Dedicated to encouraging greater usage of high quality, cost effective asphalt pavements containing recycled tire rubber.
What is the RPA?

The RPA is a non-profit industry association comprised of:

• Crumb Rubber Producers
• Contractors Who Use Crumb Rubber in Pavements
• Equipment Manufacturers
• Consulting Firms
• Testing Laboratories
Where are the RPA members?

Australia, Austria, Canada, Germany, Italy, Mexico, Netherlands, Portugal, Saudi Arabia, South Africa, South Korea, Sweden, United Kingdom, and United States
TECHNOLOGY TRANSFER THROUGH

- Seminars
- Field Tours
- Sponsoring Research
- RPA Newsletters
- Publishing Reports
- Reference Library
- Monitoring Tire Laws
- Provide Guidance for Agencies in Use of CRM Asphalt
Who advises the RPA?

The RPA Technical Advisory Board is made up of the nation’s leading experts on crumb rubber and rubber modified asphalt pavements.

George Way - Chairman
Retired Arizona DOT

Dr. Kamil Kaloush – Vice Chairman
Arizona State University
Technical Advisory Board cont.

- **Ali Zareh**, Arizona DOT
- **Jack Van Kirk**, Basic Resources Inc.
- **Joe Cano**, Bureau of Indian Affairs
- **Serji Amirkhanian**, Clemson University (Retired)
- **Jorge Sousa**, Consulpav
- **Dr. H. Barry Takallou**, CRM
- **Byron Lord**, Dep. Director, Office of Pavement Technology, FHWA

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Technical Advisory Board cont.

- **Anne Stonex**, MACTEC Engineering & Consulting
- **Maghsoud Tahmoressi**, PaveTex Engineering and Testing, Inc.
- **Larry Smith**, Florida DOT Materials Engineer (retired)
- **Douglas A. Bernard**, Quixote Transportation Safety
- **Mark Belshe**, Rubber Pavements Association
- **Shakir Shatnawi**, Caltrans (retired)
- **John Epps**, Texas A&M University
- **Larry Smith**, Florida DOT Materials Engineer (retired)
- **K.C. Evans**, Texas DOT
Technical Advisory Board cont.

- **Dale Rand**, Texas DOT
- **Rudy Jimenez**, University of Arizona
- **Peter Sebaaly**, University of Nevada Reno
- **Hussain Bahia**, University of Wisconsin
Does RPA recommend the use of all paving material containing crumb rubber from scrap tires?

- RPA has strict criteria for paving materials and processes the association recommends or promotes
- Non-patented, non-proprietary processes
Paving materials must be proven through the following:

- Extensive laboratory research
- Construction evaluation research
- Successful field performance in all climates
What products currently meet the RPA criteria?

Asphalt-Rubber as defined by ASTM D8

“Asphalt-Rubber is a blend of asphalt cement, reclaimed tire rubber and certain additives, in which the rubber component is at least 15% by weight of the total blend and has reacted in the hot asphalt cement sufficiently to cause swelling of the rubber particles.”
RPA sponsored Research

Oregon State University - PI R. G. Hicks Ph.D.

- Quality Control Manual for A-R Binders.
- Rubber Modified Binder Specification Evaluation (Caltrans).
More RPA Projects

- Mechanistic Overlay Design Method for Hot Mix.
- Influence of Aging on Fatigue Behavior.
- Project Reviews for AZ, CA, and TX
- FHWA Recap of CRM Summary of Practices
Standards & Specifications Development

• ASTM – Standard Guide for OGFC, A-R Bituminous Surface Treatments
• Performance Based Specifications for Asphalt Rubber Binder & Mixes
• Asphalt-Rubber Chip Seals
Aged Project Performance Evaluations

- Arizona
- California
- Texas
Why Do We Modify Asphalt?

