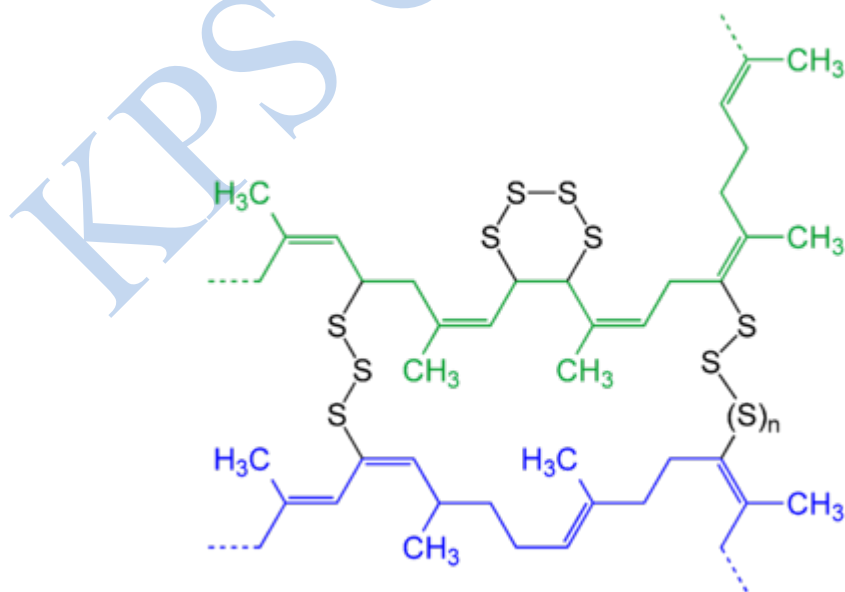


RECLAIMED RUBBER FROM END OF LIFE TYRES

Re-generated or Reclaimed rubber is produced by partial de-vulcanization of rubber granulate obtained from end-of-life tyres and other rubber products. The regenerated rubber has almost the original plasticity of virgin rubber, permitting the same to be compounded, processed and re-vulcanized or reused.

Regeneration can occur either by breaking the existing cross links in the vulcanized rubber (partial de-vulcanization) or by promoting scission of the main chain of the polymer (breakage of C-C bonds) or a combination of both processes.

Partial De-vulcanization means selective cleavage or breakage of Disulphide (S-S) chemical bonds (see: Figure below) leading to the separation of natural rubber polymer chains using **heat, mechanical shear force and assisted by peptizers** (like process oil & pine tar oil) and **reclaiming agents** (like Disulphides). The de-vulcanization is partial i.e. some and not all Disulphide (S-S) chemical bonds are broken. The main mechanism of de-vulcanization is by means of thermo - oxidative degradation and high shear force acting on the material.



