Paving Equipment - Manufactures Perspective

Agenda:

1. ***Differences in equipment - Road paving VS Airport Paving***
    - ***Principles of Screed Compaction***
        - ***Vibratory, Compaction & High Compaction Screeds***
    - ***Surface Texture and Density***
    - ***Wide Paving – Eliminate Joints***
    - ***Performance Vs Specifications***
2. ***Speed of construction:***
    - ***Setup time – Free Floating Screed VS Slip form Screeds***
3. ***Grade and Slope Controls***
    - ***Convention Grade and Slope Controls***
    - ***3D Positioning, 1D, 2D & 3D Paving***

Paving Equipment - Manufactures Perspective

1. ***Vibratory Screeds:***

   Generally More Versatile - Commercial to Mainline Paving

   - ***Mat Depth increase with Thickness control screw & Tow Point***
   - ***Density due to Angle of Attack & Front Profile of screed Plate***

2. ***Compaction & High Compaction Screeds:***

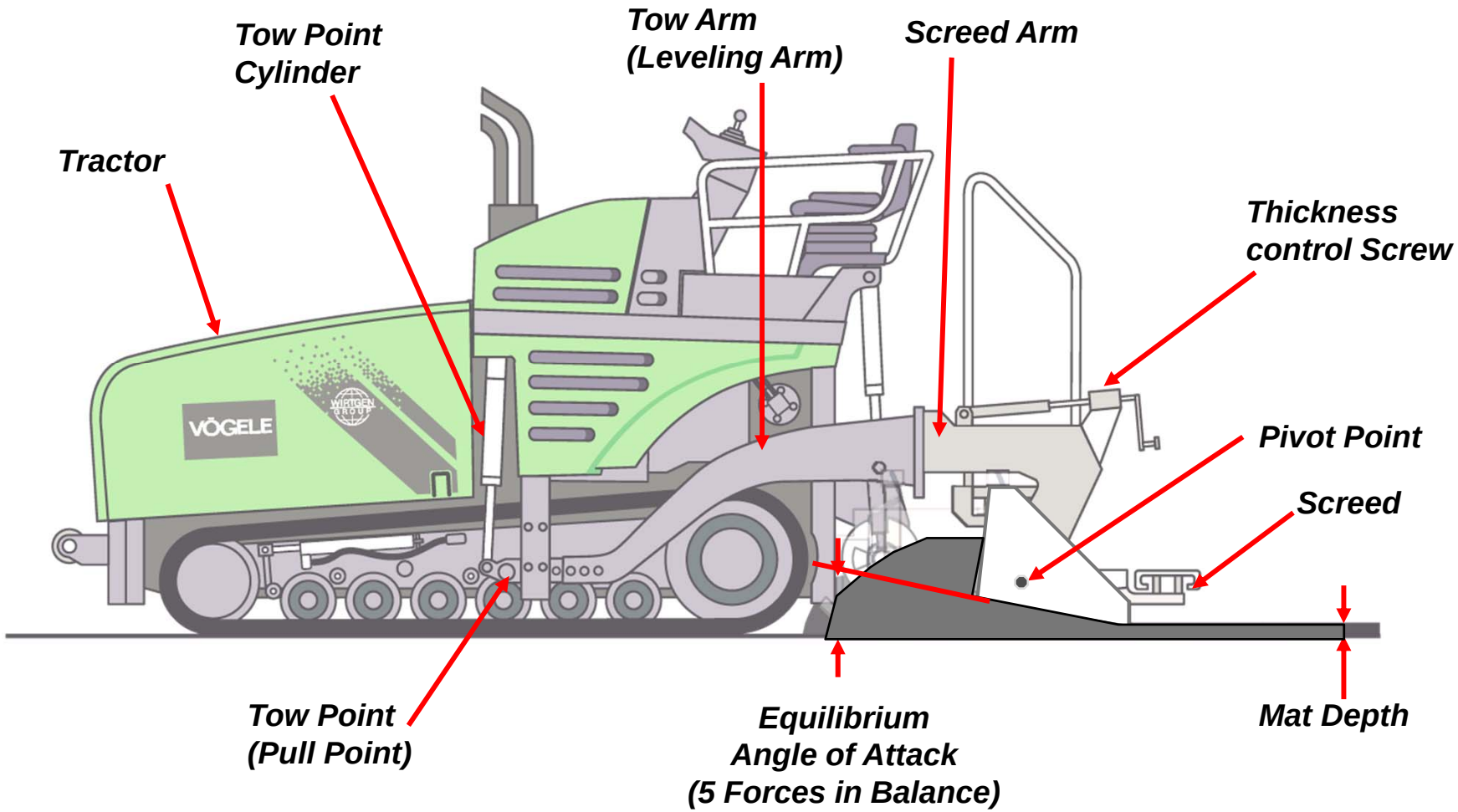
   Special applications in NA…….All applications in Europe

   - ***Mat Depth increase with Tow Point only***
   - ***Density Due to Compacting Devices:***

     Tamper Bars and or Pressure Bars

Paving Equipment - Manufactures Perspective

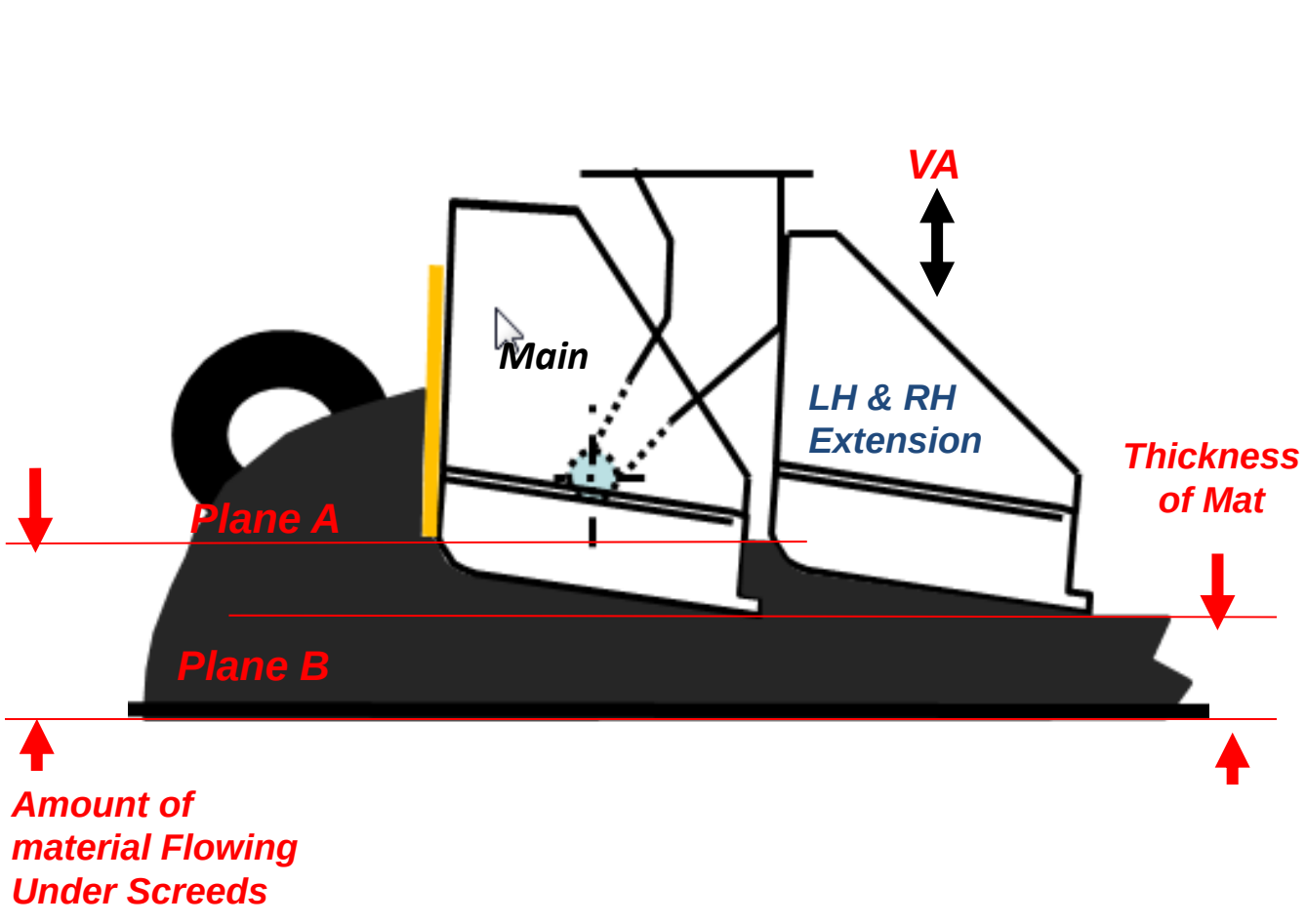
Key Components of Pavers with Vibratory Screeds:

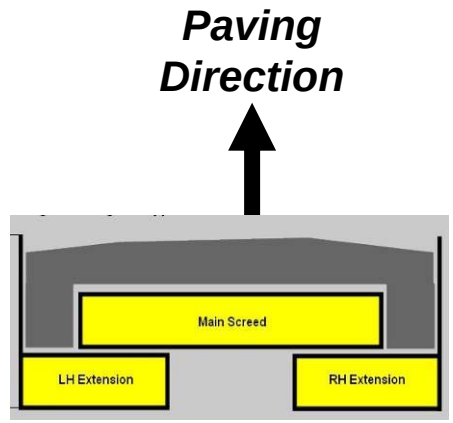


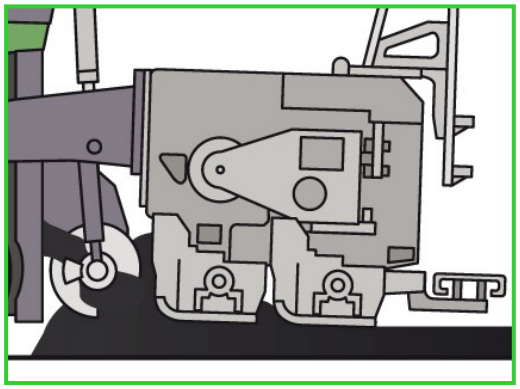
Paving Equipment - Manufactures Perspective

