



OGFC Maintenance/ Life Cycle

SEAUPG Annual Meeting
November 19, 2015




Objectives

- OGFC benefits
- Ways to extend life of OGFC
- How to maintain OGFC
 - For functionality
 - Winter Maintenance




OGFC Survey

USE OF PFC MIXTURES BY STATE



■ PFC NOT USED ■ PFC USED ■ NOT REPORTED



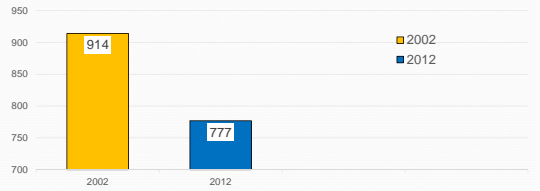
Benefits of OGFC

- Improved nighttime visibility
- Reduced splash/spray
- Reduced hydroplaning
- Wet weather friction



Accident Data for Virginia


Fatalities per 100 million vehicle miles traveled



Year	Fatalities per 100 million vehicle miles traveled
2002	914
2012	777

Fatalities reduced 15.0%

Source: U.S. DOT Bureau of Transportation Statistics



Accident Statistics


- 33,000 fatalities annually in U.S.
- 4 million injuries
- 24 million vehicles
- \$277 Billion total economic cost

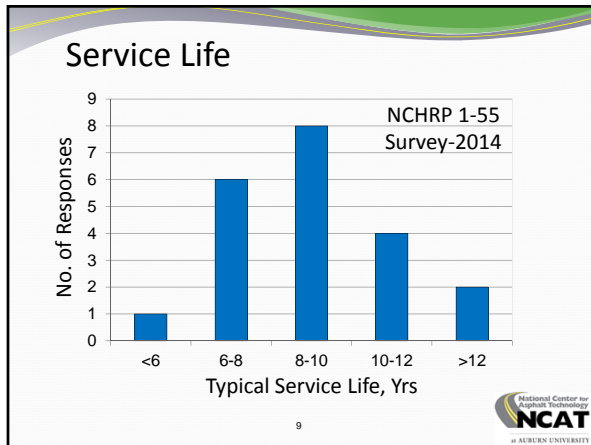
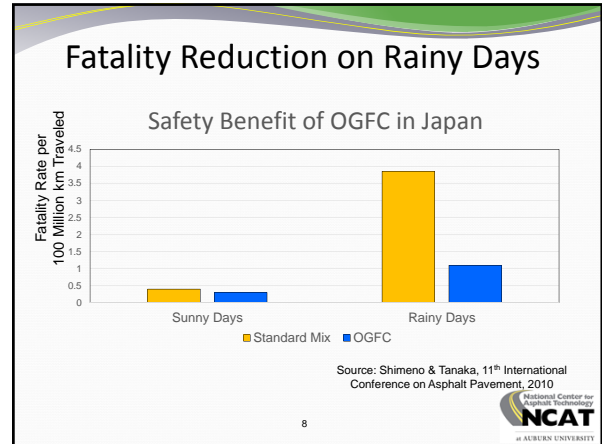
Source: National Highway Traffic Safety Administration




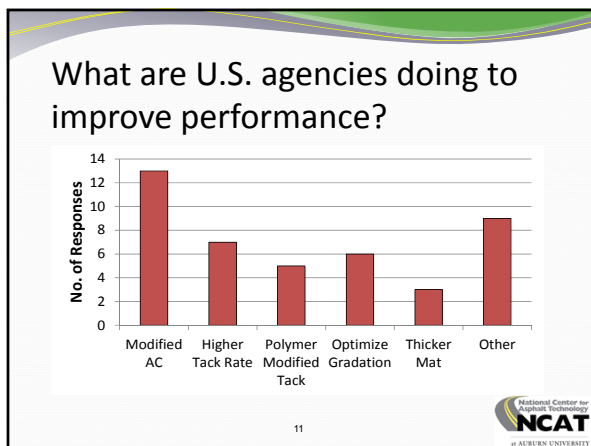
Accident Data: Travis County, Texas

Year	2001	2002	2003	2004	% Change
Total # Accidents	29	51	44	17	-58.9
Dry Accidents	10	23	13	15	-2.2
Wet Accidents	19	28	21	2	-91.2
Fatalities	0	1	5	0	-100
Total Injuries	25	16	21	0	-100
Annual Rainfall (in)	42.9	36.0	21.4	52.0	55.5
Total Rain Days	57	56	37	70	40.0

