VA/VE AND ITS USE IN MANUFACTURING

VA

VALUE ANALYSIS

VE

VALUE ENGINEERING

Subros Limited

VAVE stands for Value Analysis / Value Engineering. Its main goals are improving a product's value proposition, cutting expenses, or improving overall performance through value analysis and engineering.

Since businesses are constantly looking for ways to enhance their offerings and maintain their competitiveness in the market, VAVE is frequently utilised in manufacturing and product development. By using the VAVE principles, manufacturers can identify and adopt modifications that enhance the value of their products or processes. Better overall productivity, cost savings, and happier customers follow.

Value analysis (VA) is a methodical process that assesses a product's worth to ensure its cost does not exceed what is required to perform its tasks.
Value Engineering (VE) is altering a product design based on value analysis. It is a very advanced method for analysing and adapting products from start to finish. Reducing costs methodically, intelligently, and multidisciplinary increases customer value.

Value Analysis and Value Engineering are interchangeable terms that are frequently used synonymously. These methodologies aim at improving product or service value by optimising functions, reducing costs, and enhancing quality. They are closely related to a company's value proposition.

In marketing, a **Value Proposition** is a succinct summary of a business's advantages to clients who purchase its goods or services. It is a statement of intent that is used in the marketplace as well as within the organisation. A company's value proposition informs a client of the main factor that makes a product or service the most appropriate for them. By applying VAVE, companies can reduce costs without compromising quality, enhance functionality, and innovate, offering better solutions that meet customer needs more effectively. This alignment with customer expectations and delivering superior value at a competitive price strengthens the company's value proposition and market position.

Product positioning and VAVE aim to develop a product that fulfils consumer wants and differentiates itself in the market. Product positioning is determined by a product's market perception concerning rivals and highlighting special features, advantages, and values. Methods like VAVE help examine and improve the product's features, price, and quality. VAVE guarantees that the product provides exceptional value by identifying and implementing cost-saving methods and enhancing essential features without sacrificing quality. The product's distinctive selling qualities are reinforced, and its appeal to the target market is increased by this value improvement, aligning with the intended market position. Essentially, VA/VE supports effective product positioning by optimising the product's attributes and benefits to meet market demands and expectations.

While at Subros Limited as an intern, I learnt first-hand what VA/VE was. Hence, I share what I have learned and a few insights using an example of a product where VA/VE is applied in the form of this report.

To provide you with a background of **Subros**, it is "India's leading thermal products and solutions company largely for automotive and home applications." Subros produces Compressors, Condensers, Heat Exchangers, and all other connecting parts needed to complete an AC loop. It serves a variety of markets, including trucks, buses, cars, off-roaders, domestic air conditioners, and railroads.

Across India, Subros has state-of-the-art manufacturing facilities in technical collaboration with Denso Corporation, Japan

Subros Technical Centre Noida Uttar Pradesh	Subros Tool Engineering Centre Noida Uttar Pradesh	Compressor & Heat Exchanger Plant Noida Uttar Pradesh	Subros Pressure Die Casting Noida Uttar Pradesh	Subros Plant Manesar Haryana	Subros Plant Pune Maharashtra	Subros Plant Nalagarh Himachal Pradesh	Subros Plant Kasanpura Gujarat	Subros Plant Chennai Tamil Nadu

The company manufactures a range of compressors, HVACs, pipings and heat exchangers to suit various configurations.

- Car Air Conditioning and Engine Cooling Parts (PHOTO 1)
- Railway AC
- Transport Refrigeration System
- Commercial Vehicle Bus
- Residential and Commercial Cooling Products
- Electric Bus Air Conditioning and Battery Thermal Management Kit Development

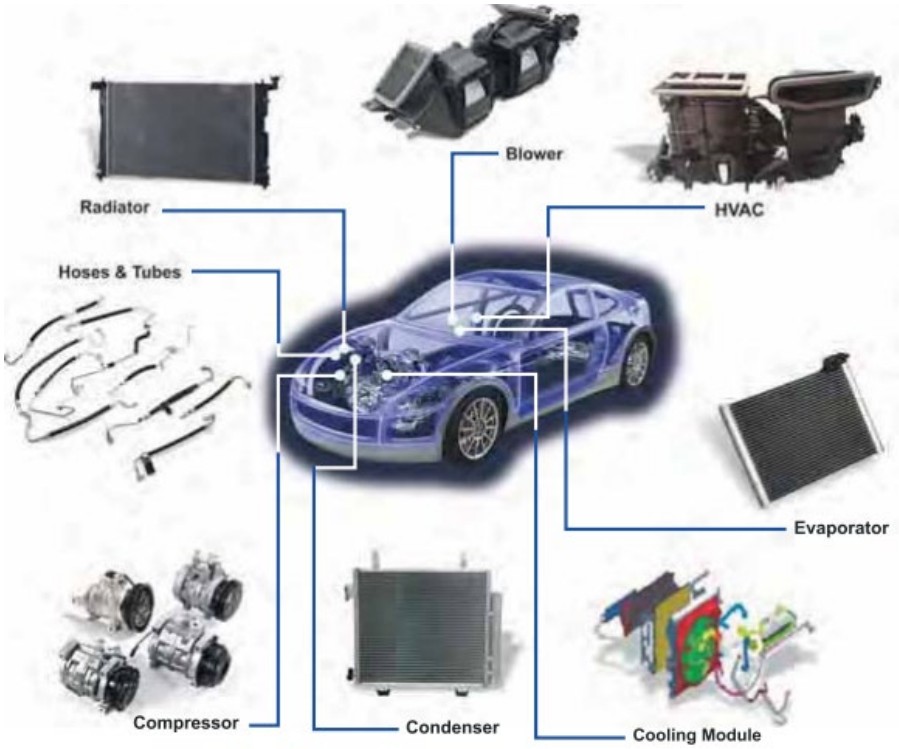

PHOTO 1

While there, I witnessed VA/VE being used in one of their products, a **Thermostatic Expansion Valve (TXV).** This valve reduces the temperature and pressure of the coolant coming from the condenser, sending a cold liquid to the evaporator. The TXV maintains constant superheat, based on which it chooses the pressure to create in the refrigerant. The VA/VE for this product was done in the Subros Technical Centre in Noida.

