Commercial Paver Application Guide

Engineered Innovation.

WEILER

Paving Fundamentals

Role of the Paver

- To meet specifications for grade, texture and smoothness

Paving Fundamentals

Project Planning

- Asphalt tonnage
- Paving Width
- Specifications
- Grade Conditions
- Site Prep

Paving Fundamentals – Asphalt Tonnage

Project Planning

- Asphalt tonnage
  - Output
  - Haul distance
  - Number of trucks
  - Traffic conditions
  - Goal of continuous paving

Paving Fundamentals – Paving Width

Project Planning

- Paving width
  - Most effective number of passes
  - Don’t end up with a 6’ pass
- Site Layout
  - String lines
  - Paint lines
- Fewest number of tie-ins
- Pave your way out

Paving Fundamentals - Specifications

Project Planning

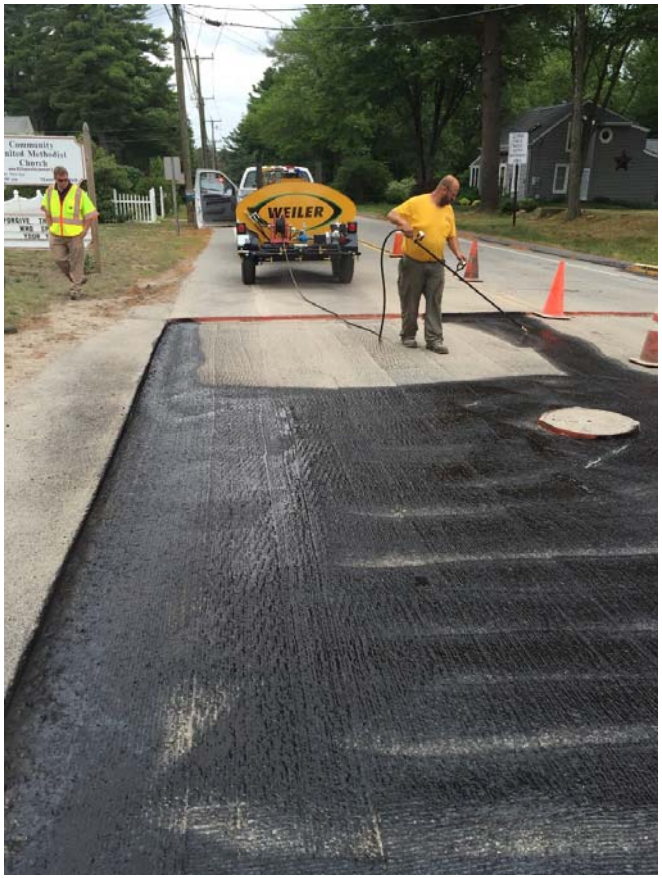
- Specifications
  - Overlay
  - Mill and fill
  - New construction
  - Crown requirements
  - Slope requirements
  - Automatics needed

Paving Fundamentals – Grade Conditions

Project Planning

- Grade Conditions
  - Leveling course
  - Bumps
  - Low spots
  - Transitions
  - Drainage

Paving Fundamentals – Site Prep



Project Planning

- Site Prep
  - Barricades
  - Traffic control
  - Clear of debris
  - Tack Coat
    - 95% coverage is optimal

Paving Fundamentals – Joint Matching

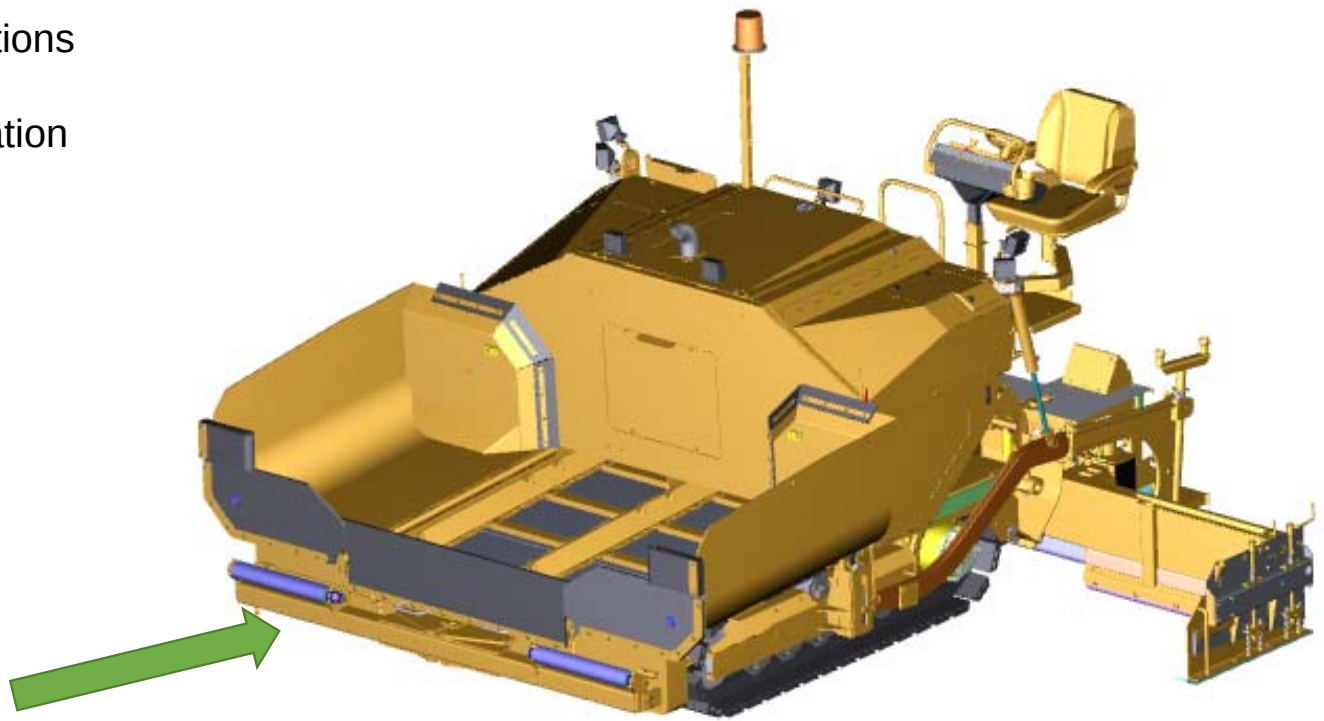
Joint Matching

- Hot Joint
  - Keep roller 6” – 8” off edge of previous pass
  - Set endgate flush with extension
  - Overlap joint 2” – 3”
- Cold Joint
  - Allow ¼” per inch for compaction
  - Overlap joint 1’ – 2”

Paving Fundamentals – Paver Components

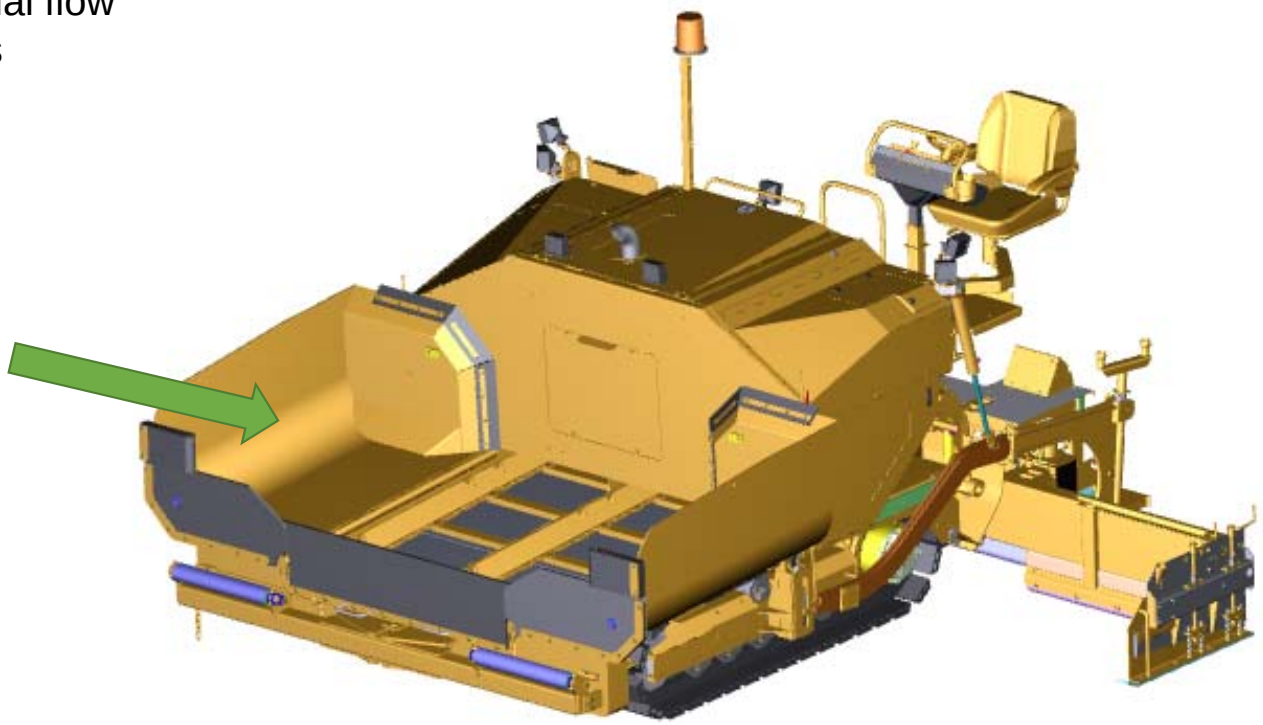
Paving Fundamentals – Push Roller

- Engage truck for material transfer
- Adjustable to meet truck configurations
- Oscillating for tight jobsites
- Keep clean to ensure proper operation



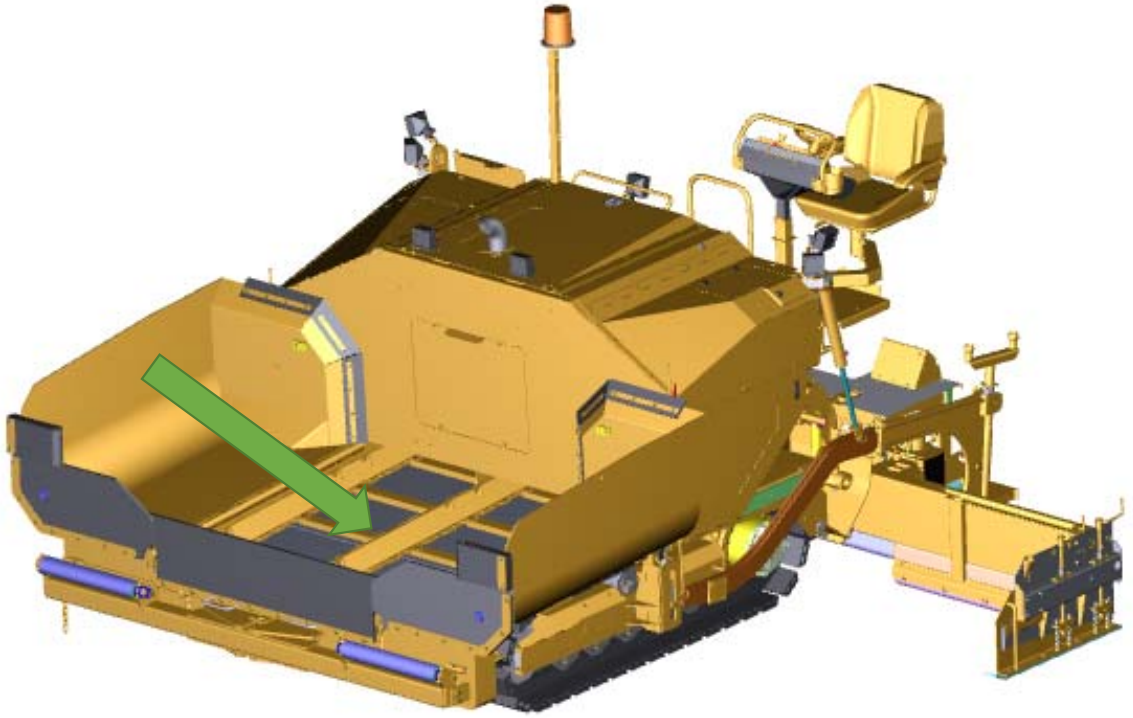
Paving Fundamentals – Hopper

- On-machine material storage
- Rounded design for improved material flow
- Independent control of hopper wings