Vulcanized Natural Rubber

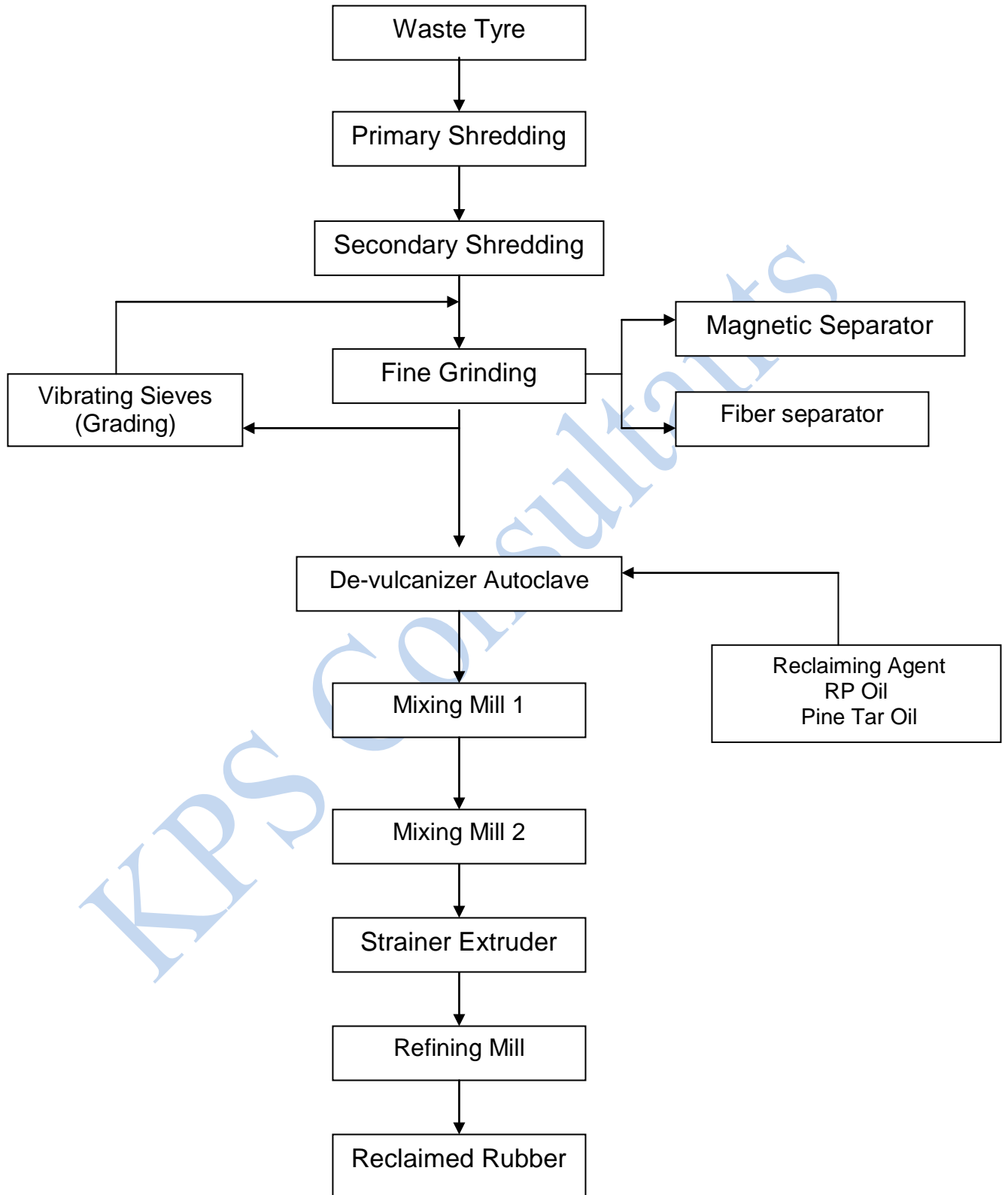
Some End Applications of Reclaimed Rubber

- ✓ Automotive Tyre & Tube
- ✓ Agricultural, Off the Road (OTR) tyres
- ✓ Solid (implement) tyres
- ✓ Bicycle Tyre & Tube
- ✓ Tyre Re-treading Material – Hot & Cold Tread
- ✓ Dock fenders, truck unloading fenders, speed bumps, parking halts
- ✓ Conveyor belting & tubing
- ✓ Moulded Rubber Goods
- ✓ Footwear - Shoe soles & Heels
- ✓ Flooring Sheet, Rubber Tiles, Automotive Mats & Mud Flaps etc.

