DEVELOPMENT OF EXHIBITION CABINET

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ABSTRACT

Exhibition plays a significant role to make people know about new technology, new product, new development and etc. Cabinet are widely used in exhibition for display. In this project Exhibition Cabinet is developed to improve the commercial design. It is intended to generate a new concept of cabinet that would make display and keep or store a small and light trophy and plague. This involves the process of designing the cabinet by considering the shape and also the ergonomic factor for people to use. After the design has completed, it was transformed to its real product where the design is used for guideline. Several methods and processes involved are conceptual design, material selection, cutting, drilling, welding and finishing. After all the process had been done, this cabinet may help us to understand the fabrication and designing process that involved in this project.

ABSTRAK

Pameran memainkan peranan yang penting untuk membuatkan orang tahu tentang teknologi yang baru, produk yang baru, peningkatan yang baru dan sebagainya. Kabinet digunakan secara meluas di dalam pameran untuk pertunjukkan. Dalam projek ini, kabinet pameran direka untuk meningkatkan rekaan komersil. Ia merangkumi satu penghasilan konsep kabinet yang baru yang boleh mempamerkan dan menyimpan trofi dan piala yang kecil dan ringan. Proses ini melibatkan proses mereka bentuk kabinet dengan mengambil kira bentuk dan juga faktor-faktor ergonomik untuk kegunaan ramai. Selepas rekaan itu siap, ia telah dihasilkan kepada produk yang sebenar di mana rekaan tadi digunakan sebagai rujukan. Beberapa cara dan proses yang terlibat adalah rekaan konsep, pemilihan bahan, proses pemotongan, proses menebuk lubang, proses mengimpal dan kemasan. Selepas semua proses tadi dilakukan, kabinet ini mungkin dapat membantu umum untuk memahami proses penghasilan dan proses mereka bentuk yang terlibat dalam projek ini.

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CHAPTER 1

INTRODUCTION

1.1 Overview

This project presents design and development of an exhibition cabinet that considers strength, durability, space and ergonomic factor. This cabinet would be entirely different from existing cabinets. The Diploma final year project allocates the duration of 1 semester, this large man-hour project requires significant efforts of the student to participate. Basically the entire Exhibition Cabinet project could be divided into 3 stages, which are concept review and development, designing and fabrication.

The Exhibition Cabinet is equipped by using all necessary items and methods for instance rectangular hollow steel, soft board, skills in manufacturing processes arc welding to join the parts and drilling. The advantages of the proposed cabinet to be developed can be seen that it can be long lasting and at the same time portable which can be easily transferable to another place as necessary.

The process of development is initiated from conceptual design stage by considering the function as well simplicity. In order to make friendly environmental-cabinet, the ergonomic factor is also taken into account. Practical development involves the measurement, cutting the materials into required size and shape and assembly.

1.2 Problem Statement

Companies, business organizations and universities use various design of cabinets to exhibit their works. However most of cabinet design are space-limited and also lack of flexibility.

It is important to further improve the current design of Exhibition Cabinet, so that is more efficient to use.

1.3 Importance of The Project

The project leads the student understand how to use the knowledge and skill gathered before in solving problem. This project also promote the student is capability of research, data gathering, analysis and then solving problem scientifically.

The project also will educate the student in communication like in a presentation and educate them to defend their research in the presentation. The project also will generate students that have capability to make a good research report in thesis form or technical writing. This project also can produce and train student to capable of doing work with minimal supervisory and more independent in searching, detailing and expanding the knowledge and experiences.

1.4 Scope of The Project

i) Technical Exhibition Cabinet

ii) Material considered

- Soft board
- Hollow steel

iii) Size and design is for

- a small and light trophy and plague.
- with maximum weight of 5 Kilogram.

1.5 Project Objectives

The objectives of the project are:

- To design and fabricate exhibition cabinet and to give maximum exposure to the reality of a product based on developed concept and the processes.

1.6 Project Planning

This project is begun with literature review via internet, books, supervisor, and other relevant academic material that related to the title. The literature review is carried out through out the project to keep up with new knowledge.

At the same week schedule management is done using Microsoft Office. This also takes a week to accomplish. Gantt chart is shown in figure 1.1.

The following weeks is proposal submission and continue literature gathering on Exhibition Cabinet. Both of these take a week to be done.

