The distributor is designed to apply a controlled and metered application of bituminous material. The unit of measurement for product “on the ground” is in gallons per square yard (gal/yd²). Distributors are typically used to apply applications from 0.05 gal/yd² up to 1.0 gal/yd².

Three important features need to be considered.

1. Desired Application Rate – gallons per square yard (gal/yd²)
2. Width of Spray – Feet
3. Forward Ground Speed – Feet Per Minute (FPM)

Items #1 and #2 are determined by the job requirements. This booklet is directed toward Item #3 – the truck speed.

### The Variables

- Engine-variable RPM
- Transmission – variable gearing selections – automatic vs manual
- Hydrostatic pump – variable displacement - married to engine RPM, affected by PTO ratio.
- Hydrostatic motor with gearbox reducer-various ratios and displacements
- Asphalt pump – variable output zero to 400 gallons per minute
- Spray bar width – variable width – 1’ to 24’
- Spray bar nozzle – different sizes available
- Tire – different sizes
- Rear axle – optional gear ratios, single speed, two speed
- Circulation system – the plumbing between the asphalt pump and spray nozzle
THE PRINCIPLE

1. The circulation and spray bar system has limits as to the maximum volume that can be pushed through the system by the pump at any given moment.

   Faster forward ground speeds or heavier application rates require higher and higher asphalt flow rates to attain target application rates.

2. The asphalt pump’s maximum rating is 400 gallons per minute and is rarely the limiting factor.

3. During “normal” operating conditions the spray bar is designed to handle about 10 to 15 gallons per minute per foot*.

   12 foot @ 10gal/ft = 120 GPM (@15gal/ft=180 GPM)
   20 foot @ 10gal/ft = 200 GPM (@15gal/ft=180 GPM)

   *This can be adjusted some by larger or smaller nozzle selection.

The Twist -
- The asphalt pump output also varies so that the application rate stays constant throughout changes in truck speed.

   \[
   \begin{align*}
   \text{↑ FPM} = & \quad \text{↑ GPM} & \text{↑SPRAY WIDTH} = & \quad \text{↑GPM} \\
   \text{↓ FPM} = & \quad \text{↓ GPM} & \text{↓SPRAY WIDTH} = & \quad \text{↓GPM}
   \end{align*}
   \]

The Requirement -
- To maintain constant application rate throughout changes in forward ground speed (FPM) and spray bar width.
THE PROBLEM

If a chassis is geared too fast, at its slowest forward ground speed, the required volume of material may be too high to be pushed through the system.

What Is A Good Truck?
Consider the following and ask questions if there is any uncertainty:

What Are You Planning To Do With It?
- Shooting light applications such as tack @ .05 gal/yd² can be done with higher speed trucks.
- Shooting heavy applications such as prime @ .60 gal/yd² requires a slower truck.

Rule Of Thumb! (FPM @ 1200 RPM)
- 100-200 FPM . . . great gearing for most applications (1.0 to 2.0 MPH).
- 200-300 FPM . . . OK for most applications (2 to 3.5 MPH).
- 300–UP FPM . . . marginal for heavy applications, may be ok for tack (3.5 MPH and up).
THE PROBLEM

• Truck chassis that are geared too ‘fast’ may not be able to go slow enough to spray the heavier applications.

• We measure the low side in feet per minute (FPM) assuming engine RPM of 1200 RPM.
  • 2-speed rear axles help by providing a slower gear without giving up highway travel speed.

The Math

\[
\frac{1200 \text{ RPM}}{1 \text{st Gear Ratio} \times \text{Rear Axle Ratio}} \times \text{Tire Factor} = \text{FPM}
\]

(varies with size)

EXAMPLES (all geared for 60+ MPH top speed with 11R22.5 tires)

• Typical 5 speed manual transmission with 2-speed rear axle:

\[
\frac{1200}{(7.52) (6.80)} \times 10.56 = 247 \text{ FPM (2.8 MPH)}
\]

• Typical “Multi-speed” transmission (eg. Fuller RT8608L) with single speed rear axle:

\[
\frac{1200}{(17.21) (4.11)} \times 10.56 = 179 \text{ FPM (2.0 MPH)}
\]

Automatic transmissions (CAUTION - automatic transmissions are fast and are best suited for tack):

• Allison 3000RDS with single speed rear axle:

\[
\frac{1200}{(3.49) (7.21)} \times 10.56 = 503 \text{ FPM (5.7 MPH)}
\]

• Allison 3500RDS with single speed rear axle:

\[
\frac{1200}{(4.59) (7.21)} \times 10.56 = 383 \text{ FPM (4.4 MPH)}
\]

Although trucks may run slower due to torque converter slippage, this is difficult to control as the world is not flat.