Rear Mount Vibratory Screed…..Angle of Attack & vertical Adjust

- ***Material Flowing Under all Screed Sections must Be Equal***







Paving Equipment - Manufactures Perspective

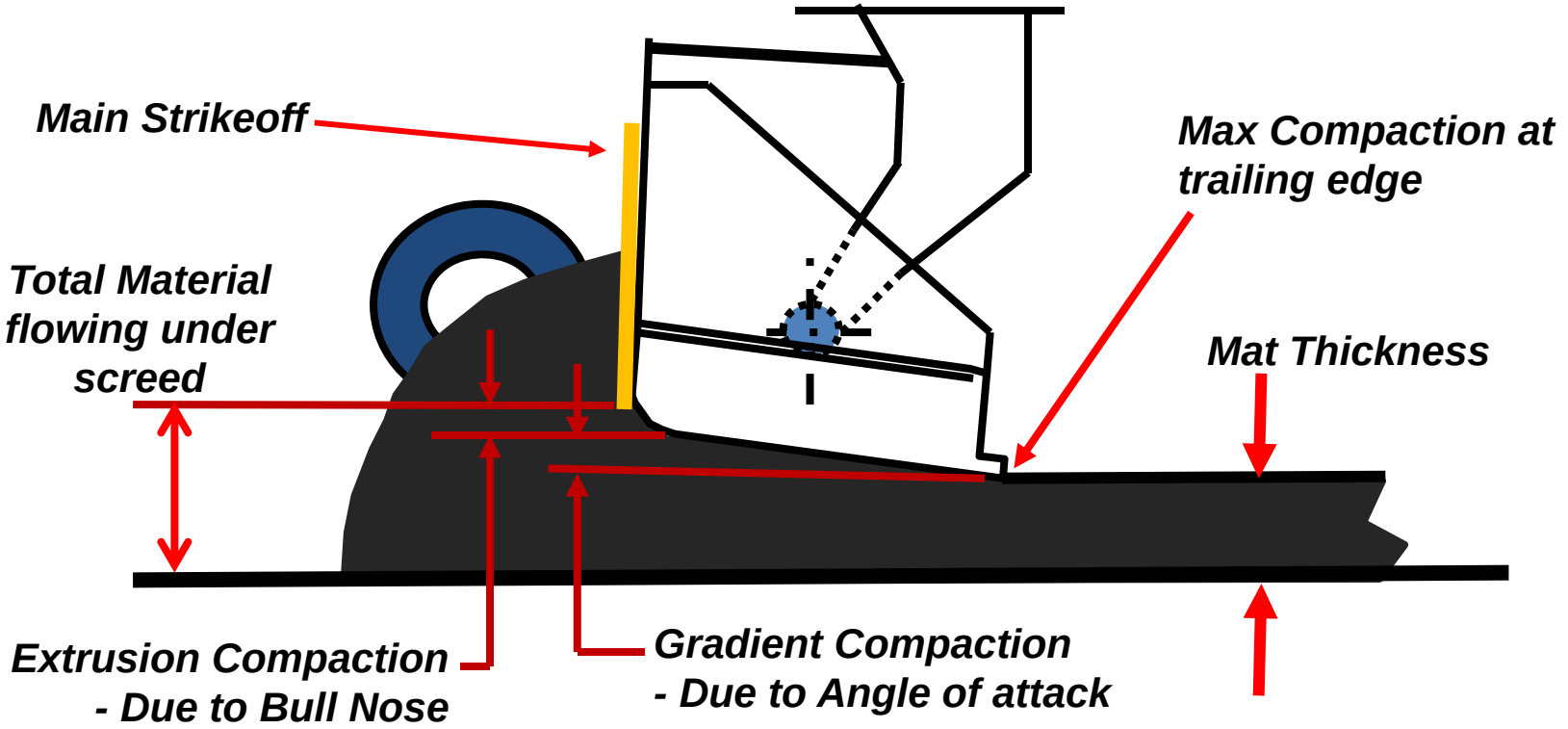
Vibratory Screed – How is Compaction Achieved??

1. *Gradient Compaction - Due to screed angle of attack*

   Influenced by Weight and or Vibration

2. *Extrusion Compaction*

   Influenced by the strikeoff and Bull nose on screed plate



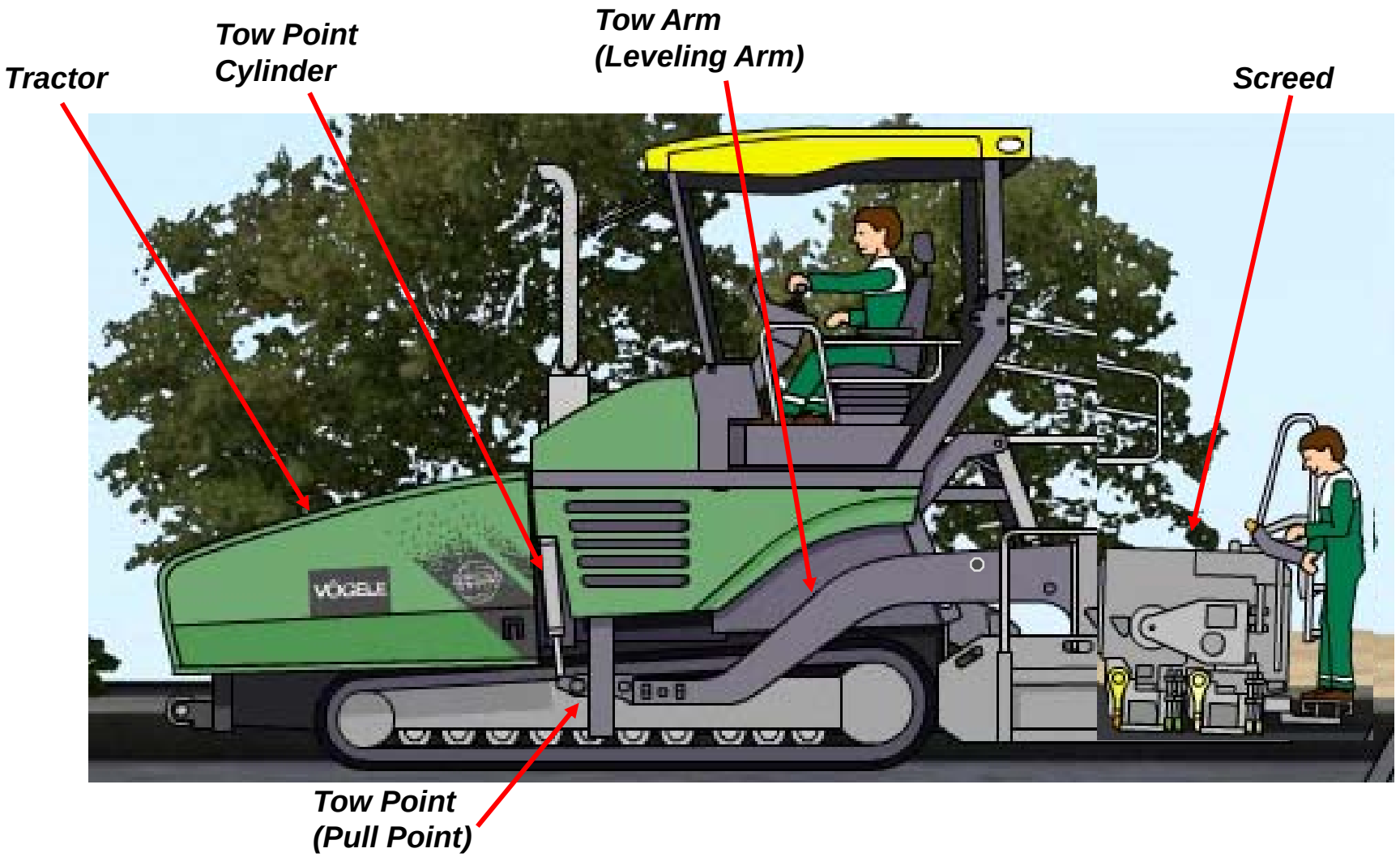
Paving Equipment - Manufactures Perspective

Unequal Width Front Mount Vibratory Screed:

- ***Highway Applications: 26' Wide, 1 ½" thick***
- ***$475K Bonus out of $500K for Smoothness & Density***

Paving Equipment - Manufactures Perspective

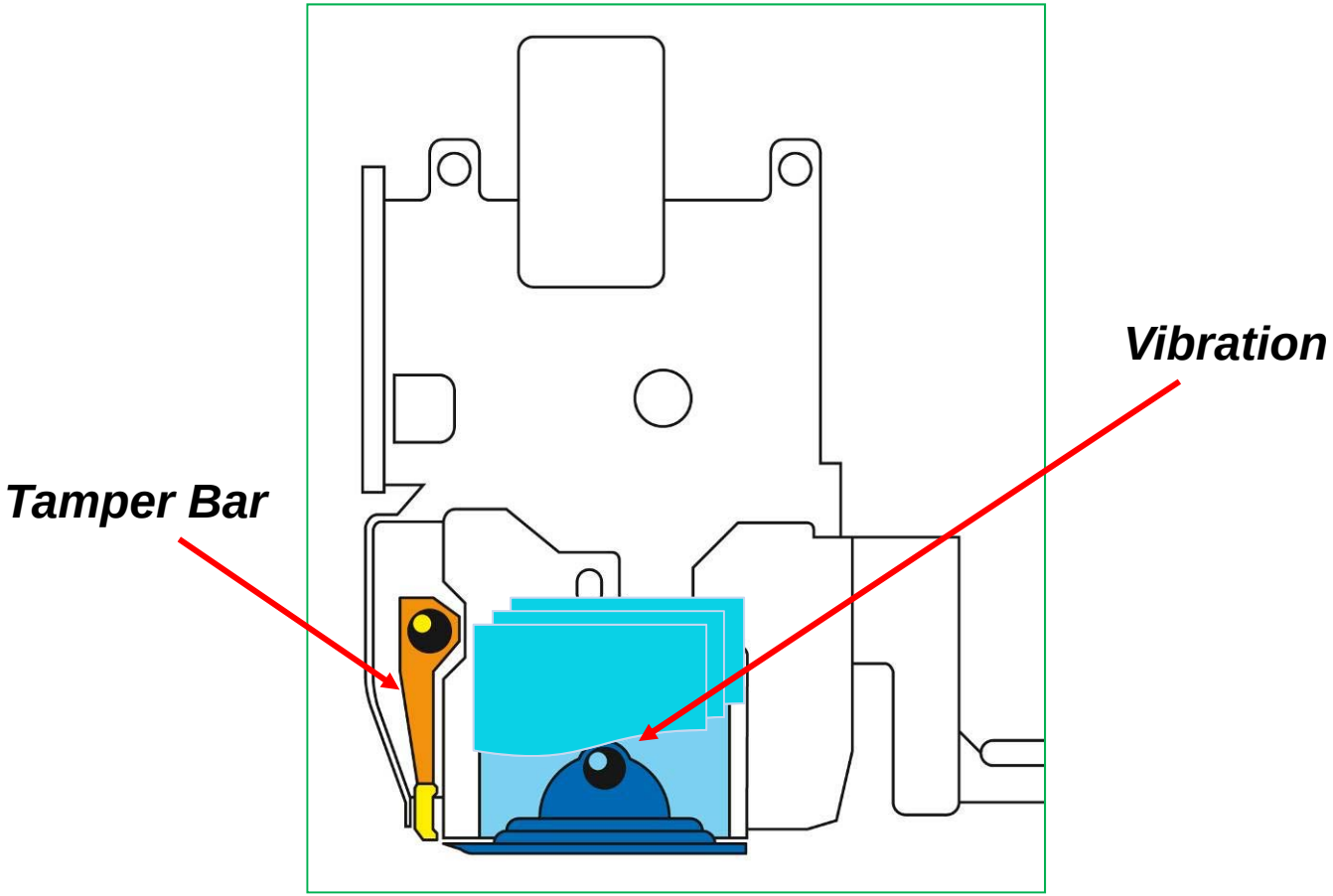
Key Components of Pavers with Compaction & High Compaction Screed:



