Two things we will need to know

• Asphalt paving and it’s principles and techniques.

• Asphalt compaction principles relative to our specific applications and specifications.
In the 1930s, Sheldon G. Hayes was the first to use a Barber-Greene finisher, which consisted of a tractor unit and a screed unit with a vertical tamping bar. Barber-Greene introduced the floating screed a few years later, and its design dominated the market until the patent expired in 1955.
What we’ll discuss today . . .

• Project Planning
• Understanding the Paver
• Tack coating
• Site preparation
• Leveling the screed
• Mat quality
• Screed types
• Compaction, principles and techniques to a commercial application.
Project Planning

• Role of the paver is to meet specifications for grade, texture & smoothness
Project Planning

- Asphalt tonnage
- Paving width
- Specifications
- Grade Conditions
- Mix at the plant
Project Planning

Asphalt Tonnage

- Hot plant output
- Length of haul
- Traffic conditions
- Number of trucks
- How many people in this room own their own plant???
Project Planning

Paving Width

- Screed extensions
- Auger extensions
Project Planning

Do we need screed extensions?

Do we need auger extensions?
Project Planning

Take the time to mark your paving lanes.
Project Planning

Take the time to mark your paving lanes.
Project Planning

Take the time to mark your paving lanes.
Project Planning

Which will look like the better Job?
Project Planning
Project Planning

Specifications
Sensors
Levelers
Project Planning

Specifications

- Sensors
- Levelers
Project Planning
Laser in a driveway application
Project Planning
Laser in a driveway application
Project Planning

Specifications

• Sensors
• Levelers
Project Planning

How are Grade Conditions?

• Leveling course?
• Bumps?
• Low spots?
• Transitions?
It goes in Lumpy and comes out Smooth!! Simple Not SO!!
Understanding the Paver

- Parts of the paver
- It is actually 2 machines in 1
Understanding the Paver

**Basic Paver Functions**

- Material feed
- Self-leveling screed
Understanding the Paver

**Tractor Self-Leveling**
- Screed is free to rise & fall
- Constant line of pull when set up properly
- Smooth surface over irregular grade
Tilt Hopper Pavers

- Gravity fed
- Used for small parking lots and driveways
- Less expensive, smaller but also lower production
Conveyor Pavers

- Conveyor moves material to augers
- Used for larger jobs requiring higher production
Conveyor Pavers
Tack Coating

- Proper asphalt emulsions are essential to bonding old asphalt to new asphalt.
Tack Coating

- Tack distributors can come in large or small sizes
Site Preparation

- Proper site management is important to material yield control.
- Base grade/slope and compaction will be revealed in the finished product.
Another way to get the grade right is using the paver to lay your aggregate base in proper profile.
Site Preparation
Site Preparation
Site Preparation
Site Preparation
Site Preparation
Leveling Course may required
Leveling the Screed

- Keep the paver in good condition
- Scheduled inspection & maintenance
- Follow maintenance and safety guidelines
Leveling the Screed
Leveling the Screed
Legend Screed Adjustments

- Adjust material depth using flight screws
- Flight Screw Controls “Angle Of Attack”
- Make slight adjustment- 1/4 to 1/2 turn at a time
- Allow 3 Tow Arm lengths for screed to react
Screed Extension Adjustments

- Screed Extension Adjusting Screw
- Controls “Angle Of Attack” on Extension
- Adjust To Achieve Proper Mat Quality
- Slight Adjustments – Do Not Over Adjust
Correct Extension Adjustment

No Extension lines
Will Not have to rake when adjusted Properly

Clean Edge
15 Ft. Paving Width – Seamless Mat
No Visible Seams
End Gate Adjustments

- Keep handle locked
- Grease Weekly
- Apply Grease to threads
- Exercise regularly
Extension Adjustment
Screed Leveling Adjustments
Screed Leveling Adjustments
Screed Leveling Adjustments

Equilibrium in material flow in front of the screed
Screed Leveling Adjustments

- Depth adjustment screws
Screed Leveling Adjustments

• Introduce angle of attack
• Crank until resistance is felt
Screed Adjustments

- Adjust material depth using flight screws
- Make slight adjustment- 1/4 to 1/2 turn at a time
Incorrect Extension Adjustment
Correct Extension Adjustment
Extension is adjusted correctly
Extension needs Adjustment
Correct Adjustment Means Little Handwork
Tow point check
Tow Point Check
Tow Point Check
Mat Quality Starting Pad

- Starting point for depth and grade
- Material dumped at the beginning of the pull and raked to grade
Starting Pad
Starting Pad
Starting Blocks

• Blocks are placed at each side of screed to assure equal depth across screed
Starting Blocks

• Machine pulls off the blocks as material passes under
Starting Blocks

- Machine pulls off the blocks as material passes under
Pave To The Truck!

