



VI International Congress
Valorisation and Recycling of Industrial Waste

WHEN THE RUBBER MEETS THE ROAD



Asphalt Rubber Italia
La gomma si fa strada. Ottima.

PHD INES ANTUNES
DR DOUG CARLSON



Rubber Pavements Association



VI International Congress
Valorisation and Recycling of Industrial Waste

Il Bitume Modificato con
Polverino di Gomma
Pneumatico Riciclato



Asphalt Rubber Italia
La gomma si fa strada. Ottima.



Rubbit

✓ Exclusive producer of Asphalt Rubber
in Italy

Project, innovative solutions and
complete technical support

www.bitem.it



Home

**VI International Congress
Valorisation and Recycling of Industrial Waste**

Our Mission Statement

Dedicated to encouraging greater usage of high quality, cost effective asphalt pavements containing recycled tire rubber.


RPA is a non-profit industry association

Technology transfer through many initiatives



Rubber Pavements Association


www.rubberpavements.org

Asphalt Rubber

40 years of experience

- ✓ Reduced oxidation
- ✓ Higher resistance to fatigue
- ✓ Smaller thicknesses
- ✓ Lower construction times
- ✓ Higher safety (high friction)
- ✓ Lower noise
- ✓ Saves natural resources and costs
- ✓ Lower maintenance costs





“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.

ASTM D6114

- Process in public domain – not patented
- Initially Mac Dowell had a patent
- Exists for 40 years

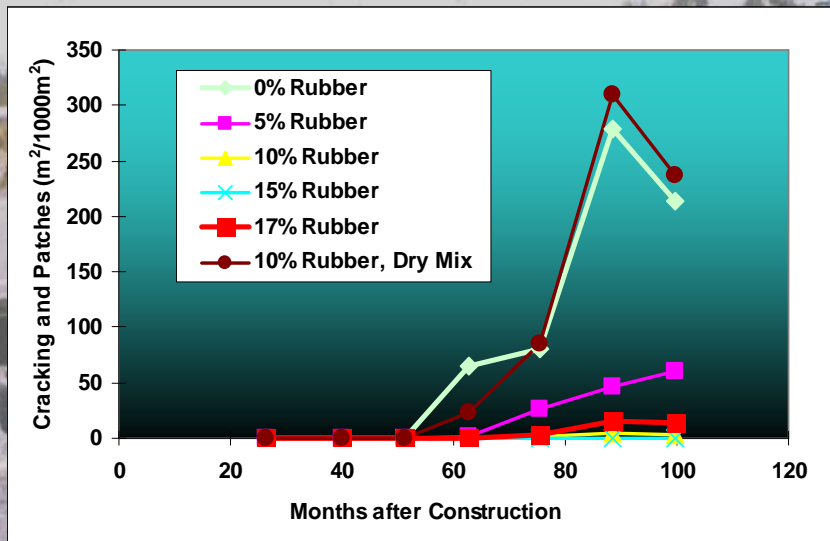
“Asphalt Rubber”



- ↓ Wet Method (less than 15%)
- ↓ Wet Method (10%) - Terminal Blend
- ↓ Wet Method (5% + SBS) - Terminal Blend
- ↓ Wet Method (3.5%) - Terminal Blend
- ↓ Dry Method (1, 2, 3%) of aggregate weight - Short and Long Reaction times
- ↓ Proprietary Methods (no technical info!)

✓ **Wet Method (with 18-22%)**

Modified Binder 20 +/- 2 % CRM Specification ASTM D6114



Italian Asphalt Rubber



- Uses **20 +/- 2 % crumb rubber**
- Crumb rubber gradation passes **#10**
- Rubber and asphalt mixed together hot to form a modified binder
- Binder pumped into plant and mixed with aggregate
- **Hot mix paved as normal**

Italian Asphalt Rubber



Summer 2006

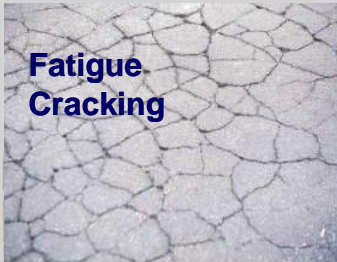
2000 Ton of GAP graded
500 Ton of OPEN graded

