



Volume 1 ♦ ISSUE 6 ♦ JANUARY 2019

₹. 100/-

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The RMWA Journal

GUJARAT'S FIRST RUBBER MAGAZINE



RUBBER- DRIVING GROWTH

IN THIS EDITION

- ☐ About Natural Rubber
- ☐ Rubber to Metal Bonding
- ☐ Silicon Insulator
- ☐ Basic Process Control - Injection Molding
- ☐ Global Rubber Market 2017 - 2020
- ☐ Key attitudes for Entrepreneurial Success
- ☐ Group Tour to Rubber Tech - China

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Publisher : RMWA (RUBBER MANUFACTURERS' WELFARE ASSOCIATION)

Editor : Manoj Shah

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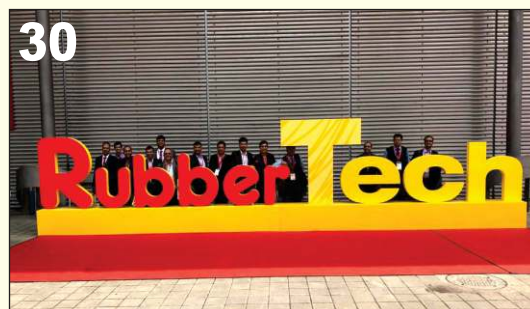
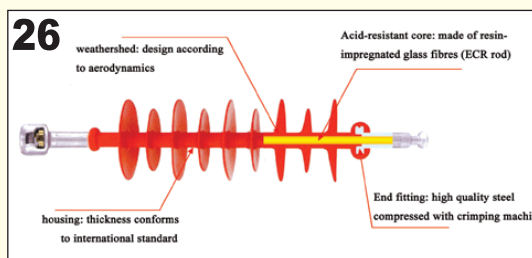
Creatives & Designs : Gautam Bhide,
Deepak Mistri

Printed By : Kasturi Graphics

5, Chandralok Society, Nr Cadila Laboratories,
Ghodasar, Ahmedabad - 50. (Gujarat) INDIA.
M : 09825433219

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EXHIBITION

2019

Editor's Note

Manoj Shah
Editor, RMWA

Manoj Shah



“Liquid Silicon Rubber”

Dear Readers ,,,,

Let us talk today about liquid silicon rubber's product market. This market is increasing globally. Silicon rubber contains carbon , hydrogen & oxygen besides silicon. It is stable , non-reactive and resistant to extreme environment and temperature changes.

One and the major factor driving growth of liquid siliconrubber market is increasing demand in health care segment and electronic industry. However strict regulation pertains to use of liquid silicon rubber in medical device is expected to check growth in this field.

Rising ageing population is to drive market demand for transparent liquid silicon rubber product in optical appliances.

Health care segment will contribute major share in liquid silicon rubber market. The global market can be divided on basis of application into [1] medical devices [2] home appliances and [3] consumer goods. Considering end uses, one can divide this market into [1] aerospace [2] health care and [3] electronics.

North America , Europe, Asia specific and middle east are the categories where the market of liquid silicon rubber remains high in near past. Asia specific is fastest growing region due to increasing demand from economy like India , China and Indonesia.

Happy Reading



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NATURAL RUBBER

Manoj Shah
Nitro Polymers

Structure

- True chemical name is 1-4 polyisoprene $[C_5H_8]_n$
- Two structure possible
 - [1] Cis 1-4 and
 - [2] Trans 1-4commonly known as balata Cis 1-4 structure is stereo regular hence high gum strength and crystallisation on stretching.

Types

- [1] Latex
- [2] Pale crepe
- [3] Smoked sheet
- [4] Technically specified block rubber
- [5] Rubber derivatives.

LATEX

- Stem of the rubber tree having 7/10 years of age is cut diagonally to 25/50 % of total circumference for tapping.
- Collected latex is preserved with ammonia or recently with zinc diethyl dithio carbamate to prevent the protein from decomposing. Thus latex is stabilized.
- Using centrifuge method latex is concentrated to 60% solid content.
- Latex is an emulsion of rubber globules surrounded by protective layer of protein.
- Latex is coaguable by acids. [formic acid / acetic acid].
- Latex particle bears a negative electric charge.

PALE CREPE

- Natural yellow colour is due to presence of Beta carotene which is removed by either fractional

coagulation or by bleaching the latex with 0.05 % sodium bisulphite or xylyl mercaptan solution.

- Hardly 10% of latex is converted into pale crepe.
- Pale crepe is high quality natural rubber which finds application in pharmaceutical goods, surgical goods, bathing auxiliaries and white side wall in tyres.

SMOKED SHEET

- This is the largest single type of dry rubber. Nearly 75/80 % of latex is converted into smoked sheet natural rubber. Major consumption of this type is attributed to tyre industry followed by different mechanical goods.

- Smoked sheets are produced by coagulating latex. 1% formic acid solution [50 p.b.w.] is added to 1000 p.b.w. of latex.
- Coagulation is done on aluminium partition. The thickness is brought to nearly 3 mm.
- Smoked sheets are dried into smoke house at about 43 / 60 ° C.

TSR [Technically specified block rubber]

- This type is widely accepted internationally. Actually it is not the type but grading of natural rubber. There are assured quality with technical specification.
- SMR EQ - SMR 5 - SMR 10 - SMR 20 - SMR 50 total 5 grades.
- Dirt content & ash content increases gradually as mentioned in above order.

RUBBER DERIVATIVES

- Depolymerised rubber is pourable useful in casting article. Used as binder for abrasive wheel.
- Chemically modified rubbers [cyclized- chlorinated etc.] are used in protection of metal as chemically resistant paint. They are also used in rubber to metal bonding.
- AC rubber [anti crystallising natural rubber] is an

equilibrium mixture of Cis & Trans isomers. They are used in brake liners and adhesives.

- OENR [oil extended natural rubber] They are extended with 30 % of either aromatic or naphthenic oil. Used in tyre manufacturing. It considerably improves skid resistance on wet & icy roads.

Properties of natural rubber

- Generally contains 93 % rubber hydrocarbon. Remaining 7 % consists of protein , fatty acids and inorganic material.
- Copper [Cu^{++}] and Manganese [Mn^{++}] are powerful catalyst to promote oxidation of rubber. Higher than 8/10 part per million of these matter are not tolerated.
- Proteins are natural antioxidant & fatty acids are working as an activator. Density is 0.92 g / c.c.
- Natural rubber has very high molecular weight hence it is very high viscosity rubber.
- Crystallisation occurs in natural rubber below 10°C. It also occurs when natural rubber is stretched. But it is reversible when load is removed or rubber is heated.
- Trans poly-isoprene is mainly used in golf ball cover due to its high impact resistance.

Compounding of natural rubber

- ACS – 1 & ACS—2 Test recipe are used according to end product application. ACS-1 is gum / thiozole cured & ACS-2 is HAF / sulfanamide cured test recipe.
- Base compound design is as follow:

Natural rubber [smoked sheet]	100
Stearic acid	2
Zinc oxide	5
Antioxidant PBN	1
Sulfur	2.5
Accelerator [CBS / HBS]	0.8
Accelerator [TMTD]	0.1
- Above base formula can be modified with fillers / carbon black & plasticizer to achieve required finish formulation.
- E.g. for high elongation , resilience & low

compression set bigger particle size carbon black like SRF & MT can be used.

For non –black product precipitated calcium carbonate can be used.

- E.g for high strength & high abrasion resistance smaller particle size carbon black like HAF / ISAF can be used. For non-black product precipitated silica can be used.
- E.g for light coloured rubber product, a non-staining phenolic type antioxidant should be used.
- Generally for most engineering goods hardness should be around 70 *A.
- Paraffin wax can be used around 2 / 5 parts. It provides ozone resistance only in static condition.
- Naphthenic & aromatic oils are useful whereas paraffinic oils are not compatible.
- Precipitated calcium carbonate imparts best hot tear resistance.
- In Some engineering product crack initiation & crack growth are to be checked carefully. In such cases blends of natural rubber & styrene butadiene rubber is beneficial.



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TYPES OF RUBBER SHEETS AVAILABLE

COMMERCIAL	Flange Gasket Packing to avoid air, water & inorganic chemical leakages.
NR / SBR	Skirt board, bridge bearing, high pressure gasket packing, sand / shot blasting, Shock absorber, shelf liner, anti-abrasion lining.
NEOPRENE	Sealing applications in construction sites & sound studios, used as gasket to avoid leakages of oil, heat, steam, water, air, acid & alkali. Used in marine, flame retardant, inorganic chemical resistant.
NITRILE	Sealing, gasket & packing to avoid leakages from oil, solvent, petroleum based fluids, lubricating oil, transformer fluid & very low permeability to gases.
EPDM	Outdoor applications like weather strips, drinking water applications, rain water sealing, protection against sunlight & heat gaining as a roof membrane, acid resistance, liner in pulverizing system.
BUTYL	Chemical tank lining, pharmaceutical stoppers, acid protective clothing.
DIAPHRAGM	1 to many ply insertion rolls used in control valves, regulators, pumps for oil, LPG & solvents resistance applications.

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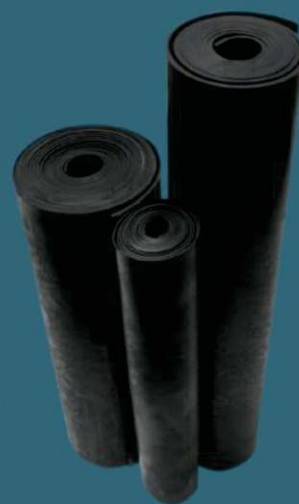
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Rubber To Metal Bonding

Ronak, B.E.M.E.
Rubber Technology.

