

A Case Study on Tyre Retreading Of S. T. Workshop

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Abstract— In India mostly commercial vehicles tyres are retreaded. State Govt., Delhi Govt., Central Govt. Bus services departments etc. The aim of this thesis is to study the Tyre retreading process of tyre of ST Buses. Old worn out tyres of ST buses retreaded by different method of tyre retreading & use old tyre instead of purchasing new tyre. This paper also present study the life cycle of this retreaded tyre of ST Govt. Buses. This Retreading of tyre of buses give cost benefit to the government by reuse of old tyre and it also decrease the wastage of tyre. In case of ST Bus of Gujarat state are very wide transport areas in the different region of Gujarat. There are so many short root found as a public transport in the test. It is very easy to used retread tyre in the different short root of public transport. In case of Gujarat state public transport used maximum 4 to 6 time old tyre. It is also found different defects of tyre, its remedies, and causes.

Key words: Curing Process, Retreading, Road Surface, Tread, Tyre

I. INTRODUCTION

It is very essential to know the meaning of 'tread'. The grooves which are cut on the tyre surface are called tread. These treads ensure the gripping action between the road surface and tyre. After the use of tyre the depth of treads becomes less and a slippery action takes place between road surface and tyre. The co-efficient of friction becomes less. A tyre is in no more condition to be used again. Now, here becomes the choice either to replace the tyre with a new one which is very expensive or to retread the tyre which is less expensive as compared to the cost of new tyre. 'Retreading' means taking a worn casing of good structural quality and putting it through a process which completely renews the tread of the tyre and sometimes the sidewall rubber. The rebuilt tyre is then subjected to a curing process where the new rubber is vulcanized to the casing and the tread pattern is formed. [1-3]

II. WHY RETREADING

A retreaded tire costs less to produce than a new tire and sells for less - usually between 30 and 50 percent of the comparable new tire price. By using retreaded tires, the commercial and military aircraft industries save more than \$100 million a year. Retreading truck tires saves the trucking industry over \$3 billion each year. Retreading is an effective way to lower your tire costs. Retreading is a highly practical and efficient form of recycling. Retreading makes it possible to re-use worn tyres. Instead of dumping tyres with worn out tread and good sidewalls, they can be rebuilt and put back to work again, and again. [4]

III. CASE STUDY

Gujarat State Road Transport Corporation (GSRTC) is a passenger transport organization providing bus services both

within Gujarat and neighbouring states. GSRTC came into existence on 1st May, 1960 on formation of Gujarat. From a modest beginning of 7 divisions, 76 depots and 7 divisional workshops and a fleet of 1,767 buses it has gone to, 15 Divisions, 125 Depots, 228 bus stations, 1,554 pickup stands, 8,000 buses.

This remarkable growth is an outcome of unflagging effort of more than 50,000 workforce, dynamic management and sustained support from the state govt. It has built up formidable technical facilities. There are 4 district's S.T Bus defective tyres are collected at Bharuch S.T depto tyre retreading plant, i.e Nadiad, Baroda, Rajpipla and Surat. Average of tyre retreading per day is 35Nos. Place-Workshop of ST depot of GSRTC, Bholav, Bharuch.

A. Retreading Process:

- 1) Conventional Process (also known as 'mould cure' or 'hot cure' process)
- 2) Precure Process (also known as 'cold cure') Tyre-Defective & worn tyre of Buses.

B. Tyre Size:

- 900X20 14 Ply Nylon
- 750X16 16 Ply Nylon

IV. DIFFERENT DEFECTS ON THE TYRE & ITS CAUSES

When the vehicle is moving, the tread of each of the vehicle's tyres is constantly rubbing against the road surface. This is evident from the tyres' gradually diminishing tread depth. If due to mis-alignment, the tyres do not run parallel to each other, then one shoulder of tread gets scrubbed off, resulting in one-sided wear.



