Reduction of Soldering Defect of NSK-A125 Product in Cavite Nagano Seiko, Incorporated

Presented to the Faculty of College of Technology

De la Salle University- Dasmariñas

Dasmariñas, Cavite

In Partial Fulfillment of the Requirement on the Course

Bachelor of Science in Industrial Technology

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ABSTRACT

Name of Institution: **De la Salle University- Dasmariñas**

Address: **Dasmariñas, Cavite**

Title: **Reduction of Soldering Defect of NSK-A125 Product in Cavite Nagano Seiko, Incorporation**

Author/s: **Alcantara, Reynaldo** and **Manansala, Leo**

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Objective of the study

General:

- Produce 100% quality assured product to the next line process.
- Minimize rework and costly production.
- Produce good quality product for delivery on time.
- To avoid overtime of employee just to reach target output.
- Avoidance of defective product processed up to the last process.

Specific:

- Reduction of soldering defect on NSK-A125 products from 66.43% up to 2.99% (based on the Quality Policy given by the Japanese Staff) from the total defect contribution of soldering.

Scope and limitations

The study was focused to the one of the various product manufactured by the Cavite Nagano Seiko Inc. This product was named NSK-A125. Die-casting has the same process only varies to the machine set-ups and mold used. Since NSK-A125 is just one of many

products produced by CNSI and with limited machine capable to manufacture this type of product, the study limits in time due to schedule of production. The study limits in 3-days inspection done by final inspection (January 2,3 & 5, 2002) with the 20 lots of NSK-A125 product.

In terms of data collection, the primary basis of this study was the FI report, because it is the only process where GOOD and NO GOOD report exist plus the type of NG defect. The study was also limited because of confidentiality and conformity of the data. Most of the data accumulated were manually filled out and the researcher was not in control to confirm if the information was true or not. It means that this study was just based on the data collected.

Since the study was about the defect occurred during final inspection, particularly to soldering defect, most of the study was done in the die casting section where the nature of defect exist during casting of product.

Most of the data was presented graphically because it is originally patterned in a QCC Story done by the researchers and it is only adapted to the format given by the institution where this study is to be presented.

Methodology of the study

Informations and possible solutions to this study were being found out by using methodologies that would fit the need of the study. Primary concept used is the application of Quality Control Circle story (QCC). Such as tools and techniques used in making QC story were used- paretto diagram, ishikawa diagram, histogram, Gantt chart, and other graphical tools, which were adapted from the confidential source institution. In this study, researchers used to survey, conduct interviews, checked standard time, and actual observation of the factors that contribute to the defect occurrence in the product,

NSK-A125, problem that arises in the Casting section. The researchers were observing machines used in the production with its operators and determining the possible factors that cause the problem. Statistics were being treated using formulas:

For No Good Product Percentage

G+NG=TPI/day

NG/TPI x 100%=%NG/day

Where:

G= Good Products

NG = No Good Products

TPI/ Day = Total Products Inspected/Day

For No Good Type Percentage

CNG/TNG x 100%= %NG

Where:

CNG = Contributed NG

TNG= Total NG (834)

%NG= NG Rate

Major Findings

Figure 1. Process Flow Chart

Studying and reviewing the flow process chart will give an idea from where the researchers concentrate. In this table, the researcher indicated the part of the process where they investigate and their point of concentration to solve the problem.

The problem in the high rate of soldering defects exists in die casting process as the respondent input to the researchers. As the researcher investigates, they found out that soldering defect exist during casting period which was found out in final inspection.

Providing manual for defects will give knowledge to the new operators and even the regular operators who do not know the nature and cause of defects. The manual may teach them on how to avoid the possible causes of existence of defect that results to a higher productivity with high quality.

No regular check ups by inspectors is one of the problems. Inspection is very significant to each process; this is to secure the quantity of product. By having scheduled inspection, operators will be required to produce products with high quality to meet the customer demand. Work Instruction Sheets (WIS) should be followed because of the scheduled checking.

Posting WIS will give knowledge to operators and will serve as their guide whenever they forgot the standard procedure of the operation. Compliance of the WIS would mean a good operation and a Good product for a soldering defect free casting products.

With all the alternatives of the problems associated in the presence of soldering defects in the NSK-A125 product of CNSI, soldering defects will be decreased or even eliminated to prevent delay of the delivery of the product that CNSI do not want to happen anymore.

APPROVAL SHEET

This thesis entitled **"Reduction of Soldering Defect in NSK-A125 product in Cavite Nagano Seiko, Inc."** prepared and submitted by **Alcantara, Reynaldo, Reynoso** and **Manansala, Leo, Delaric**, in partial fulfillment of the requirements for the degree of **Bachelor of Science in Industrial Technology**, has been examined and recommended for acceptance and approval for oral defense.

ENGR. MARLUNA URUBIO
Adviser

Research Review Panel

Approved by the Committee on Oral Defense with a grade of _____.

_____ Member

_____ Member

ENGR. MARLUNA URUBIO
Chairman

Accepted and approved in partial fulfillment of the requirement for the degree of Bachelor of Science in Industrial Technology.

ENGR. MARLUNA URUBIO
CRC Chairman and College Dean

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Chapter 1

Problem and Its Background

Background of the study

"Quality is an ideal that is difficult to define. Sometimes you just know when you see it. In simple yet profound terms, quality means doing the right things right and is uniquely defined by each individual".[1] If you do things right it is congruent to the efficiency of your work and doing things right is equal to effectiveness. Efficiency and effectiveness are mutually exclusive terms; in other words, "you can do right things wrong or the wrong things right". [2]

Cavite Nagano Seiko Inc. (CNSI) is a part of the Nagano Seiko Group, established in 1995 to produce gearboxes and aluminum die cast parts, experienced numerous of opportunities for the things go wrong in casting operation for their new product, named NSK-A125, resulting in quality defect.

NSK-A125 is new to the company. The whole Production Control and Quality Assurance Sections are having hard time in solving their problem in existing too much defect; moreover, it was detected during the last process before packing that makes their delivery delayed. During the investigation of the problem, soldering defect contributes large quantity of defect in final inspection for three days, which is equal to 20 lots (see Graph 3). The researchers tried to solve the problem using different approach and in different point of the process, instead of focusing on the Final Inspection (FI) the researchers focused their study in the die casting process. Because the nature of the defect (soldering) originates in the casting process due to different factors, man, method, machine, materials and environment.

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[1]Timothy Clark, *Success Through Quality*, What is Quality and How is it Achieved? ASQ Quality Press, 1999, pp. 7
[2]Ibid.

To Production Control Section. Since this section is responsible for the monitoring the products, orders of the customers, and schedule of production, this study may help them for easier job particularly to the NSK-A125 since this is a new product.

To the Die Cast Section. This study may help them to solve their problem against soldering defect and even the other defects that existing in their section since here was the first process and most of the defect occur in die casting process.

To the QA Section. Where the final inspection was done. They can be beneficiary of this study by allowing the inspectors to avoid having re-inspection of the NG products, and that will also allow them to inspect more products for delivery.

To the researchers. Once again the researchers used theories learned from school that gives them a clearer view on their future job on chosen field. Through this study the researchers felt the fulfillment in taking B.S. Industrial Technology for almost four years. The challenge given by this study to the researchers gave them determination, courage and self- confidence as they pursue it to finish.

To the readers, especially other Industrial Technology students and other related courses. This study may help them to foresee what is happening inside the production. This may give additional knowledge on how to deal with related problems applying the theories taught them by the professors.

