

RubberWorld ^{years} 131

THE TECHNICAL SERVICE MAGAZINE FOR THE RUBBER INDUSTRY VOLUME 269, No. 6

**Utilization of AI driven solutions
for rubber compound formulation: A practical approach**

**Custom compounding
with Spherix aluminosilicate microspheres**

**Compounding with a new heat resistant
HNBR elastomer: Therban HT**

Custom Mixing 2024



EVEN BETTER IN COLOR

Introducing: the new AirBoss dedicated color-compounding line for producing anything you need in colored rubber polymers. **Faster. Cleaner. Smoother.** With the same high-caliber expertise and service that set AirBoss apart.

AIRBOSS RUBBER SOLUTIONS
The Science of Rubber

WWW.AIRBOSSOFAMERICA.COM



EXPERIENCE IT 2024 IN YOUR PLANT

THE PLACE
**BEYOND
THE MIXER**

YOUR PLACE, OUR ADDITIVES

Lu B.
RICANT

Odo R.C.
ONTROL

P. Ross
ESSING-AGENT

D. isper
SANTS

FROM THE PRODUCERS OF SPECIALTY ADDITIVES FOR THE POLYMER INDUSTRY. AVAILABLE GLOBALLY.
PRODUCER STRUKTOL COMPANY OF AMERICA, LLC. CONTACT INFO@STUKTOL.COM. FOR INFO WWW.STUKTOL.COM

Driving the Future of the Rubber Industry with Passion and Purpose



US Production

World Class Suppliers and Products

Technical Resources and Solutions

30 Winfield Street, P.O. Box 5150, Norwalk, CT 06856-5150
(203) 853-1400 | www.vanderbiltchemicals.com

 **Vanderbilt Chemicals, LLC**
A Wholly Owned Subsidiary of R.T. Vanderbilt Holding Company, Inc.

FEATURES

26 Utilization of AI driven solutions for rubber compound formulation

by Hans-Joachim Graf, H-JG Consulting, and Christoph Hartwich, IT consultant.

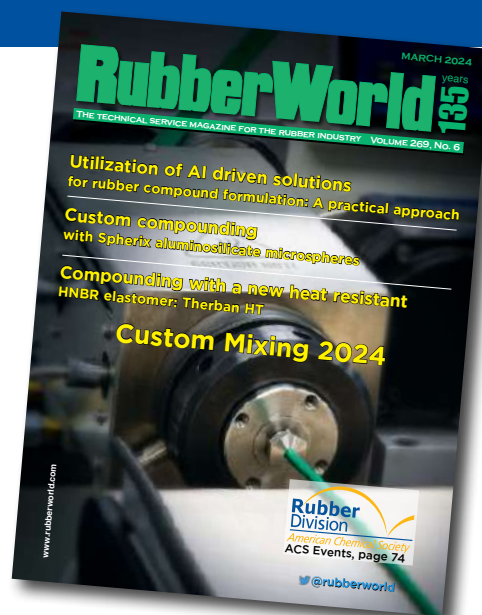
Through its comprehensive exploration of challenges and innovative solutions, the authors contribute to the evolving discourse on the practical implementation of artificial intelligence (AI) tools in rubber compound development.

34 Custom compounding with Spherix aluminosilicate microspheres

by Jeff Heath, Spherix. Spherix products provide demonstrable process improvements in a formulation designed to resemble a tire tread compound.

38 Compounding with a new heat resistant HNBR elastomer: Therban HT

by Victor Nasreddine, Marjan Hemstedevan Urk, Andreas Kaiser, Jelena Dodevski and Susanna Lieber, Arlanxeo. The effect of compounding variables on the properties of Therban HT, a polyamide reinforced HNBR elastomer with improved heat resistance, is presented.



Cover photo: Courtesy of AirBoss Rubber Solutions

47 Custom mixing and services directories

Directories list custom rubber mixing and services suppliers. Custom rubber mixers are listed, along with plant locations, equipment, mixing capabilities and whether technical service and/or recipe development are offered. A directory of companies that offer various custom services to the rubber industry follows.

DEPARTMENTS

- 4 Editorial
- 7 Business Briefs
- 10 Market Focus
- 12 Silicone/Medical Update
- 14 Overview

- 20 Patent News
- 75 Meetings
- 82 Calendar
- 84 Suppliers Showcase
- 93 People in the News

Rubber Division, ACS plans events

Rubber Division, ACS will hold its Spring Technical Meeting next month, April 30 - May 2, at the Hilton Polaris in Columbus, OH. The event honors the 2024 Science & Technology Award winners, including Dr. Katrina Cornish, the Charles Goodyear Medal winner, who will present the keynote address. Cornish, of The Ohio State University, is a global expert on alternate rubber and latex production, processing and products, with more than 30 years of experience in rubber biosynthesis, physiology, germplasm improvement, production systems innovation and alternative feedstocks in the government, commercial and university sectors.

Other S&T award winners honored at the spring meeting will include Melvin Mooney Distinguished Technology Award winner Dr. Andrew Chapman; George Stafford Whitby Award for Distinguished Teaching and Research winner Dr. Namita R. Choudhury; Sparks-Thomas Award winner Dr. Radek Stoczek; Chemistry of Thermoplastic Elastomers Award winner Gregg Patnode; Fernley H. Banbury Award winner Dr. Andreas Limper; and Bioelastomer Award winner Dr. David Dierig. See page 75 for complete coverage of the Spring Technical Meeting, including educational course descriptions and the technical presentations schedule.

March learning opportunities organized by Rubber Division, ACS will include the U.S. Regulatory Compliance in the Rubber Industry webinar on March 26, and the Global Rubber Technology: Processes, Current Status and Future Trends webinar on March 28. Rubber technology self-paced training is also offered by the Division. These basic, intermediate and advanced rubber technology courses provide convenient learning for all levels of rubber education. Continuing Education Units (CEUs) are awarded to participants once the training is completed. Details on learning opportunities from Rubber Division, ACS are available at www.rubber.org/educational-resources.

Women of Rubber Division will hold a remote WORD Conversation on March 27 featuring the Division's Tina Darnell. Details are available at www.rubber.org/upcoming-events.

Rubber Division, ACS announced that 75% of the International Elastomer Conference (IEC) Expo floor is already sold. The IEC will take place September 9-12 at the David L. Lawrence Convention Center in Pittsburgh, PA. Various booth sizes are offered, and exhibit space pricing increases on June 1. To secure your exhibit space, email ma@rubber.org.



Jill Rohrer

RubberWorld

EDITORIAL STAFF

Jill Rohrer	editor
David Schultz	technical editor
Don R. Smith	contributing editor
Michele Caprez	electronic publishing director
Matthew M. Raymond	creative director

BUSINESS STAFF

Chip Lippincott	publisher
Dennis Kennelly	senior vice president, associate publisher
Mike Dies	marketing representative
Pete McNeil	sales consultant
Laura Comstock	office manager

EDITORIAL OFFICES

1741 Akron-Peninsula Rd.
Akron, Ohio 44313-5157
Phone: (330) 864-2122
Facsimile: (330) 864-5298
Internet: www.rubberworld.com

CIRCULATION

Richard Jarrett (GCSCS8@gmail.com)
Manage or renew online:
www.rubberworld.com/subscribe

LIPPINCOTT & PETO

- Rubber World
- Blue Book: Materials, compounding ingredients, and services for rubber
- Blue Book on CD
- Blue Book Online
- Rubber Red Book
- Red Book on CD
- Rubber World Digital Edition

RUBBER WORLD, (ISSN-0035-9572), March, 2024, Vol. 269, No. 6, Copyright: Lippincott & Peto, Inc. 2024; all rights reserved. J.H. Lippincott, Chairman. Published monthly at 1741 Akron-Peninsula Rd., Akron, OH 44313-5157 by Lippincott & Peto, Inc. Editorial and Executive Offices at 1741 Akron-Peninsula Rd., Akron, OH 44313-5157. Periodicals postage paid at Akron, OH and at additional mailing offices. POSTMASTER: Please send changes of address to RUBBER WORLD, Circulation Dept., P.O. Box 16123, St. Louis, MO 63105. Publication Mail Agreement Number: 1488902. CPC Publication Agreement Number: 40032646; Canada return address: BleuChip International, P.O. Box 25542, London, ON N6C 6B2. Subscription rates: United States, 1 year \$49; Canada, \$59; International, \$169 in U.S. currency by U.S. bank draft or international money order. Single copies \$20.00. March, 2024. All rights reserved.



VMI'S ICOM FINAL MIXING PROCESS

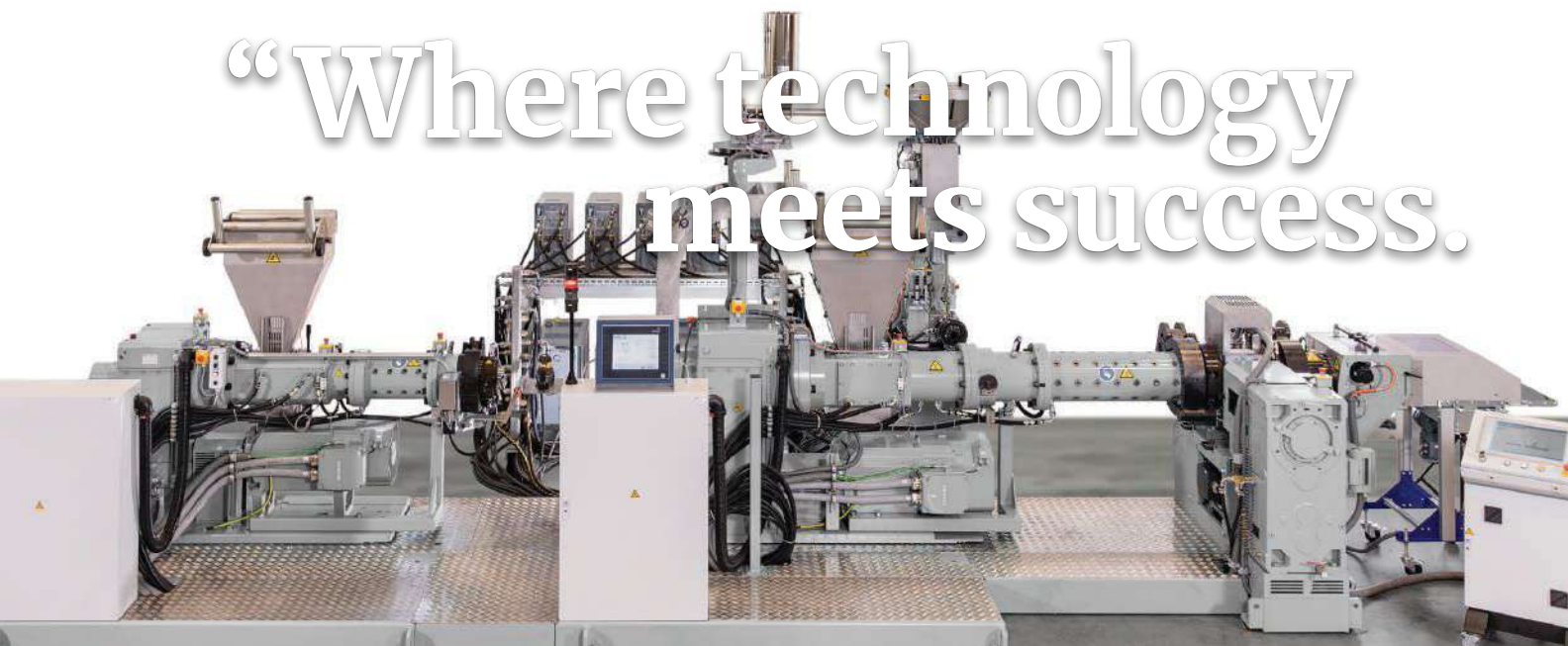
VMI'S ICOM TECHNOLOGY BUILT ON EXTRUDER GEAR PUMP SYSTEMS OFFERS JUST-IN-TIME MIXING OF MASTERBATCH WITH VULCANIZATION CHEMICALS:

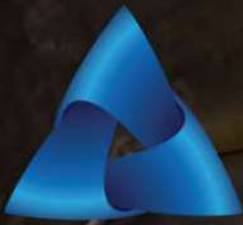
- Increase Mixing plant capacity with low investment
- Short time from planning to production
- Mixing at lower compound temperature
- Blending of masterbatches for optimal compound quality
- Single process step optional with straining / preforming
- Complete line including VMI's Batch off system

vmi-rubber.com

 VMI GROUP

“Where technology meets success.”





ARP | MATERIALS

ARP CUSTOM MIXING EXPERTISE

Your custom mixing needs rely on **quality** and **consistency**

When it comes to custom mixing, ARP offers solutions that extend beyond materials and compounds. Our expertise can save you time and money by simplifying the approach to sourcing materials.

PRODUCTS WE OFFER

- Chlorinated Polyethylene (CPE)
- Nitrile (NBR)
- Styrene Butadiene Rubber (SBR)
- EPDM
- Butyl (IIR, CIIR, BIIR)
- Poly Separator Film
- High Styrene Resin (HSR)
- CSM
- Chlorinated Paraffin Wax
- Rubber Accelerators
- Polychloroprene (CR)
- Natural Rubber (NR)
- Polybutadiene (BR)
- Reclaim Rubber
- Carbon Black

THE ARP SOLUTION

When you need raw materials, your manufacturing process depends on getting what you need, when you need it. You can't afford lags and logistical delays. ARP provides unmatched service and support by delivering complete solutions to your raw material needs.



CONTACT US



888.611.0220

arpsales@arpmaterials.com

Business Briefs

Arlanxeo constructs HNBR plant in China

Arlanxeo (www.arlanxeo.com), Maastricht, The Netherlands, a global provider of performance elastomers, announced the planned construction of a Therban hydrogenated nitrile butadiene rubber (HNBR) plant in Changzhou, China.

ACQUISITIONS, EXPANSIONS

With a nameplate annual production capacity of 5,000 tons, the first phase

of construction will allow for the production of 2,500 tons of high quality rubber per year. The plant is expected to begin operations in the third quarter of 2025.

Hexpol Rubber Compounding (www.hexpol.com), Aachen, Germany, announced that the rubber compounding arm of the **Hexpol Group** is investing in a devulcanization line in Europe. This allows them to offer mechanical devulcanization of rubber in-house and supports the transition to a circular economy. Devulcanization can transform cured rubber parts into an uncured state again. The devulcanized material still contains the polymer, carbon black or other fillers and plasticizer of the original compound. This results in a raw material base for producing new rubber parts and demonstrates that rubber can be recycled. The investment will enable **Hexpol Compounding** in Europe to produce several thousand tons of compounds with devulcanized rubber content per year.

Freudenberg Sealing Technologies (www.fst.com), Weinheim, Germany, a supplier of high performance materials and advanced products for the automotive sector and general industry, inaugurated its state-of-the-art production facility in Parets del Vallès (Barcelona), Spain. The fully carbon-neutral plant, dedicated to manufacturing automotive components, is boosting its production capacity by 15%. Freudenberg has invested more than EUR 11 million in the new production facility that replaced its existing plant at the same location.

Quality registrations

Greene Tweed (www.gtweed.com), Lansdale, PA, a global manufacturer of high performance sealing solutions and engineered components, announced that its U.K. branch has achieved the ISO 14001:2015 Environmental Management System certification with BSI. The Nottingham, U.K., facility is the first Greene Tweed location to obtain certification to this internationally recognized standard for environmental management systems developed by the ISO (**International Organization for Standardization**). Led by a core ESG (environmental, social, and governance) task team delegated with driving sustainability initiatives, this effort is said to pave the way for the company's long term plan to achieve ISO 14001 certification for Greene Tweed plants across the globe in the future. In addition, it underscores the company's intent to address the challenges of demanding applications and harsh conditions with innovative, sustainable products that enhance ESG performance.

Flame Retardants

Zinc Borate - Small particle size specific for Wire and Cable

Flame Check - Non Halogen specialty flame retardants and packages

Antimony Oxide

ATH

Magnesium Hydroxide

Phosphate Esters

Chlorinated Paraffin

Give us a call and let us help solve your biggest challenges.

Service you expect.



1665 Enterprise Pkwy, Twinsburg, OH 44087
Ph: (800) 991-2436 F: (330) 920-0971
www.hbchemical.com

Business Briefs

Sumitomo joins Future Tire Alliance

Future Tire Alliance (AZuR) (www.azur-netzwerk.de), Willich, Germany, announced significant reinforcements in elementary segments of the sustainable tire circular economy,

CONTRACTS, LICENSES

with **Sumitomo Rubber Industries**, the fifth largest tire manufacturer in the world, now belonging to the circle of AZuR partners. This means that four of the ten largest tire manufacturers in the world are now members of the Future Tire Alliance. To further improve the eco-balance of new tires, the new AZuR partner **Synthos** is developing sustainable, resource-saving synthetic rubber for the tire industry that has an optimized environmental and climate balance. AZuR has also joined the Dutch innovation network **Circular Rubber Platform (CRP)** to promote the circular economy for rubber in Europe.

Kumho Tire (www.kumhotire.com), Gwangju, South Korea, has entered into a technology licensing agreement with

Blatco (Black Arrow Tire), a Saudi company established in 2019 to promote tire manufacturing within the country with joint venture partners. Under the terms of the agreement, Kumho Tire will provide Blatco its passenger vehicle tire production technology for the next 20 years.

Lanxess (www.lanxess.com), Cologne, Germany, announced that its **Material Protection Products (MPP)** business unit has expanded distribution partnerships with **Lintech International**, **Omya Specialty Minerals** and **DKSH** for industrial preservatives in North America. The agreements enlarge the distributors' portfolios into the coatings, adhesives, sealants and elastomer (CASE), and other building materials markets following Lanxess' acquisition of **IFF's** microbial control business in July, 2022. All three distributors now represent Lanxess' full industrial preservatives portfolio for these markets.

Bridgestone Americas (www.bridgestoneamericas.com), Nashville, TN, had its largest racing presence to date at the 82nd running of the **Daytona 200** recently at Daytona International Speedway. Bridgestone supplied tires from its premium motorcycle tire line, Battlax, to 15 riders from seven different countries who are the reigning champions of the 2023 FIM Endurance World Championship.

HB CHEMICAL KNOWS MEXICO



HB Chemical Mexico has different warehouses in Monterrey, Querétaro, Leon, Toluca and Vallejo. With a team of industry experts to help Mexican companies do their jobs easier and make their products better. Call HB Chemical and see how we can help you.



Carlos Sanchez
Sales



Mariana Calderon Contreras
Operations Manager



Armando Garcia
Sales



Llame a uno de nuestros expertos hoy.

Servicio que usted espera.

HB Chemical Mexico S.A. de C.V., Av. Paseo Colon No. 311-A, Col. Residencial Colon, Toluca, Mexico 50120
Tel. +52 (722) 212 1800 www.hbchemical.com.mx

Business Briefs

German association urges reporting register

Wirtschaftsverband der Deutschen Kautschukindustrie e.V. (WDK) (www.wdk.de), Frankfurt am Main, Germany, the German rubber industry association, has proposed setting up a reporting register to reduce bureaucracy.

CORPORATE, FINANCIAL NEWS

“Contrary to the loud announcements of several federal governments, the reporting obligations for companies will not be less, but more,” said WDK President Michael Klein. He proposed the introduction of an official reporting register in which all legally binding reporting obligations of companies would have to be included.

Global Rubber Industries Ltd. (GRI) (www.gritires.com), Colombo, Sri Lanka, a producer of specialty tires for agriculture, material handling and construction machines, unveiled its next generation of environmentally friendly specialty tires with very high sustainable material content. GRI’s sustainable agriculture tire range, the Green XLR Earth series, now comes with 87.3% sustainable material, while the Ultimate Green XT, the sustainable material handling tire, boasts 93.5% sustainable material.

Orion S.A. (www.orioncarbons.com), Houston, TX, a global specialty chemicals company, announced it has maintained a Gold medal rating from **EcoVadis**, and ranks among the top 2% of the companies assessed by the organization in a wide range of sustainability areas.

Goodyear Tire & Rubber (www.goodyear.com), Akron, OH, intends to close its plant in Shah Alam, Malaysia, by June 30, with the closure process completed at the end of this year. Approximately 550 employees will be directly affected by the plant’s shutdown.

Scandinavian Enviro Systems (www.envirosystems.se), Gothenburg, Sweden, received an initial payment for costs incurred relating to the plant in Uddevalla, Sweden. The payment has been made by the joint venture established by Enviro and **Antin Infrastructure Partners**. In this initial stage, Enviro has received a payment of MSEK 53 million, of which MSEK 26.5 is cash and MSEK 26.5 is in the form of shares in the joint venture. Enviro has an option to acquire an ownership share in the joint venture that over time will ultimately correspond to approximately 30%. The joint venture is said to be the world’s first large scale tire recycling company, combining Enviro’s patented technology for extracting carbon black and pyrolysis oil from end-of-life tires with Antin’s expertise in developing and scaling up future infrastructure platforms. The joint venture plans to construct plants across Europe targeting a total annual recycling capacity of up to one million metric tons of end-of-life tires by 2030.

PRODUCTS YOU NEED. PRICES YOU WANT.

HB Chemical was founded in 1985 and has grown to be a distributor of quality rubber chemicals and products throughout North America. With 10 warehouses located in the US, Mexico and Canada, HB Chemical provides the most economical products to meet customer needs and quality requirements while providing the very best in customer service.

In 2006 our Northeast Ohio warehouse expansion was completed to serve our distribution warehouses in California, Georgia, Illinois, Massachusetts, Missouri, North Carolina, Texas, Virginia, Ontario, Canada and several locations in Mexico.

HB Chemical is certified to ISO 9001 standards and is recognized as one of the top 30 US Chemical Distributors and among the top 80 in the world by ICIS Magazine.

- Accelerators
- Antioxidants & Inhibitors
- Biocide
- Carbon Black
- Dispersions
- Fatty Acids
- Flame Retardants
- Lubricants
- Magnesium Oxide
- Nitrile, SBR, Natural Rubber
- Plasticizers
- Process Aids
- Stearates
- Sulfur
- TiO₂
- Waxes

Service you expect.



1665 Enterprise Pkwy, Twinsburg, OH 44087
Ph: (800) 991-2436 F: (330) 920-0971
www.hbchemical.com

Medical devices and consumables to grow 6%

The global market volume of medical devices and consumables is expected to grow at a compound annual growth rate (CAGR) of 5.9%, from \$536.12 billion in 2023 to \$799.67 billion by 2030, according to a market analysis by Fortune Business Insights. The accelerated aging of the global population, the trend towards paying attention to healthcare, and more people concerned about health checkups, disease prevention and regular screening have led to an increase in the market demand for medical devices and consumables.

The U.S. is the world's leading manufacturing country of medical devices, as well as the largest market of medical devices and consumables. In the rankings of the "World's top 10 pharmaceutical companies" and "World's top 10 medical device companies," the U.S. accounts

for the largest share, with four and seven companies, respectively.

The study ranks China second. Its market of medical devices and consumables is facing both challenges and opportunities with the continuous promotion of centralized VBP (volume based procurement) and DRG (diagnosis related groups) medical insurance reform. As a result, there is high potential to grow in innovative medical devices and high value consumables.

Continuous breakthroughs in material science and processing technology are crucial to the development of medical devices, equipment, consumables and pharmaceutical packaging. Polymers are biocompatible, durable, easy to process and stable in quality, contributing to the user-friendly design and safety of medical

products, the study says.

Interventional cardiology devices represent the largest sector of high value medical consumables, accounting for more than 30% of the market. The sector mainly includes stents, pacemakers and valves. The main materials of these consumables are nickel-titanium alloy, cobalt-chromium alloy, medical grade high molecular weight poly(L-lactide-co-caprolactone) (PLCL) and ultra-high molecular weight polyethylene (UHMWPE).

In addition to interventional cardiology devices, orthopedic devices have also become a fast-growing segment of medical device applications in recent years. The high age related incidence of orthopedic diseases is the major contributor, resulting in the increased demand for orthopedic devices in the elderly population. In orthopedics, PEEK, PU and PMMA are the materials of choice.

As one of the largest segments in the medical device industry, the orthopedic device segment consists of two parts: orthopedic implantable devices and specialized surgical instruments, with the former accounting for 90%. Orthopedic implantable devices mainly include craniofacial and maxillofacial implants, spinal fusion interbody cages, joint implants, fixation plates and screws. Apart from titanium alloy and stainless steel, commonly used materials are polyether ether ketone (PEEK), polyurethane (PU) and polymethyl methacrylate (PMMA).

Complying with the clinical standards, these implantable materials cannot be rejected by the human body and do not produce harmful matters. Meanwhile, these materials must be able to produce optimal structures at an affordable price, according to the market analysis.

The stiffness of PEEK closely matches with human bone, and the polymer has the properties of radiolucency and reduced stress shielding. As such, PEEK has high market potential in medical applications and is mainly used in the manufacture of spinal and joint implants.

U.S. tire makers projected to break shipment record with 335.7 million units

The U.S. Tire Manufacturers Association (USTMA) projects total U.S. tire shipments of 335.7 million units in 2024, compared to 331.9 million units in 2023 and 332.7 million units in 2019. This surpasses the previous record of 335.2 million units in 2021.

Compared with 2023, original equipment (OE) shipments for passenger, light truck and truck tires are expected to change by 1.4%, 2.6% and -3.3%, respectively, with a total increase of 0.6 million units. Replacement passenger, light truck and truck tire shipments are also projected to change by 0.5%, 2.8% and 5.9%, respectively, with a total increase of 3.2 million units.

February 2024 USTMA shipments forecast

	2024 forecast	2023	% change	Units +/-	2019	% change versus 2019
Original equipment tires						
Passenger	46.3	45.7	1.4	0.6	46.3	0.1
Light truck	6.0	5.9	-2.6	0.2	5.9	2.4
Truck	6.0	6.2	-3.3	-0.2	6.5	-7.7
Replacement tires						
Passenger	220.2	219.2	0.5	1.0	222.6	-1.1
Light Truck	35.2	34.3	2.8	1.0	32.5	8.2
Truck	22.0	20.8	5.9	1.2	18.9	16.2
Total	335.7	331.9	1.1	3.7	332.7	0.9

All shipments in millions. Figures are rounded.



Some things
just work
well together.



Like PPG and Harwick.

You wouldn't wash those cookies down with orange juice, would you? When something works, it just works. Harwick Standard thinks of its 80+ year relationship with PPG Silica Products in the same way. Except this type of partnership hasn't endured by accident. It's our shared vision of excellence, commitment to service, and mutual focus on the future that has kept our partnership going strong since 1941.

As Henry Ford said, "Coming together is a beginning.
Keeping together is progress. Working together is success."

Let's come together and find out if our quality products and dedicated service will mesh with your business. Visit harwick.com to check out all of our products from PPG or any of our other respected principals. Then contact us to get this relationship started.

Harwick Standard and PPG: Working Together for Over 80 Years.



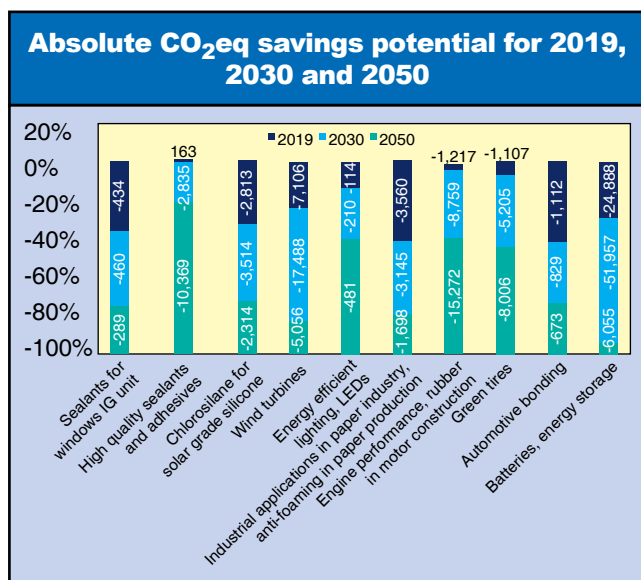
harwick.com

Akron, OH 1-800-899-4412 • Pico Rivera, CA 1-800-883-9911



Silicones' role in decarbonization studied

A study to identify and quantify silicones' contributions to the EU Green Deal's ambitions to become climate neutral by 2050 reveals an annual greenhouse gas (GHG) emission saving potential of 96.4 metric tons (MT) in 2030. This is equivalent to the carbon footprint of 36 million people's electricity consumption (for reference, Poland has 37 million inhabitants). These savings are projected to be 42.6 MT by 2050 for silicone-using technologies compared to non-silicones alternatives.



“There is no question that stopping global warming is a top priority for policymakers in the EU and beyond. It is now time to accelerate the pursuit of carbon-free ambitions, and silicones will be essential facilitators of that change, as our latest study shows,” said Karolina Warowny-Decoene, sector group manager for Silicones Europe. Silicones Europe, a sector group of Cefic, published, “Silicones’ role in supporting the EU Green Deal’s decarbonization goal,” commissioned by expert sustainability consultancy Denkstatt GmbH. “With substantial emissions savings thanks to silicones, we look forward to propelling EU decarbonization ambitions forward,” Warowny-Decoene added.

Following the methodology of a 2012 study on the GHG emissions impact of silicones, silanes and siloxanes, the paper focused on 11 relevant applications of silicones in transportation, construction, electricity, electronics and manufacturing. Those sectors were chosen based on their key role in achieving the EU Green Deal decarbonization objectives via the delivery of CO₂ savings.

For the calculation of the GHG balances and benefits, data were collected through a comprehensive survey among downstream users and literature research, as well as collaboration with industry experts and Silicones Europe member companies.

Overall, each application of silicones analyzed in the study shows a larger emission-saving potential compared to alternative applications which do not use silicones. This points to the importance of the silicone industry in supporting the Green Deal’s decarbonization goals.

Non-cytotoxic epoxy withstands medical sterilization

A two-part epoxy system that meets the requirements of ISO 10993-5 for non-cytotoxicity and can be used for bonding, sealing and coating in medical devices has been introduced by Master Bond. Master Bond EP41S-5Med features high temperature resistance and good strength properties. As an electrically insulative material, it can be utilized in medical electronic applications.

This epoxy was tested against many sterilization methods, such as autoclaving, Sterrad, Cidex and Steris, successfully resisting one hundred cycles. It is also capable of withstanding exposure to gamma radiation, ethylene oxide, as well as other aggressive sterilants and chemicals. EP41S-5Med provides a tensile strength of 10,000-12,000 psi and adheres well to a variety of similar and dissimilar substrates, including metals, plastics, rubbers, ceram-

ics and composites. This compound has a glass transition temperature of 140°C to 145°C and is serviceable from -80°F to +450°F [-62°C to +232°C]. EP41S-5Med features reliable electrical insulation characteristics with a dielectric constant of 3.5 at 60 Hz and a volume resistivity greater than 1,014 ohm-cm.

The system is black and contains no solvents or diluents. It offers convenient handling with a 100 to 25 mix ratio by weight. The mixed epoxy has good flow properties with a moderate viscosity of 25,000-30,000 cps. Upon cure, it offers low shrinkage and a hardness of 85-95 durometer D. EP41S-5Med comes in standard sized units and is also compatible with automated gun dispensing systems. EP41S-5Med is a high temperature and chemically resistant epoxy that meets ISO 10993-5 specifications.

Silicone & Medical Update sponsored by AGC Chemicals Americas, Inc.



Improve efficiency and reduce downtime for critical food contact applications by using AFLAS® FDA compliant fluoroelastomer grades **when failure is not an option.**



The AGC logo is displayed in a white box in the top left corner. It consists of the letters 'AGC' in a bold, blue, sans-serif font. A small red square is positioned between the 'A' and the 'G'.

**The Only Fluoroelastomers You Need
When Performance Matters**

The AFLAS logo features a white, stylized, teardrop-shaped icon with a wavy bottom edge, set against a dark blue background with a faint, larger-scale version of the same shape.

AFLAS[®]
FLUROELASTOMERS

www.agcchem.com • [1-800-424-7833](tel:1-800-424-7833)



Rising demand for eco-friendly products fuels surging global demand for natural rubber: Exploring the factors and diverse applications in this versatile industry

The rising global interest in environmental awareness has sparked a remarkable surge in demand for sustainable products, leading to an increase in demand for natural rubber (NR). This trend has specifically impacted the natural rubber market, driven by consumer preference for eco-friendly options. As president of the All India Rubber Industries Association (AIRIA), I wish to shed light on the factors driving this demand for natural rubber and its applications within the rubber industry.

Since the late 19th century, rubber has been playing a crucial role in people's daily lives because of its versatility and usefulness. From car tires and medical gloves to household products, rubber's uses remain unparalleled. While India faces a shortage

in the production of natural rubber, the growing demand has led to a considerable rise in the adoption of its alternate option: synthetic rubber.

The year 2022 witnessed a notable uptick in global natural rubber (NR) consumption, reaching 14.306 million metric tons (MT), a discernible 1.7% increase from the preceding year's 14.069 million MT. The surge in demand was particularly pronounced in major consumer nations, encompassing economic powerhouses such as China, India, USA, Thailand, Japan and Indonesia, all registering an uptrend in NR consumption compared to the previous year. In contrast, Malaysia and Brazil experienced a decline in consumption during this period. A closer look at India reveals a fascinating aspect: Despite its

Your #1 Source for Rubber Compounding Ingredients for over 99 years

- Polymers(inc. eSBR, FKM, & Nitrile)
- Color Masterbatch
- Curatives
- Activators
- Plasticizers
- Fillers
- Process Aids
- And much more....

Knowledgeable, Responsible, Trusted:
What Matters To You, Is Important To Us

 **R. E. Carroll, Inc.**
Specialty Chemicals • Petroleum Products
1-800-257-9365 • www.recarroll.com



Leading the industry in



TREAD STRIPING INK & CUSTOM APPLICATION EQUIPMENT

APV
ENGINEERED COATINGS[®]

1390 Firestone Parkway
Akron, Ohio
44301 USA

www.apvcoatings.com
sales@apvcoatings.com
800.772.3452

Call one of our
technical sales
reps today!



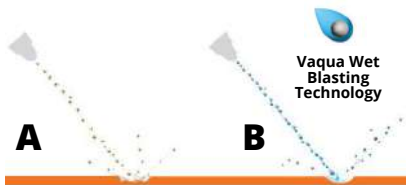
Revolutionize metal preparation for rubber bond with Guyson Industrial Vaqua Wet Blast Systems

Our innovative wet blast technology increases the rubber bond up to 120%. At the same time, it scrubs parts clean during the blasting process while using 70% less media than dry-blasting.

Guyson wet blast systems are specially designed to increase rubber bond durability, thanks to added corrosion resistance inhibitors. Trust Guyson to provide high quality prep for coating solutions and create lasting results for your products!

ADVANTAGES OF GUYSON WET BLAST SYSTEMS OVER DRY BLASTING FOR RUBBER BONDING:

VAQUA® WET BLASTING VS. DRY BLASTING



Vaqua Wet
Blasting
Technology

- A.** Crude dry grit or sand blasting direct media to metal contact. Continuation of downward force causing impregnation.
- B.** Vaqua wet blast processing water buffer between metal and media cushions shock and deadens downward force. This is the best process for rubber bonding.

- Increases the rubber bond up to 120%
- Wet blasting provides better control over surface roughness, creating an ideal texture for strong rubber bond adhesion.
- Guyson Wet blasting combines the abrasive action of blasting media with water, making it more efficient at cleaning metal surfaces and removing contaminants.
- The combination of cleaning, surface roughening, and controlled finish promotes enhanced adhesion of the rubber bond.
- The blast slurry helps cool the surface, protecting delicate or heat-sensitive metal substrates.
- Wet blasting minimizes the generation of dust and debris, improving the working environment and reducing cleanup.
- Wet blasting reduces operator exposure to hazardous airborne particles, ensuring a safer work environment.

These advantages make wet blasting a beneficial choice for preparing metal surfaces prior to rubber bonding.



FULLY CUSTOMIZED WET BLAST SYSTEMS
Engineered and built to customer specifications



AUTO KOMET
Automated Industrial wet blast system



AUTO KOMET DRUM BLASTER
Affordable manual wet blast system with large cabinet



IN-LINE SYSTEM
Affordable manual wet blast system for shop usage

Overview

growing economic stature, the per capita consumption of rubber remains considerably low at 1.47 kg. This figure stands in stark contrast to developed nations like Germany and the U.S., where per capita consumption is at 9.30 kg and 8.07 kg, respectively, as well as the global average of 3.73 kg. This intriguing consumption pattern prompts a deeper exploration of the factors influencing NR demand and the dynamics at play in the global rubber market.

The application of rubber has been pivotal in almost every sector, starting from the automotive industry. Increasing global vehicle production fuels a rising demand for rubber tires and components. India is poised to become a global automobile hub, with the significant presence of almost all major automobile companies. In the construction sector, rubber finds application in sealing and insulation, and as an additive in materials like asphalt for road construction. Consumer goods production relies heavily on rubber, contributing to essential items such as footwear, gloves and toys, driving an increasing demand. The healthcare sector extensively utilizes rubber in the manufacturing of medical gloves, tubing, syringes and various medical devices. Industrial machinery relies on rubber parts for shock absorption, vibration, reduction and sealing, crucial for the smooth functioning of equipment. In electronics, rubber serves the purpose of insulation and as a protective coating for cables and wires. Agriculture benefits from rubber in the production of equipment like hoses, belts and seals used in farming machinery. The textile industry incorporates rubber for waterproofing, elasticity and grip enhancement. In mining, conveyor belts, predominantly heavy duty, are a staple for transporting materials like ore, stone, tailings, gravel and aggregate. The transport sector, encompassing railways, roads, water and air, utilizes various rubber production such as railcar suspension components, pump seals, valve body seals and metal-to-rubber bonded assemblies. Lastly, the defense sector leverages rubber's unique properties in the aerospace/military industry in custom molded parts such as eye shields, control surfaces, bushings and vibration isolation mounts, rubber mats and pads, grips, covers, armrests, jackets, mounts, line clamp cushions, etc.

A growing number of sectors are working to accommodate consumer demand for eco-friendly products and practices. Natural rubber has environmental advantages, since it is a renewable resource derived from rubber trees. The biodegradability of natural rubber aligns with sustainability objectives by reducing non-biodegradable waste. The production method has a smaller carbon footprint than synthetic rubber, since it is based on tree cultivation rather than petrochemicals. Rubber plantations not only support sustainable agriculture, but also foster biodiversity and contribute to local economies. The production involves fewer synthetic chemicals, leading to reduced environmental impact. Increasing consumer awareness and regulatory support for eco-friendly materials contribute to the growing preference for products made from natural rubber.

There is growing recognition within the rubber industry of

CONQUERING CHALLENGES.
CREATING SOLUTIONS.



FAST-TRACK COMPOUND THUMBPRINTING

Physical properties, performance characteristics & chemical analysis: we capture the unique thumbprint of your compounds.

A solid reference for quality control, unexpected failures and establishing a baseline for further development.

CONTACT US:

+1 330-577-4088

ace_sales@ace-laboratories.com

ace-laboratories.com



ACE Laboratories is an ISO/IEC 17025-accredited laboratory for rubber, silicone & polymer testing, materials & product development, and consulting services for companies around the globe.

Ken-React[®]

Titanates & Zirconates

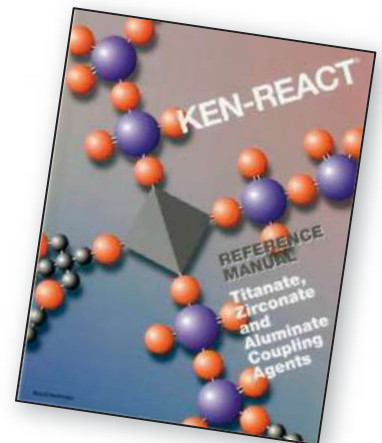


Contact
Us
for
Solutions

www.4kenrich.com

technicalservice@4kenrich.com

**Need Adhesion to Kevlar[®], Graphite, Fiberglass,
Steel, Rubber and Dispersion of Carbon Black,
Graphene, CNTs, Silica, Nanoclay, Sulfur,
Sulfides, ZnO, Boron Nitrides, etc.
...and Silanes just don't cut it?**



We wrote the book



Made in the USA



Overview

the vital role that recycling plays in enhancing the sustainability and longevity of rubber products. Recycling rubber has emerged as a top priority for major players in the industry, driven by a dual commitment to environmental responsibility and resource optimization. This approach serves as an effective means to extend the life cycle of rubber products, diverting them from becoming waste and contributing to environmental conservation. The utilization of recycled rubber represents a noteworthy shift towards sustainable practices in various sectors. Applications for recycled rubber in hospitals, playgrounds, landscaping and sports surfaces have embraced recycled rubber in innovative ways, presenting a compelling alternative to conventional new materials. This creative application of recycled rubber not only demonstrates a commitment to eco-friendly solutions, but also showcases the versatility of rubber as a material that can be repurposed for diverse applications.