Eaton Fuller does provide a two speed auxiliary transmission (Fuller AT-1201) which can be ordered or installed in most chassis and provides a great solution for marginal situations.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
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<td>1000</td>
<td>47x78x104</td>
<td>84 ca</td>
<td>8,100</td>
<td>17,500</td>
<td>25,600</td>
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| 1250              | 47x78x122  
47x78x128 | 102 ca  
108 ca | 9,000          | 17,500        | 26,500         |
| 1500              | 53x88x122  
50x83x134 
47x78x146 
47x78x152 | 102 ca  
108 ca 
120 ca 
126 ca | 9,000          | 19,000        | 28,000         |
| 1750              | 59x89x122  
53x88x137 
53x88x140 
50x83x152 | 102 ca  
108 ca 
120 ca 
126 ca | 10,000         | 21,000        | 31,000         |
| 2000              | 53x88x146  
59x89x140 | 120-126 ca  
120 ca | 12,000         | 21,000        | 33,000         |
| 2250              | 59x89x158 | 108 ca*           | 12,000         | 34,000        | 46,000         |
| 2500              | 59x89x176 | 120-126 ca*       | 12-14,000      | 34,000        | 46,000         |
| 3000              | 65x90x186 | 132-138 ca*       | 16,000         | 34,000        | 50,000         |
| 3500              | 70x92x182 | 132-138 ca*       | 16,000         | 40,000        | 56,000         |
| 4000              | 70x92x212 | 152 ca*           | 18,000         | 44,000        | 62,000         |

* Tandem Axle
Important Chassis Information

- Front Crankshaft Opening
- Cab to Axle (useable)
- Wheel Base
- GVWR
- GAWR Front
- GAWR Rear
- Transmission make/model
- Rear Axle Ratio

---

Etnyre Spray Bar Nozzles

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Part No.</th>
<th>Description</th>
<th>Application Gallons Per Square Yard</th>
<th>Application (Metric) Liters Per Square Meter</th>
<th>US Flow Gallons Per Minute Per Foot</th>
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<tbody>
<tr>
<td>1</td>
<td>3353788</td>
<td>V Slot Tack Nozzle 1/8&quot; Rifle Bored</td>
<td>.05 - .20</td>
<td>.23 - 0.91</td>
<td>3.0 - 4.5</td>
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<td>3351013*</td>
<td>V Slot Tack Nozzle 1/16&quot; Coin Slot</td>
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<td>.23 - 0.91</td>
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<td>V Slot Tack Nozzle 1/8&quot; Counterbored</td>
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<td>2</td>
<td>3351008</td>
<td>S36-4 V Slot</td>
<td>.10 - .35</td>
<td>.45 - 1.58</td>
<td>4.0 to 7.5</td>
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<td>3</td>
<td>3351009</td>
<td>S36-5 V Slot</td>
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<td>.81 - 2.04</td>
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<td>4</td>
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<td>.68 - 1.81</td>
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<td>1.81 - 4.98</td>
<td>15.0 to 24.0</td>
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* Special Order
## Max Application Rate (Gal/Yd2)

<table>
<thead>
<tr>
<th>Gearing*</th>
<th>@15 Gal Per Foot of Spraybar</th>
<th>@Max Asphalt or Hyd Pump Capacity</th>
<th>Truck Speed (FPM)</th>
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<tr>
<td>20</td>
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<td>.27</td>
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<td>.91</td>
<td>1.15</td>
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<tr>
<td>90</td>
<td>.96</td>
<td>1.21</td>
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</tr>
</tbody>
</table>

*Gearing = 1st Gear Ration X Rear Axle Ratio e.g. Allison 3500 RDS with 4.59 1st gear and rear axle with 6.50 ratio provides “Gearing” of 4.59 X 6.50 = 29.8)

**Assumptions**
- 16’ bar
- Std hyd pump/motor
- 1200 engine RPM
- FEPTO drive