Mobile CANopen robot moves loads of up to 1 t

A mobile robot solution integrating robot servo drives SimpIQ Solo Guitar 35/60s digital servo drives by Elmo Motion Control (Israel) was realized by one of company’s customer. The solution implementing up to 5,4 kW of peak power incorporates two CANopen-controllable servo drives, one for each of the two wheels.

THE MOBILE ROBOT IS A TWO-WHEELED, AUTONOMOUS VEHICLE designed for delivery of heavy components. It is capable to follow a line along magnetic tape for path guidance. This allows the robot to adjust dynamically to changing surface paths and continue to operate without interference. The vehicle uses the drives to follow the line and accordingly adapt device behavior. If there is a deviation, the drive compensates by adjusting the steering, which is done without using a multi-axis control module. The robot is suited to the automotive, packaging, aerospace and medical sectors. It implements a “master-follower” concept. A master motor outputs (emulates) the encoder of the “following” axis. This allows the “following” motor to use the master motor’s feedback, both as a reference and a target. Additionally, the on-board electronics monitors the input (I/O). These actions are performed relative to the master-axis as the steering method.

Manufacturer’s main aims for the mobile robot were to achieve a cost effective mobile robot that can handle loads of up to 1 t. The robot also should utilize the least amount of battery power for continuous operation over shifts, which allows for less frequent charging. The size of the drive should be small enough to fit into the robot. All components used must withstand a continuous shift environment and perform reliably with off-the-shelf components for quick time-to-market. The compact size of the robot required motion control products that could supply high power density within a small unit.

The Solo Guitar drive measures 80 mm x 61 mm x 46,7 mm and weights 200 g. It has a peak output of 1,7 kW (35 A) at 24 V and is compatible with brush and brushless motors. Integrated electronics monitors input and output states via CANopen or EIA-232 interfaces. Embedded programs run a master-following routine within the drive and accept emulated encoder signals that eliminate the need for a multi-axis motion controller and an oversized embedded CPU. The off-the-shelf solution supports an ambient temperature up to 40 °C. The two drives were installed in a specially designed location within the vehicle near to the motors. Optimized connector types and locations were chosen. The drives perform motion control loops, provide feedback inputs, programming capabilities and communication support. Implementation of the standard CANopen communication allows the line following processor to communicate device states to the input logic. This connectivity reduced time-to-market and eliminated the need for extra devices. Motion control manufacturer’s proprietary Composer software was used to program the commands for the drives.