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%NG= NG Rate

Definition of terms

DC- die casting process

MT- manual trimming process

SB- shot blasting process

CT- cutting process

FI- final inspection

PD- packing delivery

Rekesai- an automated spray host that sprays lubricant with other chemical to prevent the existence of carbon that lead to soldering defects.

3. Process improvement. This requires collection and use of data about process problems. This requires: (f) Training supervisors and operators in how to measure quality, collect quality data and analyze quality statistics in order to isolate causes; (g) Formally organize quality team for improvements who will make projects aiming to deficient processes capable and fail- safe; thus we return to step 1.[3]

The Role of Inspection

According to Jay Heizer, (1993) to make sure an operation is producing at the quality level expected, inspection of some or all of the items are needed. The inspection can involve measurement, tasting, touching, weighing, or testing of the product (sometimes even destroying it when doing so). Its goal is to detect unacceptable quality levels before a bad product is produced. Inspection does not, however, correct deficiencies in the system or defects in the products; nor does it change a product or increase its value.[4] Inspection is very important in a manufacturing firm or even in other aspect of life. Everyone should inspect his or her selves (product) to insure the quality and to easily detect any existing defect in order to take action about it.

There are three basic issues relating to inspection:

1. how much and how often to inspect;
2. when to inspect;
3. where to inspect.[5]

[3]Ibid. pp. 89
[4]Jay Heizer, et. al, *Production and Operations Management 3rd edition,* The Role of Inspection, Simon and Schuster Inc., (1993) pp. 748
[5]Ibid.

Casting Defects

According to Groover (1996) "there are numerous opportunities for things to go wrong in a casting operation, resulting in quality defects in the cast product". [6]

Some defects are common to any and all casting processes.

a. Misruns. A misruns is a casting that has solidified before completely filling the mold cavity. Typical causes include (1) fluidity of the molten metal is insufficient, (2) pouring temperature is too low. (3) pouring is done too slowly, and/ or (4) cross section of the mold cavity is too thin.

b. Cold shut. It occurs when two portions of the metal flow together, but there is lack of fusion between them due to premature freezing. Its causes are similar to those of a misrun.

c. Cold shots. When splattering occurs during pouring, solid globules of metal are formed that become entrapped in the casting.

d. Shrinkage cavity. This defect is a depression in the surface or an internal void in the casting caused by solidification shrinkage that restricts the amount of molten metal available in the last region to freeze.

e. Microporosity. This refers to a network of small voids distributed throughout the casting caused by localized solidification shrinkage of the final molten metal in the dendritic structure.

f. Hot tearing. This defect is manifested as a separation of the metal at a point of high tensile stress caused by the metal's inability to shrink naturally.[7]

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[6]Mikell P. Groover, *Fundamentals of Modern Manufacturing: materials, processes and systems,* Casting Quality, Prentice- Hall, Inc. New Jersey, (1996) p. 285
[7]Ibid.

Total Commitment is Expected of Employees- and is given

According to John Lorriman and Takashi Kenjo (1994), "there is strict discipline in Japanese companies. There is no smoking or consumption of alcohol on company premises, and absenteeism is heavily frowned on. Sickness absence normally has o be taken out of one's holiday entitlement". [8]

Companies encourage employees to remain on the premises at lunchtime by providing heavily subsidized meals, and often provide only one choice of menu each day in order to avoid wasting the employees' time in choosing between menus. To speed up lunches many canteens have yellow lane to guide the employees.

Total commitment is expected of employees and usually given.

Enrolling Others in the Vision

According to Joel Barker, in his video *Discovering The Future: The Power of Vision,* that there are guidelines for developing common vision:

1. It must be developed and driven by leaders. Leaders must talk with and listen to their followers, but leaders alone must develop the vision.
2. Leaders must share the vision with their followers, who must agree to support it. Understanding and support equal agreement. This focus improves decision-making.
3. The vision must be comprehensive and detailed. It must identify how everyone will contribute and participate.
4. The vision must be positive and inspiring. It must have reach and be worth the effort.[9]

[8]John Lorriman and Takashi Kenjo, *Japan's Winning Margins: Management, Training and Education,* Management and the Commitment of Employees, Oxford University Press Inc., (1994) pp. 96
[9]Joel Barker, *Discovering The Future: The Power of Vision,* Enrolling Others to Vision,

In regard to the role of values in a vision, Barker states that values are the way to measure the rightness of the vision's direction. He also emphasizes the importance of combining management (action) and leadership (vision) to achieve individual, organizational, national, and world visions. He summarizes their relationship as follows:

Action without Vision just passes time. Vision without Action is just a dream. Action without Vision can change the world.[11]

The quote means that vision should be taken with action to be tangible and realistic to start up an improvement for such process.

Economics of Inspection

According to Frank Gryna's book of "Quality Planning and Analysis"(2001), there are many ways and alternatives to evaluate lots. With this comes the economics of inspection. In their study, the company

1. No inspection. This approach is appropriate if prior inspections on the same lot have already been made by qualified laboratories, e.g. in other division of the same company or in supplier companies. Prior inspections by qualified production workers have the same effect.[12]

2. Small samples. Small samples can be adequate if the process is inherently uniform and the order of production can be preserved. For example, in some punch press operations, the stamping dies are made to a high degree of stability. As a result, the successive pieces stamped out by such dies exhibit a high degree of uniformity for certain dimensional characteristics. For such characteristics, if the first and last pieces are correct, the remaining pieces are also correct, even for lot sizes running to many thousands of pieces. In its generalized form, the press example is one of a high degree of

[11] Ibid.
[12] Frank Gryna, *Quality Planning and Analysis,* Economics of Inspection, McGraw-Hill Inc. New York, (2001) p. 185

process capability combined with stratified sampling, sampling based on knowledge of the order of production.

Inspection is very important even what type of inspection it is, sampling or large inspection. Through this activity quality can be monitor in every stage or process that the materials passing through. Putting no inspection in the process is critical wherein quality and cost is at stake.

Chapter 3

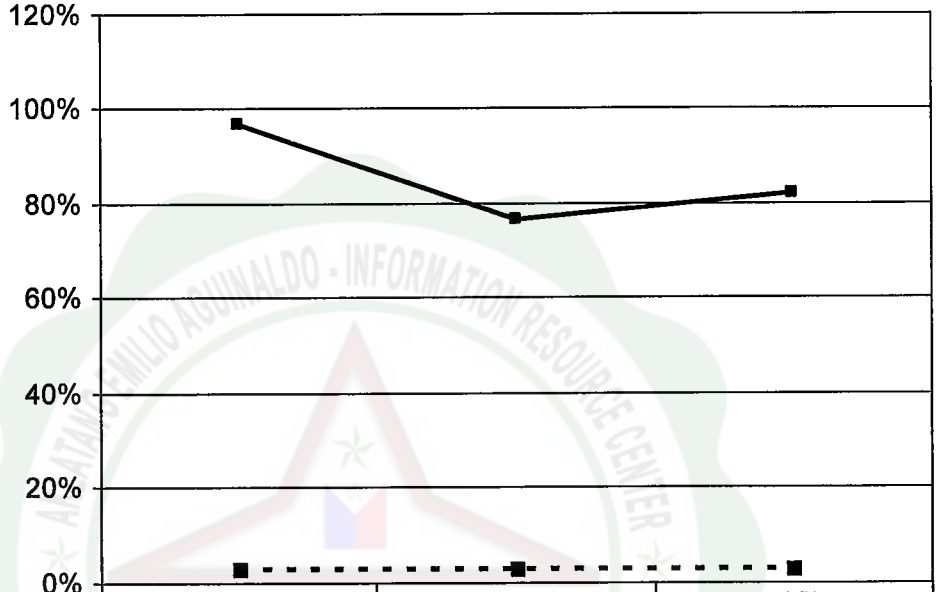
Presentation of Data

This chapter presents data showing the present condition in the CNSI regarding the problem of high rate of soldering defect in Final Inspection and analysis of the researchers using different QCC tools and techniques (graphs, tables, and figures) that will clarify the existence of the problem.