The next task is preparation of progress presentation and progress report writing, both of these tasks take one more week to be done. After that comes the progress presentation week and progress report submission. On this particular week I have to prepare the speech for the presentation and double checked the report that has to be submitted.

The fabrication process is schedule to takes on the next week but because of fabrication process is have a lot of part to fabricate and cutting. The process is scheduled to take about four weeks. Next come the assembly, painting and finishing. This task scheduled to take time about one week.

Next task is the final report writing and final presentation preparation. This take about one week to accomplished. The report is guided by UMP Thesis writing guided and also the guidance of my supervisor. Due to all problems we had when doing the project the management has agreed to extend the time to submit the report and the presentation. All the task is scheduled to take about fourteen weeks overall.

1.7 Report Outline

Scope	Weeks													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Literature Review	X	X	X											
		O	O	O										
Design & sketching			X	X	X	X								
			O	O	O									
Mid Presentation							X							
									O					
Finalize Design							X	X						
						O	O	O						
Analysis and Testing												X		
													O	
Fabrication									X	X	X	X	X	
							O	O		O	O	O	O	
Report Preparation			X	X	X	X	X	X	X	X	X	X	X	X
				O	O	O	O	O		O	O	O	O	O
Final Presentation														X
														O

X	Planning Progress
O	Actual Progress

Figure 1.1: Gantt chart

CHAPTER 2

LITERATUR REVIEW

2.1 Introduction

The cabinet is a piece of furniture that is used for displaying things with purpose of promoting, advertising and certain service. Initially, the cabinet is designed as one big object and therefore difficult to move from one place to another. Cabinets were redesigned such that it is more convenient to use and move to around.

The cabinet design is according to the present market demand and to fulfill criteria as customer needs. It should be designed to crest a product that is not at the market. Moreover, it is for evaluating the same product in the market so that it will more quality and innovative.

2.2 Type of cabinet

Several Exhibition Cabinets with various functions have been found.

1. Stationery Exhibition Cabinet – used for keep and display the stationery. (Figure 2.1)

2. Technical Exhibition Cabinet – design for keep and display the technical things. (Figure 2.2)
3. Computer Exhibition Cabinet – design for keeping and displaying the computer and accessory, which can have similar features with technical one
4. Market Exhibition Cabinet – used for keeps and display thing that want to sell. (Figure 2.3)
5. Museum Exhibition Cabinet – used for exhibit the work and has a lockable secure inner cabinet. (Figure 2.4)
6. Custom Exhibition Cabinet – are widely used for keep and display light trophy and plague. (Figure 2.5)

