Sizing and Texture/Surface Separation

Dr. Yuh-Yuan Shyy

Scientist/Sr. Engineer/IT Management
Seed Science Center
Iowa State University, Ames, Iowa USA

192 Seed Science Center, email: yshyy@iastate.edu
Sizing and Texture/Surface Separation

- Size between different crops and seed quality

- Texture/surface difference of good and bad seeds
Sizing – Width and Thickness

- Width and thickness separators are commonly referred to as ‘graders’ or ‘sizers’
- The separation is similar to, but generally more accurate than, the separation performed on the screens in Air-Screen Cleaner
- Two principles apply:
  - Seeds are sized for width by using round-hole screen openings
  - Seeds are sized for thickness by using slotted screen openings
Sizing – Width Separator

- The indented round hole screen is used for width sizing, and differs from the perforated round hole screens used in air-screen cleaner in that the hole is ringed by a ‘seat’. Why?
- If the seed is narrower than the diameter of the hole, it passes through and is termed a ‘through’. Conversely, the wider seed is termed ‘over’.
- Machine fraction and total fraction:
  - Through % = 100 * Through / Total
  - Through (Size) % of Total
Sizing – Width Separator

Flat Screen Separator - Vibration

Cylindrical Screen Separator - Rotation

(c) Seed Science Center, ISU/Dr. Shyy
Sizing – Thickness Separator

Flat Screen Separator - Vibration

Cylindrical Screen Separator - Rotation

(c) Seed Science Center, ISU/Dr. Shyy
Sizing – Length Separator

- Length separators are specifically designed to effect separations of particles differing in length.
- Cylinder and disk separators are machines to separate seed on a pure length difference basis.
- Both machines effect this separation by lifting the short particles out of a mixture containing both long and short particles.
- Efficiency of length separation?
Sizing – Length Separator/Cylinder

A: Indented Cylinder
B: Short
C: Long
D: Mixture

Indent sizes are listed in 64ths of an inch and come in a wide range. For example, a cylinder designated by the number 22 has indents 22/64th inch in diameter. There are no other figures or letters used to describe the indents. Also, there is no way to determine the shape or depth of the indent from the number. Examples of cylinder sizes used for some separations are given in an accompanying table.

Receiving trough: The receiving trough is a device to receive the liftings. The configuration of the receiving trough varies from machine to machine, but its function remains the same.

(c) Seed Science Center, ISU/Dr. Shyy
Sizing – Length Separator/Disk

Figure D15. Face and cross-section of a single disc.

lifting edge of the pocket (the bottom of the pocket is cup-shaped) so they tip out of the pocket.

The letter designation "V" is always followed by a number, such as V4, V5 1/2 or V6. The number indicates the width dimension in millimeters, i.e., a pocket designated as V4 is a pocket with a round lifting edge which is 4 mm. wide. "V" pockets seldom exceed 6 millimeters in width.

Type of disc pockets: V, R, and S

(c) Seed Science Center, ISU/Dr. Shyy
Texture/Surface Separation

- Texture separator will separate mixtures of crop seed and contaminants that differ in surface texture.
- Rough-surfaced, irregular contaminants — seed or inert material — are separated from the mass of smooth surfaced, regular shaped crop seed.
- Roller or belt covered with velvet fabric can be used.
Texture/Surface Separation

- Texture separator is a finishing machine and shall be used on seed that have already been processed on air-screen cleaner or other machines.
- There are used to clean smooth seed such as clovers, alfalfa and beans that are contaminated with rough surface weed seed, immature seeds that are wrinkled or shriveled, broken, chipped or damaged seed that have irregular surfaces, and rough and irregular shaped inert material.
- Examples of some separations made on texture separator:

<table>
<thead>
<tr>
<th>Crop Seed</th>
<th>Contaminant Removed by Roll Mill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crimson Clover</td>
<td>Cutleaf Cranesbill, Dock</td>
</tr>
<tr>
<td>Alsike Clover</td>
<td>Timothy</td>
</tr>
<tr>
<td>Whole Seed</td>
<td>Broken Seed</td>
</tr>
<tr>
<td>Beans</td>
<td>Dirt Clods</td>
</tr>
<tr>
<td>Vetch</td>
<td>Wild Winter Peas</td>
</tr>
<tr>
<td>Hulled Lespedeza</td>
<td>Unhulled Lespedeza</td>
</tr>
<tr>
<td>Clovers</td>
<td>Sorrel, Peppergrass, Foxtail</td>
</tr>
<tr>
<td></td>
<td>Catchfly, Mustard, Cockle, Wild</td>
</tr>
<tr>
<td></td>
<td>Carrot</td>
</tr>
</tbody>
</table>

(c) Seed Science Center, ISU/Dr. Shyy
Questions?

(c) Seed Science Center, ISU/Dr. Shyy