

# Plant Control & Quality Innovations in Equipment & Technology:



NCAUPG Technical  
Conference 2012  
Indianapolis, IN



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# Payne & Dolan Inc.

Vertically Integrated Construction Company



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# Operations Aggregates-Asphalt



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# Overview



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- Quality Assurance
- Forces Driving Quality
- Innovations in Quality over the years
- Quality/Production Relationship
- Future Expectations

# QA/QC



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- QA testing: Activities designed to ensure that the development process is adequate to ensure you meet given objectives-(Proactive QC)
- QC testing: Activities designed to evaluate a developed product-(after the fact)
- Contractor Terms QA=Risk Management

# Factors Driving Quality



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- Economics
  - Reduction in virgin asphalt
  - Reduction in virgin aggregates
  - Using high RAP/RAS mixes saves money
- Vital to our industry
- Competitive edge
- Risk



**LEED**  
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

# Asphalt vs. Concrete



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- Competition is getting stiffer
- Maintain economic advantage while providing superior quality
- Ensure Quality



# Economic forces Driving Quality



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	Material	%/ton	Costs/ton (\$)	Virgin	50% RAP	30% RAP	25% RAP & 5% RAS	20% RAP & 5% RAS	15% RAP & 5% RAS
Binder	Pb total Mix	5.80%							
	RAP AC	5.00%							
	RAS AC	22%							
	Virgin Binder		\$ 600.00	\$ 34.80	\$ 19.80	\$ 25.80	\$ 20.70	\$ 22.20	\$ 23.70
Aggregate	Virgin		\$ 12.00	\$ 11.30	\$ 5.60	\$ 7.88	\$ 8.04	\$ 8.56	\$ 9.13
	RAP		\$ 8.00		\$ 4.00	\$ 2.40	\$ 2.00	\$ 1.60	\$ 1.20
	RAS		\$ 30.00				\$ 1.50	\$ 1.50	\$ 1.50
	Mix Cost Per Ton			\$ 46.10	\$ 29.40	\$ 36.08	\$ 32.24	\$ 33.86	\$ 35.53
	<b>% Savings from Virgin</b>			<b>0%</b>	<b>36%</b>	<b>22%</b>	<b>30%</b>	<b>27%</b>	<b>23%</b>



# Wisconsin Specifications



## Allowable Combination Maximums

### Recycled Asphaltic Percent Binder Replacement

<u>Material</u>	<u>Lower Layer</u>	<u>Upper Layer</u>
RAS only	25	20
RAP & FRAP	40 (30)	25 (20)
RAS & RAP & FRAP	35 (30)	25 (20)
DP <sub>E</sub> Ratio	1.2	
VMA (19.0-9.5)	13-15	

(2010 Specifications)

