

# Impact of PG Binder Grades and Properties on HMA Production

**Matthew Teto, P.E.**

**Quality Control Manager – P.J. Keating Company, Inc.**



Safety, Integrity, Quality

# Northeast Asphalt User Producer Group

October 21, 2015  
Burlington, VT



# Production Facilities – Then and Now





Safety, Integrity, Quality

# Today's Workhorses of Mix Production

- Lunenburg, MA

ASTEC Double Barrel Drum Plant

6 silos: 300 tons each

AC storage: 3 tanks

- Acushnet, MA

ASTEC Double Barrel Drum Plant

9 silos: 200 tons (5) & 250 tons (4)

AC storage tanks: 3 tanks



# Choices, choices, choices!

- MassDOT Superpave Mixes (30+ varieties)

37.5 mm Base	HMA & WMA	50, 75, & 100 gyration designs	Latex & Anti- Strip
19.0 mm Intermediate			
12.5 mm Intermediate			
12.5 mm Surface			
9.5 mm Surface			

- OGFC-P, OGFC-AR, and Porous Pavement
- Asphalt Rubber Mixes
- Waterproof Bridge Surface Course
- Paver-placed Treatments (NovaChip)

# Operational Challenges

Customers *expect* Service *and* Choice  
... and Quality!



# Operational Challenges

- Baskin Robbins (32 flavors) or Burger King (Your way right away)
- Increasing number of projects include specifications and require mix design submittals
- Giving Cities/Towns and Commercial Customers “whatever is in the tubes” is no longer an option
  - QC requirements becoming common
  - 3<sup>rd</sup> party plant and field inspection
- Limited number of PGAB storage tanks  
Capacities of 20,000 – 30,000 gallon each  
80 – 120 tons (2.5 – 4 tanker loads)

# Operational Challenges

## Important considerations:

- How much do we need to make and when?
- How much *can* we make?
- Do we have enough silos for the various mixes?
- How long can we store it?
- How many liquid deliveries will we need today?
- Do we need to make room for something special tomorrow?

# Typical Peak Demand

N I G H T	CUSTOMER	MIX	PGAB	ADDITIVES	TONS	SILOS
	MassDOT	12.5mm Intermediate	PG58-28	Asphalt Rubber	1400	2
	MassDOT	12.5mm Surface	PG64-28	WMA	2000	2
	MassDOT (external)	12.5mm Bridge	PG64-28	WMA + Latex	24	??
	MassDOT (external)	37.5mm Base	PG64-28	WMA	200	1
		12.5mm Intermediate	PG64-28	WMA	200	1
SHIFT TOTAL:					3800+ tons	

# Typical Peak Demand

N I G H T	CUSTOMER	MIX	PGAB	ADDITIVES	TONS	SILOS
	MassDOT	12.5mm Intermediate	PG58-28	Asphalt Rubber	1400	2
	MassDOT	12.5mm Surface	PG64-28	WMA	2000	2
	MassDOT (external)	12.5mm Bridge	PG64-28	WMA + Latex	24	??
	MassDOT (external)	37.5mm Base	PG64-28	WMA	200	1
		12.5mm Intermediate	PG64-28	WMA	200	1
SHIFT TOTAL:					3800+ tons	