Chapter content:

- Flow process chart
- Histograph
- Bar Graph
- Paretto Diagram
- Why, why Analysis
- Ishikawa Diagram
- Cause Verification Matrix

Actual NG Rate of NSK-125 in Final Inspection



	1/2	1/3	1/5
actual NG	96.98%	76.69%	82.22%
planned NG	3%	3%	3%

Reference: Manpower Daily Output in Final

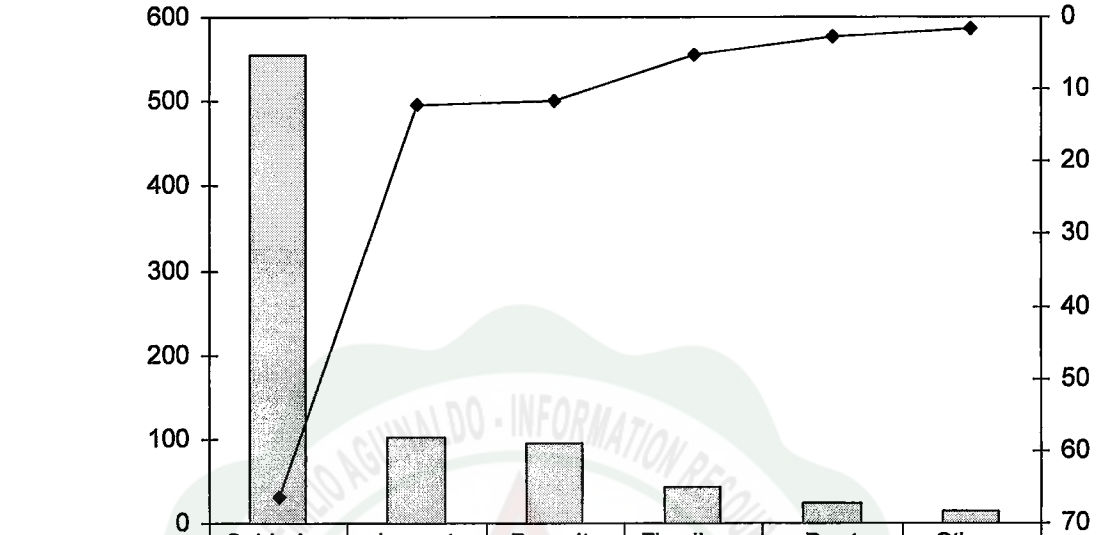
Graph 1.
This graph tries to show the reject product of NSK-125 as the final inspection inspect the product against the stated NG allowance by the Quality Policy and Japanese Staff.

Note:

The researchers studied only 3 days of inspection done by the Final Inspection (FI) but these 3 days inspection involves 20 casting batches.

The production schedule of the product was one of the researchers' delimitation because they do not have the control of such.

NG Type Contribution on NSK-125 Using Paretto Diagram



	Soldering	Inc. cut	Porosity	Flowlines	Dent	Others
contribution	554	102	96	43	24	15
percentage	66.43	12.23	11.51	5.16	2.88	1.79

Reference: Manpower Daily Output in Final

Graph 3.
Types of NG are shown in this graph with their contribution to the high rate of No Good product of NSK-125

Note: NG Types and its Causes
•Soldering (Yakitsuki) causes: (1)wrong use of molding die portion of aluminum & alloy;(2)carbon build- up in the mold; (3)Failure of Rekesai to spray the mold surface with lubricant.
•Incomplete cut- causes:(1) machine failure to set up the measurements required.
•Porosity (Su) causes:(1)different temperature of aluminum and temperature of molding die;(2)gas or air on aluminum;(3)lack of pressure at upper portion;(4)some of water or moisture soaking to aluminum;(5)overflow portion of molding design.
•Flow line (Yujiwa) causes:(1)low temperature of molded aluminum;(2)low injection pressure;(3)too much die lubricant;(4)small portion of gas;(5)pressure has difficulty reaching the diskette upper portion.
•Dent- caused by improper handling.

CAUSE VERIFICATION MATRIX

AC	PROBABLE CAUSE	VALIDATION METHOD	FINDINGS/ RESULTS	REMARKS	CONTROLABILITY
MAN	1. Aftering the target output.	survey/ interview checked standard time	*4 out 5 operators admitted that they're aftering the target output; but accdg. to the standard time it has enough time to reach the target.	Not True Cause	Controlable
	2. The operator forgot the Work Instruction	interview/ observation checked the WIS	*Accdg. to WIS, some of the operators are not frequently spray the manual rekesai to the mold.	TRUE CAUSE	CONTROLABLE
	3. Operators has no concern to the product.	interview/ observation	*No operators admitted their negative concern to the product.	True Cause	Beyond Control
	4. No standard appearance allowance for the judgement of soldering defect.	interview/ checked the documents related	*operators and inspectors' judgement to the defect varies to the perspective of each employee.(judgement if the defect can be cured by the succeeding process).	TRUE CAUSE	CONTROLABLE
	5. Inspectors busy doing other things.	observation	* operators were not properly observed if they still doing the standard because of no inspector around most of the time	TRUE CAUSE	CONTROLABLE
	6. No background to the nature of defect.	interview	*no orientation manual provided for the newly hired regarding to the possibility of defect occurance.	TRUE CAUSE	CONTROLABLE
MACHINE	1. Rekesai failed to spray all the mould surface	observation	*in long operation of the machine, some host of the rekesai dislocate and fail to spray the whole surface.	TRUE CAUSE	CONTROLABLE
	2. No defect detector	checked machine	*no detector detected, for the reason that sensors are very expensive	True Cause	Beyond Control
	3. Mold has deep slides	checked the mold used.	*the mold was designed accdg. to the customers' order.	Not True Cause	Beyond Control
	4. Avoidance of cold shot product after mold polishing	observation/ interview	*it is very possible to happen but only 4 to 6 products were subjected to be consider cold shot after mold polishing.	TRUE CAUSE	CONTROLABLE
METHOD	1. Absence of LINE INSPECTION because of redundancy of work.	observation/ checked process flow chart	*All operation of the product is subjected to be inspected by the operator but still defective products able to received in the final inspection	TRUE CAUSE	CONTROLABLE
	2. Visual Inspection	WIS checked	*part of the inspection standard.	Not True Cause	Beyond Control
	3. Continuous operation for the machine	WIS checked	*machine is subjected to run 24 hours a day.	Not True Cause	Beyond Control
MAT	1. Product appearance	checked product/ product drawing	*See appendix A*	True Cause	Beyond Control
ENVI	1. No WIS posted near the work place.	checked workplace	*WIS copy is in the Die Casting Section Office	TRUE CAUSE	CONTROLABLE

Table 1. This matrix shows the investigation done by the researchers to find out what are the true cause and the controlability of every possible causes that contribute to the existence of soldering defect.

