

TOPSOIL MAPPER

Soil Information



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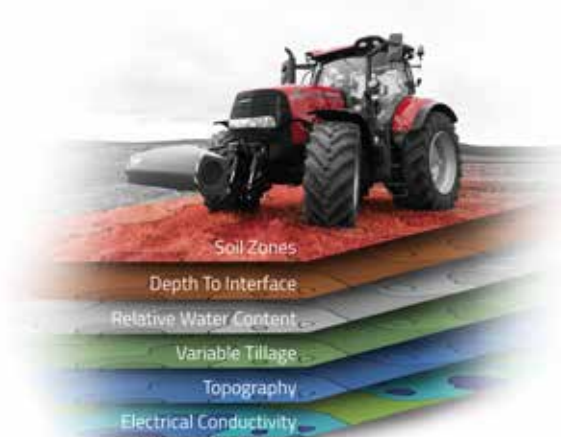
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The agricultural Topsoil Mapper sensor is an integrated geophysical measuring system which is used for automated mapping and advanced agricultural machinery control based on parameters of the rooting soil layer. The user is provided with a configurable set of parameters.

Functionality

The measurement principle of the Topsoil Mapper components is based on electromagnetic induction. A primary magnetic field is created by a transmitter coil that induces a secondary field in the soil. Inhomogeneity in the soil can be measured using the receiver coil and converted into different soil parameters using advanced mathematical models. The Topsoil Mapper consists of an array of different transmitter and receiver coil configurations which are optimised for recording the upper soil layers. The maximum exploration depth in non-lifted stage is dependent on numerous parameters and as a general rule does not exceed 1.1m.

The basis for all measurements is the apparent conductivity of the soil which is used to calculate all additional soil parameters. The measurement value output was enhanced for agricultural applications. The sample interval and the threshold values for the size of the soil inhomogeneity to be mapped were calculated in field tests taking into account the speed of the tractor, machine size, response time of the hydraulic system and mechanical parameters of the soil processing device and implemented in accordance with the Topsoil Visualizer.



Measured Data

The soil compaction horizon, the variation of water content and the soil composition/soil type are displayed in the basic configuration as standard. The information for the field is already displayed on the terminal during the survey. An advanced management and documentation function is provided in the Smart AG Cloud Solution which was not included in the tractor terminal for reasons of practicality.

The implement can also be controlled using the vertically resolved soil information. This function makes it possible to control the machine along a soil horizon with consistent properties. Reference is made to this on the corresponding white paper (TSM-WP5).

Positioning

In order to be able to take advantage of the mapping function, it is recommended to use a sufficiently accurate positioning solution. GPS systems offer sufficient accuracy with dGPS accuracy in the range of 1 m. During the installation, it is important to ensure that the lever arms (offset between the GPS antenna and sensor hub) are specified exactly. This setting must only be configured once and has been displayed as such in the product manual.



Data Processing

The soil maps that are created during the preparation operation and then produced are georeferenced and issued in an OGC-compliant (Open Geospatial Consortium) data format for further use in farm management systems.

The Topsoil Mapper system also gives you the option of asynchronous control. The soil information must not be recorded at the same time during the machine control. As the Topsoil Mapper is employed independently, the soil information can be recorded during the sowing procedure and then reused at a later stage of the soil preparation process or vice versa. The Smart AG Cloud Solution provides the management function required for this process.



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