

# Cost Estimation And Reengineering In Bus Coach Building

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**Abstract-** This project aims at reducing the time taken for building a bus body. Building a bus body takes more than three months which could be reduced. The wastage of the material could be reduced from 20% by purchasing the appropriate size or dimensions of the material used in bus body building. The cost of building a bus body could be reduced from 14,00,000 where the wastage and time involved in building the bus body is reduced. The importance of this project to reduce the time taken to build the bus body as it takes more than three months in building it. When the time taken to build the bus body is reduced, the cost involved in it will be reduced. When the cost involved in building is reduced the wastage of the material should also be reduced.

**Keywords-** Cost estimation, Bus coach building, Re-engineering.

## I. INTRODUCTION

The project study is carried out in the industry related to bus coach building. Bus coach builders are emerged as large manufacturer of Public transport Bus body. They are Focused on producing highly safe and comfortable buses and coaches for the public. They are involved in re-modelling and refurbishing the bus body which is to be done every year to get the fitness certificate. They are the pioneers and perfectionists in coach designing and building industry. Their commitment is customer satisfaction which is the backbone of their constant growth. They build the bus for which is more efficient in giving mileage and their buses are build with the best quality which can last for many years. The objective of this Research paper lies in reducing the time taken in manufacturing the bus body building. Building a bus body takes more than three months which could be reduced. The wastage of the material could be reduced from 20% by purchasing the appropriate size or dimensions of the material used in bus body building. The cost of building a bus body could be reduced from 14,00,000 where the wastage and time involved in building the bus body is reduced. The importance of this project to reduce the time taken to build the bus body as it takes more than three months in building it. When the time taken to build the bus body is reduced, the cost involved in it

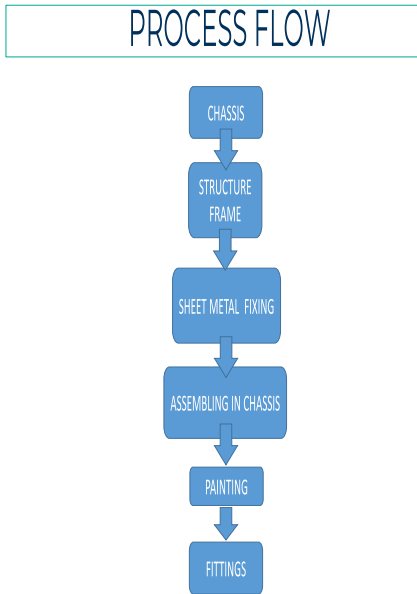
will be reduced. When the cost involved in building is reduced the wastage of the material should also be reduced.

## II. LITERATURE REVIEW

Literature review from the existing body of knowledge has provided the following:

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**III. METHODOLOGY**



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The Study has been carried out in Six phases :

**Phase 1 : Chassis**

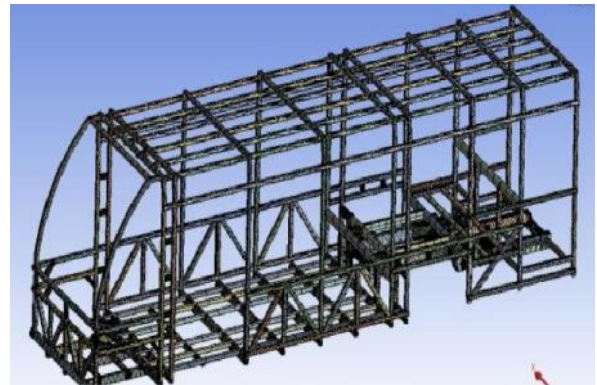
The chassis is one of the most important parts of the vehicle, also known as the support structure or frame. The bus chassis is made up of the structural underframe, the engine, the radiator, the wheels, the hcv axles, the suspension, the gearbox, the transmission, the dashboard, the steering wheel, and the driver's seat. It is designed to absorb the impact of the terrain and provide a strong foundation for other components and parts to be attached. It is also designed to support and distribute the weight of the vehicle for improved performance and stability.



**Phase 2 : Structure Frame**

The bus body structure consists of six main components: left and right frame sides, front and back frame sides, top and bottom frame sides. The top frame is called as

roof frame. The bottom frame is called floor frame. This frame is then supported by a number of cross members, which are attached to the frame sides. They add additional strength and stability to the bus body structure. The bus body is then covered with panels and windows to provide insulation and protection from the elements. The panels are typically made of lightweight materials such as aluminum or fiberglass. The windows are often made of safety glass to provide a view of the outside environment while adding additional protection.



**Phase 3 :Assembling in Chassis**

Assembling involves connecting the body parts such as the floor frame , left and right frame , front and back frame and roof frame. This ensures that the bus body is strong and rigid enough to withstand the forces of driving. The components are then welded and bolted together to form the structural frame. Finally, the body is mounted on the chassis. The chassis and body are then inspected for accuracy and quality. It also provides a base for the addition of other components such as seats , glass frames and audio video systems. Finally, it helps in improving the safety of the bus .



