From Mix to Mat: Achieving Quality in Paving & Compaction

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From Mix To Mat:
Achieving Quality In Paving & Compaction

Achieving Quality

- What is your Definition of Quality relative to Paving & Compaction?
- Click on this QR Code to engage and post your opinions and views.

Let’s get involved.

PollEv.com/jimw285

Text **jimw285** to **22333**

Who do you work for?

(A) TxDOT

0%

(B) Consulting Engineer / CEI

0%

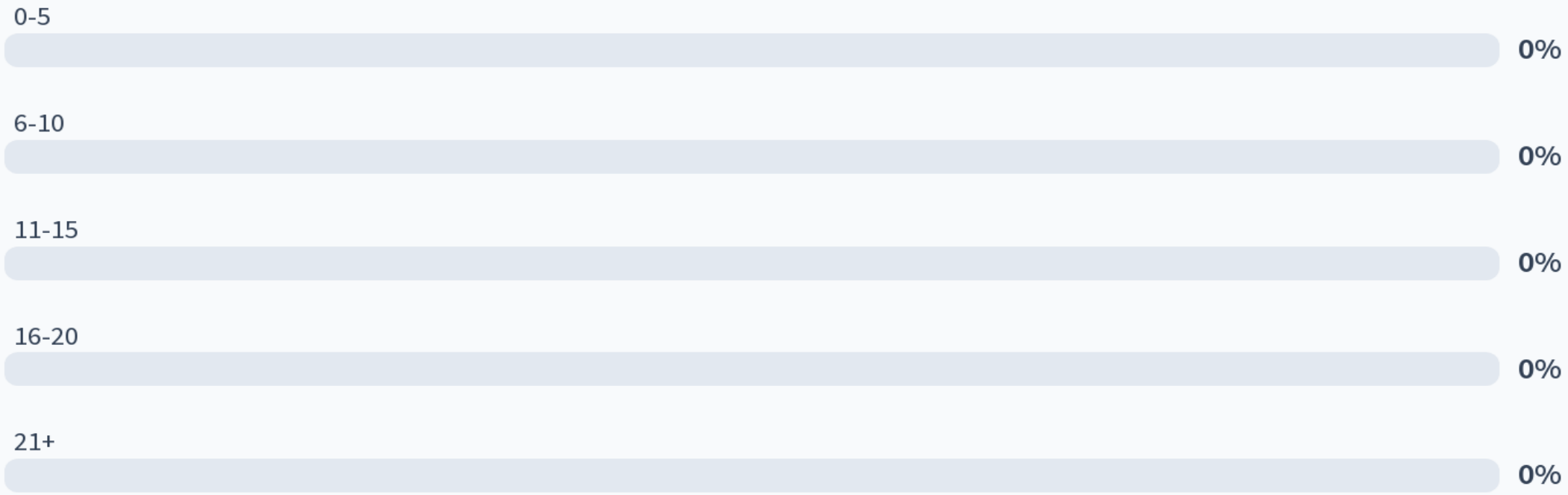
(C) Asphalt Producer or Contractor

0%

(D) Supplier/Exhibitor

0%

How many years experience in asphalt do you have?



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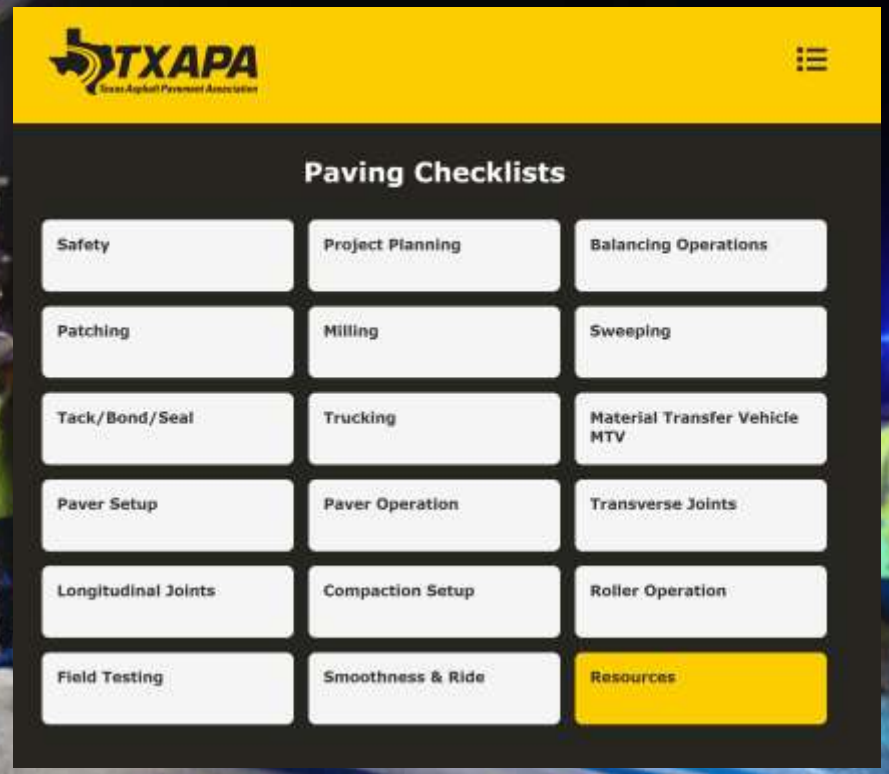
Paving and Compaction Quality Attributes

Let's compare your attribute list to mine.

- ✓Thickness
- ✓Ride/Smoothness
- ✓Cross Slope
- ✓Texture
- ✓Density (In place Air Voids)

