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Improving the Quality of Production Milk Can Ø 502 X 603 Using the Qcc (Quality Control Circle) in the Manufacturing Industry

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Abstract:- In the mechanical office world there will consistently be competion. Purchaser fulfillment is the fundamental aspect that could decide the triumph in the opposition in the mechanical world. Purchaser fulfillment could be accomplished one of them by keeping up with the nature of the subsequent item. This is the basic PT. XYZ to keep on working on quality. This exploration zeroed in on diminishing oddball level contained in milk would production be able to handle Ø 502 X 603 with Quality Control Circle (QCC) technique. The technique depends on a critical thinking philosophy with the PDCA cycle approach, that is: Plan (maintenance program), Do (execute), (review), Activity (make enhancements). which joins the 7 devices technique just as other cycle enhancement draws near. In light of the outcomes acquired oss bubble, voide/unfilled as the biggest number of rejects is just about as much as 15,200 computers or 38.59% of the absolute oddball. From Fishbone Outline examination got the reasons for Oss bubble, voide/void are: temperamental OSS consistency factor, wrong setting methodology, administrator capacity is missing, and motor condition is unusual. Subsequently, it is important to make upgrades to decrease the quantity of rejects.

Keywords:- *QCC (Quality Circle Control), 7 QC Tools, Fishbone Diagram, PDCA (Plan-Do-Check- Action).*

I. INTRODUCTION

Each factory perpetrator will attempt to succeed opposition in the mechanical field. Buyer fulfillment is the principle that aspect could decide triumph in the opposition in the mechanical world.

Customer fulfillment is the primary factor that can decide the triumph in rivalry in the mechanical world. Umar (2005), Customer fulfillment is the degree of purchaser feeling in the wake of looking at between what he got and his assumptions. As indicated by Irawan (2004), There are 2 principle factors that drive consumer loyalty, to be specific as follows:

1.Product quality, clients are fulfilled that in the wake of purchasing and utilizing the item ends up being acceptable quality items.
2.Price, for touchy clients, typically modest cost is a significant wellspring of fulfillment since clients will get high incentive for cash.

However, makers are not just confronted with the quality that purchasers need, they are confronted with proficiency and viability. By decreasing expenses brought about by harm or dismissal of the item. The organization will keep on further developing its presentation so it can proceed to endure and contend with different organizations.

PT. XYZ is engaged in canning. since 1972. This company produces finished cans according to the design and type of product to be packaged. One of the products produced is to supply Milk Can 502 X 603 canning customers such as Chil kid and Bebelac.

As of now in organization experienced issues in the creation cycle for Milk Can Ø 502 X 603 which delivered in 2019, the issue that happened was ride item interest together with an undeniable degree of item surrenders in the get together interaction.

II. LITERATURE REVIEW

- **Concepts and Theories**

Heizer dan Render (2006) Quality is the entirety of provisions and normal for an item or administration that bears on it's capacity to fulfill expressed or inferred need.

According to Edward W. Deming in Nasution (2004) capacity implies a nonstop addition measure that beginnings from a progression of cycles since the plan to deliver an item, item advancement, creation interaction to conveyance to clients. Then, at that point, in view of data as criticism gathered from item clients, thoughts are created to make new items or work on the nature of old items and existing creation measures.

Quality control as indicated by Assauri (2008) is an action (organization the board) to keep up with and direct the nature of the organization's items and administrations to be kept up with as planned.

Quality Control Circle (QCC) is an approach that is widely used by companies in making quality improvements with the PDCA cycle which stands for Plan-Do-Check-Action. This approach was presented by W.E Deming and W.A Shewhart, a well-known American quality expert, so the PDCA cycle is also known as the Deming cycle or control cycle. Quality control ought to be brought out late a consistent and incessant collaboration. One of the approaches to manage

quality level checking is passing the execution of PDCA. So this cycle is known as the Deming cycle. Additionally, can work on the thing later on. The clarification of the periods of the PDCA cycle is according to the accompanying: (Nasution, 2001).