Paving Equipment - Manufactures Perspective

Compaction Screeds – Single Tamper & Vibration

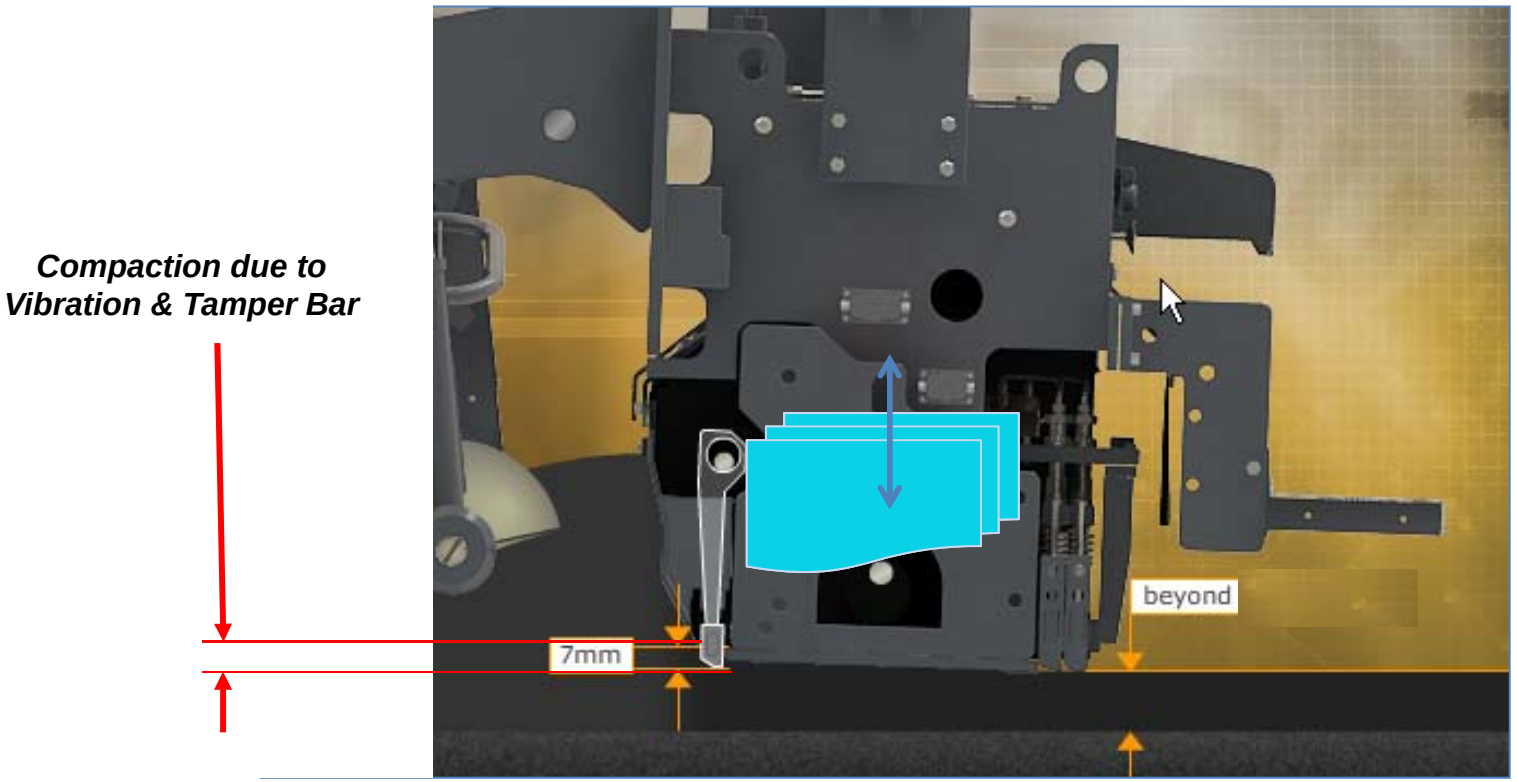
Produced by Most Manufacturers:



Paving Equipment - Manufactures Perspective

Compaction Screed – How is Compaction achieved??:

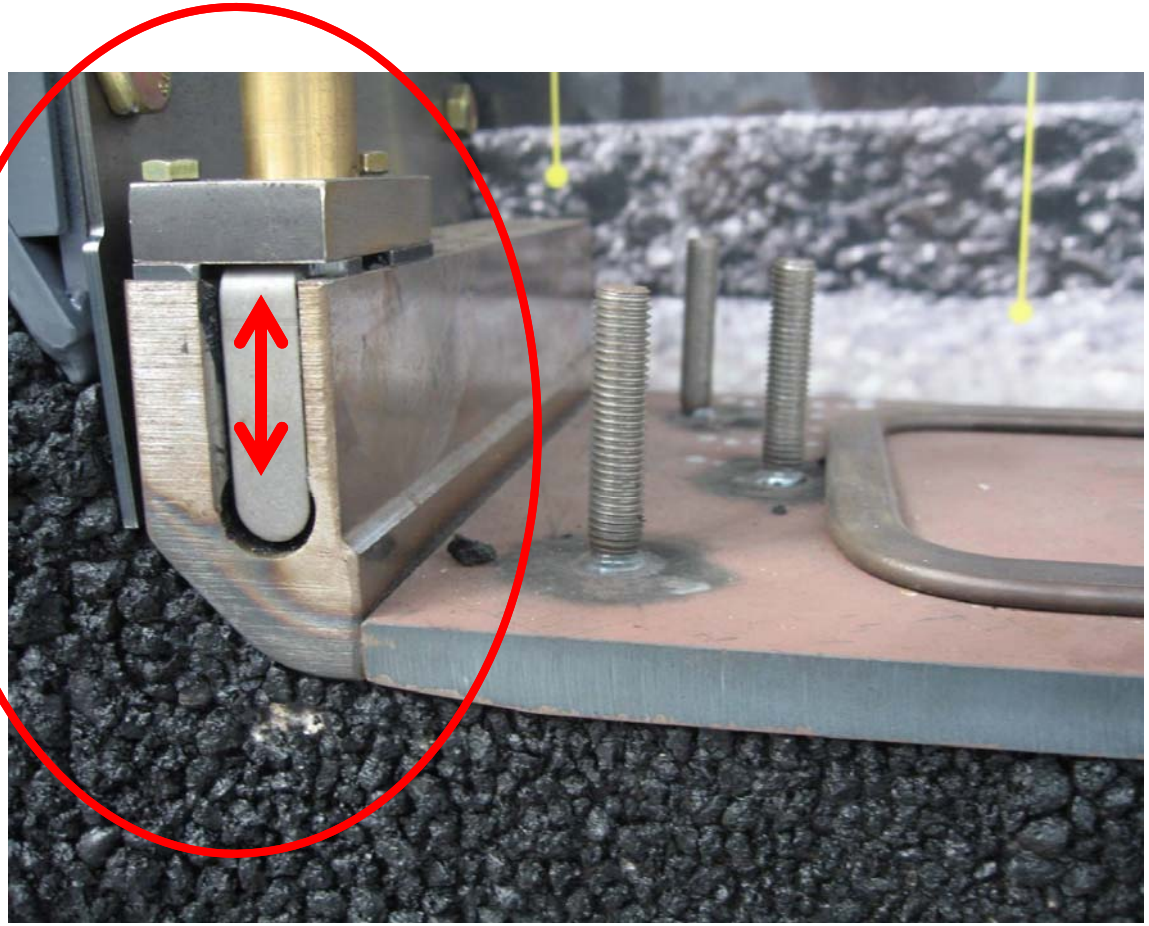
- Single Tamper Bar and Vibration
  - Tamper Bars at the Leading Edge
  - 88% to 92% Density



Paving Equipment - Manufactures Perspective

Compaction Screeds, Single Tamper Bar – Cut away View:

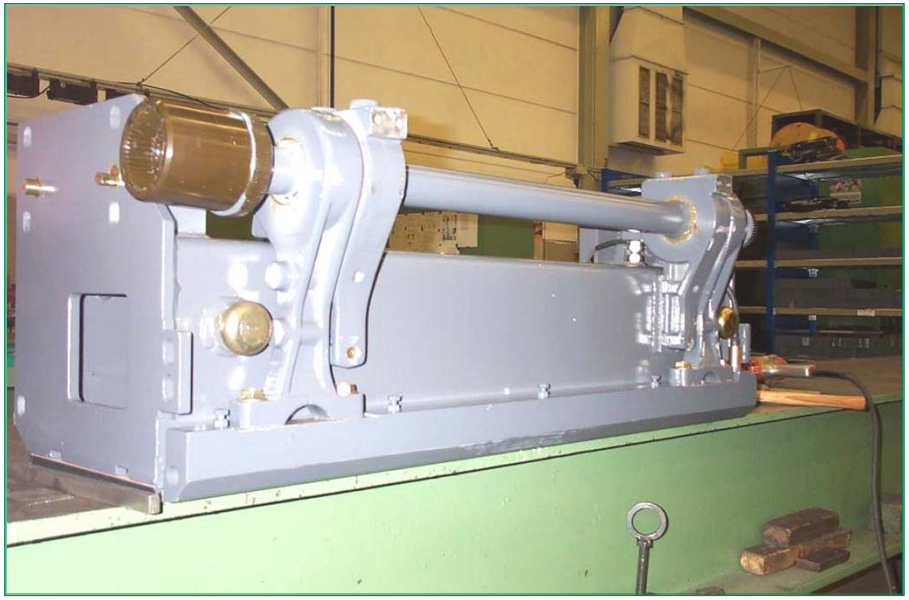
Tamper Bar Moves up & Down – To tuck the material under the screed Plate

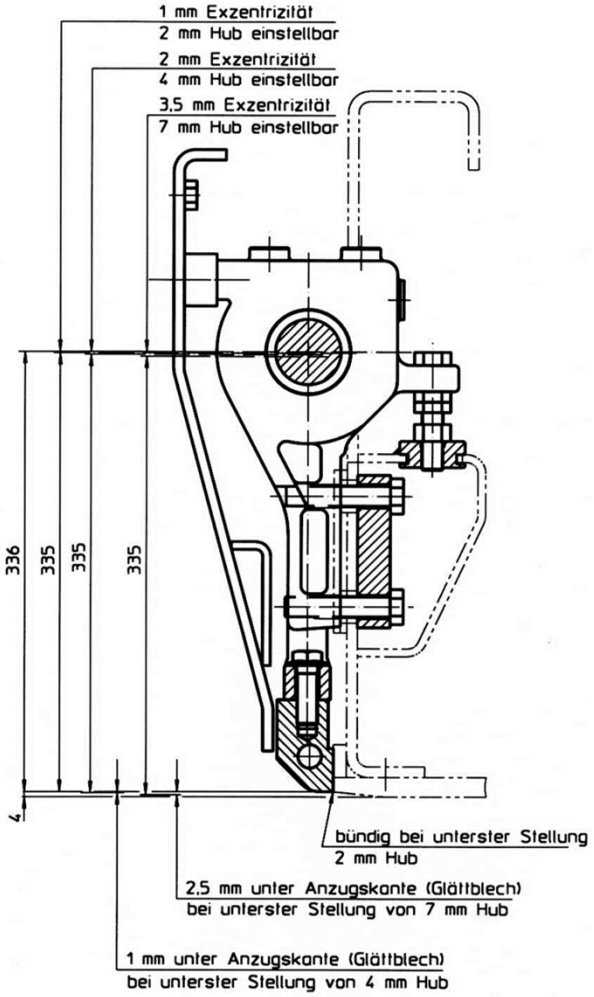


Paving Equipment - Manufactures Perspective

Compaction Screeds: Tamper Bar Specifications

- *Driven by Hydraulic Motors*
- *3 Strokes - 2, 4 & 7 mm*
- *RPM - Adjustable from 0 to 1,800*