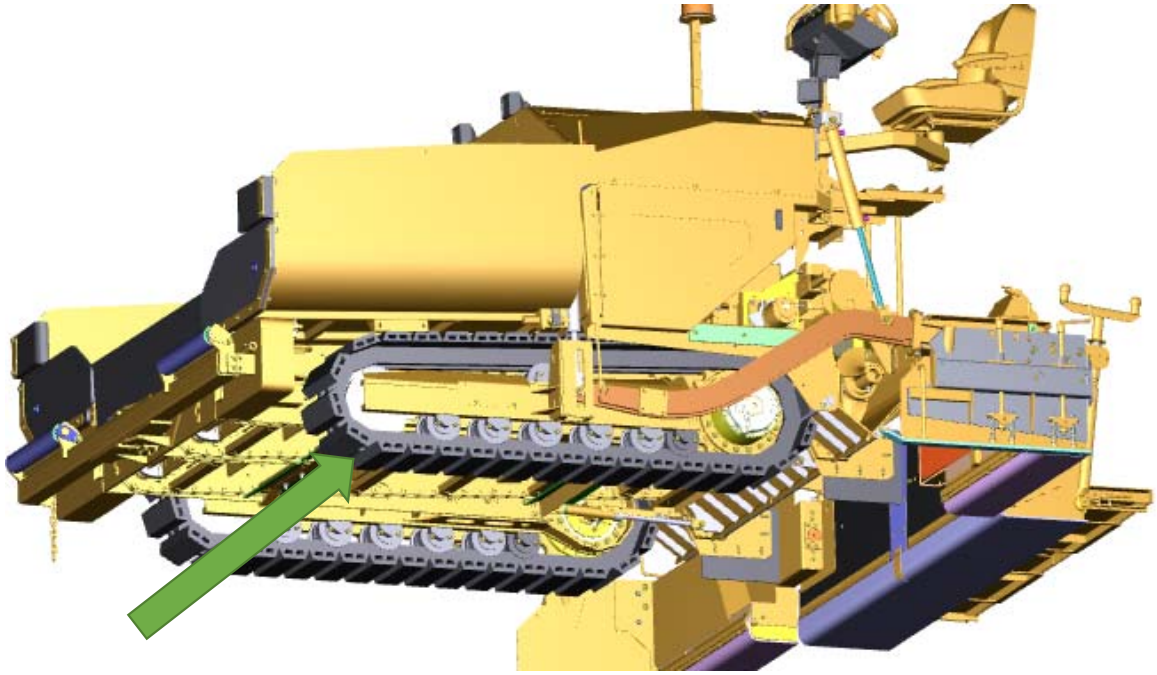
Paving Fundamentals – Feeder System

- Conveyors pull material back to screed
- Independent control of either side
- Most have an “auto” feed
- Constant or variable speed
- May be reversible



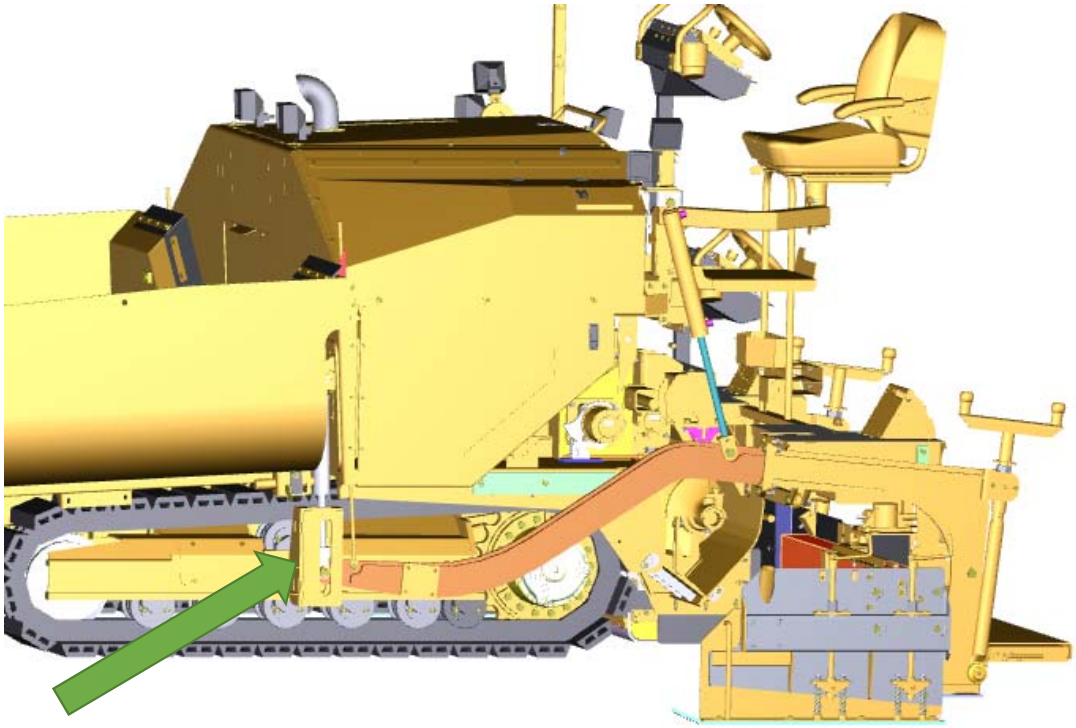
Paving Fundamentals – Undercarriage

- Ground drive system for the paver
- Tracks or rubber tire
- Steel, poly or rubber tracks
- Length and track chain pitch determine ride quality



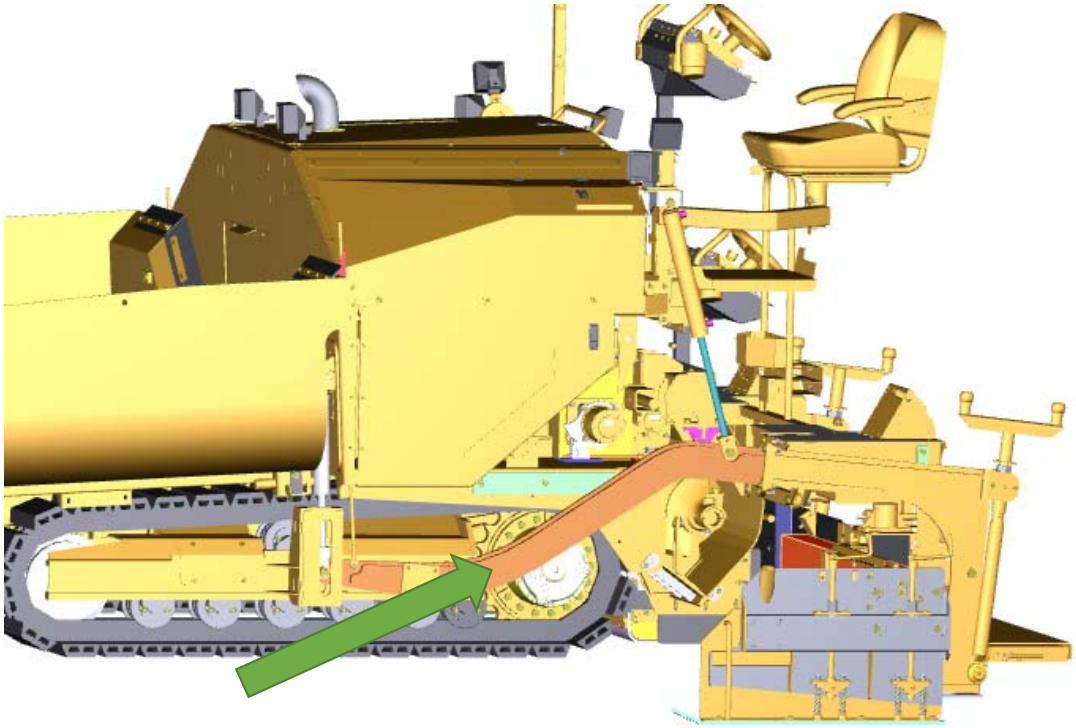
Paving Fundamentals – Tow Point

- Location where screed is being pulled by the tractor
- Fixed or adjustable
- Location of tow point determines mat thickness
- Auto grade and slope systems control to meet spec



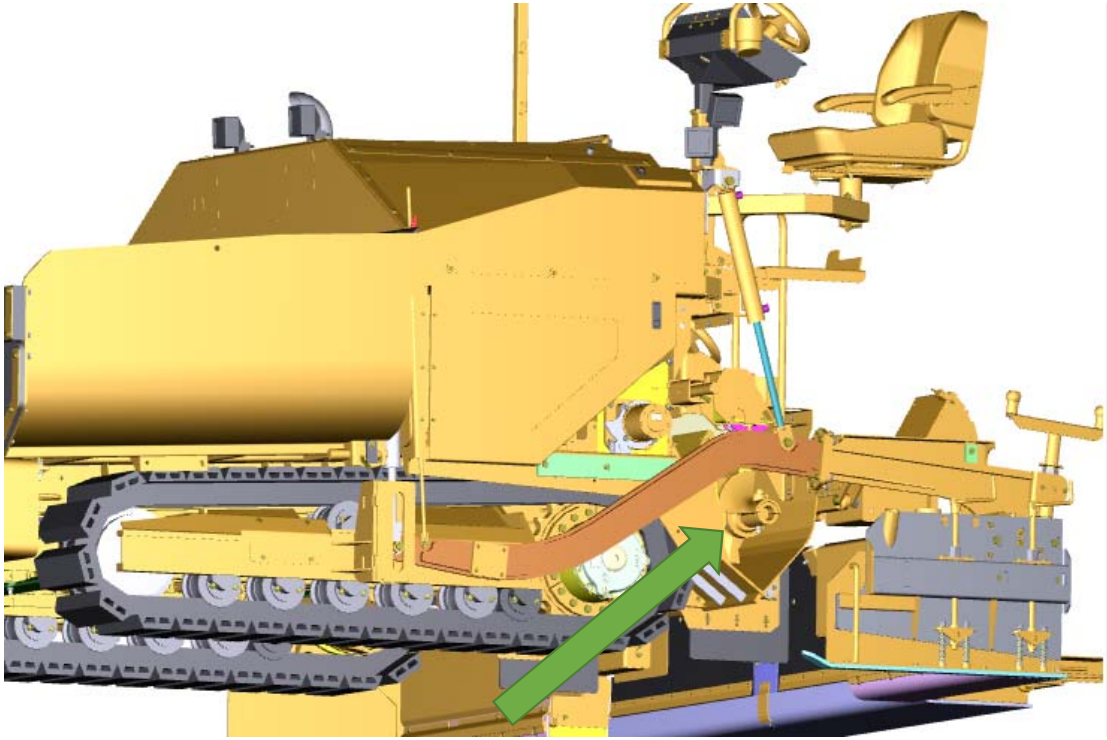
Paving Fundamentals – Tow Arm

- Arm connecting screed to tow point
- Length determines distance for screed to make full depth changes



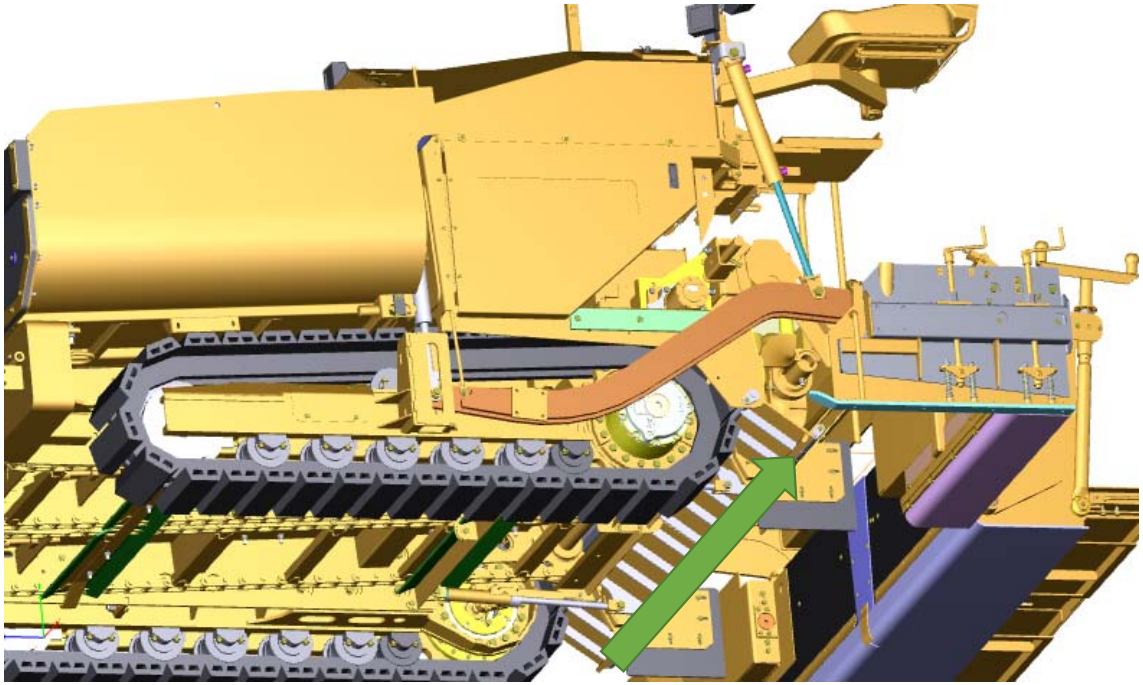
Paving Fundamentals – Augers

- Distribute material evenly in front of screed
- Constant or variable speed
- Mounted to tractor or screed
- Bolt-on augers may be added for wide-width paving