Rubber finds use in many applications as a means of isolating vibration and reducing shock or as a way to seal in solids, liquids and gases. For many of these applications, it is desirable or even imperative that the rubber be attached to a metal substrate in a reliable manner. There is a fundamental difference between bonding of rubber to metal involving crosslinking mechanisms and the physical 'sticking' of rubber to metal using a non-vulcanising adhesive. The former involves a chemical reaction (generally during cure) while the latter generally relates to a physical surface tension phenomenon. Bonded rubber parts have found use in a myriad of dynamic applications such as engine mounts, suspension bushings, body mounts, torsional dampers, helicopter rotor bearings, seismic bearings, transmission and axle seals, and as flexible couplings. These parts are usually made by vulcanising the rubber and bonding it to the metal component in a single-stage press operation. Today, many companies make adhesives for chemically bonding rubber to metal. The following companies supply general purpose primers and adhesives:

Company	Tradename
Lord Chemical Products Division of Lord Corporation	Chemlok
Henkel KGaA (Lord licensee)	Chemosil
Rohm and Haas	Thixon; Megum
Par Chemie	Parlok
Chemical Innovations Limited	Cilbond
Metalok	Metalok
Proquitec	Adetec

Adhesive Characteristics:-

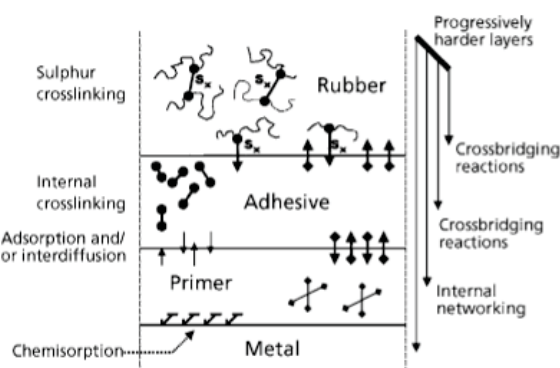
Rubber to metal primers contain organic resins which react with most metal (steel, aluminum, stainless steel, copper, brass) surfaces during the vulcanisation process

to form a chemical bond to the metal. They also contain polymers which allow for better film formation and act as an anchor for the subsequent application of the adhesive.

Rubber to metal adhesives contain polymeric materials that are compatible with the ingredients in the primer, as well as the rubber compound to be bonded. Many are based on halogenated polymers. Halogenated polymers or resins are known to wet metals efficiently and can be used in both the primer and adhesive formulation. They provide effective barriers to chemicals that can undermine the adhesive bond. The adhesive also contains very powerful curatives that react with both the polymers in the rubber and the polymers in the adhesive. Difunctional and polyfunctional chemicals are capable of making the film forming polymer a thermoset as well as reacting across the interface of the film to link into the rubber.

The rubber to metal bonding mechanism is very complex as there are several reactions occurring simultaneously. All these reactions must take place in a very short period of time (i.e., during the press cure time of the rubber) in order for a strong bond to form. The different reactions taking place are shown in Figure .

Each of the three organic layers in a rubber to metal bond (primer, adhesive, rubber) crosslink or cure during the moulding step. The source of this crosslinking is the presence of either a heat reactive resin or externally added crosslinking agents. This internal curing increases the molecular weight and cohesive strength of each layer. In addition, each layer undergoes reactions with the layers immediately above and below it. These interlayer reactions are caused by the same chemical ingredients that allow for internal crosslinking to occur.



The first 'link' in a rubber to metal bond is the primer to metal interface. As mentioned previously, in addition to the internal crosslinking that takes place in the primer, organic resins in the primer react with metal oxides on the surface of the metal part to form very strong covalent chemical bonds. This type of reaction is called chemisorption. It is differentiated from normal adsorption or physical bonding in that bonds formed by chemisorption are very resistant to attack from water, heat, and chemicals. In contrast, bonds formed by adsorption are easily destroyed by the application of environmental forces such as heat or chemical exposure.

The next link in the rubber to metal bond is between the primer and adhesive interface. The curative present in the adhesive layer migrates or diffuses into the primer layer during vulcanisation and forms a chemical bond between the primer and adhesive. The polymeric film former present in the primer diffuses and knits with the adhesive layer and further strengthens the bond between primer and adhesive because of its compatibility with polymers present in the adhesive layer. The final link in the rubber to metal bond is the adhesive to rubber interface. The curative present in the adhesive layer also diffuses into the rubber during vulcanisation and forms a chemical bond between the adhesive and the rubber. These bonds which span across the layers in the assembly are called 'crossbridges' to differentiate them from the crosslinks which occur within the rubber itself. In addition, sulphur from the rubber compound diffuses into the adhesive layer and helps to form additional crossbridges between the rubber and the adhesive.

One coat – primer/cover-coat systems

Rubber to metal adhesive systems generally occur in two broad classes. These are primer/ cover-coat systems and one coat (or single coat) systems.

One coat adhesives, by necessity, contain both materials which react with the metal surface and materials which react with the rubber. These materials, in many cases, are not stable together, so long term shelf stability of one coat adhesives is more difficult to achieve.

Each system has its advantages and disadvantages. Typically, primer/cover-coat systems are more resistant to extreme environmental conditions such as hot oil or extended salt spray exposure. However, primer/cover coat systems are more expensive to apply because of the need to have two sets of application equipment, one for primer and another for cover-coat. One coat systems only require one set of application equipment and require only one application step instead of two, and hence, are less costly to process. Inventory issues are significantly simplified with the use of one coat adhesives.

EFFECT OF RUBBER COMPOUND ON BONDING

The choice of vulcanisation system for the rubber can have a dramatic effect on adhesion. Typically sulphur cured rubbers are easier to bond to than sulphur-free or peroxide cured rubbers. This is believed to be due to the interaction of sulphur with key curative materials in the adhesive. The more sulphur that is present, the more interactions that are available, and hence the better the chance of getting good adhesion. SEV (semiefficient vulcanisation) and EV (efficient vulcanisation) cure packages are typically more difficult to bond because of their lower free sulphur contents. EV refers to cure systems which give predominantly monosulphidic or disulphidic crosslinks whereas conventional sulphur cure systems produce mostly polysulphidic crosslinks. SEV systems fall somewhere between EV and conventional systems in the type of crosslinks produced. Vulcanisation proceeds at different rates and with different efficiencies in different types of polymers, so the amount of sulphur needed to produce an EV cure system will also vary. For example, in NR, an EV system will generally contain between 0.4 and 0.8 phr of sulphur, while in NBR the sulphur level will generally be less than 0.3 phr of free elemental sulphur.

In sulphur cured rubbers, accelerators are generally used to reduce the dependency on sulphur in order to achieve more efficient vulcanisation, to improve heat and flex resistance due to the presence of more monosulphidic

crosslinks, and to increase the cure rate of the rubber and improve production capacity. Two accelerators which have been shown to enhance bondability of rubbers are 2-mercaptobenzothiazole (MBT) and mercaptobenzothiazole disulphide (MBTS). An accelerator which is known to negatively impact on adhesion is tetramethyl thiuram disulphide (TMTD). Peroxide cured rubbers are the most difficult to bond to metal with conventional adhesives. This is because the free radical peroxide cure mechanism competes with the curative in the adhesive for reactive sites on the rubber backbone. Processing oils are often necessary to ensure good flow and proper filling of moulds. Unfortunately, the use of these oils can seriously hamper adhesion due to their ability to migrate to the adhesive/rubber interface during vulcanisation and interfere with crossbridging reactions. Lower levels of processing oils are always preferred for best adhesion. Naphthenic oils have the least deleterious effect on adhesion, while aromatic and ester based oils should be avoided if at all possible.

Antidegradants including waxes, antiozonants, antioxidants, and prevulcanisation inhibitors are also necessary for good processability and performance of rubbery parts. Unfortunately, these materials are also bad for adhesion because they can also migrate to the rubber surface and interfere with crossbridging reactions. The lowest possible amount of these materials necessary to get acceptable part performance without causing blooming to the surface of the rubber is preferred.

Metal Pre-treatments

Metals must be suitably pre-treated for satisfactory bonds to be achieved with rubbers.

Two basic methods of preparation are used:

Mechanical

Metals, especially the more common iron and steel types, come from the foundry and metal plate stamping shop, coated with oil, grease and most often with a generous layer of oxide and rolling mill scale formed on the exposed surfaces. Oxide films can also develop further during

storage prior to use by the bonding shop. All these materials must be removed from the surfaces and from the voids in the metal, to ensure that the oils and greases which otherwise may be trapped unseen cannot exude under the increased temperature of vulcanisation, when they become more mobile or volatile. Surface oxides must be removed for they are often only loosely structured in their attachment at the metal substrate and will rupture and detach themselves under duress, causing the metal/adhesive bond to fail. Once the original oxide layer has been removed, the freshly exposed metal will immediately start to build a new oxide film which must be minimised by rapid degreasing and application of primer/adhesive coat.

Initial degreasing

Metals must be degreased as the first step in any metal preparation process, otherwise oil and grease contamination of blasting media, chemical treatments and machinery can result in severe factory quality problems and unreliable and variable bonding.