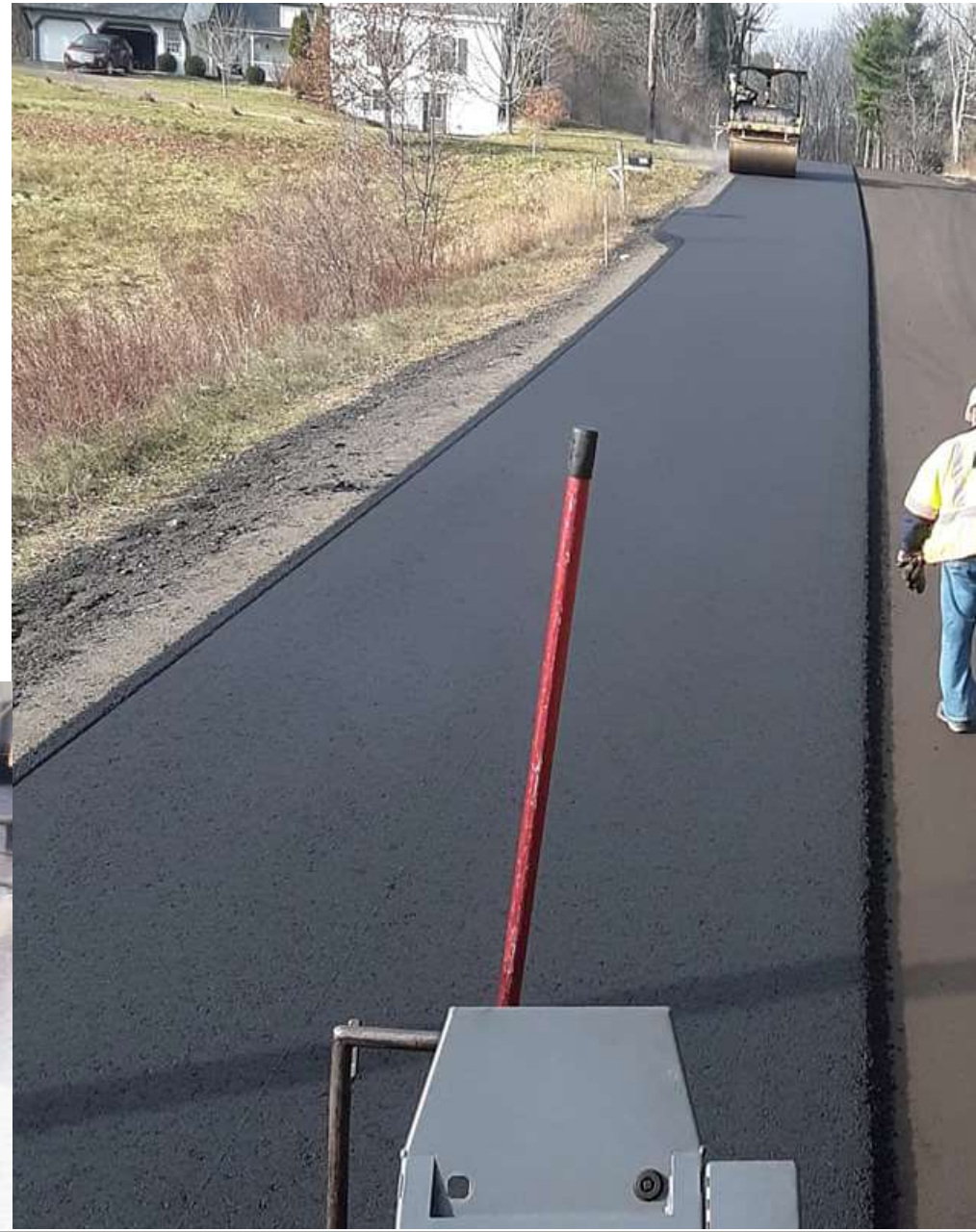
Let’s talk about Paving.



- Paver – *It’s the mobile factory that creates the finished mat.*
  - How does it work?
- Screed – *Establishes Width, Texture , and initial Density.*
  - How does it work?
- Grade control – *Establishes Ride, Spreadrate, OR Thickness*
  - How does it work?

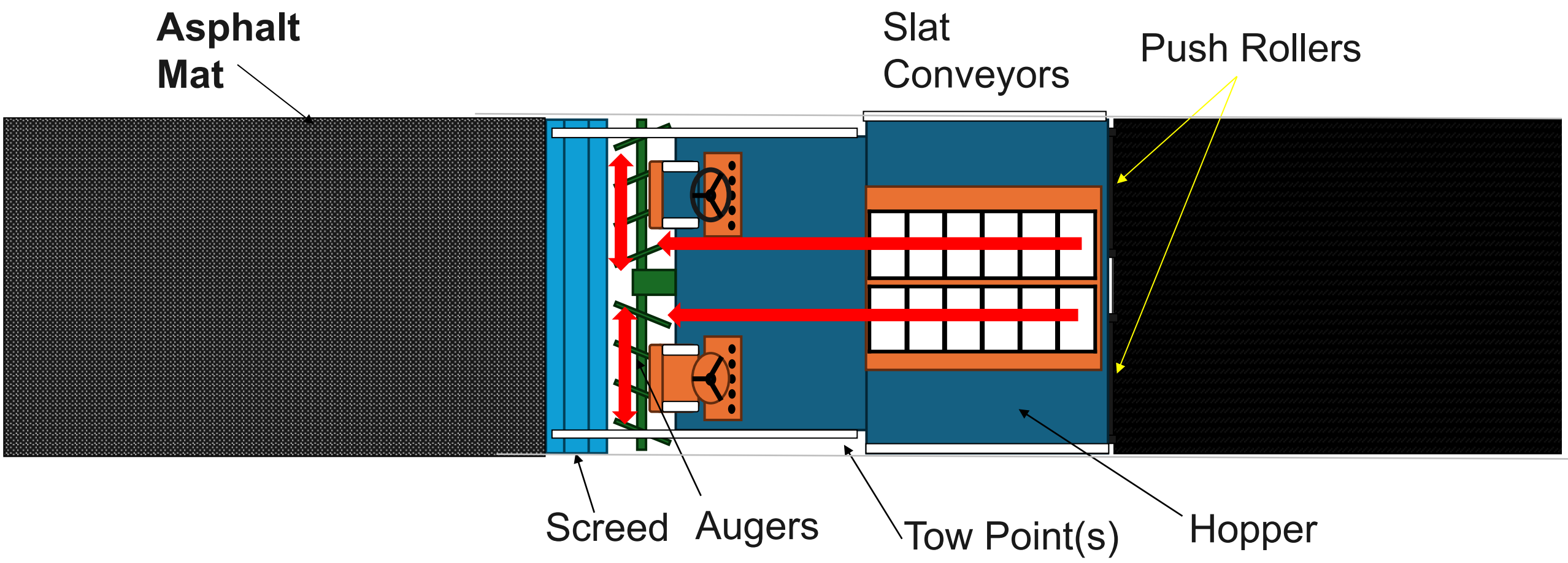
Paver

- Mat Alignment (longitudinal joint)
- Mix Delivery
- Head of Material
- Speed of Paver



