

CC-Link In Action

OPEN NETWORKS

Eurostar's high speed express uses high speed CC-Link network

A new CC-Link open network solution is helping Eurostar improve reliability on its LDA system.

Eurostar is the high-speed rail service directly linking the UK to France and Belgium via the Channel Tunnel. As the market leader with 60% of the London-Paris market and around 45% of the London-Brussels route, Eurostar prides itself on offering a quality service and a clean environment.

To ensure perfect sanitary conditions, they used Abbeyfield Electrical Services (part of the EPMS group of companies) to automate their Lavatory Discharge Apron or LDA system. This system maintains the hygienic cleaning of all train toilets and disposal of waste from the carriage tanks.

One of the main objectives of the new system was to increase reliability and efficiency of the LDA cleaning system. The previous control philosophy was semi automatic and consisted of PLCs connected to a twisted pair network. The old system was very unreliable, with the network crashing at least once a week, due to noise and other factors. It also had no feedback, preventing optimisation of cleaning times or tuning of the system.

The new system is based on a CC-Link, Open fieldbus, which is used to connect 41 PLCs that locally control cleansing operations.

These connect back via three CC-Link networks to a central PLC which masters the networks, monitors the entire system and takes care of centralised effluent pumping.

Bryan Starling, Engineering Director for Abbeyfield said, "We needed to replace an existing network with a new very reliable industrial network. After careful examination of various systems, we chose to use CC-Link. This offered us the best fit solution and we could install it without complicated and expensive cabling or strict earthing precautions".

When a train enters the special Eurostar engineering sidings at Northpole International London, the train and its carriages are parked so the toilets are aligned opposite 41 Suction, Monitoring and Pumping (SMP) stations which stand on a special platform. The LDA system allows up to two trains to be cleaned at the same time on either side of the platform to maximise throughput.



An operator manually connects pipes from the SMPs to the adjacent toilet tanks on the train. Each SMP has three connecting pipes, one for the suction system, one for the basin tank and one for the toilet tank. The SMPs suck out all the waste effluent from the appropriate tanks and then add special disinfectant fluid back into the train to kill any bacteria and keep the train smelling fresh.

Each SMP station has a PLC in its housing. These coordinate all cleansing activities and are programmed to self-optimize the cleaning cycles based on local demands. When a pipe is attached to the appropriate area the operator selects the requirements for each SMP, using a simple selector switch. By simply pressing start, the automated SMP then takes care of all other events. When the whole process has been completed it signals to the operator (via a beacon on top of each SMP) that the toilet has been cleaned and is ready for disconnection.

Different types of trains demand different cleansing routines and procedures. The current requirement for the new system is for two types, but the control system has been designed to expand to accommodate up to 5 different train types.