Sugar beet harvesters take on the challenge of digitalisation for a higher efficiency.
By **Hans Wiedemann**

A sweet digitalisation

Today, digitalisation is the basis for a great number of services, from Internet of Things, Industry 4.0 and on to mobile devices of ordinary people. No computer or control unit can undertake calculations without the existence of measurement parameters for machines, processes or people in digital form. Without communication – wired or wireless – data cannot be collected and transferred. And without scalable server architectures, it is impossible to manage the ever-increasing data volumes. The correct software is essential to make this data volume manageable, to provide this data in a comprehensible manner or to prepare the data correctly for a process. And very different systems from multiple manufacturers and with diverse focal points have to work together seamlessly.

CONDITIONS DOCUMENTED

Ropa addressed these challenges long ago and created the basis for digital services at an early stage through the automation of their machines. Machine data is recorded by sensors, converted into electrical signals, processed by control units and displayed on the Ropa terminal. Reciprocally, commands are sent to the control units via the terminal and joysticks, which together with the current sensor data, are linked to corresponding commands for actuators on the machine.

A small telematics unit by STW – the TC3G – acts as a datalogger, as programmable data pre-processing unit and as a gateway to the R-Connect (Ropa-Connect) server.

The free programmability of the TC3G is used to implement a secure, data-saving protocol for communication with the R-Connect server. Both, mobile telecommunications and a WiFi connection to a router can be used for data transmission, which then forwards the data on via an IP connection to the R-Connect server. As a result, the TC3G becomes the data management hub of the machine.

Inside the cabin of a Ropa sugar beet harvester: remote support with the machine settings can be provided to new drivers. And data about the harvest with all trimming and lifting settings can be tracked in a timeline and used for future planning or for training driving personnel.

One task of the R-Connect server is to depict and comprehensibly document all essential machine conditions in real-time during harvesting. Valuable information regarding potential, hidden faults can be analysed and used for predictive maintenance. This comprehensive depiction of pressures, speeds, sensor and potentiometer values is unique as a basis for the assessment of the currently-operated machine settings in connection with the currently-depicted fuel consumption.

As a result, professionals can provide remote support to new drivers with the machine settings. In a playback function, the harvest can be tracked in detail along a timeline with all trimming and lifting settings. The data can serve as a basis for future sowing and harvesting planning or for training driving personnel.

Besides the fact that a Ropa Tiger 6 sugar beet harvester is an impressive machine with its 15 metre length and 4 metre height and Volvo Penta D16 diesel engine with up to 565 kW power output, the task of harvesting beet appears relatively simple. However, a great deal of knowledge is involved, and an exact understanding of the work process, which can only be sensed when observing the machine in more detail. What is important is the fact that the harvesting process is not a standalone process. Beet harvesters are integrated into a complex logistics and order management chain. Today, these run, almost without exception, via the logistics portal "farmpilot". In simple terms, farmpilot is an order management and navigation system for groups in which many participants are integrated. Furthermore, additional functions exist such as the digital document entry or the storage of working times. The provider is Arvato Systems, a subsidiary of the Bertelsmann Group, which has, over recent year, adapted farmpilot to the requirements of the sugar industry. farmpilot can be used without problems in almost all areas of cross-company work.

Sugar beet harvesters by German manufacturer Ropa have already undergone a process for automation, creating the basis for digital services. The ultimate goal is increasing the efficiency of these machines and of the beet harvesting process, and better integrating them into an increasingly complex logistics and order management chain.

EDITOR'S NOTE

Hans Wiedemann, marketing manager at Sensor-Technik Wiedemann (STW) described the digitalisation process that Germany-based company Ropa carried out on its sugar beet harvesters.

Wiedemann explained that the European Union is reducing the quota for sugar beet, that is the production volume allocated to individual companies, and in turn to sugar beet farmers, for which a fixed price was guaranteed. In case of overproduction, it had been possible to export up to an upper limit which was defined by the World Trade Organisation due to import restrictions. However, a drop of the quota does not mean the complete opening up of the European market, as certain import duties still remain. Nevertheless, many players are talking of a new era, and most view themselves as being well-equipped for new, international competition. One example is German manufacturer Ropa which introduced a digitalisation process in its sugar beet harvesters, to increase harvesting performance and competitiveness.

TIME SAVINGS

An app is also included in the farmpilot portal; an application which operates on a tablet PC. All data is compared between the farmpilot portal and the farmpilot app on the tablet PC prior to commencing a harvesting order. The order data is created in advance by the farmer, dispatcher and the sugar refinery, and supplemented with external orders.

When the harvester driver starts an assignment in the farmpilot app, the app automatically transfers the assignment-relevant data to the Ropa terminal via WiFi, in which a new harvesting assignment is also simultaneously started. As soon as the harvester driver ends the current assignment in the farmpilot app, the assignment is automatically completed in the Ropa terminal. All invoice-relevant data for the completed assignment (harvested area, output, consumption, empty run ratio, harvesting speed) are transferred via the TC3G to the R-Connect server, and from there onto farmpilot. This path is selected because only in this way both the assignment scope data and the associated telemetry data can be unambiguously merged. In this way only one source exists for correct invoicing.

An error source is excluded as the data transmission occurs automatically; furthermore, the necessity for separate systems for different sugar refineries becomes obsolete through this solution, allowing the companies to save on investment costs.

Thanks to the use of modern technology, significant time-savings are achieved in the planning, coordination and execution of the beet harvest, and for subsequent hire and loading logistics.

In sugar beet harvesting savings can also be achieved through a reduction of the standstill times of the machines, although no maintenance-free beet harvester is available on the market yet because of the hard demands in their work in the field. Since, without maintenance, faults and failures are certain to occur, the objective is to eliminate these faults as rapidly as possible or not even allow them to occur. Condition monitoring can be used for this purpose with the assistance of the R-Connect server. **dpi**

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