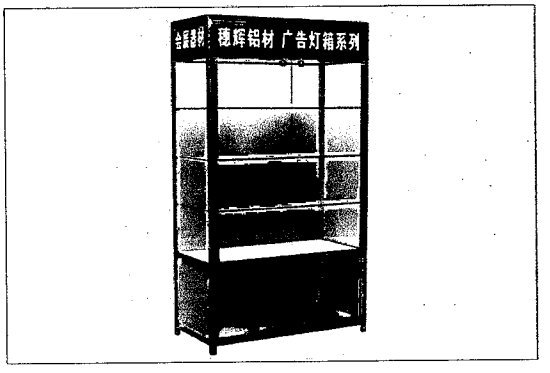

Figure 2.1: Stationery exhibition cabinet

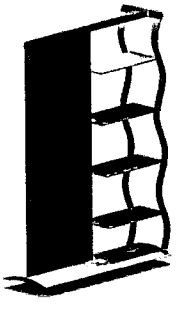

Figure 2.2: Technical exhibition cabinet

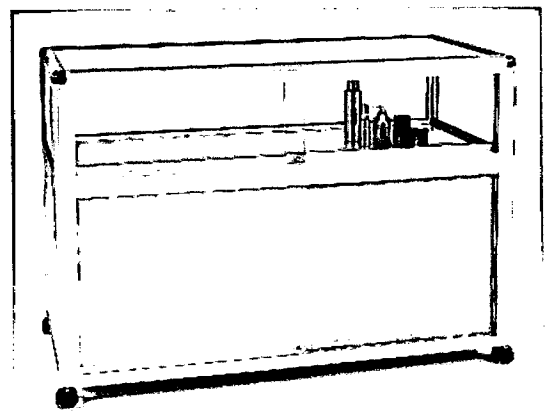

Figure 2.3: Market exhibition cabinet

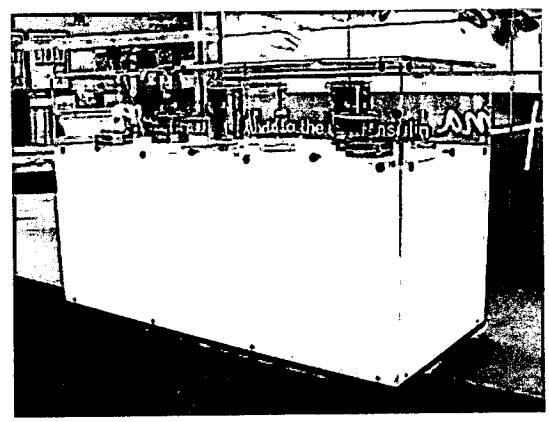

Figure 2.4: Museum exhibition cabinet

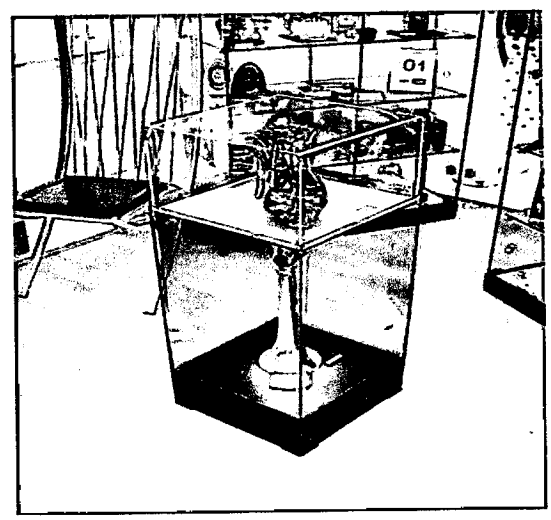

Figure 2.5: Custom exhibition cabinet

2.3 Basic Parts

Basically, there are two parts in an exhibition cabinet design, wheel and body.

- Wheel; is usually made from rubber that joined together with the bolt and nut with steel frame to ensure strength.
- Body: is usually made from wood and frame from hollow steel. Some cabinet doesn't have any body on it on purpose, and some using wood frame as the body.

2.4 Joining Method

Joining involves in assembly stage. Commonly used method to join metal part is Metal Inert Gas (MIG) welding.

2.4.1 Metal Inert Gas (MIG) Welding

Figure 2.6 illustrated schematic of MIG method: An arc is struck between a consumable electrode and the sheet metal to be welded. The consumable electrode is in the form of continuous filler metal. An inert gas surrounds the arc and shields it from the ambient to prevent oxidation. Carbon steels, low alloy steels, stainless steels, most aluminum alloys, zinc based copper alloys can be welded using this process.

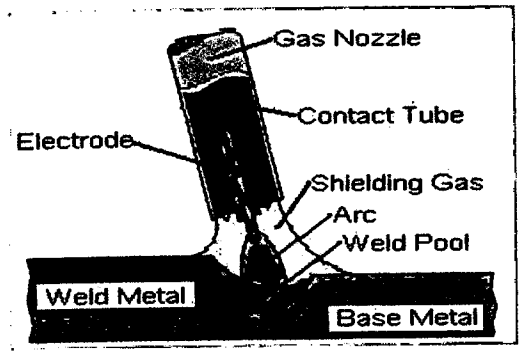

Figure 2.6: Schematic of Metal Inert Gas (MIG) welding.

Basic component used in MIG is shown in Figure 2.7. Close up view of gun is described in Figure 2.8.

