North Dakota Asphalt Conference

Smoothride & Road Resurfacing Scanner

Jason Pearson – RDO Integrated Controls

Mark Jones – Topcon Positioning Systems

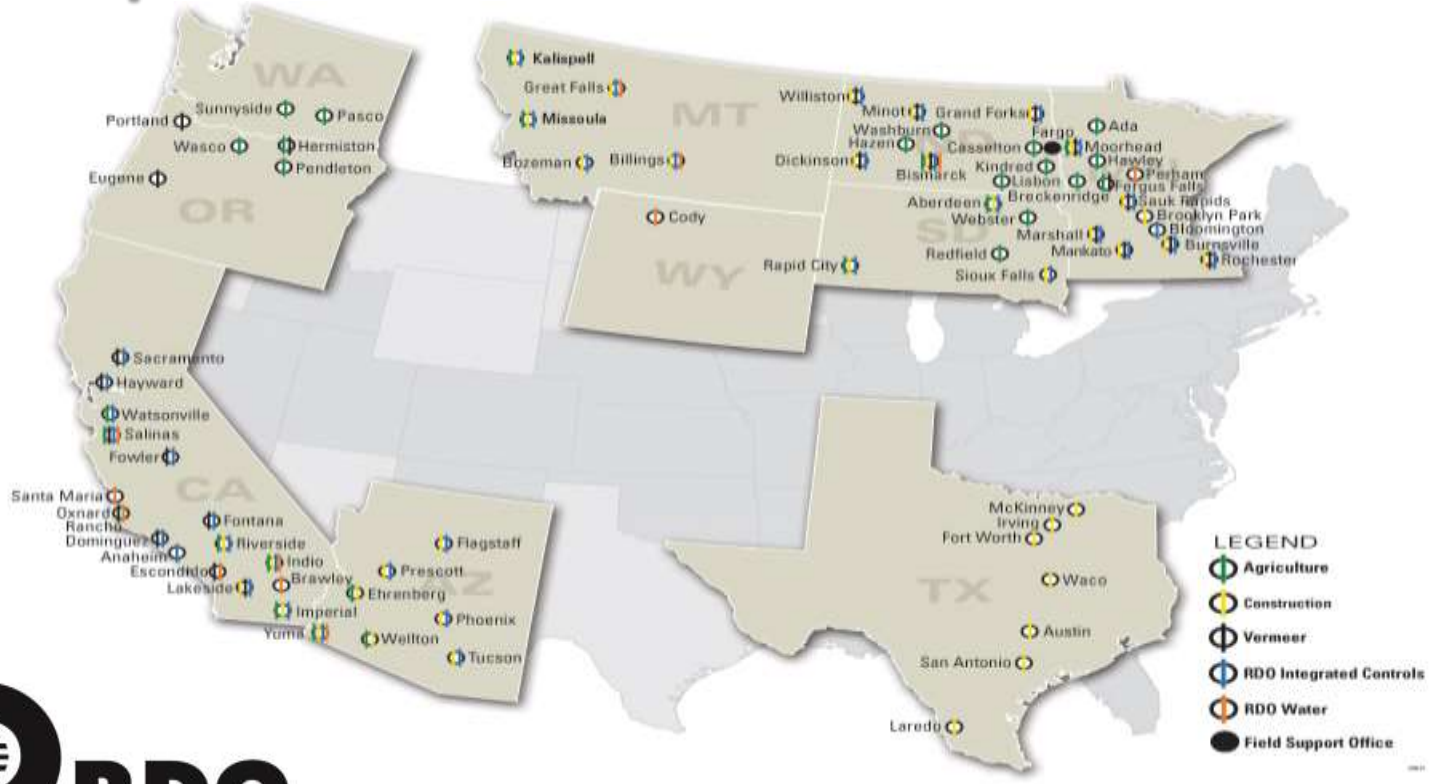
RDO INTEGRATED CONTROLS

TOPCON

RDO® EQUIPMENT CO.

- Established in 1968.
- Family owned business, based in Fargo, ND.
- 73 stores in 9 states.
- Largest John Deere dealer in North America.
- Vermeer environmental dealer in CA, OR, ND, and MN.
- International John Deere dealer: (110 stores total)
  - Russia, Ukraine & Australia

