STUDY AND ANALYSIS OF QFD IN AUTO-PARTS MANUFACTURING COMPANY

A Major Project Report

Submitted in Partial Fulfillment for the Award of the Degree of

Master of Technology

In

Mechanical Engineering

With specialization in

PRODUCTION ENGINEERING

By

SUJIT KUMAR
(Roll No. 2K12/PRD/24)

Under the guidance of

Sh. Saurabh Agrawal — **(Assistant Professor)**

Dr.Qasim Murtaza — **(Associate Professor)**

Department of Mechanical Engineering

DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

DELHI TECHNOLOGICAL UNIVERSITY

DELHI-110042

SESSION 2012-14

CERTIFICATE

This is to certify that the project entitled "**Study And Analysis Of QFD in Auto-Parts Manufacturing Company**" being submitted by me, is a bonafide record of my own work carried by me under the guidance and supervision of **Sh. Saurabh Agrawal (Assistant Professor)** and **Dr. Qasim Murtaza (Associate Professor)** in partial fulfillment of requirements for the award of the Degree of Master of Technology (Production Engineering) in Mechanical Engineering, from Delhi Technological University, Delhi.

The matter embodied in this project has not been submitted for the award of any other degree.

Sujit Kumar
University Roll No: 2K12/PRD/24

This is to certify that the above statement made by the candidate is correct to the best of our knowledge.

Sh. Saurabh Agrawal
(Assistant Professor)

Dr. Qasim Murtaza
(Associate Professor)

DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING
DELHI TECHNOLOGICAL UNIVERSITY
DELHI-110042
2012-2014

ACKNOWLEDGEMENT

I have a great pleasure in expressing my deep sense of gratitude and indebtedness to **Sh. Saurabh Agrawal (Assistant Professor)** and **Dr. Qasim Murtaza (Associate Professor)** of Mechanical Engineering Department of Delhi Technological University, Delhi for their continuous guidance and invaluable suggestion at all stages from conceptualization to final completion of this project work. They have guided me for fundamentals and provided many technical papers on the subject matter and thus inculcated the interest and quest for knowledge of this work. They provided constant support and encouragement for successful completion of this work.

I am also grateful to **Prof. Naveen Kumar** Head Department of Mechanical Engineering, for the motivation and inspiration.

I would also like to take this opportunity to present my sincere regards to all my teachers those who came to my help in some way in making the project successful. I am also thankful to all non-teaching staff of Mechanical Engineering Department for providing me unconditional and any time access to the resources.

I am grateful to my parents for their moral support all the time; they have been always around to cheer me up in the odd times of this work. I am also thankful to my classmates for their unconditional support and motivation during this work.

SUJIT KUMAR

2K12/PRD/24

CONTENTS

Sr. no.	Topic	Page no.
	Certificate	ii
	Acknowledgement	iii
	Contents	iv
	List of Figures	vii
	List of Tables	vii
	Abstract	viii
Chapter 1	**INTRODUCTION**	1
1.1	Project Objectives	2
Chapter 2	**Literature Review**	3
2.1	History of Quality Function Deployment (QFD)	3
2.1.1	Development of QFD in Japan	4
2.1.2	Development of QFD in US	4
2.2	QFD Definitions	5
2.3	Input & Output of QFD Technique	8
2.4	Application of QFD across industries	8
2.5	Benefits of adopting QFD Technique	10
2.6	Factor Affecting Success of QFD Project	14
2.6.1	Comprehensive Technical Support for the QFD Project	14
2.6.2	Strict Organization of the QFD Project	15

Sr. no.	Topic	Page no.
2.7	Problem Statement	16
2.7.1	About the Steering	16
2.7.2	Types of Steering	16
Chapter 3	**QFD Approach**	20
3.1	QFD Underlying Principle	21
3.2	House of Quality	22
3.2.1	The Parts of House of Quality	22
3.3	The QFD Team	23
3.4	Planning & Organizing Project	24
3.5	Implementation of QFD Technique	24
Chapter 4	**Case Study**	26
4.1	About the Company	26
4.1.1	Company Policy, Performance and Working Philosophy	26
4.1.2	Various Plants of ABC Company	27
4.2	Special Features of RPS System	28
4.3	Components of RPS System	28
4.4	Stepwise Implementation of QFD for the Steering System	29
4.4.1	List Customer Requirements (WHATs)	29
4.4.2	List Technical Descriptors (HOWs)	41
4.4.3	Develop a Relationship Matrix between WHATs and HOWs	42

Sr. no.	Topic	Page no.
4.4.4	Develop an Interrelationship Matrix between HOWs	45
4.4.5	Competitive Assessments	47
4.4.6	Develop Prioritized Customer Requirements	50
4.4.7	Develop Prioritized Technical Descriptors	53
Chapter 5	**Results and Discussion**	57
Chapter 6	**Conclusion**	61
	References	63
	Appendix	67

List of Figures

Fig. No.	Title	Page no.
1	Change comparison after implementation of QFD	11
2	Production start-up problem	12
3	Rack and pinion steering	17
4	Hydraulic power steering	18
5	Electric power steering	19
6	House of Quality	23
7	Components of RPS	29
8	Methodology for collecting VOC	33
9	Conversion of VOC into customer requirement	35
10	Refinement of customer requirements	40
11	Refinement of technical descriptors	41
12	Adding relationship matrix to HOQ	44
13	Adding interrelationship matrix to HOQ	46
14	Adding customer competitive assessment to HOQ	48
15	Adding technical competitive assessment to HOQ	49
16	Adding prioritized customer requirements to HOQ	51
17	Adding prioritized technical descriptors to HOQ	54

List of Tables

Table no.	Caption	Page no.
1	Customer requirements	36
2	Evaluation of customer response	39

ABSTRACT

Quality Function Deployment (QFD) is a systematic technique to translate customer needs into the technical characteristics of a product or service. The competitiveness of the product in the market is dependent on how much a product reflects the needs/requirements of the customer. QFD is a structured process, a visual language, and a set of inter-linked engineering and management charts. It establishes customer value using the voice of the customer and transforms that value into design, production, and manufacturing process characteristics. This study presents the implementation of QFD in ABC Company where steering are manufactured. Users had faced problems with current design of the steering so the company has decide to come up with design of the steering which incorporates the needs of customer so as to have lesser field problems. Hence the voices/image of the customers for a good steering were collected and converted into customer requirements (WHATS). Kano questionnaire was used to prioritize the requirements of the customer. Then engineering characteristics or technical descriptors (HOWS) were determined in such a way that technical descriptors helps in achieving/fulfilling one or more customer requirement. These WHATS & HOWS were placed in the house of quality to obtain relation between them and know how they affect each other. On the basis of customer requirements customer competitive assessment of current product was done with respect to the competitors. Similarly on the basis of technical descriptors current product was compared with the competitors so as to find where the improvement is required. Prioritized customer requirements and prioritized technical descriptors were developed for WHATS & HOWS respectively. On the basis of outcome from the house of quality various modifications for steering design are suggested so as to make the steering more competitive in the market & to have lesser complaints from user end. This will help the company to improve the quality of steering. As far as limitations of study are concerned, more customer requirements could have been placed in the house of quality to get more improved steering system, number of customer complaints row could have been used to get weakness of the product as per technical parameters. This QFD technique can be implemented for process planning and production planning phase in future which would further reduce overall cycle time required to the manufacture the product.