Traditionally the most usual method of grease and oil removal from the metal surface has been by degreasing in the vapour of a chlorinated solvent such as trichloroethylene or 1,1,1-trichloroethane or perchloroethylene. The chlorinated solvent used must have a neutral pH, otherwise the acidic condition can cause the initiation of underbond corrosion. Re-distilled chlorinated solvents, especially if recovery is carried out in-house, must be adequately checked for neutrality. The metal parts must dwell in the solvent vapour until such time as the metal reaches the temperature of the vapour and condensation has ceased. The solvent will have had the best opportunity to work at its most efficient in grease removal under these conditions. Direct contact with the degreasing solvent is not an efficient way of removing greases from metal surfaces, always leaving a molecular layer at least, still lying on the 'cleaned' surface. This cleaning method should not be used for metals to be used in bonding.

Alternative solvents, if used in a vapour degreasing system

must have a similar evaporation rate to that of the presently used chlorinated solvents. Otherwise too rapid evaporation of the condensed solvent on withdrawal of the metals from the solvent vapour will result in rapid surface cooling of the metal, with resultant condensation of water, especially in conditions of high humidity.

- Solvent dip methods for large scale removal of greases

Solvent dip methods are generally expensive to run and do not usually, unless a number of dip tanks are used, completely remove oils and greases from the metal surfaces. Contaminants are easily carried from tank to tank and it is difficult to ascertain whether the metal surface is completely cleaned after its passage through the tank series. This method would not normally be used for anything other than small scale operations. Fast drying solvents such as methylene chloride and acetone evaporate so quickly that they lower the temperature of the metal surface and water condenses.

Removal of surface oxides

Metals, after degreasing, have to be blasted with a sufficiently abrasive material to remove the surface oxidation layer. The usual medium used for ferrous substrates is steel or chilled-iron grit to BS EN ISO 11124-4 grades G12 to G24. Alumina or other non-ferrous grits such as quartz sand and carborundum may be used on ferrous metals, but their use on non-ferrous metals is essential to prevent the possible formation of galvanic cells. Initially impingement of the metal surface with abrasive grit has the effect of gouging the surface of the steel to give a larger surface area for bonding, but with use the grit wears and its efficiency decreases. The type of grit used must be coupled to the type of metal being treated. Incorrect grit/ metal combinations can lead to formation of galvanic cells remaining on the surface of the blasted metals and the commencement of underbond corrosion. Grits larger than about 30-50 mesh diameter soon lose their irregularities and grittiness, effectively turning into shot at which stage they must be discarded. The hardness

of the steel grits should be a Rockwell C hardness of 60 – 65.

Iron or steel shot should not be used as these tend to give cavitation of the blasted metal surfaces, followed by peening over of the sharp metal pinnacles, often trapping loose shot, blasted material, etc., in the peened over cavities. These cavitations and their contents cause weaknesses and possible underbond corrosion sites, resulting in ultimate failure in service.

The service life of the blasting media should be established for efficiency and quality of surface finish. Grit in use should be cleaned of dust resulting from removed oxide scale and its own degradation products and be downgraded or discarded if it becomes too worn.

Revolving drum blast machines give the best production efficiency for metals which are stout enough to resist damage from the tumbling action involved. The metal parts are tumbled on a rubber belt inside a revolving drum whilst being bombarded with the abrasive medium.

Chemical methods

The alternative metal pre-treatment processes to grit blasting use a variety of different chemical routes. It is sufficient to say here that these can be very efficient, but do occupy rather large factory floor areas and can, if not controlled correctly give variable quality of prepared surface. The usual chemical pre-treatment systems consist of acid etching of the surface followed by several water dips and subsequent phosphate or in some circumstances cadmium plating and passivating (render inert). Many of these treatments will have been carried out by the metal processor and are not the rubber bonder's processes.

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Dynamic Properties of Polymers

Materials and their Measurements

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1.4 Stress Relaxation

Stress relaxation is a viscoelastic property of an elastomeric material. In a stress relaxation experiment, the sample is rapidly stretched or compressed to a predefined strain and held constant. The stress is then recorded as a function of time. Creep experiments are carried out in a similar manner but instead of the application of a constant strain, a constant stress is applied and the deformations or the resultant strain is studied as a function of time. The stress relaxation modulus may be defined as

$$E_{rel.}(t) = \sigma(t)/\epsilon_0 \quad (1.9)$$

If there is no viscous flow in the material, the stress decays to a finite value for polymeric materials. For amorphous linear polymers at high temperatures, the stress may eventually decay to zero. For a linear viscoelastic solid, the instantaneous stress will be proportional to applied strain and will always decrease with time.

The molecular causes of stress relaxation and creep can be classified to be based on five different processes.

1. *Chain Scission* The decrease in the measured stress over time is shown in Figure(1.8) where 3 chains initially bear the load but subsequently one of the chains degrades and breaks.

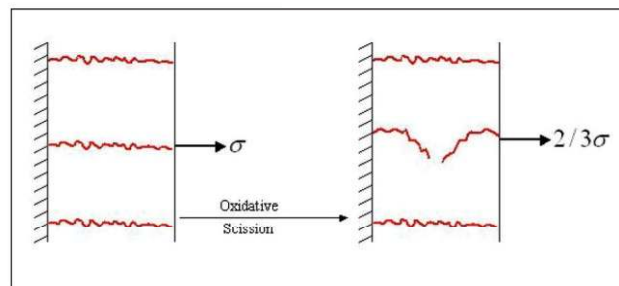


Figure 1.8: Chain Scission in an Elastomeric Material

2. *Bond Interchange* In this particular type of material degradation process, the chain

portions reorient themselves with respect to their partners causing a decrease in stress.

3. *Viscous Flow* This occurs basically due to the slipping of linear chains one over the other. It is particularly responsible for viscous flow in pipes and elongation flow under stress.
4. *Thirion Relaxation* This is a reversible relaxation of the physical crosslinks or the entanglements in elastomeric networks. Generally an elastomeric network will instantaneously relax by about 5% through this mechanism.
5. *Molecular Relaxation* Molecular relaxation occurs especially near T_g (Glass Transition Temperature). The molecular chains generally tend to relax near the T_g .

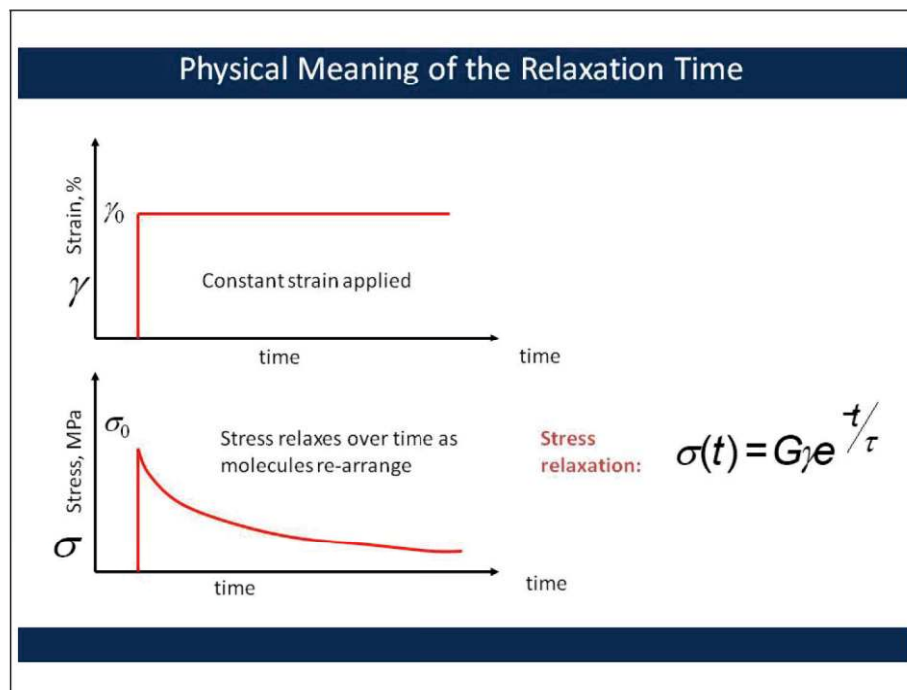


Figure 1.9: Physical Meaning of the Relaxation Time

The related effect of stress relaxation in sealing applications is the reduction in stress (i.e. sealing force) under constant strain (compression) conditions. In many applications when sealing force approaches zero, leakage is likely to occur as the seal geometry loses contact

between the mating surfaces. Stress relaxation and compression set effects are undesirable and are of key importance in determining sealing performance. For amorphous linear polymers at high temperatures, the stress may eventually decay to zero. If there is no viscous flow in the material, the stress decays to a finite non-zero value.

Stress relaxation as discussed above is caused by a combination of physical relaxation, and chemical degradation. Physical relaxation is dependent on elastomer material properties. It increases with temperature, is dominant over short timescales during the initial time period of the experiment and is fully recoverable. Chemical degradation is highly dependent on temperature and on the aggressive chemical action of fluids and application environments and is applicable over longer time frames in an experiment. ASTM D6147 and ISO 3384 with methods A and B are the applicable standards for stress relaxation experiments. Method A refers to the continuous method of measuring the force over time, while method B refers to the intermittent method of measuring the force over time. Wykeham-Farrance test apparatus is the preferred method to measure the force decay over time in method B.

1.5 Creep

Creep is an increase in plastic strain under constant stress. Creep is an increased tendency of a solid material to move slowly or deform continuously under the influence of mechanical stresses. In other words it tends towards high strain and plastic deformation with no change in stress. Figure (1.10) shows a the stress and strain curves for a part undergoing creep. The material is stressed with an applied force. Creep tends to occur as a result of long-term exposure to high levels of stress that are still below the yield strength of the material. Over time, the force and stress do not change, although the shape of the part continuously deforms. When unloaded, there is additional permanent set. Old PVC pipes for electrical installations sag at the center when simply supported at the ends. This is an example of creep under the constant force of gravity. Creep in polymers at low strains (1 percent) is essentially recoverable after unloading.