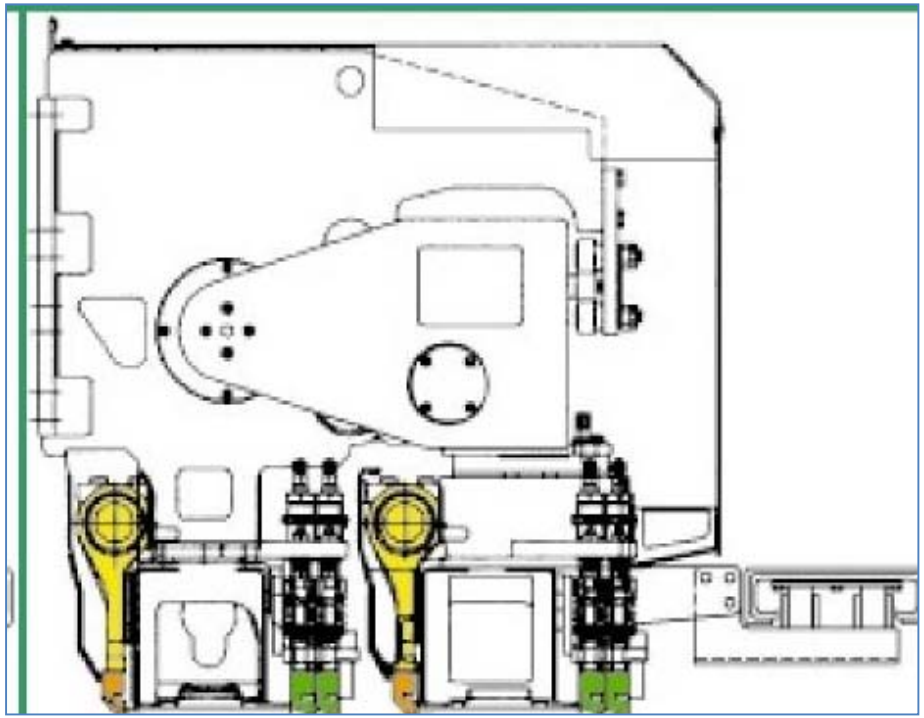
Paving Equipment - Manufactures Perspective

High Compaction Screeds: - Most suited for thicker lifts

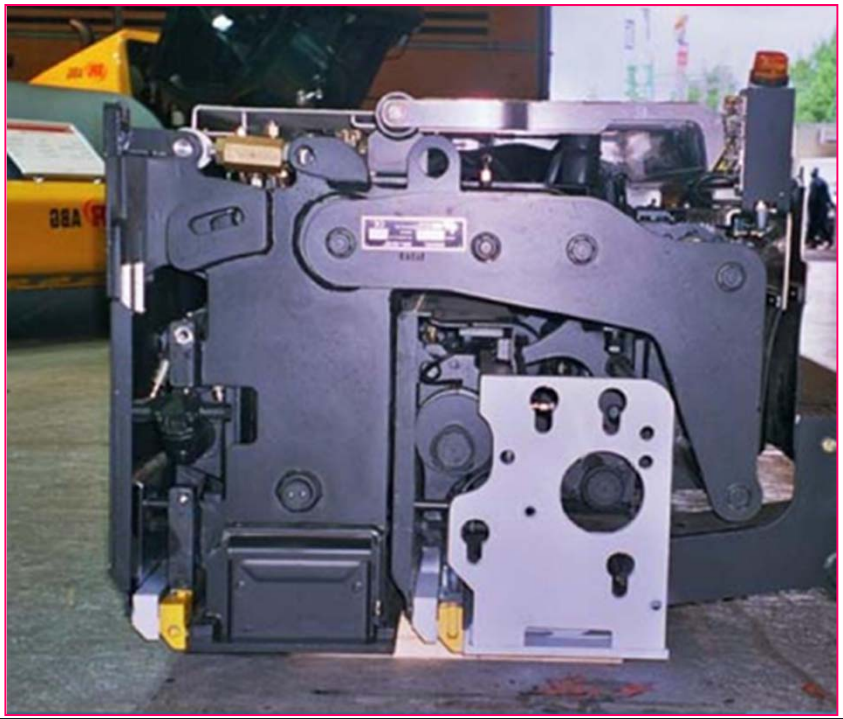
Vogele AB Screeds: 1 Tamp & 2 Pressure Bars

Some Manufactures have 2 Tamper Bars

1 Tamp & 2 Pressure Bars



2 Tamper Bars Only



Paving Equipment - Manufactures Perspective

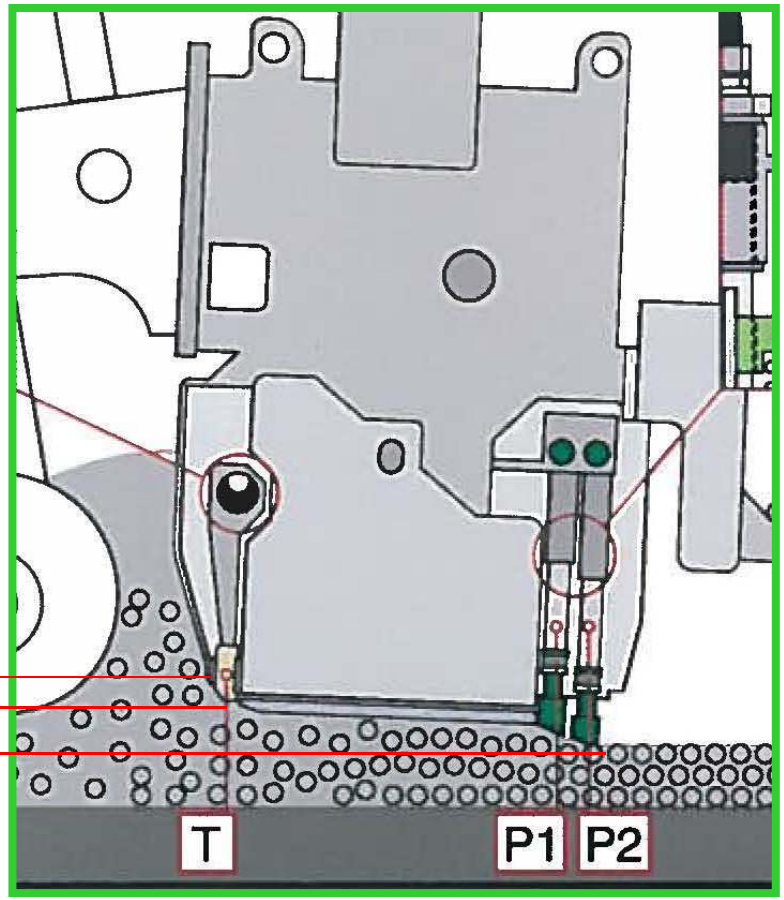
High Compaction Screed – How is Compaction Achieved??

- *Single Tamper Bar and Dual Pressure Bars*
- *Or Dual Tamper Bars*
  - *90% to 96% Density*

Initial compaction with Tamper bar, 2, 4 or 7 mm stroke

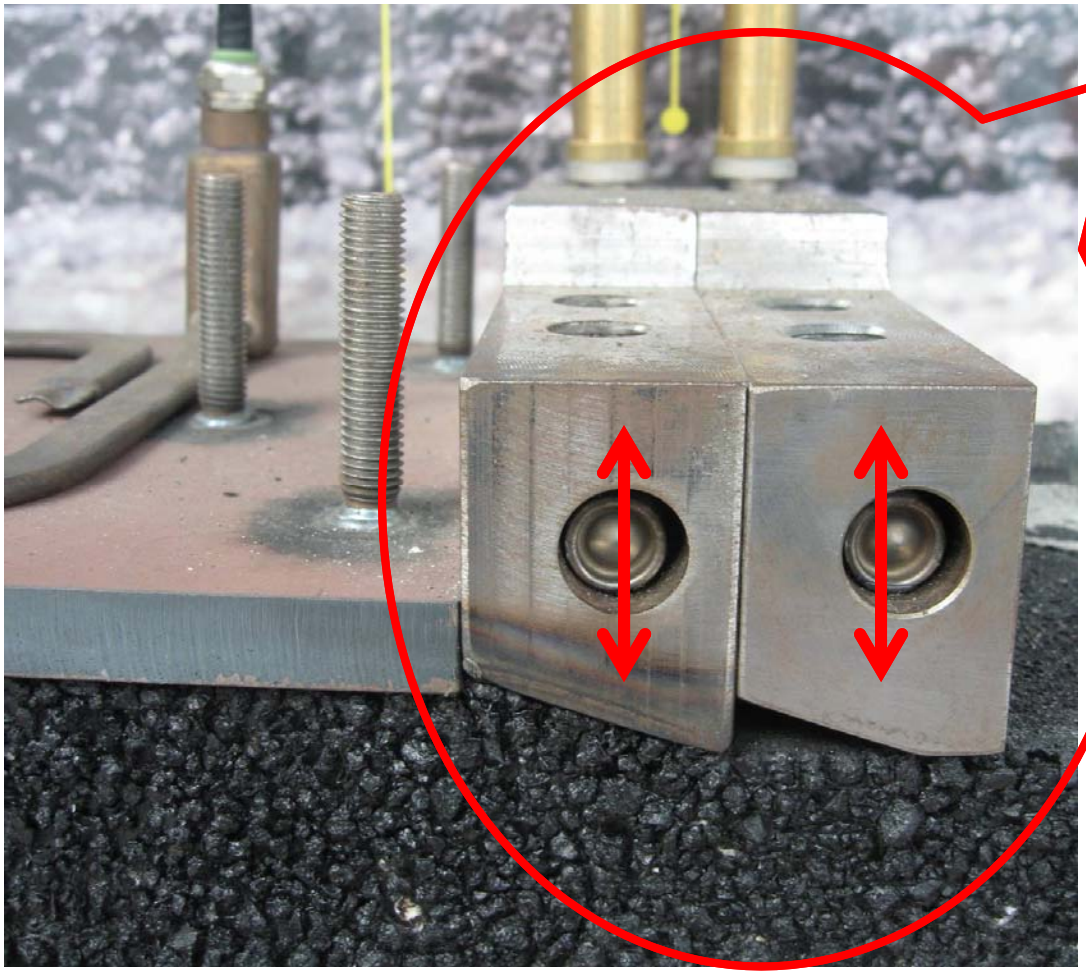
Compaction due to P1 & P2 Strokes below screed plate