Paver Unit - overview

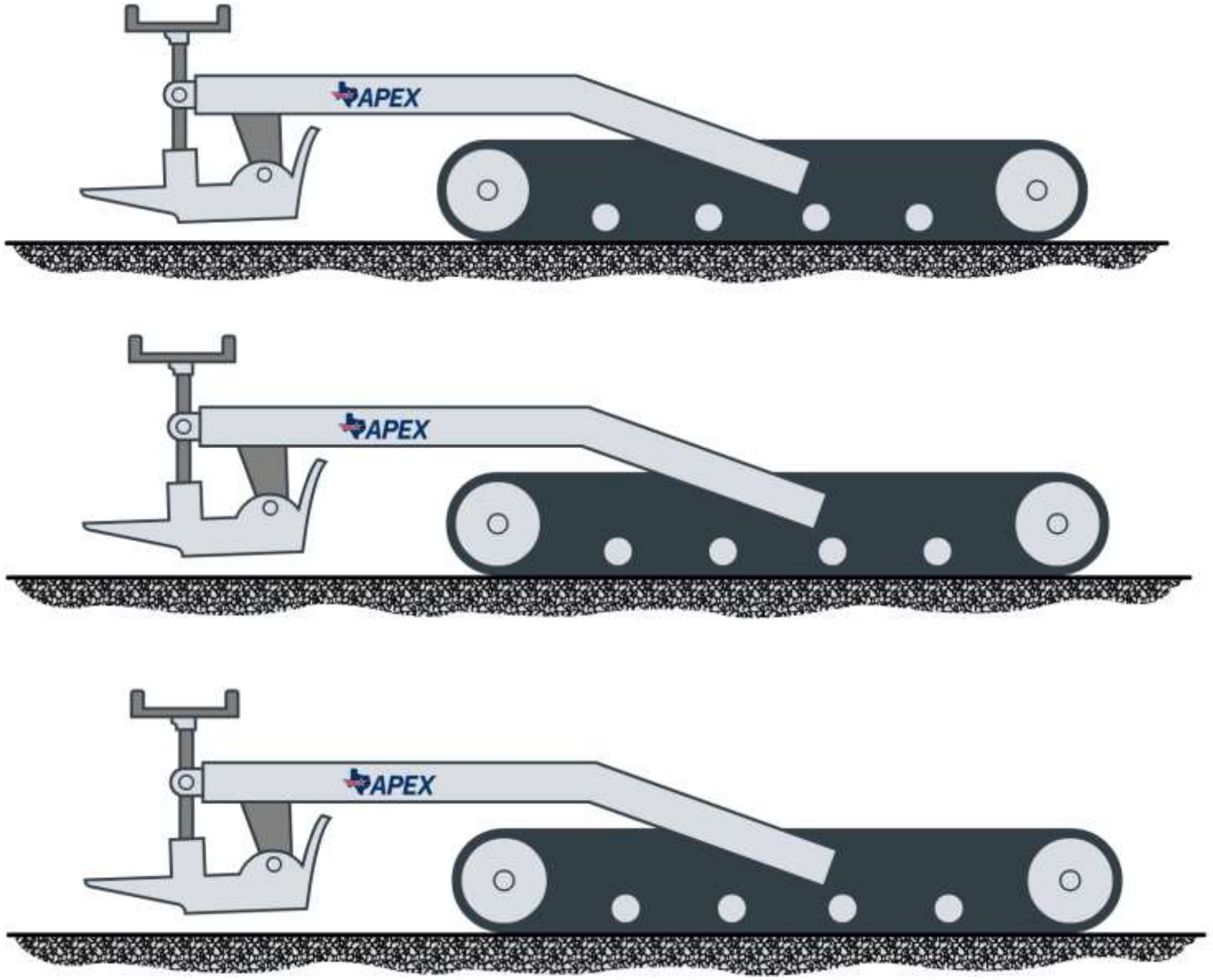
Paving Direction



Always Keep a Uniform Head of Material

Screed

- Shapes and extrudes mix into a uniform layer or mat.
- Develops initial mix density.
- Develops a surface texture unique to mix type.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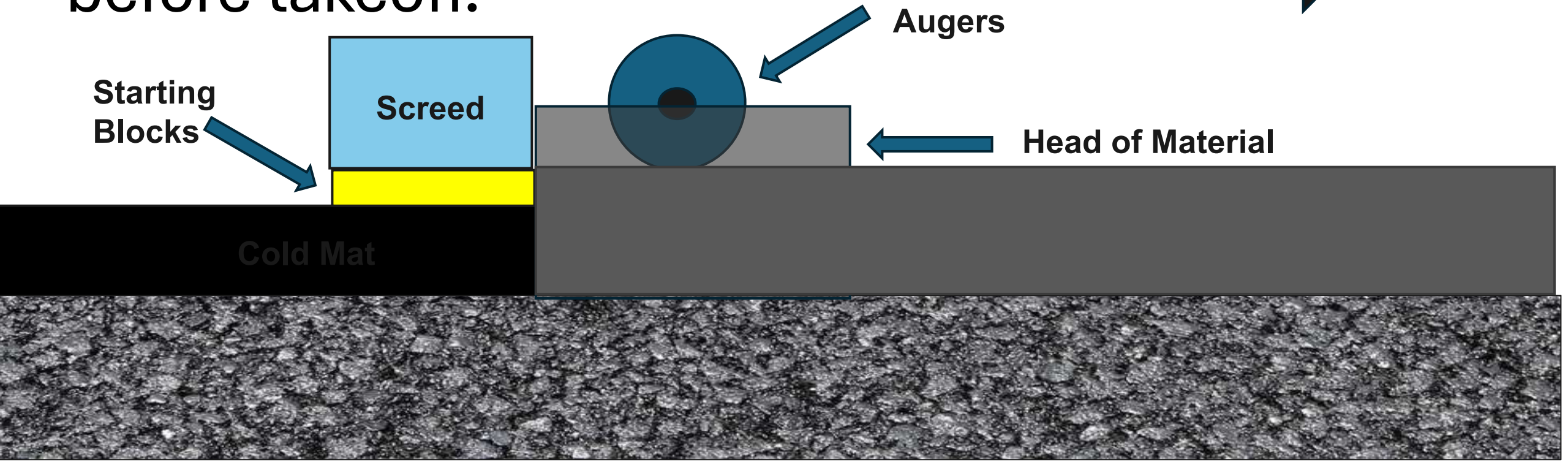
Setting screed on joint - before takeoff.

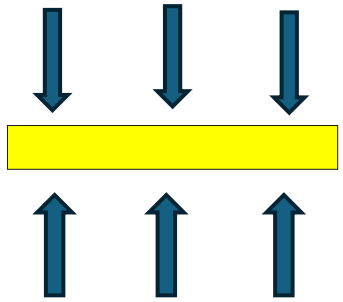


- Use starting blocks on both sides of screed.
- Blocks should be thickness of expected roll down. ~1/4” per inch of compacted thickness.
- Setup of screed and paver per “Paving by the Numbers”
- Don’t “bury the augers” when filling the auger chamber.
- Pull off joint and check settings.

Checking Transverse Joint - after pulling off.

Direction of Paving

- Place 10ft straightedge with ~2 ft overlapping on joint.
- Area underneath straightedge should be uniform thickness.
- Check in several locations across the width of mat.
- Indicates screed setup properly and parallel new mat.



Grade Control

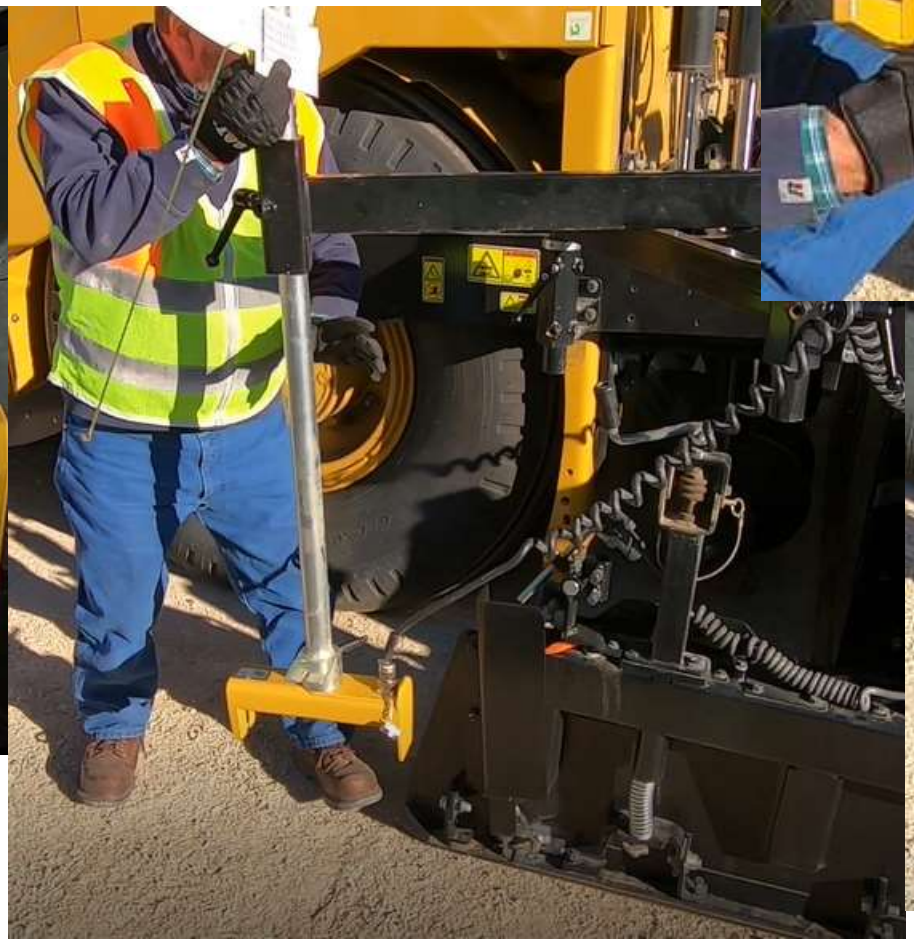
- Establishes Ride, Slope, Yield OR Thickness
- Grade Control Reference/Ski – single side towpoint input
- Joint Matcher – single side towpoint input
- Cross Slope – single side towpoint input
- Paver only has two towpoints – you can’t do everything in a single pass.

