



QUALITY FUNCTION DEPLOYMENT IN THE DESIGN PHASE OF PRESSURE DIE FOR WIRE DRAWING PROCESS

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Abstract

Quality Function Deployment (QFD) has been used worldwide by organization to bring the new products to market faster, better and cheaper. This paper presents the simple casing using QFD on the design phase of pressure die for wire drawing process. The main purpose of QFD in this project was to prioritize the customer requirement and convert to technical specification. Another purpose of QFD was to meet the customer expectation. The QFD system involves constructing one or more matrices containing information related to the others. The first matrix is sometimes referred to as the “House of Quality” and contains information about customer’s needs and requirements. The Voice of Customer (VOC) is the first step in QFD. It is information gathering technique which describes who our customer are, what their problems, how the product will be used by them etc. There are different techniques to gather the information; this paper describes method used to collect the VOC.

Keywords: Quality Function Deployment (QFD), Voice of Customer (VOC), House of Quality

1. INTRODUCTION

1.1 Wire drawing: The process of drawing through converging die is known as wire drawing. Man and Engineering depend on wire and wire products to very great extent. The wire may be both round and flattened. The wire

articles are in daily use simple obvious ones being hair pins, paper clips and key rings. In industry the utilization of wire products is even greater. for example in manufacturing industry nails of different size, helical and coil spring, cables, chain, ropes and meshes are produced from wire in great quality and quantity for use in many engineering fields. Man cannot live without wire and wire products.

1.2 Pressure Die: Pressure dies utilize lubricant pressure to increase lubricant residuals on drawn wire. As wire enters the pressure die, lubricants are carried into pressure inserts a small pressure chamber where they are trapped. Extremely high pressures are created by both the continuous entry of lubricant as well as by thermal expansion. By improving lubrication, pressure dies improve wire drawing productivity by extending die life and enabling faster drawing speeds. Pressure dies also improve wire quality by reducing friction and decreasing drawing temperature.[1]

1.3 QFD: The study focused in a system capable of translating buyers and users needs into design requirements, and changing these requirements into critical characteristics and specific parts requirements. QFD (Quality Function Deployment) is a method for: a) developing a design quality aimed at satisfying the consumer, b) translating the consumers’ demand into design targets and major quality assurance points to be used throughout the production stage (Akao 1990). The QFD system involves constructing one or more matrices containing information related to the others. The first matrix is sometimes referred to as the “House of

Quality” and contains information about customer’s needs and requirements.

2. THE OBJECTIVES OF USING QFD IN THE PROJECT ARE

- Define design and specifications for the residential units meeting the highest level as possible of customer requirements and satisfaction.
- Ensure consistency between customer requirements and product’s measurable characteristics
- Ensure consistency between the design phase and the construction work. QFD can minimize the problems that usually are detected on the interaction between design and manufacturing team
- Optimize the integration of customers’ perceptions and variables that can affect the RoI (Return on Investment) such as manufacturing cost, speed of sales, schedule and cash flow.
- Reduce the time to perform quality features throughout product development.[2]

3. IMPORTANCE OF DESIGN PHASE

Table.1. The planning to go to VOC

Which	Who	When	Where	What	How
Customer to visit?	From your company should go?	Is the customer using your product?	Is the customer using your product?	Information you need?	Will data be captured
Employees at the customer?	Has what role?			Problems / opportunities are customer facing?	Will data be analyzed

What customer wants	Importance Ranking	Comparison with competition	Comment
Life of the die at 6 to 8T	5	Competitor(4) Company(3)	Competitor life is avg 7 T
Roundness of the wire	5	Competitor (5) Company(5)	Must pass Feed ability test
Pricing of the Die	4	Competitor (3) Company(2)	Competitor wire drawing pellet is at INR 360 landed
Delivery	4	Competitor (4) Company (2)	Competitor delivers in 1 week time.

The Design Phase for Pressure Die is responsible for achieving client’s requirements and it is in this phase that the company needs to reach the standards of quality through drawings and technical specifications. The questions for any company are how to obtain the innovative solutions or information for developing new projects, and how to manage decision-making in a way that ensures the best possible results. These issues apply to the strategy for Pressure Die design.[3]

4. VOICE OF CUSTOMER (VOC)

The VOC is the first step in QFD. It is information gathering technique which describes who our customer are, what their problems, how the product will be used by them etc. There are different techniques to gather the information such as Focus group, Questionnaire, Interview, warranty information and customer complaints.[4] The Present work used Interview and customer visit to collect the Data. The planning to go to VOC is summarized in table.1 and the VOC listed in table.2[5]

Easy of Assembly	3	Competitor (4) (1)	Company	Competitor has provided hydraulic fixture
No premature failure of die	5	Competitor (3) (3)	Company	Increase in lubrication temperature cause pressure rise and premature failure

Table.2. Voice Of Customer

5. THE HOUSE OF QUALITY:

The house of quality is the most important tool in the QFD process, it is a matrix with a shape of a house, by which we can transfer the degree of importance in the costumers' requirements (the What) into design specifications (the How). This HOC is divided to six regions. Fig.1.

a. The what region: Is the region where we put the costumers' requirements, it is divided in two columns. In the first column we put the costumers' requirements, and in the second we put the coefficient that reflects the importance of each Costumer requirement.

b. The second region: The How region is where we put the Design specifications. We divide it in two lines, the first line is where we put the DSs, and in the second line we define the way of improvement: increasing, decreasing or target (targeting a value).

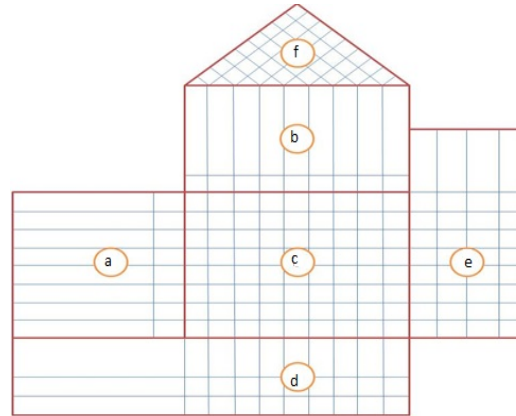
c. The third region: What vs How region is where we define how much impact DS can have on the CR. In each grid we can give a score = {1, 3 or 5} to estimate the impact.

d. The fourth region: The How Much region, this region is divided into three lines. In the first one we give the value and the unit of the DS (How Much). In the second we define the range of acceptance or the tolerance for DS. In the last line we put the score for the DS

e. The fifth region: The Benchmarking region where we compare how much our products can perform against the competitors in regards to the CR, it can take value of [1, 2, 3, 4, 5]. The value of 1 mean that the product doesn't satisfy the CR and 5 mean that the product is perfectly satisfying the CR.

f. The sixth region: the How vs How region, here we define the type of correlation between each two DSs, whether it is positive, negative or neutral, depending on which way of improvement we have fixed for each DS.

It represents the impact of improving one specification on the other one.



6. CONCLUSION:

QFD is a valuable and very flexible tool for Design. The sequence of parts and steps during the QFD process can be changed according to the strategy adopted by the design team. The correlation matrix is the heart of the QFD process and stores precious information needed for design improvements. QFD helps prioritize the improvements and design specifications. QFD also helps translating the buyers and users needs into information that can be managed by the design team. Besides, it facilitates the use of benchmarking information in a systematic way.

7. REFERENCES

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