

# TAKING THE LOAD

THE STANDARDS FOR TRANSPORTER CONTROL ARE VERY HIGH, BUT NOW A RADIO REMOTE CONTROL SYSTEM HAS BEEN DEVELOPED THAT GUARANTEES A WIDER WORKING POSITION TO HELP MINIMIZE OPERATIONAL RISKS

▶ Moving large-sized loads is not an easy task and the risks involved are great. Wheelift, an American manufacturer of vehicles for the transport of heavy loads, knows this well. Wheelift transporters range in lift capacity from 50-200 tons for a single vehicle. That capacity can be easily expanded beyond 500 tons by using multiple vehicles operating as a single unit. Wheelift's transporters can have six, 10 or more wheel modules, with every wheel being independently driven. Each module can rotate on its own centerline, allowing the transporters to travel in any direction and to operate in small spaces with precise alignment. The transporters have a wide range of uses worldwide in everything from general industry to space programs.



Wheelift transporters are used by NASA for moving space hardware

## Meeting control standards

The standards required for transporter control are very high. To help meet them even with a remote system, Wheelift's technical department has teamed with the R&D team at Autec, a leading Italian manufacturer of wireless control systems for applications such as mobile machines, construction and industrial lifting, to develop remote radio control (RRC) for these transporters.

The RRC provided with each machine ensures a reduction in accident risk, meaning safer conditions for operators as they can choose the most appropriate working position and benefit from the best possible conditions without any physical connection between themselves and the machine. Heavy loads can be handled from a distance while maintaining precision and speed of movement.

Each transporter is controlled by a single RRC. It can even electronically join multiple transporters into one 'virtual' vehicle for the transport of larger products. The RRC controls the omnidirectional travel of the Wheelift transporters. Each axle has a vertical travel center column that provides fluid equalizing suspension across all axles in the system and provides the lift for self-loading. The fluid lifting center column is the key to the independent on-center rotation of each axle. Steering,

propulsion, and lift functions are controlled directly by the SyncroSteer controller and remotely by Autec's radio control.

## Flexible system

The collaboration between Wheelift and Autec has led to the realization of a customized FJM transmitting unit, a remote-control part of the Autec Dynamic Series. This system is suitable for complex applications and special machines. Its radio communication system allows bidirectional communication in which the radio constantly scans the frequency band used. The process is repeated automatically several times a second without interruption. This increases the reliability and quality of the radio link without the need for frequency mapping and enables fast and precise response to the controls.

The configuration of the transmitting unit was specifically engineered to meet the needs of the Wheelift transporters: two dual-axis joysticks with 8bit resolution (256 steps) and dual directional enabling commands, plus eight toggle switches, each with a specific function including tandem operation where the remote

control is able to simultaneously manage multiple transporters. Customizable buttons are inserted laterally, each matched to a specific function. A 2.7in data feedback display shows information from the transporter, including live operating parameters, status and other warnings.

This system enables command of forward and reverse speeds, the turning angle, travel mode and speed, as well as the raising and lowering of the load.

In this way steering, propulsion and lift functions are controlled remotely. Control is intuitive and the system is very lightweight. The radio batteries typically last a full shift and replacement is simple. The FJM works with an automotive style receiving unit (Autec CRS) that is optimized for integration in a CAN/CANopen network with a maximum number of functions: 12 analog and 64 digital (available via a CANopen interface).

Communication via CANopen allows nearly endless possibilities for programming information that can be displayed on the unit. The display also enables interaction with the transporter via screen menus. A single, unique configuration of the radio



Autec FJM transmitting unit for Wheelift



Control system on headed transporter

control can be used for many cases thanks to Autec's flexibly customizable panels.

Wheelift transporters integrate Uniload fluid-equalizing suspension technology across every axle, which dramatically increases capacities to a virtually unlimited weight. As load weight increases, equalizing suspension becomes critical. The LEDs in



A 140-ton, eight-module headless transporter with Autec's remote control

the lower part of the transmitting unit display provide the essential visualization of the transporter's working height.

Another improvement will soon be introduced to the Autec RRC for Wheelift: a 4.3in display with 256 colors and a resolution of 480x272 pixels. This display, with customizable screens, is programmable with CODESYS V3.5 via Ethernet (according to international standard IEC 61131-3). This programmable system is used to customize the graphical interface, allowing a wide selection of representing data. The sun-readable display has a viewing angle of up to 130°. The display also includes six soft keys for navigation.

## Functional safety

All electronic and mechanical parts of Autec's RRC systems have been designed,

manufactured and tested to withstand heavy-duty use under extreme working conditions. This means high temperatures do not compromise the performance of the RRC and neither do water, vibrations and other harsh environmental conditions. The FJM is one of the transmitters in Autec's Dynamic series, which is specifically designed for mobile hydraulic machines. It has also been certified for functional safety by TÜV Süddeutschland. The Stop function complies with the requirements of EN ISO 13849-1 up to Performance Level e, Cat 4 and EN IEC 62061 Safety Integrity Level 3. The UMFS function, which protects actuators from unintended movement from standstill, complies with PL d, Cat 3/SIL2. **ivT**

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