MINIMIZING SEGREGATION

Paul Schratz
Regional Sales Manager
Roadtec

Segregation

Primarily, segregation is related to the gradation of the mix design and the type or shape of the aggregates used in the design.

Segregation can originate at any point where the materials are handled or moved.

When the mat being placed starts showing signs of segregation, the source of the problem must be found and corrected.

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Truck Loading

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Truck Loading

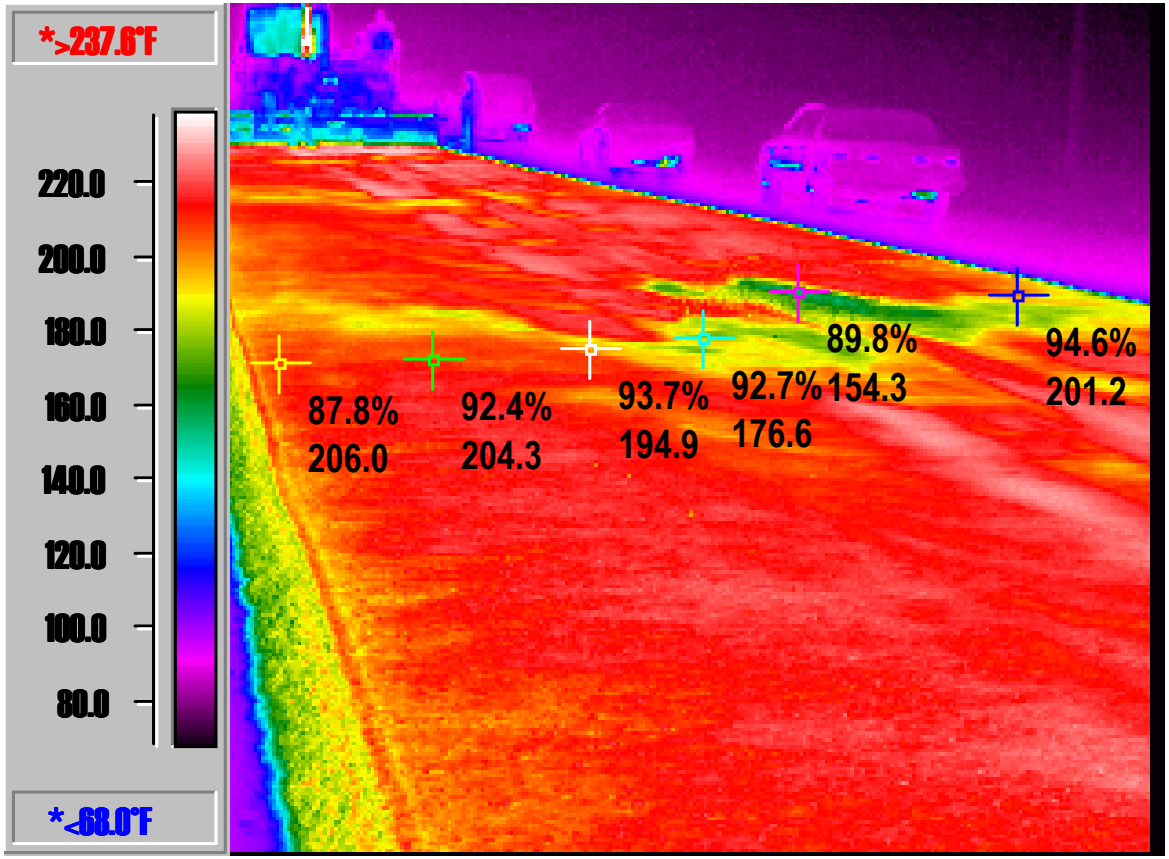
Physical Segregation

End of load

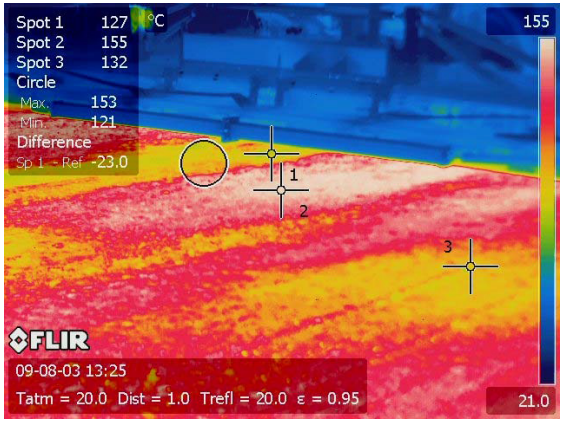
End of load segregation should not be a form of a stimulus package. Although rework is great, it is costing somebody.

End of Load Segregation

End of Load Segregation



End of Load Segregation



- At the beginning of each trailer and the end of each trailer are cold spots of asphalt mix. Stone rolls from the middle to the outside making segregation of the stone and the mix temperature.
- This mix must be re-integrated into the mix or compaction will be uneven in density.

Segregation

Even though material has been successfully processed through the cold feed bin, the plant, the surge or storage bin, then uniformly loaded on the truck, segregation can still occur in the paver.

Improper operation of a paver can cause segregation in varying degrees.

Here are suggestions that should be considered when segregation occurs at the paver.

Segregation

Run the paver as continuously as possible. Start and stop only as necessary. Adjust the paver speed to balance paver production with plant production.

By starving the augers for mix, fine material will drop directly on the ground causing coarse material to be augured to each side.

Segregation

Run augers continuously.

Auger speed should be a continuous, slow flow of material.

Augers that run at high speeds are cycling on and off continuously and contribute significantly to segregation at the paver.

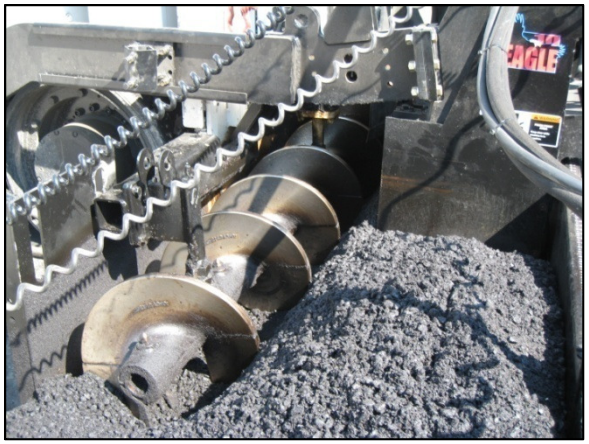
If augers are running too fast, the center of the mat will be deficient of material and this will generally result in a coarse strip.

Segregation

Augers should run constantly at a slow speed (around 20-40 RPM)
to move fresh hot material uniformly across the front of the screed.

What can you tell about this Job?

Running out of material



Truck Exchanges

Bring your machine up to the truck and then raise the bed when possible.

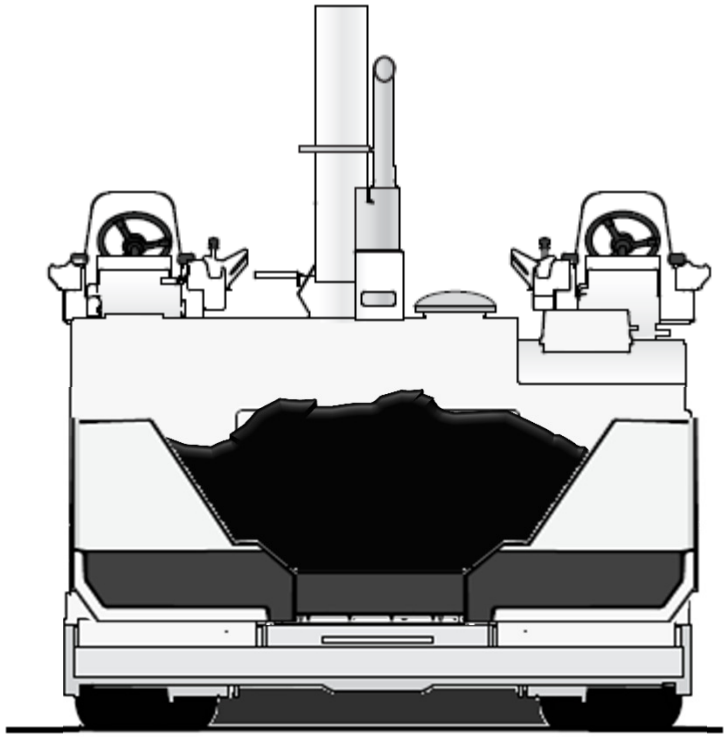
When unloading a truck, discharge the material as a mass instead of dribbling the material into a paver.

When should I empty the Hopper?

When you limit the amount of times you empty the hopper, you will have a much better Mat quality.

Stop the paver before the material drops below flow gate.

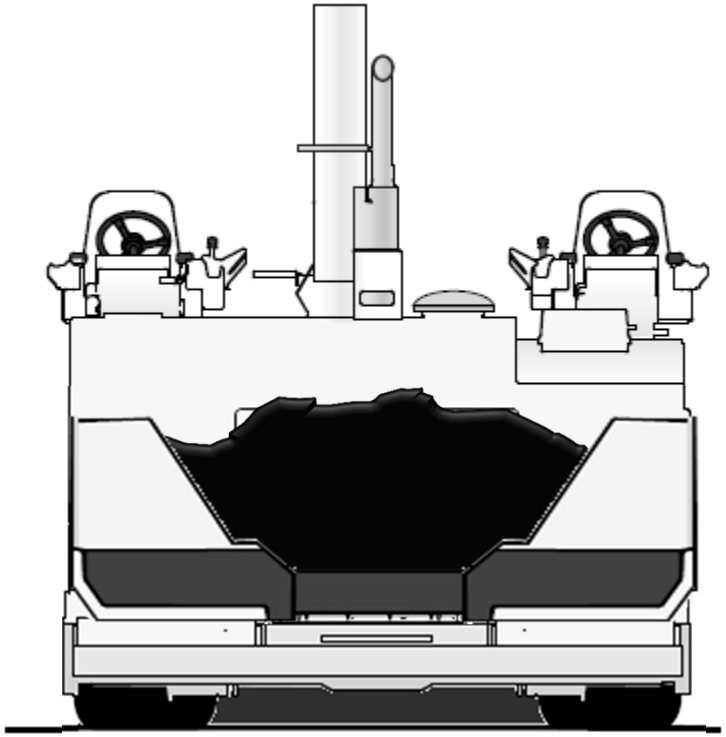
Set and keep the conveyor deck covered with a minimum of 6 to 10 inches of material. (152-254mm)



When should I empty the Hopper?

When working with segregating materials, the hopper wings should only be cycled with the hopper relatively full.

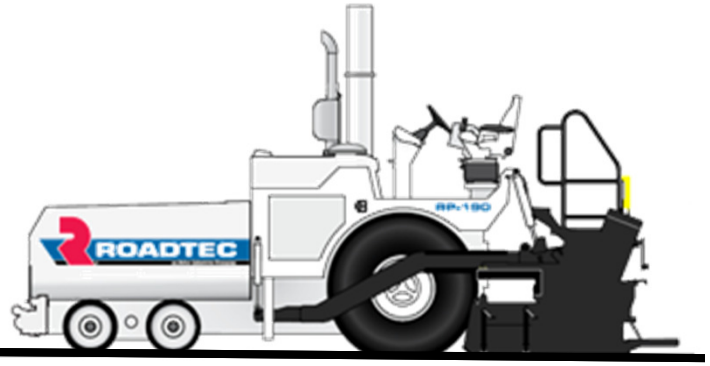
This bunches the segregated materials that collect in the hopper wings instead of flipping them into an empty center area.



Stopping and Starting

It is recommended that you stop the paver as quickly as possible and accelerate as quickly as without being erratic.

