Volume 1 ◆ ISSUE 3 ◆ MARCH 2018
₹. 100/-

The RMWA Journal

GUJARAT'S FIRST RUBBER MAGAZINE

www.rmwa.in

INDIA INTERNATIONAL RUBBER SHOW

Empowering Growth

Customers
Rubber
Advisors
Knowledgeable
International
Oil
Specialists
Show
Leaders
Development
Skills
Manufacturers
Rubber
Machinery
Experts
Chemicals
Training
Consultants
Educators
Specialists
Suppliers
Exhibition

In this edition

Alternate to Carbon Black

Bhavik Enterprise

We build relationships that build business

Importer / Stockist / Distributor

Your Supply Partners For :

SILICONE ❖ EPDM ❖ CHLOROPRENE ❖ FKM

FVMQ ❖ Speciality Additives ❖ Speciality Elastomers

SK global chemical S.KOREA **EPDM RUBBER**	S501A, S537-2, S537-3, S512F S5890F. S552, S5206F, S505A S6090WF, S600WF
KCC S.KOREA **SILICONE RUBBER**	10 TO 90 Hardness Certificate Available – FDA, BfR, RohS, TE/BE, Reach, UL etc Platinum Cured/Transparent/Translucent/Speciality Grade Solid & Liquid Silicone Rubber. RTV etc.
DENKA JAPAN **Chloroprene Rubber**	M40, M30, M120, S40V, A90, A30, A100, A400, DCR Series
Fluoroelastomer	Orings, Seal and Gasket Grade Peroxide Cured & High Fluorine Grades Grades for Bonding with Silicone, NBR, ECO etc
Processing Additives	Anti-tack, Calcium Oxide, Internal Lubricant Flow Improver, Homogenizer, S80
Peroxides	Peroxide for Silicone Rubber (Liquid, Paste, DCP) Smell-less Peroxide Paste for Molding Liquid Peroxide for Plastics/Crosslinkers
Berubsil **Silicone Rubber**	20 to 80 Hardness General Purpose Graces @ Compeitive Prices

Other Grades – Property Enhancing Additives.

Services

Offer from Ready Stock ❖ Highseas ❖ Direct Import ❖ Sampling & Trials
❖ Application Development ❖ Technical Support from Principals

Admin. Office:
Neelkanth Business Park, D 720, 7th Floor, Vidhyavihar (West), Mumbai - 400 086. India.
Tel: 022-25092756, Extn: 207 | E-mail: sales@berubber.com / berubsil@gmail.com
www.berubber.com

Chennai Office :
Padmanabha Elastosil Pvt. Ltd.
No – 907 , Sarangapani Nagar (Near Sakthi Matriculation School) , Madhavaram,
Chennai , Tamil Nadu – 600060 , India
Email : sales@perubsil.in Website : www.perubsil.in

LEAD™ RECLAIM RUBBER

Assured Quality

AN ISO 9001 : 2008 CERTIFIED COMPANY

We Produce

WTR Reclaim I Natural Tube Reclaim
Butyl Reclaim I EPDM Reclaim
Crumb Rubber Powder

LEAD RECLAIM AND RUBBER PRODUCTS LIMITED

OFFICE ADDRESS :
B/23, Rajratna Bunglows, Nr. M.B. Patel Farm, Jashodanagar Cross Road,
Maninagar (East), Ahmedabad - 380050 (Guj.) India

FACTORY ADDRESS :
856/4, Village Pethai Sarali Road, Ta. : Kathlal, Dist. : Kheda - 387630 (Guj. India)
E-mail : info@leadrubber.com • Mobile : +91 7359 010 222 / 444 / 555

www.leadrubber.com

The RMWA Journal

Publisher : RMWA (RUBBER MANUFACTURERS' WELFARE ASSOCIATION)

Project Head : Tarak Gajjar

Editor : Manoj Shah

Editorial Support : Deepak Doshi, Yashodhar Kahate, Nilesh Parikh

Content Support : Atul Shah, Ronak Panchal

Corporate Office : RUBBER MANUFACTURERS' WELFARE ASSOCIATION
B/413, Rudra Arcade, Nr. Helmet Circle, Memnagar, Ahmedabad – 380052.

Phone : 079 27410226
URL : www.rmwa.in

Editorial / Subscription / Advertisement E-mail to : info@grma.in

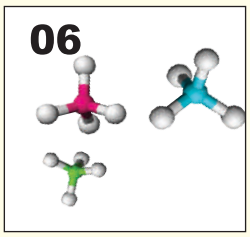
Creatives & Designs : Gautam Bhide, Deepak Mistri

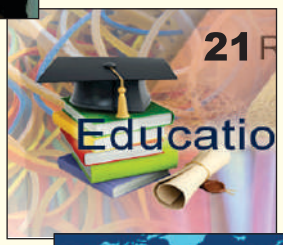
Printed By : Kasturi Graphics
5, Chandralok Society, Nr Cadila Laboratories, Ghodasar, Ahmedabad - 50. (Gujarat) INDIA.
M : 09825433219

RMWA COMMITTEE MEMBERS

Dipak Doshi	:	President
Yashodhar Kahate	:	Secretary
Samir Shah	:	Treasurer
Rupen Soni	:	Vice President
Piyush Shah	:	Vice President
Snehal Shah	:	Jt. Secretary
Arpit Karbhari	:	Jt. Treasurer
Rajesh Kothari	:	Managing Trustee
Mukesh Desai	:	Trustee
Rajendra Shah	:	Trustee
Tarak Gajjar	:	Trustee
Hemang Shah	:	Working Committee
Ni mit Arora	:	Working Committee
Yogesh Rangras	:	Working Committee
Nilesh Parikh	:	Working Committee
Smit Kothari	:	Working Committee
Hirendra Patel	:	Working Committee

CONTENTS





Fluoroelastomers

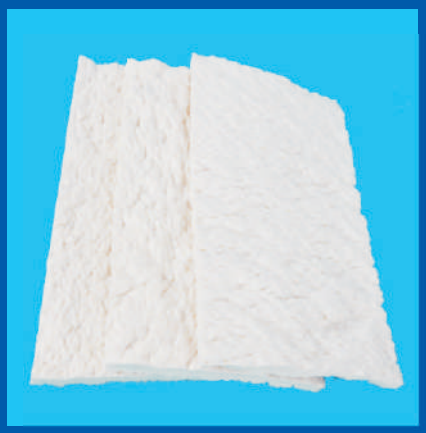
DYNAFLUON

Dynafluon Designs & Manufactures Fluoroelastomer Polymer

Dynafluon follows individual customer need/specification to design Fluoroelastomer Polymer and Compound. Dynafluon customises Fluoroelastomer to suite end application, manufacturing process & specification.

Dynafluon offers high performance Fluoroelastomers for lower compression set, better abrasion resistance, improved stress/strain (modulus) characteristics, and other special properties required such as low post cure time, high tensile strength.

Dynafluon Fluoroelastomer Polymer and Custom Compounds are versatile material, flexible and designed for all processes like injection, transfer, compression moulding, calendaring, autoclaving and extrusion.



DYNAFLUON

406, Rainbow Chambers, S.V.Road, Poinsur, Kandivali (W), Mumbai 400067, India
Tel : +91-22-28652307 Fax : +91-22-28612795 Cell: +91-9320142795
Email: info@dynafluon.com / ajempl@gmail.com
www.dynafluon.com

From the Vice President's Desk

Piyush Shah
Vice President, RMWA

Dear all members,

On 15-16-17 December 2017, IIRS was held and was very successful for that I heartily congratulate all the committee members, exhibitors and visitors who played a major role for the success of the event. This was the second successful edition and hope yet another episode of the same shall be in 2019.

We feel glad to bring to the attention of all the members that office building premises has been done in the name of Association. This year we had also held seminar on GST to assist our members which was very major issue.

We feel proud of our President Shri Dipak Doshi who is very enthusiastic with a high vision of implementing new projects under the roof of association for the benefit of the members.

We also feel proud to have Shri Yashodhar Kahate as a secretary of the association who is really having profound knowledge and willing to serve for the benefit of the association and its members.

It is with regret that we inform our readers about the demise of our Past President, Shri Praveen Mehta as also the demise of Vice President, Shri Rupen Soni's father, Shri Vinod Soni during the past quarter. We pray for lasting peace to the departed souls.

Piyush Shah

ASHUTOSH®

Rubber Products Global Standards

CRISIL RATINGS SE 2A | IS : 5382 CM/L 7995718 | RINGS & GASKETS AS PER IS 5382 TYPE I TO V

D-U-N-S NO. 86 - 255 - 7690

Our Products are compliant with European Standards REACH & RoHS

ASHUTOSH RUBBER PVT. LTD.

MANUFACTURERS OF ALL TYPES OF RUBBER & TPE PRODUCTS

www.ashutoshrubber.com

ashutoshrubber

We MANUFACTURE 9000 DIFFERENT RUBBER & TPE PRODUCTS FOR VARIED APPLICATIONS.

WE ARE CERTIFIED FOR QUALITY MANAGEMENT SYSTEMS

ISO 9001	IATF 16949 for AUTOMOTIVE	AS 9100C for AEROSPACE	ISO 14001 for ENVIRONMENT	OHSAS 18001 for HEALTH & SAFETY

WRAS approval in progress

WE MAKE RUBBER PRODUCTS FOR

- AUTOMOBILE ORIGINAL EQUIPMENT MANUFACTURERS (OEM-AUTO)
- ORIGINAL EQUIPMENT MANUFACTURERS (OEM-OTHERS)
- PIPE INDUSTRY
- CEMENT CONCRETE INDUSTRY
- AGRICULTURAL EQUIPMENTS
- POWER TRANSMISSION (COUPLINGS)
- PUMPS & FOOT VALVES
- OIL ENGINE GENERATORS
- HYDRAULIC & PENUMATICS
- RUBBER ELECTRICAL INSULATORS
- CUSTOM MADE RUBBER PRODUCTS
- ANTI VIBRATION MOUNTINGS

READY MADE RUBBER PRODUCTS RANGE OF

- O-RINGS
- OIL SEALS
- O-RINGS BOXES

Factory (Unit-1): 2516, Lodhika GIDC Industrial Estste, Inside First Gate, H1 Road, Metoda, Kalawad Road, RAJKOT - 360 021. GUJARAT, INDIA. Phone: +91 - 2827 - 287 827, Email: info@ashutoshrubber.com

Corporate Office & Correspondence: Sterling Apts., Near Jubilee Baug Chowk, Jawahar Road, RAJKOT - 360 001. GUJARAT, INDIA. Phone: +91 - 281 - 222 6161, 222 9090, Email: mktg@ashutoshrubber.com

Editor's Note

Manoj Shah

Dear Readers,

Let us talk about the user's and manufacturer's communication to build ahealthy relationship in terms of providing good rubber product to final consumer. It is important to educate your customer on your supply of rubber product.