Fig. 1: Tread remove

High torque levels, during strong acceleration or in stop-start urban traffic, or when accelerating away from traffic lights, can quickly increase wear of the tread centre.



Fig. 2: Under Wear



Fig. 3: Too Much Friction

Braking flat spots are the result of full braking with locked wheels, causing the tyre to "lay rubber".



Fig. 4: Tread Wear

If a tyre is improperly serviced and driven in an underinflated state and/or with excessive load, it heats up beyond the critical temperature range, resulting in partial separation of plies (partial tyre disintegration).



Fig. 5: Tread Worn

Tyres can also be damaged even when not in use, for example due to incorrect mounting on the rim.

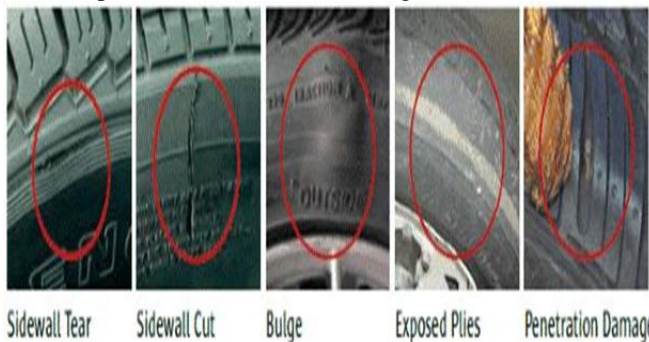


Fig. 6: Different Defects

V. PROCESS OF TYRE RETREADING

There are two main processes used for retreading tires, called Mold Cure and Pre Cure. Both processes start with

the inspection of the tire, followed by non-distractive inspection method such as shear graph to locate non-visible damage and embedded. Debris and nails. Some casings are repaired and some are discarded. Tires can be retreaded multiple times if the casing is in usable condition. Tires used for short delivery vehicles are retreaded more than long haul tires over the life of the tire body. Casings fit for retreading have the old tread buffed away to prepare for retreading.

Material cost for a retreaded tire is about 20% that of making a new tire. About 90% of the original tires by weight is retained in retreaded tires. A 1997 study estimates that then current generation of commercial vehicles tires to last up to 600,000 miles if they are retreaded two to three times.

A. Pre Cure:

Previously prepared tread strip is applied to tire casing with adhesives. This method allows more flexibility in tire sizes and it is the most commonly used method, but results in a seam where the ends of the strip meet.

B. Mold Cure:

Raw rubber is applied to the tire casing and it is then placed in a mold where tread is formed. A dedicated mold is required for each tire size and treads design. [1&5]



Chart: 1: Flow Chart of Tyre Retreading Process

1) Inspection:

Determine if a worn tyre casing can be accepted for retreading or rejected.



Fig. 7: Inspection

2) Buffing:

Remove the worn tyre tread from the casing.



Fig. 8: Buffing

3) *Skiving:*

Remove any embedded objects to ensure a clean and solid surface suitable for retreading.



Fig. 9: Skiving

4) *Treaming And Solution(Cementing):*

After rasping and skiving process, next step is to cut the nylon threads for nylon tyre or grinding the steel wire in case of radial tyre. This process is called Treaming. After treaming process, next step is to stick the solution on tyre. For this generally black vulcanizing cement type solution is used.



Fig. 10: Treaming

5) *Filling:*

Filling of the skived area with gum cord



Fig. 11: Filling

6) *Tread Application:*

A cushion gum bonding layer is placed between the tread and the casing. New layer of highly compact procured tread is then built onto the casing.

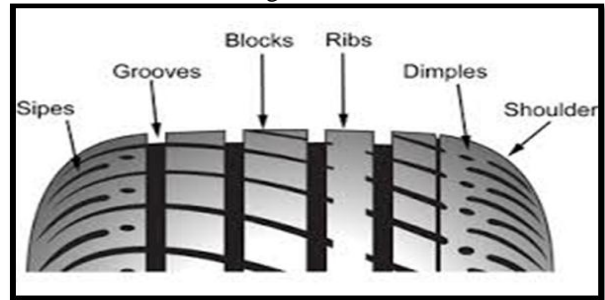


Fig. 12: Tread Application

7) *Enveloping:*

Special envelop is used to enclose the tyre and ensure the casing, bonding gum and procured tread are successfully bonded together.



