Optical Sorting of Fusarium in Wheat and Durum

Terry Rempel
Intel Seed Ltd.
Background

- Raised on a grain farm west of Winnipeg
- Family purchased first grain cleaner the year I was born
- State of the art seed plant built in 1977
- Rebuilt seed plant in 2000: Doubling capacity
- Cleaning and bagging of pedigree seed and commercial grains
Rempel Seed Service Ltd.
Intel Seed Ltd.

- Intel Seed was formed by a group of four partners with over a century of combined experience in seed production, processing, research, operations and sales.
- The company provides high-quality seed cleaning equipment and food-grade grain processing to Canadian agricultural operations.
Mission

- To assist agricultural operations to supply clean, high-quality seed and grain to customers.
Intel Seed Ltd.

- Intel Seed has been the Canadian Distributor for the Meyer Optical Sorter for 2 years.
- AMVT from Houston, Texas are the North American Distributor for Meyer Corp.
- AMVT has been in North America for over 6 years.
- They have approximately 90 machines in operation throughout North America
Intel Seed Ltd.

- Meyer Corporation is based in China
- They have approximately 60% of the optical sorter market share in Asia
- R & D department alone has approximately 300 employees
History of Optical Sorting

- Satake installed the world’s first color sorter machine for commercial sorting of Michigan beans in 1932.
- **1941** First successful installation of two color sorting machine for Idaho peas.
History of Optical Sorting

- **1970's** Introduced the first line of multi-channel slide machines. Installed hundreds of machines into the peanut and rice industry.
- Developed a line of bichromatic machines making an instant impact on the Central American coffee industry.
History of Optical Sorting

- **1980's** 3 vision product line continued to find success in the peanut and coffee industry.
- **1986** Introduction of the first sorter to use infrared technology revolutionizing the pecan, almond and walnut industries.
- **1993** Introduction of the first high volume, high-resolution CCD camera, and broad slide color sorter.
History of Optical Sorting

- **1996** Introduced a length/shape sorter.
- **1999** Introduced a seed maturity laser sorter based on chlorophyll fluorescence.
- **2010** Introduction of a full color sorting machine that uses 16 million colors, high-resolution cameras and long lasting LED lighting.
Modern Optical Sorters

- Uses high resolution RGB cameras, 2048 pixel
- High speed imaging software
- Specially designed ejectors
- LED Lighting
- 60 channels/chute (60 ejectors/chute)
- NIR can be added to optical sorters
Fusarium in Wheat:
Fusarium in Wheat

- First noted to any extent in Manitoba in the early 1990’s
- Major infestation in 1993. No resistant varieties. Finished the area as a supplier of malt barley.
Typical Seed Cleaning Operations

- Scalper (removal of large material, i.e. straw, un-harvested heads, stones, etc.)
- Indent separators (length separation)
- Seed graders (rotary screens for width separation)
- Air/screen machine (air for dust and light material separation, lift or blow light material from grain stream); varied size screens for scalp/sift separation (length & width separation)
Typical Seed Cleaning Operations

- Gravity table (specific density separation).
- This process can be fairly efficient in the removal of heavily infected fusarium seeds which are the result of an early infection of the affected plant.
- large loss of good seed with this method.
Fusarium Removal

- Large fusarium infected seeds are more difficult to remove with conventional seed cleaning equipment as they may have the same size, shape and density as healthy seeds, but are visibly infected.
- With conventional cleaning equipment, you generally lose more good material just trying to “float out” the infected seed.
Optical Sorting

- Optical sorter removes product based on visual differences. Cameras can detect small defects as small as 0.04mm² (2048 pixels/camera).
- Precision machines such as gravity tables and optical sorters work best at fine detail removal.
- The more defects you remove prior to this machine, the better and faster it operates.
Flow Through of Optical Sorter
Intel Optical Sorter

- Real-time Machine Status Monitor
- RGB CCD Sensor (2048 pixels)
- Novel Dedicated Special Ejection System
- New Generation FPGA Processor
- Optional NIR Technology
- Large Touch Screen Panel
Intel Optical Sorter
Fusarium Infected Winter Wheat
First Reject
Sorted Clean
Final Reject
# Sample Report

**Sample #: 196005641**  
**Sample Date: 11-Sep-2014**  
**Station: DUNDONALD**  
**Destination: Head Office**

- **Sample Type:** Off Farm Production  
- **Program Type:** General  
- **Grain:** WHEAT CWRW (NBF)  
- **Variety:** Flourish  
- **Customer:**  
- **CWB Permit #:**  
- **Sample Tonnes:** 100.000  
- **Bin #:**  
- **Location Filing #:**  
- **Sample Status:** Complete  
- **Test Specifications:** Grade, Moisture, Pro, Fuz count, Vomi

## Station

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<thead>
<tr>
<th>Grade</th>
<th>CW FEED</th>
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<tbody>
<tr>
<td>Remarks</td>
<td>Before Color Sorting</td>
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<td>Initials</td>
<td>RB</td>
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## QA Inspector

<table>
<thead>
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<th>Grade</th>
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<tr>
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<tr>
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<tr>
<td>MOISTURE</td>
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<td>FUSARIUM DAMAGE</td>
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<tr>
<td>VOMITOXIN</td>
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# Sample Report

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**Destination:** Head Office

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| Program Type: | General |
| Grain: | WHEAT CWRW (NBF) |
| Variety: |  |
| Customer: |  |
| CWB Permit #: |  |
| Sample Tonnes: | 100.000 |
| Bin #: |  |
| Location Filing #: |  |
| Sample Status: | Complete |

**Test Specifications:**
Grade, Moisture, Pro, Fuz Count, Vomi

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First Pass on Yellow Mustard
Sorting Hemp
1st Sort Clean
Hemp Reject
Technical Data

• 3 models to choose from.

• CF3:
  • 180 Channels
  • Capacity (t/hr): 2 - 8
  • Air Consumption: 64 CFM @ 90-120 PSI
CF5

- 300 Channels
- Capacity (lbs/hr): 3 - 15
- Air Consumption: 106 CFM @ 90 – 120 PSI
CF7

- 420 Channels
- Capacity (lbs/hr): 4 - 21
- Air Consumption: 150 CFM @ 90 – 120 PSI
NIR Option

- Optional infrared sorting can be incorporated to further reduce the number of foreign materials.
For More Information

- Visit our website: www.intelseed.ca

- Contact: Terry Rempel
terry@intelseed.ca
204.981.7637
Thank You

Questions?