



Hassan Twp Shingle Study

Henn Co Shingle Workshop

07/10/07

Shingle Study Objectives

- ⇒ Shingle Only Mixes
- ⇒ Effect on Mix & Binder
- ⇒ Difference with control

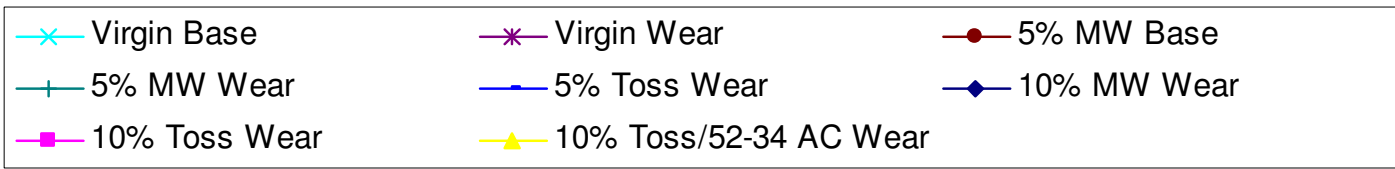
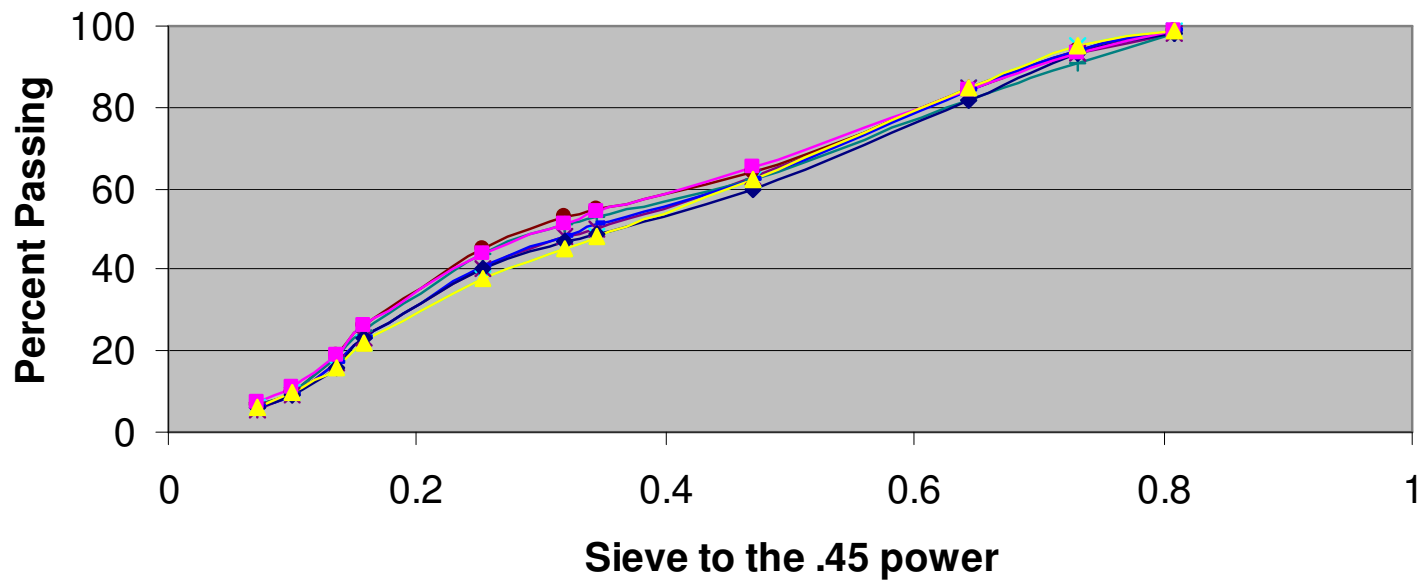