US Operations



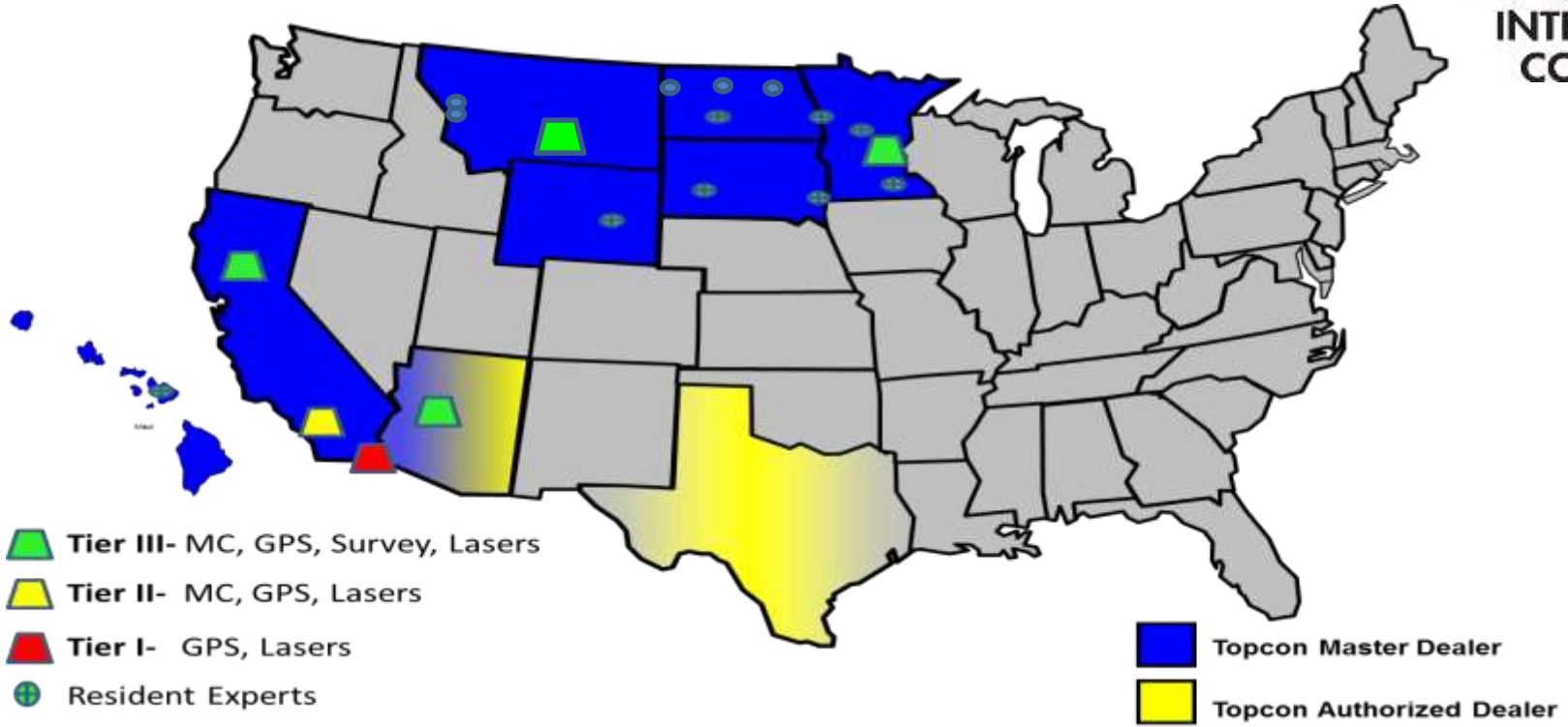
RDO® EQUIPMENT CO.

RDO INTEGRATED CONTROLS

Division of RDO Equipment Co.

- **Established in 2009 with 3 employees in Billings, Montana**
- **Carlson dealer for Mining (United States & Canada)**
- **Carlson dealer for Landfills in 19 states and 4 provinces.**
- **Sensefly UAV distributor since 2013.**
- **Topcon Construction & Survey Master Dealer in 8 states.**
- **Sokkia Survey Master Dealer in 8 states.**
- **Topcon/Sokkia Monitoring Dealer in 13 states.**
- **2013: Established Technology Support Center; world-class customer support**
- **Today: Over 450 years of Machine Control/ Survey experience amongst 97 employees**

RDOIC Service Centers



Machine Control & Automation

GPS Products

Robotic, Auto-Targeting, Motorized, Reflectorless Total Stations

Most Complete Product Portfolio in the Industry

Laser Products

Digital Levels

Data Collection & Software

Wireless, Reflectorless, WindowsCE, Construction & Surveying Grade Total Stations

