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From the Editor

Jill Rohrer

Spring keynote speaker selected

Rose Hernandez, International Space Station National Laboratory science program director for In Space Production of Advanced Materials and Manufacturing, will be the keynote speaker at the Rubber Division, ACS, Spring Technical Meeting, to be held March 4-6 in Orlando, FL. Her keynote address is titled, "The science and engineering of advanced materials and manufacturing in the International Space Station (ISS) National Laboratory."

The ISS National Laboratory serves as a unique platform for advancing the science and engineering of materials and manufacturing. In the microgravity environment of the ISS, researchers can explore the fundamental properties of materials without the interference of Earth's gravity. This allows for the development of unique atomic and molecular arrangements that lead to advanced materials with enhanced properties, such as improved strength, durability and thermal resistance. Experiments conducted in the ISS National Laboratory have led to breakthroughs in various fields, including metallurgy, polymer science and nanotechnology, paving the way for innovative applications in industries ranging from aerospace to healthcare. Moreover, the ISS National Laboratory provides an unparalleled opportunity for manufacturing research.

GPSNR supports gender equality

The Global Platform for Sustainable Natural Rubber (GPSNR) recognizes the valuable contributions women make to the natural rubber industry and affirms its commitment to fostering an inclusive and sustainable sector. The GPSNR believes that all individuals, regardless of gender, should have equal opportunities to participate in and benefit from the natural rubber sector.

As part of this commitment, GPSNR has prioritized gender inclusivity in its capacity building initiatives, ensuring that women benefit from its projects. To date, 43.49% of the 14,000 smallholders who benefited through GPSNR's initiatives are women. The organization will continue to integrate and prioritize gender inclusivity key performance indicators in relevant sustainability initiatives, ensuring that women have equal representation and access to opportunities. These efforts will help create an environment where all participants can contribute to and benefit from the growth of the sector. GPSNR is committed to advancing social sustainability alongside environmental goals, recognizing that the well-being of all stakeholders is essential for long term success in the rubber industry.

Jill Rohrer

RubberWorld

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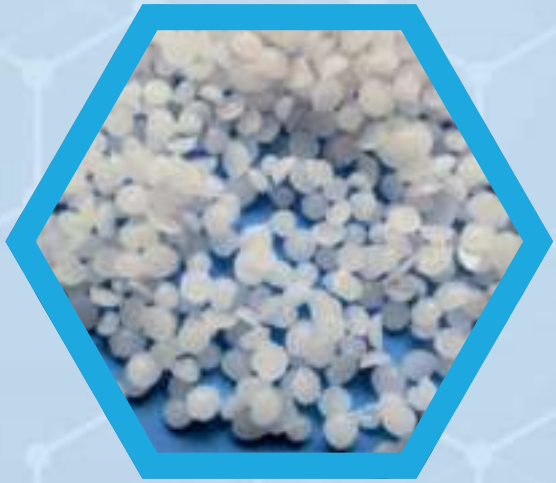

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Business Briefs

Goodyear sells Dunlop brand to Sumitomo

Goodyear Tire & Rubber (www.goodyear.com), Akron, OH, has signed a definitive agreement to sell the **Dunlop** brand, comprising trademarks and intangible assets necessary for operations of the brand business in Europe, North America and Oceania for consumer, commercial and other specialty tires, together with certain associated intellectual property, to **Sumitomo Rubber Industries, Ltd.** (SRI). The sale of the Dunlop brand follows a previously announced strategic review of the brand in connection with the company's Goodyear Forward transformation plan. Pursuant to the transaction terms, SRI will pay Goodyear cash proceeds at closing of approximately $701 million for the transfer of the Dunlop brand across the relevant geographies, a transition fee for support in transitioning the Dunlop brand to SRI and the purchase of Dunlop tire inventory. The transaction also provides for additional ongoing offtake, licensing and other arrangements.

ACQUISITIONS, EXPANSIONS

Dow (www.dow.com), Midland, MI, announced that Voranol WK5750 polyether polyol is set to be produced at its Freeport, TX, plant, marking its continued commitment to high application performance, according to Dow.

TMA Automation, an **Engel Group** subsidiary (www.engelglobal.com), Schwertberg, Austria, has begun construction of a modern office and production building in the immediate vicinity of Gdansk Airport in Poland. The new location is said to underline Engel's commitment to growth and innovation in the automation of injection molding processes.

Saip (www.saip.it), Milan, Italy, a manufacturer of plants and machinery for polyurethane, has acquired a majority stake in **Linden Polyurethane**, a producer of polyurethane equipment based in Akron, OH, with a technical assistance service active across North America.

ZC Rubber (www.zc-rubber.com), Hangzhou, China, officially commenced Phase 1 production at its new Indonesian plant, **PT Matahari Tire Indonesia**, in Kendal Industrial Park, Central Java.

Geon Performance Solutions (www.geon.com), Westlake, OH, a global specialist in the formulation, development and manufacture of performance polymer solutions, has acquired **Foster**, a differentiated compounder of biomedical polymers used in the healthcare and medical device industry.

Covestro (www.covestro.com), Leverkusen, Germany, a manufacturer of high quality polymer materials and their components, has invested a low triple-digit million Euro amount to expand its site in Hebron, OH. It will construct multiple new production lines and infrastructure to manufacture customized polycarbonate compounds and blends.

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Business Briefs

NovationSI supplies colorant for Arburg

NovationSi (www.novationsi.com), Barberton, OH, **R.D. Abbott**'s manufacturing subsidiary, will supply the custom colorant for **Arburg**'s injection molding cell at MD&M West 2025. This special NovaSperse color dispersion will match Arburg's teal logos, a highly visible feature of the German manufacturer's injection molding machines. The silicone part that Arburg will mold is a Tighty cable tie made of high consistency rubber for medical devices during sterilization.

CONTRACTS, LICENSES

Yokohama Tire (www.yokohamatire.com), Tokyo, Japan, has become a lifetime trustee of the **University of the Aftermarket Foundation** (UAF). Since 1986, UAF has funded millions of dollars of scholarships, grants, research and ongoing educational programs to help develop a strong, knowledgeable automotive workforce.

Goodyear Tire & Rubber (www.goodyear.com), Akron, OH, in collaboration with **TNO**, **The Netherlands Organization for Applied Scientific Research**, announced a significant advancement to vehicle safety systems. The integration of tire intelligence technology into the automatic emergency braking (AEB) system of a vehicle is said to have demonstrated the potential to mitigate crashes, particularly in challenging road conditions.

Quality registrations

LCY Chemical (www.lcycic.com), Tapei, Taiwan, announced that its thermoplastic elastomers, polypropylene and electronic grade isopropyl alcohol solutions, produced at its facilities in Taiwan and Huizhou, China, have successfully achieved the International Sustainability and Carbon Certification (ISCC) Plus certification.

Rubber Conversion (www.rubberconversion.com), Verona, Italy, a global supplier of high quality sustainable devulcanized rubber for the automotive, tire, footwear and rubber goods sectors, received the Gold Medal in the **EcoVadis** Sustainability Rating. This achievement places the company in the top 5% of businesses globally.

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Business Briefs

AirBoss announces new credit facilities

AirBoss of America (www.airboss.com), Newmarket, Ontario, Canada, announced that it has entered into new senior secured credit facilities consisting of aggregate financing of up to $180 million, which are replacing its current senior secured revolving credit facilities, and an update on its previously announced strategic transition. The new credit facilities will provide AirBoss with the financial flexibility it requires to continue executing its strategic transition, according to Chris Bitsakakis, president and co-CEO of AirBoss. The company continues to work diligently on its strategic review, evaluating a range of potential opportunities to enhance shareholder value. While no specific transactions are imminent or expected to occur in the near term, AirBoss continues to explore potential strategic divestitures, as well as the potential monetization of its real estate assets.

CORPORATE, FINANCIAL NEWS

TSRC (www.tsrc.com.tw), Tapei, Taiwan, a provider of materials solutions for synthetic rubber and styrenic block copolymer to customers in tires, footwear, plastic modification, adhesives and specialty applications, will cease all production activities at its compounding materials plant located in Binh Duong, Vietnam.

Liberty Tire Recycling (www.libertytire.com), Minerva, OH, is partnering with the **Ohio EPA** to help clear the site of the former **Crest Rubber** factory in Ravenna, OH. Liberty Tire Recycling will handle the responsible removal and disposal of rubble and other solid waste from the site.

The **Association for Rubber Products Manufacturers** (www.arpminc.org), Indianapolis, IN, has released its updated IP-2 Hose Handbook. This comprehensive technical publication has been updated to provide authoritative information on materials, construction, tolerances, applications, fittings, storage care and maintenance of hose.

Apollo Tyres (www.apollotyres.com), Gurugram, India, through the **Apollo Tyres Foundation**, is driving sustainable agriculture by promoting environmental sustainability, biodiversity and community well-being through targeted training programs for farmers.

Goodyear Tire & Rubber (www.goodyear.com), Akron, OH, will celebrate the 100th anniversary of the Goodyear Blimp with a 100+ city tour across the U.S. that includes appearances at various sports, music and cultural events.

Ecore International (www.ecoreintl.com), Lancaster, PA, unveiled a comprehensive corporate rebrand to more prominently convey its commitment to eliminating rubber waste through continuous recycling. The firm has reclaimed and repurposed used rubber into over 1,500 diverse products.

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EU tire industry added €43.9 billion to GDP

The European Union (EU) tire manufacturing industry supported an estimated total contribution to gross domestic product (GDP) of €43.9 billion in 2023, according to an Oxford Economics study. This is 13% higher than 2014 (in constant 2023 prices). The 2023 contribution to GDP was comprised of €13.9 billion generated by the manufacturers themselves (direct impact), €20 billion supported through their supply chains (indirect impact) and €10 billion supported by the wage spending of the direct and indirect workers (induced impact).

The study's analysis shows for every €1 million contribution to GDP the EU tire manufacturing industry generated in 2023, it supported a further €2.2 million across the EU economy through its expenditures. This economic contribution is estimated to have supported almost half a million jobs across the EU in 2023, representing a fall of 6% since 2014.

While tire production grew over the period, the decrease in the total employment supported by the industry reflects productivity improvements across the wider EU economy, and changes in market dynamics with increased competition from other parts of the world. In 2023, tire manufacturers employed 112,000 workers, equivalent to one in every 270 workers employed in manufacturing across the EU. A further 259,000 jobs were supported through supply chain impacts, and 128,000 jobs were supported through the wage financed spending of the tire manufacturers' employees and employees in their supply chains. For every 1,000 people employed in the EU tire manufacturing industry, an additional 3,500 jobs were supported in other parts of the EU economy.

The study estimates that the productivity of tire manufacturing workers was approximately 60% higher than the average across the EU economy. The total tax contribution supported by this activity was €12.2 billion through all channels of impact, the study shows.

In 2023, the value of EU tire exports was €7.4 billion, equivalent to 12% of the value of total EU exports in manufactured rubber and plastic products. At the same time, the region imported €6.9 billion in tires, resulting in a €0.4 billion trade surplus. There was a trade surplus for every year between 2014 and 2023, except 2022. In 2022, the trade deficit could be linked to the temporary removal of anti-dumping duties on imports of bus and truck tires from China, which saw imports of these goods surge by around one third.

The tire manufacturing industry also requires international trade for inputs into the tire production process. In 2023, EU tire manufacturers spent €4.2 billion or 15% of their total spend on inputs from outside of the EU. The largest shares of this were spent on chemical products and natural rubber.

Companies in the tire manufacturing industry invest heavily in research and development (R&D), driving widespread economic benefits. Between 2017 and 2023, tire manufacturers in the scope of the analysis spent an estimated €10 billion on R&D in the EU. The productivity boost resulting from this spend benefits both the tire manufacturing industry itself and the wider economy (R&D spillover effect). Over the long term, these benefits combine to create new economic conditions across the EU, and are associated with increased productivity levels, contributing €4.6 billion to GDP across the EU in 2035.

Conductive silicones to grow at 7.2% rate

According to projections by Persistence Market Research, the global conductive silicone rubber market is expected to rise from $7.13 billion in 2024 to $11.60 billion by 2031, achieving a compound annual growth rate (CAGR) of 7.2% during the forecast period of 2024 to 2031. This growth is fueled by increasing demand across industries, particularly with the rollout of 5G technology and the rise of electric vehicles (EVs). These sectors require advanced materials with superior conductivity, flexibility and durability, making conductive silicone rubber an ideal solution.

The global electronics industry is undergoing a massive transformation with the advent of 5G technology, which demands high performance materials that can withstand increased frequencies and more intense thermal conditions. Conductive silicone rubber's superior heat resistance and electrical conductivity make it indispensable for components such as antenna seals, heat dissipation pads and EMI/RFI shielding, the study noted.

The global automotive industry is transitioning towards electric and autonomous vehicles, creating a surge in demand for lightweight, high performance materials that enhance safety and efficiency. Conductive silicone rubber plays a vital role in battery pack insulation, sensor components and high voltage cabling.

The report says the healthcare industry's rapid adoption of wearable devices and medical electronics has created a burgeoning market for conductive silicone rubber. Its biocompatibility, flexibility and durability make it ideal for electrodes in ECG/EKG devices, implantable medical devices and wearable health monitors.

The Asia-Pacific region dominates the conductive silicone rubber market, driven by its booming electronics manufacturing base in countries like China, Japan and South Korea. Additionally, the rapid expansion of the automotive and healthcare sectors in this region is contributing to the market's growth.

In North America and Europe, the demand is fueled by innovations in electric vehicles, 5G infrastructure and medical devices, with both regions being early adopters of advanced materials technology.

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Interface gap filler for thermal conductivity

A liquid dispensed gap filling, non-adhesive curing silicone thermal interface material (TIM) from Shin-Etsu Silicones of America (SESA) is offered in response to the rapid growth and increasing importance in the global battery and electric vehicle (EV) sectors. SDP-6560 A/B is part of SESA's high performing SDP series, which includes two-part, room temperature cure silicone based materials. The product acts as a thermal interface gap filler, providing exceptional thermal conductivity and excellent insulation for electronics applications requiring thermal dissipation.

SDP-6560 A/B cures at room temperature when the two components are mixed. After curing, the material has low hardness, translating to less stress on components. Because of the addition reaction, curing time is shortened by heating. Moreover, it can be reworked because it does not adhere to substrates. Notably, its grease-like consistency allows the material to flow into the nooks and crannies, lowering the contact resistance over a variety of metal substrates.

Developed to provide progressive options to thermal engineers in the growing EV market sector for silicone, SDP-6560 A/B is uniquely suited to transfer the temperature out of the electronic part to the housing. While the gap fillers can be used on a myriad of electronic parts on an EV, they are primarily used around battery cells. Key applications include usage in the battery management systems to the electronic control units (ECUs) in the cars, or even the entertainment system.

SDP-6560 A/B series liquid dispense gap fillers provide high thermal conductivity over a large range of gap thicknesses requiring thermal dissipation. Easily dispensable in even complicated patterns, this range of gap fillers cures to a soft elastomer, providing flexibility and electrical isolation between components.

According to SESA's North American marketing manager, Eric Bishop, "Shin-Etsu's collaboration with our industry leading dispensing equipment partner, Atlas Copco, at the 2024 Battery Show demonstration allowed us to explore what the possibilities are for our SDP-6560 A/B product. The advanced handling and dispensing properties that were run in the production of the PCB business card sample stretched the boundaries of its complex configuration. The synergistic effort allowed us to take full advantage of the latest developments in silicone material for demanding EV applications and dispensing technology."

In addition to the SDP-6560 A/B gap fillers, SESA offers another EV ready V-O HCR (high consistency rubber) material that is said to be ideal for the growing EV sector: SESA's SV-9X001-U series. The material is said to have excellent electrical and flame retardant properties, and features the following range of specifications: hardness Type A = 40-80; tensile strength, ASTM (MPa) = 3.9-6.3; and tear strength, die B (kN/M) = 20-27. When properly catalyzed, the SV-9X001-U series can be used in a variety of applications requiring finishing by molding, extrusion or calendering. This unique material finds extensive use in molding processes to create components with exceptional heat resistance, chemical resistance and flexibility.

Silicone detachment prompts endoscopic system recall

The FDA has issued a recall for certain VasoView HemoPro endoscopic vessel harvesting (EVH) systems, adding these devices to the medical device shortage list on November 15, 2024. This recall, classified as Class I, the most serious type, involves removing the affected devices from use or sale. The devices in question are detailed in a letter to health care providers, which contains the most current information.

The recall affects VasoView HemoPro 1 (VH-3000-W) and 1.5 (VH-3500) models, identified by their unique device identifiers. Getinge, the manufacturer, sent an Urgent Medical Device Removal letter to all affected customers on September 20, 2024. The letter advises customers to examine their inventory, remove the affected devices and contact Getinge for return authorization and shipping instructions for unused or unexpired products.

The recall was initiated due to the risk of silicone detaching from the harvesting tool during use, potentially causing silicone debris to enter the patient. This defect can render the device nonfunctional, and may lead to serious health consequences, including blood vessel blockage, infection and even death. Although there have been 17 reported injuries, no deaths have been reported.

Customers are urged to complete and return the Medical Device Removal Response Form included in the recall letter, regardless of whether they have affected products. They should also forward this information to all potential users within their facilities.

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Analyzing and reporting tensile data on force measurement systems

When testing the properties of a material or component, a range of options is available for examining, reporting and tracking tensile data. In addition to reporting just the most common load and distance data for a tensile test performed on a force or material measurement system, there is more information that can be incorporated to improve traceability, readability and context to measurements. These might include graphs, tolerances, comments and test criteria.

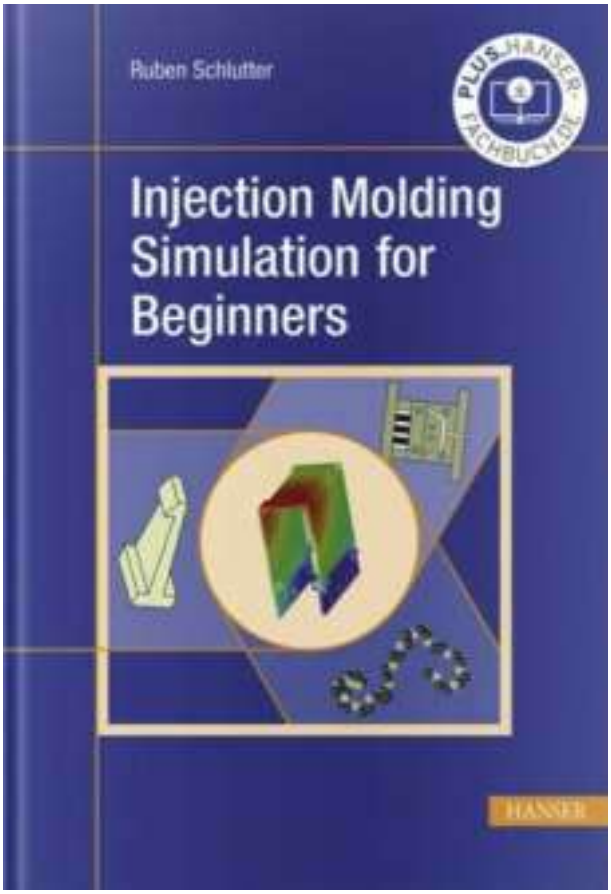
A visual comparison of graphical data from a force measurement test can serve as a quick, straightforward tool to compare tests to one another. These visual checks can often help operators identify issues. Many software options have the ability to overlay and recall previously run tests with known good parts that can be used as a reference guide, much like a "golden part." Expanding on this, some force and material testing software has interactive graphs, so when problem areas are identified, they can then be analyzed in greater detail and annotated.

These visual checks are a good aid, but can be subjective and vary from operator to operator. This variability can be removed by adding tolerances to the data collection portion of the test method. In addition, the tolerances can then be included in reports, so the performance expectations are clearly expressed. When multiple tolerances are used, the result can be reduced to pass/fail in a report summary.

Testing tolerances

Tolerances are often based on material properties, supplier or customer specifications, or historical data of known good and bad parts. In general, force testing applications have tolerances that are often expressed as a plus or a minus force value (lbf., kgf., N) or distance (inches, mm). Some rubber is not solely expressed in a numerical value and percentages can also be used, e.g., 40 lbf. ± 5% at 0.750 inch length (figure 1).

Applying tolerances to individual points is a common method



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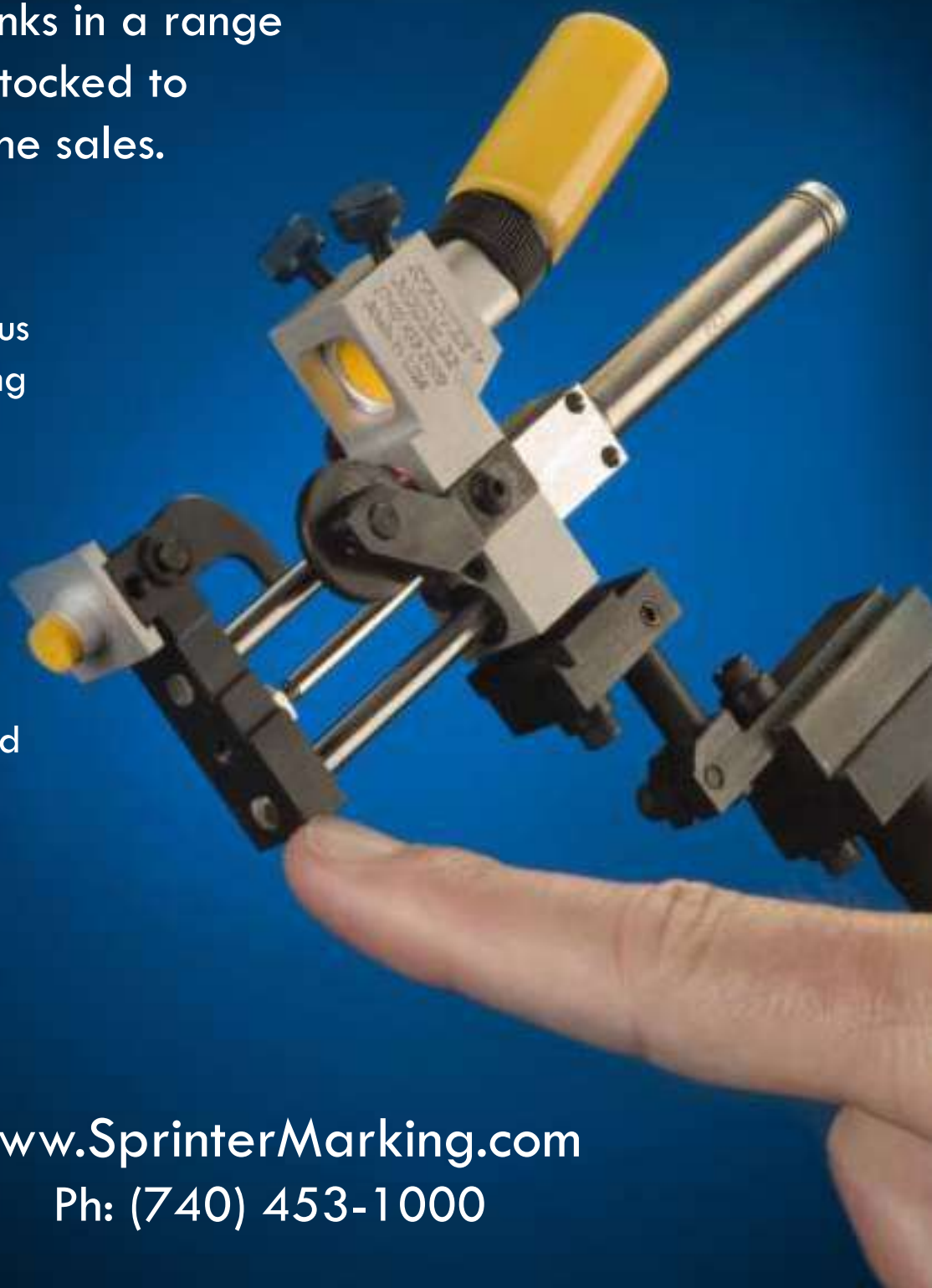

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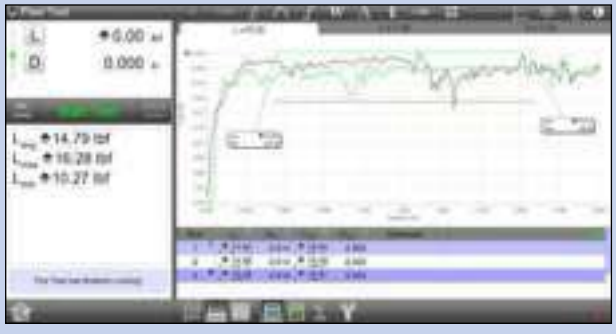
Figure 1 - testing software can aid in converting tolerance percentage to loads to prevent mathematical or transcription errors by the operator

used. In material measurement applications, it is also common to see tolerances on stress (PSI, MPa) or strain (%) values. These tolerance points allow operators in a production environment to quickly determine if a part passes or fails without detailed analysis that might otherwise require quality personnel to interpret the data. For instance, not every operator may know why measurements like Young's modulus, yield strength, ultimate tensile strength or work are being collected, or how these measurements impact the product being tested. However, having tolerances built into the test method creates a flag to notify a member of a quality team when the measurements deviate.

There are also testing scenarios where individual data points are not sufficient. For example, when testing welded or glued seams in a 90° or 180° peel test, tolerances may be specified for a maximum allowed load or minimum allowed load over the length of the seam (figure 2).

Figure 2 - creating a tolerance envelope can help operators quickly identify out-of-tolerance areas in peel or seam testing; the black trace can be seen dipping below the specified minimum load as represented by the red line; the green trace is shown in tolerance for the specified area



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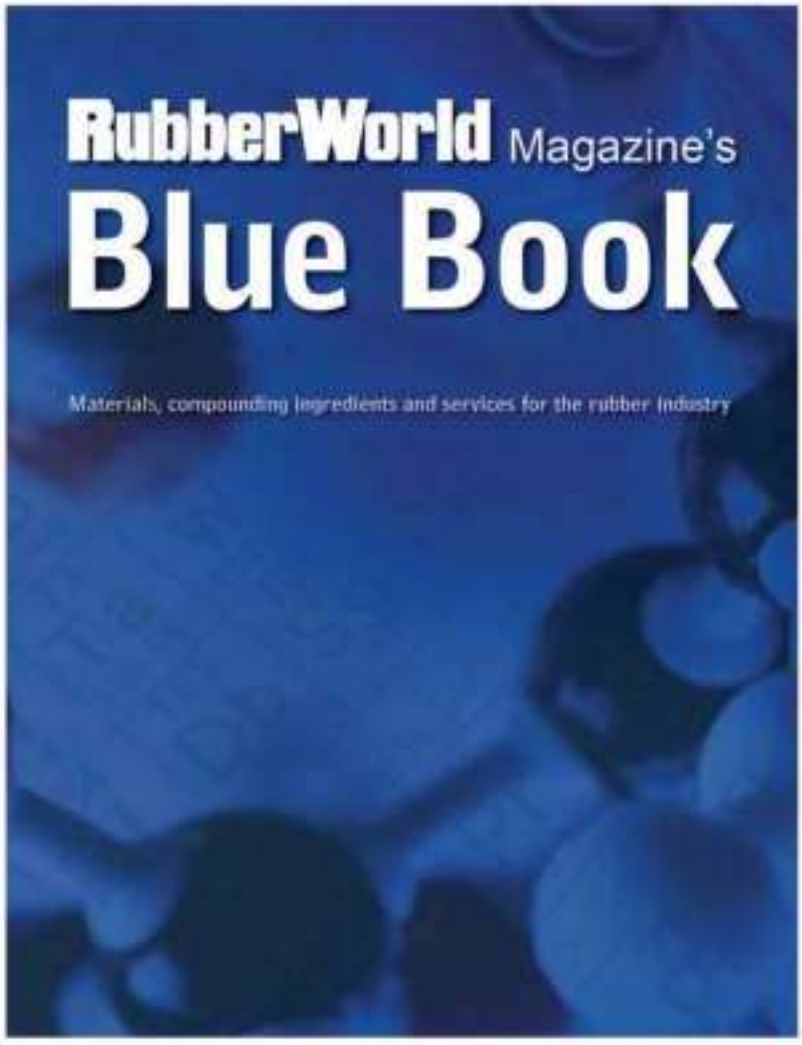

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Figure 3 - batching data can help organize testing runs and notify an operator when they have tested a sufficient number of samples in a lot; data can be seen organized by batch, then run number; when a batch is complete, it collapses and is hidden from view so only relevant data are displayed

A tolerance envelope will ensure the seal remains in the range, where using individual tolerance points risks an out-of-tolerance point being missed. If the graph trace stays within the envelope, the tolerance lines display green, indicating that the measured results are within the envelope. If the graph trace goes outside the envelope at any point, the tolerance line segment displays red. If the data for the results are outside the high limit, the top line segment will display red. If the data for the result are outside the low limit, the bottom line segment will display red.

Comments and reports for traceability

Adding comments after a run is complete is an often overlooked tool. Rather than deleting data and leaving the possibility of future questions regarding the data integrity, comments can be used to explain anomalous results that would skew a batch. Examples of these comments could be: "sample slipped during testing" or "sample broke at grip," as opposed to breaking in a controlled area of a dog bone sample.

Life science applications, such as those being used by medical device manufacturers and pharmaceutical manufacturers looking to meet 21 CFR Part 11, may require electronic signatures in their applications and other data protection tools. To be compliant, these operators mark data for deletion, but do not actually remove it.

For example, when a run is attempted to be deleted, it will have a strikethrough, and a comment is automatically added to the data table showing "deleted by user on (date)." Alternative options like "delete last run" exist, as well. When enabled, only the last run of a batch may be deleted.

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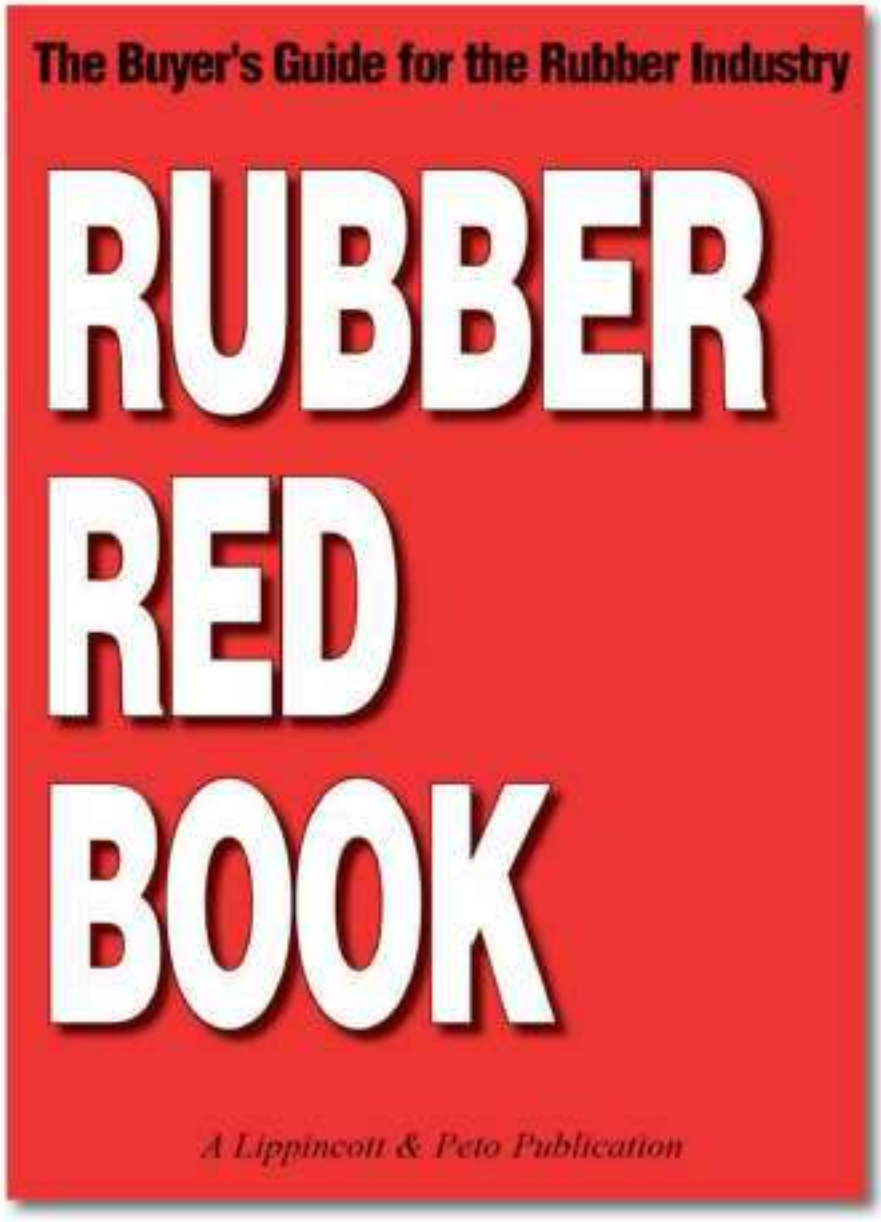

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For example, it is common to include date, time, operator and batch number. Other information less commonly factored in, but extremely valuable nonetheless, can help prove the materials were tested as specified, such as for speed, target distance, target load, number of cycles, sampling rate and whether a test method is protected against edits (figure 3).

Figure 4 - Starrett FMS-1000-L2 250 pound capacity force measurement system running L2 software performing a tensile test on a rubber sample

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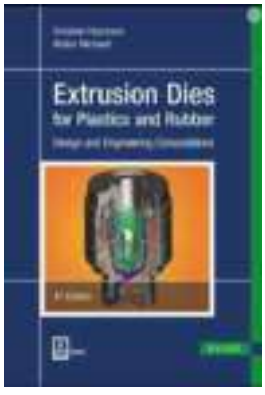
Good management

With so much information available, effectively managing it becomes an important step. Batching of data is popular to help aid traceability; the batch number within testing software can directly correspond with a company's production batch or lot number. Batching data can also aid in finding data in the future for review, and help with report generation.

Many operators also elect to export their data automatically at the completion of a run; most often to a .csv file (comma separated values file) which can be opened in Excel or an SPC program. SPC programs are especially popular because data such as dimensional, weight, hardness, etc., can be integrated into control charts to track trends.

Automatic printing of reports is becoming more common, especially in areas where 100% inspection is required and certificates need to remain with the part once tested. At the completion of a test, a report is automatically generated and printed; a small time-saving measure that adds up throughout the course of a day.