Shingle Binder Properties

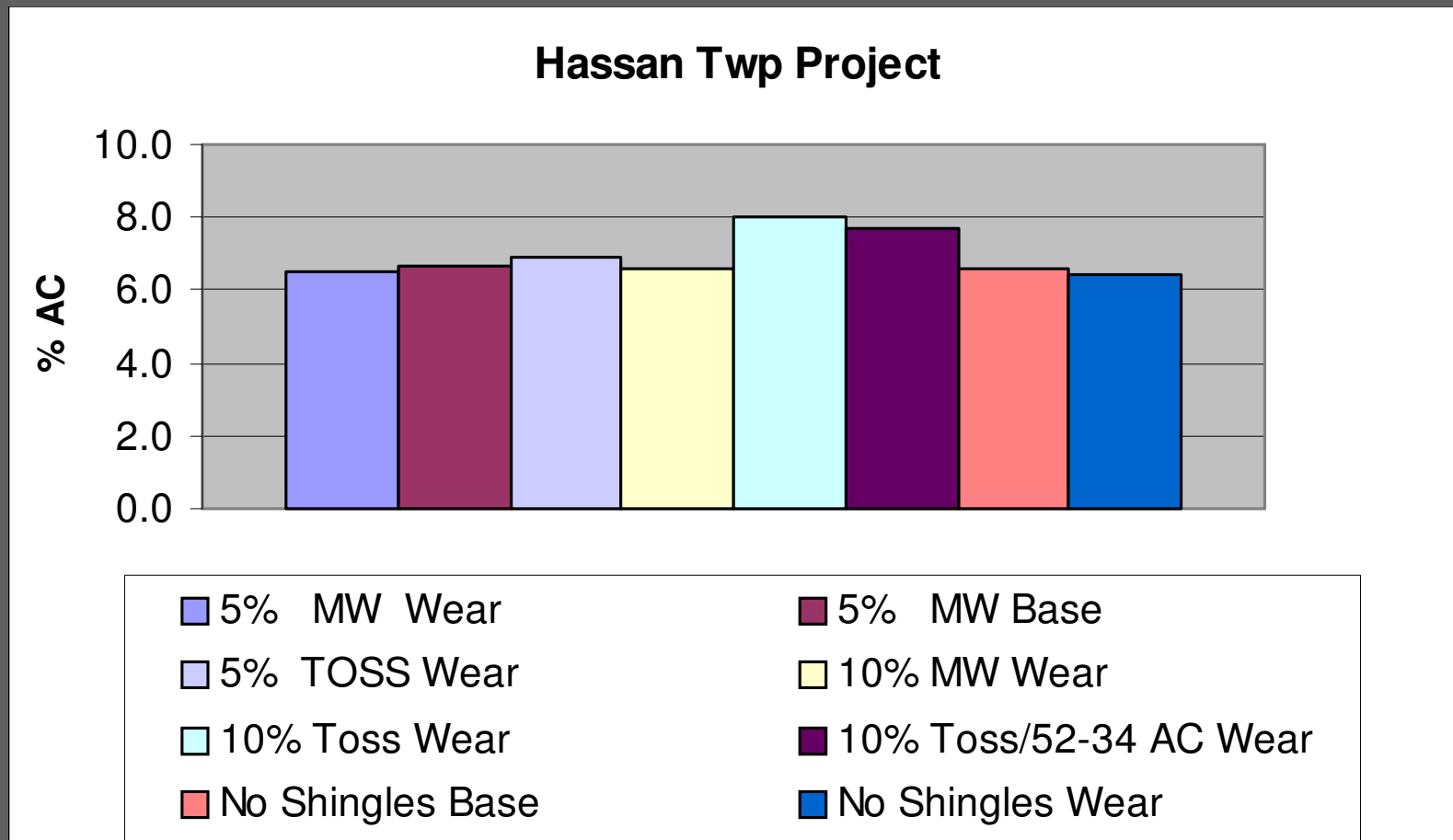
CORE TYPE	SHINGLE %	%AC	PG HIGH TEMP	PG LOW TEMP
WEAR	5% MW Wear	6.5	64.4	-30.9
BASE	5% MW Base	6.7	64.6	-30.3
WEAR	10% MW Wear	6.6	68.4	-29.6
WEAR	No Shingles	6.4	58.9	-30.7
BASE	No Shingles	6.6	58.5	-30.0
WEAR	5% TOSS Wear	6.9	65.9	-30.4
WEAR	10% TOSS Wear	8	72.8	-25.7
WEAR	10% TOSS/52-34 Wear	7.7	70.3	-27.5