Grade and Slope Controls adjust Tow Point

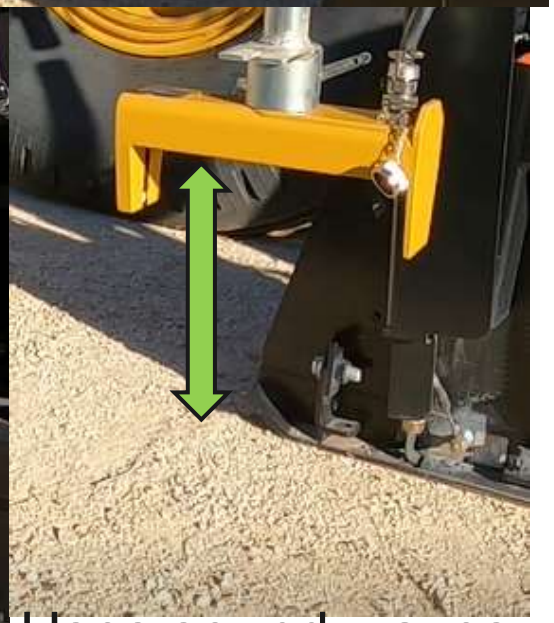
Dual Non-Contact Grade Controls

Grade Sensor and Position

Sonic sensor position close to tow point improves ride.



Grade sensor at leading edge of screed matches joints.



Uses sound waves to measure distance.

Tow point response to sensor position

Paver Interactions

- How do paver settings, screed settings, and grade control settings interact?

How many things are being done right?

Now, let's talk about Compaction

Jim's Rules:

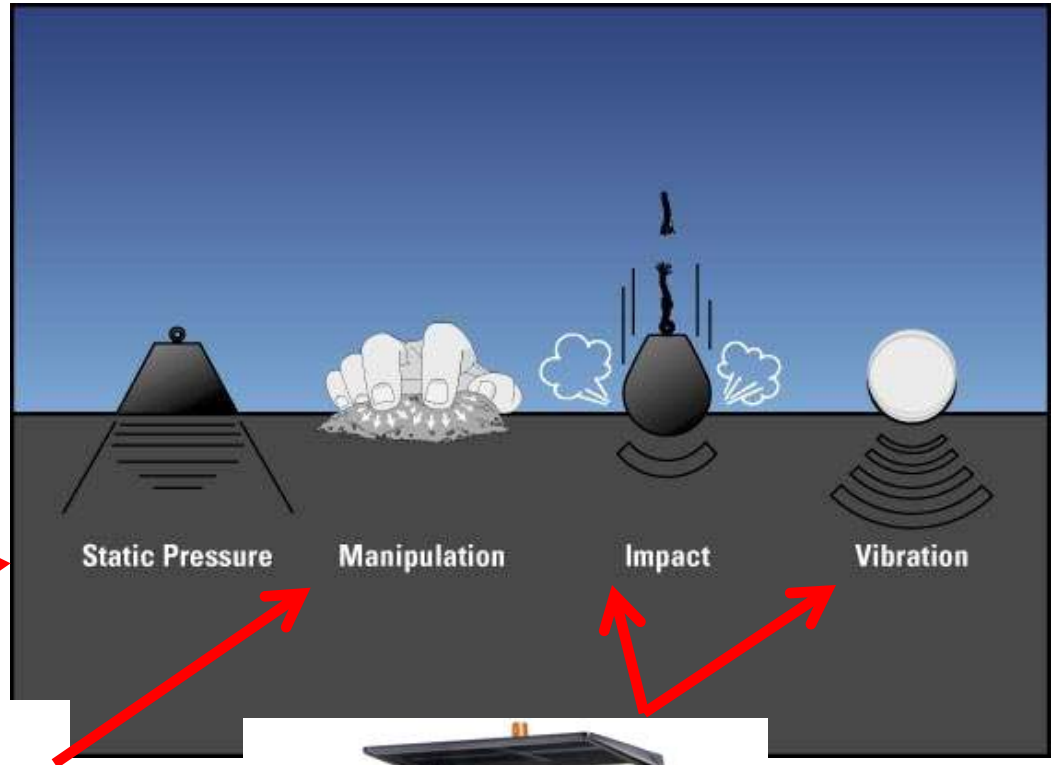
1. ***Get Density/In Place Air Voids.***
2. ***Preserve Ride/Smoothness/IRI.***
3. ***Do No Harm.***

