Using Auto Steer to Manage Research

Brian Kerr
John Deere 5210 - 53Hp 2WD - Open Station
John Deere 5210 - 53Hp 2WD - Open Station

Generally easier to mount and protect the system and electronics in an enclosed tractor
Display - Trimble FMX Centre Point RTX

- Touch screen display, supports and connects all components
- Point of control
Display - Trimble FMX
Centre Point RTX

- Full Sun visibility can be an issue
- Easy to install a hood for shade
Wheel Angle Sensor

- Vulnerable to damage
- Exposed wiring harness
- Can limit the future uses of the tractor
Nav controller

- Mounts solid to frame
- Somewhat protected from environment
- Install and forget
Antennae

- Weather Proof
- Vulnerable to damage
- Magnetic Mount for easy removal
Cellular Modem

- Contains SIM card
- Somewhat vulnerable to weather
- Period access required
- Placement of modem and routing of power and control cables can be an issue
Hydraulic Auto-Steer Controls

► No place to mount on an open station tractor
► Some creative plumbing may be required
Control Box - Planter, Sprayer etc

- Simple and Robust
- Controls the trip on the planter
- Allows operator to concentrate on seed envelopes
- Reduces operator fatigue
Green Seeker - Control Box

- Interface between Display and Sensors
Green Seeker Sensors

Needs versatility of mounting options
3 point hitch mount for early growth stages
Green Seeker Sensors

Needs versatility of mounting options
3 point hitch mount for early growth stages
Side mount overtop of tall crops - corn
Auto Steer Uses

Planting Straight lines (straight alleyways)
Auto Steer Uses

Planting Straight lines

Improved agronomics with accurate row widths and populations
Auto Steer Uses

Planting Straight lines
Reduce trial layout time and effort
Auto Steer Uses

Planting Straight lines
Reduce trial layout time and effort

Set an AB line, measure distances, set a 90 degree line for alleyways and save for future use or reference.
<table>
<thead>
<tr>
<th>Swaths</th>
<th>Line Features</th>
<th>FreeForm</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-S 2016 - Straight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-W 2016 - Straight (Current)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOSAIC rows 2015 - Straight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOSAIC alley 2015 offset - Straight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOLF PLOT - Straight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOLF ALLEY - Straight</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Import**
- **Delete**

- **A+ Heading**: 69.73°
- **Boundaries**: Enabled
- **Access Paths**

- **Shift**
- **Rename**
- **Export**

- **New Straight**
- **Load**

- **Close**
Auto Steer Uses

- Planting Straight lines
- Reduce trial layout time and effort
- Trial site maintenance
Auto Steer Uses

Planting Straight lines
Reduce trial layout time and effort
Trial site maintenance
  Spraying - perfect overlap
  Rototilling alleyways
  Laying plastic mulch and drip irrigation lines
  Hilling potatoes
  Planting, Mowing or trimming alleyways within trials
  Side dressing materials in fertility trials
In Row cultivation
Efficacy Trial Applications

Operator only has to concentrate on the map and the control panel.

Reduction of errors
NDVI Readings

Setup an exclusion file which is used to eliminate values in the alleyways and outside the plot area, then conduct passes up and down trial location.
Pitfalls

- Choose your equipment provider carefully
- Their knowledge of equipment, the program and setup is essential to getting started right
Pitfalls and other considerations

- Choose your equipment provider carefully
- Their knowledge of equipment, the program and setup is essential to getting started right and getting the right advice to troubleshoot in the field
- Plots and equipment need a good view of the sky to maintain signal
- Steep learning curve. Be prepared to devote some time to learning and training staff to use the system
- Protect the system against damage in transit on trailers
Costs

- Basic system - 1.5” pass to pass accuracy with Display, Angle Sensor, Modem, Antennae, Nav Controller, autosteer controller and wiring
  $25,000 CDN (2014)

- Green Seeker Controller and Sensors
  $10,000 CDN (2014)

- Upgraded Unlocks and Subscription system in 2016 resulting in faster signal acquisition, buffering to improve against signal loss for 5 minutes, 1.5 cm accuracy pass to pass, and annual subscription cost dropped to $600/yr
  $3,200 CDN (2016)
Costs

- Prepackaged control units for planters - Basic $1000 +
- Brush upon Ohms Law and get out your soldering gun <$100
Costs

Only 5 more lease payments to go!!!!
What is coming down the line?

- Sensors to count plants
- Plant ID - Sensors to do Weed ratings?
- Sensors to calculate leaf area index
- Nutrient Deficiencies
- ??????
Whatever you do,

Have Fun!