Extracted Gradation

Hassan Twp Shingle Mix Gradations

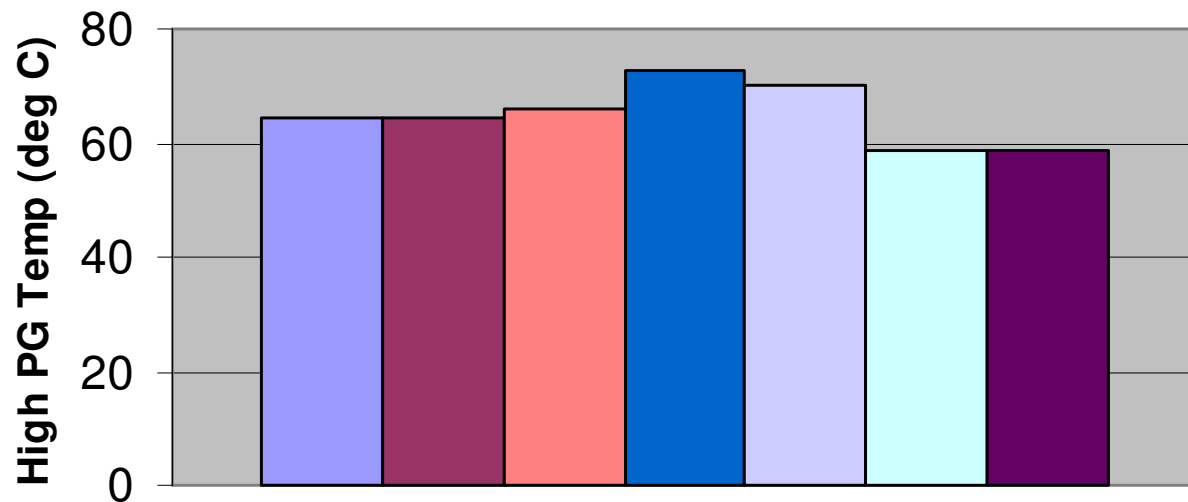


Binder Content



Shingle Mix HT PG Grade

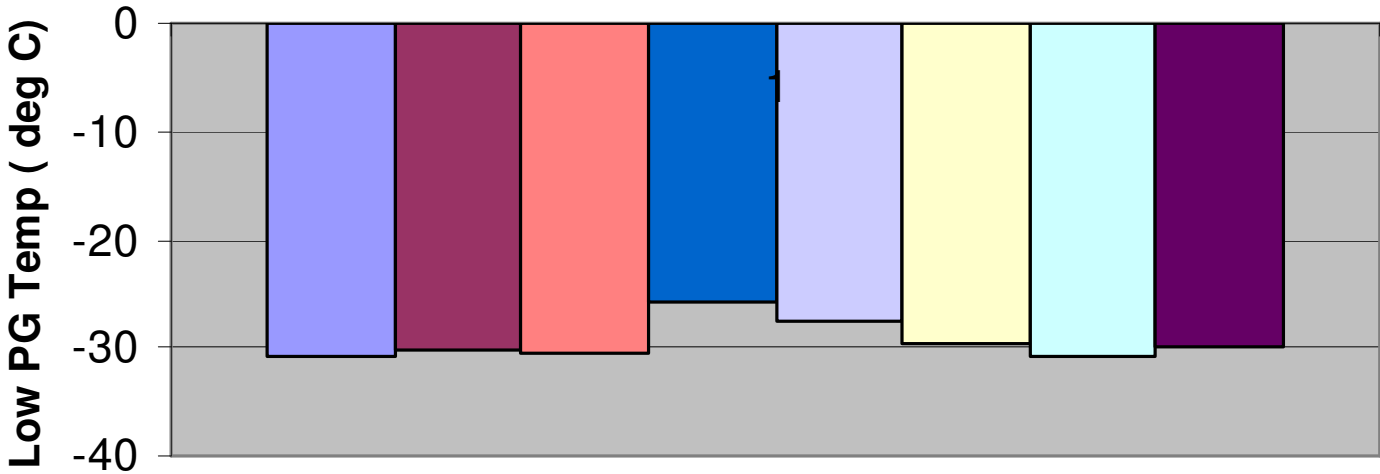
Hassan Twp Mixes



- 5% MW Wear
- 5% MW Base
- 5% TOSS Wear
- 10% TOSS Wear
- 10% TOSS/52-34 Wear
- No Shingles Wear
- No Shingles Base

