

## Table of Contents

<b>Preface</b> .....	i
<b>Abstract</b> .....	ii
1 Introduction.....	1
1.1 Background.....	1
1.2 Purpose and Reasoning.....	1
1.3 Scope of Research.....	2
1.4 Source.....	2
1.5 Script Arrangement.....	2
2 Supporting Theory.....	4
2.1 Concrete.....	4
2.1.1 Composition of Concrete.....	4
2.1.2 Water-Cement Ratio.....	6
2.1.3 Properties of Hardened Concrete.....	7
2.2 Steel Reinforcement.....	10
2.3 Reinforced Concrete Beams.....	11
2.3.1 Flexure in Beams.....	12
2.3.2 Shear in Beams.....	13
2.3.3 Design of Reinforcement.....	14
2.4 Factored Loads and Safety Factors.....	39
2.5 Cross Section and Dimensions.....	40
2.6 Java Language.....	41
2.6.1 Java is object-oriented.....	41
2.6.2 Java Code.....	42
2.6.3 Event-Driven Programming.....	46
2.6.4 Java Foundation Classes.....	47
2.7 Flash CS3.....	49
2.7.1 Actionscript.....	49
2.7.2 Timeline.....	50
2.8 Multimedia.....	51
2.8.1 Benefit of Multimedia.....	51
2.8.2 Developing a Project.....	52
2.9 Testing.....	54

2.9.1	Testing Objectives.....	54
2.9.2	Functional/ Black-Box Testing.....	55
2.10	Use-case Diagram .....	58
2.10.1	Scenario.....	59
2.10.2	Actor .....	59
2.10.3	Associations .....	60
2.10.4	Includes.....	60
2.10.5	Generalization.....	60
2.10.6	Extends .....	61
3	Analysis and Design.....	62
3.1	Design Flowchart for Reinforcements .....	62
3.1.1	Balanced Moment.....	62
3.1.2	Single Reinforcement.....	63
3.1.3	Double Reinforcement.....	64
3.1.4	Shear Reinforcement .....	66
3.2	Analysis Flowchart for Reinforcements .....	67
3.2.1	Singly Reinforced Concrete .....	67
3.2.2	Doubly Reinforced Concrete .....	68
3.2.3	Application Outline .....	69
3.2.4	Story Board .....	70
3.3	Use-Case.....	73
3.3.1	Scenario.....	74
4	Implementation .....	78
4.1	Screen-shot .....	78
4.2	Case Study.....	87
4.2.1	Design.....	87
4.2.2	Analysis .....	91
5	Testing.....	95
5.1	Testing Multimedia .....	95
5.2	Survey.....	97
6	Conclusion.....	99
6.1	Conclusion.....	99
6.2	Conjecture.....	99
7	Bibliography .....	100

## **Abstract**

The hard quality of concrete, its low heat conductivity, and its strong resistance to compression makes it a material of choice for buildings and skyscrapers in modern times. However, with the limitation of concrete such as its weak flexure strength in tension, steel reinforcements are required to help withstand forces that are applied to the structure. In order to combine properly steel and concrete to create a strong, up-to-standard members – specifically beams – complicated and long calculations must be made prior to designing. Because of that, this project is created to enlighten students in the learning process of designing longitudinal and shear reinforcements in concrete beams using multimedia. Supporting theory consists of the definition of concrete, steel, reinforcements, and multimedia. The methods used to design the multimedia comprises of use-case, outline, storyboard, and flowchart of reinforcement design. At the end of this research, it can be concluded that careful planning, meticulous attention to detail, and outside opinion about the user interface is required to complete the project. Moreover, even when all has been done, there is still room for further development.

## Abstrak

Kualitas beton yang keras, konduktivitas panasnya yang rendah, dan ketahanannya yang kuat untuk tekan membuatnya menjadi bahan pilihan untuk bangunan dan gedung pencakar langit di zaman modern. Namun, dengan keterbatasannya seperti kekuatan tarik yang lemah, tulangan baja diperlukan untuk membantu menahan beban yang diterapkan pada struktur. Merancang balok bertulang yang kuat dan memenuhi persyaratan membutuhkan perhitungan rumit dan panjang. Oleh karena itu, proyek ini dibuat untuk membantu mahasiswa dalam proses belajar merancang tulangan geser dan lentur pada balok menggunakan *multimedia*. Metode yang digunakan untuk merancang *multimedia* ini terdiri dari *use case*, *outline*, *storyboard*, dan *flowchart*. Pada akhir penelitian ini dapat disimpulkan bahwa perlu ada perencanaan yang cermat, keterlitan terhadap detail, dan saran dari luar mengenai hal *user interface* untuk menyelesaikan proyek ini. Setelah semua dilakukan, masih ada ruang untuk pengembangan lebih lanjut.