As we can see on the image (PHOTO 2), the changes made to the body of the TXV are extensive. The application of VA/VE in this product reduces the volume of aluminium used. By optimising the body of the TXV, Subros cuts costs by reducing the use of raw materials. Hence, they don't have to pass this cost on to the customer. This helps the company stay competitive, reach sustainability goals, and consume less raw materials.

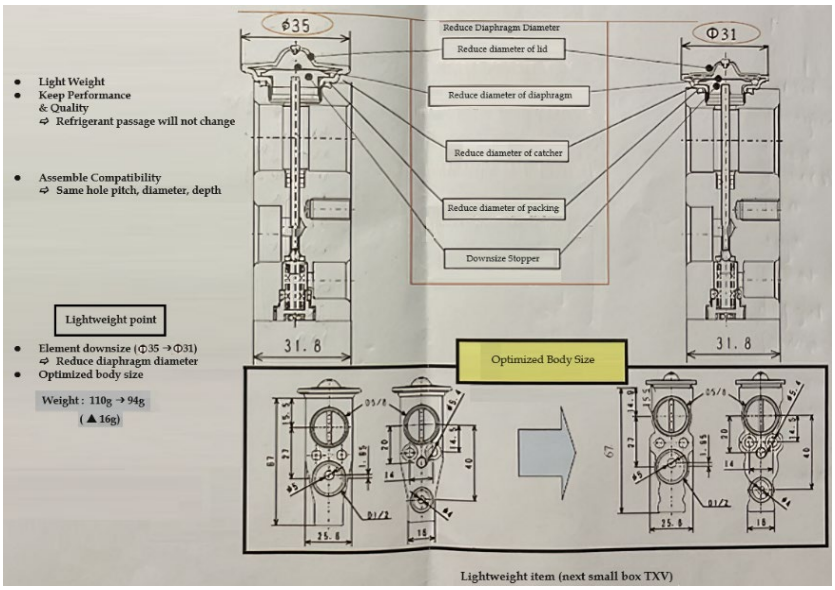

PHOTO 2

As clearly stated in the diagram above, the TXV's total weight decreased from 110g to 94g, a delta of 16 grams. The diaphragm's diameter was also reduced from 35 cm to 31 cm. The stopper was downsized, and the diameter of the packaging and catcher was reduced. Furthermore, the body's side profile was altered with the help of ridges, which cut down on extra material being used.

The image (PHOTO 3) compares the old and new bodies of the TXV. The one on the left (new) has a shorter diaphragm diameter than the one at the right.

PHOTO 3

PHOTO 4

The image (PHOTO 4) shows that the TXV body is optimised with ridges on the side profile. This helps to eliminate the use of unnecessary materials on the valve body.

Coming to the economics side of things, along with the VA/VE, there was also a localisation of the product from Japan to

India, due to which import duties were also reduced, further reducing the cost of the product.

According to data from Subros, the product's original cost was around Rs. 250. Due to the VA/VE, the reduction of aluminium used in the product was 16 g. The price of the quality of aluminium is around 356 Rs/kg. If we divide the same by 1000 and then multiply it by 16, we find the reduction in the cost of the product, which comes out to Rs. 5.696 ≈ Rs. 5.7;
Furthermore, due to the reduction in the material, the machining cost was also reduced by a margin of around 5 rs. Additionally, there was a saving of 0.15 due to the waving of import duties on the product due to localisation, which reduced the cost by (.15*250) =37.5. In totality, the reduction in the cost of the product was 5.7+5+37.5=48.2 per TXV, which is a reduction of 19.28% of the original cost or 80.72% of the original price (.8072*250=201.8)—leaving us with the residual value of Rs. 201.8 for the product.

According to Subros, they manufacture, on average, 1 million pieces of the TXV per year. This would lead to a total savings of Rs (48.2*1,000,000)= 48,200,000 annually.

This case study is based on just one example of the use of VA/VE in manufacturing, a report on what I was exposed to while interning at Subros during the summer of 2024. It is evident to what extent VA/VE can benefit manufacturers.

Conclusion

The report describes the successful implementation of Value Analysis/Value Engineering (VA/VE) in the manufacturing process of a Thermostatic Expansion Valve (TXV) at the Subros Technical Centre in Noida.
The utilization of VA/VE led to substantial alterations in the design of the TXV, resulting in reduced aluminium usage and significant cost savings. Consequently, the overall weight of the TXV decreased, and various components were optimized, leading to a 19.28% reduction in the product's cost. Additionally, the localization of the product and the reduction of import duties further contributed to the cost savings. The annual total savings resulting from the implementation of VA/VE amounted to an impressive Rs 48,200,000.
This research unequivocally demonstrates the substantial benefits of integrating VA/VE in manufacturing processes.