CAUSE AND EFFECT DIAGRAM

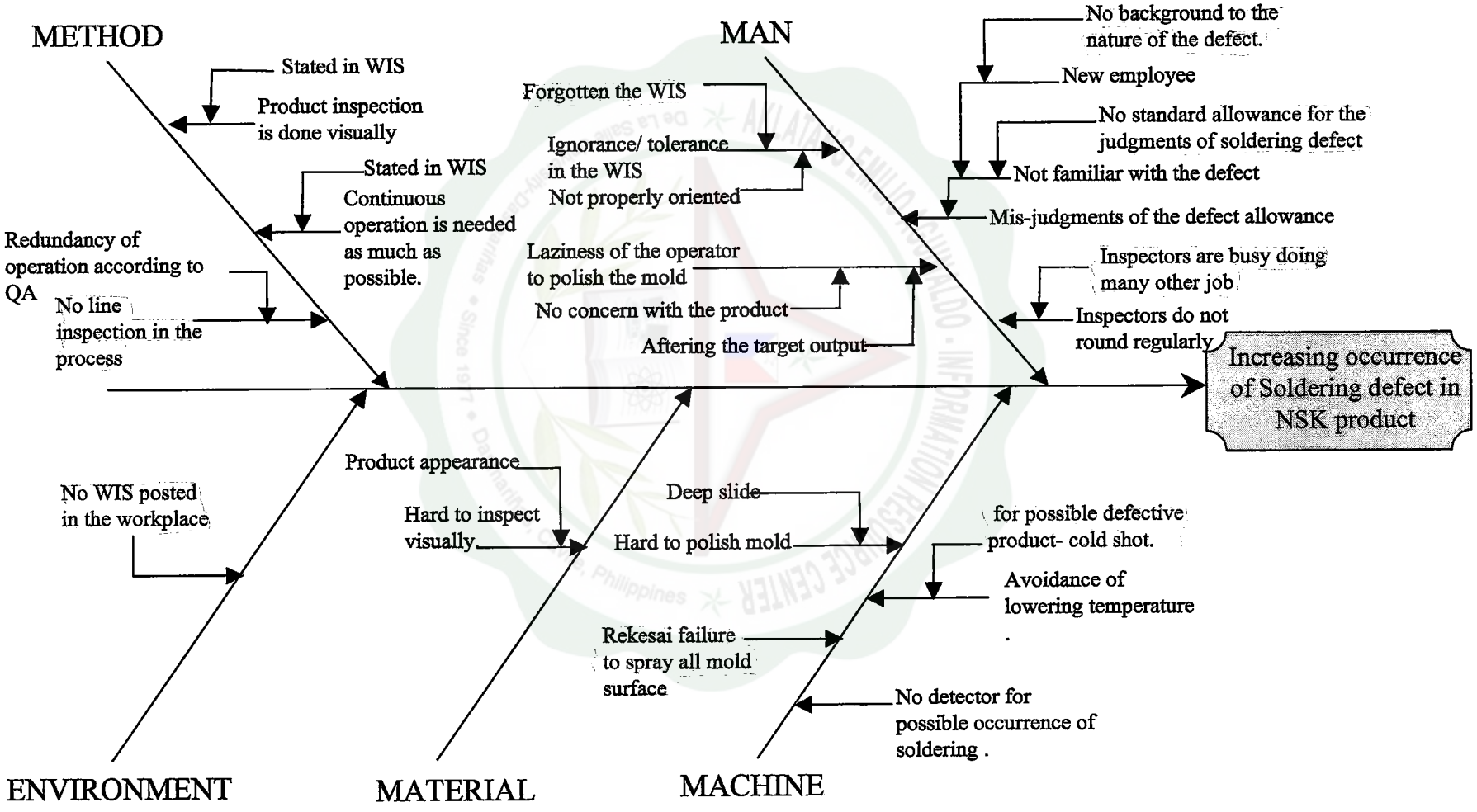


Figure 2.1 During investigation of possible causes researchers found out possible root causes of the problem in different areas of considerations (4M's – 1E).

Chapter 4

Interpretation of Data

Figure 1. Process Flow Chart

Studying and reviewing the flow process chart will give an idea from where the researchers concentrate. In this table, the researcher indicated the part of the process where they investigate and their point of concentration to solve the problem.

The problem in the high rate of soldering defects exists in die casting process as the respondent input to the researchers. As the researcher investigates, they found out that soldering defect exist during casting period which was found out in final inspection.

Graph 1. Actual NG rate of NSK-A125 in Final Inspection

The graph shows the actual rate of no good products of NSK-A125. With this, the researcher tries to show that the problems in the product need to be solved.

The 3% allowance was given by the Japanese staff, which seems too far from the actual rates. The Quality Assurance Department, where report of monthly NG is to be reported tries to hide the reality. They use the 3% allowance for overall NG product, which seems to be unreasonable. With this type of computation, other products like NSK-A125 that has many NG products will be neglected by the large quantity of good products of other type.

Computation:

G+NG=TPI/day

NG/TPI x 100%=%NG/day

Where:

G= Good Products

NG= No Good Products

TPI/ Day = Total Products Inspected/Day

Chapter 5

Solution Formulation

The chapter, the researcher aims to generate as many ideas as possible on "How to eliminate the root causes and to converge/ come up on the best solution. To be able to look for best possible solution the researcher used two techniques of solution prioritization, using the advantages and disadvantages and cost benefit analysis.

Alternative courses of action

Problem no. 1 No standard allowances for the judgment of soldering defect.

Alternatives

1. Provide standard allowance for soldering defect.

The allowance the authors were talking about was the additional time for the confirmation whether the product has a soldering defect or not so that the No Good products will be sort out of the production to eliminate redundant product sorting for defect detection.

Advantages

- Operators and inspectors will have standard basis of allowance of such defect.
- Soldering defects that is cannot be cured by the following processes will be lessened.
- The following process will accumulate lesser defects.
- Delivery of good quality products to the next process.

Disadvantages

- May result for added number of defects in DC section.

Cost

The allowance judgment for this alternative will not incur cost to the company because it is an intangible thing. Allowance that the authors were talking about is the time allowance to figure out if a product has a soldering defect or not.

2. All products with soldering defects will be treated as reject even light soldered defects.

In this alternative, all operators of the die-casting machine once encounter a soldering defect in the product will put the product in the reject bin because it is considered as No Good product. It will not be processed in the succeeding operations but it will be melted and reprocessed again.

Advantages

- 100% of no soldering product may be achieved.
- No more standard allowance needed and to be studied.

Disadvantages

- Products that can be cured serves as cost minimization in reproducing another product.
- Defects may increase.
- Reproduction of new product is costly.

Cost

Product cost = Php750

Reject products x Php750 = Total cost of reject products

Php750 = cost/piece of reject product

Problem no. 3. No regular check-ups by the inspectors

Alternatives

1. Schedule the regular check ups of inspectors. In the absence of the inspector, supervisors will take the duty.

Inspectors were assigned to inspect whether the product achieves the standard quality and if it has reject. In the absence of the inspector, the supervisors will be the responsible on checking the products and the operators to be sure that all products coming out of the production line has a good quality.

Advantages

- Inspection of the product and operation will be regular
- The alternative no. 1 of problem no. 1 will be sustained and be guided.
- Lesser defect opportunity
- The product will be inspected surely, before it goes to the next operation.

Disadvantage

- None.

Cost

This alternative will not incur cost to the company because supervisors will only relieve the duty of the inspectors.

2. Dissolve the inspectors and let the operators inspect the product they produced.

This alternative will terminate the duty of the inspectors and extending the tasks of the operators not only to process the product but also to inspect it after the process. In this case, the company will not anymore need the employment of the inspectors.