Digital Theodolites

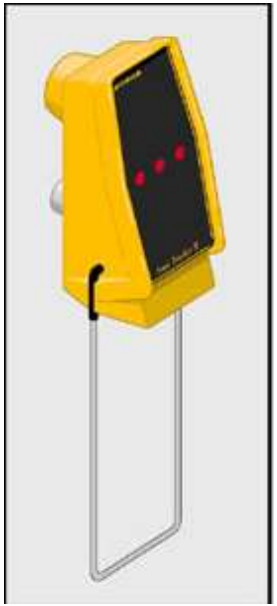
Automatic Levels

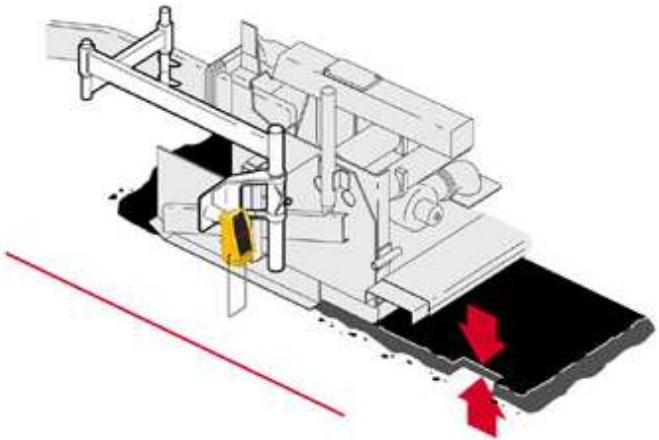
GIS

Tierra

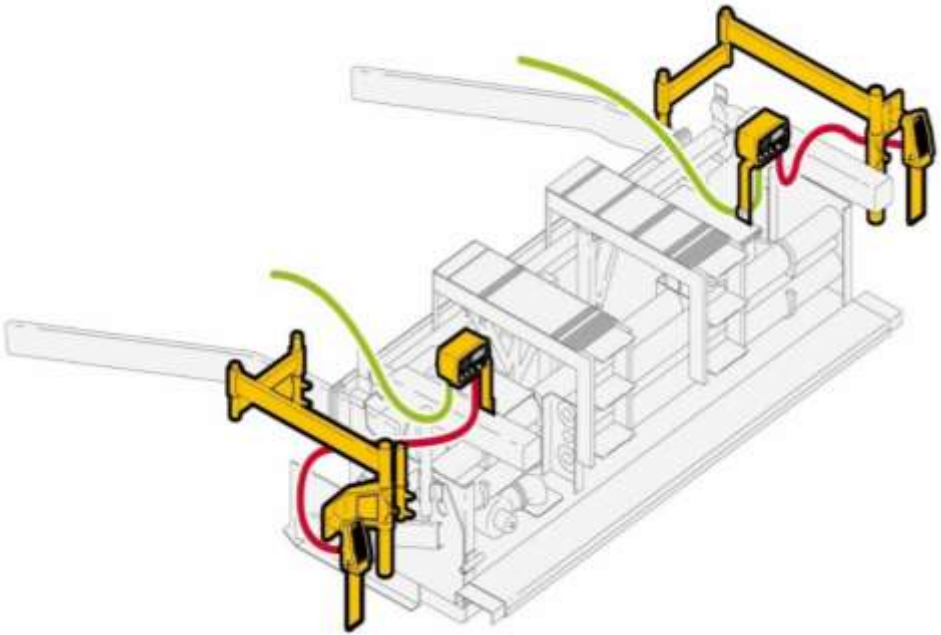
Precision Agriculture Solutions

Paving Products Topcon P32 System 2D Paving

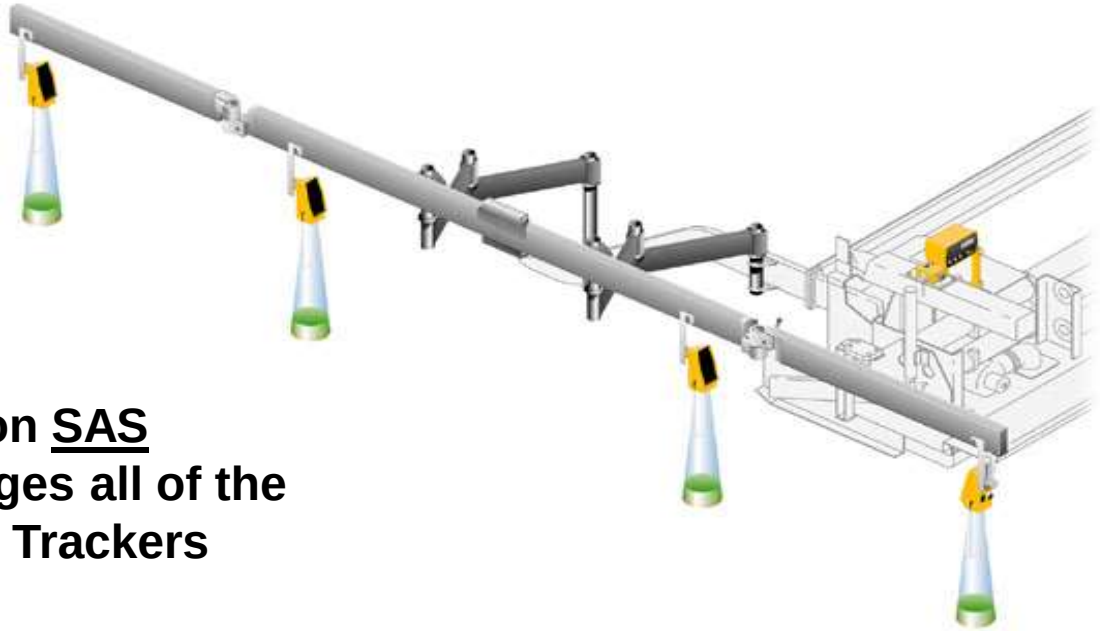




Paving Products Topcon P32+ System 2D Paving



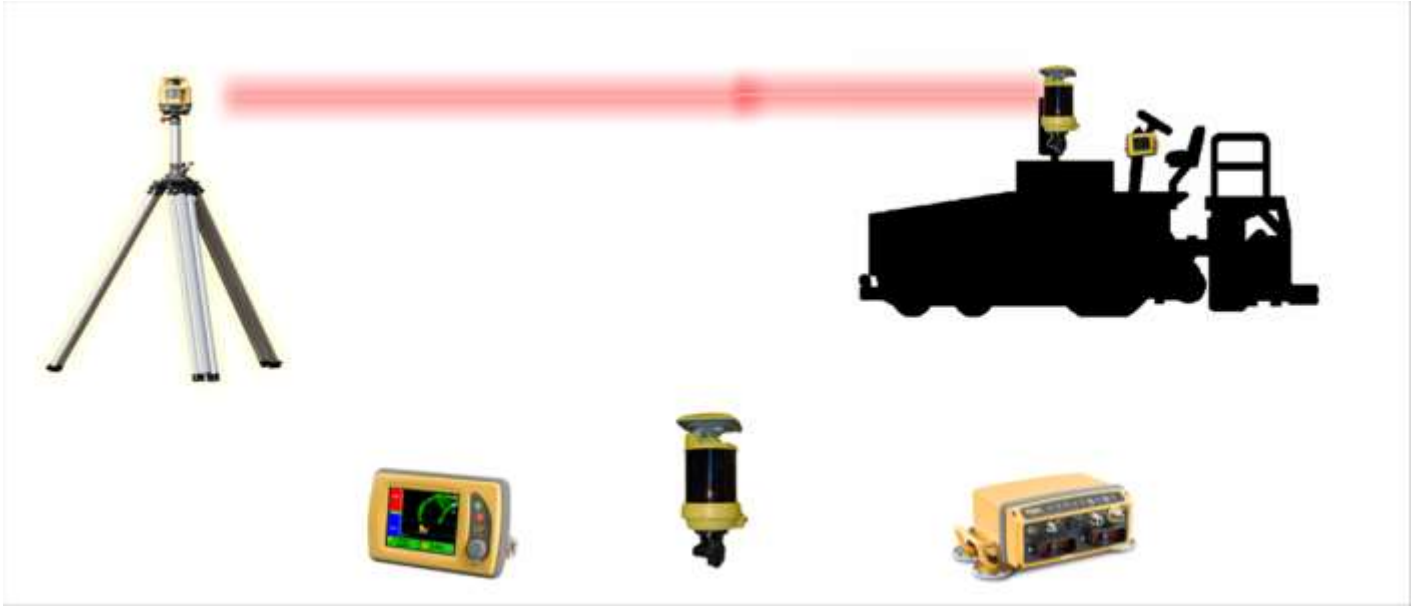
Sonic Averaging System



Topcon SAS averages all of the Sonic Trackers

Paving Products Topcon Sonic Averaging System (SAS)