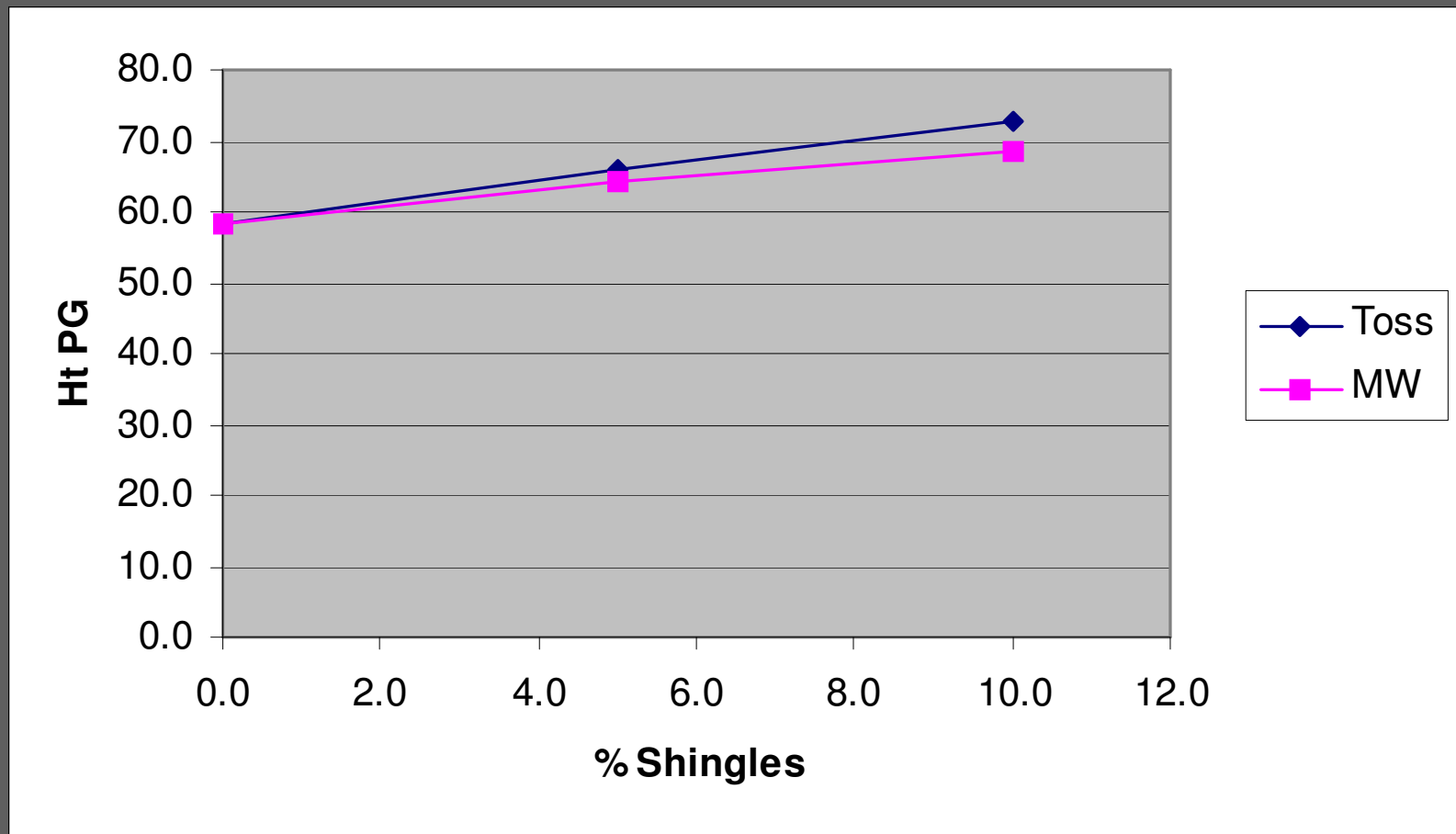
Shingle Mix LT PG

Hassan Twp Mixes

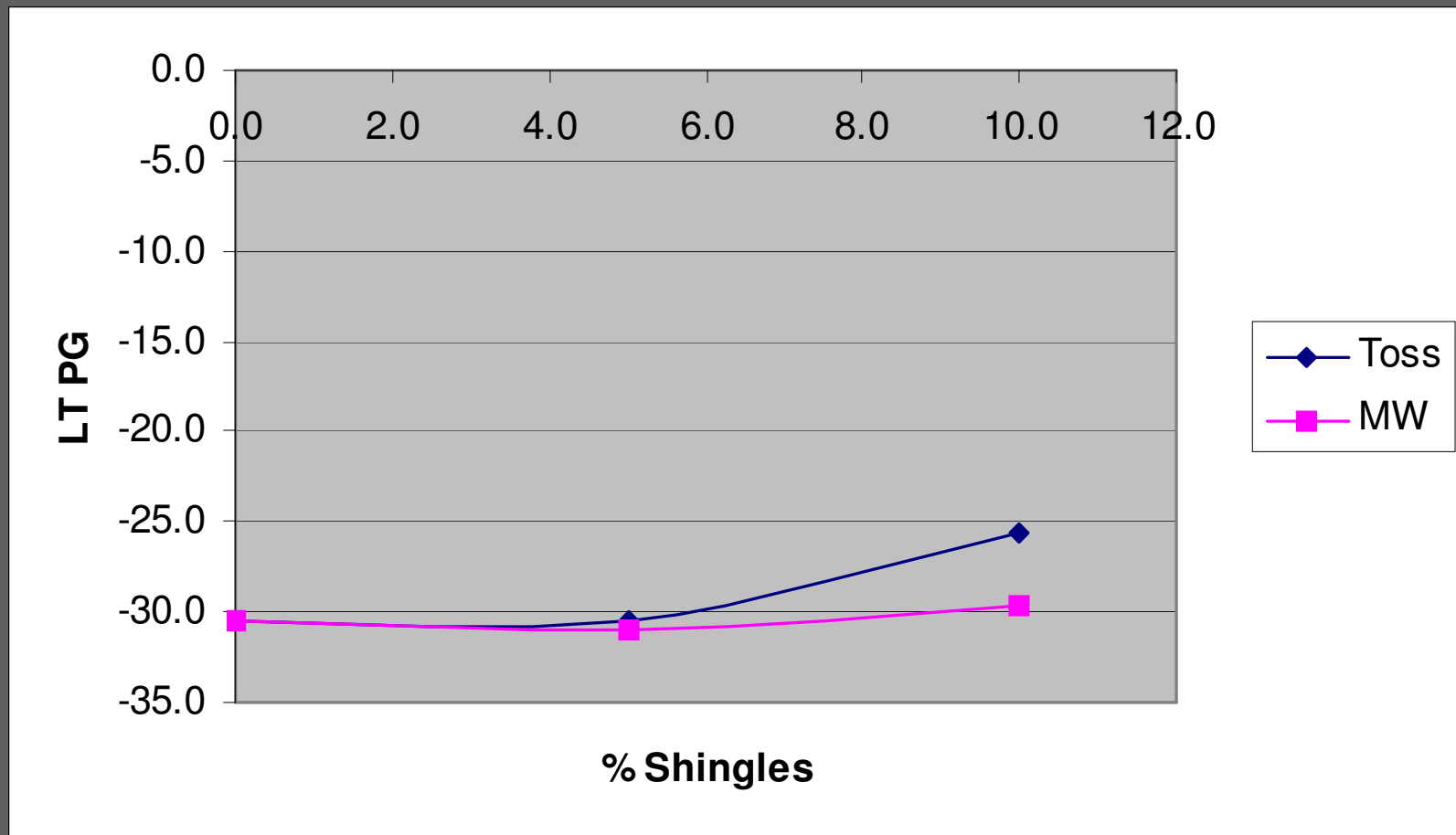


- 5% MW Wear
- 5% MW Base
- 5% TOSS Wear
- 10% TOSS Wear
- 10% TOSS/52-34 Wear
- 10% MW Wear
- No Shingle Wear
- No Shingle Base