Rubber being a complicated engineering material it is comparatively less understood by user/consumer. As a result there is sometimes confusion on quality expectation.

To start with it is utmost important for user to provide enough service condition information to manufacturer to enable him to choose correct polymer and design suitable formulation for concerned product. There are many factors which at times decide the manufacturing process too. For testing of rubber products there are different specifications and standards. Users should know and understand it.

This is particularly important in B TO B business chain because there are numerous rubber products which effect actual consumer at latter stage.

Keeping all these issues upfront RMWA has organised an educative lecture programme during IIRS 2017 SHOW at mahatma mandir Gandhinagar. Unfortunately for reasons unknown to me it did not succeed. I feel sorry for such a genuine idea going failed. It does not matter, keep it up RMWA committee. Wish you best of luck for future.

Happy Reading.....

MADHU SILICA PVT. LTD.

Manufactures of Precipitated Silicas

Regd. Office : 147, GIDC, Vartej, Bhavnagar-364060, Gujarat.
Ph: 91-278 -2540 800, 2541 766, 2541 866, 2939 550, 2939 560 • Fax: 91-278-2541 200
Email: madhusilica@madhusilica.com
Website: www.madhusilica.com

Madhu Silica Pvt. Ltd. (MSPL) is the largest manufacturer of **Precipitated Silicas** in India and 4th largest (*) in the world.

Our more than 50 grades of Precipitated silicas today find usage in end applications in various industries. The company has 4 established plants capable of manufacturing 2,00,000 MT/annum.

Apart from a large Indian market, the company exports their products to more than 40 countries.

The Company is ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007, ISO 22000:2005, FAMI-QS, FDA Certified and Registered for REACh

DU IV Plant (3D Image)
Spread across 28 acres of Land

Glimpses of our plants and Admin office...

RESEARCH & DEVELOPMENT

SINCE 1996

D.S.I.R. GOVT. OF INDIA RECOGNISED CENTRE

Our Markets & Silica Grades

1. Tyre / Rubber / Footwear / Misc. Rubber Applications
2. Oral Healthcare / Cosmetics / Pharma Applications
3. Food / Feed applications
4. Speciality applications
5. Polymer / Plastics / Paints applications (Gel route Silicas)

(*) **Ranking** as per Notch Report

Precipitated Silica for Tyre & Rubber Goods

We manufacture high performance grades of Precipitated silica having wide range of surface area and porosity, found to be suitable for broad application areas like in Tyres, Conveyor belts, Shoes soles, Micro sheets, Rice rollers, Engineering rubber goods, Battery separator etc.

Apart from conventional Silica we manufacture Highly Dispersible silica and Dust free silica.

Facilities ...

1. World class manufacturing facilities to give customer satisfaction through Consistency in Quality
2. Inhouse **Rubber, Dental, Paint Application Labs.**
3. World class **Research & Development Centre,** since 1996, recognized by DSIR, New Delhi.

MISSION

Mission to serve the Industry by offering consistent quality products, product accessibility with differentiating services.

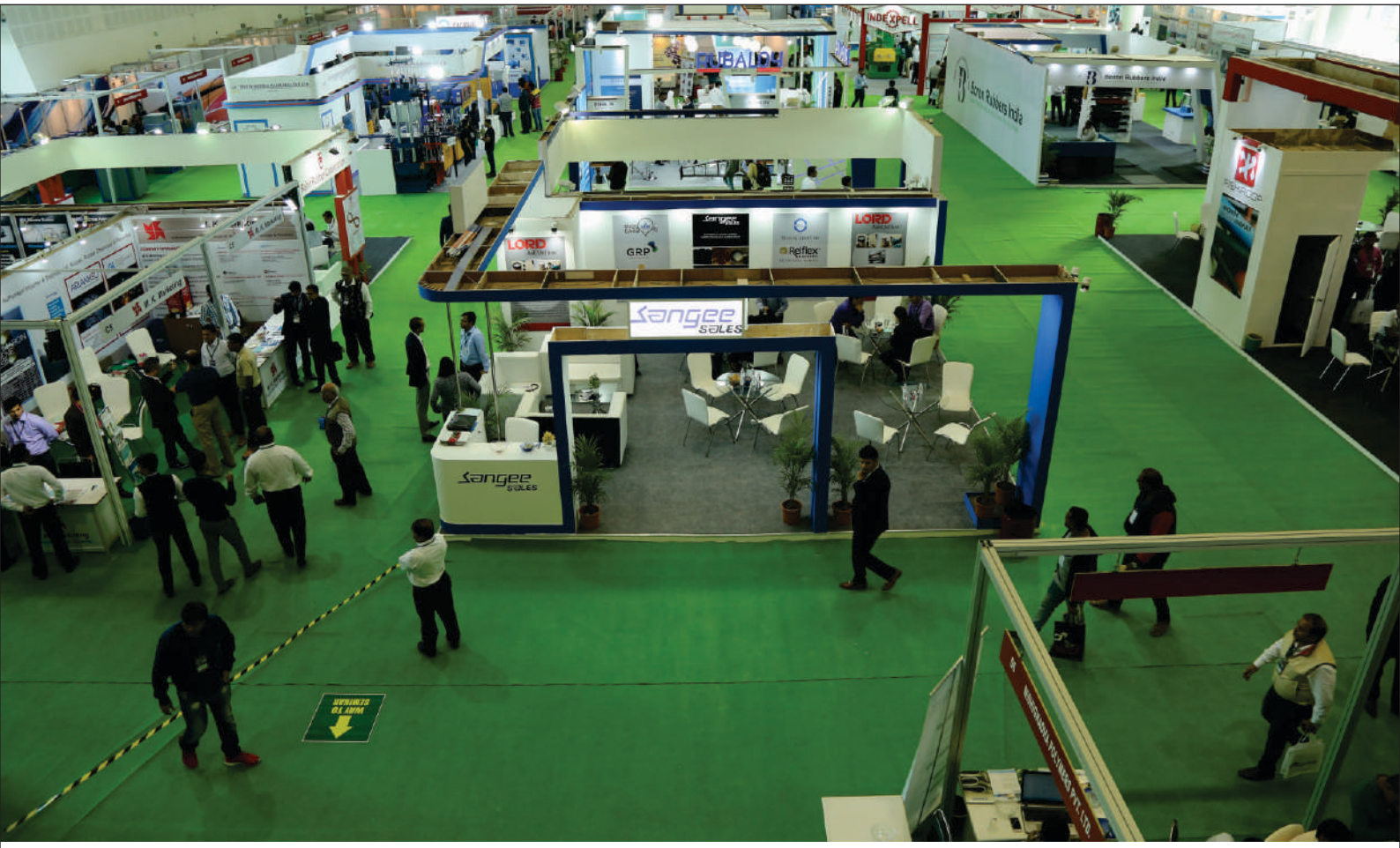
VISION

With a vision to create a Brand Image bringing in sustainability with growth.

VALUES

Keeping intact the values for core competence in Governance with Integrity. Accountability, Passion and Diversity.

With YOU ... We Move AHEAD
Innovation * Sustainability * Growth



Brief on Success of India International Rubber Show IIRS 2017

- The most successful - India International Rubber show 2017 ever organized by Rubber Manufacture Welfare Association from 15th to 17th Dec 2017 at Mahatma Mandir, Gandhinagar, capital city of Gujarat. The efforts were made to showcase tiny to major rubber products under one roof utilised in each and every industrial segment along with stall of Machineries and Raw materials.

- Nearly 2500 Sq. meter of Space occupied for Stalls with two halls. More than 150 exhibitors were participated to showcase their products. The first time exhibitors of foreign origin were participated. The complimentary stalls were provided to various Rubber Institutes. The free entry for visitors was made.

- The main sponsor of this exhibition was Boron Rubbers India, Bhavnagar, Gujarat.

- The chief Guests of this event were Shri Shailesh Patwari, President of and Guest of Honor Shri Jaymin Vasa, Vice President of Gujarat Chamber of Commerce & Industry GCCI. They were welcomed by the RMWA committee members at the entrance of the venue with garland and cultural dance.

Inaugural function of IIRS began with ribbon cutting by chief guest and lighting of the lamp by distinguished members.

- The Past Presidents of RMWA Mr. Narayan Patel, Mr. Vipin Karbhari, Mr. Atul Shah, Mr. Mukesh Desai, Mr. Rajesh Kothari and other renowned personalities from rubber industries were present to grace this event.

- The opening function was addressed by distinguished Chief guests, President and Secretary of RMWA. They all expressed willingness to include efforts and to cooperate each other towards the development of manpower and growth of rubber sector.

- The concurrent technical seminars were organized during this exhibition. Seminars benefitting manufacturers on various topics were covered by technical speakers. Seminars were designed for end users too where they made aware about basics of rubbers and their specifications and applications. The free entry for students was made to attend these seminars.

• The Committee of RMWA hosted Gala Dinner with musical night for exhibitors at Hotel Fortune Inn Haveli, Gandhinagar. This was sponsored by following companies.
1. Pukhraj Additives LLP, Mumbai,
2. Elastofusion India Private Limited, Maharashtra,
3. Irm Offshore & marine engineers Private limited, Ahmedabad and
4. Darshnik Marketing & services private limited, Ahmedabad.

• The Felicitation of these sponsors and committee members – for their successful accomplishment of project work were made during this gala evening celebration. Mr. Mr. Mahavir Vaid - Chairman of RCMA was being felicited during this function.

• On last hours of exhibition, the committee members interacted with exhibitors and distributed Certificate of Participation to all exhibitors.

• We encouraged technical institutes carrying courses on rubber technology to send their students with projects for display. The intention was to provide the students an exposure to industry and also create scope for partnerships with academics in the future. The L D College of Engineering and Shroff Institute were participated.

• We incorporated participation of Team Lease Skills University (TLSU) to promote the NETAP scheme of the government. This also was to promote the next project of RMWA, that is, the Vocational Rubber Training Institute (VRTI) that is to be set up by RMWA in Gujarat in collaboration with TLSU.