Fig. 13: Enveloping

8) *Curing:*

Commonly known as vulcanization, is the process of bonding the new tread material to the prepared tyre casing. The prepared casing, with the new tread liner in place, is put into the chamber where pressure and temperature are applied over the correct length of time, curing the cushion gum layer and bonding the tread tightly on the casing.



Fig. 14: Curing

9) *Final Inspection:*

All retreaded tyres are closely inspected to ensure that a safe and attractive product will be recycled to the customers

10) *As Good As New:*

Just like a brand new tyre, now the retreaded tyre is ready to roll on the road!

VI. DETAIL ANALYSIS

Total Travelling Distance of New and Retreaded Tyres with Different Manufacturers

	MAKE				
	VIKRANT	J.K	CEAT	BIRLA	CEAT
	1	1	1	1	1
TYRE SIZE	900X20 14 PLY NYLONE			750X16 16 PLY NYLONE	
NO. OF RETREADING	TRAVELLING DISTANCE (td) km				
NEW TIRE	35810	43552	54409	45583	28355
R1	51044	44785	29633	10793	30545
R2	37338	34519	1052	1419	22552
R3	31267	27163	2893	2164	23014
R4	19726	20146	7896	3142	16435
TOTAL td OF RETREADING	139375	126613	41564	17518	92546

Table 1: Different retread tyre Analysis

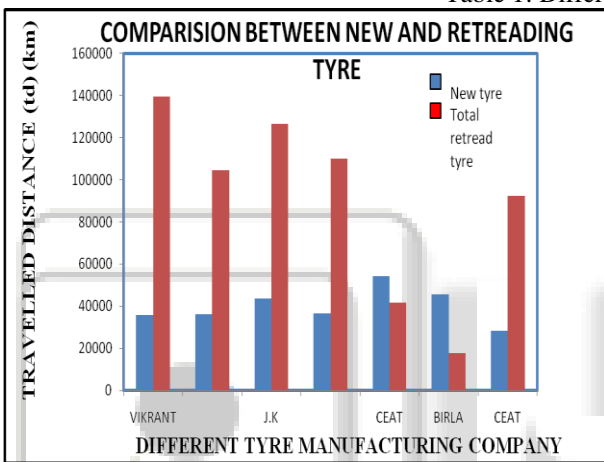


Chart. 2: Comparison between New And Retreading Tyre
This chart conclude that for vikrant tyre , tyre life can be increase up to 74.30%. For JK tyre tyre life can be increase up to 65.60% . For Ceat tyre tyre life can be increase up to 23.60% . For Birla tyre tyre life can be increase up to 61.56% after retreading.

VII. CONCLUSION

Here we went through the case study in the S.T. workshop. Knowing different retreading process and analysis that ,we can increased tyre life and we can reused old tyre therefore cost of tyre reduced. By using this experiment checking the performance of new tyre and retread tyre with different surface.

Tyre retreading represents an important ecological and economical problem which is not easy to solve. The use of retread tyres is of special importance, especially for transportation companies which have to decide whether to buy new tires, or to retread/re-use the ones already on the vehicles. In order to make such a decision, it is necessary to know the “history” of a tyre, where the focus is on the probability of travelled distance after a certain (number of) retreading. It is concluded that retread tyre is not suitable for costly item’s transportation as well as for long distance travelling because of safety point of view.

From GRAPHS it is concluded that the averagely travelled distance of new tyre is less than the retreaded tyre. It means that the cost/km of retreaded tyre is less than new tyre.

VIII. ACKNOWLEDGMENT

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