A Study on Improving the 66% Production of ROHM CT-212 in line 4

College of Engineering and Technology
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A Practicum Study Presented to the Faculty of College of Engineering,
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For the Degree Bachelor of Science Industrial Technology

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Table of Contents

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

SPI Semicon Asia is a semiconductor production of all types of single –extruded PVC tubes, it's an anti static tubes use to protect the wirings; The Company's main machine use for this kind of production is extrusion machine.

In the production department, Extrusion machine has 4 parts the Melting, Molding/cooling, and a conveyor pulls the cooled PVC tube to a cutting machine with a standard size depends on the order, this study focuses on the low productivity of ROHM CT-212 and causing of time delays of delivery of the product and causing of low productivity. The extrusion machine used for producing ROHM CT-212 is operated only by one worker that monitors the output of the product this machine operates whole day with 3 shifts depends on the customers need. The machine that used to produce the ROHM CT-212 causes some errors and monitored by the er gineers. When it is in error or breakdown the engineers knows how to fix it because of knowledge of their past experience when facing in this kind of breakdowns.

ROHM CT-212 is one of the products that have a mass production ordered in the SPI Semicon Asia. That's why in this study, it is focused on how to minimize the low productivity of this product, and by gathering data and interviewing some persons who involved in the operation, in the ACA of this study, it will help the researcher and the company to minimize the low productivity and for some choices that will fit in the company in terms of economically and for more production of the tubes. In the in the gathered data, almost 66% of 6 months production is good, and the 34% is low, in this study, it will helps the company to minimize and to save money for the entire year buy the choice ACA.

1.2 COMPANY HISTORY AND PROFILE

SPI/ Semicon were formed in 1970 for the purpose of supplying products to the Semiconductor Industry. We manufacture products for the semiconductor front-end (wafer fabrication) and back-end (finished devices).

On August, 1999 SPI Semicon Asia, Inc. started its operation here in the Philippines located at the special economic zone with plant address at Bldg 7-9 Blk 3-4 PEZA Main Drive, First Cavite Industrial Estate SEZ Bgy. Langkaan Dasmarinas, Cavite. With a total land area of 3,655.03 sq.m., the factory is equipped with automatic design machines for producing shipping tubes for I.C.'s with in-line printing.

They design and produce products at our manufacturing sites in Utah and Philippines. We utilize plastic injection molding, extrusion and vacuum-forming processes for manufacturing our products Registered with the Securities and Exchange Commission on March 12, 1998 under SEC Registration No. A199803195.

Registered as an ECOZONE EXPORT ENTERPRISE on July 1, 1998 with the Philippine Economic Zone Authority, under Certificate of Registration No. 98-041.

BIR Registration No. 98-540-005256

SSS Identification No. 03-9112986-5

MANUFACTURING AND EQUIPMENT LIST

- 2-65 mm, Davies Automatic Extruding Machine, with in-line printing.(only one with wet vacuum set Up)
- 2-65 mm, Tyng Sheng Automatic Extruding Machine.
- 6-40 &55 mm Semi-automatic Extruding Machines(original Federated Equipment but already overhauled by SPI)
- 1-65 mm Semi-automatic Extruding Machine(in house built)
- 1-40mm Semi-Automatic end plug extruder (in house built)
- 1 unit Profile Projector
- Ultrasonic recycling In Line Machine for cleaning/dipping wafer containers, Jedec and die chip trays, tubes & other plastic material for the Semiconductor and Electronic Industry
- 2-Crushing Machines
- Mixer
- Anti-static Applicator
- Silk-screen Printing
- Air Compressors
- Chillers
- Cooling Towers
- In-house Machine Shop (Latte Machine-1, Grinder Machine-1, Milling Machine-2)
- LPG operated forklift

1.3 PROBLEM STATEMENT

The SPI Semicon Asia is experiencing of 66% productivity of ROHM CT-212 in line 4 from June to November 2008 results to an average loss of P 579,698.00 per annum.

1.4 OBJECTIVES OF THE STUDY

General Objective

- To Increase the 66% productivity of ROHM CT-212 in Line 4 by 15%.

Specific Objectives

- To produced more Output in Line 4
- To ensure proper monitoring of Line 4 from first shift to the last shift.
- To improve the preventive maintenance of the machine in Line 4

SIGNIFICANCE OF THE STUDY

I intend to provide information and some necessary documents that would help the following entities:

Students

I have gained enough knowledge and ideas on how to handle some situations in the company that will serve as a guide on their studies and also to be familiarized with the problem that will encounter in the near future.