• The Rubber Skills Development Council (RSDC) was also invited to participate. They promoted their activities among our members, exhibitors and visitors. This was hugely beneficial to us too as we shall be affiliating with them for our VRTI as above.

• The CIPET, IRMRA, IGTR, Rubber Board were invited with complimentary stalls to promote their activities. This was a gesture to benefit our members and the rubber community at large because these are the organizations of national repute and standing.

• As a precursor to the VRTI, a survey was carried out during the IIRS, to ascertain the requirement of trained manpower in the rubber industry. A few engineering students were deputed to carry out the survey, who did a fabulous job of gathering 60-70 surveys from among the participants and visitors. This information from the survey will be used to seed the application form to the Government of Gujarat for financing the project. This information will also be useful for any future interactions with the government and also for developing various welfare schemes for the members of RMWA and the rubber industry in general.

• The team of committee members of RMWA accomplished this event meeting various stiff deadlines of various activities.

Feedback from Exhibitors & Visitors

• The overall satisfaction from the exhibitors and visitors was very good.
• All exhibitors were contented with fulfillment of their purpose.
• All the exhibitors showed willingness to participate again as an exhibitor in next exhibition.
• Some aspects like Registration activity, infrastructure arrangement was fairly appreciated by exhibitors & visitors, however some aspects need improvement and consideration.
• The venue for exhibition – Gandhinagar was fairly appreciated. The venue was of international standards. The distance from Ahmedabad and lack of good accommodation in Gandhinagar are a few challenges which need to be tackled while planning the next edition of IIRS.
• The Mahatma Mandir, Gandhinagar as a venue resulted in filtering out the casual visitors out for entertainment with family. As a result, only those with a specific intention of conducting business or gathering information visited the show. The lower number of footfalls as a result misled some to think that the show had not been promoted well. However, as the show was progressed participants realized that they were dealing with genuine visitors and not wasting their time with the crowd of casual visitors.

Opening Ceremony

Glimpses of Exhibition

Felicitation

Distribution of Certificates

Gala Dinner

Speaker of Seminars

EPDM, Neoprene and Nitrile rubber extruded products

Silicone rubber extruded products

Polye Rubb Industires

Professionals In Polymer Application Technology

Plot No. 82/ 4 & 5, Shed No. K1/7 & 8,
Lane No. 7, Phase-1,
B/h Kotak Mahindra Bank Ltd,
Phase-1, GIDC, Vatva,
Ahmedabad - 382445.
Gujarat, INDIA
M : +91 98250 22302
E mail : info@polyelastomer.com
www.polyrubb.com

Basic Chemistry and Terminology of Rubber Technology

Manoj Shah
Nitro Polymers

I will briefly explain above subject to enable all [having any academic back ground] to understand the basics. This will be helpful to understand detailed upcoming articles which will be published here in future.
For the sake of simplicity we divide this article into four parts.
[1] Basic chemistry
[2] Polymer science
[3] Rubber technology
[4] Terminology.

[1] BASIC CHEMISTRY

Matters- there are more than 100 matters in nature. E.g. sodium ,calcium , zinc , etc.
Atom- smallest possible part of matter is called atom. Modern atomic physics has proved that atom is divisible in further small part like electron, proton , neutron , etc.

Atoms are either positively or negatively charged. They join to each other in different capacity. Such capacity is known as velence.

Symbols for certain matters are as under:
Hydrogen [H] Oxygen [O] Carbon [C]
Sodium [Na] Nitrogen [N] Chlorine [Cl]
Fluorine [F] Calcium lCa] Aluminium [Al]
Silicon [Si] Barium [Ba] Zinc [Zn]
Molecule- The smallest possible part of compound is called molecule. It is made of many atoms by joining together. E.g. Methane [gas] CH_4
Rubber [solid] C_5H_8 Wood - paper [solid] $C_6H_{10}O_5$ Benzene [liquid] C_6H_6

Macro molecule- By polymerization small molecule joins with each other to make a big molecule, known as macro molecule. E.g.
Natural rubber $[C_5H_8]_n$ where n =20000
Wood – paper $[C_6H_{10}O_5]_n$ where n= 2000

[2] POLYMER SCIENCE

Polymer means material like rubber, plastics and fibres. Polymers are made from basic chemicals. E.g. isoprene,butadiene,ethylene, propylene Isoprene is low boiling point liquid.

Monomers of isoprene polymerize to form natural rubber [polymer]
This process is known as polymerization. There are two types of this process

[1] Addition polymerization. There is no loss of atom. E.g conversion of Ethylene gas to polyethylene.

[2] Condensation polymerization e.g. Thiokol rubber. There is loss of atom and a bi-product is formed.

Polymerization may produce two types of structure. [1] CIS [2] TRANS

CIS Natural rubber
TRANS Neoprene rubber.
Thermoplastic polymers Thermosetting polymers

Rigid— pvc , polypropylene Epoxy , ebonite , PF resins
Flexible— polyethylene , EVA Highly loaded / cured rubber
Rubbery-high styrene resin , PU Lightly cured rubber

[3] RUBBER TECHNOLOGY

Converting polymers to commercial product is rubber technology. By mixing different

HI-TECH ELASTOMERS LTD.

DOCK FENDERS

LARGE DIAPHRAGMS

DREDGER HOSE

LARGE SIZE RUBBER PRODUCTS

Hi-tech Elastomers Ltd. is a well established company in the filed of rubber manufacturing products and holds an eminent position as one of the largest rubber product manufacturing company in India.

CAPABILITY:

Hi-tech manufactures large size diaphragms, rubber components confirming to any shape & size.
Hi-tech has manufacturing capability of producing 5 mtr H x 8 mtr W x 12 mtr L product weighing up-to 20 tonnes per unit.

QUALITY ASSURANCE:

In-house rubber moulding facility , testing laboratory with latest equipment.

We offer quality inspections from major engineering consultants/third party inspection agencies like Lloyds, BVIS, TUV, IRS, LRS, SGS, ABS, DNV GL for all our products.

MANUFACTURING PLANT – I
798,Sola-Kalol Highway, Rakanpur, Dist. Gandhinagar,
Gujarat, INDIA-384002
Phone/Fax: +91-2764 286010/ 286806/ 268112
Website: www.hitechelastomers.com
Email: sales@hitechelastomers.com

MANUFACTURING PLANT – II
227, Santej-Vadsar Road, Santej, Dist. Gandhinagar,
Gujarat, INDIA-384004
Phone/Fax: +91-2764 286516/17
Website: www.hitechelastomers.com
Email: sales@hitechelastomers.com

INTERNATIONAL TIE-UPS:
HI-TECH MARINE SOLUTIONS — U.S.A.
HI-TECH MARINE FENDERS — U.K.

WHAT WE DO

IALA AISM
BSCIC Certifications BSCIC Private Limited.
NSIC ISO 9001 : 2008 National Small Industries Corporation राष्ट्रीय लघु उद्योग निगम लिमिटेड
ISO 14001:2004
ISO 9001: 2008 BUREAU VERITAS Certification

chemicals with polymer , a polymeric compound is formed. curing converts such compound to usable product. Vulcanization /curing / cross linking means joining two polymer chain with one or more sulphur atom. Cross-linking term is attached to peroxide curing. Sulphur is very inert material. [S8]. Accelerator generates reactive sulphur radicle. Thus sulphur & accelerator OR peroxide converts polymeric compound into finish elastic rubber products.

Brief summary of processes conducted in rubber industry.

[1] Compounding

Polymers / chemicals / softeners / fillers / curatives

[2] Processing

Mixing open roll / Banbury / internal

Shaping extruding / calendaring / spreading

[3] Vulcanizing

Moulding : compression / transfer / injection

Steam curing : open steam / autoclave / jacketed / L.C.M

Hot air : oven / glass bead

Microwave : U.H.F

All these topics require detail understanding which we will try to provide here in forth coming article.

[4] TERMINOLOGY

There are certain terms which consist specific meaning. Here we will try to Define the same .

[1] **Accelerator** : A chemical which speed up vulcanization. [2] **Aliphatic** : Straight chain organic compound. e.g. alkanes. [3] **Antioxidant :** chemical which slow down oxidation process. [4] **Aromatics** : Unsaturated cyclic hydrocarbon. e.g. benzene , xylene [5] **ASTM :** American society of testing material. [6] **Cold flow**: Deformation under constant pressure. [7] **Co-polymer** : Polymerizing two dis-similar monomer e.g. SBR rubber [8] **Ter-polymer**: Polymerizing three dis-similar monomer e.g. EPDM

[9] **Elastomer**: Polymer capable to return to its original shape after distortion. [10] **Elongation** :% Increase in original length. [Strain] [11] **Compression set % :** Of failure to return to original size after release constant compressive load. [12] **Elasticity** : Tendency of material to return to its original shape. [13] **Hardness :** Resistance of rubber to forced distortion. [14] **Mooney viscosity** : Measurement of plasticity [viscosity] of uncured Compound or polymers by an apparatus known as mooney viscometer. [15] **Mooney scorch** : Time to measure premature cure at elevated temp. [16] **Stress [T.S.]** : Applied force per unit area. [17] **Tensile strength**: Pull apart strength when stretched to the breaking pt. [18] **Tear resistance** : Resistance to the growth of cut. [19] **Modulus** : Tensile stress force required to produce specific increase in length.

[20] **Fluid** : A liquid or gas. [21] **Oxidation** : Reaction of oxygen with rubber products resulting in surface cracking. This involves transfer of electron hence effecting physical properties. [22] **Permanent set** : After prolonged stress &relaxation , the left deformat - on is known as permanent set. [23] **Permeability** : The rate of gas flow through rubber expressed in cubic timeter per second. [24] **Post cure** : A second step in vulcanization to remove decomposition product. [25] **Shrinkage** : It occurs during moulding. It decreases seal volume. [26] **Thermal expansion**-: Linear or volumetric expansion caused by temperature increase. [27] **Vacuum :** Negative atmospheric pressure. [28] **Viscosity** : Resistance to flow. [29] **Volume-change** : Change in the size of specimen expressed as % of original volume.

[30] **Vulcanization** : Chemically induced cross-linking of polymer chains This converts basic visco-elastic material into three dimensional net- work of flexible elastomeric chain material.

dt Deeva Traders

We take great Pleasure in approaching our goodselves as Authorised Dealers of following Manufacturing Company.

