



# **Use of Waste Tyres for Road Constructions**

**An Eco friendly-cost effective  
solution for flexible pavements**

# Pavements :

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PAVEMENTS

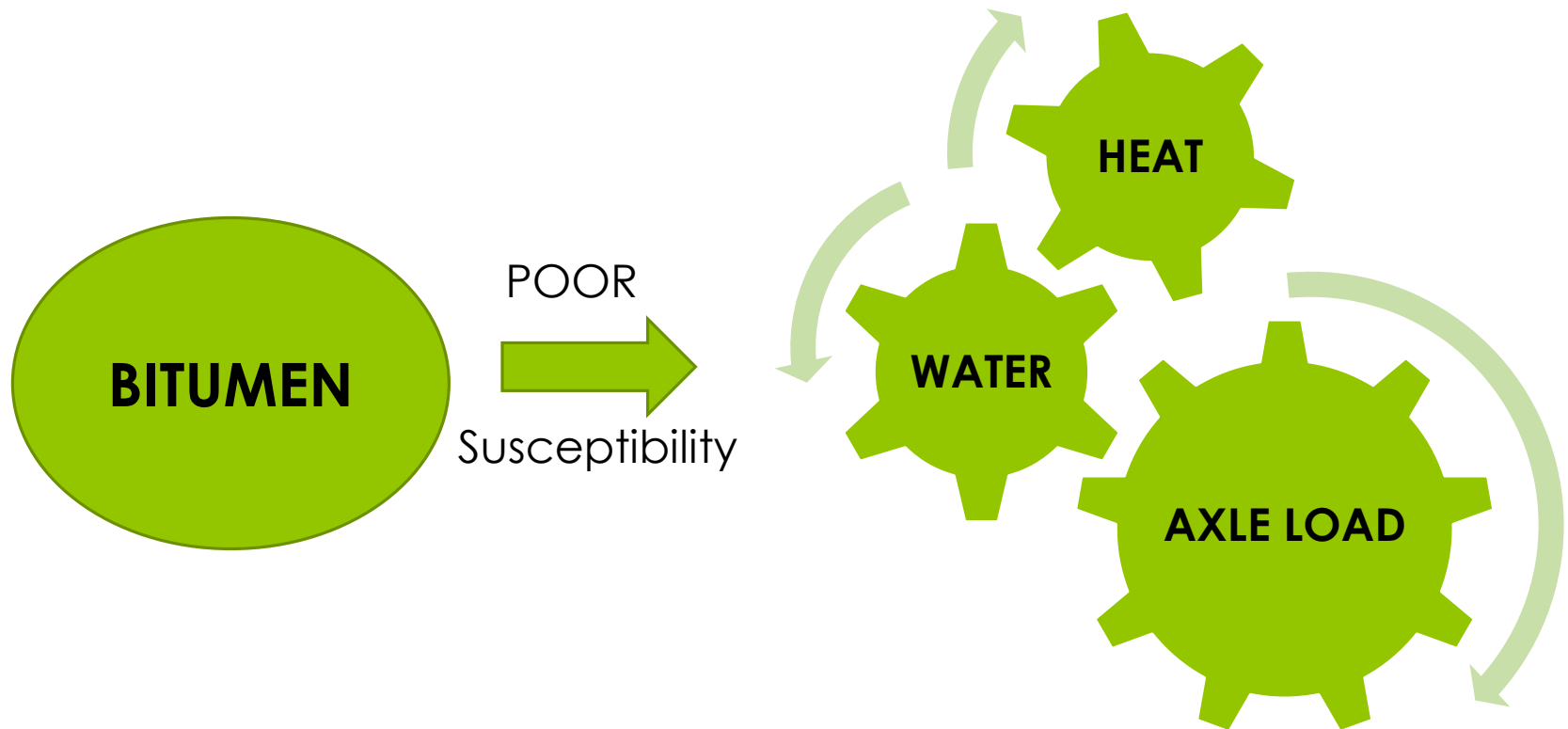
RIGID

Made with stone aggregate and **CEMENT** as binder  
(as Cement has tendency of becoming **rigid** After setting is known as Rigid.)