Researchers

This study helps the researchers to think more independent and it serves as an exposure to gain additional knowledge that can be an eye opener on the near future, because this will serve as a background or tool for future proposal or study to become professionals.

Company

This Study will help the company see the current problem they are facing and to have an ideas on how to solve it especially regarding to their machines.

1.5 SCOPE AND LIMITATION

The scope of this company focused on the low production output of Rohm CT-212. due to machine breakdowns and rejects this was been supported through six months data from June to November, from the production output of the data of the machine, the production time per month frequency of machine breakdown and the different factors that contribute in the low production of the company.

This study will not cover the other products and other factors that contribute low production to the company

1.6 METHODOLOGY

This study conducted at SPI Semicon Asia used the descriptive method of the research. The data gathered in the said company was through observation during the operation on the extrusion machine and an interview with the maintenance and assigned operator.

A. Observation

The researcher mainly focused their observation of the extrusion machine in the production area, which is the main machine used to produced ROHM CT-212, the researcher observed that the machine is having some difficulties that heading to breakdowns causing low productivity of the product and there is only three maintenance in the area.

B. Interview

The interview was conducted in the production area of SPI Semicon Asia on our on job training, we interview the head of maintenance Mr Lito Santiano about the machine in line 4 on its current condition because we observed that line 4 is causing to much time for set up before the operation. Other than the extrusion machine line 4 has the largest idle time of all.

C. Research

These where the methods used by the researcher in gathering data, we ask on the operator assigned that day on how much time consumed in set up before it starts an operation, we gathered recorded data from the maintenance department on how many breakdowns happens in the machine in line 4, the actual product produced and the target product that need to produced.

D. Consultant

The researcher consulted Mr Lito Santiano, the maintenance head of SPI Semicon Asia to have an idea about the possible causes of the low productivity of ROHM CT- 212

Definitions of Terms

•***Productivity*** – the relative efficiency of economic activity that is, the amount of products or services produced compared to the amount of goods and labor used to produced it.

•***Extrusion*** - is a process used to create objects of a fixed cross-sectional profile. A material is pushed or drawn through a die of the desired cross-section. The two main advantages of this process over other manufacturing processes are its ability to create very complex cross-sections and work materials that are brittle, because the material only encounters compressive and shear stresses. It also forms finished parts with an excellent surface finish.

•***Anti Static*** - Preventing or inhibiting the buildup of static electricity.

•***Hot extrusion*** - is done at an elevated temperature to keep the material from work hardening and to make it easier to push the material through the die. Most hot extrusions are done on horizontal hydraulic presses that range from 250 to 12,000 tons. Pressures range from 30-700 MPa (5,000 to 100,000 psi), therefore lubrication is required, which can be oil or graphite for lower temperature extrusions, or glass powder for higher temperature extrusions. The biggest disadvantage of this process is its cost for machinery and its upkeep

•***Cold extrusion*** - is done at room temperature or near room temperature. The advantages of this over hot extrusion are the lack of oxidation, higher strength due to cold working, closer tolerances, good surface finish, and fast extrusion speeds if the material is subject to hot shortness

CHAPTER II

PRESENTATION OF RELATED LITERATURE

Processing history in extrusion dies and its influence on the state of the polymer extradite at the die exit

Method is proposed to describe the processing history in extrusion dies and its influence on the state of the polymer after processing. The approach differs from conventional processing analysis, which uses the shear viscosity function to calculate pressure drop vs. flow rate relations. The approach also differs from heuristic analysis which tries to find empirical correlations between theological observations and processing behavior. The method is applied to the flow in annular extrusion dies. An integral constitutive equation is chosen to calculate the flow and to describe the flow history at the die exit as memorized. In the analysis, the kinematics is locally approximated by isothermal steady shear flow. The velocity and the velocity gradient are used to determine the Finger strain tensor, the path lines, and the residence times of the deforming material elements. Measures of the state of the polymer at the die exit are chosen to be the stress ratio $N_1/2\tau_{12}$ and the free recovery. The free recovery calculations presume that the extradite is chopped into small volumes of homogeneous flow history. The results of the calculations show the polymer very sensitively reacts to small changes of the die geometry. Important applications of this analysis are film blowing and blow molding, where the extensional behavior during the blowing process outside the die depends greatly on the preceding shaping process inside the die.