NATRAJ RUBBERS (BHAVNAGAR)
"NATRAJ" White Rubber Insertion Sheet, Natural, Neoprene EPDM, SBR, Nitrile & Silicon Calender Finish Rubber Sheet & Profile. (upto 4 Feet Width & Continues Length)

BORON RUBBER INDIA (BHAVNAGAR)
"BORON" Make Natural, EPDM, SBR, Nitrile, Neoprene, Electrical & Anti Skid Rubber Sheet, Moulded & Roto Cure Rubber Sheet. (upto 5 Feet Width & Continues Length)

CHAMPION JOINTINGS PVT. LTD. (MUMBAI)
"SPITMANN" Make Asbestos & Non Asbestos Fiber jointing Sheet & Metalic Spiral wound Gasket & Cut Gasket.

MECHANICAL PACKING IND. PVT. LTD. (MUMBAI)
"SPITMANN" Make Asbestos & Non Asbestos Gland Packing, Graf Seal Pkg., P.T.F.E., Bush, Rod, Tubes, Sheets, Tape, Bellows, Valve & Flex - O - Seal.

TIRUPATI PLASTIC INDUSTRIES (SILVASSA)
"TIRUPATI" make P.P.G.L. P.P.H.P., P.P.C.P., H.D.P.E. Sheet for fabrication works, lining of tanks, vessels & others chemical process equipments.
NOBLE POLYMERS (SILVASSA) P.P., HDPE Pipes & Pipes Fittings

OM RUBBERS & CHEMICALS (BHAVNAGAR)
Rubber Items By Extruding Moulding, Windscreen Weather Strips, Profiles, Channels, Cords, Moulded Components, Radiator & Fuel Hoses, Calendered, Sleeves, Rolls From all type of Rubbers.

THANAWALA & CO. (MUMBAI)
Cotton and Synthetic ropes, Cordges, tapes, webbings etc.

THERMAL PAPERS PVT. LTD. (FARIDABAD)
"THERMOSIL" Asbestos & Non Asbestos Mill Board for industrial INSULATION High Density Arc & Heat Resistant Asbestos & Non Asbestos Cement Board for Electrical & Thermal Insulation.

Akbari Building, Kadia Kui, Relief Road, Ahmedabad - 380 001. Ph.: (O) 079--22133517, 22122882
Tele Fax : 079-22125901 M.: 98252 35061, 99250 35061 E-mail : deevatraders@yahoo.co.in / deevatraders@gmail.com

Engineering Plastic, P.P., HDPE, Nylon, Delrin, P.T.F.E. & UHMW Sheet, Bush, Rod, Pipe, Tubing & Profile

Bio – Fillers: A Sustainable Alternate To Carbon Black

SuchismitaSahoo, Dr. K. Rajkumar

Indian Rubber Manufacturers Research Association

INTRODUCTION

Carbon black is widely used as primary reinforcing filler for rubber compound. Due to the inherent weak mechanical properties of rubber, carbon black is used to provide stiffness and modulus and convert the rubber to usable form. Carbon black is based on petroleum feedstock which is a non-renewable resource with a high carbon foot print. Carbon black has also been reported as a potential carcinogen along with numerous other health hazards caused due to direct exposure. With the rising environmental concern there has been recently a high focus to develop alternate bio – based fillers for rubber compounds. Numerous studies has been done by various scientific communities and promising results have been reported on the usage of bio – based material in different rubber matrices. The present article describes few of the potential fillers.

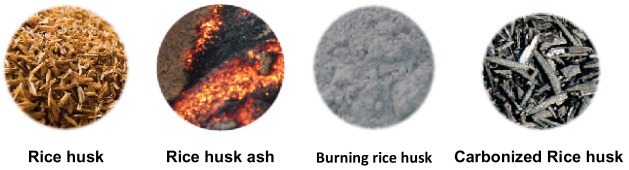
SOY FILLER

Soy spent flakes are a plentily available bio – waste in the soyabean producing countries, from the plants producing soy – protein extract. Soy spent flakes primarily contains soy carbohydrate . The composition of SSF is approximately 12% cellulose, 17% pectin, 14% protein, and 53% insoluble polysaccharide. Soy protein contains significant amount of carboxylic acid group and substituted amine group which can be exploited to have a better rubber – filler interaction for functional rubbers like carboxylated SBR, NBR, FKM , polychloroprene etc. Soy spent flakes can be used as a filler in rubber without any further treatment which makes it highly cost effective. It is the cheapest of all the soy extracted products. Dry soy spent flakes is a rigid material with an elastic modulus of 4 GPa. Soy filler satisfies the rigidity criteria required for rubber reinforcement. Literature reveals soy spent flakes when used as a primary filler the composites exhibit less than desired modulus recovery after the consecutive deformation cycles. But soy spent flake can be used as a cofiller with carbon black a 100% increase in modulus was obtained over the base rubber. Soy spent flakes have high potential to be used as a co-filler along with carbon black for rubber compounds. Soy protein contains a significant amount of carboxylic acid and substituted amine group

"Ford researchers found that soy fillers could provide an inexpensive and environmentally friendly partial replacement of carbon black, a petroleum-based material traditionally used to reinforce rubber. Used together, soy oil and soy fillers could replace up to 26 per cent of the petroleum-based content in automotive rubber applications".

RICE HUSK FILLER

The outermost layer of the paddy grain is known as rice husk or rice hull which is separated from rice during milling. 20 % of the paddy weight is contributed by the rice husk. Approximately 700 MT of paddy is produced in the world and subsequently 140 MT of rice husk is produced. The rice husk is burnt to produce rice husk ash, the partially burnt rice husk is known as carbonized rice husk depicted in the figure below.



Rice husk | Rice husk ash | Burning rice husk | Carbonized Rice husk

Rice husk has few applications like as used as a source of energy by combustion, gasification or pyrolysis for cooking stoves, brick kilns, electricity generation for steam turbines etc. And few non –

Composition	Mass fraction (%)
Silica	80 – 90
Alumina	1 – 1.25
Ferric Oxide	0.5
Calcium Oxide	1 - 2
Magnesium Oxide	0.5 – 2.0
Sodium Oxide	0.2 – 0.5
Potash	0.2
Titanium dioxide	NIL
Loss on ignition	10 – 20

insulation.Rice husk is also used for rice bran and furfural extraction. The combustion of rice husk produces 18 – 20 % rice husk ash. Silica is the major content of rice husk ash . The typical composition of rice husk is shown in the table below. Along with the above applications, still rice husk ash has potential to be used as filler in rubber applications. Rice husk ash has a high content of silica.

Preparation of rice husk ash

"*Rice husk was cleaned with tap water, then treated with 0.4M hydrochloric acid at 105°C for 3 hours. The treated rice husk was burnt at 600°C for 6 hours. The resulting white ash contained as high as 99.6% silica. The ash was ground with a jet mill and tested for its properties. It was found that silica from rich husk ash (RHA silica) had higher silica content, higher specific surface area and lower moisture content than commercial silica commonly used in rubber industries*".

The silica obtained from rice husk was of smaller particle size and higher surface area. The studies have found that they impart better improvement in mechanical properties compared to the conventional silica fillers.

BANANA FIBER

Banana is a widely grown crop in world. Banana being a tall herbaceous plant growing upto a height of 6 to 7.6 m tall. After the plants bear fruit, they die and are replaced by others that arise from the underground stem, and that process can keep on going for many years. The dead herbaceous stems are largely produced as waste. The waste is typically used as fuel, the application of banana waste in paper, furniture, building construction etc. and other applications are being studied in the research phase[14]. Other than the above mentioned applications, the banana fibers can be extracted in various ways and used as a non – reinforcing rubber filler. Literature study shows replacing carbon black with banana fiber in a range of 0 – 50 phr level does not show enhancement in mechanical properties but it can be used as a diluent filler and result in an economic alternative to mineral fillers[15].

COCONUT PITH

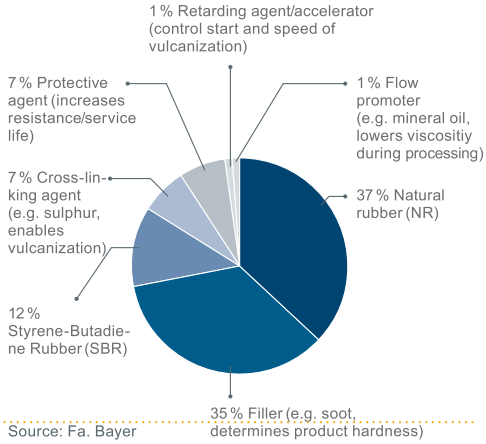
Coconut is widely grown in 90 countries worldwide along the tropical belt, 93 % is grown in Asia and Pacific region. India is the third largest grower of coconut after Indonesia and Phillipines.[16]

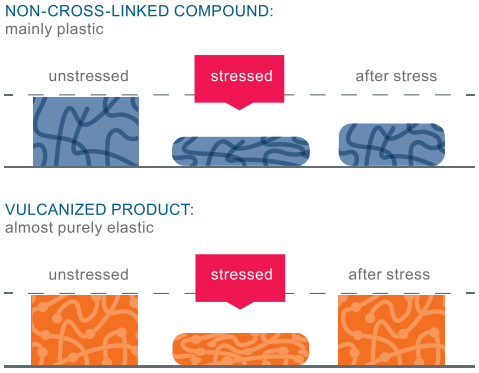
Coco-pith (or Coco-Peat, Coir Peat or Coir Dust) is a by-product as accumulating piles of short coir fiber staples (2mm or less in size) and small husk particles called dust (pith) during the extraction process of long coir fiber from the coconut husk. The husk which grows around the hard coconut contains both fibers and fine materials. After most of the fiber has been removed the fine materials which have been used for many years as a substrate called Coco-Peat or Coco-pith. Research conducted at IRMRA shows coconut pith grinded and chemically treated shows mechanical properties closer to conventional filler. Coconut pith can be a cost-effective alternative to conventional rubber filler.

CHALLENGES WITH BIO - FILLERS

For practical applications, the issue of moisture sensitivity in some applications is always associated with natural materials, but it can be improved through product formulation, processing method, or selective applications.

Disclaimer: The content is derived from various literatures and published articles in the internet and journals.