AB 600 Flash



Paving Equipment - Manufactures Perspective

High Compaction Screeds, Dual Pressure Bars – Cut away View

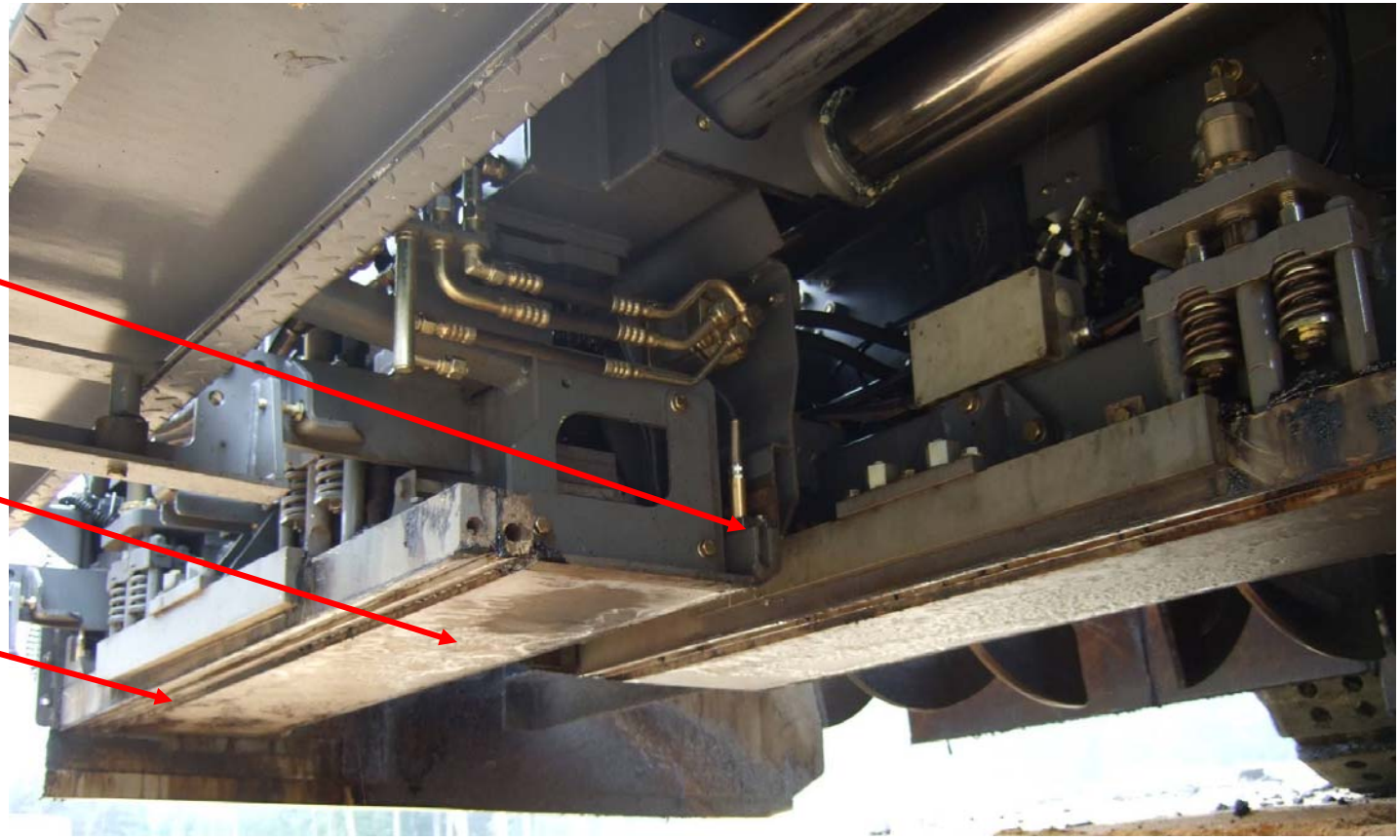


Dual Pressure Bars at the Trailing Edge of the Screed Plate – Provides the Final Compaction

Paving Equipment - Manufactures Perspective

High Compaction Screeds

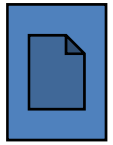
- Capable of 100% Density ……Up to 32’ Wide
  - Frame Structure must be Rigid for Consistency



Paving Equipment - Manufactures Perspective

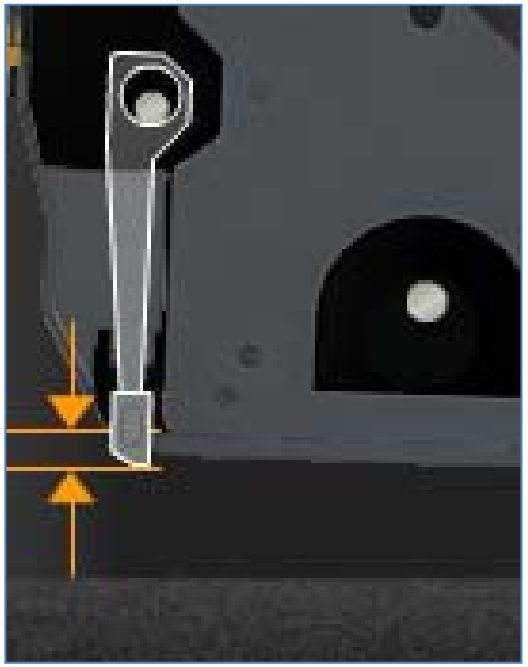
Factors Influencing Compaction & High Compaction Screeds:

- *Impact per Inch & Stroke…..based on Depth & Speed*
- *Must Maintain Constant Paving Speed*

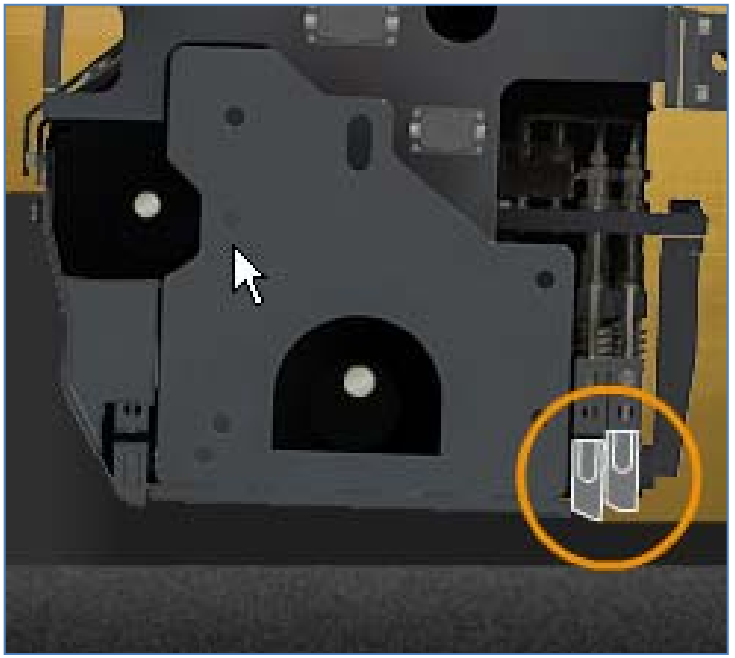


Foot Print Test

Initial Compaction from Tamper Bar



Final Compaction from Pressure Bars



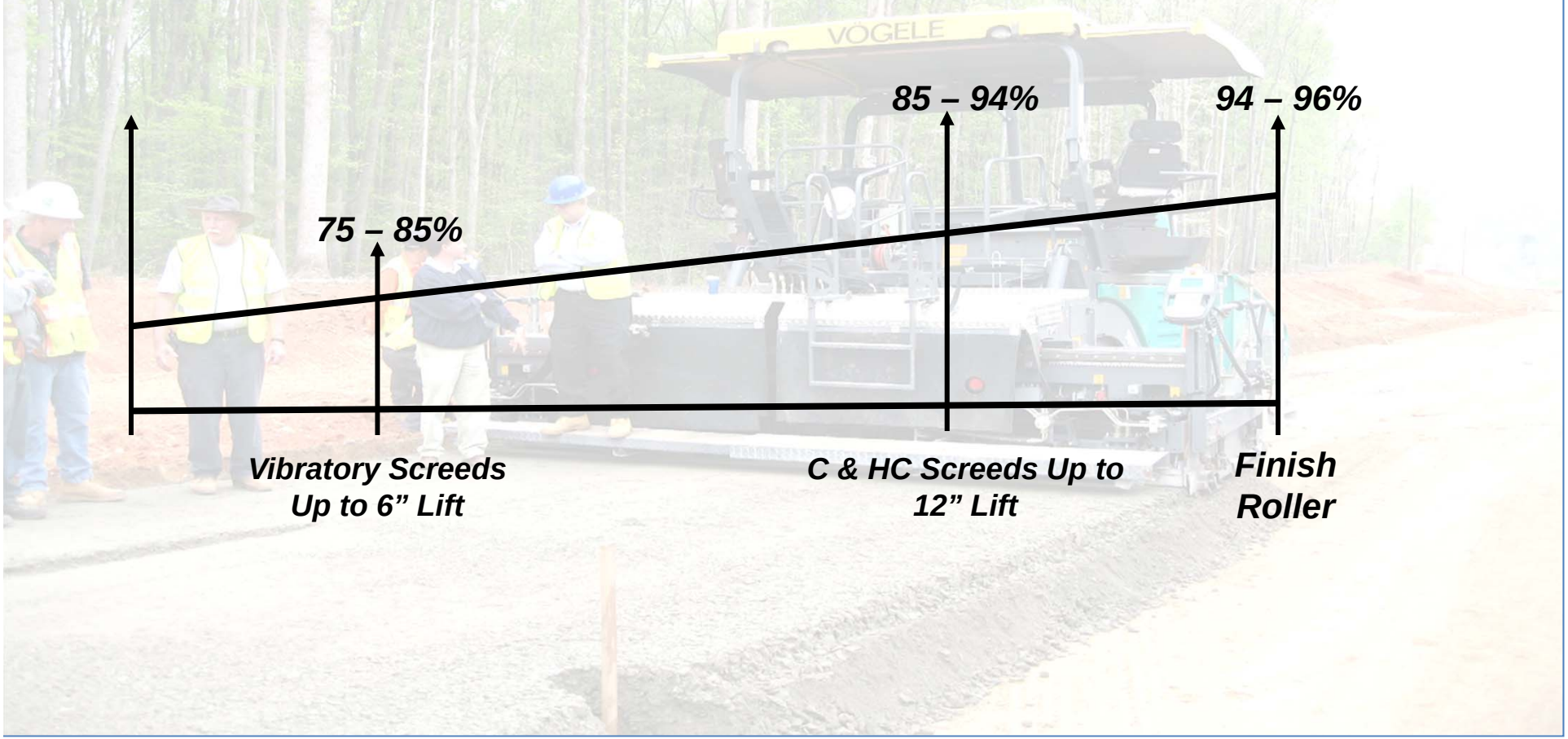
Paving Equipment - Manufactures Perspective

Compaction & High Compaction Screeds (C & HC Screeds):