1

[1] Rauwendaa, Chris 2000, *"SPC Inspection Molding & Extrusion"* U.S. 2002

Quality control

Quality assurance

Quality assurance covers all activities from design, development, production, installation, servicing and documentation. This introduced the rules: "fit for purpose" and "do it right the first time". It includes the regulation of the quality of raw materials, assemblies, products and components; services related to production; and management, production, and inspection processes.

One of the most widely used paradigms for QA management is the PDCA (Plan-Do-Check-Act) approach, also known as the Shewhart cycle.

Failure testing

A valuable process to perform on a whole consumer product is failure testing, the operation of a product until it fails, often under stresses such as increasing vibration, temperature and humidity. This exposes many unanticipated weaknesses in a product, and the data is used to drive engineering and manufacturing process improvements. Often quite simple changes can dramatically improve product service, such as changing to mold-resistant paint or adding lock washer placement to the training for new assembly personnel. Failure testing or destructive testing is a valuable tool of earthquake engineering.

Statistical control

Many organizations use statistical process control to bring the organization to Six Sigma levels of quality, in other words, so that the likelihood of an unexpected failure is confined to six standard deviations on the normal distribution. This probability is less than four one-millionths. Items controlled often include clerical tasks such as order-entry as well as conventional manufacturing tasks.

Traditional statistical process controls in manufacturing operations usually proceed by randomly sampling and testing a fraction of the output. Variances of critical tolerances are continuously tracked, and manufacturing processes are corrected before bad parts can be produced.

Company quality

During the 1980s, the concept of "company quality" with the focus on management and people came to the fore. It was realized that, if all departments approached quality with an open mind, success was possible if the management led the quality improvement process.

The company-wide quality approach places an emphasis on three aspects:-

1. Elements such as controls, job management, adequate processes, performance and integrity criteria and identification of records
2. Competence such as knowledge, skills, experience, qualifications
3. Soft elements, such as personnel integrity, confidence, organizational culture, motivation, team spirit and quality relationships.

The quality of the outputs is at risk if any of these three aspects is deficient in any way.

The approach to quality management given here is therefore not limited to the manufacturing theatre only but can be applied to any business activity:

- Design work
- Administrative services
- Consulting
- Banking
- Insurance
- Computer software
- Retailing
- Transportation

It comprises a quality improvement process, which is generic in the sense it can be applied to any of these activities and it establishes a behavior pattern, which supports the achievement of quality.

This in turn is supported by quality management practices which can include a number of business systems and which are usually specific to the activities of the business unit concerned.

In manufacturing and construction activities, these business practices can be equated to the models for quality assurance defined by the International Standards contained in the ISO 9000 series and the specified Specifications for quality systems.

Still, in the system of Company Quality, the work being carried out was shop floor inspection which did not control the major quality problems. This led to quality assurance or total quali[1]ty control, which has come into being recently.

[1] Robert, Scot "Wear Test for Plastic Selection and Use" Hill Publishing US

Total quality control

Total Quality Control is the most necessary inspection control of all in cases where, despite statistical quality control techniques or quality improvements implemented, sales decrease.

The major problem which leads to a decrease in sales was that the specifications did not include the most important factor, "What the customer required".

The major characteristics, ignored during the search to improve manufacture and overall business performance were:

- Reliability
- Maintainability
- Safety

As the most important factor had been ignored, a few refinements had to be introduced:

1. Marketing had to carry out their work properly and define the customer's specifications.
2. Specifications had to be defined to conform to these requirements.
3. Conformance to specifications i.e. drawings, standards and other relevant documents, were introduced during manufacturing, planning and control.
4. Management had to confirm all operators are equal to the work imposed on them and holidays, celebrations and disputes did not affect any of the quality levels.
5. Inspections and tests were carried out, and all components and materials, bought in or otherwise, conformed to the specifications, and the measuring equipment was accurate, this is the responsibility of the QA/QC department.
6. Any complaints received from the customers were satisfactorily dealt with in a timely manner.
7. Feedback from the user/customer is used to review designs.
8. Consistent data recording and assessment and documentation integrity.
9. Product and/or process change management and notification.

If the original specification does not reflect the correct quality requirements, quality cannot be inspected or manufactured into the product.

For instance, all parameters for a pressure vessel should include not only the material and dimensions but operating, environmental, safety, reliability and maintainability requirements.

