I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of the Bachelor's degree of Mechanical Engineering (Thermal-Fluids)

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INTEGRATING SPREADSHEET TEMPLATES AND DATA ANALYSIS INTO INDUSTRIAL HYDRAULIC INSTRUCTION

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"I hereby the author, declare this report entitled "INTEGRATING SPREADSHEET TEMPLATES AND DATA ANALYSIS INTO INDUSTRIAL HYDRAULIC INSTRUCTION" is my own except for quotations and summaries which have been duly acknowledged"

Signature :.....

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Date :19/12/2005

Dedicate to my beloved family. Thank you for all your support.

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May Allah reward and bless all of them. Finally the author is expressing his sincere gratitude to Allah once again who made the study to complete.

ABSTRACT

The purpose of this project is to assist learning process of industrial hydraulic. The scope of this thesis is to design spreadsheet templates by using the Microsoft Visual Basic 6.0. Few samples of difference spreadsheet templates are produced. The design of spreadsheet templates depends on the basic principle application in industry. Using designated spreadsheet templates, student can obtain required result that is appeared in the computer screen which is referred to the variable that we key define. Additionally, the hydraulic concept will be transferred in more clear and easier through the used of spreadsheet templates will be transferred.

ABSTRAK

Projek ini dijalankan adalah bertujuan untuk membantu proses pengajaran dan pembelajaran hidraulik. Skop kajian ini memilih rekabentuk pecontoh data berjadual menggunakan perisian Visual Basic 6.0. Beberapa pecontoh data berjadual yang berbeza akan dihasilkan berdasarkan konsep dan formula pengiraan yang berlainan.Hasil daripada pecontoh data berjadual ini, pelajar hanya perlu memasukkan nilai berdasarkan konsep soalan haudraulik yang dipilih. Kemudian output akan dipamparkan pada skrin computer. Secara tak lansung, konsep hidraulik dapat disampaikan dengan mudah kepada pelajar menggunakan soalan yang disediakan dalam "pecontoh data berjadual" tanpa membuat pengiraan.

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A	Area
Cm	Centimeter
e	Eccentricity
ID	Internal diameter
D	Diameter
F	Force
F_{OUT}	Force output
ℓ	Litter
ℓpm	Liters per minute
m	Meters
m^2	Meter Square
m^3	Meter Cubic / revolution
m^3/rev	Meter Cubic
min	Minute
m/s	Meter per second
N	Newton
P	Pressure
Rpm	revolution per minute
T	Torque
Q	Flow rate
Q_T	Theoretical flow rate
Q_A	Actual flow rate
V	Velocity
V_D	Volumetric Diameter
η_V	Volumetric Efficiency
η_m	Mechanical Efficiency
π	Phi

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The principles of hydraulics are applied to make many common machines work. For examples hydraulics are used in agricultural equipment, giant earth moving and mining machines machines, they are used to steer and stabilize giant ocean liners, help airplanes climb and turn and make the brakes in our cars work. So hydraulics can provide great force are obviously very adaptable and used in all kinds of applications as an industries or other.

Integrating spreadsheet templates is to provide a fundamental understanding of hydraulics concepts with an emphasis on the physical properties of hydraulics, component design and operation. In hydraulic instruction various techniques and training aids are used to promote understanding and learning.

In this project, a few spreadsheet templates are designed to solve problems and improve hydraulic instruction by using Visual Basic 6.0. A spreadsheet program is used to give time for custom designed templates. The spreadsheet allows Students to see answers of calculations on the screen as they are generated and permit students to change any variable at the time and to see what affect that will change to the overall value of calculations. With some exceptions, the spreadsheet calculation paradigm offers immediate updating of results when data is changed.

1.2 Objective

The major project objectives are:

- To develop software based industrial hydraulic using Microsoft Visual Basic 6.0
- To design and demonstrate spreadsheet templates in hydraulic application.
- To reduce time and increase the efficiency hydraulic instruction

1.3 Scope and Limitation of Study

The scope of this project is about development of spreadsheet templates for hydraulic industrial instruction. This program will be built by using Visual Basic 6.0 software, which is derived from formula of hydraulic calculation.

1.4 Problem Statement

Improving our understanding in the instruction and process of learning hydraulic, several of methods have to perform. The problem that occurs in the process of learning understands and question analyse.

1.5 Problem Analysis

From the problem statement, integrated spreadsheet templates can convenience for teachers and student in teaching and learning. In instruction, teachers also want to prepare calculations in advance. So they can be rerun easily with controlled and verifiable inputs. Teacher can use the spreadsheet as a platform and the student is led to a position where they can write virtually a stand alone program to support a simple application. It is clear the goal is not to teach a

programming language, but to achieve understanding of a concept for which some sort of program is needed to show, for example, variation over time, and then the spreadsheet should be the first choice.

