

PROJECT REFERENCE

Royal FloraHolland

Retrofit of the control technology during operation on one of the largest electric monorail systems in the world



Project details:

Client:	Royal FloraHolland
Partner:	Pentanova CS Nederland BV
Application:	PLC for EMS
Product:	Retrofit during operation
Key data:	Replacement of approximately 1,300 PLCs in the vehicles and more than 200 stationary PLCs along roughly 17,5 kilometers of rail track

Project overview

The Royal FloraHolland cooperative has been operating one of the largest electric monorail systems in the world in Aalsmeer (Netherlands) for more than 20 years. From here, flowers and plants are sent all over the world.

Every hour, around 2,600 individual stacking cars whiz through the plant. In total, the vehicles cover around 39,000 kilometers a day, i.e. travel around the world once every day. To ensure that the supply of spare parts with hardware components and the update and support services for the software systems continue to function smoothly in the future, Berghof Automation has developed a comprehensive modernization concept together with the operating company Pentanova CS Nederland BV and in close coordination with the owner Royal FloraHolland.

In this largest retrofit project in Berghof's history to date, we are gradually replacing the nearly 1,800 CODESYS V2.1 PLCs in use at the plant with modern CODESYS V3.5 controllers.

Challenges

For all retrofit projects, the top priority at Berghof Automation is: the plant must always remain operational.

That's why here, too, we carried out and continue to carry out all work requiring the complete shutdown of the plant either at night or at weekends. Extensive planning and precise coordination also ensure that all work goes smoothly and without any loss of productivity. In addition, we always build a fallback strategy into our planning to ensure the safe operation of the plant even in the event of unforeseen events (see also chapter "The Berghof solution in detail").

A particular challenge in this project is the enormous transport capacity of the plant: even during the modernization, up to 2,600 stacking cars per hour should be possible at any time.



Flowers and plants on stacking trolleys in the run-up to an auction

To ensure that the project also fits in optimally with Royal FloraHolland's ideas from an economic point of view, we have also divided the retrofit project into individual stages (see also chapter "Phases of the retrofit project").

In addition, there is another special feature with regard to the control of the individual EMS vehicles: Up to 6 vehicles can cover large sections of the 17,5 km long rail route in formation with minimum spacing. All the vehicles in a convoy travel absolutely synchronously - and at speeds of up to 180 m/min. For this reason, the new control systems in the vehicles have to ensure exactly the same driving characteristics as the previous control systems. This is because even minimal differences in the braking and acceleration phases could affect the complex control functions in the train set.

The Berghof solution in detail

The comprehensive compatibility of Berghof Automation systems enables efficient conversion and minimizes the probability of errors.

For all retrofit projects, we rely on mechanically compatible devices that can be installed in existing control cabinets without major wiring effort. During commissioning, we can thus quickly and easily replace the old control system with the new type. We keep the removed old device in reserve as a backup.

We also followed this tried-and-tested principle at Royal FloraHolland. Not only the controllers installed in stationary control cabinets, but also the approximately 1,300 control modules of the EMS vehicles have been set up with new CODESYS V3.5 controllers in a mechanically compatible manner.

In addition to compatible hardware, it is just as important to have a viable concept for updating the PLC application software. As a first step, the technicians at Berghof Automation port the PLC program of the controller to be replaced to the current CODESYS version 3.5. As far as possible, we pre-test communication interfaces on laboratory setups. The subsequent commissioning of the new control in the plant ensures that the original functionality is maintained.

With the modernization, the plant operator not only gets a new control system. The HMI, service concept and remote functions will also be up to date again.

Phases of the retrofit project

In the first step of the project, we focused on the components that are installed identically several times in the plant. In addition to the controls of approximately 1,300 EMS vehicles, this also applies to the controls of the 48 load change stations distributed throughout the plant.

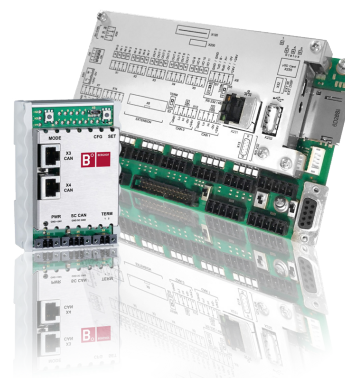
We carried out the modernization completely at one station

as an example, as a "test balloon" so to speak. After several weeks of successful test operation, our partner Pentanova CS Nederland BV then converted the other stations one after the other.

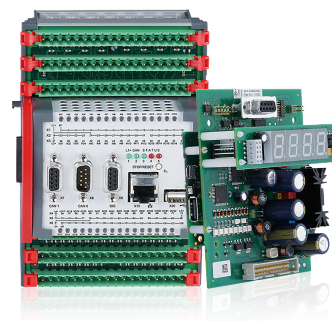
For the EMS vehicles, we have developed and commissioned a new complete control system in cooperation with Conductix-Wampfler Automation GmbH. Berghof supplies the PLC incl. application software and Conductix-Wampfler is responsible for the casing and drive electronics. After the likewise successful test phase with ten new controls, Pentanova CS Nederland BV has started to gradually convert all further vehicles to the new technology.

The last part of the modernization is the replacement of the approximately 180 stationary PLC controls distributed over 22 control areas. The modernization plan coordinated with Pentanova CS Nederland BV began in 2019 with the conversion of the first control area. By the end of 2022, we will have equipped 15 control areas with new CODESYS V3.5 controllers.

After the remaining 7 control areas have been rebuilt, the entire plant will be equipped with new, modern PLC technology by the end of 2024.



Modern and maintenance-free CODESYS V3 controller for mobile traction units with integrated rail bus interface. Counterpart on the stationary side is the CAN25C gateway.



Modern and connection-compatible CODESYS V3 controllers for Retrofit Powertrack Generation 1