FLEXIBLE

Made with stone aggregate and **Bitumen** as binder  
(Bitumen retains **flexibility** even after setting is known as flexible)

# Bituminous Pavements –Life Cycle Issue



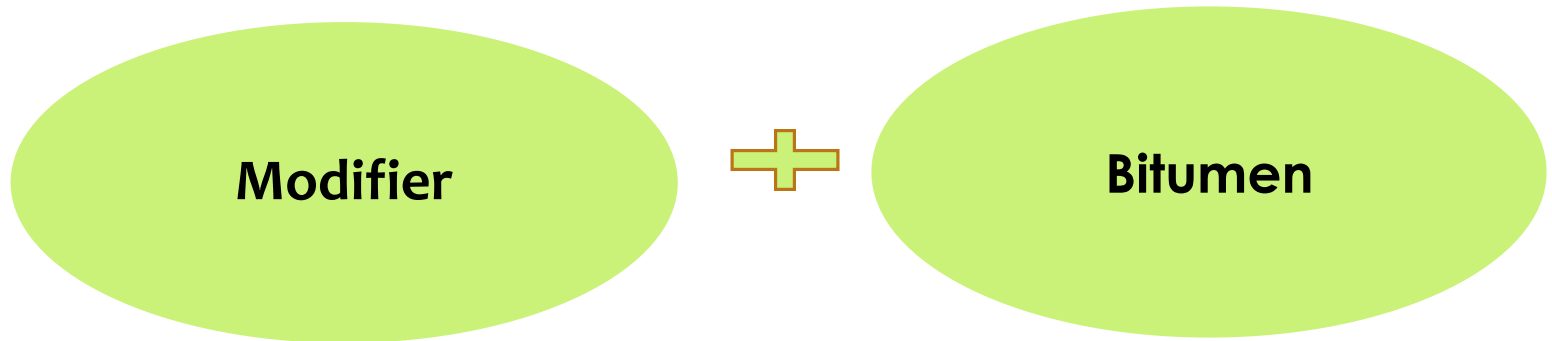
**Bitumen is softer & thermo viscous material, it needs to be hardened to overcome these issues and for better life of pavement.**