mmGPS 3D Paving



Multiple Applications Millimeter GPS

SMOOTHRIDE

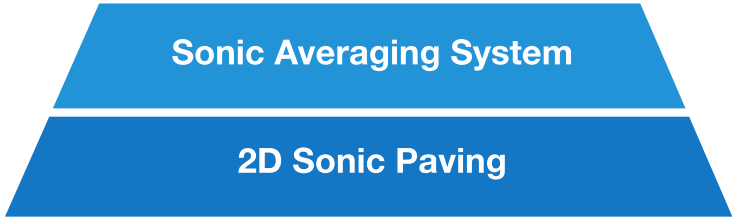
The Concept

A new way to resurface…

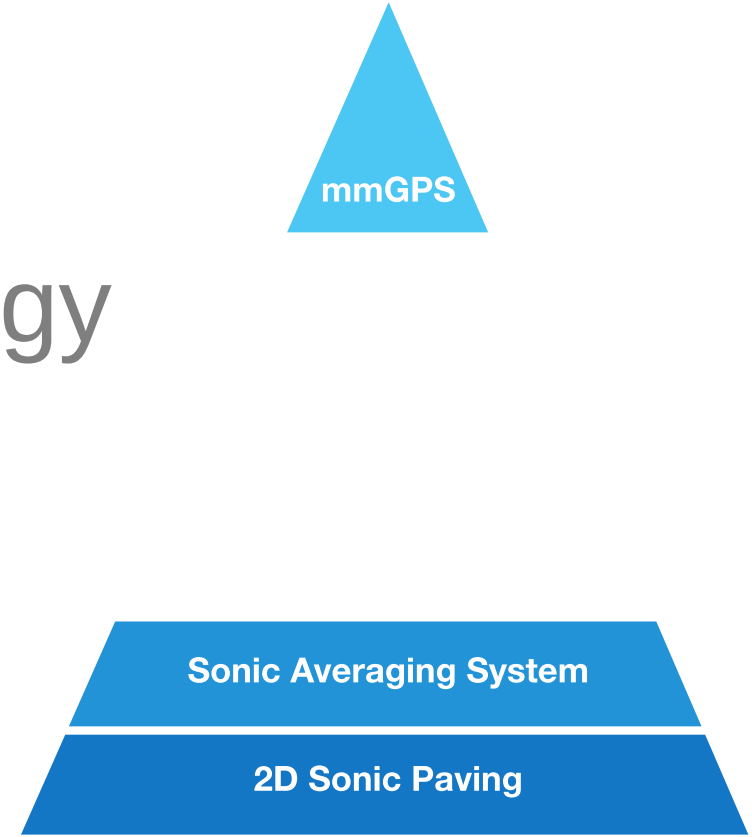
Topcon Paving Technology

2D Sonic Paving

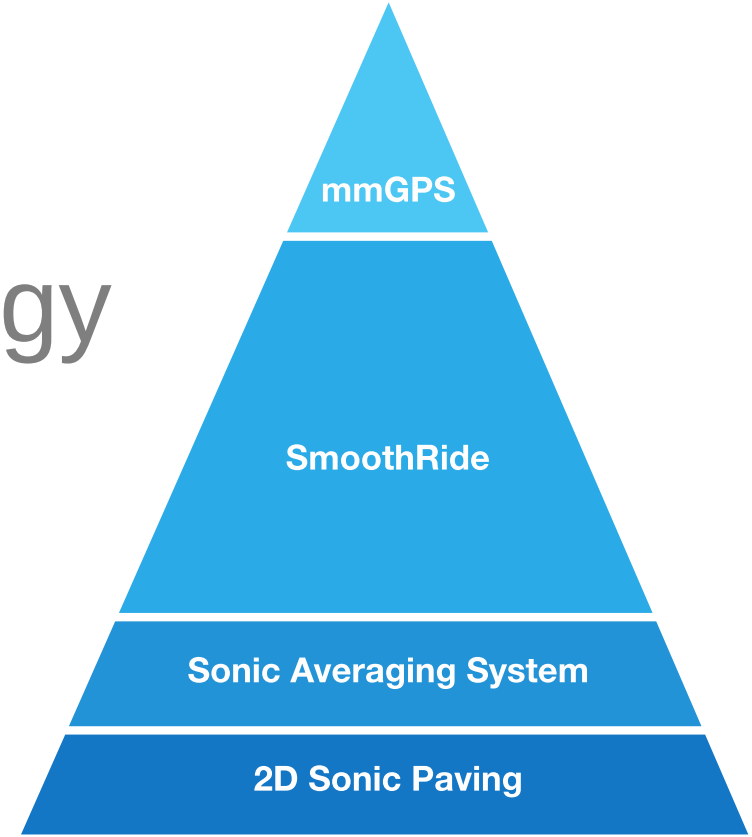
Topcon Paving Technology



Topcon Paving Technology



Topcon Paving Technology