In the long run, taking steps to add context to data and organize it can save significant amounts of time when the inevitable happens and it needs to be reviewed. Using readily available tools such as graphs, tolerances, comments and test criteria ensures that the required tensile information is on hand when needed for the most productive force measurement and materials testing processes (figure 4).



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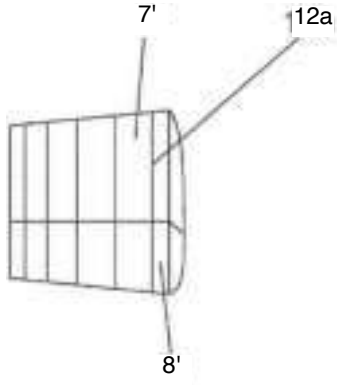
Patent News

Pneumatic vehicle tire
U.S. patent: 11,999,203
Issued: June 4, 2024
Inventors: Norbert Kendziorra and Christian Weber
Assigned: Continental Reifen
Key statement: A pneumatic vehicle tire of radial type of construction, having a tread (1), having a carcass inlay (3), having electrically nonconductive sidewalls (7) and having at least one electrically conductive component (8) or element in a bead region, which component or element, in the case of a tire mounted on a wheel rim, comes into contact with said wheel rim, wherein either the tread (1) is electrically conductive or, in the tread region, at least one electrically conductive component (10) is provided which is overlapped on the outside by the sidewalls (7) and which is connected in electrically conductive fashion to the tread outer surface and wherein filaments provided with an electrically conductive coating are incorporated at least in a sidewall region, the coating of which filaments forms electrically conductive passages between the tread (1) or the component (10) and the at least one electrically conductive component (8) or element in the bead region.



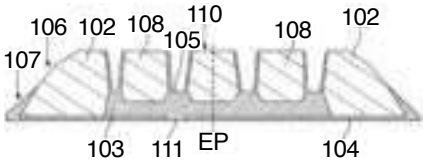
Rubber composition
U.S. patent: 11,999,854
Issued: June 4, 2024
Inventors: Tenko Hayashi and Christine Nourry
Assigned: Michelin
Key statement: A rubber composition is based on at least an elastomer matrix, a reinforcing filler comprising a reinforcing inorganic filler and a plasticizing agent comprising a hydrocarbon resin and a liquid plasticizer comprising a vegetable oil and a liquid diene polymer bearing at least one silane function, wherein the amount in phr of hydrocarbon resin is higher than that of the liquid diene polymer and wherein the amount in phr of vegetable oil is higher than one-third of the amount in phr of the liquid diene polymer.

Rubber composition and a tire
U.S. patent: 12,006,436
Issued: June 11, 2024
Inventors: Eric Engeldinger and Manuela Pompei
Assigned: Goodyear Tire & Rubber
Key statement: The present invention is directed to a sulfur vulcanizable rubber formulation comprising 10 phr to 100 phr of at least one partially saturated elastomer comprising repeat units, wherein at most 10% of all repeat units of the elastomer comprise a double bond; 0 phr to 90 phr of at least one diene based elastomer; 40 phr to 200 phr of at least one filler; and 5 phr to 70 phr of at least one hydrogenated plasticizer. This sulfur vulcanizable rubber formulation has been found to be useful in manufacturing tires.

Tire tread and a tire comprising a tread
U.S. patent: 12,005,740
Issued: June 11, 2024
Inventors: Claude Schweitzer, Jean-Louis Marie Felicien Thomas, Bodo Ahrens, William Alain Francis Ghislain Talbot, Germain Dehez and Hubert Anna Johanes Cox

Patent News

Assigned: Goodyear Tire & Rubber
Key statement: In a first aspect of the present invention, a tire tread is provided, the tread comprising a tread cap comprising a first rubber compound for contacting the road when driving, at least one circumferential groove reinforcement forming at least one of the grooves in the tread cap, the groove reinforcement comprising a second rubber compound for reinforcing an area adjacent the grooves formed by the groove reinforcement, wherein the groove reinforcement comprises for at least one of the grooves formed by the groove reinforcement two groove sidewall layers, each sidewall layer extending from the outer radial surface of the unworn tread down into the direction of the bottom of the groove formed by the groove reinforcement and wherein each sidewall layer has an essentially uniform thickness along its length and wherein the groove reinforcement comprises a groove support portion forming a bottom portion of the groove and having a radially inner base side as well as a radially outer top side, wherein the groove support portion tapers from its base side to its top side.



Overmolding thermoplastic elastomer compounds having high bio-based content
U.S. patent: 12,006,431
Issued: June 11, 2024
Inventor: Liang Xu
Assigned: Avient
Key statement: Thermoplastic elastomer compounds include (a) hydrogenated styrene-farnesene-styrene block copolymer, (b) thermoplastic polyester elastomer having a bio-based content of at least about 45%, (c) polyolefin having a bio-based content of at least about 95%, (d) secondary styrenic block copolymer such as styrene-ethylene/butylene-styrene block copolymer and (e) plasticizer. The thermoplastic elastomer compounds have a bio-based content of at least about 40%. Additionally, the thermoplastic elastomer compounds have an adhesion of at least about 10 pli according to a 90° peel test on at least one of acrylonitrile butadiene styrene, polycarbonate/acrylonitrile butadiene styrene and polycarbonate. The thermo-

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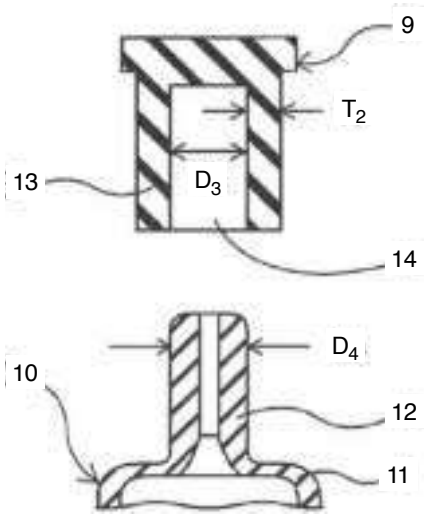
Patent News

plastic elastomer compounds can be especially useful for making overmolded thermoplastic articles.

Medical rubber composition, medical rubber part and pre-fillable syringe
U.S. patent: 12,006,391
Issued: June 11, 2024
Inventors: Hirofumi Konishi, Toshikazu Kondo, Masayoshi Kashibe and Hideyuki Shigemoto
Assigned: Sumitomo Rubber Industries
Key statement: A medical rubber composition can contain, comprise, consist or consist essentially of: (a) an isobutylene-isoprene rubber: (b) a diene based rubber; and a silica having a BET specific surface area not lower than 130 m^2/g. An amount of (a) the isobutylene-isoprene rubber contained in 100 parts by mass of a rubber component composed of (a) the isobutylene-isoprene rubber and (b) the diene based rubber can be larger than 30 parts by mass and smaller than 55 parts by mass.



Tire mounting state detection system, tire mounting state detection method and tire mounting state detection program
U.S. patent: 12,005,747
Issued: June 11, 2024
Inventor: Kyohei Honda
Assigned: Bridgestone
Key statement: A tire mounting state detection system (100) is provided with a vehicle configuration holding unit (230) holding a vehicle configuration including the number of wheels of a vehicle (10); a transmitter number detection unit (250) detecting the number of transmitters based on a radio signal received by a receiving unit; a state detection unit (260) detecting whether or not the number of transmitters exceeds or is short the number of wheels based on the number of wheels based on the vehicle configuration and

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Patent News

the number of transmitters detected; and an output unit (270) outputting that the state of the transmitter is abnormal when it is determined that the number of transmitters exceeds or is short the number of wheels.

Thermoplastic elastomer composition and automobile weather strip
U.S. patent: 12,012,507
Issued: June 18, 2024
Inventors: Shouhei Sasama, Yuki Sato and Osamu Kose
Assigned: Eneos Materials
Key statement: Provided is a thermoplastic elastomer composition obtained by melt-kneading an ethylene/α-olefin/non-conjugated polyene copolymer rubber (A) that is a copolymer of ethylene, an α-olefin having 3 to 20 carbon atoms and a non-conjugated polyene, a polyolefin resin (B) and a mineral oil based softening agent (C) in the presence of an organic peroxide (D) and a crosslinking aid (E), the thermoplastic elastomer composition having a shear viscosity of from 5 Pa·s to 20 Pa·s at 140°C and 10,000 s^{-1}.

Block copolymer intrinsic stretchable electroluminescent elastomer and preparation method and application thereof
U.S. patent: 12,012,481
Issued: June 18, 2024
Inventors: Wen-Yong Lai, Wan Song, Xiangchun Li, Yu Yan and Wei Huang
Assigned: Nanjing University of Posts and Telecommunications
Key statement: The invention discloses a block copolymer intrinsic stretchable electroluminescent elastomer and its preparation method and application. This type of elastomer is made from organic electroluminescent monomers, styrene and 1,3-butadiene through anionic polymerization. The innovation of the present invention is: for the first time, the organic electroluminescence unit is introduced into the elastomer by chemical crosslinking. On the basis of improving the intrinsic stretchability of the elastomer, at the same time, it has characteristics of excellent luminescence and high carrier mobility, novel structure and unique design strategy; meanwhile, it also solves the inherent non-stretchability problem of traditional organic optoelectronic materials and the problem that traditional elastomers do not have electroluminescent properties. This type of elastomer is used as a light-emitting layer material to prepare organic electroluminescent devices with high stability, high stretchability and high efficiency.

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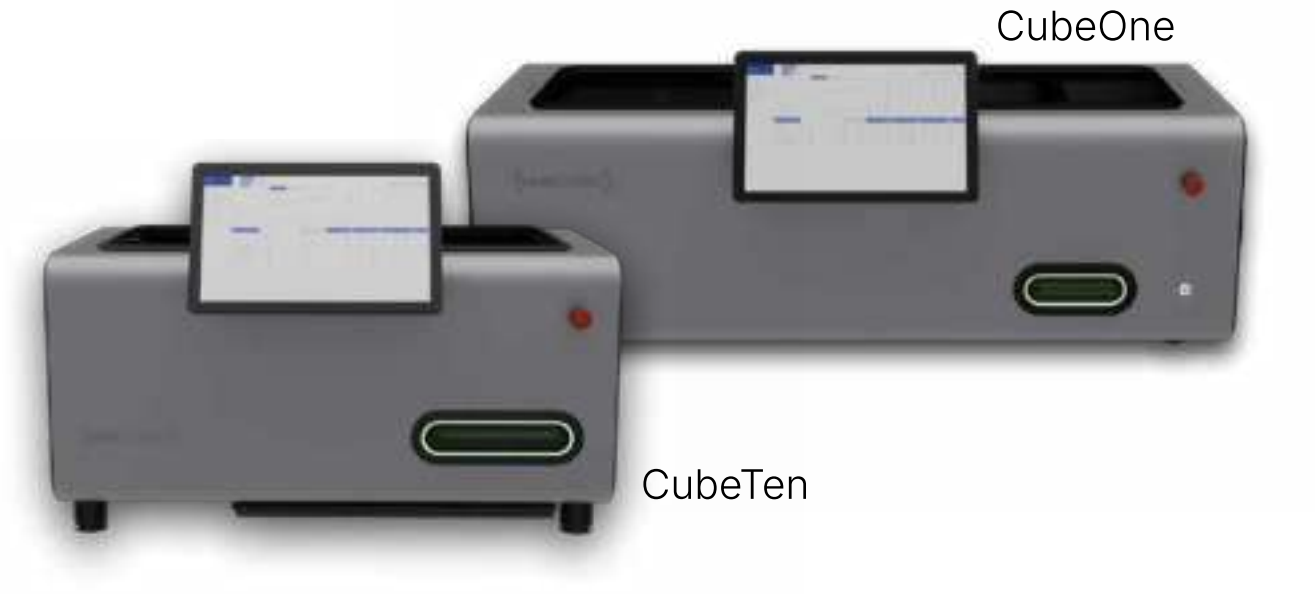

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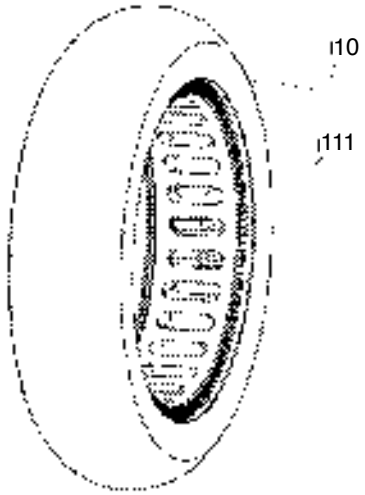
Patent News

Production method for laminate of fluorosilicone rubber and silicone rubber
U.S. patent: 12,011,904
Issued: June 18, 2024
Inventors: Chiichiro Hasegawa and Naoya Ishigami
Assigned: Dow Toray
Key statement: A production method for a laminate of a fluorosilicone rubber and a silicone rubber is provided. The production method comprises the following steps: (1) curing a fluorosilicone rubber composition comprising: (A) an organopolysiloxane having alkenyl groups and fluoroalkyl groups, (B) an organopolysiloxane having silicon atom-bonded hydrogen atoms and fluoroalkyl groups and (C) a hydrosilylation reaction catalyst; (2) laminating a silicone rubber composition comprising: (D) an organopolysiloxane having alkenyl groups and not having fluoroalkyl groups and (E) an organic peroxide on a surface of a fluorosilicone rubber produced in step (1) above; and (3) curing a silicone rubber composition layer in a laminate produced in step (2) above. A laminate in which a fluorosilicone rubber layer and a silicone rubber layer are adhered well using a hydrosilylation reaction curable fluorosilicone rubber composition is produced.

Rubber composition offering high stiffness and low hysteresis
U.S. patent: 12,018,154
Issued: June 25, 2024
Inventors: George Jim Papakonstantopoulos and Michael Joseph Rachita
Assigned: Goodyear Tire & Rubber
Key statement: This invention is based upon the discovery that benzoxazine resins can be incorporated into certain rubber compositions to increase the stiffness thereof without increasing hysteresis or reducing tear strength. Such benzoxazine resin reinforced rubber formulations can accordingly be used beneficially in components of rubber products where high stiffness is desirable. Since these benzoxazine resin reinforced rubbers do not increase levels of hysteresis, they can be used in tire components, such as apexes, chaffers and high stiffness tread blocks without compromising fuel efficiency. This invention more specifically reveals a radial tire having an apex, a chaffer, or a hard tread block segment which is comprised of a rubbery polymer and a benzoxazine resin.

Tire, wheel and vehicle
U.S. patent: 12,017,488
Issued: June 25, 2024
Inventors: Weixiang Wang, Xinjian Ji and Tuo Jiang
Assigned: Ninebot (Changzhou) Tech
Key statement: A tire, a wheel and a vehicle are provided. The tire includes a tire body. The tire body has a plurality of cavities along the circumferential direction, each of the plurality of cavities has an opening located on an inner circumferential surface of the tire body, a connecting portion is formed between adjacent openings, the connecting portion comprises a middle connecting portion and an end connecting portion distributed along a width direction of the tire body and a width of the middle connecting portion is constant.



Tire having a composition comprising an ethylene-rich elastomer, a peroxide and a specific acrylate derivative
U.S. patent: 12,017,480
Issued: June 25, 2024
Inventors: Guillaume Pibre, Andrea Messina and Benjamin Gornard
Assigned: Michelin
Key statement: A tire comprises a rubber composition based on at least one elastomeric matrix mainly comprising a random copolymer comprising ethylene units and conjugated diene units, the mole fraction of the ethylene units in the copolymer being within a range extending from 50% to 95%; a peroxide; and a specific polyfunctional acrylate derivative.

Use of a mixture of organic peroxides for crosslinking a polyolefin elastomer
U.S. patent: 12,018,139
Issued: June 25, 2024
Inventors: Jean-Pierre Disson and Chao Lu
Assigned: Arkema France
Key statement: The present invention concerns the use of a mixture of organic peroxides for crosslinking a polyolefin elastomer (POE), in particular intended to be used in photovoltaic applications. The invention also relates to a crosslinkable composition comprising at least one polyolefin elastomer (POE) and at least one mixture of organic peroxides. The present invention also concerns a method for preparing a material made from polyolefin elastomer (POE), preferably an encapsulating material or a sealing agent, in particular for photovoltaic cells, comprising a step of crosslinking a crosslinkable composition as defined previously.

Rubber composition for tires and tire
U.S. patent: 12,023,960
Issued: July 2, 2024
Inventor: Shinya Hasegawa
Assigned: Toyo Tire
Key statement: A rubber composition for tires according to an embodiment includes a diene rubber, a filler and a fatty acid ester of a polyoxyalkylene glyceryl ether and 50 mass % or more of the filler is carbon black. A tire according to an embodiment includes the rubber composition for tires.

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Reverse engineering mechanical properties of elastomers

by Nuri Akgerman and Ismail Saltuk, Tavdi

The DeMattia fatigue test method is one of the leading techniques used to determine the fatigue resistance of materials, particularly rubber. The DMYO-V (Dynamic Mechanical Yerzley Oscillograph-V) is a desktop device (figure 1) which determines the mechanical properties of rubbers and elastomers under dynamic conditions and always at the natural frequency of the system (ref. 1). A dynamic compression or shear test usually takes less than 5 seconds, and evaluated results are instantly available. A static hysteresis test, as well as a creep test, are also available. This device is compatible with ASTM D945-22 (ref. 2).

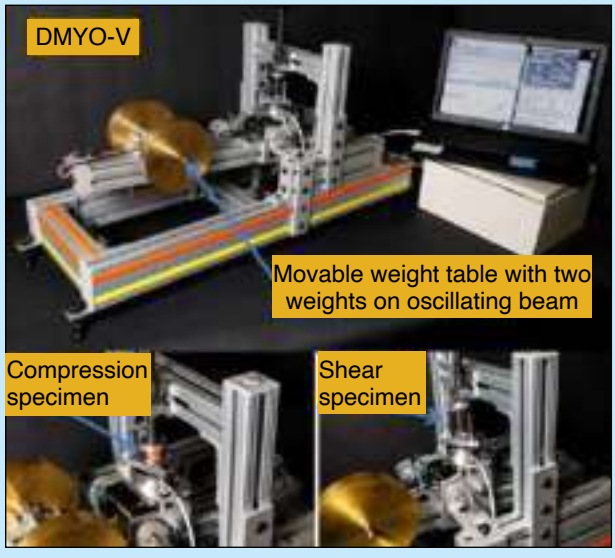
Reverse engineering an existing piece would start with chemical analysis to determine a possible recipe, as well as potential vulcanization conditions. Just as important are the mechanical properties of the component. In this article, the authors will concentrate on determining the mechanical properties.

A potential scenario

Assuming one is presented with a rubber part and asked to replicate its characteristics, how would one go about it?

- One would perform a chemical analysis and try to determine the contents of its recipe.
- One would have an educated guess at the vulcanization conditions.
- If one is provided with the specifications for the desired mechanical properties, one could mold test specimens and perform static and dynamic tests to obtain their mechanical characteristics.

Figure 1 - overall view of the DMYO-V including two close up views



- If, on the other hand, one does not have the desired specifications, one has to estimate them somehow; or try to extract test specimens from the parts provided. The DMYO-V can be used to test non-circular specimens, as well as irregular shapes, as long as the results are used as comparative numbers. The DMYO-V also provides visual comparison tools. Graphical comparisons are usually more informative, as they include a whole range of responses rather than a few numbers, as shown in figure 2.

Figure 3 illustrates the determination of absorbed and returned energy during the first cycle (refs. 4 and 5). The all important absorbed energy is the area under the load displacement curve as the rubber is being compressed. Similarly, the returned energy is the area under the return curve. The larger the difference, the more vibration energy is absorbed, the smoother the motion.

Material comparison tests

Dynamic compression tests were conducted under similar conditions. The same load was applied to all specimens. As can be seen in figure 2, this causes the softer materials to deflect further. As expected, the hardest material deflects the least among the four specimens. This does not mean that the hardest material is the best selection. If one keeps changing to harder and harder materials, eventually they will end up with something like steel. It is known that steel is not a good material for vibration isolation. Thus, there is a "best" material that exhibits the highest

Figure 2 - stress versus strain curves of four materials; the red material has a hardness of durometer 40A and it is observed that it acts almost like a spring; it has deflected more than twice the green material, which has a hardness of durometer 50A; the blue material has a hardness of durometer 60A; the black material has a hardness of durometer 70A; among the four different materials, the blue one absorbs the most energy and returns the least energy (ref. 3)

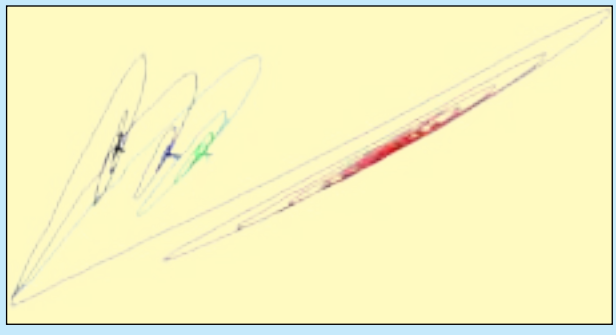


Table 1 - selected parameters computed by the DMYO-V

Durometer hardness *Color on plot*	*Durometer 40A* *Red*	*Durometer 50A* *Green*	*Durometer 60A* *Blue*	*Durometer 70A* *Black*
Yerzley resilience (%)	75.10	49.40	34.40	38.50
Hysteresis (%)	24.90	50.60	65.60	61.05
Point modulus (MPa)	2.80	5.20	6.20	9.40
Dynamic modulus (MPa)	3.50	7.40	11.10	18.30
Natural frequency (Hz)	4.10	6.00	7.30	9.30
Loss angle delta (degrees)	6.70	15.20	20.00	18.00
Damping ratio	0.059	0.135	0.179	0.160

hysteresis, the highest damping ratio, etc., which in this case is the blue material (the third material). Table 1 tabulates some of the more pertinent parameters computed by the DMYO-V at the conclusion of each dynamic compression or dynamic shear test.

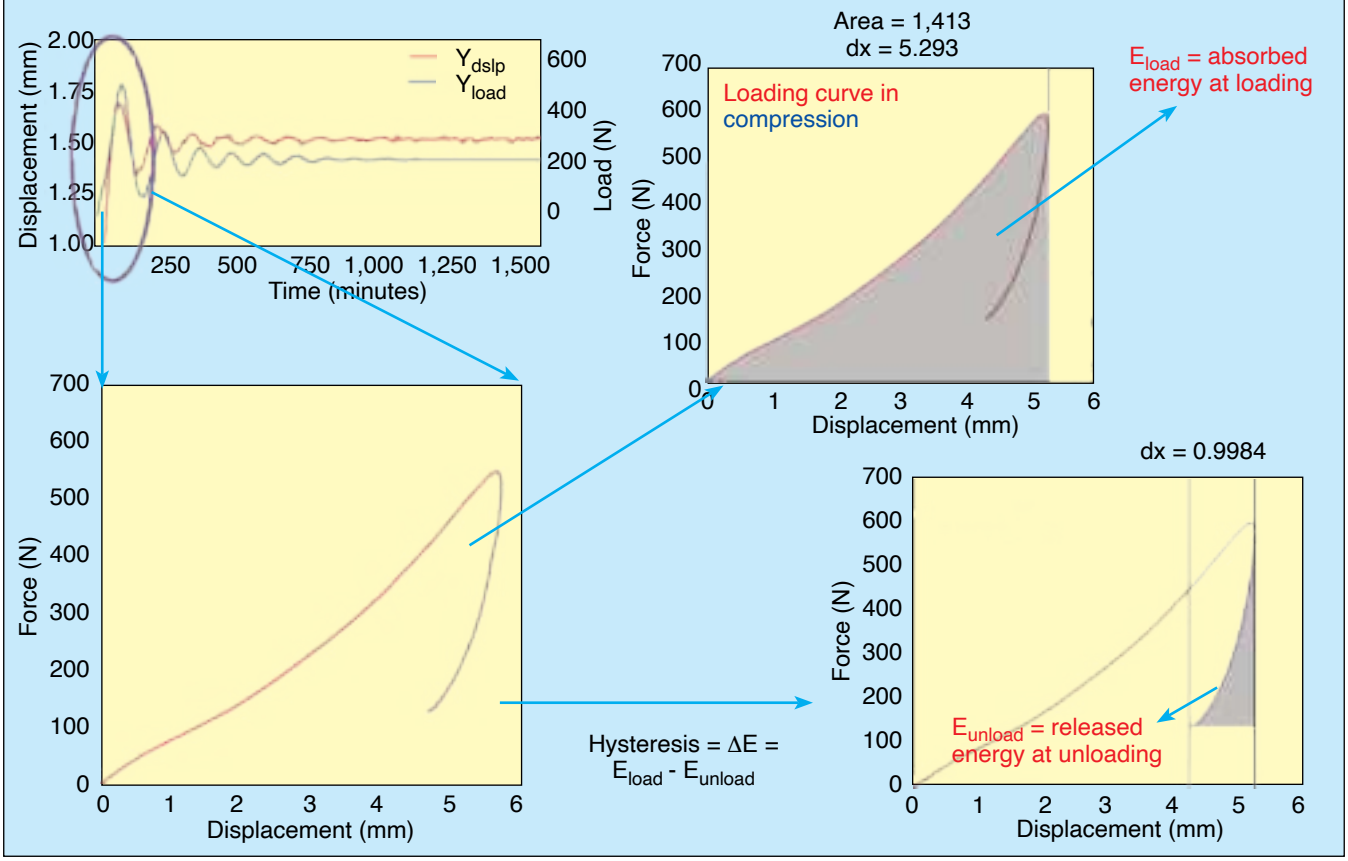
Another common comparative test method is to attempt to keep strain (displacement) constant across the different material specimens.

Applications of re-engineered vibration isolation systems

The use of advanced tools like the Dynamic Mechanical Yerzley Oscillograph (DMYO-V) for re-engineering vibration isolation components has wide ranging applications across industries:

- *Aerospace*: Aircraft and spacecraft are highly sensitive to vibrations, and the optimal design of vibration isolation systems is crucial to the functionality of avionics, instruments and crew safety.
- *Automotive*: Vehicle suspension systems and cabin vibration isolation rely on finely tuned components to ensure passenger comfort and the durability of sensitive electronic components.
- *Manufacturing and robotics*: High precision machinery and robotics require effective vibration isolation to maintain operational accuracy and extend the lifespan of equipment.
- *Medical equipment*: Instruments like MRI machines, surgical robots and diagnostic devices must be shielded from vibrations to maintain their accuracy and performance.

Figure 3 - determination of absorbed and released energy at loading and unloading and hysteresis



• *Gaskets of long term storage containers*: Nuclear waste storage gaskets, for example, need to be able to follow vibrations they are exposed to and continue sealing under adverse contions.

Compression and shear tests

Compression and shear tests include testing for the following:

• *Storage modulus (elastic modulus)*: This represents the material□s ability to store energy elastically when subjected to deformation. The DMYO-V can measure this modulus during both compression and shear tests, helping engineers understand how well the elastomer will perform under normal operational stresses.

• *Loss modulus (dissipation of energy)*: This represents the energy lost as heat during cyclic loading. The DMYO-V also measures this modulus, which is important for determining the damping effectiveness of the elastomeric component. Materials with higher loss moduli are better at dissipating vibration and providing damping.

By performing these tests, the DMYO-V allows engineers to quantify the performance of elastomers, leading to the development of more effective damping solutions for vibration isolation, which are crucial in industries like automotive, aerospace and construction.

Design assistance for engineers

Design assistance for engineers includes the following:

• *Material selection*: By evaluating the storage and loss moduli, engineers can select the ideal elastomeric material that meets the specific damping requirements for a given application. The DMYO-V helps in identifying the materials that will provide the best vibration isolation.

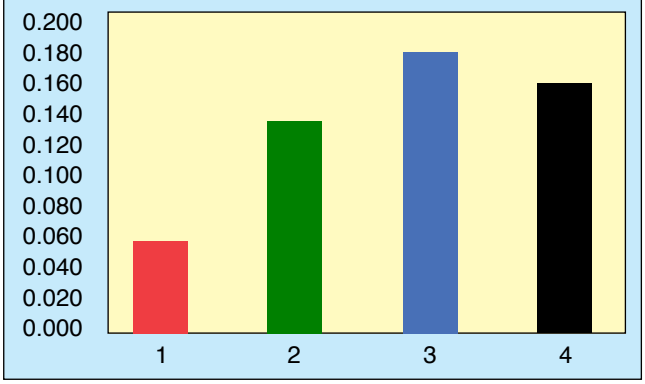
Reverse engineering for sales teams

Reverse engineering for sales teams includes the following:

• *Product analysis*: The DMYO-V can be used by sales teams to reverse engineer products that customers may request, helping them understand the material properties and performance characteristics of existing damping components. This information can be used to propose alternative solutions or customize products to better fit the customer's needs. The DMYO-V serves as a powerful tool for both engineers and sales teams. By accurately measuring the storage and loss moduli under compression and shear, it enables the development of superior damping components, and allows for effective reverse engineering of products. This ultimately supports more efficient design processes and ensures that customers receive precisely tailored vibration isolation solutions.

• *Benchmarking and comparison*: Sales teams can use the test results to compare different elastomeric materials and products available in the market. This can be particularly useful in situations where customers are looking for specific performance parameters, such as higher damping efficiency or durability.

Figure 4 - comparison of damping ratios for the four materials



Customization of damping solutions

Damping solutions customization includes the following:

• *Tailored components*: Based on the test results from the DMYO-V, both engineers and sales teams can collaborate to design components that meet the precise needs of the customer. For example, if a customer requires a material with a specific damping profile under varying loads, the DMYO-V provides the data to create a customized solution, as seen in figure 4.

Reverse engineering elastomeric vibration isolation elements using the Dynamic Mechanical Yerzley Oscillograph V (DMYO V) involves several structured steps to understand and replicate the dynamic properties of the elastomer. Below is a detailed outline of the process:

Understanding the elastomeric component

Understanding the elastomeric component includes:

• *Material identification*: Identify the type of elastomer used, such as natural rubber, polychloroprene, silicone or others. This involves assessing the chemical composition and physical properties to understand how the material interacts with dynamic loads.

• *Geometric analysis*: Examine the shape, dimensions and features of the elastomeric element. This includes analyzing mounting holes, overall geometry and the way it integrates with other components in the vibration isolation system.

Setting up the test environment

Test environment setup includes:

• *DMYO-V preparation*: Set up and calibrate the Dynamic Mechanical Yerzley Oscillograph (DMYO-V) for dynamic testing, ensuring it is equipped to test elastomers over a range of frequencies, temperatures and strains.

• *Mounting the isolation element*: Securely mount the elastomeric vibration isolation element onto the test apparatus. It is critical that the component is firmly attached to avoid slippage or added vibrations that could affect the accuracy of the test results.

Data acquisition and analysis

Data acquisition and analysis comprises the following:

- *Record dynamic properties*: Collect data on critical parameters such as storage modulus (E'), loss modulus (E") and loss factor (tan δ). These metrics provide insight into the material□s elasticity and its ability to absorb and dissipate energy.
- *Data interpretation*: Use specialized software to analyze the test data, identifying patterns and behavior under dynamic loading. These data form the basis for reverse engineering and material characterization.

Validation and iteration

Validation and iteration include the following steps:

- *Prototype testing*: Test the prototypes using the same DMYO-V setup to compare their performance against the original components. This ensures that the new designs replicate the dynamic properties and performance of the original elastomeric elements.
- *Iterative refinement*: Based on testing outcomes, refine the prototypes. This may involve adjusting material formulations, geometric features or other factors to improve performance or meet the desired specifications.

By following these steps, one can effectively reverse engineer elastomeric vibration isolation elements, gaining a deep understanding of their dynamic properties and enabling the design of such components. In elastomeric reverse engineering, especially for designing vibration isolators that mimic the properties of an unknown elastomer, the storage modulus (E') and loss modulus (E") are crucial mechanical parameters that provide insight into the material□s behavior under dynamic loading conditions. Here is how these moduli can be helpful:

Characterizing material behavior

Characterization of material behavior involves the following:

- *Storage modulus (E')*: This represents the material's ability to store elastic energy when it is deformed. It is associated with the stiffness of the material, and is crucial in determining how the elastomer will respond to deformation in situations where it is expected to return to its original shape (e.g., vibrations or mechanical stresses). A higher storage modulus typically indicates a stiffer material and lesser amount of damping.
- *Loss modulus (E")*: This indicates the material's ability to dissipate energy, typically as heat. It is related to the material's damping characteristics. The loss modulus helps in understanding how much energy is absorbed by the material during deformation, which is critical for vibration isolation. Higher loss modulus values typically mean better vibration damping capabilities.

Matching performance characteristics

When reverse engineering an elastomeric vibration isolator, it is important to match not just the material□s appearance, but also its mechanical performance (i.e., vibration damping and energy absorption). The storage and loss moduli provide direct information about these properties:

- Storage modulus will help the reverse engineer choose a base material with similar stiffness to ensure the vibration isolator has the same mechanical strength and deformation characteristics.
- Loss modulus will guide the engineer in selecting a material with similar energy dissipation characteristics. This is crucial for ensuring that the new vibration isolator absorbs and dissipates energy in the same way, providing the same level of isolation from vibrations as compared to the control sample.

Temperature and frequency dependence

Temperature and frequency dependence is described below:

- The storage and loss moduli vary with temperature and frequency, so these values provide insight into the viscoelastic behavior of the elastomer. Vibration isolators typically experience varying loads at different frequencies, so having this dynamic information, especially the expected natural frequency (figure 5) helps to ensure the designed isolator performs well across the range of expected operating conditions.
- By studying the temperature and frequency dependence of the storage and loss moduli, reverse engineers can match the dynamic stiffness (storage modulus) and damping performance (loss modulus) of the target elastomer in a wide range of operational scenarios.

Material selection and customization

Once the reverse engineer has determined the ideal storage and loss modulus values for the elastomer, they can choose materials with similar properties. If necessary, they can also modify or blend materials to fine tune the moduli:

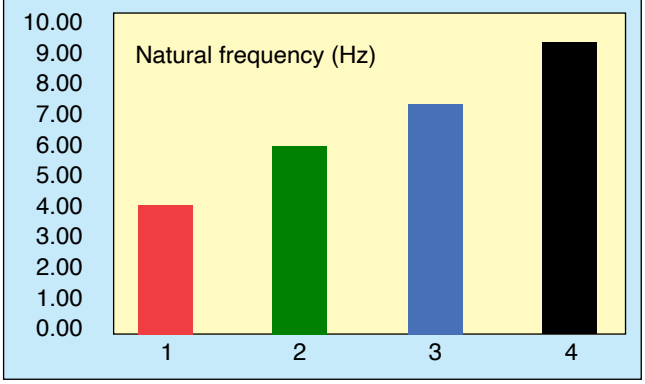
- Blending different elastomers or incorporating specific additives (like plasticizers or fillers) can help achieve the desired storage and loss moduli.
- For example, increasing the level of fillers might increase the storage modulus, but reduce the loss modulus, altering both stiffness and damping.