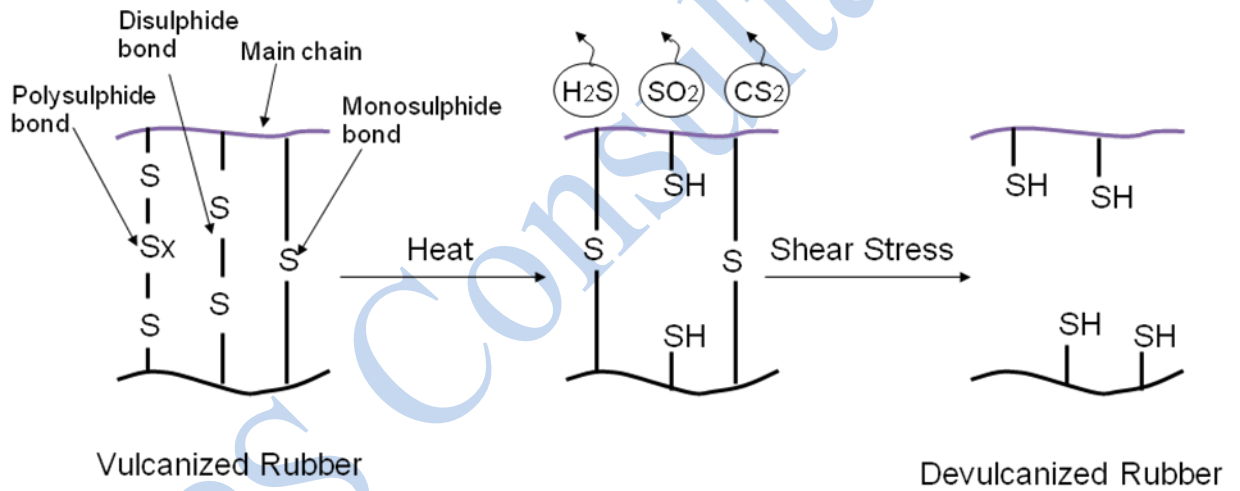
Advantages of Reclaimed Rubber

- ✓ The cost of reclaim rubber is much lower than virgin rubber hence it reduces cost and improves economics of the rubber compound.
- ✓ Besides cost reduction reclaim rubber provides various technical and processing advantages
- ✓ Lower power consumption during rubber compound mixing
- ✓ Lower mixing, calendaring and extrusion temperature
- ✓ Reclaim rubber builds up less internal heat during extrusion & calendaring hence imparting greater process (scorch) safety.
- ✓ Uniform Calendaring and Extrusion leading to better surface finish.
- ✓ Improves penetration of rubber into the fabric during coating of nylon or polyester tyre cord fabric
- ✓ Improves tackiness and holds it over a broad range of temperature.
- ✓ Reduces and retards blooming of sulfur in cured & uncured compound.
- ✓ Low swelling and shrinkage on extrusion and calendaring.
- ✓ Lower Thermo plasticity. Due to the cross linked structure of reclaimed rubber, its compounds are less thermoplastic than virgin rubber compounds and therefore when extruded and cured in open steam, they tend to hold their shape better.
- ✓ Low volume cost for the product

Reclaim Rubber Production Flow Chart



Reclaimed Rubber Sheet



Mechanism of cross-linking bond cleavage reaction

BOND	BOND ENERGY
C ----- C	370 kJ / mol
C ----- S	310 kJ / mol
S ----- S	270 kJ / mol

Energy required to break S ---- S bond is least





We can provide complete assistance for planning & implementation of reclaimed rubber manufacturing project. Once you decide to go for the project we can assist you in all activities related to the implementation of the project i.e. selection and sourcing of plant & machinery, plant layout design, selection and sourcing of utilities & support equipment, commissioning of the plant, trial production, processing know-how to produce different grades, quality control & testing aspects, approaching major buyers for technical qualification & approval purpose etc. .

As the first step we can prepare a Techno - Economic Project Report enabling you to understand different aspects of the project, approach Banks for loan purpose and Govt. departments for statutory clearances. The report will include

- 1.0 Introduction
- 2.0 Suggested Production Capacity & project parameters
- 3.0 Manufacturing Process & Technology
- 4.0 Production Process Flow Diagram
- 5.0 Input & Output Material Guiding Specifications / Standards
- 6.0 End Applications / Key Markets
- 7.0 Plant & Equipment with basic Specifications & Indicative prices
- 7.1 Utilities & Support Facilities with indicative prices
- 7.2 Quality Control & Testing equipment with indicative prices
- 8.0 Estimated Project Cost
- 9.0 Manpower Requirement & Cost
- 10.0 Estimated Product Cost (raw material, production, overheads)
- 11.0 Estimated Turnover, Profitability and Project Payback Period
- 12.0 Working Capital Requirement
- 13.0 List of Machinery & Chemical Suppliers
- 12.0 Market Scenario: Consumption / Production / Growth for last 10 Years
Tyre Production Statistics (10 years), Major producers with capacity & location, Export statistics and key markets
- 13.0 Land & Factory Building Requirement
- 14.0 Project Implementation Schedule (Bar Chart)

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