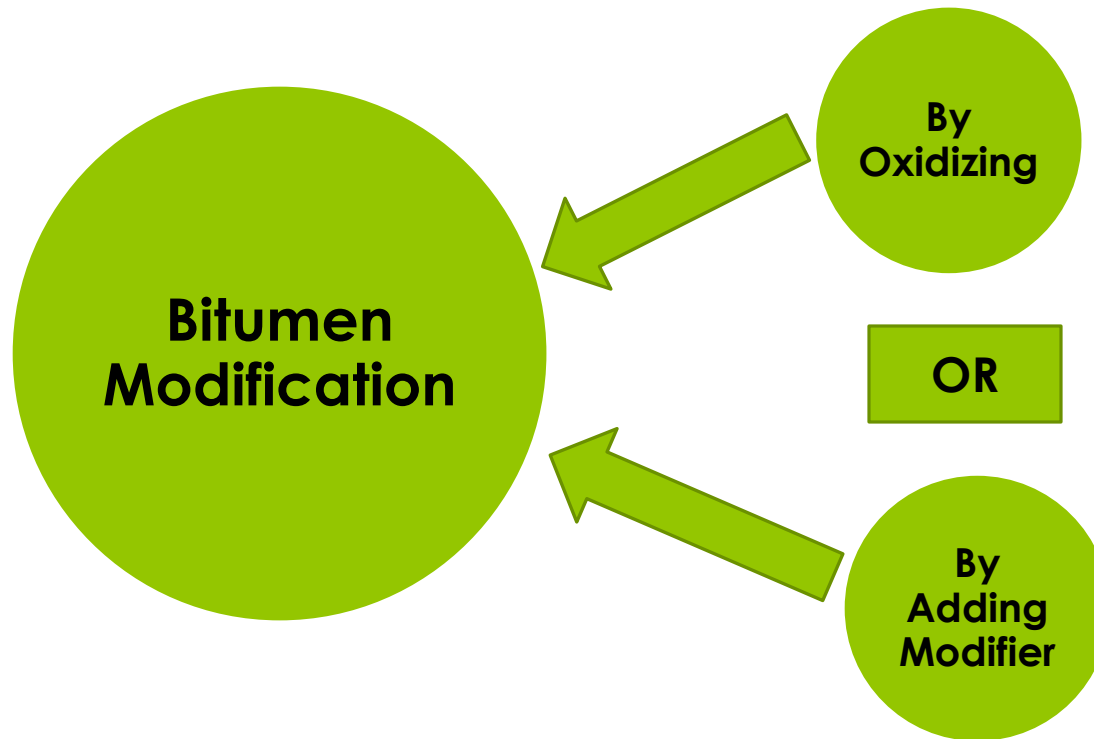
# WHY ROADS BREAKDOWN

- Bitumen which is the powerful binder and holds together the stone pieces sand and other materials used in building of the road surface has its own limitation and the life of the road is mainly affected due the following limitation of bitumen binder:
  - Bitumen loses its adhesive character when water falls on its surface resulting in potholes & cracks on the roads.
  - Summer heat melts Bitumen which travels to the surface and gets stuck to the moving objects on road surface, here again because of lack of binder the road brakes down.
  - In very cold regions the Bitumen becomes brittle and cracks up and again the road surface is broken.
  - Roads made out of straight run bitumen tend to oxidize faster

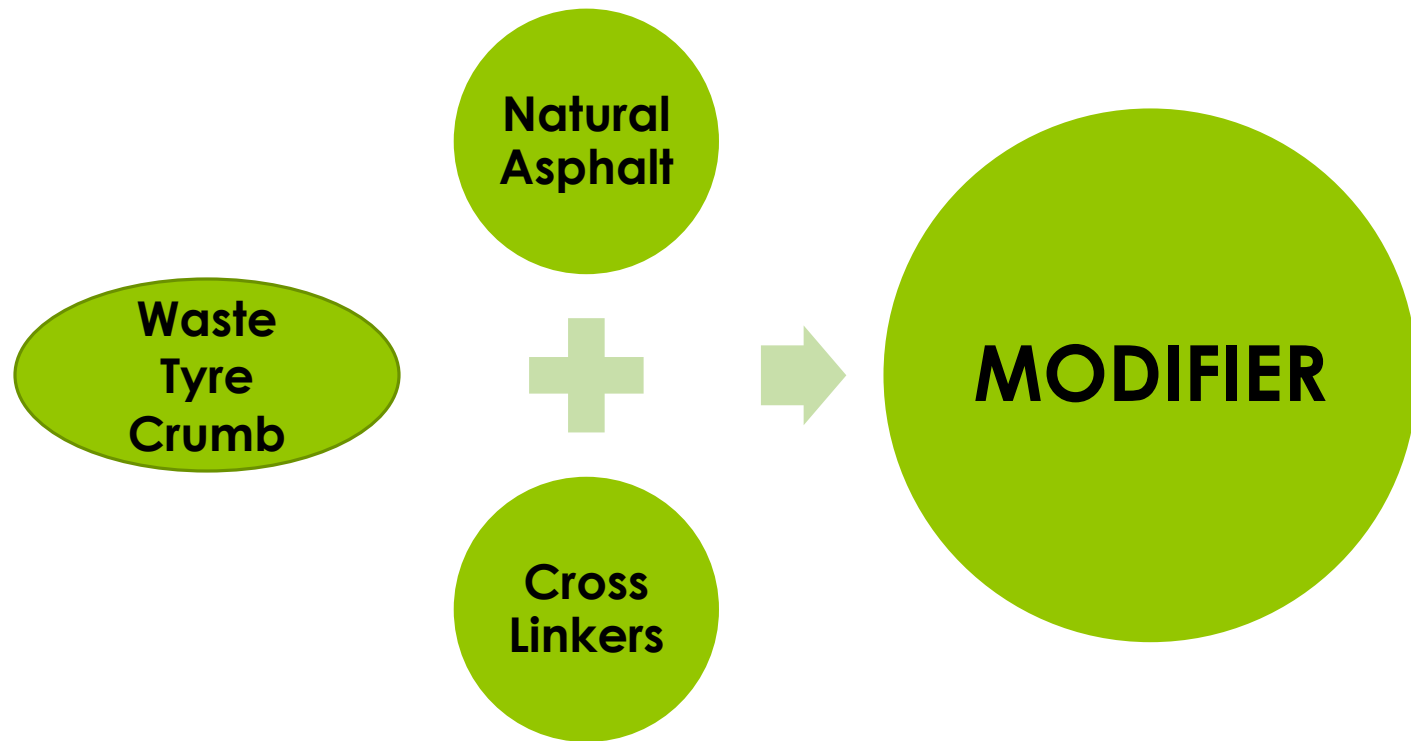
**Solution is....**

## **Modified Bitumen**





- During Oxidization, bitumen tends to loose its elasticity.
- Process makes bitumen dry & it tends to get brittle with the time.
- **While addition of modifier makes bitumen elastic in nature.**



