



2nd International Conference on Materials Manufacturing and Design Engineering

Weight Optimization of Valve for Cost Effectiveness: Using Value Analysis

Satish M. Silaskar^{a*}, Dr. Vilas B. Shinde^b

^a *Research Scholar, Datta Meghe College of Engineering, Airoli, Navi Mumbai, India.*

^b *Research Guide, Datta Meghe College of Engineering, Airoli, Navi Mumbai India.*

Abstract

This paper concentrates on value engineering and analysis of ball valve used hydraulic systems. Principles of value engineering have been primarily applied for weight Optimization of valve for cost effectiveness as well as improvement in performance. In manufacturing industry changes observed in the product are very faster and difficult to predict its presence in comparison to earlier design due to largely changing customer demands and variety of expectation added to the changing environment. The continuous development of the technology leads to frequent changes in the design. The manufacturing industries are practicing to innovate and improve the design of product by weight optimization and improvised manufacturing process of product for cost effectiveness. Value Engineering defines a process in which the value of the product can be increased by significantly by decreasing its cost to achieve a long-term growth of the comp

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Peer-review under responsibility of the scientific committee of the 2nd International Conference on Materials Manufacturing and Design Engineering.

Keywords: Analysis, Cost Effectiveness, Value Engineering, Weight Optimization.

1. Introduction

The valves become prominent parts of industrial fluid power systems as the controls flow, regulate pressure & control the direction of pressurizing of fluid. Valves are also important from safety point of view; it can be extremely

Corresponding author. Tel.: 9769605164; 022-25972874

E-mail address: satishsilaskar@rediffmail.com, silaskarsatish@gmail.com.

expensive and complicated in design. In most of the industries, considerable quantity of fluid is transferred through pipes and for regulating purpose use of valves is unavoidable. Valve manufacturing industries are producing various valves like Globe control valve, High-Performance Butterfly Valve; Manual operated Butterfly, Ball valve necessary for different process industries. It will not be possible to cover all the products in the research work. Hence the research work will be confined only Ball Valve. The various parameters that can be optimized for cost effectiveness & overall performance are weight, & energy required to operate the valve. The selected valve in manufacturing enterprise is facing the problem of 10 to 15% cost escalation in the production process as compared to their other competitors. This has resulted in a loss of profitability and decreased return on investment to the concerned therefore the question arises about its sustainability and cost effectiveness. weight has to be focus for the reduction in material cost. Reduction of weight can be achieved by redesigning the product. Weight optimization is the process of modifying or changing an existing design in view of the objective to improve few of the aspects of engineering design which concerns performance, manufacturing and assembly of the product. So modification in design and standardization of the valves is required which can be termed as the redesign of a valve. Due to redesign and standardization in size of the valve, it will be reduced and effects in weight reduction. Therefore, by weight reduction not only the material cost will be saved, but also the machining time and the cycle time will be reduced. Value Engineering methods are very important and useful in Cost Reduction and sustain their profitability. Value Engineering is one of the most effective techniques available to identify and eliminate unnecessary cost in manufacturing processes, design, test, construction, maintenance, data specifications and practices. Although its application to procedures, specifications and practices is less well known, its effectiveness in these areas has been proven. Value Engineering is a systematic approach to direct and analyzing the function of equipment, services, systems and supplies for the purpose of achieving their essential functions at the lowest cost consistent with required reliability, performance, safety and quality. [1] Society of Japanese Value Engineering defines as: “Value Engineering is a systematic approach to analyzing functional requirements of products or services for the purposes of achieving the essential functions at the lowest total cost and improve the value of product” [2].

2. Various Phases of Value Engineering

The organized and systematic approach to Value Engineering (VE) Job Plan is the key to success in a value engineering study. It is the job plan that the study identifies the key areas of unnecessary cost and seeks new and creative ways of performing the same function as the original part, process, or material. It works and has been proven effective in manufacturing processes and procedures, and in the other field. The job plan allows the study team to go beyond than the usual design process. The following are the phases of value engineering for cost reduction and modifications in the product for improvement in function of product and cost reduction.

A. Information Phase: During this phase clearly identify the problem to be solved and gather the possible information of the product in terms of basic function. The collect data and examine the results, in the context of the cost and find best options for weight reduction and improvement in the value of the product.

B. Function Analysis Phase: In this phase, Product is defined in terms of functional performance and expectation.

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