Understanding durability and long term performance

Aspects of durability and long term performance include the following:

- The storage modulus can also provide insight into how the

Figure 5 - observed natural frequency of the four materials



material will perform under prolonged mechanical stress, which is important for the durability of vibration isolators. Materials with lower storage moduli might degrade more rapidly under repetitive stress.

- The loss modulus can give insight into the energy dissipation ability of the elastomer and how it will perform over time as it undergoes continuous deformation. Elastomers that are too soft may have a high loss modulus, but wear out faster, while those with a more balanced moduli can offer better long term durability.
- In reverse engineering elastomeric vibration isolators, the storage modulus helps in selecting materials with similar stiffness, while the loss modulus assists in matching energy dissipation properties. Together, they allow for the design of an isolator that behaves identically to the unknown elastomer, both in terms of vibration isolation and long term performance. By carefully analyzing and matching these moduli, reverse engineers can replicate the performance characteristics of the original material, ensuring the new product serves the same functional purpose.

In the reverse engineering of elastomeric vibration isolators, understanding various material properties and behaviors is crucial to optimizing their design for performance, durability and reliability. Here is how each of the factors mentioned, Yerzley resilience, dynamic hysteresis, static hysteresis, Mullins effect and elastic region modulus, contributes to the design and performance of elastomeric vibration isolators:

Figure 6 - variation in the observed resilience of the four materials

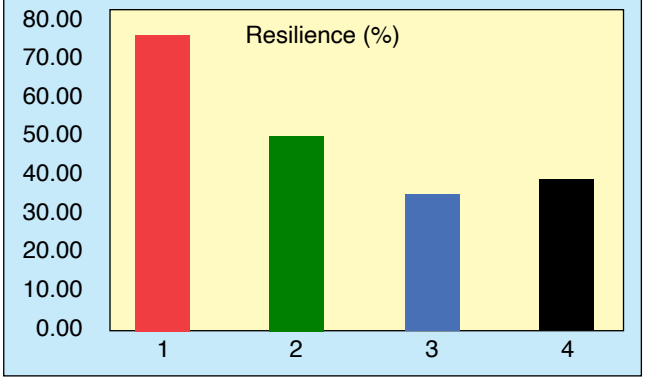
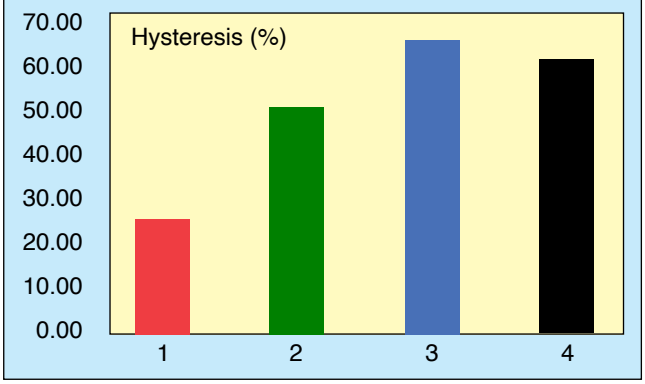


Figure 7 - expected hysteresis of the four example materials



Yerzley resilience

Yerzley resilience is described as follows:

- *Definition*: Yerzley resilience refers to the energy return or the capacity of an elastomer to recover after deformation when subjected to cyclic loading. Figure 6 illustrates the differences in the observed resilience of the example materials.
- *Design implications*: In vibration isolators, a high Yerzley resilience means that the material can absorb and then return a significant amount of energy without permanent deformation. This is important for ensuring that the isolator maintains its effectiveness over many cycles of loading and unloading, which is critical for long term durability.
- *Design use*: In reverse engineering, determining the Yerzley resilience helps in assessing how well an isolator will perform under dynamic loading conditions, guiding the selection of elastomer materials that provide a good balance between energy dissipation and recovery.

Dynamic hysteresis

Dynamic hysteresis is described as follows:

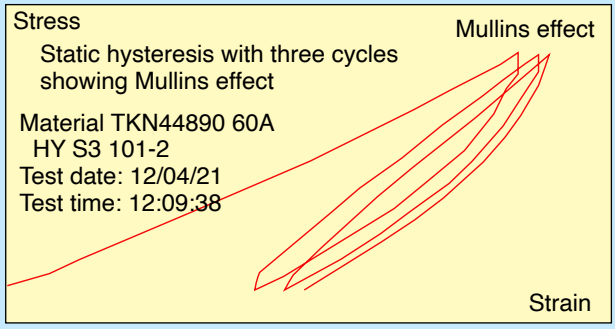
- *Definition*: Dynamic hysteresis describes the energy loss in an elastomer when it undergoes cyclic deformation, represented as the area between the loading and unloading curves in a stress-strain diagram.
- *Design implications*: High dynamic hysteresis indicates greater energy dissipation, which is often desirable in vibration isolators for reducing unwanted vibrations. However, excessive hysteresis can lead to excessive heat generation and wear over time, negatively impacting performance. As seen in figure 7, material 3 exhibits the highest hysteresis; maybe it is the best choice?
- *Design use*: In reverse engineering, understanding the dynamic hysteresis helps optimize the material□s performance for vibration isolation, balancing energy dissipation with the potential for overheating or degradation of the isolator material.

Static hysteresis

Static hysteresis is described as follows:

- *Definition*: Static hysteresis refers to the energy loss that occurs when an elastomer is subjected to a slow, non-cyclic load. It reflects the material□s internal friction during loading and unloading at low deformation rates.
- *Design implications*: Static hysteresis contributes to the isolator□s ability to dampen low frequency vibrations and impacts. It is particularly important when isolators are subject to static or quasi-static loads, as in applications where large, slow movements occur.
- *Design use*: Understanding static hysteresis helps reverse engineers predict how an isolator will perform under sustained loads and low frequency vibrations, allowing for material selection that offers optimal damping properties for specific applications.

Figure 8 - DMYO-V data plot showing the Mullins effect; slowly repeated load/unload cycles cause increased strains



Mullins effect

The Mullins effect is described as follows:

- *Definition*: The Mullins effect is a phenomenon where the material softens after repeated loading and unloading, leading to a decrease in stress and stiffness during cyclic deformation.
- *Design implications*: While the Mullins effect (figure 8) can be beneficial for improving damping characteristics by reducing peak stresses, it can also lead to permanent set or degradation of the elastomeric material if not controlled. The material may not fully recover its original stiffness, leading to changes in isolator behavior over time. This characteristic is extremely important for the o-rings used in nuclear waste canisters to recover from sudden deformation; to recover to their original shape to seal perfectly so no nuclear waste leak can happen. The only way to test for this property is to test samples at their own natural frequency.
- *Design use*: In reverse engineering, understanding the Mullins effect is crucial for ensuring the isolator's performance remains consistent over its lifetime. This knowledge allows engineers to choose materials that resist excessive degradation and maintain effective vibration isolation properties, even after prolonged use.

Elastic region modulus and dynamic modulus

Elastic region modulus and dynamic modulus are described as follows:

- *Definition*: The elastic modulus (also known as the stiffness) in the elastic region of an elastomer describes the material's resistance to deformation under stress, specifically when it behaves elastically (figure 9), before entering plastic or permanent deformation. Note that in general, the dynamic modulus (figure 10) is higher than the elastic modulus. For softer materials, the dynamic modulus is maybe 25% higher than elastic modulus. For harder material, it could be twice as high. Thus, as expected, resistance to dynamic deformation is stiffer in harder materials.
- *Design implications*: The elastic modulus determines the isolator□s stiffness at low strains. A higher modulus means a stiffer isolator, which may be useful for isolating high frequency vibrations, while a lower modulus means a more compliant isolator, which is better for isolating low frequency vibrations.
- *Design use*: In reverse engineering, determining the modulus helps ensure the isolator is appropriately tuned for the frequency range it needs to isolate. It also helps in balancing the isolator□s stiffness with its ability to absorb vibrations without becoming overly rigid or too compliant.

Figure 9 - elastic modulus or modulus under static conditions

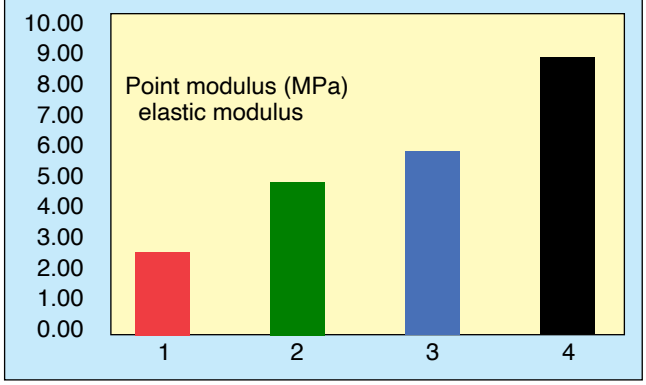
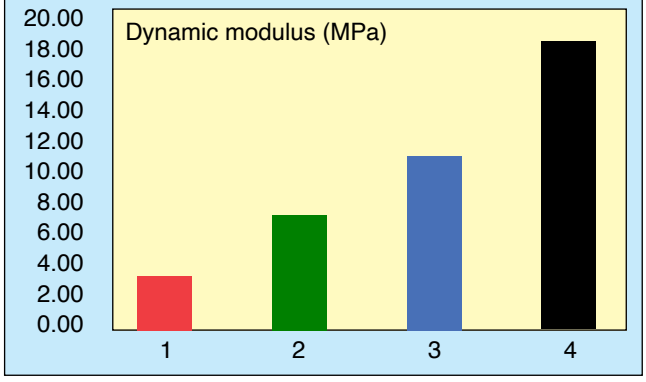


Figure 10 - dynamic modulus or modulus under dynamic conditions



Summary of design implications

Design implications can be summarized as follows;

- Yerzley resilience helps to predict long term performance, ensuring that the elastomer returns energy without permanent deformation.
- Dynamic and static hysteresis inform energy dissipation and damping, crucial for vibration isolation in dynamic and static conditions.
- The Mullins effect provides insight into material softening with repeated use, guiding material selection for durability.
- Elastic region modulus helps fine tune the stiffness of the isolator for specific vibration frequencies and loading conditions.

When reverse engineering elastomeric vibration isolators, these properties help the engineer select and optimize materials

that provide the right balance of damping, stiffness and longevity for the intended application.

Conclusion

Re-engineering vibration isolation components using the free oscillation Dynamic Yerzley Oscillograph offers significant improvements in the performance and reliability of vibration sensitive systems. By providing detailed insights into the dynamic behavior of vibration isolation components, the Yerzley Oscillograph allows engineers to optimize material choices, component designs and overall system performance. As industries continue to push the boundaries of precision and sensitivity, the Yerzley Oscillograph will play a crucial role in advancing vibration isolation technology for a wide range of applications. Ultimately, the ability to accurately measure and understand the complex dynamics of vibration isolation systems enables engineers to create more effective, durable and efficient designs, ensuring the longevity and functionality of critical systems across diverse sectors.

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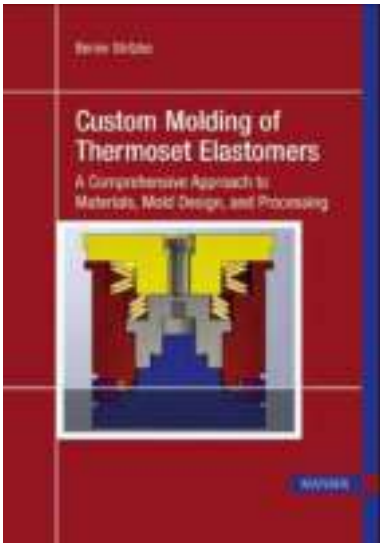

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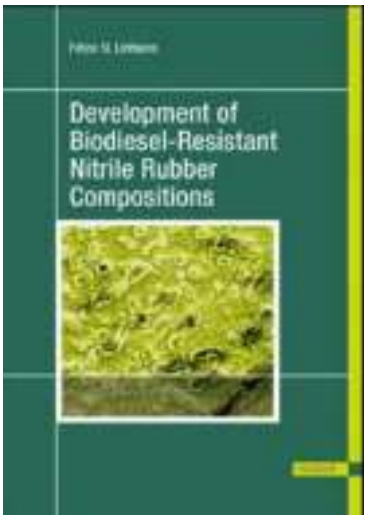
This comprehensive reference book incorporates the latest developments in the synthesis, production, characterization, and application of various types of polymeric nanocomposites. It outlines the various preparation techniques using different types of nanoparticles and polymer matrices with emphasis 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.



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DeMattia fatigue test with automatic storage and AI analysis of sample images

by Mauro Belloni, Gibitre Instruments s.r.l.

The DeMattia fatigue test method is one of the leading techniques used to determine the fatigue resistance of materials, particularly rubber. Technological advancements have led to the integration of automated systems for monitoring and analyzing samples during testing, improving efficiency, accuracy and speed

This article describes an innovative system that combines the DeMattia test method with an advanced image acquisition system, AI-driven analysis and an environmental chamber to simulate various thermal conditions.

Instrument description

The DeMattia fatigue check AI camera (figure 1) is a state-of-the-art instrument designed for conducting fatigue tests on rubber and other polymers using the DeMattia method. Its key features include:

- Flexometer according to the DeMattia method
- Environmental chamber with temperature control from -40°C to 200°C, enabling tests in extreme conditions
- 12 samples mounted simultaneously for multiple test runs
- Six cameras for simultaneous image acquisition of all

Figure 1 - DeMattia fatigue check AI camera

Figure 2 - temperature control via an integrated refrigeration unit

Figure 3 - an Excel file correlates crack size with the number of cycles, allowing for easy data analysis

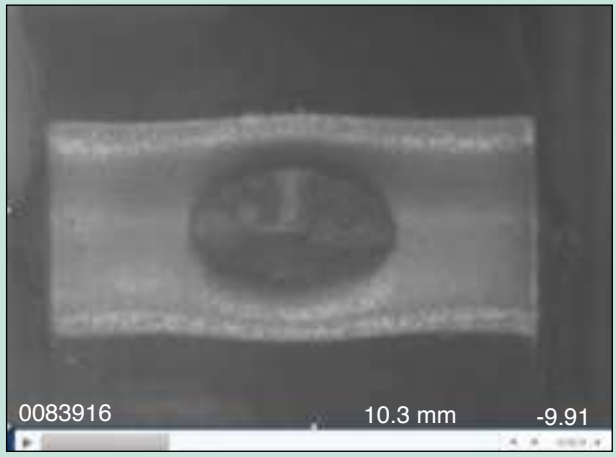
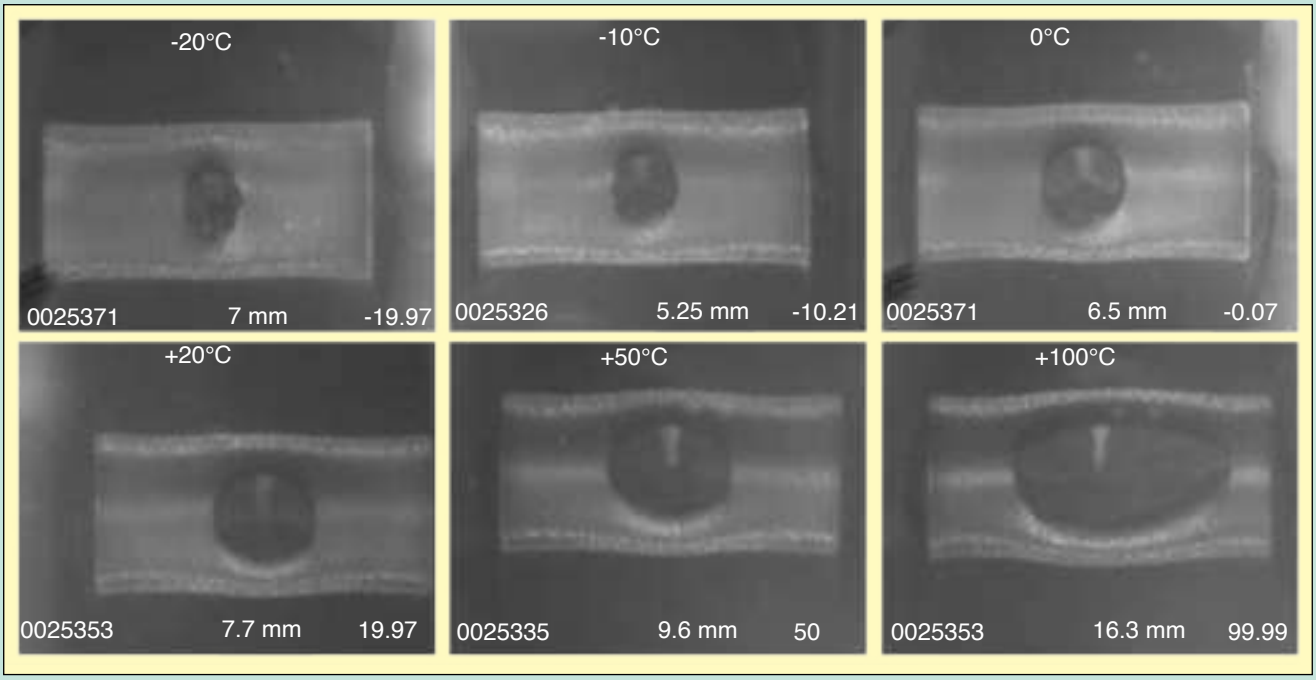


Figure 4 - movies of samples at different temperatures (status of samples at 25,000 cycles)



samples during testing

- Artificial intelligence for automatic crack detection
- Automatic movie generation for each sample, showing the progression of cracks over time

The instrument complies with the following international standards: ISO 132, ISO 6943, ASTM D813 and ASTM D430.

Instrument control

The entire instrument is controlled via powerful software installed on an onboard PC, with additional control available through a 15" touch screen panel. Users can adjust parameters such as test frequency (0 to 300 rpm), stroke (up to 60 mm), grip distance (up to 100 mm) and temperature range (-40°C to 200°C).

Figure 5 - movies of samples at different temperatures (status of samples at 50,000 cycles)

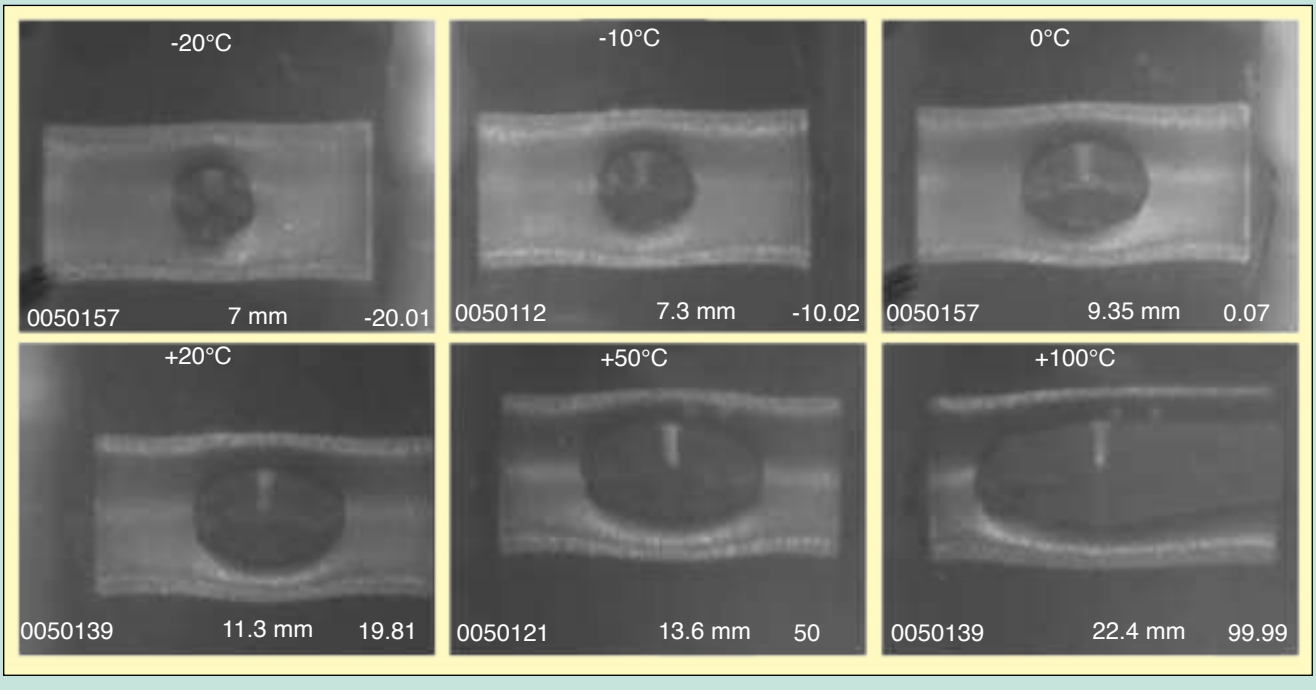
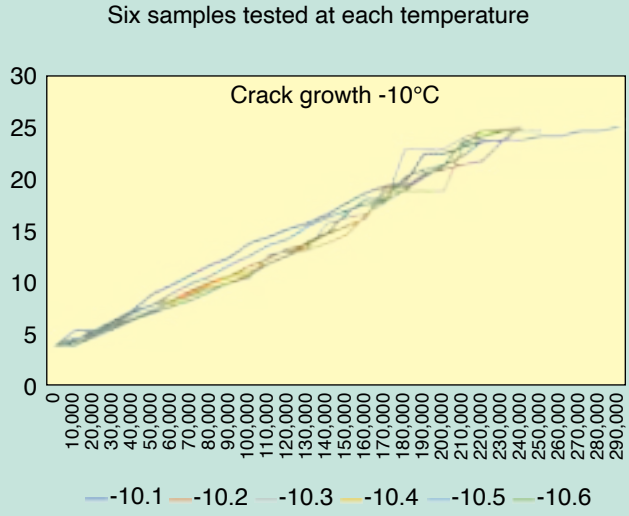


Figure 6 - overlapping crack growth curves of the samples at -10ºC

Temperature	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*
Sample	*1*	*2*	*3*	*4*	*5*	*6*
	-10-1	*-10-2*	*-10-3*	*-10-4*	*-10-5*	*-10-6*
Cycles			*Crack size (mm)*			
0	4	4	4	4	4	4
10,000	4.45	4.05	4.75	4	5.45	4
20,000	5.45	4.8	4.75	5.15	5.45	5.15
30,000	6.4	5.6	5.9	6.15	6.05	5.95
40,000	7.4	6.45	6.65	7.1	7.25	6.5
50,000	8.9	7.3	7.4	7.9	7.9	7.1
60,000	9.8	8.4	8.1	8.4	9	7.75
70,000	10.75	9.3	8.75	9.05	9.95	8.35
80,000	11.75	10.1	9.55	9.95	10.65	9.2
90,000	12.45	10.65	10	10.55	11.75	10.05
100,000	13.75	11.6	10.45	11.1	12.55	10.7
110,000	14.35	12.3	12.7	11.85	13.6	11.85
120,000	15.1	13.3	12.95	12.65	14.15	12.6
130,000	15.7	13.65	13.35	13.2	15.4	13.95
140,000	16.5	14.65	15.65	13.75	16.2	14.75
150,000	17.6	15.4	16.2	14.6	16.9	16.65
160,000	18.55	16.15	16.6	16.4	17.45	18
170,000	19.2	19.1	17.6	18.75	17.75	18
180,000	19.5	19.1	22.7	18.75	18.65	20.1
190,000	22.3	20.4	22.7	18.75	20.05	20.8
200,000	22.3	20.8	22.7	18.75	21.15	21.2
210,000	22.9	21.25	23.8	23.06	22.1	23.45
220,000	23.55	21.6	24.5	24.45	23.45	23.9
230,000	23.55	23.45	24.6	24.45	23.6	24.4
240,000	24.85	-	24.75	24.45	23.6	-
250,000	-	-	-	24.45	23.95	-
260,000	-	-	-	-	23.95	-
270,000	-	-	-	-	24.45	-
280,000	-	-	-	-	24.45	-
290,000	-	-	-	-	24.8	-



Additional features

Addional features of the DeMattia fatigue check AI camera include:

- Exclusive movement system where the sample holders

Figure 7 - result of overlapping curves at the different test temperatures

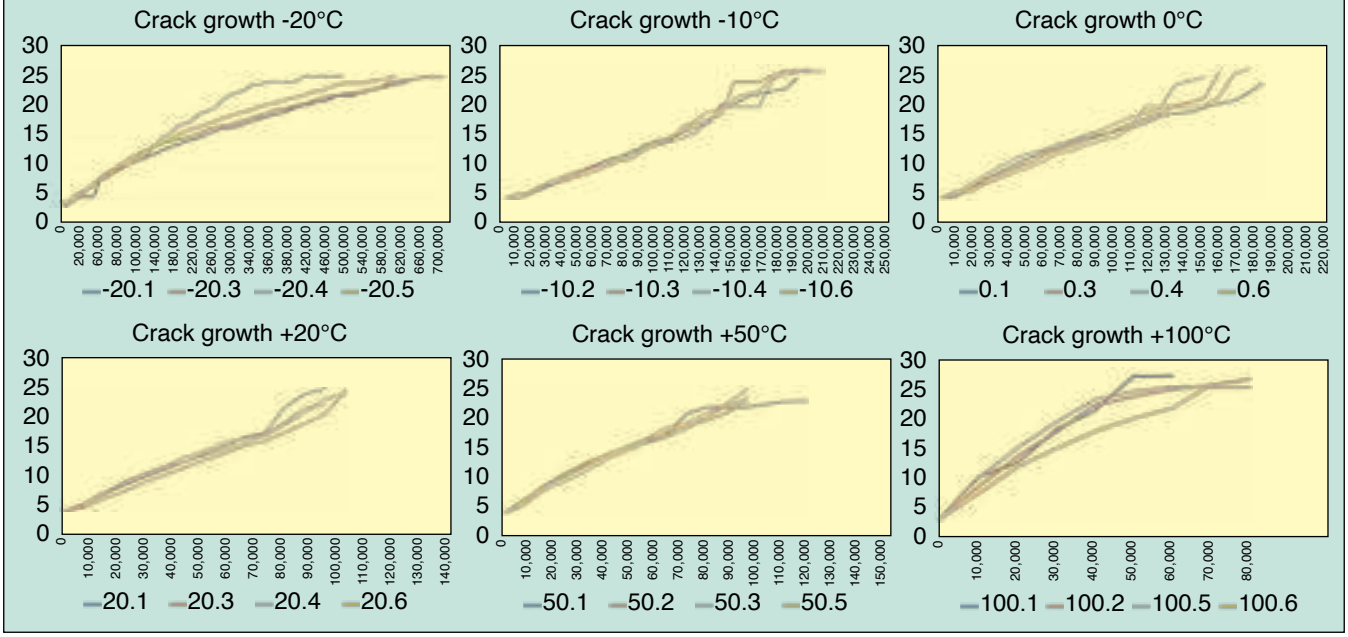
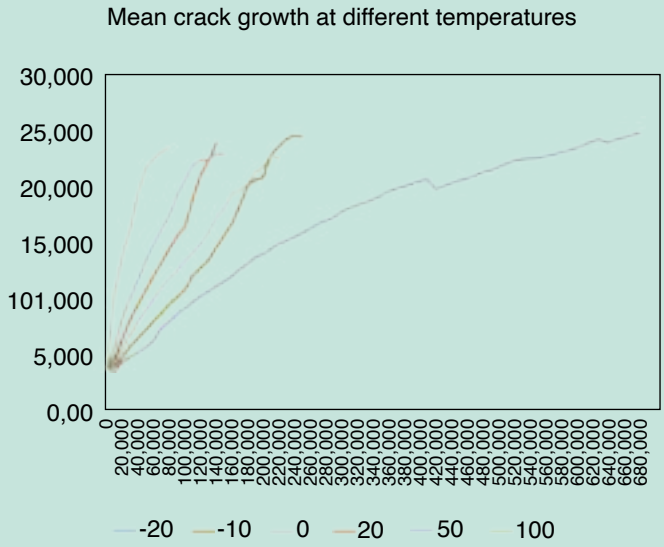


Figure 8 - overlapping of the average crack growth curve for each temperature

Temperature	*-20*	*-10*	*0*	*20*	*50*	*100*
Cycles	*Mean crack growth (mm)*					
0	4.00	4.00	4.00	4.00	4.00	4.00
10,000	3.69	4.20	4.65	4.85	5.89	10.73
20,000	4.53	4.96	5.68	6.59	8.36	13.83
30,000	5.00	5.90	6.93	8.23	10.21	16.29
40,000	5.43	6.68	8.09	9.68	11.83	19.39
50,000	5.91	7.43	9.18	10.90	13.51	21.73
60,000	6.41	8.16	10.10	12.13	14.94	22.50
70,000	7.60	8.86	11.08	13.33	16.23	23.13
80,000	8.16	9.70	11.99	14.56	17.49	23.53
90,000	8.78	10.31	12.65	15.69	19.30	-
100,000	9.29	10.96	13.55	16.54	20.70	-
110,000	9.88	12.18	14.21	18.94	21.98	-
120,000	10.34	12.88	15.00	21.04	22.43	-
130,000	10.81	13.54	16.01	22.30	22.50	-
140,000	11.25	14.70	17.36	23.95	22.95	-
150,000	11.65	15.71	18.10	-	22.95	-
160,000	12.14	16.79	19.44	-	-	-
170,000	12.80	18.36	19.73	-	-	-
180,000	13.21	20.16	20.29	-	-	-
190,000	13.84	20.66	21.27	-	-	-
200,000	14.10	20.86	21.80	-	-	-
210,000	14.53	22.89	22.88	-	-	-
220,000	15.04	23.61	22.55	-	-	-
230,000	15.30	24.23	-	-	-	-
240,000	15.59	24.60	-	-	-	-
250,000	15.96	24.45	-	-	-	-
260,000	16.35	-	-	-	-	-
270,000	16.75	-	-	-	-	-
280,000	17.05	-	-	-	-	-
290,000	17.34	-	-	-	-	-
300,000	17.88	-	-	-	-	-
310,000	18.16	-	-	-	-	-
320,000	18.44	-	-	-	-	-
330,000	18.66	-	-	-	-	-
340,000	18.95	-	-	-	-	-
350,000	19.25	-	-	-	-	-
360,000	19.63	-	-	-	-	-
370,000	19.89	-	-	-	-	-
380,000	20.11	-	-	-	-	-
390,000	20.36	-	-	-	-	-
400,000	20.58	-	-	-	-	-



move in opposite directions, minimizing noise and vibrations (<50 dB)

- Temperature control via an integrated refrigeration unit, with options for room temperature (+10°C) or a full temperature range (-40°C to 200°C) (figure 2).

Image acquisition system

The image acquisition system consists of six black and white video cameras, synchronized with the sample movement. Each camera has independent LED lighting, with adjustable frequency for image capture. This setup ensures precise data collection on crack formation and growth during the test.

Movie generation and Excel file

The software of the De Mattia fatigue check AI camera manages thousands of images for each sample and automatically generates movies that show the evolution of the cracks over time. Each movie can be downloaded via USB or network connection. Additionally, an Excel file is created that correlates crack size with the number of cycles, allowing for easy data analysis (figure 3).

Description of the experiment

An experiment has been conducted to demonstrate the capability of the instrument to:

- Produce high quality images
- Automatically analyze the images using an AI algorithm
- Automatically produce a movie for each sample under test that shows the behavior of the sample during the complete duration of the test
- Automatically produce Excel output of the data to summarize the results and permit easy overlapping of results obtained with different testing conditions.

This experiment focuses on evaluating crack growth in a

natural rubber (NR) sample subjected to fatigue testing at various temperatures. The goal is to observe how crack growth rate is influenced by different thermal conditions.

Objective of the experiment

The objective of the experiment is to apply repetitive deformation to the sample and measure the degradation of its central region as a function of the number of cycles applied. The AI algorithm analyzes images to detect cracks, and records the cycle number at which the crack appears.

Test parameters

Test parameters include the following:

- Test compound: Natural rubber (NR)
- Test temperatures: -20°C, -10°C, 0°C, 20°C, 50°C, 100°C
- Conditioning: 30 minutes at temperature before starting the test
- Number of samples per temperature: Six
- Data analyzed: Crack size versus number of cycles

Analysis of the results: Comparison of the movies

For each test temperature, six samples have been tested and the software of the instrument has produced a corresponding movie that can be easily compared for visual analysis of the crack evolution and shape (figures 4 and 5).

Analysis of the results: Numerical analysis of Excel files

The Excel file produced for each sample at the end of the test shows the crack size at different numbers of cycles. The Excel files for the samples tested at each temperature are overlapped to calculate average crack growth speed (figures 6, 7 and 8).

Results and discussion

The results show a clear correlation between temperature and crack growth rate in the tested natural rubber sample. At higher temperatures, the crack growth rate was significantly faster; while at lower temperatures, the crack growth rate was much slower. This may be attributed to better heat dissipation at lower temperatures, leading to less thermal degradation of the material.

Conclusions

The experiment confirms that the crack growth rate of the NR compound tested is directly proportional to the test temperature. Lower temperatures resulted in slower crack growth, suggesting that the material exhibits better resistance at colder temperatures due to reduced thermal degradation.