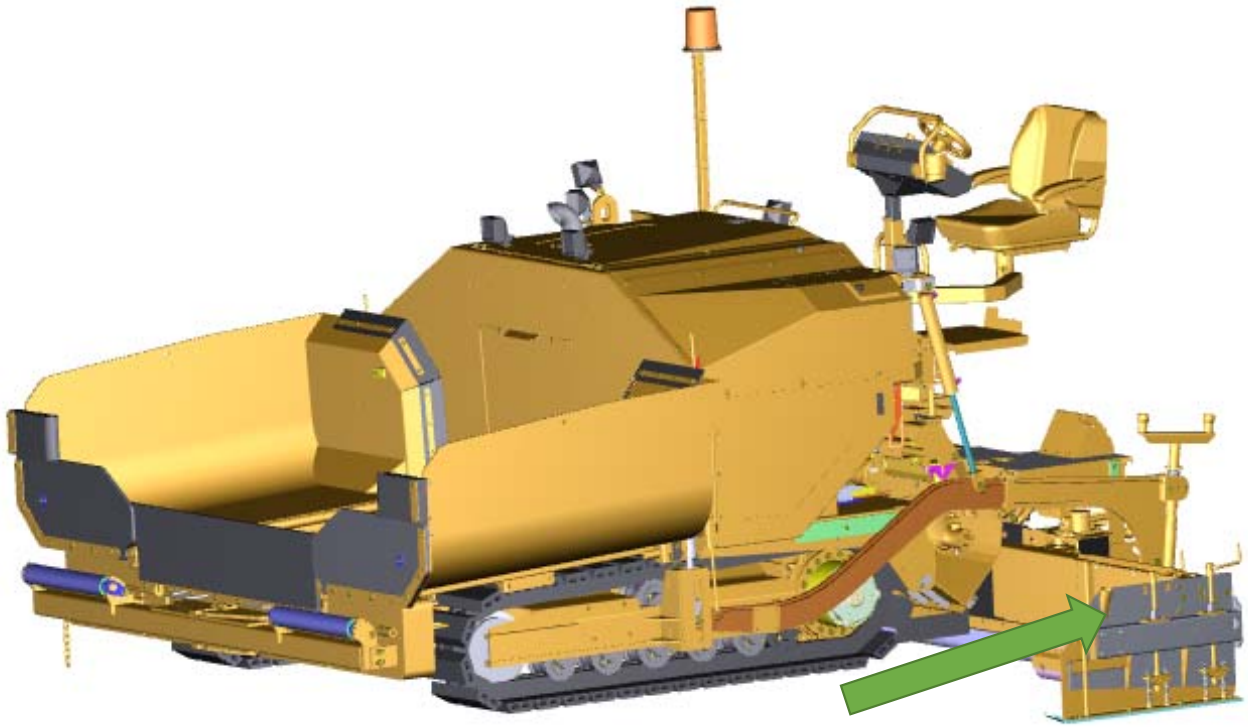
Paving Fundamentals – Cut-Off Doors

- Used to control flow of material to the screed
- Can close to reduce hand work between passes
- Allow for use of cut-off shoes for less than main screed width paving



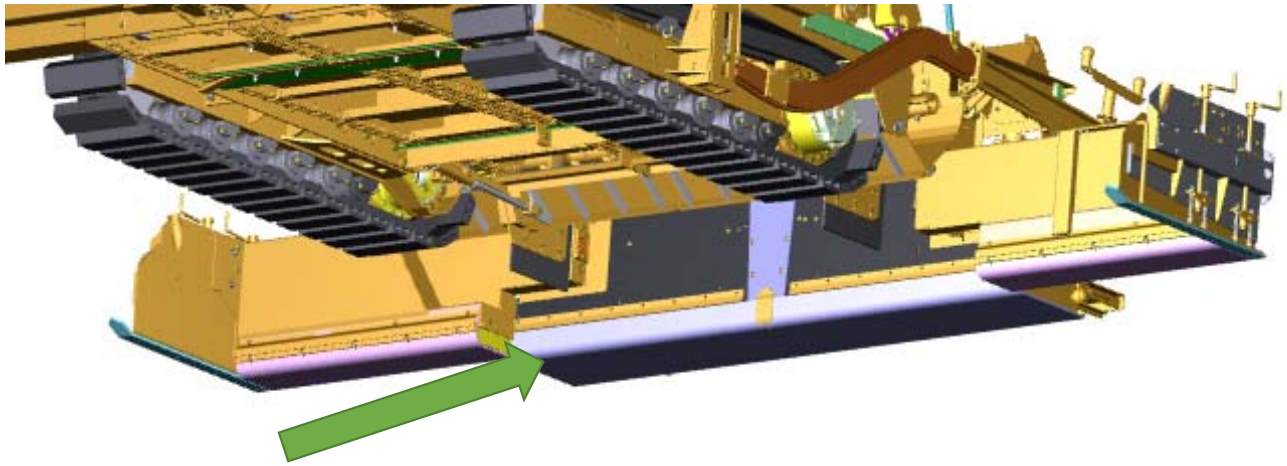
Paving Fundamentals – Sonic Sensors

- Manage head of material in front of screed
- Control auger feeder system
- Adjustable for varying widths



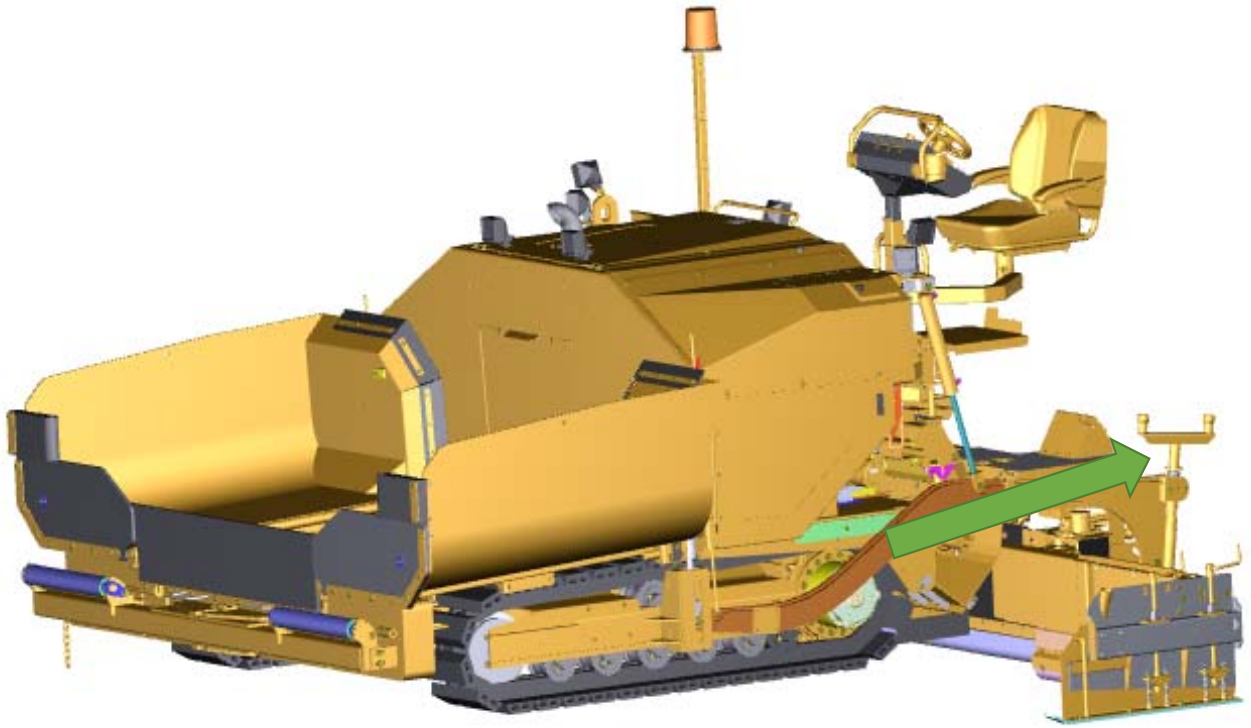
Paving Fundamentals – Screed

- Hydraulically extendable
- Self-leveling
- Smooth surface over irregular grade
- Front-mount, rear-mount, fixed or tamper bar



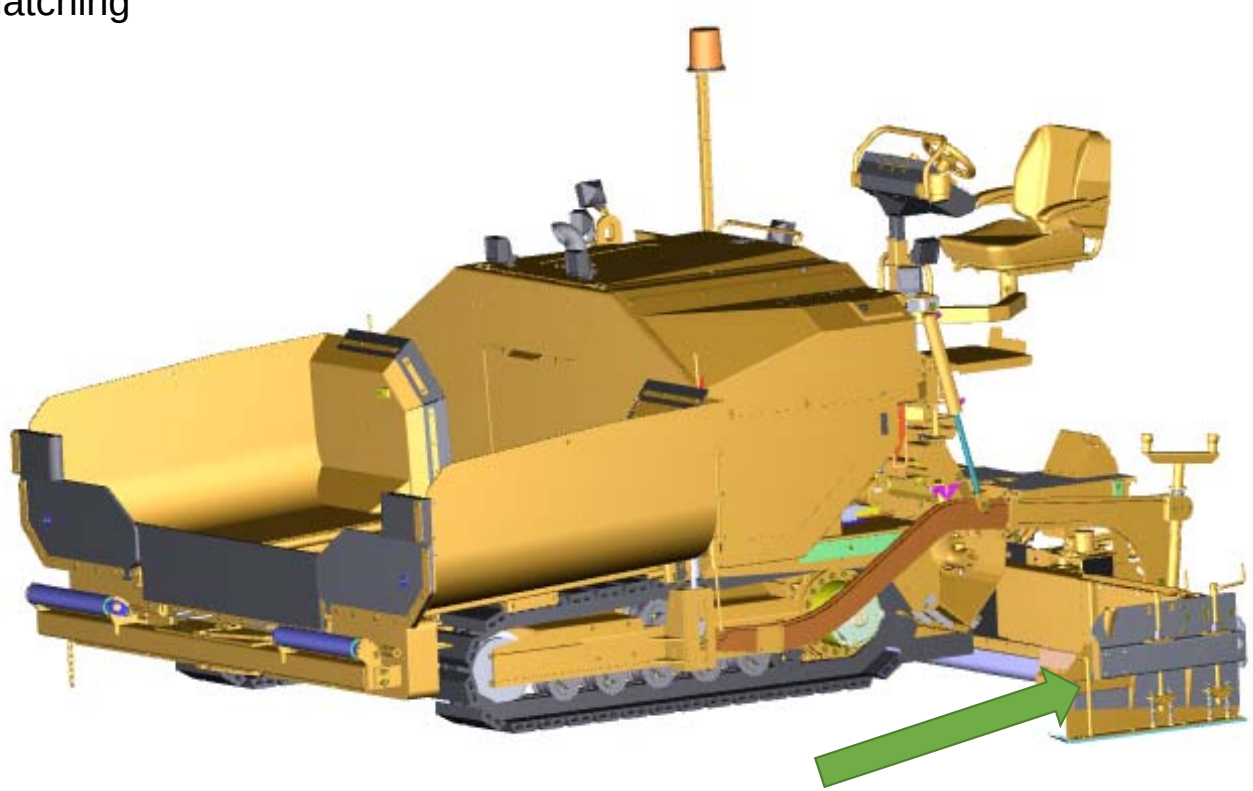
Paving Fundamentals – Adjustment Cranks

- Used to change paving depth
- Perform same function as tow points
- Clockwise or counter-clockwise



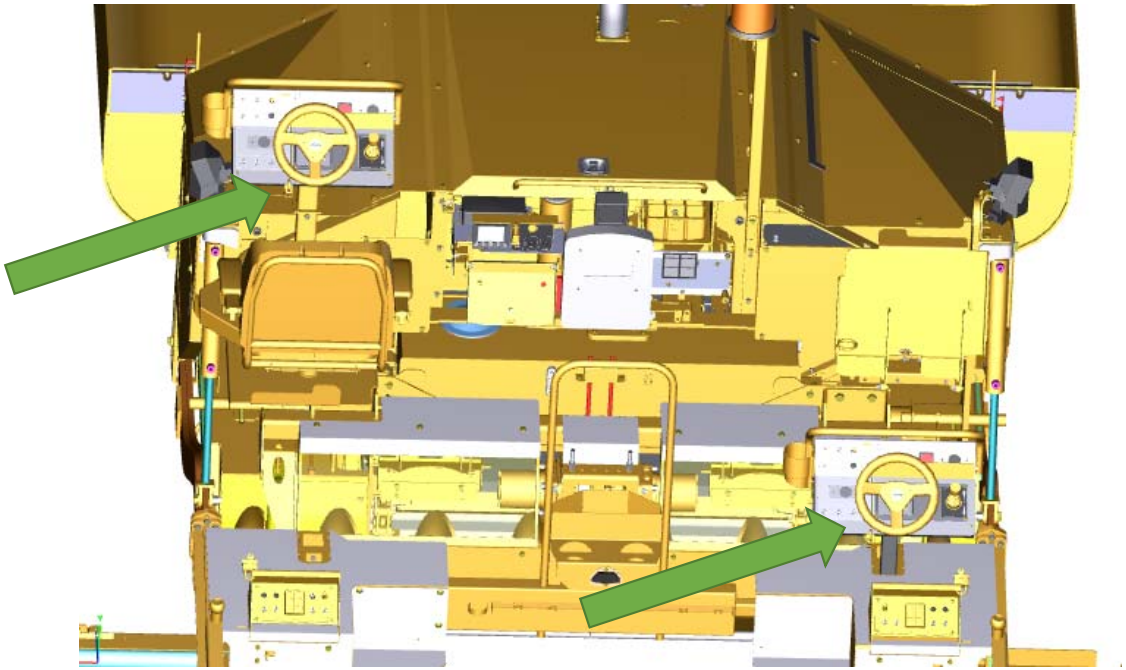
Paving Fundamentals – End Gates

- Create outer edge of paved mat
- Adjustable height and angle for joint matching
- Heated option
- Safety edge, notch wedge option