# Typical Gradations



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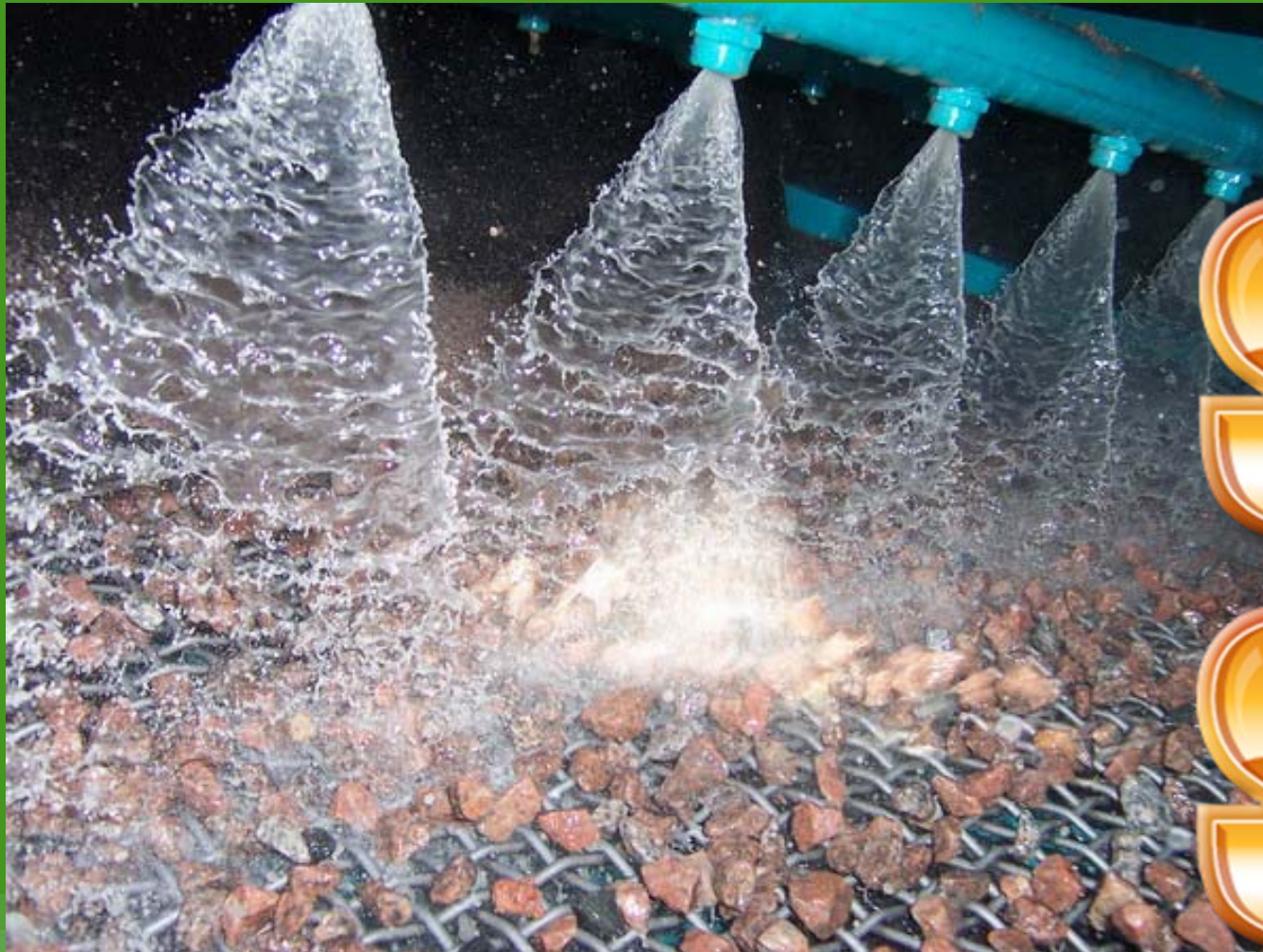
Parameter	Typ. RAP	Typ. RAS	Typ. E-1	Typ. E-10
AC	4.80%	29.10%	5.00%	4.91%
19.0mm	100.0	100.0	99.5	99.4
12.5mm	100.0	100.0	92.5	92.6
9.5mm	96.0	100.0	82.7	83.1
4.75mm	73.0	94.0	61.9	63.6
2.36mm	56.0	88.5	46.3	43.3
1.18mm	45.0	71.0	36.1	30.2
0.600mm	36.0	49.0	27.1	21.1
0.300mm	23.0	41.5	14.6	11.8
0.150mm	23.0	33.5	7.0	6.5
0.075mm	10.0	27.0	4.6	4.4

