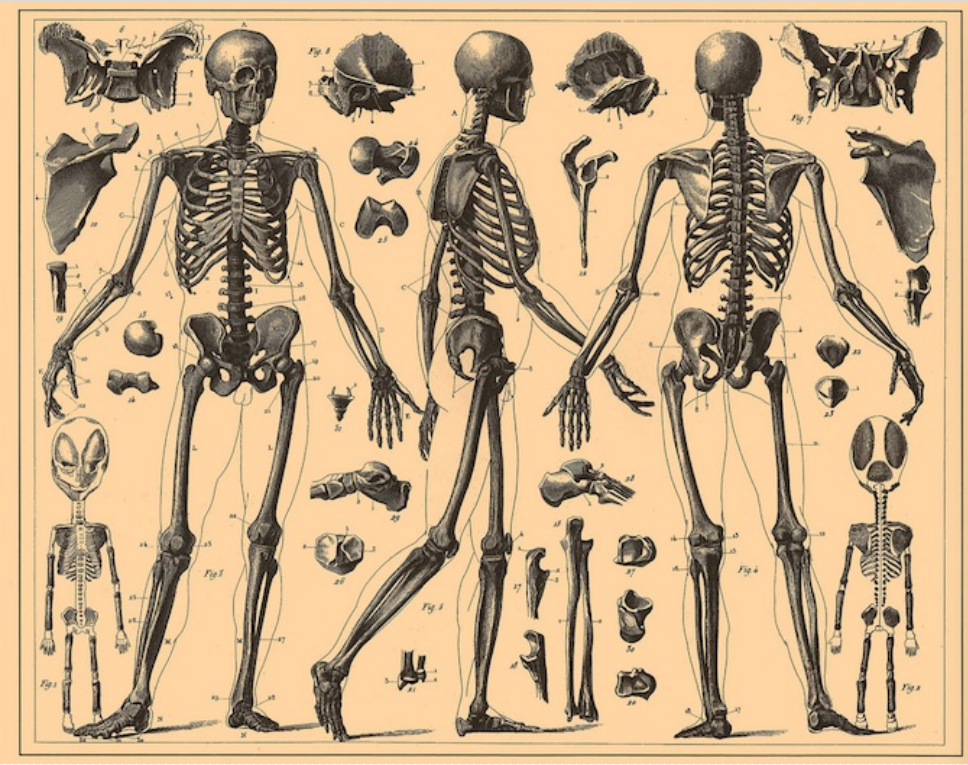
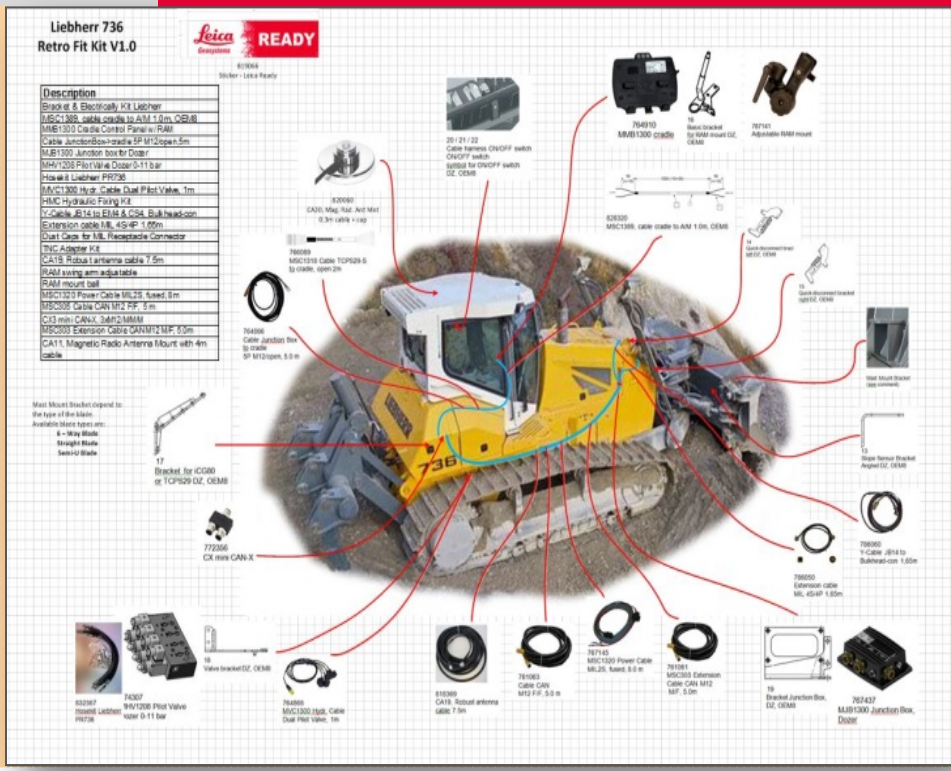
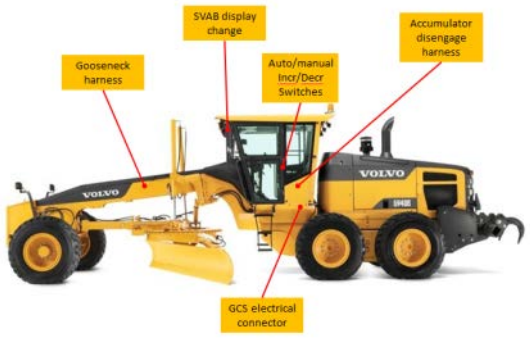




Anatomy of AMG Machines

Kevin Murphy – Leica Geosystems



- when it has to be right

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What We're Going to Cover

How AMG Works on the Machines

- Wiring
- Hydraulics
- Sensors
- Positioning
- Data
- User Interface

And We're Going to Discuss

Applications Where We Shine and Where Sources of Error Exist

- Sensor Error
- Data
- Blade Wear
- Positioning
- Materials
- Contractor Knowledge

… And Then Finally

The Next Generation of Machine Control

- It’s already here!!!