Compaction

- Rollers
- Variables

Forces of Compaction - Roller Types

Static Steel-Wheeled



Pneumatic

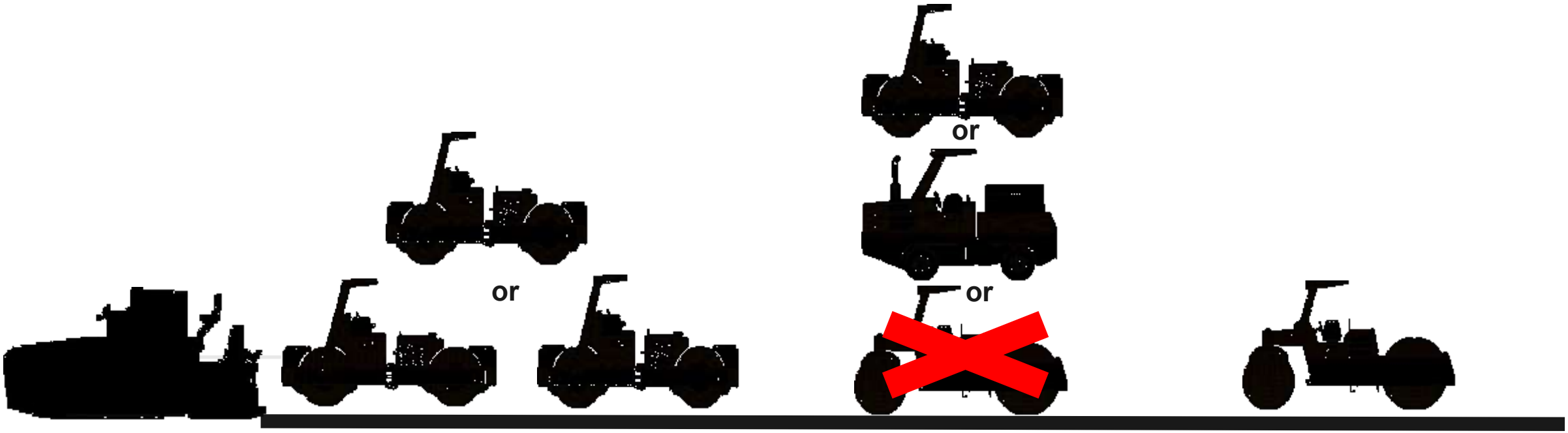
Vibratory

Many Options for Compacting

- Pressure
- Vibration
- 1 or 2 rollers

- Pressure/Static
- Manipulation
- No roller

- Pressure/Static only



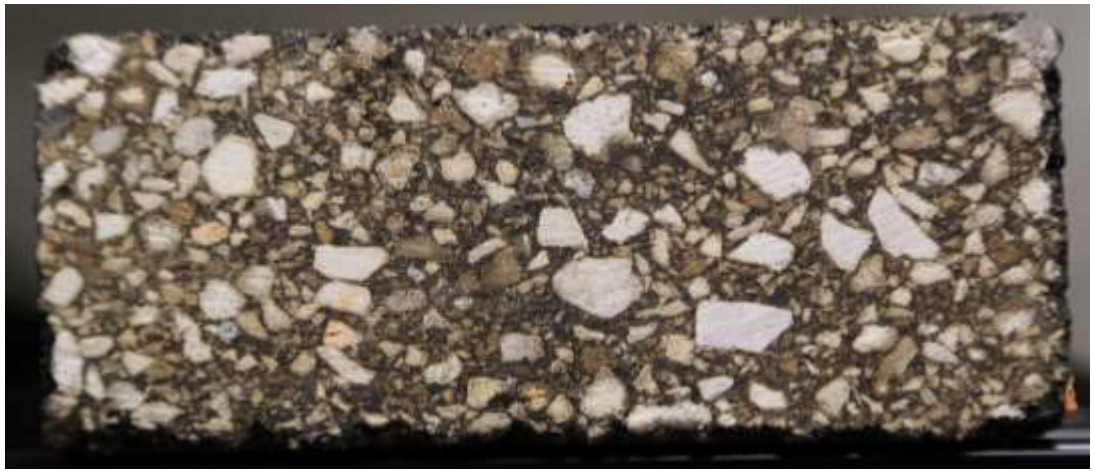
Breakdown Zone ~ 300° - 240°F

Intermediate Zone ~240° - 180°F

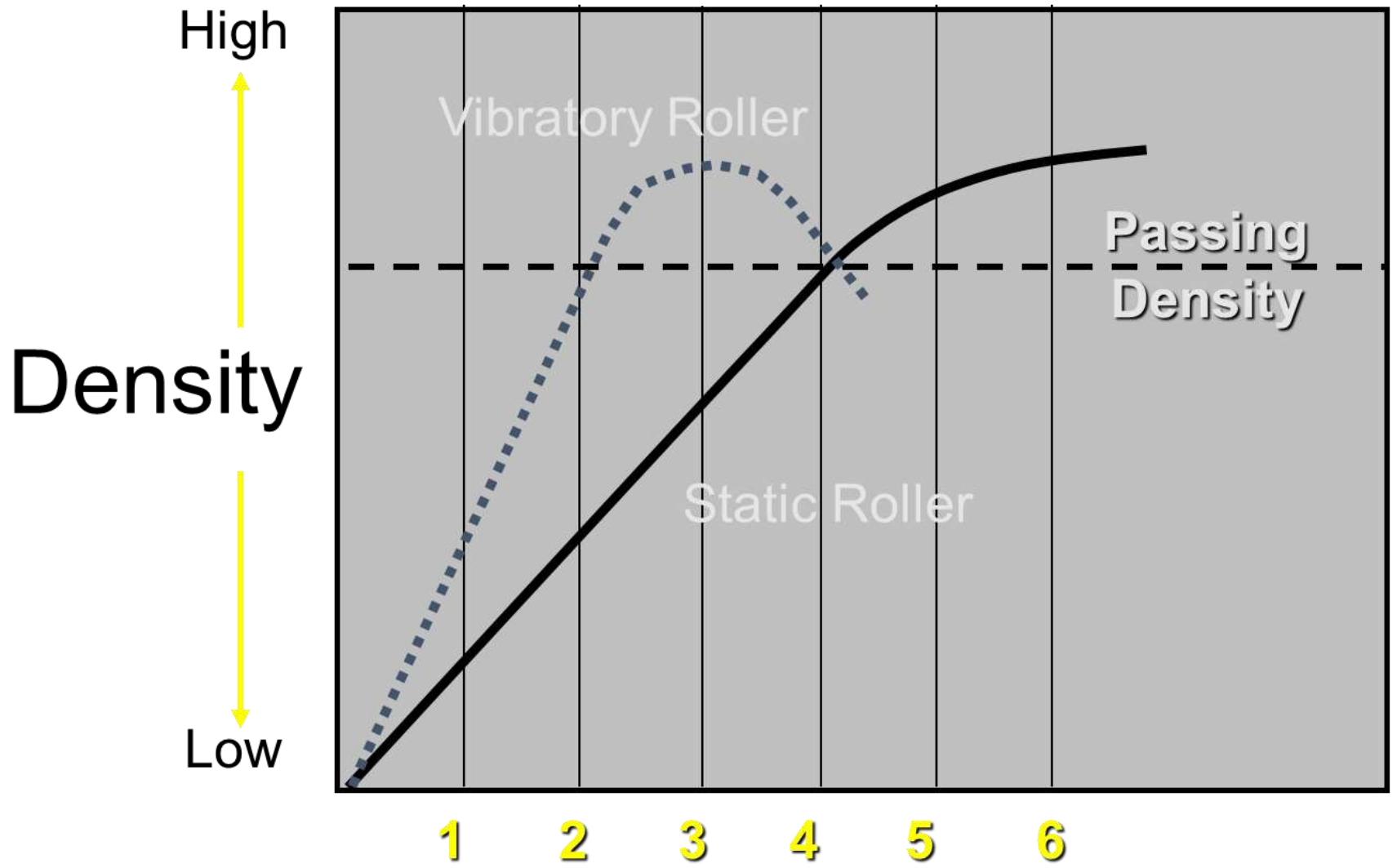
Finish Rolling Zone ~180 - 150°F

IMPORTANT: Temperature Zones vary significantly by mix type, binder type, and thickness. Temperature zone significantly impacted by environment and may change throughout shift.

