

ABSTRACT

PT. Indoprima Gemilang Plant-1 Gresik is a manufacturing company that produces Wiring Harness. Wiring Harness is a collection of several wires with part / accessories that serve to drain electrical current. The focus of this research is the pre assembly process which is one of several stages of the process that exist in making Wiring Harness. The condition of the company's production process is currently indicated to occur many defects in the pre assembly process. To reduce the defect it is necessary to know what types of defects occur and what factors cause the occurrence of the defect. Therefore, continuous improvement is required. In this research use Six Sigma method with DMAI cycle that can identify and analyze defect cause to improve product quality continuously. Stages of research using this DMAI cycle starts from defect identification, finding the cause of defect, analysis of defect using RCA and FMEA. From the data processing, the pre assembly process is divided into three processes: cutting and stripping process, crimping process, and joint and tapping process. In the process of cutting and stripping found the most critical defect is one of the cutting length of the cable and the wrong size of the cable. In the crimping process found the most critical defect is one type of terminal, damaged wire seal, and nonstandard crimping height. While in the joint and tapping process found the most critical defect is the over joint, the number of wireless on the joint, and one joint branch. The appearance of the defect causes the production to be not maximal. After a critical defect of each process is known, then look for the cause. From the various causes of the defect, a recommendation for improvement is made. Then the final stage of improvement based on the highest RPN value. The result shows that the crimping height out of standard process has the highest RPN value of 240, followed by cutting and cutting length of 210, crimping process (miss type of terminal) of 168 and so on. So the crimping process for defect C / H out of standard type requires priority of improvement because it has the highest RPN value. Improvements that need to be given is to do 3N each of the crimping process as much as 1 lot, make the SOP of the nuts and bolts mount on the applicator, make a tool to ensure the standard crimping used is correct, make counter dies in applicator, and replace every 200,000 strokes, and make standard operation setting stripping block.

Keywords: Pre assembly, DMAI cycle, RCA, FMEA

TABLE OF CONTENTS

COVER	i
VALIDITY SHEET	ii
STATEMENT SHEET	iii
FOREWORD	iv
ABSTRACT	vi
TABLE OF CONTENTS.....	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
CHAPTER I INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem Formulation	5
1.3 Research Objectives.....	5
1.4 Advantages	6
1.5 Limitations.....	6
1.6 Assumptions	7
1.7 Writing Systematics.....	7
CHAPTER II LITERATURE REVIEW	8
2.1 Quality	8
2.2 Product Defects.....	10
2.3 Quality Control	10
2.4 DMAIC	10
2.5 FMEA (<i>Failure Mode and Effect Analysis</i>).....	13
2.6 Tools Used in Quality Control.....	15
2.7 States of The Art.....	17
CHAPTER III RESEARCH METHODOLOGY	19
3.1 Types of Research.....	19
3.2 Research Variable	19
3.3 Place and Time of Research	20
3.4 Kind or Data Type	20
3.5 Equipment and Materials Research	20

3.6 Techniques of Data Collection	22
3.7 Settlement Method.....	23
3.8 <i>Flowchart Research / Flow Completion</i>	26
CHAPTER IV COLLECTION AND DATA PROCESSING	27
4.1 Define Stage.....	27
4.1.1 Overview of Products Produced by The Company	27
4.1.2 Identify the Process Being Amusement	32
4.1.3 Identify the Type of Defect and CTQ Determination	37
4.1.3.1 Identify The CTQ (Critical to Quality) Pre Assembly.....	37
4.2 Measure Stage.....	43
4.2.1 Process Capability Measurement	43
4.2.2 Identification of Causes of Disability with RCA	44
4.2.3 Determining Severity, Occurrence, and Detection.....	47
4.2.4 Risk Priority Number (RPN).....	49
4.3 Analyze Stage	51
4.3.1 The Most Influential Defect Analysis	51
4.3.2 Process Capability Analysis	55
4.3.3 Factor Analysis Causes The Most Influential Defects	56
4.3.4 RPN Value Calculation Analysis on FMEA	58
4.4 Improve Stage	60
4.4.1 Recommendations for Improvement Based on FMEA's Release Results	60
CHAPTER V CONCLUSIONS AND RECOMMENDATIOS	61
5.1 Conclusions.....	64
5.2 Recommendations.....	65
REFERENCES	66
ATTACHMENT	