First Up
The Motor Grader

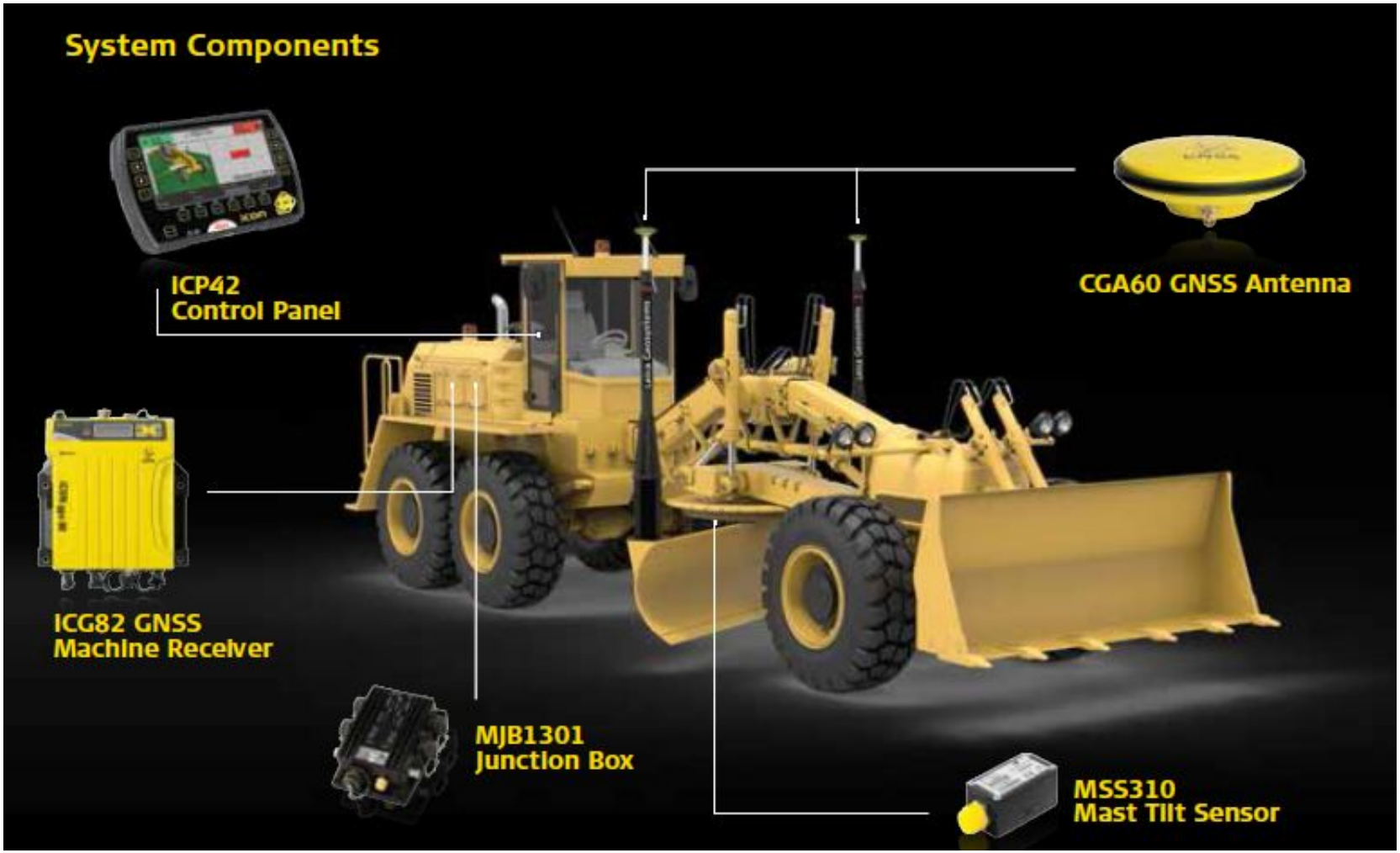
Positioning Options

- Single GPS with Cross Slope
- Dual GNSS
- Robotic Total Station Control

Sensors: Included and Optional

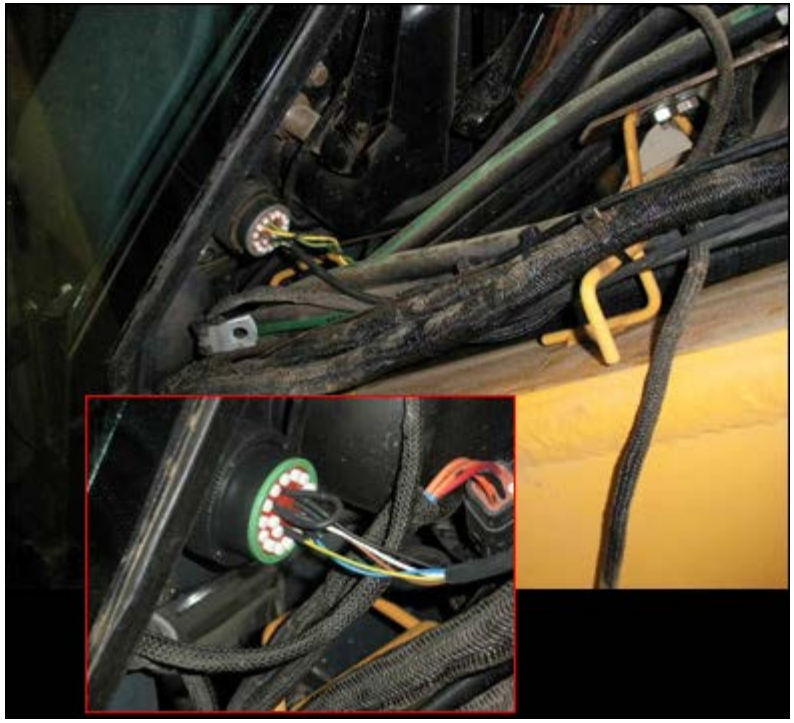
- Cross Slope Sensor
- Rotation Sensor
- Main Fall Sensor
- Mast Tilt Sensor