To conclude, the above forms the basis from which the philosophy of Quality Assurance has evolved, and the achievement of quality or the "fitness-for-purpose" is "Quality Awareness" throughout the company

Chapter III

Presentation of Gathered Data

	June		July		August		September		October		November		Average	
	Hrs.	%	Hrs.	%	Hrs.	%	Hrs.	%	Hrs.	%	Hrs.	%	Hrs	%
Machine Start-up	10.01	20.02	20.02	17.47	49.96	25.33	44.31	23.69	20.08	17.90	22.43	19.01	27.80	20.07
Material Problem	13.34	26.68	22.448	19.6	37.69	19.11	39.35	21.04	21.86	19.49	24.76	20.98	26.57	21.15
Machine Problem	16.575	33.15	32.003	27.94	62.60	31.74	53.12	28.40	33.38	29.76	42.35	35.89	**40.04**	**31.14**
Tool Breakdown	10.075	20.15	40.062	34.98	46.96	23.81	50.29	26.88	36.85	32.85	28.45	24.11	35.44	27.13

Table 1 presents the factors of rejection rate; Machine Problem is the one who involves in the rejects that causing low productivity of good outputs in line 4 including the hours and the percentage taken from each causes of problem.

Machine Problem: Machines have difficulties in temperature and environmental problem like easily overheating during the operation

Tool Breakdown: During the operation. Sometimes the machine experiencing of changes of parts like cutter

Material Problem: Materials don't have enough monitoring for inspection before it goes in the extrusion machine.

Machine Start-up: Starting up the machine for operations delay.

_____

Mr.

Maintenance Department

Month	Actual Output	Target Output	Rejects	Percentage yield
June	3760	5769	2009	65%
July	2928	4902	1974	60%
August	4882	7019	2137	70%
September	4528	6718	2190	67%
October	3782	5783	2001	65%
November	4153	6176	2023	67%
Total	**24,033**	**36,367**	**12,334**	**66%**

Table 3: Production time of Extrusion machine in Line 4

Months	June	July	August	September	October	November	Total	Average
Target Production Time (Hrs)	115.20	576.00	576.00	460.80	230.40	576.00	2534.40	422.40
Actual Production Time (Hrs)	65.20	460.88	378.85	273.77	118.25	458.01	1754.97	292.50
Downtime	50.00	115.12	197.15	187.03	112.15	117.99	779.43	129.90

Table 3 shows the production time of extrusion machine in line 4 for 6 months (June – November 2008) The data shows the downtime consumed every month, the downtime every month is computed as follows

Down time = Target (hrs) – Actual (hrs)

The computation shows that the company was consuming a 779.43 wasted hours for six months which really affected the output produced in the production of extrusion machine in Line 4

Table 4. Man – Machine Ratio of Line 4 Extrusion machine

Table 4 shows that there are time that the machine is idle. In the line 4 machine, shows that it has the longest time of idle than the 3 machines.

TIME(2nd Shift)	Set up of Machine	Front Line Machine				
		Line 1	Line 2	Line 3	Line 4	Line 5
8:00am-8:45am	-Maintenance of Machine.	Set up of the machine before the Operation	Set up of the machine before the Operation	Set up of the machine before the Operation	Set up of the machine before the Operation	Set up of the machine before the Operation
	-Set-up of extrusion Machine 1					
8:45am-9:00am		**Idle**			**Idle**	**Idle**
	-Set-up of Extrusion Machine 2		**Idle**	**Idle**		
9:00am-9:30am		*Production*				
	-Setup of Extrusion Machine 3					
			Production	*Production*		*Production*
9:30am-10:00am						
	-Set-up of Extrusion Machine 4					
10:00am-10:30am					*Production*	
	-Other activities					
10:30am-onwards						

