## **TABLE OF CONTENT**

COVER	i
THESIS APPROVAL OF SUPERVISOR	ii
THESIS APPROVAL OF EXAMINATION COMMITT	тееiii
DEDICATION	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENT	vi
FIGURE LIST	ix
TABLE LIST	
ABSTRACT	xii
CHAPTER I INTRODUCTION	
1.1 Background of the Study	
1.2 Problem Statement	
1.3 Objectives of the Research	
1.4 Significance of the Research	
1.5 Scope of the Research	4
1.6 Outline of the Research	
CHAPTER II LITERATURE REVIEW	
2.1 Hot Dip Galvanizing	7
2.2 Continues Galvanizing Line Machine	9
2.3 Limited Over-Lap Seam Welding Machine	
2.3.1 General	

2.3.2 Welding Capacity 17		
2.3.3 Utilities		
2.3.4 Main Unit18		
2.4 Welding		
2,5 Electrode		
2.6 Metallurgy Aspect24		
2.7 Copper Based Alloy		
CHAPTER III RESEARCH METHODOLOGY		
3.1 Research Object28		
3.2 Identification and Problem Statement		
3.3 Data Collection		
3.4 Data Processing		
3.5 Research Result Analysis		
3.6 Research Framework		
CHAPTER IV DATA COLLECTING AND PROCESSING		
4.1 PT. XYZ		
4.1.1 PT. XYZ in Brief		
4.1.2 Limited Over-Lap Seam Welding Machine		
4.1.3 Welding Wheel Electrode		
4.2 Domestic Welding Electrode Development		
4.2.1 Data Collecting		
4.2.1.1 Properties of Import Welding Electrode		
4.2.1.2 Microstructure Test of Import Electrode		

4.2.2 Data Processing		
4.2.2.1 Developing Domestic Welding Electrode		
4.2.2.2 Microstructure Analysis45		
4.3 Domestic Electrode Performance Test47		
4.3.1 Data Collecting47		
4.3.1.1 Visual and Physical Examination47		
4.3.1.2 Hardness Test		
4.3.1.3 Welding Test		
4.3.1.4 Weld Strength Test		
4.3.2 Data Processing		
4.3.2.1 Visual and Physical Analysis54		
4.3.2.2 Hardness Test Analysis		
4.3.2.3 Welding Test Analysis		
4.3.1.4 Weld Strength Analysis63		
CHAPTER V DISCUSSION		
5.1 Domestic Welding Electrode Development65		
5.2 Domestic Welding Electrode Analysis66		
5.3 Domestic Welding Electrode Performance Analysis		
5.4 Cost Analysis67		
CHAPTER VI CONCLUSION AND RECOMMENDATION		
6.1 Conclusion68		
6.2 Recommendation		

## REFERENCES

APPENDICES

## FIGURE LIST

Figure 2.1 Photomicrograph of Galvanized Coatings
Figure 2.2 Continuous Galvanizing Line Machine11
Figure 2.3 Temperature Cycles in Annealing Furnace
Figure 2.4 Limited Over-Lap Seam Welding Machine16
Figure 2.5 Welding Machine Component
Figure 2.6 Welding Process
Figure 2.7 Welded Area In Strip Of Coil
Figure 3.1 Research Framework
Figure 4.1 Import Welding Electrode
Figure 4.2 Import Welding Electrode Microstructure Photo with 50x Magnification35
Figure 4.3 Import Welding Electrode Microstructure Photo with 100x Magnification35
Figure 4.4 Import Welding Electrode Microstructure Photo with 200x Magnification36
Figure 4.5 Import Welding Electrode Microstructure Photo with 400x Magnification36
Figure 4.6 Correlation of Hardness with Strength of CuCrZr Alloy42
Figure 4.7 The Equilibrium Phase Diagram Of Cu – Cr
Figure 4.8 Detail of General Microstructure (BSE Image) with EDS Spectra46
Figure 4.9 Import and Domestic Welding Electrode
Figure 4.10 Electrode Radius Information48
Figure 4.11 Weld Result49
Figure 4.12 0.20mm x 914mm Strip of Coil Weld51
Figure 4.13 0.25mm x 882mm Strip of Coil Weld51
Figure 4.14 0.30mm x 882mm Strip of Coil Weld52
Figure 4.15 0.50mm x 914mm Strip of Coil Weld

Figure 4.16 0.60mm x 1219mm Strip of Coil Weld
Figure 4.17 0.70mm x 1219mm Strip of Coil Weld53
Figure 4.18 0.80mm x 914mm Strip of Coil Weld53
Figure 4.19 1.0mm x 914mm Strip of Coil Weld53
Figure 4.20 1.2mm x 1219mm Strip of Coil Weld
Figure 4.21 Hardness in Electrode Outer Radius
Figure 4.22 Hardness in Electrode Middle Radius
Figure 4.23 Hardness in Electrode Inner Radius
Figure 4.24 Weld Thickness Comparison
Figure 4.25 Weld Width Comparison
Figure 4.26 HAZ Width Comparison
Figure 4.27 Weld Length Comparison
Figure 4.28 HAZ Length Comparison
Figure 4.29 Weld Interval Comparison60
Figure 4.30 HAZ Interval Comparison61
Figure 4.31 Weld Spot Comparison61
Figure 4.32 Strip of Coil Punch Test64
Figure 4.33 Strip of Coil Punch Test64

## TABLE LIST

Table 4.1 Overview of Different Aging Parameters	44
Table 4.2 Hardness of Import Electrode	49
Table 4.3 Hardness of Domestic Electrode	49
Table 4.4 Welding Test of Import Electrode	50
Table 4.5 Welding Test of Domestic Electrode	