In-Place Density/Air Voids



Control / Test Strip

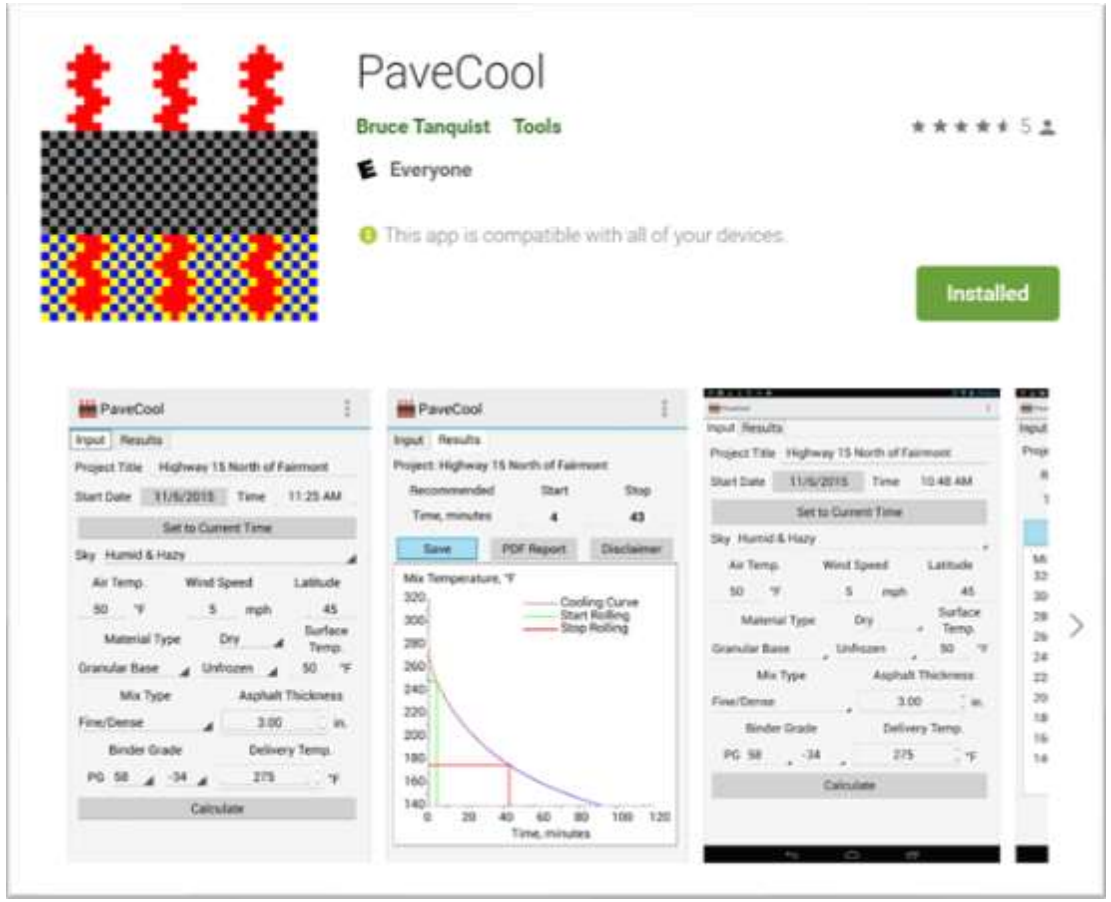


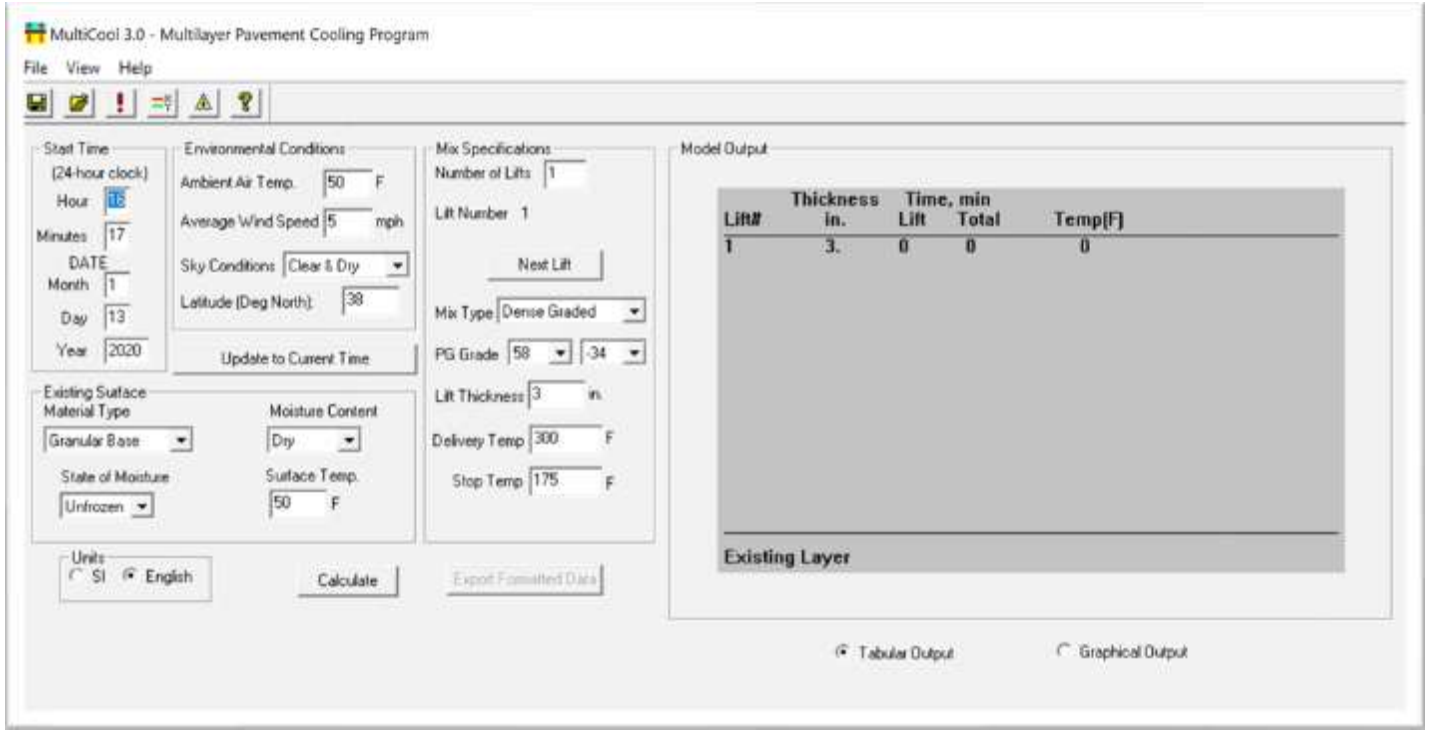
Environmental Factors

Several factors come into play regarding how fast the mix cools onsite, affecting time available for compaction:

- ✓ **Ambient air temperature**
- ✓ **Temperature of the existing surface**
- ✓ **Wind speed**
- ✓ **Lift thickness**
- ✓ **As-delivered mix temperature**
- ✓ **What do you do when they change?**

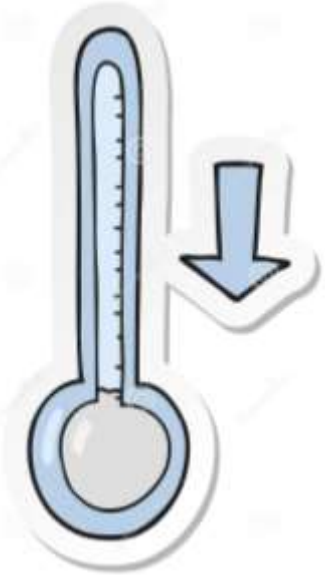
Use Cooling Rates to determine TAC.