**Phase 4 : Sheet Metal fixing or paneling**

Paneling which is done on the exterior is known as exterior paneling. This is done with galvanized steel sheets

that are zinc-coated. Steel sheets are welded or riveted together to form panels. Body paneling can be done in two ways. Small panels are attached together according to the requirement. For the entire length, one big panel is made on the top. When the surface is uneven, steel sheets are used. To avoid corrosion, leak and vibration, the panel is made with plastic trim fillet. The basic material for exterior paneling is aluminium. This is the paneling done in side the vehicle. Paneling which is done on the interior is known as interior paneling. The paneling inside the body should be done to attract the passenger and it should ensure that it gives comfort to the passengers. The factors to be considered during paneling are safety, easy maintenance, easy cleaning. Decorated laminated sheet are used for this. When laminated sheet and aluminium and stainless steel are combined give the good look. Floor side panel and roof has to be thermal insulated.



#### **Phase 5 : Painting**

The process of bus body painting plays a crucial role in enhancing the aesthetic appeal and branding of a bus with eye-catching designs, vibrant colors, and high-quality finishes. Painting allows bus operators to showcase their brand identity,

promote products or services, and create a memorable impression on passengers and onlookers. The steps involved in bus body painting are Surface Preparation, Putty Works, Primer coating, Design Concept and Artwork, Paint Application, Clear Coat Application. Considering design concepts, employing quality painting techniques, and adhering to relevant regulations, bus operators can effectively enhance their brand visibility and create a positive impression among passengers and the general public. Regular maintenance and environmentally conscious practices further ensure the longevity and sustainability of bus body painting.



#### **Phase 6 : Fittings**

Front and back glass , Side Glass frames are fixed on the body.

The seats are fixed on the flooring according to the boot space.

The handle post and luggage carriers are fixed.

The electrical items are fixed and insulated on the appropriate places.

The audio and video devices are mounted on the interior panels.

All the fittings are done and the vehicle is taken for the leak testing.

The leak test is done and the places that the leak occurs are laminated using silicon paste.



**IV. CALCULATION&JUSTIFICATION OF TOOL**

**Business Process Reengineering**

Business Process Reengineering is the radical redesign of business processes to achieve dramatic improvements in productivity. Business Process Reengineering (BPR) is a methodology that can used to improve their,

- Business process,
- Cycle time,
- Reduce costs and
- Enhance customer satisfaction.

**Cycle Time Reduction**

It refers to the shortening the time taken for a product to manufacture. It is the amount of time that process from the start of a process until its conclusion.The benefits are

- Increases cash flow
- Meeting deadlines consistently
- Improves customer satisfaction

S.No	Process flow	Previous Duration (1 day = 1 shift)	Current Duration (1 day = 1 shift)
1.	Specification and model designing	3 days	2 days
2.	Chassis Washing	1 day	2 days
3.	Chassis Checking	1 day	
4.	Removal of Panel and Battery wiring	2 days	
5.	Flooring frame	12 days	22 days
6.	Structure frame	17 days	
7.	Paneling and flooring	12 days	16 days
8.	Sheet Metal fixing	10 days	
9.	Putty and Primer coating	12 days	12 days
10.	Painting	7 days	9 days
11.	Glass and Seat fixing	5 days	9 days
12.	Leak testing	1 day	
13.	Electrical lining and assembly	4 days	
14.	PDI , Pre-Delivery Inspection	3 days	3 days
15.	<b>TOTAL DAYS</b>	<b>90 days</b>	<b>75 days</b>

- Increased Profits,
- Improving Cash Flow,
- Negotiating with Suppliers
- Automation.

The cycle time reduction table shows that how much time is reduced while combining two to three process at similar time.

On combining Chassis washing, Chassis checking, Removal of battery panel and battery wiring jobs , the time taken for performing this jobs are reduced from 4 days to 2 days and hence the labour cost for this process is reduced about Rs 5400 in this process. On combining flooring frame and structure frame jobs , the time taken for performing this jobs are reduced from 29 days to 22 days and hence the labour cost for this process is reduced about Rs 18200 in this process.

On combining panelling, flooring and sheet metal fixing jobs, the time taken for performing this jobs are reduced from 22 days to 16 days and hence the labour cost for this process is reduced about Rs 9800 in this process.

On combining glass, seat fixing, leak testing, electrical lining and assembly jobs, the time taken for performing this jobs are reduced from 10 days to 9 days and hence the labour cost for this process is reduced about Rs 4800 in this process.

Therefore the cost of about **Rs 38,200** is reduced by reducing the cycle time.

**Customer satisfaction**

Customer satisfaction is defined as a measure of how the customers are happy with a company’s products, services, and capabilities. Customer satisfaction information, including surveys and ratings, can help a company determine how to best improve or changes its products and services.

The customer is satisfied by reducing the time taken to build the body from **90 days to 75 days**.

The customer is satisfied by reducing the cost for building the body from **Rs 13,98,500 to Rs13,60,300**.

**Cost reduction :**

Cost reduction is the process of decreasing a company's expenses to maximize profits. It involves identifying and removing unnecessary expenditures that adds value to customers while optimizing processes to improve efficiency. The benefits are

**V. CONCLUSION**

This project concludes that by using the reengineering approaches like lead time reduction and cost reduction, the time taken for building the bus body is reduced from **90 days to 75 days** and the cost for building the bus body reduced from **Rs 13,98,500 to Rs 13,60,300**.

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