**Possible transition to SBS-modified PG70-28?**

# Typical Peak Demand

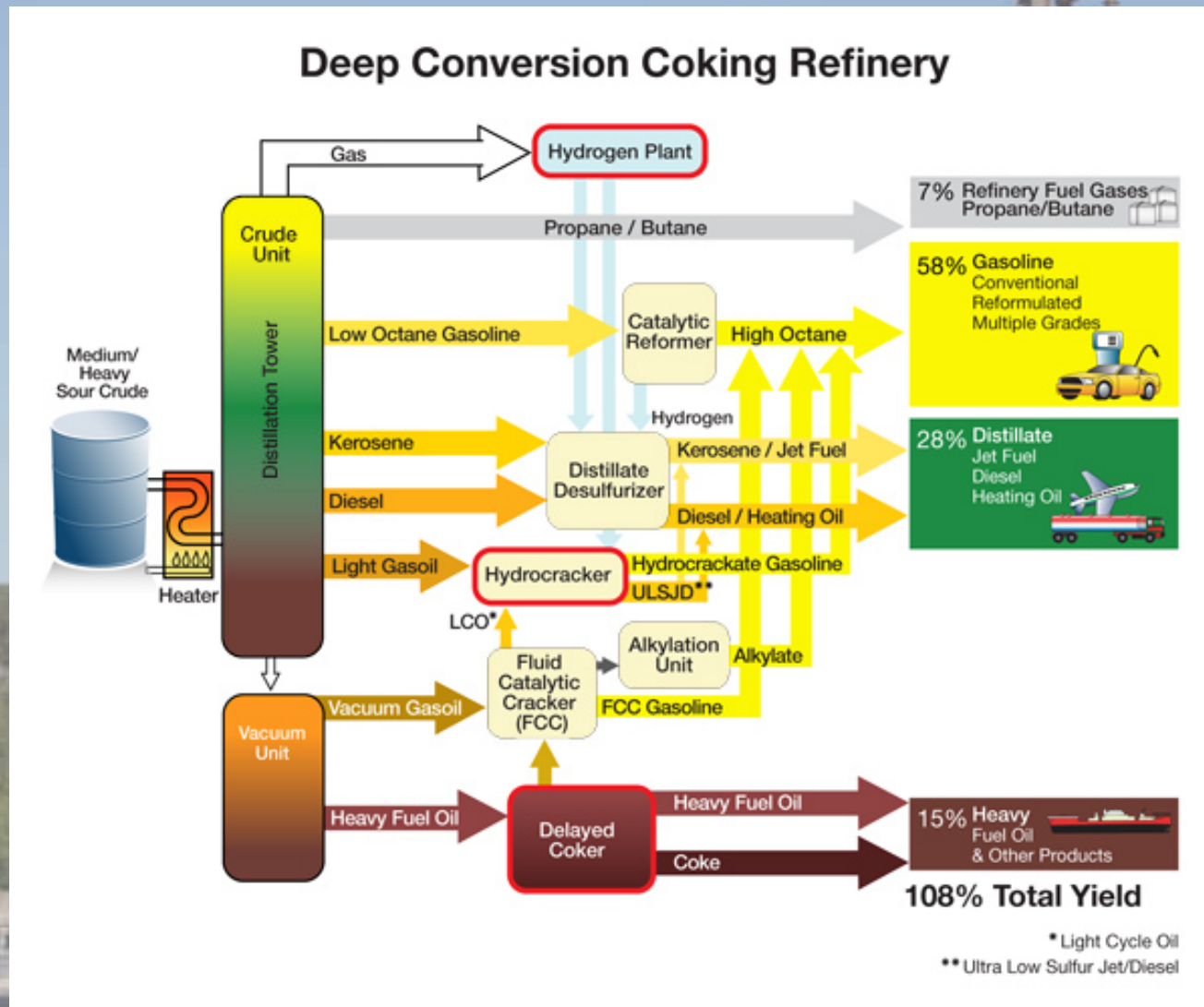
	CUSTOMER	MIX	PGAB	ADDITIVES	TONS	SILOS
<b>D A Y</b>	City/Town	12.5mm Intermediate	PG64-28		600	1
		12.5mm Surface	PG64-28		600	1
	Commercial Customer	MHD Dense Binder	PG64-28		400	1
		MHD 1/2 Top	PG64-28		250	1
	City/Town	9.5mm Surface	PG64-22		600	1
	Various	Driveway Top	PG64-28 / PG64-22		?	1
<b>SHIFT TOTAL:</b>					<b>2450+ tons</b>	

# Typical Peak Demand

D A Y	CUSTOMER	MIX	PGAB	ADDITIVES	TONS	SILOS
	City/Town	12.5mm Intermediate	PG64-28		600	1
		12.5mm Surface	PG64-28		600	1
	Commercial Customer	MHD Dense Binder	PG64-28		400	1
		MHD 1/2 Top	PG64-28		250	1
	City/Town	9.5mm Surface	PG64-22		600	1
	Various	Driveway Top	PG64-28 / PG64-22		?	1
SHIFT TOTAL:					2450+ tons	

**One hiccup can upset the entire operation!**

# Production of PG Binders



# PG Binder Supply Chain



# Proliferation of Specialty Grades

- Northeast roads need to withstand heavy traffic and extreme cold
- DOTs jumping on the innovation bandwagon
  - Pilot projects and Contract Special Provisions are common
- Designers of private projects specifying alternative mixes (porous pavement) to capture LEED credits
- Scheduling deliveries of PMAs days in advance is history
- Local liquid suppliers can produce modified binders on-demand

# Production of Specialty Grades



# A Few Words About “Snake Oil”

Snake oil (noun):

any of various liquid concoctions of questionable medical value sold as an all-purpose curative, especially by traveling hucksters.



**SNAKE-OIL LINIMENT**

**RELIEVES INSTANTANEOUSLY**

**AND CURES** HEADACHE, NEURALGIA, TOOTHACHE, EARACHE, BACKACHE, SWELLINGS, SPRAINS, SORE CHEST, SWELLING of the THROAT, CONTRACTED CORDS and MUSCLES, STIFF JOINTS, WRENCHES, DISLOCATIONS, CUTS and BRUISES.