a. Draft (Developing an improvement plan) Fostering a maintenance plan is a stage in the wake of testing fixing the issue. Improvement plans are arranged dependent on the 5 guideline W (what, why, who, when and where) and 1 H (how), which are made unmistakably and exhaustively and put forward objectives and focuses to be accomplished. In defining objectives and targets, the SMART (Specific, Measurable, Attainable, Reasonable and Time) principle must be considered.
b. Apply (Implementing the draft) The arrangement it has arranged is carried out gradually, beginning from a limited proportion and separating errands uniformly as per limit and capacity. of each staff. During the execution of the arrangement, control should be completed, specifically attempting to guarantee that all plans are done as well as could be expected so the mean can accomplished.
c. Observe (Check or examine the outcomes accomplished) control or investigating alludes to deciding if the execution is on target, as per the arrangement and observing the advancement of the arranged enhancements. Devices or gadgets that can be utilized to control are Pareto outlines, histograms and observe graphs.
d. Step (Playing out the fundamental change activities) Changes are made when considered significant, in light of the consequences of the investigation above. Change identifies with normalization of new techniques, to stay away from reoccurring similar issue or setting new focuses for the following improvement. The PDCA cycle turns constantly, when an improvement is accomplished, the condition of the improvement can give motivation to additional enhancements. In this way, the board should ceaselessly define new objectives and focuses for development.

- **Cause and Effect Diagram**

This outline is likewise called a fishbone graph and is helpful for showing the principle factors that influence quality and affect the issue we are examining. Moreover, we can likewise see more itemized factors that impact and affect these primary components which we can see from the bolts looking like fish bones in the fishbone graph.

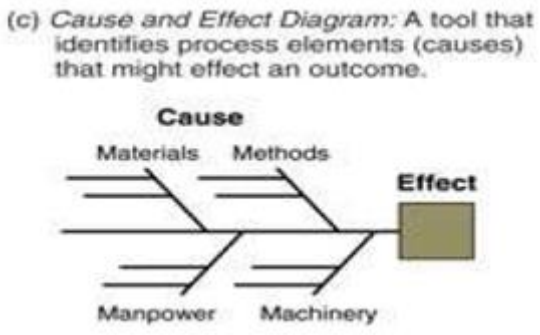

Figure 1 Cause and Effect Diagram

This causal graph was first evolved in 1950 by a quality master from Japan, specifically Dr. Kaoru Ishikawa utilized a realistic depiction of cycle components to investigate expected wellsprings of interaction deviation.

These fundamental causative elements can be gathered into:
1) Material
2) Machines
3) Man
4) Methods
5) Environment

The Pareto diagram was first presented by Alfredo Pareto and was first utilized by Joseph Juran. Pareto diagrams are visual charts and line diagrams that delineate the correlation of each kind of information to the entirety. By utilizing Pareto graphs, it very well may be seen which issues are predominant so they can know the need of critical thinking. The capacity of the Pareto outline is to distinguish or choose the primary issues for quality improvement from the biggest to the littlest.

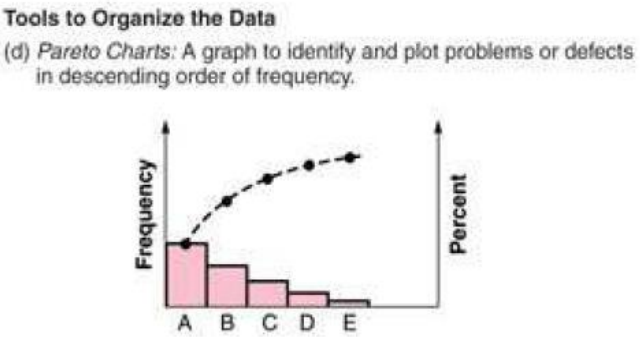

Figure 2 Pareto Diagram

III. RESEARCH METHODS

QCC method

- Determining the Theme

Identifying problems by looking at the 4M+1E factor (Man, Method, Machine, Material, and Environment).

- Setting Target

The target data to be taken is cabin maintenance delay data from January - December 2019 which has the most elevated imperfection rate with the help of the Pareto Diagram.

- Analysis of Existing Conditions

Carry out a direct observation in the field by taking into account the 4M+1E factor.

- Cause and Effect Analysis

This analysis will be carried out with the help of Fishbone Diagram which will be processed to discover the foundation of the issue.

- Establish Countermeasures Plan

Create data for repairs with a specified time limit and the

progress that has been made.

- Countermeasures

Collecting data on repair activities that have been carried out, and if there are countermeasures that are still not effective, then re-planning must be carried out until successful.