Google “Pavecool” or “Multicool”

Compaction

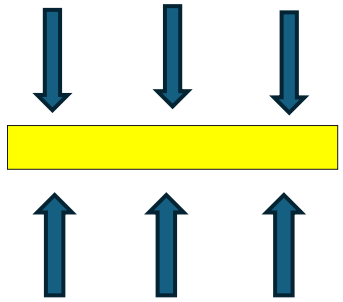


- **Use enough roller(s)**
- **Monitor your temps – use an infrared thermometer – a lot!**
- **Understand how much time you have to compact.**
- **Keep tight to the paver.**
- **Pinch the joint.**
- **Roller patterns change with weather and temp.**

Checking Transverse Joint - Before Compaction

Direction of Paving

- **Place 10ft straightedge with ~2 ft overlapping on joint.**
- **Area underneath straightedge should be uniform thickness.**
- **Check in several locations across the width of mat.**
- **Indicates screed setup properly and parallel new mat.**



Checking Transverse Joint - After Compaction

Direction of Paving

- **Slide the 10ft straightedge from cold mat to compacted mat.**
- **Check in several locations across the width of mat.**
- **Little to no gap underneath straightedge indicates smooth joint.**

Compaction Interactions

- Design and Operation impact ultimate performance
- Variable thickness versus density
- Variable thickness versus initial and ultimate ride

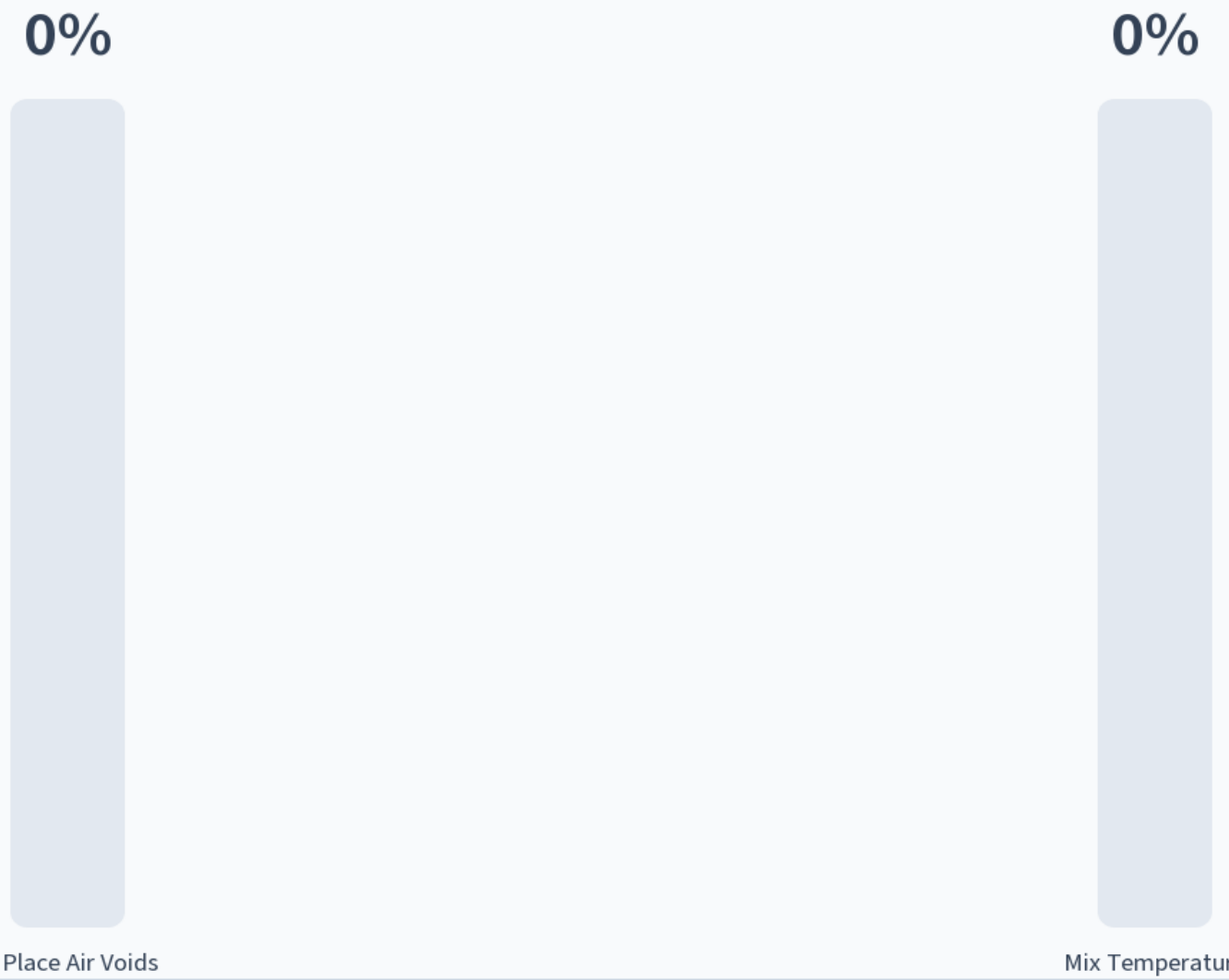
What's More Important?

- Let's do some Attribute comparisons and see which you think is more important?
- Attributes:
  - In Place AV
  - Temperature
  - Ride/Smoothess/IRI
  - Thickness
  - Cross Slope
  - Spread rate
  - Texture






What's More Important? In place Air Voids or Temperature?



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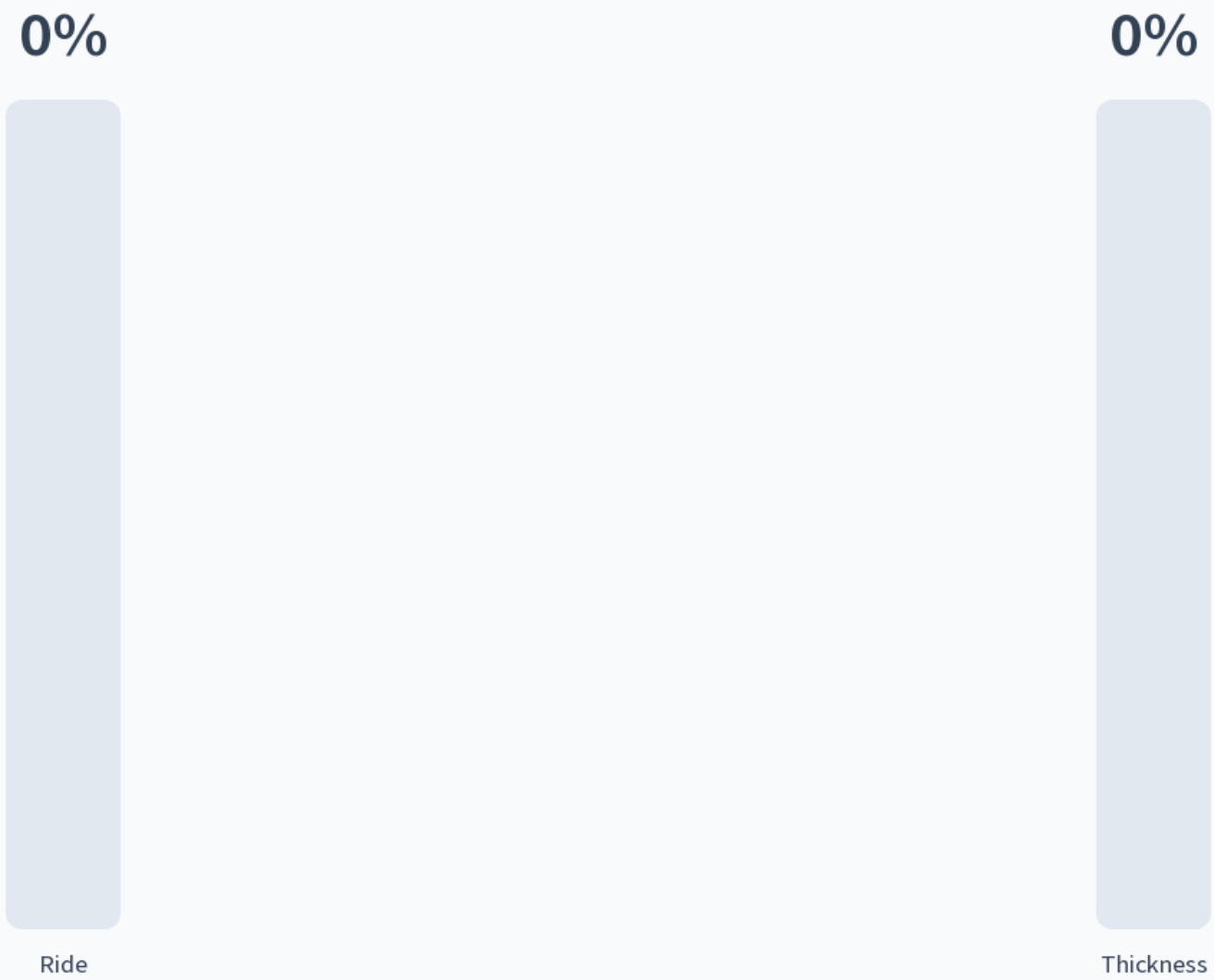
What's More Important? Ride or Thickness?