Mix w/25% RAP and 5% RAS requires all  
Virgin Aggregates <1% P200

# Washing Aggregates



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# Controlling Size



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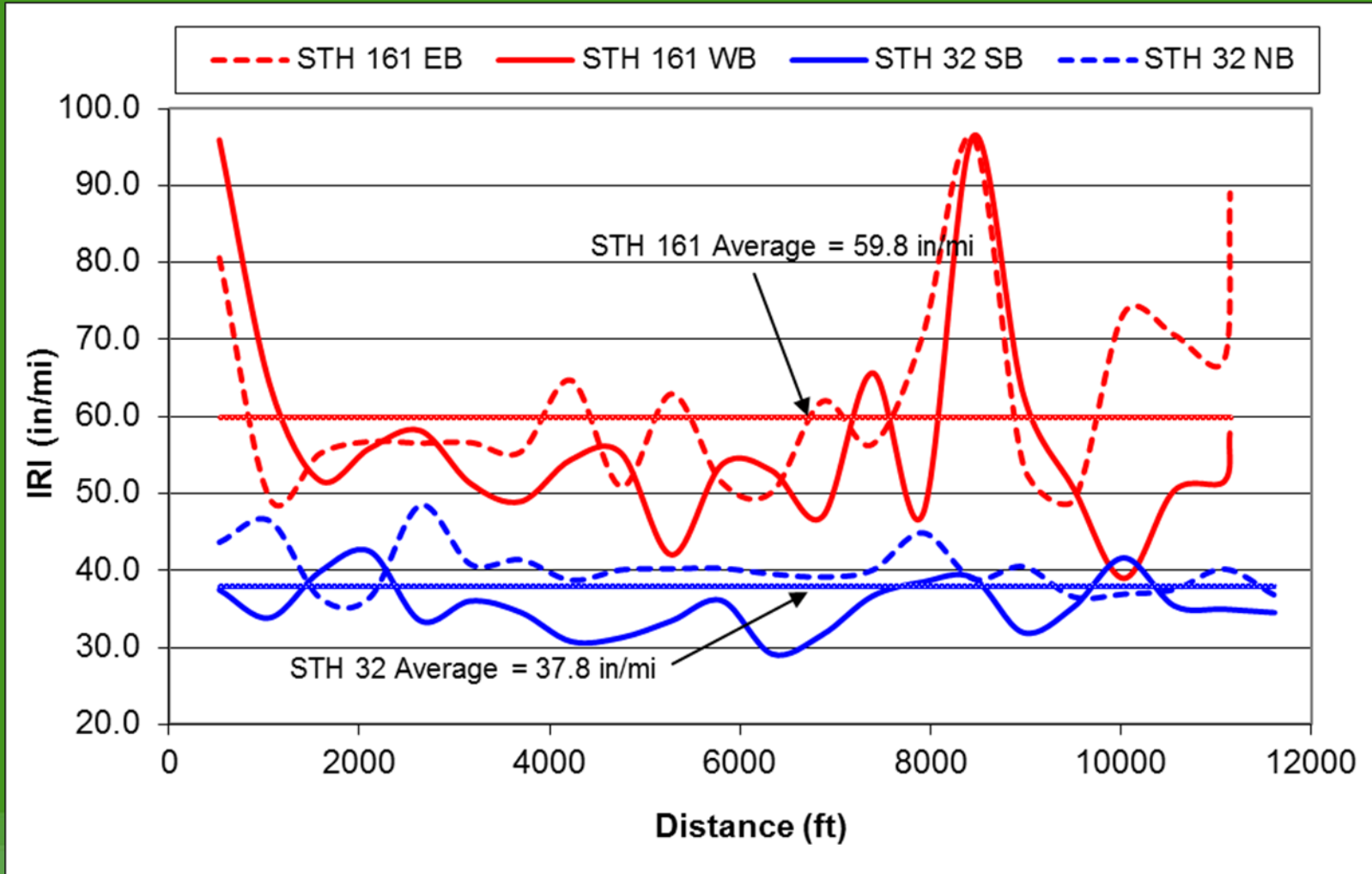
## Wisconsin DOT 2011

IRI (in/mi)	Pay Adj (per segment)
< 30	+250
≤ 30 to < 35	1750 - (50 x IRI)
≥ 35 to < 60	0
≥ 60 to < 75	1000 - (50/3 x IRI)
≥ 75	-250