- Result Evaluation

Evaluate the targets that have been carried out and then make comparisons between before and after improvements.

- Standardization and Advanced

After the evaluation results are considered good, the next step is to standardize with the approval of the relevant parties so that previous problems do not recur.

- Conclusions and Suggestions

After the research process is complete, the next step is to draw conclusions from the results of the analysis in the company, and what to do after this research is carried out in the company, so that the desired goals in the company are achieved.

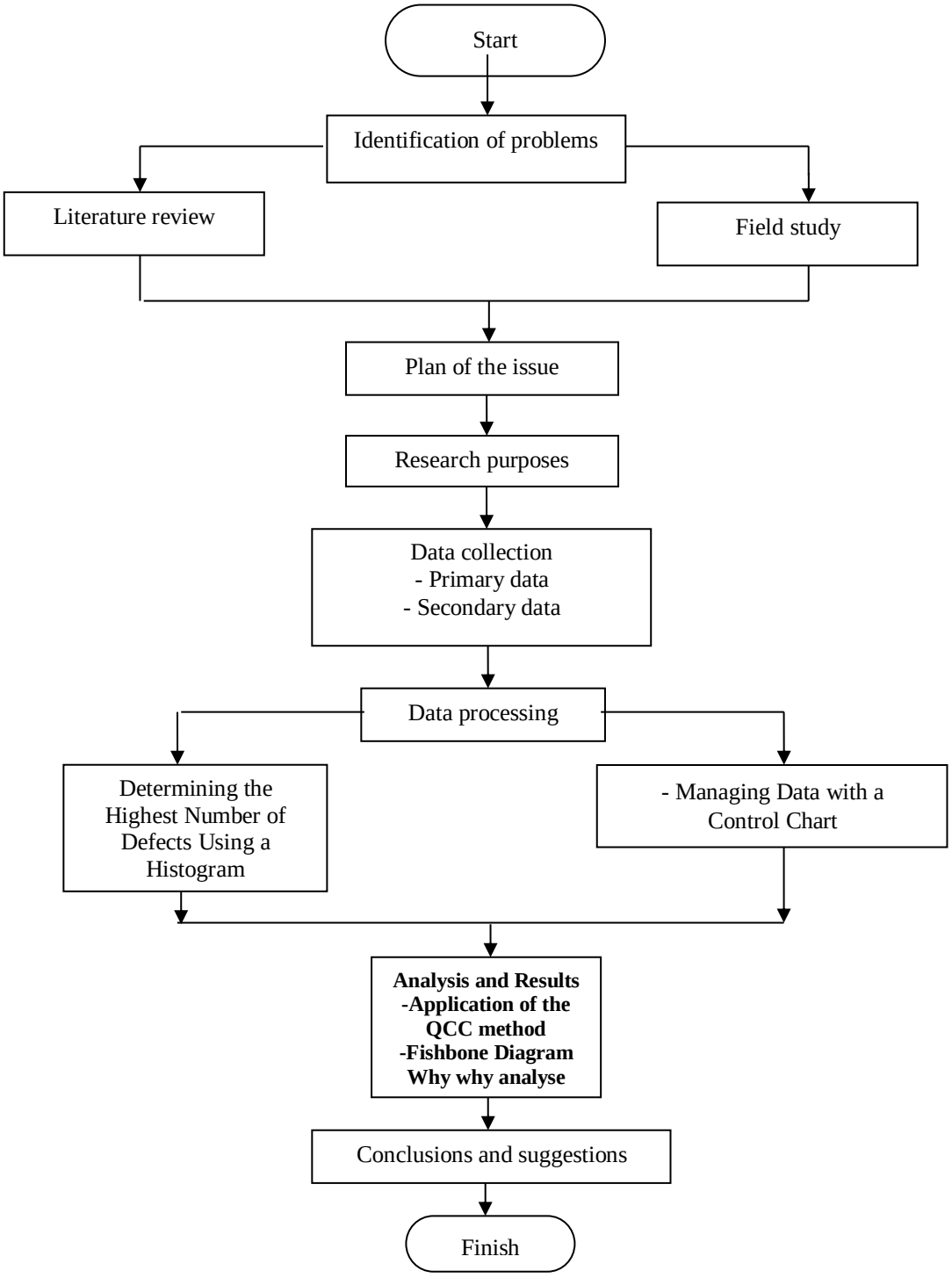

Figure 3 Flow chart of research methods

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IV. RESULT AND DISCUSSION

- **Data Collection and Processing**

The examination was done utilizing the means to tackle issues with the Quality Control Circle (QCC) strategy. This examination was arranged dependent on a critical thinking procedure with the PDCA cycle approach that joins the 7 apparatuses technique to decide the interaction that causes abandons, gather the essential information, notice a lot to acquire information. The goals are taken from the field, investigate the capacity of the suitable cycle abilities, search for the circumstances and end results of the issues that happen and give ideas to enhancements at that correction step happens yet the rate is little or seldom happens.