High Temp PG by % Shingles

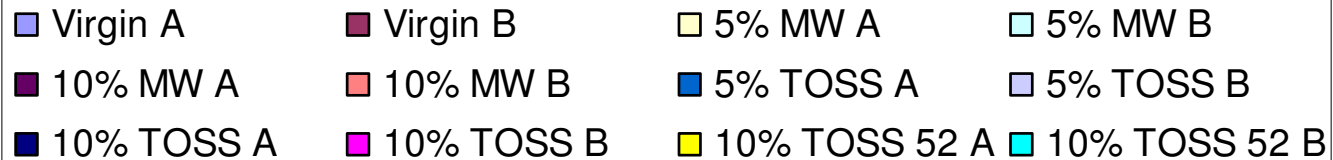
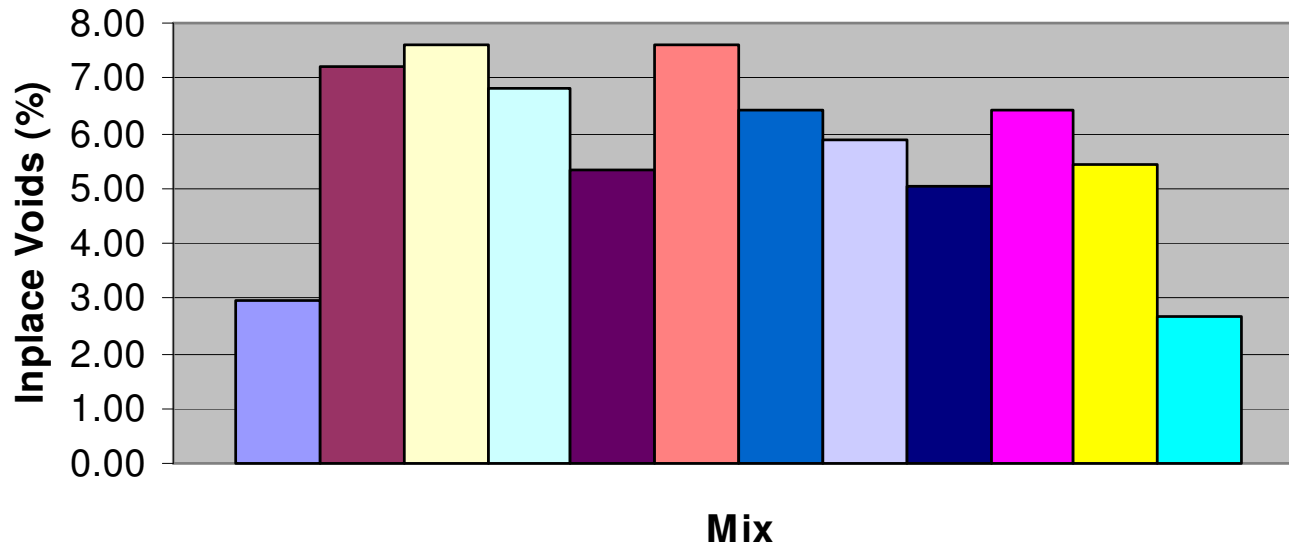