Do Not Let Truck Bump Paver
Proper Contact Between Truck and Paver is Essential
Proper Contact Between Truck and Paver is Essential
Cutoffs Gates
Under Auger Cutoffs

- Close partially to maximize Material flow to extensions When paving 10’ or more
- Close completely for road Or driveway widening
- Always close completely before taxiing or loading machine
End Gate Adjustments

- Tilt front end up when paving up against curbs
- This will allow asphalt to flow up against curb reducing hand work
End Gate Adjustments

- Keep end gate flush & level
  When matching a joint

- Tilt front end down to sub base to get a crisp edge
End Gate Adjustments

- Drop Gate Down For A Crisp Edge
- Caution! Do Not Let Gate Ride On Sub Base!
Mat Quality
Note: It takes approx. 3-5 “Tow Arm Lengths” For Screed To fully React!
Understanding the Paver

Factors Affecting the Screed

P - Pulling Force
W - Screed Weight
R - Reaction of Asphalt
M - Resistance of Material
C - Compacting Force
- Rotation of Auger
Factors Affecting Screed

*Constant Speed*

- Shear factor is constant
- Depth remains constant
Factors Affecting Screed

*Increased Speed*

- Shear factor decreases
- Depth decreases
Factors Affecting Screed

*Decreased Speed*

- Shear factor increases
- Depth increases
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 attack
Screed Adjustments

Screed Reaction Time

- Screed reacts to change in angle of attack over 5 tow arm lengths
- 65% of change occurs in the first tow arm length
- 35% of change occurs in the last 4 tow arm lengths
Factors Affecting Screed

Correct Head of Material

- Constant resistance
- Constant depth
Factors Affecting Screed

*Head of Material Decreased*

- Resistance decreased
- Depth decreases
Factors Affecting Screed

Head of Material Increased

- Resistance increased
- Depth increases
Controlling Yield

- Do not correct based on one measurement
- Make series of measurements
- Average measurements
- Correct based on average
- Improves rideability & yield
Controlling Mat Quality

“Windmill Johnny Puts Waves In The Mat”
Leveling Course may required
Head of Material

- Sonic augers
Sonic Augers

• Make adjustments while machine is moving
• Keep Head Of Material Constant
• Keep Extension Full
Sonic Augers

• Make adjustments while machine is moving
• Keep Head Of Material Constant
• Keep Extension Full
Mat Quality
Rolling Patterns and Techniques

Easy Does It!
When To Start The Rolling Procedure

PaveCool 2.4 - Simulation Results

Input File: PaveCool
Project: LeeBoy Sales School Demo

<table>
<thead>
<tr>
<th>Project Date &amp; Time</th>
<th>Start Rolling*</th>
<th>Stop Rolling*</th>
</tr>
</thead>
<tbody>
<tr>
<td>05/18/08 2:28 PM</td>
<td>3 min. (248 °F)</td>
<td>33 min. (175 °F)</td>
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</table>

<table>
<thead>
<tr>
<th>HMA Mix Type</th>
<th>Binder Grade</th>
<th>Thickness</th>
<th>Delivery Temp.</th>
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</thead>
<tbody>
<tr>
<td>Fine/Dense Graded</td>
<td>PG 58-34</td>
<td>2.00 in.</td>
<td>275 °F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Air Temp.</th>
<th>Wind Speed</th>
<th>Sky</th>
<th>Latitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>70.0 °F</td>
<td>5 mph</td>
<td>Clear &amp; Dry</td>
<td>35.0 ° North</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Existing Surface</th>
<th>Moisture</th>
<th>State</th>
<th>Surface Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>N/A</td>
<td></td>
<td>85.0 °F</td>
</tr>
</tbody>
</table>

* Some asphalt mixtures will require compaction start and stop times different from those recommended by this program. As always, good judgment must be exercised in order to ensure a properly compacted surface. Special considerations should be made for polymers modified asphalt binders. In this case, manufacturer guidelines should supersede recommendations made by this program. Consult the help file for further details. In accordance with the Minnesota Department of Transportation, the University of Minnesota or their suppliers be liable for damages or expense arising out of the use of this program.

Simulation Time: 01/18/08 2:30 PM

![Cooling Curve Graph](image-url)
Rolling Patterns and Techniques

Joint Construction

• Keep roller off edge of previous pass 6” to 8”

• Set end gate flush with screed extension & completely flat spray end gate frequently

• Overlap previous pass 2” to 3”

• Adjust up or down with manual or electric screw

• Use Automatic Joint Matcher

• Rolled or “Cold” Joint
  Allow 1/4” per Inch for compaction
Joint Construction

- Quality joints are no accident
“Hot” Joint Construction

- Keep roller off edge of previous pass 6” to 8”
- Set end gate flush with screed extension & completely flat spray end gate frequently
- Overlap previous pass 2” to 3”
- Adjust up or down with manual or electric screw
- Use Automatic Joint Matcher
Joint Construction

1st Pass

2nd Pass
Over lap of 3”-6” is desired

This is how a 3 wheel roller compacts looks good but doesn’t get density

Material will move to the area of least resistance and not compact
Joint Construction

- Rolled or “Cold” Joint - Allow 1/4” per Inch for compaction
- Overlap cold joint by 2”
Longitudinal joint compaction

It's called building up a "Wedge"
Compaction Basics

- Rolling pattern
  - (Example) staggered 5 pass pattern

After enough coverages
- Reached density
- Now step closer to paver

4th Pass
- 5th Pass
- 2nd Pass
Proper Roller Pattern
Rolling pattern

- **Basic rolling techniques**

Always stop at an angle
ALWAYS STOP AT AN ANGLE
Quality Jobs Are No Accident
Quality Jobs Are No Accident
Quality Jobs Are No Accident
Quality Jobs Are No Accident
Quality Jobs Are No Accident
Quality Jobs Are No Accident
Quality Jobs Are No Accident
Quality Jobs Are No Accident
End with a Daily Routine

• Remove all excessive Asphalt from Paver
• Lift Hopper and Clean and Spray Components
• Run Conveyers for 3-4 minutes
• Spray Auger Chains and Conveyer Chains
• Add Fuel… if necessary
• Add Propane… if necessary
• Grease Necessary Parts
Our Ultimate Goal is Quality
Member of the following organizations:

- AED (Associated Equipment Distributor)
- Ohio Contractors Association
- Flexible Pavements of Ohio