Data from the International Rubber Study Group (IRSG) reveal a notable 4.80% increase in NR production in the year 2022, marking a substantial rise from the 13.808 million MT recorded in 2021 to 14.477 million MT. This upturn in production is a significant indicator of the industry's dynamism and its response to the evolving global demand for rubber. Delving deeper into the geographical breakdown, the top producing nations, including Cote d'Ivoire, India, Indonesia, Vietnam and Cambodia, experienced growth in NR production during 2022. This growth signifies the crucial role played by these nations in contributing to the overall surge in global production.

According to a recent estimate, India's gross domestic product (GDP) is rising at an average rate of 6% to 7%, thanks to massive government investment in infrastructure and other vital areas, bringing the country to 5th place in the global rankings. The government is also actively monitoring rubber plantations through subsidies, and has recently announced a subsidy of 708 crores for the period 2024-2026. This is a testament to the government's dedication to fostering a conducive environment for the growth of rubber plantations. This financial support not only incentivizes rubber cultivation, but also underscores the government's recognition of the industry's role in bolstering economic activities, generating employment and contributing to foreign exchange earnings. The strategic alignment between economic growth, infrastructure development and support for key sectors like rubber underscores a comprehensive approach to sustainable development, positioning India as a key player in the global economic landscape. The government's proactive measures are favorable for the natural rubber industry, ensuring its resilience and capacity to meet the rising global demand, while contributing significantly to the nation's economic prosperity.

In essence, the global demand for natural rubber is intricately tied to environmental consciousness and sustainability goals. With a growing emphasis on eco-friendly practices and products, the natural rubber industry stands at the forefront, offering versatile solutions, while addressing challenges

CONQUERING CHALLENGES.
CREATING SOLUTIONS.



DO YOUR
COMPOUNDS
MEET THE
SPECIFICATIONS?

We deliver rapid turnaround specification testing to international and industry standards for certification and product approval.

ASTM | ISO | A-A | MIL | GMW

CONTACT US:

+1 330-577-4088

ace_sales@ace-laboratories.com

ace-laboratories.com



ACE Laboratories is an ISO/IEC 17025-accredited laboratory for rubber, silicone & polymer testing, materials & product development, and consulting services for companies around the globe.


Overview

through innovation, recycling and government support.

As the elected president of AIRIA for the year 2023-24, I play a pivotal role in steering the association forward. Drawing upon a wealth of experience, having served in the rubber industry for two decades and holding diverse positions within AIRIA, I am committed to building upon the foundation laid by my predecessors. Acknowledging their invaluable contributions, I aim to bring a blend of continuity and innovation to the association's initiatives, shaping its future endeavors.

Established in 1945, the All India Rubber Industries Association (AIRIA) boasts its headquarters in Mumbai, while extending its presence through regional offices in Kolkata, Delhi

and Chennai. Furthermore, it has chapter offices in Pune and Ahmedabad, strategically positioning itself across key industrial hubs. With a membership of around 1,300, AIRIA plays a pivotal role in uniting and representing the rubber industry. The association actively promotes knowledge exchange and industry growth through a diverse range of events, including seminars, factory visits, international conferences, workshops and the renowned India Rubber Expo. These platforms not only serve to enhance the expertise of its members, but also provide a vital stage for interaction with international markets. AIRIA's multifaceted approach underscores its commitment to fostering a dynamic and globally connected rubber industry in India.

	Adhesion and Adhesives Technology 4th Edition	\$215.00
This book describes, in clear understandable language, the three main disciplines of adhesion technology: mechanics of the adhesive bond, chemistry of adhesives, and surface science. Some knowledge of physical and organic chemistry is assumed, but no familiarity with the science of adhesion is required. The emphasis is on understanding adhesion, how surfaces can be prepared and modified, and how adhesives can be formulated to perform a given task. Throughout the book, the author provides a broad view of the field, with a consistent style that leads the reader from one step to the next in gaining an understanding of the science.		
www.rubberworld.com/book-store		



ARDL Testing Experts for all Your QA Needs

Need testing support with quick turnarounds?

Having issues with failures or defects?

Equipment problems or backlog?

ARDL can fast track continuing QA testing and deliver results quickly. Our team of Technical Advisors is available to answer questions and provide technical solutions for failures or defects. Our labs are A2LA accredited, ensuring accurate results every time. Not sure if we can help? ... Put us to the test!



CONTACT US AT SALES@ARDL.COM

2887 GILCHRIST RD.
AKRON, OHIO 44305
TOLL FREE 866-780-ARDL
WORLDWIDE 330-794-6600



ARDL.COM

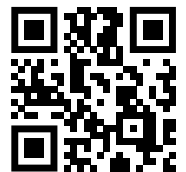
Think **Reliability.**
Think **Stability.**

With over 50 years of service to the industry, Cancarb's Thermax® N990 medium thermal carbon black continues to offer solutions to compounders most difficult problems. With continued investment, industry-leading service, and dependable quality, 50 years is just the start.



Think **Thermax®!**

cancarb



Find Out More
cancarb.com

*For a complete list of the countries where THERMAX® and CANCARB are registered trademarks go to www.cancarb.com/trademarks

Patent News

Silicon-functionalized rubber

U.S. patent: 11,767,388

Issued: September 26, 2023

Inventors: Seth Cody Ensign, Margaret Flook Vielhaber, Jena Lynn Johngrass and Liqing Ma

Assigned: Goodyear Tire & Rubber

Key statement: The compatibility between silica fillers and synthetic rubbers which are synthesized utilizing lanthanide-based catalyst systems, such as neodymium catalyst systems can be improved by terminating the polymerization with a vinyl silane terminating agent. In doing so the vinyl silane is allowed to react with the polymer chain ends of the neodymium rubber to functionalize the chain ends of the polymer chains with silicon containing groups. This results in the rubber having better characteristics for utilization in tire rubber formulations,

such as tire tread formulations, that exhibit improved wear characteristics and lower rolling resistance. The process for the synthesis of such functionalized polydiene rubber comprises (1) polymerizing a diene monomer in the presence of a lanthanide-based catalyst system and (2) terminating the polymerization with a vinyl silane terminator. The functionalized polydiene rubber composition made by this method is comprised of a polydiene rubber which is functionalized at its chain ends with a silicon containing group.

Rubber composition

U.S. patent: 11,767,418

Issued: September 26, 2023

Inventors: Ryosuke Kobe and Koichi Kawamoto

Assigned: Kao

Key statement: The present invention

relates to a rubber composition with an excellent grip force; a method of producing the rubber composition; a shoe sole, a shoe and a tire each using the rubber composition; and a method of improving a frictional force of a rubber component. The present invention is concerned with [1] a rubber composition containing a rubber component (A), a lignin degradation product (B), and a specified amine compound (C); [2] a rubber composition composed of a blend of a rubber component (A), a lignin (B) and a specified amine compound (C); [3] a shoe sole using the aforementioned rubber composition; [4] a shoe having the aforementioned shoe sole; [5] a tire using the aforementioned rubber composition; [6] a method of producing a rubber composition, including blending a rubber component (A), a lignin (B) and a



**NEW • USED • REBUILT
RUBBER EQUIPMENT
IN STOCK**

NEW LABORATORY PRESSES



**NEW 20"X20"/100T
VACUUM PRESS**



**NEW 18", 32" & 48"
GUILLOTINE CUTTERS**



NEW PRODUCTION PRESSES



NEW PREFORMERS & COOLING CONVEYORS



NEW SILICONE CURING OVEN



**NEW HYDRAULIC UNITS &
PRESS CONTROL PANELS**



NEW 16"X40" MILL



NEW 3.5" EXTRUDER



**All Items
In Stock!**



GET A QUOTE: SALES@GOMAPLAST.COM • 330-263-7845 • GOMAPLAST.COM

Patent News

specified amine compound (C) and vulcanizing the blend; and [7] a method of improving a frictional force of a rubber component, including blending a rubber component (A), a lignin (B) and a specified amine compound (C).

Tire comprising a tread

U.S. patent: 11,767,417

Issued: September 26, 2023

Inventor: Tomoya Sakurada

Assigned: Michelin

Key statement: A tire having a tread comprising at least three radially superposed portions which comprise a radially external portion being made of a first rubber composition, a radially intermediate portion being made of a second rubber composition and a radially internal portion being made of a third rubber composition; wherein each of the rubber compositions is

based on at least an elastomer matrix, a reinforcing filler and a crosslinking system based on sulfur; wherein the amount in phr of sulfur in the first rubber composition is lower than that in the second rubber composition and wherein the amount in phr of sulfur in the second rubber composition is higher than that in the third rubber composition.

Fluorinated copolymer composition and metal rubber laminate

U.S. patent: 11,767,410

Issued: September 26, 2023

Inventor: Keisuke Yagi

Assigned: AGC

Key statement: To provide a fluorinated copolymer composition capable of forming a crosslinked rubber having favorable rubber properties and excellent metal adhesion and a metal rubber

laminate using the crosslinked rubber. A fluorinated copolymer composition comprising a copolymer having units based on tetrafluoroethylene and units based on propylene, a copolymer having units based on tetrafluoroethylene and units based on a perfluoro(alkyl vinyl ether), or a copolymer having units based on hexafluoropropylene and units based on vinylidene fluoride, hydrophilic silica and an acid acceptor.

Grinding roller for waste tires and multifunctional crusher having the same grinding roller

U.S. patent: 11,766,673

Issued: September 26, 2023

Inventors: Yun Huo and Zhengqing Huo

Key statement: Disclosed is a grinding roller for waste tires and a multifunctional crusher having the grinding roller. The grinding roller comprises a roll

Zinc Oxide supply chain problems?

Not at Zochem!

We have the zinc oxide that you need, in stock, close to you!

- Inventory in 33 North American locations
- On-time delivery of virtually any quantity
- High purity, high & low surface area, USP, pellets and powder
- US and Canadian plants for delivery security
- Unsurpassed quality

Zochem 

USA: (615) 375-5058 • Canada: (905) 453-4100 • zochem.com

DISTRIBUTED BY:

Palmer Holland • 440-686-2300 • palmerholland.com

Univar Solutions • 331-777-6026 • univarsolutions.com

HM Royal • 800-257-9452 • hmroyal.com

R.E. Carroll, Inc. • 609-695-6211 • reccarroll.com

ChemSpec (Safic Alcan) • 800-200-4753 • chemspectd.com

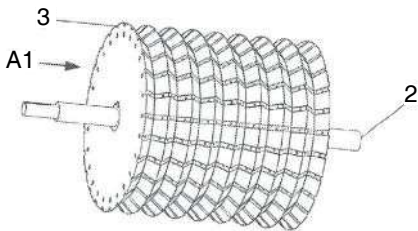
YOU GO FAR WE TAKE CARE

Since 1987, Interbusiness Group has been involved in the production and distribution of INTERCURE®, a niche selection of curing agents and accelerators for special elastomers. To ensure the final product's maximum reliability, all Interbusiness Group's products are made with the purest raw materials and undergo a constant and rigorous quality control process. INTERCURE® curing agents and accelerators are fine-tuned for rubber compounds in which only the highest quality standards and excellent performances are demanded.



Patent News

shaft and a plurality of grinding components. The grinding components each comprise a grinding frame and grinding blocks mounted in grooves of the grinding frame. Each grinding block has a grinding surface that protrudes with respect to the grooves. Axial interval adjusting rings are disposed on the ring shaft for separating the grinding components at a predetermined distance to cut waste tires into blocks. The crusher comprises a box for housing the grinding roller. The box is provided with a material inlet and a material outlet. Axial blockers are mounted on the crusher to help grind waste tires into fine powder.



Pneumatic tire

U.S. patent: 11,766,891

Issued: September 26, 2023

Inventors: Katsunori Shimizu and Tsuyoshi Nomaguchi

Assigned: Yokohama Rubber

Key statement: A pneumatic tire includes an innerliner and a tie rubber. A rubber composition for an innerliner constituting the innerliner includes from 25 to 75 parts by mass of a carbon black having a nitrogen adsorption specific surface area from 25 to 95 m²/g, from 1 to 13 parts by mass of a resin and from 0.1 to 1.8 parts by mass of a zinc oxide, per 100 parts by mass of a diene rubber containing from 50 to 100 parts by mass of halogenated butyl rubber and the dynamic storage modulus at -45°C of the rubber composition is not greater than 600 Mpa.

Curable composition, especially as crystallizing rubber to substrate bonding primer

U.S. patent: 11,767,452

Issued: September 26, 2023

Inventors: Anna Ryzhova, Christian Beirich, Wolfgang Weimar and Martin Hornung

Assigned: Henkel AG

Key statement: The subject matter is a new composition comprising at least

one hydroxyl group-containing resin, at least one nitroso-containing compound or at least one nitroso precursor compound, at least one blocked isocyanate and at least one crystallization germ suitable as primer or coating for



Hydraulic Presses

for customers molding critical rubber and composite components in the automotive, defense, medical, sporting goods industries, and more.

French Oil Machinery Company | Piqua, Ohio
We make machines to make people's lives better®

WWW.FRENCHOIL.COM

In 1900 The French Oil Mill Machinery Company began as a new idea - an idea that improved manufacturing processes and challenged established industry methods. Always focused on innovation and engineering creativity, our fourth generation family-owned company continues this tradition for the benefit of our customers.

Patent News

rubber to substrate bonding, which provides a scratch resistant surface when applied, and excellent adhesion and steam resistance for rubber to substrate bonds. These compositions can especially be used as one coat systems.

Thermoplastic elastomer with adhesion to crosslinked ethylene propylene diene rubbers

U.S. patent: 11,773,250

Issued: October 3, 2023

Inventors: Jae Hyeuk Jeong, Sehyun Kim and Yaw Boateng

Assigned: Kraiburg TPE

Key statement: The invention relates to a thermoplastic elastomer with an excellent adhesion to crosslinked ethylene propylene diene rubber (EPDM) or rubber mixtures containing crosslinked EPDM. The invention also relates to the use of the thermoplastic elastomer according to the invention for producing a composite material with cross-

linked EPDM or rubber mixtures containing crosslinked EPDM, as well as an article that comprises a thermoplastic elastomer according to the invention and crosslinked EPDM or rubber mixtures containing crosslinked EPDM. The present invention also relates to a process for producing a thermoplastic elastomer.

System for detection of non-pneumatic tire loading

U.S. patent: 11,772,416

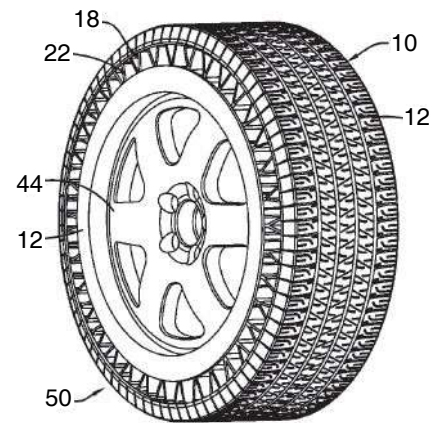
Issued: October 3, 2023

Inventors: Wesley Glenn Sigler and Joseph Carmine Lettieri

Assigned: Goodyear Tire & Rubber

Key statement: A system for detection of non-pneumatic tire loading includes a non-pneumatic tire. The non-pneumatic tire includes a ground-contacting annular tread, a central rim and at least one spoke disk disposed between the rim and the tread. The spoke disk includes an

inner ring mounted on the central rim, an outer ring and spokes extending radially between the inner ring and the outer ring. A shear band is disposed between the outer ring of the spoke disk and the tread. A flange is disposed on an outboard surface of the spokes of the spoke disk. Indicating means are formed on the outboard surface of the plurality of spokes of the spoke disk radially outwardly of the flange. The flange interfaces with the indicating means when the tire is in an overloaded state or is in need of replacement.



Tire rubber composition and tire

U.S. patent: 11,772,422

Issued: October 3, 2023

Inventor: Ryoji Matsui

Assigned: Sumitomo Rubber

Key statement: The present disclosure aims to provide a tire rubber composition and a tire which have an excellent ability to reduce deterioration of fuel economy and abrasion resistance over time. The present disclosure relates to a tire rubber composition which contains one or more rubber components having a combined content of styrene-butadiene rubber and polybutadiene of 90% by mass or more, one or more fillers and one or more vulcanizing agents, the rubber composition as a whole having a vinyl content of 53 mol % or higher based on 100 mol % of the combined amount of the butadiene-based structural units in the butadiene portion of the styrene butadiene rubber and the polybutadiene.

★ ★ ★ ★ ★

YOUR SPECS. OUR SPECIALTY.

CUSTOM RUBBER MIXING

WIRE
CALENDERING

ISO 9001
CERTIFIED

FABRIC
CALENDERING

Contact Tennessee Custom Mixing's Sales Manager
Wendell Duke | 731-884-2530 | wendell.duke@tcmmix.com





FPS Abrasion Tester

- Advanced Lambourn based wear testing of rubber materials
- Strong correlation between lab and field performance data for tire development
- Fully automated testing of up to 56 (50mm spec) or 24 (70mm spec) samples
- Variable slip control technique used with abrasion drum and test sample offering wide range of wear severity capabilities
- Full control over speed, slip, load, temperature, and time
- Test output data easy to manage and report

Ueshima

UESHIMA SEISAKUSHO CO., LTD.

RTM Friction Tester

- One-of-a-kind tester that offers friction testing in dry, wet, and icy conditions
- Acceleration and braking analysis for traction studies
- Rolling resistance measurement capabilities
- Chamber and water temperature control offering wide range of test conditions
- Friction coefficient data graphed in Real Time
- Variable slip angle
- Asphalt road surface option



For more info, please visit our website or contact
SEIKA MACHINERY, INC.
Tel: 770-446-3116
info@seikausa.com
www.seikausa.com/rubbertesting



Utilization of AI driven solutions for rubber compound formulation: A practical approach

by Hans-Joachim Graf, H-JG Consulting, and Christoph Hartwich, IT consultant

The integration of artificial intelligence (AI) into various industrial sectors has spurred remarkable progress in the field of manufacturing process development. This concept has been extended to polymer compound formulations, where AI techniques have been used to optimize rubber formulations (refs. 1-10), as well. Furthermore, it is conceivable that mixtures of other polymers, such as TPEs, thermoplastic materials or polyurethane compounds, could be similarly treated. Advantages of employing AI driven tools include reduced development time, enhanced efficiency and increased accuracy.

However, certain formidable challenges exist around AI based rubber formulation development (ref. 11). One identified consideration is that these tools are useful only when conventionally organized datasets, cultivated over years through rigorous experimental design techniques, are used. AI analysis is only as good as the dataset it is analyzing.

Besides the challenges associated with using unstructured databases, additional difficulties arise from the fact that many mixtures address multiple and highly variable desired solutions. Finally, specific to rubber development, it is also understood there is some degree of measurement error compared to the exact values that are obtained in other fields.

Due to these inherent challenges, at present the use of AI in rubber compound development is generally restricted to small, highly specific databases, and can only be used by experienced, knowledgeable technicians.

To address these challenges, this article presents two possible solutions:

- Certain pragmatic methodologies for handling data under non-ideal conditions are described. They aim to handle the absence of systematic organization and offer practical insights into navigating the complexities of unstructured data.
- An AI tool, specifically tailored for accurately formulating mixtures from data characterized by diverse testing conditions, inherent errors and limited structural organization, is also described. By leveraging advanced AI algorithms, this tool can mitigate the negative impact of data variability and incompleteness, thereby enhancing the accuracy of mixture formulation prediction.

Through its comprehensive exploration of challenges and innovative solutions, this article contributes to the evolving discourse on the practical implementation of AI tools in rubber compound development.

The importance of effective mixing formulation development within the rubber industry is undeniable. Rubber compound formulations have an influence not only on product quality and functionality, but also on manufacturing efficiency. As mentioned, AI technologies have already made their way

into the manufacturing processing sector. A sketch of a forward propagation AI is depicted in figure 1. As developers become convinced of the benefits of AI driven compound development as a powerful assistant, its integration within the thermoplastic and rubber compounding fields will most likely advance.

Along with this burgeoning development, however, challenges related to using AI tools on unstructured datasets have arisen. In the late 1990s, the author had the opportunity to test a “first generation” AI tool. Despite conducting tests with a consistent dataset of several hundred mixtures based on only one EPDM polymer, significant deviations in predicting new mixture properties arose. The primary reason for these failures was due to the lack of transparency or back traceability. The deficiency between the data and confirmation experiments was extremely large, indicating the presence of unknown faulty data. Errors within the data (for instance, measurement errors or even typing errors) could be neither identified nor rectified.

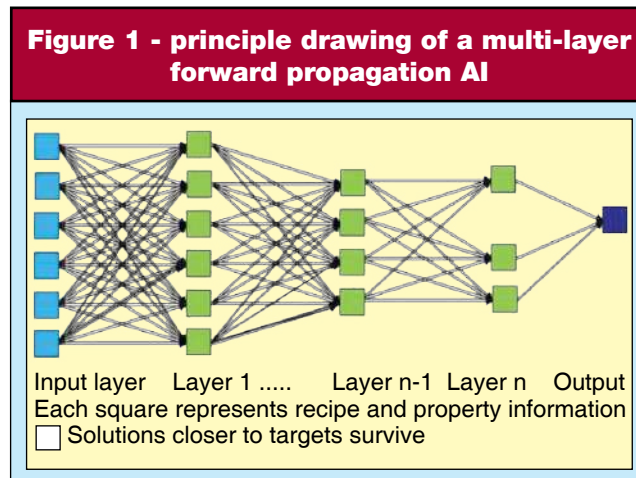
Since the introduction of experimental design techniques that construct numerically limited datasets through variations of a few ingredients, attempts have been made to push these boundaries and overcome dataset challenges (refs. 12-14). However, the majority within the rubber industry still tend to utilize historically accrued files for development; and thus, the chance for significant AI analytic errors still remains.

AI analysis challenges in rubber compound development

Implications for AI precision, unstructured databases

Many companies currently use and populate databases that have limited structural organization. For example, these databases may contain non-comparable values, i.e., those that have been measured according to different testing protocols like ISO and ASTM. Values may also have come from nonstandard customer specifications. They may even contain missing property values.

Unfortunately, within the rubber industry, these types of databases are more prevalent than the structured, logical type. The resultant dataset values, therefore, cannot be considered compa-



rable; and as such, cannot be analyzed using AI tools with any accuracy. This represents a significant impediment for the rubber industry in the use of AI driven tools for development.

Implications for AI precision. incompatibilities

In the realm of AI and cloud computing, it is widely acknowledged that AI thrives on copious amounts of data; and, with the assumption “the more data, the better,” precision in prediction is typically assured. While this assertion resonates in contemporary AI applications, the landscape differs significantly in the rubber industry.

This industry performs redundant experiments in many cases, even when employing DoE (Design of Experiments) techniques. Unfortunately, the conventional DoE approach becomes impractical due to the industry’s complexity, where numerous compound ingredients cannot be held constant while varying three to four ingredients. The resulting influx of experiments poses challenges in both laboratory execution and data analysis complexity.

As a result, more and more data from experiments accumulate, which in turn require a meticulous search and find approach for a few target property analyses. Additional difficulties arise from the fact that many mixtures address multiple and highly variable solutions. For example, certain applications may require different base polymers or crosslinking systems. For instance, sulfur based systems may work well for one application compared to a peroxide based one. Or, an HNBR compound may work better for one application compared to EPDM. Or even two entirely different base compounds/crosslinking systems may suitably work for one application. The database necessarily ends up containing data on multiple polymers or crosslinking systems. Additionally, both ingredients and properties can be unevenly distributed. This “incompatibility” between polymers or crosslinking systems can lead to unmanageable second order effects.

Therefore, predictive mixtures, because they reference completely different base polymers/crosslinking systems, etc., are not directly discernible in extensive, preexisting datasets. There is no way to easily separate such datasets. This again, poses a challenge for AI tools tasked with generating viable solutions.

Implications for AI precision, data with unpredictable errors

In rubber development, it is understood there is some degree of divergent error compared to the exact, pristine values observed in other fields in the computing domain, such as spell checkers or face recognition. Specifically, divergent error can be represented by the equation:

$$y = x + \mu \text{ (with } x = \text{true value, } \mu = \text{error)} \quad (1)$$

This transcends the traditional definition of error. Unlike datasets in other fields, errors in rubber testing are not only non-normally distributed, but can also exhibit diverse sudden onsets, among other possible distributions. These induced errors that occur through, for example, the change of procedures (mixing process, test protocols), testing equipment, material storage degradation or even operator influence, can find their way into

the data over time. Additionally, measurement errors can be introduced during test sample preparation; for example, changing storage/preconditioning conditions, testing on different equipment, or even movement of the testing facility to other locations.

As an illustration, consider the crucial parameter of tensile at break (TB) and the intricate network of factors that influence its true value.

Variables such as the molecular weight (MW) of the polymer, energy uptake during mixing, filler distribution and dispersion, and variations in the weight of crosslinkers and accelerators, for example, all contribute to the nuanced nature of TB. This is over and above the aforementioned environmental influences. Considering all these factors will help provide a comprehensive understanding of the complex error distribution in rubber development.

Unfortunately, the cumulative impact of diverse sources of error cannot be accurately mathematically modeled. This reality sheds light on the challenges posed and their implications for AI prediction precision. It makes certain machine learning (ML) tasks particularly challenging within this domain when using forward propagation AI tools.

Practical solutions when working with AI

Dealing with historically accumulated mixture databases

The following solution is proposed when analyzing massive amounts of disparate information in one large file. Contrary to conventional wisdom, storing all this data in a single file is ill-advised. Going forward, such data sets should be divided, possibly using the following separation criteria:

- Polymers (based on their compatibility)
- Vulcanization systems (based on sulfur, peroxide, metal oxide, resin or other chemicals)

This separation will necessarily result in a large number of smaller datasets. Consequently, if AI driven analysis is to be

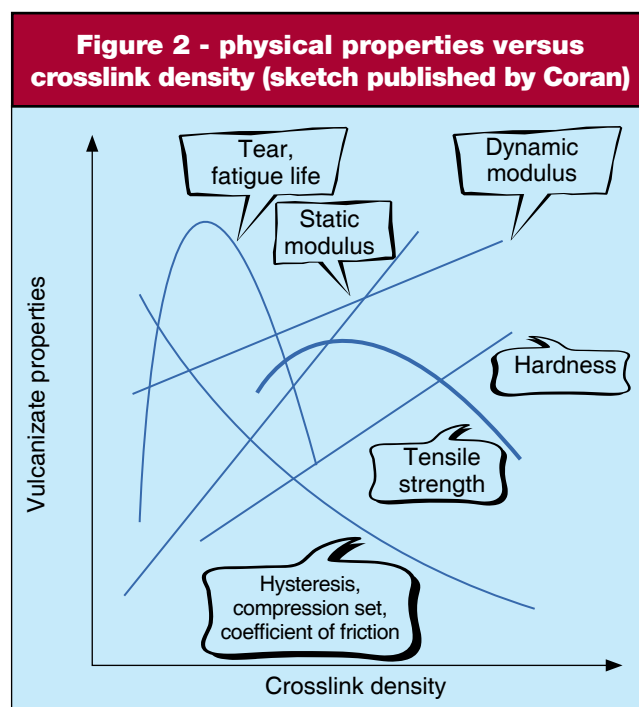
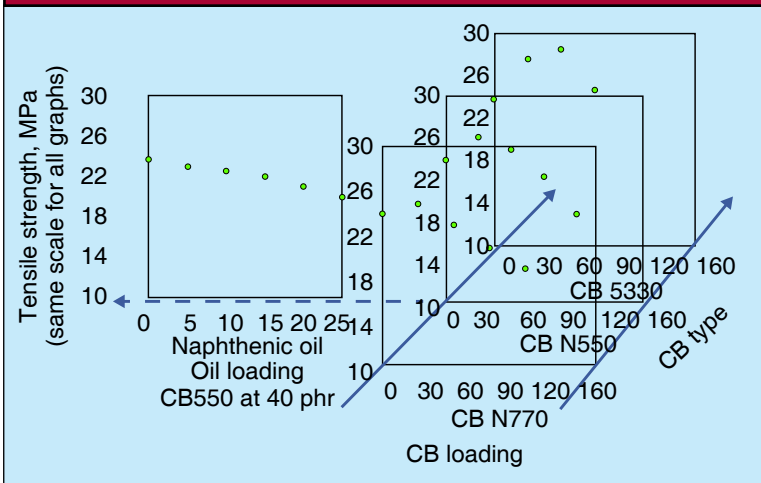


Figure 3 - tensile at break versus oil loading at one datapoint; carbon black N550 at 40 phr tensile at break versus carbon black type and loading

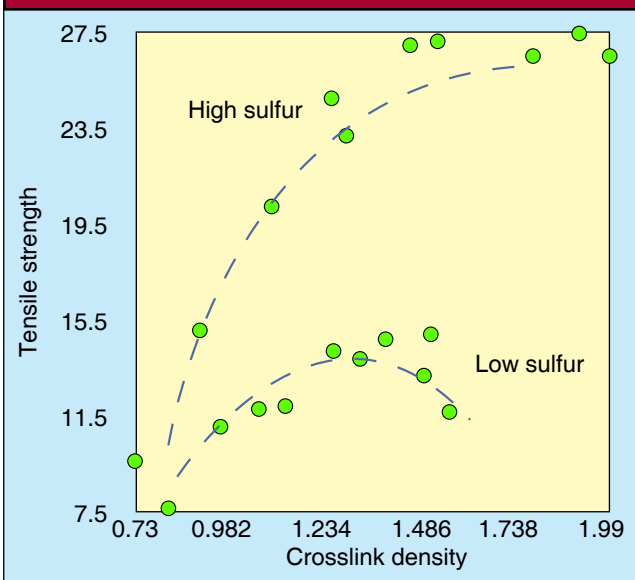


successful within the scope of this application, it needs to be prepared to handle smaller amounts of data. However, the downside to using smaller datasets is that there might be insufficient data available for a potential solution, or a prediction may occur that lacks statistical confidence.

Methodology to address non-ideal data conditions

One pragmatic solution to address dataset challenges involves detecting and eliminating faulty data using a correlation analysis between ingredients and properties, as elucidated in the renowned diagram by Coran and Stuebaker (refs. 15-17) (figure 2). This visual representation effectively captures the correlation of crosslink density to physical properties in vulcanized rubber compounds. It describes a compound at constant carbon black and oil loading where the crosslinking agent (sulfur) is the only

Figure 4 - tensile strength versus crosslink density at two different sulfur levels



variable. While it is widely acknowledged that additional components, such as carbon black, oil, polymer and crosslinker, can significantly influence TB and other properties, these factors are expected to adhere to the correlation demonstrated in Coran’s diagram.

Coran’s diagram needs only to be converted into a multidimensional format to be useful for more in-depth data analysis, as illustrated in figure 3. A Cartesian diagram, with properties plotted against crosslink density, is constructed for each level of carbon black and oil loading, forming perpendicular representations. In this illustration, utilizing datasets from published sources (refs. 18 and 19), one can effectively showcase the influence of variations in carbon black and oil loading, as well as their types (represented on the z-axis), on the tensile at break (TB on the y-axis).

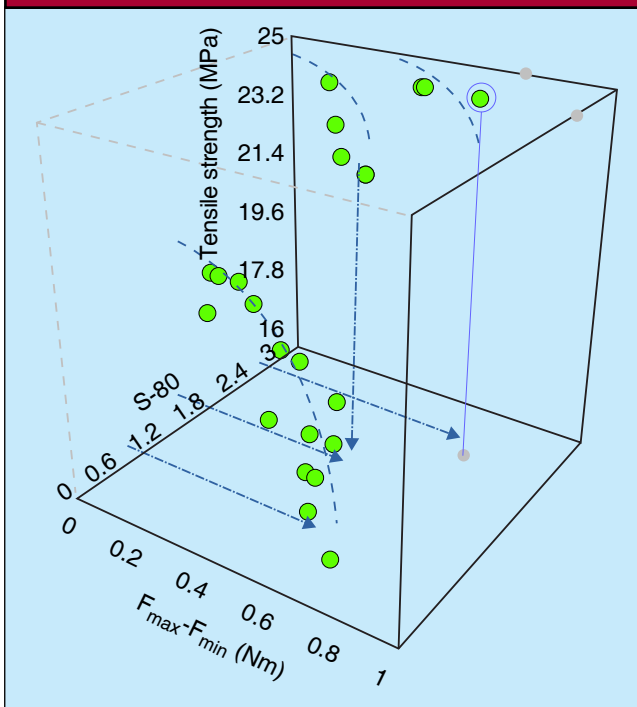
As another example, the impact of sulfur as the crosslinking agent suggests that the sulfur bridge structure undergoes changes with varying sulfur amounts, influencing the tensile at break relative to crosslink density (sulfur on the x-axis, or alternatively MH-ML on the x-axis) (figure 4). These curves were generated using a sulfur cured natural rubber (NR) compound accelerated with N-cyclohexylbenzothiazol-2-sulphenamide (CBS), maintaining a constant sulfur to CBS ratio at two different levels of sulfur (ref. 20). This multidimensional approach provides a comprehensive view of the interrelationships between these crucial factors.

Dealing with data containing unpredictable errors

It is challenging to make definitive judgments about errors in the data, especially when dealing with larger datasets. There are two ways of tackling this:

- When confronted with repetitive data, valuable insights into measurement errors can be gained. Traditionally, the control compound acts as a benchmark, as is used in DoE in combination with iterative processes. Thus, it is advisable to incorporate a control compound as a standard procedure, even in trial and error experimentation. Adhering to good manufacturing practice (GMP), it is recommended to produce and test the control compound three to four times a year, for example. This precaution is essential due to the inherent unpredictability of results stemming from the aforementioned measurement errors, and ensures no erroneous conclusions are drawn.
- Quality dataset assessment can be facilitated again using correlations between ingredients or among properties themselves. The user can generate 2D graphs that illustrate relationships between ingredients and/or properties, along with regression correlation coefficients. Additionally, users can employ a 3D graph for the analysis of relationships involving three variables, such as two ingredients and a specific property, for example.
- The generation of diagrams depicting property versus crosslinker concentration, typically used as a measure of crosslink density, while keeping other ingredient concentrations constant, is a crucial step. If the resulting

Figure 5 - tensile strength versus $F_{max}-F_{min}$ and sulfur at three different levels (0.6 phr, 1.25 phr and 2.0 phr)



diagram, using the same x-y axis as in Coran’s work, demonstrates a similar curvature or trend with minimal

scatter around that curve, the condition proposed by Coran’s scheme is fulfilled. In such cases, the error can be estimated through visual data inspection or with regression and its correlation coefficient.

As an example, using a dataset of 23 compounds, a 3D graph can be generated, placing $F_{max}-F_{min}$ values on the x-axis for use as a synonym for crosslink density (refs. 21 and 22). Sulfur levels of 0.6 phr, 1.25 phr and 2.0 phr are plotted on the y-axis, and tensile strength on the z-axis (figure 5). The graph adequately follows the trends of figure 4, albeit with slightly more scattering around the trend curve.

To increase measurement confidence, standard deviations and errors should be assessed to decide whether datasets should be retained or excluded. To aid in differentiation between a measurement value and the “true” value, it is sensible to exclusively utilize data either from certified laboratories or from data that is trusted by the user, with minimized measurement error.

Formulations for rubber compounds or other polymer compositions, such as TPEs, thermoplastic materials and polyurethane compounds, can be used as long as they are normalized formulations, as is customary in the rubber industry.

Optimizing AI integration in rubber industry data management

Thus, when working with existing rubber data information, from an AI perspective it is imperative that smaller data amounts stored in discrete repositories be used for analysis. In general, compound data sets should adhere to a standardized structure. Foundational physical properties should be consistently mea-

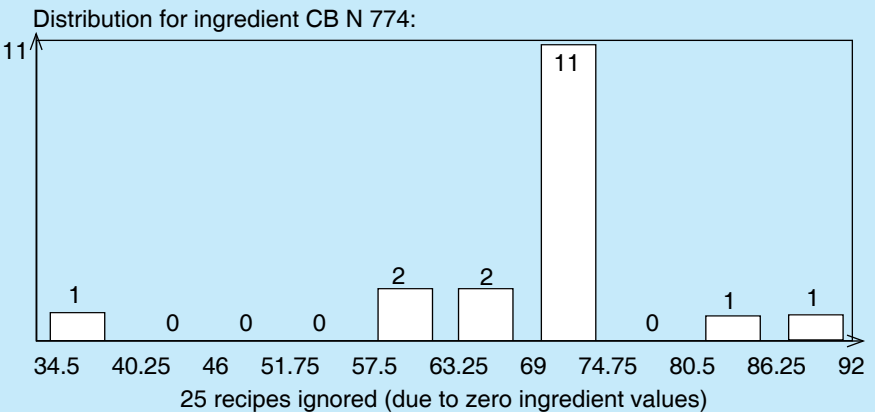
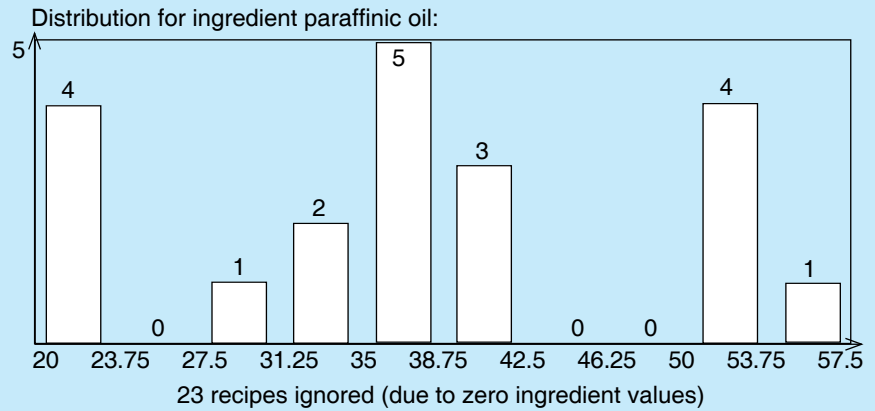
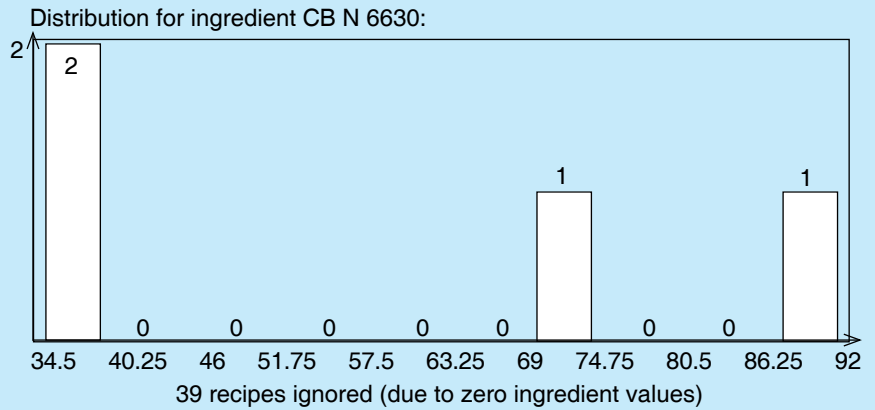
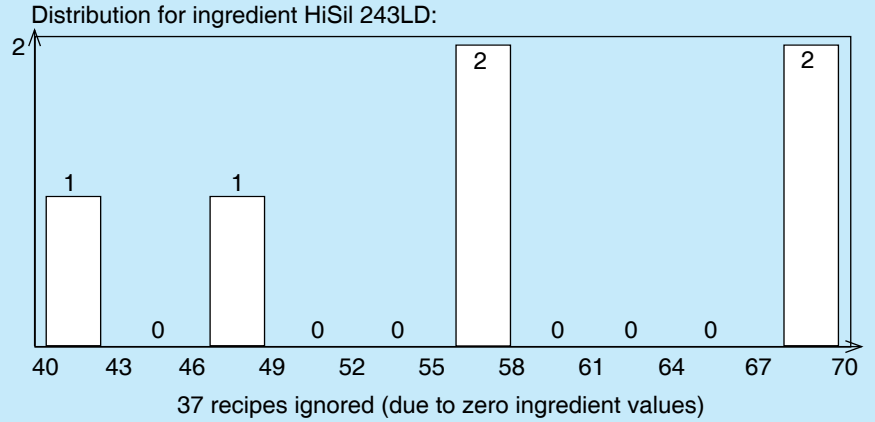
Figure 6 - screen shot of GrafCompounder AI software tool

Figure 7 - frequency distribution bar diagram of selected ingredients in small compound data set

Frequency distribution, AB50-6013-606 EPDM demo neutral V2.gc

Ingredients:

- EPDM 01
- EPDM 02
- EPDM-M90-C256-ENB5
- EPDM C2-70M-60
- EPDM C2-70-M-30
- EPDM C2-55-M-60
- EPDM C2-70-M-60
- EPDM C2-60-M-70
- EPDM C2-70-M-60
- CB N 550
- CB N 6630
- CB N 774
- CB N 990
- Ultrasil VN3
- Ultrasil 7000 GR
- HiSil 243LD
- Silane 172 DLC
- Liquid BR ST
- Mistron vapor
- Soft clay
- Hard clay
- Graphene B OX
- TiO2 Anatas
- Mg 170
- Akrochex red OX
- EP oil
- Paraffinic oil
- MBPA 445
- PBCDCP L
- TMQ
- ZMTI
- Paraffin wax
- PE wax
- FA blends
- N-NDPA
- MBM/HVA-2
- LBR-150



sured for each compound, complemented by customer specific attributes. Similarly, if trial and error, one step at a time or DoE techniques are employed, adherence to standardized protocols is imperative.