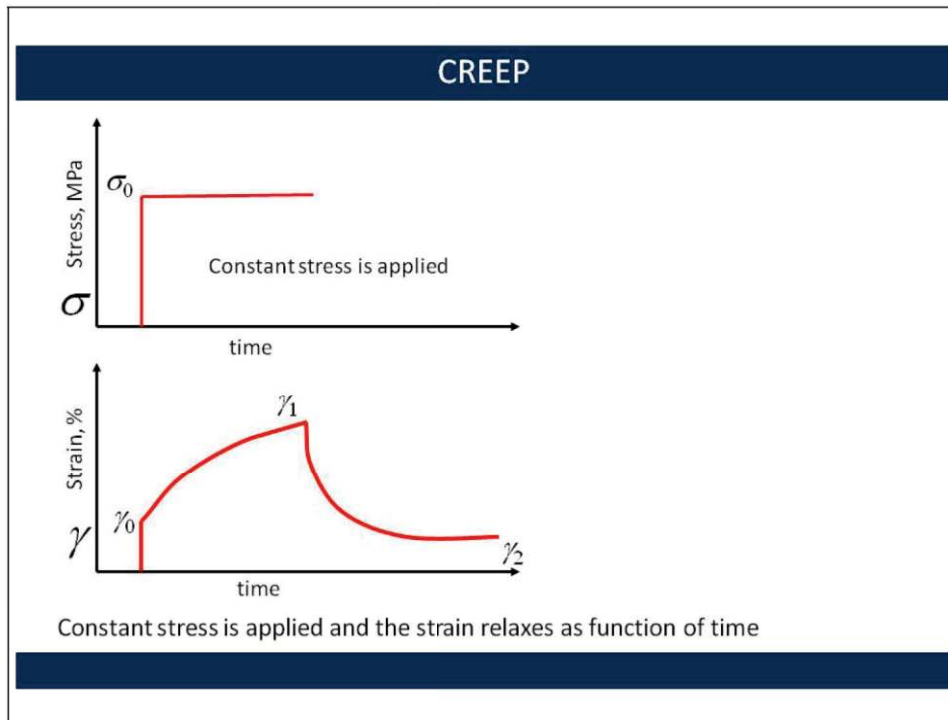


Figure 1.10: Physical Meaning of Creep

γ_1 is the immediate elastic deformation taking place under the effect of applied load. γ_2 is the elastic deformation that takes place over a period of time. γ_3 is the flow of the material or the non-recoverable creep that remains once the loading on the material is removed. The creep compliance may be define as

$$C_{comp.}(t) = \epsilon_t / \sigma(0) \quad (1.10)$$

Creep is thus a time- dependent deformation under an externally applied load. It generally occurs at high temperature (thermal creep), but can also happen at room temperature in certain materials albeit at much slower rate. As a result of Creep the material undergoes a time dependent increase in length, which could be dangerous while occuring in engineering components under service loads and boundary conditions.

ASTM F38 is the standard test method for Creep experiments on a gasket material.

To be continued

Note Worthy

Global Rubber Market 2017-2021

Growing Demand for Rubber in APAC is Driving the Market –

The global rubber market is expected to grow at a CAGR of 4.66% during the period 2017-2021.

The latest trend gaining momentum in the market is bio-based tires helping market growth. The tires used in automotive vehicles are going to be bio-based during the forecast period. There is a great turmoil in the rubber industry to manufacture automotive vehicle tires made from renewable raw materials. Companies such as DuPont have been working on the use of renewable raw materials, which can be used to manufacture tires. DuPont Industrial Biosciences is working to develop a product known as BioIsoprene, which is a bio-based alternative for petroleum-derived isoprene. BioIsoprene can be used to produce synthetic rubber, which is regarded as an alternative for natural rubber and other elastomers.

One of the major drivers for this market is the growing demand for rubber in APAC. APAC accounted for the largest market for rubber consumption in 2016 and is expected to be the fastest-growing market for rubber consumption during the forecast period. Countries such as Indonesia, India, Vietnam, Thailand, and China will also witness a high rubber consumption. China was the world's largest rubber market in 2016. China will continue to be the largest consumer of natural rubber in the world, accounting a 36%-39% of the natural rubber consumption by 2021. China uses 80% of its natural rubber to manufacture tires. Indonesia and Malaysia are the major markets for natural and synthetic rubbers. The high production of natural rubber in these countries is expected to increase the growth of the rubber market. The rising demand for tires in the automotive sector is a major factor that is encouraging the growth of the rubber market in APAC.

Launch of new range of mattresses :

Kerala-based Periyar Polymers, the makers of Skyfoam mattresses, has launched its latest offering – the Florid range of premium and ultra-premium mattresses.

Cine Actor Priyal Gor (of Anarkali movie fame) launched the Florid range at a function held here.

The Florid range of mattresses is made of imported Belgium latex, memory foam, rubberised coir and re-bonded foam, packaged in viscose and bamboo fabric. The range comprises over 20 categories in various sizes, and is priced from ₹10,000 to ₹1 lakh and comes with a 10-year warranty.

Modern technology to drive rubber industry:

The future of the island's rubber industry largely depends on how it focuses on introducing

technology to develop yield, an industry expert said.

Rubber plantations are in need of a revival plan, Secretary, Sri Lanka Association of Manufacturers and Exporters of Rubber Products (SLAMERP), Dr. Sisira Ranatunga said.

Talking to the Business Observer on the sidelines of an industry forum in Colombo on Friday Dr. Ranatunga said, the industry representatives have worked tirelessly over the past two years with government agencies, such as the Ministry of Finance, Ministry of Development Strategies and International Trade, the Ministry of Plantations Industries and the Ministry of Industry and Commerce to get the Rubber Industry Master Plan (RMP) approved.

“This will be a great impetus for the next phase of development of another golden era of growth in the Sri Lankan rubber industry,” he said.

He said the industry's aim is to achieve an export income of over US\$ 3 billion from rubber products by 2026, even though it is going to be a challenging task due to climate change and raw material supply, the intense competition from developed countries having access to higher capital, better technology, bigger markets, advance human resources and productivity and better industry infrastructure. However, with years of experience and the right policies being adapted the Sri Lanka rubber sector can achieve greater growth as envisaged.

Dr. Ranatunga said as a major measure of the RMP, Sri Lanka will launch its first digital technology centre for development of the rubber sector in Ratmalana (Rubber Research Institute) next month.

The setting up of the centre is a key strategy of the RMP. By using more advanced technologies in the new centre such as Finite Element Analysis and Simulation (FEAS), which is being implemented by the Rubber Research Institute of Sri Lanka (RRILSL) in Ratmalana, the industry representatives, hope that they can enter new markets and secure new customer bases overseas.

Sri Lanka's rubber sector experienced a major hiccup since

2011 until 2016 and the production level drastically declined to 80,000 MT from 140,000MT earlier. Currently manufacturers and exporters of rubber products require 140 000 MT for their production units, however, the country's rubber output is quite low. At present the gap is covered with imports from Vietnam and Malaysia.

Tyre sector accounts for the largest share of export turnover (60%) of rubber products exports, which include solid tyres, pneumatic tyres, bicycle tries, three wheeler tyres and a variety of smaller tyre categories. Currently Sri Lanka is considered as the global leader in Solid tyres, which accounts for over 25% of the global demand. Exports of solid and pneumatic tyres accounted for US\$ 513 million in 2017 recording an increase of 7.1 % over the previous year. The main export markets for tyres are USA, Belgium, Germany, Italy and UK of which USA accounts for 34% (US\$ 164 million) of the total tyre exports.

Sri Lanka has become a world class solid tyre product manufacturer supplying to international markets. Further, the Pneumatic tyre industry is also fast developing industry. Pneumatic tyres accounted for US\$ 181 million in 2017 recording a 15% increase when compared to year 2016. The main export markets for pneumatic tyres are USA, Germany, Italy, India and UAE.

The two-day forum was organised by the Sri Lanka Export Development Board (EDB) in collaboration with SLAMERP and the Plastics and Rubber Institute of Sri Lanka (PRISL). The forum with international experts meant for training the industry representatives on Product Innovation, Technology and R & D, and to upgrade the knowledge of the tyre industry personnel.

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Basics_Process Control

- Desma

6. Process control in Injection Rubber Moulding.

6.1 INFLUENCING VARIABLES

Volumetric

- Plasticization volume
- Compressibility of the injected compound
- Injection speed
- Volume upon changeover from injection to dwell phase
- Dwell pressure and time
- Piston backstroke, dwell time of injection unit or time to nozzle closing
- Mould clamping force

Cavity filling

Thermal

- Viscosity and chemical kinetics of the compound
- Screw speed
- Screw cylinder temperature
- Back pressure
- Injection speed
- Injection cylinder temperature
- Cold runner block temperature
- Mould temperature
- Nozzle, runner and cavity geometry
- Cure time

Mass temperature and degree of vulcanization

The injection speed influences mass temperature and inner cavity pressure.

Thermal observation of the plasticization phase

The plasticization process is intended to transfer the solid compound strip into a flowable aggregate state. To do this, the compound temperature is carefully raised to the required level:

The rotary movement of the screw pulls in the compound strip, and conveys it towards the injection cylinder. The strip is thoroughly kneaded and the compound is heated up by the internal friction. The circumferential speed of the screw and the back pressure (pressure loss between intake throat and injection cylinder) can be used to influence the resulting frictional heat. Simultaneously, heat flows from the heated steel of the screw cylinder into the compound. The permanent mixing reliably prevents temperature peaks in the peripheral zones.