Paving Fundamentals – Operating Station

- Controls for operation, ground drive and screed functions
- Seated or standing options



Paving Fundamentals

Understanding the Paver

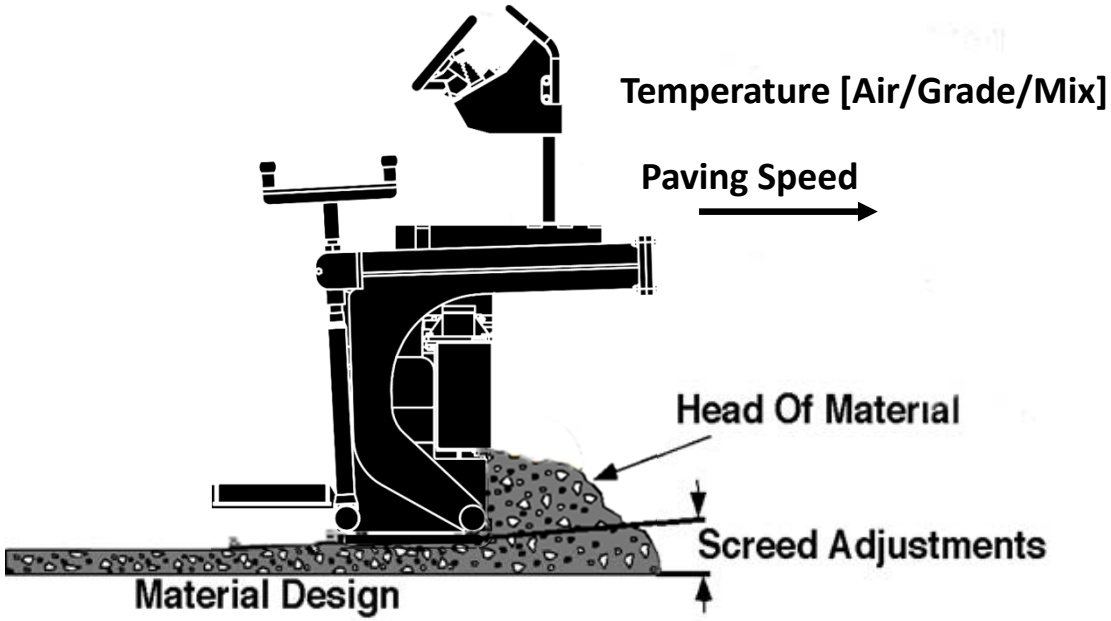
- Self-Leveling
- Screed is free to rise and fall
- Constant line of pull when set up properly
- Smooth surface over irregular grade

Paving Fundamentals

Free-Floating Screed

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

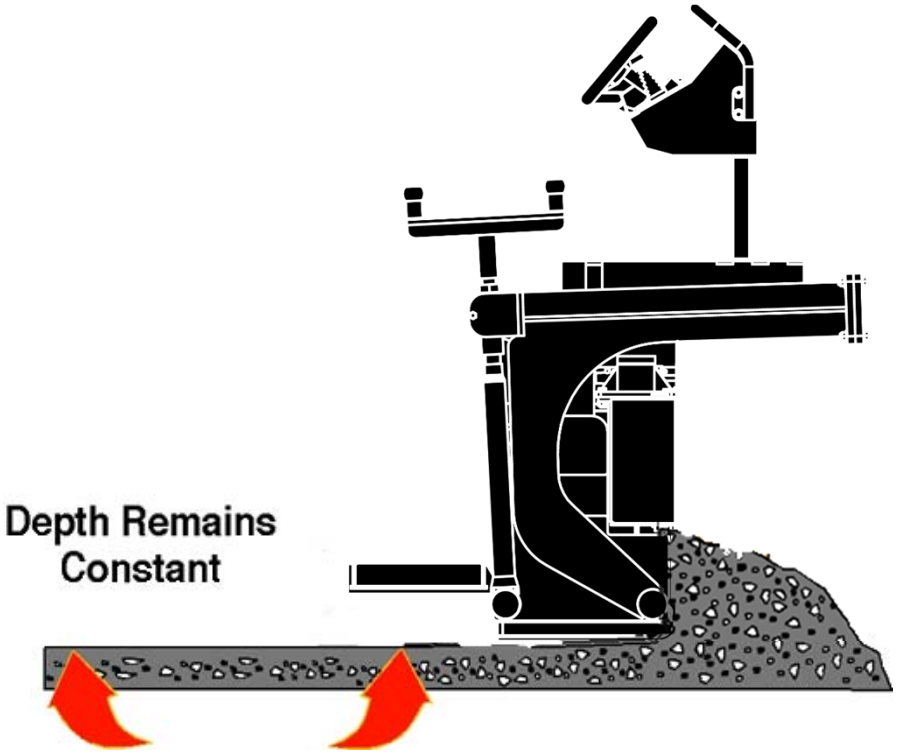
Paving Fundamentals



Factors Affecting the Screed

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

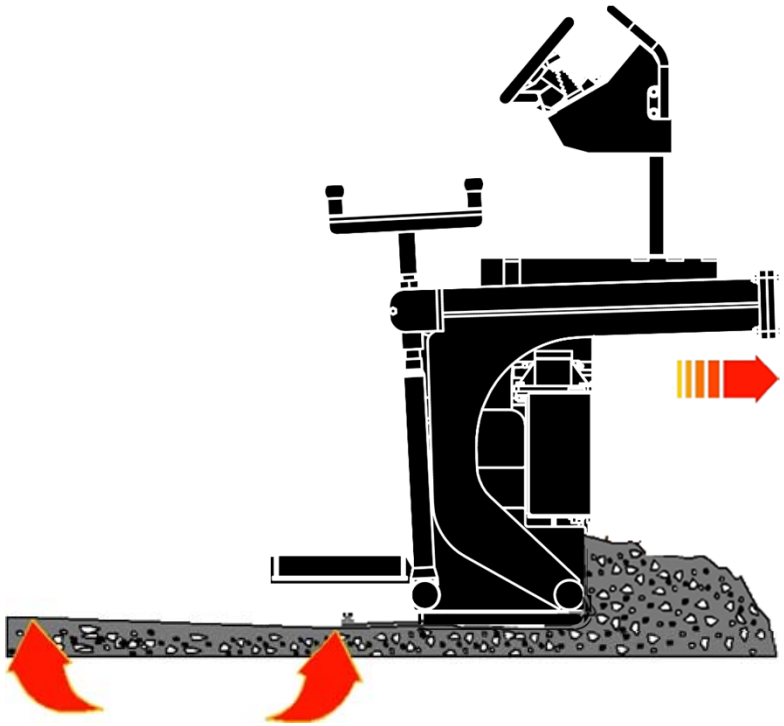
Paving Fundamentals



Constant Speed

- Shear factor is constant
- Depth remains constant

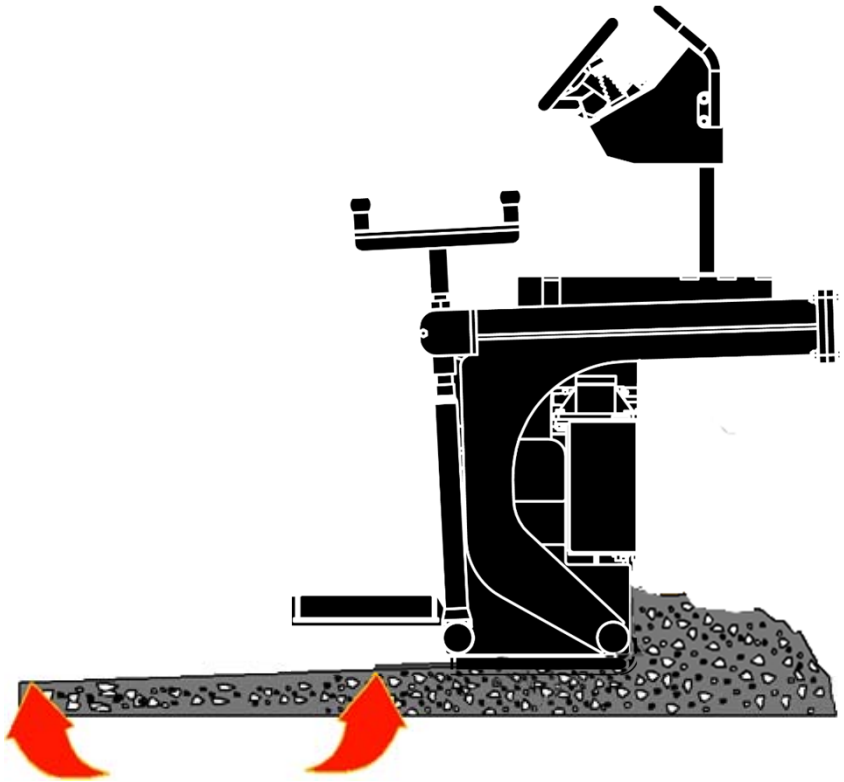
Paving Fundamentals



Increased Speed

- Shear factor decreases
- Depth decreases

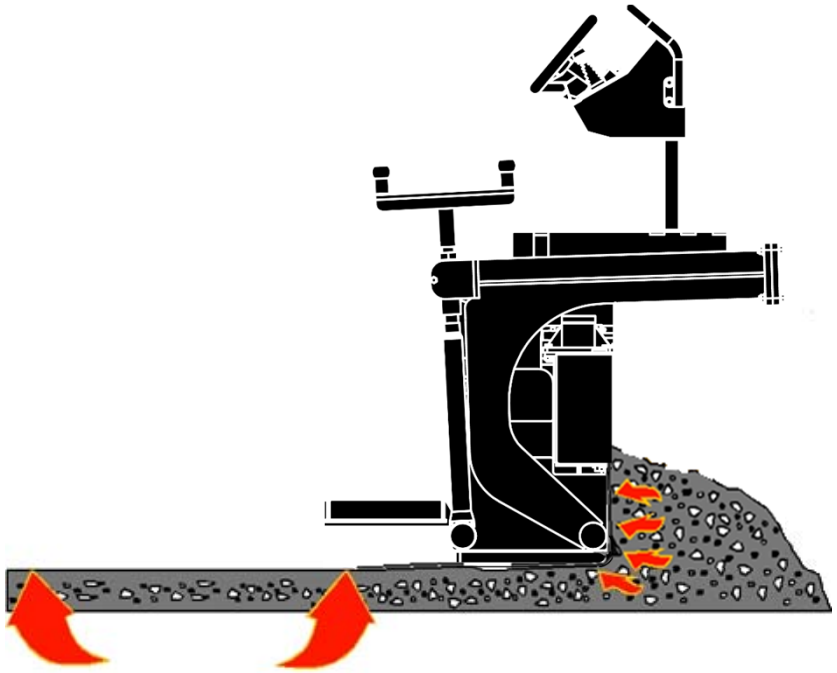
Paving Fundamentals



Decreased Speed

- Shear factor increases
- Depth increases
- Amount of depth change varies with amount of speed change
- Mix design also affects shear factor

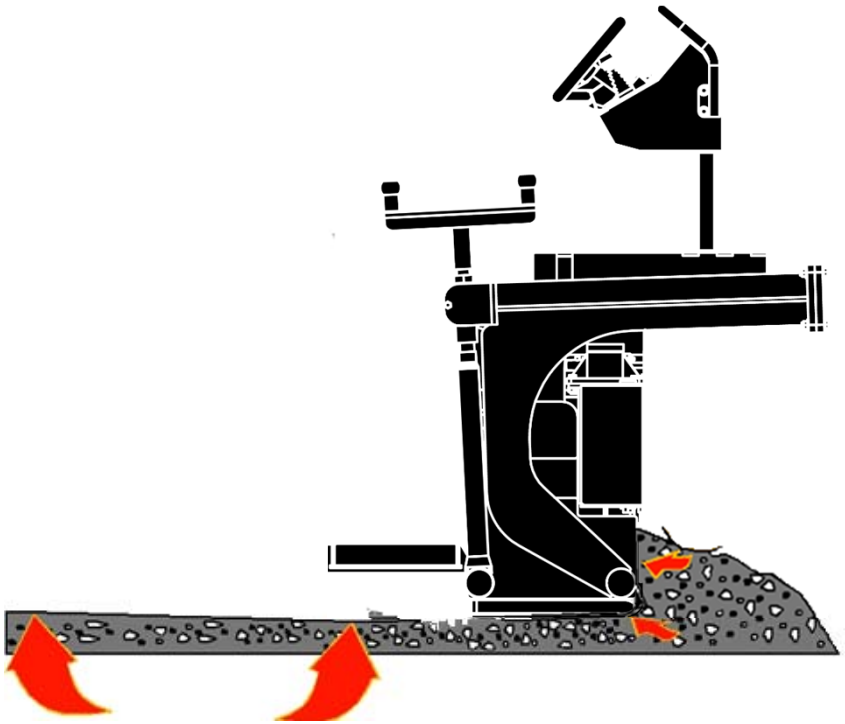
Paving Fundamentals



Correct Head of Material

- Amount of material that is placed ahead of the screed
- Constant resistance
- Constant depth

