How Little Things Lead to BIG Results

1

Fundamentals: Todd's "Top 5"

1. Screed Setup
2. Take Offs
3. Head of Material
4. Pre-Paving Planning
5. Communication!!

2

The Paver: Tractor & Screed

Tractor

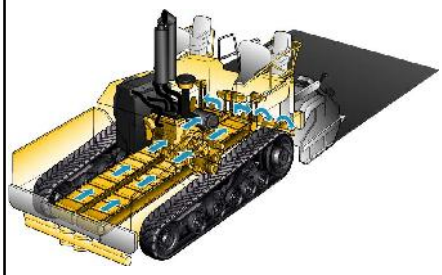
- tows screed
- Accepts mix from trucks, MTV, etc.
- Pushes trucks
- Feeds mix to screed

Screed

- Floats on the mix
- Free to rise and fall according to many factors

3

Tractor



Material Feed System

1. Hopper
2. Feeder bars
3. Adjustable height augers
4. Feeder sensors (not shown)

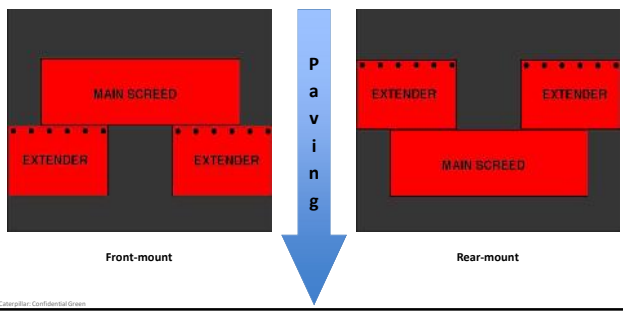
4

Screed

- Screed is extendable to pave different widths
- Hydraulic extendable and fixed-width screeds

5

Front-mount and Rear-mount Screeds



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Front-mount Screeds

7

Rear-mount Screeds

8

1. Screed Setup

Considerations

- Clean screed - free floating
- Paving width
- extensions & tunnels (variable vs. fixed)
- Angle of attack (main & extenders)

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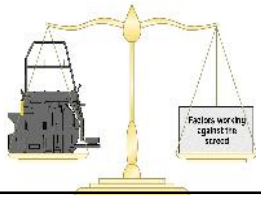
Free-Floating Screed

- Screed position determines mat thickness
- Screed position is constant as long as all factors remain constant



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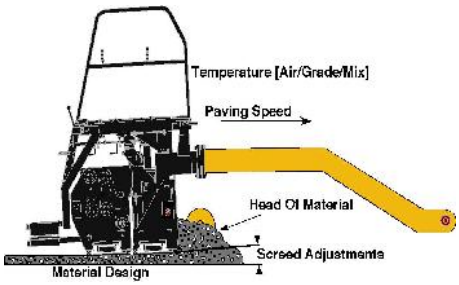
Factors Affecting the Screed



- Paving speed
- Head of material
- Screed adjustments
- Mix design
- Mix temperature
- Air temperature
- Grade temperature

11

Clean your screed for it to work properly!

- Must be free to rotate about pivot points
- Strike off and nose bar must be clean
- End gate springs should be clean and free

12

Dirty, plugged pivot points

- Screed behaves erratically
- Can't control thickness
- Runs at bad angle of attack - wears plates
- Chatter in the mat
- Caused by high head of material
  - often result of insufficient auger extensions
  - auger too high

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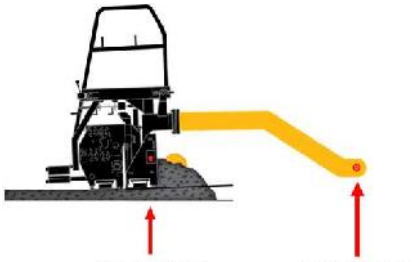
Pivot points must be free to rotate



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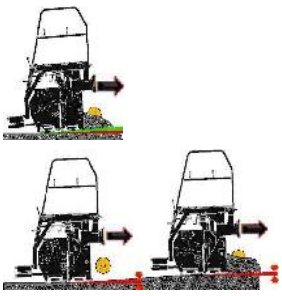
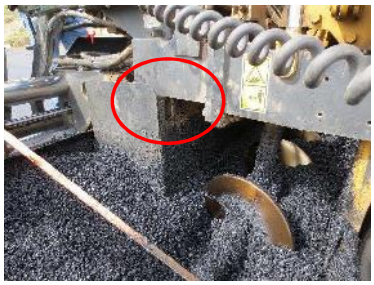
Clean pivot points allow smooth changes