The optimum preheating temperature can be determined via tests or with adequate measurements (BRABENDER measuring mixer, for example). Basically, the plasticization process shall merely permit the compound to be briskly injected at the existing injection pressure. The strong compound preheating that is intended to reduce the cure time should only be performed in the second step during injection (briefly before cavity filling). It must be taken into account that the compound cannot be processed immediately after preheating. A relatively small increase of the compound temperature in the area of the injection unit and the cold runner block significantly increased the risk of premature scorching. This requires some preparing steps in the production cycle to be performed before the plasticized compound can actually be injected into the mould:

Curing the last mould filling, opening the mould, demoulding the article, cleaning the mould, inserting release agent / inserts, closing and pressing the mould, and - if necessary - building up vacuum

The compound temperature must therefore be kept for some time after plasticization at a constant level - this MUST NOT yet initiate a cross-linking reaction. The compound temperature in the injection cylinder should thus neither rise nor fall during the dwell time. In particular the peripheral zones, where the compound is in contact with the steel of the injection cylinder, are particularly at risk. The injection cylinder temperature should therefore be approximately equal to the compound temperature. The actual compound temperature is thus measured best with a plunging sensor (or contact-free) during plasticization with fully retracted screw cylinder, immediately after the exit at the injection piston.

Thermal observation of the injection phase

The compound temperature increases significantly during the injection process. The cold runner block, too, should therefore be preheated approximately to the level of the compound temperature (usually approximately 3... 8°C higher than the injection cylinder).

The hot steel additionally feeds much heat in the area of the hot pot, in particular at a low volume flow. Caused by the constriction of the article gate, there is another steep rise. In particular with thin-walled articles, additional heat flows from the cavity surfaces into the compound when the mould cavity is filled. The temperature load is thus highest at the flowing front of the compound. Premature cross-linking thus shows first with negative signs in the areas of the merging points, where the cavity is filled last.

The employed compound must therefore show a proper „staying power“. By no means, the compound is allowed to scorch heavily before the end of the dwell / pressure equalization phase. A correspondingly long processing time / latent period of the compound is therefore absolutely necessary in an injection moulding process (in particular with thin-walled articles and long flow paths).

Due to the compressibility of the compound, the mould filling can vary despite an exact piston stroke!

This effect is particularly obvious if the compound is decompressed immediately after the completion of the injection phase (no dwell pressure activated). The effect is less, however, when dwell pressure is activated and the injection piston thus remains at its approximate position for some time. If the dwell time is long enough, and if the compound remains fluid during this time, the compressed compound can relieve towards the mould cavity (pressure equalization phase).

The exact filling volume should therefore only be defined exactly after the optimization of injection profile and temperatures has been completed. Experience shows, that all parameters that influence the pressure loss during injection also influence the effective filling volume.

Volumetric observation of the injection phase

During this phase, the injection piston performs its exactly defined stroke (dosing value minus dwell pressure changeover point) at the specified speed. Even with changed process conditions (poor fluidity, for example), the controller maintains the injection speed at an absolutely constant value. This is achieved by adjusting the injection pressure. In a correctly set modern machine, there are basically no more injection time variations. This is very important since the process window of optimized processes is very narrow. An injection speed that is slightly too high quickly produces rejects (overmoulding, entrapped gas). Slightly too low a speed causes similar problems (premature scorching).

A brisk filling of the mould always produces a relatively large pressure difference between injection cylinder and cavity (dynamic pressure loss).

If such an injection moulding compound exists, the gate of a new mould can be very narrow. During the test injections, the gate is increased until faultless articles can be produced. For thick-walled articles, you can thus reach highest filling temperatures, and thus shortest cure times.

DESMA FlowControl® technique permits the required filling temperature to be adjusted conveniently at the control system.



Inner cavity pressure

A certain inner pressure is required to:

- Fill the cavity and, if required, the overflow grooves completely
- Ensure a good heat introduction
- To achieve good adhesion between elastomer and insert

Basically, this is already possible at a relatively low positive pressure. Since in practice the inner cavity pressure cannot be maintained at a constant value, we use appropriate safety allowances. The minimum pressure is thus guaranteed even in the worst case.

There are additional problems when the compound is distributed unequally to the individual cavities:

Volumetric observation of the dwell pressure phase

The injection profile is adjusted during the injection moulding process the way that some millimetres before the mechanical limit stop of the injection piston (approximately 95% of the total stroke), the dwell pressure phase starts. During the dwell pressure phase, a specified hydraulic pressure is kept at a constant level during a specified time. A specific piston speed is thus irrelevant here.

The remaining compound between changeover point and limit stop („residual or compound cushion“) is required to transfer the selected pressure to the cavities. The pressure equalization between injection cylinder and cavities begins with the dwell pressure phase. The heavily compressed compound in the injection cylinder expands towards the mould until approximately the same pressure is everywhere (static system). The time required for pressure equalization depends on the fluidity of the compound, and cross-section and length of the runner channels.

The object of the dwell pressure phase is thus „regulating“ the mass pressure in each cavity to a similar value.

This „inner cavity pressure regulation“ permits a secure and constant filling - which is required for automatic production and production with little flash - to be achieved, even at changing process conditions.

However, the required effect is prevented when premature vulcanization causes the compound to lose its fluidity!

Holding time of injection unit, piston backstroke time, or time to nozzle closing

These parameters, too, influence the inner cavity pressure (as a side effect). The „injection-unit-retract“ function, for example, is chiefly used for avoiding scorching in the nozzle tip in case of moulds having hot runner. It permits the nozzle tip to be lifted off the hot mould after injection. In this case, however, compound flows almost always out of nozzle and mould.

There can be significant overheating in some cavities while other areas have not yet been filled. At the beginning of a process optimization, the synchronism of cold runner and hot pot is thus checked, and improved if necessary (balancing).

Cold runner block balancing

Disconnecting the cold runner block from the mould is expedient here. Using the approximate parameter values and the compound of the future production plasticization takes place, and also using the future production parameters the cold runner block is purged. The compound flowing out of the nozzles is weighed and compared. To be able to detect variations, you should repeat the process several times without changing the parameter values. In standard cold runner blocks (without nozzle closing), the synchronism is optimized by increasing or reducing the adjusting sleeves or nozzle tips. Proceed very carefully here - first check the current temperature distribution!

In **FlowControl** cold runner blocks, the synchronism can very conveniently be adjusted via the machine control system. You merely change the opening time of the nozzles on the screen page. Processing the cold runner block mechanically is thus no longer required. Additional benefits: Incorrect estimates can be undone without any problems. Various settings for specific compounds can be saved and loaded as required.

Hot pot balancing

To check the synchronism of the hot pot, mould, injection unit, and cold runner block are first heated up to the approximate production temperature. With the usual rubber compounds, the plasticization volume is adjusted such that only approximately 75% of the complete cavity filling are reached. With very sticky compounds (HTV silicone, for example), you may have to work with an almost complete filling. It is important that no cavity is filled completely! Next, partial shots are performed at production injection speed. The individual articles

are weighed, and the weight distribution is analyzed. This process, too, should be repeated several times. The runner gates (point or film) are usually increased for balancing **Caution!** First, check the current temperature distribution and the permissible size of the article injection!

An exception are moulds where the FlowControl or FlowControl® cold runner is used for directly injecting the article (this means without runner waste). Balancing the hot pot is not necessary here.



Compressibility of the compound

Due to the high injection pressure, the compressibility (in addition to the injection piston stroke) also influences cavity filling. With constant injection parameters, this can have the following effects in production:

If, for example, the compound flows exceptionally well after a batch change, you need less injection pressure for the specified injection speed. Less pressure in the injection cylinder means less compression of the compound in this area **Effectively, less material thus flows into the mould.**

The fluidity of the compound can be significantly worse after a future batch change. To achieve the specified injection speed, the system increases the injection pressure and the compound in the injection cylinder is higher compressed:

Effectively, more material thus flows into the mould during the filling operation.

Obviously, there is still a certain pressure in mould and nozzle at this time. This pressure decays rapidly due to the emerging compound.

The longer the injection unit nozzle is in contact with the mould, the longer remains the pressure clamped in the runner.

The nozzle tip of modern machines can be cooled very well, so that lifting off the nozzle is no longer necessary in most cases. A permanent contact of the machine nozzle has the advantage that the volume variation is reduced, and that no foreign matters (dust, oil, etc.) can get into the runner channel. If decomposition of the compound is required in the runner system, retracting the injection piston mostly proves sufficient.

Shut-off nozzles have the opposite effect:

They are closed after a given time. The pressure in the cavity thus remains clamped. Shut-off nozzles are mainly used in the injection unit area to prevent material to escape when the nozzle is lifted off (with low-viscosity materials, e.g. liquid silicone).

Injection speed

There are several reasons to inject as quickly as possible. In addition to the direct time saving during the injection process, the mass temperature is also raised due to the increase in shearing within the runner area (friction) which enables a significant reduction of the necessary cure time. Various tests showed that there is rather a smaller risk of scorching:

With a lower injection speed, you would rather expect the compound temperature to drop significantly - due to the reduced friction speed. However, due to the Bingham flow behaviour (little shearing - higher viscosity), the temperature drop is mostly small. With slow injection, however, the compound is in a significantly longer contact with the hot steel surfaces. Since this allows considerably more conductive heat to flow

into the compound, this increase is mostly higher than the energy saved with friction heat (dissipation). The thermal load on the compound and the risk of scorching is therefore even higher!