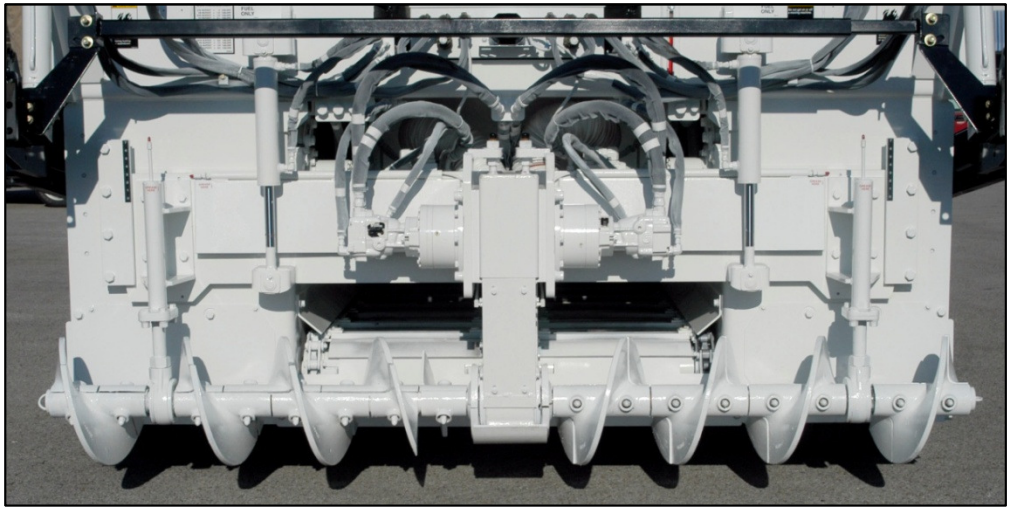
This helps not only to minimize mat deviations, but also to maintain a constant, uniform head of material.



Material Management

Key Points in Prevention of Segregation:

- Keep Material Contained
- Prevent Excessive Rolling of Materials
- Move Material in a Smooth Uniform Uninterrupted Manner.



Say When !!

What's happening to this screed ?

And what if we were going to bring our end-gate in, what would happen?

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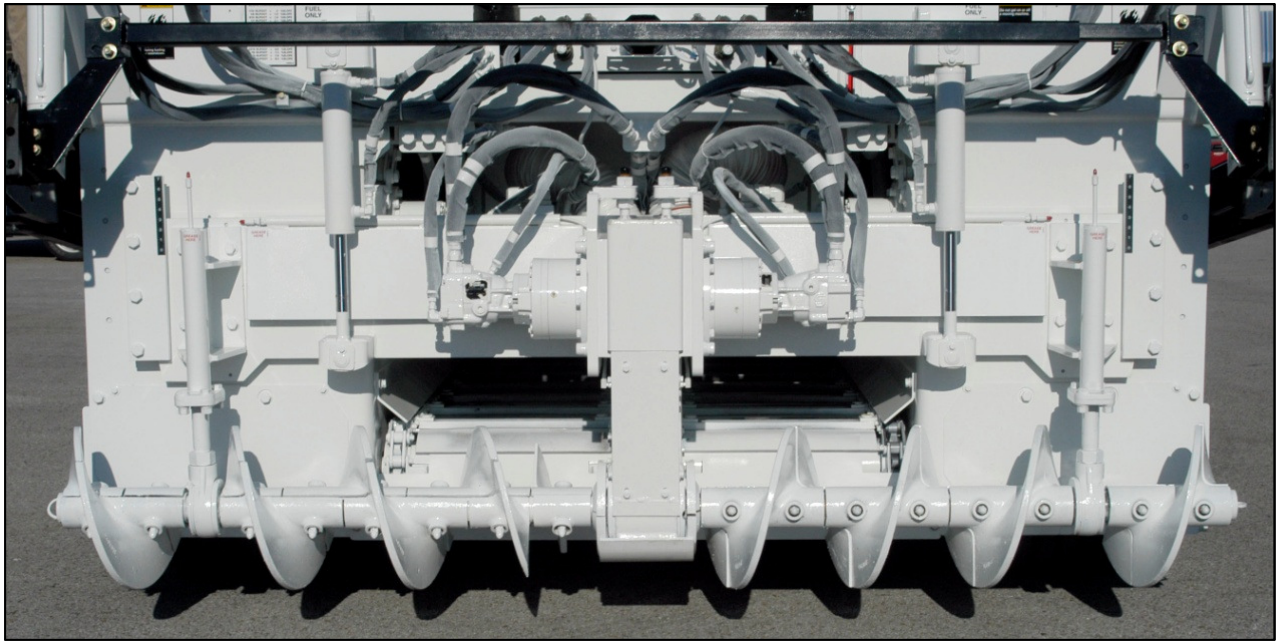
What can we Change?

Auger Adjustments

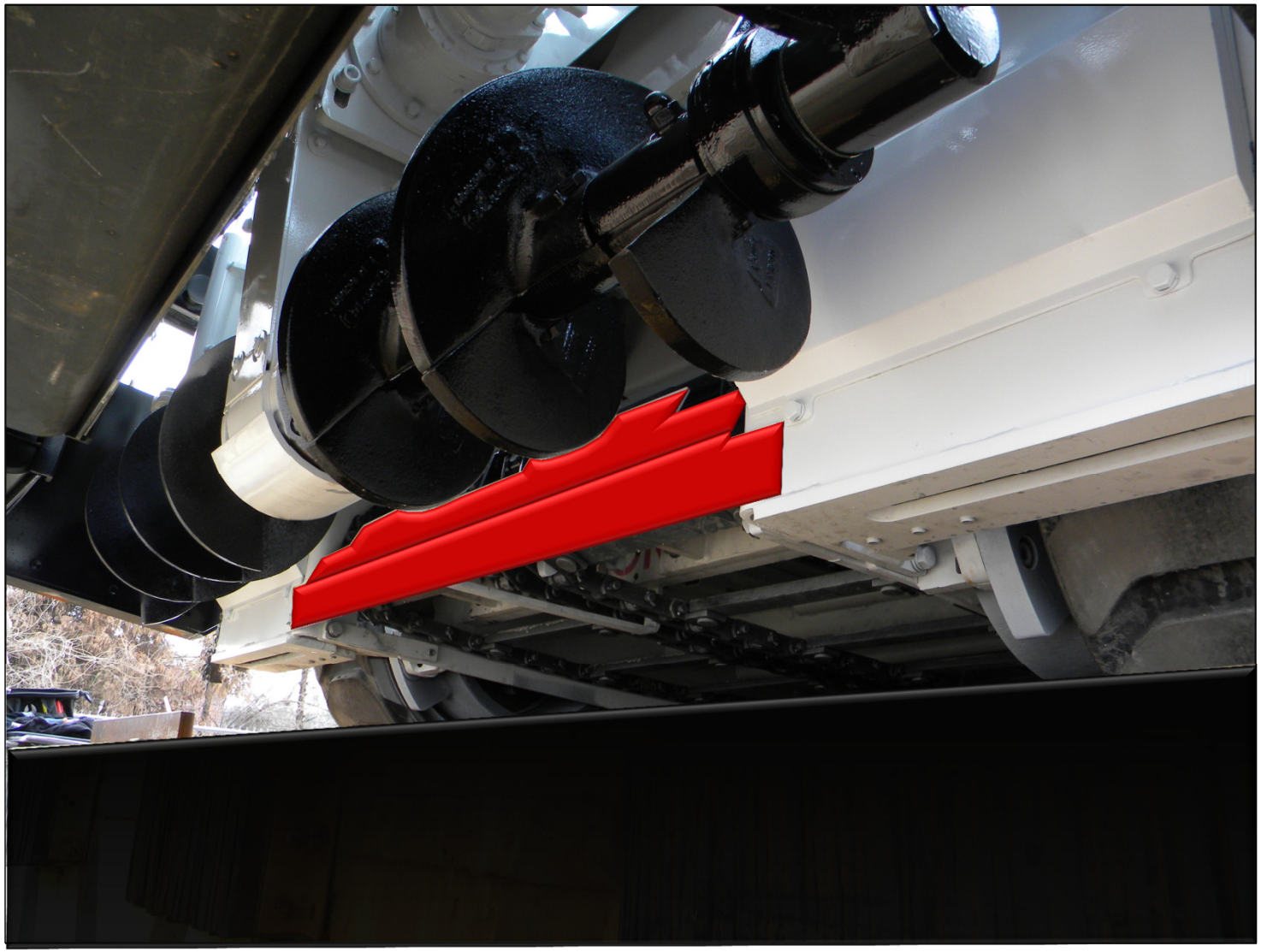
The head of material is the asphalt that is carried in front of the screed

There is no need to carry anymore material in front of the screed than is required to feed the entire length of the screed.

Ninety-Five to Ninety-Eight percent of all Mat flaws originate from paving with an improper head of material.