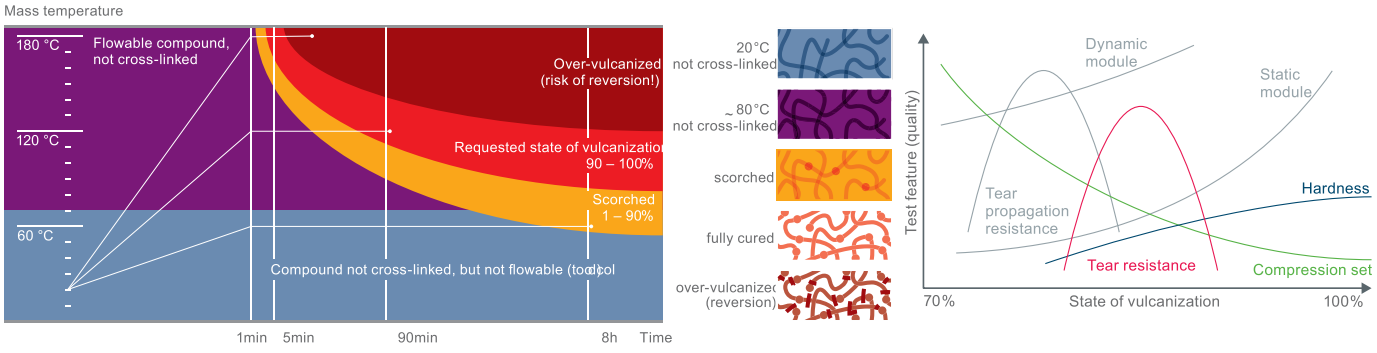


Various additions have to be added to the rubber base material (base polymer) in order to be able to produce an elastic and long-life end product. Only the addition of a cross-linking agent (sulfur, peroxide, etc.) makes the processing to the elastic end product (vulcanisate) possible. Other substances improve resistance to wear and aging stability. The processing properties as well can be optimized by way of suitable additions. The workable material is therefore called „elastomer compound“. If not being cross-linked and at ambient temperature, consistency of this compound varies between viscous (LSR silicone), plasticine-like (solid silicone) and solid (rubber).

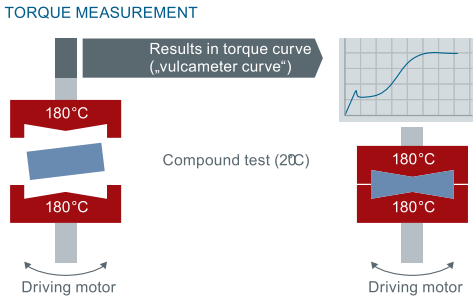
2.1 VULCANIZATION

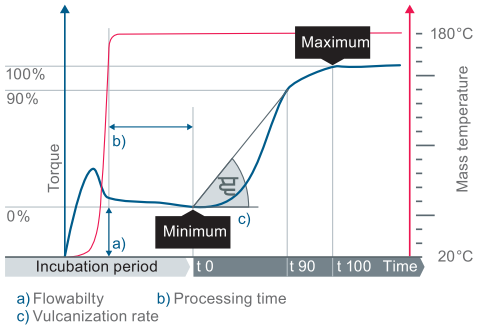
With increasing temperature, the fl owability of the compound improves almost proportionally. However, the heat input also reduces the latent period after which the chemical cross-linking (vulcanization) starts. In this process, solid compounds (cross-linking points) between the individual macro molecules of the base polymer gradually develop. This drastically reduces the fl owability of the mass, and the material response gradually changes from plastic to elastic. This reaction starts earlier and develops faster at higher temperatures. Stopping the heat input permits the cross-linking reaction to be aborted prematurely. The maximum possible cross-linking density (= 100 % cross-linking degree) is limited by the compound recipes / the cross-linking agent in the compound.

To avoid cross-linking before or during cavity fi lling, „retarders“ are added to the compound. After the mould has been fi lled, however, the reaction shall start and progress as fast as possible. „Accelerators“, that take effect with the cross-linking reaction, help here. The required vulcanization or cure time



thus depends on the compound recipe, the mass temperature curve, and the required degree of vulcanization. With thickwalled products, in particular, you must bear in mind that the cross-linking process continues after demoulding for a short while (while the product is cooling down), since a lot of heat is still stored in the product. With a medium wall thickness, this „postvulcanization“ is approximately 10%. To achieve the required fi nal quality, the products can also be post-vulcanized or fully cured in a curing oven. Due to the lower machine hour rate, this frequently results in lower costs. The vacuum oven also permits specifi c degassing.





2.2 COMPOUND TEST

Vulcameter Test (MDR)

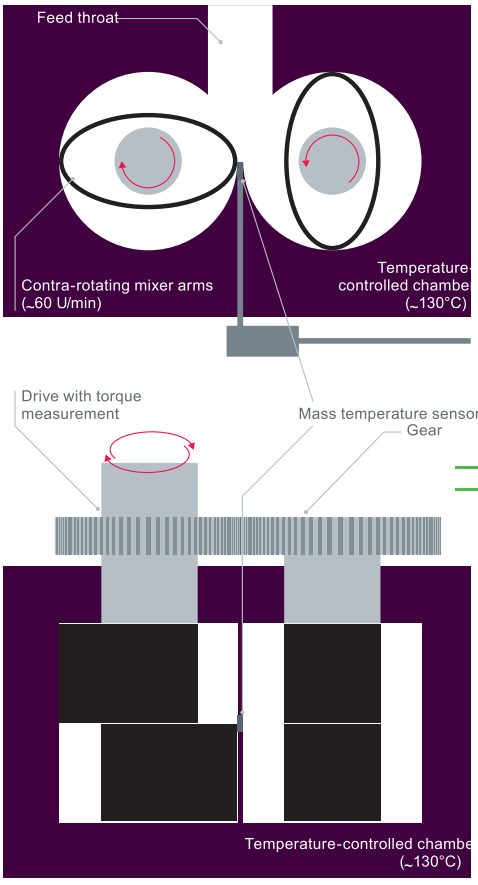
Standard test procedure for production release after the compound has been produced.

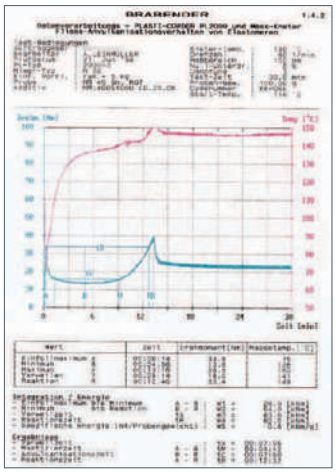
- Rheological and precuring behaviour at constant temperature
- The small amplitude and low frequency produce only minimum shearing / friction
- Corresponds to the process fl ow in the CM process (vulca-presses)

Since the mass temperature development in injection moulding is not constant, and the shear rate is much higher, the determined data cannot be used directly for setting the injection moulding machine.
However, the torque curve and a little experience permit at least the approximate processing properties of a compound to be assessed. Such a statement is possible for the following points:
a) Flowability during injection (necessary pressure)
b) Processing time (max. injection time)
c) Vulcanization rate (necessary cure time)
The known cure time optimization systems / cure time calculators also use (among other things) cure-meter data to maintain the article quality at a constant level, even at changing production conditions.

Measuring mixers (from Brabender, for example)

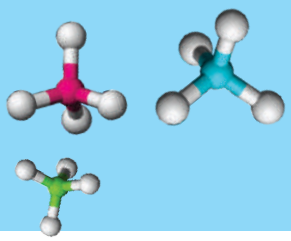
The measuring mixer is another, less known, test method. Its structure is very similar to the compounder. The mass temperature
can thus be measured exactly during the test. The higher resolution permits changes to be detected that are still in the range of the measuring fl uctuations of the cure-meter





Our website address :
www.desma.biz

Precipitated Silica for Rubber Products



Dr. Bijan Kumar Roy
Head - R&D and Technical Services
Madhu Silica Pvt. Ltd.

Typical rubber compounds used to manufacture industrial rubber products such as tyres, hoses and conveyor belts contain up to 8 classes of additives. They include curing agents, accelerators, activators, processing aids, antidegradans and fillers. Fillers improve the physical and mechanical properties such as tear, abrasion resistance, hardness and tensile strength. Choice of filler thus has a major influence on the service life, performance and durability of rubber products. Particulate fillers used in rubber industry in general can be classified as "Black" and "Non black" , depending on their origin, the former being produced from petroleum feedstock and the latter from mineral sources. The most important particulate reinforcing fillers being used in rubber industry are carbon black and precipitated silica. Carbon Black historically was the first reinforcing filler used in the tire industry. Since the early nineteen forties, carbon blacks have been complemented by the group of highly active silicas. Technological reasons have long prevented silicas from being used in tyre compounds. Conventionally, carbon black is considered to be more effective reinforcing filler for rubber tyre treads than silica if the silica is used without a coupling agent. Precipitated silicas are traditionally used in shoe soles of athletic footwear, where these white reinforcing fillers give an improved resistance to wear and tear with the option of using all possible colours. The great advantages of light-colored reinforcement vis-à-vis carbon black is the possibility of satisfying practical requirement, whether they be that of shoe soles be non-marking, transparent, or a particular color or whether it be necessary for applications in rubber rice rollers, conveyor belts, transmission belts, hoses, footwear, rubber sheets, railway pads etc. The addition of 20 - 100 parts by weight of

precipitated silica to 100 parts by weight of natural or synthetic rubber improves the tensile strength, hardness, tear strength, and abrasion resistance of the vulcanized material. Precipitated silicas are also used as reinforcing agent in silicone rubber, where they replace the more expensive pyrogenic silicas in certain formulations. Precipitated silicas have been used in tire compounds for many years, typically as a minor portion of the filler owing to its hydrophilic nature, in combination with carbon black as the major filler. In the tread area the primary usage of silica has been in large off-the-road tires to promote high tear, cut growth, and chunking resistance. In tire wire compounds silica promotes good brass coated wire to rubber adhesion. Silica is also reported to be used in tire sidewall for increasing tear strength, cut growth resistance and resistance to ozone ageing.

The major breakthrough in silica technology came with the discovery of silane coupling agents. Sulfur functional organosilanes are utilized as coupling agents that modify the surface chemistry of silica and enhance its compatibility and reinforcement capabilities. The fillersystem based on silica and the silane coupling agent in winter tire tread compounds which led to an improvement in winter performance never seen before. Compounds using silica are more elastic and flexible at lower temperatures, allowing better grip and braking during wintry weather. Silanes turned silica into an active chemical reactant in the rubber compound. Another major improvement of the precipitated silica came with development of highly dispersible silica, an innovation that has proven to be a breakthrough for the tire industry. On account of its excellent dispersion capacity, the newgeneration silica has permitted to develop the green tires (replacing carbon black by silica in car tire tread compound) which have a low rolling resistance, improved wet grip and maintained longevity.