- The Crumb Rubber and Cross linkers have been designed to rapidly blend in to Bitumen.
- The rubber gives the additional bindings strength, increasing elasticity, and higher softening point of the Bitumen.
- Natural Asphalt dissolves into the bitumen & helps in improving the softening values.

## NEED FOR RUBBERIZED BITUMEN

- ❑ Increasingly aggressive traffic conditions.
- ❑ Severe climatic conditions with daily and seasonal variation of temperature.
- ❑ Need to maintain roads at higher serviceability level.
- ❑ Increased fatigue resistance of bituminous mixes under repeated loading and higher degree of flexibility.
- ❑ Improved cohesion which assists resistance to weathering and adhesion to reduce risks of binder being stripped by water.
- ❑ Achieve higher stiffness modulus to minimize thickness of resurfacing in urban areas and to avoid milling.
- ❑ Resistance to cracking, raveling, deformation and creep failure.



# Straight Run Bitumen vs. Rubberized Bitumen :

Characteristic	VG 10	VG 30	VG 40	CRMB 55	CRMB 60
Penetration at 25°C, 0.1 mm 100g, 5 sec	80-100	50-70	40-60	<60	<50
Softening Point (Min.)	40	47	50	55	60
Elastic Recovery at 15°C (Min.)				50	50
Flash Point (Min.)	220	220	220	220	220

# Advantage of Rubberized Bitumen over Plain Bitumen

- Rubberized bitumen has higher softening point, giving **more stability to the pavement during hot months.**
- Much improved Elastic Recovery over 60, **giving resistance to fatigue.**
- Improved resistance to stripping due to **water repellent properties.**
- Lower susceptibility to daily and seasonal temperature variation.
- **Better age resistance properties.**
- **Much improved Elastic Modulus increases load carrying capacity.**
- **Delays oxidization of mixes thus enhanced pavement life.**

**Rubberized Bitumen** is manufactured by All Government **Petroleum Refineries at PAN India level**, is a **superior product** having **enhanced properties in comparison to VG 10/ VG 30 bitumen.**

## Rubberized Bitumen – Global Reach :

- ❖ Rubberized Bitumen is being used in USA from 1960
- ❖ Currently Arizona , Florida , Texas and California using 2 million tons of Rubberized Bitumen .
- ❖ Rubberized Bitumen is very popular in Australia for chip sealing wearing courses and structural layers .
- ❖ Use of Rubberized Bitumen being increase in developing countries of Latin America.

- ❖ Seeing the use of Rubberized Bitumen in USA, Canada, France, Germany and South Africa. UK Environmentalists want use of it to be encouraged on roads.
- ❖ Belgian Road Research center encouraging the use of Rubberized Bitumen on Freeways.
- ❖ South African companies due to ever increasing oil and bitumen prices are encouraging the use of rubber modified mixes.

# Rubberized Bitumen in India

- The technology known as rubberized bitumen exploits the potential of rubber to greatly improve the properties of bituminous binders and hence that of the bituminous mixes and to enhance eventually the performance of the pavements in terms of strength, durability, serviceability, safety and traffic noise reduction.
- The driving force behind the technology is the environmental concern for safe disposal of discarded tyres of automobiles and long lasting roads.
- Concept on Usage of waste tyre crumb rubber for the roads took off in the year of 1996 and established in the year of 1998 and subsequently INDIAN ROAD CONGRESS issued their guidelines on its usage in the year of 1999.
- While rubberized bitumen advantages are known even though it could not get implemented in full spirit.

