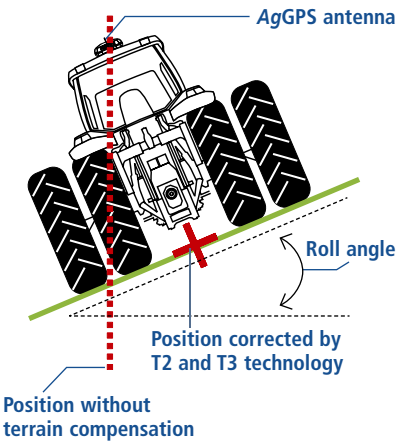
TRIMBLE T2 AND T3 TECHNOLOGY

You can depend on the accuracy and efficiency of your Trimble® GPS assisted steering or automated guidance systems when working on rolling terrain and rough ground thanks to T2® and T3™ technology.

T2 AND T3 TERRAIN COMPENSATION TECHNOLOGY

Improves accuracy when driving straight lines across sloping or rough terrain by minimizing skips and overlaps.



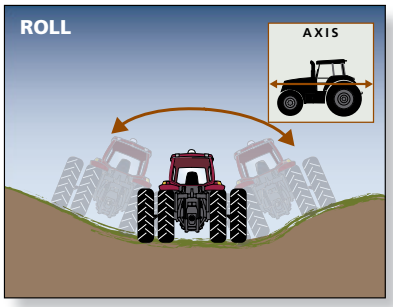
Trimble developed T2 and T3 technology to minimize skips and overlaps between each pass when working on rough and sloping fields. This concept is called 'terrain compensation'.

WHAT IS TERRAIN COMPENSATION?

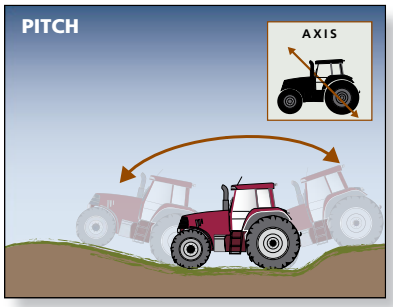
Terrain compensation calculates the difference between the GPS antenna's location and the actual desired position of the vehicle's center point on the ground, no matter what slope the vehicle is on (see diagram to the left).

To make these calculations, sensors such as accelerometers and gyroscopes can be mounted in different axes to compensate for roll, pitch, and yaw. When mounted on the roll axis, the sensors are used to measure the grade of the ground and how fast that grade changes.

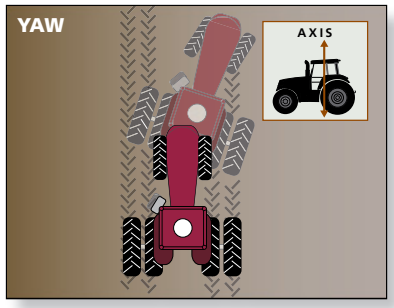
Using this information, the system can then tell the difference between a bump and a slope to compensate the position of the vehicle accordingly. When the sensors are mounted on the pitch axis they are used to compensate the vehicle's position when driving up or down a slope or hill. Additionally, when mounted on the yaw axis the sensors are used to compensate for crabbing, which is caused by steering up the slope constantly to keep the vehicle in a straight line.



ROLL: Rotates on horizontal (front to back) axis



PITCH: Rotates on the side to side axis



YAW: Rotates on vertical (top to bottom) axis

EXPLAINING ROLL, PITCH, AND YAW

In the illustrations above, the lines running through the vehicle center depict the three axes that the vehicle rotates around, resulting in roll, pitch and yaw.

Trimble®

Trimble Agriculture. The line everyone follows.

TRIMBLE T2 AND T3 TECHNOLOGY

WHAT DOES TRIMBLE OFFER?

*Ag*GPS EZ-STEER SYSTEM WITH T2 TECHNOLOGY

- ✓ The EZ-Steer system combines a friction wheel with GPS guidance from the display to turn the steering wheel for you.
- ✓ The Trimble *Ag*GPS® EZ-Steer® assisted steering system comes standard with T2 technology, and can be used in conjunction with the *Ag*GPS EZ-Guide® 250 and *Ag*GPS EZ-Guide 500 lightbar guidance systems, as well as the *Ag*GPS FmX® integrated display.
- ✓ The EZ-Steer system is ideal for applications that require guidance accuracy of 6–8 inch pass-to-pass[1] accuracy on rolling, sloping, or rough terrain, such as ditches, waterways, and terraces.
- ✓ The EZ-Steer system uses two accelerometers and two gyroscopes to compensate for roll and yaw. These sensors, located in the Steering Control Module, are used 50 times a second to compensate the GPS position for sloping and rough terrain.

*Ag*GPS AUTOPILOT SYSTEM WITH T3 TECHNOLOGY

- ✓ Connecting to the vehicle's hydraulic steering system, the Autopilot system is ideal for applications that require one inch year-to-year[2] repeatable automated steering.
- ✓ The Trimble *Ag*GPS Autopilot™ automated steering system comes standard with T3 technology.
- ✓ The Autopilot system uses three gyroscopes and three accelerometers to compensate for roll, pitch, and yaw (which are located in the *Ag*GPS NavController II). Information from these sensors is used at 50 times a second to compensate the GPS position for sloping and rough terrain. This fast update rate ensures an optimal amount of information is provided, allowing the Autopilot system to maintain one inch steering accuracy at any speed and any pattern.

ACCELEROMETER

- ✓ The accelerometer determines the angle of the inclination by measuring the direction towards the center of the earth using gravitational pull. By measuring the direction to the center of the earth, the vehicle's tilt can be determined and the correct compensation factor can be applied to the GPS position.

GYROSCOPE

- ✓ The gyroscope measures the speed that the angle changes. This is done by measuring minute oscillations of a silicon ring and then calculating the changes to the oscillations when the gyroscope is rotated around its axis.

NOT ALL GPS GUIDANCE AND STEERING PRODUCTS ARE CREATED EQUAL

SOME PRODUCTS:
Only have one accelerometer for tilt correction and, as a result, do not compensate for rough terrain and can only adjust for gradually changing slopes.
Have only one gyroscope, limiting their ability to compensate for rough ground and changing slopes.
Use only two vertical GPS positions to correct the roll of the vehicle. By using two GPS positions that are only accurate to +/-1.5 inches, it is difficult to accurately obtain the angle measurement required to calculate the compensation for sloping terrain.

1. *+/- 6-8 inch accuracy 95% of the time using WAAS corrections on straight swaths at speeds up to 12 mph.*
2. *+/- 1 inch pass-to-pass, year-to-year accuracy using RTK corrections 95% of the time.*

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