Several jobs in TOSCANA



Advantages

Fatigue Cracking



Longitudinal Cracking



IRI



Low Temperature

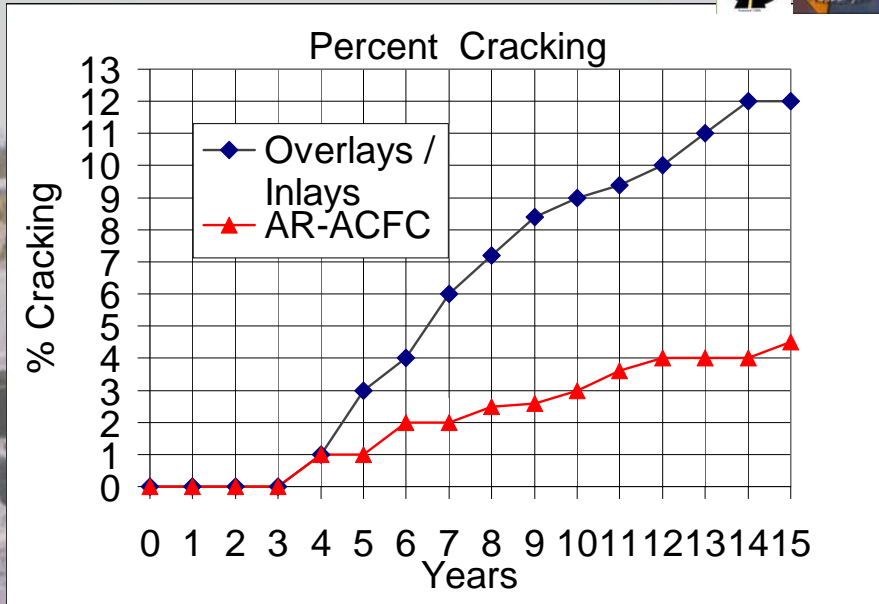


Rutting

To solve problems



Cracking



Asphalt Rubber

“Can undergo about **five** times the strain before rupture than can asphalt”