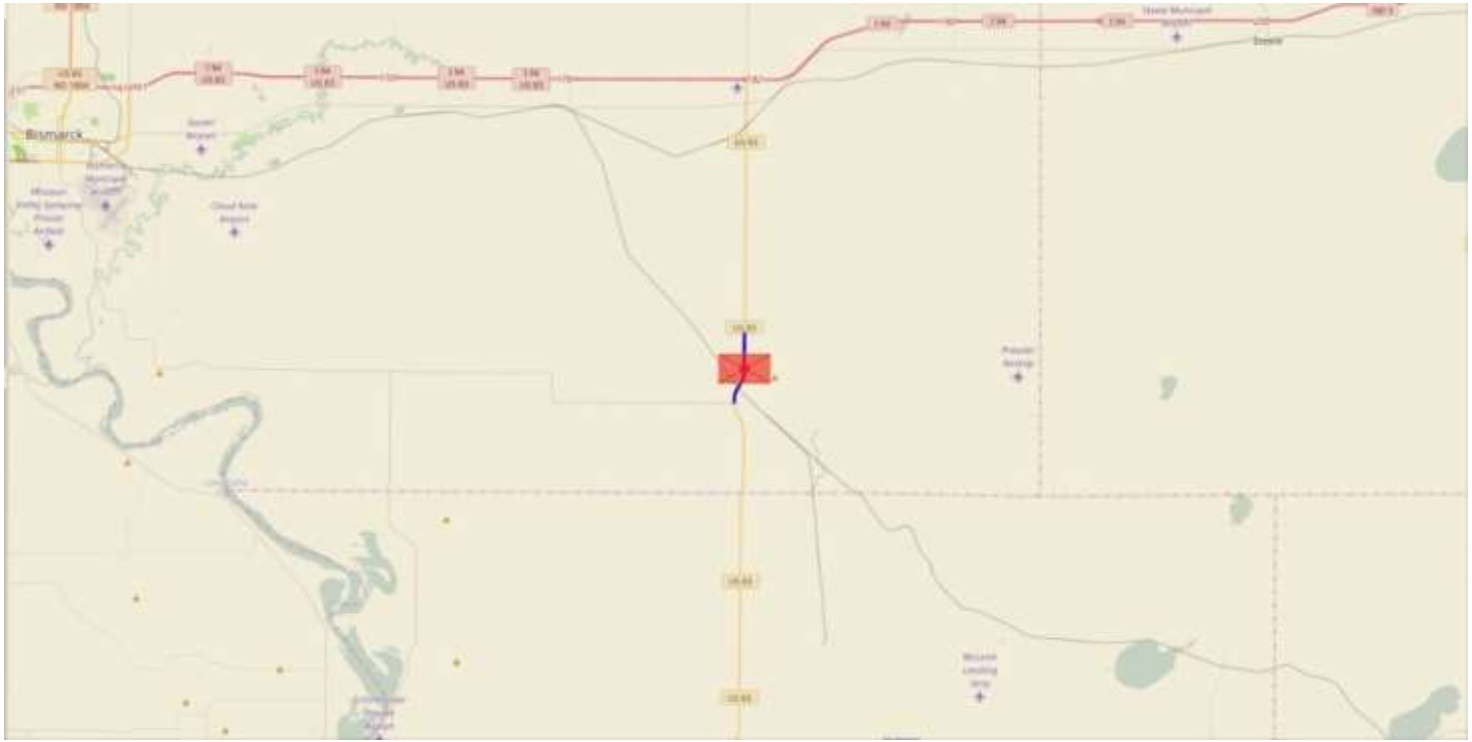


What does this solution provide?

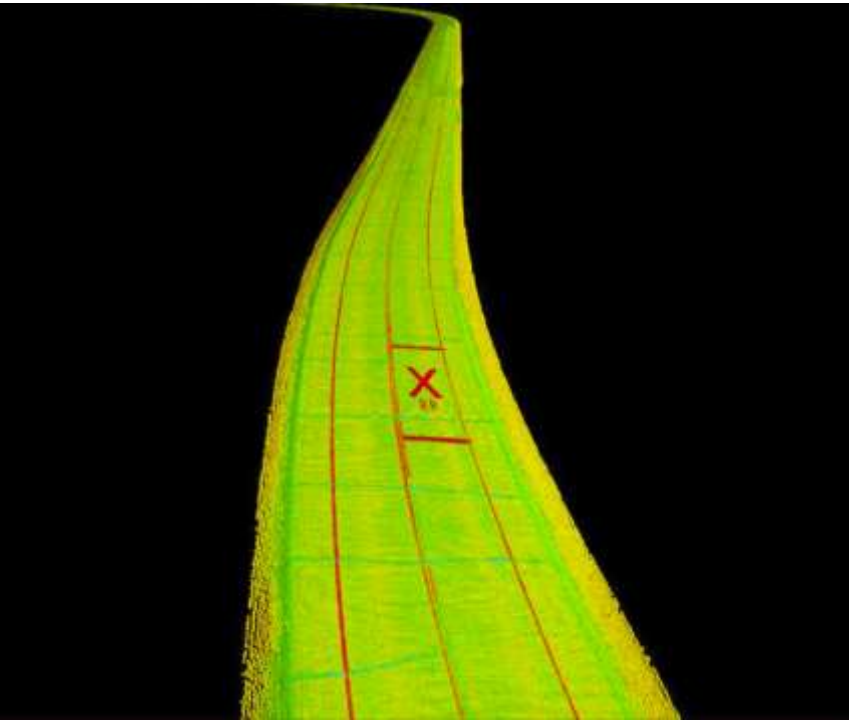
- For Collection:
  - Eliminates the need for tedious point collection
  - Eliminates lane closures, crash trucks, etc.
  - Identifies possible problem areas ahead of milling / paving
  - Creates a very dense model of the surface