- Pivot points must be free to rotate for thickness changes to occur smoothly and for the screed to "float" relaxed
- When pins are plugged, we compensate & wear the screed out
- Smoothness suffers

15

Pivot Points can get plugged up



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Pivot Points - keep clean & free ☺

View looking down on top of pivot point

Remove side cover

Clean hardened mix out

17

Install rubber belting

18

Chatter in the mat…

19

Strike Off Plate & Nose Bar

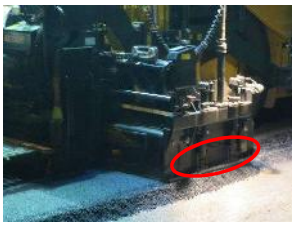
20

Keep end gates clean & free

- End gates down for good longitudinal joints
  - density, straight edge to match next pull
- Who is responsible?

21

End Gates: Clean springs & slides daily



22

End gate down - good joint

CAT

23

End gate down

CAT

24

End gate down - no raking

CAT

25

Dirty tracks, wheels, bogeys

- Bearing run hot
- Faster wear on the screed
- Could affect steering
- Who's responsible?

CAT

26

Clean tracks, wheels, bogeys

- Use tunnel extensions to keep clean
- Tunnels also minimize segregation

CAT

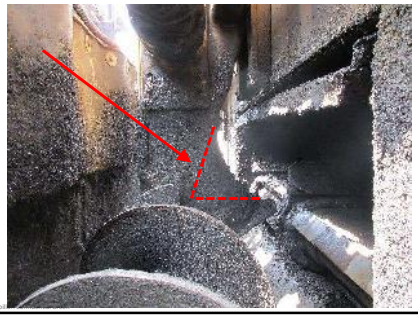
27

Keep sonic feed sensors clean

- Erratic auger movement = bad IRI
- Use WD40
- No Brake Clean!

28

Keep deflector plates clean



- Wear item to be replaced
- Centerline streak

29

Clean deflector plate

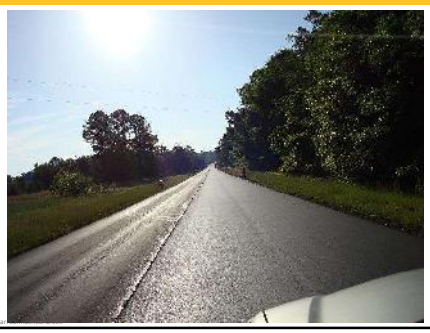
- Needs daily cleaning
- Knock down with shovel handle

30

Dead material on deflector plate

31

Centerline streak



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Keep auger slides clean

- Augers should be free to move up/down

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Auger Extensions & Tunnels

- Fixed width paving
- Variable width paving
- Front-mount screeds
- Rear-mount screeds

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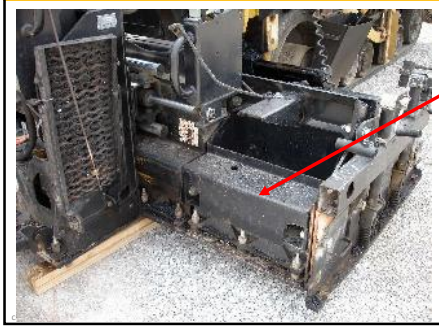
Fixed Width Paving



- Width is constant
- Bolt on extensions
- Setup screed with optimum auger extensions & tunnels (mainframe extensions)

35

Auger Extensions (18”/front 36” rear)

18” with front-mount

36” with rear-mount

36

Variable Width Paving

- Auger extensions & tunnels to minimum width
- Be prepared to shovel as needed at wider widths

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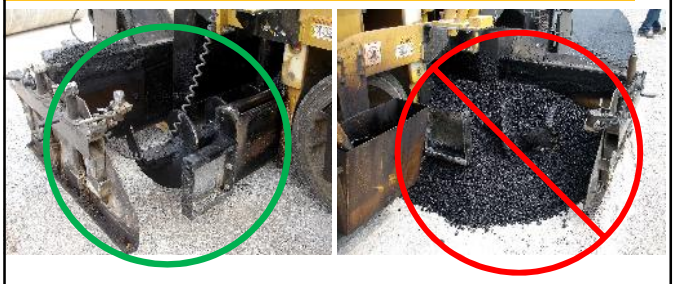
Always Extend Tunnel in front of Augers



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Taking off: Is this a good place to start?