# Controlling Size



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# Controlling RAP: Agglomeration and Oversize



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# Controlling Size



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# Controlling Moisture



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- Measure Consistent and Accurately
- Moisture Probe vs stockpile sample (lab)



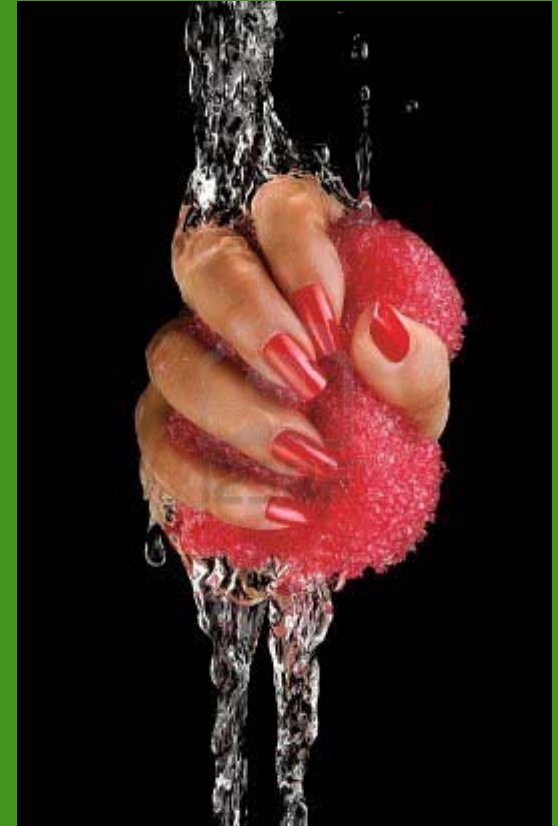


# Plant Capacity



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- Remove the Moisture
  - Know your moisture content
    - Moisture changes
    - Your mix volumetric change
    - Quality Changes
    - Pay factors change
    - Production

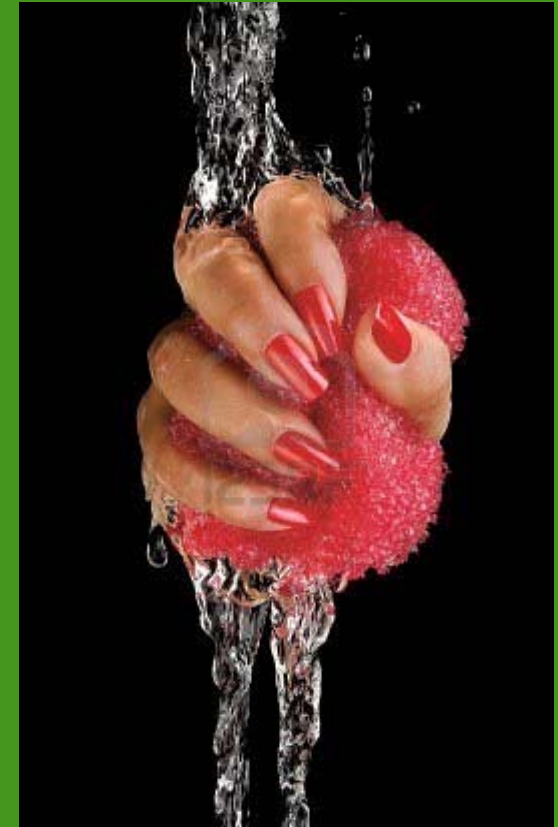


# Plant Capacity



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- 500 TPH Plant
  - Capacity to Remove H<sub>2</sub>O?
    - 25 ton H<sub>2</sub>O - Total per Hour
    - 5 ton H<sub>2</sub>O - Mixing / Rap Entry
  - RAP Moisture 5.0%
  - RAS Moisture 10.0%
  - Virgin Aggregate 3.5%