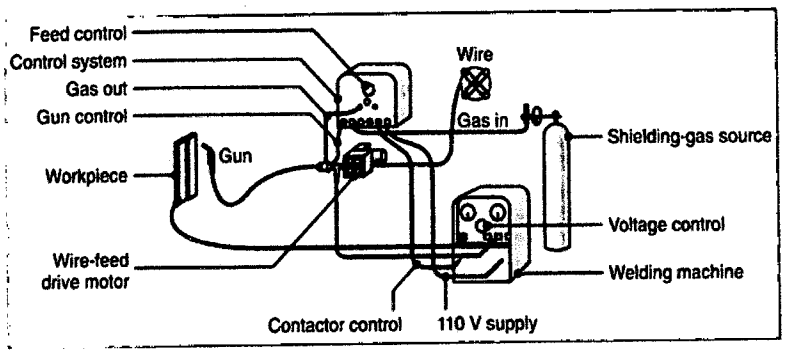

Figure 2.7: Basic component used in MIG operations

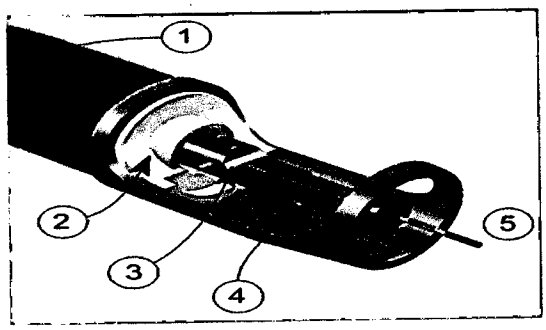

Figure 2.8: GMAW torch nozzle cutaway image. **(1)** Torch handle, **(2)** Molded phenolic dielectric (shown in white) and threaded metal nut insert (yellow), **(3)** Shielding gas nozzle, **(4)** Contact tip **(5)** Nozzle output fac.

Gas Metal Arc Welding (GMAW) is frequently referred to as MIG welding. MIG welding is a commonly used high deposition rate welding process. Wire is continuously fed from a spool. MIG welding is therefore referred to as a semiautomatic welding process. The shielding gas, forms the arc plasma, stabilizes the arc on the metal being welded, shields the arc and molten weld pool, and allows smooth transfer of metal from the weld wire to the molten weld pool. There are three primary metal transfer modes which are spray transfer, globular transfer and short circuiting transfer.

In spray transfer, small, molten metal droplets from the electrode are transfer to the weld area at a rate of several hundred droplets per second. The transfer is spatter-free and very stable. High Direct Current (DC) and voltages and large-diameter electrodes are used with argon or argon-rich gas mixture used as the shielding gas. The average current required in this process can be reduced by using a pulsed arc, which superimposes high-amplitude pulses onto a low, steady current. The process can use in all welding positions.

In globular transfer, carbon-dioxide-rich gases are utilized, and globules are propelled by the forces of the electric-arc transfer of the metal, resulting in considerable spatter. High welding currents are used, making it possible for greater weld penetration and higher welding speed than are achieved in spray transfer. Heavier sections commonly are joined by this method.

In short circuiting, the metal is transferred in individual droplets (more than 50 per second), as the electrode tip touches the molten weld metal and short circuits. Low currents and voltages are utilized with carbon-dioxide-rich gases and electrodes made of small-diameter wire. The power required is about 2 kW.

There are some advantages and disadvantages in using MIG welding. As advantages,

1. High productivity, because based on this machine the consumer no need to stop their work to change rods or chip and brush the weld frequently.
2. Easy to learn and makes great-looking welds.

3. Can weld on stainless steel, mild steel, and aluminium.
4. This welding process also can be weld in all positions.

The Disadvantages of MIG Welding

1. Can not check watch, count money, smoke cigarette, or talk to buddy as often.
2. Costs money of consumable, such as tips and nozzles.
3. Is not worth a dang on paint, rust, or dirty surfaces.
4. No good for thick steel, because it does not get the proper penetration.

2.4.2 Mechanical Fastening

Two or more components may joined or fastened in such a way that they can be taken apart sometime during the products service life or life cycle. Numerous products (including mechanical pencils, watches, computers, appliances, engines, and bicycle) have components that are fastened mechanically. Mechanical fastening may be preferred over other methods for the following reasons: ease of manufacturing, ease of assembly and transportation, ease of disassembly, maintenance, parts replacement, or repair, ease in creating designs that require moveable joints, such as hinges, sliding mechanism, and adjustable components and fixtures and lastly lower overall costs of manufacturing the product.

The most common method of mechanical fastening is by the use of bolts, nuts, screws, pins and a variety of other fasteners. These operations are known also as mechanical assembly. Mechanical fastening generally requires that the components have holes through which the fasteners are inserted. These joints may be

subjected to both shear and tensile stresses and should be designed to resist these forces.

2.5 Drilling Machines

Drilling machines are used for drilling holes, tapping, reaming, and small diameter boring operations. The most common machine is drill press, the major components of which are shown in (Figure 2.9). The workpiece is placed on an adjustable table, either by clamping it directly into the slots and holes on the table or by using a vise, which in turn is clamped to the table. The drill is lowered manually by a hand wheel power or by power feed at preset rates. Manual feeding requires some skill in judging the appropriate feed rate.