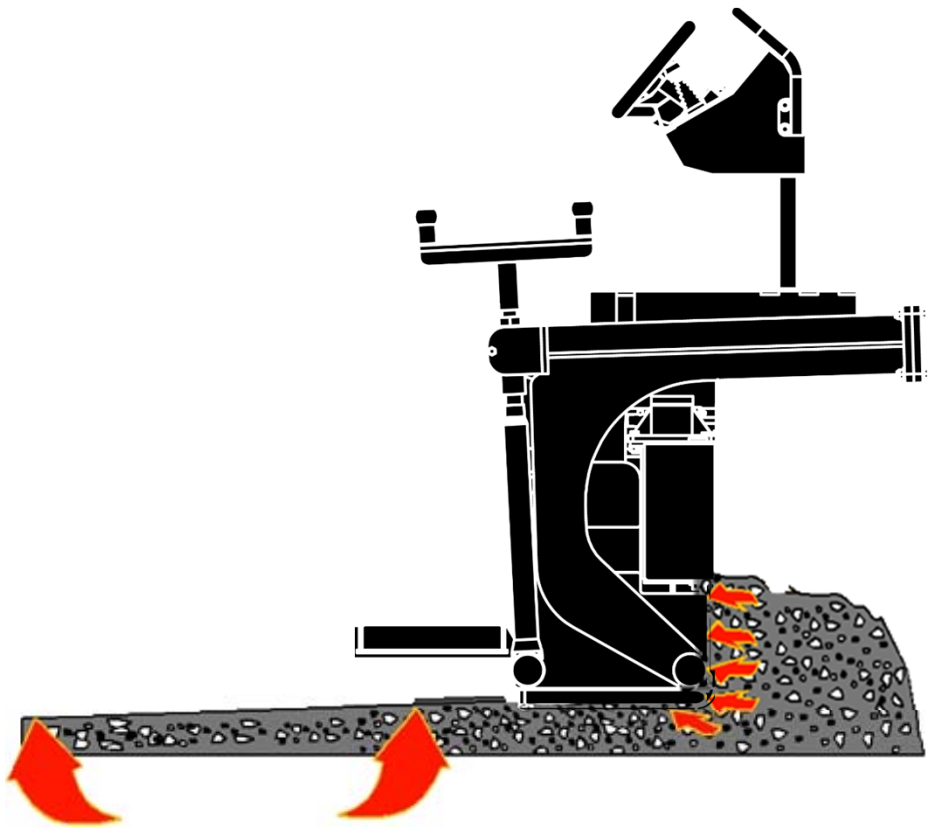
Paving Fundamentals



Head of Material Decreased

- Resistance decreased
- Depth decreases

Paving Fundamentals



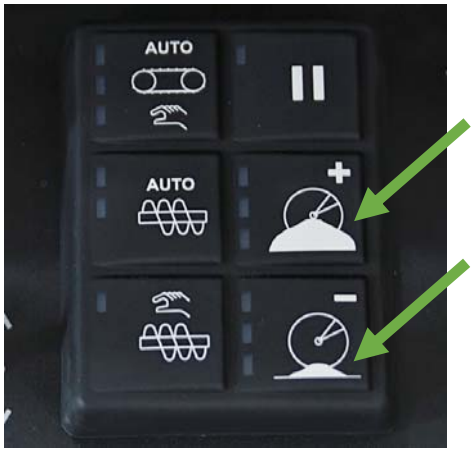
Head of Material Increased

- Resistance increased
- Depth increases

Paving Fundamentals

Controlling Head of Material

- Paving speed
- Sonic feed sensor



Paving Fundamentals

Paving Speed

- Paving speed constant
- Feeder system set to match paving speed
- Changes in paving speed may require feeder system adjustments

Paving Fundamentals

Variable Width Paving

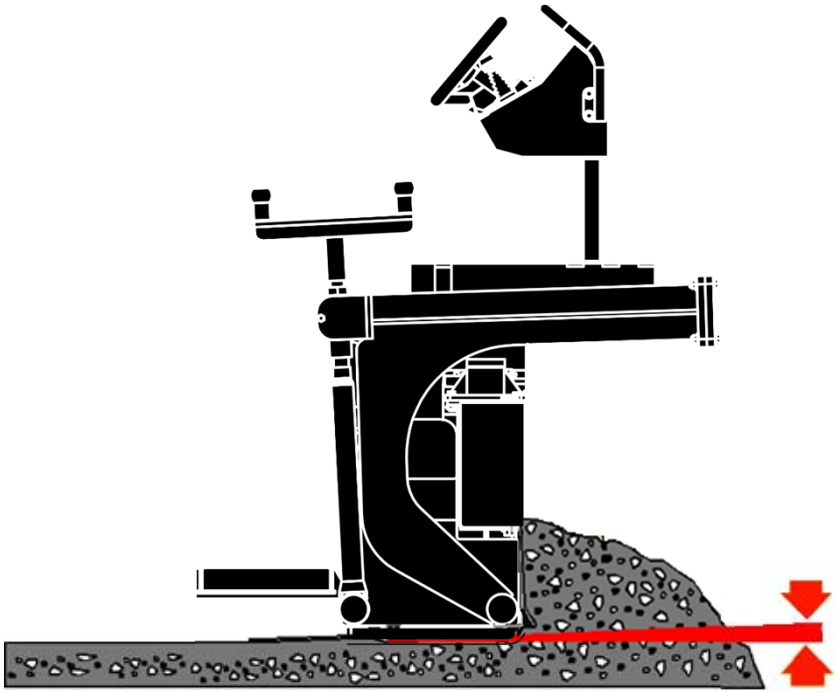
- Requires control & judgment
  - Increase head of material when extending
  - Decrease head of material when retracting
- May require manual over-ride of feeder system

Screed Adjustments

Engineered Innovation.

WEILER

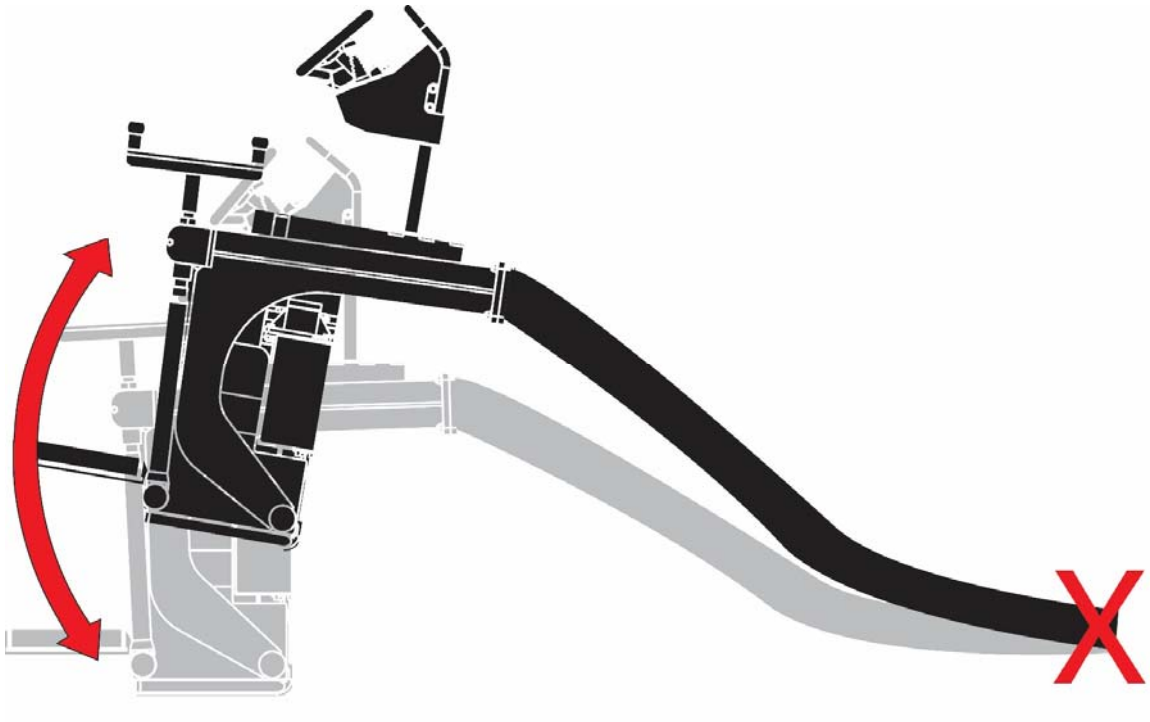
Screed Adjustments



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
- Mat thickness is controlled by angle of attack
- Angle of attack is controlled by the thickness control screws or the tow points

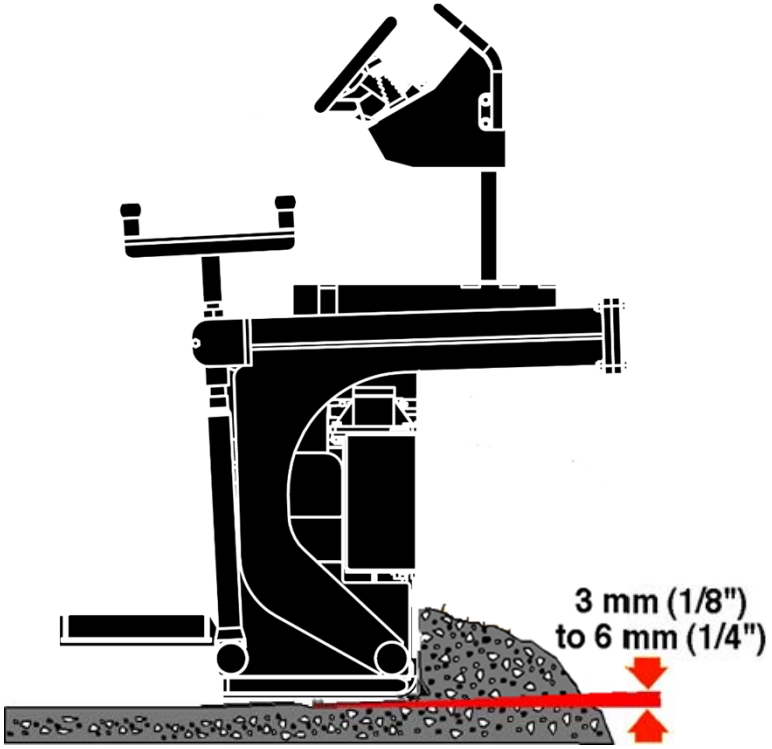
Screed Adjustments



Tow Point

- Tow point fixed
- Screed pivots around fixed tow point

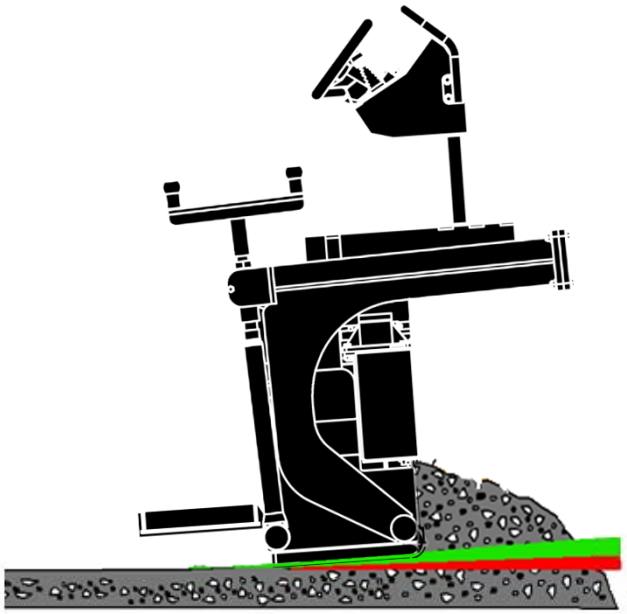
Screed Adjustments



Angle of Attack

- Normally 3 mm (1/8") to 6 mm (1/4")
- Angle too high, screed compacting with trailing edge
- Angle too low increases shear factor and wear