In practice, the maximum possible injection speed is therefore limited rather by **the maximum possible injection pressure, the mould clamping, and the venting of the cavities.**

Flash in the area of the runner distributor results from an inner pressure in this area that rises as the injection speed increases. When the resulting uplift force exceeds the clamping force, compound can flow into the split line. This flash is then an additional working surface for the compound pressure. The mould plates therefore move away from each other until opening force and clamping force are balanced.

When cold runner technique is used, this problem occurs only at a much higher injection speed, or not at all (with direct injection). This is due to the design of modern cold runners. The distribution channels are fitted into the massive block with deflections by way of deep-hole borings, and split lines do not exist anymore. A split line exists only at the sub-distributor / hot pot distributor where the compound is distributed to several articles. Since this sub-distributor is very close to the cavity, the inner pressure and thus the uplift force is relatively lower.

In direct injection with FlowControl cold runner block, the cold runner nozzle leads directly to the cavity. Since there are no flash possibilities, higher injection speeds are basically possible.

Merely the injection pressure of the machine and the venting of the cavities delimit the maximum possible injection speed.

Cure time

The selected cure time is sufficient if enough heat can flow into the coolest sections of the article (mostly inside or on cold inserts) so that the required minimum cross-linking degree can be obtained. This heat quantity is influenced by a large number of individual parameters. The exact cure time should therefore only be selected at the end of the optimization process, after all the other parameters have been defined. The optimum cross-linking degree is usually determined by „step heating“.

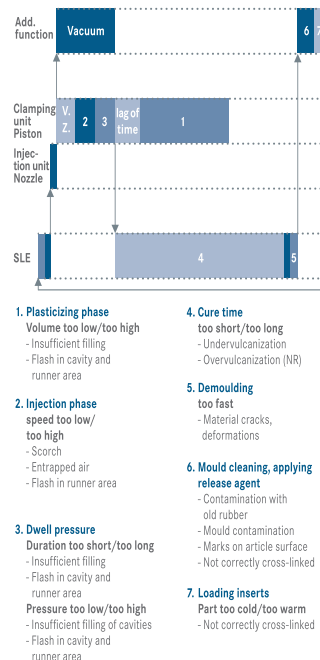
Prior to starting step heating, set the cure time such that the article does not show any more obvious defects. Next, carry out cycles with shorter and longer cure times, and identify the sample articles correspondingly. In the test laboratory you can then determine the cure time that provided the best results (article properties).

To be able to keep the vulcanization degree at a constant level even under varying process conditions, additional systems (cure time calculator) are used which exactly measure the required cure time considering the current process conditions.

6.2 TYPICAL ARTICLE DEFECTS, CAUSES AND COUNTERMEASURES

Chronological development of the defects:

PROCESS PHASES AND ARTICLE DEFECTS



6.2.1 INSUFFICIENT FILLING

Insufficient inner cavity pressure shows as:

- Incompletely moulded articles
- Dents in the article surface
- Fuzzy contours
- And or bubbles inside the article.



Points to be checked:

1. Uniform material distribution to the cavities?
2. Loss of material on the flow path (flash)?
3. Sufficient injection pressure?
4. Selected volume too small?

Point 1

The distribution system must be checked when the filling of the individual cavities is very irregular. If a cold runner block is used, check it first. The cause of the irregularities during purging can be scorching or deposits if they start already here. To exclude this possibility, clean the complete cold runner block (complete curing, then injecting to waste, or dismantling). Check also the runner channels of the hot pot. This area, too, must be free of deposits. If this does not explain the material difference, check temperature distribution, and venting / vacuum in the affected areas. If you cannot find any problems here either, try to improve the distribution with a suitable dwell pressure adjustment. If this is not possible, improve the synchronism of cold runner block / hot pot. In order to achieve uniform filling, the article gates must be identically realized in terms of dimension and geometry.

Point 2

If material distribution is uniform, check whether the entire compound really flows into the cavities. Typical material loss

occurs in the area of the contact surfaces of the injection unit nozzle / mould (or injection unit nozzle / CRB and CRB nozzles / mould). Geometry faults, damaged surfaces, or inadequate contact force can cause leaks here that are not immediately obvious from the outside. Check the sealing seat of the injection unit nozzle tip (if necessary, also of the CRB nozzles) at regular intervals, in particular immediately after mould installation.

If flash exists in the area of hot pot or article, check mould clamping first. Section „6.2.2 Overmoulding / Flash - points 3 ... 6“ (page 43) describes the related procedure. If clamping is OK, reduce the pressure loss in the mould. Is the compound liquid enough? Does cross-linking start early? (See „Premature scorching“).

If premature scorching can be excluded, try to increase the compound temperature and / or reduce the injection speed. If all these measures fail, the fluidity of the compound is inadequate. In this case, change the compound batch. If the new

batch behaves the same, try to find a solution together with the machine manufacturer, the mould builder, and the mixing department. Possible remedial actions include: Improving clamping, increasing distributing channel and runner, or adding fluid additives.

Point 3

Check the injection pressure if significant flash cannot be detected. Has the machine already reached its limit during injection? Does the injection piston stop before it has reached the end (switching over to dwell pressure)? If the pressure loss cannot be improved via temperature changes, and if the machine is not able to generate a higher injection pressure - you may have to think about modifying machine, mould, or compound.

Point 4

If the above-mentioned points are not correct (the machine does still have some power reserve), the filling volume can be increased with a higher dwell pressure or a larger dosing volume. For a rough adjustment, first change the dosing volume. For fine adjustment, use the dwell pressure.



To be continued

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- Source : The Economic Times



Maxxis Tyres opens first manufacturing plant in India

The facility is currently dedicated to manufacture two-wheeler tyres and tubes, and will have a capacity to produce around 20,000 tyres and 40,000 tubes per day.

Sanand (Gujarat): [Maxxis Rubber India](#), a sub-company of [Maxxis Group](#), inaugurated its first [manufacturing facility](#) in Sanand, Gujarat.

The plant with an investment of over \$400 million (Rs 2,640 crore), is spread across a massive 106 acres. The facility is currently dedicated to manufacturing of Two-Wheeler [tyres](#) and tubes and will have a capacity to produce around 20,000 tyres and 40,000 tubes per day. With this size and capacity, the company is targeting a market share of at least 15% of India's tyre market within 5 years.

The plant was inaugurated by Vijaybhai Rupani, Chief Minister, Gujarat, in the presence of Tsai-Jen Lo, Chairman, Maxxis Group; Cheng-Yao Liao, President, Maxxis India; and Jia-Ciao Liou (Gary), Spokesperson, Maxxis India.

Cheng-Yao Liao, President, Maxxis India stated that Maxxis Global is targeting to become one of the top 5 tyre manufacturers in the world by 2026 and India market will play a vital role in their growth.

"We are fully committed to the government's [Make In India](#) initiative and our intent is to Make In India for the world. We monitored the market for over two decades and then devised the strategy for entering India. The manufacturing plant in Sanand is only the first step of Maxxis's full range appearance in the country." asserted by Cheng-Yao Liao.

Maxxis currently serves as an OEM tyre supplier to Honda (Two-wheelers), Maruti Suzuki, Mahindra, Tata and Jeep in India. Apart from catering to the domestic tyre market, the product portfolio from the facility will be exported to South Asia, and will further expand to Africa and Middle East countries in the coming years.

The production from the first phase of the facility began in August, 2017 and Maxxis has been selected as the original equipment tyre supplier to India's number one selling mode, Honda Acura, since 2015.

Jia-Ciao Liou (Gary), spokesperson, Maxxis India said the Sanand facility, an integrated manufacturing plant offers all facilities from mixing to tyre building and curing all under one roof.

"With a rich global experience of over fifty years, Maxxis utilises the most advanced manufacturing equipment and engineering facilities in the industry. We are committed to delivering the same world class quality products and services that customers in India expect and deserve," Jia-Ciao Liou (Gary) stated.

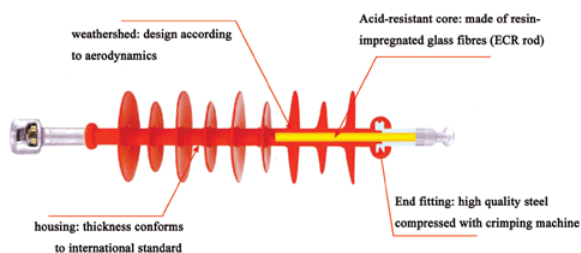
"The plant currently employs a workforce of 600 people and we are working to extend our manpower to 2000 human resources within a span of five years", he added.

Maxxis India is dedicated towards Government of India's Swachh Bharat Abhiyan and reiterated their commitment to contribute towards the Clean India Mission during the ceremony. The Sanand facility boasts of the most efficient Effluent Treatment Plant (ETP) and Sewage Treatment Plant (STP) that gives the plant the status of Zero Liquid Discharge facility.

Maxxis's global product portfolio includes tyres for passenger cars, two-wheelers, light trucks, trucks, buses, ATV's and agricultural & industrial vehicles. Globally, Maxxis's high standards for quality, efficiency and innovation have been acknowledged with numerous honours and awards. The group has its presence in 6 continents with 21 manufacturing plants and 5 R&D Centres worldwide and develops its diversified tyre products for customers across 180 countries



The development of Silicone rubber composite insulators in power system



Power sector is one of the important infrastructures, which gets affected due to disasters leading to disruption in generation, transmission and distribution of electric power. One of the reasons is the deposition of pollutants on the insulators which start conducting during foggy weather conditions resulting in flashover and interruption of power. Amongst the non-ceramic insulators, silicone rubber insulator is better equipped to deal with flashover problems due to its unique hydrophobicity property. The hydrophobicity property of silicone prevents the formation of water forming on surface of insulator. Silicone rubber insulators have many advantages over the ceramic and glass insulators such as good performance in contaminated environment, easy handling, maintenance free, light weight, high strength to weight ratio, high impact resistance etc. Because of these properties it is gaining popularity worldwide and replacing the conventional ceramic and glass insulators in power transmission all over the world. The present paper deals with designing aspects of the silicone rubber composite long rod insulator and testing the same by performing 'Tracking and Erosion test'. As the surface degradation in outdoor applications of either tracking or erosion occurs

because of association with arcing over dry bands which develops during or immediately after precipitation. The surface damage, erosion or carbonization results from the heat of the arc and this damage accumulates until the surface between the electrodes can no longer sustain the applied voltage. Tracking and erosion test is a simulated environment testing facility developed at 'ERDA' which simultaneously tests ultra violet light, rain cycle, voltage, heating and salt-fog environment. This is based on IEC 61109 (1992). The performance of the insulator is compared with the conventional porcelain insulator. The results obtained are encouraging.

