A Contractor’s Perspective on Achieving Quality and Smoothness in Hotmix Paving
Quality is in the eye of the beholder.

In construction, Quality is defined by the Owner.
- Through the specifications
- By paying incentives / disincentives
FORD FESTIVA
Why does quality matter in Construction?

- Pride of ownership
- Reputation
- Improved Corporate Culture
- Product Performance / Warranties
- Bonus Incentives
- Confidence in Bidding
Workmanship

- Segregation
- Joints
- Smoothness
- Compaction
- Aggregate Properties
  - Specifications
  - Incentives/Disincentives
- Mix Properties
  - Specifications
  - Incentives/Disincentives
Why Incentives / Disincentives?

• Specification defines minimum Quality
• Allows Private Sector to be the Innovator
• To stimulate innovation, Bonus specification allows Contractors to risk money on new Methods and Equipment
• Allows successful Contractors method for recovering costs of innovation
Why not just Disincentives?

- Owner may pay for imagined risk at bid time
- Contractor’s motives not same as Owner’s
- Subtle Quality “defects” are tolerated
- No “incentive” to achieve the best
Quality does not have to cost more

• Highest Quality Contractors succeed through market competition
• Incentive evolves to lower and lower bids
• Lower Quality Contractors can’t compete
• Better, smoother roads are built
Quality as a Corporate Culture

• Instilled in everyone that works there
• Gives the company a competitive edge
• Is good for the bottom line
One of the most obvious examples of Quality in Road Construction

SMOOTHNESS

• Lower fuel consumption
• Less pollution
• Less vehicle wear and tear and damage
• Less damage to freight
• Less pavement damage from vehicle dynamics
• Happier traveling public
• More money for roads!!!
The Keys to Smoothness:

The time, effort, and money spent to achieve a given level of final ride quality depends on:

– The pre-construction ride quality for overlays
– The number and types of opportunities for improvement
– The practices employed at each opportunity
Steps to Smoothness

• Be aware of every opportunity for ride quality improvement
• Know best practices
• Implement best practices
• Monitor your work – know what you can and cannot accomplish
• Be concerned and willing to learn
Opportunities for Improvement

- Corrections applied to existing surface
- Milling
- Intermediate lifts
- Corrections applied to intermediate lifts
- Final lift
- Corrections applied to final lift
Leveling Course
Leveling Course Followed by Grinding
What you pave on matters
What you pave on matters
What you pave on matters
General Best Practices

- Maintain constant speed – DO NOT STOP
  - Milling
  - Paving
- Balance operation
  - Mix production
  - Haul
    - To the paver, from the mill
  - Paver / Mill speed
  - Compaction of mix
    - Breakdown
    - Intermediate
    - Finish
Best Practices

• Reference as smooth a surface as possible
  – Existing surface
  – Previously-ground or placed lane
Skis

• Sense off the smoothest part of the pavement
  – reference the new mat or the adjacent mat
• Average the bumps out over the longest possible length
  – $0.79 can be just as good as $22,000
Best Practices – Milling

• Consistent maintenance
  – Blocks and teeth
  – Referencing equipment
  – Machine in general

• May want fine or micro-milling, especially for single, thin overlays
Best Practices – Leveling Course

• Choose an appropriate mix
• Make sure you have adequate time to compact
  – Thin lifts cool very quickly – Multicool recommended
• Use pneumatic rollers
  – Steel drums will bridge
• Choose an appropriate mix
• Control mix properties
  – Gradation
  – Binder content
  – Temperature
  – Segregation
Best Practices – Paving

• Balance production / haul / placement / compaction
• Monitor time available to compact
  – Multicool
  – May need to adjust for changing conditions
Best Practices

• Minimize contact with the paver
  – Windrow paving
  – Material transfer device / vehicle
Best Practices – Paving

• Avoid thermal and mechanical segregation in the hopper
  – Either fold the wings after every load, or never fold them
  – Do not run the hopper below half full
Best Practices – Paving

• If end dumping
  – Do not back into the paver – let the paver pick up the truck
  – “Break” the load before releasing the end gate
  – Flood the hopper
Best Practices – Paving

Do not allow material to overflow
Best Practices – Paving

- Set flow gates to allow for balanced flow and steady flight chain operation
  - If paver is not centered on pass, adjust accordingly
Best Practices – Paving

- Use auger and tunnel extensions as necessary
- Use material management / anti-segregation baffles / chain curtains / etc.
Best Practices – Paving

Maintain a constant (and proper) head of material ahead of the screed
Best Practices – Paving

• Create as straight a joint as possible
  – Stringline and guide
  – If you cut the longitudinal joint back, cut it in a straight line
• Pave in constant widths as much as possible
• If you have to adjust widths, do it slowly and adjust material flow
Best Practices – Paving

- Minimize raking
- Do not walk on the mat
Best Practices – Paving

- Do not park the rollers on the mat
- Reverse roller direction at an angle
- Control roller speed, particularly on turns
Rolling

• Don’t transfer adjacent bumps onto new mat by rollers straddling it
• Roll off mat - don’t stop on the hot mat
• For ACFC’s - achieve breakdown / compaction with one roller, 2 finish rollers running ONE direction only in tandem
Best Practices – Paving

- Use a straightedgedge on construction joints
- Leave enough manpower and material to build the joint
Expected Outcome

• Ride quality after any given opportunity for improvement
  – Depends on the existing ride quality
  – Will generally be no better than about 60% of pre-operation ride quality

• Your results may vary – you need to know what you can accomplish

• Good best practices have big influence
THE MOST IMPORTANT PART!

- PERSONEL - THE REAL KEY
  - Education
  - Expectations
  - Access your Assets
  - Share the Wealth
EXPECTATIONS

- Make sure everyone knows what the specification is
- Tell everyone what is expected of them.
- Make the people who do the job every day part of the quality process
ACCESS YOUR ASSETS

• Turn loose your innovators
• No toleration for failures is bad climate for taking risks (and finding innovations)
SHARE THE WEALTH!!

- Laydown Crew
- Truckers
- Millers
- Plant Operators
- Mechanics
- Traffic Control
- Quality Control
Zen And The Art of Asphalt Paving

• Remain constant
  – Continuous uninterrupted process
• You want Equilibrium
  – Production Consistency
  – Quality Consistency
  – Heat Consistency
  – Personnel Consistency
Some Days Are Better Than Others
Construction Practices

Paving in wet weather or cold weather may lead premature failures.
Questions?

Mark Belshe, P.E.
mbelshe@rpamail.org
Rubber Pavements Association

Slide and Photo credits: Mike Robinson, Tom Massaro, Darren Coughlin