that only on some occasions it is necessary to use the micrometer this allows it to be known if a terminal complies with the appropriate measures, the

Micrometer is usually used in situations where the components of the harness did not present any defector visible and it only remains to pay greater attention to the terminals that even though they have not presented signs of corrosion or that any of them is broken, there may be minimal chances that they do not comply with the measures that are they find dwithin the standards of acceptance.

This can be done, in case the results of the previous observations present easily visible damage such as a broken component or signs of corrosion in the connectors.

By gathering the evidence of the above, it is documented in the warranty format by adding data regarding the part such as: customer, type of part(wiring or wiring kit), numberor part customer number, distance in miles, among other fields, adding a brief description of the situation after being observed.

Steps 1 to 5 are constantly repeated, considering the arrival time of the pieces thatcila you every two weeks and it is necessary to carry out the process in each of them.

As the guarantees arrive at the plant, it is necessary to collect information from them so that it is stored in a database that contains the same fields that the reviews of each one have. package, in addition one more is added in which the date corresponding to the moment in which the pieces arrive at the plant is included.

When making the database with the reviews of past warranties, it is necessary to identify the main defects that can be found in the parts, for last year's warranties it was possible to use the client's narrative, this contemplating that as the analysis has been carried out the pieces are taken to the scrap to be discarded, so that their defects cannot be identified in any other way.

In order to propose solutions against the problem that is causing the pieces to be returned to the plant, it is of the utmost importance to identify at least 5 of the main reasons, which are ordered in the database by date and composed by colors according to corresponds are considered only 5, being a reasonable number with which you can work, because there are very unlikely conditions and that are not really the main failures that originate in the guarantees

Depending on the defect being evaluated, it is necessary to detect which are the components of the harness most affected or those that have become more vulnerable to failure, or means of comparison with other parts for example in a front fascia harness that has been returned to the pl anta Zacatecas 1 for presenting signs of corrosion in the inline to dash and AGS connectors, according to the client's narrative and another case is taken from the database, but that is a piece that corresponds to the same model and verify their condition in such a way that if they present similar conditions, it can give way to a deeper investigation that allows to know what is causing such a condition.

After classifying the defects, each of the pieces where it is identified is filtered to be able to count them, according to the frequency in which a defect appearsor is given priority with the sole purpose of proposing solutions and if possible apply corrective or preventive actions as necessary, by means of quality tools like Pareto and Ishikawa, detecting potential problems requires applying a more immediate solution, those that could have the greatest impact on the company and then identify how to attack the problem.

Using the cause and effect diagram or fishbone, being an established problem solving tool. It is particularly suitable to be used crossing functional equipment, helping a group to organize the possible root causes of a problem in a visual and easy-to-understand format [4].

Herself Determines What the elder frequency in the Parts returned is by the intrusion of water and correspond to front fascia (front fascia of the car) and connectors that more are damaged in this situation are the inline to dash and the AGS, sometimes they are also involved tooth lamps and marker lamps, Taking in account the results What Throw statistics and according to the database is necessary Focus even more in the Connectors inline, AGS and tooth lamp.

III. RESULTS

Reviewed individually each harness returned to the company to validate the warranty, the connectors to identify which are suffering the most damage to its structure as well as to know if the narrative of the customer Agrees with the condition in the What herself Find the harness y Yes No Exists some other damage What beech past unnoticed.

It can be observed in Fig. 6 that the defect "Water intrusion", is one of the main defects that occurs most frequently among the pieces that are constantly analyzed within the plant, so it represents a greater threat to the quality of the product itself that if attacked or managed to be eradicated would have a beneficial impact of up to 84.31%

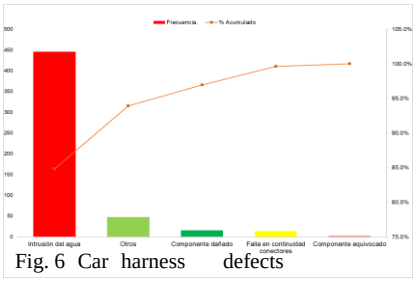

Fig. 6 Car harness defects

After it has been identified which is the situation that requires greater attention, it is time to investigate what causes the intrusion of water and consequently corrosion in the harness, we proceed to make a cause-effect diagram to reach the root cause of said problem.

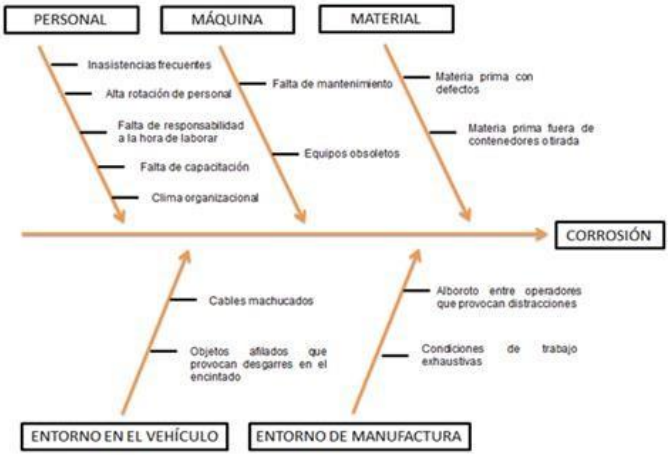

Fig. 7 Cause-effect diagram

To the analyze the Different harness herself Observed What the water intrusion generates corrosion, so it proceeds to carry out the Fig. 7, the Which one Sample What the majority of the defects originate because of the company's personnel, because there is a high rotation of them, which Generates lack of training y Little responsibility a the hour to work, by end is reflected in the organizational climate, Like this how in the defects of the harness.

After having identified that corrosion is a problem that requires greater attention, it is time to investigate what causes it, so a brief investigation is carried out in the manufacture of each harness returned, we proceeded to check the seal of each connector as shown below.

Fig 8. Sello inline

Fig. 9 Ags Seal.

In Figs. 8 and 9 it can be seen that the seals are checked in order to reach the copper wires and identify which of the connectors the water is filtered through.

IV. CONCLUSIONES

The use of the Pareto diagram allowed to determine that if it is possible to eliminatethe problem of water intrusion in the manufactured harnesses, the benefit is 84% in the reduction of defects, the root cause of this situation is the high rotation of personnel and consequently training problems in the personnel involved in the transformation process.

After performing a detailed and specific analysis on the internal cables of each harness returned for warranty review, it was determined that the inline to dash connector reflects the largest number of burned cables, which indicates that it is necessary to change this part to improve product performance

V. AGRADECIMIENTOS

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VII. BIOGRAPHY

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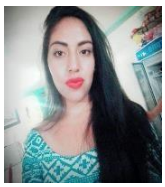

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