While the standard structure involves conducting a larger number of tests per compound in the development phase, the subsequent benefits of utilizing AI tools are noteworthy. These advantages encompass the prevention of redundant experiments through the prediction of an “in-specification” compound, which should always be verified in a confirmation experiment. In the event of an unacceptable deviation between the predicted compound and confirmation, it serves as a good starting point for further refinement.

To facilitate seamless data integration, standardization of ingredient names, property names, and procedural and employee nomenclature should be implemented. Such standardization ensures compatibility, allowing for the effortless merging of compound data files with minimal effort and complication. In essence, the rubber industry’s journey towards AI integration is underlined by the need for strategic data structuring and standardized practices to unlock the full potential of advanced analytics.

AI development tool for rubber compounds: A practical approach
A software tool based on a forward propagation AI called “Graf-Compounder” (figure 6) seems particularly suited to address many of the above concerns (ref. 23).

The aforementioned prediction failures prompted the development of this AI tool (refs. 24 and 25). It is grounded in a highly pragmatic approach. It does not possess any secret domain knowledge. Most importantly, it does not endeavor to derive equations, analytical or regression, from the assigned data. Instead, the tool treats each formulation as a data point, consisting of a list of ingredients with corresponding quantity indications and a list of properties with their measured values. Each data point can be described as an n th dimensional vector, where n represents the number of ingredients and properties.

At its core, this tool employs a specialized AI technique, a highly specific genetic algorithm that converges on a solution through multiple intermediate steps (generations). The process operates automatically and interconnects data points through simple interpolation in small steps. It determines which data points/vectors should be mixed, and which factors should be used to best fulfill the user defined target mixture properties. It addresses both the selection of the most suitable data points and, if necessary, the determination of optimal compromises among all requirements. To achieve this, the process internally employs a computation called the fitness function, which it generates from the given criteria.

Its ultimate advantage is that it can work with existing datasets without any modifications. Limitations arising from the dataset’s structure must be accepted or modified by the user. Several tools and features are available in the software for this purpose; for example, a frequency bar diagram (figure 7):

- The frequency distribution of each mixture component and/or each test value can be displayed and evaluated. This tool allows the user to identify empty data spaces that

should be filled with additional compound data.

- Compound data points with data missing in essential places, like missing values for properties specified as criteria, are automatically excluded from calculations.
- Datasets from other files can be added and integrated with the merger function.
- The composition of the predicted mixture is comprehensively presented, ensuring backward traceability to the original formulations utilized during the prediction process.

Ultimately, this tool can counteract some of the disadvantages of dealing with non-structured/disparate databases.

Considerations and outlook

The integration of AI into mixing formulation development brings about practical advantages, including:

- *Efficiency:* A systematic development approach that minimizes experimental efforts, thereby expediting the development process.
- *Accuracy:* Utilizing AI driven tools enables targeted variations in criteria to focus on specific material properties.
- *Optimization:* It has the capability to improve existing formulations and tailor them to specific requirements.
- *Sustainability:* The reduction of waste is achieved through decreased experimentation efforts. This enables the analysis of numerous formulations, with only a few selected for actual confirmation experiments.

However, the absence of systematically constructed historical datasets, material incompatibilities and the possibility of inherent measurement errors pose a challenge, requiring a severely structured, pragmatic approach in the application of AI driven tools.

Consequently, the use of AI tools at present requires technological knowledge and judgment, not only in selecting and compiling data for calculations, but also, based on the user’s experience and knowledge; their ongoing assessment of whether the results make sense. Consequently, existing AI tools for mixture development should currently be classified as assistance systems, and utilized only by expert rubber technologists.

The GrafCompounder AI tool is poised to work well for processing historically accumulated datasets by the general user, particularly if assessment criteria such as data reliability can be established for AI processing. The tool has been designed with the goal of contributing significantly to the efficient, accurate and sustainable advancement of rubber compound formulation development.

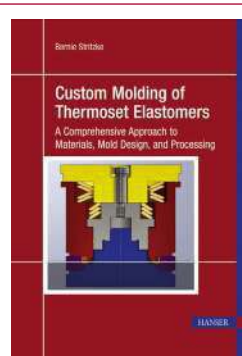
Conclusion

Given the inherent challenges associated with current rubber formulators’ existing datasets, the employment of general AI based analytical tools can only be used in rigorously controlled instances, and cannot guarantee statistically significant results. However, because of its promising inherent ability to analyze mass amounts of information, it is imperative that its use be advanced within the rubber industry to avoid the loss or neglect of valuable historical data.

The GrafCompounder AI driven development tool represents a significant advancement in polymer formulation development. Unlike traditional trial and error approaches, this tool allows developers to integrate their expertise with AI based calculations. The incorporation of the GrafCompounder AI driven development tool into rubber compound development procedures, including data management, enhances data quality and provides more accurate predictions for rubber compounds, accelerating development and encouraging the creative exploration of new possibilities.

References

1. K. Deb, *Multi-Objective Optimization Using Evolutionary Algorithms*, John Wiley & Sons, Inc. (2001).
2. A.C.C. Coolen, *A Beginner's Guide to Mathematics of Neural Networks in: Concepts for Neural Networks, A Survey*, L.J. Landau and J.G. Taylor (eds.), Springer, Berlin, 13 (1998).
3. G.A. Schwartz, "Prediction of rheometric properties of compounds by using artificial neural network," *Rubber Chem. Technol.*, 74, pp. 116-123 (2001).
4. Y. Nakajima, inventor; U.S. Patent 06411965B1, June 25, 2002.
5. R.C. Rowe and E.A. Colbourn, "Neural computing in product formulation," *Chem. Educator*, 8, pp. 1-8 (2003).
6. Y. Shen, K. Chandrashekhara, W.F. Breig and L.R. Oliver; "Neural network based constitutive model for rubber material," *Rubber Chem. Technol.*, 77, pp. 257-277 (2004).
7. V. Vijayabaskar, R. Gupta, P.P. Chakrabarti and A.K. Bhowmick, "Prediction of properties of rubber by using artificial neural networks," *J. Applied Polymer Sci.*, 100, 3 (2006).
8. U. Zeyneb and A. Kiraz, "Artificial intelligence based prediction models for rubber compounds," *J. Polymer Eng.*, 43, 2, pp. 113-124 (2022).
9. Y. Shen, K. Chandrashekhara, W.F. Breig and L.R. Oliver; "Neural network based constitutive model for rubber material," *Rubber Chem. Technol.*, 77, pp. 257-277 (2004).
10. C. Drahl and J. Kemsley, *AI for Materials Discovery*, ACS Report, C&EN 02 (2021).
11. J. Huang, J. Liew, A. Ademiloye and K.M. Liew, "Artificial intelligence in materials modeling and design," *Archives of Computational Methods in Engineering*, 28, 5, pp. 3,399-3,413, <https://doi.org/10.1007/s11831-020-09506-1> (2020).
12. EP 0865 890 A1, *Method of Designing Multicomponent Material, Optimization and Storage Medium on Which Multi-component Material Optimization Analysis Program is Recorded*, Applicant: Bridgestone Corporation (1998).
13. U.S. 7541122B2, *Empirical Design of Experiments Using Neuronal Network Models*, Assignee: Honeywell International Inc. (1996).
14. H.-J. Graf, "Methodical recipe development: Increases technological and economical advantages [GE]," *Conference Proceeding at IRC, June 29 - July 2, 2009, Nuremberg, Germany*, (2009).
15. P.J. Flory, N. Rabjohn and M.C. Schaffer; "Dependence of tensile strength of vulcanized rubber on the degree of crosslinking," *Rubber Chem. Technol.*, 23, pp. 27-43 (1950).
16. M.L. Studebaker; "Effect of curing systems on selected properties of natural rubber vulcanizates," *Rubber Chem. Technol.*, 39, pp. 1,359-1,381 (1966).
17. A.Y. Coran, in *Science and Technology of Rubber*; F.R. Eirich (ed.), Academic Press, New York, NY, ch. 7, p. 292 (1978).
18. R.F. Ohm (ed.), *The Vanderbilt Handbook, Thirteenth Edition* (1990).
19. R. Kirschbaum and F. Jones, *Profile of Cabot Carbon Blacks in Natural Rubber*, Technical Report RG 133.
20. L. Gonzalez, A. Rodriguez, J.L. Valentin, A. Marcos-Fernandez and P. Posadas, "Conventional and efficient crosslinking of natural rubber: Effect of heterogeneities on the physical properties," *Kautsch. Gummi Kunstst*, December 2005, pp. 638-643.
21. S. Lee, H. Pawlowski and A.Y. Coran, "Method for estimating the chemical crosslink densities of cured natural rubber and styrene butadiene rubber," *Rubber Chem. Technol.*, 67, pp. 854-864 (1994).
22. M. Saewe, *Investigation of Sulfur Vulcanization of Polybutadienes with Benzothiazole-Sulfenamides*, Thesis (GE) University of Hannover; Germany (2007).
23. H.-J. Graf, "A new tool for a systematic development and improvement of compounds [ENG]," paper presented at Rubber Division, ACS, 183rd Spring Technical Meeting, Akron, OH, April 24, 2013.
24. H.-J. Graf, C. Sirisinha and P. Pangamol, "Simulation of a statistical experimental design with a new software tool," *Rubber Fiber Plastics* 04, 10, pp. 266-276 (2015).
25. H.-J. Graf, "Where are we with artificial intelligence and machine learning in rubber development?" poster presented at RubberCon23, May 10-11, 2023, Edinburgh, Scotland.



Custom Molding of Thermoset Elastomers

\$140.00

This comprehensive reference book incorporates the latest developments in the synthesis, production, characterization, and application of various types of polymeric nanocomposites. It outlines the various preparation techniques using different types of nanoparticles and polymer matrices with emphasis on clay nanoparticles. All fundamental issues such as thermodynamics, kinetics, and rheology are discussed. Also, the structure and the characterization of polymeric nanocomposites, including their molecular characteristics, thermal properties, morphology, and mechanical properties, are covered in detail.

www.rubberworld.com/book-store



VALEX

We are your
trusted supplier
of Natural Rubber
from Latin America

Discover our diverse
range of products:

- TSR 10
- TSR 20
- TSR 10 CV
- TSR CV
- TSR L
- SKIM
- DPNR

As we commemorate Women's Month, we proudly feature Eliana Alvarez, an exceptional Rubber tapper from Caquetá, Colombia. **Valex Group, a women-owned company**, takes great pride in celebrating Eliana's dedication and the **contributions of women like her.**

valex
group
.com

235 Alpha Dr. Pittsburgh, PA 15238 | info@valexgroup.com

Custom compounding with Spherix aluminosilicate microspheres

by Jeff Heath, Spherix

Spherix manufactures post-industrial recycled aluminosilicate ceramic microspheres with a mean particle size of 3-4 μm . The solid, incompressible spheres mechanically facilitate ingredient dispersion, processing speed and improved surface quality within a wide variety of polymer systems during both mastication and downstream processing. They promote flow and can reduce the need for conventional lubricants depending on the compound. Spherix is a registered trademark of Spherix.

Spherix additives are derived from coal combustion residuals (CCRs). CCRs are harvested from third party impoundments, eliminating the need to landfill them. After being harvested, the CCRs are dried and processed through the patented and trademarked Staged Turbulent Air Reactor (STAR). In the STAR reactor, the CCRs are subjected to temperatures of more than 900°C, effectively becoming the fuel source for the entire STAR process. Upon exiting the STAR, the material is free of any organic matter and particles are spherical. The STAR material is then further size classified to achieve a unimodal particle size distribution with a mean particle size of 3-4 μm . The resulting product is consistent, spherical and suitable for various thermosets, thermoplastics and coatings systems (figure 1).

Fortimix products utilize targeted surface chemistries to impart benefits such as enhanced lubricity, cure activation and se-

lect polymer compatibility. The Fortimix SC series is designed to increase activation within sulfur cured elastomeric systems, while providing the same mechanical benefit to rubber processing as Spherix 20M. Fortimix products help reduce passes in complex formulations that require multiple passes and improve extrusion characteristics in compounds that are difficult to process. This article will discuss one specific use case where Spherix products provide demonstrable process improvements. This case utilizes a formulation designed to resemble a tire tread compound. A typical particle size distribution can be seen in figure 2 for Spherix and Fortimix process aids. Fortimix is a registered trademark of Spherix

Abstract of the case study

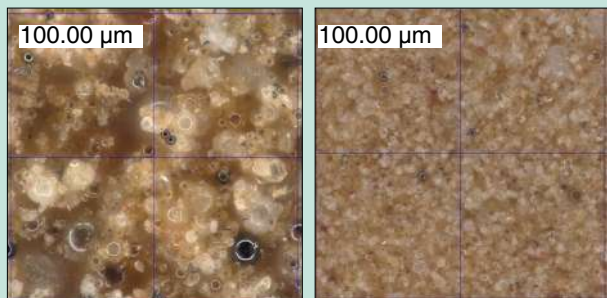
Spherix and Fortimix products are sustainably derived mineral process additives that provide mechanical benefit by internal shear plane modification like that of ball bearings or ball mills. Through increased polymer mobility and agglomeration breakdown, highly filled compounds can achieve faster mixing, improved dispersion, better homogeneity of ingredients and superior surface quality and extrudability. This trial demonstrates the ability of Fortimix SC series additives to improve mixing and processing, while reducing passes without sacrificing rheological or physical properties.

Testing confirmed that the addition of Fortimix SC and Fortimix SC-5 resulted in vastly improved levels of filler dispersion, with comparable rheological and physical properties measured. Additionally, with only 6 phr of Fortimix, a pass was eliminated. The scope of this case study explores compounding options for improved dispersion and reduced mixing requirements in highly filled compounds.

Case study: Pass reduction in a highly filled tread compound

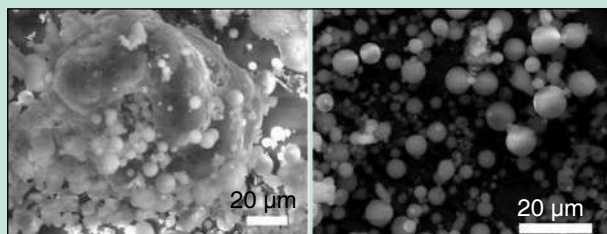
Highly filled formulations, especially when silica is involved as a reinforcing aid, generally result in high Mooney compounds requiring multiple passes to achieve a workable processing vis-

Figure 1 - unclassified and classified microspheres (top), and Spherix images before and after the STAR process



Unclassified microspheres at 1,000x

Classified microspheres at 1,000x



SEM images of Spherix 20M before and after the STAR process

Figure 2 - typical particle size distribution of Spherix and Fortimix process aids

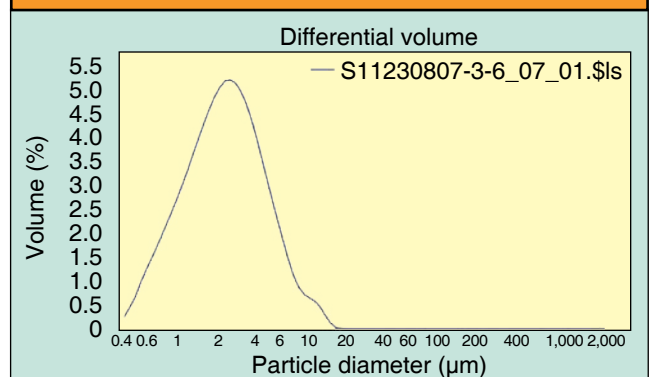


Table 1 - example tire tread formulation

Material	Fortimix SC	Fortimix SC-5	Control
SBR 1783	110	110	110
Buna CB 22	20	20	20
N234 carbon black	5	5	5
Fortimix SC	6.0	-	-
Fortimix SC-5	-	6.0	-
Lubricant	1.5	1.5	3.0
Silica	80.0	80.0	80.0
TDAE oil	8.0	8.0	8.0
Stearic acid	2.0	2.0	2.0
<i>Second pass</i>			
Silica	30.0	30.0	30.0
Si-69 silane (TESPT)	8.8	8.8	8.8
TDAE oil	8.0	8.0	8.0
6PPD	2.5	2.5	2.5
Remill #1	Yes	Yes	Yes
Remill #2	No	No	Yes
Zinc oxide	2.5	2.5	2.5
Sulfur	1.1	1.1	1.1
CBS	2	2	2
DPG	1.5	1.5	1.5
Total phr	288.9	288.9	284.4

cosity. Compounders are forced to absorb the time and overhead costs associated with additional remill passes as a necessity. To evaluate reducing mixing time and the possibility of eliminating an entire pass, a custom compound was created using Fortimix dispersion enhancing additives to increase shear. Performance was measured against a control utilizing traditional process lubricants.

Fortimix products function as a mechanical process aid to boost dispersion and deagglomerate fillers within the polymer matrix, while employing targeted surface chemistries to improve ingredient compatibility in the cured product. The treated microspheres provide a means to address dispersion problems in early passes. Better homogenization rates of filler ingredients help to reduce processing time, while meeting or exceeding customer specifications. The target of this study is to quantify the level of benefit.

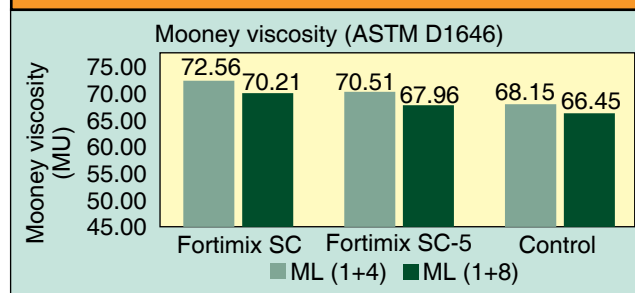
Experimental

Formulation and usage of Fortimix

Formulation of the control and experimental mixes (table 1) was designed to resemble a tire tread compound with high silica loading. When using Fortimix products, the ideal introduction is during a short 30 to 60 second premastication step with the ram down. This step promotes microsphere integration, effectively priming the polymer for filler and additive incorporation. The remaining ingredients can be added in a typical order of addition.

Compounding variables

The adjustments worth studying in the formulation are the reduction of fatty acid processing aids and the addition of Fortimix performance additives. Fortimix has been found to synergize well with waxy process aids by providing mechanical lubrication to complement the chemically derived lubrication. For

Figure 3 - Mooney viscosity

this reason, compounders can reduce waxy additives, while increasing processing performance.

Lubricant is reduced by 1.5 phr, while 6 phr of Fortimix SC and SC-5 are added in the experimental mixes. The experimental formulations result in a slightly less polymer-rich compound.

Mixing instruction

Each mix was processed in a 1.6 liter laboratory Banbury mixer. Fortimix was added early in the experimental runs with an incorporated 30 second ram down premastication. After premastication, the remaining ingredients in the first pass were added. The first two passes incorporated fillers, additives and plasticizers, and the compound was dropped at 150°C. The third and fourth remill passes were used to distribute ingredients further and achieve necessary Mooney reduction and raw material distribution. Each remill pass was carried out on a two-roll mill for 2.5 minutes. The final pass was dropped at 110°C to limit the amount of heat history to added curatives.

Testing methods and experimental observations

Rheological testing measured the Mooney viscosity ML (1+4) at 100°C and the Mooney scorch at 121°C per ASTM method D1646. The cure characteristics were determined by a moving die rheometer (MDR) set to 160°C per ASTM method D5289. Standard physical property testing was conducted per ASTM D412, ASTM D624 and ASTM D2240 Type A to quantify the benefits of Fortimix within the highly loaded compound. Varying levels of dispersion were observed pass to pass and recorded by ASTM D7723. Dynamic mechanical analysis (DMA) was used to quantify the energy dissipation capability of the mixed materials further.

Results

Rheological findings

The Mooney viscosity curve (figure 3) shows that Fortimix SC caused a 4.41 point increase, while Fortimix SC-5 caused only a 2.36 point increase in ML (1+4) compared to the control data. This rise is to be expected due to the 1.5 phr waxy process aid removal and dry powder performance additive introduced at 6 phr. The differentiation between the two Fortimix products lies in SC-5's surface treatment design, which imparts some level of peptization and increased lubricity (table 2).

Mooney Scorch Ts1 data for the three compounds all range within less than a minute, and reveal that adding the performance additives does not affect scorch safety. Fortimix can be

Table 2 - Mooney viscosity data (ASTM D1646)

Sample ID	Initial viscosity (MU)	Viscosity at minimum (MU)	Viscosity at maximum (MU)	ML 1+4 (MU)	ML 1+8 (MU)
Fortimix SC	109.51	70.27	96.28	72.56	70.21
Fortimix SC-5	106.49	68.01	93.06	70.51	67.96
Control	103.47	66.41	90.16	68.15	66.45

Table 3 - moving die rheometer data (ASTM 5298)

Sample ID	Minimum (dNm)	Maximum (dNm)	Ts2 (minutes)	Tc90 (minutes)
Fortimix SC	2.60	18.30	1.66	9.84
Fortimix SC-5	2.55	17.67	2.25	9.93
Control	2.31	16.62	2.67	10.29

Table 4 - dispersion data (ASTM D77723)

Sample ID	Pass	Dispersion
Fortimix SC	First	96.70%
	Second	96.00%
	Remill #1	97.60%
Fortimix SC-5	First	98.90%
	Second	96.50%
	Remill #1	93.10%
Control	First	97.60%
	Second	87.50%
	Remill #1	97.80%
	Remill #2	95.80%
	Final	98.40%

Table 5 - tear die C (ASTM D624)

Sample ID	Tear strength (kN/m)
Fortimix SC	38.23
Fortimix SC-5	40.43
Control	37.57

added without concern of making the compound scorchier than usual at processing temperatures. Moving die rheometer (MDR) data (table 3) show that adding Fortimix products results in a rise of the maximum and minimum torque, and a shortening of Tc90 values. The maximum torque rises by 1.68 dNm for SC, while SC-5 rises by 1.05 dNm. The Tc90 times range from 9.84 to 10.29 minutes, with the Fortimix compounds expectedly measuring on the faster end of the spectrum (figure 4). This is likely due to a slight increase in the ratio of dry ingredients to polymer. Additionally, the surface chemistry for Fortimix SC and SC-5 is designed to boost compatibilization and to cure within sulfur-dependent vulcanization systems, which could also be a contributing factor. The rise in MH compared to ML differences suggests that the two Fortimix products can enhance the state of cure and boost crosslink density, or indicate the added solids content in the formulation.

Shifts in several sets of physical property data were observed in testing, and are presented in figure 5. An increase of 1.0 to 1.5 in durometer hardness was recorded for Fortimix modified compounds. Elongation and tensile show a reduction in measurements compared to the control.

Stress at break for Fortimix SC measured only 0.5% lower

than the for control, while SC-5 exhibited a 4.4% reduction in tensile. SC-5 measured 98.7% of the control elongation, while SC measured 95.2% of the total elongation reached by the control. Tensile properties were within tolerable variability expected in batch-to-batch mixing for this specific application, and elongation again demonstrates the effects of adding additional dry ingredients to a formulation.

Dispersion data capture crucial added value for Spherix and Fortimix products

By boosting polymer mobility and reducing the filler agglomerations, a compounder can expect faster filler incorporation and mix homogeneity.

Per table 4 data, the control shows 79.8% dispersion in the first pass, and 87.5% in the second pass. In comparison, both trial batches containing post-industrial microspheres show roughly 96% to 97% dispersion in both the first and second passes. This shows a 17% and 9% improvement in experimental first and second passes, respectively. By maximizing filler dispersion and breaking most agglomerations early, one can reduce the prescribed mixing, which can lead to fewer passes in the mixer and greater overhead cost savings.

In referencing table 5 for tear strength, SC-5 shows a 7.6% improvement, while SC only shows a 0.8% improvement over the control. This gain can likely be attributed to higher levels of filler dispersion in earlier passes, as detailed in table 4.

The difference in each compound's ability to absorb and

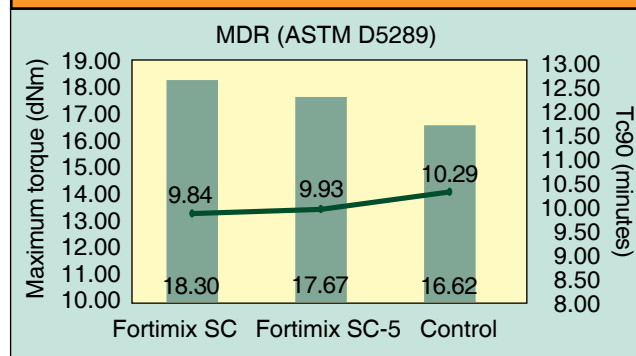
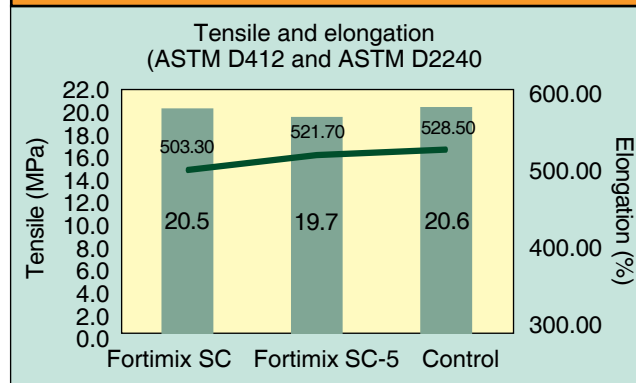
Figure 4 - moving die rheometer**Figure 5 - physical properties**

Table 6 - dynamic mechanical analysis (DMA)

Sample ID	Tan delta at 60°C	Tan delta at 0°C
Fortimix SC	0.249	0.383
Fortimix SC-5	0.254	0.391
Control	0.217	0.296

Temperature range: -70°C to 70°C; frequency: 10 Hz; static strain: 2%; dynamic strain: 0.5%

disperse energy can be quantified by measuring the tangent of delta for the compounds under DMA specific strain conditions (table 6). When evaluating a tread compound, compounders typically consider the “magic triangle of tire performance” to explain the tradeoffs between rolling resistance, wet traction and wear resistance. These tradeoffs can be observed when utilizing Fortimix treated microspheres to alter the connectivity of the vulcanized filler/polymer network.

Dynamic mechanical analysis reveals that the Fortimix SC compound demonstrates a 29.4% rise in EDP (energy dissipation potential) or tan delta at 0°C compared to the control, and indicates expected gains in wet traction. The Fortimix SC-5 compound demonstrates a 32.1% higher EDP at 0°C than the control. The Fortimix SC-5 compound demonstrates a slightly higher tan delta at 60°C and 0°C than Fortimix SC. The accelerated boost in dispersion and deagglomeration with fillers in compounds containing Fortimix treated microspheres affords greater efficiency in increasing silica loadings. The potential for higher silica when compounding with Fortimix presents new opportunities to modify wet traction for tires or vibrational damping in other finished products.

Conclusion

With an average 17% increase in dispersion in the first pass, and a 9% increase in dispersion in the second pass, Fortimix SC and SC-5 demonstrate greater dispersibility of fillers and additives compared to the control formulation. Additionally, the potential for saved mixing and processing time by reducing a pass is a benefit that can translate into cost savings for compounders.

Rheological and physical properties performed on par or within the expected mixing variability compared to the control. Compounders incorporating Fortimix post-industrial performance additives at a 5 to 7 phr loading level can expect a 1 to 1.5 point rise in durometer A hardness, and up to a 10% rise in ML and MH. Improved tear die C measurements can be attributed to the ability of Fortimix to increase filler dispersion and homogeneity of the polymer matrix.

The chemical treatments of Fortimix performance additives enable optimization of the silanization process carried out with silanes such as TESPT. Compounders gain better physical properties from a more connected filler/polymer network by creating a more consistent silica and polymer interface. The energy dissipation potential of Fortimix, when added to silica filled rubber compounds, is considerable and presents the opportunity for performance optimization, depending on the tire compound.

Fortimix performance additives enable more efficient processing due to greater ingredient deagglomeration and added shear modification provided by the mechanics of the hard and spherical nature. With added shear, drop temperatures can be achieved sooner with maintained or increased levels of dispersion. When dropping onto a mill, more effective filler incorporation leads to lower crumble characteristics and better batch cohesion. Each of these benefits can translate into cost savings for the compounder.

See us at the show!



International Elastomer Conference
September 9-12, 2024 • Pittsburgh, PA






 Vanderbilt Chemicals, LLC <small>A Wholly Owned Subsidiary of R.I. Vanderbilt Holding Company, Inc.</small> Booth # 616	 POLYMERICS Booth # 919	 SOVEREIGN CHEMICAL Booth # 606
 Release Coatings of New York, Inc. Booth # 619	 R.E. Carroll, Inc. <small>Specialty Chemicals • Petroleum Products</small> Booth # 619	 VENANGO <small>Heated Platen Specialists</small> Booth #608
 ACE LABORATORIES Booth # 1116	 RDAbbott <small>APPLIED CURIOSITY</small> Booth # 607	 AGC <small>Your Dreams, Our Challenge</small> Booth # 421

Therban HT: Compounding with a new heat resistant HNBR elastomer

by Victor Nasreddine, Marjan Hemstede-van Urk, Andreas Kaiser, Jelena Dodevski and Susanna Lieber, Arlanxco

There is an increased demand for elastomeric compositions having improved heat and fluid resistance in automotive and industrial applications. In automotive applications, new sophisticated designs and engineering of engine compartments and under-the-hood parts require the use of elastomeric composites that can withstand higher service temperatures and have excellent long term aging properties. Similarly, industrial applications are following a similar trend where elastomers are expected to have high performance and function longer in harsher conditions.

When nitrile rubber (NBR) is hydrogenated to HNBR (ref. 1) using a metal catalyst at designated temperatures and pressures, a new polymer is formed that has excellent heat and oil resistance, and its properties can be controlled by varying the acrylonitrile level, residual double bonds and molecular weight. Hydrogenated nitrile elastomers have excellent chemical, oil and solvent resistance, as well as very good heat and ozone resistance. Increasing hydrogenation levels results in improved heat and ozone resistance. As a result, HNBR is widely used in applications requiring higher service temperatures. The use of HNBR in demanding automotive applications (for example,

seals [ref. 2], hoses [ref. 3] and fuel systems [ref. 4]) has been demonstrated. More recently, novel HNBR compounds have been developed that meet high temperature requirements and provide resistance to engine coolant (ref. 5). Industrial applications are following a similar trend, where elastomers are expected to have high performance and function in harsh conditions, such as in oil and gas exploration (refs. 6 and 7).

There are many methods for improving the heat resistance of peroxide cured HNBR compounds by using antioxidants that have minimal interference with peroxide curing and high pH fillers and acid acceptors. Other methods include the use of synergistic stabilizer systems composed of metal salts of secondary amines based on sodium and lithium carbonate (refs. 8-11), but they result in increased water swell. This article presents the compounding and properties of new and novel polyamide reinforced HNBR elastomers (refs. 12 and 13).

Experimental

HNBR polyamide blends were prepared by melt blending in a Werner & Pfleiderer GK 1.5E internal mixer (1.5 liter), or alternatively in a co-rotating Leistritz ZSE 27 Maxx twin screw extruder (TSE) with a screw diameter of 28.3 mm and an OD/ID ratio of 1.66. This was done above the melting point of PA6, which is 221°C. The rubber compounds were prepared in a Werner & Pfleiderer GK 1.5E internal mixer (1.5 liter). Cross-linking agents were added on a two-roll mill. For mixing, unless described otherwise, a filling degree of 70%, a ram pressure of 8 bar and a rotor speed of 40 rpm were used. The mixer tem-

Table 1 - HNBR polymers

Tradename	ACN (weight %)	RDB (%)	ML (1+4) at 100°C
Therban LT 2007 VP	21	<0.9	74
Therban 3406	34	<0.9	63
Therban 3407	34	<0.9	70
Therban 3907	34	<0.9	70

Table 2 - formulations and properties of compounds based on HNBR 3907 and 3907 HT

Ingredient		Reference	HT
HNBR 3907		100	-
HNBR 3907 HT		-	110
Corax N 550		80	60
CDPA		1.5	1.5
ZnO		2	2
MgO		3	3
TAIC		1.5	1.5
Perkadox 14-40 B-PD		8	8
		Reference	HT
MS 1+4 100°C	ME	105	84
Hardness	Durometer A	86	86
M100	MPa	20	20
Elongation at break	%	139	155
Tensile strength	MPa	27	30
Tear resistance	N/mm	36	36

Figure 1 - AFM microscopy image of a polyamide (PA) reinforced HNBR; dark phase = HNBR, light phase = PA6

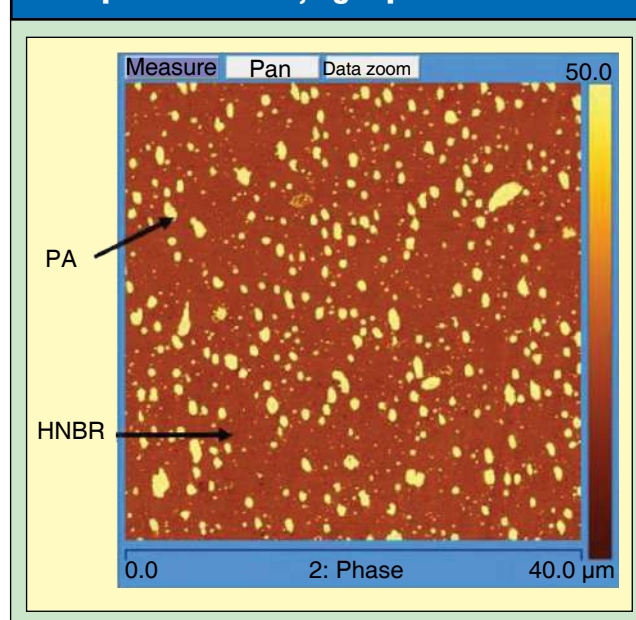
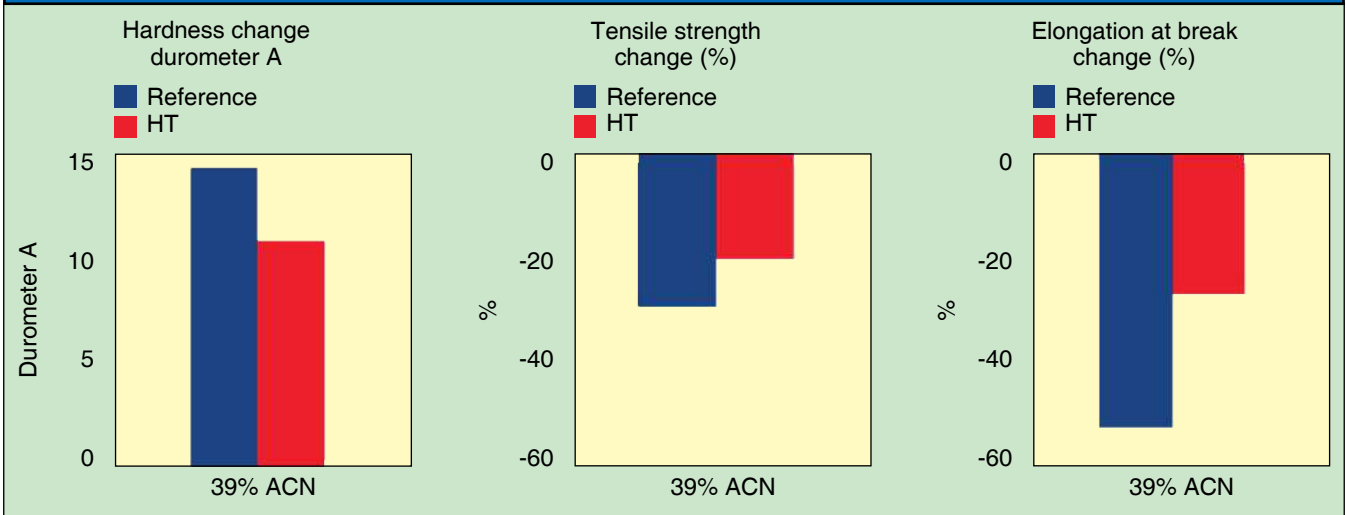


Figure 2 - effect of hot air aging for 168 hours at 180°C on stress-strain properties

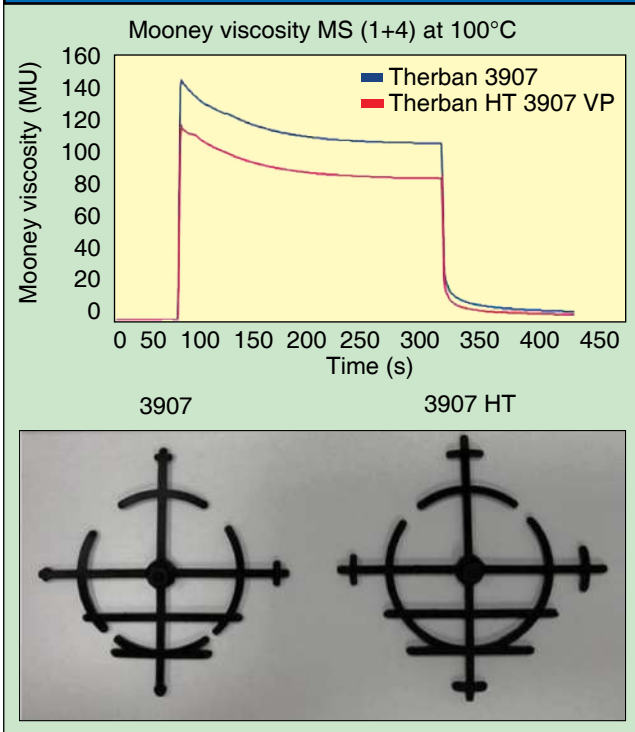


perature was set to 40°C. To start, the polymer was added into the mixer and masticated for one minute, followed by other components. After three minutes, the ram was lifted and swept; and after five minutes total mixing time, the compound was discharged. Finally, the compound was cut and rolled end-way-on three times, respectively.

The curing characteristics were obtained using an MDR 2000E rheometer (Alpha Technologies) at 180°C according to ISO 6502:1999. Test pieces were prepared by curing at 180°C using a curing time equivalent to $t'c(90)$, as determined by

MDR rheology testing. Standard procedures and test conditions were used for Mooney (ISO 289-1:2005), hardness (ISO 7619-1:2004), tensile strength (ISO 37:2005, dumbbell type 2), tear strength (ISO 34-1:2010), compression set (ISO 815-1:2008), hot air aging (ISO 188:2007), fluid aging (DIN 53521) and low temperature retraction/TR (ISO 2921). Good-rich flexometer (DIN 53533), dynamic mechanical analysis/DMA measurements were performed on a Mettler Toledo DMA 861e rheometer, equipped with a double-sandwich, simple shear sample holder. Test specimens with 6 mm diameter were cut from 2 mm thick rubber slabs. Temperature sweep measurements were undertaken with a 1 K/minute heating rate at 1 Hz frequency.

Figure 3 - compound Mooney viscosity and spider mold flow of compounds based on HNBR 3907 and 3907 HT



Results and discussion

HNBR polymers evaluated in this study are listed in table 1. The HNBR HT technology with improved resistance to hot air aging is based on polyamide reinforced HNBR elastomers, and can be used with different types of HNBR copolymers and terpolymers. It is based on Arlanxéo's blending technology, where the polyamide phase functions as a polymeric filler dispersed in an HNBR matrix, and the morphology is shown in the AFM image in figure 1. Polyamide reinforced HNBR grades will be referred to as HNBR HT. For example, Therban/HNBR 3907 HT is polyamide enforced Therban/HNBR 3907. THERBAN is a registered trademark of Arlanxéo.

