

TABLE OF CONTENTS

ABSTRACT	i
RESUMEN	ii
DEDICATORY	iii
ACKNOWLEDGEMENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
1. INTRODUCTION	1
1.1. CONTEXT AND WIDE PERSPECTIVE	1
1.2. RELEVANCE	1
1.3. THESIS OUTLINE	2
2. LITERATURE REVIEW	3
2.1. REVIEW METHODOLOGY AND SIMILAR WORKS	3
2.2. MODELING ESSENTIALS	8
2.3. STARTUP MODELS	11
2.3. PROCESS CONTROL	17
2.4. MODEL PREDICTIVE CONTROL	24
2.5. MPC STARTUP ALGORITHMS	28
3. OBJECTIVES AND SCOPE	32
3.1. OBJECTIVES	32
3.2. SCOPE	32
4. FLOTATION MACHINES SELECTION	33

4.1. INDUSTRIAL CONTEXT	34
4.2. FLOTATION MACHINES	37
4.3. EXPLORATORY ROUGHER CAMPAIGN	40
4.4. ROUGHER VARIABILITY CAMPAIGN	45
5. PROCESS SIMULATION FRAMEWORK	52
5.1. SYSTEMS IDENTIFICATION STRATEGY	52
5.2. INSTRUMENTATION AND CONTROL	56
5.3. SINGLE CELL CHARACTERIZATION	59
5.4. ROW CHARACTERIZATION	70
6. ADVANCED CONTROL AND OPTIMIZATION	75
6.1. ADVANCED CONTROL PERSPECTIVE	75
6.2. ADVANCED CONTROL METHODOLOGY	76
6.3. CONTROL DESIGN	77
6.4. CONTROL SIMULATION FRAMEWORK	84
7. OVERALL DISCUSSION	88
7.1. MODELING	88
7.2. INSTRUMENTATION	89
7.3. ADVANCED CONTROL STRATEGY AND OPTIMIZATION	90
8. CONCLUSSIONS AND FINAL REMARKS	91
BIBLIOGRAPHY	93