

Tyre Retreading by Hot Retreading Process

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Abstract

Tyre is made up of natural rubber or synthetic rubber. Natural rubber is present as milky liquid or latex in the bark of rubber tree, *HEVEA BRASILIENSIS*. Natural rubber combines with carbon, oil, sulphur and the chemicals at a temperature of 100-140°C and under goes a number of stages of processes. Synthetic rubber is any vulcanisable man made rubber like polymer. By retreading tyre we are doing a good job which is in favour of Natural resources. Tyre Retreading is a new technology, where the old tyres are made serviceable by removing worn out and damaged treads and replacing it with new treads. New treads are available in the market in form of rolls and in brief, in can be put on old tyre and cured with the help of steam. Similar to the new tyres, the treaded tyres can be very well used on all vehicles, irrespective of light or heavy vehicles. With a safe and new technology, which is being adopted now-a-days, it will be more easy and economical to produce tyres. As day by day, more and more vehicles are running on roads, hence more tyres are required for replacement. With further growth of economy, there will be an increase in transport as well as passenger vehicles and hence more tyres will be required. Hence, there is a very wide scope for retread tyres as an original replacement.

Keywords: Retreading, synthetic rubber, curing, buffing, vulcanization, new technology, economy.

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 process can also rectify minor cuts or defects on the side walls of tyre, beads and punctures in a single stage. A tyre can be retreaded or not this is entirely dependable on the type of use of tyre and condition of tyre.

Manufacturing Process

The manufacturing of retreading rubber is done in the following stages:

- (I) Compounding: Removing unwanted materials such as nails, rivets etc.
- (II) Mixing: Reclaimed rubber and oils
- (III) Extruding: The mixture of rubber so obtained is put into extruder to form rubber sheets.
- (IV) Retreading: Before retreading tyre is buffed and it is allowed to stick properly.

Tyres are buffed properly to remove all undesired rubber and to clean surface. The retreading rubber is now put on its outer surface with an adhesive solution.

Retreading process is of two types:

- 1. Hot retreading
- 2. Cold retreading

Hot Retreading Process

Before the tyre undergoes certain process, it should be verified for the initial inspection throughout inside and outside of the tyre. Identify the casing injuries and determine if repairable and then reject or approve the casing for further process. The source for the hot retreading process is current and steam. Mostly in small industries boilers i.e. steam is used as source for the process because it should be convenient for them it takes 2 hours to heat completely here the water level also indicated and the pressure should be 50 atm so that it does not collapse during the process the source is as shown in figure 1.



Fig. 1: Steam boiler

Stages of Retread

Buffing

The primary objective of buffing is to prepare the worn out tread surface of tyre for retread process. The original tread design and the some of the under tread is also removed to provide the casing with required dimensions and surface texture. In other words it increases the co-efficient of friction of untread surface of tyre so that it can hold firmly the cushion and sole of new tread. The machine used for buffing process of tyre as shown in the figure 2.



Fig. 2: Buffer machine

Tread Preparation and Building

Building is the process of applying a premoulded retread or new tread rubber to the buffed and prepared casing. It done by rotating a tyre continuously and vulcanized rubber solvent is placed over the surface of tyre .the solvent is prepared by mixing black vulcanizing cement and petrol ,here petrol is used for reducing the viscosity of the solvent so that they can be applied on the tyre smoothly In this way it spreads uniformly. Take another dip of solvent if required. After the application of sufficient solvent a cushioning strip is fixed and tyre is slowly rotated so that complete circumference of ta painting brush depth in tyre is covered and uncured tread compound is extruded or applied as a strip of sufficient length directly to the casing. Prepared tread and tyre with solution is as shown in figure 3, 4.



Fig. 3: Prepared tread



Fig. 4: Tyre to be retread

Mechanical Pressing

The rubber with solution and the tyre with solution is fixed for process and with the help of machine which gives some force to the tyre for making them fixed. The machine used for mechanical pressing is as shown in the figure 5.

Enveloping

The tyre with roll of rubber fixed is placed in a mould and air pressure is maintained at about 50 atm so that it expands uncured material takes the position of the mould temperature of 150° C the tread and after some time the mould is opened and tyre is taken from the mould. Therefore the tyre from the vacuum system is ready for use and it taken from the system



Fig. 5: Mechanical pressing machine

carefully. The premoulded tread uniformly on the cushion and casing. the machine used for moulding and mould is as shown in figure 6(a), (b).



Fig. 6: moulding for tyre retread

Final Inspection

To insure a quality retread each tyre passes through the inside and outside visual inspection. It is mandatory that the tyre meets all customer and government regulations. Some retreaders are also using instrumented inspections X-ray shearographie or high pressure tester.

Financial Aspects

- ◆ Fixed Capital:
 - ◆ Land And Building Rent Per Month = ₹ -10,000
- ◆ Machinery And Equipment:

Particulars	Price in ₹
Buffing Machine	60,000
Work Bench Envelope	35,000
Boiler Cap 300 Kg/Hr	2,25,000
Pressure Air Compressor-5Hp Motor	40,000
Air Conditioner	50,000
Total	9,50,000

- ◆ Electrification And Installation At 10% Of The Above Cost = Rs.95,000
- ◆ Cost Of Auxillary Items = ₹ 1,50,000
- ◆ Pre Operative Expenses = ₹ 50,000
- ◆ Total = ₹ -12,95,000
- ◆ Raw Material = ₹ 4,32,800
- ◆ Utilities Per Month = ₹ 32,600

- ♦ (Power @ ₹ 3.50 For 3600 Units and Fuel For Boiler)
- ♦ Other Contigent Expenses = ₹ 33,000
- ♦ Total Recurring Expenses = ₹ 5,63,000
- ♦ Total Capital Investment
 - Fixed Capital ₹ 12,95,000
 - Working Capital ₹ 16,89,000
 - Total = ₹ 29,84,000(Including All Taxes)

Conclusion

Retreading of tyres is an important ecological and economical issue which is not easy to solve. Since the retreading saves the rubber which is raw material for the tyre.. A tyre is made up of 100% rubber approximate. as main ingredient 20% is only used in worn out tyres rest 80% is tyre carcass. For retreading only 5 litres of crude oil is needed but for making a new tyre about 28 litres is needed. Another thing is that exploitation parameters of tire, where the accent is put on distribution of probability of number of retreading and travelled distance after certain (number) of retreading. To make final decision to retread or not, it is necessary that for each such problem proper data bases for each tire are provided and statistic analysis are made.

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