• Unmodified asphalt can be sensitive to temperature variations
  – Brittle in cold temperatures
    • Thermal Cracks
  – Softens in high temperatures
    • Rutting and surface deformations
• Modification makes asphalt more temperature stable
Ways to Modify Asphalt

- Air Blowing
- Flux Oils
- PPA - Polyphosphoric acid
- SBR Latex
- SBS – Styrene Butadiene Styrene
  - Very common usage
  - Shortage of polymers in 2008
- Crumb Rubber derived from Scrap Tires
Why Put Rubber In Asphalt?

• The purpose is not to get rid of tires but to enhance the performance of the binder and mix.
• Tires have great engineering properties, they don’t crack in the cold or melt in the heat. They have a wider range of performance temperatures than asphalt.
• Make asphalt pavements that perform like tires.
Why Put Rubber In Asphalt?

Tire rubber is an engineering tool to:

- Reduce cracking
- Increase asphalt content and asphalt film thickness
- Prevent bleeding, flushing, and drain-down
- An aid to increase performance life
- Save Money in reduced maintenance
- Save money in project cost through reduced thickness
- Increase safety and reduce noise
Rubberized Asphalt, Rubber Modified Asphalt, and Asphalt-Rubber

- Methods of Combining Components

  - Wet Process – Rubber is added to liquid asphalt before mixing at the hot plant, rubber is wet before mixing with aggregates.

  - Dry Process - Rubber is added at the same time the asphalt and aggregate are mixed, rubber is dry before mixing with the aggregate and liquid asphalt.
Adding Rubber to Asphalt

Wet Process - with agitation
- Adding graded rubber to asphalt and mixing and reacting requires agitation due to size and large amount of rubber used.

Wet Process – no agitation
- Adding fine rubber typically < #30 to asphalt at the terminal—generally little or no agitation. Often referred to as terminal blend.

Dry Process
- Use CRM as substitute for 1-3% of Aggregate by mixing crumb rubber directly with aggregate
Wet Process-with Agitation

- Method of modifying asphalt cement with CRM and other components
- Most widely used in California and Arizona, Texas. Also used in Florida, Nevada, Nebraska, New Jersey, Massachusetts, Canada.
- Contains 18-22 % crumb rubber – agency spec vary
- Particle size ranges from # 8 to #10 top size
Wet Process-No Agitation

- Contains from <5%-18 % crumb rubber
- Particle size ranges from 40 to 80 mesh top size
- Can also contain polymers
- Used in Arizona, California, Florida, Texas, and several northeastern states
- Often referred to as Terminal Blend
Asphalt Rubber vs Terminal Blend

**Advantages**
- Open technology
- Use of high binder contents
- Excellent Ageing
- Demonstrated ability to resist reflective cracking
- Long documented history of performance
- Cost effective from life cycle perspective
- Uses lots of crumb rubber

**Advantages**
- Performs better than neat asphalt
- Easy to use
- Uses crumb rubber but less than asphalt rubber
- Can be performance graded
- Does not require special equipment in field.
Asphalt Rubber History

• Developed in 1960’s by City of Phoenix Engineer
• Referred to as the “wet process” or McDonald Process
• Large amount of crumb rubber used as a Binder Modifier
• Needs constant agitation
• ASTM definition – 15% rubber minimum
Asphalt Rubber

80 % Asphalt

20 % Ground Tire Rubber
PRODUCTS AND PROCESSES IN THE PUBLIC DOMAIN

PATENTS PROPRIETARY PRODUCTS SECRETS

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STATE RESEARCH
ROAD BUILT WITH
16,400 RECYCLED TIRES
84TH TO 56TH STREET

210,920 SCRAP TIRES BEING USED TO SURFACE NEXT 20 MILES
Every Mile of Asphalt Rubber Road Recycles 4000 Waste Tires
In the last ten years, RPA Members have recycled enough tires to make a scrap tire “pipeline” from Prudhoe Bay, Alaska to Washington, D.C.!
Questions?

For more information call
(480) 517-9944

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