The formulations and properties of carbon black filled compounds based on HNBR 3907 and 3907 HT with 86 durometer

Table 3 - elongation retention after 168 hours at 180°C air aging of HNBR as a function of dumbbell thickness

Dumbell thickness	3406		3406 HT		3406 HT	
	1 mm	2 mm	3 mm	3 mm	3 mm	3 mm
Change in elongation at break, %	-73	-6	-57	-1	-47	-12

Figure 4 - long term hot air aging up to 42 days at 150°C for N220 filled compounds based on HNBR 3406 and 3406 HT

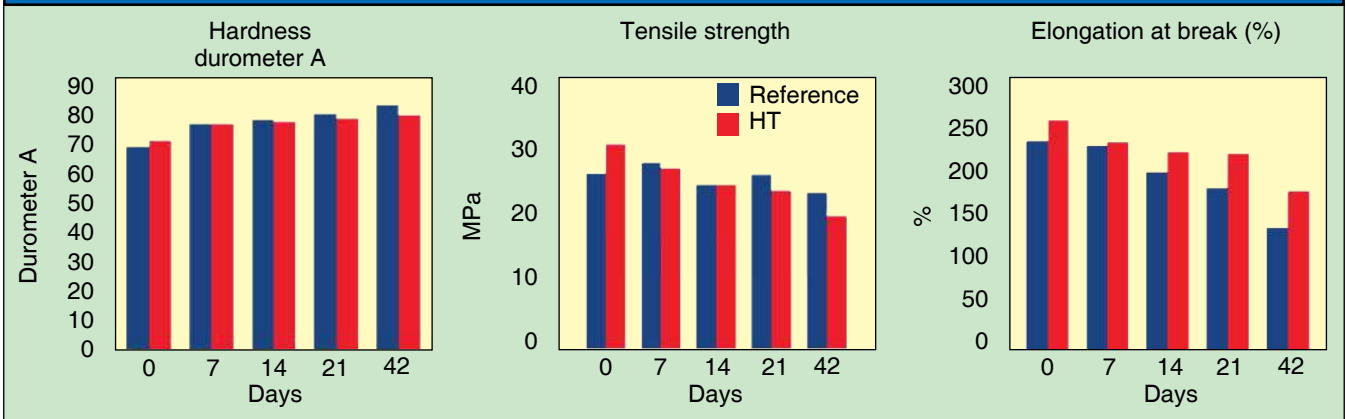


Figure 5 - short term hot air aging at 160°C, 170°C and 180°C for compounds based on HNBR 3406 and 3406 HT

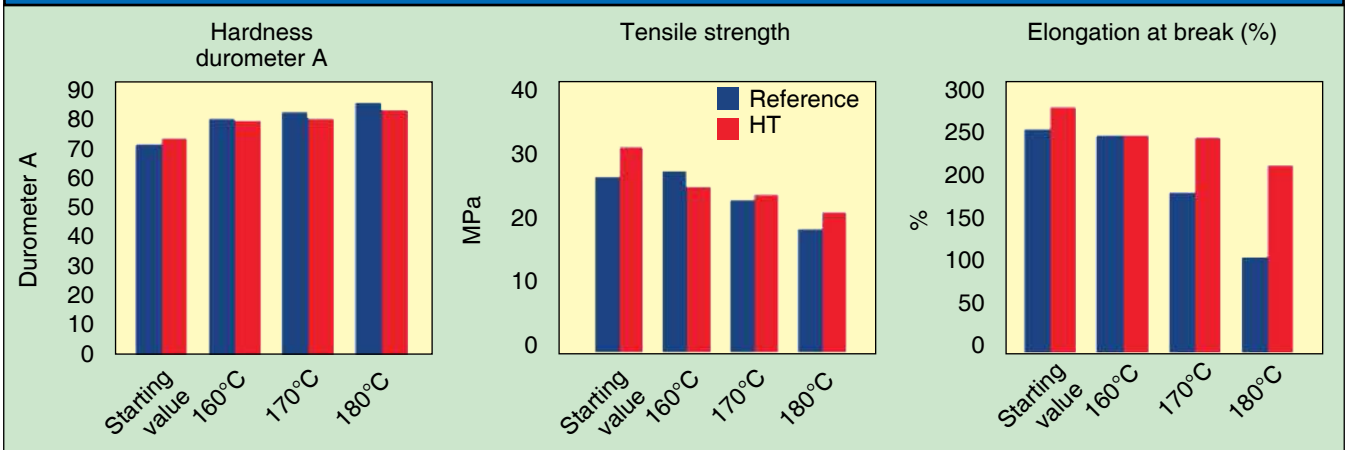


Figure 6 - effect of different HNBR grades and their HT counterparts after air aging for 168 hours at 180°C on stress-strain properties

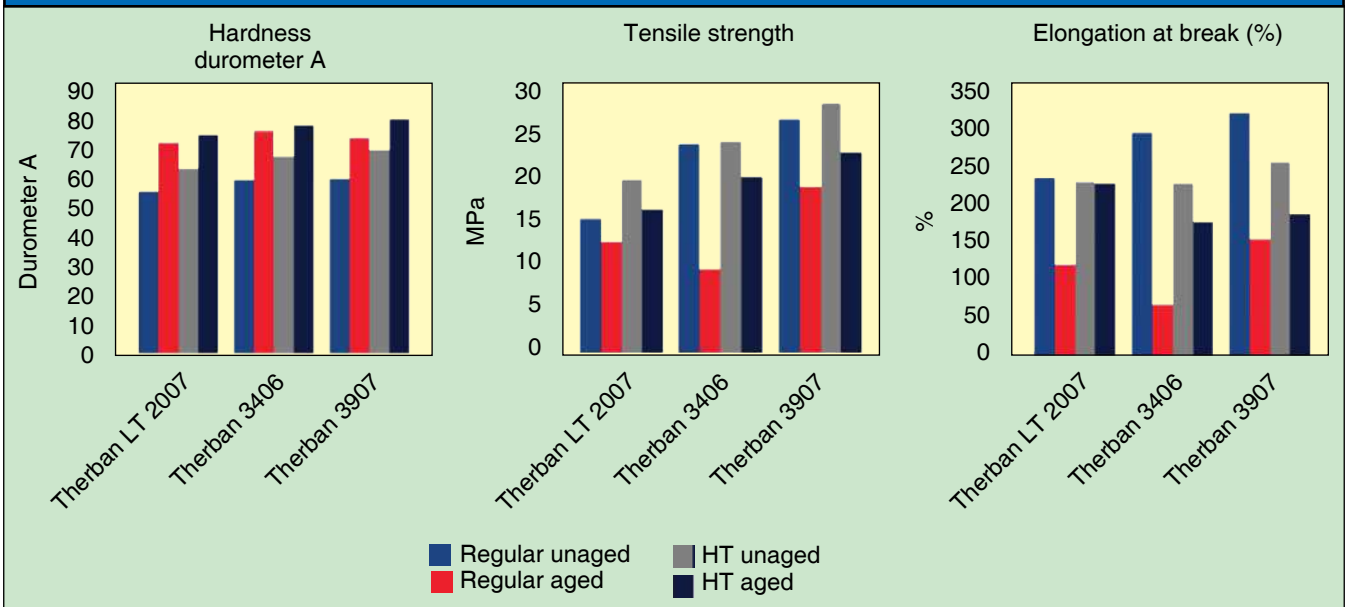


Figure 7 - compression set at 150°C and 165°C for N220 filled compounds based on HNBR 3406 and 3406 HT

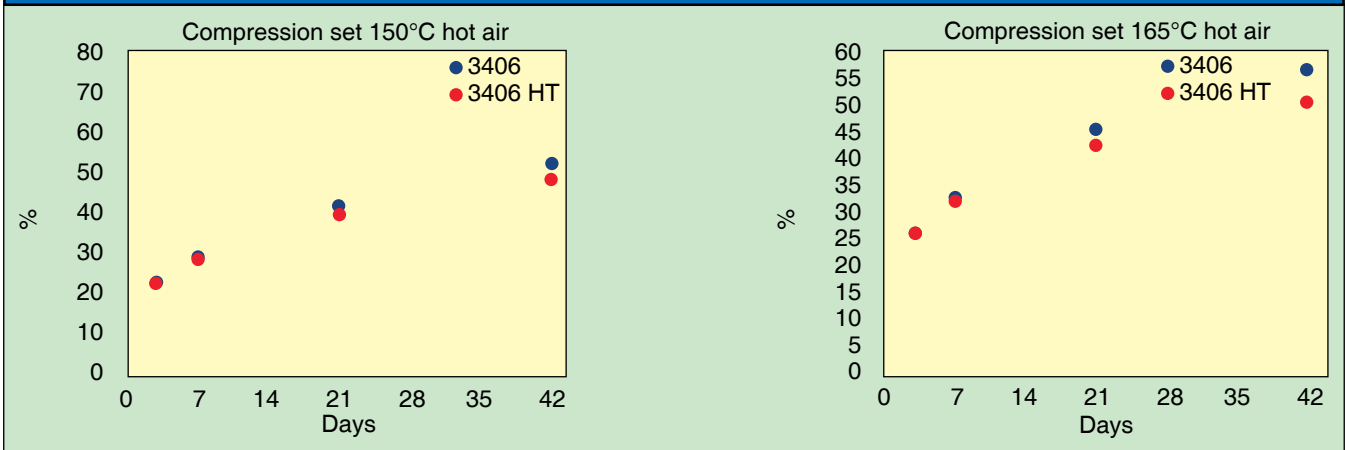
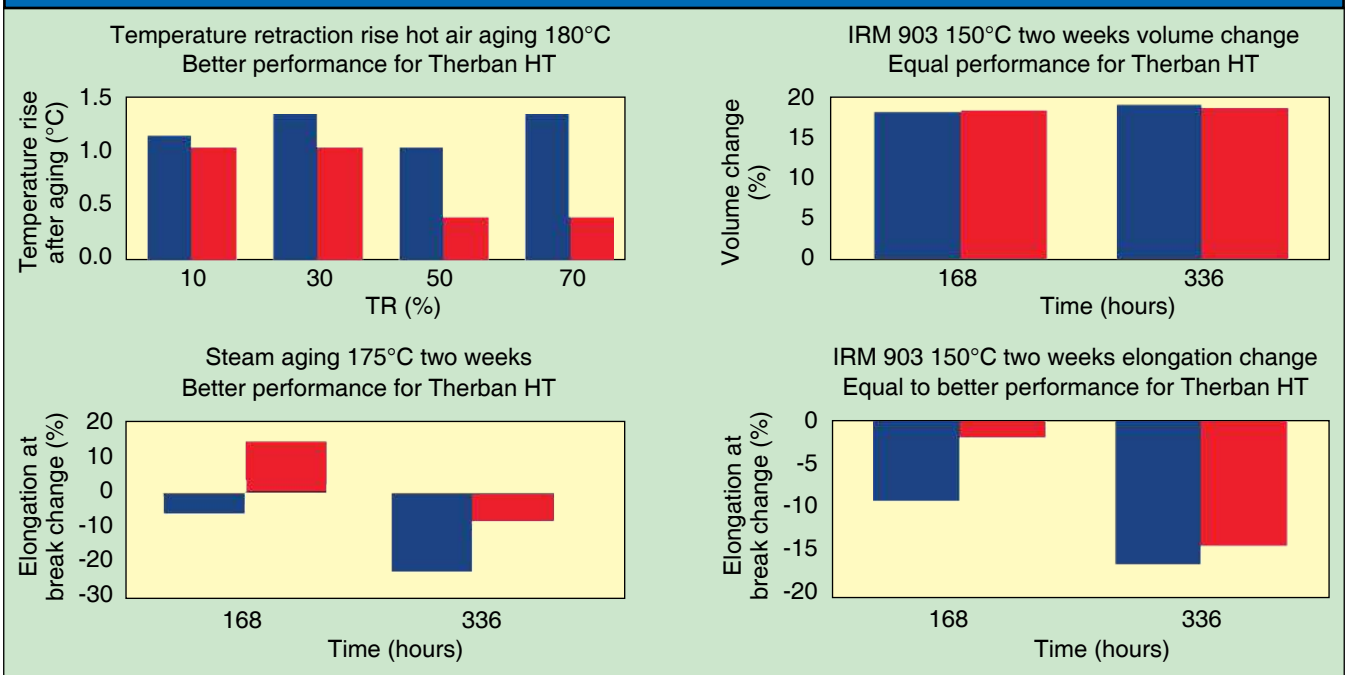


Figure 8 - low temperature retraction and fluid aging (IRM 903 test fluid and steam) for 3406 (blue) and 3406 HT (red)



A hardness are shown in table 2. The compound based on HNBR HT results in the same hardness, although it is formulated with 20 phr less N550 carbon black. The improved heat resistance for HNBR 3907 HT is demonstrated in figure 2 after hot air aging for 168 hours at 180°C with less hardening and better retention in stress-strain properties, especially for the elongation at break. While the standard compound loses 50% of its elongation, the compound based on HNBR 3907 HT only loses around 25% of its original elongation value. An additional benefit of the HT technology is the ability to formulate compounds with lower filler content to achieve the same hardness due to the reinforcing effect of the polyamide. This results in improved processing, as observed with lower compound Mooney viscosity and improved mold flow (figure 3).

The improved resistance to hot air aging of this technology is also demonstrated for compounds formulated with higher surface area/more reinforcing fillers, such as carbon black N220, after long term aging up to 42 days at 150°C and short term aging of 168 hours at elevated temperatures of 160°C, 170°C and 180°C. HT compounds have better hardness and elongation retention, but less retention in tensile (figure 4).

Table 3 shows the effect of the thickness of dumbbell test samples on the resistance to air aging. While HT compounds have improved heat resistance for all sample dimensions, their advantage is particularly evident for thinner samples, which is beneficial to rubber articles with thin cross-sections, such as seals and gaskets. This indicates that the polyamide reinforcement is reducing the oxygen diffusion into the samples. Further

Table 4 - effect of carbon black type on the air aging (168 hours at 180°C) and the heat buildup and hysteresis of compounds based on 3406 and 3406 HT

3406		100	100	100	100				
3406 HT						110	110	110	110
N 330		45				35			
N 550			50				40		
N-990				90				60	
Acetylene black					45				35
<i>Stress strain properties</i>									
Hardness	Durometer A	72	74	74	77	75	77	73	79
M100	MPa	6	9	9	8	10	13	9	10
Elongation at break	%	219	224	225	300	192	205	215	237
Tensile strength	MPa	27	26	17	24	25	27	23	23
<i>Hot air aging 168 hours at 180°C</i>									
<i>Change in properties</i>									
Hardness	Durometer A	12	10	8	8	9	7	6	6
Elongation at break	%	-50	-36	-32	-42	-9	1	7	14
Tensile strength	%	-25	-10	2	-22	-16	-29	-26	-27
<i>Dynamic properties (78 durometer A compounds)</i>									
Tan delta 23°C, DMA			0.175		0.155				
Heat buildup (°C)			50		38				

Table 5 - effect of mineral filler type on the air aging (168 hours at 180°C) of compounds based on 3406 and 3406 HT

3406		100	100	100	100				
3406 HT						110	110	110	110
Vulkasil A1		50				40			
Vulkasil S			35				25		
Polestar 200R				60				45	
Coupsil 6508					50				40
<i>Stress strain properties</i>									
Hardness	Durometer A	71	76	67	86	74	75	70	85
M100	MPa	6	6	7	11	9	7	9	14
Elongation at break	%	212	258	249	158	189	227	208	149
Tensile strength	MPa	27	30	17	23	24	26	18	24
<i>Hot air aging 168 hours at 180°C</i>									
<i>Change in properties</i>									
Hardness	Durometer A	4	7	9	2	4	5	6	3
Elongation at break	%	-9	-41	-61	-26	-5	-11	-16	-5
Tensile strength	%	-17	-36	-5	-15	-28	-23	-13	-18

work is ongoing to understand the mechanism of HNBR air aging in the presence of polyamide. Figure 5 demonstrates similar results when Therban 3406 and 3406 HT are exposed to

Table 6 - effect of TOTM plasticizer level in phr on the air aging (168 hours at different temperatures) of compounds based on 3907 and 3907 HT

Air aging 168 hours		3907	3907 HT	3907	3907 HT
Change in elongation				10 oil	10 oil
150°C	%	-19	-3	-5	10
165°C	%	-14	0	-16	7
180°C	%	-47	-13	-49	-11

short term hot air aging.

Figure 6 demonstrates the versatility of this technology, in that any HNBR polymer can be reinforced with polyamide to improve resistance to air aging. When the HT technology is applied to HNBR LT terpolymers, typically used for improved low temperature flexibility, an HNBR LT HT polymer is formed that combines both enhanced low and high temperature properties with the widest service temperature range. HNBR LT terpolymers without HT also have improved hot air resistance to standard HNBR copolymers. When the HT technology is applied to a high acrylonitrile HNBR, then improved oil and air aging resistance is realized with one HNBR polymer.

The compression set of HT compounds is comparable to standard compounds after short term aging, but lower/improved after long term aging (figure 7).

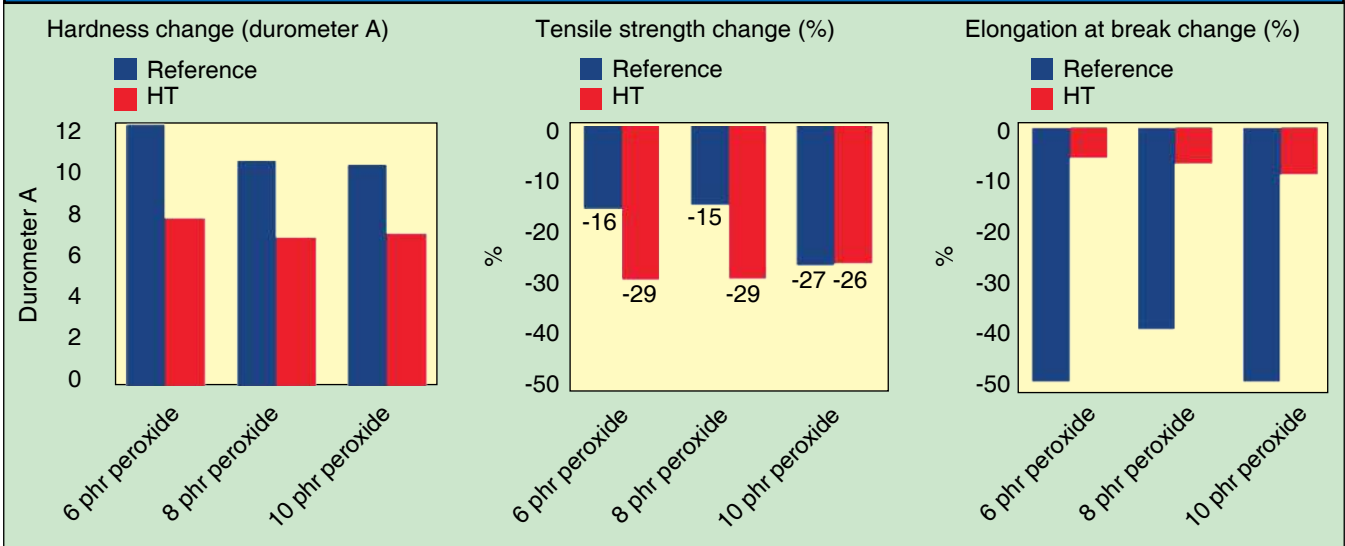
HT compounds have similar volume swell to standard HNBR compounds in IRM 903 standard test fluid, and better aging resistance in steam. HT compounds also have lower TR (temperature retraction) test values after aging, indicating improved flexibility at low service temperatures after aging (figure 8).

The effect of carbon black and mineral filler types (tables 4 and 5), plasticizer content (table 6) and peroxide level (figure 9) on air aging also demonstrates that HT compounds have improved heat resistance, and can be used with a variety of compounding ingredients for different applications. The reinforcing effect of the polyamide phase makes it possible to formulate compounds with lower filler levels. In addition to the benefit of improved flow properties, HT compounds

have lower hysteresis (lower tan delta from DMA) and heat buildup (lower temperature rise in Goodrich flexometer testing) (table 4), which is beneficial in dynamic rubber applications such as belts and rollers, and for oil and gas stator applications.

Table 7 lists aging data in 5W20 engine oil, automatic transmission fluid, engine coolant, diesel fuel, biodiesel fuel and standard test fuel C, as well as permeation testing in fuel C and diesel. HT compounds have similar fluid resistance to standard HNBR polymers with the same acrylonitrile content. Table 8 shows a compound based on HNBR LT 2007 HT that meets application requirements, combining good resistance to air aging, diesel and AdBlue, and has very good low temperature properties. AdBlue is a colorless exhaust fluid made of urea and deionized water. AdBlue is injected into the flow of exhaust

Figure 9 - effect of peroxide level on the air aging for 168 hours at 180°C of compounds based on 3406 and 3406 HT



gases in diesel vehicles. At high temperatures, AdBlue turns to ammonia and carbon dioxide. The ammonia then reacts with

toxic nitrogen oxide inside the selective catalytic reduction (SCR) catalyst, and is transformed to nitrogen and water.

Table 7 - additional fluid aging and fuel permeation properties

	3406	3406HT
168 hours at 150°C 5W20 engine oil		
Hardness Durometer A	2	3
Tensile strength %	9	4
Elongation at break %	-18	-6
Volume %	3	3
168 hours at 150°C automatic transmission fluid		
Hardness Durometer A	0	0
Tensile strength %	-3	-6
Elongation at break %	-4	-7
Volume %	5	5
168 hours at 150°C Glystantin G64 coolant (steam phase)		
Hardness Durometer A	5	3
Tensile strength %	-22	-15
EB %	27	37
Volume %	4	4
168 hours at 80°C diesel		
Hardness Durometer A	-2	-1
Tensile strength %	-15	-20
Elongation at break %	-14	-18
Volume %	12	11
168 hours at 80°C B100 (100% biodiesel/RME)		
Hardness Durometer A	-8	-5
Tensile strength %	-38	-36
Elongation at break %	-35	-32
Volume %	32	30
168 hours at 40°C Fuel C		
Hardness Durometer A	-11	-9
Tensile strength %	-65	-68
Elongation at break %	-59	-60
Volume %	65	65

Conclusions

This article presented studies on the compounding and properties of Therban HT VP, a novel and new HNBR technology developed by Arlanxeo based on polyamide reinforced HNBR elastomers. This technology provides:

- Improved processing, resistance to hot air aging, especially for rubber articles with thin cross-sections like seals and gaskets, and lower heat buildup/hysteresis in dynamic applications
- Similar oil standard HNBR compounds
- Versatility in compounding, as the polyamide reinforcement in HNBR can be applied to different HNBR types.

When combined with higher acrylonitrile, low temperature terpolymer HNBR LT grades and low Mooney viscosity HNBR

Table 8 - resistance of LT 2007 HT to diesel and AdBlue

Hardness	Durometer A	71
Tensile strength	MPa	15
Elongation at break	%	179
Compression set, 70 hours at 165°C	%	27
Low temperature retraction TR10	°C	-32
Air aging 168 hours at 180°C		
Change in properties		
Hardness	Durometer A	10
Elongation at break	%	-57
Tensile strength	%	-16
Diesel 70 hours at 100°C		
Hardness	Durometer A	-9
Volume	%	20
AdBlue 168 hours at 120°C		
Hardness	Durometer A	-4
Volume	%	9

AT grades, improved oil resistance, and low temperature flexibility and processing can also be realized, in addition to the above performance advantages.

This article is based on a paper presented at the 202nd Technical Meeting of the Rubber Division, ACS, October 2022.

References

1. Arlanxeo, "Hydrogenated nitrile rubber: Therban HNBR," in *Arlanxeo Handbook of Synthetic Rubber*, pp. 295-317 (2021).
2. R.J. Pazur, J. Bielby and U. Dinges, 164th ACS Rubber Division Meeting, Paper 107, Cleveland, OH, October 2003.
3. V. Nasreddine, R.J. Pazur, J. Dato, S. Guo, S. Kelbch, M. Mezger and D. Schaefer, *Rubber and Plastics News Hose Manufacturing Conference*, Cleveland, OH, June 2007.
4. R.J. Pazur and V. Nasreddine, 172nd ACS Rubber Division Meeting, Paper 112, Cleveland, OH, October 2007.
5. D. Meyer, U. Frenzel, S. Lieber, S. David and K. Schneiders, 190th ACS Rubber Division Meeting, Paper 66, Pittsburgh, PA, October 2016.

6. J. Dato, E. Campomizzi and D. Achten, 170th ACS Rubber Division Meeting, Paper 57, Cleveland, OH, October 2006.
7. V. Nasreddine, M. Soddemann, K. Kulbaba, B. James, L. Guo, D. Gerrard and J. Goodson, 178th ACS Rubber Division Meeting, Paper 34, Milwaukee, WI, October 2010.
8. H. Bender and E. Campomizzi, *KGK Kautschuk Gummi Kunststoffe* 54, Jahrgang, Nr. 1-2/2001.
9. E. Campomizzi, H. Bender and W. von Hellens, *KGK Kautschuk Gummi Kunststoffe* 54, Jahrgang, Nr. 3/2001.
10. European Patent Publication EP 2065437.
11. V. Nasreddine, S. Soddeman, K. Kulbaba and M. Saewe, 176th ACS Rubber Division Meeting, Paper 49, Cleveland, OH, October 2009.
12. S. Lieber, A. Kaiser and U. Frenzel, WO2019121157, *Vulcanized HNBR Product With Improved Hot Air Resistance* (2017).
13. P. Spanos, M. Hemstede-van Urk, J. Dodevski, A. Kaiser and S. Lieber, 196th ACS Rubber Division Meeting, Paper B29, Cleveland, OH, October 2019.

Save Time! Renew Online!

Rubber World magazine subscriptions can easily be managed or renewed at:

www.rubberworld.com/renew



Designing silicones that work for you and your application.

For over 25 years CRI-SIL Silicone Technologies has supported the silicone industry by offering custom HCR and RTV compounds. These custom grades are designed with quality and repeatability in mind and meet or exceed your material and process specifications.



www.crisil-silicones.com

800.290.9192

silicone@crisil-silicones.com



Performance Elastomers

FKM & FFKM

Copolymer
Terpolymer
Cure Incorporated
Peroxide Curable
Low Temp Grades
Perfluorinated

HNBR

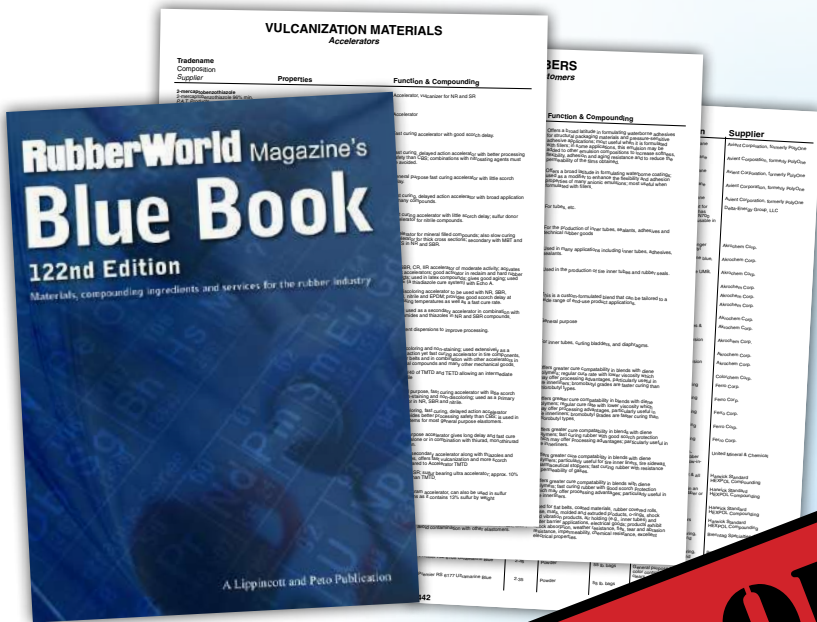
High & Low ACN Content
Various Saturation Levels
Very Low Viscosity Grades
Advanced Catalyst Technology
Expanding Capacity

Our team of dedicated commercial and technical staff and 3000 sq ft fully equipped lab are ready to provide solutions and bridge the gap between our customers and principals.

Contact Lianda Corporation or visit our website to find out more • ISO 9001:2015

LIANDACORP.COM • INQUIRY@LIANDACORP.COM • 330.653.8341

RubberWorld 123 years LATEST EDITIONS



Long regarded as the industry's single most important reference for technical information, the BLUE BOOK contains detailed information on every raw material used by the rubber industry-including chemical additives, extenders, elastomers and latexes, fillers and reinforcing materials, carbon black and coloring materials, to name a few.

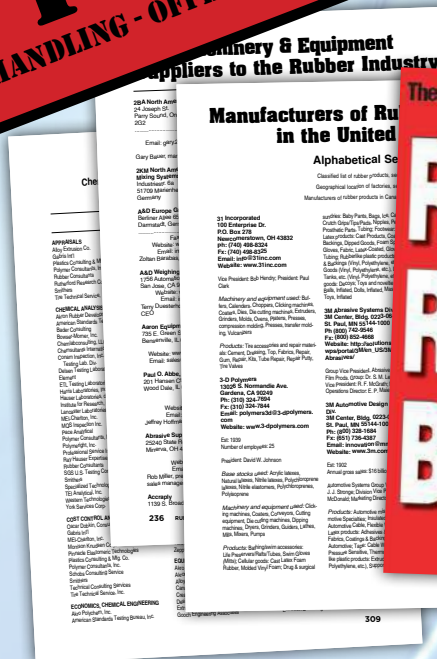
The latest, most current information on more than 10,000 materials and ingredients is listed. And, to help you locate the best materials at the lowest possible cost, more ingredients are listed by their chemical name as well as trade names currently using a name that has been discontinued, so you can find a suitable substitute.)

SPECIAL OFFER!
BOTH FOR \$160
 PLUS SHIPPING AND HANDLING - OFFER GOOD THROUGH 4/15/24

Rubber
 72 years
 locate a
 making im

Rubber Red
 professionals
 up-to-date list
 and services including: Rubber Machinery & Equipment, Laboratory & Testing Equipment, Accessories and Fittings, Rubber Reclaimers & Recyclers, Rubber Chemicals & Compounding Materials, Synthetic Rubber, Fabrics and Textiles, Latex and Related Materials, Educational Courses in Rubber Chemistry and Technology, Technical and Trade Journals.

\$115.00 plus \$15.00 postage & handling
 \$180.00 Outside U.S.



Visit www.rubberworld.com/bookstore to order or call 330.864.2122

Custom Mixing, Services

The following directory lists custom services suppliers. The first part lists custom rubber mixers along with plant locations, equipment, mixing capabilities and whether technical service and/or recipe development are offered. A directory of companies that offer various custom services to the rubber industry follows.

Ace Elastomer Corp.

320 Bryant Blvd.
Rock Hill, SC 29732 (803) 324-7979
Fax: (803) 324-7060

Website: www.aceelastomer.com

Email: scott.lieberman@airboss.com

Scott Lieberman

Equipment: Mixers, calenders

Services offered: Mixing

Capacity: All elastomers

Tech service: yes

Recipe development: yes

AGC Chemicals Americas, Inc.

55 E. Uwchlan Ave., Ste. 201
Exton, PA 19341 ... (610) 423-4300 ext. 2

Website: www.agcchem.com

Email: AGCChemicals.Info@agc.com

(See our ads on pages 12, 13, 37 and 94)

AirBoss of America

16441 Yonge St.
Newmarket, Ontario, Canada L3X 2G8
..... (905) 751-1188

Fax: (905) 751-1101

Website: www.airbossofamerica.com

Gren Schoch, chairman and CEO; Chris Bitsakakis, COO and president

Mixing capabilities: Custom rubber mixing of all types of rubber

Capacity: 500 million lbs./yr.

Tech service: yes

Recipe development: yes

Divisions:

AirBoss Rubber Solutions

101 Glasgow St.
Kitchener, Ontario, Canada N2G 4X8
..... (519) 576-5565

Fax: (519) 576-1315

Chris Bitsakakis, COO and president
AOA; Scott Lieberman, president ARS;

George Papazotos, vice president sales and product development; Edward Kiell, vice president corporate supply chain;

Steven Yu, vice president compound technology; Carl Chapman, senior vice president and general manager

Equipment: Six mixers, gear pump extruder, strainer, strip auto piler

Services offered: Custom compounding, development, straining, A2LA accredited lab

Mixing capabilities: All elastomers including black, color and specialty

Capacity: 350 million lbs./yr.

AirBoss Rubber Solutions

500 AirBoss Pkwy.
Scotland Neck, NC 27874

..... (252) 826-4919
Fax: (252) 826-4994

James O'Quinn, plant manager

Equipment: Two mixers, in-line strainer
Services offered: Custom compounding, development, straining

Capacity: 100 million lbs.

AirBoss Defense Group

881 Landry
Acton Vale, Quebec, Canada J0H 1A0

..... (450) 546-2776
Fax: (450) 546-2776

Patrick Callahan, CEO; Yvan Ambeault, executive vice president

Equipment: Skinner 270, two RMS

extruders, four-roll calender

Services offered: Custom compounding, development, slitting, preforms

(See our ads on the 2nd cover and page 91)

Akron Rubber Development Laboratory, Inc.

2887 Gilchrist Rd.
Akron, OH 44305..... (330) 794-6600
(866) 781-ARDL

Fax: (330) 794-6610

Website: www.ardl.com

Email: answers@ardl.com

Bonnie Stuck, president, senior technical advisor

Equipment: Rheometer (MonTech MDR 2000s, Upgraded MonTech MV 2000, MonTech R-VS 3000), mixers, mills,

calenders, presses, extruders, molds and extruder dies, instrumented 1.6 liter mixer and 60 ml mixer head, mills: three

12" laboratory mills, four-roll inverted laboratory calender, skim coating fabric or calendering rubber and plastic sheets

from 0.02" to 0.5" thick and up to 10" in width. The calender is oil heated and can obtain temperatures up to 204°C

(400°F). Six hydraulic presses from 12" x 12" to 36" x 36" platens, 1" screw extruder, steam autoclave for lab samples,

molding: compression, transfer and extrusion

Services offered: Compound formulation development, mixing, molding,

calendering, curing, Mooney viscosity, Mooney scorch, rheometry, extrudability, in-house technical consulting,

reverse engineering/formula reconstruction, complete in-house evaluative testing capabilities, technical problem-solving, processability testing, compound optimization/cost reduction, new product development for thermoset and thermoplastic applications including SBR, BR, NR, butyls, CR, nitriles, acrylics, fluoroelastomers, urethanes and more. Ability to mix compounds in-house on lab-scale equipment, prior to molding and testing, greatly reducing variability and providing additional levels of process control

Mixing capabilities: All elastomers

Tech service: yes

Recipe development: yes

(See our ad on page 18)

Allgrind Plastics, Inc.

P.O. Box 363
Bloomsbury, NJ 08804
..... (908) 479-4400

Mark Rogack

Equipment: Granulators, pulverizers, blenders and sifters

Services offered: Grinding, pulverizing, blending, sifting, re-packaging

Mixing capabilities: Dry materials in twin cone blenders

Capacity: <5,000 lb. batches

Tech service: yes

Recipe development: no

(See our ad on page 94)

Alttran Inc.

5285 Hudson Dr.
Hudson, OH 44236..... (330) 650-2223
Fax: (330) 650-2215

Website: www.alttran.com

Email: orders@alttran.com

Rick Prinkey

Equipment: Internal mixers, two-roll mills

Services offered: Rubber compound mixing, formulation development, lab testing of rubber, applications development

Mixing capabilities: Separate black and non-black mixing lines, mix most types of organic rubber (no silicone mixing)

Tech service: yes

Recipe development: yes

Alttran Technical Services, LLC (ATS)

5285 Hudson Dr.
Hudson, OH 44236..... (330) 650-2223
Fax: (330) 650-2215

Website: www.alttran.com

Email: cmanges@alttran.com

David Topliff

Equipment: Lab mixers, ovens, ex-

Custom Mixing, Services

truder, RPA, viscometer, tensometer, various low temperature testing, FTIR, electrical testing, abrasion, adhesion, flex fatigue, and more.

Services offered: Compound development, laboratory testing, ASTM testing

Tech service: yes

Recipe development: yes

American Biltrite

200 Bank St.
Sherbrooke, Quebec, Canada J1H 4K3
..... (888) 275-7075

Fax: (877) 271-1751

Website: www.american-biltrite.com

Email: rubber@american-biltrite.com

Tracey Lancaster

Equipment: Dedicated mixer for colors

Services offered: Choose from any of the available compounds or work with our experienced technical team to develop your own exclusive blueprint to match your specifications. Leave your most complex recipe in our hands, our team can interpret your specification and then compound distinct formulations for your precise requirements.

Rest assured you will receive a consistent and reliable product delivered on time from a domestic source that you can trust. Creating exclusive products for esteemed customers is where our 100 years of experience meets today's innovation.

Mixing capabilities: Black, white and colors

Tech service: yes

Recipe development: yes

American Phoenix, Inc.

800 Wisconsin St., #11
Eau Claire, WI 54703 ... (715) 831-0966

Website: www.apimix.net

Email: sales@apimix.net

Greg Lewis, COO; Mike Amis, national sales manager

Equipment: Mixers, mills, strip stackers

Mixing capabilities: SBR, natural rubber, EPDM

Capacity: 300 million lbs./yr.

Tech service: yes

Recipe development: yes

Ampacet Corporation

6600 White Plains Rd.
Tarrytown, NY 10591..... (914) 631-6600

Fax: (914) 631-7278

Website: www.ampacet.com

Eileen Ferguson, marketing and communications coordinator

Equipment: Mixers, calenders

Services offered: Color matching, compounding, injection molding, mixing black, mixing colors

Tech service: yes

Recipe development: yes

Divisions:

Manufacturing sites:

100 Ampacet Dr.
Cartersville, GA 30120

..... (770) 387-0060

Fax: (770) 382-2182

125 Ampacet Dr.
DeRidder, LA 70634 (337) 463-6001

1855 James Pkwy.
Heath, OH 43056..... (740) 929-5521

Fax: (740) 928-2077

3701 North Fruitridge Ave.
Terre Haute, IN 47806... (812) 466-5231

Fax: (812) 466-6926

101 Sasaga Dr.
Kitchener, Ontario, Canada N2C 2G8
..... (519) 748-5576

Fax: (519) 748-9767

APV Engineered Coatings

1390 Firestone Pkwy.
Akron, OH 44301 (330) 773-8911

Fax: (330) 773-1028

Website: www.apvcoatings.com

Email: sales@apvcoatings.com

David Hanna, vice president of sales and marketing

Equipment: 197 different grinding, blending and mixing pieces of equipment

Mixing capabilities: Batch sizes from one gallon to 8,500 gallons, 50 CPS to 1,000,000

Capacity: 12 million gallons

Tech service: yes

Recipe development: yes

(See our ad on page 94)

Avient

33587 Walker Rd.
Avon Lake, OH 44012 ... (440) 930-1000

(866) POLYONE

Fax: (440) 930-3064

Website: www.glstpes.com

Cathy Dodd, vice president marketing
Equipment: Mixer, two-roll mills, three-roll mills

Mixing capabilities: Silicone dispersions, colors, catalysts, additives; liquid silicone colors

Capacity: 2 million lbs./yr.

Tech service: yes

Recipe development: yes

Barco L.L.C.

280 Peqanoc Dr.

Tallapoosa, GA 30176... (770) 574-2272

Website: www.barco-us.com

Mike Cash, president

Equipment: Mixers

Blair Rubber Company

5020 Enterprise Pkwy.
Seville, OH 44273..... (330) 769-5583

Fax: (330) 769-9334

Website: www.blairrubber.com

Email: sales@blairrubber.com

David Jentzsch, general manager

Equipment: Internal mixer and open mill, calendering, slitter, autoclaves
Mixing capabilities: NR, nitrile, EPDM, polychloroprene, chlorobutyl, butyl, Hypalon, SBR

Capacity: 6 million lbs./yr.

Tech service: yes

Recipe development: yes

Britannia Rubber Mfg. Ltd.

1676 Britannia Rd. East
Mississauga, Ontario, Canada L4W 1J2
..... (905) 564-0582

Fax: (905) 564-0585

Website: www.britanniarubber.com

Email: richelle@britanniarubber.com

Romeo Olalia

Equipment: Internal mixer, three-roll calender, mixing mills, strip cooler/stacker
Services offered: Custom mixing, calendering, strips, slabs

Capacity: 2.1 million lbs./yr.

Tech service: yes

Recipe development: yes

Bruckman Rubber Co.

101 S. St. Joseph Ave.
Hastings, NE 68901 (402) 463-3129

Fax: (402) 463-3406

Website: www.bruckmanrubber.com

Email: sales@bruckmanrubber.com

Jack Schreiner, president

Equipment: Tilt body dispersion mixer, mills, extruders, roller head die, strip cutters

Services offered: Mixing (black and white, colored), strip, slab, extruder

Mixing capabilities: Silicone, SBR, EPDM, FKM, nitrile, natural, polyisoprene, polynorborene, polychloroprene, etc.

Capacity: 11 million lbs.

Tech service: yes

Recipe development: yes

Burke Industries, Inc.

2250 South 10th St.
San Jose, CA 95112..... (408) 297-3500

Fax: (408) 280-0938

Website: www.burkeind.com

Email: burkecustom@burkeindustries.com

Custom Mixing, Services

Bob Pitman, president

Equipment: Rubber processing equipment

Services offered: Rubber products, mixed, extruded, molded

Mixing capabilities: All types

Capacity: 35 million lbs./yr.

Tech service: yes

Recipe development: yes

Cardinal Rubber Co.

939 Wooster Rd. N.

Barberton, OH 44203(330) 745-2191

Website: www.cardinalrubbercompany.com

Email: info@cardinalrubbercompany.com

Diane Schnee, president

Equipment: Mixers

Services offered: Mixing, color matching

Mixing capabilities: Most elastomers

Tech service: yes

Recipe development: yes

Chardon Custom Polymers LLC

373 Washington St.

Chardon, OH 44024(440) 285-2161

Fax: (440) 286-8422

Website: www.chardoncp.com

Email: garotin@chardoncp.com

Marian Keener DeVoe, president

Equipment: Mills, mixers, internal mixers, extruders

Services offered: Mixing, recipe development, full processing and physical testing

Mixing capabilities: Most elastomers

Capacity: 20 million lbs.