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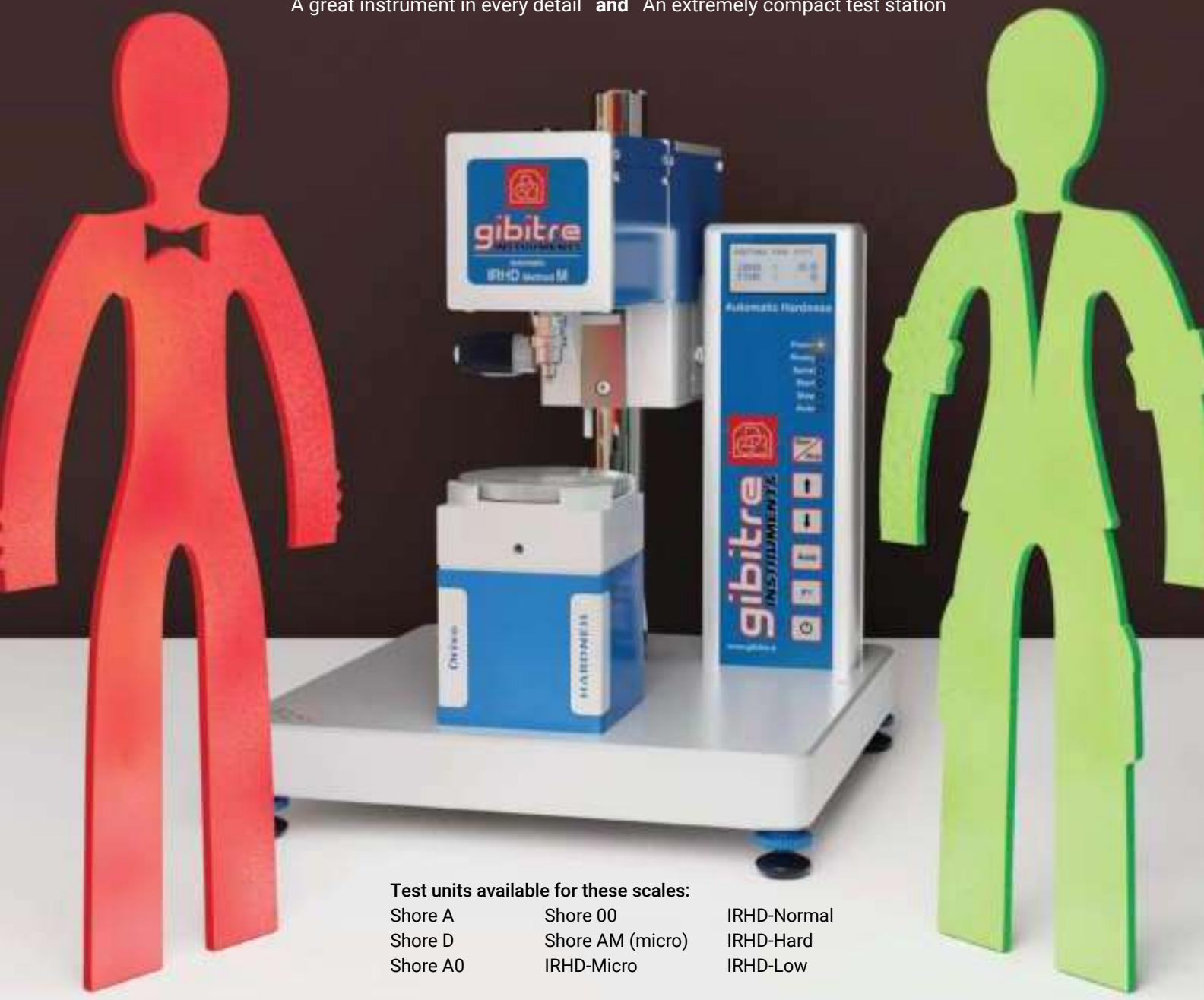

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Utilizing optimized time-temperature superposition test parameters to determine the accuracy of fit for various filled compounds and one unfilled compound

by Jonathan E. Martens and Kaylan Yaceczko, Akron Rubber Development Laboratory

Research presented herein is a continuation of the research presented in a the article, "Optimization of test parameters for time-temperature superposition testing and effect of heat history on superposition results," published in the January 2024 issue of *Rubber World* (Vol. 269, No. 4). As discussed in the previous article, the time-temperature superposition (TTS) principle relates long test times for various viscoelastic properties at a desired operating temperature to short test times for the same properties at a higher temperature, and it relates very short test times at the desired operating temperature to longer test times at colder temperatures. For viscoelastic properties, the test time is best reflected in the frequency setting for the test. For example, if the available test instrument is capable of only 500 Hz, and characterization at 10 kHz is needed, those properties can be obtained utilizing this principle and testing at colder temperatures.

The relationship between temperature and test time was first published in the 1950s. Three of the main researchers were Malcolm Williams, Robert Landel and John Ferry. These three looked at a variety of polymers (both high molecular weight [ref. 1] and low molecular weight [ref. 2]), along with other glasses or glass forming liquids (ref. 2). They also established the idea of using a shift factor called a_T, which they define as "a single temperature dependent parameter which represents the ratio of any relaxation time at temperature T to its value at an arbitrary reference temperature T_0" (ref. 1). Because of their research, this analysis technique has been labeled as WLF.

Since the original WLF publication, other researchers have conducted research on the TTS principle. Each has focused on various aspects or applications of the principle.

There has been a handful of research into how to handle the data from a filled rubber compound compared to the unfilled compounds that the original research was performed upon (refs. 3-5). With no ability to test the filled compounds at the high frequencies necessary to validate the shifted values, any method that was proposed as the "right way" or "more correct way" to handle these results was deemed appropriate. Some of the published ways include horizontal shifting only (ref. 3), using the universal C1 and C2 constants from the WLF equation and then vertically shifting the results (ref. 4), or using one viscoelastic property's horizontal shift for all properties, and then vertically shifting the results of the other properties based on the ratio of the horizontal shift factors for the properties (ref. 5).

Utilizing newer technology, the Metravib VHF104 dynamic mechanical analyzer is an innovative instrument that is able to measure viscoelastic properties over a very high frequency range of 100 Hz to 10 kHz. By having a filled rubber compound tested on this instrument, the best analysis method for filled rubber compounds can be determined.

This research aims to analyze the accuracy of the current TTS analysis methods by comparing the master curves of six different filled rubber compounds and one unfilled rubber compound to their corresponding VHF results. The master curves will be obtained using the optimized testing parameters discussed in the previous article. If it is determined that none of the current analysis methods are sufficient to match with the VHF results, then a new analysis method will be proposed.

Experimental

Compounds

Six different filled rubber compounds were evaluated in this study. These six included a natural rubber (NR) compound, a butyl rubber (IIR) compound, a silicone (polysiloxane) rubber (VPS) compound, a fluoroelastomer (FKM) compound, a hydrogenated nitrile butadiene rubber (HNBR) compound and a model solution styrene butadiene rubber (S-SBR) compound. The unfilled compound was a model solution styrene butadiene rubber (S-SBR) compound. All of these compounds were mixed or obtained previously.

Test procedures

The TTS tests were conducted on a Metravib +300 dynamic mechanical analyzer (DMA) in tension on all of the materials listed above. The dynamic strain was 0.1%, which was within the linear region for all of the compounds. A static displacement to dynamic displacement ratio of 1.3 was used to ensure the test specimens stayed in tension for the duration of the test. The frequency range was 1 to 100 Hz, and the temperature range was -50°C to 100°C. The step sizes for the frequencies and temperatures were chosen to be within the optimized ranges presented in the previous article; they were 10 steps (11 data points) and 5°C steps, respectively. A fresh test specimen was used in each test.

The first shifting method that was performed was horizontal only. This method follows the techniques laid out by Ferry (ref. 3). After this shift was made, the horizontal shift factors of tan delta were fitted to the WLF equation, and values for C1 and C2 were generated to obtain the best fit.

The second shifting method that was performed was the horizontal plus vertical shifting discussed by J.W.M. Noordermeer (ref. 4). This method uses the universal C1 and C2 values (8.86 and 101.6, respectively) to perform the horizontal shift, and then a vertical shift is employed numerically to make the

master curves.

The third shifting method that was performed was the horizontal plus vertical shifting discussed by B. Duperray and J.L. Leblanc (ref. 5). In this method, all desired properties are horizontally shifted. Then, one viscoelastic property's horizontal shift factor is chosen as the reference for the other properties and is applied. To obtain proper master curves for the other properties, a calculated vertical shift factor is applied. This calculation is shown in equation 1 using loss modulus (E"), with a storage modulus (E') reference as an example. For the analysis shown below, E' was used as the reference, as it was in the referenced article.

$$\log \Phi(e) = \log\left(\frac{E''_{T1}}{E''_{T0}}\right) \chi \left[1 - \frac{\log a_T (E'')}{\log a_T (E')}\right] \quad (1)$$

The VHF testing was conducted on a Metravib VHF 104 DMA in compression. At the time of writing, only the butyl and silicone rubber compounds have been evaluated. The dynamic strain was 0.1%. An additional mass was applied to each compound to ensure it stayed in compression for the duration of the test. This mass was 20 g for the butyl compound and 40 g for the silicone compound. The frequency range was 100 Hz to 10 kHz at 130 steps (131 data points), and the testing was performed at room temperature. A fresh test specimen was used in each test.

Results and discussion

TTS testing

All seven compounds were evaluated and their results were analyzed as described above. Master curves were made of storage modulus (E'), loss modulus (E"), tangent delta, damping coefficient (C), critical damping (C_c) and transmissibility. The horizontal shift factors for these properties were mostly different from each other. The only ones that were equal to each other were tangent delta, damping coefficient and transmissibility. This observation makes sense, as damping coefficient and transmissibility can be directly calculated from tangent delta. The other three properties were all slightly different from each other.

Figure 1 - tangent delta versus reduced frequency (filled S-SBR versus unfilled S-SBR) (horizontal shift only)

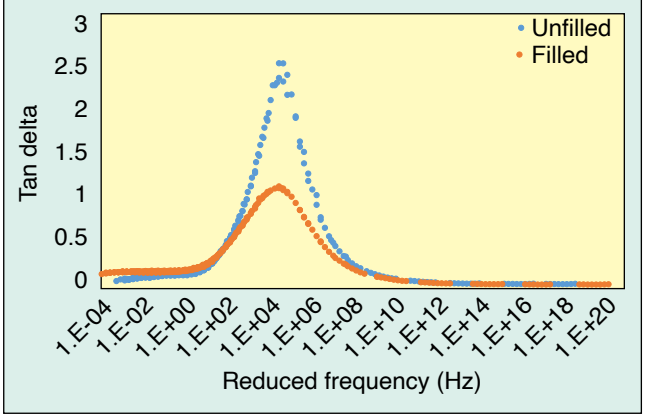
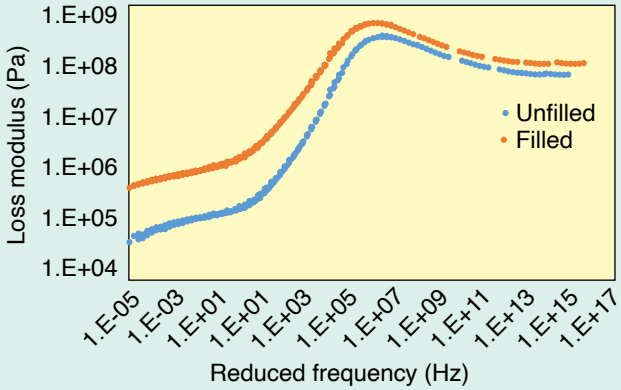


Figure 2 - loss modulus versus reduced frequency (filled S-SBR versus unfilled S-SBR) (horizontal shift only)



The authors have made this same observation in previous projects with TTS testing.

The unfilled model SSBR compound was compared to the filled SSBR compound in each analysis method, and the results can be seen in figures 1-12. For these comparisons, only E", tan delta and their respective shift factors are reported. The E' results are presented in the full paper, but have been left out of this article. From the horizontal only method, it was observed that the biggest change was only the magnitude of the viscoelastic response (figures 1 and 2). The shift factors were almost identical (figures 3 and 4). The only ones that changed were the ones for the hottest and coldest temperatures. For the horizontal plus numerical vertical shift, the same observation was made (figures 5 and 6). Here, the vertical shift factors were almost identical (figures 7 and 8). Again, the biggest differences in the shift factors were at the hottest and coldest temperatures. For the horizontal plus calculated vertical shift, the same observation was made (figures 9 and 10). Here, the vertical shift factors had even better overlap, with only a handful of points not overlapping (figures 11 and 12).

There was one observed shortcoming of the calculated vertical shift method. It was observed that when looking at the cold-

Figure 3 - tangent delta shift factors (filled S-SBR versus unfilled S-SBR) (horizontal shift only)

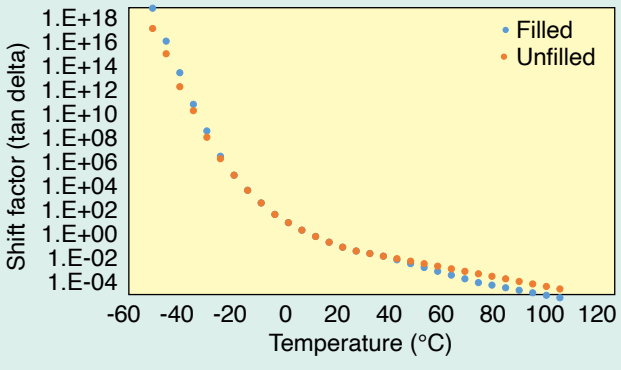


Figure 4 - loss modulus shift factors (filled S-SBR versus unfilled S-SBR) (horizontal shift only)

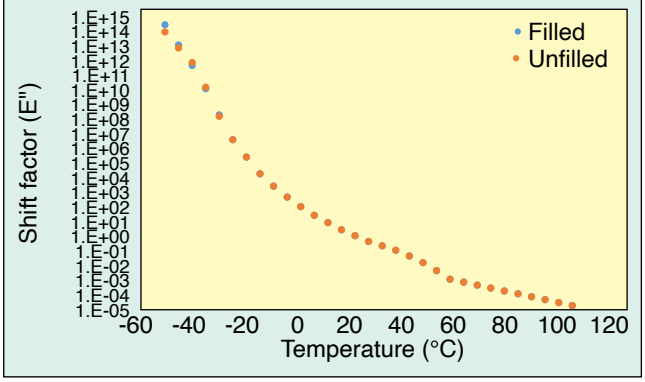
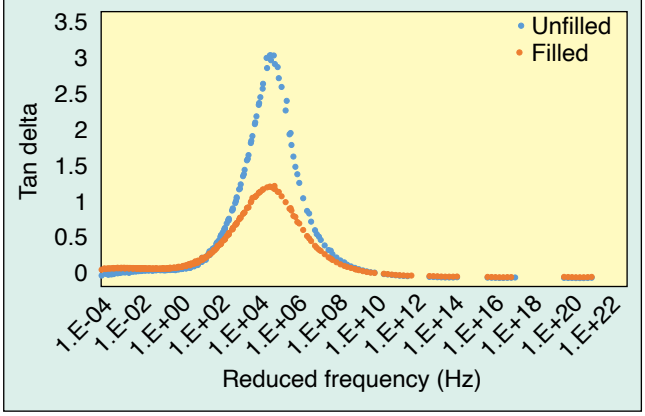


Figure 5 - tangent delta versus reduced frequency (filled S-SBR versus unfilled S-SBR) (numerical vertical shift)



est temperatures (highest reduced frequencies), the E" data do not align properly. It appears that either an additional shift is required, or that the calculation overcorrects the data in this range. When looking at the original horizontal shift factors, it is

Figure 6 - loss modulus versus reduced frequency (filled S-SBR versus unfilled S-SBR) (numerical vertical shift)

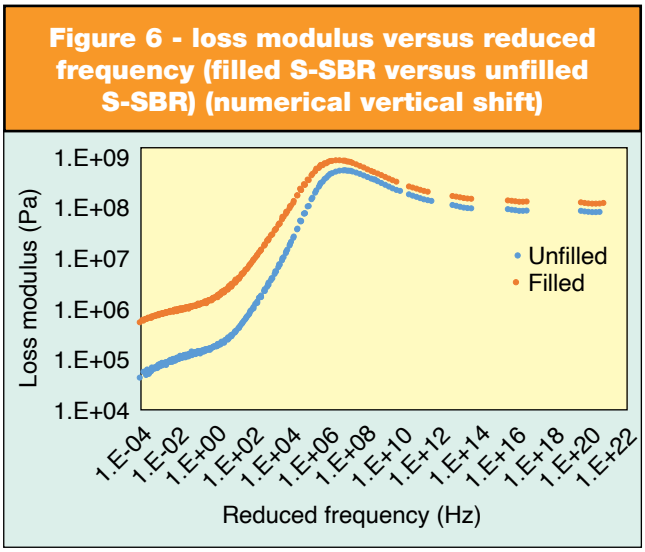
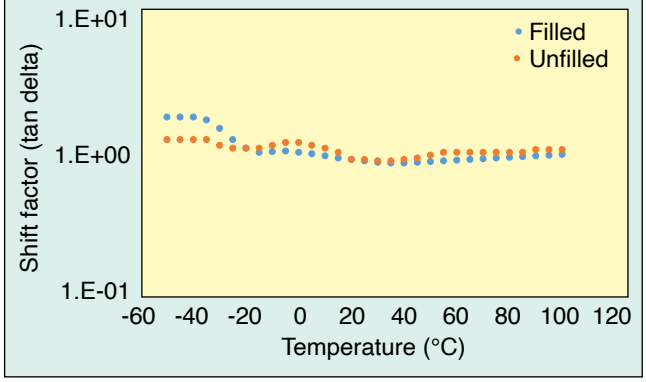


Figure 7 - tangent delta shift factors (filled S-SBR versus unfilled S-SBR) (numerical vertical shift)



seen that there is a larger difference between them at these temperatures compared to at the other tested temperatures. Knowing how dependent the calculated vertical shift is on the ratio of these horizontal shift factors, it leads to the conclusion that this is the main reason for the misalignment.

Figure 8 - loss modulus shift factors (filled S-SBR versus unfilled S-SBR) (numerical vertical shift)

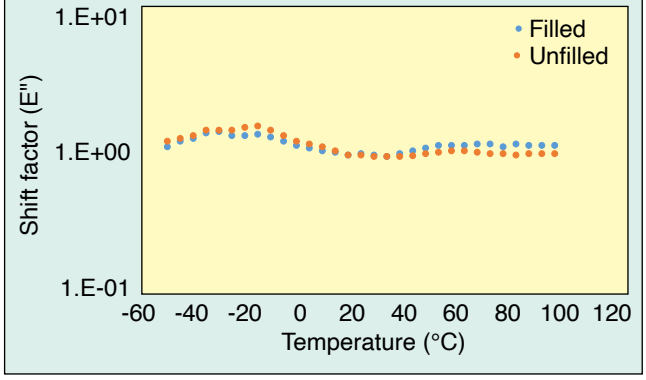


Figure 9 - tangent delta versus reduced frequency (filled S-SBR versus unfilled S-SBR) (calculated vertical shift)

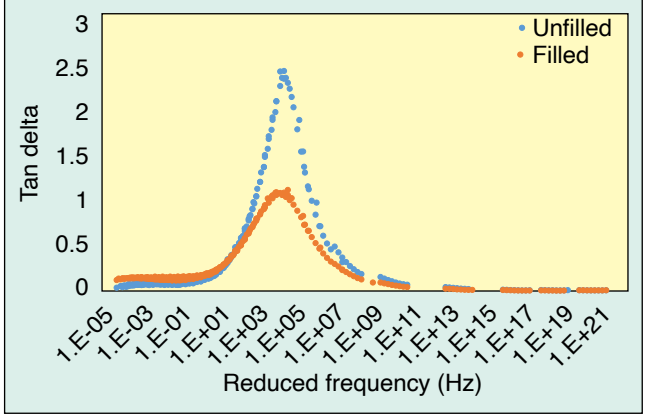
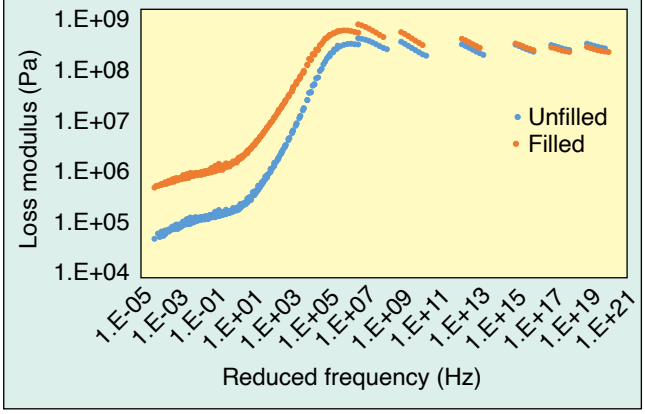


Figure 10 - loss modulus versus reduced frequency (filled S-SBR versus unfilled S-SBR) (calculated vertical shift)



From the results presented in the figures, it can be seen that any of the analysis methods used provides a decent prediction of how the material will behave at the higher frequencies (the coldest temperatures would be disregarded from the calculated vertical shift method). This then leads to the question, "Which one is accurate?"; or perhaps this is better worded as, "Which one best matches how the material behaves at these high frequencies?"

Figure 11 - tangent delta shift factors (filled S-SBR versus unfilled S-SBR) (calculated vertical shift)

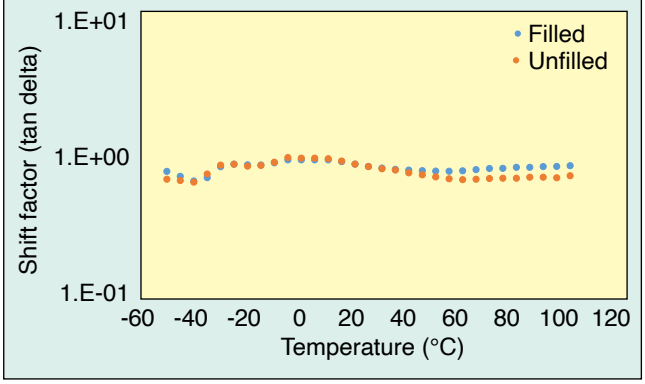


Figure 12 - loss modulus shift factors (filled S-SBR versus unfilled S-SBR) (calculated vertical shift)

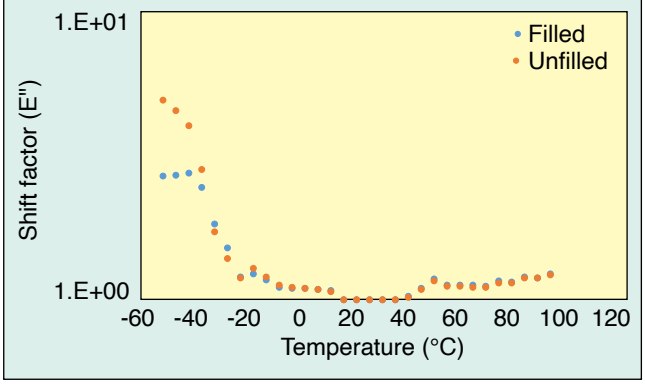
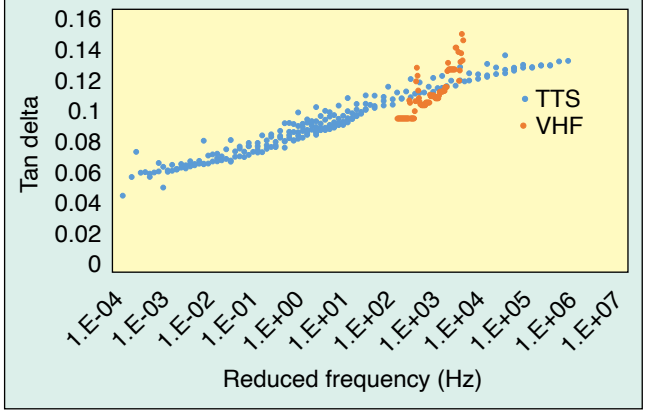


Figure 13 - tangent delta versus reduced frequency (TTS versus VHF) (horizontal shift only)



VHF testing

The VHF results for E', E" and tangent delta were plotted and compared to the TTS shift results for these properties for the butyl compound. The comparisons for tan delta and E' are shown in figures 13-18. The E" comparisons can be seen in the full paper, but have been left out of this article. While the TTS test was performed in tension and referenced at 20°C, and the VHF test was performed in compression at room temperature (approximately 21.5°C), the comparisons are valid for a couple of reasons. First, because the strain level is 0.1%, which is in the linear region for all compounds tested, this allows for direct comparison between deformation modes, as the compounds are fully elastic at this strain. Second, the temperature difference of 1.5°C between the tests does not affect the performance of the material enough to discredit the validity of the comparison.

The silicone results are currently being left out of the article due to insufficient time to change the TTS reference temperature to 25°C. This change in reference temperature is necessary because the VHF test for this compound was performed at ap-

Figure 14 - storage modulus versus reduced frequency (TTS versus VHF) (horizontal shift only)

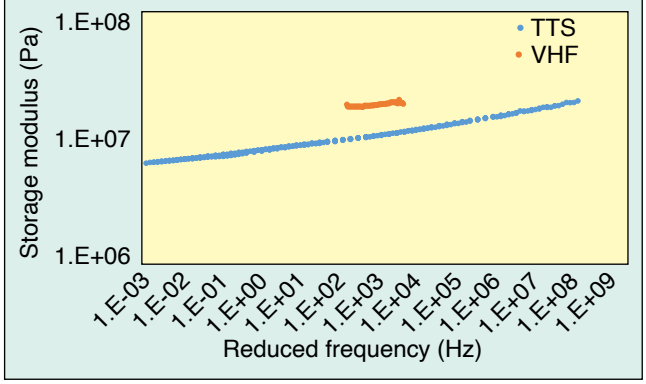
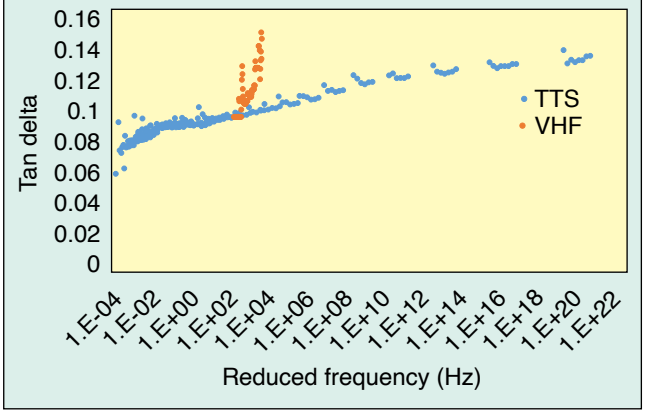


Figure 15 - tangent delta versus reduced frequency (TTS versus VHF) (numerical vertical shift)



proximately 23°C, which is currently 3°C above the reference temperature of 20°C; and this makes any comparison suspect due to the material starting to behave slightly differently than it would at 20°C. For readers of the previous paper, recall that 3°C

Figure 16 - storage modulus versus reduced frequency (TTS versus VHF) (numerical vertical shift)

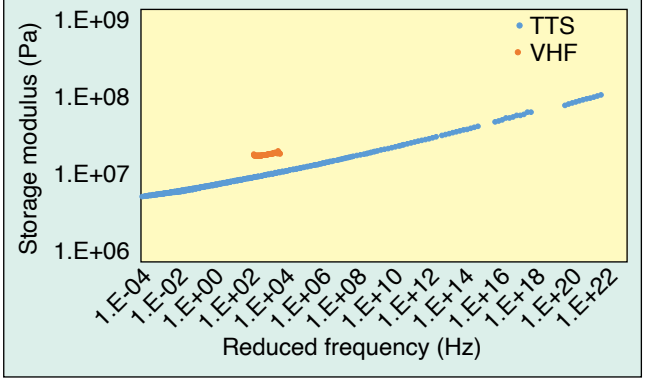


Figure 17 - tangent delta versus reduced frequency (TTS versus VHF) (calculated vertical shift)

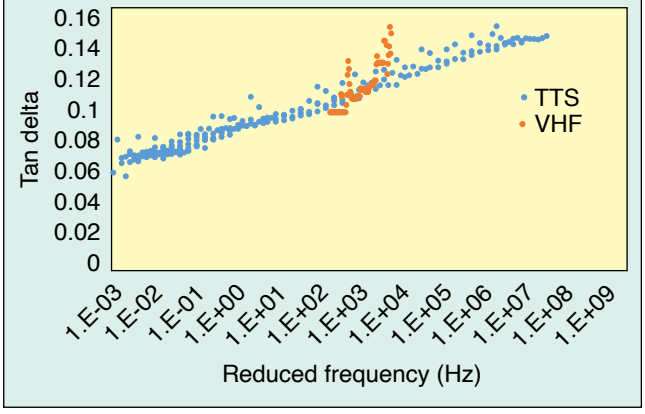
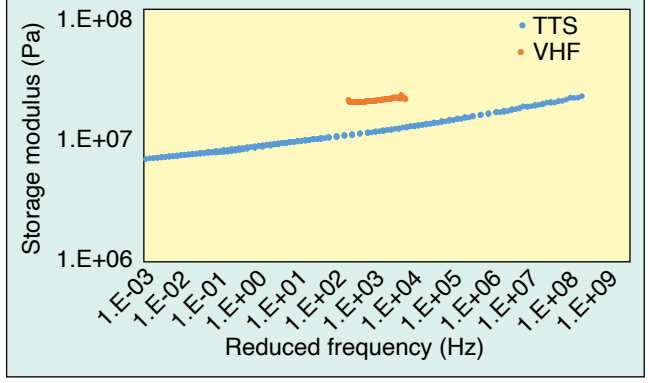


Figure 18 - storage modulus versus reduced frequency (TTS versus VHF) (calculated vertical shift)



was one of the step sizes investigated, and that the results for this step size were very good and could be used if there was sufficient turnaround time in the project. In the time since this research was presented at IEC 2024, this shift to a new reference temperature has been performed for all three TTS analysis methods. For simplicity, the results are still omitted in this article.

When looking at the comparisons of TTS and VHF results for the butyl compound presented in the following figures, there are a couple of observations that can be made. First, none of the analysis methods employed match well with either of the modulus results (figures 14, 16 and 18 show the E' results; the E" results are presented in the full paper). The TTS results have the correct slope, but not the correct magnitude. Second, a decent fit of the tan delta data is obtained by horizontal only shifting (figure 13); but a better fit is obtained by the calculated vertical shift (figure 17).

Based on these comparisons, it appears that a better shift method may need to be developed to match the high frequency modulus results. Looking at E', it appears that the values obtained from the room temperature VHF results line up with the results obtained at -45°C to -50°C for the horizontal only and the calculated vertical shifts (since this vertical shift is based on the horizontal E' shift), or -25°C for the numerical vertical shift. Looking at E", it appears that the values obtained from the room temperature VHF results line up with the results obtained at -40°C to -45°C for the horizontal only shift, -25°C to -35°C for the numerical vertical shift or -30°C to -45°C for the calculated vertical shift.

Conclusion

A few main conclusions can be drawn from this testing. First, it was seen that only the magnitude of the viscoelastic response was changed when looking at an unfilled model SSBR compound versus a filled model SSBR compound. Second, all three TTS analysis methods investigated in this article yield good predictions for how the material will behave at high frequency. Third, in the case of a filled butyl compound, it was seen that the calculated vertical shift gave the best prediction of tangent delta when compared to actual high frequency test data. Fourth, none

of the three TTS analysis methods gave a good prediction for actual E' and E'' data from the high frequency test. This conclusion points to the possibility of possibly needing a better shifting method; but more will be known as the remaining compounds are tested and their results analyzed.

Future Work

At the time of writing, the main future work includes finishing the testing on the Metravib VHF104 instrument. From there, the authors can evaluate the other materials and see if the same conclusion can be drawn about the proper shifting of all filled compounds, or if there is some variation between the various rubber compounds. It will also allow for a more conclusive result on the discussion of analyzing filled versus unfilled compounds.

If the same observation is made on the other compounds, then another aspect of future work could include developing a more accurate shift method to allow TTS tests to better predict material performance (particularly modulus) at high frequencies.

One other future idea that has been discussed internally is the application of this principle and technique to component testing.

This article is based on a paper presented at the 206th Technical Meeting of the Rubber Division, ACS, September 2024.

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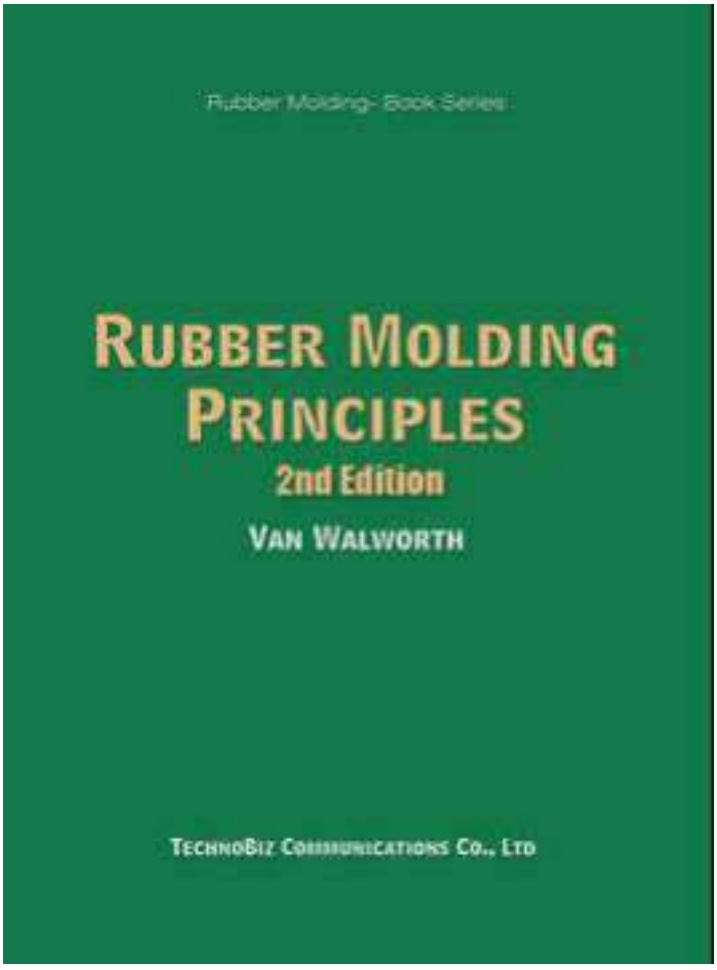

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Website: www.pnltest.com
Email: pnl@pnltest.com
Alex Zuran III, president
Technical service: Testing and inspection services.

Physical Properties Testers Group (PPT Group)
Richmond Works
Lakeview, Halifax
HX3 6EP, U.K. .....+44 (0) 1422 366355
Website: www.pptgroup.com
Email: info@pptgroup.com
Andrew Jesudowich, vice president of sales, Americas

Polymer Diagnostics Inc.
33587 Walker Rd.
Avon Lake, OH 44012
.....(800) 438-2335
Fax: (440) 930-1644
Website: www.polymerdiagnostics.com
Email: info@polymerdiagnostics.com
Thomas Hughes, senior vice president
Technical service: Polymers/rubber.

Polymer Solutions Incorporated
135 Technology Dr.
Christiansburg, VA 24073
.....(877) 961-4341
Website: www.polymersolutions.com
Email: george.cheynet@polymersolutions.com
George Cheynet
Technical service: Polymer solutions is an independent testing laboratory that is CGMP compliant, FDA registered, DEA licensed and ISO 17025 certified. Polymer Solutions Inc. offers chemical analysis, physical testing, consultation and research and development services.