Demands for lower rolling resistance, with its resultant reduction in fuel consumption and lowering of combustion gas emissions, created the need for a new balance of tire tread properties that were beyond the capabilities of traditional carbon black filler approaches.

Precipitated silicas are manufactured using a wet process that involves chemical reactions and precipitation, achieved by neutralizing a solution of sodium silicate (water glass). The process steps

include precipitation, filtration, washing, drying, milling and granulation, followed by packing and shipping of the product. The size of the primary

If courier not delivered send to : Rubber Manufacturers' Welfare Association B/413, Rudra Arcade, Nr.Helmet Circle, Memnagar, Abad – 380052

particles and the amount of aggregation and agglomeration are determined by the manufacturing processes, reaction conditions, e.g. pH, temperature, concentration and amount of agitation. Precipitated silica thus produced has its use in manifold applications. Among all, the use of precipitated silica as a reinforcing agent in rubber & tires is the largest single application.

At present, precipitated silica manufacturers supply products that can be divided into three groups :

1. Products that can be described as first-generation, standard, or conventional (CV) silica.

2. Products belonging to the second generation of silica. Today, such products are frequently termed easily dispersible silica or semi-highly dispersible (SD) silica.

3. The third and latest generation of silica comprises a product group characterized by excellent dispersion. These products are described as highly dispersible (HD) silica.

An easy incorporation of the silica into the rubber mixture and its good dispersion are crucial because they have a considerable effect on the processing costs and on the rubber product's performance. Table 1 indicates some of the rubber grade silicas available from Madhu Silica.

Table 1 : Rubber Grade Precipitated Silica offered by MSPL in Granular Form

Silica Grade	BET Surface Area, m^2/g	CTAB Surface Area, m^2/g	pH (5% in Water)	Loss on Drying, %	Bulk Density, g/l	Type
MFIL-150(G)	125	115	6.9	5.5	333	CV
MFIL-200(G) LG	160	145	6.5	5.5	330	CV
MFIL-200 (G) RG	180	170	6.5	5.5	330	CV
MFIL-200 (G) HG	220	200	6.5	5.5	330	CV
MFIL-210(G)	205	155	6.2	5.5	312	SD
MFIL-125(G)	125	120	6.9	5.5	300	SD
MFIL-100 (G)	115	110	6.5	6.0	300	HD
MFIL-200(HDS-G)	175	170	6.5	6.0	300	HD
MFIL-210(HDS-G)	210	200	6.5	6.0	300	HD

*All corresponding grades are also available in powder and micro-pearl forms.

Highly dispersible silica (HDS) has become the worldwide benchmark, enhancing low rolling resistance and high wet-grip properties when compared to carbon black compounds. HDS, compared to conventional (CV) silica, provides substantially better dispersibility and higher loadability in rubber compounds due to its specific structure. Proper understanding of silica's morphology and surface chemistry is necessary to understand the behaviour of silica in rubber. Characterizing silica morphology include the ratio between the inner and outer surfaces, the size and shape of pores, the absorption capacity, the surface roughness, the primary particle size, the formation of aggregates from these primary particles with the development of siloxane bonds, and the combination of aggregates to form agglomerates held together by van der Waals forces.

However, in recent times synthetic precipitated silicas have also proved to be beneficial to rubber properties, and are replacing blacks in many applications. Partial replacement of carbon black by precipitated silica in rubber formulation (e.g. tread, footwear, conveyer / transmission belt, seal and hoses compounds) is one such example, wherein it has been reported to have reduced rubber compound cost, optimised process-ability and achieved desired end application properties. Table 2 gives an example of such a guideline compound formulation which is commonly used for partial replacement of carbon black by low surface area silica grade, MFIL-100(G) in combination with regular surface area grade, MFIL-200(G) and where the silica/black ratio varies from 5/55 to 25/35; as seen in the table compound costs decrease in proportion to silica content.

Table 2 : Compound Formulation

Sl. No.	Ingredients	PHR				
		C1	C2	C3	C4	C5
1	Natural Rubber	49.50	49.50	49.50	49.50	49.50
2	Poly Butadiene Rubber	50.5050	50.50	50.50	50.50	50
3	Peptiser	0.07	0.07	0.07	0.07	0.07
4	Process Oil	12.00	12.00	13.00	13.00	14.00
5	**Carbon Black**	**55.00**	**50.00**	**45.00**	**40.00**	**35.00**
6	**Precipitated Silica, MFIL-200(G)**	**5.00**	**5.00**	**5.00**	**5.00**	**5.00**
	Precipitated Silica, MFIL-100(G)		**5.00**	**10.00**	**15.00**	**20.00**
7	Anti-oxidant	2.25	2.25	2.25	2.25	2.25
8	Stearic Acid	2.50	2.50	2.50	2.50	2.50
9	Microcrystalline Wax	1.75	1.75	1.75	1.75	1.75
10	Zinc Oxide	2.60	2.60	2.60	2.60	2.60
11	Soluble Sulphur	1.64	1.64	1.64	1.65	1.70
12	Accelerator	1.03	1.03	1.03	1.05	1.10
	Compound Cost / Kg (Rs)	**X**	**X-**	**X--**	**X---**	**X----**

A detailed rubber compound properties evaluation based on this partial replacement of carbon black by low surface area silica, in Table 3, also shows its superiority as far as hysteresis, reinforcement and processing characteristics are considered.

Table 3 : Compound Properties

Compound Properties		C1	C2	C3	C4	C5
A	**Cure Characteristics (150 deg C / 30 Min) MDR**					
	ML(lb-in)	2.46	2.47	2.24	2.12	2.33
	MH(lb-in)	15.59	15.91	14.41	13.11	12.72
	MH - ML(lb-in)	13.13	13.44	12.17	10.99	10.39
	TS1 (min)	4.6	4.75	5.23	5.8	5.52
	TS2 (min)	5.52	5.2	6.3	7.02	6.82
	Tc10 (min)	4.98	4.75	5.57	5.98	5.55
	Tc15 (min)	5.5	5.73	6.17	6.7	6.35
	Tc25 (min)	6.02	6.25	6.77	7.48	7.23
	Tc50 (min)	7.07	7.22	7.87	8.77	8.63
	Tc90 (min)	11.65	11.47	12.45	13.77	13.47
B	**Mooney & Mooney Scorch**					
	Mooney @ 135	51.66	52.24	49.06	49.13	53.29
	MS@135					
	t5	12.34	12.75	13.79	14.57	13.99
	t10	13.2	13.66	14.87	15.9	15.31
	t35	14.6	15.08	16.57	18.04	17.54
C	**Dispersion Rating of Cured Sample, 100X Magnification, G Scale**					
	X	10	10	10	10	9.5
	Y	9.5	9.5	9.5	9	9

D	Unaged Physical Properties (cure 150c/30m)					
	M100 (Mpa)	1.91	1.84	1.73	1.53	1.31
	M200 (Mpa)	4.54	4.2	4.19	3.26	2.67
	M300 (Mpa)	8.61	8.13	8.13	6.16	5.01
	TS (Mpa)	21.7	21.04	22.4	20.95	20.98
	EB (%)	592	580	608	678	754
	Abrasion loss (mm3)	122	116	118	128	131
	Hardness (Sh-A)	61	61	61	57	56
	Work up to break (J/mm2)	1.38	1.27	1.42	1.46	1.6
	Tear Strength (N/mm)	85	78	84	80	79
	Tear Energy (J)	21.35	19.73	19.04	19.77	22.66
E	De-Mattia Cut Growth Resistance : Samples Cured at 141.7 deg C for 60 min					
	Crack Length after 5K Cycles	11.7	11.9	10.5	10.3	9
	Crack Length after 10K Cycles	17.5	18.4	16.3	17.1	13.3
	Crack Length after 25K Cycles	21.9	22.6	21.5	22.1	20.3
F	Dynamic Mechanical Properties (cure 150 C / 30 m) : 10 hertz, 0.25%, dynamic strain					
	Storage Modulus at 60 degC (Mpa) E'	14.9	13.3	14	11.1	10.3
	Loss Modulus at 60 degC (Mpa) E"	2.44	2.1	2.13	1.77	1.7
	Tan delta at 60 degC	0.164	0.159	0.152	0.159	0.165
	Loss Compliance at 60 degC (Mpa-1)	0.0108	0.0115	0.0106	0.0139	0.0156

This highly dispersible, low surface are silica grade, MFIL-100(G), is specially introduced for higher load-ability, partial replacement of carbon black in the formulation to prove its feature in mechanical rubber goods. As demonstrated, around 10 to 12 phr replacement of carbon black by silica in compound formulation woks well and thus reducing compound cost is gaining considerable attention in rubber industries.

References

1. Compounding Precipitated Silica in Elastomers, Ed: Norman Hewitt, William Andrew Publishing, New York (2007).
2. The Chemistry of Silica, R. K. Iler. New York: Wiley (1979).
3. J. T. Byers, Rubber Chem. Technol., 75, 527 (2002).
4. S. Mihara, Ph.D thesis, University of Twente, Enschede, the Netherlands (2009).
5. S. Wolff, Rubber Chem. Technol., 55, 967 (1982).
6. W.J. van Ooij, Rubber Chem. Technol., 57, 421 (1984).
7. Meng-Jiao Wang, Rubber Chem. Technol., 71, 521 (1997).
8. A. Blume, Kautsch. Gummi Kunstst. 53, 338 (2000).
9. S. Wolff, Rubber Chem. Technol. 69, 325 (1996).
10. Blume, B. Freund, B. Schwaiger, M. Siray and S. Uhrlandt (to Degussa AG), EP 0983966B1 (November 7, 2001).
11. Alesia C. Salberg, Ph.D thesis, The Graduate Faculty of The University of Akron (2009)
12. S.C.Debnath, R.N.Datta, J.W.M. Noordermeer, Rubber Chem. Technol., 76, 1311 (2003).
13. S. Wolff, Kautsch. Gummi Kunstst. 41, 674 (1988).
14. W. Dierkes, Ph.D Thesis, University of Twente, Enschede, the Netherlands (2005).
15. S. Wolff, Kautsch. Gummi Kunstst. 34, 280 (1981).
16. W. Meon, A. Blume and H.D. Luginsland, Stefan Uhrlandt, Copyright © 2004 by Taylor & Francis (2004).
17. H. D. Luginsland, J. Frohlich, A. Wehmeier, Rubber Chem. Technol., 75, 563 (2001).
18. W. Kaewsakul, Ph.D Thesis, University of Twente, Enschede, the Netherlands (2013).