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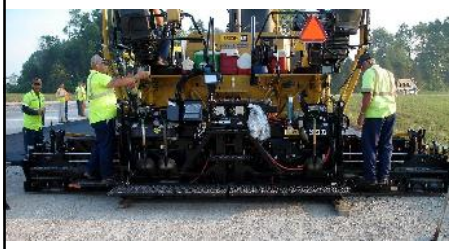
Good Starting Point

- Cut straight starting joint
- Butt joint flat
- Tack butt joint
- Clean area where screed will set down

40

2. Set Down & Take Off



PAVING BY THE NUMBERS

1. Heat the screed
2. Set the tow points
3. Set paving width
4. Set crown
5. Set extender height
6. Set extender slope
7. Lower screed and remove slack
8. Null the screed
9. Position end gates
10. Set auger height
11. Position feeder sensors
12. Set feeder controls
13. Fill auger chamber/place in auto
14. Set accessory functions
15. Pull off starting reference

CAT

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Heat the Screed

- Mix sticks to cold screed plate
- Creates very open texture
- Screed drops
- Pick up, heat screed and re-start OR
- Repair low spot while screed rests on hot mat to warm up.

42

Build a Pad or use Starter Boards

- Support full length of screed & extensions
- 3 to 4 feet long boards
- Based on uncompacted mat thickness (1/4" per 1")

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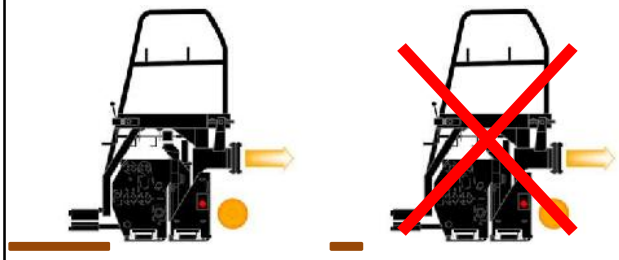
Boards must support main & extenders



Full Support Main & Extenders

Screed will drop or 'nose over'

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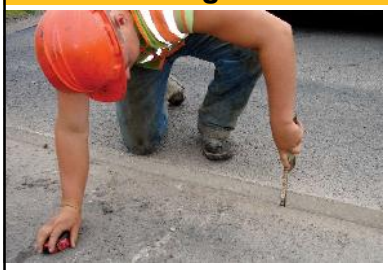
What's wrong with this take-off ?

No starter boards!

45

Measure Height of Starting Joint



- Calculate thickness of starter boards
- General rule vibratory screed: ¼" compaction per 1" loose depth
- Example: Place 2-½" loose to end up with 2" after rolling

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Set Tow Points

- Based on uncompacted mat thickness
- Establish a straight "line of pull"
- Set tow points BEFORE lowering the screed

47

Example: 2 ½ inch mat (rear-mount)

- Tow point scales are different
- Know where "0" is on your paver
- Establish a straight line of pull

Tow Point set at 2 ½

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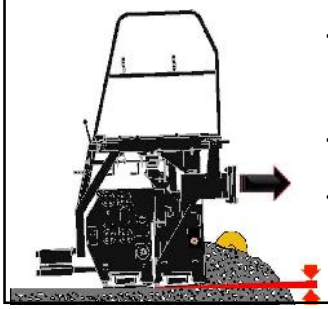
Angle of Attack



- Angle of attack is the relationship between the nose of the screed & the trailing edge of the screed
- Nose up attitude
- Screed reaches equilibrium

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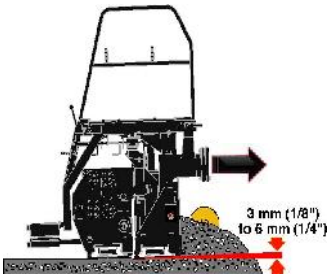
Angle of Attack



- Normally 1/8“ to 1/4“
- Angle too high, screed compacting with trailing edge
- Erratic screed behavior
- Angle too low increases shear factor and wear