Precision Testing Laboratories, LLC
313 Hill Ave.
Nashville, TN 37210 .....(615) 254-3401
Fax: (615) 254-3488
Website: www.precisiontesting.com
Email: vpsales@precisiontesting.com
Suzanne Piispanen, COO; John Piispanen, director of business development

Princeton Polymer Labs
1026 New Holland Ave.
Lancaster, PA 17601.....(239) 213-8057
Website: www.princetonpolymerlaboratories.com
Email: princtonpolymer@aol.com
P. Wachtel, president
Technical service: Compounding, testing and synthesis.

Q-Lab Corporation
800 Canterbury Rd.
Westlake, OH 44145 .....(440) 835-8700
Fax: (440) 835-8738
Website: www.q-lab.com
Email: info@q-lab.com
Bill Tobin, weathering and corrosion technical marketing specialist; James Gauntner, North American sales manager; Richard A. Kish, international sales manager
Technical service: Weathering, lightfastness and corrosion contact testing.

Rubber Consultants
Brickendonbury
Hertford, U.K. SG13 8NL
..... + 44 (0)1992 554657
Fax: +44 (0)1992 504248
Website: www.rubberconsultants.com
Email: info@rubberconsultants.com
Technical service: Analytical, product and material testing, biotechnology, commercial products, engineering and design, tires, training, technical support and product and compound development.

Rutherford Research
89 Prospect Place
Rutherford, NJ 07070 ....(201) 933-2711
Website: www.rutherford-research.ca
Email: calgary@rutherford-research.ca
William Rutherford, owner
Technical service: Research and development, design, testing and analysis, consulting, electrical and physical measurements, failure analysis, testing equipment, conductive rubber and expert testimony.

Independent Testing Laboratories Directory

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291 Fairfield Ave.
Fairfield, NJ 07004 .....(973) 575-5252
Fax: (973) 575-7175
Website: www.us.sgs.com/cts
Email: marketing.cts.us@sgs.com
Chris Kirk, CEO
Technical service: Mechanical, electrical, thermal and flammability properties testing of all kinds of elastomers, plastics, metal, wood and stone, per ASTM, ANSI, federal and military specifications.

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Oro Valley, AZ 85737.....(520) 449-7603
Technical service: Tensile, tear, elongation, modulus, hardness, density/specific gravity, ODR, MDR, compression set, bonding, oven aging, ozone, moisture analysis, ash, FTIR, SEM/EDX

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Akron, OH 44303.....(330) 762-7441
Fax: (330) 762-7447
Website: www.smithers.com
Jim Popio, vice president
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Barrington, RI 02806-0298
.....(401) 432-7086
Fax: (401) 432-7183
Website: www.tavdi.com
Email: tavdi@tavdi.com
Ismail Saltuk
Technical service: Mechanical testing of rubber, plastics and other polymeric components and damping devices in relation to product design, research and development investigations and quality assurance operations. Determine creep and set of materials under dead load and measure consistency or flow of viscous and putty-like materials.

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Northbrook, IL 06082.....(847) 272-8800
Fax: (860) 749-7533
Website: www.ul.com
Email: customerexperiencecenter@ul.com
Paul Moore
Technical service: Quality assurance and testing services; materials selection/evaluation.

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5 Serangoon North Ave.
5 Singapore 554916 .....+65-6481-0033
Website: www.utac.com
Email: Sini.hokanen@utac.com

VTEC Laboratories Inc.
212 Manida St.
Bronx, NY 10474 .....(718) 542-8248
Fax: (718) 542-8759
Website: www.vteclabs.com
Email: Neil@vteclabs.com
Neil Schultz
Technical service: Commercial testing and research, testing: physical, structural, flammability, combustion, toxicity, weathering electrical, mechanical.

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Scottsdale AZ 85257
.....(602) 437-3737
Fax: (602) 470-1341
Website: www.wt-us.com
Email: r.tixier@wt-us.com, s.banda@wt-us.com
Raphael Tixier, Sathish Banda

Instrumentation, Test Equipment Suppliers
Page 64

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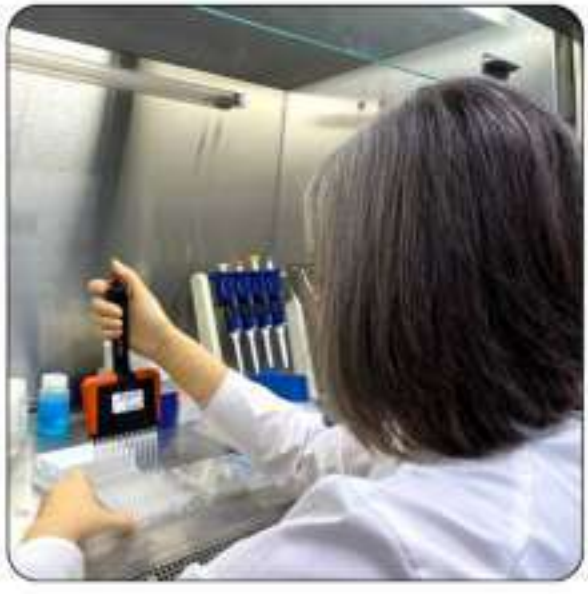

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(866) 788-ARDL
ARDL.com

Independent Testing Laboratories Directory

The following grid lists the types of testing offered by independent testing laboratories. Tests for physical testing of rubber include stress/strain tests; time-dependent tests; destructive tests; durability; electrical properties; and processing. Tests for chemical analysis of raw materials and rubber are broken down into spectrophotometry, spectrometry and spectroscopy; chromatography; thermal analysis; and microscopy. Each of these subdivisions is further broken down into the specific type of tests.

	Physical testing of rubber														
	Stress/strain tests				Time-dependent tests				Destructive tests				Durability		
	Tensile	Tear	Hardness	Adhesion	Set	Creep and stress relaxation	Rebound and resilience	Dynamic/thermomechanical	Crack and cut growth	Abrasion	Fatigue	Heat build-up	Heat resistance (static)	Fluid resistance	Permeability
R.D. Abbott Company, Inc.	•	•	•	•	•	•	•	•	•		•		•	•	
ACE Laboratories	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Akron Rubber Development Lab, Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Alttran Technical Services	•	•	•		•	•	•	•	•	•			•	•	
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Atlas Material Testing Technology LLC															
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Bowser-Morner, Inc.				•	•	•	•	•					•	•	
Collaborative Testing Services, Inc.	•		•												
Dektron Scientific Instruments	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
EAG Laboratories	•	•	•	•	•					•			•	•	•
Elastomer Research Testing B.V.	•	•	•	•	•				•	•	•	•	•	•	
Element Los Angeles												•	•		
Element Materials Technology	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Endurica, LLC	•	•				•			•		•	•			
Experimental Services, Inc.	•	•	•	•		•			•		•	•	•	•	
Green Globe Laboratories															
Hauser GmbH	•		•		•	•	•			•	•				
Intertek Automotive Research															
In USA, Inc.															
MEI-Charlton, Inc.	•	•	•	•	•	•			•	•	•			•	•
MonTech															
NSL Analytical Services	•	•	•	•	•	•		•		•	•			•	•
O-Ring Prüflabor Richter GmbH	•	•	•	•	•	•	•						•	•	
Phoenix National Laboratories, Inc.	•	•	•	•	•	•							•	•	
Polymer Diagnostics Inc.	•	•	•	•							•				•
Polymer Solutions Inc.		•							•		•				

Independent Testing Laboratories Directory

Physical testing of rubber										Chemical analysis of raw materials and rubber															
Durability			Electrical properties			Processing				Spectrophotometry, spectrometry and spectroscopy					Chromatography		Thermal analysis			Microscopy					
Ozone resistance	Weathering resistance	Brittleness	Dissipation constant	Dielectric strength	Dielectric factor	Cure rate	Extrudability			Infrared	Ultraviolet and visible	Mass spectrometry	Nuclear magnetic resonance	Flame emission/atomic absorption	Gas	Liquid	Thermogravimetric	Differential thermal anaylsis	Differential scanning calorimetry	Optical	Electron				
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Independent Testing Laboratories Directory

The following grid lists the types of testing offered by independent testing laboratories. Tests for physical testing of rubber include stress/strain tests; time-dependent tests; destructive tests; durability; electrical properties; and processing. Tests for chemical analysis of raw materials and rubber are broken down into spectrophotometry, spectrometry and spectroscopy; chromatography; thermal analysis; and microscopy. Each of these subdivisions is further broken down into the specific type of tests.

	Physical testing of rubber														
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	Tensile	Tear	Hardness	Adhesion	Set	Creep and stress relaxation	Rebound and resilience	Dynamic/thermomechanical	Crack and cut growth	Abrasion	Fatigue	Heat build-up	Heat resistance (static)	Fluid resistance	Permeability
Precision Testing Laboratories, Inc.	•	•	•	•	•				•	•	•		•	•	
Princeton Polymer Labs	•		•										•	•	•
Rubber Consultants	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Rutherford Research															
SGS North America	•	•	•	•	•	•	•				•		•	•	•
Sigma Testing Services	•	•	•												
Smithers	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
UL Verification Services	•	•	•		•		•			•			•	•	
VTEC Laboratories Inc.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Western Technologies Inc.	•	•	•	•	•										

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Physical testing of rubber										Chemical analysis of raw materials and rubber															
Durability			Electrical properties			Processing				Spectrophotometry, spectrometry and spectroscopy					Chromatography		Thermal analysis			Microscopy					
Ozone resistance	Weathering resistance	Brittleness	Dissipation constant	Dielectric strength	Dielectric factor	Cure rate	Extrudability			Infrared	Ultraviolet and visible	Mass spectrometry	Nuclear magnetic resonance	Flame emission/atomic absorption	Gas	Liquid	Thermogravimetric	Differential thermal anaylsis	Differential scanning calorimetry	Optical	Electron				
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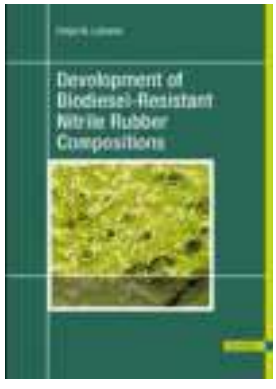

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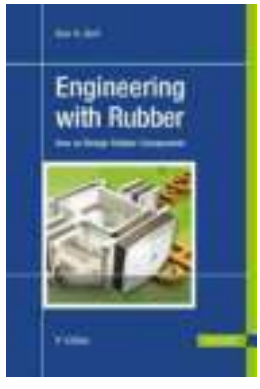

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The following directory lists suppliers of instrumentation and test equipment to the rubber industry, with address, contact person, types of instrumentation, test equipment and services offered.

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Garden Grove, CA 92841
..... (562) 944-5354
Fax: (562) 944-5374
Website: www.rdabbott.com
Email: info@rdabbott.com
Rick Ziebell, vice president of technology and innovation management
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Windsor, Ontario, Canada N8S 2B7
..... (519) 944-5900
Fax: (800) 465-9674
Website: www.acrolab.com
Email: jhodgins@acrolab.com
John Hodgins, chief executive officer
Instrumentation: Heat transfer technology.

Acu-Gage Systems
12 Park Ave.
Hudson, NH 03051 ..... (603) 622-2481
(800) 422-2283
Fax: (603) 626-1277
Website: www.acu-gage.com
Email: info@acu-gage.com
John A. Kane, president
Instrumentation: Acu-Gage I single axis linear measuring machine in sizes ranging from 12" to 120"; Acu-Gage II, two axis coordinate measuring machine with base sizes of 12" x 12" to 48" x 96", z-axis also available.

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(800) 667-3220
Fax: (781) 769-0884
Website: www.admet.com
Email: info@admet.com
Scott Carroll
Instrumentation: Elecromechanical and hydraulic universal testing frames for tension, compression and torsion testing; digital indicating systems for tension, compression and torsion testing.

Akron Special Machinery, Inc.
2740 Cory Ave.
Akron, OH 44314..... (330) 753-1077
Fax: (330) 753-7308
Website: www.polinggroup.com
Email: sales@polinggroup.com
David L. Poling, president
Instrumentation: Instruments for uniformity testing, runout testing, sidewall testing and grinding, tire testing.

Alpha Technologies
6279 Hudson Crossing Pkwy.
Hudson, OH 44236..... (330) 745-1641
(800) 356-9886
Fax: (330) 848-7326
Website: www.alpha-technologies.com
Email: alphasales@alpha-technologies.com
Melissa Kollar, global marketing manager
Instrumentation: ISO 9001-registered and ISO 17025-accredited, Alpha Technologies' instruments measure the dynamic, physical and processability characteristics of rubber and polymers. The product line includes material process analyzers, rheometers, viscometers, dispersion analyzers, density and hardness testers, physical property testers, universal testers, sample cutters and laboratory information management systems.
Services offered: Alpha delivers advance precision rubber and elastomeric materials analysis for production optimization and product compliance solutions. Alpha Technologies, a Roper Technologies company, is dedicated to working closely with clients and industries to improve and enable performance value and safety to consumers. Alpha continues to innovate and advance with best in class testing solutions.

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Lisle, IL 60532 ..... (630) 963-0031
Fax: (630) 963-0089
Website: www.altmanmfg.com
Email: brian@altmanmfg.com
Paul Altman
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(800) 438-4249
Fax: (781) 647-3356
Website: www.bcames.com
Email: info@bcames.com
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Email: chatillon.fl-lar@ametek.com
Dave Hermance, vice president
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Services offered: Technical services, training, software programs.

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Horsham, PA 19044..... (248) 435-0700
Website: www.ametekusg.com
Email: usg.sales@ametek.com
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Services offered: Technical service, training.

Leverett A. Anderson Co.
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Copley, OH 44321 ..... (330) 670-1363
Fax: (330) 670-9450
Website: www.leverettanderson.com
Email: sales@leverettanderson.com
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Services offered: Sales, service including calibration design and fabrication or special testing equipment.

Applied Test Systems, Inc.
154 Eastbrook Ln.
Butler, PA 16002..... (724) 283-1212
(800) 441-0215
Fax: (724) 283-6570
Website: www.atspa.com
Email: sales@atspa.com
Greg Osborne, sales manager
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Instrumentation, Test Equipment Suppliers

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816 Maple St.
Three Rivers, MI 49093
..... (269) 279-3603
Fax: (269) 278-6555
Website: www.armstronginternational.com
Email: marketing@armstronginternational.com
Denise DeVries, North American marketing manager
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Asylum Research, an Oxford Instruments Company
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Santa Barbara, CA 93117
..... (805) 696-6466
(888) 472-2795
Fax: (805) 696-6444
Website: www.oxford-instruments.com/AFM
Email: afm.info@oxinst.com
Ben Ohler, director of marketing
Instrumentation: Atomic force microscopes, scanning probe microscopes, AFM probes/cantilevers, nanomechanical properties.

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1500 Bishop Ct.
Mount Prospect, IL 60056
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Fax: (773) 327-5787
Website: www.atlas-mts.com
Email: atlas.info@ametek.com
Stefani Levine, marketing services
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Services offered: Technical service, training.

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Houston, TX 77008-6294
..... (713) 869-0361
(800) 231-2062
Fax: (713) 869-7332
Website: www.dynatrolusa.com
Email: sales@dynatrolusa.com
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Umair Waheed, chief operating officer
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Fax: (610) 280-7608
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Email: sales.usa@baslerweb.com
Instrumentation: Inspection systems, laboratory equipment (miscellaneous), measuring equipment.

Benz Materials Testing Instruments
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Email: engineering@benztesters.com
Ted Benz, president
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8001 Technology Blvd.
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Fax: (937) 233-7284
Website: www.ndc.com/betalasermike
Email: sales@betalasermike.com
Jay Luis, marketing communications manager
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C.W. Brabender Instruments, Inc. DBA Brabender
50 East Wesley St.
South Hackensack, NJ 07606
.....(201) 343-8425
Fax: (201) 343-0608
Website: www.cwbrabender.com
Email: chemicalsales@cwbrabender.com
Christoph Pielen, president
Instrumentation: Laboratory testing equipment for rubber testing, including processability studies, dispersion, mixing, cure and density for research and development and quality control.
Services offered: Testing laboratory.

Brookhaven Instruments Corporation
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Holtsville, NY 11742 ..... (631) 758-3200
Fax: (631) 758-3255
Website: www.brookhaveninstruments.com
Email: info@brookhaveninstruments.com
Joe Pozzolano, general manager
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Email: sales@cober.com
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Instrumentation: Microwave receptivity testing, microwave curing ovens.
Services offered: Technical service for microwave technology.

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Website: www.comtime.com
Email: sales@comtime.com
Ronald Symens, president
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(913) 492-1888
Fax: (913) 492-1483
Website: www.instruments.com
Email: info@instruments.com
Chris Herring, president
Instrumentation: Temperature instrumentation (alarms, monitors, controllers, etc.).
Services offered: Repairing company equipment.

Corporate Consulting, Service & Instruments, Inc.
1868 Akron-Peninsula Rd.
Akron, OH 44313..... (330) 376-3600
(800) 742-8535
Fax: (330) 376-8500
Website: www.ccsi-inc.com
Email: sales.department@ccsi-inc.com
David Warner, president; Michael Kent Warner, executive vice president
Instrumentation: ISO/IEC 17025 calibration and certifications, durometer hardness testers (Shore, Wallace, PTC, Rex and others), durometer operating stands, durometer test blocks, Mooney viscometers, moving die rheometers, oscillating disk rheometers, tensile/compression testers, compression set fixtures, ASTM/ISO specimen cutting dies and specimen molds, custom rubber molds, laboratory bale cutters, rubber cutters/trimmers, Atom swing arm clicker presses, ElasTek 'mini clicker' presses, ElasTek DeMattia flex testers, ElasTek fully automatic density/specific gravity testers, rubber buffers, rubber grinders, environmental chambers, laboratory ovens, heated mold presses, Taber abrasion testers, BarCol hardness testers, Ross flex testers, Scott flex testers, Taber stiffness testers, Mullen burst testers, ElasTek ASTM D865 aging block ovens, Orec ozone chambers, Orec ozone monitors, low temperature retraction (TR test) and brittleness point testers, ASTM D2632 vertical rebound testers (ElasTek resiliometers), ElasTek Williams' parallel plate plastometers, Brinell, Vickers and Rockwell hardness testers.
Services offered: ISO/IEC 17025 calibration and certifications (A2LA) service and repair of: durometer hardness testers, Mooney viscometers, all rheometers, tensile testers, thickness gauges, micrometers, calipers, cutting dies, molds, resilience testers, compression testers, plastometers, scales and balances, abraders, mass and weights, gauge blocks, Brookfield viscometers, dimensional measurement tools, tachometers, laboratory ovens (E145 and D7969), air flow, thermocouples and thermometers, ozone chambers, ozone monitors (NIST direct traceability) and time measurement instruments.

CPM Wolverine Proctor, LLC
251 Gibraltar Rd.
Horsham, PA 19044..... (215) 443-5200
Fax: (215) 443-5206
Website: www.cpmwolverineproctor.com
Email: sales@cpmwolverineproctor.com
Peter Zagorzycki, senior applications engineering; C. Schnitzer, advertising manager; F.C. Keill, lab manager; B. Thomson, sales manager
Instrumentation: Dryers and extruders.

Davis Instruments
625 East Bunker Ct.
Vernon Hills, IL 60061-1844
..... (847) 327-2000
(800) 358-5525
Fax: (800) 433-9971
Website: www.davis.com
Email: info@davis.com
Instrumentation: Hardness testers and durometers.

Davis-Standard, LLC
1 Extrusion Dr.
Pawcatuck, CT 06379 ... (860) 599-1010
Fax: (860) 599-6258
Website: www.davis-standard.com
Email: info@davis-standard.com
Robert Preston, CEO
Instrumentation: Laboratory equipment.

Dektron Scientific Instruments
244 East Third St.
Plainfield, NJ 07060..... (908) 226-1777
Fax: (908) 226-4973
Website: www.dektroncorp.com
Email: info@dektroncorp.com
Miguel Vargas, manager
Instrumentation: Test equipment for materials.
Services offered: Applications assistance for testing of materials; service and repair of test equipment.

Despatch Industries
8860 207th St.
Minneapolis, MN 55044
..... (952) 469-5424
(800) 726-0110
Fax: (952) 469-4513
Website: www.despatch.com
Email: info@despatch.com
Roger Dullinger, marketing
Instrumentation: Environmental test chambers, curing test systems, testing ovens.
Services offered: Technical service, training.

Dillon
1000 Armstrong Dr.
Fairmont, MN 56031
..... (507) 238-8796
Fax: (507) 238-8258
Website: www.dillon-force.com
Email: info@dillion-force.com
Robin Rogge, marketing
Instrumentation: Testing systems,

Instrumentation, Test Equipment Suppliers

computer controlled to manual systems, force guages, load cells, software programs.
Services offered: Sales, service and technical assistance.

Eagle Polymer Equipment
P.O. Box 1271
Akron, OH 4430..... (330) 706-0552
Fax: (330) 706-0546
Website: www.polymerequipment.com
Email: info@polymerequipment.com
Tim Samples, president
Instrumentation: Curemeters/rheometers, environmental chambers, measuring equipment, physical testing equipment, scales, test chambers, tensile tear testers, viscometers.

Ektron Tek Co., Ltd.
Tien-Chung Chang-Hwa 520
Taiwan
.....886-4-8761635
Fax: 886 4-8761637
Website: www.ektrontek.com
Email: ektronco@ms48.hinet.net
Zhang Yaodong, president
Instrumentation: Flexing machines, ozone testers, rheometers, tensile testers, tire testers, viscometers, vibration simulator.

Elastocon AB
Tvinnargatan 25
Bramhult, Sweden ...0046 33 32 33 900
Website: elastocon.com
Email: info@elastocon.se
Göran Spetz, marketing and sales manager; Alice Lindh, laboratory manager; Anna Anderzén, sales manager, export area
Instrumentation: Instruments for testing with precision, stress relaxation systems, aging ovens, specimen preparation, low temperature test, LTCS, freezers, automatic Gehman, TR and brittleness tester, windscreen fogging, electrical tests, computerized testing, automatic creep and relaxation test, hot set test, software and more.
Services offered: Testing services (also accredited), lifetime estimations, accredited calibration, seminars and education, both in our facilities and on site.
We have representatives in several countries around the world.
(See our ad on page 93)

Electronic Development Labs, Inc.
244 Oakland Dr.
Danville, VA 24540 ..... (434) 799-0807
Fax: (434) 799-0847
Website: www.edl-inc.com
Email: sales@edl-inc.com
Danielle Smith
Instrumentation: Pyrometers, calibrators, sensors.
Services offered: Calibration services.

Electro Standards Laboratories
36 Western Industrial Dr.
Cranston, RI 02921 .....(401) 943-1164
Fax: (401) 946-5790
Website: www.electrostandards.com
Email: eslab@electrostandards.com
Jeanette Gouin, marketing manager
Instrumentation: Controllers, laboratory equipment (miscellaneous), measuring equipment, testers and testing equipment, burst testers, compression testers, cord tensile testers, creep rupture testers, fatigue testers, shear testers, tear tensile testers, tensile strength testers, universal testers.

Electro-Steam Generator Corporation
50 Indel Ave.
Rancocas, NJ 08073 ..... (609) 288-9071
(866) 617-0764
Fax: (609) 288-9078
Website: www.electrosteam.com
Email: sales@electrosteam.com
Sal Negro, manufacturing executive
Instrumentation: Laboratory equipment.

Emerson Apparatus, Inc.
59 Sanford Dr.
Gorham, ME 04038 ..... (800) 445-1055
Fax: (207) 856-1117
Website: www.emersonapparatus.com
Email: sales@emersonapparatus.com
Connie Upson, vice president, sales, marketing
Instrumentation: Rubber buffing machines, foam endurance tester, ASTM 1055 load deflection tester.
Services offered: Technical service, training.

Emery Winslow Scale Company
73 Cogwheel Ln.
Seymour, CT 06483-3919
..... (203) 881-9333
Fax: (203) 881-9477
Website: www.emerywinslow.com
Email: homeoffice@emerywinslow.com
William K. Fischer, president; Rudi P. Baisch, vice president, sales and marketing; David M. Young, sales manager
Instrumentation: Load cells, scales and weighing systems.

Endurica
1219 West Main Cross, Ste. 201
Findlay, OH 45840..... (419) 957-0543
Website: www.endurica.com
Email: info@endurica.com
William Mars, president
Instrumentation: Intrinsic strength analyzer, tear and fatigue analyzer and chip and cut analyzer. Endurica solutions are provided in your own lab using our protocols running on Coesfeld instruments.
Services offered: Simulation software that analyzes the fatigue performance of elastomers under real world service conditions.
(See our ad on page 84)

Equitech Int'l Corporation
South Jersey Technology Park
107 Gilbreth Pkwy.
Mullica, NJ 08062..... (706) 364-6060
Website: www.equitechintl.com
Email: tmartin@equitechintl.com
Terry Martin, regional sales director
Instrumentation: Probes, chemical process analyzer and spectrometers.

Erhardt + Leimer Inc.
350 Tucapau Rd.
Duncan, SC 29334 ..... (864) 486-3000
Fax: (864) 486-3011
Website: www.erhardt-leimer-us.com
Email: info-us@erhardt-leimer.com
Werner Neumann, division manager tire and rubber industry

Exakt Technologies, Inc.
7002 N. Broadway Ext.
Oklahoma City, OK 73116-9006
..... (800) 866-7172
Fax: (405) 848-7701
Website: www.exaktusa.com
Email: info@exaktusa.com
Linda E. Durbin, president and CEO
Instrumentation: Laboratory cutting systems, grinding systems, three-roll mills.

Experimental Services, Inc.
894 W. Waterloo Rd.
Akron, OH 44314..... (330) 848-0059
Website: www.esilab.com
Email: kwinkler@esilab.com
Karl Winkler, president
Instrumentation: Used equipment, actuators, manifolds.

Facts, Inc.
2737 Front St.
Cuyahoga Falls, OH 44221
..... (330) 928-2332
Fax: (330) 928-3018
Website: www.facts-inc.com
Email: tfisher@facts-inc.com
Tim Fisher, owner
Instrumentation: Computers, controllers, gauges, measuring equipment, monitors.
(See our ad on page 77)

Finna Group
9567 Arrow Route, Ste. E

Instrumentation, Test Equipment Suppliers

Rancho Cucamonga, CA 97130
..... (909) 941-7776
Fax: (909) 941-6444
Website: www.finnagroup.com
Email: sales@finnagroup.com
Patrick Youssi, president
Instrumentation: Analysis equipment, gauges, laboratory equipment (miscellaneous), measuring equipment, meters and moisture meters, testers and testing equipment.

Forte Technology, Inc.
58 Norfolk Ave., Ste. 4
South Easton, MA 02375
..... (508) 297-2363
Fax: (508) 297-2314
Website: www.forte-tec.com
Email: info@forte-tec.com
Patricia R. White, president
Instrumentation: Electronic moisture measurement system for an entire bale of synthetic rubber.
Services offered: Non-destructive testing, physical testing, production control.

French Oil Mill Machinery Co.
1035 W. Greene St.
Piqua, OH 45356-0920 ... (937) 773-3420
Fax: (937) 773-3424
Website: www.frenchoil.com
Email: sales@frenchoil.com
Tayte French Lutz, chairman and CEO; Jason McDaniel, COO and president; Doug Smith, hydraulic sales; Dave Sledz, hydraulic sales; Mary Quinlan, hydraulic sales; Jeff Rudy, aftermarket sales; Alex Lee, polymer sales; Brian Greever, polymer sales
Instrumentation: Laboratory compression and transfer hydraulic presses and mixers.

Future Foundation North America Inc.
2400 Old Brick Rd., #329
Glen Allen, VA 23060..... (585) 794-5612
Website: www.ffinstruments.com
Email: abeersinghal@ffinstruments.com
Abeer Singhal, partner/president
Instrumentation: Design and manufacturing of laboratory equipment, testing instruments and QMS software, rheometers, viscometers, tensile testers, ozone monitors and ozone test chambers, aging ovens, abrasion testers, laboratory presses, lab mills, hardness testers, grips, test dies, test molds. ISO 9001 registered and accredited firm.

Gasmet Technologies
Oy, Pulttitie 8 A, FI-00880
Helsinki, Finland 358 9 7590 0400
Website: www.gasmet.com
Email: contact@gasmet.fi
Instrumentation: Gas monitoring instruments and systems.

Divisions:
Gasmet Ansyco GmbH.....+49 721 626 560
Website: www.gasmet.de
Email: info@ansyco.de

Gibitre Instruments
Via dellilndustria, 73
Bergamo, Italy 24126 ....+39 035 460146
Website: www.gibitre.it
Email: info@gibitre.it
Mauro Belloni and Sergio Cattaneo
Instrumentation: Rheology: Rheometers (MD and OD), Mooney viscometer. Physical properties: Tensile testers, durometer and IRHD hardness, fatigue, density, rebound, abrasion, TR-brittleness point. Aging: ozone cabinet, flammability, compression set. Sample preparation: Laboratory press, sample cutting machines, splitting machine.
Services offered: Installation, training, technical assistance, calibration, on-site and remote services are provided.
(See our ads on pages 43 and 77)

Goettfert
488 Lakeshore Pkwy.
Rock Hill, SC 29730 ..... (803) 324-3883
Fax: (803) 324-3993
Website: www.goettfert.com
Email: info@goettfert.com
Tim Haake, general manager
Instrumentation: Rheometers, rheovulkameter, curemeters and extruders.
(See our ad on page 22)

Gomaplast Machinery, Inc.
2424 Long Rd.
Wooster, OH 44691 ..... (330) 263-7845
Fax: (330) 263-7846
Website: www.gomaplast.com
Email: sales@gomaplast.com
Marcelo S. Hildebrandt, president
Instrumentation: Tensile testers, rheometers, lab ovens, lab presses, lab mixers, viscometers and scales.
(See our ad on page 26)

GreCon, Inc.
15875 SW 74th Ave.
Tigard, OR 97224 ..... (503) 641-7731
Fax: (503) 641-7508
Website: www.grecon-us.com
Email: sales@grecon-us.com
Terry Franklin, sales
Instrumentation: GreCon spark detection and extinguishing systems are a preventative measure against combustible dust fires and explosions.

Grieve Corporation
500 Hart Rd.
Round Lake, IL 60073 ... (847) 546-8225
Fax: (847) 546-9210
Website: www.grievecorp.com
Email: sales@grievecorp.com
Frank Calabrese, vice president, sales
Instrumentation: Ovens and furnaces.

Guill Tool & Engineering Co.
10 Pike St.
West Warwick, RI 02893
..... (401) 828-7600
Website: www.guill.com
Email: sales@guill.com

Hardy Process Solutions
9440 Carroll Park Dr.
San Diego, CA 92121 .... (858) 278-2900
Fax: (858) 278-6700
Website: www.hardysolutions.com
Email: hardyinfo@hardysolutions.com
Rodger Jeffery, director of marketing and product development
Instrumentation: Scales.

HF Rubber Machinery, Inc.
1701 Northwest Topeka Blvd.
Topeka, KS 66608 ..... (785) 235-2336
Fax: (785) 235-1331
Website: www.hf-group.com
Email: mixing@hf-group.com
Paul White, executive vice president, operations
Instrumentation: Laboratory equipment.

HITEC Luxembourg S.A.
49, rue du Baerendall
L-8212 Mamer
Luxembourg.....+352 49 84 78 – 1
Fax: +352 40 13 03
Website: www.hitec.lu/testing-technologies
Email: sales@hitec.lu
Instrumentation: Testing equipment for carbon black, rubber fillers, battery materials and other powder materials (OAN tester, void volume and resistivity tester, COAN carbon black press, Pellet hardness tester, mass strength tester, sieve residue testing device, mocker device, NDM non-dispersible matter testing device).
Services offered: Testing equipment for carbon black, rubber fillers, battery materials and other powder materials, calibration, maintenance, repair, training.

Hitec Sensor Developments, Inc.
537 Great Rd.
Littleton, MA 01460.....(978) 742 9032
Fax: (978) 742 9033
Website: www.hitecsensors.com
Email: sales@hitecsensors.com
Tim Cetto, vice president
Instrumentation: Rolling resistance load

Instrumentation, Test Equipment Suppliers

cells, multi-axis load cells.
Services offered: ISO-17025 accredited calibration.

Hoto Instruments
3100 Dundee Rd., Ste. 707
Northbrook, IL 60062..... (847) 564-2260
(866) 527-4666
Fax: (847) 564-2095
Website: www.hoto-instruments.com
Email: info@hoto-instruments.com
Bob Hashioka, marketing manager
Instrumentation: Asker digital and analog durometers; hand-held, auto loading and automatic micro durometers for measuring hardness and characteristics of various rubber, elastomers, plastics, sponges, urethane foam and polystyrene foam.
Services offered: Calibration services.
(See our ads on pages 100, 102 and 103)

Hudson Cutting Solutions, a division of IPSUMM, Inc.
8810 Place Ray-Lawson
Anjou, Quebec, Canada H1J 1Z2
..... (603) 570-4090
Website: www.hudsoncutting.com
Email: dlees@hudsoncutting.com
David Lees, sales
Instrumentation: Fortuna rubber splitting and skiving machines; Hudson swing beam cutting presses for laboratory ASTM specimen preparation.

Hydramotion Ltd.
1 York Road Business Park
Malton, North Yorkshire, U.K. YO17 6YA
.....+44 1653-600294
Fax: +44 1653-693446
Website: www.hydramotion.com
Email: sales@hydramotion.com
Danny Morbey, operations manager
Instrumentation: Process viscometers, portable and laboratory viscometers, viscosity measuring instrumentation, online viscosity analyzers, viscosity meters.

IKA Works, Inc.
2635 Northchase Pkwy., SE
Wilmington, NC 28405... (910) 452-7059
(800) 733-3037
Fax: (910) 452-7693
Website: www.ikausa.com
Email: sales@ika.net
Bob Anderson, operations manager
Instrumentation: Laboratory equipment.

Imada, Inc.
3100 Dundee Rd., Ste. 707
Northbrook, IL 60062..... (847) 562-0834
Fax: (847) 562-0839
Website: www.imada.com
Email: imada@imada.com
Bob Hashioka, marketing manager
Instrumentation: For tension, compression, peel, adhesion; mechanical and digital force gauges, manual and motorized test stands, SPC software and special attachments up to 4,400 lbf.; ISO 9001 and ISO/IEC 17025 accredited.