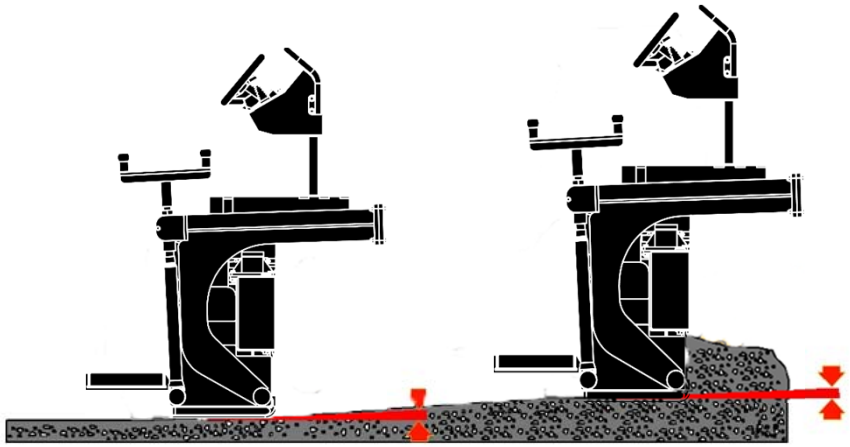
Screed Adjustments



Increase Angle of Attack

- More material passes under screed
- Screed rises to new level

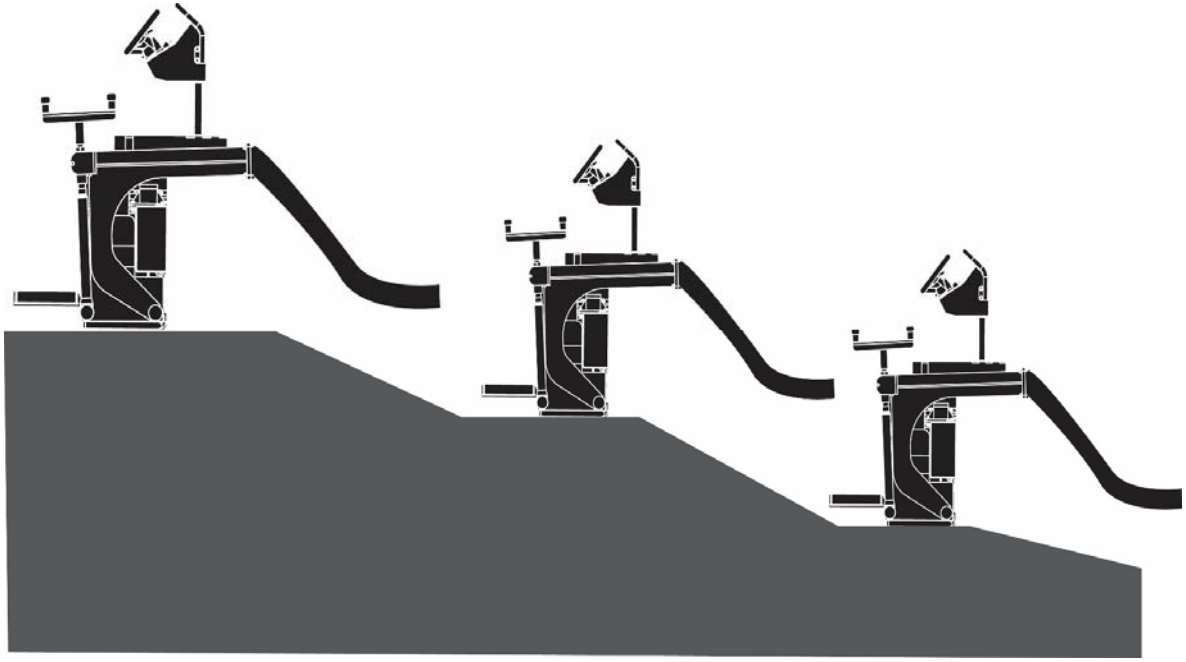
Screed Adjustments



Screed Reaches New Height

- Achieves equilibrium
- Resumes original angle of a attack

Screed Adjustments



Screed Reaction Time

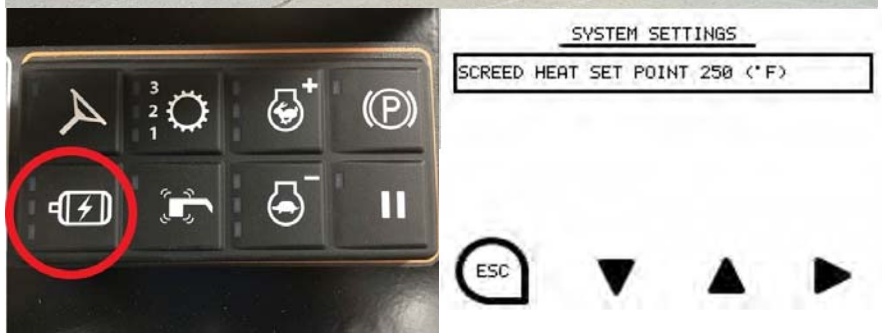
- Screed reacts to change in angle of attack over three (3) tow arm lengths

Paving by the Numbers

Engineered Innovation.

WEILER

Step 1



Heat the Screed

- Turn generator on to activate the thermostatically controlled screed heat.
- Engine speed will increase automatically to heat the screed to set screed temperature
- Adjust screed temperature through system settings screen.

Step 2

Align the Machine

- Drive paver into starting position
- Align the steering guide with the edge that is established for the mat

Step 3

Adjust Tow Point Cylinders

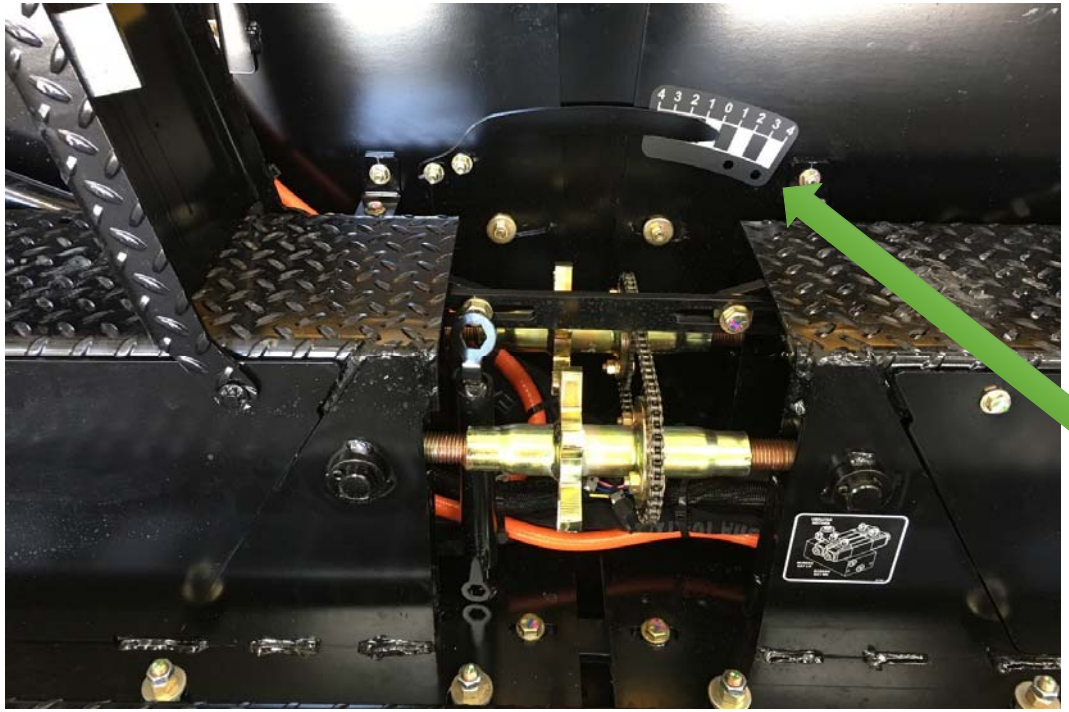
- Center the tow points to mid-stroke of the cylinders using tow point switches to allow equal travel of screed in both directions

Step 4

Set the Paving Width

- Set extensions to desired paving width

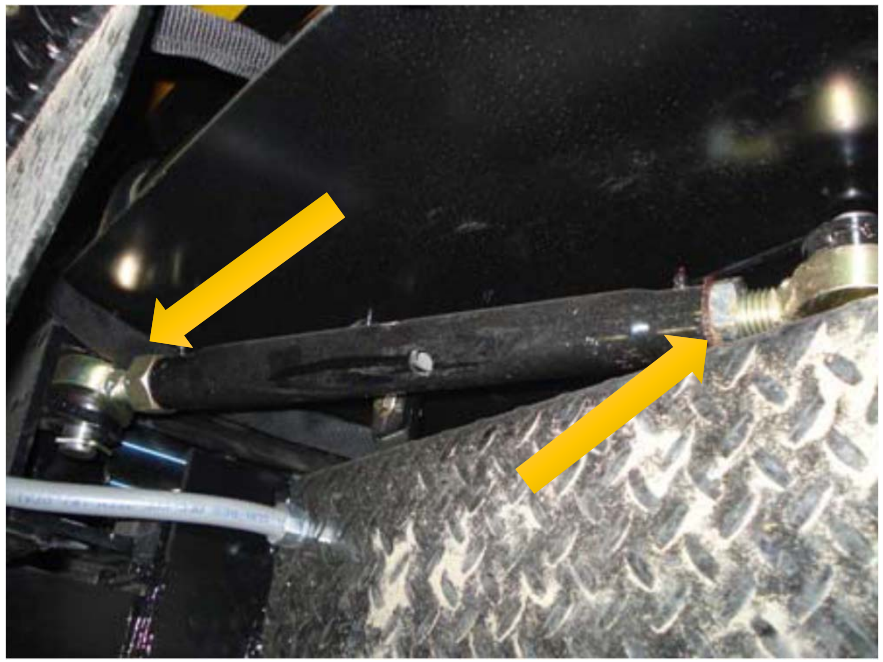
Step 5



Set Crown

- Loosen ties bars and bolts
- Use adjusting handle to turn star wheel to set crown to job specs
- Screed crown indicator provides degree of crown
- Power crown option available

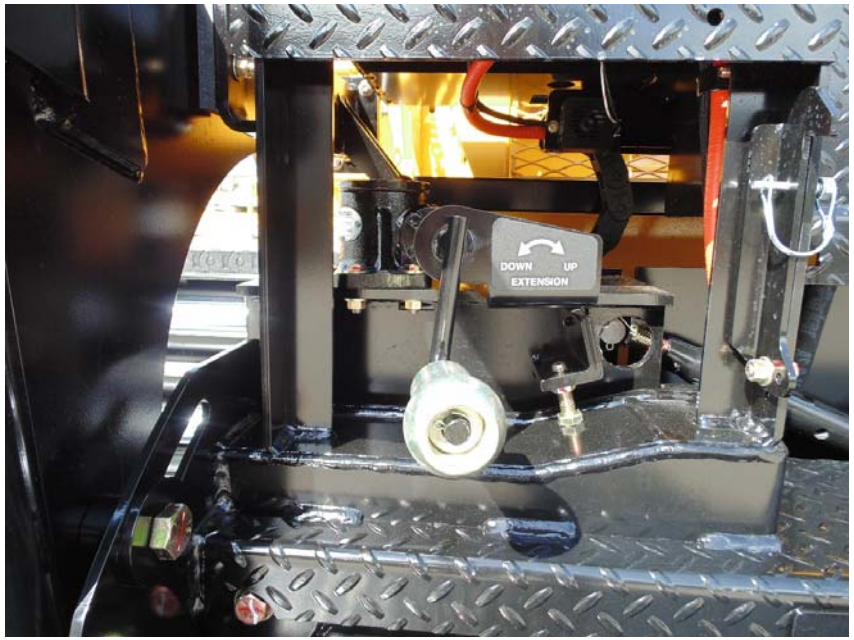
Step 6



Set Extension Slope

- Loosen jam nuts and adjust turnbuckles to set extender to job specs
- Power slope option available

Step 7



Set Extension Height

- Set the height of the extensions to match the height of the main screed
- Remove angle lock and turn shaft with adjusting handle or wrench to change angle of attack
- Electric adjustment option available

Step 8

Set the Mat Thickness

- Place wood blocks at each side of the screed directly under the screed thickness screws or build starting pad
- Blocks/pad should be 25% thicker than the desired thickness of the compacted mat
- Blocks/pad should extend from the front of the extensions to the rear of the main screed

Step 9

Lower the Screed and Remove Slack

- Lower the screed onto the blocks/starting pad
- Place screed in FLOAT position
- Slowly move the paver forward to remove any slack in the tow arm

Step 10

Null the Screed

- Turn the thickness control cranks until there is little or no resistance, the NULL position
- Turn one screw until no resistance, repeat for other side, check the first side again

Step 11

Set Height

- Turn the thickness cranks clockwise two (2) full turns after resistance is met

Step 12

Position End Gates

- Turn cranks to match end gate to grade
- Front handle is for height adjustment
- Rear handle is for angle adjustment of end gate

Step 13

Paver Control Setup

- Place ground drive range switch in LOW or MED
- Disengage parking brake
- Press engine speed button up into working throttle speed
- Ensure screed lift is in FLOAT
- Turn vibrator ON if required
- Turn on grade/slope switch if using automatic grade/slope system

Step 14

Feed Material to Paver

- Lower the hopper wings
- Dump asphalt from truck into hopper
- Open both cut-off doors
- Activate both conveyors and augers to fill the front of the screed to desired material height

Step 15

Feed Material to Paver

- Adjust the head of material control to keep the level of material in front of the screed at the desired height based on paving width

Step 16

Start Paving

- Slowly move the paver off the starting blocks/pad
- Mat will gradually increase to the full thickness
- Adjust propel handles to the desired paving speed
- Use the PAUSE mode to stop and start the paver travel and feeder system

Step 17

Check Mat Thickness

- Check thickness at several locations across the mat
- Adjust mat thickness using tow point controls or height adjustment cranks
- Do not adjust too often. Allow paver to travel two (2) to three (3) lengths of the tow arms before adjustment takes affect
- Do not turn the cranks more than one revolution when adjusting

Understanding Mat Defects

Engineered Innovation.