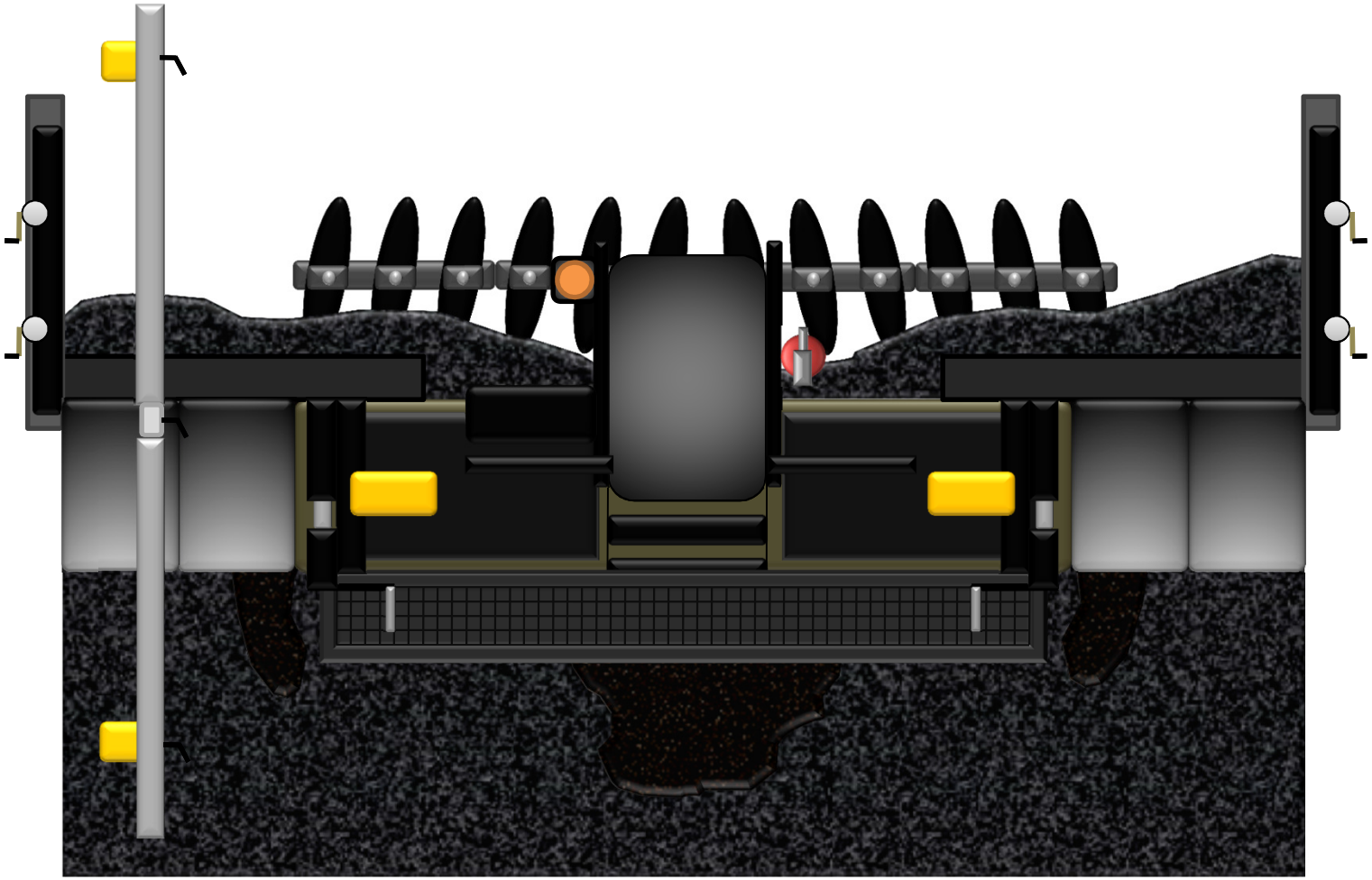
Delta Plate



Irregular head of material

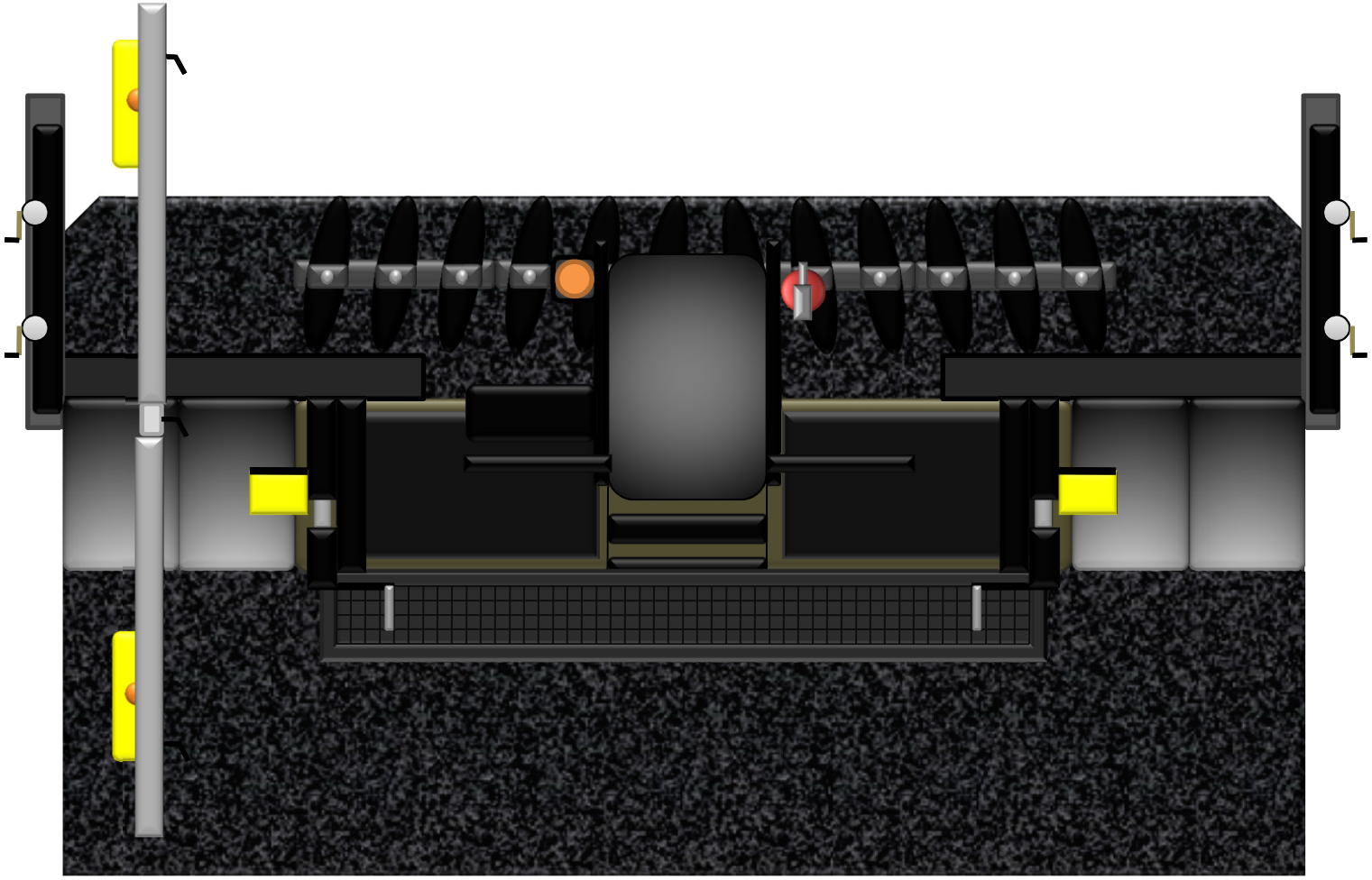
When you have an irregular head of Material, you can usually see the same imperfections in the Mat.

Gradation changes in the mix design will effect how a screed reacts.



Consistent head of material

When you have a consistent head of material, you can usually see a Mat that is flawless and very uniform in density.

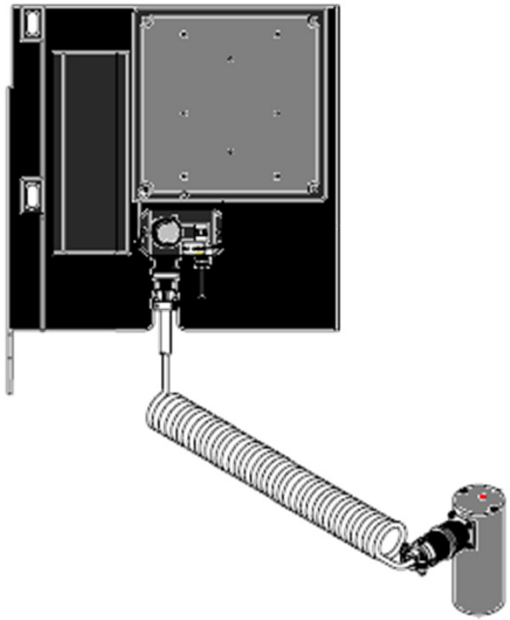


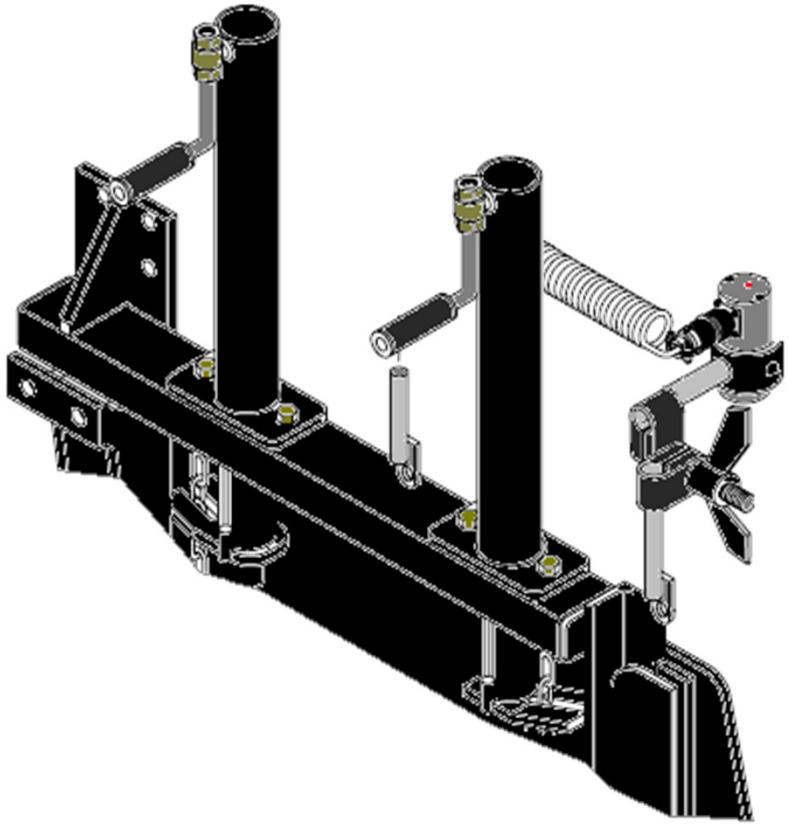
Auger Height

Auger height controls the head of material and is determined by mat thickness.

Add 2 inches to the loose thickness you are laying, or more for larger aggregates. (50mm)

Feeder Placement

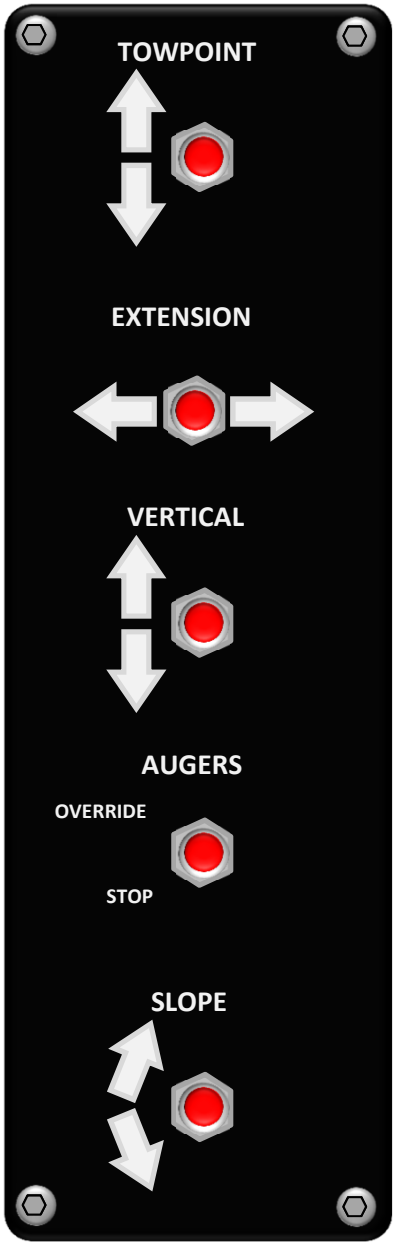


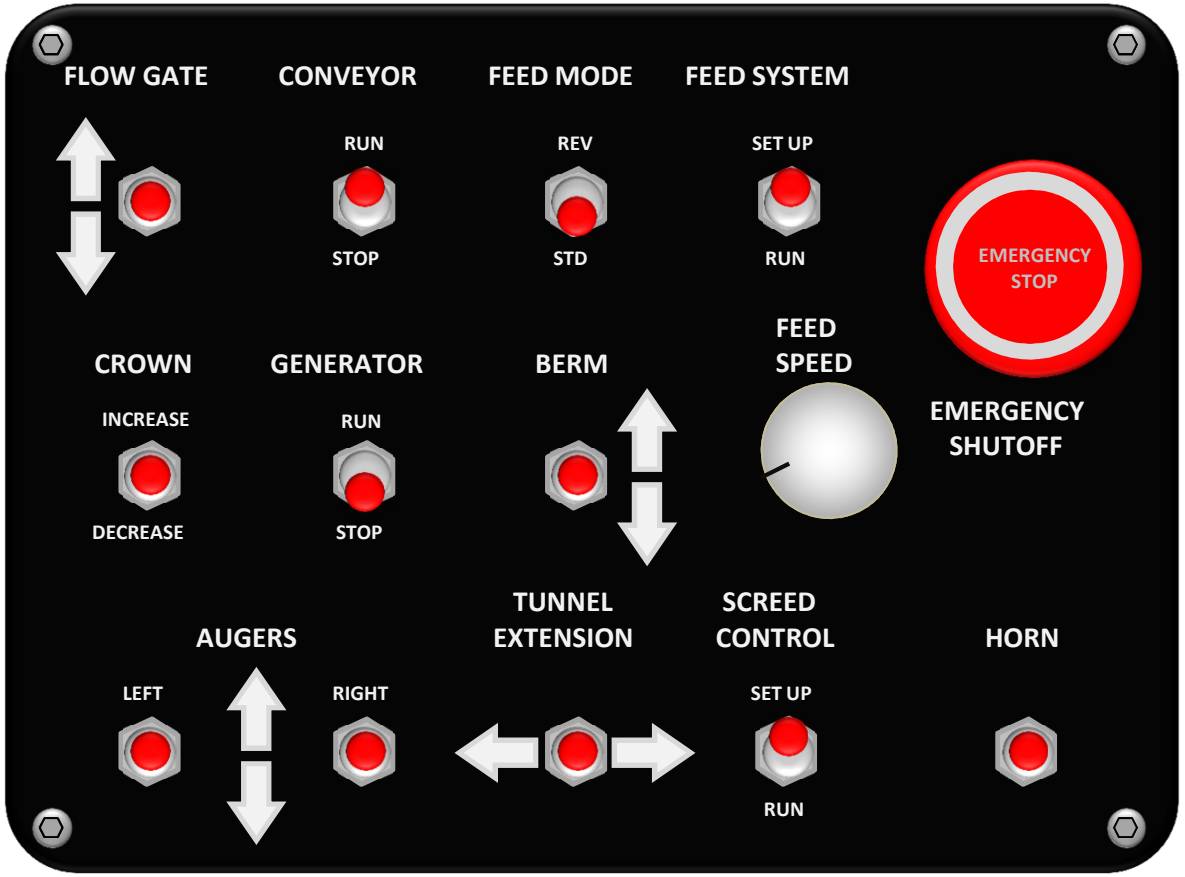


When should I change my Feeder position?