A,B,C,D... of 2017

- Ruma Dubey
www.sptulsian.com

As 2017 hobbles its way to the exit door, one cannot help but heave a sigh of relief. This was a tumultuous year all around, what with India reeling under GST, growth pangs, Parliament logjam, North Korea, Trump. The shoot-out in Las Vegas left everyone numb while movies like *Secret Superstar* and *Tumhari Sulu* instilled some hope.

We step into 2018 with some trepidation as major changes are expected in USA and 8 regional elections in India. As we get ready to sit back and reminiscence about the year gone by, let us do the ritual of taking a quick look at the year that was. Its back to basics - an A,B,C,D... of 2017.

A – Aadhaar was the big thing of 2017; its linkage with PAN and then bank account, insurance policies and all other financials, the flip-fops on dates, kept people in queues.

B – Bank recapitalisation. The Govt announced a huge Rs 2.11 lakh crore two-year road map for strengthening NPA-hit public sector banks, which includes re-capitalisation bonds, budgetary support, and equity dilution

C – Catalonia. This push for freedom shocked the world and this separatist crisis was Spain's biggest political crisis since democracy was restored in 1975, after the death of military dictator Gen Francisco Franco.

D – Deregulation. There was complete deregulation of fuel prices. India joined the league of select countries like the US and Australia where petrol and diesel prices are revised on a daily basis in sync with global crude oil price.

E – Ease of Doing Business. India jumped up 30 notches into the top 100 rankings on the World Bank's 'ease of doing business' index, thanks to major improvements in indicators such as resolving insolvency, paying taxes, protecting minority investors and getting credit.

F – Financial Resolution and Deposit Insurance (FRDI) Bill and more importantly, the "bail-in" clause has created a huge furor, giving Fixed Deposit holders some sleepless nights.

G –GST. The country's biggest tax reform since Independence, the Goods and Services Tax (GST) finally got implemented and the ensuing chaos was a thing of history books! People say things have settled but we will know only once the fiscal ends.

H – Hats off to the BJP! The Govt remained focused only on regional elections in 2017, winning with a landslide majority earlier in Uttar Pradesh and winning for the sixth straight time in Gujarat and wresting control from the Congress in Himachal. Next year, 8 regional elections to go!

I – India International Rubber show 2017 ever organized by Rubber Manufacture Welfare Association from 15th to 17th Dec 2017 at Mahatma Mandir, Gandhinagar, capital city of Gujarat.

J – Jio. This telecom giant and a new entrant shook up the market, leading to consolidations. It has set itself a target of 50% market share by 2021 and we see only four standing next year - Bharti, Jio, Vodafone and maybe the combined entity of BSNL and MTNL.

K – Kim Jong-un. The North Korean dictator is intent on developing a nuclear arsenal or provoking an unwinnable conflict with the US and throughout the year, kept all on tenterhooks.

L – Layoffs. This has shaken up the entire dynamics of the Indian IT sector. There have been some 56,000 layoffs and still counting.

M – Mania. That's the only way to explain the feeling unleashed by Bitcoin. The crypto currency rose around twentyfold since the start of the year, climbing from less than $1,000 to as high as $19,666 on the Luxembourg-based Bitstamp exchange this month and to over $20,000 on other exchanges.

N– NPA resolution. This got off and kicking, with RBI giving it an aggressive tone, naming the now famous "Dirt Dozen".

O – Oil. The price did a lot of ups and downs but mostly remained around the $50/barrel. The production cut of last year remains in place and one can only hope that in 2018 too, the price remains benign.

P – Presidential election. There was so much brouhaha over the Presidential election, mostly by the media, which could smell an overpowering political story, drowning all other stories. Giving it only a caste angle, we cannot help but wonder what was this election all about anyway. Parliament logjam.

Q – Quick! That's how one would describe the Railway Budget of FY18, which was for the first time in history, combined with the Union Budget. The Railway Budget announcements took exactly three and half minutes in all!

R – Ratings! India's sovereign rating was big news in 2017 after Moody's Investors Service in November raised India's sovereign rating for the first time in over 13 years though this did not influence S&P's rating.

RERA or Real Estate Regulation Act got implemented. It is the best thing that could have happened for the Indian property buyers – it more pro-buyer than it has ever been. For once the interest of the buyer has been kept in mind and it is not merely from the builder/developer perspective.

S – Shootouts. The shootouts in USA were worse than acts of terrorism. The mass killing of people in Las Vegas and then a few more to follow, makes one wonder what it would take for USA to ban freedom of weapons? Something that might never happen.

T – Trump. The US President remained in news all through the year and unfortunately for all the wrong reasons. Right from the travel ban to Jerusalem, he has hurt sentiments across the world. Efforts to repeal Obamacare, the firing of an FBI chief and investigating Russian meddling all in the name of "making America great" again.

U – UK. The country held its general elections where Theresa May's gamble backfired – the governing Conservative Party won most seats but lost its majority and was forced to form a minority government with the DUP.

V – Vodafone. The biggest merger in the Indian telecom sector was announced between Vodafone and Idea Cellular, going on to become the largest telecom company, surpassing Bharti.

W – Wonderful year for the IPOs! Some 167 IPOs hit the market in 2017, going on to raise Rs.68,810 crore, which is 35% more than the total of Rs.50,930 crore raised for the past 5 calendar years.

X – Xenophobia. This is supposed to be a dislike for people of other countries. But in India, we witnessed this feeling for our countrymen. Scarily, it is only increasing...not just in India but all over the world.

Y – Yellen was very much the woman of the year! She should receive a standing ovation for her remarkable tenure. She seamlessly navigated America through a very turbulent financial crisis to an exit from that crisis, without causing any upheavals. In an ideal world, she should have been reappointed as has always been the case but currently America is anything but ideal.

Z – Zero. It is zero tolerance to the word, "intolerance". It was the most abused and used word of 2017, creating huge controversies and needless debates when there are really more issues at the core leading to this intolerance.

RMWA Thanks the exhibitors, Visitors, delegates, members, sponsors, co-sponsors, suppliers, contractors, government officials for their tremendous supports for making Successful

INDIA INTERNATIONAL RUBBER SHOW 2017

WE LOVE TO HEAR INTERESTING INFORMATION FROM YOU

Please share your Product Write-ups with photographs, Innovations, Research & Technical Articles, Joint ventures & Collaborations, and Press Releases. We shall explore to publish the same in this magazine. Please send to email info@grma.in.

Yokohama Rubber develops informatics-based design for materials and tires

The Yokohama Rubber Co., Ltd. has developed a new tyre design technology that applies informatics to the development of rubber materials used in tyres and to tyre shape design.

The new technology's key feature is its use of machine learning to conduct information and knowledge searches, which is expected to greatly increase the speed and precision of the development new high-performance tyres.

For material development, the technology combines the simulation technology that emerged from the company's research aimed at fostering innovative thinking about rubber material design with data generated by its research on the design, processing, analysis and measurement of existing rubber materials. It also incorporates information and knowledge exploration using machine learning. Yokohama Rubber expects this new development technology to dramatically raise the accuracy and speed of the development of rubber materials with unprecedented high-performance characteristics.

Material searches to date have relied on researchers' experience and intuition, but this new materials development technology will facilitate speedier discovery of new materials with the desired characteristics. In Japan, research in materials informatics is being advanced at many levels, including the Ultra High-Throughput Design and Prototyping Technology for Ultra Advanced Materials Development Project being coordinated by a government organisation. Similar projects are being promoted in many other countries, including the USA, China, and some European nations.

WORLD: Malaysia, Thailand, Indonesia to hold back rubber exports

Thailand, Indonesia and Malaysia' pledge to withhold exports of 350,000 tons of natural rubber (NR) until March 2018 comes into immediate effect on Thursday (4 Jan 2018).

The three countries will also push ahead with greater domestic consumption of the commodity, according to the Bangkok-based International Rubber Consortium Ltd (IRCo).

The IRCo said the withholding of exports of NR was under the framework of the International Tripartite Rubber Council's (ITRC) Agreed Export Tonnage Scheme (AETS).

To recap, the pledge was made during the ITRC senior officials meeting on 22 Dec 2017 in Bangkok. It will be monitored by the ITRC Monitoring and Surveillance Committee.

"The AETS will be implemented through their respective domestic regulators including addressing business commitments under existing forward contracts. Thailand, Indonesia and Malaysia will also cooperate to increase NR consumption domestically," the IRCo said.

The strategy is to use NR in various sectors such as transportation, infrastructure, sports, defence, health and consumer goods, rubberised road construction, rail pads for railway construction, dock fenders and sea toll and other suitable areas.

The IRCo said Thailand, Indonesia and Malaysia are confident that with the joint implementation of these measures, the NR prices will recover and continue to be fair and remunerative to all rubber smallholders and other stakeholders in NR industry.

Global Information

- Source Viet Nam's NR Products

Viet Nam's Natural Rubber Export by Market in the first 8 months of 2017

Market	Jan-Aug / 2017			YOY Change (%) (2017/2016)	
	Tones	Qty (%)	USD	Qty.	Value
CHINA	510.531	63,3	869.060	25,7	72,9
MALASIYA	48.513	6,0	75.836	-13,4	12,9
INDIA	32.804	4,1	55.744	-44,3	-29,2
KOREA	29.544	3,7	56.874	21,7	74,4
GERMANY	23.943	3,0	44.472	9,2	58,7
USA	23.868	3,0	37.623	18,9	56,0
TAIWAN	15.903	2,0	29.886	-0,9	36,4
TURKEY	15.877	2,0	27.901	19,8	72,8
SRI LANKA	11.386	1,4	19.841	5,5	39,1
ITALY	9.865	1,2	17.381	16,1	73,1
NETHERLANDS	9.431	1,2	15.724	49,6	85,0
OTHERS	74.239	9,1	132.310		
TOTAL	805.904	100,0	1.382.651	12,8	54,1

RSDC Launches Mobile App and Online Simulated content

RSDC Mobile App

Online Simulated content and Mobile app being launched by Mr Satish Sharma, during the Awards Ceremony)

Continuous learning and updation of skill set is an imperative today. Online learning is gaining in popularity especially for those who can't attend a training programme at a particular time and place. It also helps as a good reference material which is easy to access even to those who have undergone a training programme and need to upgrade their skills.