## WASTE TYRE GENERATION – A Cause of Concern

- Globally over 15 million tones of waste tyres are generated, annually.
- India also contributes approx. 1 million tyres annually.
- Currently these waste tyre are being utilized for :
  - **Recycling for rubber goods**
  - **Pyrolysis &**
  - **Road constructions**



## WASTE TYRE : An Environmental Hazard



- Tires are designed and built to last and as such are not naturally degradable and difficult to treat. This poses a huge problem in recycling them.
- Accidental fires caused in stockpiled sites can rage for months releasing toxic fumes. The oily residue left after tire fire is difficult to eliminate from the environment.
- Waste tyre use for industrial applications by burning emits Green House Gases and thereby contributes to global warming and climate change.

## Waste Tyres & Its Application

- A tire that can no longer serve its original intended purpose is a waste tyre.
- A waste tire out typically consists of rubber compound (70.%), steel (16.5%), and nylon/fiber (5.5%).
- The most common applications for scrap tires use either whole or shredded tires or granulated rubber derived from tires. The main end-markets for scrap tires are tire-derived fuel, road constructions & ground rubber applications.



## WASTE TYRE CRUMB FOR ROADS

- As per MORTH directives for NHAI that an **approx. 30 km road is to be constructed every day.**
- Keeping in view the above, an approx. 750 MT of bitumen is to be used for wearing course every day.
- **If Waste tyre crumb is to be used with bitumen for wearing course, an approx. 250 no's of tyre waste can be consumed in roads every day or 100,000 no's of waste tyre annually .**

## TINNA – Caring for Environment



- The company has installed plants at various locations across India (in North, South, East and Western parts) for the manufacturing of crumb rubber powder from scrap tires.
- We are at present processing over 3000 MT of crumb rubber every month and currently consuming around 30000 – 35000 MT of scrap tires annually, for our plants.
- Processing waste tyres thru ambient mechanical grinding process, the breaking up of a scrap tire happens at ambient temperature. Its completely environment friendly process.

## Tinna's Initiative on use of Waste tires

- Waste tyre processing is done in an environmentally friendly manner using mechanical methods which do not generate any EFFLUENT.
- No Fumes/ gasses generated during processing.
- No thermal energy required for process.
- Total recovery of rubber from tires.

## PROCESS :



## Journey So Far.....

- **1977** : Company founded under the leadership of Mr. BHUPINDER KUMAR SEKHRI, who had the vision of introducing innovative technologies in the market.
- **1980** : With the technical understanding from JAPAN, started automation of rubber compounding for manufacturing of footwear soling sheets.
- **1982** : Introduced light weight rubber slipper with Japanese's technology.
- **1987** : Sets up the largest leather footwear manufacturing units with machinery imported from Italy & Korea.
- **1990** : Diversified into edible oil & Agro commodities and setting up oilseeds crushing & refining unit in western & southern part of India.
- **1994** : Diversifies into commodities export & becomes the largest exporter from India for rice, sugar and soya meal. Only Indian company to export potatoes & onions to Russia.
- **1998** : Introduces additives for bitumen modification.
- **2010** : Market leader in bitumen reprocessing & selling of additive to infrastructure company of India.
- **2010** : Introduced Bitumen Emulsions in the market. Sets up most modern automated plant & technology from Denmark to produce quality bitumen emulsion.
- **2012** : Single largest tyre crumbing facility in India. Using 20,000 MT of tyre rubber in an eco friendly manner.

# Product Portfolio:



Modified Bitumen & Bitumen Emulsion  
for Road & Infrastructure Industry



Rubberized Additive for Bitumen  
Modification



Services for converting customer's  
bitumen in to modified bitumen



Crumb Rubber Powder for Rubber  
Compounding

# An Overview on Infrastructure



Bitumen Modifying Plant



Bitumen Emulsion Plant



In house R & D and QC



Tyre Crumbing Plant



Bitumen Modifying Mobile Plant



## NATIONWIDE PRESENCE of TINNA

Corporate Office



Rubberized Asphalt  
modifying plant.



Mobile Blending Plant  
Locations. At present 14  
Plants are in operation.



Rubberized asphalt Plants  
At Refinery Location



Tyre Crumbing plants





# ESTEEMED CUSTOMERS



*strengthening lives*



हिन्दुस्तान पेट्रोलियम लि.  
Hindustan Petroleum Co.  
*Future full of energy*



**IndianOil**



**RELIANCE**

**Gawar Construction Limited**

**HCC**

**GVK**



*& many more.....*



# Thank You.....

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