It Quickly takes out the Soreness and Inflammation from Corns, Bunions, Insect and Reptile Bites.

The best External Preparation for BYCICLISTS and ATHLETES. It makes the Muscles supple and Relaxes the Cords. Loosens the Joints and gives a feeling of Freshness and Vigor to the whole System.

**SNAKE-OIL LINIMENT CURES ALL ACHES AND PAINS.**

If you are suffering from Rheumatism, ALWAYS take LA-CAS-KA internally for the Blood and **as SNAKE-OIL LINIMENT** externally. When used together we **GUARANTEE A CURE** in every instance or **MONEY REFUNDED.**

**If You Are Afflicted With DEAFNESS**

Get Our Specially Prepared

**PURE Rattlesnake Oil**

# A Few Words About “Snake Oil”

- “Affectionate” term for undisclosed and/or vaguely-named *proprietary* ingredients.
- Refers to the various petrochemicals, aromatic oils, and waxes used in asphalt modification.
- Certificates of Compliance, Bills of Lading, Quality Control Plans, etc. are public documents.
- Bringing new asphalt technologies to market is expensive and risky. Producers and suppliers must protect their investment.

# Binder Grades Used in New England

STATE	Primary Grade	Alternate Grade	Polymer Grade
Connecticut	64-22	76-22	64E-22
Maine	58-28	64-28	64E-28
Massachusetts	64-28	52-34	SBR Latex
			64V-28
			64E-28
New Hampshire	58-28	64-28	76-28
		52-34	
Rhode Island	64S-28	58S-28	64E-28
			64E-34
Vermont	58-28	52-34	70-28

# Binder Grades Used in Massachusetts

- PG 64-28
- PG 52-34 (Recycle > 25%)
- PG 64-22 (City of Worcester – No PPA)
- PG 70-28
- PG 76-28 HP (Waterproof Bridge Surface)
- PG 64V-28
- PG 64E-28
- PG 64-28 + Latex(Blended at Plant)
- Asphalt Rubber (Special Blending Process)

# How Mix Production is Affected

## Recall:

- Seemingly endless choices on the menu
- Market *expects* product availability at all times
- Binder suppliers becoming more flexible and producing more grades on-demand
- Limited PGAB Storage Capacity

# How Mix Production is Affected

- Greater variability of production temperatures
  - Transition between HMA, WMA, and Polymer Modified mixes multiple times per shift
- Mix storage time is limited with modified mixes
- What happens to excess PMA at the end of a project?
  - Mixing of PGAB Grades is not allowed by DOT spec.
  - If mixed, HMA producer becomes responsible for PG Grade
  - List of projects that can accept non-certified material is shrinking
- Increased waste
- Potential quality issues
  - (Jack of all trades, master of none)

# Simple Solution: Just Increase Capacity!

- Limited physical space for additional tanks
- Permitting process is time-consuming and expensive
- Opening Pandora's Box?
  - Increased scrutiny of operations (noise, odor, traffic, etc)
  - Will changes to permit void grandfathered items? (such as hours of operation)
  - Neighbors often oppose increases capacity



# Pop Quiz: What's a Producer To Do?

- A. Just go about operations as usual and pray everything works out.  
(No, this is not also our current Quality Control Program)
- B. Tell the customer “We’ll fit you into the schedule when we can. Don’t call us, we’ll call you.”
- C. Get the sales team to tell the customer “We can’t make that porous pavement mix, but we have some lovely ½” State Top to sell you.”
- D. Somehow get invited to speak at annual User/Producer meeting. Use the opportunity to wow the audience with a thought-provoking presentation.

# At The End of The Day...

We want:

- To produce a quality product
  - It's cost effective
  - Our reputation is directly related to our performance
- To provide the highest level of customer service
  - "We can't" is not an acceptable answer
  - In-stock and in-spec, every day
  - We need to be better than our competition
- To be the best in the business

# What THIS Producer Is Doing

- Educate, educate, educate!
  - Customers, sales staff, estimators, project managers, etc. need to know what they are bidding on and what the plant is capable of producing
  - Support plant operators to ensure proper scheduling, production, and storage of mixes
  - Support paving crews to ensure proper use and placement of these new products
- Encourage agency to reduce mix design options
  - Specify *at most* two gyration levels
  - Specify a common PG grade according to traffic loading
  - Facilitate (mandate?) adoption of WMA by municipalities
- Encourage states to collaborate with their neighbors in regards to PG Binder Grades & Specifications

Thank You!