Best Practices: Construction

Placement and Compaction of SMA

Presented by: Todd Mansell, Caterpillar
Temperature! Temperature! Temperature!

- Compact while hot!
- Stay close to paver
- SMA is open-textured, cools quicker
- 12 minutes from 280°F to 220°F (surface)
- 305°F to 285°F (internal)
Temperature: End dumps/windrow/MTV

- Keep windrows short
- MTV can help with uniform temperatures
- Keep tarps on trucks
Roller types and settings...

- Static steel drum
  - high PLI

- Vibratory steel drum
  - low amplitude, high frequency
  - oscillation

- Pneumatic tire
  - should not be used
Compacting with steel drums

- Should I use vibration?
- Careful not to break aggregate
- How do I avoid breaking aggregate?
Get on, get off!!

- It’s easy to over-roll SMA and damage the mat using vibration
  - It’s also more efficient to use vibration

- Watch for ‘drum bounce’

- Watch for white surface
Recommendations:

- Static steel on thinner lifts with rigid base support

- Use vibration on thicker lifts, less rigid base
  - use vibration whenever possible where it doesn’t fracture aggregate
  - the only way to know is to try!!
  - highly temperature dependent

- Oscillation may work in any position
  - less risk of damaging/fracturing aggregates
  - more risk of not achieving density

- Pneumatic tire should not be used due to pickup on the tires
Typical rolling patterns

- 12’ with 84” drum
- 12’ with 79” drum
- 12’ with 67” drum
- Make odd pass back on the wheel path
12-Foot Wide Lane: 84” x 2 passes
12-Foot Wide Lane: 79” x 2 passes

Pass 1 (up/back)

Pass 2 (up/back)

6” Overhang

12’ Wide Mat

6” Overhang

2” Overlap
12-Foot Wide Lane: 79” x 2 passes

Pass 1
(up/back)

Pass 2
(up/back)

4” Overhang

12’ Wide Mat

6” Overlap

79”

4” Overhang
12-Foot Wide Lane: 79” x 3 passes

Pass 1  
(up/back)

Pass 3  
(up/back)

Pass 2  
(up/back)

6” Overhang  12’ Wide Mat  6” Overhang
12-Foot Wide Lane: 67” x 3 passes

Pass 1
(up/back)

Pass 2
(up/back)

Pass 3
(up/back)

6” Overhang

12’ Wide Mat

6” Overhang
12’ with 84” drum w/ 6” overlap

Paving Direction
12’ with 79” drum w/ 6” overlap

Paving Direction
To get same coverage:

- Take 7-pass pattern with 79” rollers
- Takes 5-pass pattern with 84” rollers
- Temperature!!!
Echelon breakdown - no finish required

- Get density while it’s hot!
- Sets up quickly
- Often no need for finish rolling with echelon rolling
Mix behind the screed before rollers

- Use screed vibration
- Initial + 0.5 to 3.0%
- What affects optimum screed vibration setting? How do I set it?
Mix after compaction

- Required density achieved in first 4 vibratory passes
- No finish roller needed in many cases
Rolling tips

- Many SMA mixes are prone to sticking to steel drums
- Imperative that water system is working properly
- Soap/release agent mixture
Rolling tips

• Don’t park on hot mat
• Water fill on shoulder
• Continuous paving/compaction
• Flushing & bleeding, fat spots…

• Several possible causes
  – drain down in silos/trucks
  – uneven distribution of cellulose
  – non-uniform mix temperatures
  – too high mix temperatures
  – unequal dist’n of recycling agent
  – moisture in mix
  – excessive vibration
    • high pre-compaction (tamper)
    • too many roller passes
    • vibratory screed settings
Design and Specification considerations

• Lift thickness: NMAS

• NCAT Report 9-27
  – Fine 3:1 or greater
  – Coarse 4:1 or greater
  – SMA 4:1 or greater

• Density Specs
  – minimum 94% ??
  – abolish upper limit??
German process

- Tamper bar screeds
- Slower paving speeds
- Hotter mix temperatures
- Difficult to compare to US
German food needs temperature too!
Thank You for your attention!

Questions?

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