What benefit will I see from a different position?

Feeder Speed

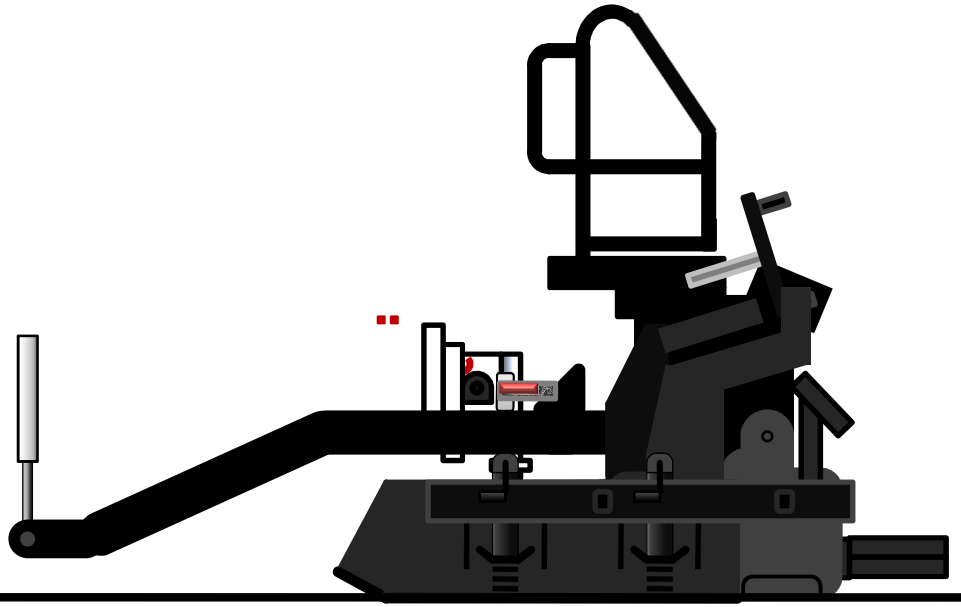




Managing the Feed System

Managing the Feed System

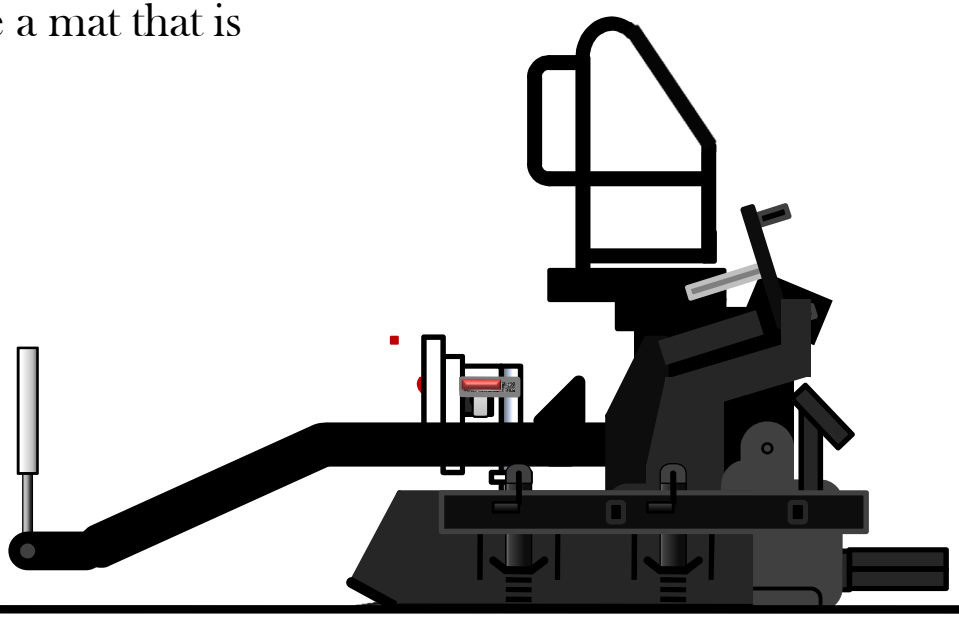
This is an example of a Feeder that is not positioned properly.



Managing the Feed System

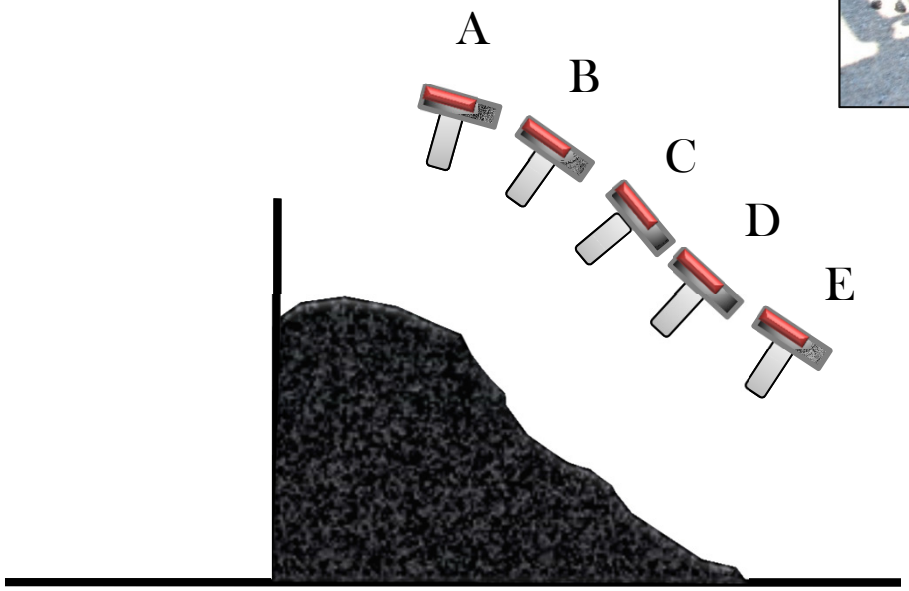
The correct position as illustrated here, will cure many problems with your paving operation.

Material that is not manageable will make a mat that is unmanageable.



Managing the Feed System

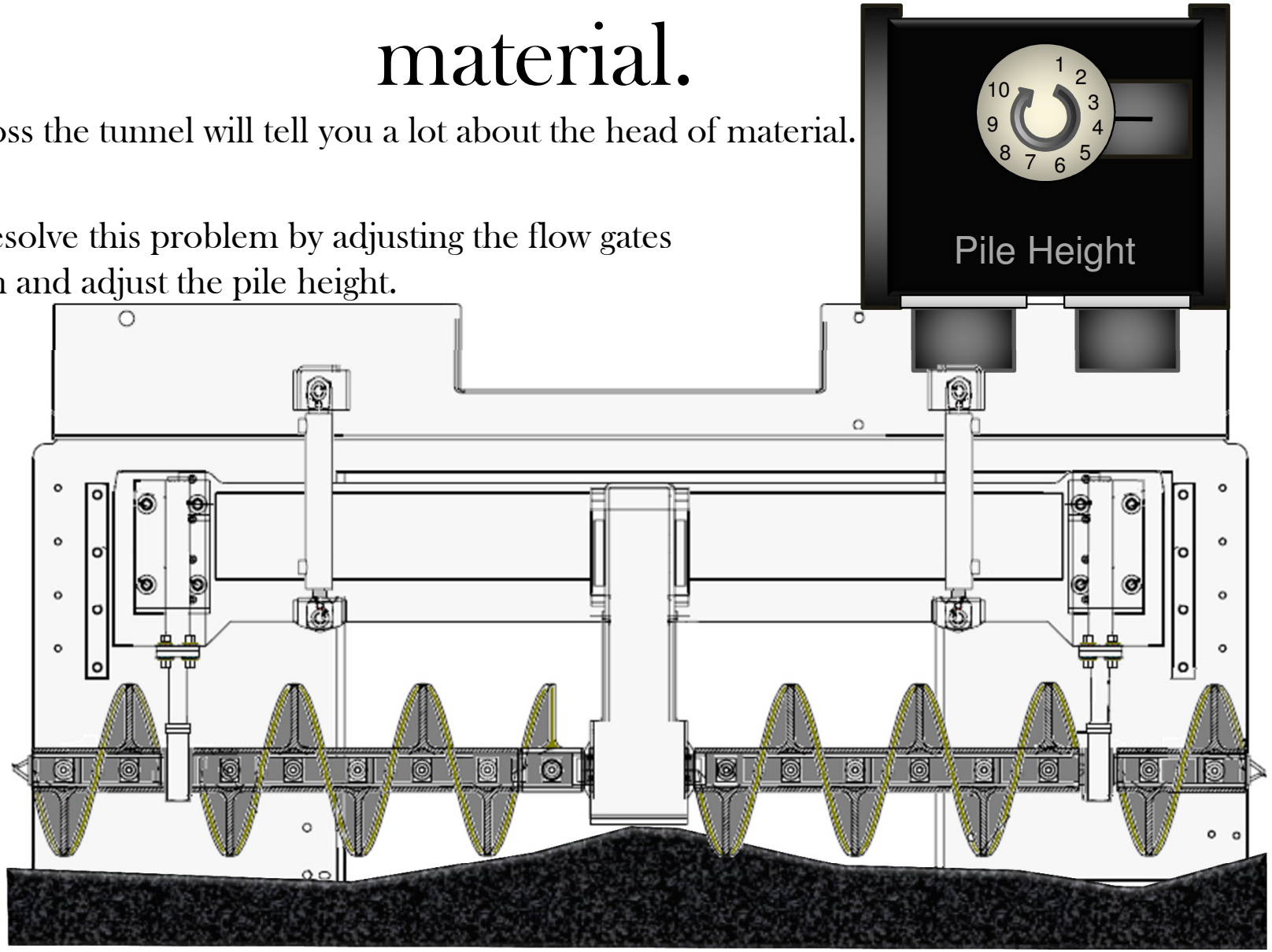
What is the best position to manage this head of material?



Adjusting the proper head of material.

Looking across the tunnel will tell you a lot about the head of material.