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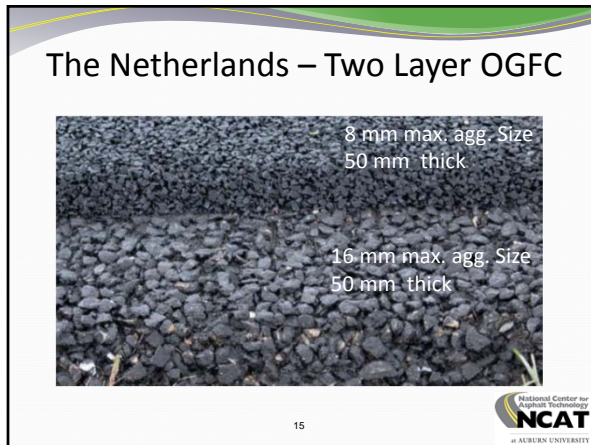
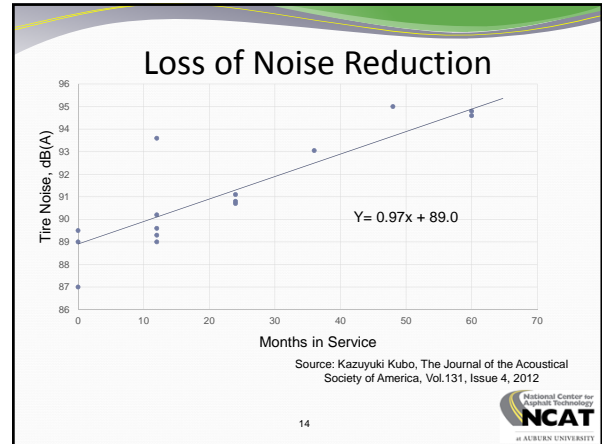
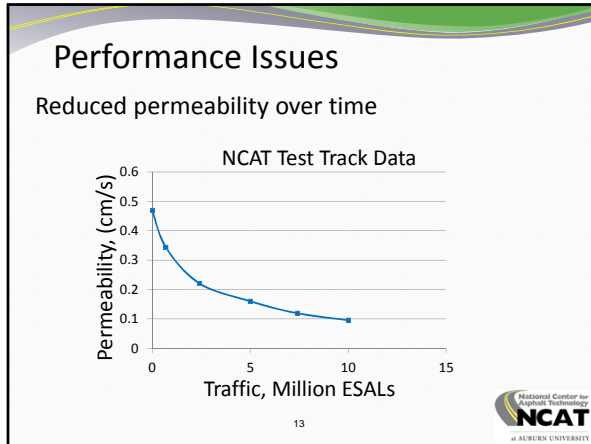
- ### Service Life-Europe
- Germany: 7-10 yrs
 - Switzerland: 8-12 yrs
 - France: limited use due to high winter maintenance costs (≥ 4 lanes; <30 days of snow/ice)
 - The Netherlands: 9-11 yrs
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Tack

- Emulsion - target 0.05-0.10 gal/sy residual AC.
- Other products - consult manufacturer for rate.

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- ### The Netherlands
- 90% of highways use OGFC (reduce noise)
 - 2005- Began use of 2-layer system
 - 2007- increased AC by 1% (≥20% more life)
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The Netherlands – Noise, Cost, Life

	Dense	Single layer OGFC	Double layer OGFC
Noise reduction	Reference	4 dB	6 dB
Construction cost	100%	102%	112%
Maint. Cost	100%	105%	180%
Life-outside lane	12 yr	11 yr	9 yr
Life-other lanes	18 yr	17 yr	13 yr

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- ### Keep Voids Open
- Sweep/vacuum with high pressure spray (Denmark uses twice/year)
 - Use OGFC for high speed, high volume traffic
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Prevent Raveling

- Design OGFC with high binder film thickness
- Use rejuvenators/fog seals
- Use higher tack rates
- Other???

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Snow and Ice Removal

- Start de-icing applications sooner than for conventional mixes
- Continue applications longer



(Remember, the OGFC will cool quicker and stay cold longer due to its open void structure.)

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Germany

- Up to 50% more salt than dense-graded
- Reapply at 60-90 minute frequency
- Double salting (wet and dry combination) improves performance

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Switzerland

- Only used where needed for noise reduction (14% of network)
- Apply more salt at 2-3 times frequency of dense-graded
- Clean emergency lanes every 6 months

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The Netherlands

- Apply 30-40% more salt

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Summary

- Benefits and lives saved worth extra cost
- Must increase service life
 - Modified asphalt
 - Improved tack coats and application rates
 - Optimize gradation
- Winter Maintenance
 - More salt
 - More frequent application

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