Table 1 Production Data 2019

NO	MONTH	QTY	GOOD	REJECT	% HFI	PROBLEM REJECT					
						Oss Bubble, Voide/Empty	Scratch	Leaking	powder Sq in / Bubble	Seam Scratch	Other
1	January	887,372	856,372	31,000	3.49%	15,200	2,350	3,500	4,000	5,000	950
2	February	770,825	740,345	30,480	3.95%	13,700	3,400	3,680	4,500	4,120	1,080
3	March	447,200	435,520	11,680	2.61%	4,250	1,570	1,780	2,200	1,400	480
4	April	678,275	657,495	20,780	3.06%	7,800	4,800	1,250	2,790	2,890	1,250
5	May	323,548	313,578	9,970	3.08%	1,950	1,800	2,700	1,360	1,314	846
6	June	197,476	190,116	7,360	3.73%	1,720	950	1,200	1,350	890	1,250
7	July	765,890	738,020	27,870	3.64%	11,850	2,900	3,850	3,790	4,800	680
8	August	520,784	503,914	16,870	3.24%	8,900	1,950	1,670	1,950	1,425	975
9	September	912,468	887,578	24,890	2.73%	8,850	3,420	2,870	4,600	4,000	1,150
10	October	540,630	512,880	27,750	5.13%	9,800	4,800	5,200	3,400	3,780	770
11	November	287,708	278,168	9,540	3.32%	3,800	1,800	2,500	490	310	640
12	December	354,575	338,985	15,590	4.40%	2,400	1,500	6,830	2,900	1,270	690
	Total	6,686,751	6,452,971	233,780	3.50%	90,220	31,240	37,030	33,330	31,199	10,761

- **Data processing with Histogram**

In deciding the most noteworthy issue reject, it is finished utilizing a histogram. Coming up next is the estimation information:

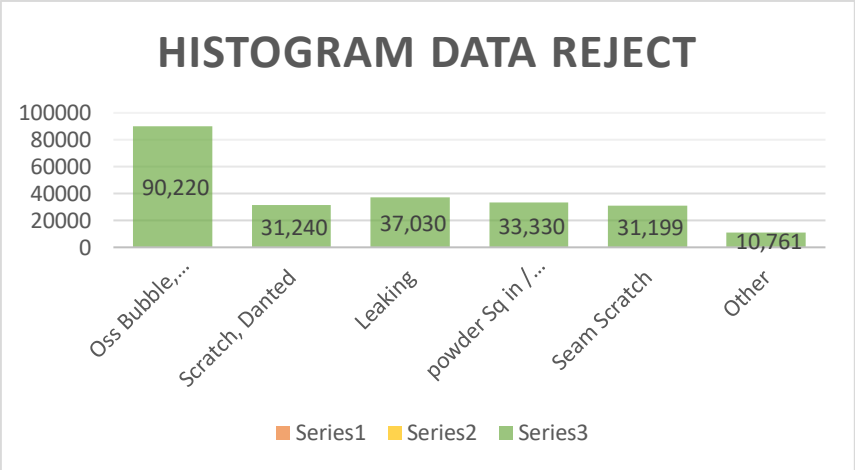

Figure 4 Chart of Milk Can item histogram

The histogram picture tells that the most raised issue rejects for Milk Can things Ø 502 X 603 are the Oss bubble reject type, voide/void with an aggregate of 90,220 PCs containers, accompanied by rejection spilling with an amount of 37,030 containers, reject Powder sq in/bubble with an amount of 33,330 metal containers, 31,240 containers of reject scratch and gouged items, 31,199 laptops of jars of crease smear, other oddball items, for example, (messy, welding issues, preliminary jars) 10,761 laptops of jars.