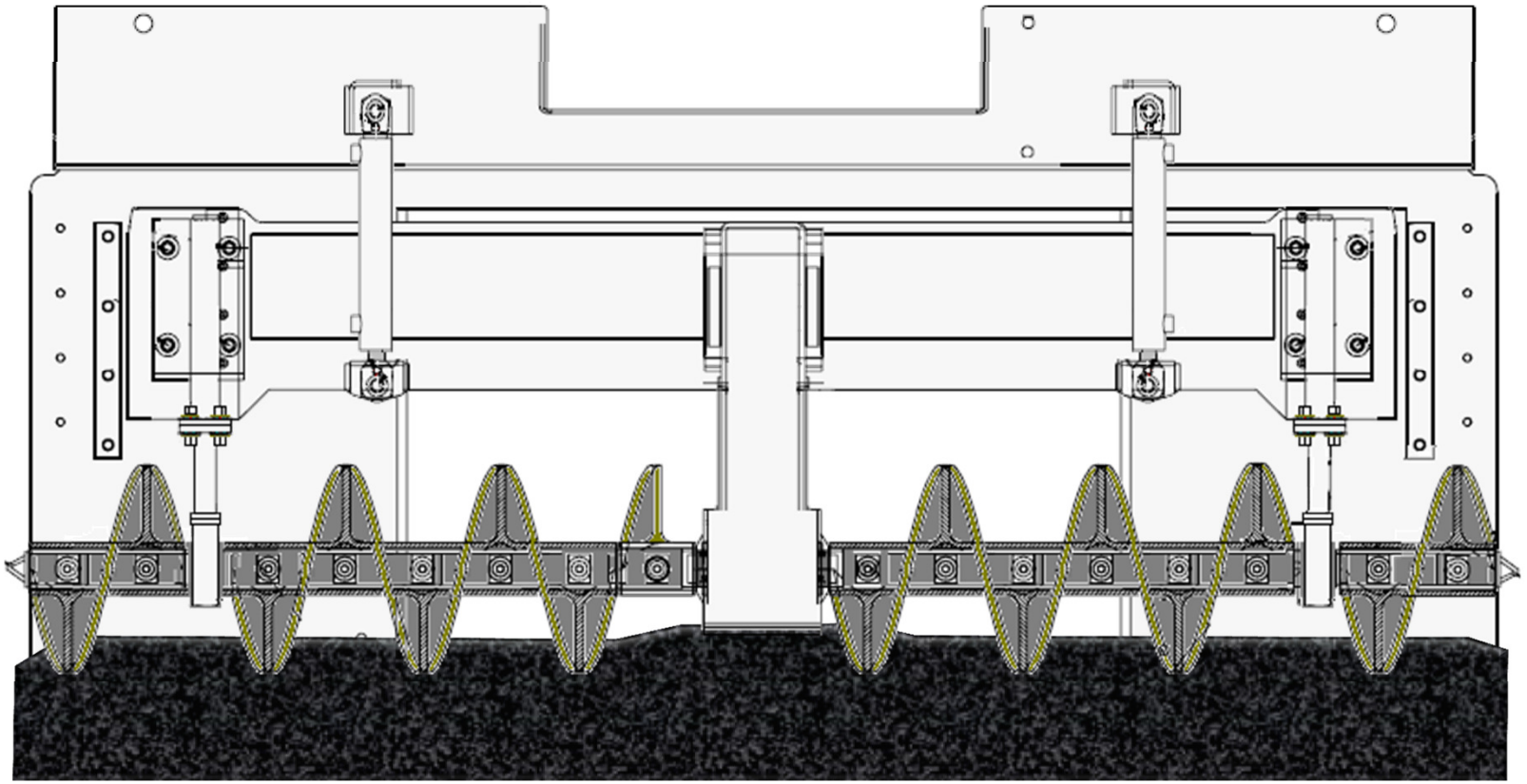
You could resolve this problem by adjusting the flow gates or slow down and adjust the pile height.



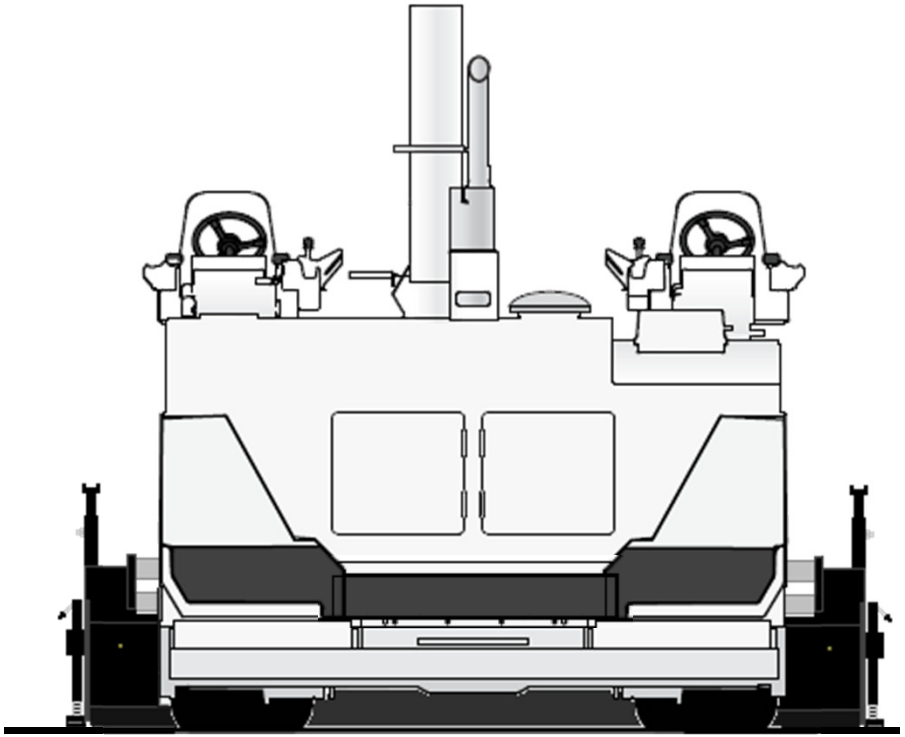
Adjusting the proper head of material.

This is the proper head of material you should see.

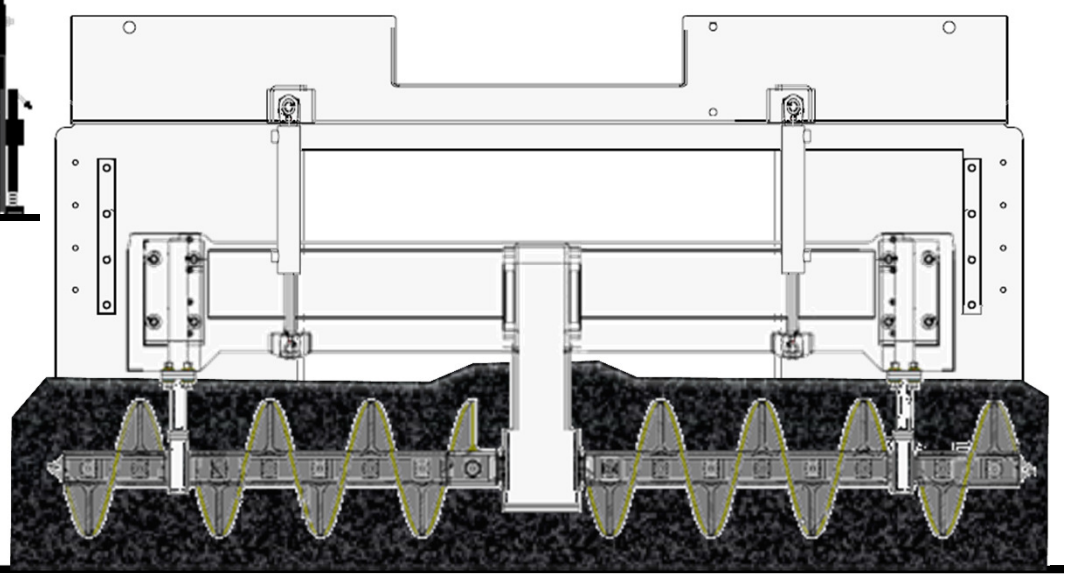
You should have an even amount of material across the auger chamber, and your augers should be running 100 % of the time.



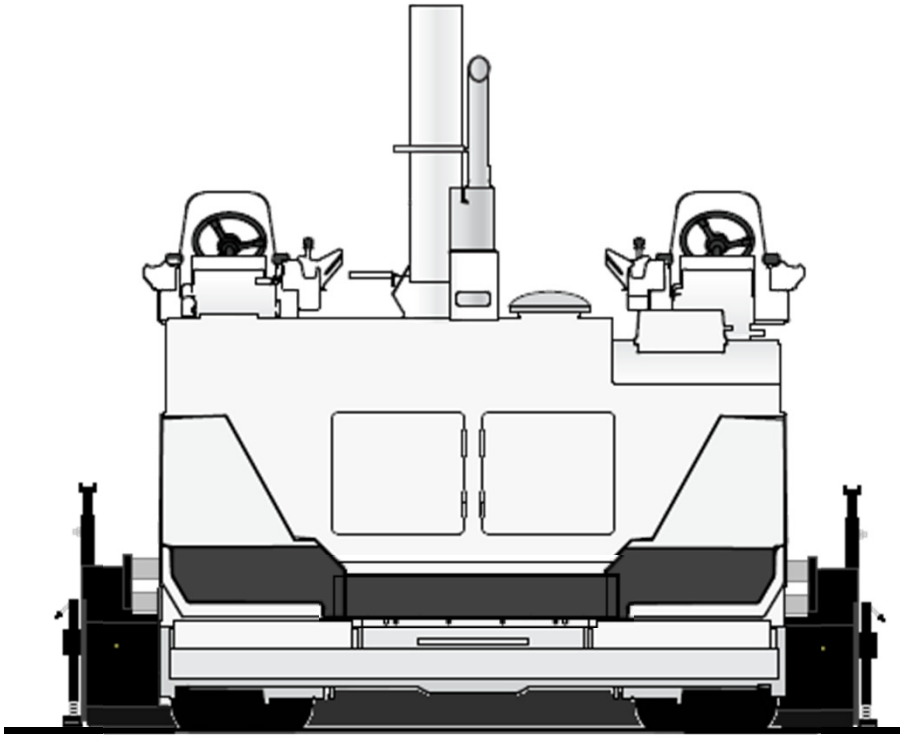
Improper Pile Height



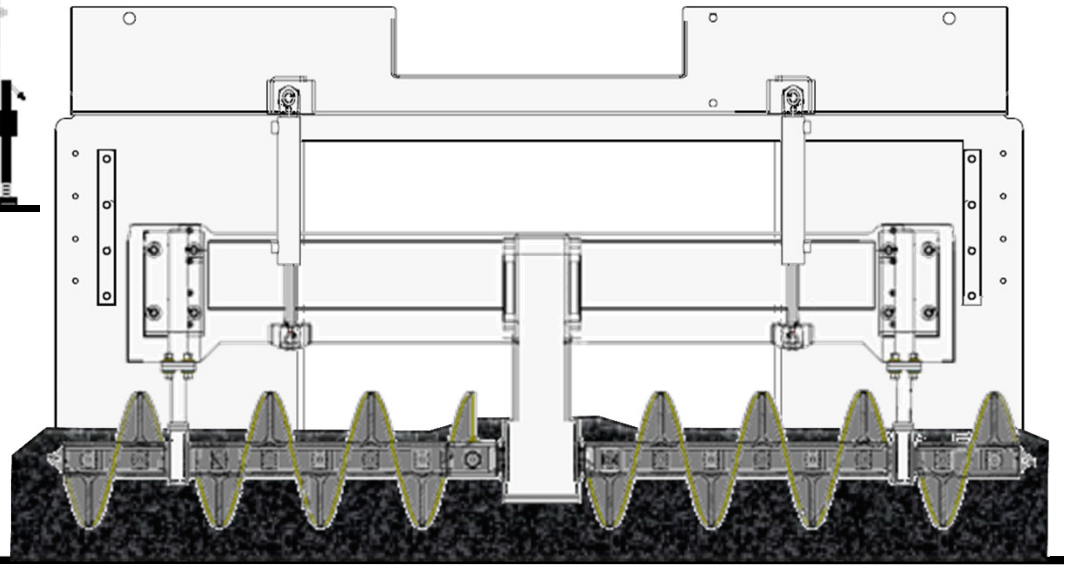
What we see is a flood of material across the auger chamber.