- ***Higher In Place Density…….Less Roll down***
- ***Less Probability for Roller Imperfections***

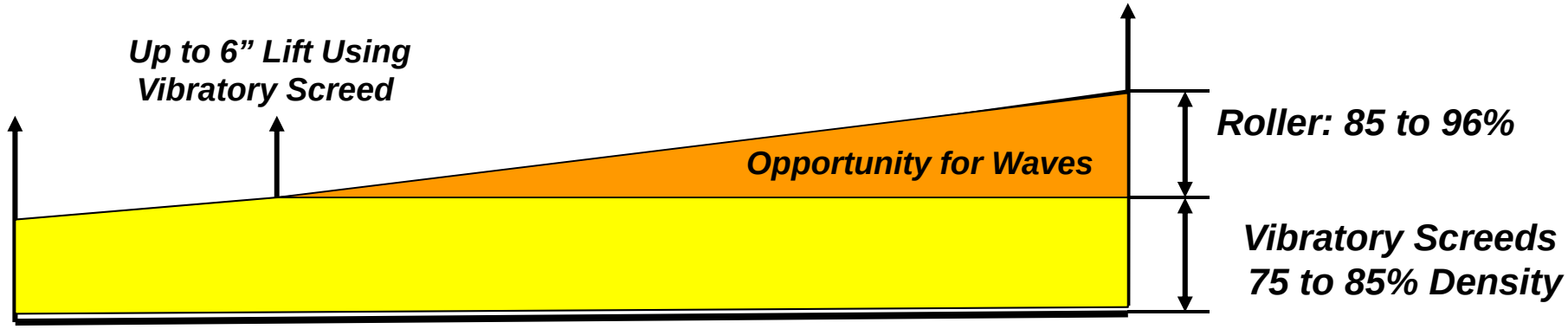
Paving Equipment - Manufactures Perspective

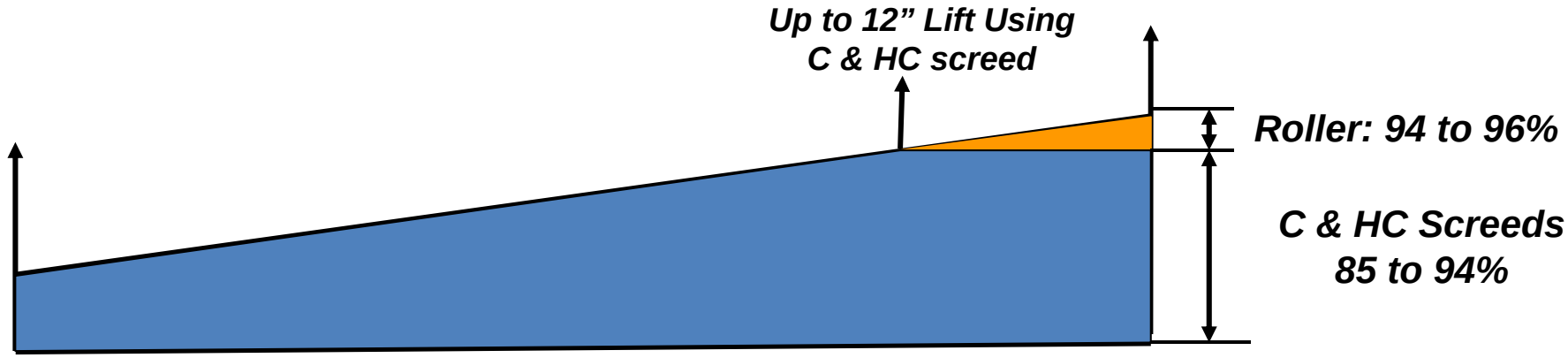
Screeds & Roller Compaction Comparisons:



Paving Equipment - Manufactures Perspective

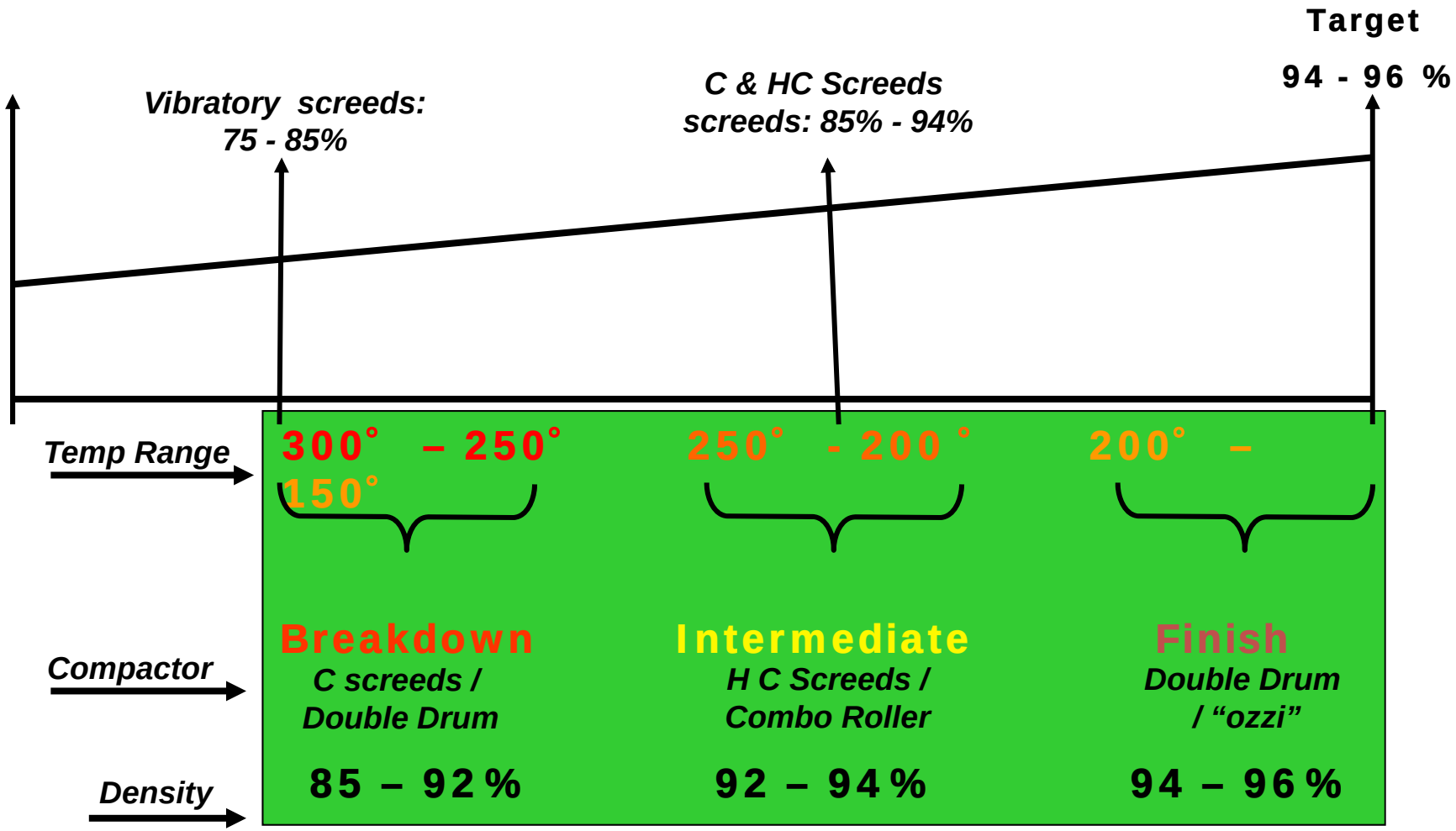
Screeds & Roller Compaction Comparisons:





Paving Equipment - Manufactures Perspective

Screed Densities and Rolling Zones



Paving Equipment - Manufactures Perspective

Compaction & High Compaction Screed Applications (any Asphalt):

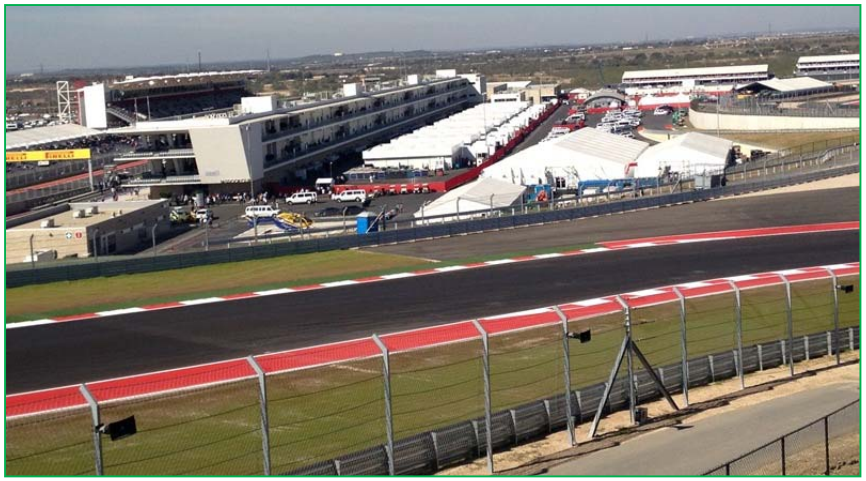
- ***Wide Paving for Airfield & Road Applications***
- ***Design Build; From Gravel to Base to Surface***

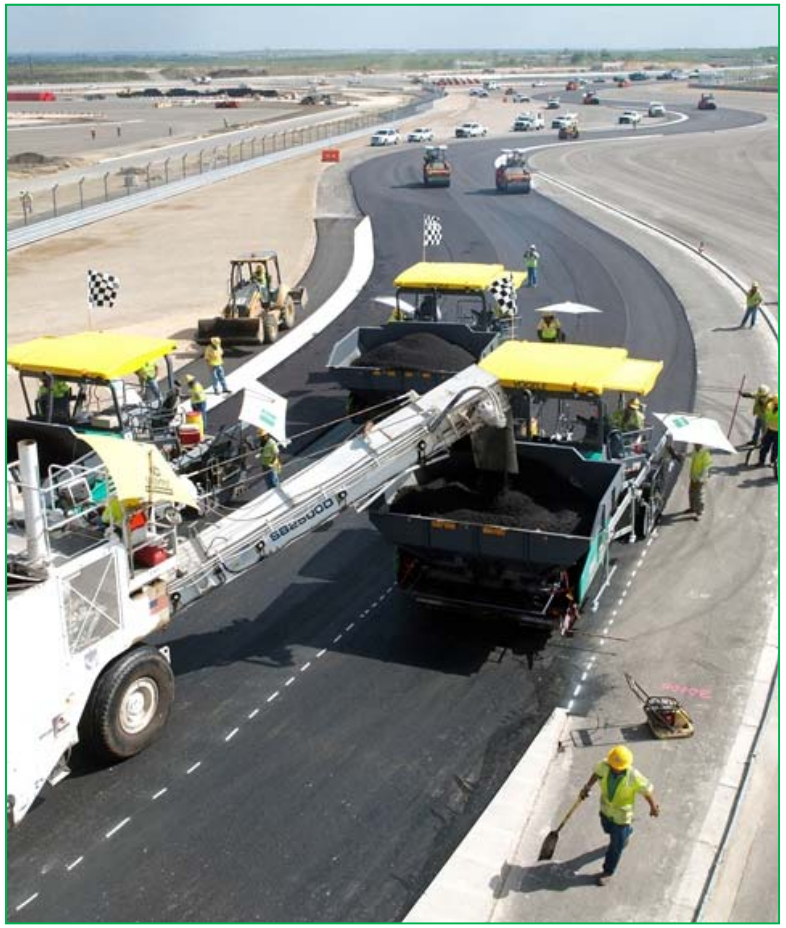
Perception of Slow Paving & Lost Production