1977 ADOT Research Report
By Green and Tolonen

Film Thickness

Dense Graded HMA
9 Micron

5 % Bitume



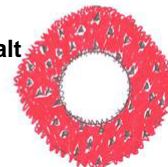
Gap Graded Asphalt Rubber
18 Micron

7.5 % Asphalt Rubber



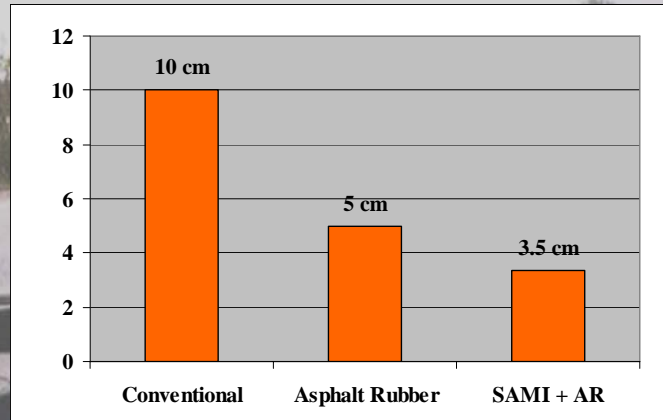
Open Graded Asphalt Rubber
36 Micron

9.0 % Asphalt Rubber



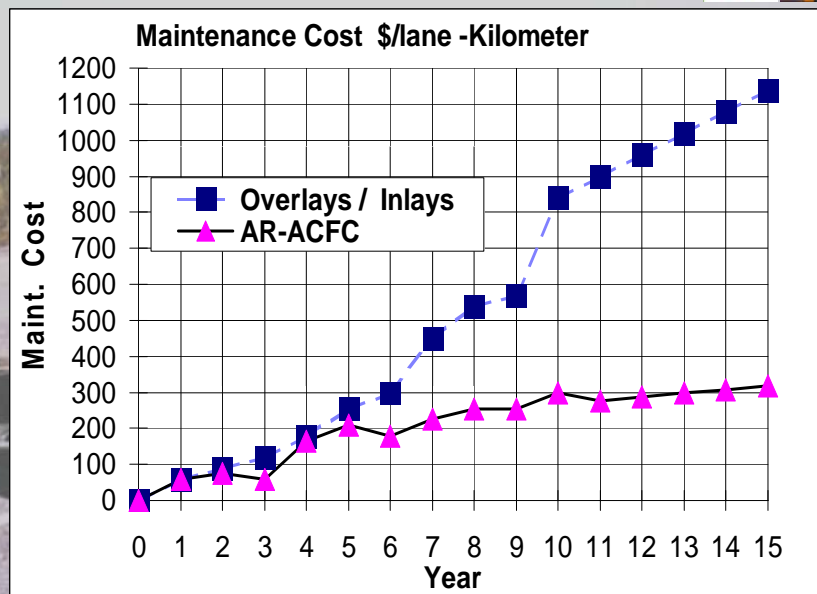
CALTRANS

Recommendations for Thickness Reduction

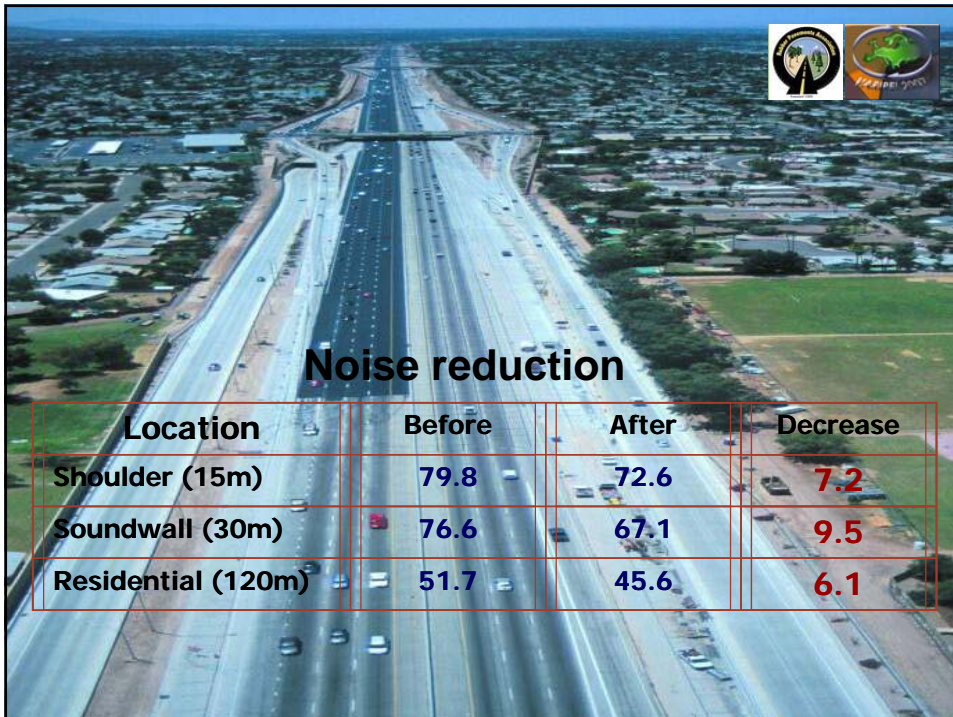
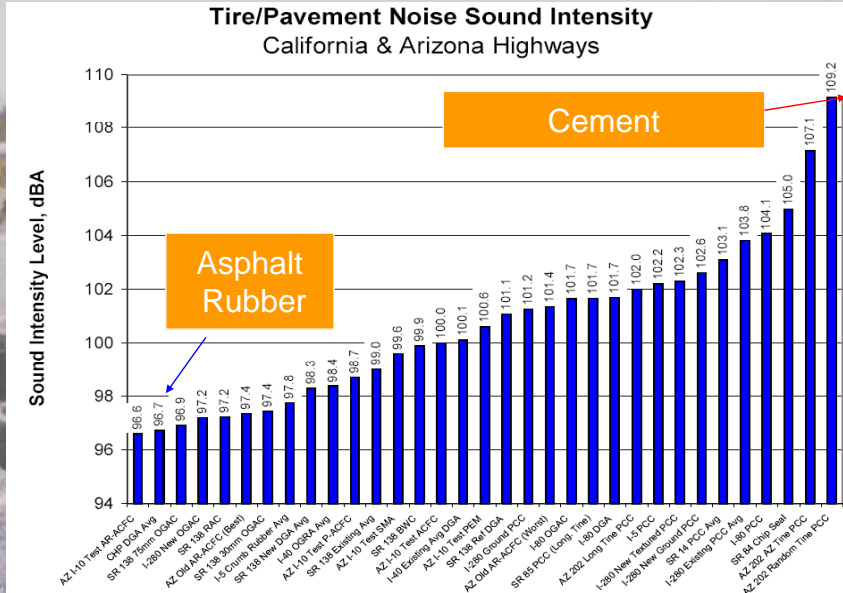


- Up to **50% thickness reduction** when compared with conventional mixes
- Approved by FHWA, CSIR and UCB