Advantages

- Less cost for inspectors' salary.
- Operators will be familiar with the product and its defects.

Disadvantages

- Standard allowance may differ in each operator's perspective.
- May lessen the effectiveness of alternative no. 1 of first problem which more safes to consider.

Cost

Cost Savings: Elimination of inspector

Php217 x 28 days = Php6, 076/month

Problem no. 4. No WORK INSTRUCTION SHEET (WIS) posted near or at the workplace of Die casting line. (*Note: this problem is also related to the problem in man: forgotten the WIS.)*

Alternative

Post a WIS in a board and place it beside the machine. Impose that that it should be read by the operator before the operation starts.

In this alternative, the operators should strictly read Work Instruction Sheet (WIS) before the work starts so that they will not forget the procedures, thus eliminating mistakes that can cause reject products. WIS must be placed in the work cell so that it is very accessible to the operators when they need it.

Advantages

- No reason for the operator to forget the WIS because it is accessible.
- Inspectors may know if the operators are doing their job properly.
- Operators may consult to the WIS anytime when there is trouble.

Disadvantage

- Operators may ignore the alternative.

Cost

WIS Cost = Php25/piece

Note: Cost of the board used is already included.

Problem no. 5. Rekesai failure to spray all mould surfaces.

Alternatives

1. Follow- up spray of the operators

Follow up spray by the operators to the mould surface will be done to eliminate the chances of soldering defect. The process of spraying was the factor that resulted for the reject product. Spraying must be done in a manner that the surface of the mould will be free from remains of the ingot.

Advantages

- The part will be sprayed thoroughly because the follow up spray is done manually
- Operators can contrite on the hard carbons to be taken out to avoid soldering defect.
- Machine will function well because of maintenance of its cleanliness even during operations.

Disadvantage

- Additional operation for the operator.

Cost

Cost of time consumed for the additional spray

56 seconds = Php750

Php750 = Product cost

2. Additional host for Rekesai

Rekesai is the automatic spray system of the die-casting machine and this alternative would like an additional host for the spraying system so that spraying will be easier and faster.

Advantage

- Mold maybe sprays on its every point.

Disadvantages

- Additional host for rekesai is costly
- Problem may still exist in long run of operation
- Additional consumption for chemical lubricant.

Cost

Cost of host = Php37, 513

Lubricant cost = Php150

Problem no. 6. Operators avoiding having cold shot products after mold polishing.

Alternative

Direct the operators the difference if they continue producing even there is small soldering defect in the product that it may lead to a bigger quantity of defects rather than having 4 to 6 products for cold shot defect.

In this alternative, workers will be oriented that they may have bigger reject product produce if they will continue on processing with soldering defect while it will be more efficient if they will have only 4 to 6 product defects due to cold shot.

Advantages

- This may change the way of thinking of operators about avoidance of cold shot.
- New knowledge that may add to the operators.

Disadvantage

- Operators may neglect this possible solution.

Cost

There is no cost involve in this alternative because this will serve as an orientation to the workers about avoiding production of reject products.

Problem no. 7. Absence of Line Inspection because of redundancy of operation.

Alternative

Include a line inspection to its process since it is a new product.

These alternative needs to put up a line inspection after the production line where products will be inspected after it undergoes casting process. This line inspection will determine the reject products in the product line and enabling the operators to know how will they adjust on their production and eliminating extra sorting of products. Inspection will be done critically because the quality of the product is in issue.

Advantages

- Quality of the product will be secured before going to the next section.
- The assurance of no defect product will be double-checked.
- The workload of inspectors will be lessened.

Solution Matrix

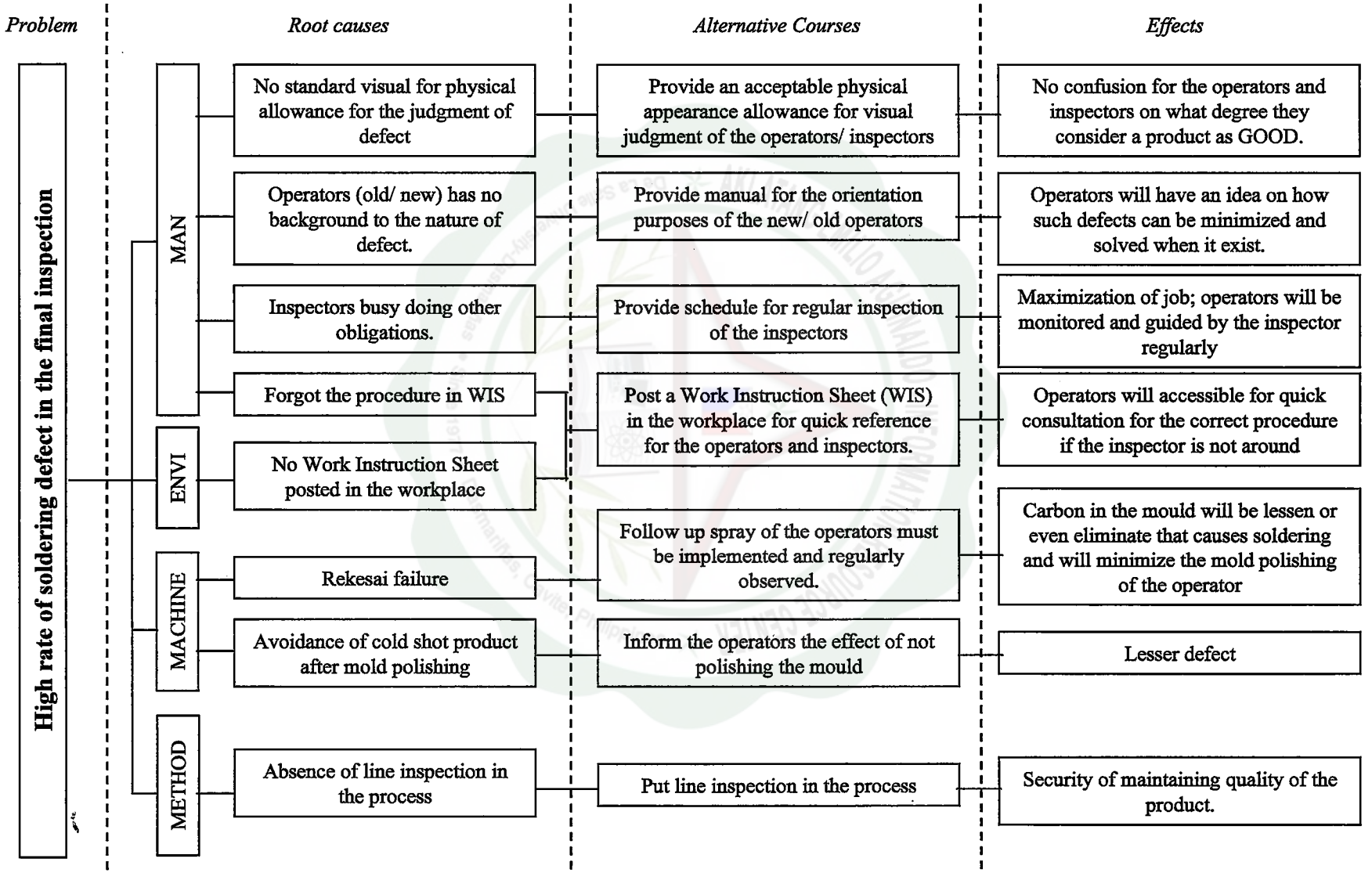


Figure . Solution matrix is the summary of the countermeasure given by the researchers to solve the problem and its projected effect to the process.