Proper Pile Height



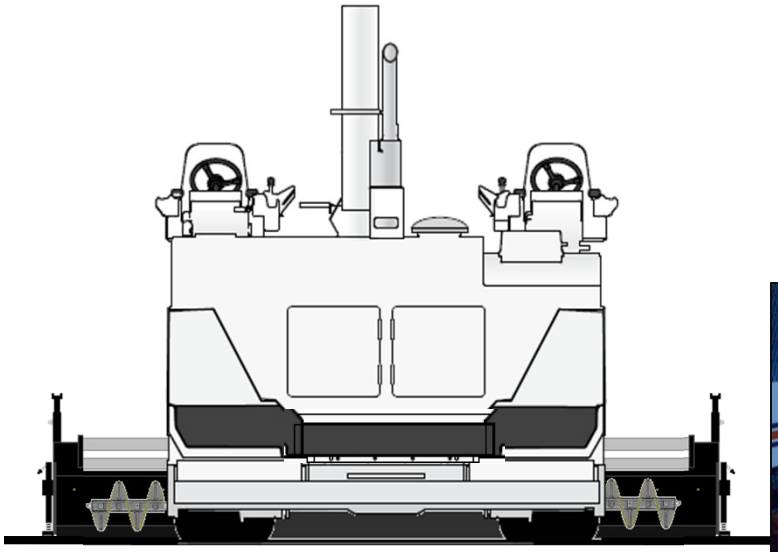
What we see is the correct head of material and an even flow of material across the auger chamber.

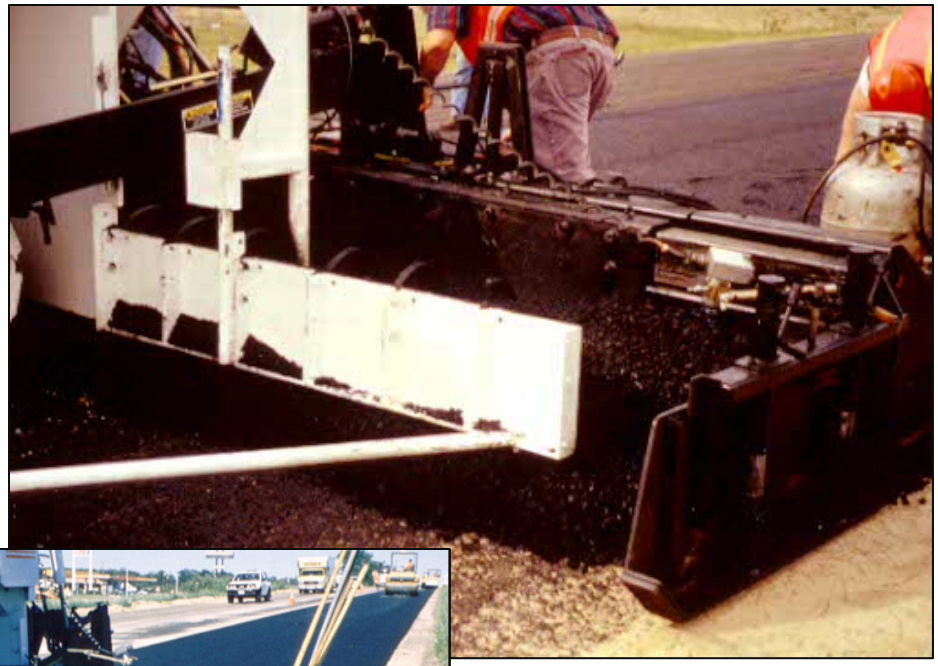


Augers Extension

Auger extensions should always be used when wider paving is done.

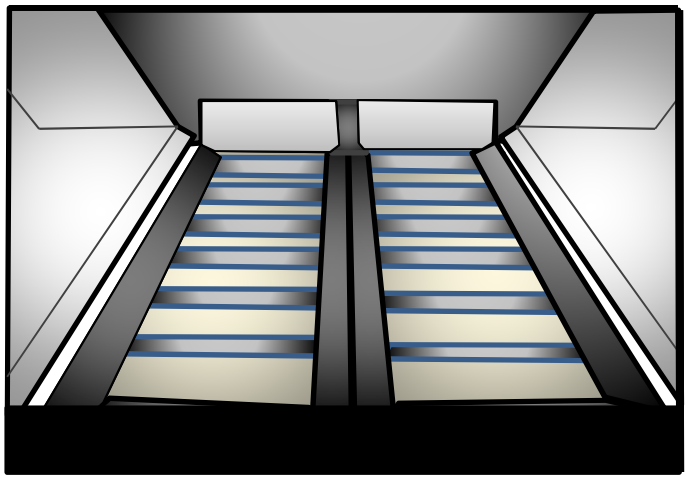
Some material designs may require additional auger extensions that would not be required when working with traditional material designs.





Flow Gates

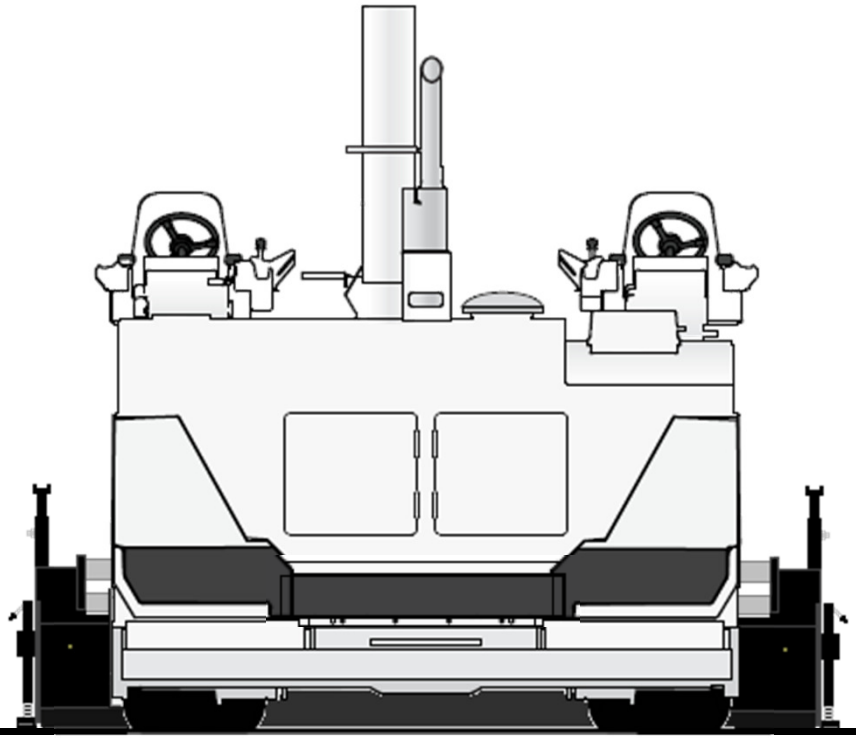
Flow gates are designed to Meter the amount of material that is delivered to the Auger Chamber.



With this width, what should we do with the Flow-Gates?

So in this width, we will just move the gates down a little, or choke them down?

What else could we do to help manage the Material in this application?

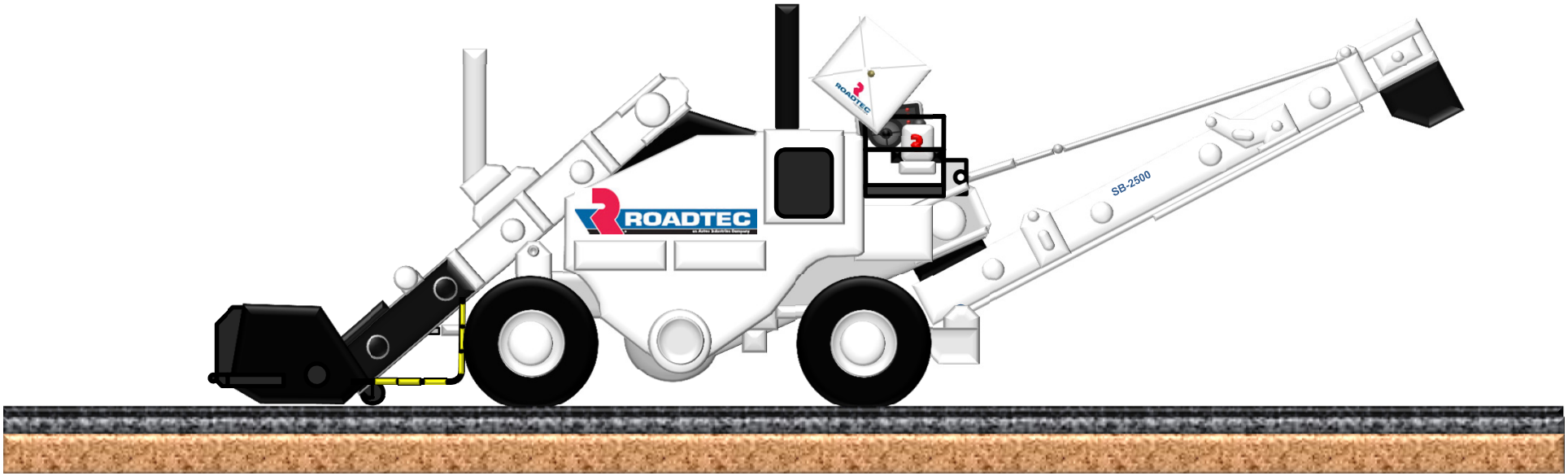


Material transfer? Why

Not only do we use this machine for temperature regulation and remixing of the material but what about production?

What is the average truck transition?

If we eliminate the start and stop we benefit what?



Material transfer? Why

We all know it takes time to properly transition a truck.

Material transfer? Why

This time loss is also getting the truck out of the construction lane and back to the plant.

Cleaning out the bed, slamming the door for a half mile and then looking too see how big of a mess you made.

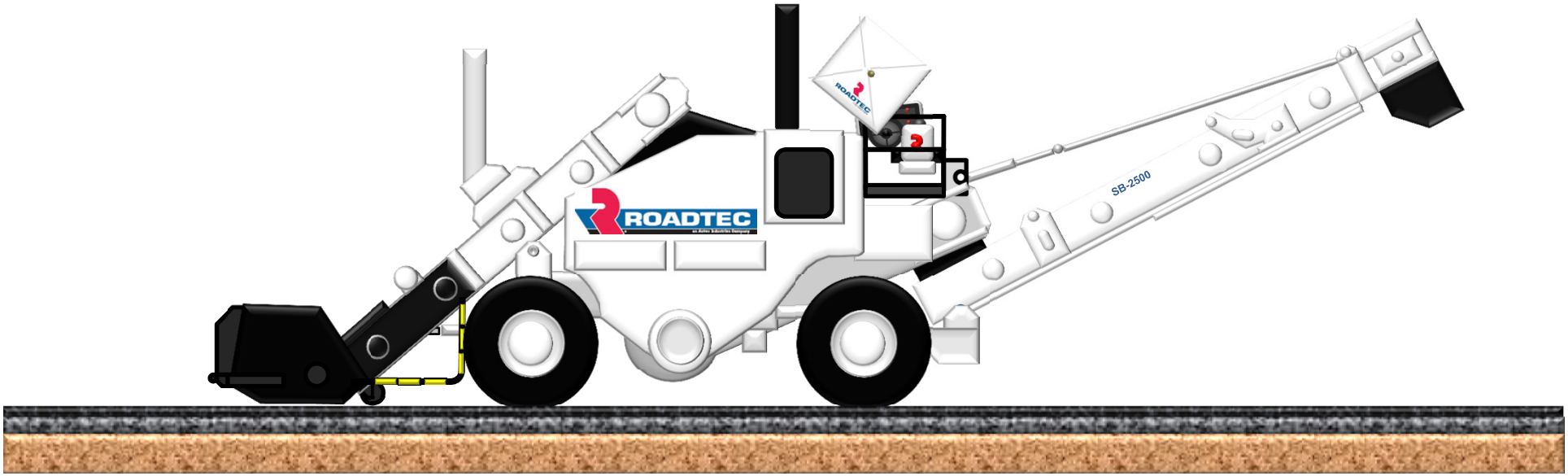
Time is money

If we are in constant contact with a truck then this will give us:

A. A non stop paving operation.

B. Better overall job

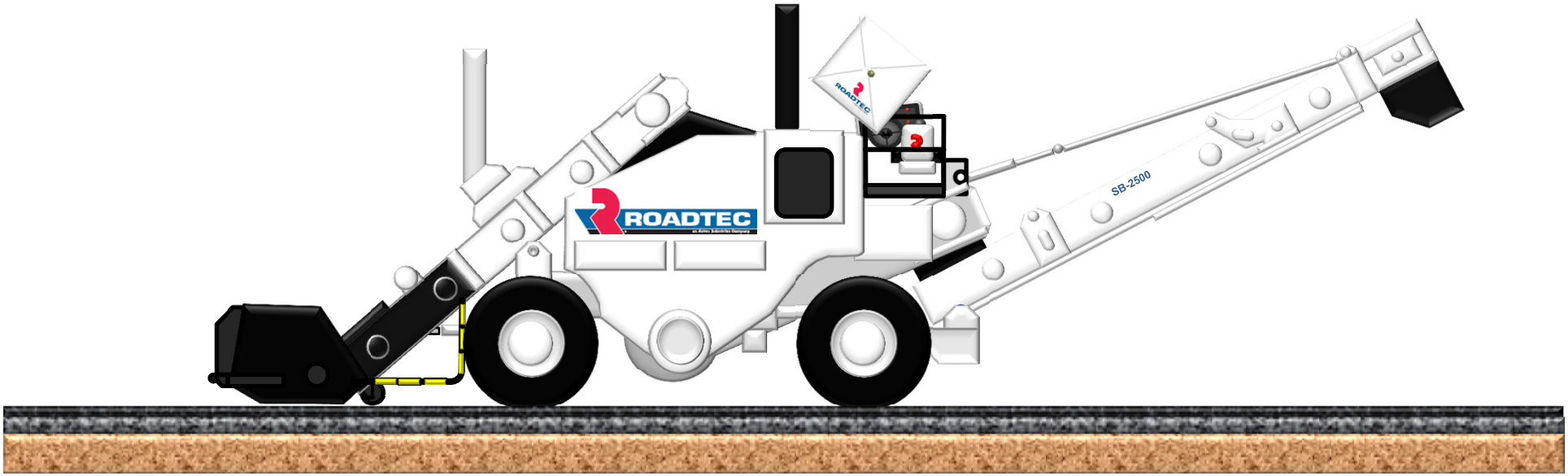
C. Allow trucks to dump and return to the plant for ?



Your Objective

YOU are in the Asphalt business and your job is to sell as much product as possible.

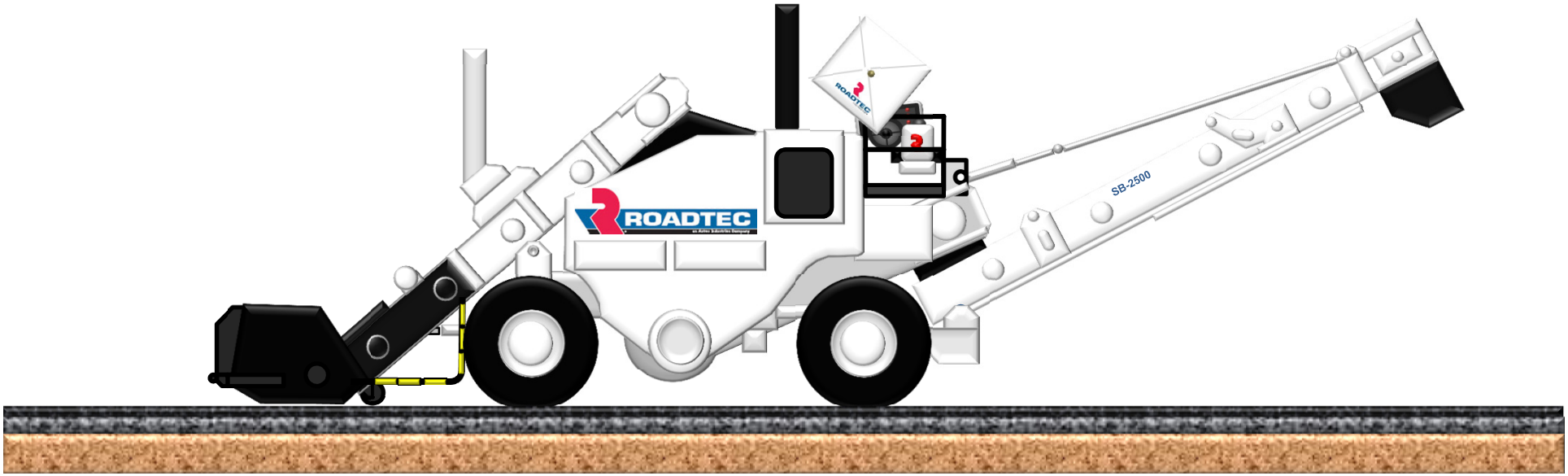
The more tons you produce and lay down, then the more people will benefit from the sale of your product.



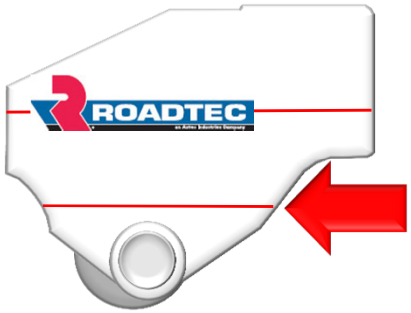
Time is money

If trucks aren't being tied up at the paver waiting to dump, then is it true that less truck's will be needed in our process?

So, we have less trucking cost and increased production. And this is a benefit to who???

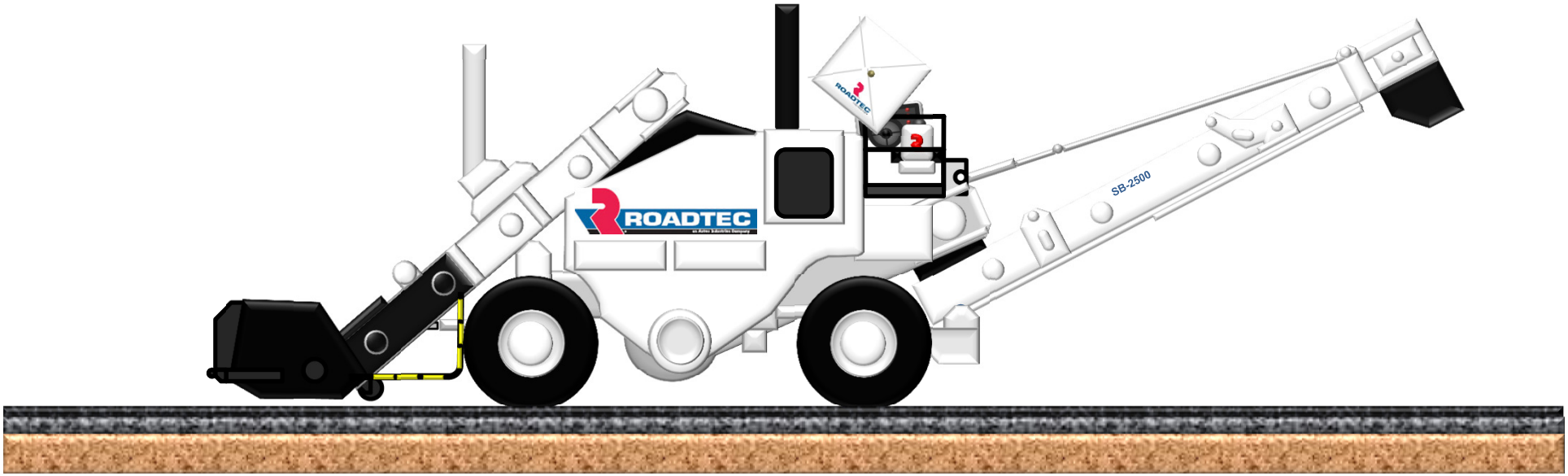


Material Flow



Make sure that the C2 has at least 1/3rd to 2/3rd capacity at all times.

Never deviate from the suggested amount of storage.



Material Management

Key Points in Prevention of Segregation:

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Material Management

Key Points in Prevention of Segregation:

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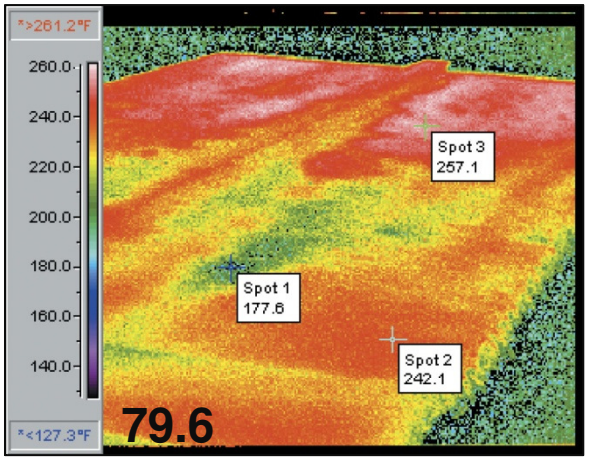
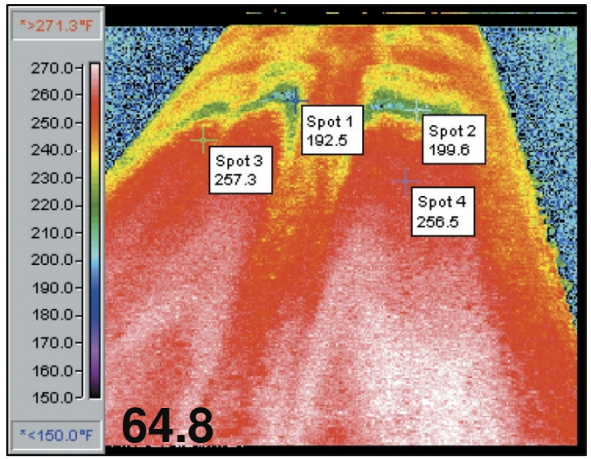
This is all important because we want to match the amount feeding to equal:

A. The amount going out.
B. The rate the material goes through the insert.
C. The amount going through the machine to the auger section.
D. The amount being laid.