- **Calculation With Control Chart**

To decide the upper control limit (UCL) and the lower control limit (LCL), the normal worth of the deformity is needed beside the accompanying estimation:

1. Calculating the percentage of damage (P)

$$pc = \frac{x}{xi} = \frac{31.000}{887.372} = 0{,}0349$$

Etc how to ascertain as long as a year

2. Figure the middle line (CL) focus line which is the normal harm to the item (p)
3.

$$CL = GP\ p = \frac{\sum x}{\sum xi} = \frac{233{,}780}{6.686.751} = 0{,}03493$$

Etc how to ascertain as long as a year

4. Calculate the upper control limit (UCL)

$$UCL = P + 3\sqrt{\frac{P\,(1-P)}{n}} = 0{,}03493 + 3\sqrt{\frac{0{,}03493\,(1-0{,}03493)}{887.372}} = 0{,}0357$$

Etc how to ascertain as long as a year

5. Calculating the lower control limit (LCL)
6.

$$LCL = P - 3\sqrt{\frac{P\,(1-P)}{n}} = 0{,}03493 - 3\sqrt{\frac{0{,}03493\,(1-0{,}03493)}{887.372}} = 0{,}03422$$

Etc how to ascertain as long as a year

Table 2 Estimations utilizing a control outline

NO	MONTH	QTY (Pcs)	GOOD	TOTAL REJECT	%	PC	UCL	CL	LCL
1	January	887,372	856,372	31,000	3.49%	0.03493	0.03570	0.03496	0.03422
2	February	770,825	740,345	30,480	3.95%	0.03954	0.03570	0.03496	0.03422
3	March	447,200	435,520	11,680	2.61%	0.02612	0.03570	0.03496	0.03422
4	April	678,275	657,495	20,780	3.06%	0.03064	0.03570	0.03496	0.03422
5	May	323,548	313,578	9,970	3.08%	0.03081	0.03570	0.03496	0.03422
6	June	197,476	190,116	7,360	3.73%	0.03727	0.03570	0.03496	0.03422
7	July	765,890	738,020	27,870	3.64%	0.03639	0.03570	0.03496	0.03422
8	August	520,784	503,914	16,870	3.24%	0.03239	0.03570	0.03496	0.03422
9	September	912,468	887,578	24,890	2.73%	0.02728	0.03570	0.03496	0.03422
10	October	540,630	512,880	27,750	5.13%	0.05131	0.03570	0.03496	0.03422
11	November	287,708	278,168	9,540	3.32%	0.03316	0.03570	0.03496	0.03422
12	December	354,575	338,985	15,590	4.40%	0.04397	0.03570	0.03496	0.03422
	Total	6,686,751	6,452,971	233,780					