3D Motor Grader
How it Works



3D Motor Grader

Hydraulics or E/H



iCON tps

- when it has to be right

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MC User Interface

Grading

What the Operator Sees:

- Cut / Fill
- Position of Machine on Site
- Cross Slope
- Stationing / Alignment

- when it has to be right

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Error Sources:
Motor Grader

Watch For:

- Blade Wear
- Mast Tilt / Pitch
- Grade after Compaction
- Machine Measurements

Next:
The Crawler Dozer

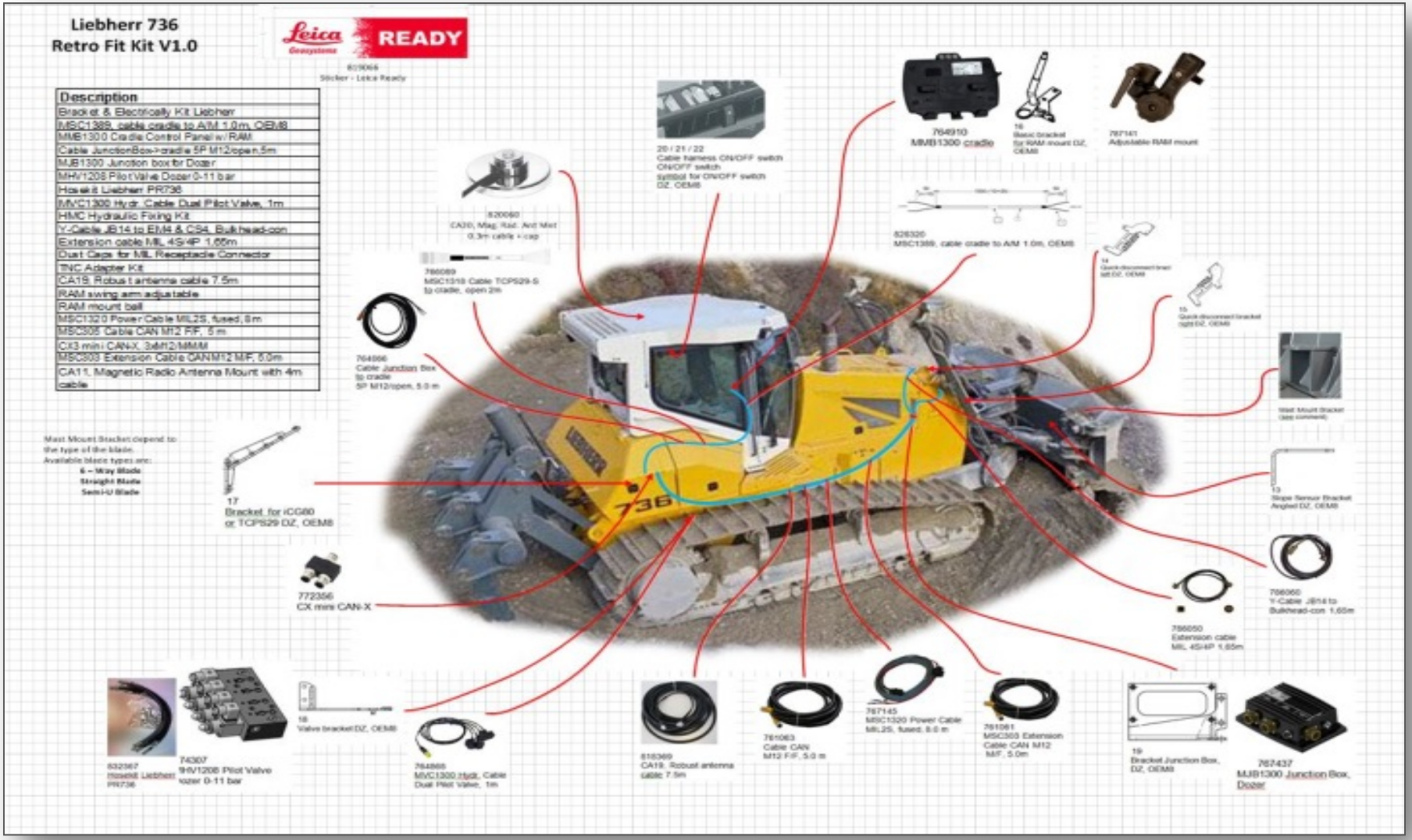
Positioning Options

- Single GPS with Cross Slope
- Dual GNSS
- Robotic Total Station Control
- - Not as common on dozers