LT PG by % Shingles



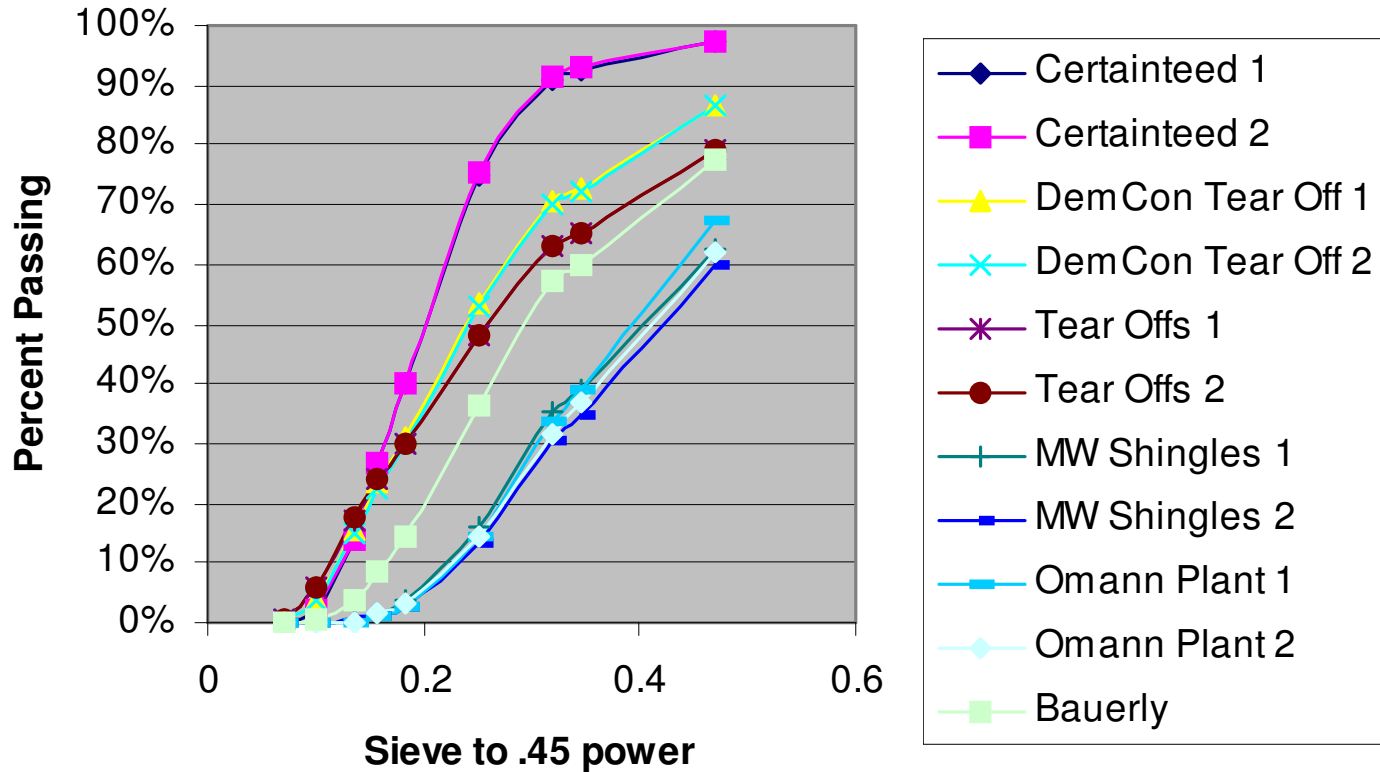
Inplace Voids

Hassan Twp Core Inplace Voids

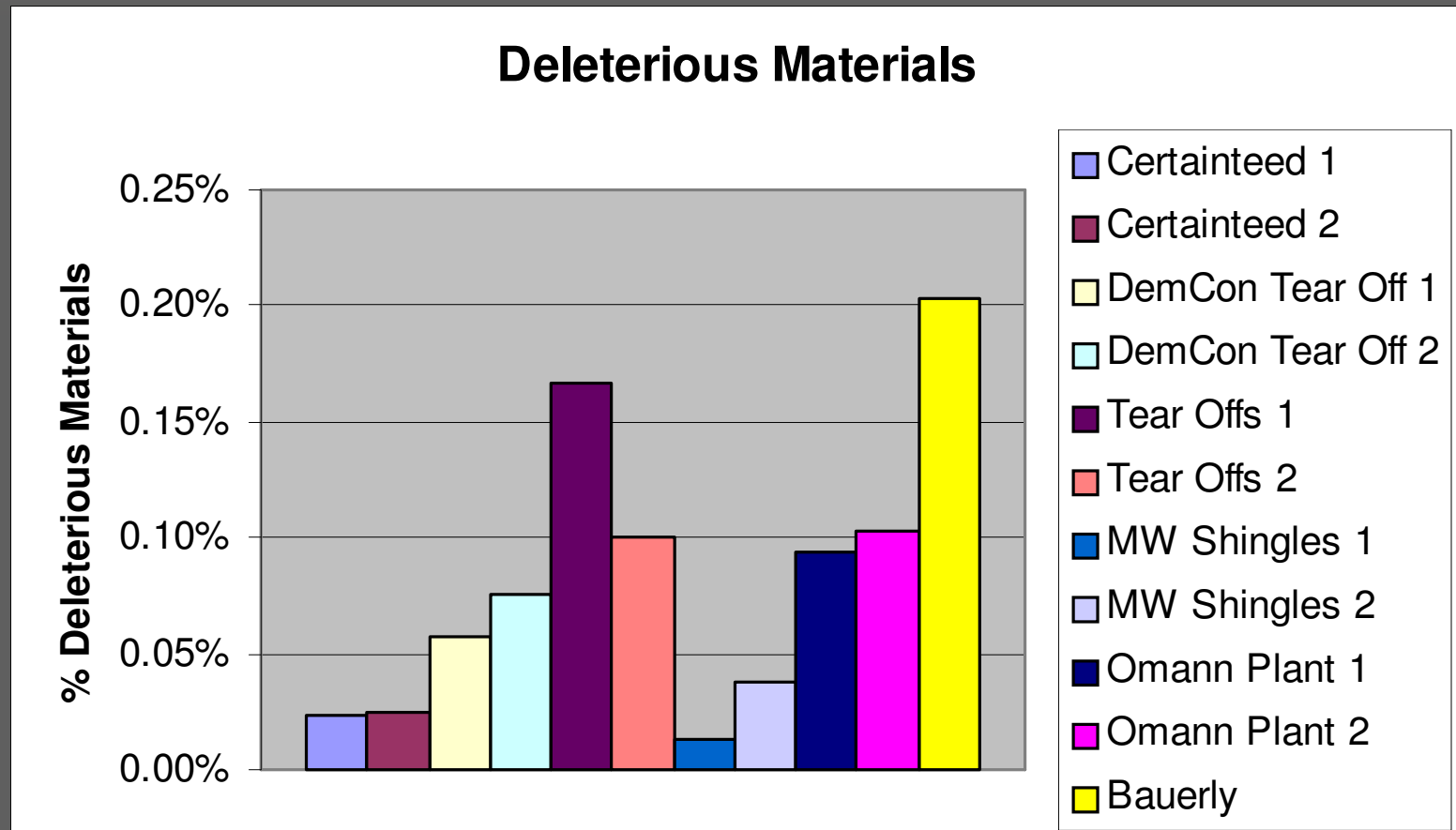


Processed Shingle Gradations

Processed Recycled Shingles



Deleterious Materials



Binder Testing Conclusions



- ⇒ Difference in AC related to % shingle binder
- ⇒ PG Grade-5% Toss/MW- not much difference
- ⇒ 10% Toss- HT 2 ½ grades, LT- ½ grade
- ⇒ Soft binder-decrease both ½ grade- close to PG 58-28

Gradation Conclusions

- ⇒ Mix gradations uniform
- ⇒ Processed product significant differences
- ⇒ Deleterious Material-plastic, paper
- ⇒ TSR Failure-swelling of pucks



TH 10 Shingle HMA- SP 0502-09

- ⇒ PG 64-28/30% RAP - PG 69.5-29.8
- ⇒ PG 64-28 /27% RAP and 3 % shingles PG 72.5-25.0
- ⇒ PG 64-28/5% shingles/25% RAP- PG 75.8-25.5
- ⇒ Adding 3% shingles it increases stiffness on both ends by $\frac{1}{2}$ grade over that of the 30% RAP.
- ⇒ Adding an additional 2% for a total of 5% increases the high end by an additional $\frac{1}{2}$ grade but doesn't effect the low temp grade
- ⇒ Major cracking

US 10 –Shingle Mix- 2 Yrs





Issues

- ⇒ New AC/Film thickness
- ⇒ Mix designers push limit
- ⇒ Pavement Failures after 1 yr
- ⇒ Sizing of processed shingles
- ⇒ Amount of total recycled product in mix
- ⇒ Mix temperature/mixing time
 - More effect from shingles