Chapter 6

Conclusion and Recommendation

This chapter presents the conclusion of the researchers and their recommendation in order to solve the problem using advantage and disadvantage of its alternative courses, cost benefit analysis and Gannt chart for the program of so0lution. The researchers also used solution matrix to summarized their recommendation and as a part of QCC story tools and techniques.

Conclusion

With the evidences and information gathered, the researchers concluded that the defect occurrence was caused by many factors in the Die casting section where the primary contributor was the manpower performance and the machine condition. The researcher would like to emphasize that various defects in the NSK-A125 product type occurs when there are acts of non-compliance with the standard process and procedures of the CNSI and whenever the machine being used has low efficiency and has mould defect.

The researchers found out that the inspectors detects too much No Good product during the final inspection because most of the time, line inspection doesn't inspect the product output and just leave the product to the next process line until it reach the final inspection. Due to this scenario's, fewer Good Products were being delivered to the customer and it's a need to reprocess all No Good product just to meet the customer demand.

The researchers also concluded that the reduction of the product defects especially soldering is possible if the inspection of the product will be standardized in every process line. The machine condition always affects the quality of the product and the workers

who handles and inspect the product must be the factors to be considered to solved the problem.

Recommendation

The researchers highly recommend the following alternatives according to the following problems.

In first problem, providing a standardized allowance to soldering defects will help the operators to recognize the allowable weight of defect with same perspective. This will also lessen the defect and add production's higher quality products.

Providing manual for defects will give knowledge to the new operators and even the regular operators who do not know the nature and cause of defects. The manual may teach them on how to avoid the possible causes of existence of defect that results to a higher productivity with high quality.

No regular check ups by inspectors is one of the problems. Inspection is very significant to each process; this is to secure the quantity of product. By having scheduled inspection, operators will be required to produce products with high quality to meet the customer demand. Work Instruction Sheets (WIS) should be followed because of the scheduled checking.

Posting WIS will give knowledge to operators and will serve as their guide whenever they forgot the standard procedure of the operation. Compliance of the WIS would mean a good operation and a Good product for a soldering defect free casting products.

With all the alternatives of the problems associated in the presence of soldering defects in the NSK-A125 product of CNSI, soldering defects will be decreased or even eliminated to prevent delay of the delivery of the product that CNSI do not want to happen anymore.

Detailed Plan of Action

The researchers formulated their version of plan of action regarding to the alternative courses recommended.

Recommended Alternative no. 1

Provide an acceptable physical appearance allowance for visual judgment of the operators/ inspectors.

ACTIVITY	DAYS					
	1	2	3	4	5	6
1. Rechecking of standardized description of product as specified by the customer.						
2. Study soldering defect.						
3. Meeting of the officers concern						
4. Finalization of allowance						
5. Computerization of accepted allowance for standardization and QA validation						
6. Standardization/ validation						
7. Orientation and training of operators and inspectors.						

Recommended Alternative no. 2

Provide manuals for orientation purposes of the new operators and serves as references for the old operators *(this manual is all about casting of products including the nature of defects).*

ACTIVITY	DAYS					
	1	2	3	4	5	6
1. Meeting of officers concern						
2. Computerization of manual						
3. Rechecking/ QA validation						
4. Implementing						

Recommended Alternative no. 3

Provide scheduled inspection for the inspector.

ACTIVITY	DAYS					
	1	2	3	4	5	6
1. Scheduling						
2. DC Section manager validation						
3. Orientation of inspectors						
4. Monitoring						

Recommended Alternative no. 4

Posting of Work Instruction Sheet (WIS) near/ on the workplace.

ACTIVITY	DAYS					
	1	2	3	4	5	6
1. Checking of WIS						
2. Revising WIS (translation to Filipino)						
3. QA Validation						
4. Orientation of workers about the use of posting the WIS						
5. Monitoring						

Recommended Alternatives nos. 5 & 6

Follow up spray of the operators to mold/ information of operators to the effect of not polishing mold.

ACTIVITY	HOURS							
	1	2	3	4	5	6	7	8
1. Orientation/ meeting of operators and supervisors								
2. Monitoring								

Recommended Altenative no. 7

Installation of line inspection process in the production of NSK-A125.

ACTIVITY	DAYS									
	1	2	3	4	5	6	7	8	9	10
1. Meeting of officers										
2. Deployment of workforce for Line Inspection (experimental)										
3. Motion and Time Study										
4. Checking schedule										
5. Final deployment of work force for the process										
6. Monitoring										

Reference:

Books:

Timothy Clark, *Success Through Quality*, What is Quality and How is it Achieved? ASQ Quality Press, 1999, pp. 7

A. V. Feigenbaum, *Total Quality Control: Engineering and Management*, McGraw- Hill: New York, 1961

Richard J. Schonberger, et. al, *Operations Management: Continuous Improvement,* Quality Control and Improvement, Richard D. Irwin Inc., 1994, pp. 88

Jay Heizer, et. al, *Production and Operations Management 3rd edition,* The Role of Inspection, Simon and Schuster Inc., (1993) pp. 748

Mikell P. Groover, *Fundamentals of Modern Manufacturing: materials, processes and systems,* Casting Quality, Prentice- Hall, Inc. New Jersey, (1996) p. 285

John Lorriman and Takashi Kenjo, *Japan's Winning Margins: Management, Training and Education*, Management and the Commitment of Employees, Oxford University Press Inc., (1994)

Joel Barker, *Discovering The Future: The Power of Vision*, Enrolling Others to Vision,

Frank Gryna, *Quality Planning and Analysis,* Economics of Inspection, McGraw-Hill Inc. New York, (2001) p. 185

Company files:

Work Instruction Sheet (WIS), Die Casting Process

Daily Manpower Output, Final Inspection, Quality Assurance Department

NSK-A 125 Technical Drawing, Engineering Department

Plant Layout, Engineering Department

Standard Time per Process (NSK-A125), Production Control Department

Private Documents:

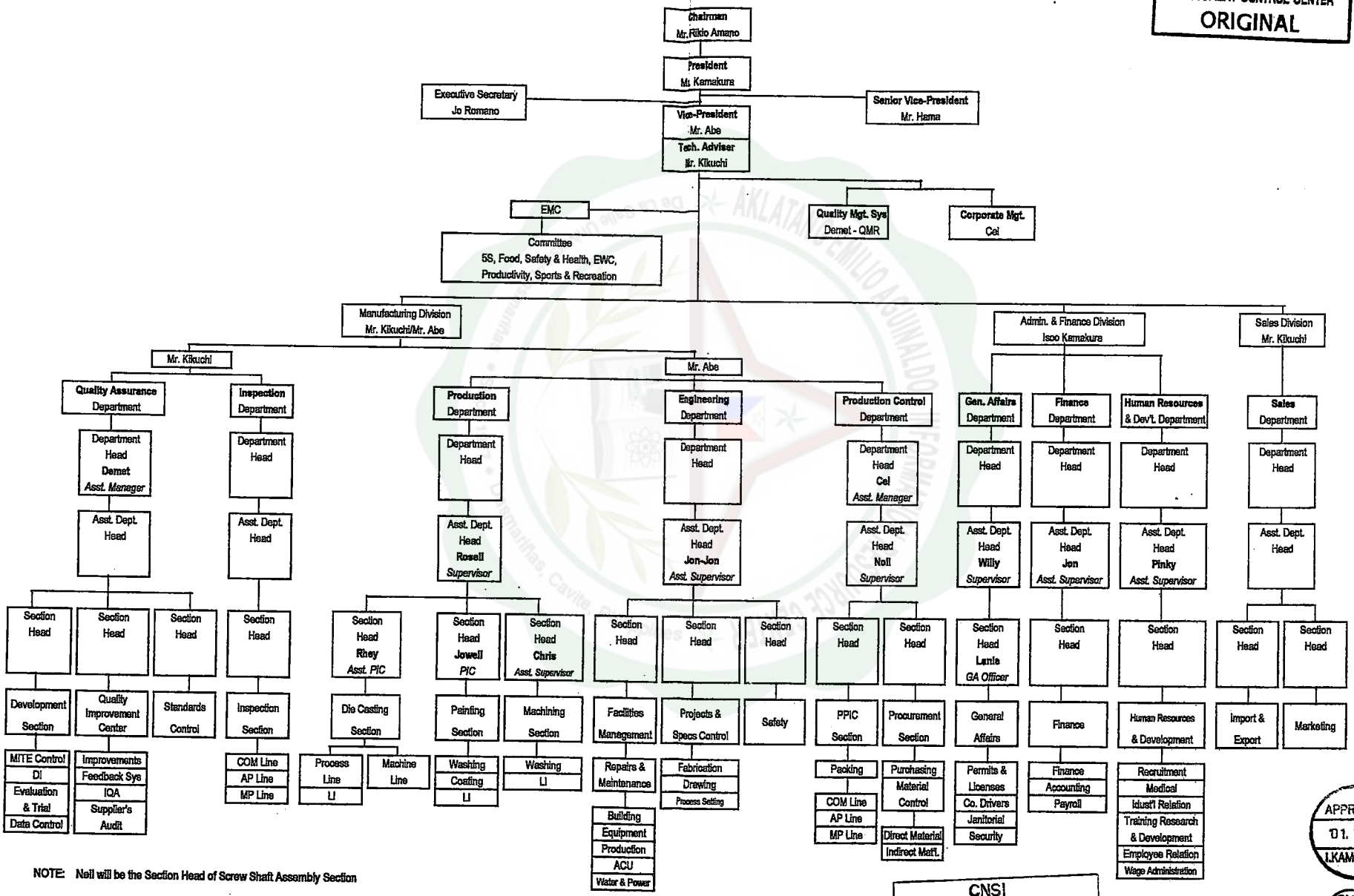
QCC Leaders Training Manual, Total Quality Managemant Department, EDS Manufacturing Inc.- Yazaki, Anabu II, Imus Cavite.

APPENDICES

MATERIALS OF THE STUDY

- ***Organizational Chart***
- ***Product (NSK-A125) Picture***
- ***Technical Drawing of the Product***
- ***Plant Layout***

CAVITE NAGANO SEIKO, INC.
Organizational Chart

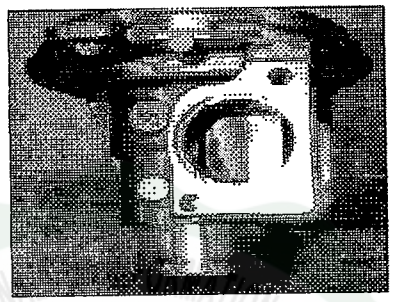


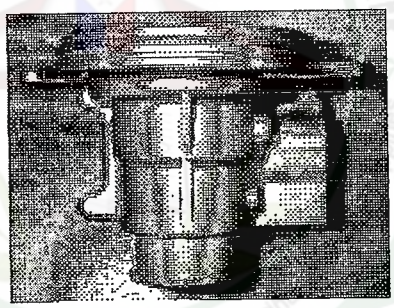
NOTE: Neil will be the Section Head of Screw Shaft Assembly Section