Imass, Inc.
22077 Drake Rd.
Strongsville, OH 44149
..... (781) 834-3063
Fax: (440) 238-4746
Website: www.imass.com
Email: sales@imass.com
Michelle Soltis, sales/advertising manager
Instrumentation: Materials testing instruments.

Impakt
5721 Dragon Way
Cinncinnati, OH 45227
..... (513) 271-9191
Fax: (513) 271-5120
impaktusa.com
sales@impaktusa.com
Bruce Freeman
Instrumentation: Laboratory specimen cutters, laboratory cutting presses, sample molds.
Services offered: Sharpening and certification of laboratory specimen cutters.

Indusco
120B Spence Ln.
Nashville, TN 37210 ..... (615) 833-0666
(800) 347-4472
Fax: (615) 834-8722
Website: www.induscousa.com
Donny Fetzer, sales manager
Instrumentation: Fatigue, tear, tensile testing; instrumentation for testing of raw materials, vulcanized and unvulcanized rubber testing.

Indy Tech Lab Equipment Inc.
90 Surrey Dr.
Ancaster, Ontario, Canada L9K 1L9
..... (905) 512-7751
Fax: (905) 304-2110
Website: www.indytechlab.com
Email: sales@indytechlab.com
Brian Williams
Instrumentation: Indy offers a wide range of used and reconditioned test instruments and devices: Izod charpy impact, hardness, tensile, tear, density, tack, micrometer, microscopy, stress and strain, salt fog.
Services offered: Sales and calibration of test instrumentation.

Instron Corporation
825 University Ave.
Norwood, MA 02062..... (781) 828-2500
(800) 877 6674
Website: www.instron.com
Email: marcom@instron.com
Brian Warren, senior marketing/sales administration manager
Instrumentation: Universal tension and compression testing machines, servohydraulic machines for determining the dynamic properties of elastomers, grips, extensometers and environmental chambers.
Services offered: Technical service, training, software programs, load and extensometer verification traceable to NIST.

ISRA Surface Vision
4470 Peachtree Lakes Dr.
Berkeley Lake, GA 30096
..... (770) 449-7776
Fax: (770) 449-0399
Website: www.isravision.com
Email: info.surface@isravision.com
Maureen Macken, marketing manager
Instrumentation: Quality control systems; inspection and measurement, web inspection system.
Services offered: Turnkey systems including training, installation, maintenance and support worldwide.

J&L Tool & Machine, Inc.
1441 Miller Ave.
Shelbyville, IN 46176..... (317) 398-6281
Fax: (317) 392-4267
Website: www.jltool.com
Email: bob@jltool.com
Bob Landwerlen, president
Instrumentation: JL 5000 SPL flow comparator.

JCR Automation, Inc.
1426 S. Ryan Rd.
New Haven, IN 46774 ... (260) 493-6606
Fax: (260) 749-4782
Website: www.jcrautomation.com
Email: sales@jcrautomation.com
Rick Johnson, general manager
Instrumentation: PVT (pressure-vibration-thermal) coolant hose durability tester.
Services offered: Design and build test equipment for component durability, audit and functional tests; leak and burst testing equipment with data acquisition capability.

J.D. & Company
P.O. Box 818
Cleburne, TX 76033 ..... (817) 645-5644

Instrumentation, Test Equipment Suppliers

Fax: (817) 645-9180
jdcustommix@sbcglobal.net
R. Joe Dunnam, CEO; Amy Hiett, president; Deborah Baker, vice president
Instrumentation: Curemeters, rheometers, laboratory equipment, testers - specific gravity.
Services offered: Consulting services, general, formula and/or compound development, management consulting.

J.M. Machinery
P.O. Box 378
Wadsworth, OH 44282 .. (330) 825-2400
Fax: (330) 825-0569
Website: www.jmmachinery.com
Email: dyer@jmmachinery.com
Michael Dyer, president
Instrumentation: Autoclaves, calenders, extruders, laboratory equipment (miscellaneous), mills, mixers, presses, compression testers, cord tensile testers, specific gravity testers, tear tensile testers, tensile strength testers, viscometers.

Keithley Instruments, Inc.
28775 Aurora Rd.
Solon, OH 44139 ..... (440) 248-0400
Fax: (915) 852-4084
Website: www.keithley.com
Email: info@keithley.com
Linda Rae, president
Instrumentation: Data systems (includes acquistion systems), electronic instrumentation, recorders and indicators (includes chart, event and production, round and/or strip chart records), temperature controllers, controls, systems.

KLA-Tencor
One Technology Dr.
Milpitas, CA 95035..... (408) 875-3000
Fax: (408) 875-4144
Website: www.kla-tencor.com
Email: customer.parts@kla-tencor.com
Rick Wallace, CEO
Instrumentation: Xi-100 IFM.
Services offered: Carbon black dispersion index measurement.

Kokusai, Inc.
5333 W. 79th St.
Indianapolis, IN 46268
..... (317) 704-9922
Fax: (317) 704-9921
Website: www.kokusaiusa.com
Email: sales@kokusaiusa.com
John Funcheon, president, Kokusai USA
Instrumentation: Bead seaters, dynamometers, laboratory equipment (miscellaneous), measuring equipment, fatigue testers, high speed uniformity testers, rolling resistance testers, tear tensile testers, tire testers, tire endurance testers, tire laser measurement systems, tire durability testers, inside drum testers (durability/fatigue), treadwear tester, 10 tire tester, side force testing machine, tread pressure distribution testing machine, bead expansion tester, road surface motion observation machine, traction-bus testing machine, bump run-over testing machine, plunge testing machine.

LabsCubed
14 Hoffman St.
Kitchener, Ontario, Canada N2M 3M4
..... (519) 749-5234
Website: www.labscubed.com
Email: info@labscubed.com
Khaled Boqaileh, CEO
Instrumentation: CubeOne: automated tensile/tear testing and software.
Services offered: Polymer testing automation.
(See our ad on page 27)

The Lanly Company
26201 Tungsten Rd.
Cleveland, OH 44132 .....(216) 731-1115
Fax: (216) 731-7900
Website: www.lanly.com
Email: sales@lanly.com
Dennis W. Hill, president
Instrumentation: Ovens.

Leica Microsystems Inc.
1700 Leider Ln.
Buffalo Grove, IL 60089
..... (800) 248-0123
Fax: (847) 236-3009
Website: www.leica-microsystems.com
Email: info@leica-microsystems.com
Markus Lusser, president
Instrumentation: Microscopes, measuring equipment, microphotographic equipment, microtomes.
Services offered: Technical service, training.

C.A. Litzler Co., Inc.
4800 W. 160th St.
Cleveland, OH 44135-2689
..... (216) 267-8020
Fax: (216) 267-9856
Website: www.calitzler.com
Email: sales@calitzler.com
James H. Rogers, vice president, sales
Instrumentation: Computreater 2000 single end cord treating lab machine.
Services offered: Field service.

LMI Technologies
9200 Glenlyon Pkwy.
Burnaby, British Columbia, Canada
V5J 5J8.....(604) 636 1011
Fax: (604) 516 8368
Website: www.lmi3d.com
Email: contact@lmi3d.com
Kassandra Sison, marketing manager
Instrumentation: Over 44 non-contact laser-based measurement sensors for a variety of on- and off-line applications; these include radial runout at full production speed; profiling green and high silicone content rubber; tire sidewall and inspection, thickness control of calendered rubber; splice width detection; treadwear analysis; extrusion profiling and profiling sidewall bulge and dent and many others.
Services offered: Installation, training and support services; OEM capability.

Lydon Oven Company
P.O. Box 708
Hackensack, NJ 07602-0708
..... (201) 343-4334
Fax: (201) 343-7335
Website: www.lydonoven.com
Email: info@lydonoven.com
Timothy McBride, president
Instrumentation: Ovens.

Malcam, Ltd.
27th Habarzel St.
Tel Aviv, Israel 6971039
..... +972-3-6485664
Fax: +972-3-6488335
Website: www.malcam.com
Email: info@malcam.com
Udi S. Moshe, sales director, sales and marketing department
Instrumentation: Analysis equipment, measuring equipment, meters and moisture meters, density testers, high speed uniformity testers.

Malvern Panalytical
117 Flanders Rd.
Westborough, MA 01581-1042
..... (508) 768-6400
Fax: (508) 768-6403
Website: www.malvernpanalytical.com
Email: sales.us@malvern.com
Randy Byrne, sales and marketing
Instrumentation: Instrumentation for dynamic/thermomechanical and processability testing.

Manufacturers Supplies Co.
4220 Rider Trail N.
Earth City, MO 63045 .... (314) 770-0880
Fax: (314) 770-0990
Website: www.mfgsup.com
Email: information@mfgsup.com
Robert D. Goellner, president
Instrumentation: Equipment for lab test-

ing clickers for dumbbell cutting; skiving equipment for ply splitting; bandknife splitters for splitting for layer analysis. *Services offered:* Service and installation of company equipment.

Mast/Keystone
2200 Dickerson Rd.
Reno, NV 89503..... (510) 931-7747
Fax: (775) 324-5375
Website: www.mastdev.com
Email: sales@mastdev.com
Thomas Hall, marketing director; Gifford Mast, president
Instrumentation: Ozone test chamber, monitors.

McGill AirPressure, LLC
1777 Refugee Rd.
Columbus, OH 43207
..... (614) 829-1200
Fax: (614) 445-8759
Website: www.mcgillairpressure.com
Email: sales@mcgillairpressure.com
Jared McGill, sales manager
Instrumentation: Autoclaves, dryers.

Meeco Inc.
250 Titus Ave.
Warrington, PA 18976.... (215) 343-6600
Fax: (215) 343-4194
Website: www.meeco.com
Email: sales@meeco.com
Rob Leiter, marketing
Instrumentation: Electrolytic moisture analyzers, electronic measuring instruments to detect trace moisture in gases and solids.
Services offered: Technical service.

Mesabi Control Engineering, Ltd.
1350 Arcade St.
St. Paul, MN 55106
..... (651) 771-1890
Fax: (651) 771-0437
Website: www.mesabicontrol.com
Email: mesabi@mesabicontrol.com
John Beaudoin, president
Instrumentation: Computers, controllers, measuring equipment, monitors, scales, software systems, special services, temperature measuring devices.

Metravib
200 Chemin Des Ormeaux
Limonest, France 69760
.....+33 472 52 48 00
Fax: +33 4 72 52 47 47
Website: www.metravib-design.com
Email: hugues.baurier@acoem.com
Hugues Baurier, head of international sales
Instrumentation: Dynamic mechanical analyzers for rubber compounds, including a range of instruments to fulfill the highest requirements of research and development and industrial testing: Young (E) and shear (G) modulus, tan delta, glass transition (TG), Payne and Mullins effects, high frequency, high force, fatigue, crack growth, heat buildup and flexometer, creep, automated testing.
Services offered: Training courses are delivered by DMA experts and combine theory and practice. With the help of the instructor, users carry out tests and perform detailed analysis of the results, enabling them to master the use of Metravib's instruments and analysis software.

Mettler-Toledo, Inc.
1900 Polaris Pkwy.
Columbus, OH 43240
.....(800) - METTLER
Fax: (614) 438-4518
Website: www.mt.com/us
Email: labinsidesales@mt.com
Michael Zemo, sales specialist
Instrumentation: Dynamic mechanical analyzers, thermomechanical analyzers, differential scanning calorimeters, thermogravimetric analyzers, balances.

Micromeritics Instrument Corporation
4356 Communications Dr.
Norcross, GA 30093
..... (770) 662-3633
Fax: (770) 662-3696
Website: www.micromeritics.com
Email: ussales@micromeritics.com
Preston Hendrix, president; Jeff Sherman, vice president, sales and business development; Ray Lombardi, marketing manager
Instrumentation: Analysis equipment, physical testing equipment, porosity detectors, testers density, testers specific gravity.

Micro-Poise Measurement Systems, LLC
555 Mondial Pkwy.
Streetsboro, OH 44241-4510
..... (330) 541-9100
Fax: (330) 541-9111
Website: www.micropoise.com
Email: micropoise.techsupport@ametek.com
Instrumentation: Analysis equipment, inspection systems, measuring equipment, physical testing equipment, software systems, testers and testing equipment, testers - tire, tire laser measurement systems, x-ray inspection machines.

Micro-Vu Corp.
7909 Conde Ln.
Windsor, CA 95492
..... (707) 838-6272
Fax: (707) 838-3985
Website: www.microvu.com
Email: sales@microvu.com
Greg Chatfield, marketing/sales manager
Instrumentation: Automated video coordinate measuring machines providing automatic dimensional measurement of o-rings, gaskets, etc.

MonTech USA
1280 S. Williams Dr.
Columbia City, IN 46725-0169
.....(800) 552-5115
Fax: (260) 244-4158
Website: www.montechusa.com
Email: info@montechusa.com
Spencer Bagan, national sales and marketing manager
Instrumentation: Rubber process analyzers, rheometers, Mooney viscometers, hardness/density testers, filler dispersion testers, lab presses, lab mills, plastometers, abrasion testers, aging ovens, fatigue testers, sample cutters, legacy equipment upgrades, parts, analysis software, LIMS software.
Services offered: Rubber testing equipment, calibration, maintenance, repair.

MTI Instruments, Inc.
325 Washington Ave. Ext.
Albany, NY 12205-5505
..... (518) 218-2550
(800) 342-2203
Fax: (518) 218-2506
Website: www.mtiinstruments.com
Email: tdewsbury@mtiinstruments.com
Terry Dewsbury, Eric Rosenberg, Jen Stevens, sales
Instrumentation: Quality control inspection products, sensors, amplifiers using fiber optic, capacitance, laser technologies, for displacement vibration, runout, thickness and surface condition.

MTS Systems Corp.
14000 Technology Dr.
Eden Prairie, MN 55344-2290
..... (800) 328-2255
Fax: (925) 937-4515
Website: www.mts.com
Email: info@mts.com
Dr. Jeffrey A. Graves, president
Instrumentation: Test systems to measure the dynamic properties of elastomeric materials and components.
Services offered: Technical consulting service, training, software programs.

Instrumentation, Test Equipment Suppliers

Nanotronics Imaging
2251 Front St., Ste 109-111
Cuyahoga Falls, OH 44221
..... (330) 926-9809
Website: www.nanotronics.co
Email: info@nanotronics.co
Matthew Putman, CEO; John Putman, president and chief technology officer
Instrumentation: Nanoscale imaging and inspection systems, rapid topography measurements.

NDC Infrared Engineering Inc.
5314 North Irwindale Ave.
Irwindale, CA 91706 ..... (626) 939-3887
Fax: (626) 939-3870
Website: www.ndc.com
Email: enquiries@ndc.com
David Wambold, vice president
Instrumentation: On-line thickness gauging, contact systems for the rubber and calendered products industry; systems range from simple single-point measurements to complete scanning systems.

NELA Vision Systems
610 Whitetail Blvd.
River Falls, WI 54022 .... (888) 407-4808
(715) 425-1900
Fax: (715) 425-1901
Website: www.nela-usa.com
Email: info@nela-usa.com
Katharina Gruber, marketing manager
Instrumentation: Fully automatic inspection systems.

Netzsch Instruments North America, LLC
129 Middlesex Turnpike
Burlington, MA 01803 .... (781) 272-5353
Fax: (781) 272-5225
Website: www.netzsch.com
Email: nib-sales@netzsch.com
Bob Fidler, national sales manager
Instrumentation: Analysis equipment, curemeters/rheometers, testers and testing equipment - thermal analysis and thermal properties measurement instruments and testing services; featuring the new highest-force dynamic mechanical (DMA/DMTA) testing instruments; Netzsch-Gabo Eplexor and Qualimer, flexometers for measurement of thermal fatigue of rubber, testing instruments for measurement of the dynamic durometer hardness or adhesive properties (autohesion) such as rubber compounds before vulcanization. Thermal analyzers for polymer analysis including DSC, TGA, STA (DSC-TGA) and TMA with coupling to FTIR, MS and GC-MS for analysis of evolved gases. Thermal conductivity by guarded hot plate and the laser flash method.
Services offered: Contract testing.

Newage Testing Instruments, Inc., An Ametek Company
820 Pennsylvania Blvd.
Feasterville, PA 19053... (215) 355-6900
Fax: (215) 354-1803
Website: www.hardnesstesters.com
Email: newage.info@ametek.com
Rick Wismer, sales manager
Instrumentation: Hardness testers for IRHD and durometer scales in both regular and micro, built in SPC, RS232 output, fully automated for reduced operator influence.

Nikon Inc., Instrument Group
1300 Walt Whitman Rd.
Melville, NY 11747.....(973) 966-1100
Fax: (631) 547-4025
Website: www.nikoninstruments.com
Cynthia Flynn, sales manager
Instrumentation: Profile projectors, video measuring systems, microscopes.
Services offered: Technical service, training, software programs.

Nishiyama Corporation of America
111 Great Neck Rd., Ste. 216
Great Neck, NY 11375... (516) 466-7570
Fax: (516) 466-7572
Website: www.nishiyama.co.jp/en
Email: Sales@nishiyama-usa.com
Takumi Kawabe, vice president, sales and marketing

ODC Tooling and Molds
110 Randall Dr., P.O. Box 70
Waterloo, Ontario, Canada N2J 3Z6
..... (519) 576-8950
Fax: (519) 576-3670
Website: www.odctooling.com
Email: sales@odctooling.com
Ronald Levene, CEO/president
Instrumentation: Controllers, dies, presses, testers and testing equipment, testers tear tensile, testers tensile strength.

OHMIC Intruments
3081 Elm Point Industrial Dr.
St. Charles, MO 63301
.....(410) 820-5111
Fax: (410) 822-9633
Website: www.ohmicinstruments.com
Email: ohmic@ohmicinstruments.com
Ed Donovan
Instrumentation: Dew point monitors and controllers; absolute humidity transmitters.
Services offered: Servicing and calibration of all "Ohmic" manufactured equipment.

Ontario Die International
235 Gage Ave.
Kitchener, Ontario, Canada N2M 2C9
..... (519) 745-1002
Fax: (519) 745-0051
Website: www.ontariodie.com
Email: kitchener@ontariodie.com
Gary Levene, president
Instrumentation: Laboratory specimen cutters, laboratory cutting presses, sample molds.
Services offered: Sharpening and certification of laboratory specimen cutters.

Ontario Die International (USA) Inc.
1755 Busha Hwy.
Marysville, MI 48040 ..... (810) 987-5060
Fax: (810) 987-3688
Website: www.ontariodie.com
Email: porthuron@ontariodie.com
Instrumentation: Laboratory specimen cutters, laboratory cutting presses, sample molds.

OREC Ozone Chambers and Monitors
1868 Akron-Peninsula Rd.
Akron, OH 44313..... (330) 376-3600
(800) 742-8535
Fax: (330) 376-8500
Website: www.orecozone.net
Email: info@ccsi-inc.com
Michael Kent Warner, executive vice president; David Warner, president
Instrumentation: Equipment: Orec ozone test chambers providing continuous ozone measurement control; data acquisition through the optional data logger; Orec ozone destruct unit; and Orec DM-150 series ozone monitors. Additional Orec accessories: Dyna- Stretch 8, DynaStretch 16 (complies with D1149 method A, procedure A1) and static-stretch (complies with D1149 method B, procedures B1 and B3). Static strain with triangular sample complies with D1149 method B, procedure B2. Static strain with looped sample complies with D1149 method B, procedure B4. Complies with test methods: D1149 and D4575.
Services offered: Orec ozone monitor calibration and service, Orec ozone chamber on-site service and ISO/IEC 17025 calibrations NIST primary monitor standards.

Oxford Instruments
300 Baker Ave.
Concord, MA, 01742-2124
..... (800) 447-4717
(978) 369-9933
Fax: (978) 369-8287
Website: www.oxford-intruments.com

Instrumentation, Test Equipment Suppliers

Email: industrial@oxinst.com
Chris Horvath, director of sales and marketing, XRF products - Americas
Instrumentation: EDXRF, WDXRF, MDXRF and HHXRF.

Pacific Transducer Corp. - PTC Instruments
2301 Federal Ave.
Los Angeles, CA 90064
.....(310) 478-1134
Fax: (310) 312-0826
Website: www.ptc1.com
Email: info@ptc1.com
John S. Marcus, president
Instrumentation: Durometers, microscopes, temperature measuring devices, hardness testers, tester stands.

Physical Properties Testers Group (PPT Group)
Richmond Works
Lakeview, Halifax
HX3 6EP, U.K. ..... +44 (0) 1422 366355
Website: www.pptgroup.com
Email: info@pptgroup.com
Andrew Jesudowich, vice president of sales, Americas

PLV Systems Inc.
116 Viceroy Rd., Bldg. D, Unit 5
Concord, Ontario, Canada L4K 2M4
.....(905) 761-7234, ext. 24
Fax: (905) 760-1473
Website: www.plv.com
Email: sales1@plv.com
Sam Melamed
Instrumentation: FS200 family of profile extrusion measurement instruments for on-line and off-line dimensional characterizations.

Polymer Machinery Company
154-B Potomac Ave.
Tallmadge, OH 44278.... (330) 633-5734
Fax: (330) 633-6367
Website: www.polymermachineryco.com
Email: jchiofolo@polymermachineryco.com
Jim Chiofolo, sales
Instrumentation: Rheometer, viscometer, testers; fatigue, dynamic, flex-cracking, ozone chamber, aging oven, tire plunger, air permeability, oil bath, carbon black dispersion, electronic tensile, tensile strength, abrasion resistance; electronic densimeter, tire cutting machine, constant temperature and humidity chamber.

Polymer Testing Instruments
10 National Ave.
Fletcher, NC 28801..... (828) 252-1326
Website: www.polymer-testing.com
Email: michael@polymer-testing.com
Doug Giffin
Instrumentation: Durometers, rheometers, viscometers, rubber process analyzers (MFR), tensile testers, ozone chambers and many more laboratory instruments.
Services offered: A2LA accredited calibration services (on-site and mail-in). Various new and used polymer laboratory instruments for sale. On-site emergency troubleshooting and repairs.

Precision Measurement Company
P.O. Box 7676
Ann Arbor, MI 48107
..... (734) 995-0041
Website: www.pmctransducers.com
Email: info@pmctransducers.com
Samuel K. Clark, president
Instrumentation: Pressure transducers

Precision Quincy Ovens
483 Gardner St.
South Beloit, IL 61080 ... (302) 602-8738
Website: www.pqovens.com
Email: sales@pqovens.com
Troy F. Berg, president
Instrumentation: Dryers, ovens, temperature measuring devices.

Prescott Instruments Ltd.
Unit F, Northway Trading Estate
Tewkesbury, Gloucester, UK GL20 8JU
.....44 0 1684 274300
Fax: 44 0 1684 293223
Website: www.prescott-instruments.com
Email: enquiries@prescott-instruments.com
Instrumentation: Mooney viscometer, oscillating disc rheometer(ODR), moving die rheometer (MDR), multi-function rheometer (RPA), dynamic mechanical analyzer (DMA), plastimeter, sample and bale cutters
Services offered: calibration, service, and repair.

Prosco, Inc.
3901 Grove Ave.
Gurnee, IL 60031..... (847) 336-1323
Fax: (847) 336-1390
Website: www.prosco-inc.com
Email: contact@prosco-inc.com
Peter Kubala, sales manager
Instrumentation: Grinders, laser inspection systems.

Proton Products Inc.
1278 Glenneyre #425
Laguna Beach, CA 92651
..... (909) 485-1598
(626) 384-9730
Website: www.protonproducts.com
Email: grantlatimer@protonproducts.us
Grant Latimer, president
Instrumentation: InteliSENS laser doppler speed and length measurement, InteliSENS wire diameter gauge, InteliSENS wire spark detection, InteliSENS wire lump and neck detection, ProTHERMIC wire preheating.

PTC Instruments/PTC Metrology
2301 Federal Ave.
Los Angeles, CA 90064.....(310) 478-1134
Website: www.ptc1.com
Email: info@ptc1.com
Linda A. Wolfe, general manager
Instrumentation: Durometers to measure the hardness of rubber, plastic, ASTM, A, B, C, D, DO, O, OO, OOO.
Services offered: Technical service, repair, durometer calibration and certification with standards traceable to NIST design custom durometers, A2LA accredited laboratory for durometer calibration (1896.01).

Pyromation, Inc.
5211 Industrial Rd.
Fort Wayne, IN 46825 ... (260) 484-2580
Website: www.pyromation.com
Email: scott@pyromation.com
Scott Farnham, sales and marketing manager
Instrumentation: Thermocouples and thermocouple assemblies, temperature measuring devices.

Pyrometer Instrument Company
70 Weber Ave.
Ewing, NJ 08638 ..... (609) 443-5522
Fax: (609) 443-5590
Website: www.pyrometer.com
Email: sales@pyrometer.com
David Crozier, CEO
Instrumentation: Temperature measuring devices, thermal line scanners, temperature controllers, recorders, transmitters, NLW-laser pyrometer to measure emissivity.
Services offered: Technical service, training, calibration.

Q-Lab Corporation
800 Canterbury Rd.
Westlake, OH 44145-1419
..... (440) 835-8700
Fax: (440) 835-8738
Website: www.q-lab.com
Email: info@q-lab.com
James Gauntner, sales manager
Instrumentation: QUV accelerated weathering tester, Q-SUN xenon arc test chambers, Q-Panel standard test

Instrumentation, Test Equipment Suppliers

substrates, Q-Fog cyclic corrosion test chambers, Q-Trac natural sunlight concentrator.
Services offered: Contract testing lab, accelerated weathering testing, outdoor weathering testing.

Qualitest USA, LLC
8201 Peters Rd., #1000
Plantation, FL 33324 ..... (877) 884-8378
Fax: (954) 697-8211
Website: www.WorldofTest.com
Email: info@qualitest-inc.com
Greg Skory
Instrumentation: Testing technologies for rubber, including universal testing machines, durometers/IRHD hardness testers, densimeter, brittleness testers, abrasion testers, rebound resilience tester, environmental chambers, cutting dies, clicker presses, moving die rheometer, flexometers, stress relaxation tester, aging oven, Mooney viscometer and more.

R&C Roll Grinding, Inc.
P.O. Box 14190
Bradenton, FL 34280..... (941) 778-7655
Website: www.rcrollgrinding.com
Email: rollgrinding@gmail.com
Ken Bowers, owner
Instrumentation: Calenders.

Rex Gauge Company, Inc.
244 Telser Rd.
Lake Zurich, IL 60047 .... (847) 465-9009
Fax: (847) 465-9229
Website: www.durometer.com
Email: info@durometer.com
JC Blum, vice president
Instrumentation: Durometer hardness gauges (for checking the hardness of non-metallic surfaces), accessories
Services offered: Repair and calibration (durometer sales)
(See our ads on pages 57 and 99)

RKC Instrument
4245 Meghan Beeler Ct.
South Bend, IN 46628
..... (877) 599-1990
Fax: (574) 247-9657
Website: www.rkcinst-usa.com
Email: info@rkcusa.com
Yoshi Unno, president
Instrumentation: Controllers, temperature measuring devices.

Rockwell Automation, Inc., Allen-Bradley
1201 S. 2nd St.
Milwaukee, WI 53204 .... (414) 382-2000
Fax: (414) 382-4444
Website: www.rockwellautomation.com
Email: webmaster@rockwellautomation.com
Keith Nosbusch, chairman and CEO
Instrumentation: Computers, inspection systems, laboratory equipment (miscellaneous), measuring equipment, monitors, software systems, temperature measuring devices.

Charles Ross & Son Company
710 Old Willets Path
Hauppauge, NY 11788.... (631) 234-0500
Fax: (631) 234-0691
Website: www.mixers.com
Email: klanghorn@mixers.com
Ken Langhorn, vice president, sales
Instrumentation: Dryers, mills, mixers.

Sanyo Corporation of America
500 Fifth Ave., Ste. 3620
New York, NY 10110..... (212) 221-7890
Fax: (212) 221-7828
Website: www.sanyocorpusa.com
Kenichi Shindo, president
Instrumentation: Physical testing equipment, testers - tensile strength.

Satra Technology Centre
Wyndham Way
Kettering, Northamptonshire, U.K.
NN16 8SD ..... +44 (0)1536 410000
Fax: +44 (0)1536 410626
Website: www.hampden-test.com
Email: info@satra.co.uk
Austin Simmons, CEO
Instrumentation: Ozone test cabinets, abrasion testers, resilience testers, IFD and CFD foam hardness testers, porosity, rise apparatus.
Services offered: Service and calibration.

Schenck Corporation
535 Acorn St.
Deer Park, NY 11729..... (631) 242-4010
Fax: (631) 242-4147
Website: www.schenck-usa.com
Email: sales@schenck-usa.com
Bertram Dittmar, president and CEO
Instrumentation: Universal and specialized balancing machines for the production, maintenance and repair of virtually any rotating component; vibration analyzers, field balancers and condition monitoring systems.

SDS Systemtechnique
Rudolf-Diesel Str. 7
75365 Calw, Germany
..... +49 (0) 7051 931540
Website: www.sds-systemtechnik.de
Email: stefan.dengler@sds-systemtechnik.de
Instrumentation: Interferometric tire tester, off-the-road interferometric tester, laser markier system, endurance test monitoring system, pressure test system
(See our ads on pages 77 and 97)

Seika Machinery, Inc.
1580 Boggs Rd., Suite 900
Duluth, GA 30096
.....(770) 446-3116
Website: www.seikausa.com/rubbertesting
Email: info@seikausa.com
Instrumentation: Lab testing equipment to measure dynamic properties of rubber and plastic for use in research and development and/or production.
Services offered: Installation, training and support services.
(See our ad on page 85)

Shimadzu Scientific Instruments
7102 Riverwood Dr.
Columbia, MD 21046..... (410) 381-1227
(800) 477-1227
Fax: (410) 381-1222
Website: www.ssi.shimadzu.com
Email: webmaster@shimadzu.com
Kevin McLaughlin, marketing
Instrumentation: Hardness testers, universal/tensile testers, capillary/flow testers, thermal analyzers, endurance/fatigue testers, UV-VIS and FTIR spectrometers, balances, gas and liquid chromatography.

Sikora International Corporation
215 Prospect Pk., Ste. C
Peachtree City, GA 30269
..... (770) 486-1233
Fax: (770) 486-8695
Website: www.sikora.com
Email: sales@sikora.net
Instrumentation: On-line measuring and control systems for polymeric tubes and hoses, controllers, gages, thickness gages, laser equipment (includes laser/microprocessor measuring products), measuring equipment and machines, process systems and equipment.

SP Industries
935 Mearns Rd.
Warminster, PA 18974 ... (215) 672-7800
(800) 523-2327
Fax: (215) 672-7807
Website: www.spscientific.com
Email: info@spscientific.com
Bill Downs, CEO
Instrumentation: Ovens, environmental test chambers, incubators.
Services offered: Technical services, training, manufacturing.

Starrett-Bytewise Measurement Systems
1245 Broadway

Instrumentation, Test Equipment Suppliers

Columbus, GA 31901 .... (706) 323-5142
Fax: (706) 323-0178
Website: www.starrett.com/bytewise
Email: sales.bytewise@starrett.com
Matt Orvis, global sales director
Services offered: Automated, in-process laser measurement systems to the tire industry for component preparation measurement (extrusion, calendering, belt and apex), tire building machine monitoring (carcass, belt/ tread and shaping), final finish quality checking (bulge and depression, runouts), and cured-tire 3D scanning for research and development and test centers. The Profile360 measures extrusion profiles for auto seals, rubber sheet and custom rubber extrusions. The Surface360 is offered for flaw detection in extruded and calendered rubber sheets and profiles. Also, the Tire360 is a 3D tire scanning system that measures parameters such as crown radius, section width, section height, circumference, and location and height of tread wear indicators.
(See our ads on pages 52, 53 and 98)

The L.S. Starrett Company
121 Crescent St.
Athol, MA 01331 (978) 249-3551
Fax: (978) 249-8495
Website: www.starrett.com
Email: general@starrett.com
Jim Ballou, marketing manager
Services offered: Hundreds of precision measuring tools and gages including electronic durometers and hardness testing systems, and a full line of force measurement systems, optical comparators vision systems and special gaging solutions. Starrett also offers band saw blades ideal for cutting steel belted tires including carbide grit and high-carbon steel blades. See separate listing for the Starrett-Bytewise division which offers profile measurement systems.
(See our ads on pages 52, 53 and 98)

Herman H. Sticht Company, Inc.
45 Main St., Ste. 401
Brooklyn, NY 11201-1075
..... (718) 852-7602
Fax: (718) 852-7915
Website: www.stichtco.com
Email: stichtco@aol.com
Paul Plotkin, president
Instrumentation: Tachometers, testers and testing equipment.

TA Instruments, Inc. - Waters LLC
109 Lukens Dr.
New Castle, DE 19720.... (302) 427-4000
Fax: (302) 427-4001
Website: rubber.tainstruments.com
Email: info@tainstruments.com
David Bohnsack, product manager, rubber/rheology
Instrumentation: Thermal analysis, dynamic mechanical analysis, dielectric analysis, rubber process analyzers, moving die rheometers, Mooney viscometers, automated hardness and density testers, rheometers for fluids and soft solids.
Services offered: Technical service

Taber Industries
455 Bryant St.
North Tonawanda, NY 14120
..... (716) 694-4000
(800) 333-5300
Fax: (716) 694-1450
Website: www.taberindustries.com
Email: sales@taberindustries.com
Alan Jaenecke, vice president marketing
Instrumentation: Destructive tests, abrasion.

Tavdi Co., Inc.
140 Beacon Park Dr.
Riverside, RI 02915..... (401) 432-7086
Fax: (401) 432-7183
Website: www.tavdico.com
Email: tavdi@tavdi.com
Ismail Saltuk, president
Instrumentation: DMYO-V (dynamic mechanical Yerzley oscillograph V), advanced Yerzley oscillograph (AYO-IV) for testing physical properties of rubber specimens as per ASTM D-945-16.
Services offered: Equipment sales, maintenance and repair services, consulting and testing.

Tekscan
333 Providence Hwy.
Norwood, MA 02062..... (617) 464-4500
Website: www.tekscan.com
Email: info@tekscan.col
Instrumentation: Test and measurement, research and development, pressure mapping

Tensitron, Inc.
733 S. Bowen St.
Longmont, CO 80501 ... (303) 702-1980
Fax: (303) 702-1982
Website: www.tensitron.com
Email: sales@tensitron.com
Ellen-Alisa Saxl, manager
Instrumentation: Cord, filament, wire, strap, band and cable tension testers, tension transducers, sheet-tension, rubber thread tension testers, digital, mechanical and electronic tension meters. OEM since 1935.
Services offered: Custom instrumentation available if your application requires a product not in our regular line of instrumentation.