LIST OF TABLES

Table 1.1 Summary of the amount of vehicles in Indonesia.....	1
Table 1.2 Internal failure cost on wiring harness	2
Table 1.3 Number of claims on wiring harness from PT. YIMM to PT. IPG	3
Table 2.4 Quality of dimensions	8
Table 2.5 Comparison of the quality gurus	9
Table 2.6 Comparison of states of the art	17
Table 3.7 Severity (S)	21
Table 3.8 Occurrence (O).....	21
Table 3.9 Detection (D).....	22
Table 4.10 Color initial wire	28
Table 4.11 Total defects in cutting and stripping section March 2017 until February 2018.....	38
Table 4.12 Total defects in crimping section at March 2017 until February 2018	40
Table 4.13 Total defects in joint section at March 2017 until February 2018	42
Table 4.14 Recap sigma level cutting and stripping process	44
Table 4.15 Recap sigma level crimping process	46
Table 4.16 Recap sigma level joint and tapping process	48
Table 4.17 Severity rank	53
Table 4.18 Severity in failure mode	53
Table 4.19 Occurrence rank	54
Table 4.20 Occurrence in failure mode.....	54
Table 4.21 Detection rank	55
Table 4.22 Detection in failure mode.....	56
Table 4.23 FMEA	57
Table 4.24 Final RCA recalls for defects in cutting and stripping section	63
Table 4.25 RCA end recalls for defects in crimping section	64
Table 4.26 RCA end recalls for defects in joint and tapping section.....	65
Table 4.27 RPN sequence from largest to smallest on FMEA	66
Table 4.28 Recommendation of improvement based on the highest RPN value..	68

LIST OF FIGURES

Figure 1.1 Wiring harness motor model product	2
Figure 1.2 Defect production of motor wiring harness in PT. IPG at 2017	3
Figure 1.3 Total defects of motor wiring harness in 2017	4
Figure 2.4 DMAIC processes	11
Figure 2.5 DMAIC <i>flow chart</i>	13
Figure 2.6 Process FMEA document	14
Figure 3.7 Research flowchart	26
Figure 4.8 Wiring harness product for motor.....	27
Figure 4.9 Wire	29
Figure 4.10 Kinds of terminals	29
Figure 4.11 Connector.....	30
Figure 4.12 Tape / isolation	30
Figure 4.13 Tube	31
Figure 4.14 Accessories	32
Figure 4.15 Protector.....	32
Figure 4.16 Flow process	33
Figure 4.17 "ShinMaywa" automatic machine	34
Figure 4.18 Conventional machine "Komax"	35
Figure 4.19 Process of cutting until crimping.....	35
Figure 4.20 Total defects in cutting section	38
Figure 4.21 Pareto diagram of defects in cutting section at March 2017 until February 2018	39
Figure 4.22 Total defects in crimping section at March 2017 until February 2018	40
Figure 4.23 Pareto diagram of defects in crimping section at March 2017 until February 2018	41
Figure 4.24 Total defects in joint and tapping section at March 2017 until February 2018	41
Figure 4.25 Pareto diagram of defects in joint and tapping section at March 2017 until February 2018.....	42

Figure 4.26 Shift sigma value in cutting and stripping process	45
Figure 4.27 Shift sigma value in crimping process.....	47
Figure 4.28 Shift sigma value in joint and tapping process	49
Figure 4.29 RCA diagram of wrong length of cable at cutting and stripping section	50
Figure 4.30 RCA diagram of wrong size of cable at cutting and stripping section	50
Figure 4.31 RCA diagram of miss type of terminal at crimping section	50
Figure 4.32 RCA diagram of wire seal broken at crimping section.....	51
Figure 4.33 RCA diagram of crimping height out of standard at crimping section	51
Figure 4.34 RCA diagram of over joint at joint and tapping section.....	51
Figure 4.33 RCA diagram of less amount of wire joint at joint and tapping section	52
Figure 4.34 RCA diagram of miss direction of joint at joint and tapping section	52