Figure 2.9: Drilling machine

Drills pressed usually are designed by the largest workpiece diameter that can be accommodated on the table and typically range from 150 to 1250mm. In order to maintain proper cutting speeds at the cutting edges of drills, the spindle speed on drilling machines has to be adjustable to accommodate different drill sizes. Adjustments are made by means of pulleys, gear boxes or variable-speed motors.

The types of drilling machines range from simple bench-type drills used to drill small diameter-holes (Figure 2.10a), to large radial drills (Figure 2.10b), which can accommodate different large workpieces. The distance between the column and the spindle center can be as much as 3m. The drill head of universal drilling machines include numerically controlled three-axis machines, in which the operations are performed automatically and in the desired sequences with the use of turret punch.

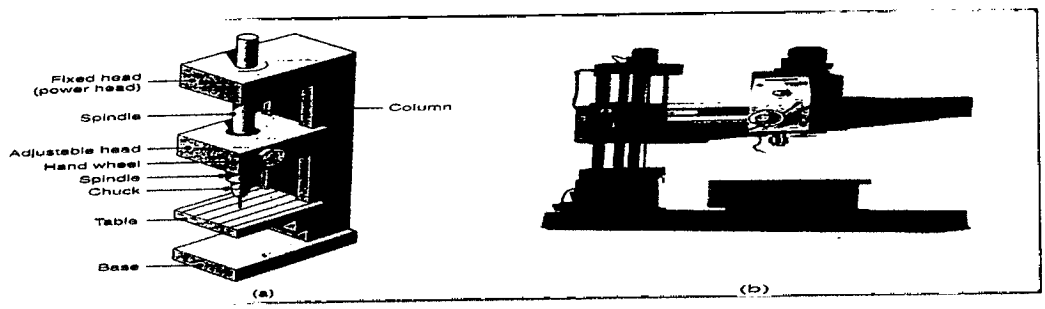

Figure 2.10: a) Schematic illustration of the components of a vertical drill press machine. **(b)** A radial drilling machine

CHAPTER 3

METHODOLOGY

3.1 Project Flow Chart

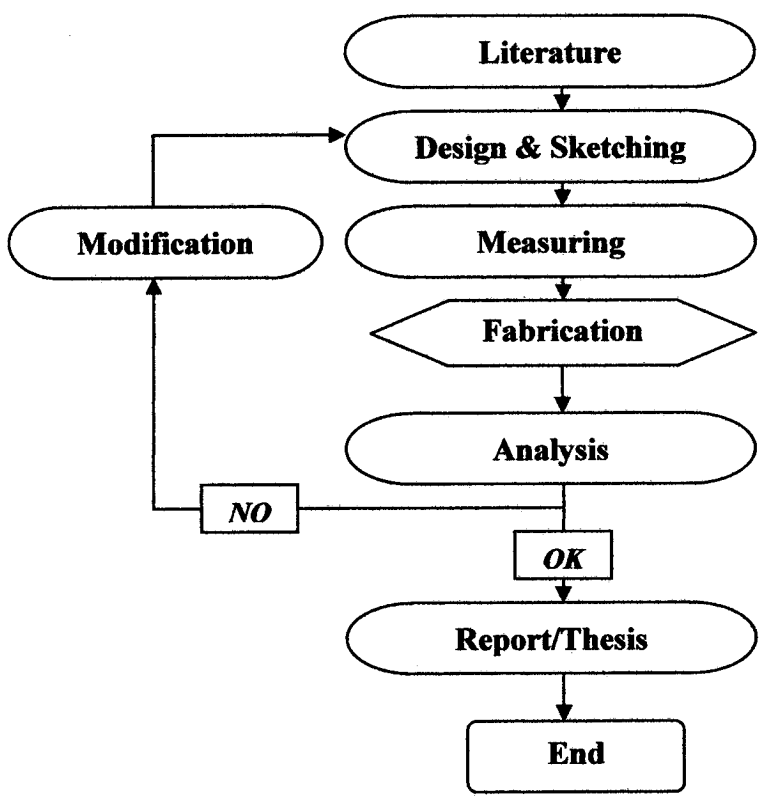

Figure 3.1: Project flow chart