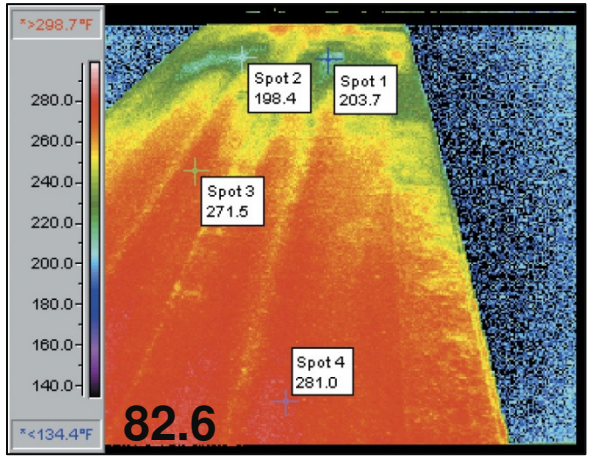
Types of Transfer Machines



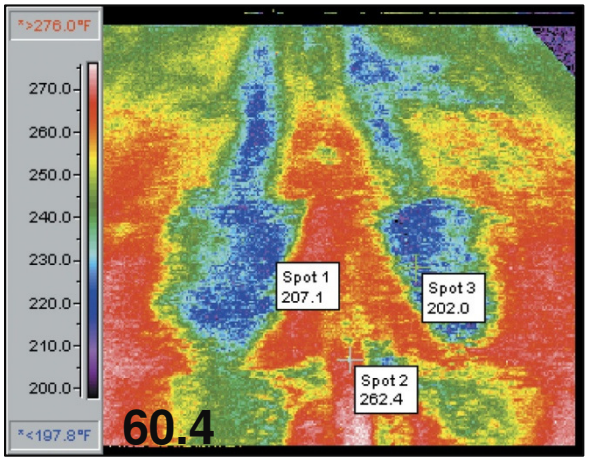
Windrow Pickup



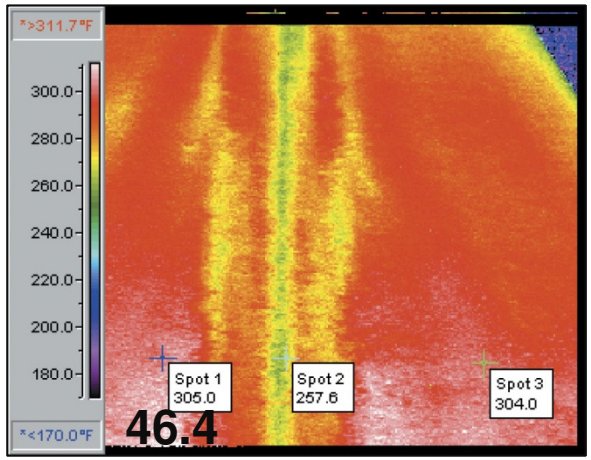
Windrow Pickup w/ Truck Dump



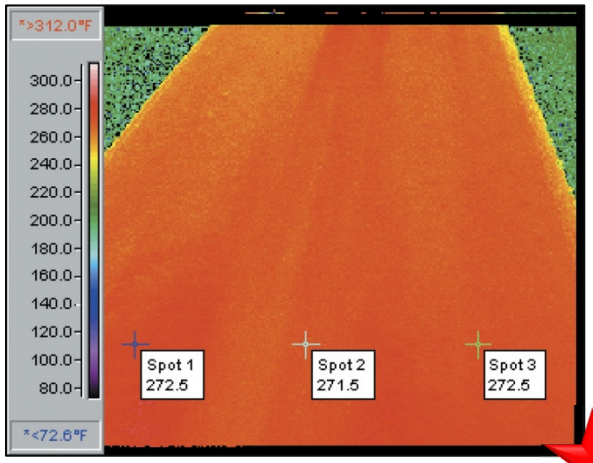
Remix paver w/ Auger Feeders



Belt Conveyor Type



Belt Conveyor Type w/ Pug Mill



Shuttle Buggy

New NDT Technologies

- **Few advances in last 10 years in measuring HMA quality**
- **Localized segregation of new overlays is a major concern**
- **Need for 100% Coverage devices**

Infra-Red

- Temperature Uniformity During Placement
- Location and Duration of Paver stops

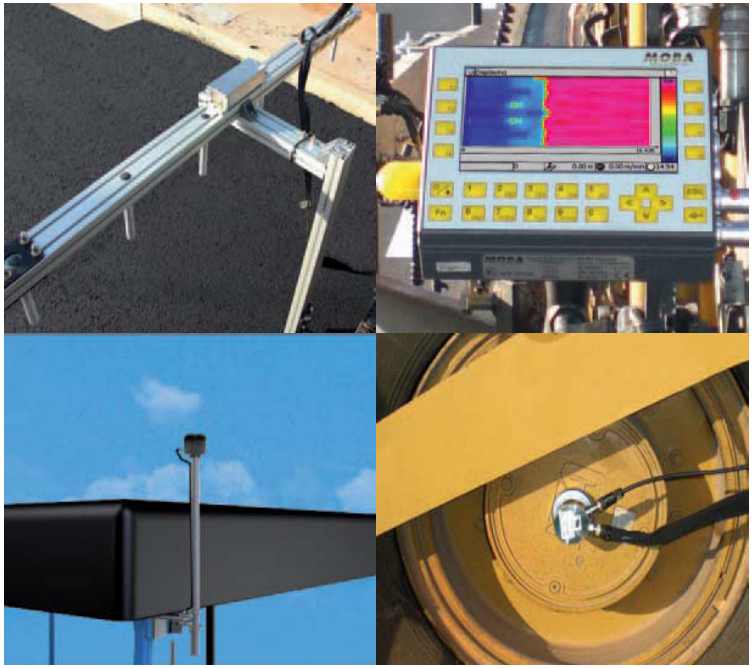
Ground Penetrating Radar

- Directly related to in-place density after compaction

MOBA Pave-IR

- Real time infrared logging
- Temperature tied to location using GPS coordinates

MOBA Pave-IR

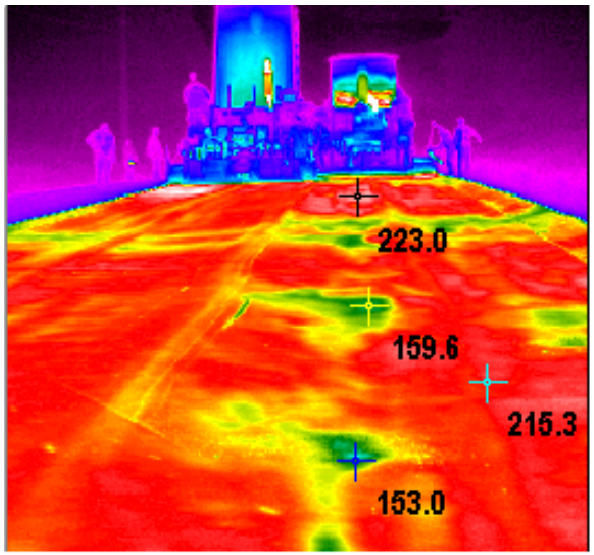


- Real time infrared logging
- Temperature tied to location using GPS coordinates

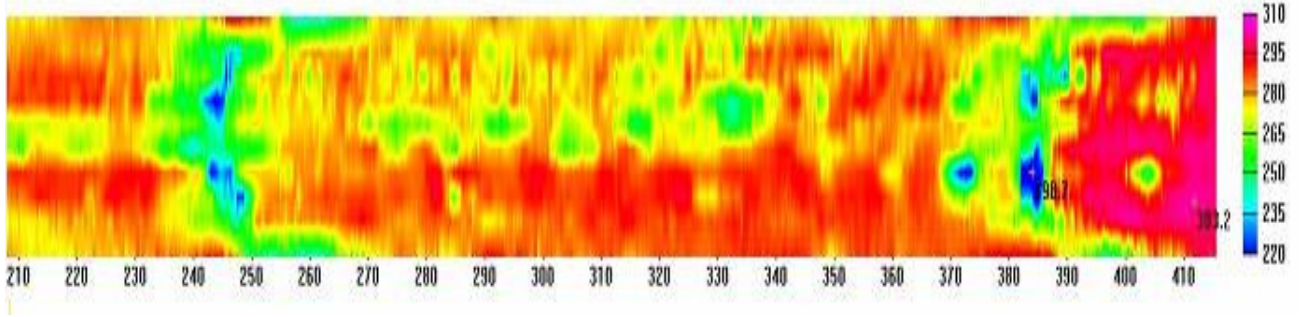
Segregation leading to performance problems

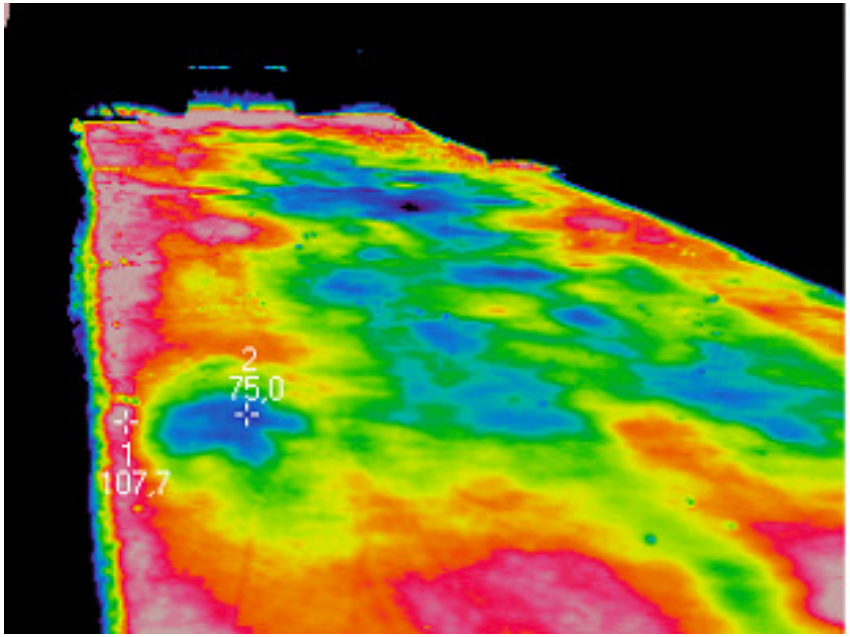
Short term: coarser texture, low density and holding water

InfraRed Technologies measuring Temperature uniformity at placement



WsDOT (IR Camera)
Joe Mahoney (1999)

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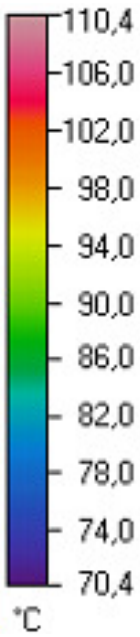
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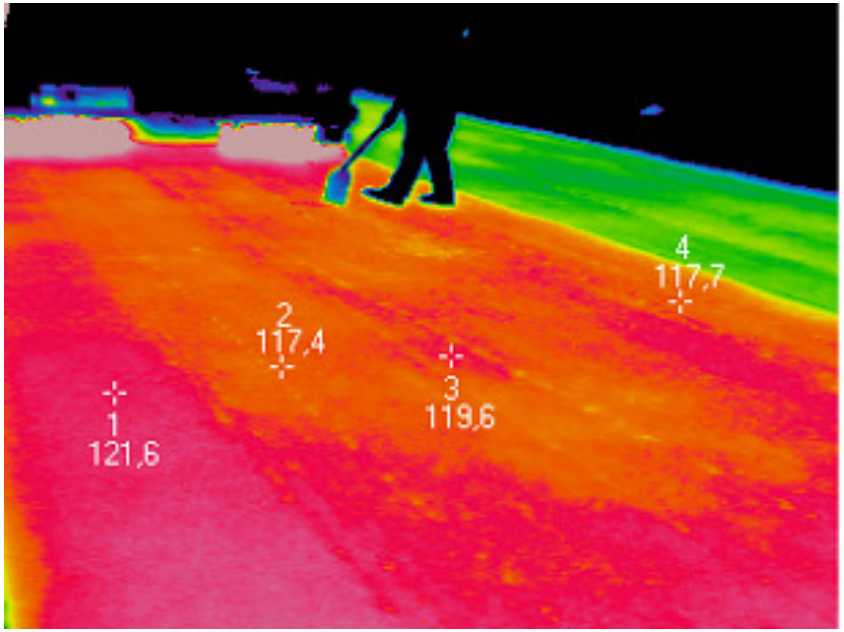
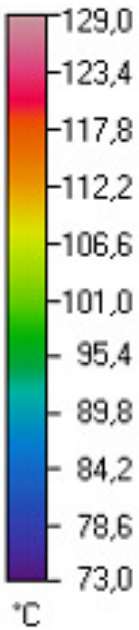

4
117,7
2
117,4
3
119,6
1
121,6


129,0
123,4
117,8
112,2
106,6
101,0
95,4
89,8
84,2
78,6
73,0
°C

Segregation

In summation, segregation in Hot Mix Asphalt mixtures is a common and persistent problem.

However, the problems can be controlled and even eliminated through:

- Proper mix design
- Proper maintenance
- Operation of plants
- Paving equipment