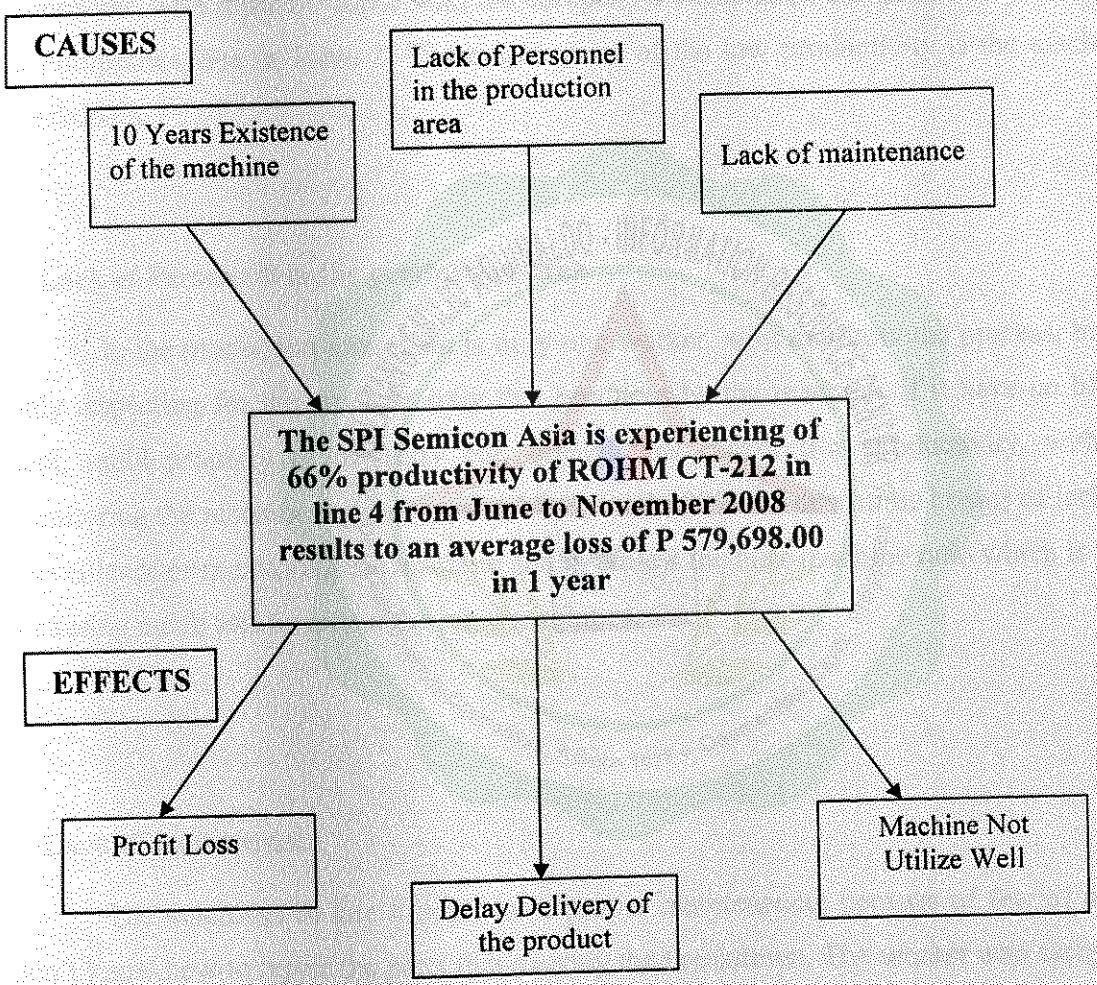
Ms. Theresa Magnanao

Production Department

Chapter IV

Analysis of Data

Problem Tree



CAUSES

1. 10 Years of Existing of the machine.

Line 4 Extrusion machine is a machine that used to make ROHM CT-212 for holder of semiconductors chips. This machine was purchased in Taiwan, in the year of 1999. It was continuously used for 3 shifts/day depends on the order of the other companies. This machine copes with the company's expectation for almost 10 years here in Philippines, See in Table 1. The major cause of the low productivity is the machine breakdown.

2. Lack of Personnel in the production area.

In the production area there is only one worker, who monitors the process, but it only inspecting for the products only that produces by the machine, if it have no black spot, mold properly or perfectly cut, breakdowns causes low productivity, without monitoring the machine regularly; see table 3, total of 779.43 downtime causes of lack of surveillance or monitoring the machine and in table 4 the man-machine ratio which is line 4 causing much idle time than the other machines.

3. Lack of maintenance

The machines in line 4 don't have proper maintenance; because of few of them don't know how to repair the parts that causing the breakdown. The worker who assigned that day is only monitoring the products that have been produced in the operation he have no idea on how to solve this kind of problem. And there is no procedure on how to prevent it from the breakdown,

EFFECTS

1. Profit Loss

Because of 10 years existence of the machine. Machine breakdowns happen always were there is an operation; half a million per year is wasted of products due to not reaching its quotas because of the breakdowns happening in the 6 months data of the machine.