CHAPTER 2

LITERATURE RIVIEW

2.1 Introduction

Spreadsheets build an ideal bridge between arithmetic and algebra and allow the student freely movement between the two worlds. Students look for patterns, construct algebraic expressions, generalize concepts, justify conjectures, and establish the equivalence of two models as intrinsic and meaningful needs rather than as arbitrary requirements posed by the teacher (Friedlander, 1998). A spreadsheet is a tool for working with and analysing of data. A template is a spreadsheet with formatting, frequently used text and formulas or functions already applied. Spreadsheet templates are reducing the time design and increase the efficiency in mechanical instruction. The content of a spreadsheet is:

- Numbers - The basic elements of every spreadsheet are number. As mentioned above, any numbers you type into a spreadsheet will be stored in the same way, no matter what is refers to. So the result of scientific calculation will be stored in the same way as a figure relating to a budget proposal. Therefore most spreadsheet has the ability to display number in different ways.
- Text-Text in a spreadsheet is used mainly for labelling and annotating the number so that to know what the numbers refer to. Most spreadsheet also has some simple

- Database capabilities, including searching and sorting and here the text it is important. Text is always important when it comes to presenting your numbers and calculation to other people. Most spreadsheet therefore allows presenting the text in a variety of type faces, sizes and styles to add visuals impact to a presentation
- Formula – spreadsheet cell can contain formula instead of text numbers. When a formula is entered into a cell then the result of a formula is displayed rather than content. A formula can also be made up of reference to other cells.

2.2 Visual Basic 6.0 Software

Visual Basic 6.0 is a high level programming language evolved from the earlier DOS version called Basic. Basic means Beginners All purpose Symbolic Instruction Code. It is a fairly easy programming language to learn. The codes look a bit like English Language. Different software companies produced different version BASIC, such as Microsoft QBASIC, QUICKBASIC, GWBASIC, IBM BASICA and so on.

Visual Basic is visual and events driven Programming Language. These are the main divergence from the old BASIC. In BASIC, programming is done in text only environment and the program are executed sequentially. In Visual Basic, programming is done in a graphical environment. Because users may click on a certain object randomly, so each object has to be programmed indecently to be able to response to those actions (events). Therefore, a VISUAL BASIC program is made up of many subprograms, each has its own program codes, and each can be executed indecently and at the same each can be linked together in one way or another.

Visual Basic is an object oriented, event driven and graphically based computer language. As such it differs radically from a so called procedural language like C where none of these concepts are part of the language. Programming in VB includes essentially separating processes. First the programmer designs a user

interface using pre made components such as forms, buttons, labels and dialog boxes. Once the interface has been created the programmers writes code to handle a user's actions. This second phase involves the classic elements of program construction, variables subroutines, and control structure, looping arrays and input or output algorithm design.

2.2.1 The Development Environment of Visual Basic 6.0

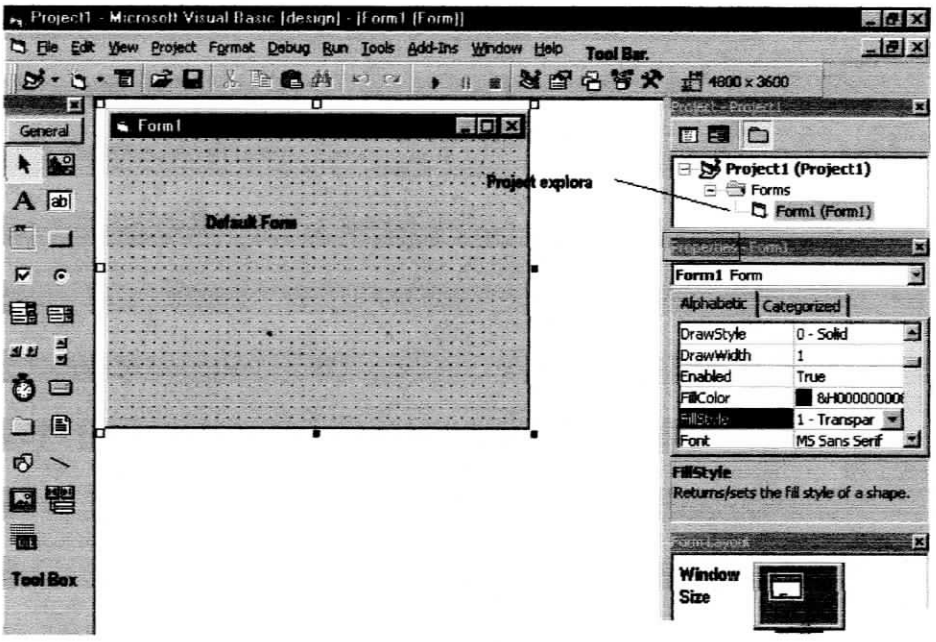

Figure 2.1: The elements of the main visual basic screen

The Figure 2.1 shows the development environment with all the important points labelled. Many of Visual basic functions work similar to Microsoft word example the Tool Bar and the tool box is similar to other products on the market which work off a single click then drag the width of the object required. The Tool Box contains the control placed on the form window. All of the controls that appear on the Tool Box controls on the above picture never run out of controls as soon as place one on the form another await on the Tool Box ready to be placed as needed.