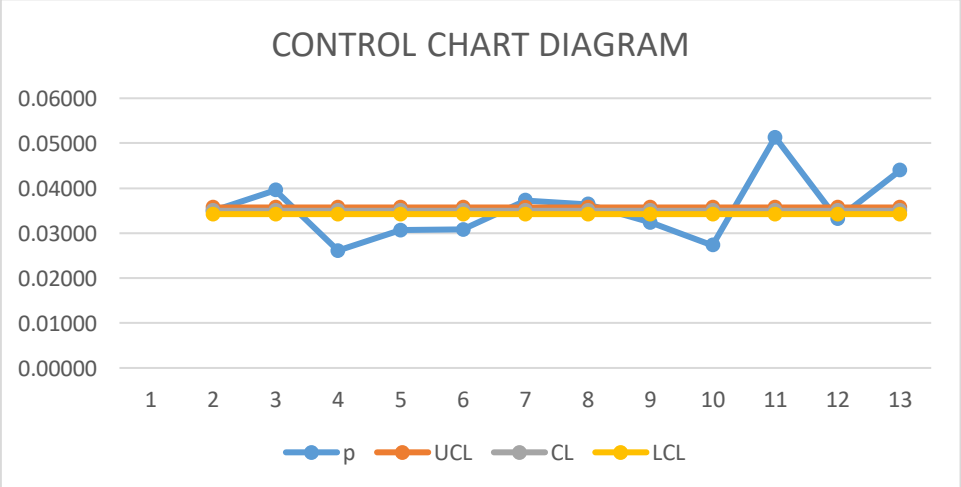

Figure 5 Control chart diagram of the reject number

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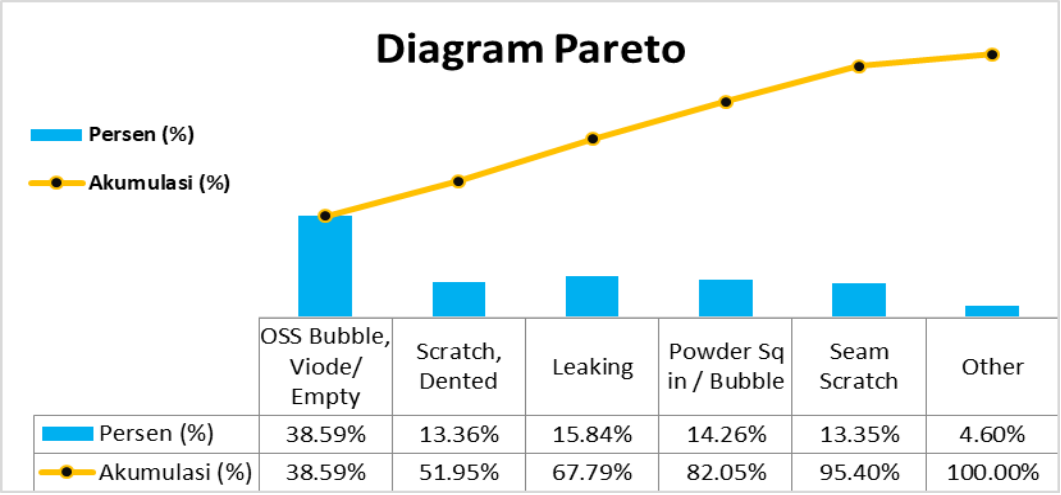
- **Defect Analysis Using Pareto Charts**

In the accompanying, we can pay attention a diagram of the three greatest kinds of deformities dependent based on Pareto which has been created, to be specific:



	OSS Bubble, Viode/ Empty	Scratch, Dented	Leaking	Powder Sq in / Bubble	Seam Scratch	Other
Persen (%)	38.59%	13.36%	15.84%	14.26%	13.35%	4.60%
Akumulasi (%)	38.59%	51.95%	67.79%	82.05%	95.40%	100.00%

Figure 6 Pareto Outline of Number of Imperfections

- **Application of the QCC method**

Table 3 QCC Activities

NO	ACTIVITIES	MONTH / YEAR 2021															
		MARCH				APRIL				MAY				JUNE			
		WK 1	WK 2	WK 3	WK 4	WK 1	WK 2	WK 3	WK 4	WK 1	WK 2	WK 3	WK 4	WK 1	WK 2	WK 3	WK 4
1	Theme Selection																
2	Specify the target																
3	Condition analysis																
4	Cause analysis																
5	Countermeasures plan																
6	Implementation prevention																
7	Result Evaluation																
8	Standardization																

- **Theme Selection**

In light of the information above, it tends to be presumed that item abandons that frequently happen in the creation cycle of Milk Can 502 X 603 are Spilling, Oss Bubb voide/void, also powder voide /void.

- **QCC targets**

A decent objective must be sufficient SMART (Specific, Measurable, Achieveable, Reasonable, Time Oriented) components. Coming up next is a clarification of every component in the QCC target:

- Specific: Dispenses with the imperfections of OSS Air pocket, Void/Vacant.
- Measurable: The level of deformities in OSS Air pocket, Void/Void developed the most elevated in January 2019 at 1.71%, diminishing or in any event, vanishing to underneath 1%.
- Achieveable: The nature of Milk Can items 502 X 603 can be accomplished pass this QCC.
- Reasonable: Increment efficiency to contend on the lookout.
- Time Base: As per the course of events, a few stages ought to be trought first.

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- **Analysis of Existing Conditions**

In light of the consequences of the investigation with a causal chart, which is recognized into two kinds of variables that are straightforwardly included and factors that are not straightforwardly included, coming up next is the organization's method of managing the issue of the degree of imperfection in the item:

1. Forthright factor

a. Factor Machine (Machines)

• Grimy/ obsolete app roll.

• Capacity Parts/ the machine element help the OSS application. measure are not in acceptable state or are harmed.

b. Material Aspect (Material)

• Non-standard OSS material thickness level.