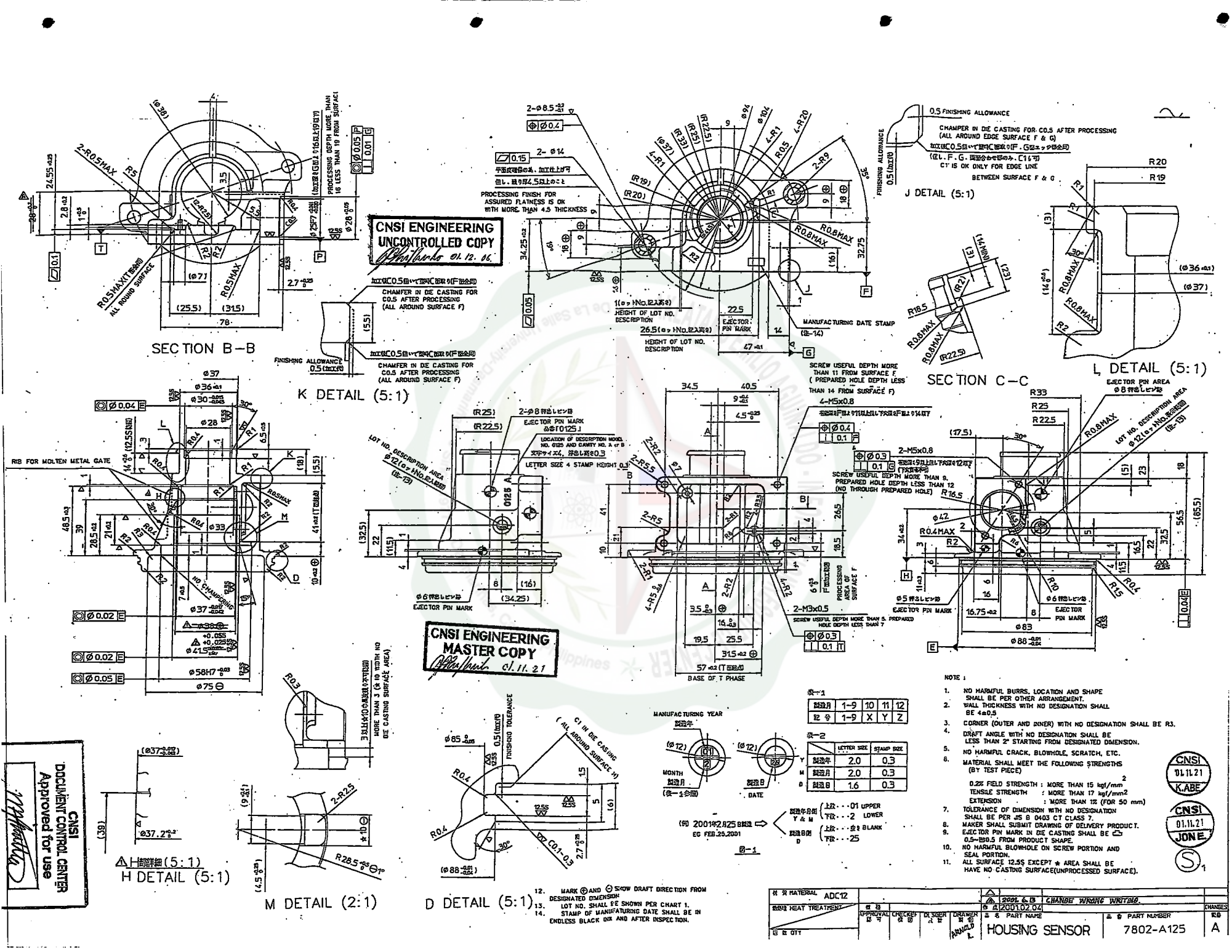
APPROVED
01. 7. 24
I.KAMAKURA

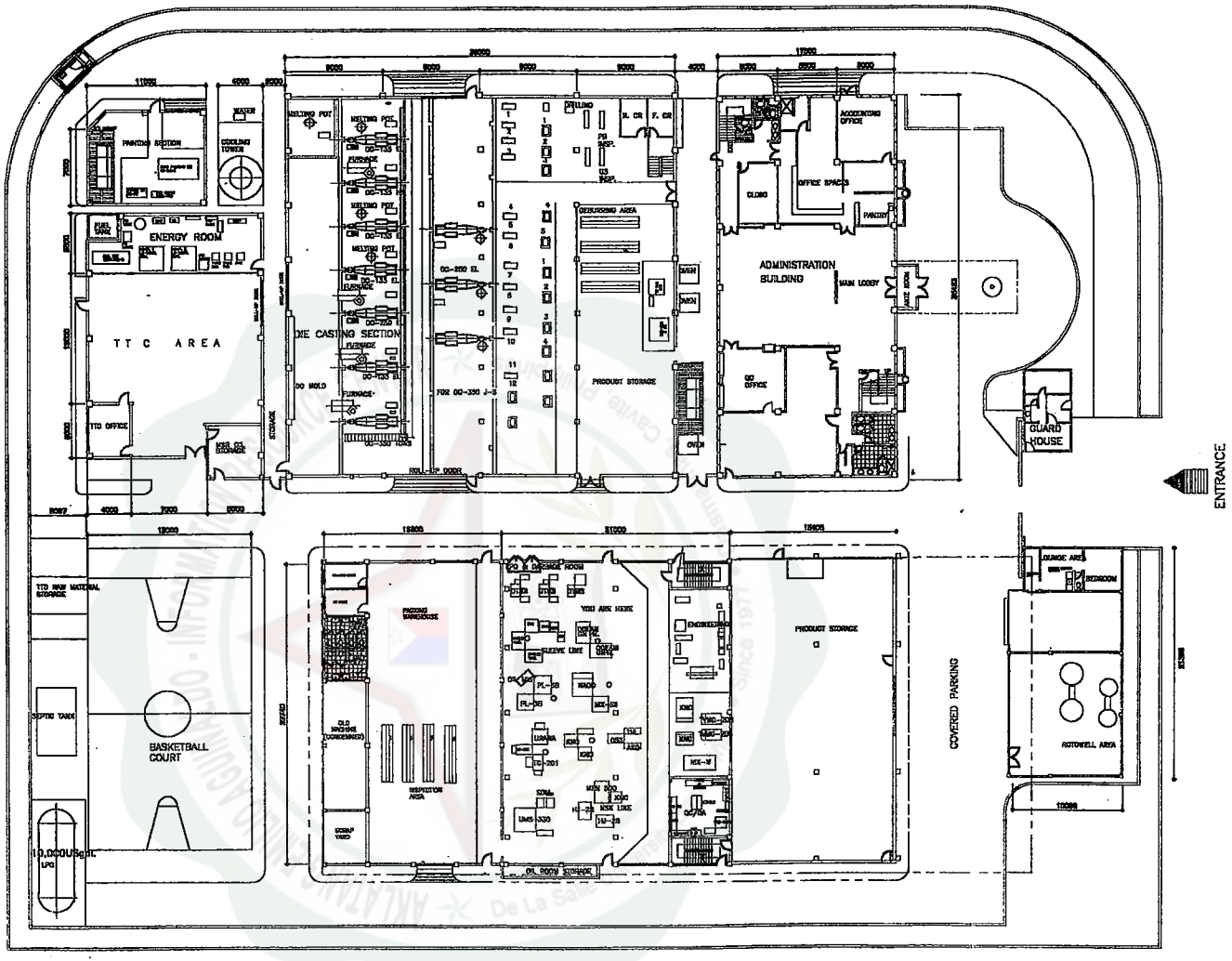
CNS.
01. 7. 24
K.ABE

PICTURE OF NSK-A125






SECTION B–B
K DETAIL (5:1)
J DETAIL (5:1)
SECTION C–C
L DETAIL (5:1)
H DETAIL (5:1)
M DETAIL (2:1)
D DETAIL (5:1)
CNSI ENGINEERING UNCONTROLLED COPY
CNSI ENGINEERING MASTER COPY
CNSI DOCUMENT CONTROL CENTER Approved for use
NOTE :
1. NO HARMFUL BURRS. LOCATION AND SHAPE SHALL BE PER OTHER ARRANGEMENT.
2. WALL THICKNESS WITH NO DESIGNATION SHALL BE 4±0.5
3. CORNER (OUTER AND INNER) WITH NO DESIGNATION SHALL BE R3.
4. DRAFT ANGLE WITH NO DESIGNATION SHALL BE LESS THAN 2° STARTING FROM DESIGNATED DIMENSION.
5. NO HARMFUL CRACK, BLOWHOLE, SCRATCH, ETC.
6. MATERIAL SHALL MEET THE FOLLOWING STRENGTHS (BY TEST PIECE)
0.2% FIELD STRENGTH : MORE THAN 15 kgf/mm2
TENSILE STRENGTH : MORE THAN 17 kgf/mm2
EXTENSION : MORE THAN 12 (FOR 50 mm)
7. TOLERANCE OF DIMENSION WITH NO DESIGNATION SHALL BE PER JIS B 0403 CT CLASS 7.
8. MAKER SHALL SUBMIT DRAWING OF DELIVERY PRODUCT.
9. EJECTOR PIN MARK IN DIE CASTING SHALL BE ⌓ 0.5~⌓0.5 FROM PRODUCT SHAPE.
10. NO HARMFUL BLOWHOLE ON SCREW PORTION AND SEAL PORTION.
11. ALL SURFACE 12.5S EXCEPT ★ AREA SHALL BE HAVE NO CASTING SURFACE(UNPROCESSED SURFACE).
12. MARK ⊕ AND ⊖ SHOW DRAFT DIRECTION FROM DESIGNATED DIMENSION
13. LOT NO. SHALL BE SHOWN PER CHART 1.
14. STAMP OF MANUFATURING DATE SHALL BE IN ENDLESS BLACK INK AND AFTER INSPECTION.
MANUFACTURING YEAR
MONTH
DATE
EG FEB.29.2001
CHANGE WRONG WRITING
MATERIAL ADC12
HEAT TREATMENT
QTY
PART NAME HOUSING SENSOR
PART NUMBER 7802-A125
CHANGES A



SITE LAYOUT SHOWING EXISTING FLOOR PLAN

SCALE 1 : 200 METRIC

CNSI ENGINEERING
UNCONTROLLED COPY
01.12.06

CNSI
01.12.-3
K.ABE

OWNER:	ARCHITECT/ENGINEER:	PROJECT TITLE/LOCATION:	REVISIONS:	DATE :	SHEET CONTENTS:	DRAWN BY: ARNOLO	SHEET NO. :
CAVITE NAGANO SEIKO, INC. Block 7 Lot 18 Phase II Cavite Economic Zone Authority Gen. Trias, Cavite		PROPOSED LAYOUT FOR DC AREA LOT 18 BLK. 7 PHASE 2 BO. LANGKAAN GASMARRAS , CAVITE			SITE DEVELOPMENT PLAN	CHECKED :	
	PRO NO. : TIN NO. :					APPROVED :	
	PTE. NO. : ISSUED AT/ON					SCALE : 1 : 200 M	
						DATE : DEC 03, 2001	JOB NO. :