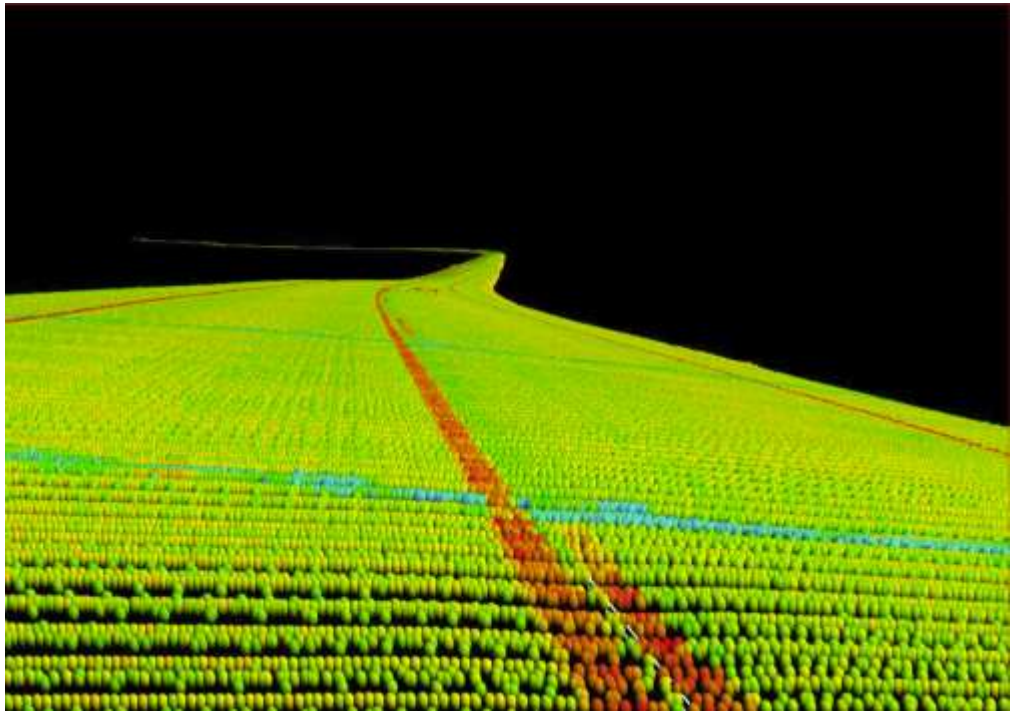
- For Milling / Paving:
  - Eliminates the need for averaging systems
  - Hits tight ride specs without the need for mmGPS
  - Variable depth milling and paving

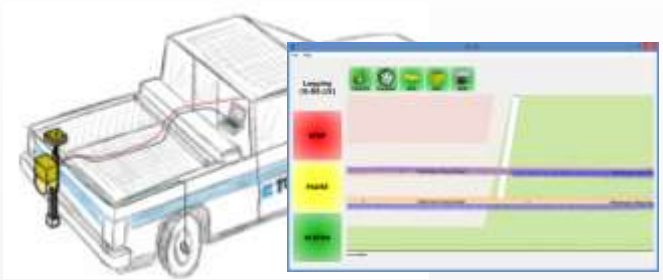
NDDOT Demo Project, Fall 2016
Highway 83 South of Sterling, ND near Moffit, ND