So far access to Information, Communication and Technology (ICT) universe has been limited and that posed a major barrier to the advancement of education. However, with increasing use of smart phones across the social strata and easy data connectivity the scenario is changing.

Research has shown several advantages of online learning. It allows the people to self-pace their learning which leads to better skill retention. Further, it increases performance, efficiency and job satisfaction of those employees who are constantly on the lookout for new skills. It also fosters a learning culture.

Mobile apps have the added advantage of improving accessibility and seamlessly connect and interact with the stakeholders. With the fast adoption of smart phones and tablets especially amongst the younger generation, mobile apps offer more opportunities to stay connected and share information and updates.

In breakthrough initiatives and firsts by any Sector Skill Council in India, RSDC launched simulated e-learning content and Mobile app to provide the ease in connecting with the target segment by introducing the courses online and benefit the students and those looking for up skilling in rubber.

“Both e-learning content and Mobile app have been launched to widen the reach of skill training to many more aspirants in the country. In its own way the e-learning and mobile content furthers the Skill India Mission of the Government of India to provide vocational training to millions”, said Ms Meghna Mishra, CEO Of RSDC.

Apart from domain specific, qualification packs, the content also plans to offer courses on soft skills, languages and digital literacy so as to improve the job prospects of those seeking training.

The e-learning platform will ensure ease of skill training for all so that they could transcend environmental and circumstantial challenges and get trained at their pace and place”, added Ms Mishra

For those looking for trained manpower in rubber sector, the skilled manpower is now just a download away. The employers will not just be able to get skilled manpower but will also be able to ensure a robust skilling environment at the work places by re-skilling existing workforce and creating their own training centres.

Those looking for skills updation will be able to know more about certificate courses of RSDC and also locate the nearest training centres.

RSDC is hopeful that all the stakeholders will help in promoting the usage of online contents so that many more benefit from the program that has been painstakingly put together.The “RSDC” Mobile app can be downloaded from both Android play store and iOS App store.

RMWA NEWS

New Members List

No.	Name and Address	Contact Details	Products
AM-254	Sunim Rubber Enterprise 136/2 GIDC Nr.Modern Bread Factory, Naroda, Ahmedabad – 382330	Udit Shah -9824257528 SB Shah - 9327000854 Email: sunimrubber@gmail.com	Tyre Retreading Materials, RCC Pipes, Rubber Rings, Rubber Compound
LAM-66	SPC Compounding India P.Ltd. 902, Building No.P%, Empire Estate, Bombay Pune Road, Chinchwad, Pune – 411019.	Prashant Vasani - 9370555399 Email: prashant.vasani@spc-group.com	Rubber Compounding
LM-255	Sanrhea Technical Textiles Limited 2nd Floor, Parshwanath Chambers Nr.New RBI, Ashram Road, Income Tax, Abad – 380014	Tushar Patel – 9825067899 Email: Tushar.sanrhea@gmail.com Mahendra Hada - 9727752082 sanrhea@gmail.com Landline: 02764227696 Email : sanrhea@sanrhea.com	Conveyor Belting Fabrics, Chater Fabrics, Diaphragm & Impression Fabrics
AM-256	NanoTech Chemical Brothers P.L. Village Mangarh, P.O.Kohara, Chandigarh Road, Ludhiana – 141112	Shail Vinayak - 9812370303 Email : shail@chemicalbrothers.co.in	Liquid Silicone Rubber, Silicone Colour Oils, R.T.V's
LAM-67	Shree Ambica Corporation 83, Shyam Vihar Bunglows, Opp.Avsar Party Plot, Modhera road, Mehsana – 384002	Rohit Prajapati - 9173650996 Email: Rohitprajapati18465@gmail.com	Oil Well Drilling Parts, O rings, V Seals, Profiles/Stripe/Cords/Wiper Scall/Diaphragms/Tyre Coupling/Gaskets/Flat Ring/Seal Kit
AM-257	Agro International 704, 7th Floor Mangalam Fun Square, Durga Nursery Road, Udaipur - 313001	Ashok bohra 9672970901 Agro.eva@gmail.com Aditya Bohra 9840414095 sales@easy.flux.com	EVA Bag, Emboss/Release Poly, Thermo Adhesive Poly
AAM-68	Hitech Boilers P.Ltd. Plot No.361, Manjusar GIDC, Tal.Savli Vadodara - 391775	Vinaykant Parikh hitechboilers@gmail.com 9825031498 Jayesh Purani 9879531204	IBR Steam Boilers, Thermic Fluid Heating System, Auto Clave, Hot Air Generator

Press Release

The Rubber Board

Ref.No.48/1(PRE-117)/2016-17/PUB
Press release

Call Centre to answer queries on licences issued by the Rubber Board

Kottayam
23 January 2018

Rubber Board Call Centre will answer queries related to various licences issued by the Rubber Board. Mr. M.N Omanakumar, Deputy Director (Excise Duty), Rubber Board will be available at Board's Call Centre from 10 am to 1 pm on Thursday, 25 January 2018. The Call Centre number is **0481 - 2576622.**

With the implementation of GST, cess on rubber, M form to be filed by rubber goods manufacturers and N form for interstate transfer of rubber were discontinued. Apart from this, the fees charged for special licences issued to rubber rmanufacturers, dealers and processors are also revised.

Assistant Director (Publicity)

Book Advertisement

- For RMWA Journal

Advertisement Tariff

Sr.No.	Type	Full Year Package Amount in Rs.	Single Package Amount in RS.	Total No. of Insertion s per year
1	Front Cover Inside	25000/-		4
2	Back Cover Inside	25000/-		4
3	Back Cover of the Magazine	30000/-		4
4	Colour Pages(Full)	20000/-		4
5	Colour Pages(Full)		6000/-	1
6	Colour Pages(Half)		4000/-	1
7	Colour Pages(Quarter)		3000/-	1
8	Classified Advt		1000/-	1

: NOTE :

Designs should be in CDR / PDF format .
Prioritity will be on first cum first basis on the availability of page.

Full Page	:	21 cm x 28 cm
Half Page	:	19 cm x 12 cm
Quarter Page	:	9.25cm x 28 cm
Classified	:	9 cm x 6.5cm

Bank Details : Cheque in Favour of Rubber Manufacturers' Welfare Association

Address : B/413, Rudra Arcade, Nr.Helmet Circle, Memnagar, Abad – 380052

Contact : 07927410226 Email : info@grma.in grma.rmwa@gmail.com

NEFT Details : A/c No.**6281877317** / A/c.Name : **Rubber Manufacturers' Welfare Association**

Bank Name : Indian Bank **Branch :** Drive in Ahmedabad **IFS Code :** IDIB000D051

BECOME A MEMBER

Fees : Entrance Fees Rs. 1,000/-

MEMBERSHIP APPLICATION

Categories of Membership :	Yearly Membership	Life Membership
(1) Ordinary Member (Manufacturer)	Rs. 1000/- Yearly Fee	Rs. 7,500/-
(2) Technical Member	Rs. 1000/- Yearly Fee	Rs. 7,500/-
(3) Associate Member	Rs. 1500/- Yearly Fee	Rs. 10,000/-
(4) Patron Membership	Rs. 1,11,000 /-	

SUBSCRIPTION

- For RMWA Jounral

RMWA SUBSCRIPTION COUPON

Annual Subscription Rate	
1 Year	₹ 360/-
2 Year	₹ 700/-

Yes, I/We want to subscribe "The RMWA Journal"
Fill in BLOCK LETTERS

Name:_____

Designation:_____

Company Name:_____

_____

Address:_____

_____

City:_____ State:_____

Country:_____ Pin Code: _____

Tel: _____ Fax :_____

Mobile:_____

Email :_____

DD/Cheoue No._____

Drawn on(Bank):_____

Dated: _____ for Rs : _____ in favour

"RUBBER MANUFACTURERS' WELFARE ASSOCIATION" payble at Ahmedabad or Cash / Cheque / DD may be deposited to any branch of Indian Bank and copy should be mailed / faxed to the Association.

JOURNAL WILL BE SENT BY NORMAL POST

NEFT Details	:	A/c No.6281877317
A/c.Name	:	Rubber Manufacturers' Welfare Association
Bank Name	:	Indian Bank
Branch	:	Drive in Ahmedabad
IFSC Code	:	IDIB000D051

ADVERTISEMENT INDEX

Automatic Batch Weighing Systems

EESHAAN AUTOMATION PVT LTD.

The Automatic Batch Weighing system is useful for weighing the different ingredients of a batch process.

The system is useful for :

INDUSTRIES

- Rubber
- PVC / Plastic
- Paints
- Pharma
- Food Processing
- Glass
- Cement / Ceramic
- Chemicals

MATERIALS

- Powders
- Granules
- Pellets
- Flakes
- Oils
- Esters
- Viscous liquids

- Repeatability,
- Reliability,
- Accuracy,
- Programmability,
- Display & Annunciation,
- Recipe Management.

EESHAAN AUTOMATION PVT LTD.

Facility: 89, 90, 91, Rajdeep Industrial Estate, Bibi Talav, Vatva, Ahmedabad 382440.

Communication : Tel: 91 79 25891296, M: 9227972801/2/3/5/6/10,

Email : ykahate@yahoo.co.in / info@eeshaan.co.in / ykahate@eeshaan.co.in

Website : www.eeshaanautomation.com / www.eeshaan.net / www.rubberrollers.asia

RAVASCO Swastik INDUSTRIES LLP

LEADERS IN RUBBER SHEETIING

- Natural/SBR Rubber Sheet
- Neoprene Rubber Sheet
- Nitrile Rubber Sheet
- Silicone Rubber Sheet
- Butyl Rubber Sheet
- Diaphragm Rubber Sheet
- Rubber Matting
- Rubberized Fabric
- Diamond Groove Pulley lagging Rubber Sheet

MANUFACTURERS, SUPPLIERS & EXPORTERS OF RUBBER SHEET

RAVASCO SWASTIK INDUSTRIES LLP.

Swastik House, 159, Nagdevi Street, Mumbai – 400 003.
Tel: 022 -23400694/790 Cell: 9022842223 . E mail: rsnilesh@vsnl.net

If courier not delivered send to : Rubber Manufacturers' Welfare Association B/413, Rudra Arcade, Nr.Helmet Circle, Memnagar, Abad – 380052