50

Angle of attack – what you see…

Too high – shiny

Too low – open texture

51

Different angle of attack

- Different angles of attack between main screed and extenders
- Extenders need to be adjusted to match the main screed angle

52

Set Extender Height

- Angle of attack stablished by setting extender height
- ¼" angle of attack

53

Lower the Screed & Remove Slack

- Lower screed onto starting boards in "float" position
- Take out the slack
- This "sets" the angle of attack at ¼" (or whatever extender height was set at) when we null the screed

54

Null the Screed - must be “free floating”

- Nulling the screed removes all the tension in the screed
- Use depth screws on each side until no resistance is felt
- The screed must be “free-floating” on the mix

55

Establishing Angle of Attack

56

Fill the Auger Chamber

- Fill auger chamber with asphalt mix to ½ auger height
- Use conveyors and augers
- Do not overfill

57

Pull Off Starting Boards Quickly

- Quickly get to paving speed
- Check mix feed
- Check auger speed
- Check for lines in mat

58

Separation Marks – Extension Low

- Lined up with inner edge of screed extension, extension too low
- Raise extension to erase line
- If line re-appears behind outer edge of main screed, use extension slope switch to erase line

59

The Result: Straightedge tells the story

60

3. Managing Head of Material

4 things to manage

- Ratio dials (or flow gates)
- Auger height
- Auger speed
- Feed sensor position

Single leading cause of Mat Defects!!!

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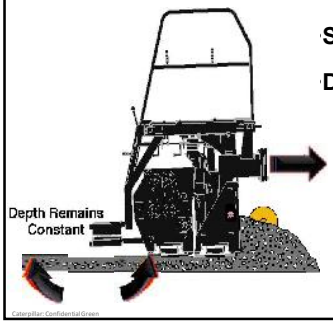
Head of Material @ ½ auger height



- Shear factor is constant
- Depth remains constant

62

Head of Material

- Half auger height @ center auger chamber

63

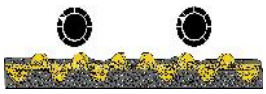
Head of Material – common issue

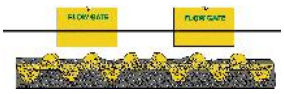
Dip

Bump

64

Managing Head of Material: Conveyors





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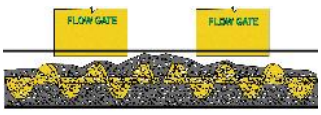
Managing Head of Material: Overfilling

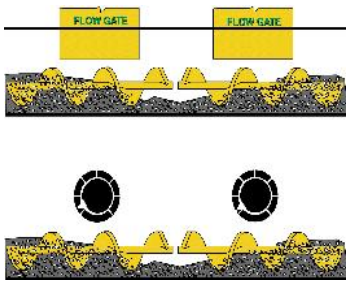


Gates/Ratio Set High

- Too much material in center
- Affects shear factor
- Depth may change

66

Managing Head of Material: Starving



Gates/Ratio Set Low

- Too little material in center
- Affects shear factor
- Depth may change

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Auger Height

- Adjustable height augers help mat texture
-
- Help prevent segregation
- Help manage head of material

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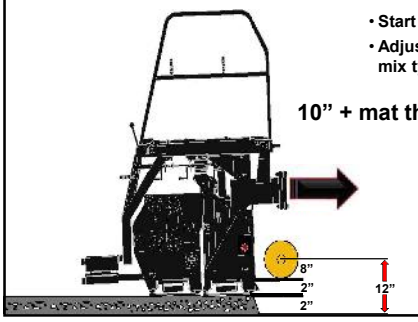
Auger Height



- Start at 2" above level of mat
- Adjust up or down depending on mix type and appearance of mat

10" + mat thickness = auger height

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Auger Speed too fast…

- Too fast will segregate
- How do I slow down the augers?