• Sort of OSS to be utilized for creation elements.

c. Aspect Method (Methods)

• Ill-advised application coil control methodology.

2. Indirect factors

a. Human Aspect (Man)

• Operator capabilities. The operator's capacity to work the machine and the operator's proficiency in deal with issues that happen while the creation cycle.

• Administrators don't follow SOPs. Standard Functional Cycles should consistently be the administrator's reference in action, so that everything moves properly.

b. Climate (Environment)

• The temperature of the working environment that influences the thickness of the OSS material.

Filthy workplace that can influence representative fixation.

- **Cause Analysis**

Subsequent to directing field perceptions, it is recognized the elements that influence the event of not accepted in Milk Can items Ø 502 X 603. In the wake of knowing the kinds of deformities that happen, it is important to find restorative ways to forestall the rise of a similar blemished item. As an instrument to discover the reasons for the blemished item, a circumstances and logical results outline is utilized to follow the most predominant kinds of deformities, which are as per the following:

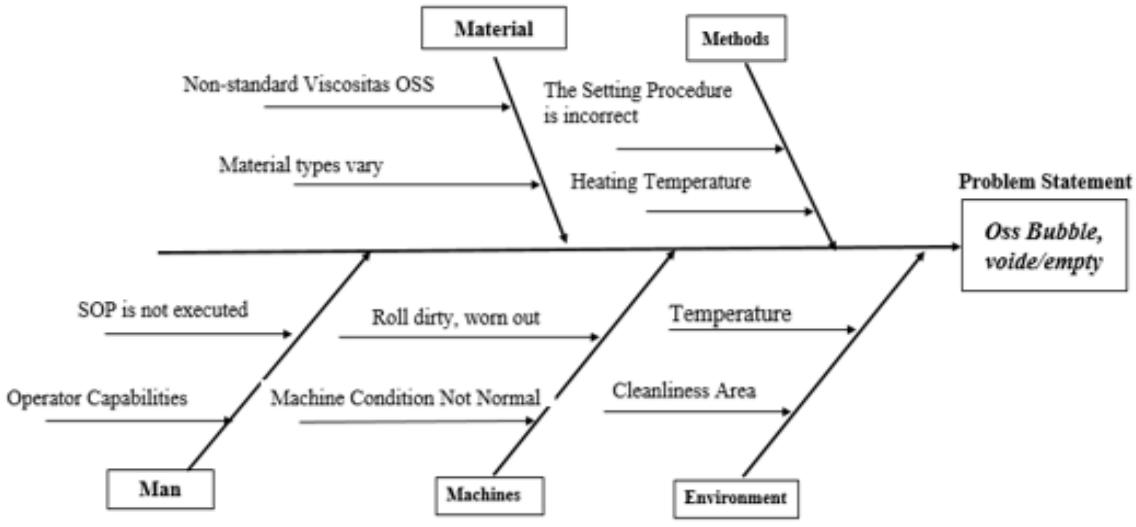

Figure 7 Fishbone diagram for OSS Bubble, Viode / empty

Table 4 Why why analysis

4M+1E	No	Why	Why	Why	Why	Why
Man	1.1	Not according to SOP	SOP has not been studied in practice	Lots of work	Less manpower	No budget yet to add employees
	1.2	Operator Capacity	New operator	Not much experience	Lack of operator training	No time for training
Machine	2.1	Dirty and Worn Roll	Because OSS is	Not often cleaned	Cleaning takes a	OSS applications

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		Application	easy to harden		long time	easily harden
	2.2	Machine condition is not standard	Belt is easy to wear	Often sticks with OSS	Unstable road	Lack of maintenance
Materials	3.1	Materials vary	Different types of materials	Different material layers	Plain and illustrated material	Following customer's request
	3.2	Different viscosity standards	The mixing of OSS ingredients is not the same	Air humidity	storage	Cleanliness of the place
Method	4.1	Heating temperature	Incorrect settings	Each material has a different temperature setting	Dirty crusty heater	Blower tersubat debu
	4.2	Incorrect settings	OSS application settings change frequently	Many cans are produced	OSS coating is easy to dry	Dirty app roll
Environment	5.1	Environmental temperature and cleanliness	Unstable temperature	Dust dirty environment	The place is not closed and uses AC	There is no budget to change building standards yet

- **Countermeasures Plan**

QCC's progression in the wake of looking for the establishment of the issue that is being able is to address the countermeasures which will be picked to beat the issue. The treatment intend to be done is spread in accompanying table.