Testing Machines Inc.
40 McCullough Dr.
New Castle, DE 19720.... (302) 613-5600
(800) 678-3221
Fax: (302) 613-5619
Website: www.testingmachines.com
Email: info@testingmachines.com
Instrumentation: Physical testers.
Services offered: Technical service, training.

Testo, Inc.
40 White Lake Rd.
Sparta, NJ 07871..... (800) 227-0729
Fax: (862) 354-5020
Website: www.testo.com
Email: info@testo.com
Burkart Knospe, president
Instrumentation: Temperature-based instrumentation.
Services offered: Sales and technical service.

Thermal Product Solutions (TPS), a division of SPX Corporation
2821 Old Route 15
New Columbia, PA 17856-9396
..... (800) 586-2473
(570) 538-7200
Fax: (570) 538-7380
Website: www.tenney.com
Email: tpsinfo@tps.spx.com
Ron Cozean, CEO
Instrumentation: Industrial ovens, environmental test chambers and curing ovens.

Thermotron Industries
291 Kollen Park Dr.
Holland, MI 49423 ..... (616) 393-4580
Fax: (616) 392-5643
Website: www.thermotron.com
Email: info@thermotron.com
Clint Peterson, president; Kevin Ewing, marketing manager
Instrumentation: Controllers, environmental chambers, test chambers, testers and testing equipment.

Thwing-Albert Instrument Co.
14 W. Collings Ave.
West Berlin, NJ 08091... (856) 767-1000
Fax: (856) 767-2615
Website: www.thwingalbert.com
Email: info@thwingalbert.com
Steven Berg, vice president of sales and marketing
Instrumentation: Universal materials tensile testing machines, tear testers,

Instrumentation, Test Equipment Suppliers

sample cutters.
Services offered: Technical service, training, calibration.

Tinius Olsen Testing Machine Co.
1065 Easton Rd.
Horsham, PA 19044..... (215) 675-7100
Fax: (215) 441-0899
Website: www.tiniusolsen.com
Email: info@tiniusolsen.com
Wayne Hayward, marketing manager
Instrumentation: Tension, compression testing machines.
Services offered: Technical service, software programs.

TSI Incorporated
500 Cardigan Rd.
Shoreview, MN 55126 ... (866) 266-5919
Fax: (651) 490-3824
Website: www.tsi.com
Email: info@tsi.com
John R. Ross, president
Instrumentation: Dimensional measurement products designed to improve productivity and enhance quality; products include gauges for measuring diameter, speed and length, flaw detection, profile, 100% length inspection systems.
Services offered: Technical service.

U-Can
No. 95 Nankang 3rd. Rd.
Nantou City 540, Taiwan
..... 886-4-25591351~9
Fax: 886-4-25591362
Website: www.ucandyna.com
Email: ucan@u-can.com.tw
Jim Chiofolo
Instrumentation: Rheometer, viscometer, testers; fatigue, dynamic, flex-cracking, ozone chamber, aging oven, tire plunger, air permeability, oil bath, carbon black dispersion, electronic tensile, tensile strength, abrasion resistance; electronic densimeter, tire cutting machine, constant temperature and humidity chamber.

Ueshima Seisakusho Co., Ltd.
c/o Seika Machinery, Inc.
1580 Boggs Rd., Suite 900
Duluth, GA 30096 .....(770) 446-3116
Website: https://www.ueshima-seisakusho.co.jp/top_en.html
Email: info@seikausa.com
Instrumentation: Lab testing equipment to measure dynamic properties of rubber and plastic for use in research and development and/or production.
Services offered: Installation, training and support services
(See our ad on page 85)

Union Process, Inc.
1925 Akron-Peninsula Rd.
Akron, OH 44313..... (330) 929-3333
Website: www.unionprocess.com
Email: unionprocess@unionprocess.com
Emery Li, sales manager
Instrumentation: Laboratory attrition mills, fine grinding and dispersion equipment.
Services offered: Chemical analysis and physical testing.
(See our ad on page 103)

United Testing Systems
2245 N. Cleveland-Massillon Rd.
Bath, OH 44210..... (330) 659-6422
Fax: (330) 659-6433
Website: www.unitedtestingsystems.net
Email: unitedtestingsystems@gmail.com
Joseph Augustyn, president
Instrumentation: Magnetic particle, penetrant, ultrasonic and eddy current equipment, digital radiometer/photometer.

United Testing Systems, Inc.
1375 S. Acacia Ave. Ste. A
Fullerton, CA 92831..... (800) 765-9997
Website: www.utsflint.com
Email: info@unitedtesting.com
Cliff Schaffer, vice president
Instrumentation: Materials testing systems for hardness, tensile and compression.
Services offered: Calibration and certification of hardness and various force testing systems.

UTPVision S.r.l.
Via Tonale
9 24061 Albano S. Alessandro (BG)
Italy.....+39 035 4521465
Fax +39 035 4521082
Website: www.uptvision.com
Email: sales@vindum.com
Luca Palleschi, sales manager and
Jenny Puglisi, marketing/communication
(See our ad on page 99)

Vindum Engineering, Inc.
369 Syringa Ridge
Sandpoint, ID 83864..... (281) 782-8312
Website: www.vindum.com
Email: sales@vindum.com
Jorgen Vindum, president
Instrumentation: Analysis equipment, laboratory equipment, testers, viscometers.

Visco Technologies USA
511 West Golf Rd.
Arlington Heights, IL 60005
..... (773) 332-3775
Website: www.visco-tech.com/usa
Email: owakizono@visco-tech.com
Osamu Wakizono
Instrumentation: Image processing algorithm, optical technology and cosmetic (appearance) inspection solution.

VTEC Laboratories Inc.
212 Manida St.
Bronx, NY 10474 ..... (718) 542-8248
Fax: (718) 542-8759
Website: www.vteclabs.com
Email: Neil@vteclabs.com
Neil Schultz
Instrumentation: Flammability test equipment.

Wabash MPI
1569 Morris St.
Wabash, IN 46992-0298
.....(260) 563-1184
Fax: (260) 563-1396
Website: www.wabashmpi.com
Email: wabashmpi@acscorporate.com
David Singer, sales and marketing manager
Instrumentation: Manufacturer of compression, vacuum and transfer presses for various rubber molding applications. Force ranges from .5 to 1,200 ton and platen sizes up to 6' by 10'. Presses can be supplied in standard configurations or customized to your specifications.

H.W. Wallace & Co Ltd. (Wallace Instruments)
Curtis Road Industrial Estate
Curtis Road
Dorking, Surrey, England RH4 1EJ
..... + 44 (0)1306 867 417
Website: www.wallaceinstruments.com
Email: info@wallaceinstruments.com
Instrumentation: IRHD hardness testers H14 + H12; Shore scale hardness testers H17; densimeter X22B + X21C; plastimeter P14; aging chamber O14; Mooney viscometer V3 + software; compression stress relaxometer C11; compression sets C3 + C4; S4 thickness gauge; specimen preparation: S6 cutting dies + S1 press + X17 thin film grips.
Services offered: Calibration, service and repair.

Webber Manufacturing Co.
8498 Brookville Rd.
Indianapolis, IN 46219... (317) 357-8681
Fax: (317) 357-8685
Website: www.webbermfg.com
Email: info@webbermfg.com
Dave Lovett, president
Instrumentation: Ovens, environmental chambers.

Instrumentation, Test Equipment Suppliers

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Concord, MA 01742..... (978) 369-9607
Fax: (978) 369-5485
Website: www.williamsonir.com
Email: sales@williamsonir.com
W.R. Barron, vice president; T.F. Larrick, technical manager
Instrumentation: Radiation pyrometers.

Willrich Precision
80 Broadway
Cresskill, NJ 07626
..... (866) 945-5742
Fax: (201) 567-5770
Website: www.willrich.com
Email: info@willrich.com
Rich Chitos, president
Instrumentation: Analytical and torsion balances, cord testers, coating testers, compression testers, durometers, elasticity testers, dimensional gauges, other laboratory and testing equipment.

Winters Instruments
121 Railside Rd.
Toronto, Ontario, Canada M3A 1B2
..... (416) 444-2345
Fax: (416) 444-8979
Website: www.winters.com
Email: sales@winters.com
Barry Phillips, executive vice president; Desmond Khor, marketing and communications manager
Instrumentation: Controllers, gauges, laboratory equipment (miscellaneous), measuring equipment, temperature measuring devices, testers and testing equipment.

WSF Industries, Inc.
7 Hackett Dr.
Tonawanda, NY 14150
..... (800) 874-8265
(716) 692-4930
Fax: (716) 692-4135
Website: www.wsfindustries.com
Email: sales@wsfindustries.com
John L. Hettrick, chairman; Gary R. Fornasiero, president
Instrumentation: Autoclaves, process simulators.

Wyoming Test Fixtures, Inc.
2960 E. Millcreek Canyon Rd.
Salt Lake City, UT 84109
..... (801) 484-5055
Fax: (801) 484-6008
Website: www.wyomingtestfixtures.com
Email: wtf@wyomingtestfixtures.com
Donald F. Adams, president
Instrumentation: Dies, laboratory equipment (miscellaneous), physical testing equipment, testers and testing equipment, testers adhesion, testers coefficient of friction, testers compression, testers cord tensile, testers creep rupture, testers fatigue, testers flexing machines, testers impact, testers plasticity, testers shear, testers tack, testers tear tensile, testers tensile strength, testers tire, testers torsion, testers universal.

Yxlon/Comet Technologies USA
5675 Hudson Industrial Pkwy.
Hudson, OH 44236
..... (234) 284-7849
(877) XRAY-100
Fax: (234) 284-7886
Website: www.yxlon.com
Email: yxlon@yxlon.com
Tom Swanger, account manager, tire/rubber/wheel
Instrumentation: X-ray inspection equipment for industrial applications, whether operated manually, semi-automatically or on a fully automatic scale. Instruments for applications in the automotive industry, aviation and aerospace, shipbuilding and vessel construction, electronics and other industrial sectors.
Services offered: Non-destructive testing (NDT), computed tomography (CT), highly dynamic radioscopy (HDR), microfocus x-ray testing, automatic defect recognition (ADR) testing. Applications include tire, rubber, wheel, cast parts, electronics, fiber-reinforced materials and more.

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One Zeiss Dr.
Thornwood, NY 10594... (800) 233-2343
Fax: (914) 681-7446
Website: www.zeiss.com
Email: micro@zeiss.com
James Sharp, president
Instrumentation: Microscopes to examine surface characteristics, image analysis equipment.
Services offered: Technical service, training, software programs.

Zumbach Electronics Corp.
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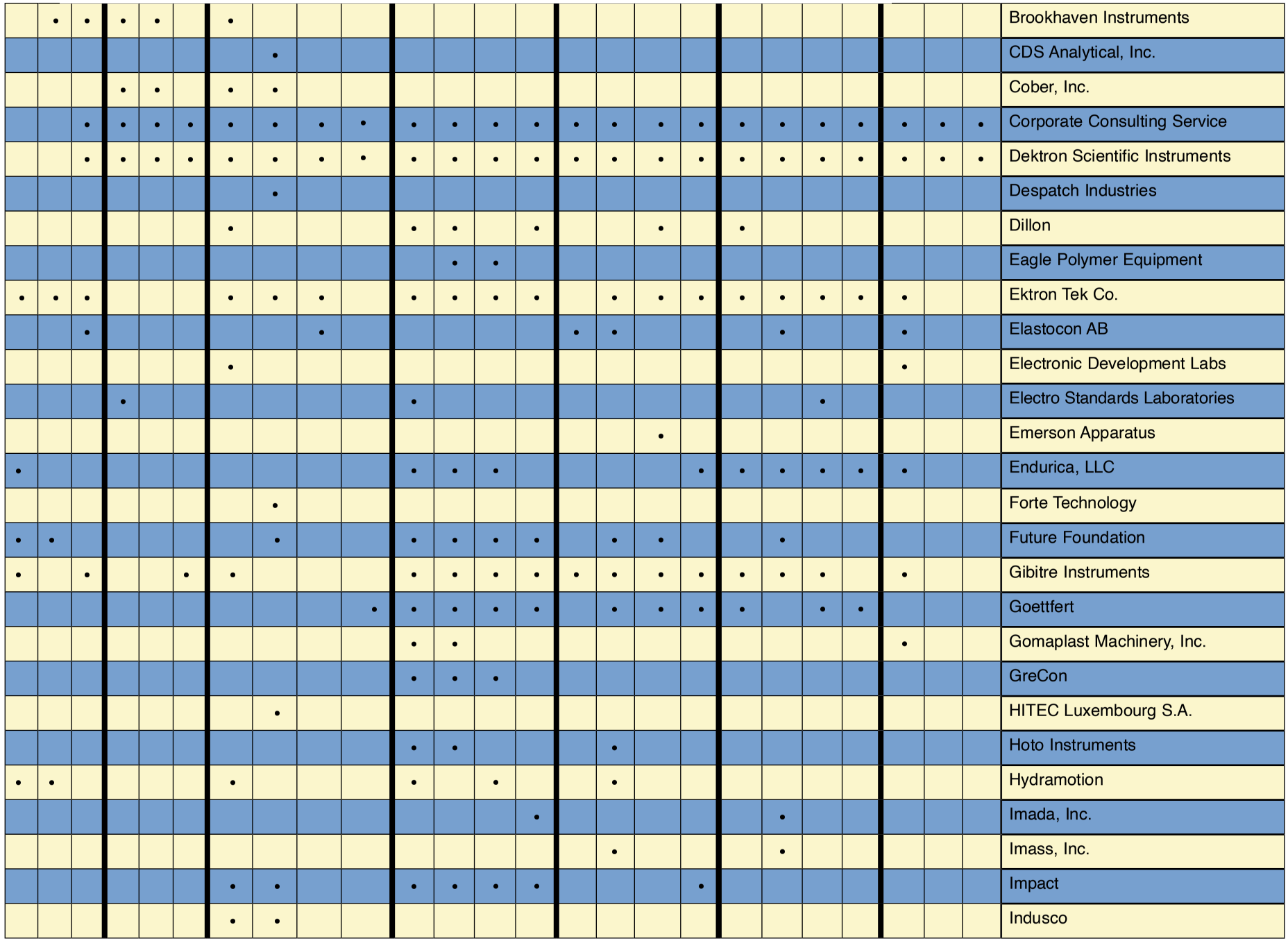
Mount Kisco, NY 10549-1407
..... (914) 241-7080
Fax: (914) 241-7096
Website: www.zumbach.com
Email: sales@zumbach.com
Keith F. Donahue
Instrumentation: Non-contact diameter gauges, ultrasonic, eddy current based wall thickness monitoring/control systems for hose, cable jackets, tubes, pipes; bench top diameter measuring instruments for QC; non-contact sheet thickness gauges; OD/ID/wall monitoring, control systems with color display, optical lump/neckdown detector, spark testers for cables, inductive wire preheaters; SQC/SPC data acquisition reporting, logging systems, plus PC link networking software.
(See our ad on page 37)

The following grid lists the types of instrumentation and test equipment offered by suppliers. Equipment for testing rubber vulcanizates has been broken down into stress/strain tests; time-dependent tests; destructive tests; durability and electrical properties. Instruments and test equipment for the chemical analysis of raw materials, vulcanized and unvulcanized rubber include spectroscopy; chromatography; thermal analysis; and microscopy.

			R.D. Abbott	Acrolab Ltd.	Acu-Gage Systems	Admet Inc.	Akron Special Machinery, Inc.	Alpha Technologies	B.C. Ames Co.	Ametek, U.S. Gauge Div.	Leverett A. Anderson Co.	Applied Test Systems, Inc.	Asylum Research	Atlas Material Testing Technology	Automation Products	Basler	Benz Materials Testing Instruments	Beta LaserMike	C.W. Brabender
Instrumentation/equipment for the testing of rubber vulcanizates	Durability	Permeability													•		•		
		Fluid resistance	•														•		
		Heat resistance (static)	•					•									•		
	Destructive tests	Heat build-up						•								•	•		
		Fatigue					•	•			•						•		
		Abrasion					•				•						•		
		Crack and cut growth	•					•			•						•		
	Time-dependent tests	Dynamic/thermomechanical	•					•			•						•		
		Rebound and resilience	•					•									•		
		Creep and stress relaxation	•					•			•	•					•		
		Set	•					•			•						•		
	Stress/strain tests	Adhesion	•			•		•			•	•					•		
		Hardness	•					•		•	•						•		
		Tear	•			•		•			•	•					•		
		Tensile	•			•		•			•	•					•		
Physical testing of rubber	Microscopes						•						•			•			
	Dimensions		•		•				•	•						•	•	•	
	Raw materials, vulcanized and unvulcanized rubber testing		•					•			•				•		•		
	Processability testing			•				•			•				•		•		•
	Electrical properties	Dissipation factor															•		
		Dielectric strength															•		
		Dielectric constant															•		
	Durability	Brittleness															•		
		Weathering resistance												•			•		
		Ozone resistance															•		


Brookhaven Instruments
CDS Analytical, Inc.
Cober, Inc.
Corporate Consulting Service
Dektron Scientific Instruments
Despatch Industries
Dillon
Eagle Polymer Equipment
Ektron Tek Co.
Elastocon AB
Electronic Development Labs
Electro Standards Laboratories
Emerson Apparatus
Endurica, LLC
Forte Technology
Future Foundation
Gibitre Instruments
Goettfert
Gomaplast Machinery, Inc.
GreCon
HITEC Luxembourg S.A.
Hoto Instruments
Hydramotion
Imada, Inc.
Imass, Inc.
Impact
Indusco

The following grid lists the types of instrumentation and test equipment offered by suppliers. Equipment for testing rubber vulcanizates has been broken down into stress/strain tests; time-dependent tests; destructive tests; durability and electrical properties. Instruments and test equipment for the chemical analysis of raw materials, vulcanized and unvulcanized rubber include spectroscopy; chromatography; thermal analysis; and microscopy.

			Indy Tech Lab Equipment	Instron Corporation	ISRA Surface Vision	J&L Tool & Machine	J.M. Machinery	KLA-Tencor	Kokusai, Inc.	LabsCubed	Leica Microsystems	LMI Technologies	Malcam, Ltd.	Malvern Panalytical	Mast/Keystone	Meeco, Inc.	Mesabi Control Engineering	Mettler-Toledo, Inc.	Micromeritics Instrument Corporation
Instrumentation/equipment for the testing of rubber vulcanizates	Durability	Permeability	•													•			•
		Fluid resistance	•																
		Heat resistance (static)	•																
	Destructive tests	Heat build-up	•																
		Fatigue	•	•															
		Abrasion	•									•							
		Crack and cut growth	•									•							
	Time-dependent tests	Dynamic/thermomechanical	•			•							•	•				•	
		Rebound and resilience	•			•	•												
		Creep and stress relaxation	•			•	•					•	•						
		Set	•			•	•					•	•						
	Stress/strain tests	Adhesion	•	•															
		Hardness	•													•			•
		Tear	•	•			•		•	•									
		Tensile	•	•			•		•	•								•	•
Physical testing of rubber		Microscopes	•								•								
		Dimensions	•				•		•		•	•						•	•
		Raw materials, vulcanized and unvulcanized rubber testing	•		•												•		
		Processability testing	•	•	•			•						•			•		
	Electrical properties	Dissipation factor														•			
		Dielectric strength			•									•					
		Dielectric constant			•									•					
	Durability	Brittleness	•	•															
		Weathering resistance	•																
		Ozone resistance	•												•				

								•	•	•															Micro-Vu
•		•				•	•		•		•	•			•	•	•	•	•	•	•				MonTech USA
						•	•		•									•								MTI Instruments
							•			•								•								MTS Systems
			•	•		•																				NDC Infrared Engineering
						•	•	•		•			•	•	•	•	•				•	•	•			Netzsch Instruments North America
					•							•														Newage Testing Instruments
						•	•			•	•	•														Nikon, Inc.
						•	•												•							ODC Tooling and Molds
							•																			OHMIC Instruments
										•	•															Ontario Die International
										•	•				•		•			•						Ontario Die International (USA)
•	•	•		•			•			•	•	•	•	•	•	•		•	•			•	•			Orec Ozone Chambers and Monitors
						•	•																			Oxford Instruments
							•																			Pacific Transducer
								•		•	•								•						•	Polymer Machinery Company
					•																					Precision Quincy Ovens
							•					•												•	•	Prescott Instruments
					•						•	•					•									PTC Instruments/PTC Metrology
												•														Q-Lab Corporation
•	•	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•		Qualitest USA, LLC
												•									•					Rex Gauge Co., Inc.
									•												•					Rockwell Automation, Inc.
•	•	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•		Satra Technology Center
														•									•	•		Schenck Corporation
										•		•					•			•						Shimadzu Scientific Instruments
							•																•	•		Sikora International Corporation

The following grid lists the types of instrumentation and test equipment offered by suppliers. Equipment for testing rubber vulcanizates has been broken down into stress/strain tests; time-dependent tests; destructive tests; durability and electrical properties. Instruments and test equipment for the chemical analysis of raw materials, vulcanized and unvulcanized rubber include spectroscopy; chromatography; thermal analysis; and microscopy.

			Starrett-Bytewise Measurement	The L.S. Starrett Company	TA Instruments, Inc.	Taber Industries	Tavdi Co., Inc.	Tensitron, Inc.	Testing Machines, Inc.	Testo, Inc.	Thermotron Industries	Thwing-Albert Instruments Co.	Tinius Olsen Testing Machine Co.	TSI Incorporated	U-Can	United Testing Systems	United Testing Systems, Inc.	Vindum Engineering, Inc.	VTEC Laboratories, Inc.
Instrumentation/equipment for the testing of rubber vulcanizates	Durability	Permeability																	
		Fluid resistance										•							
		Heat resistance (static)								•		•							•
	Destructive tests	Heat build-up																	•
		Fatigue		•		•						•			•	•			
		Abrasion	•	•	•				•						•				
		Crack and cut growth													•	•			
	Time-dependent tests	Dynamic/thermomechanical					•												
		Rebound and resilience		•			•												
		Creep and stress relaxation		•			•												
		Set					•										•		
	Stress/strain tests	Adhesion							•							•		•	
		Hardness		•					•						•	•	•	•	
		Tear		•					•				•		•	•			
		Tensile		•					•				•		•	•	•		
Physical testing of rubber	Microscopes			•															
	Dimensions		•	•										•					
	Raw materials, vulcanized and unvulcanized rubber testing		•				•	•	•	•		•		•		•	•		
	Processability testing		•									•		•	•	•			
	Electrical properties	Dissipation factor									•								
		Dielectric strength																	
		Dielectric constant																	
	Durability	Brittleness		•															
		Weathering resistance									•								
		Ozone resistance									•								

Wabash MPI	Wallace Instruments	Webber Manufacturing Co.	Williamson	Willrich Precision	Winters Instruments	Wyoming Test Fixtures, Inc.	Carl Zeiss, Inc.	Zumbach Electronics Corp.
			•	•	•			
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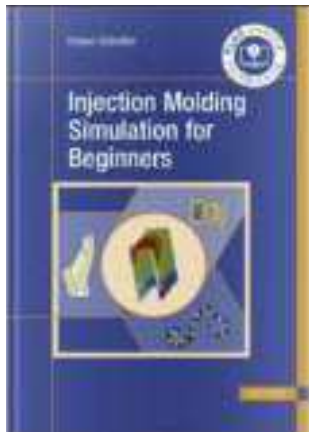
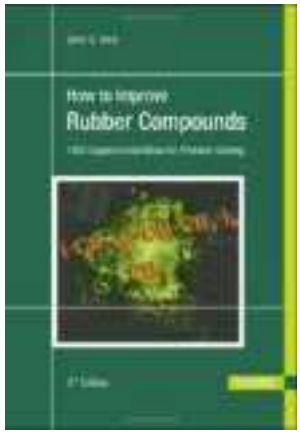
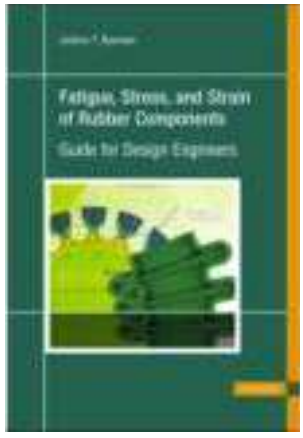
Publications



Injection Molding Simulation for Beginners
$125.00



How to Improve Rubber Compounds
$215.00



Fatigue, Stress, and Strain of Rubber Components
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www.rubberworld.com/book-store

Silicone elastomer technology course held

M.R. Toub Training is hosting an expert led course, Silicone Elastomers Technology and Fabrication, at the Kellogg West Conference Center in Pomona, CA, January 28-31. The Silicone Elastomers Technology and Fabrication course will emphasize liquid injection molding (LIM) of liquid silicone rubber (LSR), and explore extrusion and calendering of high consistency rubber (HCR). Areas of instruction will include: material selection; tool design considerations, including virtual simulation techniques in LSR design; pump, press, calender and extruder designs; the injection molding process, including machine setups, pump operation and automation; secondary processes, such as post-cure and deflashing; and special subjects, like optical silicone molding, overmolding and bonding to plastics and metal.

Rick Ziebell, R.D. Abbott's vice president of technology and Technical Fellow, will be an instructor for this university accredited course. Other instructors include Bob Pelletier, operations manager for Elmet North America; John Timmerman, CEO of Poly-Nova

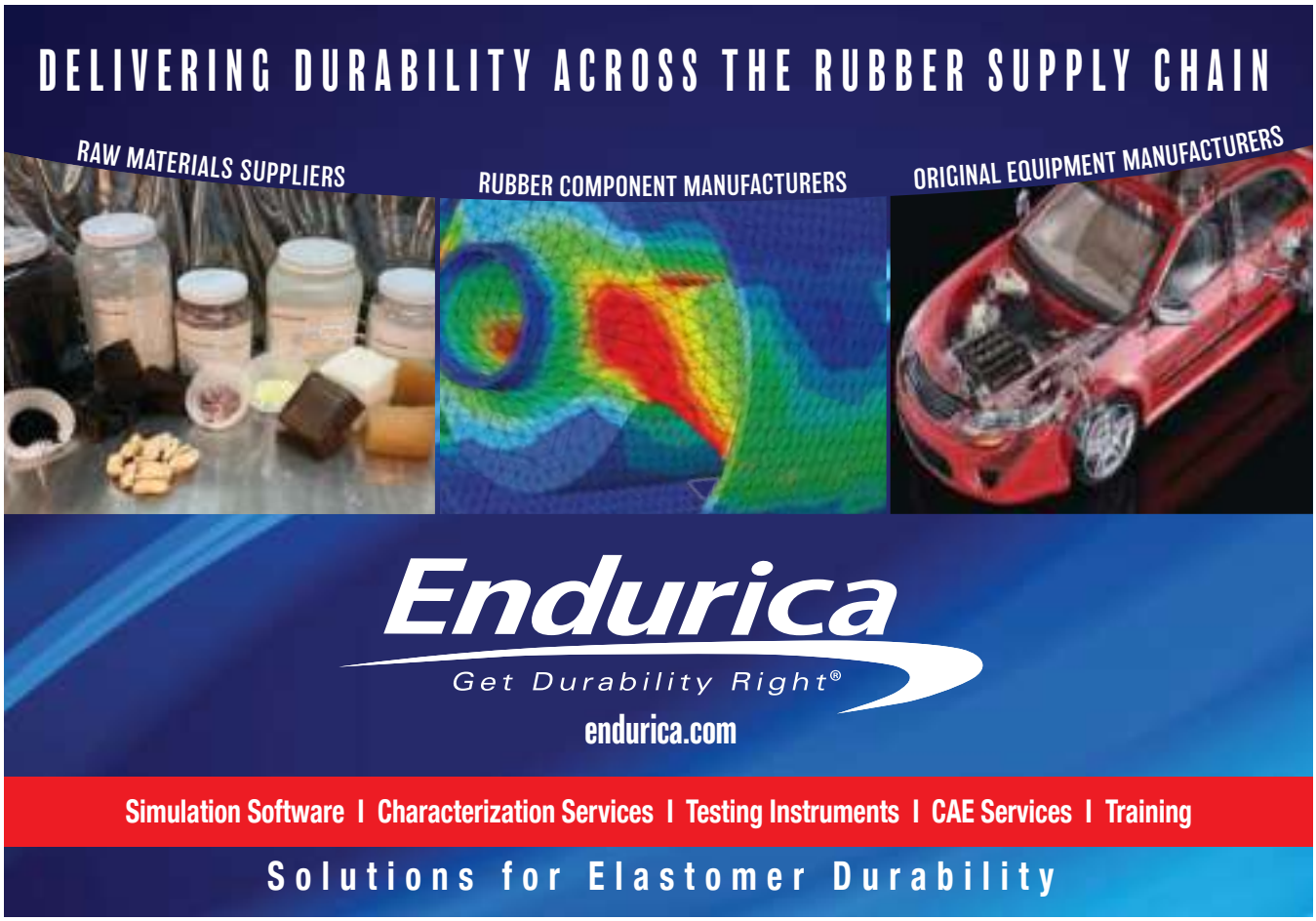
Rubber Group News

The Los Angeles Rubber Group, Inc. will hold a golf outing February, 3 at the Goose Creek Golf Club in Jurupa Valley, CA. Further information is available at www.tlargi.org.

The **Mid Atlantic Rubber and Plastics Group** elected the following to its board of directors: Joe Martin, Syensqo, chair; Evan Silo, McLube, vice chair; Bruce Rhoades, Greene Tweed, past chair and treasurer; John Meser, ARDL, co-vice chair; Bret Neese, Greene Tweed, secretary; Dilip De, Greene Tweed, area director; Gaurab Samanta, Air Products & Chemicals, board member; Stephen Vajtay, H.M. Royal, board member; and Paul Brigandi, Dow, board member. Further information is available at www.marpg.org.

The **Ohio Rubber Group** will hold its winter technical meeting January 28 at the Hilton Garden Inn in Twiinsburg, OH. Details are available at www.ohiorubbergroup.org.

The **Southern Rubber Group** will hold its winter technical meeting March 9-11 at the Embassy Suites in Greenville, SC. Details are available at www.southernrubbergroup.com.



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SEIKA

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Tel: 770-446-3116
info@seikausa.com
www.seikausa.com/rubbertesting

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Meetings

Technologies; Rick Finnie, president of M.R. Mold & Engineering; Robert Jovingo, LIMS process engineer for Shin-Etsu Silicones; and Stefan Scheibner, application technician for Arburg.

Further information and details on registration are available at www.mrtoubtraining.com.

Rubber Division offers training opportunities

The Rubber Division of the American Chemical Society offers professional development throughout the year. Training opportunities cover a wide variety of topics. Webinars are free for Rubber Division, ACS members; and all courses are free for undergraduate student members. All courses are held virtually, with the exception of a few that are scheduled to be held at partner locations.

Rubber Division members can purchase a training pass to attend all the virtual courses and webinars for one year at one price. Individual passes, as well as company level passes with tiers of up to 50 trainees are available.

February training opportunities include the following: Sponge Rubber 101 online course (February 4); Carbon Blacks Manufacturing, Properties and Applications in Rubber Compounds online course (February 6); Optimizing the Rubber Molding Process Through Advanced Simulations webinar (February 11); Managing Scientists and Engineers (February 12); Understanding Your Data online course (February 13); The Fatigue Limit of Rubber webinar (February 18); Global Regulatory Compliance in the Rubber Industry online course (February 19); Dynamic Viscoelastic Properties online course (February 20); and Elastomers for Selective Gas Separation, Including Carbon Capture webinar (February 25).

The Sponge Rubber 101 course, to be held February 4, was developed for those who currently make flexible cellular elastomer products and wish to expand their knowledge, or students wanting to gain insight into these materials and how they can be used. The course instructor is Richard Strong of Elastomeric Consulting Services LLC.

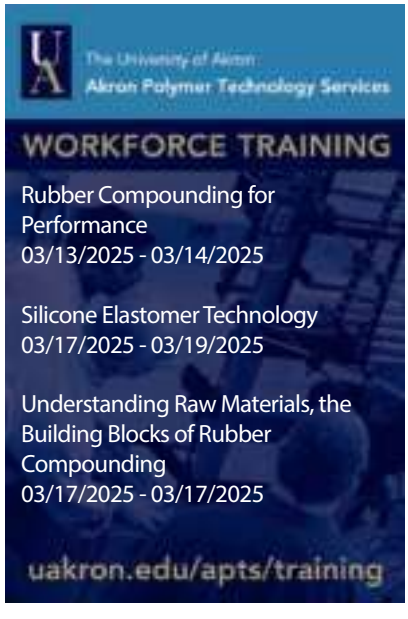
The Carbon Blacks Manufacturing, Properties and Applications in Rubber Compounds course, to be held February 6, is centered around carbon black and was designed to be advantageous for both technical and non-technical personnel working in the rubber industry. The course instructor is Irene Yurovska, vice president of Himadri Specialty Chemicals.

The Optimizing the Rubber Molding Process Through Advanced Simulations webinar, to be held February 11, will show how simulating the behavior of rubber, silicones and LSRs during the injection, transfer and compression molding process can help explain the root cause of various molding issues. The course instructor is Harshal Bhogesra of Moldex3D.

The Fatigue Limit of Rubber webinar, to be held February 18, will introduce industry professionals to the concept of fatigue threshold in elastomers and how to use this material parameter to develop highly durable rubber products. The course instructor is Will Mars, president of Endurica LLC.

The Dynamic Viscoelastic Properties course, to be held February 20, will show how tire performance can be predicted using dynamic mechanical analysis. The course instructor is Paul Merda of Akron Rubber Development Laboratory.

Further information, including details on registration and Continuing Education Units, is available at www.rubber.org.



Classified

Rubber Division
American Chemical Society

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- Green Energy & Alternative Energy Technology
- Elastomers in Medical Products
- Polymers in Aerospace & Defense
- Advances in Tires
- Urethanes
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- Rubber Characterization & Analysis
- Advances in Rubber Ingredients

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Calendar

Rubber Division
American Chemical Society

Future Meetings/ Expos

2025

Orlando **March 4-6**
Cleveland **September 8-11**

2026

Louisville **Sept. 28 - Oct. 1**

www.rubber.org

Ohio Rubber Group, Winter Technical Meeting, Hilton Garden Inn, Twinsburg, OH, www.ohiorubbergroup.org - January 28.
Rubber Division, ACS, Basics of Polymer Testing and Processing webinar, www.rubber.org - January 28.
M.R. Toub, Silicone Elastomers Technology and Fabrication course, Kellogg West Conference Center, Pomona, CA, www.mrtoubtraining.com - January 28-31.
Rubber Division, ACS, Strength and Endurance in Rubber webinar, www.rubber.org - January 29.

