



Part of the SCADA mimic display of the new DLR control system

trains for display on the mimic board. The system was installed early in the 1990s, and was definitely showing its age, with only very basic visualisation capabilities and very limited flexibility.”

The obvious replacement for the mosaic system was a SCADA system communicating with modern PLCs kinked, in turn, via high-speed communications to the trackside I/O.

With the original PLCs being obsolete and with no obvious upgrade path, Iconsys was free to choose the most suitable SCADA system for the upgrade. “We had previously installed a Rockwell Automation RSVIEW SCADA package at Poplar,” says Darrall. “Among other things, this delivered remote control of the Beckton sidings as a backup to the local mosaic board operation.

“Having had good experiences with the design and installation of that system, we were naturally keen to base Beckton’s own SCADA implementation on a Rockwell package. This, in turn, led us to look at Allen-Bradley ControlLogix PLCs, and we quickly realised that the combination would form the basis of a very effective solution.”

Iconsys project engineers set about developing the control system, including writing, testing and proving all of the control software. The upgrade had to be “right first time” with the system being installed in one “hit”, in a live changeover, with minimal disruption to the rail network.

> Familiar asset

The new system is built around Rockwell’s FactoryTalk View HMI software, which provides a scalable, distributed platform that simplifies system design.

“Our familiarity with the RSVIEW SCADA installation at the Poplar control centre was an asset,” Darrall reports. “The two packages share common development tools, easing us through this project as well as simplifying integration between Poplar and Beckton.”

The SCADA system connects to three new PLCs in the Beckton

control room. A challenge for Iconsys was to network the PLCs to the 30 trackside I/O boxes, spread across some 2km of track around the marshalling yards.

The answer was to link the I/O via a fibre optic network using EtherNet/IP communications. Iconsys adopted a linear topology, with the I/O boxes daisy-chained via a series of repeaters. The result is reliable, robust communications at speeds of 10Mbps with no practical limits on operating distances.

Installing the new system was a key challenge, with minimum disruption to the rail network being a priority. “We discussed several installation and commissioning strategies, but the all-in-one approach was by far the most straightforward,” says Darrall. In the event, the changeover went smoothly with the old system being replaced and the new one commissioned in just five days, with almost no downtime.

“Instead of the physical buttons on the mosaic, the operators now bring trains into sidings at the click of a mouse,” Darrall explains. “But we ensured that the SCADA screen mimicked the mosaic as closely as possible to minimise the learning curve for the operators.”

Introducing the SCADA software has brought a wealth of other benefits, with much better visibility of the train track positions compared with the original mosaic, plus improved safety processes and alarms, and superior system diagnostics.

The upgraded PLCs also provide a ready upgrade path if and when additional sidings are added. The PLCs are networked to provide a degree of redundancy so that if one of them – or even two – should go down, the sidings can still be used.

As the DLR enters its third decade of service, with more and longer trains than ever before, the importance of the Beckton facilities will continue to grow. And with its newly installed control system, those overseeing the development of the DLR can be confident that the Beckton facilities can meet the needs of today, as well as being flexible enough to meet the requirements of tomorrow. D&C



Controls upgrade puts DLR in Olympic starting blocks

The Docklands Light Railway will play a vital role in transporting visitors to the 2012 London Olympics. In preparation for the Games, a key marshalling yard has been upgraded by replacing its obsolete controls and mimic displays with modern PLCs, SCADA software and communications facilities.

When the Olympic games come to London in 2012, the capital will see more than nine million people coming together to cheer on competitors in 26 sports, appearing in 34 venues over 17 days.

One of the keys to the London Olympic Committee's successful bid was the investment to develop the capital's transport infrastructure, based on a predicted peak capacity which could exceed 240,000 passengers per hour. And a cornerstone of the transport system will be the Docklands Light Railway (DLR), which will connect spectators with events in venues across East London. A new extension to the DLR is also being built to provide a direct link to the Olympic Park.

The Olympic Delivery Authority and Transport for London have already invested £100m to improve the DLR, but the ongoing investment goes far beyond the requirements of just the Games themselves. The work will allow the railway to keep pace with increasing passenger numbers – currently 65 million per year, but expected to rise to 100 million by 2012.

The transport plans will also continue to drive regeneration of East London and the wider Thames Gateway, creating one of the best-connected areas in the capital, and bringing economic and social benefits that go far beyond 2012, and far beyond sport.

The DLR, which opened in 1987, today transports more than ten times its original passenger numbers and has played a vital role in the regeneration of East London. Customer satisfaction with the

service is 96% and, with a 97% reliability record, the DLR leads all of Britain's rail networks.

The DLR trains are fully automatic and operated by onboard computer systems linked to a central control room at the Poplar intersection. But while Poplar is the hub for overall control, just as important is the depot at the eastern-most end of the line, at Beckton, that offers servicing and stabling facilities for the trains.

> Major upgrade

Over the years, as the DLR infrastructure has grown, the Beckton depot has expanded with new facilities and extra sidings. Most recently, as part of the construction of new sidings, it became clear that a major upgrade of the control systems was needed, with the aim of delivering vastly improved visualisation, easier maintenance, superior flexibility and a ready-upgrade path for any future expansion.

The upgrade was undertaken by the Telford-based system integrator Iconsys, which specialises in the design, manufacture and commissioning of turnkey control projects, with transport as one of its key areas of expertise. Iconsys has maintained the existing Beckton control system for many years, and designed and has installed equipment in other areas of the DLR control system.

"The driverless DLR is a great example of how effective a computer-controlled rail network can be," says Iconsys managing director, Trevor Darrall. "A state-of-the-art SCADA system in the central control room at Poplar monitors all the relative positions and speeds of the trains from their onboard computer signals and trackside monitoring systems, and then sends data to the trains to ensure that safe distances are maintained.

"By contrast, the local control system at Beckton that we were looking at upgrading was based on a traditional mosaic tile mimic board," Darrall continues. "Operators bringing trains into the depot would press a button on the mimic board to set an end destination. The connected PLCs would determine the route and operate the points and signalling, feeding back the position of the



London's Docklands Light Railway carries 65 million passengers a year