# Plant Capacity

- Mixing/Drying Capacity 500TPH Plant

<u>Percent Recycle</u>	<u>TPH</u>
50% RAP	200
30% RAP	335
25% RAP, 5% RAS	285
20% RAP, 5% RAS	335

- Controlling factor 5TPH of H<sub>2</sub>O removal after RAP entry
- Savings doesn't take into account Plant efficiency

# Existing Plant Capacity



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## Counter Flow



## Parallel Flow



# Capital Costs: Bigger Drums



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# Capital Costs: Aggregate Storage



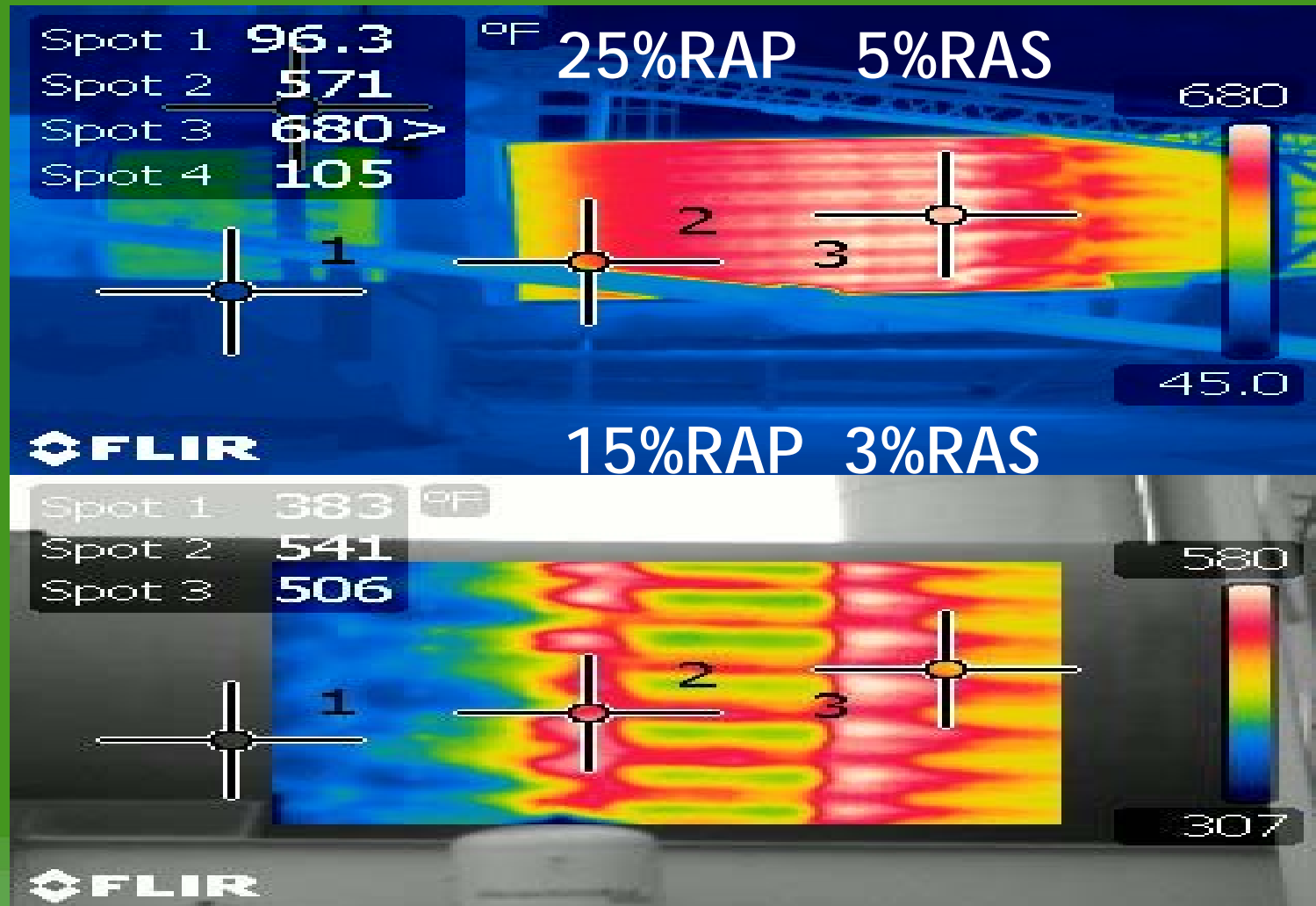
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# Infered Camera



