

Precision Farming with Machinery and in the Farm Office

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INTRODUCTION

The ISOBUS communication standard is widely known for its ‘Virtual Terminal’ aspects enabling end users to plug and play implements into a tractor and operate multiple functions from one terminal in the cab. The ISOBUS standard also comprises protocols for recording and storing data which offer opportunities for precision management of farm machinery and farm business costs – the next step for precision farming after crop management.

Chapter 10 of the ISO11783 standard identifies the “Task Controller and management information system data interchange” describing data exchange to and from sensors, the Task Controller, Virtual Terminal and Farm Management information Systems.

The scope of this chapter basically identifies two objectives:

- Transfer data to and from devices
- Management and transfer of data to and from Farm Management Information systems. (FMIS) or PC office packages.

Some additional components of an ISOBUS system other than a Virtual Terminal is a ‘Task Controller’ and also a ‘TECU’ (Tractor Electronic Control Unit). These items can work together to provide a valuable management tool. TECU’s can come in different varieties but the basic concept is that they provide an interface for the tractor control systems (such as engine, transmission, general tractor performance data) and share sensor information across the ISOBUS network.

The ‘Task Controller’ can then record this information as a task or job.

This highlights the need for following ISO standards when data logging as the machine will log raw sensor data such as fuel flow rate, mechanical wheel rotation, GPS distance and or radar distance. If this information is recorded in standard formats then any Farm Management system (Office PC package) can use the raw data to calculate meaningful parameters such as wheel slip.

Job information can consist of:

Tractors:

- Fuel Burn
- Wheel Slip
- Ground Speed
- Draft control
- Trans/Engine temperatures

Harvesting:

- Traditional yield & related data
- Ground speed
- Concave settings, combine setting
- Grain Loss
- Some harvesting information may just be a record of a mechanical setting as there may not always be a sensor to measure from.

Why is this additional recorded data important?

INTERPRETING YIELD MAPS

It has often been stated that a major difficulty in precision farming and the adoption of VRT is the difficulty in interpreting yield maps. Providing more history on a particular crop can certainly help. For instance:

Ground speed

Most thoughts of precision agriculture revolve around lateral precision attained from Steering systems, not must discussion revolves around ground speed precision.

- Could a map of ground speed when seeding overlaid over a yield map show a correlation between speed and seeder performance, to help explain an area of poor yield that was uncharacteristic and previously unexplained?
- Could a map of wheel slip during seeding or tillage operation highlight hard spots within management zones that may need further analysis?
- Are there optimum efficiencies to be gained in operating machines within certain parameters to balance work rates, fuel usage, crop production? Could you know what these operating parameters are unless you record and analyse the information?

ANALYSING MACHINE COSTS

Most Farming businesses can accurately allocate crop related costs (seed, fertiliser, spray) to paddocks or farm business units- what about machine costs?

- Could accurately allocating machine costs to marginal areas influence a decision as to the particular areas viability?
- Should accurately allocating a machines maintenance/operating costs to a given area be included in the enterprise profit/loss analysis?

BUSINESS EFFICIENCIES

Job recording can also provide precise labour analysis. Are all machine operators equal? Job recording can allocate machine performance data to operators- Analysis of machine performance data may highlight that three operators on the same machine doing the same operation may vary in performance. For example wheel slip: Two operators may average 5% wheel slip seeding whereas the third may average 15% wheel slip. This would scenario would obviously represent an obvious setup/ operator training issue that needs addressing which wouldn't have been picked up if it wasn't for job recording from 'Task Controller'.

TRACEABILITY

Few people argue that traceability requirements are increasing and will continue to increase, representing a real cost to Farm Businesses. ISOBUS through Task Controller and data logging can help make these mundane tasks efficient by recording all job information from 'as applied' maps to the machine performance data all in the one spot, no need for putting memory cards separately into implement terminals for as applied maps and tractor terminals for machine data.

INVOICING

Many Farm business are turning towards contracting to supplement income and increase utilisation of expensive machinery investments. Any contracting job requires generating an invoice, which can be an arduous office task. Job Recording with an ISOBUS ‘Task Controller’ can efficiently and equally importantly accurately provide machine performance data required to invoice the job. For example, fuel burn from the Machine, a coverage map from an ISO Guidance system showing accurate area, as applied information from an ISO Implement such as sprayer, spreader.

IN SUMMARY

Task Controller and ISOBUS provide an easy way for machinery operators to record all relevant data required by Farm Businesses to improve efficiencies in their business. As Precision Farming is about finding efficiencies in inputs, the next step after crop inputs is to run precise farming operations right the way through from machinery operation, machinery maintenance, farm bookwork and labour inputs. As Data logging crop information such as yield maps is the tool for efficiency using VRT, Data logging machine performance is the tool for looking more efficiency in other areas of the farm business.

ISO11783 EXTRACT:

Part 10

Task Controller and management information system data interchange

Scope

This standard specifies a serial data network for control and communications on forestry or agricultural tractors, mounted, semi-mounted, towed or self propelled implements. Its purpose is to standardise the method and format of transfer of data between sensor, actuators, control elements, information storage and display units whether mounted or part of the tractor, or any implements. This particular standard, describes the Task Controller Applications Layer which defines the 1) requirements and services needed for communicating between the Task Controller and electronic control units. 2) The data format to communicate with the farm management computer, 3) the calculations required for control and 4) the message format sent to the ECU are defined in this document.