February

The Los Angeles Rubber Group, Inc., Golf Outing, Goose Creek Golf Club, Jurupa Valley, CA, www.tlargi.org - February 3.
Rubber Division, ACS, Sponge Rubber 101 online course, www.rubber.org - February 4.
Active Communications International, The Future of Chemical Recycling Europe 2025, Amsterdam, The Netherlands, www.wplgroup.com/aci/ - February 5-6.
Rubber Division, ACS, Carbon Black Manufacturing, Properties and Applications in Rubber Compounds online course, www.rubber.org - February 6.
University of Akron, Polymer Training Services, Polymers in Packaging course, www.uakron.edu/apts/ - February 6-7.
University of Akron, Akron Polymer Training Services, RPA Testing of Rubber Processability and Dynamic Properties online course, www.uakron.edu/apts/ - February 10-11.
Rubber Division, ACS, Optimizing Rubber Molding Process Through Advanced Simulations webinar, www.rubber.org - February 11.
University of Akron, Akron Polymer Training Services, Polymer Compounding, Formulating and Testing of Plastics, Rubber, Adhesives and Coatings course, www.uakron.edu/apts/ - February 12-14.
Rubber Division, ACS, Understanding Your Data online course, www.rubber.org - February 13.
University of Akron, Akron Polymer Training Services, Structure/Property Relationships in Polyurethanes course, www.uakron.edu/apts/ - February 13-14.
University of Akron, Akron Polymer Training Services, Rubber Technician Training course, APTS, Akron, OH, www.uakron.edu/apts/ - February 17-19.
Rubber Division, ACS, The Fatigue Limit of Rubber webinar, www.rubber.org - February 18.
University of Akron, Akron Polymer Training Services, Introduction to Color Science online course, www.uakron.edu/apts/ - February 18-19.
Rubber Division, ACS, Global Regulatory Compliance in the Rubber Industry online course, www.rubber.org - February 19.
University of Akron, Akron Polymer Training Services, Rubber Molding Processes: Principles, Troubleshooting and Mold Design online course, www.uakron.edu/apts/ - February 19-21.
Rubber Division, ACS, Dynamic Viscoelastic Properties online course, www.rubber.org - February 20.
Rubber Division, ACS, Elastomers for Selective Gas Separation, including Carbon Capture webinar, www.rubber.org - February 25.

March

Association for Rubber Products Manufacturers, Advanced Rubber Manufacturing Technologies Training, Chicago, IL, www.arpminc.org - March 3-5.
Association of Modified Asphalt Producers, 2025 AMAP March Educational Workshop, Embassy Suites by Hilton Dallas DFW Airport South, Irving, TX, www.modifiedasphalt.org - March 4-6.
JEC Group, JEC World 2025 International Composites Show, Paris-Nord Villepinte, Paris, France, www.jec-world.events - March 4-6.
Rubber Division, ACS, Spring Technical Meeting, Hilton Orlando Lake Buena Vista, Lake Buena Vista (Orlando), FL, www.rubber.org - March 4-6.
UKi Media & Events, Tire Technology Expo/Conference 2025, Hannover, Germany, www.tiretechnology-expo.com - March 4-6.
Association for Rubber Products Manufacturers, Product Liability Training, Indianapolis, IN, www.arpminc.org - March 6-8.
University of Akron, Akron Polymer Training Services, Sponge Rubber 101 online course, www.uakron.edu/apts/ - March 7.
Southern Rubber Group, 2025 Winter Technical Meeting, Embassy Suites, Greenville, SC, www.southernrubber-group.org - March 9-11.
TechnoBiz, Asian Tyre Tech Conference, Bangkok, Thailand, www.technobiz.org - March 12-13.
TechnoBiz, GRTE 6th Global Rubber Latex & Tire Expo, Bangkok International Trade & Exhibition Center, Bangkok, Thailand, www.grte-expo.com - March 12-14.
TechnoBiz, Rubber Research Fair, Bangkok International Trade & Exhibition Center, Bangkok, Thailand, www.technobiz.org - March 12-14.
University of Akron, Akron Polymer Training Services, Rubber Compounding for Performance online course, www.uakron.edu/apts/ - March 13-14.
University of Akron, Akron Polymer Training Services, Understanding Raw Materials, the Building Blocks of Rubber Compounding online course, www.uakron.edu/apts/ - March 17.
Rubber Division, ACS, How to Create and Deliver Scientific Presentations webinar, www.rubber.org - March 18.
University of Akron, Akron Polymer Training Services, Solving Problems in Rubber Compounding and Processing course, www.uakron.edu/apts/ - March 18.
Informa Markets, Plastics and Rubber Vietnam 2025, Saigon Exhibition and Convention Center, Ho Chi Minh City, Vietnam, www.plasticsvietnam.com - March 18-20.
Rubber Division, ACS, Rubber Explained online course, www.rubber.org - March 19.
University of Akron, Akron Polymer Training Services, Injection Molding Certificate Program online course, www.uakron.edu/apts/ - March 24-28.
Rubber Division, American Chemical Society, Green Tire Chemistry: Optimizing the Tire Magic Triangle through Tread Chemistry webinar, www.rubber.org - March 27.
University of Akron, Akron Polymer Training Services, Elastomer Molding Technology online course, www.uakron.edu/apts/ - March 26-28.

April

University of Akron, Akron Polymer Training Services, Polymer Science for Engineers online course, www.uakron.edu/apts/ - April 1-3.
International Institute of Synthetic Rubber Proudcers (IISRP), 65th Annual General Meeting, Hyatt Centric The Liberties, Dublin, Ireland, www.iisrp.com - April 7-10.

Upgraded automated tensile testing

This provider of automated tensile testing machines for the rubber and plastics industries has upgraded its flagship CubeOne machine and introduced the CubeTen, specifically designed for plastics testing. These advancements are said to set new benchmarks for precision, efficiency and compliance in ASTM and ISO material testing.

The upgraded CubeOne now includes automated thickness measurement and ambient temperature control, enhancing the consistency and reliability of test data. Additionally, the introduction of trouser tear sample testing broadens the machine's versatility, while ISO sample setups for tensile testing and CE certification ensure compliance with global standards, according to the company.

The CubeTen is a 10 kN machine specifically designed to handle all ASTM D638 and ISO sample standards. Equipped with automated thickness and width measurement, it offers users a choice between an automated physical extensometer or an advanced vision system for elongation measurement. With multiple configurations available, the CubeTen can accommodate testing up to 1,000% elongation, making it an adaptable and powerful solution for a wide range of applications, according to the firm. By eliminating human error and reducing data variations, the CubeTen is said to empower manufacturers to make more accurate adjustments to compounds with less risk.

The company is said to develop advanced equipment and software to help manufacturers eliminate human error, reduce data variations and recover valuable time. These solutions streamline compound adjustments, reduce risk and make testing processes faster and easier, according to the company. (*LabsCubed*)

www.labscubed.com

Polymer prototyping

Expertise in polymer prototyping and scale-up is provided by this company, including expertise in low volume molding and extrusion manufacturing. The company is said to be a trusted technical advisor guiding customers through every step of the molding process, from conceptualization to final product. The firm is said to work closely with customers to create prototypes that not only look great, but also perform exceptionally, ensuring that every aspect of the design is tested and perfected before moving to production. The team is equipped to take customer projects from prototyping to production, ensuring that the transition is smooth and efficient, without any compromise on the quality or performance of their parts, according to the company. Prototyping is offered for compression molding, injection molding and extrusion molding. (*Akron Rubber Development Laboratory*)

www.www.ardl.com

Automated melt feeding

The Contifeed extruder is flanged to the bottom of the channel of its capillary rheometer. For the user of rubber bits and chunks, it is said to make filling the rheometer much easier and air bubble free. It pre-plasticizes the material independent of the actual measurement, and thereby improves reproducibility, according to the company. As rubber can easily deteriorate under temperature, bringing the material quickly up to the desired temperature is said to be important, and time savings of up to 50% can be useful for productivity and to keep the material stable up to the point of measuring it, according to the company. (*Goettfert*)

www.goettfert.com

Durometer test block kit

The Model TBK-A type A durometer test block kit consists of seven color-coded test blocks, each of which measures 1/4" x 2" x 2". The blocks are calibrated at the manufacturer and correspond to type A durometer values of 30 to 90 in increments of 10. The kit comes in a sturdy carrying case with the true readings for each block on the inside cover of the case. A certificate of calibration is also included for users who need documentation of traceability to NIST. The company's durometers are available in ASTM D 2240 durometer types A, B, C, D, E, DO, O, OO, OOO, OOO-S, M, R, as well as JIS, DIN ISO, Asker and other custom durometer scales. (*Rex Gauge*)

www.durometer.com

Conveying test laboratory

Comprehensive testing capabilities are provided to evaluate pneumatic conveying solutions for a variety of materials. The state-of-the-art facility is equipped with multiple hoppers and conveyors, allowing for demonstration of vacuum, dilute, semi-dense and dense phase conveying methods. With pipe sizes ranging from 2.5" to 8" and conveyance lengths between 138' and 569', the company's test laboratory features four positive displacement blowers and compressed air systems that can be fine tuned to adjust pressures and airflow. This enables the firm to simulate various conveying conditions to meet specific requirements. Testing services include data collection and reporting on key performance metrics. (*Cyclonaire*)

www.cyclonaire.com

Relaxation, creep tester

The EB 32 automatic relaxation and creep tester has a liquid circulator for cooling and can cycle between -40°C and +200°C, with the same temperature in all three test stations.

The EB 32 can perform testing of rubber and plastics according to ISO 188 method A, ISO 3384-1 method A and B, ISO 3384-2, ISO 6914 method A, ISO 899-14 and ISO 899-2 with some modification (no extensometer required). The original model EB 18-II-3 also has three test stations with individual control of each station. The temperature in each cell can also be controlled individually, between +40°C and +200°C (up to +300°C in the HT version). The EB 18-II-3 can perform testing according to the same standards, except ISO 3384-1 method B and ISO 3384-2. Both models have test rigs that are based on the company's relaxation rig EB 02, but here the lowering and raising of the rigs, as well as the compression or elongation of the samples, are motor driven. (*Elastocon*)

www.elastocon.com

Rapid plastimeter upgrade

A software upgrade is available for the Mk V (P14) rapid plastimeter. This upgrade introduces a software system designed to improve efficiency, enhance traceability and analytics, and integrate with existing laboratory and enterprise systems, according to the company. The Mk V (P14) is said to be a trusted solution for measuring the plasticity of unvulcanized rubber and determining the plasticity retention index (PRI) when used with the company's aging chamber (O14). It is currently available as a standard or variable temperature model, both with PC connectivity. Additional accessories such as printers and data input terminals are also available to suit different laboratory needs. The software builds on this foundation, offering an easy to use, fully integrated system that centralizes data management, according to the firm. By connecting multiple machines in the laboratory to a single server, it is said to eliminate the need for individual software installations and streamlines the testing process. (*Wallace Instruments*)

www.wallaceinstruments.com

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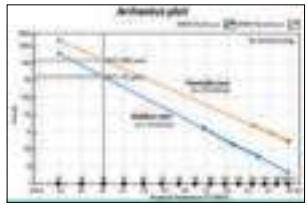

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Carbon black content tester

The QualiCBCT-200 carbon black content tester is said to be an advanced instrument designed to meet the rigorous demands of the rubber, plastics and polymer industries. By

delivering precise, consistent and reliable measurements, the QualiCBCT-200 is said to set a new benchmark for ensuring material performance and quality control. Carbon black is said to play a critical role in determining the properties of rubber and plastic materials, including strength, flexibility, conductivity and UV resistance. Variations in carbon black content can compromise product performance, leading to reduced durability and inconsistent quality. Accurate testing is said to be essential for manufacturers to optimize processes, ensure compliance with international standards and deliver reliable, high quality products. The QualiCBCT-200 is said to address these challenges with advanced technology, making it an indispensable tool for testing laboratories and quality control departments. (*Qualitest*)

www.worldoftest.com

Long range extensometer

This company has developed a long range extensometer which is used to calculate elongation based on the overall distance moved. This easy to use, practical fixture provides a long travel distance, critical for rubber and elastomer applications, according to the company. The long range extensometer pictured is the MMS-EXT-1100M on the Starrett Force MMS-5000-L3 material testing system, designed for stress-strain testing for samples up to 5,000 newtons (1,100 pounds) and up to 1,100 mm (43 inches) in total travel length. The company provides services that include installation; hardware and software training; calibration and preventive maintenance; retrofits, upgrades and refurbishments; and applications engineering. NIST traceable documentation is offered for all calibration artifacts and standards. (*L.S. Starrett*)

www.starrettmetrology.com

Capillary rheometer

The Rheograph is said to be an innovative high pressure capillary rheometer according to DIN 54811 for determining the flow behavior and viscosity of thermoplastics and rubbers. This device is said to be the result of more than 40 years of experience gained from numerous generations of rheological capillary rheometry. The device is used to determine the flow behavior and viscosity of thermoplastics and rubbers. In the process, plastic granulate or powder is melted in the heated test cylinder and pressed out of the capillary with a test piston and a constant force or speed. The Rheograph is used in research and development, as well as in quality and incoming goods control. The signal from the pressure transducers on the Rheograph can be displayed with a resolution of 0.005 % of the nominal range, i.e., 0.1 bar for a 2,000 bar transducer. All of the company's pressure transducers are specially recalibrated via a software-controlled system to achieve the highest accuracy. To ensure traceability to ISO 9001, DKD certified test equipment is used for this calibration. The PC program LabRheo is used to set the parameters, carry out the measurements and evaluate the raw data with the aid of databases. (*Goettfert*)

www.goettfert.com

Stress relaxation testing

An automatic relaxation and creep tester, a cell oven model for stress relaxation tests up to +350°C, a cell oven specially designed for stress relaxation tests of rubber according to ASTM D6147 and a cell aging oven for temperatures up to +350°C have been introduced by the company. The automatic relaxation and creep tester, EB 32, has a liquid circulator for cooling and can cycle temperatures between -40°C and +200°C. The EB 38 cell oven for stress relaxation tests has a temperature range from +40°C to +350°C. The EB 39 cell oven (pictured) is specially designed for stress relaxation tests of rubber according to ASTM D6147. The oven has six cells, each with individual temperatures and control of the air exchange rate. The cell aging oven EB 37 performs accelerated aging and heat resistance tests of rubber and plastic materials according to ISO 188 method A, IEC 60811-401, IEC 60216-4-3 and DIN 53508 p.6.4 under controlled conditions at temperatures up to +350°C. (*Elastocon*)

www.elastocon.com

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Digital hardness tester

The DRIVE Series digital durometer hardness tester is available in durometer A, D, DO and OO scales. This state-of-the-art testing equipment is said to set a new standard for precision, reliability and user friendliness in measuring the hardness of rubber materials. Key features of the DRIVE Series include the highest accuracy with high resolution sensor and frictionless mechanical construction to ensure precision measurements, according to the company. Other beneficial aspects involve storing up to 60 measurements in the memory storage, humidity and temperature sensors as standard configuration, user friendly display that takes advantage of a large 25 x 50 mm digital display for convenient readability and long lasting battery life where it uses a rechargeable lithium battery for extended usage. A comprehensive range of accessories is offered by the company, including specialized manual holders said to be meticulously crafted for testing on round surfaces. (*Qualitest*)

www.worldoftest.com

Rubber measurement

This manufacturer of laser based measurement systems offers the Profile360 in-line, real time laser measurement system with 30 mm through 100 mm field of view. The Profile360 continuously monitors key profile dimensions in complex shapes, such as rubber, plastic, ceramic, wood-plastic composite extrusions and roll formed metal profiles to assure quality and avoid the high cost of defects, according to the company. The system acquires thousands of data points around the profile and matches them to a CAD template, where key measurement parameters such as width, thickness, gap, radius and angle are extracted. Measurement parameters are compared to allowable control limits and displayed on the operator□s terminal with a pass/caution/fail status indicator. The Profile360 runs at rates up to 20 profiles per second. The system is available in standard sizes, and can be custom built for almost any size and shape. (*Starrett-Bytewise*)

www.starrett.com

Composition analysis

For industrial processors and manufacturers, a composition analyzer is said to be a crucial instrument in any laboratory or production line setting. These analyzers not only can test the makeup, efficacy and quality of products, but also assist in evaluating a host of constituents besides moisture. An NIR composition analyzer can produce accurate test results in a fraction of the time of traditional methods. Instruments can take a reading over the test subject or product stream for online models, as well as desktop models like the BS-F1700 compact fiber beat sensor. Light is transmitted through the sample if translucent or transparent, or reflected off the process sample with models that measure the amount of light absorbed by the subject. The absorbance readings are then converted into component values by analyzing the composition of the subject based on the instrument's exact calibrations. NIR spectroscopy provides non-destructive laboratory quality readings in real time. Often, this is said to require no sample preparation and no contact with the sample. These instruments are said to offer precise, virtually instant readings of moisture, composition analysis, even full spectrum composition. This kind of full spectrum testing allows users to measure a broad range of targeted factors in real time, with only initial instrument calibration necessary. Accurate readings are nearly instantaneous, which is said to dramatically reduce the time needed for each test cycle. Simplifying the process also lowers any ancillary costs related to testing. Since NIR composition analyzers are designed with speed and accuracy in mind, there is said to be no learning curve for sample preparation. For most models, there is no sample to prepare. In some cases, tests can be performed on the production line without the risk of user error. (*Kett*)

www.kett.com

Rubber aging ovens

The high precision cell oven, cabinet oven and test tube oven for the aging of materials in compliance with ISO 188, IEC 811 and other standards in the sector feature very small temperature variations in space and time, low or high air speeds and management of air changes. It is said to have been demonstrated that good control of these parameters is very important to ensure good repeatability and reproducibility of aging test results. The most common way to investigate the effects of aging on rubber and plastics is said to be to perform tensile and hardness tests on aged specimens. Temperature accuracy is very important, as temperature errors of 1°C correspond to an error of about 10% in terms of aging time. The cell oven is available with four to six single temperature or independent cells in the 40°C to 300°C range, which will soon be extended up to 350°C. The cabinet oven instead is said to be ideal for finished products or large specimens, and is available in various models with specific benefits in the 40°C to 300°C range. Finally, the test tube oven is available with 24 tubes at a single temperature and 4 x 6 tubes at different temperatures in the 40°C to 300°C range. (*Elastocon*)

www.elastocon.com

Extrusion crosshead

The Micro Medical is an extrusion crosshead that uses micro-fine adjustment screws for precise concentricity adjustment. The precision of concentricity reaches 0.008" or finer per revolution. This single point concentricity adjustment is designed for the extrusion of thin-walled and precision ID/OD medical tubing. One adjustment bolt controls 360° of adjustment. Features of the Micro Medical crosshead include a patented cam-lock deflector for quick changeovers, with a residence time of one minute at .5 pound/hour material flow, optimized usage with extruders measuring 1/2" and 3/4", and a maximum die ID of .250". Additionally, the Micro Medical crosshead is said to offer great flexibility to its users. It not only accepts both vacuum and micro-air accessories, but is also said to be ideal for pressure and sleeving applications. Fluoropolymer designs are available upon request. (*Guill Tool & Engineering*)

www.guill.com

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.

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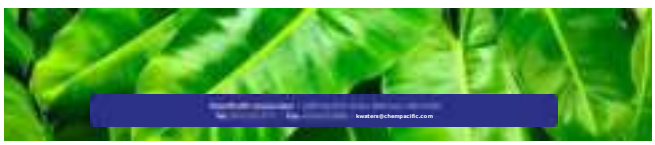

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EXR199 – 3 1/2" Davis Standard Rubber Extruder, 15: 1 L/D, Thermatic II
EXR190 – 75mm Davis Standard Rubber Extruder Model 75mm 25H

MIXERS:
PLA668 – Farrel Banbury Mixer, #11D, 1000 HP DC Drive
PLA628 – Farrel Banbury Mixer, #9 w/Ram, Hydraulics and Heat Exchanger
PLA629 – Farrel Banbury Mixer, #11, 600 HP AC

ROLLING MILLS:
MSC1488 – 2 Roll Lab Mill, 6" Dia x 12" W, AC Motor
MSC1786 – Reliable Rubber& Plastic Machy 8" 2 Roll Mill For Lab
MSC2387 – Erie 42"X18" 2 Roll Mill w/ 125 HP Fincor DC Drive
PLA668.1 – 84" Stewart Bolling, 24" Roll Mill, 200 HP DC Motor/Drive

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Healthcare TPE materials

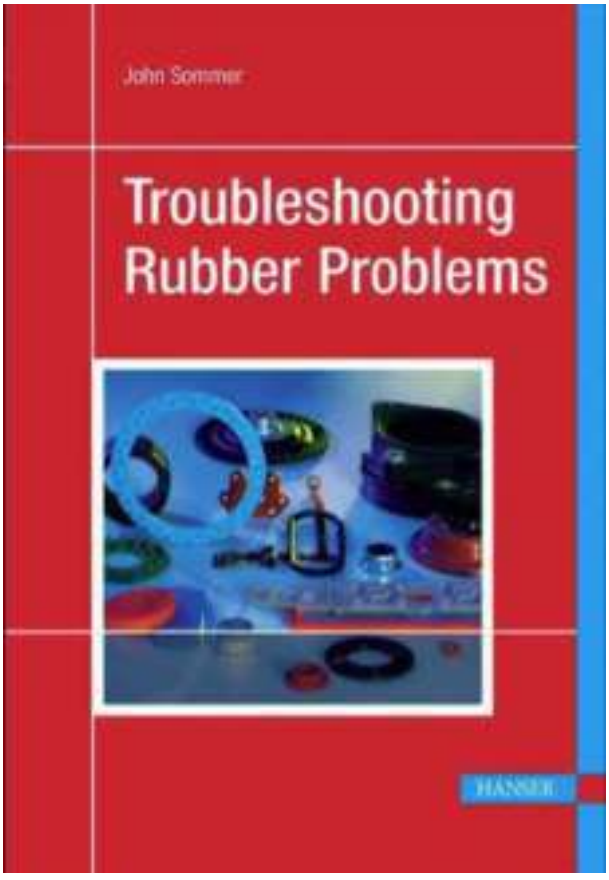
TPE Healthcare has selected this company's thermoplastic elastomers for its TPE tourniquets and TPE Esmark bandages, as the materials are said to ensure superior performance, high quality and reliability standards in critical medical and healthcare applications. The TPE tourniquet and TPE Esmark bandages are said to be renowned for their single use design, which also supports ESG criteria by enhancing hygiene, reducing cross-contamination and promoting sustainable medical practices, according to the company. The company's materials are said to have significantly enhanced the performance of the TPE Healthcare medical products, including the TPE tourniquet and Esmark bandages. Their innovative TPE solutions and services are said to offer an ideal blend of elasticity, safety and comfort, delivering reliable and superior functionality, according to the company. Key advantages of the TPE tourniquet and TPE Esmark bandages are said to include superior elasticity that provides reliable compression and flexibility, ensuring optimal performance and patient comfort; enhanced safety; single use hygiene applications; durability and tear resistance; soft touch and comfort; and innovative design. (*Kraiburg TPE Technology*)

www.kraiburg-tpe.com

Custom color dispersion

A custom colorant is being supplied for Arburg□s injection molding cell at the MD&M West conference. The NovaSperse color dispersion will match Arburg□s teal logo. The silicone part being molded is a Tighty cable tie made of a high consistency rubber (HCR) for medical device sterilization. The cycle time is 45 seconds, and the part weight is 3.45 grams. The ACH Solution TurnMix HTV (high temperature vulcanized) dosing system is used for continuous material feed. The NovaSperse color dispersions are supplied for HTV, LSR and room temperature vulcanizing (RTV) silicone. The company is said to offer three-day turnarounds for most silicone dispersions, and provides NovaSperse healthcare dispersions, which are free of heavy metals, phthalates and bisphenol A, and are tested to meet USP Class VI standards. The company specializes in modifiers, additives and colors for silicone; custom liquids silicone rubber (LSR) compounds; and highly specialized elastomer products. The firm's elastomer technologists, compounders and pigment specialists are said to work closely with distributor R.D. Abbott's materials scientists and application engineers to create fully customized elastomer solutions. (*NovationSi*)

www.novationsi.com



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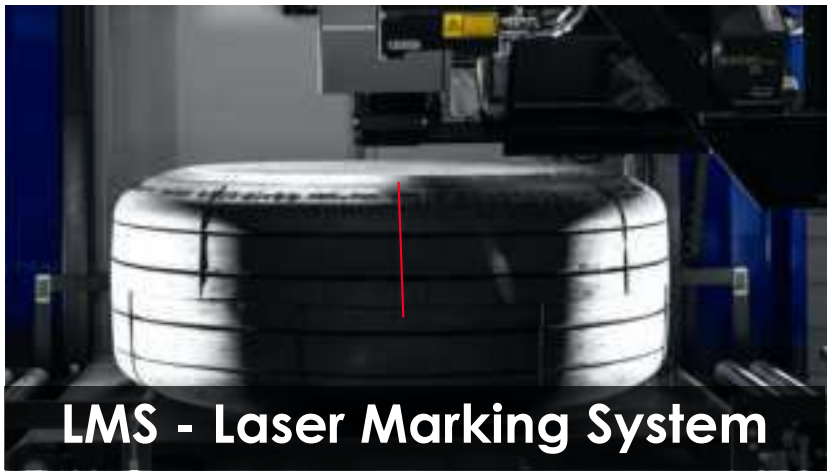

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The L.S. Starrett Company (www.starrettmetrology.com), a leading global manufacturer, offers a wide range of metrology solutions, including force measurement and material testing systems, optical comparators, vision systems, custom metrology solutions, and hundreds of precision measuring tools and gages, in addition to electronic durometers and hardness testing systems. The **Starrett-Bytewise** division offers profile laser measurement systems for tire manufacturing and other industries. The Starrett line also includes band saw blades that are ideal for cutting steel belted tires, including carbide grit and high-carbon steel blades.

The **Starrett Metrology** website highlights Starrett force measurement and material testing systems, as well as optical comparators, vision systems and custom metrology solutions. The site includes comprehensive product information, a video library, access to catalogs, and brochures and support manuals. A link is also provided to the Starrett Industrial website which includes Bytewise laser measurement equipment, precision hand tools and gages, saw blade solutions, and more.

Starrett Force and Material Testing Systems, which are engineered and manufactured in the U.S.A., feature advanced and easy-to-use solutions for testing compression, creep, puncture and tensile strength in rubber and elastomer applications. The systems have a flexible architecture that enables the range of Starrett force and material testing software programs to be compatible with its different test frames. This interchangeable system architecture increases application versatility, providing users a wider range of solutions from basic to advanced, for their specific force and material testing needs. Digital force gages are also available for handheld use, as well as manual or motorized force stands. A full line of force gage grips and accessories is also offered.

Starrett continually innovates to meet customer challenges and has developed a long-range extensometer which is used to calculate elongation based on the overall distance moved. This easy-to-use, practical fixture provides a long travel distance, critical for rubber and elastomer applications.

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UTPVision (https://usa.utpvision.com) is a leading provider of turnkey vision inspection systems for rubber and plastic parts. With long experience in a variety of industries, UTPVision can develop solutions for virtually any application, precisely tailored to customer needs.

UTPVision's automated vision inspection and sorting systems are designed for real-time quality monitoring and statistical process control. They are able to identify critical surface defects (such as cuts, cracks, flashes, burrs, pitting, voids, blisters, stains, discoloration, foreign materials, etc.) and to perform extremely accurate dimensional measurements (lengths, heights, diameters, radii, cross-sections, concentricity, ovality, etc.) on different types of products.

UTPVision's systems feature best-in-class optical, electronic and mechanical components; but what makes them unique is the innovative artificial intelligence software, which twists the traditional image processing methods based on manually set thresholds. With AI (artificial intelligence) technology, the operator needs to collect a series of significant defective samples and the machine will identify "objects" (with defined shapes) and surface defects (with undefined shapes) just by looking at sample images.

UTPVision's systems can improve production quality by detecting manufacturing defects and eliminating inspection errors, leading to increased productivity and reduced costs from day one.

Send in samples for a free feasibility study. UTPVision specialists will be able to recommend the best machine configuration based on a customer's specific quality needs, production rates and budget.

Rex Gauge (www.durometer.com) has been specializing in quality durometers made in the U.S.A. for over 80 years. Rex Gauge prides itself on the fact that the durometers are easy and convenient to use, as well as durable and extremely accurate. The company's personnel are truly professionals in their trade, as is evident in the fine workmanship and quality that go into each gauge, from the first calibration to the final approval before delivery to the customer.

Durometer models featured on the company's informative website include various types. Type A durometers are used for soft rubber, plastics, elastomers and printers' rolls. Type D durometers are used for hard rubber, plastics and thermoplastics, flooring and bowling balls. Type B durometers are used for hard elastomers, hard plastics, paper, fibrous materials and materials above 93A durometer hardness. Type C durometers are used for medium hard materials, plastics and elastomers. Type DO durometers are used for dense granulars and textile windings. Type O durometers are used for very soft elastomers, textile windings and granular materials below 20A durometer hardness. Type OO durometers are used for light foams and sponge rubber gels. Type OOO durometers are used for ultra soft gels and sponge rubber. Type M durometers are used for checking materials thinner than .250" (as thin as .050").

Durometer accessories provided by Rex Gauge include operating stands, test block kits, constant load weights, o-ring fixturing, calibrators, and more.

The durometer is the international standard for the hardness measurement of rubber, plastic and other non-metallic materials. Durometers are described in the ASTM specification D-2240, the recognized specification for the instrument and test procedure.

Rex Gauge offers the Model DD-5 digital durometer featuring the DuroTimer for performing timed hardness testing. The DD-5 is equipped with an internal adjustable time and onscreen countdown that can be set to desired elapsed time for 0-30 seconds. When enabled, the time function will be automatically activated when the presser foot meets the test specimen.

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

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Hoto Instruments provides an e-commerce website (www.HotoDirect.com) to provide quick access to top quality measurement instruments at the lowest prices to meet the needs of engineers and quality control personnel across a broad range of industries. All of Hoto Instruments' instruments are warranted for one year.

Durometers are supplied by Hoto Instruments, along with stroboscopes and tachometers. A durometer is an instrument used to measure the range of hardness from soft rubbers and polymers to hard plastics. Hardness measurements are used for quality control or comparison purposes. Durometers with varying levels of sophistication and accuracy may be used, depending upon the application. Durometer models available from Hoto Instruments include handheld analog and digital durometers, manual and motorized durometer stands, auto durometers and data acquisition software.

Hoto Instruments' knowledgeable sales and engineering staff is ready to help with stock instruments or custom applications. Send Hoto Instruments your sample to test and the firm will recommend a system to deliver consistent results. Customers may trade in an old instrument for a discount on a new one. Most items from Hoto Instruments ship the same day from stock. Hoto Instruments has met the rigorous standards of business operation for ISO 9001 certification to assure customers of the firm' s commitment to quality procedures and continuous improvement.

In addition to ISO 9001, Hoto Instruments has achieved ISO/IEC 17025 laboratory accreditation. This is further quality assurance that all calibrations and repairs done in Hoto Instruments' laboratory are performed using properly calibrated equipment by proficient and experienced personnel.

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People in the News

Sanyu USA names Mark Beaver president

Sanyu USA, a supplier of rubber injection molding machines, mixers and extruders, announced the promotion of **Mark Beaver** to president. This appointment follows his 18 years of service to the company, during which he played a significant role in expanding the company's footprint, forging strategic partnerships and providing technical service to existing customers. Beaver succeeds **Katsumi Ishida**, who served as president for 14 years. Ishida will continue to support Sanyu USA in an advisory capacity.

Management

Don Metzelaar was named vice president, global manufacturing and supply chain, for Goodyear Tire & Rubber, reporting to CEO and President **Mark Stewart**.

NewAge Industries, parent company of AdvantaPure and NewAge Performance Products, appointed **Mary Marcus** to the position of CEO.

Sales

Sumitomo Rubber North America, a subsidiary of Sumitomo Rubber Industries, Ltd., has promoted **Wayne Horne** to national sales manager.

Michael Vandel was promoted to OEM sales manager, agriculture, for Maxam Tire. In this new role, Vandel will leverage his extensive industry experience to expand Maxam's presence with OEMs and drive growth within the company's agriculture product line.

Luigi Tondi was appointed sales director for KraussMaffei Italy.

Rishi Raj Singh will head the OEM Asia Pacific area for BKT (Balkrishna Industries), a multinational off-highway tire manufacturer. **Aniruddha Pandit** will head the Africa and Middle East area.

Daniel Greear was appointed director of consumer sales, central region, and **Richey Aiken** was named director of consumer sales, east region, for API Tire.

Mark Beaver
Sanyu USA

Don Metzelaar
Goodyear

Julian Kätzlmeier was appointed sales director EMEA for the Nordson Polymer Processing Systems BKG product line.

Associations

The U.S. Tire Manufacturers Association (USTMA) announced the election of three new members to its board of directors, including **Scott Damon**, CEO of Bridgestone West (Americas and EMEA) and group president of Bridgestone Americas; **Ryan Waldron**, president of Goodyear Tire & Rubber's Americas region; and **Brad Heim**, vice president, product development Americas, for Goodyear Tire & Rubber.

Wayne Horne
Sumitomo Rubber NA

Michael Vandel
Maxam Tire

ACE Laboratories appoints business development manager

ACE Laboratories, an independent ISO/IEC 17025 accredited laboratory for rubber, silicone and polymer testing and development, announces the appointment of **Mike McDonnell** as business development manager.

With over 20 years of experience in elastomers, plastics and distribution, McDonnell has held key roles in specialty polymers, custom mixing and laboratory services, earning recognition as a highly regarded professional in the industry for his relationship focused approach. His proven expertise in sales, project management and exceptional customer relations positions him as an outstanding addition to ACE Laboratories.

"Mike truly reflects our core values," said **Erick Sharp**, founder and CEO of ACE Laboratories. "His depth of experience and ability to build lasting relationships will be essential to support our continued growth and strengthen our partnerships worldwide."

2024 was a milestone year for ACE Laboratories. The company grew its global customer base by more than 20% and completed a significant expansion, adding 7,500 square feet of laboratory space for its new dynamic testing capabilities. ACE also broadened its scope of accreditation.

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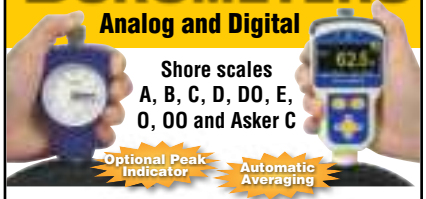

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