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# Drying/Flighting



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Dramatically increasing Virgin Aggregate Temperatures (super heating) can increase aggregate degradation in your drum. Knowing temperatures can let help you predict absorption or degradation.





# Plant Innovations



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- RAP Entry Evaluation?

## GENCOR ADVANCED RAP ENTRY MATERIAL FLOW

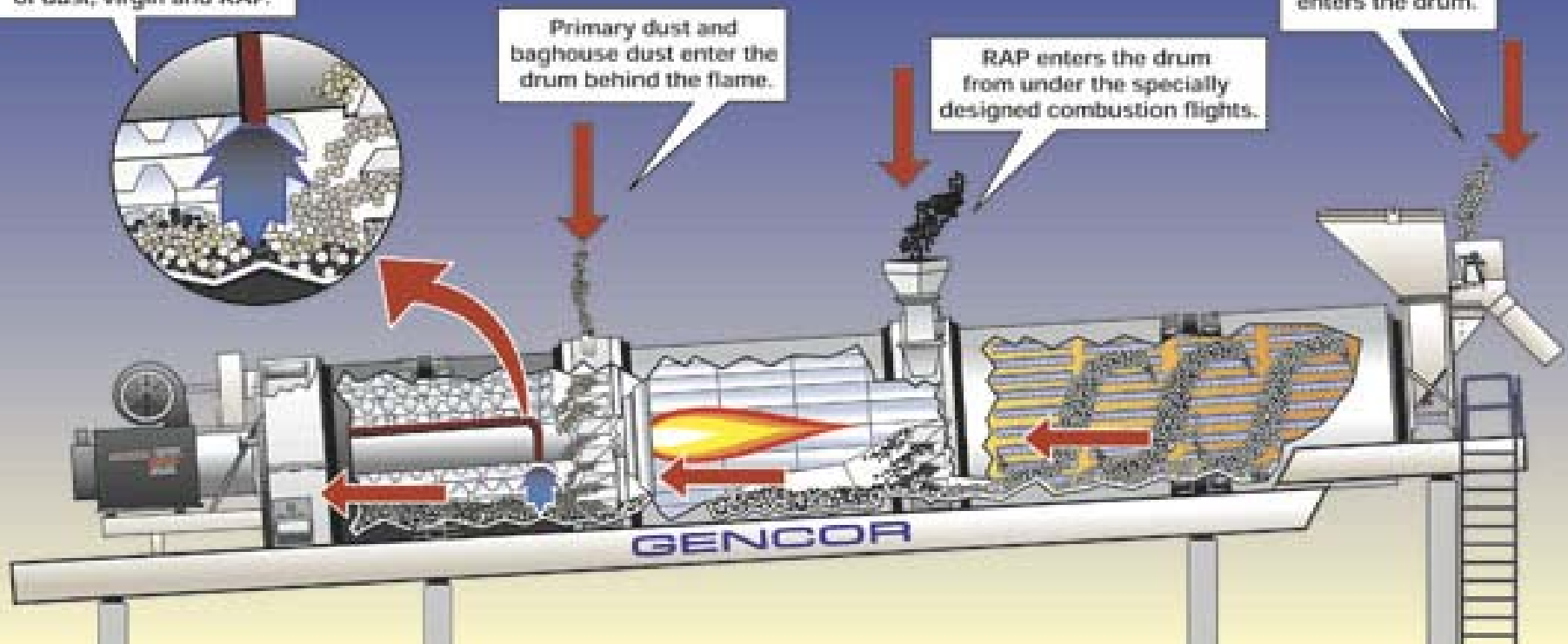
Asphalt Cement (AC)  
is added to the mix  
after thorough dry mixing  
of dust, virgin and RAP.