Source from [2009 International Conference on Control, Automation, Communication and Energy Conservation](#)



5 Key Attitudes for Entrepreneurial Success

No entrepreneur succeeds in every business venture. Every successful entrepreneur fails at least once, if not twice. How entrepreneurs learn from and utilize their failures, however, is what matters, because in entrepreneurship, attitude is everything.

Here are five key attitudes every entrepreneur must conquer in order to run a prosperous business venture.

PASSION

Entrepreneurs should be passionate about their ideas, goals and, of course, [their companies](#). This passion is what drives them to do what they do.



Some entrepreneurs love the adventure and excitement of [creating something new](#), and once it is established they lose interest and move on to something else.

Other entrepreneurs feel passionately about the product they are constructing or the sense of accomplishment they feel because [they know they are helping](#) other people, helping animals or helping the planet.

Whatever drives an individual to try to succeed is where his/her passion lies, and that passion is integral to entrepreneurial life.

BRAVERY

Entrepreneurs, like everyone else, feel fear. They are fearful that they won't succeed or fearful a well-conceived idea cannot be executed.

They do not, however, let these fears of failure define them. They are brave. They learn from failure. They utilize their fear of failing to push themselves to work harder and to strive to correct the mistakes that may have caused them to fail.

Many entrepreneurs need multiple attempts to create a successful company. It is bravery that drives them to pursue success.

FLEXIBILITY

Entrepreneurs experience setbacks. There are hurdles to overcome on any journey.

Not everyone handles change or disappointment well. However, entrepreneurs must possess flexible mindsets so they can alter a course that seems to be headed

toward failure.

Flexible entrepreneurs should be aware that they may have to modify the route toward their established goal, or even perhaps tweak that established goal, in order to reach it successfully.

STRONG WORK ETHIC

It is not easy to start from the ground up and become a successful business owner. Many hours of hard work, frustration, creativity and supervision are poured into a new venture.

If you are not willing to get up and work hard every day, probably seven days a week, then how can you expect success? No successful business is created quickly, easily or without strife.

Entrepreneurs do not work a standard 9-5 day, nor do they log 40-hour work weeks. They are always working—establishing new ideas, creating new products, designing new processes, hiring smart and talented people.

Entrepreneurs motivate themselves and continually look forward.



Entrepreneurs must be able to show others they are truthful and honest. Regardless of the type of business they hope to establish, colleagues, vendors, customers and investors must trust them. There is no way around this—entrepreneurs must be trusted, and trust must be earned.

The best business idea in the world will likely fail if an untrustworthy person is at the helm. Suppliers need to know that payments for goods they have shipped will arrive on time.

Customers need to know that whatever product or service they have ordered will be delivered as promised. Colleagues need to know that they are a valued part of the company's success. Investors need to know that the company has potential to grow.

Attitude is everything in entrepreneurial life.

Skilling excellence celebrated at RSDC's award ceremony

With a view to recognise and applaud the sterling contributions made towards skill development in the Rubber value chain including plantation and manufacturing segments, Rubber Skill Development Council (RSDC), the sector skill council in Rubber celebrated the 3rd Award Ceremony at New Delhi.



Pic 1: Esteemed dignitaries lighting the lamp at the Awards Ceremony. Mr Vinod Simon, Chairman, RSDC, Mr R C Bhargava, Chairman, Maruti Suzuki Ltd, Mr R Gopalakrishnan, Ex-Executive Director, TATA Sons Ltd, Mr VikramMakar, President, AIRIA and Ms Meghna Mishra, CEO RSDC (from left to right)

As one of the prominent gatherings in Rubber sector, the award ceremony brought together policy makers, research organisations, top corporates, management consultants and a large number of stakeholders from all the parts of the country. Industry veteran and leading thought leader **Mr R C Bhargava**, Chairman, Maruti Suzuki Ltd and management expert **Mr R Gopalakrishnan**, Ex-Executive Director, Tata Sons and an acclaimed author, graced the occasion as Guests of Honour.

Welcoming the guests, Chairman of RSDC, **Mr Vinod Simon** said, "RSDC has come a long distance in the last six years of its existence. National Occupation Standards (NOS) have been developed for the entire sector including manufacturing and plantation segments. Nearly one lakh trainings have been imparted so far. Skill gap analysis has been undertaken in 20 states of the country. According to Mr Simon, RSDC has already tied up with 13 State Missions besides 11 universities and was the first to start B.Voc. in Rubber technology. RSDC has on its board 550 certified trainers, 350 assessors and around 150 training partners.

Mr R Gopalakrishnan in his remarks linked the very evolution of society to skill building. According to him for any leader or organisation to make a difference, three characteristics were required- domain capability, planning capability and execution capability. According to him RSDC has done well by bringing on board people with different domain capabilities including rubber growers, tyre industry, rubber products manufacturers, academia, Government etc. With so many industries working together, RSDC can truly be called as *Mahagahatbandhan* (largest group) of Rubber Sector, he said.

Mr R C Bhargava presented a keynote on Rubber and its importance for Auto OEMs. Skill development is very important to improve the competitiveness of the industry. RSDC is one of the few organisations which has been proactively developing skill for all segments of the industry, he said.

Rubber industry has very high presence of MSMEs and this is one area of economy which is very critical for improving overall competitiveness of the industry. Rubber industry is particularly important because the industry provides inputs which to a large extent determine the performance of other industries. So Rubber industry needs to become really competitive. Rubber industry and the OEMs need to work together because the future of both will move in the same direction. And OEMs can't grow without suppliers including rubber industry growing in equal measure, Mr Bhargava added.

A special attraction at RSDC awards was the unveiling of a Mobile Tyre Fitting Skill Van, which will move across different auto clusters. Mobile van, fitted with necessary equipment and manned by skilled personnel, will train tyre fitters, assess them on skills acquired and also certify them.

"Tyre mechanics which dot the length and breadth of Indian highways play an important role in making road transport safer. Fitting of tyres especially commercial tyres is a skilled job requiring formal training. Automotive Tyre Manufacturers Association (ATMA) is collaborating with RSDC for upskilling tyre fitters. The training will be provided under Recognition of Prior Learning (RPL) Type 1. Formal certification is known to be aspirational and raises the confidence levels of trainees", said **Mr Rajiv Budhraj**, DG ATMA said on the occasion.

Recognising RSDC's considerable work under the RPL scheme, Ministry of Skill Development & Entrepreneurship has given an ambitious target to assess, up skill & certify 10 lakh trainees under the scheme. A logo of the project code named *SAAMRATH* – *Empowering million lives in Rubber* was released on the occasion. "As an ally of the Government we are committed to work with all the sincerity for achieving the target. We will be counting on the support and cooperation by the Rubber Board and the industry in achieving the same", said **Ms Meghna Mishra**, CEO RSDC.

Skill India Mission has led to transforming of lives allowing the youth to acquire a skill of their choice and make available skilled manpower for the industry. A film was released under the theme #farkdikrahahai with success stories of marginalised people benefitting from skilling in rubber.

RSDC Best Training Partner award went to Rubber Board of India and was received by Mrs Sudha P, Director Training. Rubber Board of India. Mr T P Radhakrishnan from Rubber Board Karnataka office was adjudged as the Best Trainer. Mr Prabhuraju, Director, Cindrel Technologies, received the award as Best Assessment Agency. Mr Vikash, employed at Relxo Footwear, was conferred the best trainee award in manufacturing, whereas in Plantation best trainee award was awarded to Mr.Rajesh PonnuMuthu.



Pic 1: Winners of the Evening

Under the special category awards Best University Award went to B.S. Abdur Rahman Crescent Institute of Science and Technology, Chennai. Another Special Category for honouring the Best Government Skill Project was bagged by The Directorate of Skill Development Tripura..

Industry is at the heart of all skilling drives across the country. This year, RSDC introduced special category of award for an industry partner who has extended outstanding support towards nation building activity through Skill Development in Rubber sector. The award was conferred on Metro Tyres and was received by Mr Rummy Chhabra, Managing Director.

Proposing vote of thanks, CEO of RSDC **Ms Meghna Mishra** said RSDC is committed to upskill the entire rubber sector notwithstanding the enormity and complexity of the task.

Information of Upcoming Rubber Events / Exhibitions



India Rubber Expo 2019

“INDIA RUBBER EXPO – 2019” is in its **10th Edition** and the Marquee event is being held from 17th to 19th January 2019 at the Nesco Complex – Goregaon(E) Mumbai.



