

Drives Support Growing Market in Holland



The challenge to produce a cost-effective automation system for plant watering and handling at one of Europe's leading growers of annuals has been answered by a partnership between automation company Riwo Engineering B.V. in conjunction with Control Techniques' Drive Centre at Rotterdam in Holland.

Dutch company Emsflower, actually based just across the border at Emsbüren in Germany, has currently some 26 hectares under glass, growing around 500 million plants per year, many of these for promotions in discount supermarket chains, when in excess of a million plants may need to be shipped simultaneously to destinations throughout Europe.

Faced with this background, Riwo Engineering had to meet a demanding brief, explained by Riwo partner Wim Spit. "The new system had to encompass the transport of plants, watering, spraying and pest control, autonomous function of individual sections as well as a central control, precise positioning over runs of 250 metres, the means to transport both power and water along 150m, ease of maintenance and all of this at a very limited cost.

"The drives had to have a very wide frequency control range in order to provide accurate positioning under varying loads and also high speed travel between positions to minimize downtime," adds Wim Spit.

The scheme proposed, and subsequently tested and accepted, comprises trollies with plastic wheels running along overhead rails running along each 8-metre wide greenhouse bay. Two wheels on each trolley are powered using asynchronous motors with encoders controlled by 1.5 kW Unidrive SP AC drives from Control Techniques.

However, position control is not as simple as it may seem. The temperature in the glass houses can vary between 1°C and 50°C, with the track itself expanding and contracting as much as 600-mm over the 250 metre length. In addition, when under heavy load, there can be considerable slip on the driving wheels. To meet the low-cost objectives, Riwo Engineering and Control Techniques had to come up with a simple solution.

This solution has been achieved using absolute reference marks along the track and temperature measurement both of which are fed back to a program running in the SM intelligent application module fitted to each drive. The program provides error correction and compensates for changes in temperature.

"This has kept the system as simple as possible and eliminated the need for expensive measuring systems or PLCs," comments Wim Spit, "so that each system operates autonomously. The closed loop control, combined with full torque from standstill and the intelligence in the drives has produced an excellent level of accuracy (typically less than 1-cm) and repeatability of the positioning, in all conditions."

Since there is no room for hanging cables or hoses under the trollies, the power cable is run through the water hose, which is controlled by a system with steel cables and pulleys to feed or rewind as the trolley moves along the track. Again, to minimize cabling, yet facilitate communications with every drive in each greenhouse, a Wi-Fi system was chosen. Each trolley has a Wi-Fi bridge that is connected to each drive via a serial interface. Each greenhouse has full network coverage that is used for telephone links, PDAs and other production machines.

KEY BENEFITS

- COST EFFECTIVE AUTOMATION SYSTEM
- EASE OF MAINTENANCE
- LOW COST INTERFACE TO MASTER SYSTEM
- EXCELLENT LEVEL OF ACCURACY
- REPEATABILITY OF POSITIONING

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The primary task of each trolley is to provide water spray of the plants, to a program determined on the master computer. Each is also used to carry tools to provide extra functionality.

The possibilities are diverse; currently there are ten handling modules that can be slung under a trolley, to provide insecticide or fungicide spraying for instance and different modules are used for picking and placing 16 sq metre blocks of plants. In addition to calling for additional spraying, personnel can call up trollies to transport them along the greenhouses to points where they need to work.

Many of the modules are powered by Control Techniques Unidrive SP drives, communicating through CT-Net with the master drive and thence by Wi-Fi with the master computer.

“We like the Unidrive SP and the drives have proved ideal for this application,” says Wim Spit. “CT-Net allows multiple drives to be connected to a master, the onboard programming has enabled us to provide the degree of accuracy and repeatability that the client requires, the open structure based on the Modbus protocol gives a low-cost interface to the master – and even the ability to have the cooling heatsink at the rear of the IP54 control cabinets have proved ideal in this environment.”

Unidrive SP is the world’s most advanced ‘solutions platform’ AC drive, configurable into five operating modes – open and closed loop, vector, servo and regenerating modes – connectivity to most industry standard networks, configurable for all types of AC motors, including linear motors, and accepting 14 position feedback protocols. It has a range of plug-in module options for adding connectivity, feedback, extra I/O and on-board programming.

Wim Spit pays a tribute to the entrepreneurial spirit of father and son Bennie and Tom Kuipers who run the enormous enterprise at Emsflower. Bennie Kuipers has been in horticulture for all his working life and runs that side of the business, whilst son Tom has been instrumental in the development of the computer control system with a powerful and sophisticated system for logistics, planning,

production, order completion, administration and personnel management required for this complex organization. Their clear thinking and positive approach working closely with Riwo Engineering brought the realization of this dream into reality in a record time.

The testing of a prototype by Riwo proved to be successful and, in a very tight time frame, this led to an order and the installation of 140 trollies with many more to follow to meet proposed expansion plans for the complex. The mechanical engineering support for the project was provided by Riwo Engineering’s close partner Achtersbosch Kleinmetaal Bewerking.

There has been so much interest in Emsflower and so many people wanted to look around, that the forward-looking Kuipers have developed the complex into a tourist attraction, with over 200,000 visitors per year enjoying the tropical house, two restaurants, children’s play areas, shops and gardens.

A final comment from Tom Kuipers: “Our criteria for drives are that the price and maintenance must be low and the drives must perform to our performance targets with absolute reliability. That’s why Control Techniques are now our drives of choice.”

Riwo Engineering comprises a group of automation, control and software specialists. The 20 employees are mainly concerned with machinery automation and process automation.

Factoids on the Dutch horticultural market:

- There are 10,000 hectares of greenhouses (20,000 soccer fields)
- There are 7,000 growers, with a total of 500,000 employees
- Exports of greenhouse products amount to €14.7 billion
- This is around 10% of the GDP
- Electricity usage is 4 billion kWh/year
- Natural gas consumption is 3.6 billion cu m/yr

Automation is crucial in keeping costs competitive. Control Techniques B.V is playing a major role in this.



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