Tech service: yes

Recipe development: yes

(See our ad below)

Chemionics/Protech Group

390 Munroe Falls Rd.

Tallmadge, OH 44278 ... (330) 733-8834

Fax: (330) 733-9346

Website: www.chemionics.com

Email: chemionics@chemionics.com

John Blackfan, general manager

Equipment: Blenders, mixers, vulcanizers, dispersers

Services offered: Custom formulating and

compounding and toll compounding

Mixing capabilities: Natural latex, polychloroprene latex, nitrile latex, water-based adhesives

Capacity: 25+ million pounds annually

Tech service: Product development and on-site tech service

Recipe development: Custom formulations

Chem Technologies Custom Mixing

14875 Bonner Dr.

Middlefield, OH 44062... (440) 632-9311

Fax: (440) 632-9578

Website: www.chemtechnologiesltd.com

Email: kcohill@chemtechnologiesltd.com

Kevin Cohill, vice president sales and marketing; Randy Vancura, CEO; Jim Schill, chairman; Donna Decker, vice president purchasing and customer relations

Equipment: Intermeshing and tangential internal mixers, bi-conical sheet preformers, mills, pelletizing, metal detection

Services offered: Custom rubber com-

We Deliver Solutions

From Raw Material to Finished Product,
Our Custom Mixed Compounds will
Meet or Exceed your Expectations.

Markets served:

- Transportation/Automotive
- Roller
- Heavy Equipment
- Architecture and Construction
- Appliance
- Food
- Oil Field and Mining
- Military
- Energy
- General Industrial
- Electrical
- YOURS

373 Washington Street
Chardon, Ohio 44024
chardoncp.com
Customer Service: 440-285-2161



Chardon
Custom
Polymers

Custom Mixing, Services

pounding (strips, slabs, pellets), chemical dispersions (dust suppressed powders and beads, preweighed batch inclusive blends, polymer-bound), reversion of FKM and other exotic polymers
Mixing capabilities: NBR, CPE, EPDM, NR, NBR/PVC, SBR, HNBR, IR, BR, IIR, CR, ECO, AEM, ACM, FKM
Capacity: 135 million lbs./yr. custom rubber mixing; manufacturing of blends and dispersions
Tech service: yes
Recipe development: yes
(See our ad on page 51)

Claude Bamberger Molding Compounds Corp.
 111 Paterson Plank Rd.
 Carlstadt, NJ 07072.....(201) 933-6262

Website: www.claudebamberger.com
 Email: cpbamberger@gmail.com
 Mo-Li Bamberger, president

Colonial Diversified Polymer Products, LLC
 2055 Forrest St.
 Dyersburg, TN 38025-0930
(731) 287-3636
 Fax: (731) 287-3691
 Website: www.colonialdpp.com
 Email: sales@colonialdpp.com
 Wendell West, president
Equipment: Mills, mixers, internal mixers, extruders, calenders
Services offered: Vulcanizing rubber sheets
Mixing capabilities: EPDM, polychloroprene, natural rubber, SBR and NBR

Capacity: 50 million lbs./yr.
Tech service: yes
Recipe development: yes

Cri-Sil Silicone Technologies, LLC
 359 Hill St.
 Biddeford, ME 04005-3949
(207) 283-6422
 (800) 290-9192
 Fax: (207) 283-6551
 Website: www.cri-sil.com
 Email: silicone@crisil-silicones.com
 Matt Caldwell, vice president of sales and technical development
Equipment: Sigma blade mixers, planetary mixers, mills, extruders
Services offered: Full technical service, custom compounding, recipe development.

North American custom mixers - Northeast, Mid-Atlantic regions

Northeast

Company	City	Equipment	Capabilities
Allgrind Plastics, Inc.	Bloomsbury, NJ	Granulators, pulverizers,	Dry materials
Ampacet Corporation	Tarrytown, NY	blenders, sifters	
Cri-Sil Silicone Technologies	Biddeford, ME	Mixers, calenders	Most elastomers
Cri-Tech Inc.	Hanover, MA	Mixers, mills, extruders	Most thermoplastic elastomers
Fulflex, a Garflex Company	Brattleboro, VT	Mixers, extruders	Silicones and fluorosilicones
KRI-Color, LLC	Sanford, ME	Mixers, calenders	Most elastomers
Mechanical Rubber Products	Warwick, NY	Mixers	Most elastomers
Momentive Performance Materials	Waterford, NY	Mixers, extruders	Most elastomers
Pierce-Roberts Rubber Company	Trenton, NJ	Calenders, mixers	Silicone elastomers
		Autoclaves, calenders,	Most elastomers
		deflashers, ovens, mixers,	
		extruders, grinders, mills,	
		presses	
PolyGel	Whippany, NJ	Compounding equipment	TPE
Solar Compounds	Linden, NJ	Mixers	Most elastomers
Specialty Silicone Products	Ballston Spa, NY	Mixers, extruders, mills,	Silicone
		calenders, robotics, die cutting	
Technical Industries, Inc.	Peace Dale, RI	Mills	-
Vanguard Products Corporation	Danbury, CT	Coaters, cutters, extruders, mills,	Most elastomers
		presses	

Mid-Atlantic region

Company	City	Equipment	Capabilities
AirBoss Rubber Compounding	Scotland Neck, NC	Mixers	All polymers except silicone
Dyna-Mix	Grafton, WV	Mixers, mills, extruder, granulator	All polymer types except silicone and FKM
HEXPOL Compounding NC	Statesville, NC	Mixers, mills, extruders, calenders	All elastomers
Patch Rubber Co.	Weldon, NC	Mixers, calenders, extruders	All elastomers
Pelmor Laboratories Inc.	Newtown, PA	Clicking machines, coolers, deflashing, dies, extruders, grinders, lathes, mills, mixers, molds, ovens, platens, presses, slitters, autoclave	Most elastomers
Polymeric Systems	Elverson, PA	Mixers, extruders	Most elastomers
Reiss Manufacturing, Inc.	Blackstone, VA	Mixers, mills, extruders, presses, calenders, dies	Most elastomers

Custom Mixing, Services

Mixing capabilities: HCR and RTV silicone and HCR fluorosilicone custom and standard compounds, bases and dispersions
Capacity: 16-18 million lbs./yr.
Tech service: yes
Recipe development: yes
(See our ads on pages 44 and 95)

Cri-Tech Inc.
 85 Winter St.
 Hanover, MA 02339-2553
(800) 826-5699
 (781) 826-5600
 Fax: (781) 826-5770
 Website: www.critechinc.com
 Email: info@critechinc.com

Equipment: Computer controlled 3D and 1D internal mixers, twin screw extruders
Services offered: Computer controlled 3D and 1D internal mixers, Inconel twin-screw compounding lines (lab to large volume production)
Services offered: Custom thermoplastics (F-TPE, F-TPV and F-TPX e-beam

crosslinkable compounds) compounding, rubber compounding; pre-colored compounds; fully equipped rubber and plastics laboratory, toll mixing.
Mixing capabilities: Cri-Line fluoroelastomer compounds, Cri-plastMP fluoroelastomer compounds/blends (PVDF, ETFE, FEP, PFA, PEEK), thermoplastic elastomers F-TPEs, TPVs and TPXs (e-beam crosslinkable), specialty elastomer (HNBR, BRE, Atlas, perfluoroelastomers – FFKM, specialty compounds utilizing CNTs, graphene, etc., static dissipative, thermally conductive, low permeation technology
Capacity: 8 million lbs./yr.
Tech service: yes
Recipe development: yes

CS Rubber Industry Co.,Ltd.
 199/20 Moo 3 , Panthong-Banboun Rd.
 Tambol Banboun, Amphur Banboun, Chonburi 20170, Thailand
(66-38)-443986, 444315 to 7
 (66-38)-443989, 443932

Website: www.csrubber.co.th
 Email: naimnual@gmail.com
 Jittima Niamnual

R.E. Darling Co., Inc.
 3749 N. Romero Rd.
 Tucson, AZ 85705 (520) 887-2400
 Fax: (520) 887-4551
 Website: www.redarling.com
 Email: mktg@redarling.com

Gary Darling, president
Equipment: Mixers, calenders and extruders
Services offered: Full technical service, custom compounding, recipe development, large and small production
Mixing capabilities: All elastomers
Tech service: yes
Recipe development: yes

Datwyler Sealing Solutions USA
 875 Center Dr.
 Vandalia, OH 45377 (800) 227-3539
 (937) 387-2800
 Fax: (937) 890-4905
 Email: sales.susv@datwyler.com



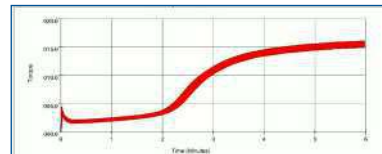
CHEM TECHNOLOGIES ADDS SYNERGY TO CUSTOM MIXING



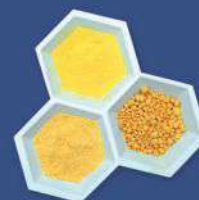
Synergy is defined as the interaction or cooperation of two or more organizations, substances, or other agents to produce a combined effect greater than the sum of their separate effects.

Not only does Chem Technologies sell blends and dispersions to the industry, we practice what we preach. We exemplify Synergy by using them extensively in our own custom compounds. This Synergistic effect provides:

- Improved ingredient weighing accuracy and compound quality
- Custom mix process efficiencies which can reduce conversion costs
- Excellent dispersion and uniformity
- Unsurpassed batch to batch consistency and traceability



Chem Technologies, Ltd.
 14875 Bonner Drive, Middlefield, OH 44062
 Phone: 440-632-9311, Fax: 440-632-9878, www.chemtechnologiesltd.com



Custom Mixing, Services

Torsten Maschke, CEO
Equipment: Mixers, calenders and extruders
Mixing capabilities: All elastomers
Tech service: yes
Recipe development: yes

Dow Corning
Corporate Headquarters
2200 W. Salzburg Rd.
P.O. Box 994
Midland, MI 48686-0994
..... (989) 496-4000
Fax: (989) 496-4586
Website: www.dowcorning.com
Email: tech.info@dowcorning.com
Equipment: Mills, extruders, dough mixer systems, product development laboratory
Services offered: Product development and customization
Mixing capabilities: Silicones, fluorosilicones, color masterbatches
Tech service: yes
Recipe development: yes

Dyna-Mix, Inc.
P.O. Box 369
Country Club Rd.
Grafton, WV 26354..... (800) 255-2681
(304) 265-5310
Fax: (304) 265-5104
Website: www.dyna-mix.com
Email: crobinson@dyna-mix.com
Chad Robinson, president, Grafton commercial division
Equipment: One 270 six-wing rotor and one 270 four-wing rotor mixer; variable speed mixers and dual mill take-offs; extruder/strainer and granulator
Services offered: Custom mixed rubber (black and color), straining, rubber granulating; formulation development, standard rubber testing.
Mixing capabilities: All polymer types except silicone and FKM
Capacity: 100 million lbs.
Tech service: yes
Recipe development: yes

Divisions:
Dyna-Mix, Inc.
P.O. Box 4726
S. Lyons St.
Tyler, TX 75712..... (800) 527-8403
Fax: (903) 596-7532
Email: dminick@dyna-mix.com
David Minick, manager manufacturing service
Equipment: One 305 four-wing, variable speed mixer and dual mill take-off; one kneader 110-300 tilt; 50" mill

Services offered: Custom mixed rubber (black and color), all polymers except silicone
Mixing capabilities: All general purpose polymers
Capacity: 40 million lbs.

Eagle Elastomer, Inc.
70 Cuyahoga Falls Industrial Pkwy.
Peninsula, OH 44264 (330) 923-7070
Fax: (330) 923-4005
Website: www.eagleelastomer.com
Email: eagle1@eagleelastomer.com
Charlie Christie, custom mixing sales manager
Equipment: Internal mixer, mills, calender, granulator, extruders, autoclaves and curing ovens
Services offered: Custom mixing, preforming, technical service and recipe development
Mixing capabilities: Specializing in fluoroelastomer and perfluoroelastomer compounds
Capacity: 1 million lbs./yr.
Tech service: yes
Recipe development: yes
(See our ads on pages 53 and 90)

Eastland Compounding, A division of E3g Limited
Bank St.
Clayton, Manchester, U.K.
..... +44 (0)161 230 2170
Fax: +44 (0)161 223 3520
Website: www.eastlandcompounding.com
Email: sales@eastlandcompounding.com

Keith O'Brien, managing director and director
Services offered: Finishing and packaging, plant capability, relationships, technical capabilities, compound testing
Mixing capabilities: EPDM, HNBR, natural rubber, SBR/BR, NBR, XNBR, CR, IIR/CIIR/BIIR

Eaton Corporation
860 Blankenship Rd.
Newbern, TN 38059 (731) 627-2531
Fax: (731) 627-6165
Website: www.eaton.com
Email: sales@eaton.com

Craig Arnold, chairman and CEO
Equipment: Various
Services offered: Custom mixing
Mixing capabilities: NR, EPDM, SBR, NBR, CR, CSM, ECO, BR, IR, HNBR, EPM, XNBR
Capacity: 74 million lbs./yr.
Tech service: yes
Recipe development: yes

Electric Cable Compounds Inc.
108 Rado Dr.
Naugatuck, CT 06770.... (203) 723-2590
Website: www.electricensecablecompounds.com

Gene Fridland, president; Jessica Foss, market development manager
Equipment: Various
Services offered: ECC operates a non-carbon black compounding facility specializing in the development and manufacture of elastomeric, high-performance rubber (EPR), polyolefin, and other specialty polymer based compounds and masterbatches. ECC provides custom mixing, tolling and proprietary rubber and plastic compounds
Mixing capabilities: Typical base materials include EPR, PE, PP, POE and EVA
Tech service: yes
Recipe development: yes

Elite Advanced Polymers, Inc.
P.O. Box 496
Ripley, MS 38663 (662) 512-1770
Fax: (662) 512-1756
Website: www.eliteadvancedpolymers.com
Email: sales@eliteadvancedpolymers.com

Andy Claytor, vice president of sales
Equipment: 55L and 110L tilt mixers, mills
Services offered: Specialty custom compounding and mixing with full service research and development laboratory
Mixing capabilities: Black and color compounds with all elastomers except silicone
Tech service: yes

Evercompounds
Via S. Barbara 192
48010 Fusignano (RA), Italy
..... +39 0545 955841
Fax: +39 0545 52238
Website: www.evercompounds.com
Email: info@evercompounds.com

Equipment: Five mixing lines Intermix; extruders/straining lines and granulators; calendering line
Mixing capabilities: Color and black compounds; custom mixing all polymer types
Tech service: yes
Recipe development: yes

Division:
Evercompounds LLC
7046 Stateline Rd.
Olive Branch, MS 38654
..... +1 (662) 966-8900

Fluoroelastomer Specialists...



**... Proudly Compounding and Processing
Fluoroelastomers Since 1983**

Products and Services

- Specialists in Fluoroelastomer (FKM, FEPM) and Perfluoroelastomer (FFKM) products
- Custom Mixed Compounds
 - Extruded & Calendered Preforms
 - Stocked Compounds
 - Color Compounds
- Fully Cured Extruded Products
 - O-Ring Cord, Profiles & Tubing
- Fully Cured Sheet Products
 - Molded Sheet 36" X 36"
 - Continuous Sheet Roll
- Technical Support
- ISO 9001 and AS9100 Quality Management System



Eagle
ELASTOMER *INC.*

P.O. Box 939 • Cuyahoga Falls, OH 44223
Telephone 330-923-7070 • Fax 330-923-4005
www.eagleelastomer.com • eagle1@eagleelastomer.com

Made in the USA... Sold Globally

Custom Mixing, Services

Website: www.evercompoundsllc.com
 Email: info@evercompoundsllc.com
 Email: carlo.baldovino@evercompounds.com

Carlo Baldovino, general manager and vice president of sales
Equipment: Two mixing lines Intermix; extruder/straining line
Mixing capabilities: Black compounds; custom mixing all polymer types
Tech service: yes
Recipe development: yes (global center)
Ongoing investment: 4-roll calendaring line

Finite Fiber

1374 Markle St.
 Akron, OH 44306-1801
(330) 773-6654
 Fax: (330) 773-6273
 Website: www.finitefiber.com
 Email: kkleve@finitefiber.com

Keith Kleve, sales director
Equipment: Mixers, calenders, mills
Services offered: Custom mixing fibers
Mixing capabilities: Most elastomers

Garware Fulflex USA Inc.

32 Justin Holden Dr.
 Brattleboro, VT 05301 ... (802) 257 5256
 Mobile (305) 781 7551
 Fax: (802) 257-5602
 Website: www.fulflex.com
 Email: aamit.lunavat@fulflex.com

Aamit Lunavat, national sales manager, custom mixing
Equipment: Mixers, calenders
Services offered: Custom mixing, compounding, calendaring and thin gauge elastic tapes, threads and sheets
Mixing capabilities: Fulflex specializes in contamination-free custom rubber mixing requirements. Fulflex does not mix free carbon black, delivering the highest quality, clean compounds to customer specifications. We can screen up to 300 mesh, provide color matching and color consistency, all in a variety of packaging configurations, including slab, strip and pellets
(See our ad below)

Gendon Polymer Services, Inc.

38 Nixon Rd.

Bolton, Ontario, Canada L7E 1W2
 (905) 951-6118
 Fax: (905) 951-6119
 Website: www.gendon.com
 Email: info@gendon.com

Doug Burwell, general manager; Tim Bruewer, sales and marketing manager
Equipment: Extruders, internal mixers, mills, pelletizers, ribbon blenders
Services offered: High performance rubber stock, fluoroelastomers, Vamac, HNBS, etc.
Tech service: yes
Recipe development: yes

Global Silicones Inc.

49 Industrial Way
 Buellton, CA 93427..... (805) 686-4500
 Website: www.globalsil.com
 Santiago Speceiro, president

Goldsmith & Eggleton, Inc.

300 First St.
 Wadsworth, OH 44281 ... (330) 336-6616
 Website: www.goldsmith-eggleton.com,
www.Ravaflex.com
 Email: reggleton@hbchemical.com



Custom Mixing / Rubber Compounding, Calendaring & Pre-form Services

For over 85 years, Fulflex has specialized in Custom Mixing / Rubber Compounding, Calendaring & Pre-form Services to provide superior color, cleanliness and consistency lot-to-lot and run to run.

What truly stimulates us is...a challenge, an unsolved problem, a never explored opportunity in rubber mixing & calendaring...

So, simply put us IN THE MIX and consider it done!

Fulflex Advantage:

- Ultra-clean Equipment & Process
- No Free Carbon
- Black Fine Screening Available
- Consistent Color Matching
- Specialty Calendaring Services

Markets we serve:



Hose



Pharma / Medical



Industrial



Automotive



Printing

Fulflex, 32 Justin Holden Drive, Brattleboro, VT 05301, USA.
 Contact: Aamit Lunavat at 305-781-7551 | aamit.lunavat@fulflex.com | www.fulflex.com

Custom Mixing, Services

Rob Eggleton, business director
Equipment: F-305 internal mixer for reprocessing elastomers; F-270 internal mixer for manufacture of carbon black masterbatches
Services offered: Reprocessing of elastomers and masterbatching of elastomers
Mixing capabilities: Industry standard C-BMB or proprietary blends
Capacity: 30 million lbs./yr.
Tech service: yes

Goodyear Rubber Co. of Southern California
 9615 Feron Blvd.
 Rancho Cucamonga, CA 91730
 (909) 987-1774
 Website: www.goodyearrubber.com
 Email: info@goodyearrubber.com
Equipment: Calenders, mills, mixers, extruders
Services offered: Compound formulation and rubber mixing

optimization
Mixing capabilities: All elastomers
Tech service: yes
Recipe development: yes

Graphic Arts Rubber, Inc.
 101 Ascot Pkwy.
 Cuyahoga Falls, OH 44223
 (330) 923-4101
 Fax: (330) 923-4464
 Website: www.graphicartsrubber.com
 Email: info@graphicartsrubber.com
 David Corron, general manager
Equipment: Calenders, mills and slitting equipment
Services offered: Mixing and calendaring
Mixing capabilities: Open mill only
Capacity: 5 million lbs./yr.
Tech service: yes
Recipe development: yes

Gumena L.L.C.
 13738 E. Jefferson Blvd.

Mishawaka, IN 46545 (574) 339-6510
 Website: www.gumenallc.com
 Email: c.diaz@gumenallc.com, s.diaz@gumenallc.com

Claudio Diaz president
Equipment: Mixers
Services offered: Mixing master batches, custom formulation and mixing, special color match
Mixing capabilities: Open mill only
Tech service: yes
Recipe development: yes

HEXPOL Barberton
 1020 Lambert St.
 Barberton, OH 44203
 (330) 798-4790
 Fax: (330) 798-4795
 Website: www.hexpol.com/rubber
 Email: info.bar@hexpol.com

HEXPOL Burton
 14330 Kinsman Rd.

North American custom mixers - Ohio

Ohio

Company	City	Equipment	Capabilities
Akron Rubber Development Laboratory	Akron, OH	Milers, mills, calenders, extruders, dies	Most elastomers
Altran	Hudson, OH	Mixers, mills	Most elastomers except silicone
Altran Technical Services	Hudson, OH	Mixers, ovens, extruder, RPA, viscometer, tensometer	Most elastomers except silicone
APV Engineered Coatings	Akron, OH	Grinders, mixers, blenders	Small to large batch sizes
Blair Rubber Co.	Seville, OH	Mixer, mills, calenders, slitters, autoclaves	Most elastomers
Chardon Custom Polymers	Chardon, OH	Mixers, mills, extruders, calenders	Most elastomers
Chem Technologies	Middlefield, OH	Mixers, mills, preformers, pelletizing, metal detection	Most elastomers
Datwyler Sealing Solutions	Vandalia, OH	Mixers, mills, calenders, extruders	All elastomers
Eagle Elastomer	Peninsula, OH	Mixers, mills, calenders, extruders, autoclaves and curing ovens	Fluoroelastomers
Finite Fiber	Akron, OH	Mixers, mills, calenders	Most elastomers
Goldsmith & Eggleton, Inc.	Wadsworth, OH	Mixers	All elastomers
Graphic Arts Rubber Inc.	Akron, OH	Mixers, mills, extruders, calenders	All elastomers
HEXPOL Compounding	Cuyahoga Falls, OH	Mills, calenders, slitters	SBR, BMB, EPDM, IR, SBR/BR
	Barberton, OH	Mixers, mills, strainers	Open mill
	Burton, OH	Mixers, mills, extruders, calenders	All elastomers
	Middlefield, OH	Mixers	All elastomers
IER Fujikura	Macedonia, OH	Deflashers, curing ovens, cutting, dipping, dryers, extruders, grinders, mixers, lathes, mills, presses, trimmers	All elastomers Most elastomers
Polymeric Inc.	Cuyahoga Falls, OH	Mixers, mills, extruder	All polymers except silicone
Quanex Custom Mixing	Cambridge, OH	Mixers, mills, batch-offs, conveyors, gear-pump strainers, pelletizers	Most elastomers
Rainbow Mastermixing, LLC	Akron, OH	Mixers, mills, calender, extruders, autoclaves, presses	All elastomers, silicone
Salem-Republic Rubber Co.	Sebring, OH	Calenders	Most elastomers
Shin-Etsu Silicones	Akron, OH	Mixers, mills, extruders	Silicone
Silicone Solutions	Cuyahoga Falls, OH	Mixers	Silicone
Silmix-Ohio	North Canton, OH	Mills, mixers, extruders, calenders	Silicone and fluorosilicone
Smithers	Akron, OH	Mixers	All elastomers

Custom Mixing, Services

Burton, OH 44021.....(440) 834-4644
 Fax: (440) 834-5524
 Website: www.hexpol.com/rubber
 Email: info.btn@hexpol.com

HEXPOL City of Industry

491 Wilson Way
 City of Industry, CA 91741
(626) 961-0311
 Website: www.hexpol.com/rubber
 Email: info.coi@hexpol.com

HEXPOL Dyersburg

150 S. Connell Ave.
 Dyersburg, TN 38024(731) 285-4353
 Fax: (731) 287-3098
 Website: www.hexpol.com/rubber
 Email: info.dyr@hexpol.com

HEXPOL Huntingdon

55 Associated Way
 Huntingdon, TN 38344 ..(731) 986-2271
 Fax: (731) 986-2273
 Website: www.hexpol.com/rubber
 Email: info.hun@hexpol.com

HEXPOL Kennedale

635 Tower Dr.
 Kennedale, TX 76060....(817) 483-9797
 Fax: (817) 483-1978
 Website: www.hexpol.com/Rubber
 Email: info.kdl@hexpol.com

HEXPOL Long Beach

2500 E. Thompson St.
 Long Beach, CA 90805
(562) 803-1117
 Fax: (562) 803-3117
 Website: www.hexpol.com/rubber
 Email: info.coi@hexpol.com

HEXPOL Middlefield

14910 Madison Rd.
 Middlefield, OH 44062...(440) 632-0901
 Fax: (440) 632-0929
 Website: www.hexpol.com/rubber
 Email: info.mid@hexpol.com

HEXPOL Muscle Shoals - Robbins LLC

2306 S. Wilson Dam Hwy.
 Muscle Shoals, AL 35661
(800) 633-3312
 Fax: (800) 321-7918
 Website: www.robbinsllc.com

HEXPOL Statesville

280 Crawford Rd.
 Statesville, NC 28625(704) 872-1585
 Fax: (704) 872-7243
 Website: www.hexpol.com/rubber
 Email: info.sta@hexpol.com

HEXPOL Tallapoosa

P.O. Box 245

101 and 155 Stoffel Dr.
 Tallapoosa, GA 30176
(770) 574-2321
 Fax: (770) 574-5315
 Website: www.hexpol.com/rubber
 Email: info.tal@hexpol.com

HEXPOL Whitewater

736 Executive Dr.
 Whitewater, WI 53190
(262) 249-8133
 Fax: (262) 473-6966
 Website: www.hexpol.com/rubber
 Email: info.whi@hexpol.com

HEXPOL Silicone

1497 Exeter Rd.
 Akron, OH 44306
(440) 682-4039
 Fax: (440) 682-4076
 Website: www.siliconebyhexpol.com
 Email: info.mog@hexpol.com

HEXPOL AQS

Av. Japon #302
 Parque Industrial San Francisco
 Aguascalientes, Mexico CP 20304
+52 449 139-3270
 Fax: +52 449 139-3289
 Website: www.hexpol.com/rubber
 Email: info.ags@hexpol.com

HEXPOL SLP

Circuito Exportacion No. 402
 Parque Industrial Tres Naciones
 San Luis Potosi, SLP CP 78395
 Mexico444 137 13 00
 Fax: 444 137 53 01
 Website: www.hexpol.com/rubber
 Email: info.slp@hexpol.com

HEXPOL QRO

La Noria 115
 Parque Industrial Querataro
 San Francisco de los Romo
 Santa Rosa Jauregui
 Mexico C.P. 76220
 Website: www.hexpol.com/rubber
 Email: info.qro@hexpol.com

Berwin Group Ltd.

A HEXPOL Company
 Broadway, Globe Lane Industrial Estate
 Dukinfield, Cheshire, U.K. SK16 4UR
+44 (0)161 342 1150
 Fax: +44 (0)161 343 1208
 Website: www.berwin-rubber.co.uk
 Email: info@berwin-rubber.co.uk

Berwin Group Ltd.

A HEXPOL Company
 Church Rd., Lydney, Gloucestershire
 U.K. GL15 5FG

.....+44 (0)1594 846 551
 Fax: +44 (0)1594 846 569
 Website: www.berwin-rubber.co.uk
 Email: info@berwin-rubber.co.uk

HEXPOL Compounding UK Ltd.

Unit 3, Fifth Ave.
 Tameside Park, Dukinfield, Cheshire
 U.K. SK16 4PP+44 161 343-4433
 Fax: +44 161 343-4422
 Website: www.hexpol.com/rubber
 Email: info.duk@hexpol.com

Gislaved Gummi AB - A HEXPOL Company

P.O. Box 522
 332 28 Gislaved, Sweden
+46 (0) 371 848-00
 Fax: +46 (0) 371 848-88
 Website: www.hexpol.com/rubber
 Email: info.gis@hexpol.com

HEXPOL Compounding SPRL

Industriestrasse 36
 4700 Eupen, Belgium SE-332 28
+32 (0) 87 59 54 30
 Fax: +32 (0) 87 74 44 73
 Website: www.hexpol.com/rubber
 Email: info.eup@hexpol.com

HEXPOL Compounding SRO

Sumperská 1344
 78391 Unicov, Czech Republic
+42 (0) 585 004 011
 Fax: +42 (0) 585 053 568
 Website: www.hexpol.com/rubber
 Email: info.uni@hexpol.com

HEXPOL Compounding GmbH

Ottostrasse 34
 41836 Huckelhoven, Germany
+49 (0) 2433 97 55 0
 Fax: +49 (0) 2433 97 55 99
 Website: www.hexpol.com/rubber
 Email: info.huk@hexpol.com

HEXPOL Compounding SLU

Ctra. Molins de Rei a Caldes Km 13,2
 Rubi (Barcelona), Spain 08191
+34 93 699-8611
 Fax: +34 93 699-9251
 Website: www.hexpol.com/rubber
 Email: info.bcn@hexpol.com

HEXPOL Compounding (Qingdao) Co. Ltd.

899 Qingdao Middle Rd.
 266431 Jiaonan, Qingdao, China
+86 532 8173-1118
 Fax: +86 532 8173-1119
 Website: www.hexpol.com/rubber
 Email: info.qdo@hexpol.com
(See our ad on page 57)



Leading the Industry in Sustainable Innovations and Solutions

- Sustainable compounds, utilizing natural rubber, bio-based & recycled raw materials
- Supporting 60% of our operational energy needs with carbon free energy via onsite and offsite investments
- Boldly committing to a 75% carbon reduction of Scope 1 and 2 by the end of 2025

www.HEXPOL.com/rubber

Custom Mixing, Services

Hiawatha Rubber Co.

1700 67th Ave. North
Minneapolis, MN 55430

..... (763) 566-0900
Fax: (763) 566-9537
Website: www.hiawatharubber.com
Email: info@hiawatharubber.com

Tim Carlson, new business development

Equipment: 30 mold presses (including injection press), up to 42" x 42" platen, robotic CNC grinding, cylindrical grinding, three 60" mills, cryogenic deflasher, eight manufacturing cells

Services offered: Research and development, prototyping and product development

Mixing capabilities: Custom molded precision rubber rollers and rubber-to-metal bonded rubber parts and all rubber parts

Capacity: 24 hours; 5 days/week

Tech service: yes

Recipe development: yes

Hoosier Racing Tire Corp.

2307 Pidco Dr.

Plymouth, IN 46563..... (574) 784-3409
Fax: (574) 936-9467

Website: www.hoosiertirecustommfg.com
Email: jmikesell@hoosiertire.com

Jerry Mikesell, custom calendaring, mixing and specialty tire sales

Services offered: Custom textile calendaring (up to 59" wide) tire cord, nylon, monofilament nylon, aramid, rayon, polyester, square woven, industrial textiles, custom gum calendaring up to 38" wide x .300" thick, custom rubber mixing and compound formulation, specialty tire development and manufactur-

ing; product engineering and testing; high speed and endurance test wheel services

Mixing capabilities: Black only, NR, SBR, BR, nitrile, halobutyl, EPDM, polyisoprene, polychloroprene, others upon request

Tech service: yes

Recipe development: yes

IER Fujikura, Inc.

8271 Bavaria Rd.
Macedonia, OH 44056

..... (330) 425-7125, ext: 254
Fax: (330) 425-7596

Website: www.ierfujikura.com

Email: sales@ierfujikura.com

Ricardo Herrera, sales and marketing manager

Equipment: Cryogenic deflashers, curing ovens, cutting, deflashing, dipping, dryers, extruders, grinders, internal mixers, lathes, mills, presses - hydraulic, injection (HCR, LSR), transfer, compression and punch, trimmers.

Services offered: Color matching, compounding, cutting general, deflashing, grinding, injection molding, milling, mixing black, mixing colors, mold making, molding general, preforming, processing. Specialize in over-molding of various substrates

Mixing capabilities: Internal, open roll, lab

Tech service: yes

Recipe development: yes

Infinity Rubber Technology Group

100 Kennedy St.
Welland, Ontario, Canada L3B 0B

..... (905) 735-6366
Website: www.infinityrubber.com

Email: sales@infinityrubber.com

Equipment: 3 D11 internal mixer, four-roll calender

Services offered: Calendaring black, calendaring colors, color matching, compounding, custom mixing black, custom mixing colors

Mixing capabilities: NR, EPDM, polychloroprene, nitriles, SBR, chlorobutyl, butyl, HNBR, XNBR, Hypalon

Capacity: 80 million lbs./yr.

Tech service: yes

Recipe development: yes

(See our ad on page 59)

International Silicone Technologies

11019 Greenstone Ave.

Santa Fe Springs, CA 90670

..... (562) 946-2405

Website: www.inter-sil.com

Email: info@www.inter-sil.com

Vicky Martinez, technical director

Ivanhoe Rubber, a division of Home Rubber Co., L.P.

31 Wolverton St.

Trenton, NJ 08611

..... (609)394-1176

Website: homerubber.com/core-features
Email: sales@homerubber.com

Martin Beirn, vice president

KRI-Color, LLC

1893 Main St.

Sanford, ME 04073

..... (888) 978-6803

Website: www.kri-color.com

Tom Manello, co-owner

Equipment: Mixers, mills, three-roll mills

Mixing capabilities: Pigment and catalyst dispersions

North American custom mixers - Midwest

Midwest

Company	City	Equipment	Capabilities
American Phoenix	Eau Claire, WI	Mixers, mills, strip stackers	SBR, NR, EPDM
Bruckman Rubber Co.	Hastings, NE	Mixers, mills, extruder, strip cutters, roller head die	Most elastomers
Dow Corning	Midland, MI	Mills, extruders, mixers	Silicones
HEXPOL Compounding	Whitewater, WI	Mixers, mills	All elastomers
Hiawatha Rubber	Minneapolis, MN	Presses, mills, grinders, deflashers	Rubber rollers, rubber-to-metal
Hoosier Racing Tire Corp.	Plymouth, IN	Calenders, mixers	Most elastomers, black only
Laur Silicone	Beaverton, MI	Mixers, strainers, calenders	Silicones
Mid-States Rubber Products	Princeton, IN	Mills, mixers, extruders, calenders	Most elastomers
Molex	Lisle, IL	Mixers	Most elastomers
Northstar Elastomers	Fridley, MN	Mixers	All polymers
Otech	Rolling Prairie, IN	Mixers	All polymers
Rubber Consortium	Highland Park, IL	Mixers, extruders	Most elastomers
U.S. Silicones	Fort Wayne, IN	Mixers	Silicones

Custom Mixing, Services

Laur Silicone, Inc.
4930 S. M-18
Beaverton, MI 48612-9181
.....(989) 435-7400
Fax: (989) 435-7707
Email: laursilicone@laursilicone.com
Kevin Rudy, vice president
Equipment: Mills, double arm mixers, preforming strainers, calenders,
Mixing capabilities: Exclusively silicone
Capacity: 1.5 million lbs./yr.
Tech service: yes
Recipe development: yes
(See our ad on page 61)

Loc Performance
13505 N. Haggerty Rd.
Plymouth, MI 48170
.....(734) 927-3901
Website: www.locperformance.com
Email: jkoviak@locper.com
Joel Koviak, director of sales, rubber product

Mechanical Rubber Products Corp.
P.O. Box 593

77 Forester Ave., Ste. 1
Warwick, NY 10990(845) 986-2271
Fax: (845) 986-0399
Website: www.mechanicalrubber.com
Email: steve.kelley@mechanicalrubber.com
Steve Kelley, national sales

Mid-States Rubber Products Inc.
P.O. Box 370
1232 S. Race St.
Princeton, IN 47670(812) 385-3473
Fax: (812) 385-5008
Website: www.mid-states.com
Email: rfq@mid-states.com
Philip Eykamp, president and CEO
Mixing capabilities: Most elastomers

Molex
2222 Wellington Ct.
Lisle, IL 60532(800) 786-6539
Website: www.centralrubbercompany.com
Email: al.maldonado@molex.com
Services offered: Custom colored rubber milled to customer specifications or

Central Rubber specifications
Mixing capabilities: All non-black custom rubber compounds, with polymers used - NR, SBR, polychloroprene, Hypalon, nitrile, EPDM, silicone, butyl, urethane and nitrile/PVC
Capacity: Over 8.5 million lbs.
Tech service: yes
Recipe development: yes

Momentive Performance Materials
420 North Taylor Rd.
Garrett, IN 46738-1846
Website: www.momentive.com
Email: commercial.services@momentive.com

Sam Conzone, chief executive officer and president; Robert Bush, senior vice president and chief financial officer; Michael Foley, president and general manager, formulated specialties; V.P. Nalian, president and general manager, performance additives
Services offered: Ready to use silicone (HCR and LSR) compounding; specialty packaging, colors, testing and



Infinity Rubber Technology Group
www.infinityrubber.com
905.735.6366

ISO 9001:2015 Certified

CUSTOM RUBBER MIXING AND CALENDERING



Manufacturing

- Black and Color Compounds
- Flexible Scheduling
- Focus on Customer Service

Product Development

- Proven recipe library for all applications
- Custom Compound Development
- Molding and Extrusion Expertise



sales@infinityrubber.com

Custom Mixing, Services

application development; silicone base development.
Mixing capabilities: Silicone elastomers, VMQ, FVMQ, PVMQ

Mountville Rubber Inc.

1602 Orchard Hill Rd.
 LaGrange, GA 30240

..... (833) 213-5311
 Fax: (706) 298-2994

Website: www.mountvillerubber.com
 Email: DLayton@mountvillerubber.com

Darrin Layton, president

Equipment: Two 268L mixers

Mixing capabilities: All elastomers with the exception of silicone

Capacity: 50 million lbs./yr.

Tech service: yes

Recipe development: yes

National Rubber Corp.

367 Morganza Rd.
 Canonsburg, PA 15317

..... (412) 831-6100

Website: www.nationalrubber.com

Email: perry@nationalrubber.com

Perry Monpara, owner

Natrochem Inc.

1 Exley St.
 Savannah, GA 31415

..... (912) 236-4464

Fax: (912) 236-1919

Website: www.natrochem.com

Equipment: Two mixers, two reactors

Mixing capabilities: Toll processing of dry liquid concentrates and blending operations

Capacity: 20 tons per day

Tech service: yes

Recipe development: yes

Northstar Elastomers L.L.C.

4500 Main St. NE
 Fridley, MN 55421 (952) 270-4767

Website: www.nselastomers.com

Email: jimj@nselastomers.com

Jim Judson, general sales

Mixing capabilities: All polymers

Capacity: 500 pounds to 10,000 pounds

Oregon Rubber Mills

1985 S.W. Airport Ave.

Corvallis, OR 97333 (541) 752-4142

Fax: (541) 752-8146

Website: www.oregonrubbermills.com

Email: jjones@oregonrubbermills.com

Josh Jones, general manager

North American custom mixers - Southeast, Southwest and West

Southeast

Company	City	Equipment	Capabilities
Ace Elastomer Corp.	Rock Hill, SC	Mixers, calenders	All elastomers
AirBoss Rubber Solutions	Scotland Neck, NC	Mixer	Most elastomers
Barco L.L.C.	Tallapoosa, GA	Mixers	Most elastomers
Colonial Diversified Polymer Products	Dyersburg, TN	Mills, mixers, extruders, calenders	Most elastomers
Eaton Corporation	Newbern, TN	Various	Most elastomers
HEXPOL Compounding	Muscle Shoals, AL	Mixers, mills, calender, extruders, autoclaves, presses	All elastomers
	Tallapoosa, GA	Mixers, mills, straining, calenders	All elastomers
	Dyersburg, TN	Mixers, mills, calender, extruder	All elastomers
	Huntington, TN	Mixers, mills	All elastomers
	Statesville, NC	Mixers, mills, calender, extruder	All elastomers
Mountville Rubber	LaGrange, GA	Mixers	All elastomers except silicone
Natrochem	Savannah, GA	Mixers, reactors	Dry liquid concentrates
Patch Rubber Co.	Weldon, NC	Mixers, calenders, extruders	All elastomers
Pinnacle Elastomeric Technology	Lula, GA	Mixers, mills, extruder	Fluoroelastomers, HNBR
Reiss Manufacturing	Blackstone, VA	Mixers, mills, calender, extruders, autoclaves, presses	Silicones
Tennessee Custom Mixing	Union City, TN	Mixers, calenders	Elastomers

Southwest, West

Company	City	Equipment	Capabilities
Burke Industries, Inc.	San Jose, CA	Mixers	All types
R.E. Darling	Tucson, AZ	Mixers, calenders and extruders	All elastomers
Dyna-Mix	Tyler, TX	Mixers, mills	All general polymers
Goodyear Rubber Co.	Rancho Cucamonga, CA	Calenders, mills, mixers, extruders	All elastomers
HEXPOL Compounding	City of Industry, CA	Mixers, mills, calenders	All elastomers
	Long Beach, CA	Mixers, mills, calenders	All elastomers
	Kennedale, TX	Mixers, mills, calender, extruder	All elastomers
Oregon Rubber Mills	Corvallis, OR	Mills, calenders, mixers	All polymers
R&S Processing	Paramount, CA	Mixers, mills, stripping	All elastomers
Silmix-California	Chino, CA	Mixers	Silicone and fluorosilicone

LAUR SILICONE

Celebrating 45 years in business

CUSTOM SILICONE COMPOUNDS


Our expertise and dedicated focus mean we deliver fast and cost-effective silicone mixing and compounding solutions, no matter the scale.