Primary dust and  
baghouse dust enter the  
drum behind the flame.

RAP enters the drum  
from under the specially  
designed combustion flights.

Virgin aggregate  
enters the drum.



# Field Checks



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# Controlling Variability when Sampling



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## Sampling....When, Where & How?



# Controlling Variability Measuring Dust



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## Control Dust Surges from baghouse to Drum

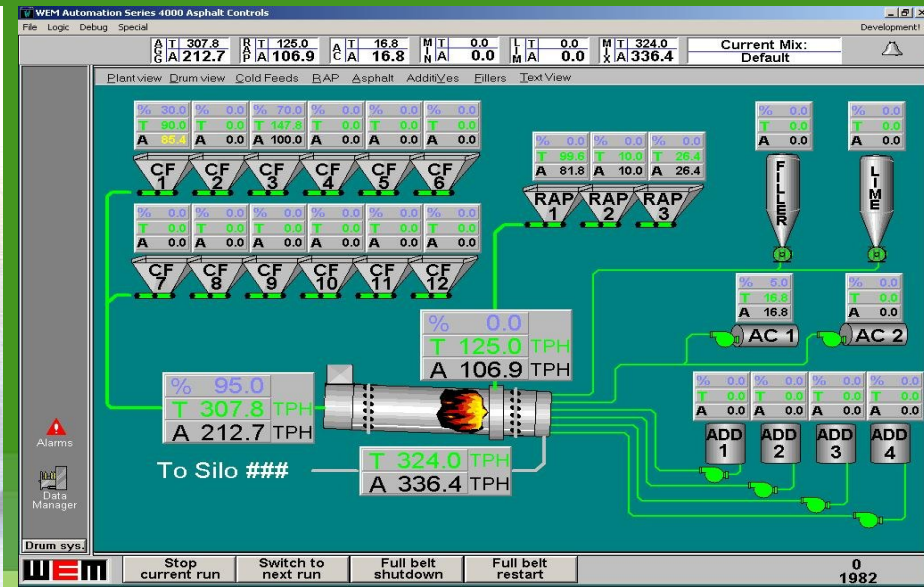
- Record by Mix / Plant amount of dust created in Drum
- Maintain constant dust flow through baghouse
- Control Dust Surges within your system



# Plant Control Systems

## Control Systems

- Record / Graphing Telemetry Systems
- Multiple Weigh Point System vs Single Weigh Point System
- Capability to separate RAP on Inclines

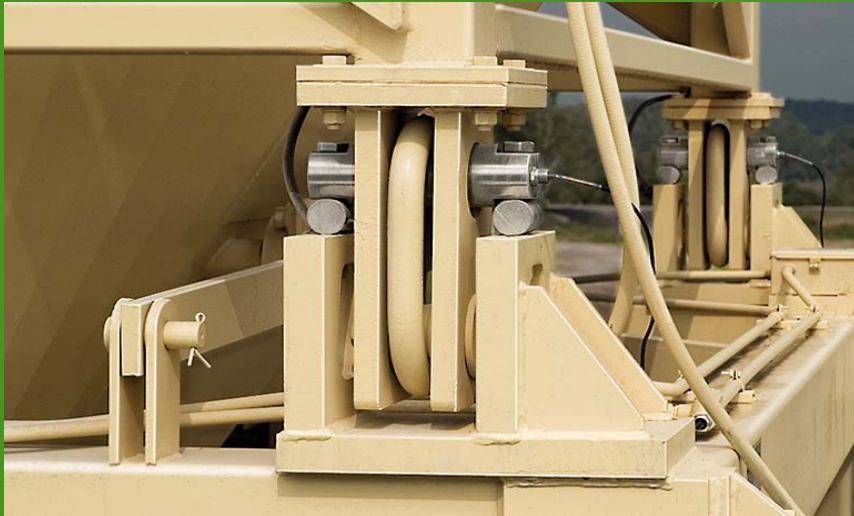


# Measuring Weight



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## Incline (Combined Weights) vs Individual Bin