WEILER

Understanding Mat Defects

Causes of Mat Defects

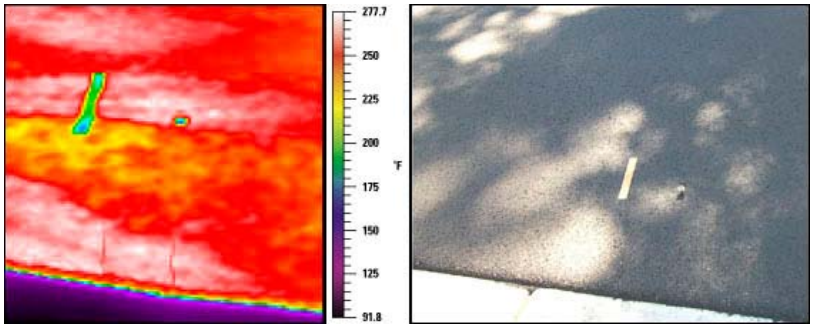
- Grade Conditions
- Truck Exchanges
- Mat Texture

Understanding Mat Defects – Grade Conditions

Grade Conditions

- Spills
- Low Spots
- High Spots
- Soft Base

Understanding Mat Defects – Grade Conditions



Grade Conditions - Spills

- High caused by mix dumped on ground
- Continuous spill out of hopper
- Pile compacted by truck or paver
- Thermal image shows cold pile spread by screed
- Uneven compaction may result in a bump

Understanding Mat Defects – Grade Conditions

Grade Conditions – Low Spots

- Cause uneven compaction
- Material thickness is greater than surrounding areas
- May not show up visually after compaction
- Will result in a dip

Understanding Mat Defects – Grade Conditions

Grade Conditions – High Spots

- Cause thin mat
- Open texture
- May see loose aggregate and fractured rock at surface
- Large temperature variations

Understanding Mat Defects – Grade Conditions

Grade Conditions – Soft Base

- Base should not show significant distortion from traffic or trucking
- Re-grade and compact if needed
- Compaction process finds soft spots
- Severe distortion possible

Understanding Mat Defects – Truck Exchanges

Truck Exchanges

- Mat defects can be caused by paver and truck interaction
- Training is key to preventing mat defects related to trucking

Understanding Mat Defects – Truck Exchanges

Aligning the Truck

- Center of the hopper
- High side of hopper on transverse slopes

Understanding Mat Defects – Truck Exchanges

Bumping the Paver

- Always stop the truck short of the paver
- Bumping paver causes screed marks that often can not be rolled out

Understanding Mat Defects – Truck Exchanges

Truck Hitch or Light Brake Pressure

- Truck hitch provides solid connection, or
- Light brake pressure to prevent roll away

Understanding Mat Defects – Truck Exchanges

Control the Dump

- Release tail gate
- Raise bed to create a surge in the hopper
- Hold bed angle
- Increase angle when more mix is needed
- Constant surge of mix is best, dribbling material causes segregation
- Driver is continuously watching operator or ground person

Understanding Mat Defects – Truck Exchanges

Truck Exchange

- Release truck as soon as bed is empty
- Continue paving as truck pulls away
- Slowly fold hopper wings to combine mix
- Lower hopper wings. Leave mix covering conveyors if waiting on trucking
- Shovel excess material to conveyors periodically to prevent cold chunks

Understanding Mat Defects – Truck Exchanges

Truck Clean-out

- Designate a clean-out area
- Do not clean-out in areas that will be paved

Understanding Mat Defects – Truck Exchanges

Truck Roll Away

- Use clear signals
- Communication
- Training
- Have a plan to clean it up

Understanding Mat Defects – Truck Exchanges

Long Stops

- Screed will settle during long stops
- Compaction may or may not clean it up

Understanding Mat Defects – Mat Texture

Mat Texture Affected by:

- Angle of attack
- Screed adjustments
- Type of mix
- Temperature of mix
- Paving speed
- Base condition

Understanding Mat Defects – Mat Texture

Angle of Attack

- Correct angle of attack creates uniform, tight texture
- Low angle of attack creates a slightly open texture
- Extension angle of attack can vary from main screed causing open/tight textures across the mat

Understanding Mat Defects – Mat Texture

Open Texture Mat

- If open texture is seen behind the main screed, the angle of attack of the extensions may need to be decreased, turn counterclockwise

Understanding Mat Defects – Mat Texture

Open Texture Mat

- If open texture is seen behind the extender, the angle of attack of the extensions may need to be increased, turn clockwise

Understanding Mat Defects – Mat Texture

Screed Adjustments

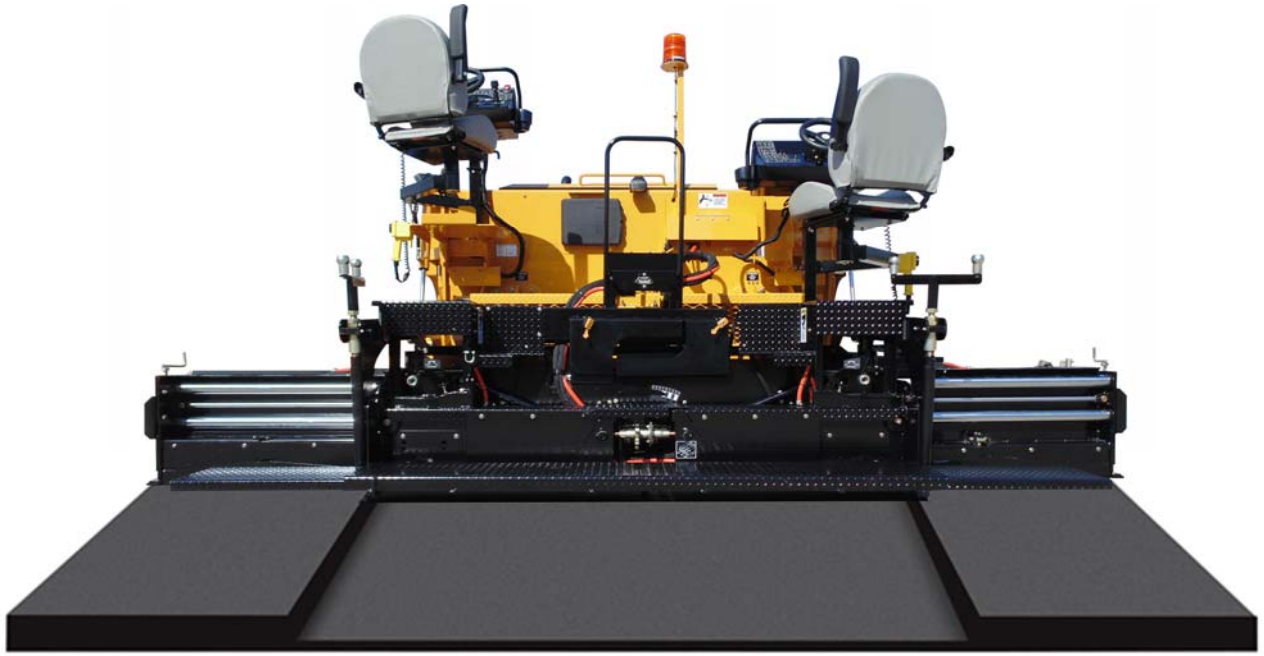
- Improper extension height can cause a line in the mat either at the edge of the main screed or the inner edge of the extension
- Adjustment of extension height done with crank handle or electric option

Understanding Mat Defects – Mat Texture

Lines in the Mat

- Due to extensions being too high or too low
- If the extension is lower than the main screed, the edge of the extension will leave a line in the mat
- Bring extension up to remove line

Understanding Mat Defects – Mat Texture



Lines in the Mat

- Due to extendsion being too high or too low
- If the extension is higher than the main screed, the edge of the main screed will leave a line in the mat
- Lower extension to remove line

Understanding Mat Defects – Mat Texture

Mix Type and Temperature

- High polymer mixes are prone to tearing, causing open spots in the mat
- Lower mix temps can also cause open spots
- Typically at end of loads or during cold season paving with long hauls
- Increase plant temperature if possible

Understanding Mat Defects – Mat Texture

Paving Speed

- High paving speed can create tearing forces
- Using vibrator can help
- Slow speed down until texture improves

Understanding Mat Defects – Mat Texture

Grade Conditions

- Spills cause high spots that cause the screed to drag cold mix
- Results in open texture
- Smoothness and density reduced

Ride Quality

Ride Quality Factors

- Paving Speed
  - Keep consistent
- Screed Settlement
  - Long stops cause mat defect
- Head of Material
  - Screed adjusts with changes
- Grade and Slope Controls
  - Proper setup and use for application

End of Day

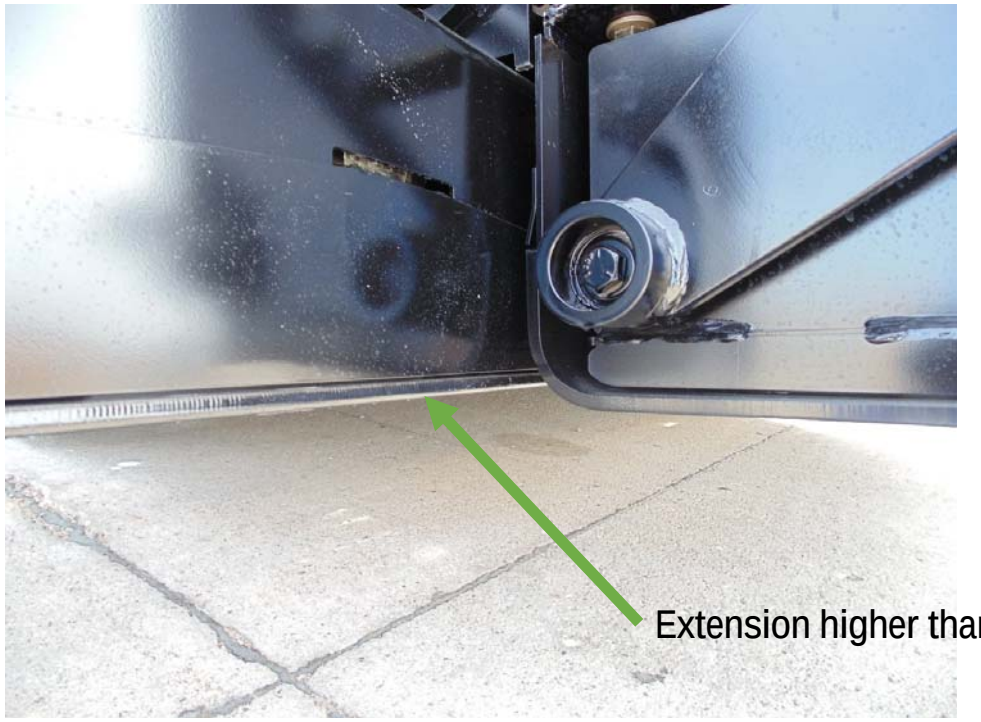
- Clean-out
  - Remove all excess asphalt from machine and screed
  - Clean and spray down conveyors and augers
  - Spray down push rollers
- Grease
  - Follow manual guidelines for daily and weekly maintenance points

Screed Adjustment Procedure

Engineered Innovation.