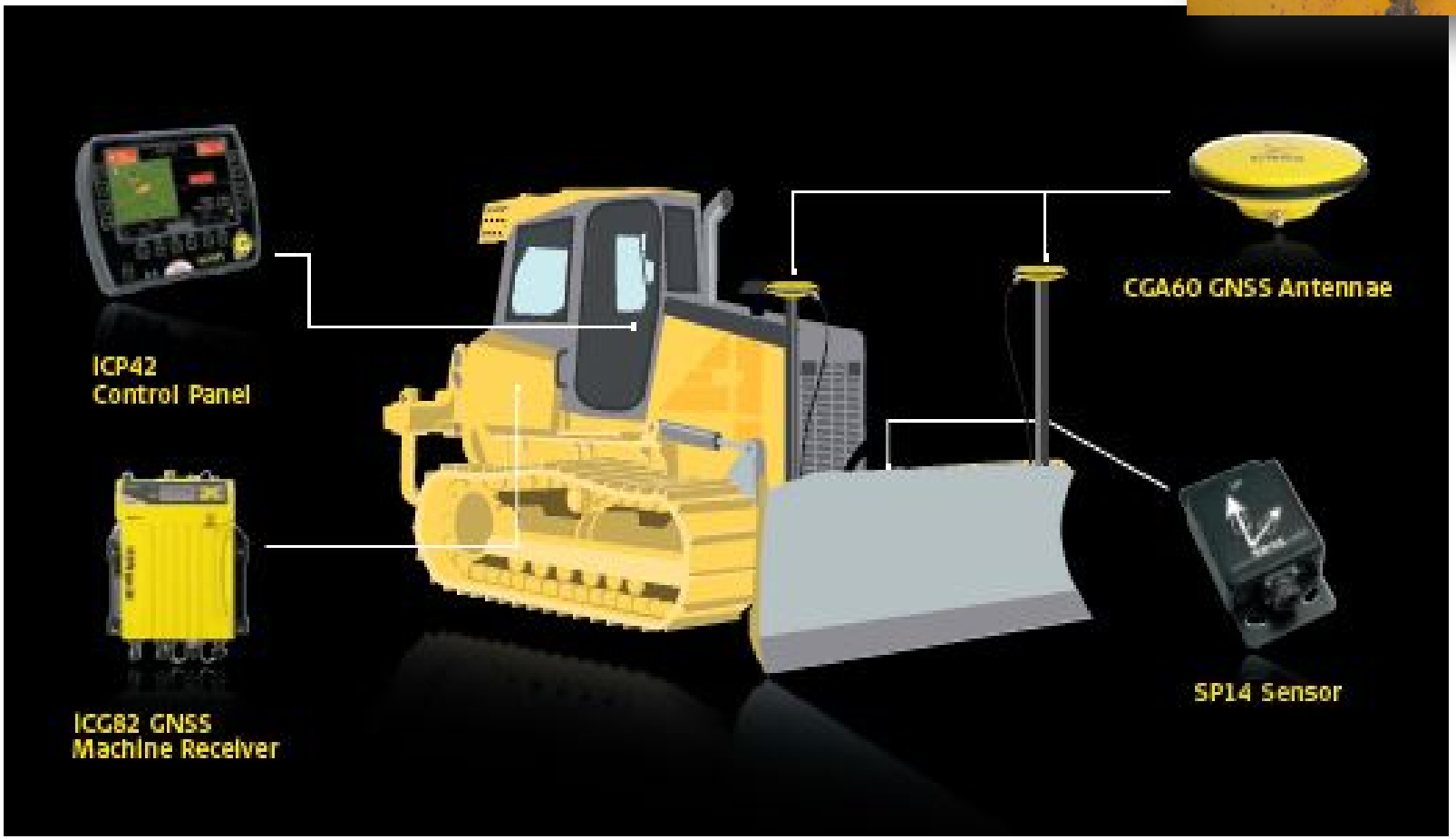
Sensors: Included and Optional

- Cross Slope Sensor
- High Speed Sensor / IMU

3D Dozer
How it Works

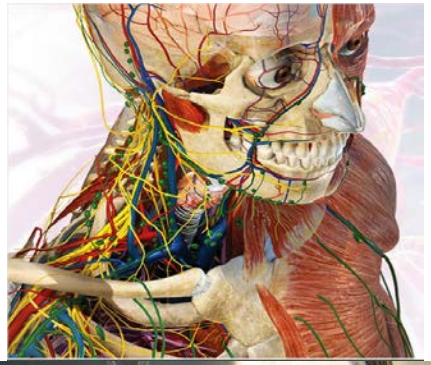


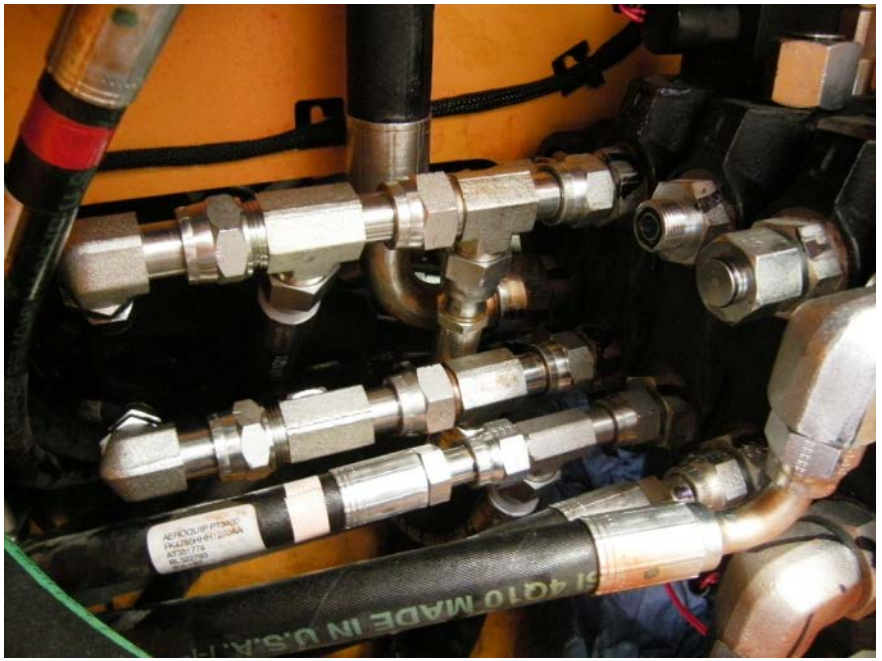
3D Dozer
How it Works



3D Dozer

Hydraulics or E/H