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What's More Important? Thickness or Cross Slope?

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What's More Important? Texture or Ride?

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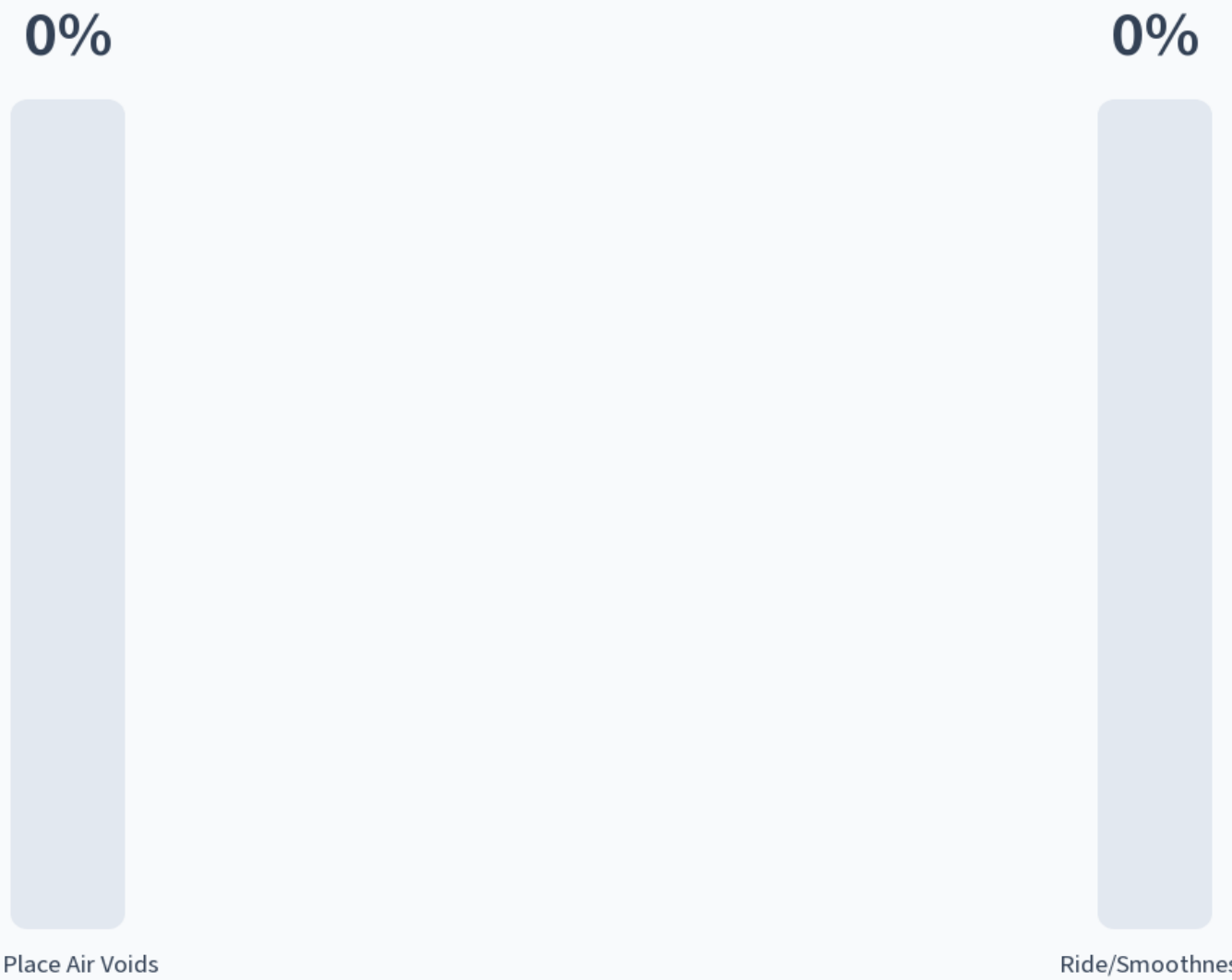
What's More Important? In Place Air Voids or Ride?



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What's More Important?

- Let's do a **Constraint comparison** and see which you think is more important?
- Sort your constraints top to bottom. *Choose Wisely…*
- Constraints?
  - Improving Performance
  - Quick Fix
  - Putting Tools in the Toolbox
  - On Time
  - On Budget
  - PMIS Score Card Goals

What Constraint is more Important?

A - Improving Performance

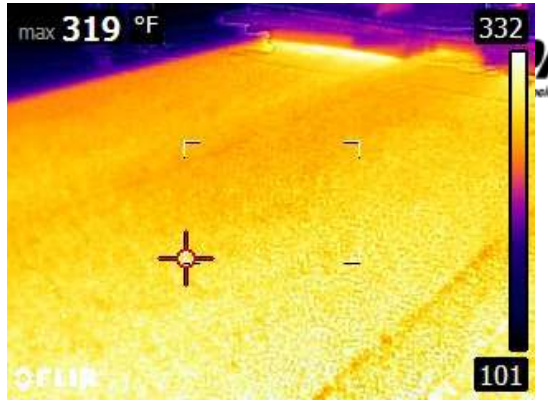
B - Staying on Budget

C - Staying on Time

D - Achieving PMIS Targets

E - Putting Tools in the Project Toolbox

Good Practices



How can I tell if good practices are being followed?

- ❑Paving off a stringline or longitudinal reference.
- ❑Continuous paving operations and uniform paver speed – minimal paver stops.
- ❑Mainline paving, thickness and slope adjustments should be made with electronic grade and slope control. Not screed thickness control screws.
- ❑Head of material in auger chamber held consistent.
- ❑Feed augers turning slowly and consistently (not stop/start)
- ❑Minimal raking/luting on the mat and joints.
- ❑Minimal paver stops. Paver/MTV pickup truck on fly.
- ❑Rollers move in a continuous fashion and only stop on cooler portion of mat transversely.

Take-A- Ways



- Paver paves, Screed shapes, Grade Control delivers ride and thickness.
- Rollers Compact, Preserves ride, & Create final air void structure
- Many parts interact – choices have to be made.
  - Do you want ride?, thickness?, density/air voids?
- Competing Constraints cause conflicts.
  - *Know what impacts the other.*
  - *Provide tools to improve construction, ride, density. Lower your maintenance costs and improve your PMIS score card.*