2.2.2 The project Explorer Window

The Project explorer window gives a tree-structured view of all the files inserted into the application. Users can expand these and collapse branches of the views to get more or less detail (Project explorer). The project explorer window displays forms, modules or other separators that are supported by the visual basic like classes and Advanced Modules. If want to select a form on its own simply double click on project explorer window for a more detailed look. And it will display it where the Default form is located.

2.2.3 Properties Window

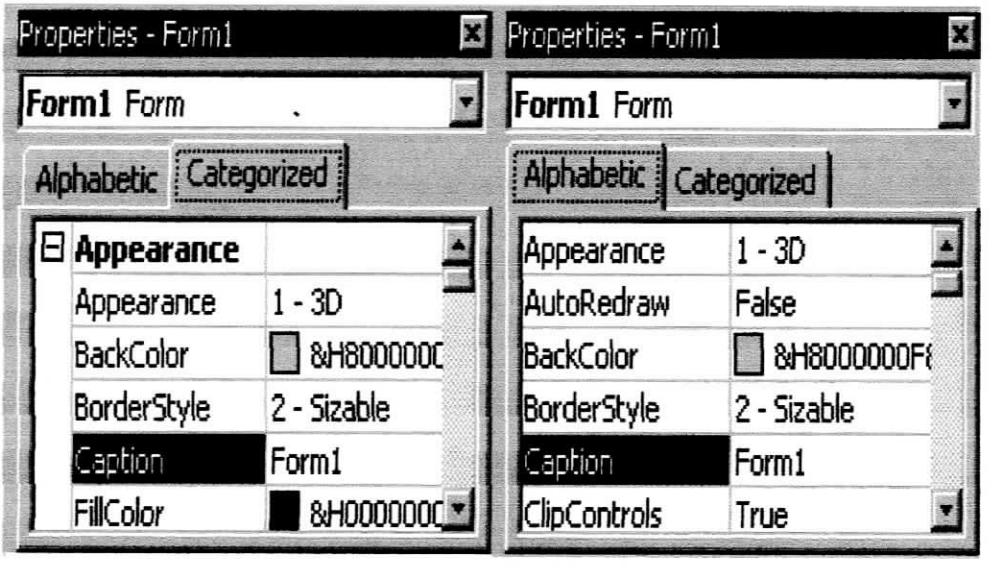

Figure 2.2: properties window components

Some programmers prefer the Categorises view of the properties window. By defaulting, the properties window displays its properties alphabetically (with the exception of the name value) when you click on the categorized button the window changes to left picture.

2.2.4 The Default Layout

When starts the Visual Basic, it's provided with a VB project. A VB project is a collection of the following modules and files.

- The global module (that contains declaration and procedures)
- The form module (that contains the graphic elements of the VB application along with the instruction) The general module (that generally contains general-purpose instructions not pertaining to anything graphic on-screen)
- The class module (that contains the defining characteristics of a class, including its properties and methods)
- The resource files (that allows to collect all of the texts and bitmaps for an application in one place)

On start up, Visual Basic will display the following windows:

- The Blank Form window
- The Project window
- The Properties window

2.2.5 Tool box

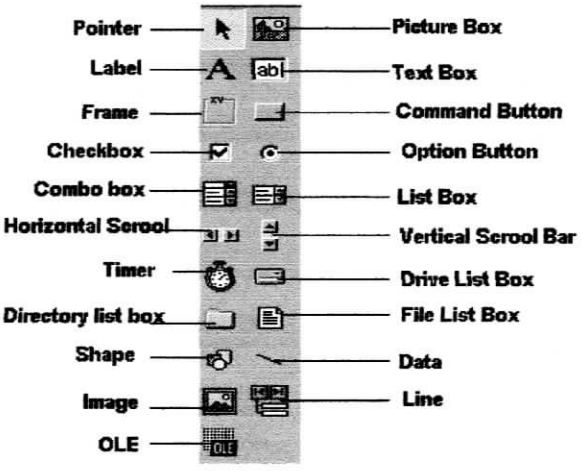

Figure 2.3: Toolbox display