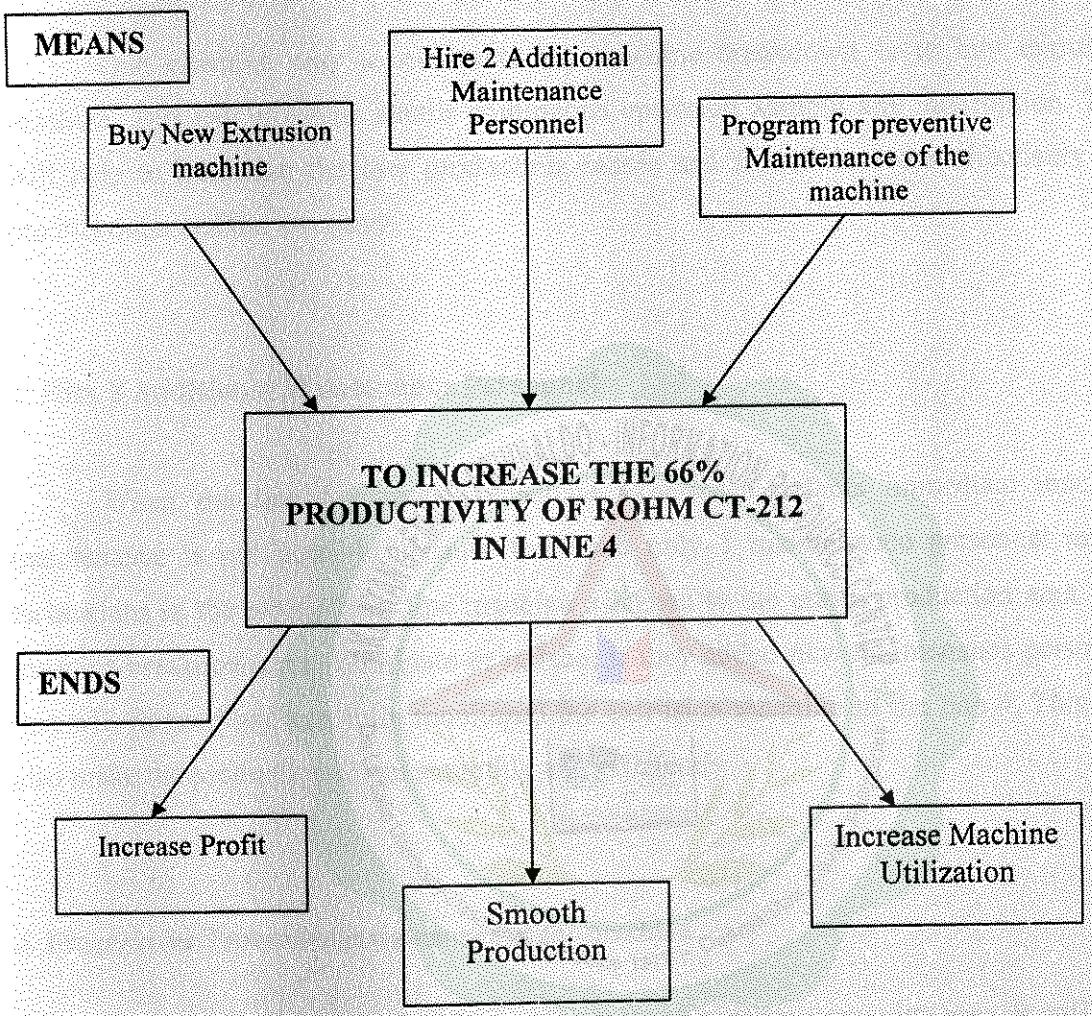
2. Delay Delivery of the Product

Because of lack of personnel who monitors the production, the operation having difficulties in production because of downtime of the machine. In table 3. Total of 779.43 average of downtime of the machine, instead of the full time of production to meet the delivery, it is causing the 34% low of productivity because of this downtime.

3. Machine Not Utilize well

Because of the breakdown of machine due to lack of maintenance, instead of operation in the 1st day, they were doing it on the next day because of the machine that causing low productivity and didn't reach the quota of that day. And they need to finish the order that before it meets the deadline because of the breakdown occurred.

Objective Tree



MEANS

1. Buy new Extrusion machine

One effective way to eliminate the machine breakdown is to buy extrusion machine. This new machine entails continuous operation without any interruption. This will help to minimize the low production causes and it will increase effectively the product output of the company.