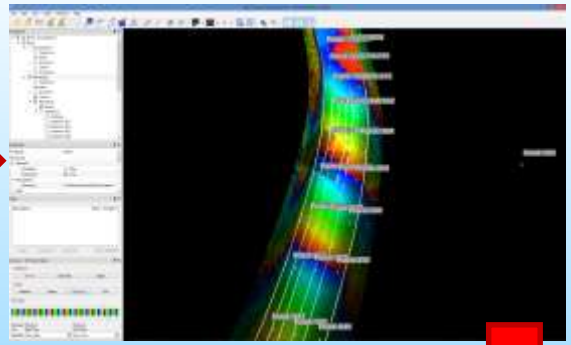
NDDOT Demo Project, Fall 2016



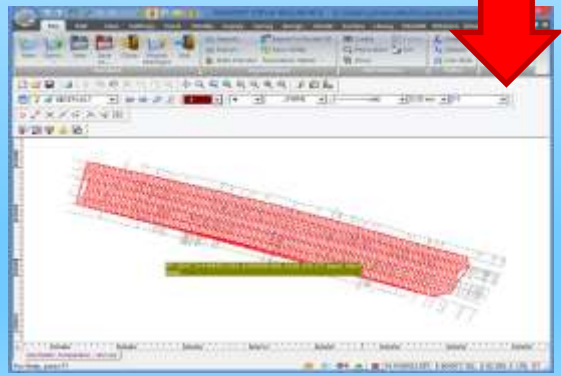




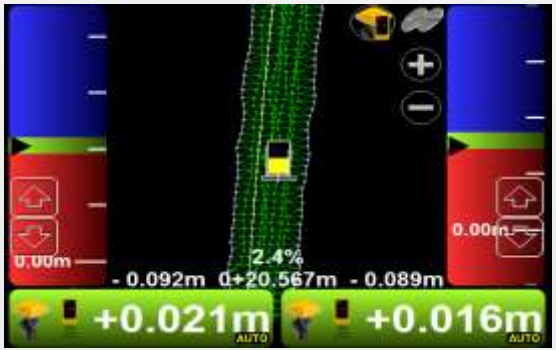
RD-M1 Collection



RD-M1 Process

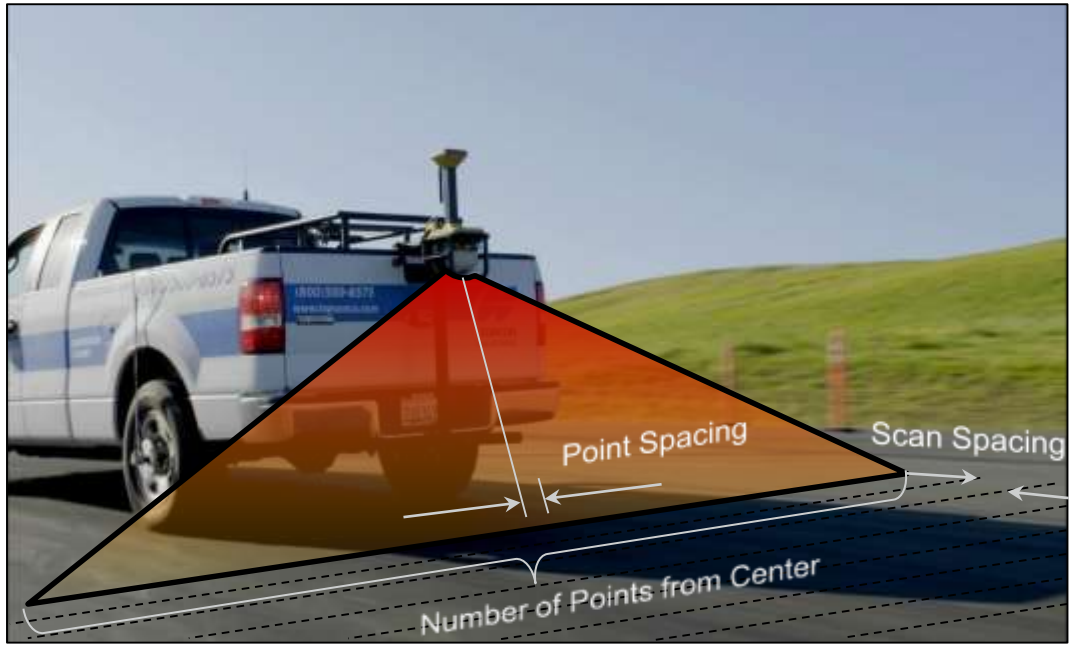


Magnet Office Resurface Design



RD-MC

RD-M1 Point Density



Lane width of 12ft

Point spacing (.04ft) - (.08ft) (center to edge)

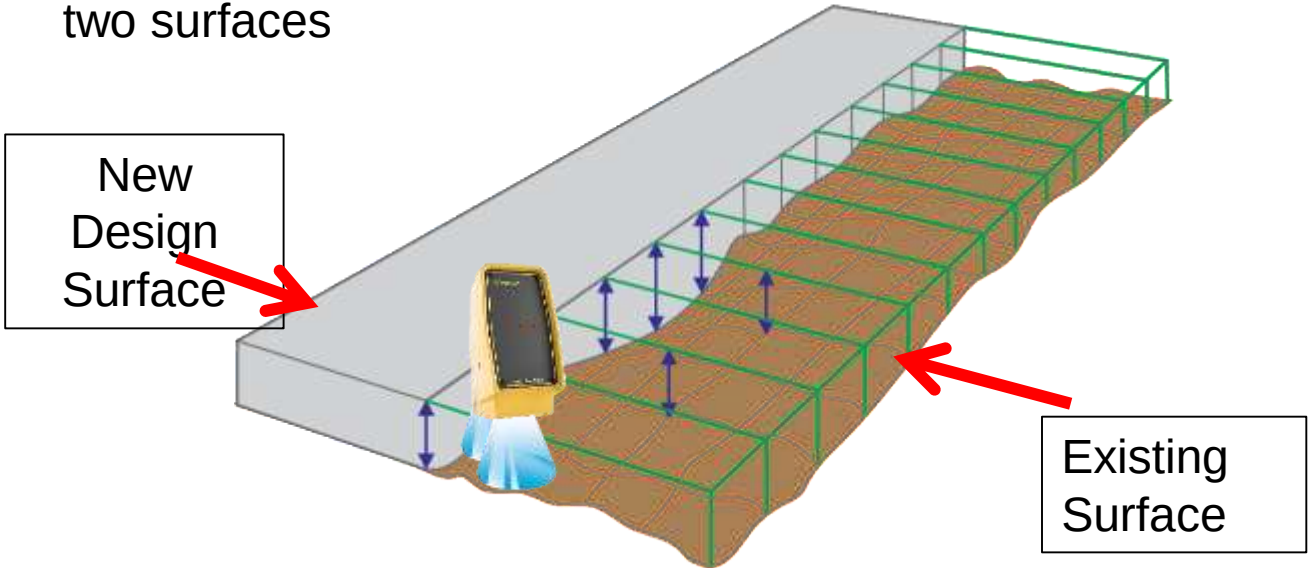
Per scan ~340 points (per cross section)