iCON tps

- when it has to be right

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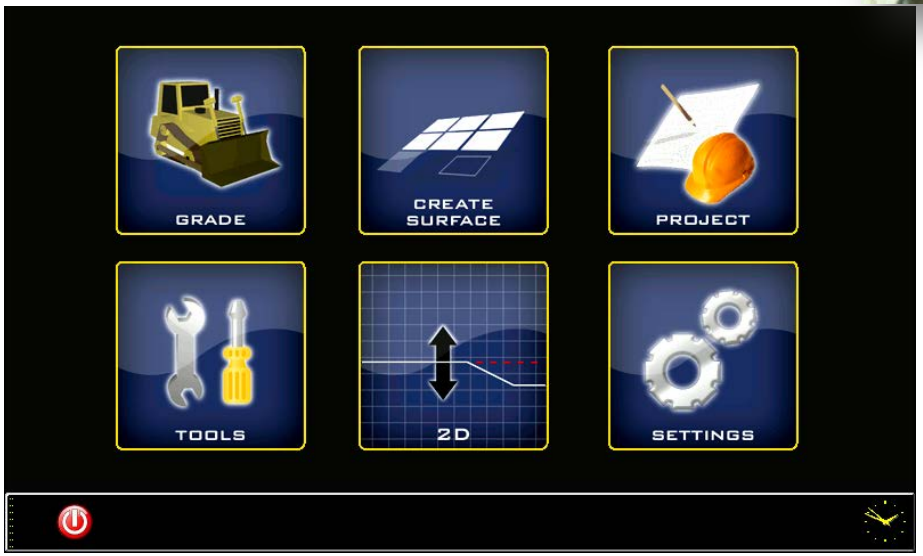
MC User Interface
Grading / Dozer



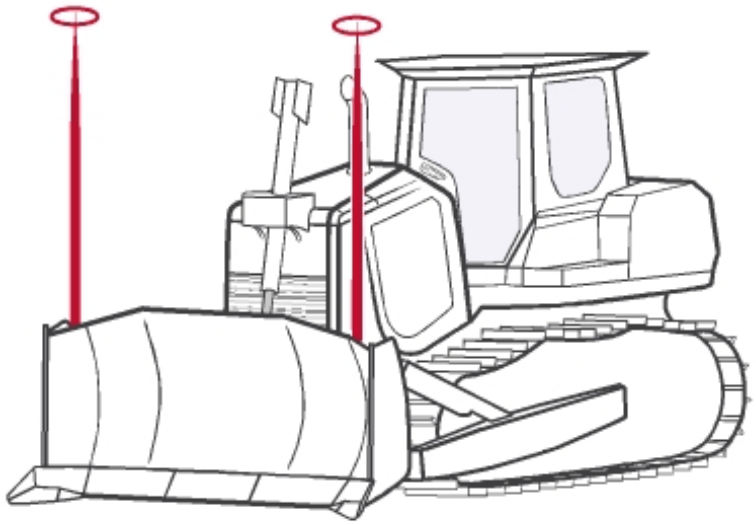
- when it has to be right

Leica Geosystems

Error Sources:
Dozer

Watch For:

- Blade Wear
- Grade after Compaction
- Machine Measurements



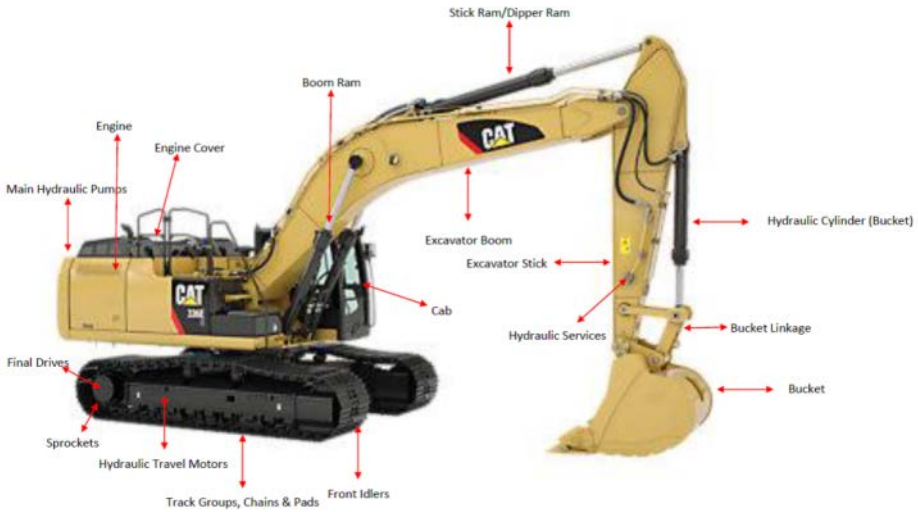
Next:
The Excavator

Positioning Options

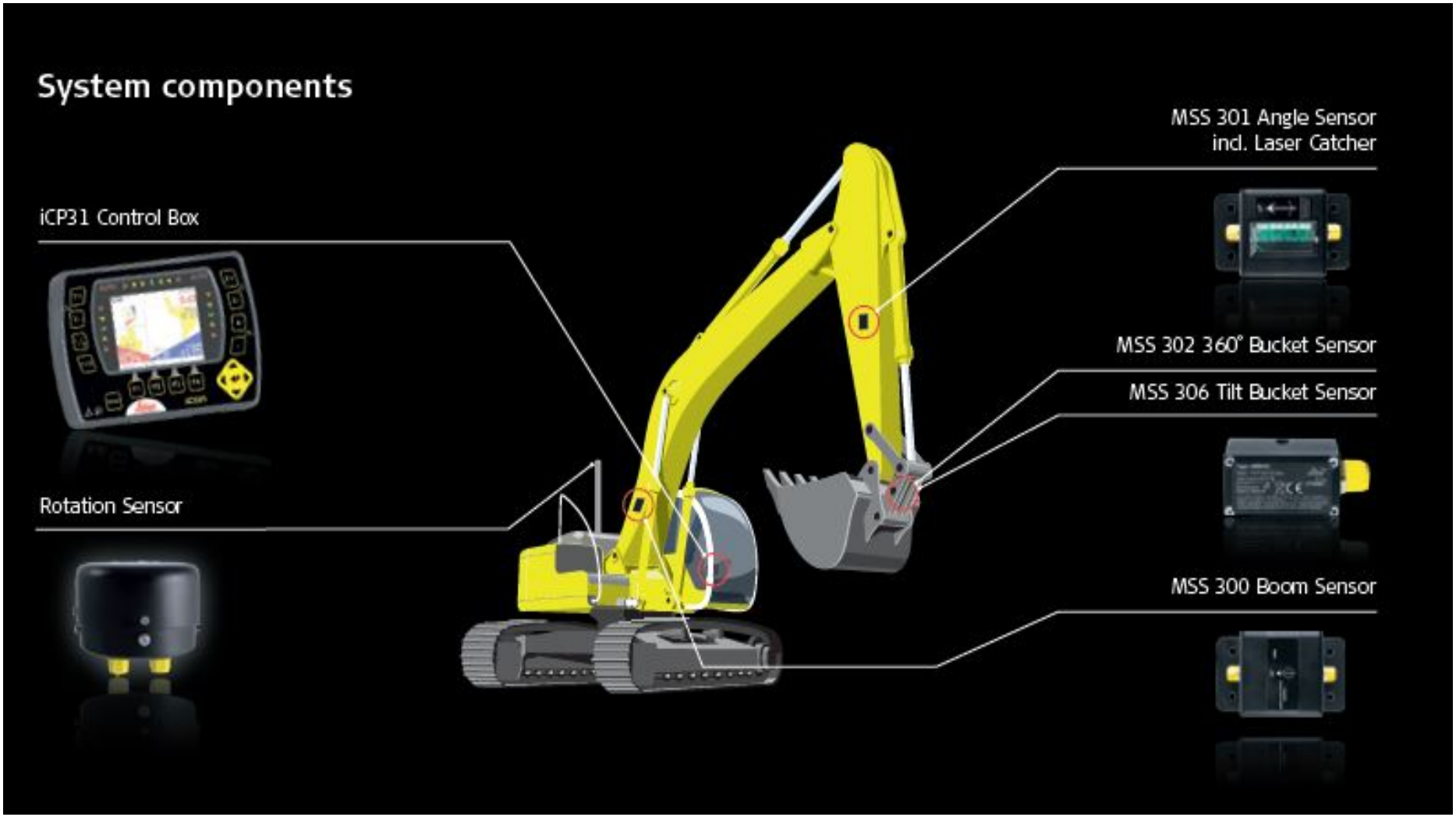
- Dual GNSS
- 2D or 3D

Sensors Required

- Boom Sensor
- Stick Sensor
- Bucket Sensor
- Pitch & Roll Sensor



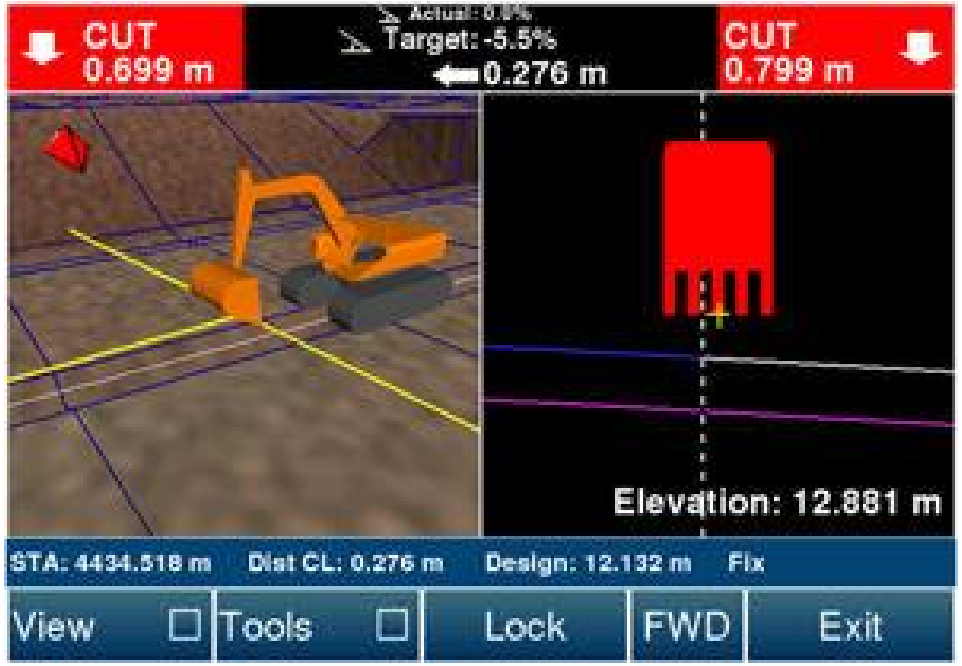
3D Excavator
How it Works

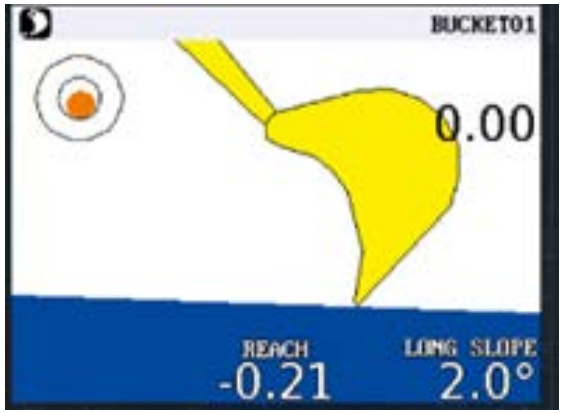


MC User Interface
Excavating

What the Operator Sees:

- Cut / Fill
- 3D Position
- Existing and Design Elevations
- Stationing, Slope, etc.