2. Hire 2 Additional Maintenance Personnel

When the line 4 extrusion machine experience defects immediate machine maintenance is not possible because there are only 1 maintenance personnel and 2 technicians in the whole front line machine assigned to the entire production area. The machine breakdown may eliminate or reduce, if they added new maintenance personnel that will focused and can fully monitored the extrusion machine in the line 4. This will also make the production to run smoothly and efficiently

3. Program for Preventive maintenance of the machine

If there is a program plan like seminars for the entire production area, it will be a big help for the workers and it will benefits to them as knowledge in preventing the breakdowns of the machine. They will teach basics steps on how to prevent or to solve different problem situations.

ENDS

1. Increase Profit

When buying new machine, it is more productive than the previous operation because it can avoid continuously breakdown of the machine. And produce more tubes that can minimize the 34% low Productivity in line 4.

2. Smooth Production

When hiring new personnel, the machine can monitor regularly to avoid machine problem causing low productivity and when breakdown happen. It can easily fix and return to the operation without large amount of downtime, they can focused on the operation of the machine in line 4 to produce more tubes.

3. Increase Machine Utilization

It can avoid large time of downtime when there is a plan of prevention of the machine, by checking it regularly, they can monitor in what specific part of the machine is in trouble and for allowing the personnel get ready on the situation when the machine for continuing the operation in time.

Chapter V

ALTERNATIVE COURSE OF ACTION

1. Buy new Extrusion machine.

This alternative proposes buying a new extrusion machine. This will give the company loss of benefit but the main purpose of this alternative is to reduce or can be eliminate the 34% of rejects experienced by the company and to increase the 66% productivity. This will increase the output produced every month and will have a smooth flow of operation in the production. Though, this alternative entails a higher cost.

Advantages

- Increase the 66% productivity
- Increase product output
- Eliminate idle Time
- Produce productive worker

Disadvantage

- Incurs high cost
- Demands operator's familiarization with a training using the new machine
- Takes time for Ordering and Installation
- Takes a long payback period

2. Hire Additional two (2) Maintenance Personnel

This alternative proposes an additional 2 maintenance personnel. Having 1 maintenance personnel and 2 technicians is not enough for the whole production, therefore, hiring 2 more maintenance personnel will maximize the monitoring in the molding area. This is to have maintenance to fully focus and monitor the machine. This is to eliminate/minimize machine problems or breakdowns that causing low production. The productivity can increase by 15.27% when hiring 2 more personnel .

Advantage

- Increase the Productivity in Line 4
- Smoothens production.
- Maximize the monitoring
- Increase product output

Disadvantages

- Requires Additional Cost
- Need to train maintenance for familiarization of the machine.

3. Program for Preventive maintenance of the machine.

This alternative is to make a Seminar, preventive check sheet per month in the extrusion area; the check sheet is compromise of the machine parts, Machine controls how can it be maintain, safely requirements, and changing its part. Maintenance personnel's will benefit knowledge about the machine. This will also produce and effective preventive maintenance that will minimize the machine problem and increase the production output of the company

Advantages

- Minimize the Machine Problem
- Increase the Productivity
- Smoothens Production
- Increase production

Disadvantage

- Incurs cost of the company
- Time Consuming
- Additional Expenses of the company

Cost Benefit Analysis

ALTERNATIVES	TOTAL COST PHP	BENEFIT	
		TANGIBLE	INTANGIBLE
Alternative 1 Buy new Extrusion Machine.	P 914,924.5	•Increase the Productivity up to 95% of the machine •Increase the profit by P 559,339.2	•Comfortably using the machine
Alternative 2 Hire Additional two (2) Maintenance Personnel	P 46,077.04	•Increase the Profit by P 531,372.254	•Smooth Production
Alternative 3 Program for Preventive maintenance of the machine	P 87, 077.04	•Increase the profit by P 422,218.16 P 422,218.16	•Effective preventive maintenance •Active Members

Computation of cost

Alternative 1 (Buying)		
	•New Extrusion machine	P 600,000
	•Shipping of machine	P 150,000
	•Installation	P 20,000
	•Company Loss: 12 weeks (3months)	P 144,924.5
Total		**P 914,924.5**
Alternative 2 (Adding)		
	•Hire New Maintenance Personnel	P 24,000
	(3 Maintenance x 8000 per month)	
	(400per day x 24 days)	P 10,000
	•Training for 1 week	P 12,077.04
Total	•Company Loss: 1 week	**P 46,077.04**
Alternative 3 (Program)	• Seminar (Trainer/Lecturer + Supply)	P 500.00/ day +P 100.00/ day P 600.00/ day
		P 600 x 5 days =P 3000
	•Salary of 36 operators (3 shifts)	14,400/day x 5 days = P 72,000
		= P12,077.04
	•Company Loss: 1 week	**P 87,077..04**