Scan Spacing (cross section interval)
@40mph-60mph (.78ft) – (1.17ft)

Single pass points per mile ~1.5M
Three passes points per mile ~4.5M
Five passes points per mile ~7.5M

RDMC versus thickness based paving

- GNSS for position only
- Sonic trackers tracking the surface for elevation
- 3DMC compares the elevation difference between the two surfaces

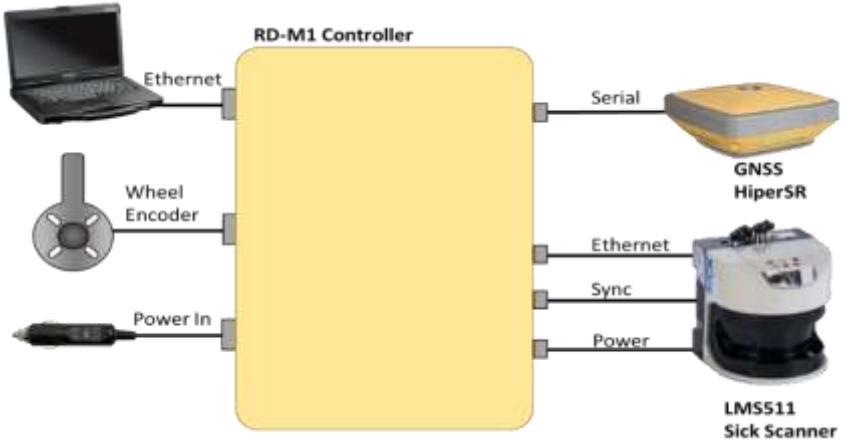


RD-M1 Description

RD-M1 is a portable vehicle mounted road surface scanning system. Scans of the road surface are captured from a downward facing LIDAR scanner with typical scanning width of 6 meters to ensure adequate lane overlap. Precise timestamped data from all sensors is collected and stored on the laptop computer for post-processing. The resulting data is used to create a detailed 3D point cloud of the road surface.

System Components

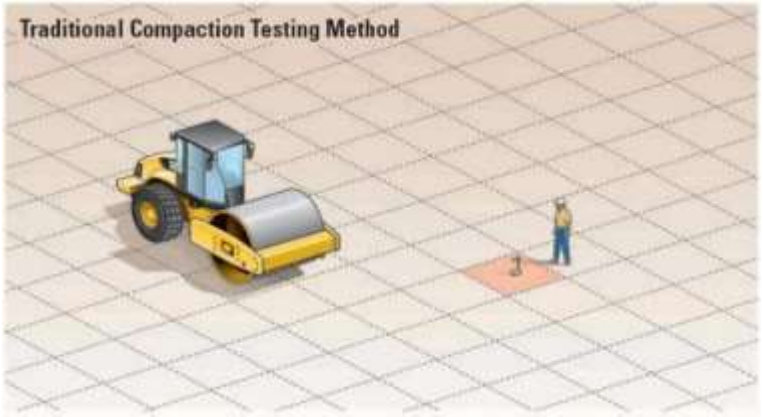
- GNSS Receiver
- IMU Sensor
- LIDAR scanner
- Wheel Sensor
- High-end Laptop

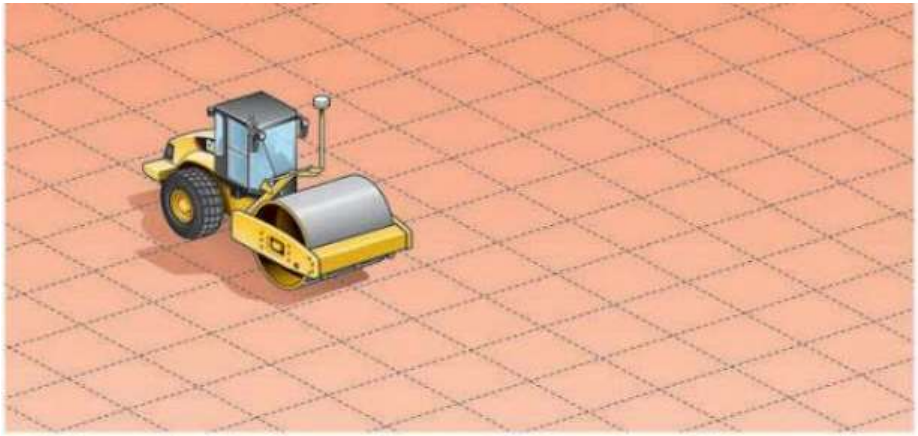


RD-M1

Topcon “Disruptive” Technologies

Intelligent Compaction





- 1/1,000,000 (point measurements)
- 100% Coverage (surface measurements)

If we continue to build roads as we have done in the past, why should we expect any different results?

Why Intelligent Compaction?

Limited on-the-fly feedback

Over-compaction

Under-compaction leads to distresses

Limited number of locations

After compaction is complete

Thank You!