Slightly fast augers

70

Auger Speed 20 - 40 rpm

Good auger speed

71

Feed Sensor Position

- Mechanical or sonic
- Control level of material
- Position Sensor 18" from end of augers

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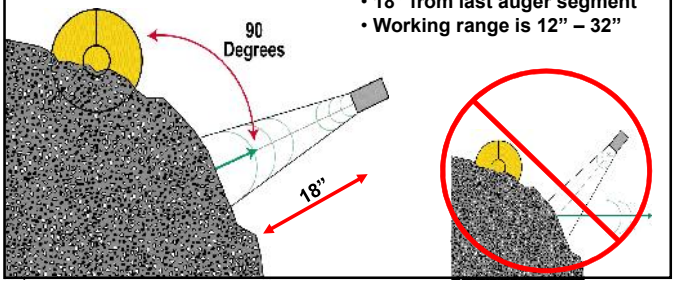
Sonic Sensor Mounting Distance

- 18” from mix
- 18” from last auger segment
- Working range is 12” – 32”



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Aiming Sonic Feed Sensors

- Mechanical or sonic
- Control level of material
- Position Sensor 18" from end of augers

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Paddle sensor at 18” and 45°

75

Mat Texture – on/off augers…feed sensors

- Aim feed sensors for continuous auger movement

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4. Pre-paving Planning

- Do you have a paving plan?
  - Trucking - usually a "yes"
  - Paver speed? Often a "no"
  - Traffic control? Usually a "yes" - sub-contractor?
  - Compaction? Often a "no"
- Are you able to inspect the base ahead of paving and fix any problems?
- Paving layout and pulls/widths/sequence
- Is the equipment on site to meet specs?

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Inspect ahead of paving

78

Inspect ahead of paving

- Low spots cause uneven compaction
- Fix prior to paving over

79

Grade Conditions – High Spot

- How will this affect smoothness? Compaction? Mat texture?

80

High Spot - Mat Texture

- Paving with averaging skis on both sides
- Screed fills in lows and scalps off highs
- Screed dragging rock due to poor ratio thickness: aggregate

81

Inspect ahead of paving

- Slope correction

82

Grade Conditions – Slope Correction

- Grade control right side provides correct mat thickness
- Slope control left side builds correct profile
- Where do you check depth?
- Will there always be a height match at shoulder?

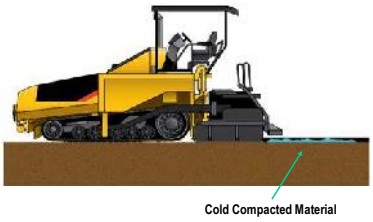
83

Spills on grade

- Potholes
- Density problem
- Smoothness problem

84

Trucks cleaning in front of paver



- Small compacted pile usually not visible in mat surface
- Thin layer of fresh mix for compaction
- Uneven compaction
- Bump
- Fractured aggregates

CAT

85

Clean-out Area

- Designate a clean-out area
- Prohibit clean-out in front of the paver
- Send mix back at end of shift

CAT

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Paver Speed

- Goal is non-stop paving
- Set to match mix delivery
- Balance with rollers
- Quick starts/stops
- 60 fpm maximum

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Why Continuous Paving?

- Screed settlement during long stop
- Compaction process may clean up mark
- Screed assist can help

CAT

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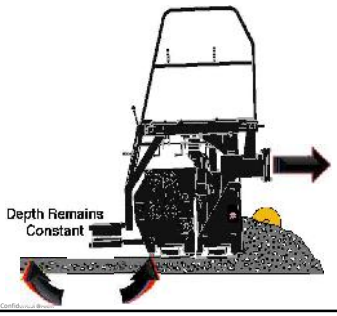
Paver Speed Constant = Smoothness



- Shear factor is constant
- Depth remains constant

CAT

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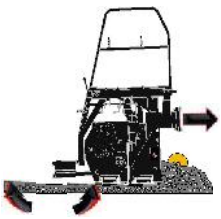
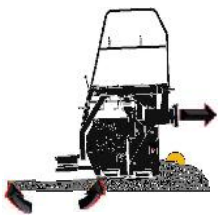
Changes in Paver Speed



Increased Speed

- Shear factor decreases
- Depth decreases



Decreased Speed

- Shear factor increases
- Depth increases

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Planning ≈ 20 minutes

Pre- paving planning
- Tons per day
- Number of trucks need
- Paver speed
- Roller speed
- Rolling Pattern
  - Density
  - Smoothness

Tools available
- NAPA IS-120
- Paving Production Calculator App
- PaveCool App

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Balancing Plant, Trucking, Paver, Roller

- Expected 2,500 tons/day
- 8-hr paving window
- End dumping (18-ton)
- 12-ft wide, unconfined edge
- 2-inch overlay
- 12.5mm polymer-modified mix
- Autumn < 70°F
- Given 3 rollers
  - 84" steel vibratory (Cat CB64)
  - 79" steel vibratory (Cat CB54XW)
  - 82" pneumatic (Cat CW34)

