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Reliable remote controlled machine

VEGETATION MAINTENANCE MACHINES INCREASE SAFETY AND SIMPLICITY FOR WORKERS OPERATING ON SLOPED GROUND

Maintenance of green spaces alongside roads, in forests and along the banks of rivers and canals calls for work to be carried out on land characterized by steep slopes where access for operators is not always safe or easy.

Energreen, an Italian producer of professional machinery for this type of working environment, has designed the Robogreen Evo. This radio-controlled machine has tracks that enable a range of different tasks to be performed, removing the need for manual operations and allowing operators to reduce exposure to risks related to working activities.

The company's multi-year partnership with Autec, a company based in the industrial area to the north of Vicenza that manufactures radio remote control systems for industrial applications, falls within this context.

The team of specialists at Autec has created a customized radio remote control that provides the operator with sophisticated remote control of the machine. A DJR transmitting unit allows the machine to be maneuvered via two proportional joysticks, while two potentiometers regulate the travel speed within a range of 0 to 100%. It also controls the speed of one track in relation to the other to neutralize the effect of gravity, improving stability on sloping ground by allowing the machine to move in a straight line.

The CRD receiving unit was selected to integrate with the machine control system, maximizing performance in terms of efficiency and safety. The transmitting unit and the receiving unit communicate with each other via radio in a 'frequency hopping' mode, continuously changing the working frequency and dynamically checking for the best radio channel availability before deciding to use it. This allows a stable radio link to be maintained, even in cases of interference.

The receiving unit communicates with the machine controller via a CANopen port through which the operator sends the commands and receives information regarding the working status. This is then shown on the transmitter's display.

Integrated control and data

The continuous development of latest-generation technologies for new and increasingly advanced human-machine interfaces (HMI) has recently enabled Autec to integrate new communication and visualization functions into the wireless transmitter and to manage the status of the machine in line with Industry 4.0 requirements. The hardware support is based on a 4.3in TFT LCD color display, which is programmable via Codesys V 3.5 in compliance with IEC 61131-3.

ABOVE: **Customized radio remote control with 4.3in color display**

The HMI has 16 million colors, a resolution of 480 x 272 pixels, six navigation keys, a viewing angle of up to 130°, alarms, temperatures, total hours of operation, time remaining until the next maintenance, and much more can also be displayed graphically or numerically.

The collaboration between the technical departments at Autec and Energreen has made it possible to take a further step towards the concept of Industry 4.0, with the inclusion of a host of innovative functions that improve the quantity and quality of data available to the user in real time.

The first of these enables total and partial real productivity to be measured in reference to the individual work cycle, providing information on the screen concerning total working time, distance travelled and area worked. Temperatures and other key information regarding the machine are also graphically displayed.

Additional displays dedicated to the tools mounted on the Robogreen Evo can also be viewed, along with the total working hours of parts subject to wear such as the rotor, roller and belt bearings.

The data collected can be used to program the necessary routine maintenance operations and once these have been performed, qualified personnel can reset these values directly from the radio remote control. The result of this extraordinary joint endeavor provides the operator with an extremely useful and immediately legible interface, which helps to save time as well as improving efficiency and productivity, reducing fuel consumption and mitigating the environmental impact. It has been demonstrated in this case that excellent results can be achieved when the relationship between OEMs and technology suppliers begins with the analysis of specific requirements, before proceeding with a collaborative relationship that benefits both parties, right until the final test. **iVT**

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