Paving Equipment - Manufactures Perspective

Compaction & High Compaction Screed Applications:

F 1 Track – From Gravel to Surface





Paving Equipment - Manufactures Perspective

Compaction & High Compaction Applications:

- ***Wide Paving – Eliminate a Joint***
  - ***Extendable Screeds ….. Up to 32' Wide***

Paving Equipment - Manufactures Perspective

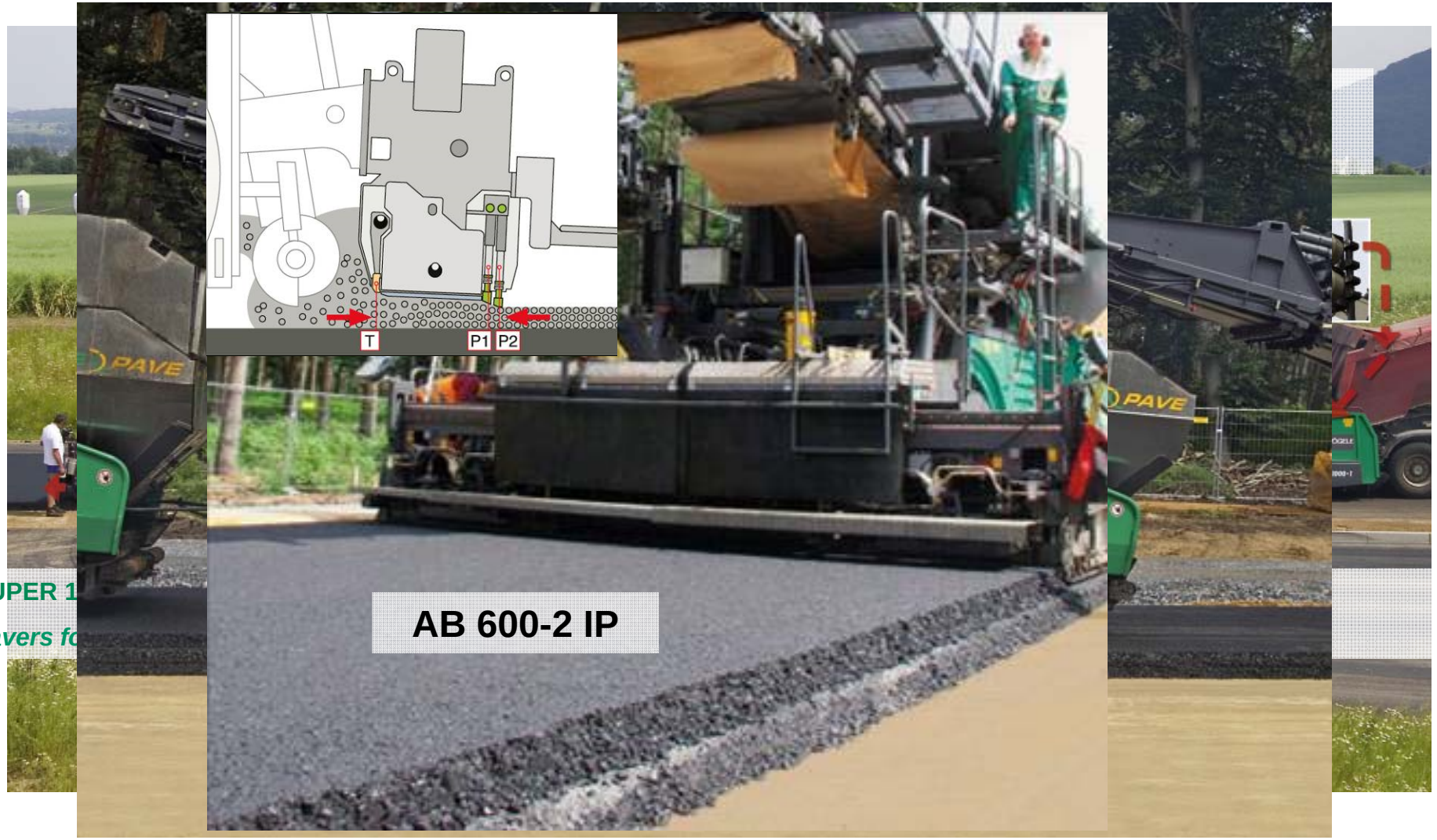
Fixed Screeds with Hydraulic Extensions at the end:

- ***Up to 50 Ft wide with 1.5' to 3' Extension on each end***

Paving Equipment - Manufactures Perspective

INLINE PAVE

Hot on Hot



SUPER 1

Pavers fo

Paving Equipment - Manufactures Perspective

Multiple Extendable Screed Options Available:

- ***Most Contractors Cannot Afford a paver for each application***
  1. ***Front Mount Vibratory Screed – Most Popular Choice***
  2. ***Light Rear Mount Vibratory Screed – Close Second Choice***

  3, 4, & 5 Heavy Rear Mount Vibratory Screed, C & HC Screeds - Special
    - ***3, 4, & 5 uses the same Structure – Generally Heavy & Rigid***
- ***Method Specification vs Results Specification……Drives the Decision***

Paving Equipment - Manufactures Perspective

Vibratory Screeds – Front Mount:

- ***Typical Commercial Screeds***

Military Airfield:

2 x 8’ Front Mount screeds in Echelon

Military Airfield:

10’ Front Mount screeds

Paving Equipment - Manufactures Perspective

Vibratory Screeds Using the same Chassis as C & HC Screeds:

Chicago Midway Airport – 25' wide

Paving Equipment - Manufactures Perspective

HC Screeds – Cold Mix at Ft. Lauderdale Airport

25’ wide, 8” Compacted Subbase

Paving Equipment - Manufactures Perspective

Alternative Applications for C & HC Screeds to Maximize Utilization:

Cold Mix for Higher in place Density…..Less Roll down

HC Screed – 6” Compacted

- ***96 to 98 % density after 1 Pass***
- ***Very smooth***

Vibratory Screed – 6” Compacted

- ***89 to 91 % After 1 Pass***
- ***Not As smooth, Wavy***

Rolling
Vib. Scr

Paving Equipment - Manufactures Perspective

Speed of Construction:

Free Floating Screed vs Slip Form Screed

Hot Mix on Airfield

- ***Position the paver***
- ***Deliver material ……. and start making Pavement***

Paving Equipment - Manufactures Perspective

Speed of Construction ……Free Floating Screed vs Slip Form Screed

Free Floating Screed – Cold Mix (RCC) on Airfield

- ***Position the paver***
- ***Deliver material ……. and start making Pavement***

Free Floating Screed Laying 12” thick

Paving Equipment - Manufactures Perspective

Automatic Grade and Slope Controls:

- ***Following Physical <u>Reference</u>:***
  - ***String line, Existing Joint, Base, Curb, mechanical Ski, etc.***
- ***<u>Machine controls</u> guided by Grade and Slope <u>Sensors</u>***

Physical References

Paving Equipment - Manufactures Perspective

Machine Controllers used with <u>Physical References</u>:

- ***Controlling Depth Only (1D)***
- ***Grade L and or R***
- ***Grade L & Slope R…….or Grade R and Slope L***
  - ***Niveltronic, Topcon & MOBA and Others***

Paving Equipment - Manufactures Perspective

1D Image of a Pavement

Paving Equipment - Manufactures Perspective

1 D Paving Using Physical Reference: Controlling Depth LH & RH

Using 2 Averaging Ski

Paving Equipment - Manufactures Perspective

String line erected to used as Reference for Grade Control – Generally Expensive

- ***New construction***
- ***Base material***

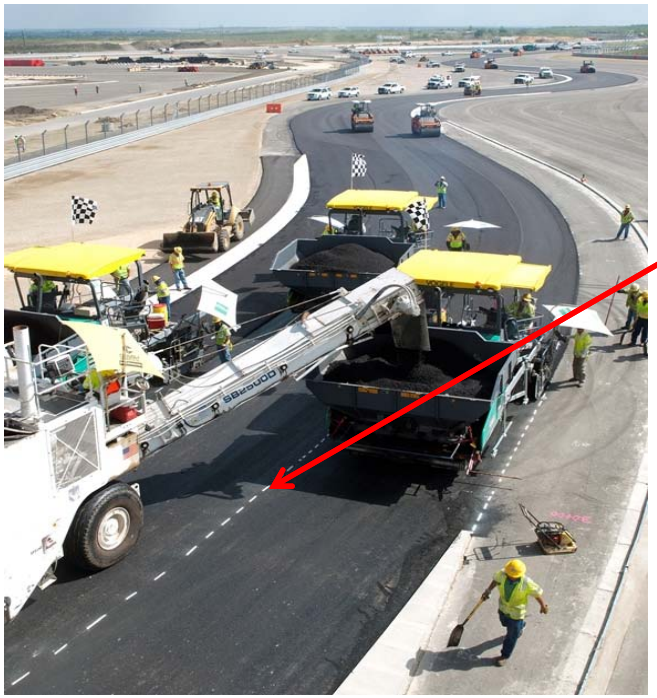
String
Used as a Physical
Reference

Paving Equipment - Manufactures Perspective

Painted Lines for Steering References:

- ***Paving Projects with Complicated Transitions:***
  - ***Race Tracks***
  - ***New roads***

Paint Line used for Steering Reference



Paving Equipment - Manufactures Perspective

3D Controls:

- ***No Physical Reference Required for automatic Grade Control***
  - ***Eliminate Expensive Stakes and String Line***

Paving Equipment - Manufactures Perspective

Why 3D???