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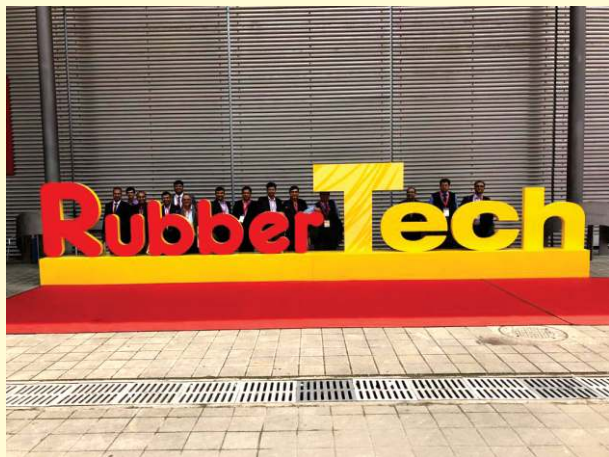
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RMWA Activities & News



A group tour was organized by the association to visit the “Rubber Tech China Exhibition” that was held in Shanghai, China during 18th to 21st September, 2018.

Cox and Kings were appointed tour agents for the same. A very economical price was negotiated and fixed for the tour where in twenty six members participated.

The tour was for four nights and five days and included air fare, accommodation, meals and venue transfers. So the participants did not have to worry about anything. In addition a tour manager of the travel agent accompanied the members on the entire tour to take care of entire travel related arrangements. So even though the route was not very convenient, the manager made life easier for the members during the tedious flight schedules, immigration and other formalities. In Shanghai, a local guide accompanied the members the whole day, which was a boon since language was a big issue there.

The exhibition was large by Indian standards yet could be covered in two to three days. As anticipated most of the exhibitors were suppliers of raw materials and a few machinery manufacturers, with a sprinkling of rubber product manufacturers. Since Chinese manufacturers now a days promote themselves strongly everywhere so it was not surprising to see them in so many numbers on their home turf.

To the experienced eye Rubber Tech China did not offer much in terms of innovation and new technology. However, for our members who rarely venture out of their daily routines, it was an eye opener. Their feedback has been very positive about the value addition obtained from the tour. Some of the members were even able to form partnerships with their Chinese counterparts during this

Group Tour to Rubber- Tech China

tour. That says a lot about the possibilities that can be explored with such a tour.

Besides the exhibition the tour also included sight seeing visits to places of tourists interests such as Huangpur River Cruise, Shanghai World Financial Tower up to 94th Floor, Silk and Pearl Market, Bullet Train etc. Members thoroughly enjoyed such outings after a tiring visit to exhibition. Indian meals were served at night at different restaurants each night which added flavor to overall rich experience of the members.

A total of 26 members of the RMWA participated in this exhibition.

Mr.Kartikaya, Mr. Bhaveshkumar, Mr. Viratbhai, Mr. Yashodhar Kahate, Mr. Samirkumar, Mr. Hiren Gajendraprasad, Mr.Arpit, Mr. Smit Kothari, Mr. Yogesh Vasantbhai, Mr. Rushik , Mr. Tarak Gajjar, Mr. Sakib Idris, Mr. Hitendrakumar, Mr. Pritpal sing, Mr.Ravikumar, Mr.Apurva, Mr.Arpit Agnihotri, Mr.Vishang Patel, Mr.Parth Doshi , Mr.Girish belonged to the product manufacturers who visited the tour. Mr. Virat Prajapati even remarked, Thanks to RMWA to provide an opportunity to explore business to international platforms and know latest technology and machinery of rubber industry.

Mr.Nilesh, Mr.Kewal, Mr.Kushal and Mr. Nimit were from the machine manufacturing segment who participated in the tour.

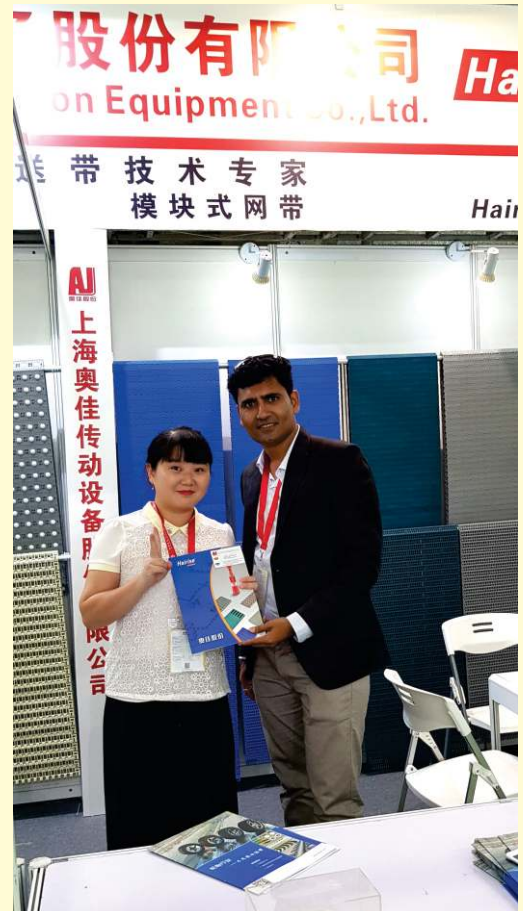
The traders were also not left behind Mr. Malhar and Mr. Rakesh also took the opportunity of being the part of the same.

Overall the tour was a mega success and with a remark to organise many such tours and willingness of their future participation for the same.

GLIMPSES OF THE TOUR



Exhibition Area



Group Tour Pics



Group photo of all members







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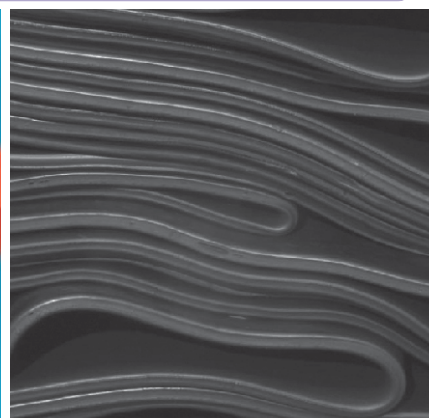
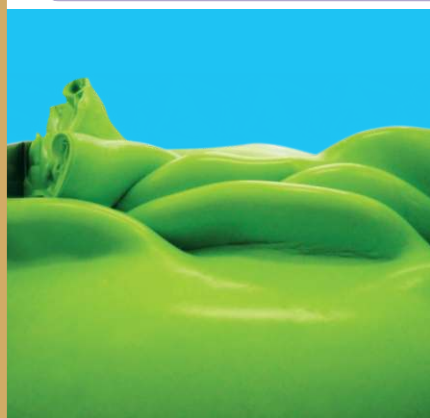
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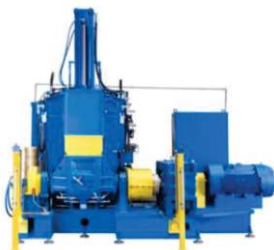


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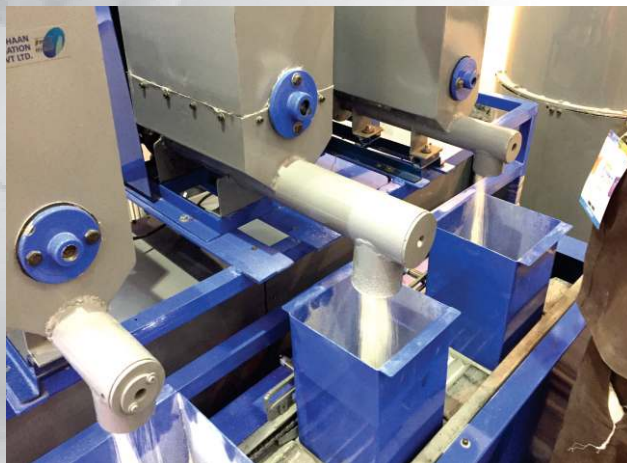


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MBTS, MBT, TMTD, TMT, TDQ, CBS,
ZDC 4020, PVI, ZDBC, ZDC, CBS, DCP-98,
DCP-40, NA-22, DIAK 3, STARIC ACID,
MGO, SULPHUR, DPTT, TETRON-A

RUBBER PROCESS OIL : GANDHAR

GANDHAR : FLEX P, FLEX A, FLEX N
HP : ELASTO 710, 245, 541

METAL OXIDE :

ZINC OXIDE (99.5% WHITE SEAL-'Ace
Chemie), TITANIUM DIOXIDE Dupont
Rutile 104, Anatase TTK,
LITHARGE - LEAD OXIDE, ACTIVE ZINC

RECLAIM RUBBER:

BUTYL RECLAIM, TUBE GRADE,
EPDM RECLAIM, WHITE RECLAIM,
HIGH TENSILE, WTR-SF HR-MEDIUM.

RESIN :

PF RESIN, CI RESIN,
HYDRO CARBON C9/C5, WOOD ROSIN

SILICONE EMULSIONS :

DOW CORNING, WACKERS

PLASTICIZER :

DOP, DBP, FH

WAX :

PARAFFIN WAX

CARBON BLACK

HAF-330, FEF-550, GPF-660,
SRF-774, ISAF-220,



Dealers :



Phillips Carbon
Black Limited



Jay Ashirwad Trading Co.

M : 98240 88289 RUSHABH KAMDAR

Add : 30, Janta Chamber, Saijpur Bogha, Naroda Road, Ahmedabad-382345.

E-mail : info@rubberrawmaterial.com, www.rubberrawmaterial.com

Phone : (O) +91-79-2281 6327 +91-79-2282 2841

IF COURIER NOT DELIVERED PLEASE RETURN TO :

RUBBER MANUFACTURERS' WELFARE ASSOCIATION, B/413, RUDRA ARCADE, NR. HELMET CIRCLE, MEMNAGAR, ABAD - 380052