

Design for Assembly (DFA) On Sandwich Toaster

NAZATOL SffIMA BT. AHMAD RADZUKI

2007271148

A thesis submitted in partial fulfilment of the requirements for the award of
Bachelor Engineering (Hons) Mechanical

**Faculty of Mechanical Engineering
Universiti Tcknologi MARA (UiTM)**

MAY 2010

ACKNOWLEDGEMENT

First of all, my praise is to the Almighty for His benevolence and kindness in giving me power, strength and inspiration to complete my thesis effectively and this final year project.

I would like to express my sincere gratitude and appreciations to my project supervisor Mr. Wan Emri Bin Wan Abdul Rahman for his kindness, advice, guideline and his patient to help me for completing my final year project. The helps that have been given are truly being appreciated and very thankful for my supervisor.

Finally, my appreciation goes to my parent, family and friends who have giving me support and understanding both mentally and physically during the completion of this thesis. Thank you very much.

ABSTRACT

The idea of this project is to explain the growing significance the design of assembly (DFA) and evaluate the design of a sandwich toaster by using Boothroyd Dewhurst method. Nowadays, a DFA method is usually used for improvement in product design. This method will help for improving product for easy and low cost assembly, focusing on functionality and on assimilability concurrently. DFA will help to estimate the difficulty of assembly, eliminate unnecessary parts and design products that are less costly to manufacture. The project majority based on Computer Aided Design (CAD) software as well as DFA method criteria to accomplish the purpose of implementation this project. Further, literature review is details on Boothroyd Dewhurst method. The study will concentrate on analyzing the current design of sandwich toaster, reducing the number of parts, and comparing the design efficiency and the cost between the previous and latest design. The product is evaluated by using Manual Handling Table and Manual Insertion Table. The design efficiency, cost assembly time, operation time and part are calculated based on the data obtained from evaluation. The results of current design are used to make improvement of the product. In that case, latest design is complete by eliminating or combining the previous design accordingly that total cost and time for assemble the product is reduced. Last but not least, comparison is made between latest and previous design. The improvement are decrease parts from 55 parts to 33 parts, decrease operation time from 264.03 seconds to 177.15 seconds, reduce assembly cost from RM 0.3251 to RM 0.2306 and followed by design efficiency from 37.49% to 54.19% are increased.

TABLE OF CONTENTS

CONTENTS	PAGE	
ACKNOWLEDGEMENT	1	
ABSTRACT	ii	
TABLE OF CONTENTS	••	
LIST OF TABLES	in	
LIST OF FIGURES	vii	
	viii	
I	INTRODUCTION	
1.1	Design for Assembly	1
1.2	Objectives	2
1.3	Scopes	3
1.4	Problem Statement	4
1.5	Aspect assembly	4
1.6	Significant Of the Study	4
CHAPTER II	LITERATURE REVIEW	
2.1	Design for Assembly (DFA)	6
2.2	Benefits of DFA in product Development	11

2.3	Boothroyd Dewhurst Method	14
	2.3.1 Concepts	14
	2.3.2 Determining design efficiency	20
2.4	Summarize of Boothroyd Dewhurst Method	21
2.5	Examples of Case Study	23
	2.5.1 Existing design	24
	2.5.2 Proposed design	26
	2.5.3 Result	28

CHAPTER III RESEARCH METHODOLOGY

3.1	Introduction	29
3.2	Development Flow	31
3.3	Product and Model Selection	33
3.4	Dissemble the Sandwich Toaster	34
3.5	Determining Part Name, Material, and Function	35
3.6	Drawing Parts Using CATIA Software	35
	3.6.1 Role of CAD/CAM *	36
3.7	Evaluate Current Design of Sandwich Toaster	37
3.8	Improving Existing Design	37
3.9	Compare the old design with the new Design	38

CHAPTER IV CURRENT PRODUCT DESIGN ANALYSIS

4.1	Introduction	39
4.2	Current Design Analysis	40
4.3	Disassemble sandwich toaster	41
4.4	Theoretical Minimum Number	43