- ***No Physical Reference Required***
- ***All Equipment uses the same Data***

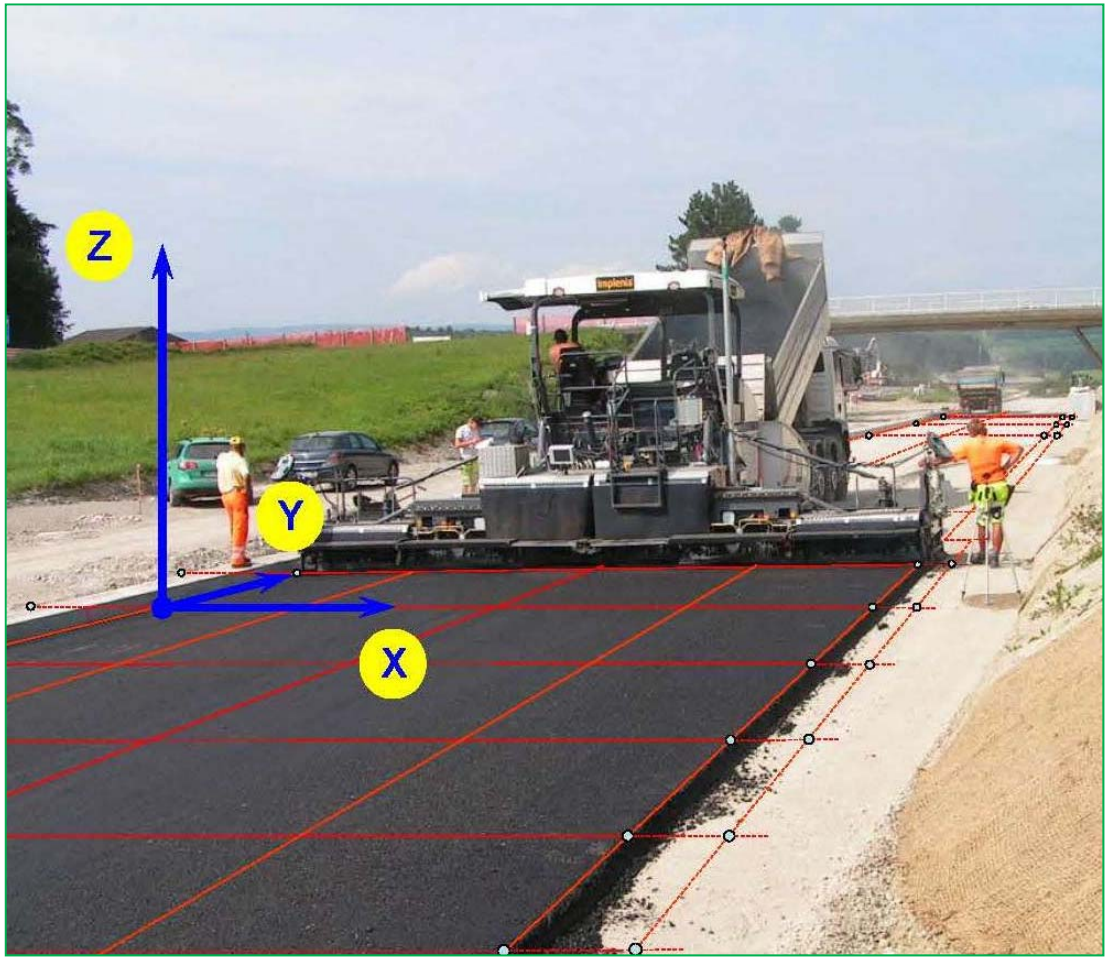
Paving Equipment - Manufactures Perspective

What is Required??

1. ***3D Job Files (3 D Coordinates as Reference)***
2. ***Positioning Systems, (Laser for Grade)***
2. ***Machine Controls***

Paving Equipment - Manufactures Perspective

3D Image of a Pavement (3 D Coordinates as Reference):



Paving Equipment - Manufactures Perspective

3D Image of a Pavement (3 D Coordinates as Reference):

Paving Equipment - Manufactures Perspective

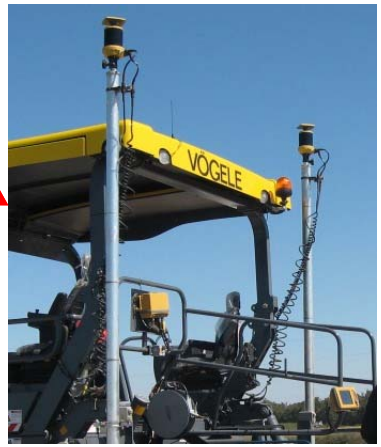
Paving Equipment Machine Controls

- Easier for Contractors to use 3D Positioning Systems to control Grade:
- Leica or Trimble Positioning Systems with Vogele Machine Controls:

Leica

Vogele

Trimble



Paving Equipment - Manufactures Perspective

Paving Equipment Machine Controls:

- *Trimble Positioning Systems with CAT Machine Controls*

Trimble

Paving Equipment - Manufactures Perspective

1 D Paving……. Using 3D Positioning and Coordinates:

- ***Controlling Grade***
- ***Airfield New construction***

Paving Equipment - Manufactures Perspective

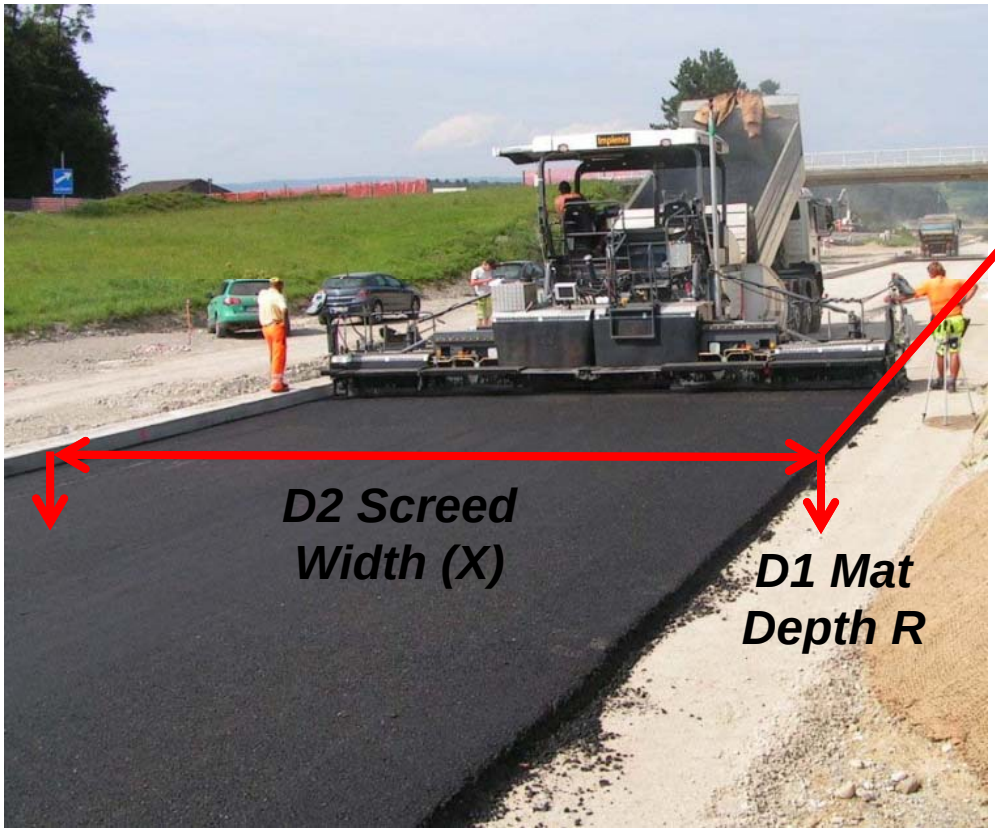
3 D Paving……. Using 3D Positioning and coordinates:

Controlling Grade…..Screed Width…..and Direction (Steering)

Paving Equipment - Manufactures Perspective

2 or 3D Paving:

Controlling Grade and or Screed width & Steering

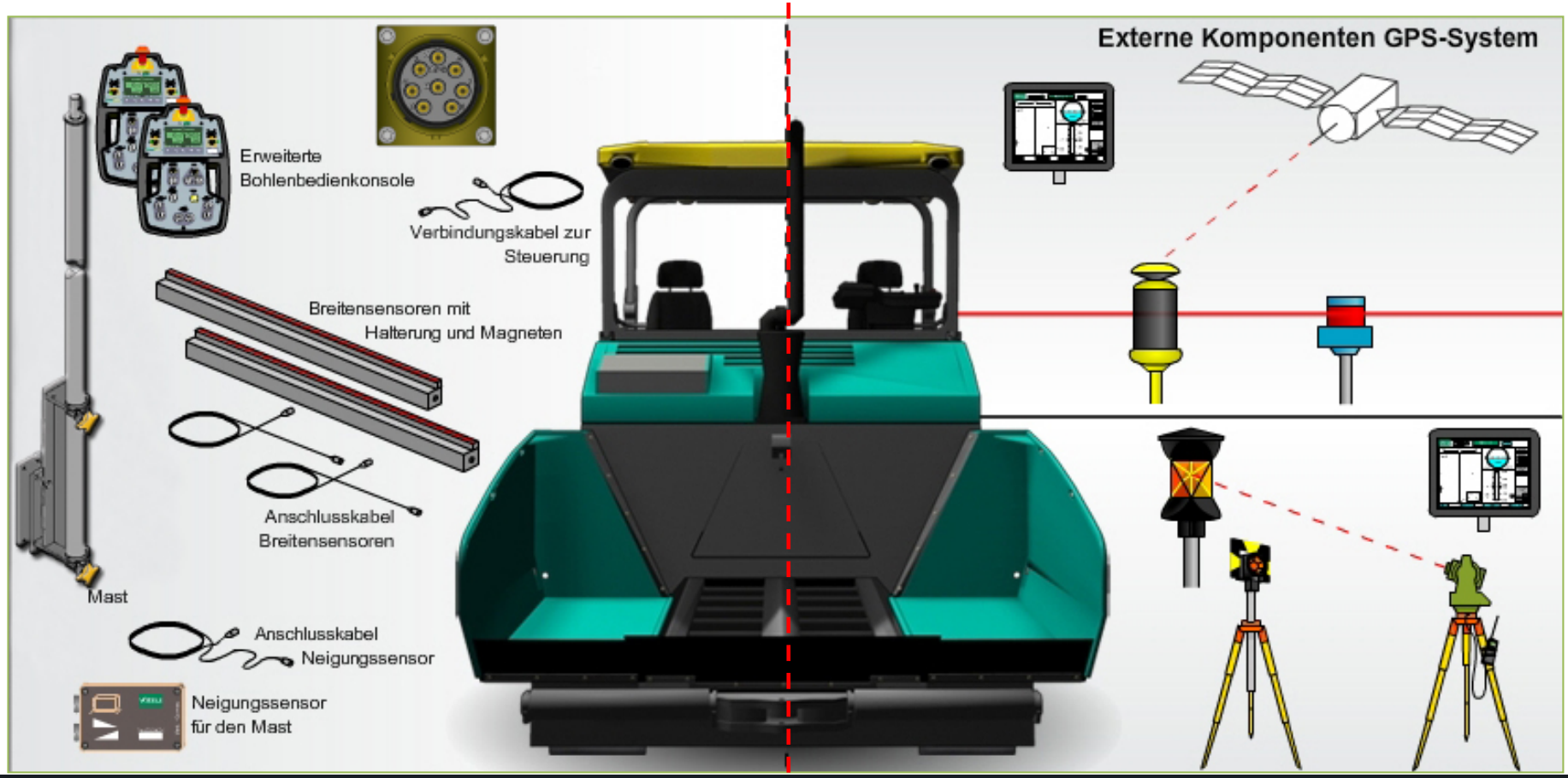


Paving Equipment - Manufactures Perspective

1. 3D Job Files – From the Designers

2. Machine Control: Vogele Navitronic Plus

3. Positioning Systems & Laser Topcon, Leica, Trimble



Paving Equipment - Manufactures Perspective

Questions?