- when it has to be right

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MC User Interface

Excavator

- when it has to be right

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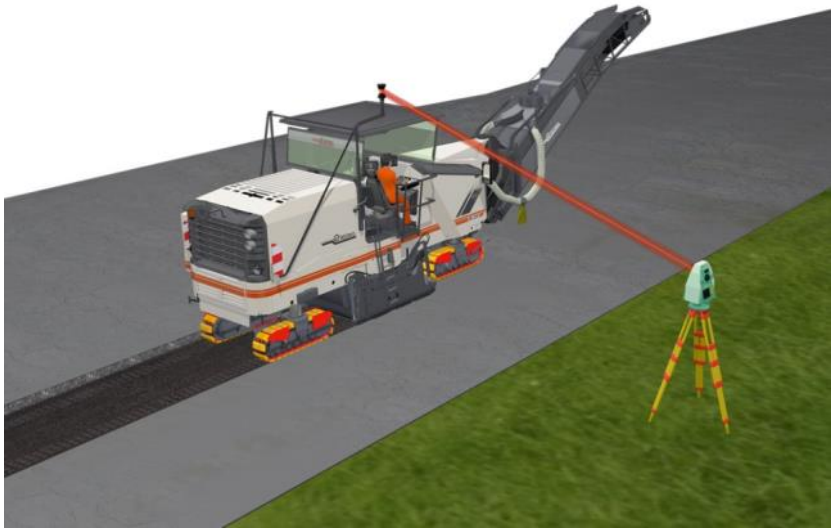
Error Sources:
Excavator

Watch For:

- Machine Measurements
- Switching Buckets

Next:
The Milling Machine



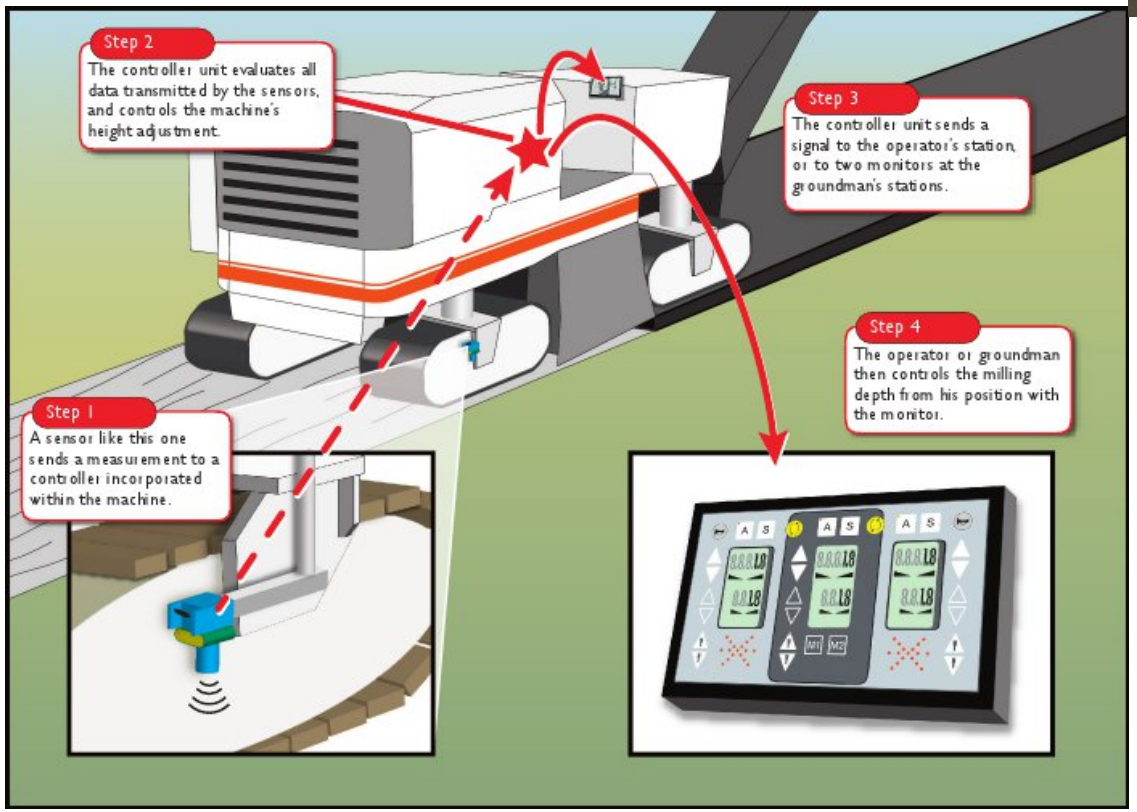
Positioning Options

- ~~GNSS~~
- Robotic Total Station

Sensors Required

- Slope Sensor
- Main Fall Sensor

3D Milling to a Profile
How it Works



MC User Interface
Milling

- when it has to be right

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Error Sources:
3D Milling to Profile

Watch For:

- Poor Survey Control
- Inaccurate Profile – Existing surface

Next:
3D Paving

Options

- Asphalt
- Concrete

Positioning

- Single (Asphalt)
- Dual Total Station (Concrete)

3D Paving
How it Works

MC User Interface

3D Paving String Less

- when it has to be right

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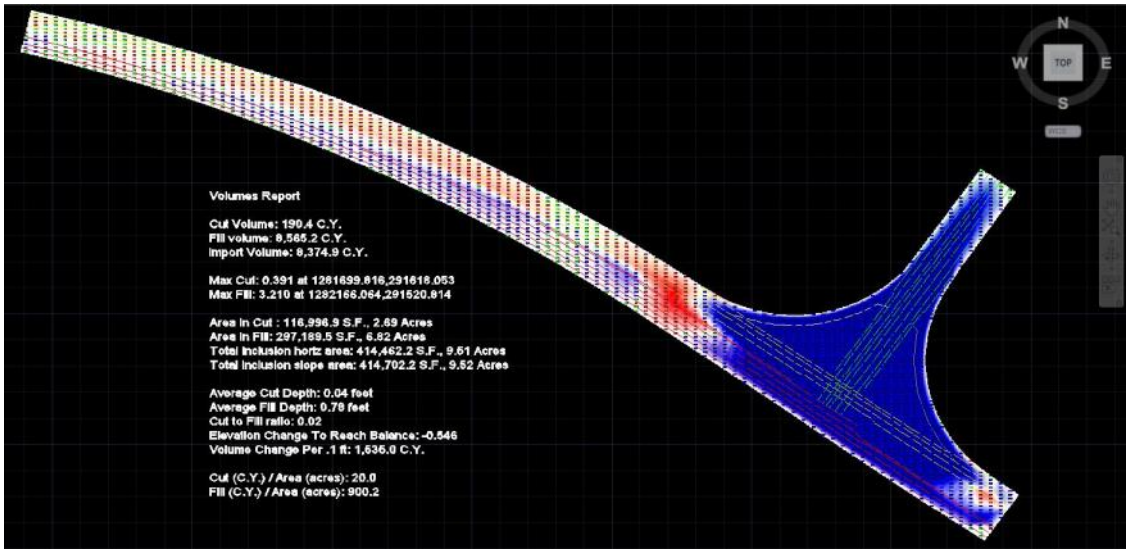
Error Sources:

Same as with String:

- Mix Design
- Starting off the Header in the Morning
- Speed
- Not enough concrete in front of the machine
- Weather
- Survey Control
- Machine Behavior
- DBI



In Stores Now:
Integrated Machine Control

Machines so far include:

- Crawler Dozers – With Automatics
- Excavators – “Semi” Automatics: Blade Stop

What & Why

- Integrated Performance for the Entire Machine
  - No Track Slippage
  - Work in Optimized Mode
- Remove the GPS Mast from the Dozer Blade
  - Safety concerns
  - Time Saving

- when it has to be right

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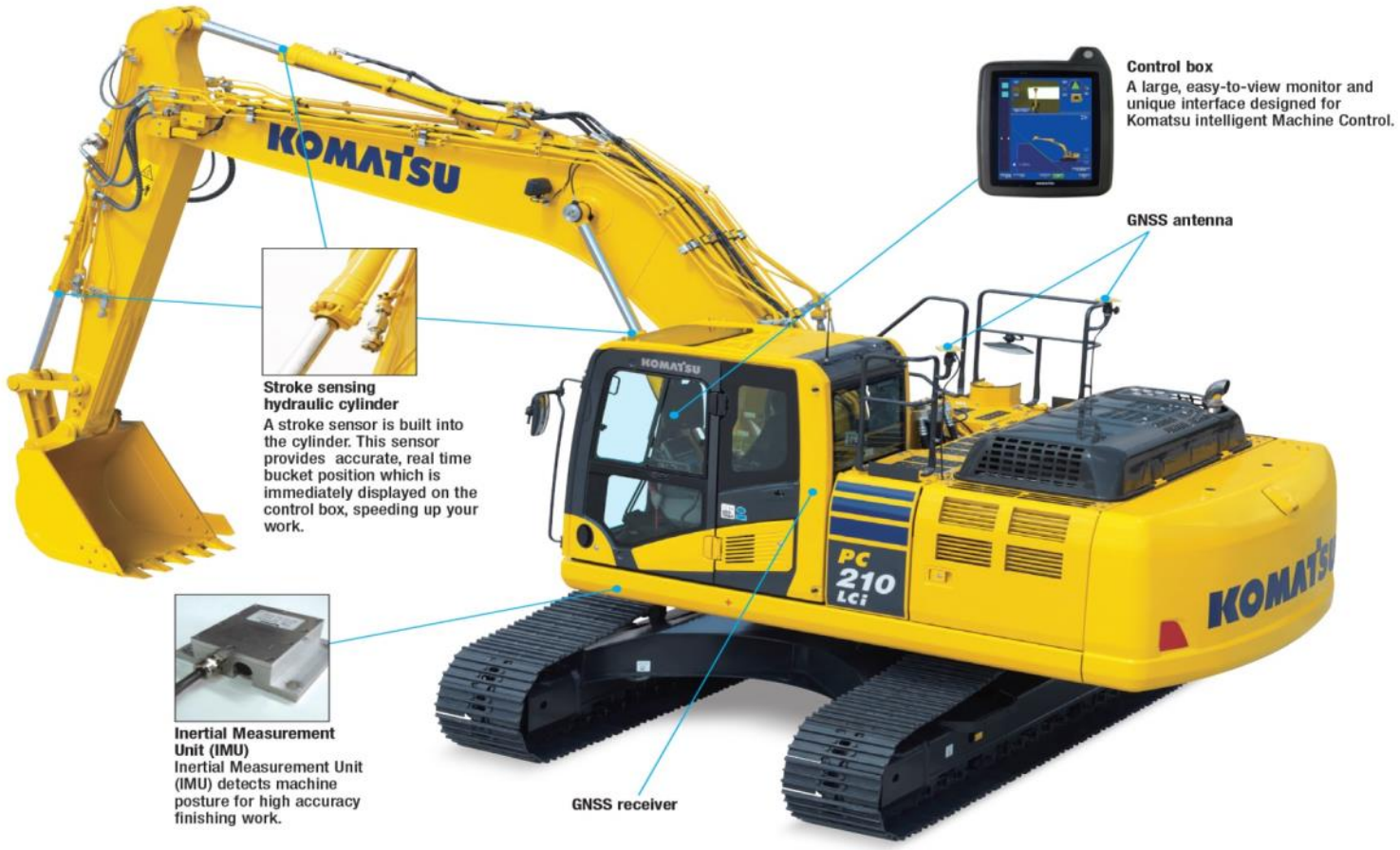
Some Examples:
Integrated Machine Control

In Stores Now:
Integrated Machine Control



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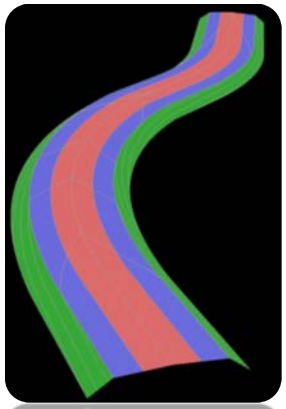

Thank You!!