WEILER

Screed Adjustment Procedure



Step 1 (Screed Preparation)

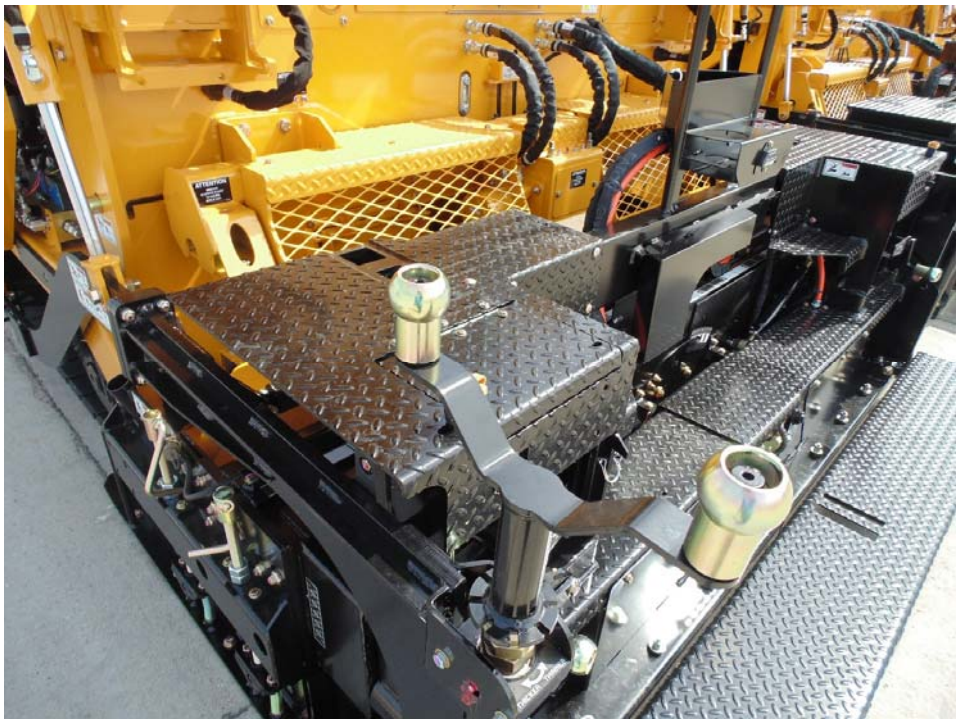
- Start engine
- Raise screed to full height with console Screed Lift switch
- Raise the trailing edge of each screed extension equal to or higher than the leading edge of the main screed by turning the screed extension height adjuster

Screed Adjustment Procedure

Step 2 (Center Tow Point Cylinders)

- Adjust left tow point cylinder up or down using console Tow Point, Left switch
- Adjust right tow point cylinder up or down using console Tow Point, Right switch (2)
- Tow point indicators will have second line from the top visible when in the center position

Screed Adjustment Procedure



Step 3 (Null Screed)

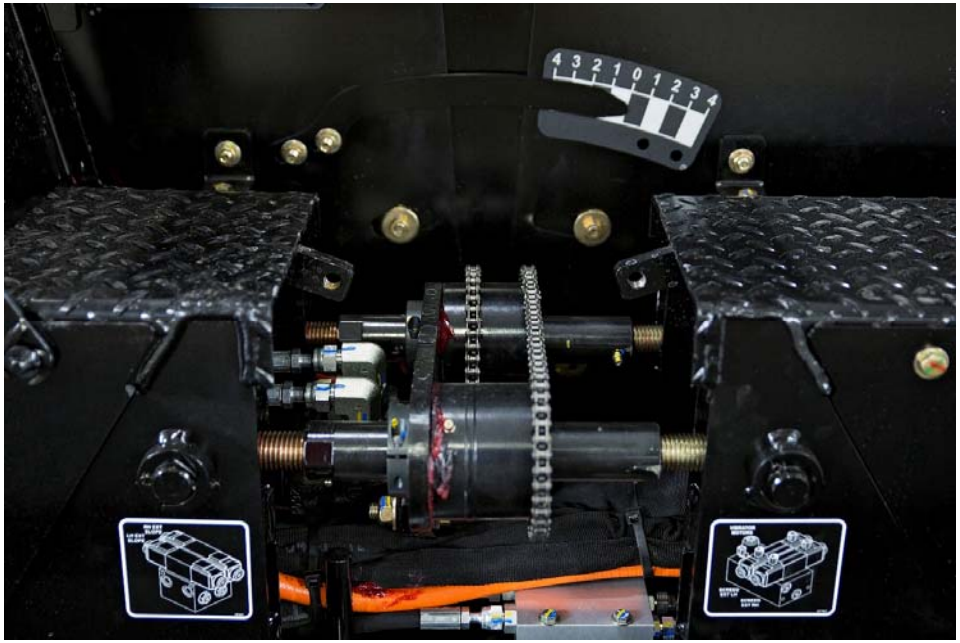
- Clear screed area of personnel.
- Lower the screed onto a flat surface with console Screed Lift switch in the “Float” position
- Turn thickness screws until left and right side thickness screws swing freely ½ turn in either direction.

Screed Adjustment Procedure

Step 4 (Secure Screed)

- Raise screed with console Screed Lift switch
- Engage screed lock out support pins on left and right side
- Lower screed onto tow arm supports with console Screed Lift switch
- Place console Screed Lift switch in center position

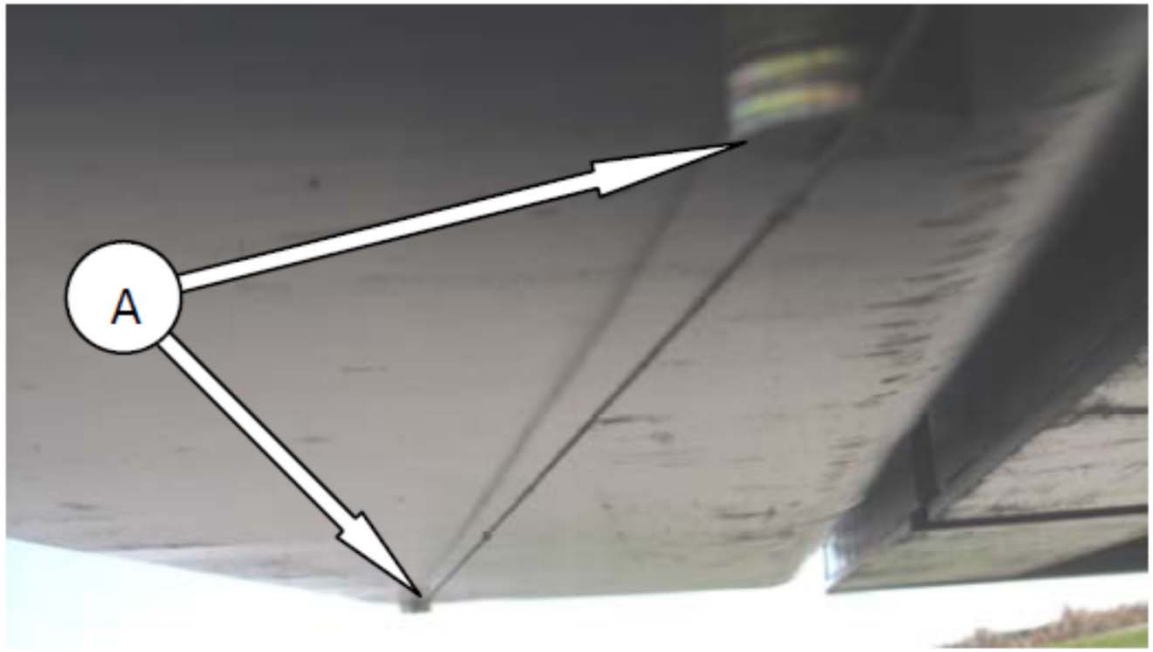
Screed Adjustment Procedure



Step 5 (Crown Adjustment)

- Place a string line under the leading edge of the main screed from left side to right side.
- Place spacers of equal thickness, under string line 3” in from each end of the screed
- Measure from the screed plate down to the string to determine if there is crown in the main screed.
- If crown exists, loosen bolt on one side of crown bar
- Remove all crown by adjusting crown turn buckle using supplied adjustment rod

Screed Adjustment Procedure



Step 6 (Main Screed Twist)

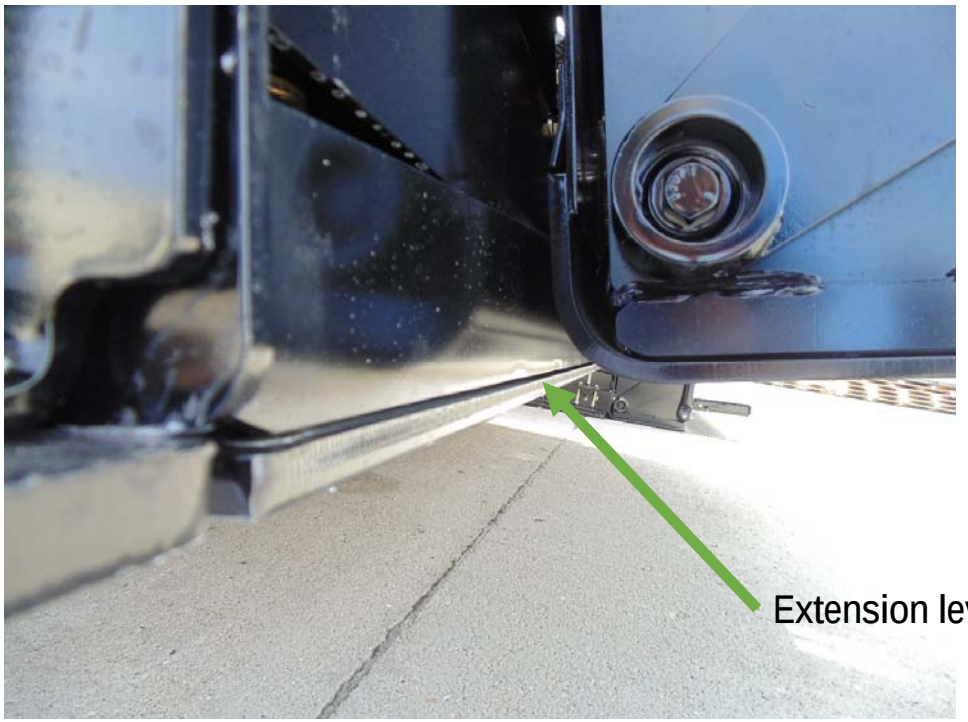
- Place a string line from the left trailing edge of main screed to the leading right edge of main screed
- Place spacers of equal thickness, under string line 3” in from each end of the screed
- Measure from screed to string line at several points, if either of the string lines shows a twist in the screed, adjust screed mount nut adjusters to remove twist
- Loosen jam nut on screed mount nut
- Turn screed mount nut adjuster clockwise to lower screed plate, counter clockwise to raise screed plate
- Place a string line from the right trailing edge of the main screed to the leading left edge of main screed
- Place spacers of equal thickness, under string line 3” in from each end of the screed
- Measure from screed to string line at several points, if either of the string lines shows a twist in the screed, adjust screed mount nut adjusters to remove twist.
- Loosen jam nut on screed mount nut
- Turn screed mount nut adjuster clockwise to lower screed plate, counter clockwise to raise screed plate
- Tighten jam nut after adjustments are made

Screed Adjustment Procedure

Step 7 (Trailing Edge Adjustment)

- Place a string line under the trailing edge of the screed from left side to right side
- Using screed mount adjusters on main screed plate mount to flatten the trailing edge of main screed plate
- Loosen jam nut on screed mount nut
- Turn screed mount nut adjuster clockwise to lower screed plate, counter clockwise to raise screed plate
- After adjustments are completed tighten jam nuts
- **NOTE:** Repeat steps 5 – 7 as necessary to get main screed flat.

Screed Adjustment Procedure



Step 8 (Match Extension Height)

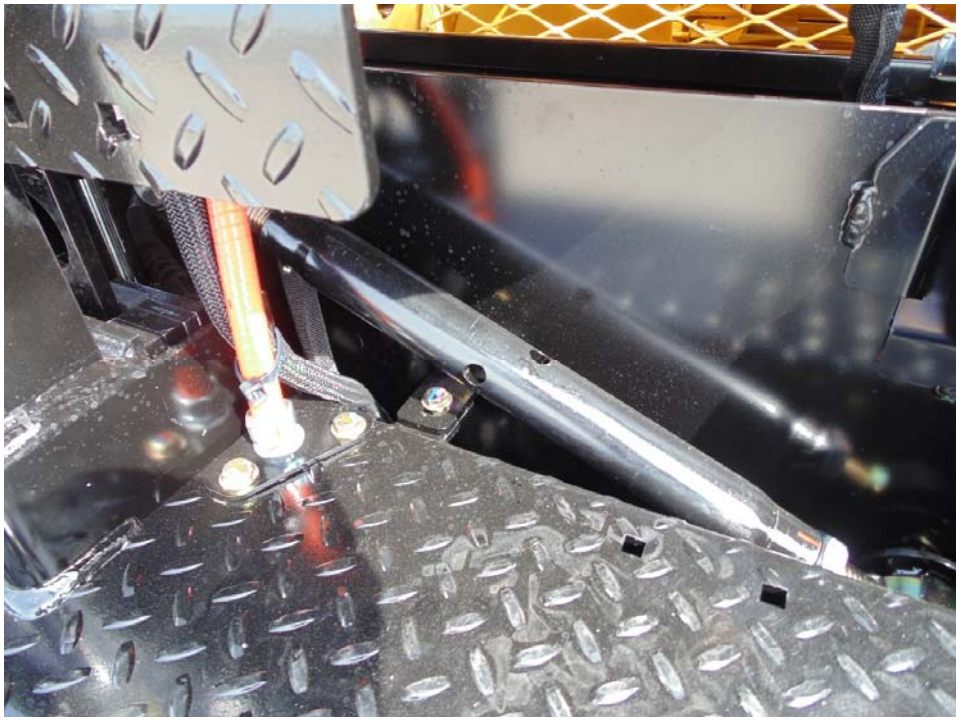
- Use the screed extension height adjuster to match the outer trailing edge of the screed extension to the bottom of the main screed
- Do this to both left and right screed extensions

Screed Adjustment Procedure

Step 9 (Level Extensions)

- Run screed extensions out completely with console Screed Extension switches
- Use the screed extension angle of attack adjuster to adjust the screed extension level with the main screed
- Turn adjustment bolt head clockwise to lower rear edge of screed extension
- Turn adjustment bolt head counter clockwise to raise trailing edge of screed
- If significant adjustment is required you may need to repeat “Step 8”

Screed Adjustment Procedure



Step 10 (Extension Slope)

- Run screed extensions in completely with console Screed Extension switches
- At the center of the main screed, run a straight edge from the trailing edge of the main screed to the leading edge of the screed extension.
- Loosen jam nuts on slope turn buckle
- Adjust extension slope turn buckle until screed extension is at the same height as the main screed.
- **NOTE:** Step 8 may need to be repeated in the Screed Extension Slope/Crown adjustment process.


WEILER