STANDARD MATERIALS


- High Strength
- Thermal Transfer
- High Resilience
- Anti-Static
- High Temperature
- Flame Retardant

CUSTOM MATERIALS

- Color
- Catalyst
- Special Properties
- Packaging: Strip Form, Slab, Calendered

 +1 989-435-7400

 laursilicone@laursilicone.com

 4930 S. M-18, Beaverton
Michigan 48612

 laursilicone.com

SMALL ORDERS WELCOME!



Custom Mixing, Services

Equipment: Mixers, mills
Services offered: Custom mixing, formulation development, technical service
Mixing capabilities: All elastomers
Capacity: 20 million lbs.
Tech service: yes
Recipe development: yes

Otech Corp.

4744 E. Oaknoll Rd.
 Rolling Prairie, IN 46371
 (219) 778-8001
 Fax: (219) 778-8007
 Website: www.otechcompounds.com
 Email: info@otechcompounds.com
 Jack O'Donnell, president and CEO

Patch Rubber Co.

100 Patch Rubber Rd.
 Weldon, NC 27890 (252) 536-2574
 Fax: (252) 536-4940
 Website: www.patchrubber.com
 Email: sales@patchrubber.com

Rob Wells, plant manager

Equipment: Mixers, calenders, extruders

Services offered: Compound mixing, calendering, extruding

Mixing capabilities: All elastomers

Capacity: 600,000 lbs./yr.

Tech service: yes

Recipe development: yes

Pelmor Laboratories Inc.

401 Lafayette St.
 P.O. Box 309
 Newtown, PA 18940 (215) 968-3334
 Fax: (215) 968-3676
 Website: www.pelmor.com
 Email: sales@pelmor.com

James Ross, president

Equipment: Clicking machines, coolers, deflashing equipment, dies, extruders, grinders, lathes, mills, mixers, molds,

ovens, platens, compression molding presses, injection molding presses, transfer molding presses, slitters, electronic autoclave, 1B mixer, roll mills

Mixing capabilities: Generally all types, specializing in fluoroelastomers

Capacity: 500,000 lbs./yr.

Tech service: yes

Recipe development: yes

Pierce-Roberts Rubber Company

1450 Heath Ave.
 P.O. Box 5007
 Trenton, NJ 08638 (609) 394-5245
 Fax: (609) 394-0709

Website: www.pierceroberts.com

Email: info@pierceroberts.com

Chris Weber, owner; Denise Hoffman, owner; Charles Foley, business development manager

Equipment: Autoclaves, calenders, cryogenic deflashers, curing ovens, custom mixers, extruders, grinders, injection molding, knives, lathes, liquid injection molding, mills, mixers, presses, rubber mill, vulcanizers

Pinnacle Elastomeric Technology

5272 Mountain Center Plaza
 Lula, GA 30554-2544 (770) 967-4111
 Fax: (770) 967-2100

Website: www.pinnacleelastomers.com

Email: info@pinnacleelastomers.com

Bobby Rathbun, sales manager

Equipment: 55 liter tilt mixing line, mixing mills, refiner mill, extruder

Services offered: Fluoroelastomer, perfluoroelastomer (FFKM), HNBR and Aflas mixing, full service rubber lab

Mixing capabilities: Internal mixer, open mill mixing, slab, strip or cord

Capacity: 6+ million lbs./yr.

Tech service: yes

Recipe development: yes

PolyGel

30 Leslie Ct.
 Whippany, NJ 07981 (973) 884-3300
 Fax: (973) 884-1331

Website: www.polygel.com

Email: info@polygel.com

Lawrence Kersen, president and CEO

Equipment: Toll compounding equipment

Services offered: Compounding of TPE/viscoelastic gels

Capacity: 7 million lbs./yr.

Tech service: yes

Recipe development: yes

Polymeric Systems Inc.

47 Park Ave.
 P.O. Box 522
 Elverson, PA 19520
 (610) 286-2500
 Fax: (610) 286-2510

Website: www.polymericssystems.com

Email: sales@polymericssystems.com;

orders.polymericssystems@ppg.com

Jack Kane, vice president of sales

Polymeric, Inc.

2828 Second St.
 Cuyahoga Falls, OH 44221
 (330) 928-2210
 Fax: (330) 929-8819

Website: www.polymericinc.com

Email: sales@polymericinc.com

Tim Samples, sales director; Lora Mc-Cambridge, technical director
Equipment: #9 mixer, #3 mixer, 60" mill, 84" mill, extruder

Services offered: Custom rubber mixing, dispersions, chemical blends

Mixing capabilities: All polymers except silicone

Capacity: 24 million lbs./yr.

Tech service: yes

Recipe development: yes

Canada custom mixers

Canada

Company	City	Equipment	Capabilities
AirBoss of America	Newmarket, Ontario	Mixers, extruders, calenders	Most elastomers
AirBoss Rubber Solutions	Kitchener, Ontario	Mixers, gear pump extruder, strainer, strip auto piler	Most elastomers
American Biltrite	Sherbrooke, Quebec	Mixer	Black, white and colors
Britannia Rubber	Mississauga, Ontario	Mixers, calenders, mills, strip cooler/stacker	Most elastomers
Gendon Polymer Services	Bolton, Ontario	Extruders, mixers, mills, pelletizers	Most elastomers
Infinity Rubber	Welland, Ontario	Mixers, mills, calenders, slitters	Most elastomers
PPD	Waterville, Quebec	Mixers, extruders, calenders	Most elastomers
Soucy Techno Inc.	Sherbrooke, Quebec	Mixers, extruders, calenders	Most elastomers
Viceroy Rubber	Weston, Ontario	Mixers, calender, autoclaves, mills, presses	Most elastomers

Custom Mixing, Services

Polymeric, Inc. - Kent

1540 St. Clair Ave.
Kent, OH 44240.....(330) 677-1131
Website: www.polymericinc.com
Email: sales@polymericinc.com
(See our ads on pages 37, 85 and 95)

PPD Group

325 Rue Principale N.
Waterville, Quebec, Canada J0B 3H0
.....(819) 837-2491
Fax: (819) 837-3140
Website: www.ppdgroup.com
Email: jacars@ppdgroup.com

Jacques Arseneault, account manager
Equipment: Internal mixers, calenders, milling, slitters, strainers, quality control laboratory.

Services offered: Custom rubber mixing and compounding, straining, calendering, slitting, customized to customer needs; calendering rolls, strip, slabs, etc.
Mixing capabilities: Sponge and dense formulations (NR/IR, EPDM, SBR, BR, IIR, CIIR, CR, CSM, NBR, xNBR, hNBR, FKM [Viton] and more)
Tech service: yes
Recipe development: yes

Precix Inc.

744 Belleville Ave.
New Bedford, MA 02745
.....(508) 998-4000
Fax: (508) 998-4101
Website: www.precix.net
Email: sales@precixinc.com
Richard Shannon, president

QPoly L.L.C.

12911 Industrial Park Dr., Ste. 2
Granger, IN 46530.....(833) 447-7659
Website: www.qpoly.com
Email: info@qpoly.com

Ryan Boeskool, national account manager
Equipment: 55 liter tilt mixers
Services offered: FKM mixing
Mixing capabilities: FKM
Tech service: yes
Recipe development: yes

Quanex Custom Mixing

804 Byesville Rd.
Cambridge, OH 43725... (877) 564-7822
Fax: (740) 435-0909
Website: www.quanex.com
Email: QCMinfo@quanex.com

Greg Mealer, technical sales manager
Equipment: Internal mixers, mills, batch-offs, conveyors, gear-pump strainers, pelletizers
Services offered: Mixing, blending, milling, straining, pelletizing, granulating and compound development, ISO

9001:2015 with design certified
Mixing capabilities: Custom mixing of technical grade rubber compounds, including but not limited to black and color, dense and sponge, extrusion, molding and calendered types
Capacity: 60 million lbs./yr.

R&S Processing Co., Inc.

15712 Illinois Ave., P.O. Box 2037
Paramount, CA 90723-8037
.....(562) 531-1403
Fax: (562) 531-4318
Website: www.rsprocessing.com
Email: info@rsprocessing.com

Karen Kelly, president
Equipment: #11 internal mixer, #9 internal mixer, three #4 internal mixers, seven mills, black and non-black, sheeting, stripping, Barwell preforming, organic and silicone
Services offered: Custom mixing, Barwell preforming, organic and silicone
Mixing capabilities: Internal, laboratory, open mill
Capacity: 40 million lbs./yr.
Tech service: yes
Recipe development: yes

Rainbow Mastermixing

467 Dan St.
Akron, OH 44310.....(330) 374-1810
Fax: (330) 374-1812
Website: www.rainbowmastermixing.com
Email: trickey@rainbowmastermixing.com

Tom Rickey, technical service
Equipment: Two 60" mills, one 42" mill
Services offered: Custom mixing, product testing (rheology properties, tensile properties, short term compression set), technical service, formulation development
Mixing capabilities: Mill mixing, two 60" mills, one 42" mill
Capacity: 1 million lbs./yr.
Tech service: yes
Recipe development: yes

Reiss Manufacturing, Inc.

1 Polymer Place
P.O. Box 60
Blackstone, VA 23824 ... (434) 292-1222
Fax: (434) 292-1757
Website: www.reissmfg.com
Email: reissmfg@reissmfg.com

Sandra Hall, executive sales representative
Equipment: Internal mixer, mills, extruders, presses, calenders, clicker dies
Services offered: Custom and standard formulating and mixing of silicone, fluo-

rosilicone; molded compounds including silicone, Viton, fluorocarbon and EPDM rubber; extruded profiles and tubings; calendered roll goods; laminates, die cut, splicing and other fabricated functions; molding by compression, injection, transfer; fabrication; solids, sponge and foams, registered to ISO 9001:2015; laboratory testing, prototype design, in-house mold design and manufacturing
Tech service: yes
Recipe development: yes

Divisions:

Ronsil Rubber Div.
Blackstone, VA 23824
Website: www.reissmfg.com

Email: Reiss-Silicones@reissmfg.com
Ned Hudson, national sales and marketing manager
Equipment: Mixers, mills, extruders, vacuum presses, compression molding, transfer molding, LIM molding, calendering, clicker dies, laminators, machine shop tool, die and mold build, fabricating equipment splicing, ovens and more
Services offered: Formulating to manufacturing finished custom rubber products, silicone, fluorosilicone, extruded solid or sponge, molded or calendered sheet in: silicone, fluorosilicone, fluorocarbon, Viton and EPDM rubber
Mixing capabilities: Small to large preform lots

RTP Company

580 East Front St.
Winona, VA 55987.....(800) 433-4787
(507) 454-6900
Fax: (507) 454-2041
Website: www.rtpcompany.com
Email: rtp@rtpcompany.com

Rolf Dahl, president
Services offered: Color matching, compounding, extruding and vulcanizing extrusions, mixing black, mixing colors
Mixing capabilities: All polymers except silicone

Rubber Consortium Inc.

1544 Old Skokie Rd.
Highland Park, IL 60035
.....(847) 926-0930
Fax: (847) 926-9557
Website: www.therubberconsortium.com
Email: info@therubberconsortium.com
Tom Rothing, president

SACO AEI Polymers

3220 Crocker Ave.
Sheboygan, WI 53081.. (844) SACOAEI

Custom Mixing, Services

(920) 803-0778
 Fax: (920) 803-0779
 Website: www.sacoaei.com
 Email: sales@sacoaei.com

Salem-Republic Rubber Co.

475 W. California Ave.
 Sebring, OH 44672.....(877) 425-5079
 Fax: (330) 938-9809
 Website: www.salem-republic.com

Email: jdunchuck@salem-republic.com
 Drew Ney, president; Don McCaughtry, vice president operations; James Dunchuck, vice president sales and marketing

Equipment: Processing machinery and equipment, mills, extruders, calenders, cutting equipment, dryers, hose-making machinery, lathes, vulcanizers

Services offered: Hand and machine-made hose, uncured custom calendered rubber, jet starter hose, uncured tank lining materials

Capacity: 2.5 million lbs./yr.

Tech service: yes

Recipe development: yes

Shin-Etsu Silicones of America, Inc.

1150 Damar Dr.
 Akron, OH 44305.....(330) 630-9460
 Fax: (330) 630-9855

Website: www.shinetsusilicones.com
 Email: jagee@shinetsusilicones.com

Jim Agee, national sales manager;
 Tony Kondo, plant manager

Equipment: Dough mixers, internal mixer, dispersion mixers, open two-roll mills, extruders

Services offered: Custom compounder of silicone HLR

Mixing capabilities: Silicone

Tech service: yes

Recipe development: yes

Silicone Solutions

338 Remington Rd.
 Cuyahoga Falls, OH 44224
(330) 920-3125
 Fax: (330) 920-3126

Website: www.siliconesolutions.com
 Email: david@siliconesolutions.com

David Brassard

Equipment: Mixers
Services offered: Custom mixing of liquid and paste products

Mixing capabilities: Silicone elastomers, RTVs and coatings

Tech service: yes

Silmix - Ohio, A Div. of Wacker Chemical Corp.

2215 International Pkwy.
 North Canton, OH 44720

.....(330) 628-5017
 Fax: (517) 264-1628
 Website: www.silmix.com
 Email: info.silmix-oh@wacker.com

Equipment: Mills, extruders, calenders, internal mixers

Services offered: Silicone compound development and custom mixing

Mixing capabilities: Silicone and fluoro-silicone

Tech service: yes

Recipe development: yes

Silmix - California

Division of Wacker Chemical
 13910 Oaks Ave.
 Chino, CA 91710(909) 590-8822
 Fax: (909) 627-2926

Website: www.silmix.com
 Email: info.silmix-ca@wacker.com

Equipment: Mills, extruders, calenders, internal mixer

Services offered: Compound development and custom mixing

Mixing capabilities: Silicone and fluoro-silicone

Tech service: yes

Recipe development: yes

Smithers

425 West Market St.
 Akron, OH 44303.....(330) 762-7441
 Website: www.smithers.com

Email: infomse@smithers.com
 Josh Guilliams, vice president of consultancy

Services offered: Formulation development, small batch mixing/compounding and compression molding

Mixing capabilities: We offer both banbury and intermesh mixing options depending on the formulation and material requirements. The intermeshing mixer delivers improved distributive dispersion and reactive mixing and can achieve high quality results. Can work with multiple polymers (SBR/BR/NR/EPDM/HIIR/FK/FKM/HNBR/NBR/VMQ)

Tech service: yes

Recipe development: yes

Solar Compounds Corp.

1201 W. Blancke St.
 Linden, NJ 07036(908) 862-2813
 Fax: (908) 862-8061

Website: www.solarcompounds.com
 Email: sales@solarcompounds.com

Services offered: Mixing and compounding, formulation development and manufacture

Mixing capabilities: High speed and shear, low speed, solids and caulks

Capacity: 10 million+ lbs./yr.

Tech service: yes
Recipe development: yes

Soucy Techno Inc.

2550 St-Roch Rd. South
 Sherbrooke, Quebec, Canada J1N 2R6
(819) 864-4284

Fax: (819) 864-6352
 Website: www.soucy-group.com

Email: michael.cassin@soucy-group.com

François Bédard general manager

Equipment: Mixers, extruders and calenders

Services offered: Mixing, calendering, preforming, compounding

Mixing capabilities: Most elastomers

Capacity: Rubber: 60 million lbs./yr.;

plastic: 40 million lbs./yr.

Tech service: yes

Recipe development: yes

(See our ads on pages 65 and 91)

SPC Europe Ltd.

Cory Way
 West Wilts Trading Est.
 Westbury, U.K. BA13 4QT
01373 866020

Fax: 01373 866045
 Website: www.spcuk.com

Paul Hallas, operations director

Equipment: Five mixing lines, production control systems, two-roll mill

Services offered: Compounding

Mixing capabilities: EPDM, HNBR, NBR, NR, FKM

Tech service: yes

Recipe development: yes

Specialty Products & Polymers Inc.

2100 Progressive Dr.
 Niles, MI 49120.....(269) 684-5931
 Website: www.specialtyproductspolymers.com

Rich Orosz, owner

Rick Enriqueto Rey, owner

Specialty Rubber Inc.

P.O. Box 483
 4500 White Horse Pike
 Elwood, NJ 08217(609) 704-2555
 Fax: (609) 704-8020

Website: www.specialtyrubber.com

Email: specrub@yahoo.com, specialtyrubber@hotmail.com

Rich Orosz, owner

Specialty Silicone Products, Inc.

3 McCrea Hill Rd.
 Ballston Spa, NY 12020
(800) 437-1442

(518) 885-8826
 Fax: (518) 885-4682

Website: www.sspinc.com



Agriculture / Defense / Oil & Gas / Mining

WHERE OUR RUBBER MEETS THE ROAD TO YOUR SUCCESS

Custom mixing of black
and colour compounds

Calendering

Preforming

GET IN TOUCH

1 819 864 4284 • soucy-group.com

Custom Mixing, Services

Email: astiles@sspinc.com

Randy Putnam, president
Equipment: Mixers, CAD-CAM/mold making, extruders, mills, calenders, die cutting, LSR equipment, robotics
Mixing capabilities: Mixing, molding, injection molding, gasketing
Capacity: 75 million lbs./yr.
Tech service: yes
Recipe development: yes

Spherix Mineral Products

217 Cedar Rd.
Lexington, SC 29073 (844) 744-3749
Website: www.spherixproducts.com
Email: customersupport@spherixproducts.com

Mike Renzi, executive director; Bill Black, sales engineer; Barbara Benton, marketing director
Services offered: Manufactures and markets 100% post-industrial mineral microspheres. Treated and untreated ceramic microsphere process aids reduce processing time and energy consumption and are designed to increase throughput and consistency of organic rubber, plastic and silicone rubber

SRP

120 Seegers Ave.
Elk Grove Village, IL 60007
..... (847) 593-5630
Fax: (847) 593-5634
Website: www.srpco.com
Email: info@srpco.com

Larry Gualano, president
Equipment: Traveling head press die cutter, reciprocating knife cutter, rotary die cutter, waterjet cutter, laser cutter, automatic slitter, automatic adhesive laminator
Services offered: Custom rubber gaskets, custom foam gaskets, custom closed cell sponge gaskets, custom silicone gaskets, custom poron gaskets, custom bisco gaskets, custom electrical enclosure gaskets, custom electrical insulator gaskets, custom EMI shielding gaskets, custom thermal management gaskets, custom thermal gap pads, custom high temperature gaskets, 3M adhesives and tapes, adhesive backed materials

Technical Industries, Inc.

217 Church St.
P.O. Box 65
Peace Dale, RI 02883 ... (401) 783-5887
Fax: (401) 789-2270
Website: www.tidispersion.com
Email: sales@tidispersion.com
Eric Rose, president

Equipment: Pebble mills
Services offered: Manufacture aqueous dispersions
Recipe development: yes

Tennessee Custom Mixing

3260 Goodyear Dr.
Union City, TN 38261
..... (731) 884-2530
Website: www.tcmmix.com
Email: wendell.duke@tcmmix.com

Wendell Duke
Services offered: Provide high quality rubber compounds and calendered products
Mixing capabilities: Rubber mixing, fabric and wire calendering, extrusion
Tech service: yes
Recipe development: yes
(See our ad on page 24)

Thai RubbTech Co., Ltd.

35 Soi Bangbon 4 Soi 2 , Bangbon
Bangkok 10150 Thailand
..... +66 (0) 880029596
+66 (0) 2892-2534
Website: www.thairubbttech.com
Email: sales@thairubbttech.com

U.S. Silicones LLC

3508 Independence Dr.
Fort Wayne, IN 46808
..... (260) 480-0171
Website: www.ussilicones.com

Services offered: Color matching, compounding, mixing black, mixing colors
Mixing capabilities: Silicones
Tech service: yes
Recipe development: yes

UTH GmbH

Eisenhowerstr. 7-9
36041 Fulda, Germany
..... +49 661 9741-19
Fax +49 661 9741-30
Website: www.uth-gmbh.com
Email: mbessler@uth-gmbh.com

Manuel Bessler, general manager sales and project management
(See our ad on page 67)

Vanguard Products Corporation

87 Newtown Rd.
Danbury, CT 06810 (203) 744-7265
Fax: (203) 798-2351
Website: www.vanguardproducts.com
Email: info@vanguardproducts.com

Robert C. Benn, CEO and president
Equipment: Coaters, cutting, extruders, liquid injection molding, mills, presses - transfer
Services offered: Color matching, com-

pounding, cutting - general, extruding and vulcanizing extrusions, fabricating, injection molding, milling, mixing - black, mixing - colors, molding - general, processing, special services
Mixing capabilities: Butyl, EPDM, fluoroelastomer, fluorosilicone, nitrile, polychloroprene, silicone
Tech service: yes
Recipe development: yes

Viceroy Rubber

707 Arrow Rd.
Weston, Ontario, Canada M9M 2L4
..... (416) 762-1111
Fax: (416) 762-0889
Website: www.viceroyrubber.com
Email: info@viceroyrubber.com

Todd Bruhm, president
Equipment: Mixers, calender, auto-claves, mills, hydraulic compression presses
Mixing capabilities: Most elastomers
Tech service: yes
Recipe development: yes

Wacker Chemical Corporation

3301 Sutton Rd.
Adrian, MI 49221 (888) 922-5374
Website: www.wacker.com
Email: info.usa@wacker.com

Wooster Elastomers LLC

1205 E. Bowman St.
Wooster, OH 44691
..... (330) 264-5553
Website: www.eliteelastomersohio.com
Email: info@eliteelastomersohio.com
Laurie Schang, president

Zeppelin Systems USA, Inc.

11050 West Little York, Bldg. D
Houston, TX 77041 (610) 282-5848
Fax: (610) 282-5849
Website: www.zeppelin-usa.com
Email: christian.tittensor@zeppelin-usa.com

Christian Tittensor, director of sales and marketing; Bob McNabb, national sales manager

Custom Services

Abrasive Supply Company, Inc.

25240 State Route 172
Minerva, OH 44657 (330) 894-2818
Fax: (330) 894-2626
Email: sales@polyblast.com

Rob Rouse
Equipment: Cryogenic and ambient de-flashing/deburring/tumbling machine, blast

Custom Mixing, Services

cabinets, both manual and automatic
Services offered: Deflashing, deburring, tumbling

ACE Laboratories
 6800 N. Chestnut St., Ste. C
 Ravenna, OH 44266.....(330) 577-4088
 Website: www.ace-laboratories.com
 Email: ace_sales@ace-laboratories.com

Erick Sharp, president and CEO; Doug Foster, director of technical service; Eric Britton, technical sales
Equipment: Laboratory Banbury mixers, laboratory tilt mixers, sigma mixer, lightening mixers, ross mixers, lab size two-roll mills, Brabender mixer/extruders
Services offered: Laboratory batches, small scale specialty batches 25 lbs. or less
Mixing capabilities: All rubber elastomers, black and color
Capacity: 25 lbs. or less per order
Tech service: yes
Recipe development: yes
(See our ads on pages 15, 16 and 37)

Advanced Cryogenic Enterprises, LLC
 1034 Home Ave.
 Akron, OH. 44310.....(330) 922-0750
 Fax: (330) 922-0560
 Website: acecryo.com
 Email: dave.norton@att.net

David Norton, owner
Equipment: Granulator, shredders, cryogenic hammer mills, cryogenic attrition mills, ambient mills, cryogenic lab mills
Services offered: Cryogenic and ambient grinding and pulverizing of multiple types of polymers
Capacity: Small trials to truckloads
Tech service: yes

Akron Dispersions, Inc.
 3291 Sawmill Rd.
 P.O. Box 4195
 Akron, OH 44321(330) 666-0045
 (800) 664-1455
 Fax: (330) 666-7842
 Website: www.akrondispersions.com
 Email: kfishel-hayat@akrondispersions.com

Kayley Fishel-Hayat, vice president of business development and technology
Services offered: Aqueous dispersions and emulsions, chemical grinding, dry liquid dispersions
Tech service: yes
Recipe development: yes

Aldon Corporation
 221 Rochester St.
 Avon, NY 14414(800) 724-9877
 (585) 226-6177
 Fax: (585) 226-6919
 Website: www.aldon-chem.com
 Email: info@aldon-chem.com

Alex Molinich, president
Services offered: Carbon black re-packing, either into smaller sizes or into super sacks
Capacity: 1 million lbs./yr.

Allgrind Plastics, Inc.
 P.O. Box 363
 Bloomsbury, NJ 08804
(908) 479-4400
 Mark Rogack

+++ meet us at Spring Technical Meeting (OH), April 30-May 2, 2024 +++
 +++ International Tire Expo and Conference (OH), May 14-16, 2024 +++

HIGH EFFICIENCY

SAVES RESOURCES

ROLL-EX® GEAR PUMP TECHNOLOGY

roll-ex® fine mesh straining solutions for particularly gentle processing to achieve clean rubber and silicone, for best quality.







www.UTH-gmbh.com

Custom Mixing, Services

Equipment: Granulators, pulverizers, blenders and sifters
Services offered: Grinding, pulverizing, blending, sifting, re-packaging
Mixing capabilities: Dry materials in twin cone blenders
Capacity: <5,000 lb. batches
Tech service: yes
Recipe development: no
(See our ad on page 94)

All-Tra Rubber Processing

154B Potomac Ave.
 Tallmadge, OH 44278 ... (330) 630-1945
 Fax: (330) 630-1143
 Website: www.alltrarubber.com
 Email: sgilbraith@polymermachinery.com

Dick Gotham, manager
Equipment: Computer controlled pre-former, take-off and cooling system, coating equipment, mills, chillers, etc.
Services offered: Custom preforms for compression molding, pellets, extrusion
Tech service: yes
Recipe development: yes

APV Engineered Coatings

1390 Firestone Pkwy.
 Akron, OH 44301 (330) 773-8911
 Fax: (330) 773-1028
 Website: www.apvcoatings.com
 Email: sales@apvcoatings.com

David Hanna, vice president of sales and marketing
Equipment: 104 different grinding, mixing and blending pieces of equipment
Mixing capabilities: Batch sizes from one gallon to 6,000 gallons, 50 CPS to 2,000,000
Capacity: 12 million gal.
Tech service: yes
Recipe development: yes
(See our ad on page 94)

Chemsultants, Inc.

9079 Tyler Blvd.
 Mentor, OH 44060 (440) 974-3080
 Fax: (440) 974-3081
 Website: www.chemsultants.com
 Email: info@chemsultants.com
Services offered: Consultants and testing services for the adhesive industry
Recipe development: yes

Conitex Sonoco

1302 Industrial Pike
 Gastonia, NC 28052
 (704) 864-5406
 Fax: (704) 865-7926
 Website: www.conitexbulksak.com
 Email: info@conitex.com
 Jamie Watkins, marketing associate

Services offered: Packaging products (FIBCs, corrugated pallets)

CSI Calendering, Inc.

1120 Commercial Blvd. N.
 Arlington, TX 76001 (817) 467-1200
 (817) 372-0029
 Fax: (817) 468-0963
 Website: www.csicalendering.com
 Email: sales@csicalendering.com

Equipment: Four three-roll calenders, mills, duster, three slitting machines
Services offered: Specialist in calendering oil and water swell compounds, tire cords, aramid, industrial fabrics, skim coating, friction coating and sheet stock; CSI calenders widths up to 86 inches; also available, slitting, laminating, cold room storage, product development calendering up to 84" wide
Mixing capabilities: Outsourced
Tech service: yes
Recipe development: yes

Deguma-Schütz GmbH

Industriestraße 4-8
 36419 Geisa
 Germany +49 (0) 36967 761-0
 Fax: +49 (0) 36967 761-22
 Website: www.deguma.com
 Email: deguma@deguma.com

Sebastian Bein and Heike Pfaffl
Equipment: Fabrication of high quality rubber mixing mills, supply of refurbished rubber machinery, such as mixing mills, calenders, internal mixers, etc.
Services offered: Fabrication of new mixing mills, extruders, bale cutters and lab presses. Refurbishment of rubber machinery, safety upgrades, maintenance and service
Tech service: yes
Recipe development: no

Desmasa

Condado de Treviño 87, 09001
 Burgos, Spain +34 947 470940
 Website: www.desmasa.com
 Email: info_web@desmasa.com

Services offered: Develop solutions with the objective of improving your product or your productive system, responding where standard commercial systems cannot. Desmasa has a clear international vocation. Our technology is distributed mainly to Europe and America, consolidating us as a leading company in the tire industry.
Recipe development: no

Dura Undercushions Ltd.

8525 Delmeade Rd.
 Montreal, Quebec, Canada

QC H4T 1M1 (514) 737-6561
 (800) 295-4126
 Fax: (514) 342-7940

Website: www.duracushion.com
 Email: info@duraundercushions.com
 Yves Boudreau, general manager
Equipment: Grinders, curing oven
Services offered: 30 mesh rubber, under padding, acoustical and sound control underlayment

Eaton Corporation

14615 Lone Oak Rd.
 Eden Prairie, MN 55344 (952) 937-9800
 Website: www.eaton.com
 Email: sales@eaton.com

Lynn Soule, manager, marketing communications
Equipment: Autoclaves, braiders, buffers, calenders, cooling, cutting, extruders, hose - manufacturing, internal mixers, liquid salt bath, mills, plastic processing, sheeters, slitters, vulcanizers
Services offered: Custom mixing
Mixing capabilities: NR, EPDM, SBR, CR, CSM, ECO, BR, IR, HNBR, EPM, XNBR
Capacity: 74 million lbs./yr.
Tech service: yes
Recipe development: yes

Elkem Silicones

Two Tower Center Blvd.
 Ste. 1601
 East Brunswick, NJ 08816
 (732) 227-2060
 Website: www.elkem.com
 Email: info@elkem.com
 Frédéric Jacquin, senior vice president

Goldsmith & Eggleton, Inc.

300 First St.
 Wadsworth, OH 44281-2084
 (330) 336-6616
 Website: www.goldsmith-eggleton.com,
 wwww.Ravaflex.com
 Email: reggleton@hbchemical.com

Rob Eggleton, business director
Equipment: F-305 internal mixer for reprocessing elastomers; F-270 internal mixer for manufacture of carbon black masterbatches
Services offered: Reprocessing of elastomers and masterbatching of elastomers
Mixing capabilities: Industry standards C-BMB or proprietary blends
Capacity: 30 million lbs./yr.
Tech service: yes

Hiawatha Rubber Co.

1700 67th Ave. North

Custom Mixing, Services

Minneapolis, MN 55430

..... (763) 566-0900
Fax: (763) 566-9537

Website: www.hiawatharubber.com

Email: info@hiawatharubber.com

Tim Carlson, new business development

Equipment: 30 molding presses (including injection press), up to 42" x 42" platen, robotic CNC grinding, cylindrical grinding, three 60" mills, cryogenic deflasher, eight manufacturing cells
Services offered: Research and development, prototyping and product development

Capacity: 24 hours; 5 days/week

Tech service: yes

Recipe development: yes

Hope Global

50 Martin St.

Cumberland, RI 02864 .. (401) 333-8990

Fax: (401) 334-6442

Email: info@hopeglobal.com

Website: www.hopeglobal.com

Mixing capabilities: Color matched pile fabric for weatherstrips; Form-A-Grip wire carrier insert for rubber and vinyl weatherstrip; polyester and Teflon sleeveings for reinforcements

Infinity Rubber Technology Group

100 Kennedy St.

Welland, Ontario, Canada L3B 0B4

..... (905) 735-6366

Website: www.infinityrubber.com

Email: sales@infinityrubber.com

Equipment: 3 D11 internal mixer, four-roll calender

Services offered: Calendering black, calendering colors, color matching, compounding, custom mixing black, custom mixing colors

Mixing capabilities: NR, EPDM, polychloroprene, nitriles, SBR, chlorobutyl, butyl, HNBR, XNBR, Hypalon

Capacity: 80 million lbs./yr.

Tech service: yes

Recipe development: yes

(See our ad on page 59)

JohnPac, Inc.

208 American Legion Dr.

Crowley, LA 70527 (866) 916-2247

Outside U.S.A.: (337) 783-5466

Website: www.johnpac.com

Email: mehenny@johnpac.com

Peter John and David John, owners

Services offered: Industrial packaging, manufacturing PP woven products

LRB Enterprises

220 Sacramento St., Ste. 1106

San Francisco, CA 94115-2309

..... (712) 832-3352

Website: www.lbrenterprises.com

Email: tlemker@qwestoffice.net.

Larry Barnblatt

Equipment: Shredders, grinders, granulators, fiber separation equipment, debadders, screening systems, devulcanization equipment

Services offered: Complete recycling services and support, designs and installation

Tech service: yes

Mac Valves

30573 Anderson Ct.

Wixom, MI 48393..... (248) 624-5710

Fax: (248) 624-4770

Website: www.macvalves.com

Email: mac@macvalves.com

Don DeMallie, president

Equipment: Mixer, 48" mills, compression, transfer and injection presses, form grinders, trim lathes, cryogenic deflasher

Services offered: Compounding, mixing, rubber testing, bonding rubber to metal, grinding, cryogenic deflashing

Tech service: yes

Recipe development: yes

Mechanical Rubber Products Corp.

77 Forester Ave.

Warwick, NY 10990..... (845) 986-2271

Fax: (845) 986-0399

Website: www.mechanicalrubber.com

Email: steve.kelley@mechanicalrubber.com

Steve Kelley, national sales

Mesabi Control Engineering

HF Mixing Group

7800 3rd St., North, Ste. 900

Oakdale, MN 55128..... (651) 771-1890

Fax: (651) 771-0437

Website: www.mesabicontrol.com

Email: mesabi@mesabicontrol.com

Doug Hinderliter, chief executive officer
Equipment: Rubber compounding automation and control systems

Services offered: HF/Mesabi provides equipment, hardware, software, engineering, fabrication, installation supervision, training, commissioning and 24/7 on-line support

Mixing capabilities: Mixing equipment and automation systems.

Capacity: Global sales, support and service.

Tech service: yes

Midland Consultants

7261 Engle Rd., Ste., 201

Middleburg Heights, OH 44130

..... (440) 234-1800

(877) 786-3539

Website: www.midlandconsultants.com

Services offered: Established in 1973, Midland Consultants is a leading national search firm serving a broad spectrum of disciplines. Whether you are an employer searching for the "best" candidates or a candidate looking to make the next career move, we have the resources and expertise to assist you.

Midwest Elastomers, Inc.

700 Industrial Dr.

P.O. Box 412

Wapakoneta, OH 45895

..... (419) 738-8844

(877) 786-3539

Fax: (419) 738-7647

Website: www.midwestelastomers.com

Email: info@midwestelastomers.com

George Wight, president

Equipment: Granulators, cryogenic hammer mills, cryogenic attrition mills, roll mills, uncured bale grinders, cryogenic grinders, blenders, colored rubber mulch blending

Services offered: Cryogenic and ambient grinding of post industrial scrap rubber which has been crosslinked and cured; 10-120 mesh ASTM D-5644; size reduction of uncured rubber; toll grinding of plastics; ISO 9001:2000
Tech service: yes

MOCAP Custom Molding Group

409 Parkway Dr.

Park Hills, MO 63601..... (800) 633-6775

(314) 543-4000

Fax: (314) 543-4111

Website: www.mocapcmg.com

Email: sales@mocap.com

Equipment: Vinyl dip molding, rubber injection, rubber compression, insert molding, plastic injection, tube extrusion, silicone tape extrusion and printing

Services offered: Proprietary and custom products

Tech service: yes

Recipe development: yes

MURubber Technologies Inc.

1350 Commerce Dr.

Stow, OH 44224 (330) 688-4881

Fax: (330) 688-3324

Website: www.murubber.com

Email: info@murubber.com

Equipment: 60" mixing mills, 84" mixing mill, three calenders including a four roll inverted L calender for cord, glass and fabrics

Services offered: Custom mixing

Custom Mixing, Services

services, custom calendaring, custom compounding, autoclave curing, post-curing, dry oven curing, press molding, continuous sheet press curing, die cutting, unvulcanized rubber sheet, fabric inserted materials, slit to width and length services

Tech service: yes
Recipe development: yes

National Rubber Corp.

367 Morganza Rd.
Canonsburg, PA 15317
.....(412) 831-6100
Fax: (412) 831-6300

Website: www.nationalrubber.com
Email: perry@nationalrubber.com

Perry Monpara, president

Equipment: Extruder, molding press, die cutting, open mill, internal mixer, etc.

Services offered: Extruded, molded, die cut gasket, rubber metal bonded parts, custom and standard

Mixing capabilities: Prototype to production as per request.

Tech service: yes
Recipe development: yes

Natrochem, Inc.

1 Exley St.
Savannah, GA 31415(912) 236-4464
Fax: (912) 236-1919

Website: www.natrochem.com
Email: cmoore@natrochem.com

Equipment: Two mixers, two reactors

Mixing capabilities: Toll processing of dry liquid concentrates and blending operations

Capacity: 20 tons/day

Tech service: yes
Recipe development: yes

Northstar Elastomers L.L.C.

4500 Main St. NE
Fridley, MN 55421(952) 270-4767

Website: www.nselastomers.com
Email: jimj@nselastomers.com

Jim Judson, general sales

Passaic Rubber Co.

45 Demarest Dr.
P.O. Box 505
Wayne, NJ 07474-0505
.....(973) 696-9500

Fax: (973) 696-0686
Website: www.passaic.com
Email: answers@passaic.com

J.D. Mathey, president

Equipment: Calenders, mills, fabric dryers, slitters, extruders, lathes, presses, vulcanizers, shot blaster

Services offered: Calendaring rubber and coating fabrics, slitting and convert-

ing, rubber rollers, endless belting, tank lining, shot blasting, press molding, contract manufacturing, private labeling

Mixing capabilities: None

Capacity: significant

Tech service: yes

Polycorp Ltd.

33 York St. West
Elora, Ontario, Canada N0B 1S0

.....(800) 265-2710
(519) 846-2075

Fax: (519) 846-2372
Website: poly-corp.com
Email: info@poly-corp.com

Andrew Haber, vice president and general manager

Services offered: Protective linings

Mixing capabilities: Most elastomers

PolyGel

1 Danforth Dr.
Easton, PA 18045(973) 884-3300

Fax: (973) 884-1331
Website: www.polygel.com
Email: info@polygel.com

Equipment: Toll compounding equipment

Services offered: Compounding of TPE/viscoelastic gels

Capacity: 1 million lbs./yr.

Tech service: yes
Recipe development: yes

Polymer Valley Chemicals, Inc.

1872 Akron Peninsula Rd.
Akron, OH 44313-9100

.....(330) 945-6499
Fax: (330) 945-6488

Website: www.polymervalleychemicals.com

Email: customerservice@polymervalleychemicals.com

Mike Beck, chief executive officer

Equipment: Proprietary mixers and blenders for treating and coating, baggers, packaging and palletizing equipment.

Services offered: Silane surface treating and coating; custom packaging, low melt batch inclusion poly bags; mineral fillers: kaolin, precipitated silica, others; carbon black: standard ASTM furnace grades, thermal black, recovered carbon black, 50:50 carbon black/silane, bulk sacks trans-loading into hopper truck, dry blending, toll manufacturing
Tech service: yes

(See our ad on page 71)

Ponn Machine Cutting Co.

20A Cross St.
Woburn, MA 01801

.....(781) 937-3373

Fax: (781) 937-0372

Website: www.ponnmachine.com

Email: mark@ponnmachine.com

Mark Pellicio

Equipment: Punch presses, pre-co presses, tube slicers, waterjets, clickers, machine shop

Services offered: Die cutting, lathe cuts, custom gaskets, waterjet cutting

Tech service: yes

Procex Ltd.

880 Cherry St.
P.O. Box 628

Kent, OH 44240.....(330) 673-1114
Fax: (330) 836-6001

Website: www.procexltd.com

Services offered: Strip coating, urethane, rubber from variety of substrates

Renosol Corporation

691 South River Rd.
Bay City, MI 48708(989) 894-0300

Fax: (989) 894-0340

Website: www.renosol.com

Email: info@renosol.com

Larry Adkisson, CEO

Services offered: Custom formulation, tinting, manufacture and delivery of molded polyurethane

Tech service: yes
Recipe development: yes

Sage Automation

4925 Fannet Rd.
Beaumont, TX 77705

.....(409) 842-8040
Fax: (409) 842-9141

Website: www.sagerobot.com

Email: rodney@sagerobot.com

Rodney Gonzalez

Equipment: Fanuc robotic bale loading, gantry robots, mechanical handling, bale resizers, film wrappers, dryer bed spreaders, arms and conveyors

Services offered: Project management, system design, integration, manufacturing and service, upgrades, overhauls and PM programs.