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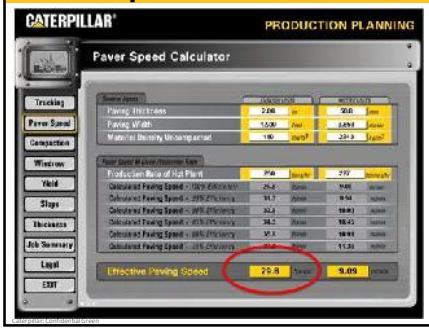
Need 7 pieces of information



Use Paving Production Calculator or use NAPA IS-120 Worksheets

1. Plant tph & silo capacity
2. Paving window
3. Average truck capacity
4. Truck cycle time
5. Mat thickness (loose)
6. Mat width
7. Loose mix density

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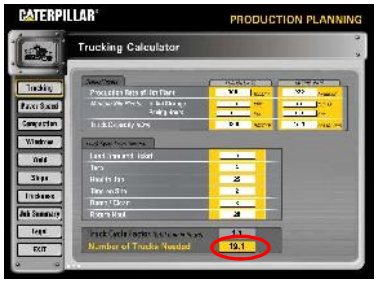
Number of Trucks = 20



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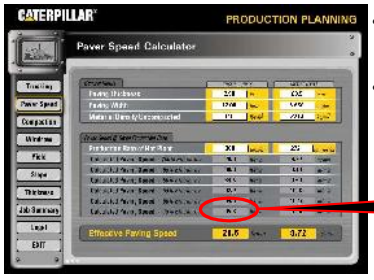
Paver speed using end dumps



- Use 100% for MTV
- Use 75% for end dumps

36 fpm

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Paver Speed, trucking, plant, rollers balanced

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Paver Speed - Real World Paving

- Do not panic
- Stay with the plan
- Get rid of trucks in an orderly fashion
- Establish a uniform trucking pattern
- Will help density & smoothness

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Changes in Paver Speed

- Changes in paving speed may require feeder system adjustments
- Too often, paver speed changes, but feeder system ratio dials or flow gates are not adjusted to match new paver speed to maintain 20 - 40 rpm auger speed

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5. Communication

Emergency 911

Makesno Sense	Project Manager	555-234
Lotsa Iron	Equipment Manager	555-234
Alwayson Myphone	Area Superintendent	555-234
Ihate Timecards	Paving Foreman	555-234
Orange Cone	Traffic Control	555-234
Big Mack	Trucking	555-234
Marshall Hammer	Quality Control Manager	555-234
Thirsty Tomore	Water truck	555-234
Reomove Andreplace	DOT Inspector on site	555-234
Hot Mixer	Batch room @ drum plant	555-234
Dilitoo Anjob	Equipment dispatch	555-234
I. Fixit	Mechanic	555-234

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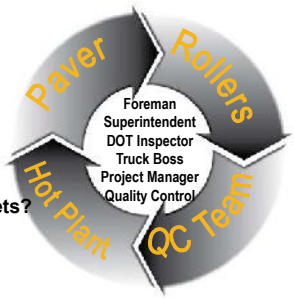
Who's responsibility is it?

- Paver Speed?
  - Paver operator?
- Roller Speed?
  - Roller operator?
  - Quality Control?
- Meeting Density & Smoothness targets?
  - Quality Control?



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Review & Summary: "Top 5"

1. Screed Setup
   - Have auger & tunnel extensions when needed
   - Clean pivot points and end gate springs
2. Set Down & Take Off
   - Use starter boards of proper thickness and length of 36" to 48"
   - Set tow points at mat thickness + compaction
   - Set extender height (angle of attack) @ ¼"
   - Lower screed & remove slack
   - Null the screed
3. Managing Head of Material @ ½ auger height
   - Set conveyor ratio dials/flow gates
   - Set sonic or paddle feed sensors at 18" from last auger segment
4. Pre-Paving Planning & Paver Speed
   - Set a target speed based on plant and/or rollers
   - Adjust feed system (conveyor ratio dials or flow gates) when changing paver speed
   - Keep constant speed
5. Communicate!!

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Thank-you for your attention! Questions?

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