Maintenance



Noise reduction



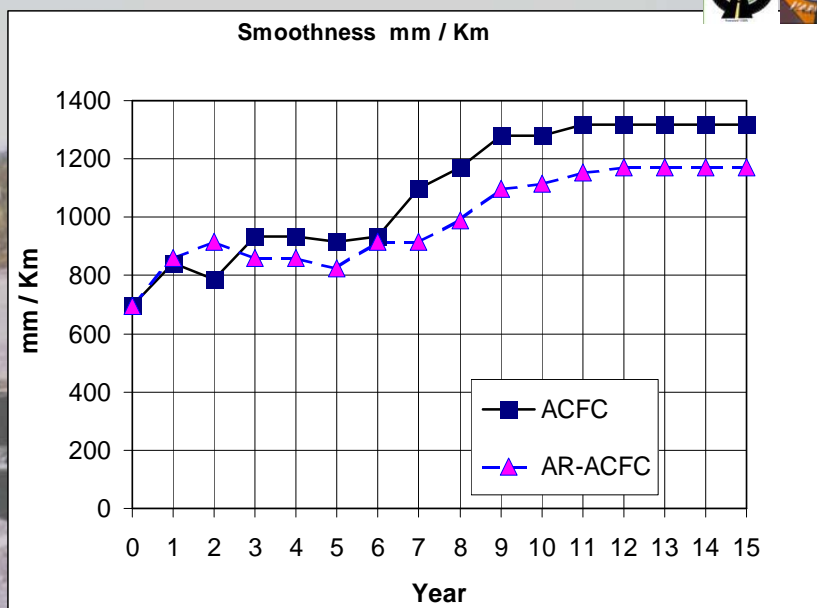
Improves security



Asphalt Rubber
Open Graded

Pavimentazione
Rigida

Improves security



Improves security



Accident Data: FM 1431 - Travis County - Near Jonestown
(PFC mixture was placed in February 2004)

	2001	2002	2003	2004	2005	Avg 01'-03'	Avg 04'-05'	% Change in 04' & 05'
Total # of accidents	25	48	36	17	6	36.3	11.5	-68.3
Dry weather accidents	10	22	13	15	5	15.0	10.0	-33.3
Wet weather accidents	15	26	23	2	1	21.3	1.5	-93.0
Fatalities	0	1	5	0	0	2.0	0.0	-100.0
Total injuries	25	16	21	6	2	20.7	4.0	-80.6
Incapacitating injuries*	6	4	3	0	1	4.3	0.5	-88.5
Non-incapacitating injuries	19	12	18	6	1	16.3	3.5	-78.6
Annual rainfall (inches)	42.9	36.0	21.4	52.0	22.3	33.4	37.2	11.1
Total rain days (>0.1 in.)	57	56	37	70	45	50.0	57.5	15.0

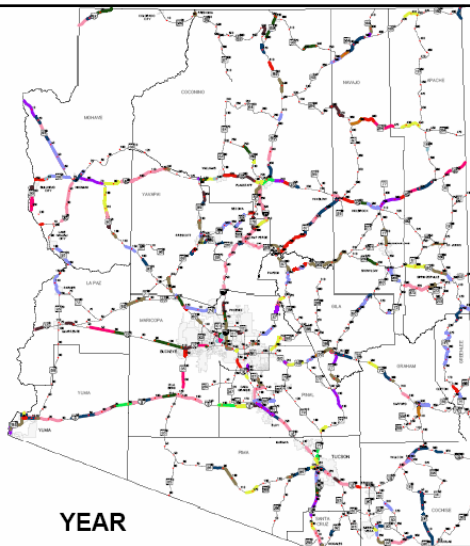
* Some of these injuries later became fatalities

Source: Cedar Park Police Department & Austin Mabry Weather Station

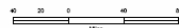
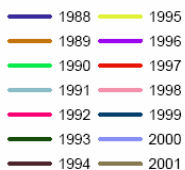
Environment



More than 30 000000
tires were recycled
since 1988, AZ



YEAR



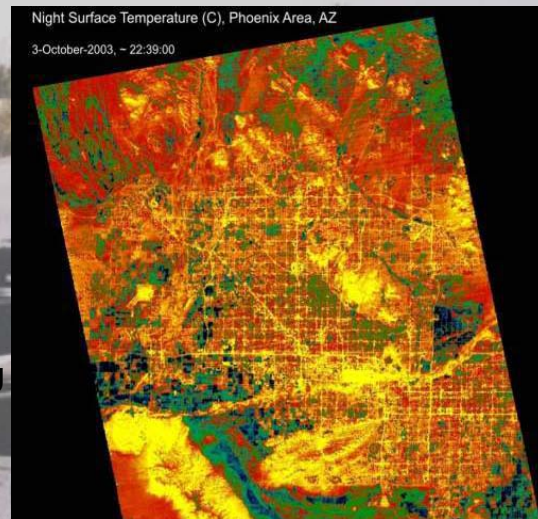
Environment

Heating

New Research



Urban Heat Island
www.urbanheat.org



Conclusions



- Asphalt-Rubber Friction Courses can enhance safety and reduce accidents
- Asphalt-Rubber Friction Courses can be applied in very thin layers on aged concrete surfaces and can be used to reduce tire noise
- Asphalt-Rubber provides a longer lasting fatigue and crack resistant surface

Thank you!

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