Table 5 Dealing with Table for OSS Bubble, Void / Empty Causes

Items	Existing conditions	Damage effect	Potential causes	Preventive control design	Detection control design	Action recommendations	Target fulfillment achievement
Material factor	OSS Viscosity and OSS materials	Cause OSS problems, Like OSS Bubble, holes.	The mixing of OSS materials is still done manually.	Making standard mixing materials	OSS viscosity checking every hour by the operator.	• Filling out the OSS viscosity check sheet per hour • Automated mixing machine	Stable OSS Viscosity
Human Factors and Method Factor	Different OSS application settings for each operator	OSS applications are skewed, hollow, bubble, non-standard	Lack of knowledge about how to set the appropriate OSS application	Checks the application at the start of the shift and monitors application settings every hour.	*Check visual can after OSS application*	Created SOP OSS application setting procedure	OSS application settings by default
Engine Factor	Roll application dirty and worn out, engine condition is not standard	Cause OSS problems, Like OSS Bubble, holes.	Non-standard machine conditions result in operators often setting OSS applications	Perform periodic maintenance on the machine and the OSS application Roll	*Visual Check Machine Condition and Application Roll*	Carry out control and maintenance by technical	The machine is always in good condition so it doesn't interfere with the production process

- **Results Evaluation**

Meanwhile the QCC treatment, the imperfections of Oss Air pocket, Void/Fail are relied upon to diminish because of fixes, the two machines, strategies, and labor (administrators) who do the creation interaction.

- **Standardization**

➢ Direct preparing before administrators will be put in the get together cycle, particularly new administrators.
➢ The work interaction is completed as per the principles
➢ Administrators are needed to conform to work measure guidelines.

- **Proposed Improvement**

Table 6 Proposed Fix Utilizing 5W 1H

No	Factor	*what*	*When*	*Where*	*Why*	*Who*	*How*
1	Material	OSS Viscosity	during 2019	OSS storage area and OSS applications on the machine	The mixing of OSS materials is still done manually.	operator support	Filling the OSS Viscosity Check Sheet every hour Making mixing machine automatically
2	*Man and Method*	Different OSS application settings for each operator	during 2019	OSS app on bodymaker machine	Lack of knowledge about how to set the appropriate OSS application	*Operator*	Created SOP OSS application setting procedure
3	Machine	Application Roll wear and non-standard machine	during 2019	OSS app on bodymaker machine	Lack of maintenance on OSS application machine	*Maintenance and Operator Section*	Perform the control and maintenance by the maintenance department and Operators

V. CONCLUSIONS

From the aftereffects of information handling and examination that has been done, this investigation presumes that:

1. By utilizing the seven instruments, particularly the Pareto outline, it was at last tracked down that the reason for the deformity that influenced the quantity of rejects was Oss Bubbel, voide/empty with a percentage of 38.59%. After analyzing with fishbone diagram tools, the highest cause was due to unsteady OSS consistency, diverse OSS roll settings, administrator capacity to work the machine, and machine condition.
2. Suggestions for activities that should be carried out as an improvement exertion are as per the following:

➢ To keep up with the solidness of the OSS consistency, to produce accurate Satisfaction mix around diminish and veneer, an OSS blending the instrument is assembled through fitting piece.
➢ Direct normal preparing for all administrators, particularly for new administrators, along these lines lessening the danger of mistakes underway exercises. Just as preparing administrator discipline in executing and keeping the Standard Working Method (SOP) when doing creation exercises, just as expanding management in carrying out SOPs so they are as per what not really settled once more.
➢ To keep the machine in prime condition, it is necessary to carry out regular maintenance and control, especially in the OSS application section

SUGGESTIONS

In light of these ends and dissects, the ideas that can be given to the organization are as per the following:

1. After this research, it is hoped that future researchers can conduct research by including machine maintenance data.
2. Direct normal preparing for all administrators, particularly for new administrators, along these lines lessening the danger of mistakes underway exercises. Just as preparing administrator discipline in executing and keeping the Standard Working Method (SOP) when doing creation exercises, just as expanding management in carrying out SOPs so they are as per what not really settled.

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