Salem-Republic Rubber Co.

475 W. California Ave.
Sebring, OH 44672.....(877) 425-5079

Fax: (330) 938-9809

Website: www.salem-republic.com

Email: jdunchuck@salem-republic.com

Drew Ney, president; Don McCaughtry, vice president operations; James Dunchuck, vice president sales and marketing

Equipment: Processing machinery and equipment, mills, extruders, calenders,

CUSTOMIZED REINFORCING FILLERS



Polymer Valley

CHEMICALS, INC

EST. 1986

KAOLIN CLAYS

PV-BOND® • PV-BRIGHT® • PV-FLOAT®

Silane Treated, Waterwashed, Calcined, Exfoliated, Airfloated and Custom Blends.

SILICA PRODUCTS

PV-SIL®

- HDS, Silane Treated, Precipitated, Silica Fume.
- Pretreated silica can eliminate VOC emissions, improve coupling efficiency, reduce mixing cycle time, reduce the number of passes in multi-stage mixing and reduce energy consumption.

CARBON BLACK PRODUCTS & SERVICES

PV-BLACK®

- 50:50 Carbon Black/Silane
- PV-BLACK 071 rCB
- Bulk Transfer from Super Sacks to Bulk Trucks
- Pre-weighed batch inclusion bags

CUSTOM TREATING & PACKAGING

- Custom filler treating and surface modification: Kaolin, Silica, ATH, Other
Reduces VOC emissions
- Custom Pre-weigh packaging in low melt batch inclusion bags (210° & 160° F)
Pre-weighs save time, reduce waste, improve accuracy and efficiency, promote "green" practices

**Excellence in Service,
Quality and Innovation.**



330-945-6499 • www.polymervalleychemicals.com

Custom Mixing, Services

cutting equipment, dryers, hose-making machinery, lathes, vulcanizers

Services offered: Hand and machine-made hose, uncured custom calendered rubber, jet starter hose, uncured tank lining materials

Capacity: 2.5 million lbs./yr.

Tech service: yes

Recipe development: yes

Smithers

425 West Market St.

Akron, OH 44303.....(330) 762-7441

Website: www.smithers.com

Email: infomse@smithers.com

Josh Williams, vice president of consultancy

Equipment: Banbury mixer (1.5 L capacity), MXI kneader mixer with intermeshing rotors (1 L capacity)

Services offered: Formulation development, small batch mixing/compounding and compression molding

Tech service: yes

Recipe development: yes

Sparton Enterprises, Inc.

861 Norton Ave.

Barberton, OH 44203(877) 772-7866

Fax: (330) 745-5862

Website: www.spartonenterprises.com

Email: sales@serubber.com

Jim Little, president

Equipment: Grinders, granulators, sifters and sizing equipment

Services offered: Rubber grinding, granulating, recycling

Tech service: yes

Recipe development: yes

Tahoma Rubber & Plastics, Inc.

255 Wooster Rd. N.

Barberton, OH 44203(330) 745-9016

Fax: (330) 745-4886

Website: www.tahomarubberplastics.com

Email: mwilcox@trp-usa.com

Steve Nieto

Services offered: Repelletizing, custom grinding, molding and mixing

Mixing capabilities: Internal mixer and mill mixing

Tech service: yes

Recipe development: yes

Divisions:

Manufacturing Plant

584 Highway 28 Bypass

Abbeville, SC 29620(864) 459-9613

Valpac, Inc.

1400 Industrial Park Rd.

Federalburg, MD 21632

.....(410) 754-7390

Fax: (410) 754-7541

Website: www.valpac.com

Email: customerservice@valpac.com

Gary Radziewicz, president

Services offered: Formulating, pig-menting, contract/toll manufacturing, equipment high/low speed dispersing, formulating, compounding, low speed mixing, high speed dispersing, pigmenting, homogenizing, granulating, experience in water, solvent and 100% solids chemistries

Capacity: 20 million lbs./yr.

Tech service: yes

Recipe development: yes

West American Rubber LLC

1413 Braden Ct.

Orange, CA 92868.....(714) 532-3355

Fax: (714) 774-2238

Website: www.warco.com

Email: sales@warco.com

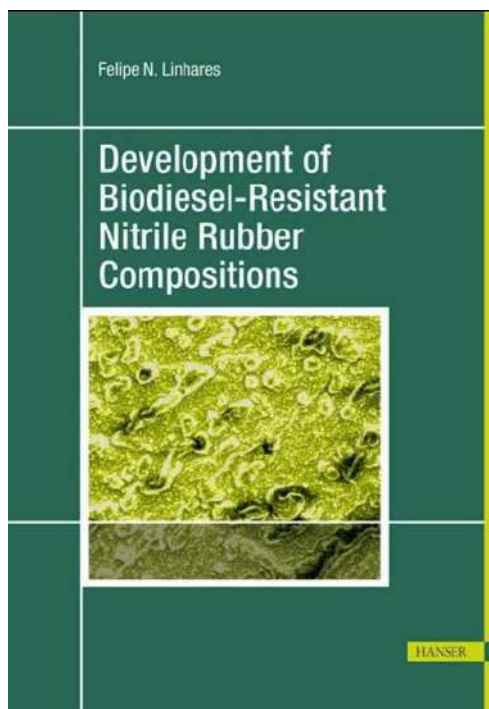
Oliver Hinkley, vice president of sales and marketing

Services offered: Complete laboratory including compound development and casting, calendering, cold and hot feed extrusion lines, microwave extrusion, splice, compression, transfer and injection molding with rubber-to-metal bonding

Capacity: 24 million lbs./yr.

Tech service: yes

Recipe development: yes



Development of Biodiesel—Resistant Nitrile Rubber Compositions

\$195.00

Biodiesel is an excellent potential replacement for petroleum diesel fuels because of its comparable physical properties in addition to its improved environmental benefits, such as low pollutant gas emissions, nontoxicity, renewability, and biodegradability. However, biodiesel and petroleum diesel differ greatly with respect to their chemical properties. Therefore, the compatibility of the materials that are commonly employed in contact with diesel must also be assured for biodiesel that has been obtained from different sources.

www.rubberworld.com/book-store



As **CRI-SIL Silicone Technologies** prepares to mark its 30th anniversary on April 1, 2024, it's a moment of reflection and celebration for the entire team behind this pioneering company. Founded and owned by Mark S. Stevens, CEO, and Michael Hirschy, President, CRI-SIL has established itself as a leader in the silicone manufacturing industry, delivering innovative solutions to customers around the world.

The journey of CRI-SIL began three decades ago with a vision to redefine the possibilities of silicone technologies. From its humble beginnings, the company has grown steadily, driven by a relentless commitment to quality, innovation and customer satisfaction. Under the leadership of Stevens and Hirschy, CRI-SIL has expanded its reach and capabilities, becoming a trusted partner for industries ranging from automotive and aerospace to electronics and healthcare.

One of the hallmarks of CRI-SIL's success is its dedication to customizing silicone compounds to balance price versus performance. This includes designing products to meet the customer's stringent physical specifications, as well as meet specific processing requirements.

Moreover, CRI-SIL has always placed a strong emphasis on customer satisfaction. The CRI-SIL team, based on the values instilled by the founders, understands that success in the manufacturing industry hinges on more than just product quality—it's about building lasting relationships with customers and providing them with the support and expertise they need to succeed. Whether it's collaborating on custom formulations, offering technical assistance or providing responsive customer service, CRI-SIL goes above and beyond to ensure that its clients receive the highest level of satisfaction.

In addition to its focus on innovation and customer service, CRI-SIL is also committed to sustainability and corporate responsibility. Recognizing the importance of minimizing its environmental footprint, the company has implemented various initiatives to reduce waste, energy consumption and greenhouse gas emissions. By sourcing raw materials responsibly and adopting eco-friendly manufacturing practices, CRI-SIL is not only safeguarding the planet for future generations, but also setting an example for others in the industry to follow.

Looking ahead, the future appears brighter than ever for CRI-SIL Silicone Technologies. With its strong leadership, dedicated team and proven track record of success, the company is well-positioned to continue its trajectory of growth and innovation for many years to come. As it celebrates its 30th anniversary, CRI-SIL remains steadfast in its commitment to push the boundaries of silicone compounding, and to deliver unparalleled value to its customers.

In conclusion, the 30th anniversary of CRI-SIL Silicone Technologies is not just a milestone—it's a testament to the hard work, dedication and vision of everyone who has been a part of this remarkable journey. From its founders, to its employees, partners and customers, CRI-SIL's success is a collective achievement that deserves to be celebrated. Here's to 30 years of excellence, and to many more years of innovation and success ahead!



Two great events
presented by
Rubber Division, ACS!

SAVE THE DATE!



Spring Technical Meeting • April 30-May 2, 2024

Hilton Polaris – Columbus, OH

- Featured Topics:**
- Virtualization in Rubber Product Development
 - Elastomers in EV & Batteries
 - Enhancing Durability in Autonomous Vehicles
 - Sustainability & Recycling Advances
 - Environmental Risk: PFAS, 6PPD, etc.
 - Supply Chain Issues for Polymers & Additives
 - Lightweighting
 - Advanced Processing & Rheology

Visit rubber.org for information about this event.

The logo for the International Elastomer Conference. It features a stylized black and blue line with four blue circles, resembling a polymer chain, above the text "International Elastomer Conference".

International
Elastomer Conference

September 9-12, 2024

David L. Lawrence Convention Center • Pittsburgh, PA

Co-located with:

silicone **EXPO**
USA

Interested in exhibiting? Visit rubberiec.org today!

Rubber Division spring meeting planned

The Rubber Division of the American Chemical Society is holding its 205th Technical Meeting April 30 through May 2 at the Hilton Polaris in Columbus, OH. Featured technical presentation topics will include: Sustainability and Recycling; Supply Chain for Polymers and Additives; Environmental Risks: PFAS, 6PPD and More; Enhancing Durability in Autonomous Vehicles; Advanced Processing and Rheology; Virtualization and Rubber Product Development; and Science & Technology Awards Symposium (featuring the 2024 Science & Technology Award winners).

The keynote address will be presented at 9 a.m. on Tuesday, April 30, by Dr. Katrina Cornish of The Ohio State University. Cornish is a global expert on alternate rubber and latex production, processing and products with over 30 years of experience in rubber biosynthesis, physiology, germplasm improvement, production systems innovation and alternative feedstocks in the government, commercial and university sectors. Her inventions and leadership are said to provide the foundation of the current worldwide efforts to develop alternative natural rubber crops. Currently, Cornish is Ohio Research Scholar/Endowed Chair Bioemergent Materials at The Ohio State University, a fellow of the National Academy of Inventors and the American Association for the Advancement of Science, and founder and CEO of EnergyEne, Inc., and several other start-up companies. Cornish leads a program on alternate rubber production, bio-based fillers and exploitation of opportunity feedstocks from agriculture and food processing wastes for value-added products and biofuels.

Tabletop exhibits are included at the spring meeting, and attendees may visit them on Tuesday, April 30, from 10 a.m. until 7 p.m., and on Wednesday, June 1, from 9:30 a.m. until 3:30 p.m. Exhibitors will include ACE Laboratories, Akron Rubber Development Laboratory, CFI

Carbon Products, ChemSpec, Endurica, FutureOpp, HF Mixing Group, Kobelco, MonTech, Nordmann, Renkert, Sanyu, UTH, VMI Rubber, Case Western Reserve University and the University of Akron.

The Rubber Division's 25-Year Club Luncheon takes place on Tuesday, April 30, at noon. The Welcome Reception takes place from 5 p.m. until 7 p.m. on Tuesday, April 30.

The 5K Walk/Run, presented by H.M. Royal, will be held on Wednesday, May 1, from 6:30 a.m. until 8:30 a.m., with check-in at the hotel lobby. The Science & Technology Awards banquet, sponsored by Alpha Technologies, will be held on Wednesday, May 1, at noon.

Registration to attend the Spring Technical Meeting costs \$850 for Rubber Division members; \$950 for non-mem-

bers; and undergraduate students are admitted at no charge.

Several educational courses will also be held during the Spring Technical meeting.

The course, Essentials of Rubber Technology, will be held on Monday, April 29, from 1 p.m. until 5 p.m. The course instructor is Joseph Walker of Elastomer Technologies. Participants can expect to gain a fundamental understanding of rubber materials and processing during this training. Course content will cover: rubber and its history; basic polymer chemistry and how to use it; why engineers use rubber; differences between rubber and plastic; types of rubber; how to select the type of rubber for the application; how rubber compounds are formulated; how rubber compounds are mixed; rubber curing and its relation-

Rubber Group News

The **Brazil Rubber Group** will hold the 20th Brazilian Congress of Rubber Technology at the Expo Center Norte, Sao Paulo, Brazil, June 26-27. Details are available at <https://abtb.com.br/congresso2024/index.php>. The Brazil Rubber Group also will participate in the Expobor 15th International Technology Fair, to be held June 26-28 at the same location. Further information is available at <https://expobor.com.br/>.

The **Chicago Rubber Group** will hold a golf outing July 18 at the Village Links of Glen Ellyn in Glen Ellyn, IL. Details are available at www.chicagorubbergroup.org.

The **Detroit Rubber Group** will hold its spring technical meeting May 7 in Plymouth, MI. Further information is available at www.rubber.org/detroit-rubber-group-inc.

The **Fort Wayne Rubber and Plastics Group** will hold a golf outing June 13 at the Maxwellton Golf Course in Syracuse, IN. Details are available at www.fwrpg.org.

The **Mexico Rubber Group** will hold the How to Improve Rubber Compounds, Part IV course, instructed by Jose Gazano, on April 18 in the Rubber Chamber Auditorium in Mexico City, Mexico. The MRG will

hold the Rubber Compound Engineering course, instructed by Luis Mayorga, June 6 at the same location. The MRG will hold the Processing Aids for Rubber Compounds course, instructed by Jose Gazano, July 25 at the same location. Details are available at www.rubber.org/mexico-rubber-group.

The **Michigan Rubber Group** will hold a golf outing May 30 at Forest Akers Golf Course in East Lansing, MI. Further information is available at www.michiganrubbergroup.com.

The **MidAtlantic Rubber and Plastics Group** will hold its spring technical meeting May 30 at Air Products Global Headquarters in Allentown, PA. The meeting will include presentations and a plant tour. Details are available at www.marpg.org.

The **Ohio Rubber Group** will hold a technical meeting April 16 at the University of Akron, Goodyear Polymer Center, Akron, OH. The ORG will hold a golf outing June 11 at the Brookledge Golf Club in Cuyahoga Falls, OH. Details are available at www.ohiorubbergroup.org.

The **Southern Rubber Group** will hold its summer technical meeting June 2-6 at the Marriott Downtown in Chattanooga, TN. Further information is available at www.southernrubbergroup.org.

Meetings

ship to properties; how to test rubber; rubber bonding; rubber molding; improving rubber part quality; and how to write and interpret a rubber specification. Learning objectives will include: demonstrate the difference between natural rubber and synthetic rubber; contrast the difference between thermoset rubber and thermoplastics; choose the correct rubber system for specific applications; discuss the most common testing methods used to classify rubber characteristics; describe and contrast the characteristics between different fabrication methods; recognize the importance of crosslink density relative to rubber characteristics; and apply the principles presented to create specifications and improve the quality of rubber articles.

The course, Rubber Extrusion Technology, will be held on Tuesday, April 30, from 8 a.m. until 5 p.m. The course instructor is Richard D. Strong of Elastomeric Consulting Services. This course was designed for rubber industry employees who currently extrude rubber and wish to expand their knowledge of the process, or those wishing to gain insights into these processes and how they can be used. The course will offer an overview of the variety of commercially viable rubber extrusion processes

and examine their strengths and weaknesses. Next, attendees will look at the three most common rubber extrusion processes, i.e., liquid curing media (LCM), better known as the salt bath process; hot air vulcanization (HAV); and microwave/hot air vulcanization. The emphasis will be on practical knowledge that can be utilized in production. In all areas, specific safety concerns will be highlighted and addressed. First, the common elements to all extrusion processes, namely the extruder and its components, plus dies and other tooling will be reviewed. The course then will look at each of the three most common and important extrusion processes in more depth, giving useful ideas for process improvements that the participants can apply in their own manufacturing. The course will conclude with a brief look at rubber compound development for the extrusion processes, emphasizing important compound design features. Samples of products made using rubber extrusion processes will be available.

The course, Interactive Compound Development and Problem Solving, will be held on Wednesday, May 1, from 8 a.m. until 12 p.m. The course instructor is Nicki Hershberger of Akron Rubber Development Laboratory (ARDL). This course will be split into three sections. It will start with an introduction to compound development, how to choose raw materials for a starting point and how to tweak an existing formulation. Next, students will have an opportunity to break into small groups and work as a team to develop a compound to meet a set of requirements. Each group will be led by an ARDL coach who will help guide the students through the material selection process they learned about. Each group will have an opportunity to present their compound to the group and explain how they chose each material. The third portion of the course will conclude with a brief introduction to problem solving in the rubber industry and will review some of the testing that can be done to facilitate failure analysis in the event that a compound or product fails.

The course, Rheology 101, will be held on Wednesday, May 1, from 2 p.m. until 5 p.m. The course instructor is Unal C. Yilmazoglu of Alpha Technologies. This course serves individuals new to rheology, as well as those with foundational knowledge in the field. Beginners will gain insights into the core principles of rheology and its relevance across industries. Those with prior understanding can expect a comprehensive review, broadening their grasp on more intricate concepts. Suitable for students, professionals or any individual keen on the science of fluid behavior, this course provides a systematic exploration of rheology's fundamentals. Topics covered will include: what is rheology; why rheology is important; types of fluids; deformation and fluid behavior; elasticity versus flexibility; shear rheology; deformation modes; two plates model; shear stress and shear rate; viscosity; modulus; tangent delta; oscillatory shear rheology; strain; frequency; oscillatory shear; frequency and strain sweeps; linear viscoelastic region; viscoelastic responses; rheological measurements; modulus temperature relationship; and modulus frequency relationship.

The following technical presentations will be held during the Rubber Division, ACS 2024 Spring Technical Meeting:

Tuesday, April 30 - Session 1: Supply Chain in Polymers and Additives

"National security risk: Critical rubber chemical supply," Joseph Walker, Elastomer Technologies; "Are global supply chains returning to COVID scenarios?" Whitney Luckett, Simko NA; "Supply chain from a compounding perspective," Amanda Peak, Peak Analytics; and "Raw materials supply chains for rubber industry and cost efficiency," Irene Yurovska, YI Global, and John Dick, Rubber Chemist LLC.

Tuesday, April 30 - Session 2: Advanced Processing and Rheology

"3D and 4D printing of elastomers and high performance polymers with AI trends," Rigoberto Advincula, University of Tennessee; "About the influence of

U
A The University of Akron
Akron Polymer Technology Services

WORKFORCE TRAINING

Complete Injection Molding
04/08/2024 - 04/10/2024

Blown Film Extrusions
04/22/2024 - 02/23/2024

Tire Safety and Durability
04/18/2024

uakron.edu/apts/training

Meetings

fine mesh straining upon the rheological and physical properties of rubber compounds,” Julia Uth, Uth; “Liquid metal composites for durable, conformable elastomer composites,” Amanda Koh, University of Alabama; “Surface-engineered hybrid carbon-silica composites: Unveiling properties and application,” Tapas R. Mohanty, Apollo Tyres; and “Using dynamic rheology to characterize the thermal stability of raw elastomers and effects of antioxidants,” Chris Robertson, Polymer Technology Services.

Tuesday, April 30 - Session 3: Virtualization and Rubber Product Development

“Performance and composition of medical gloves: A public health concern,” Ashley Herkins, The Ohio State University; “Essentials for new product development, part 1: An upper-level overview before cost collection,” Robert W. Welch, Cross Country; and “Essentials for new product development, part 2: A systematic approach for cost collection,” Robert W. Welch, Cross Country.

Tuesday, April 30 - Session 4: Environmental Risk: PFAS, 6PPD and More

“Concentrations of 6PPD in U.S. and European tires and emerging alternatives, and other contaminants of concern,” James Hobday, Emissions Analytics; “Reducing zinc oxide leach rate in tire tread with alternative zinc blends,” Darren Bowers, Baerlocher; and “Syensqo and PFAS: A responsible innovation journey,” Gregory Poterala, Syensqo.

Wednesday, May 1 - Session 5: Enhancing Durability in Autonomous Vehicles

“Comparison of cut and chip testing methods,” Will V. Mars, Endurica.

Wednesday, May 1 - Session 6: Sustainability and Recycling Advances, Part 1

“Biomaterials in elastomers,” Linda Botha, Suzano Canada; “Elastomeric

materials derived from bio-based sources via RAFT-mediated miniemulsion polymerization,” Uddhab Kalita, University of Melbourne; “Hydroponic rubber dandelion: A sustainable source of natural rubber,” Nathaniel King-Smith, The Ohio State University; “Metabolic engineering studies in *Parthenium argentatum* (Guayule),” Colleen McMahan, United States Department of Agriculture (USDA); and “Evaluation of devulcanization technologies,” Erick Sharp, ACE Laboratories.

Thursday, May 2 - Session 7: Sustainability and Recycling Advances, Part 2

“Limits and improvement of thermochemical devulcanization of tire compounds,” Ulrich Giese, DIK; “Rheology, structure and performance of ultrasonically decrosslinked peroxide-crosslinked

flexible tubing,” Avraam I. Isayev, University of Akron; “Automobile tire rubber reinforces silicone rubber,” Michael Brook, McMaster University; “Surface activated recovered carbon black: A sustainable reinforcing filler for passenger tire tread rubber composites,” Chandresh Dwivedi, Apollo Tyres; “Bio-based tough elastomeric hydrogels: Designer superabsorbent for sustainability,” Naba Dutta, RMIT University; and “Utilizing modified fly ash as an alternative rubber filler,” Eric Devney, The Ohio State University.

Further information on the Rubber Division, ACS, 2024 Spring Technical Meeting, including registration information and details on the costs for the educational courses and special events to be held during the meeting, is available from the Rubber Division (330) 595-5531; www.rubber.org.



TRANSFER MOLDING PRESSES FOR RUBBER, SILICONE, PLASTICS & COMPOSITES



Used for superior molding of encapsulated electronics, medical products, insert molded plugs and connectors, rotors, sensors, and many other applications.

- 30 thru 350 ton capacity
- Rigid four-post construction
- Cartridge heated insulated steel platens for quality results

WabashMPI.com

260-563-1184

WabashMPI@acscorporate.com

ISO 9001:2015

SPRINTER MARKING

Offering a full range of ink codemarking machines.

Quick drying inks in a range of colors are stocked to support machine sales.

Mark:

Porous/Non-porous
Stationary/Moving
Flat/Curved

On:

Rubber/Plastic
Metal/Glass
Paper/Cardboard
Flexible/Rigid
Films/Belts



www.SprinterMarking.com

Ph: (740) 453-1000

Meetings

Endurica plans event coinciding with eclipse

Endurica, the developer and provider of comprehensive CAE workflows for fatigue analysis of elastomers, announces its first Community Conference. This in-person event, taking place April 8-9 in Endurica's hometown of Findlay, OH, has the theme, "Delivering Durability Across the Rubber Supply Chain," and will bring together OEMs, rubber parts manufacturers and material suppliers to engage at a high level on how durability is evaluated and assured within their specific domains and across the industry.

The conference's two-day agenda will focus on the latest in simulating rubber durability, materials characterization and testing methodologies, showcasing how these technologies are advancing rubber product and tire durability worldwide.

Participants can look forward to a mix of keynote speeches, panel discussions, workshops and user presentations by technology leaders from Endurica, CNH Industrial, Birla Carbon, Rassini Bypasa, General Motors, Tenneco, BASF, Bridgestone Americas, Stellantis and the Center for Tire Research (CenTiRe).

The conference is free to attend, with support from presenting sponsors Axle Products; Coesfeld; Dassault Systemes; and Wolf Star Technologies; and additional sponsors including ACE Laboratories; Akron Rubber Development Laboratory; Ansys; Rubber Heart; Rubber Division, ACS; and Smithers.

Taking place at the prestigious Hancock Hotel, ranked as the second-best hotel in Ohio and located in the heart of downtown Findlay, the conference is uniquely timed and situated to coincide with the total solar eclipse on April 8.

This rare event, offering almost four minutes of totality in Findlay, will provide a spectacular backdrop to the conference activities, promising an unforgettable experience for all attendees, according to Endurica.

"This is our first event of this scale, and it is truly exciting to bring people from around the world together to focus on advancements in rubber durability," said Will Mars, founder and president of Endurica. "We have arranged the very best viewing location for participants to experience the eclipse, which will add an extraordinary highlight to our gathering, making it an even more memorable event."

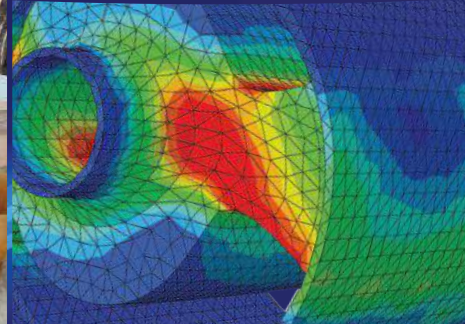
The conference is said to be particularly beneficial for material suppliers to the rubber industry, rubber parts and tire manufacturers, OEMs specifying rubber part requirements, or anyone needing to assess how long their elastomeric product

DELIVERING DURABILITY ACROSS THE RUBBER SUPPLY CHAIN

RAW MATERIALS



RUBBER COMPONENT MANUFACTURERS



ORIGINAL EQUIPMENT MANUFACTURERS



Endurica

Get Durability Right®

endurica.com

Simulation Software | Characterization Services | Testing Instruments | CAE Services | Training

Solutions for Elastomer Durability

Meetings

will last. Full refreshments will be provided each day, along with a special dinner on the evening of April 8, providing the perfect opportunity for networking and relaxation after a day of learning and connecting, according to Endurica.

Due to limited availability and anticipated high demand for accommodation during the eclipse, attendees are encouraged to register early to take advantage of the specially reserved block of rooms at a discounted rate for the event.

To register for the Eclipse with Endurica Community Conference, and for more detailed information about the event schedule, speakers and hotel, visit <https://endurica.com/eclipse-with-endurica/>.

Latex Conference confirms speakers

The Latex Conference 2024 will take place May 14 at the Hilton Fairlawn/Akron in Fairlawn, OH. The Latex Conference provides a formal and informal exchange of information designed to increase the total knowledge of the latex industry and provide opportunities for networking with latex industry professionals.

The tentative schedule of presentations and speakers will include the

following: “Surgical patient complications highlight needed surgical glove improvement,” Wava Truscott, Truscott MedSci Associates LLC; “A novel recycling process for transforming latex scrap into functional products,” Maria Heller, Valex; “Synthetic latex feedstocks: Is this the return to normal we expected?” William Hyde, Chemical Market Analytics; “Case studies of failure analysis of rubber products,” Jason Poulton, Akron Rubber Development Laboratory; “Gambling on innovation portfolios,” Darrel Velegol, Penn State University; “Rubber dandelion latex: Progress and prospects,” Katrina Cornish, The Ohio State University; “The importance of latex in asphalt emulsions,” Arlis Kadrmas, BASF; “Chloroprene rubber latex in non-dipping applications,” Mousumi De Sarkar, Denka Performance Elastomer; “Shelf life study of Hevea latex,” Erick Sharp, ACE Laboratories; and “Sustainable nitrile latex,” Jack Murphy, LG Chem.

Further information on The Latex Conference 2024 is available from the conference chair, Jim Finn (jimfinn1215@finntexusa.com).

Paper calls

Association of Modified Asphalt Producers (AMAP). A call for papers is issued for the 2024 Annual Conference & Workshop of the Association of Modified Asphalt Producers, to be held October 14-17 at the Sheraton Hotel in Salt Lake City, UT.

Submissions on topics related to quality, performance, innovation and implementation in modified asphalt paving and roofing applications are welcome. Abstracts must not exceed 500 words and must provide a description of the presentation. If there is specific data that the submitter wishes to include, use no more than one page for figures and tables.

The list below is not all inclusive, but intended to provide examples of the variety of presentations that AMAP is seeking: Equipment companies and inno-

ventions to handle modification; asphalt mixture producers and contractors sharing experiences and lessons learned; pavement preservation: exploring new technology and uses for modification; agencies/SAPAs: specification changes, test sections, implementation using modifiers and additives, and challenges; liquid suppliers: examining material effects of different modifiers; modifier/additive suppliers: delving into supply chain effects and new technologies and applications; collaborations: recognizing that people do not work in isolation, exploration into how collaboration truly gets the job done; and modified roofing: industry challenges, current trends and new uses for modified asphalt in roofing applications.

Further information on submitting an abstract is available from AMAP, www.modifiedasphalt.org.

Smithers. Speakers are solicited for the Thermoplastic Elastomers World Summit and Silicone Elastomers World Summit, organized by Smithers and scheduled to take place November 19-20 in Vienna, Austria.

The abstract submission process is currently open, and topics may include the themes below, or another topic of interest to the audience: new material developments, future trends and new markets; application specific challenges and solutions in key industries, i.e., automotive, medical and healthcare, energy, consumer electronics, food industry; customer case studies; developments in processes and manufacturing technology; AI as a solution provider; sustainability: regulation and industry updates, case studies and materials; recycling, disposal and circularity focus: innovative solutions for the industry, management, case studies and processes; quality control and testing; temperature, durability and material compatibility; substrate adhesion; and curing, processing challenges and solutions.

The deadline for submissions is May 17. Further information is available at www.smithers.com.

U The University of Akron
Akron Polymer Technology Services

WORKFORCE TRAINING

Language and Matter:
Technical Writing for Analytical
Scientists and Managers
04/12/2024 - 04/12/2024

An Introduction to Continuous
Vulcanization And CV Processes
07/05/2024 - 07/05/2024

Sponge Rubber 101
05/10/2024 - 05/10/2024

uakron.edu/apts/training

The Latex Conference 2024

1 Day, 10 Presentations, Including a Panel Discussion by Industry Leaders Focusing on:

- POLYMERS
- MANUFACTURING & APPLICATIONS
- MATERIALS & COMPOUNDING
- BUSINESS ISSUES

May 14th, 2024

at the Hilton Fairlawn/Akron OH

Confirmed Speakers and Topics

Wava Truscott PhD – Truscott MedSci Associates LLC – *“Surgical Patient Complications Highlight Needed Surgical Glove Improvement”*

Maria Heller – Valex – *“A Novel Recycling Process for Transforming Latex Scrap Into Functional Products”*

William Hyde – Chemical Market Analytics – *“Synthetic Latex Feedstocks: Is This the Return To Normal We Expected?”*

Jason Poulton PhD – Akron Rubber Development Laboratory – *“Case Studies of Failure Analysis of Rubber Products”*

Darrel Velegol PhD – Penn State University – *“Gambling on Innovation Portfolios”*

Katrina Cornish PhD – The Ohio State University – *“Rubber Dandelion Latex – Progress and Prospects”*

Arlis Kadrmas – BASF Corp. – *“The Importance Of Latex In Asphalt Emulsions”*

Mousumi De Sarkar PhD – Denka Performance Elastomer – *“Chloroprene Rubber Latex in Non-Dipping Applications”*

Erick Sharp – Ace Laboratories – *“Shelf Life Study of Hevea Latex”*

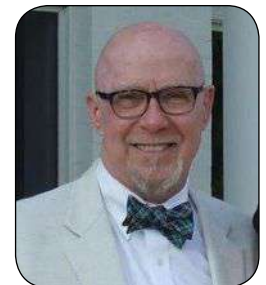
Jack Murphy – LG Chem – *“Sustainable Nitrile Latex”*

in conjunction with

RubberWorld 135 years

The Latex Conference provides a formal and informal exchange of information designed to increase the total knowledge of the latex industry and provide opportunities for networking with latex industry professionals.

Jim Finn, Conference Chairman
jimfinn1215@finntex.pro



Sponsored by:



**REGISTER TODAY
SEATS ARE LIMITED**

<http://tinyurl.com/latex2024>



Calendar



Future
Meetings/
Expos

2024
Columbus April 30 - May 2
Pittsburgh September 9-12
2025
Cleveland September 8-11
www.rubber.org

Rubber Division, ACS, Processing and Testing of Rubber online course, www.rubber.org/event-calendar/ - March 19.

Tire Technology International, Tire Technology Expo 2024, Deutsche Messe, Hannover, Germany, www.tiretechnology-expo.com - March 19-21.

Rubber Division, American Chemical Society, U.S. Regulatory Compliance in the Rubber Industry webinar, www.rubber.org/training/ - March 26.

Active Communications International, European Biopolymer Summit, Ghent, Belgium, <https://www.wplgroup.com/aci/event/european-biopolymer-summit> - March 26-27.

Rubber Division, ACS, Women of Rubber Division WORD Conversation (remote), www.rubber.org/upcoming-events - March 27.

Rubber Division, ACS, Global Rubber Technology: Processes, Current Status and Future Trends webinar, www.rubber.org/training/ - March 28.

April

Endurica, Eclipse With Endurica Community Conference, Hancock Hotel, Findlay, OH, <https://endurica.com/eclipse-with-endurica/> - April 8-9.

Ohio Rubber Group, Spring Technical Meeting, University of Akron, Goodyear Polymer Center, Akron, OH, www.ohio-rubbergroup.org - April 16.

Mexico Rubber Group, Course: How to Improve Rubber Compounds, Part IV, Rubber Chamber Auditorium, Mexico City, Mexico, www.rubber.org/mexico-rubber-group - April 18.

TechnoBiz, Rubber Compound Conference, Century Park Hotel, Bangkok, Thailand, <https://conference.technobiz.org> - April 22-23.

TechnoBiz, Rubber Industry Training, Century Park Hotel, Bangkok, Thailand, <https://conference.technobiz.org> - April 22-26.

Adsale Exhibition Services, Chinaplas 2024, National Exhibition and Convention Center, Hongqiao, Shanghai, China, www.chinaplasonline.com - April 23-26.

Emissions Analytics, Tire Emissions and Sustainability USA 2024, The Beckman Center, Irvine, CA, www.emissionsanalytics.com/events - April 24-25.

TechnoBiz, Rubber Molding Conference, Century Park Hotel, Bangkok, Thailand, <https://conference.technobiz.org> - April 24-25.

TechnoBiz, Smart Elastomer Conference, Century Park Hotel, Bangkok, Thailand, <https://conference.technobiz.org> - April 26.

Rubber Division, ACS, Spring Technical Meeting, Hilton Polaris, Columbus, OH, www.rubber.org - April 30 - May 2.

May

Association for Advancing Automation, Automate. McCormick Place, Chicago, IL, www.automateshow.com - May 6-9.

Plastics Industry Association, NPE: The Plastics Show, Orange County Convention Center, Orlando, FL, www.npe.org - May 6-10.

Detroit Rubber Group, spring technical meeting, Plymouth, MI, www.rubber.org/detroit-rubber-group-inc - May 7.

University of Akron, Akron Polymer Training Services, Structure/Property Relationships in Polyurethanes online course, www.uakron.edu/apts/ - May 9-10.

FinnTex LLC, The Latex Conference 2024, Hilton Fairlawn, Akron, OH, jimfinn1215@finntexusa.com - May 14.

U.S. Tire Manufacturers Association (USTMA) and Scrap Tire Research and Education Foundation, 2024 Recycling Conference, Marriott Renaissance Atlanta Waverly Hotel and Convention Center, Atlanta, GA, www.ustires.org - May 14-17.

Fortes Media, European Conference: CO₂ Capture, Storage and Reuse 2024, Copenhagen, Denmark, www.fortesmedia.com - May 15-16.

U.K. Industry Events Ltd., ChemUK 2024, National Exhibition Center, Birmingham, U.K., www.chemicalukexpo.com - May 15-16.

University of Akron, Akron Polymer Training Services, Rubber Technician Training course, National Polymer Innovation Center, Akron, OH, www.uakron.edu/apts/ - May 20-22.

University of Akron, Akron Polymer Training Services, Polymer Compounding, Formulating and Testing of Plastics, Rubber, Adhesives and Coatings online course, www.uakron.edu/apts/ - May 22-24.

Michigan Rubber Group, golf outing, Forest Akers Golf Course, East Lansing, MI, www.michiganrubbergroup.com - May 30.

MidAtlantic Rubber and Plastics Group, spring technical meeting, Air Products Global Headquarters, Allentown, PA, www.marpg.org - May 30.

June

Southern Rubber Group, summer technical meeting, Marriott Downtown, Chattanooga, TN, www.southernrubbergroup.org - June 2-6.

Active Communications International, Biobased Coatings Europe 2024, Valencia, Spain, www.wplgroup.com/aci/event/biobased-coatings-europe - June 5-6.

Mexico Rubber Group, Course: Rubber Compound Engineering, Rubber Chamber Auditorium, Mexico City, Mexico, www.rubber.org/mexico-rubber-group - June 6.

Ohio Rubber Group, golf outing, Brookledge Golf Club, Cuyahoga Falls, OH, www.ohiorubbergroup.org - June 11.

Leistritz Extrusion Technology, Bioplastics Twin Screw Workshop, The Polymers Center, Charlotte, NC, www.leistritz-extrusion.com - June 11-12.

Nova-Institute, Renewable Materials Conference, Siegburg/Cologne, Germany, www.renewable-materials.eu - June 11-13.

Fort Wayne Rubber and Plastics Group, golf outing, Maxwellton Golf Course, Syracuse, IN, www.fwrpg.org - June 13.

Active Communications International, The European Carbon Black Summit 2024, Amsterdam, The Netherlands, www.wplgroup.com/aci/event/carbon-black-summit - June 19-20.

Society of Plastics Engineers (SPE) Extrusion Division, Screw Design Conference-Topcon, UMass Lowell, Lowell, MA, www.4spe.org - June 19-20.

Brazil Rubber Group, 20th Brazilian Congress of Rubber Technology, Expo Center Norte, Sao Paulo, Brazil, <https://abtb.com.br/congresso2024/index.php> - June 26-27.

Brazil Rubber Group, EXPOBOR 15th International Technology Fair, Expo Center Norte, Sao Paulo, Brazil, <https://expobor.com.br/> - June 26-28.

July

Association for Rubber Products Manufacturers (ARPM), Seals Product Design and Manufacturing training, Ice Miller, Columbus, OH, www.arpminc.com - July 15.

Chicago Rubber Group, golf outing, Village Links of Glen Ellyn, Glen Ellyn, IL, www.chicagorubbergroup.org - July 18.

RELIABLE

MACHINERY SOLUTIONS

For Over 88 Years

We design, custom engineer, manufacture, remanufacture and rebuild machinery that endures. From the laboratory to the production floor, **RELIABLE** has the experience and equipment to target your specific requirements. Servicing the Rubber and Plastic Processing Industries goes beyond just a list of equipment in "Inventory." We deliver machinery that surpasses the everyday challenges of today's technology. With the most comprehensive facilities in the industry, **RELIABLE** performs more work in-house than any of our competitors.

Our 250,000+ square foot facility gives us plenty of space for an extensive on-site inventory, machine shop operation, in-house engineering, overhead crane operation (up to 40 tons), erecting and manufacturing. Contact **RELIABLE** today to navigate the industry and find your machinery solutions at WWW.RELIABLE-MACHINERY.COM.

PRODUCTION EQUIPMENT

- Two Rolls Mills - Rubber & Plastic
- Hydraulic Presses (Compression & Transfer)
- Calenders: 2, 3, & 4 Roll
- Extruders/Strainers
- Intensive Mixers (Banbury® & Kneader Type)
- Bale Cutters (New)

LABORATORY EQUIPMENT

- Two Rolls Mills - Rubber & Plastic
- Two Roll Mills - Plastic (Electrically Heated)
- Intensive Mixers (Banbury® & Kneader Type)
- Hydraulic Presses (Compression & Transfer)
- Calenders: 2, 3 & 4 Roll
- Extruders/Strainers
- Bale Cutters (New)



CALENDERS



CRACKER MILLS



HYDRAULIC PRESSES



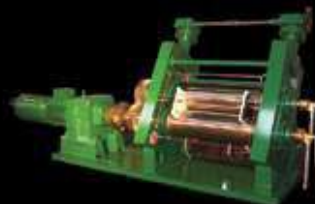
PRODUCTION MIXERS



BALE CUTTERS



LAB MIXERS



SPECIALTY CALENDERS



LAB MILLS



LAB BENCHTOP CUTTERS



EXTRUDERS/STRAINERS



PRODUCTION MILLS



RELIABLE

Rubber & Plastic Machinery

2008-14 Union Turnpike, North Bergen, NJ 07047 USA Phone (201)865-1073 Fax (201)865-6878
WWW.RELIABLE-MACHINERY.COM Email: Info@Reliable-Machinery.com

Mixing control for rubber compounding

A critical step in most dry bulk ingredient batching processes is said to be the mixing of ingredients. The mixing together of various ingredient materials is done in a specific proportion to produce a final product or compound. Control of the mixer and mixing process is said to be critical to quality and production efficiency. One industrial application example is rubber products manufacturing, where mixing control for rubber compounding is critical.