# Controlling Variability using Control Systems



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## Control System Logging - Real Time

- Each Keystroke logged
- All material calibrations stored
- Mix changes / TPH ongoing
- Fuel / Power Usage
- AC / Additive Flow



### ASPHALT PLANT ROOT CAUSE ANALYSIS

EVENT DATE	PERSON PERFORMING INVESTIGATION	CREW'S MANAGER/SUPERVISOR
INVESTIGATION DATE	INDIVIDUALS INVOLVED	
ESTIMATED TIME SPENT TO COMPLETE REPAIR:	HRS	
PRODUCTION STOPPED AT WHAT TIME:	PRODUCTION RESUMED AT WHAT TIME:	
INVESTIGATION INCLUDED SITE VISIT:	Yes	No
REPAIR DESCRIPTION CATEGORY		
CONTROL HOUSE	CONVEYOR BELTS	LOADER/SKIDSTEER
SILOS	BAGHOUSE	PLANT COMPUTER
DRAG	AC TANK(S)	SCALES/LOADOUT SY
DRUM	BURNER FUEL TANK(S)	SCHEDULING
BURNER	PUMPS	PLANT MANAGEMENT
FEDDER BINS	METERS/TACHOMETERS	AGGREGATE MANAG
RECYCLE BINS	GENERATOR	OTHER: _____
DESCRIPTION OF SITUATION (A brief explanation of how the event or situation (Breakdown) occurred)		
ROOT CAUSES (why did the event occur?) Check all that apply.		
PERSONNEL FACTORS	SYSTEM/EQUIPMENT	

# Success Stories



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## ■ STH 47 Wisconsin –WARRANTY PROJECT

- E-3 12.5mm
  - 20% RAP
  - 5% RAS
- Average IRI 34





# Success Stories



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- STH 47 Wisconsin



# Wisconsin Outstanding Paving Award Winner



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Division of Transportation  
System Development  
Bureau of Project Development  
P O Box 7916  
Madison, WI 53707-7916

Scott Walker, Governor  
Mark Gottlieb, P.E., Secretary  
Internet: [www.dot.wisconsin.gov](http://www.dot.wisconsin.gov)

Telephone: 608 266-1621  
Facsimile (FAX): 608 266-6469

E-mail: [DOTSUPPORT@dot.wisconsin.gov](mailto:DOTSUPPORT@dot.wisconsin.gov)

Dear Mr. GANNON:

Final selections have been made for the Department's annual construction award program. It is our pleasure to advise you that your company has been selected as the winner of the outstanding Asphalt Paving award in 2011 for your work on STH 47, Shawano/Outagamie Counties.

The presentation of awards will be made in Madison at the Wisconsin Transportation Builders Association Awards Program scheduled for the evening of January 18, 2012, at the Madison Marriott West. We would appreciate you advising Don Greuel at (608)267-7774 by January 6, 2012, of the name and title of the person you would like to have present at the awards ceremony to accept the plaque on behalf of your firm.

I extend to you my personal congratulations on being selected as an award winner. It is an honor of which I am sure your company can be justifiably proud.

Sincerely,

A handwritten signature in black ink, appearing to read 'Don Greuel'.

Don Greuel

Chief Project Services Engineer

CC: WTBA

# Future Expectations



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- Plant efficiencies continue to get better for high recycle materials
- Plant Automation Systems
  - Real time QA results continual
- Develop real time gradation Testing
  - Close to being perfected
- Lower risk for our customer and contractor

# Questions



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Thank You!