

CC-Link In Action

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CC-Link in building automation

Fieldbus architecture reduces the cabling and commissioning requirements of control systems, particularly in large, highly distributed systems. Steve Jones, General Manager of the CC-Link Partners Association, Europe, illustrates the theory by referring to experiences in his own offices.

The environmental control systems in modern office buildings can be on a par with large sophisticated manufacturing control systems in terms of operational complexity, I/O count and wide ranging distribution. And, just like in the industrial world, the amount of cabling can become almost untenable.

In recent years there has been an increasing desire to find ways to reduce the cabling requirement, as it should speed up installation and commissioning, simplify maintenance, make reconfiguration easier and pull significant costs out of premises overheads.

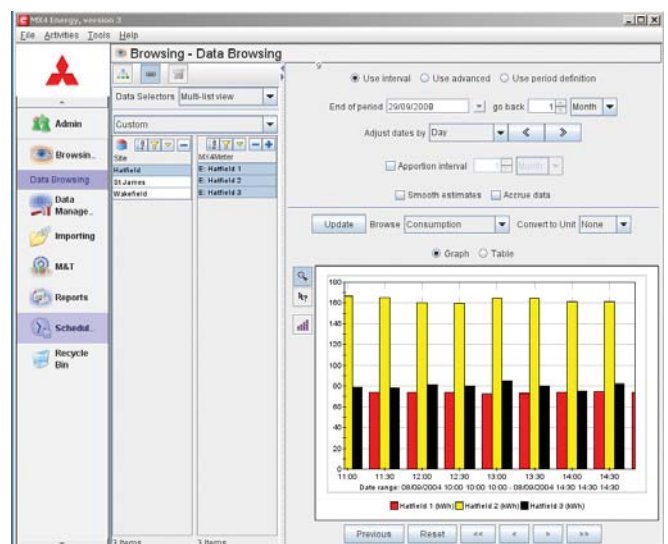
Building services engineers who can summon up a bit of free thinking have in fact discovered that there is a ready-made solution to this emerging need. Traditionally building control systems have been based on dedicated controllers made by specialist manufacturers, but by switching to the sort of control technology used in plant and machinery, tremendous extra freedom can be achieved, while data collection and analysis becomes far easier.

Pushing this concept on to the next level, they find that fieldbus control can be a real boon, offering reduced wiring, speed of response and performance analysis.

The CC-Link Partners Association (CLPA) can vouch for these claims from recent personal experience. It has its European headquarters on the first floor of a large office building in Hatfield, Hertfordshire, and has recently been involved in refurbishing the entire buildings control systems.

The building is about 25 years old and the owners wanted to bring the environmental and energy performance up to contemporary standards.

Fairly typically, the building was originally open plan, but over the years a significant percent of the floor space has been converted to offices and meeting rooms. Local control was provided for the air conditioning in the closed offices, and we all suspected that this drove up operating costs significantly. So I suggested that we fitted energy meters at key points in the system to check the situation.



CLPA has a partner company that makes CC-Link network compatible energy meters, ND Metering Solutions in Bradford. It was natural to use them and to link them together via a CC-Link network.

The monitoring system was relatively easy to install. Each main feeder in the main switch panel was fitted with CTs wired to a new panel containing sixteen energy meters. Using a CC-Link open network these meters were then connected to a central controller. In this instance we used a Mitsubishi PLC to manage the CC-Link network, but we could have just as easily have used the PC based CC-Link master card.

CC-Link does not require the more complex set up or slave device files of other open networks, making it extremely easy to install and to add further devices if the system expands. Installation was therefore quick and easy; had this been a commercial job, we'd have saved significant time and cost.

What makes it interesting is that the PLC uses a TCP/IP connection directly to the adjacent office LAN. That meant very little cabling and the data can be accessed from any PC on the office network with the right access. Using a simple PC based monitoring package then enabled us to see the demand immediately, set sampling times and continuous demand monitoring.

The idea was to run the energy meters for six weeks to identifying patterns of energy use and highlighting trends and hot spots.

By the end of the six weeks' data collection, energy consumption trends were emerging - some of which were addressable with simple changes of habit.

The first thing that struck us was that we were using 20% of our daily consumption at night, when the offices were empty. Further investigation identified that equipment in the kitchen was being left on 24 hours a day including the weekend, and that bank holidays were not programmed into the existing controller's calendar. These alone made the energy meter project worthwhile, but we have also identified further potential savings that we'll be addressing over time.

Overall, the air conditioning is split into zones, each with a medium level controller, feeding back to an overall control computer via a local area network. It looks like we will be upgrading each zone in turn with CC-Link.

We can optimise the air conditioning further, integrate environmental systems with safety and security systems, and bring the commercial equipment such as security onto the control network. We are certainly looking at occupancy monitoring so that areas can be powered down when empty.

Additionally, we are adopting very green technologies such as photovoltaic panels and ground source heating - who knows, we may even get wind turbines mounted on the roof, all or which could be integrated into the controlsystem by CC-Link.

The great advantage of going down the industrial controls route is that operational data and analysis becomes very easy. In manufacturing you are looking at commercial issues like productivity, throughput and order fulfilment; for building controls, it energy monitoring and cost apportioning, carbon minimisation and environmental optimisation.

Our building controls refurb is a gentle evolution. We won't do anything shockingly big and sudden, but we will add control elements over time. This is typical of course; the difference is that once the CC-Link infrastructure has been put in place, the flexibility of our solution means that a control strategy can be achieved without the need for major extra investment.

Overall our expectation is that we will reduce energy consumption and running costs by 25-30 percent, and this is starting with a system that wasn't particularly inefficient in the first place."

CC-link has proved itself to be a very good architecture and it looks like becoming the system of choice as we work through the rest of the control systems upgrade.