To produce a rubber compound, a combination of dry chemicals, bulk ingredients and liquids is batched and put into a mixing process. These materials require accurate and efficient control during the batching and during mixing. Customized systems are offered for a rubber compounding application, including ingredient batching and mixing control. This system includes the automation of the mixing and batching processes, a bulk bag unloading system and the electrical controls.

A specialty mixer is often used for rubber compounding, according to the company. The workhorse mixer of rubber manufacturing is the internal mixer, in which heat and pressure are applied simultaneously. The internal mixer uses two interrupted spiral rotors moving in opposite directions at a set RPM, as required by the compounding process for the specific rubber compound being produced. The shearing action in the internal mixer is intense, and the power required for the

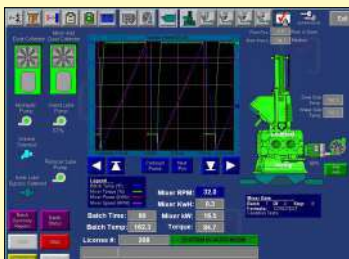
mixing/blending operation can be quite high, according to the company.

Mixer process control is required to produce the end product, and is automated for optimal efficiency. This is a part of the overall automation and process control system, which includes the ingredient batching process, mixing process, auxiliary batching, drop-mill process, extruding and cooling.

An HMI mixing screen is provided in a rubber compounding automation system, and is an extension of the main batching screen which shows all the equipment associated with the mixer. From the mixing screen, the user has the capability to control the mixer's RPM on the formula being run, along with the capability to view the status of and control of related equipment. This screen also offers a data trending screen, allowing the user to view batch temperature, mixer torque/power and speed.

This company has more than 50 years of experience providing efficient solutions for the control of ingredient batching and mixing equipment, bag unloading systems, as well as process control and plant automation. Designs utilize the latest technology to provide specialized data management and raw material management, along with production data tracking, according to the company. (*Sterling Systems & Controls*)

www.sterlingcontrols.com



Custom rubber mixing

Two internal mixer lines are in operation at the company's facility in Cuyahoga Falls, OH. The firm mixes natural rubber (NR), EPDM, nitrile rubber (NBR), styrene butadiene (SBR), polychloroprene or Neoprene (CR), Hypalon (CSM), polybutadiene (BR), isoprene (IR), butyl (IIR) and millable urethane. The company does not mix silicones or FKM. The firm's #9 Banbury is dedicated to black stocks. The average batch size is 325 pounds. A FACTS system is installed and provides mixing monitoring and control. The company can add optional straining at various mesh sizes. The firm also operates an F-80 dedicated color only line with an average batch size of 150 pounds. This line also includes the FACTS mixing control system. The firm can add optional straining at various mesh sizes. Its color mixing room has positive pressured, filtered air flow to insure that no carbon black dust reaches the color mixing area. The company has a dedicated 60" mill for open mill mixing of both black and color compounds. Most of the company's production is packed as a wig-wagged continuous strip cut from 1-1/2" to 12" wide (color) or 18" wide (black). The firm can also cut slabs 36" long. Normal strip thickness is 1/4" to 1/2". Compounds are treated with release dip to prevent sticking, and packaged in a cardboard gaylord box. (*Polymeric*)

www.polymericinc.com

Two-roll laboratory mills

This company's experience and capabilities in the engineering and manufacturing of two-roll laboratory mills is said to be unparalleled. The firm is said to provide cost-effective solutions to match exact machinery needs and process requirements. The company's capabilities in mills are said to be the broadest in the industry, from 3" x 8" up to 14" x 40" cabinet mills. These solutions include new, remanufactured and rebuilt-guaranteed laboratory rubber mills. Available features include an automated control/data acquisition package, variable speed drive systems, overhead mill blenders, hydraulic batch plows, motorized roll nip adjustments, anti-friction/roller bearings, drilled rolls and hydraulic drives. When requirements are geared towards a traditional, cabinet style, laboratory mill, the company is said to offer a wide selection of cost-effective solutions. These industry proven laboratory mills, whether new or rebuilt, are used in conjunction with oil, water or steam temperature control units (TCUs) for heating and/or cooling of the mill rolls. Available features include an automated control/data acquisition package, variable speed drive systems, variable roll surface friction, motorized roll nip adjustments, flip-up stock guides, energy efficient motors, roller bearings and chrome plated rolls. (*Reliable Rubber and Plastic Machinery*)

www.reliable-machinery.com

Refurbished mixing mills

This company specializes in the modernization of used mixing mills, as well as the construction of new ones. The firm's Efficiency is said to be an innovative drive system that saves up to 30% in energy costs compared to conventional standard drives. At the same time, it is said to extend the service life of older machines by up to 40 years. Maintenance costs are said to be reduced by up to 20%. As an expert in machinery for the rubber and plastics processing industry, the mechanical engineering company overhauls used machines, including those from other manufacturers, which is a sustainable solution for the environment and the economy, according to the company. (Deguma)

www.deguma.com

Double planetary mixer

Fully rebuilt to perform like brand new, reconditioned double planetary mixers are said to be dependable workhorses for high viscosity and heavy duty applications. The reconditioned Model DPM-4 has been meticulously restored to as-new working condition and offers the same standard one-year warranty as a new mixer. Especially effective for thick and sticky semi-solids, the patented high viscosity (HV) blades rotate on their own axes, while orbiting the mixing vessel on a common axis, according to the company. The blades continuously advance along the periphery of the vessel, pushing materials forward and downward, while transporting product from the sidewalls to the interior. They are lowered and raised from the mix vessel by an air/oil hydraulic lift. Safety limit switches prevent the operation of the drive when the stirrers are in the raised position or when the mix can be removed. (Charles Ross & Son)

www.mixers.com

Bracket mount mixers

BM Series gear drive bracket mount mixers are offered for medium to heavy viscosity materials in 30-55 gallon drums. An adjustable mounting bracket fits steel drums from 18" to 31" in diameter, and tightens to the drum with a hand knob so no tools are required. They are available with air, electric or variable speed electric drive, totally enclosed fan cooled (TEFC) or totally enclosed non-ventilated (TENV) motors from 1/2 to 4 HP. Electric variable speed models feature a controller mounted on and prewired directly to the motor. Single phase TEFC models are equipped with cord, plug and switch. Sturdy 5/8" by 30" stainless steel shaft size is fitted with one or two axial impellers with size and number matched to the HP of the unit. All wetted parts are stainless steel for chemical resistance. BM Series mixers are said to be ideal for a variety of medium to heavy viscosity materials. (Indco)

www.indco.com

Keeping Service in the Mix

Experience, Technology, & Personal Response

- Custom Mixing
- Dispersions
- Chemical Blending



ISO 9001:2008

Custom Rubber Mixing

- Black Mixing
- Color Mixing
- Straining Capabilities
- Slab, Strip, or Pellet Forms Available

Dispersions

- Combination-type Dispersions
- Slab or Pellet Form
- Custom Dispersions Available

Chemical Blending

Benefits

- Increased Control
- Tighter Consistency
 - Modulus
 - Tensile
 - Cure Rates
- Safe Material Handling



www.polymericinc.com

Ph: 330.928.2210 • sales@polymericinc.com

LSR injection molding

A production cell available from the company is centered around an electric Allrounder from the Golden Electric series, and is said to offer precise, cost-effective production of valves



made of liquid silicone rubber (LSR). A Flexlift 10 linear robotic system performs the handling tasks. An electric Allrounder 470 E Golden Electric with a clamping force of 1,000 kN, LSR cylinder and vacuum equipment can produce valves made of liquid silicone for use in cars. The Elastosil material (durometer

hardness 50A) from Wacker is resistant to heat and media, and is also said to be known for its good resilience and consistently high performance. Using an eight-cavity mold, eight LSR components weighing 0.8 grams each can be produced in a cycle time of around 55 seconds. Injection is sprueless and takes place directly via a pneumatic cold runner system. The LSR dosing unit comes from 2KM. (Arburg)

www.arburg.com

Custom rubber molds

This custom mold maker specializes in the manufacture of tight tolerance, complex geometry, high quality liquid silicone rubber (LSR) and plastic injection molds. The company's molding accessories are said to not only provide it with invaluable capabilities within its tech center, but also benefit the silicone molding industry. The firm's innovative concepts are said to offer the industry trouble-free molding alternatives. The company's proprietary line of molding products includes valve gated cold runner systems, a pneumatic stuffer box, a universal base and a one drop universal base which has been designed for prototyping. The company also offers customers end-of-arm tooling, robotics and vacuum seals. (M.R. Mold & Engineering)

www.mrmold.com

Rubber bonding system

The Auto-Komet wet blast cabinet is an affordable, precise and highly productive system that helps eliminate defects and waste, while improving surface finish for rubber bonding, according to the company. This wet blast system uses minimal capital investments and offers the highest quality product at competitive prices, according to the firm. The wet blast method is said to ensure improved adhesion, better durability and extended part life. Using the Auto-Komet system is said to significantly reduce labor costs and time, as well as increase overall performance in rubber bonding processes. With its enhanced process speed and various automated components, customers are said to achieve maximum cleaning and abrasion results with minimal effort required from their staff or operators, according to the company. (Guyson)



www.guyson.com

Injection molding system

Silicones, and particularly the new generations of LSR (liquid silicone rubber), are said to conquer new application areas thanks to their excellent physical properties, offering great opportunity for growth. At the same time, however, they burden the processor with challenges when it comes to precision and process consistency in the injection molding process, according to the company. The firm's PX 121-180 SilcoSet produces matrix lenses for the headlight industry. The machine function APCplus supports sustainable production by continuously analyzing the injection molding process, and quickly and accurately compensating for material and environment related fluctuations in melt viscosity. This is said to ensure a consistently high component quality, and thus minimum scrap. The linear robot LRX 150 is said to allow inline production with inspections, weight check and separation. (KraussMaffei Technologies GmbH)

www.kraussmaffei.com



SETTING THE STANDARD SINCE 1932

ZINC OXIDE

- ▶ Treated
- ▶ Untreated



harwick.com Akron, OH | 1.800.899.4412
Pico Rivera, CA | 1.800.883.9911

Rubber testing instruments

Rubber testing evaluates the processing and final properties of rubber, polymer and elastomer materials. Rubber testing includes using rheometers, curemeters and viscometers to optimize production and end-use properties. Rubber rheometers measure important characteristics such as minimum and maximum viscosity, scorch time and conversion time. Curemeters measure curing profiles of rubber compounds under isothermal and non-isothermal test conditions at constant user-defined strain and frequency. Mooney viscometers provide standard viscosity, scorch and stress relaxation testing of rubber polymers and compounds under isothermal test conditions. The company is said to offer a complete line of instruments to measure the rheological and physical properties of rubber and rubber compounds easily and accurately at all stages of manufacture. The rubber process analyzer (RPA) rheometer, moving die rheometer (MDR) curemeter and MV One Mooney viscometer are specifically designed to offer high precision rubber data that are easy to analyze. The company's line of rubber test instruments is said to offer the widest range and combination of tests and testing conditions available. *(TA Instruments/Waters)*

www.tainstruments.com

Mixing control system

The company's Total Mixing Control (TMC) System for batch processes integrates and centralizes control of the entire mixing and compounding process. The TMC System is applicable for all new or existing mixing lines. The TMC System provides full integration of all line equipment, including control/monitoring of material handling systems; oil ingredient weights; bulk compound weights; minor compound weights; mixer speed and temperatures; mix time, temperature and/or energy; extruders; pelletizers; drop offs; and batch offs. In addition to the Total Mixing Control System, the company provides recipe management, job scheduling, weigh belt management and total information management. The company is a global supplier of online management, process control and information management for the rubber and plastics industries. *(FACTS)*

www.facts-inc.com



UPGRADES FOR CALENDER & MIXING

CALENDER

Gauge Control
Line Control
Hydraulic Conversion

SCADA &
Reporting Systems

MIX CONSISTENCY

Recipe-Based Batch Mixing
Automatic Ingredient Weigh
Weigh Scale Systems
Batch Data Reporting
Bar Code Support



330-928-2332

facts-inc.com
factsmachinerygroup.com

FACTS, Inc.
MEASURE . CONTROL . INFORM

Naphthenic oil products

Naphthenic oils are an excellent solution for formulating high performance tire compounds, according to the company. With secure supply and a smaller overall carbon footprint, Nytex 4700 is said to offer an attractive alternative to Group I refining aromatic sidestreams such as TDAE and RAE. Nytex 4700 is said to show high performance on wet surfaces and excel in winter conditions. Combined with lower rolling resistance, this means reduced fuel consumption and carbon footprint, while maintaining the same high level of traction and safety, according to the company. In 2017, wet traction and rolling resistance field tests on real tires were carried out by an external laboratory. In these tests, the performance of tires made with Nytex 4700 was compared to those compounded with TDAE and RAE as tire oil. Results confirmed that naphthenic oils can improve rolling resistance and traction without compromising on safety, according to the company. As car manufacturers are putting pressure on tire companies to reduce rolling resistance to meet their own CO₂ reduction targets, Nytex 4700 is said to provide tire compounders with an excellent tool to enhance this performance. (Nynas AB)

www.nynas.com

Silicone elastomer

SSP2575 is a 65 durometer silicone elastomer for low outgassing and low temperature applications in spacecraft. This product maintains its flexibility at temperatures as low as -116°C (-177°F), and passes ASTM E595 outgas testing with a total mass loss (TML) of 0.17%, according to the company. SSP2575 is independently tested and supplied by the company as a ready-to-mold compound, compression molded sheet stock or custom molded parts. SSP2575 is black in color and can be pigmented to meet customer requirements. This heat cured silicone elastomer uses a Varox-peroxide catalyst system. (Specialty Silicone Products)

www.sspinc.com

Rubber additive solutions

Butyl Zimate is an accelerator/antioxidant. It is used as an accelerator for EPDM, as well as for natural and synthetic latexes. It is said to be fast curing and non-blooming. Vanox ZMTI is a specialty antioxidant. It is a synergistic antioxidant and is used for maximizing heat and flex resistance. It provides heat and oxygen aging protection, and flex fatigue resistance. (Vanderbilt Chemicals, LLC)

www.vanderbiltchemicals.com

Silica dispersants

Faster processing of high performance silica compounds can be achieved using the company's silica dispersants. The use of processing additives in compounds containing high dispersity silica/silane coupler and high levels of natural rubber can provide a variety of processing and physical property benefits, according to the company, including the following: reduced viscosity for improved processing; increased cure state; improved scorch safety; better modulus and tensile; significant decrease in Payne effect; abrasion loss is reduced; lower tan δ (better fuel economy); lower heat buildup (better durability); and longer blow out times (better durability). The selection of a processing additive for a particular application can be accomplished by evaluating the physical property and processability benefits. Struktol HT 207 is a zinc-free processing aid, specially designed for use with silica filled elastomers. It is said to improve extrusion rate, reduce hysteresis and reduce mill roll sticking. It has a slight activation effect in sulfur cured compounds, which in some instances is said to be very desirable. Struktol JV 46F is designed to improve extrusion output and appearance in NR, SBR, SSBR and EPDM compounds. It is said to have a very high affinity for silica fillers, and provides for maximum reduction of rolling resistance in high performance silica tire treads, according to the company. Struktol ZB 49 is designed for use as a process additive in silica filled compounds to both reduce viscosity and improve extrusion rate. Struktol ZB 49 is said to promote the crosslinking reaction between polysulfide silane coupling agents and polymer. (Struktol Company of America)

www.struktol.com



Eco-Friendly Latex Rubber Emulsions

ChemPacific offers a number of Eco-Friendly Latex Rubber Emulsion products for a variety of industrial manufacturing applications. Currently, these products are widely used in the production of latex gloves. These emulsions provide improvements to process & performance of finished products such as enhanced barrier properties, improved fabric strength, increased handling features, and elasticity & viscosity of many anionic emulsions.

Protective & Safety Workwear

Industrial Latex Gloves
Fabric Gloves with Latex Coating
Moisture Resistant Clothing

Medical PPE

Medical Latex Gloves
Gowns, Aprons & Bed Linens
Incontinence Pads

Paints, Coatings & Adhesives

Food Packaging Paper Coating
Water-based Latex Paint
Glue Manufacturing



Environmentally friendly
can be treated with most H₂O₂ Non-Halogenated

Weather resistant
resistant to the effects of exposure to the outdoor environment. Maintains its physical and mechanical properties after aging.



Hypoallergenic
non-toxic, allergen-free formulations.

Versatility
compatible with a wide range of anionic emulsions and latexes. The natural properties of the latex are preserved.



Low Air Permeability
provides air tightness for air and moisture gases.

Chemical resistant
can withstand the contact of various industrial chemicals. Provides excellent waterproofing and chemical resistance performance in industrial and commercial applications.



Abrasion resistant
provides the abrasion resistance of the fabric, improves fabric strength and elasticity.

Coagulant Dip
compatible with oil based glove processing water based latex processing to meet processing to meet environmental safety and efficiency.

ChemPacific Corporation | 6300 Seaford Street, Baltimore, MD 21228
Tel: 410-433-5571 | Fax: 410-633-5858 | sales@chempac.com

Rubber Division

American Chemical Society

rubber.org

NEVER STOP LEARNING!

CONVENIENCE: Most all our learning opportunities are virtual only with some in-person courses at our partner's locations.

CEUs: We partner with The University of Akron to offer CEUs for many of the courses we offer, as well as for our Basic, Intermediate and Advanced Rubber Technology Self-paced Learning opportunities.

TRAINING PASS: You can purchase a training pass to attend all our virtual courses and webinars for ONE YEAR for ONE PRICE. Individual passes, as well as company level passes with tiers of up to 50 trainees are available.

Visit rubber.org/training for details about these courses, including full descriptions and pricing.



UPCOMING LEARNING OPPORTUNITIES

- **March 19, 2024**
Course: Processing & Testing of Rubber
- **March 20, 2024**
Webinar: The Function & Selection of Ester Plasticizers
- **March 26, 2024**
Webinar: US Regulatory Compliance in the Rubber Industry
- **March 28, 2024**
Webinar: Global Rubber Technology - Processes, Current Status & Future Trends
- **April 4, 2024**
Webinar: Maintaining High Performance in Challenging Testing Laboratories
- **April 9, 2024**
Webinar: Green Tire Chemistry: Optimizing the Tire Magic Triangle through Tread Chemistry
- **April 10-12, 2024**
Endurica Workshop: Characterizing Elastomer Fatigue Behavior for Analysis and Engineering
- **April 11, 2024**
Webinar: Basics of Polymer Testing & Processing
- **April 17, 2024**
Course: Thermoplastic & Functional Elastomers
- **May 9, 2024**
Webinar: How to Extend Lifetime of Elastomers & Rubber Products
- **May 16, 2024**
Course: Setting Up a Rubber Molding Process
- **May 21, 2024**
Webinar: How to Create & Follow Your Professional Development Plan
- **May 21-24, 2024**
Endurica Workshop: Application of Rubber Fatigue Analysis with Endurica Software
- **May 22, 2024**
Course: Understanding Your Data
- **May 23, 2024**
Webinar: Managing Scientists & Engineers
- **June 3 - July 22, 2024**
Webinar Series: Manufacturing Mondays - Tires

All webinars are FREE for Rubber Division, ACS Members and all Rubber Division, ACS courses are FREE for undergraduate Student Members (discount for masters & graduate Student Members)!



Corporate Sponsor

Rubber World Industry Links



Eagle Elastomer (www.eagleelastomer.com) has manufactured fluoroelastomer products for a wide range of markets since 1983. Eagle Elastomer supplies fluorosilicone (FKM) and perfluoroelastomer (FFKM) custom mixed compounds, as well as fully cured FKM extrusions and sheet products. The company's products offer excellent sealing properties for applications requiring high temperature and chemical resistance.

Eagle Elastomer delivers the highest quality fluoroelastomer products and offers the best customer service and technical support in the elastomer industry. The firm's knowledgeable engineering staff and long term relationship with the FKM suppliers DuPont, AGC Chemicals and

Solvay ensure that Eagle Elastomer is constantly monitoring new developments and processes in the fluoroelastomers industry.

Conformance to product requirements is assured through Eagle Elastomer's world class manufacturing facility and quality system certified to AS9200 and ISO 9001.

Eagle Elastomer specializes in the production of high quality fluoroelastomer products. Only 100% virgin fluoroelastomers are used in the manufacture of the company's products. No regrind, off-spec or non-fluoroelastomer polymers are used in production. Short lead times are achieved by maintaining an inventory of standard items in most sizes.

Eagle Elastomer is committed to be the leader in supplying fluoroelastomer custom mixed compounds, and extruded and cured sheet products requiring high technology and special expertise. Fluoroelastomer compound mixing serves such industries as oil and gas, truck and rail, aerospace, automotive, mining, food and beverage, agriculture, semiconductor, chemical and pharmaceutical.

Custom fluoroelastomer mixing is offered for polymers (copolymers, terpolymers, peroxide curable polymers and specialty samples) to 500 pound lots of fluoroelastomer compound.

CHEMICALS AND MATERIALS

R.D. Abbott
AGC Chemicals Americas
AirBoss Rubber Solutions
Akrochem Corporation
Akron Dispersions, Inc.
APV Engineered Coatings
Arduro
ARP Materials
Brenntag Specialties
Cabot Corporation
Cancarb Limited
Carter Brothers
Chemours
Çınar Kauçuk
Cri-Sil Silicones
Davis-Standard
DRP Industries
Eagle Elastomers
ECO USA
Elmet
Emsodur
Evonik
Goldsmith & Eggleton
H&R Group
HallStar Company
Harwick Standard
Infinity Rubber
Kayton Industry Co., Ltd.
Kenrich Pertochemicals
Kumyang
Monolith Materials
Polymer Solutions Group
Polymer Valley Chemicals, Inc.
Pyropel, Inc.

Renkert Oil
Soucy
Struktol Company of America
Tokai Carbon Cancarb Limited
Valex
Vanderbilt Chemicals

MACHINERY AND EQUIPMENT

The Bonnot Company
Davis-Standard
Desma USA, Inc.
Doss Visual Solution
Emsodur
French Oil Mill Machinery Co.
Gomoplast Machinery
Guill Tool and Engineering Co.
Hilma Div. of Carr Lane
Roemheld
HITEC Luxembourg
Jing Day Machinery Industrial Co.
Kayton Industry Co., Ltd.
LWB Steinl
Reliable Rubber & Plastic Machinery
Samson Machinery
Seika Machinery
Sprinter Marking
Troester Machinery Ltd.
Tung Yu Hydraulic Machinery Co.
United Feed Screws
UTH GmbH
UTPVision
VMI Americas Inc.
Wabash MPI/Carver

MOLD RELEASES

ITW Franklynn
McLube
Release Coatings of New York

CUSTOM CALENDERING

Hoosier Racing Tire

TESTING EQUIPMENT / LABORATORIES

Akron Rubber Development Laboratory, Inc.
Facts, Inc.
Future Foundation
Gibitre Instruments
Hoosier Racing Tire
Hoto Instruments
Rex Gauge
Seika
The L.S. Starrett Co.
SDS Systemtechnik
Starrett Byewise
TA Instruments
Ueshima Seisakusho
Uncountable
Wallace Instruments

CUSTOM MIXING & COMPOUNDING

Carter Brothers
Eagle Elastomer
Hoosier Racing Tire
Polymeric

RUBBER SHOWS

International Elastomer Conference
Rubber Tech India



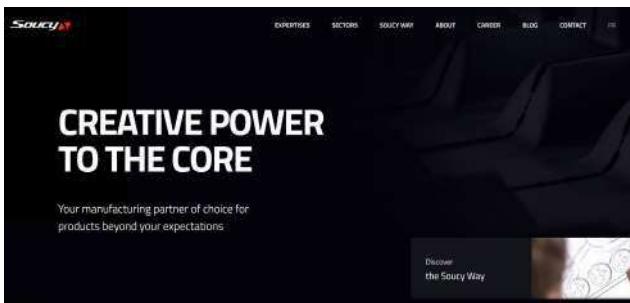
AirBoss Rubber Solutions (www.airbossrubbersolutions.com) is a world leader in custom rubber mixing and converting with the capacity to process approximately 500 million turn pounds of rubber polymer compound annually. Technically advanced and focused on service excellence, AirBoss provides solutions customized for performance and optimized for customers' equipment; longer lasting compounds to stretch a customer's investment; and rapid, proactive service and support. AirBoss is a quality-first company; every batch is consistently formulated and accurately reproduced. Quality is highly controlled at the processing plants and routinely tested at clients' facilities by AirBoss experts.

Whether a customer extrudes, calenders, injects, compresses or forms, AirBoss compound performs. AirBoss associates are chemists as much as compounders. As such, AirBoss can make virtually any compound needed, or can draw from its extensive library of compound recipes. Then, AirBoss will fine tune the recipe for specific customer operations.

AirBoss continues to invest in world class, responsible, efficient technology. With three manufacturing facilities in Canada and the United States, AirBoss offers broad supply capability, short lead times and on-time delivery through efficient freight lanes for delivery anywhere in North America. AirBoss can also convert compound with its calendering, extruding and molding expertise.

AirBoss Rubber Solutions compounding includes bridge pad compounds, butyl (IIR, BIIR, CIIR) rubber compounding, CBRN rubber compounding, compression molding rubber compounding, CPE, CSM, elastomeric, EPDM, FKM, HNBR, IR and natural rubber compounding, and nitrile Buna-N, NSF, rubber extrusion, stator tube, styrene butadiene and synthetic rubber compounding.

AirBoss Rubber Solutions sectors include automotive, energy and oil, building and construction, mining, aerospace and water treatment.



Soucy (www.soucy-group.com) produces custom rubber compounds from its extensive database to arrive at the best blend of raw materials for rubber molding. The excellence of the final product depends on the quality of the ingredients used in its mixture. All ingredients are carefully chosen based on the application of the product. Reverse engineering can be carried out on rubber samples thanks to efficient and precise mixture analysis in order to know the components.

Equipment used by Soucy includes Banbury rubber and plastic mixers, calenders and extruders. With its three mixers, including one dedicated to color mixing, Soucy mixes 34.2 million pounds of rubber per year, ranging in width from 1.5 to 30 inches. More than

45,000 metric tons of rubber mixtures and 19,500 metric tons of polyethylene are produced annually.

Polyethylene based black concentrate formulations are designed to suit customers' processes, UV requirements, color tones and price point. It is also possible to incorporate ingredients into carbon black concentrates to improve the performance of resins supplied to customers.

The manufacturing process makes it possible to disperse fine black particles to guarantee better protection against UV rays, to carry out the integration of multiple ingredients, to have the possibility of treating resins having a low melting temperature and to load the resin with more than 60% carbon black. Additionally, the formulas are designed for HDPE, PP and PS resins.

Soucyprene is a revolutionary, patented rubber blend that uses Kevlar fibers and nanotube technology to create a super strong reinforcement network that is extremely dynamic, flexible, durable and lightweight.

With its numerous facilities specialized in molding materials, Soucy offers a personalized service for each solution proposed. The complex, high precision rubber and elastomer parts resist stress and damage that can be caused by the external environment. Soucy has expertise in noise and vibration (NVH) analysis and monitoring for all rubber parts.

If you would like your web site featured here contact your sales rep

Dennis Kennelly, dennis@rubberworld.com, Mike Dies, mike@rubberworld.com or Pete McNeil, pete@rubberworld.com

YOU CAN SOAR WE TAKE CARE

Since 1987, Interbusiness Group has been involved in the production and distribution of INTERCURE®, a niche selection of curing agents and accelerators for special elastomers. To ensure the final product's maximum reliability, all Interbusiness Group's products are made with the purest raw materials and undergo a constant and rigorous quality control process. INTERCURE® curing agents and accelerators are fine-tuned for rubber compounds in which only the highest quality standards and excellent performances are demanded.



People in the News

ASTM appoints ARDL's Ana Barbur to post

Ana Barbur, vice president of chemical/analytical services for Akron Rubber Development Laboratory (ARDL), was appointed sub chair of the ASTM International Technical Committee D11.40.02 Medical Gloves Task Force. Barbur has collaborated closely with ASTM for more than 20 years, aiding in the development of standardized testing for examination, surgical and chemotherapy gloves. Barbur also serves as the ISO liaison in the ISO CEN/TC 205 Medical Gloves Group.



Ana Barbur

ARDL



Justine Franchina

Greene Tweed



Rick Zimmerman

Sumitomo Rubber



Barry Guildford

GRI

MANAGEMENT

Justine Franchina has joined Greene Tweed, a global manufacturer of high performance sealing solutions and engineered components, as chief operating officer.

Rick Zimmerman was promoted to director of original equipment for both four-wheel and two-wheel businesses at Sumitomo Rubber North America, a subsidiary of Sumitomo Rubber Industries Ltd. **Edith Avina** was promoted to customer service manager for Sumitomo Rubber North America.

Corey Parks was named to succeed **Robert Foord** as Kal Tire president. Foord is transitioning to the role of executive vice chair of the board after 15 years as president of Kal Tire.

Melanie Bockemühl, an expert in digital technologies, was elected to the advisory board of G. Siempelkamp GmbH.

Mitchell Yang was named managing director of the Arburg subsidiary in Taichung, Taiwan. Yang takes over for **Michael Huang**, who successfully established the subsidiary in 2015.

Eric Nelson, vice president of global operations for Eriez, announced the promotion of **John Klinge** to director, EMEA operations and strategy. In this role, Klinge will spearhead the company's strategic management initiatives in the Europe, Middle East and Africa region.

SALES

Barry Guildford was appointed as the global commercial director for Global Rubber Industries Ltd. (GRI), a specialty tire manufacturer based in Colombo, Sri Lanka.

Alex Winchester was named sales manager for Syncro Group USA, a supplier of automation for extrusion, quality control systems, material handling and storage, defect measurement, recycling lines, laboratory and pilot lines. He works under the direction of **Paolo Gasparotto**, group sales director.

OVER **95** YEARS
OF EXPERIENCE IN
MATERIALS DISTRIBUTION

Trenton, NJ 08601 | 800.257.9452
Buena Park, CA 90620 | 800.826.8175

hmroyal.com



Classifieds

AGC

Your Dreams, Our Challenge



AFLAS Fluoroelastomers

FEPM: 100 and 150 Series high strength, general purpose use; **NEW Grades** 600X and 400E with rapid cure and multi-layering capability. **Specialty FKM:** 200P BRE for improved performance over Type VI FKMs. **FFKM:** PM-1100, PM-3000 and CP-4000 for critical applications at ultra-hot temperatures.

[Contact us](#) to learn about our FDA compliant AFLAS Fluoroelastomer grades!

www.agcchem.com



Release Coatings
of New York, Inc.



Formed Hose Release



Injection, Compression & Transfer Molded Parts Release

(800) 457-7817 • Fax: (585) 593-4912

Website: www.rcony.com • Email: rnaples@rcony.com

ISO 9001:2015 Company

DUROMETERS Rubber Hardness Testers

Shore A Normal rubber
Shore D Hard rubber & plastics
Shore E Soft rubber & sponge
And More Scales Available

- Reliable, highly accurate
- Heavy-duty metal case
- NIST Certificate included
- Optional peak indicator available



Best Value

866-527-4666

www.hoto-instruments.com



KNEADER MACHINERY
World Leaders of Dispersion Mixers

KNEADER MACHINERY HAS BEEN OPERATING FOR OVER 31 YEARS AND IS RECOGNIZED AS THE FOREMOST SUPPLIER OF CUTTING-EDGE TECHNOLOGY IN THE RUBBER AND PLASTICS INDUSTRIES.

www.kneadermachinery.com



TOTAL PRINTING SOLUTIONS

GEMGRAVURE.COM | 781.878.0456

Pulverizing - Fine Grinding Services

- Pulverizing - Fine Grinding
- Blending – Mixing
- Laboratory Processing – Lab Grinding, Pulverizing, Sifting



Allgrind Plastics, Inc.

908-479-4400

1-78 Bloomsbury, NJ

www.allgrind.com • services@allgrind.com

Ken-React®

Titanates & Zirconates
Better than silanes – We offer
Solutions: www.4kenrich.com



APV
ENGINEERED COATINGS

THE LEADER IN
MARKING INKS & CUSTOM APPLICATION EQUIPMENT SINCE 1878

APVCOATINGS.COM



INTERCURE®

Accelerators and Curing Agents for Special Elastomers

www.interbusinessgroup.com ph: (212) 228-2525

Classifieds

SPRINTER MARKING

Offering a full range of ink codemarking machines.



Quick drying inks in a range of colors are stocked to support machine sales.

www.SprinterMarking.com
Ph: (740) 453-1000



Silicones Designed for YOU!

The premier independent custom silicone compounder for your specialized needs.

Having operated for over 26 years and with a wealth of technical expertise, we can meet your requirements.

800-290-9192
silicone@crisil-silicones.com
crisil-silicones.com

PYROPEL

MOLD AND PRESS INSULATION

FIND OUT MORE AT
WWW.PYROPEL.COM
1-888-797-6735



Experts in Custom Rubber Mixing, Chemical Blending, Dispersions and Compound Development

“Keeping service in the mix”

sales@polymericinc.com - www.polymericinc.com
(330) 928-2210
ISO 9001:2008



Union Process has been a trusted name for high quality inks for over 40 years.

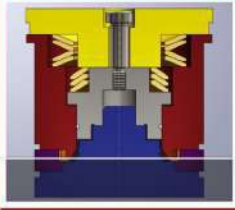
- Our inks are ideal for screen printing, stamping and marking natural latex-based rubber products.
- Great Pricing!

Corinne Seelie - (330) 929-3333

Bernie Stritzke

Custom Molding of Thermoset Elastomers

A Comprehensive Approach to Materials, Mold Design, and Processing



HANSER

Custom Molding of Thermoset Elastomers

This comprehensive reference book incorporates the latest developments in the synthesis, production, characterization, and application of various types of polymeric nanocomposites. It outlines the various preparation techniques using different types of nanoparticles and polymer matrices with emphasis on clay nanoparticles. All fundamental issues such as thermodynamics, kinetics, and rheology are discussed.

www.rubberworld.com/book-store



Trustable & High Quality Rubber Solutions

Reprocessed Synthetic Rubber Manufacturer

- ✓ E-SBR, S-SBR, BR, IR, EPDM,
- ✓ Cost Reducer
- ✓ Green Environmental Solution for Rubber Mixing



Click or Scan!



+90 554 268 4737
info@cinarkaucuk.com
www.cinarkaucuk.com

Index To Advertisers

R.D. Abbott (www.rdabbott.com)	37	Interbusiness USA, Inc. (www.interbusinessgroup.com)	22, 94
ACE Laboratories (www.ace-laboratories.com)	15, 17, 37	Kenrich (www.4kenrich.com)	16, 94
AGC Chemicals Americas (www.agcchem.com)	12, 13, 37, 94	Kneader Machinery (www.kneadermachinery.com)	94
AirBoss Rubber Compounding (www.airbossofamerica.com).....	2nd cover, 91	Latex Conference 2024 (jimfinn1215@finttexusa.com)	81
Akrochem Corporation (www.akrochem.com)	4th cover	Laur Silicone (www.laursilicone.com)	61
Akron Rubber Development Laboratory, Inc. (www.ardl.com).....	18	Lianda (www.liandacorp.com)	45
Allgrind Plastics (www.allgrind.com)	94	Polymerics (www.polymerics.com)	37, 85, 95
APV Engineered Coatings (www.apvcoatings.com)	94	Polymer Valley Chemicals, Inc. (www.polymervalleychemicals.com)	71
ARP Materials (www.arpmaterials.com)	6	Pyropel, Inc. (www.pyropelinc.com)	95
Cancarb Limited, Tokai Carbon Group (www.cancarb.com)	19	Release Coatings of New York, Inc. (www.rcony.com)	37, 94
R.E. Carroll (www.recarroll.com)	14, 37	Reliable Rubber & Plastic Machinery (www.reliable-machinery.com)	83
Chardon Custom Polymers (www.chardoncp.com)	49	H.M. Royal (www.hmroyal.com)	93
Chempacific (www.chempacific.com)	88	Rubber Division, ACS (www.rubber.org)	74, 89
Chem Technologies Ltd. (www.chemtechnologiesltd.com)	51	Seika USA (www.seikausa.com)	25
Cinar Kaucuk (www.cinarkaucuk.com)	95	Soucy Techno (www.soucygroup.com)	65, 91
Cri-Sil Silicone Technologies (www.crisil-silicones.com)	44, 73, 95	Sovereign Chemical Company (www.sovchem.net)	37
Eagle Elastomer (www.eagleelastomer.com)	53, 90	Sprinter Marking (www.sprintermarking.com)	95
Endurica LLC (www.endurica.com)	79	Struktol Company of America (www.struktol.com)	1
Facts, Inc. (www.facts-inc.com)	87	TechnoBiz (www.rubber-expo.com)	3rd cover
French Oil Mill Machinery Company (www.frenchoil.com)	23	Tennessee Custom Mixing (www.tcmix.com)	24
Garware Fulflex USA Inc. (www.fulflex.com)	54	Ueshima Seisakusho, Co., Ltd. (www.seikausa.com)	25
Gem Gravure (www.gemgravure.com)	94	Union Process (www.unionprocess.com)	95
Gomoplast Machinery, Inc. (www.gomoplast.com)	20	University of Akron (www.uakron.edu/apts/training)	76, 80
Harwick Standard Distribution (www.harwick.com)	11, 86	UTH (www.uth-gmbh.com)	67
Hexpol (www.hexpol.com/rubber)	57	Valex (www.valexgroup.com)	33
HB Chemical (www.hbchemical.com)	7, 8, 9	Vanderbilt Chemicals, LLC (www.vanderbiltchemicals.com)	2, 37
Hoto Instruments (www.hoto-instruments.com)	94	Venango Machine (www.venangomachine.com)	37
Industry Links Directory (www.rubberworld.com)	90, 91	VMI (www.vmi-group.com)	5
Infinity Rubber (www.infinityrubber.com)	59	Wabash MPI (www.wabashmpi.com)	77
		Zochem (www.zochem.com)	21

Rubber World SALES STAFF

DENNIS J. KENNELLY
Senior VP-Associate Publisher
1741 Akron-Peninsula Rd.
Akron, OH 44313-5157
Ph: 330-864-2122/Fx: 330-864-5298
Email: dennis@rubberworld.com

MIKE DIES
Marketing Representative
1741 Akron-Peninsula Rd.
Akron, OH 44313-5157
Ph: 330-864-2122/Fx: 330-864-5298
Email: mike@rubberworld.com

PETE MCNEIL
Sales Consultant
1741 Akron-Peninsula Rd.
Akron, OH 44313-5157
Ph: 330-864-2122/Fx: 330-864-5298
Email: pete@rubberworld.com
India

KAPIL SURI
Address B - 4/5, Vasant Vihar
New Delhi - 110057
India
Mobile: +91-9810248458
Email: kapshan@hotmail.com

RINGIER TRADE PUBLISHING
East China - **VIVIAN SHANG**
Phone: +86-21 6289-5533 EXT 169
vivian@ringiertrade.com
North China and South China

MAGGIE LIU
Phone: +86-20 8732-3316, EXT 9332
Email: maggieliu@ringiertrade.com

Hong Kong
MIKE HAY
Phone: +852 2369 8788 ext 11
Email: mchhay@ringier.com.hk

Taiwan
SYDNEY LAI
886 4 2329 7318
Email: sydneylai@ringier.com.hk

TechnoBiz

Event Calendar 2024

TechnoBiz
**RUBBER
WEEK**

Conferences & Trainings for Rubber Industries
Details : <https://conference.technobiz.org>

22-26 April 2024, Bangkok

Conferences

- 22-23 Apr'24 : Rubber Compound 2024
- 24-25 Apr'24 : Rubber Molding 2024
- 26 Apr'24 : Smart Elastomer 2024

Trainings

- 22-26 Apr'24 : 10+ Short Courses on Rubber Compounding, Molding & Bonding

15-19 July 2024, Bangkok

Conferences

- 15-16 Jul'24 : Silicone Rubber 2024
- 17-18 Jul'24 : Speciality Rubbers 2024
- 19 Jul'24 : Rubber Extrusion 2024

Trainings

- 15-19 July'24 : 5+ Short Courses on EPDM, FKM and Rubber Extrusion

**EXECUTIVE
DIPLOMA
360°**

diploma.technobiz.org

**RUBBER
INDUSTRY
TECHNOLOGY
& MANAGEMENT**

3-MONTH
Online Program

**RUBBER
COMPOUND
TECHNOLOGY
& MANAGEMENT**

2-MONTH
Online Program



Stressed by supply-chain headaches?



Supply-chain issues have disrupted seemingly every industry leaving companies with unfulfilled orders and unhappy customers.

Akrochem carries the most complete inventory of compounding materials in the rubber industry. And they're in stock to fulfill your immediate or future needs with multiple warehouses available to expedite your delivery. All materials feature the same high quality that has made Akrochem a leader in the market for the past 90 years.

Call us at 1.800.321.2260 today.



Providing the most complete line of compounding materials in the industry.

AKROCHEM.COM

800.321.2260