Cost Benefit Analysis Computation

Alternative 1: Buy new Extrusion machine

•Capacity per hour	= 480 units per hr.
•Selling price	=P 23.50
Fixed Cost	=P 20.00
Variable Cost	=P 3.50
•Average Downtime	=129.90 hrs
•Average % machine problem	=31.13 %

Machine Breakdown

= Average Downtime x Average % of machine problem

= 129.90 hrs x .3113

= 40.44 hrs

Actual production time without machine problem

= Average actual production time + machine breakdown

= 292.50 hrs. + 40.44 hrs

= 332.94 hrs

Sales

=Actual Production time w/out machine problem x Selling price x capacity per hr.

= 332.94 hrs x P23.50 x 480 units per hour

=P 3,755,563.2

Profit

=Actual Production time w/out machine problem x variable price x capacity per hr.

= 332.94 hrs x P3.50 x 480 units per hour

=559,339.2

Alternative 2: Hire Additional two (2) maintenance

- Capacity per hour = 500 units per hr.
- Selling price =P 23.50

Fixed Cost =P 20.00
Variable Cost =P 3.50

- Average Downtime =129.90 hrs
- Average % machine problem =31.13 %

Machine Breakdown

= Average Downtime x Average % of machine problem

= 129.90 hrs x .3113

= 40.44 hrs

Actual production time without machine problem

= Average actual production time + machine breakdown

= 292.50 hrs. + 40.44 hrs

= 332.94 hrs

Average Output:

= Actual Production time w/out machine problem x capacity per hr

= 332.94 hrs x 38 units /hr

=12,651.72 units

Sales

=Average Output x selling price

= 12,651 units x P23.50

=P 297,298.2

Profit

=Actual Production time w/out machine problem x variable price x capacity per hr.

= 332.94 hrs x P3.50 x 38 units per hour

= P 44,281.02

= P 44,281.02 x 12 months

= P 531,372.24

Benefit

=Profit – Cost

= P 531,372.24 - 46,077.04

= P 485,295.2

Alternative 3: Program for Preventive maintenance of the machine

•Capacity per hour	= 500 units per hr.
•Selling price	=P 23.50
Fixed Cost	=P 20.00
Variable Cost	=P 3.50
•Average Downtime	=129.90 hrs
•Average % machine problem	=31.13 %

Machine Breakdown

= Average Downtime x Average % of machine problem

= 129.90 hrs x .3113

= 40.44 hrs

Actual production time without machine problem

= Average actual production time + machine breakdown

= 292.50 hrs. + 40.44 hrs

= 332.94 hrs

Average Output:

= Actual Production time w/out machine problem x capacity per hr

= 332.94 hrs x 38 units /hr

=12,651.72 units

Sales

=Average Output x selling price

= 12,651 units x P23.50

=P 297,298.2

Profit

=Actual Production time w/out machine problem x variable price x capacity per hr.

= 332.94 hrs x P3.50 x 38 units per hour

= P 44,281.02

= P 44,281.02 x 12 months

= P 531,372.24

Benefit

=Profit – Cost

= P 531,372.24 - 46,077.04

= P 485,295.2

Chapter VI
CONCLUSION AND RECOMMENDATION

Conclusion

SPI Semicon Asia is striving for more sufficient, less time consuming method and is finding way on how to increase the 66% production rate of line 4 in production area; The Company's product output was greatly affected because of the problem.

I concluded and formulate different alternatives but will help to resolve the problem in the company; these alternatives were analyzed. The researcher decides to choose alternative 1: buy new extrusion machine because the machine problem/breakdown causes affected the productivity in line 4. Having new machine can avoid the low productivity in the near future

Recommendation

The researcher highly recommended applying 2nd course of action as an immediate action, which is to add 2 more individual maintenance personnel to maximize monitoring of the extrusion machine especially in line 4 for corrective maintenance, with 15% more productive. The semiconductors are down. That's why in SPI Semicon cannot produce more product to sell. So there is no way to apply the first ACA: buying new extruder machine because of its high cost and long time of pay back.

In addition to this, the researcher recommended the company to save money to buy new machine to be more productive in the new future.