## New Manufacturing Systems Embrace Open Networks

Across Europe manufacturing is being automated as a way to both compete against imports from 'low cost' economies and to ensure consistent output quality. However 'greenfield' projects are rare and the vast majority of automation projects are retrofits, upgrades and extensions. Here, John Browett of the CC-Link Partner Association (CLPA), looks at how the upgrade of systems using open networks can provide major cost benefits, while also improving system performance.

It is very easy for politicians to say: 'let's improve the productivity of our industrial base.' But many European manufacturing companies already have their factories and plants working at above global average efficiencies. So what else can be done to increase output?

The first practical issue to address is finance. It is a rarity indeed when there is more than enough money to go around. Usually there is fierce competition between every department in a company to secure investment funding; and when production wins, the funds have to be spent wisely.

So let's briefly look at the main cost elements of an automation project. The hardware is a major expense; and the skilled engineers that design the systems also command high rates. In addition, there is also the often- overlooked cost in cabling of the system. Cable itself is relatively inexpensive, but installing it is time consuming. In many instances the upgrading or extending of an existing system can take more time than installing a new system from scratch.

There is, however, an alternative to conventional wiring systems: one that cuts costs substantially for both existing and new projects. This is to use a single ring or bus communications topology, where field devices are 'daisy-chained', rather than being individually wired back to a controller.

In moderate to large size plants, using this option results in notable savings in the amount of cable used. But more importantly, the cabling operation is reduced in scale by orders of magnitude; and the cabling itself is so simplified that it is much easier to maintain and reconfigure – reducing installed costs on an ongoing basis.

The facilitator to achieve these control system benefits is an open fieldbus, such as CC-Link. In essence, CC-Link sends the right signals to the right field devices, and does it in a time frame that matches the old fashioned dedicated wiring model. Another major advantage of CC-Link is that because it is open, users can even mix and match equipment from different manufacturers in a single system. This might mean company A's inverter communicating with company B's PLC, interfacing with company C's HMI, along with sensors from half a dozen different sources. In a new-build project this facility enables users to choose the best in class equipment. More importantly, in projects such as a retrofits or upgrades, the problems of legacy equipment not being able to communicate are effectively overcome. Further, in a maintenance situation, if company A's inverter is not available, perhaps company D's product can be substituted instead, providing a fast recovery from breakdown.

The net effect of this benefit is that machinery is retrofitted rather than scrapped, resulting in greatly reduced project costs. In addition, disruption to production is reduced and commissioning becomes much quicker and easier.

**Uneven take up**

It is significant that open networks have been around for 10 years or more, but their usage is not even right across Europe. They have been the de facto choice in Germany for some time; most of industrialised Europe is following this lead, but lagging by about three-to-eight years.

Japan is probably on a par or slightly ahead of Germany. Its neighbouring Asian economies, which have also become manufacturing powerhouses, are well advanced with installing open networks. The same is also true across North America.

CC-Link is finding a welcome home in Central and Eastern Europe and the old Soviet-bloc countries. These economies are rebuilding manufacturing facilities that are basically of 1950s' origin. But they do not have to work through the

technologies of the 1960s, 70s, 80s and 90s to catch up: they are thrusting straight into the best today has to offer and aiming to build world class facilities.

An excellent example of this process in action is Russian railways. The Russian Railways Corporation is one of the world's three biggest railway companies, transporting more than 1.3 billion passengers and 1.3 billion tons of freight every year. Its 85,500-kilometre network is the second-largest in the world, extending across eleven time zones from the Black Sea to the Pacific. Almost everything in Russia depends on the railways. Around 80 percent of all goods and 40 percent of all passengers in the giant country are carried by rail. Huge distances and some of the most extreme environmental conditions in the world place a very heavy burden on the rolling stock, which includes around 20,000 locomotives, 25,000 passenger cars and 630,000 freight cars.

Added to the many operational problems faced by the Russian Railways Corporation in its everyday operations is the fact that its rolling stock is showing its age; modernisation is, therefore, an absolute necessity. Along with its other initiatives, the company is accelerating the use of modern manufacturing and automation to improve efficiency and productivity of the rolling stock maintenance facilities at Magnitogorsk in the Southern Urals.

All operations involved in the maintenance and refurbishment of bogie components have been automated. This involved development of a control system based upon the latest generation multi-processor programmable logic controllers (PLC) and motion controllers. The control system is integrated with other completely new equipment, and with machinery that had been in place for many years.

The resulting overall system incorporates machine tools, welding robots, conveyor and handling systems and an RFID (Radio Frequency IDentification) tag system for component tracking, providing a comprehensive solution that includes a CC-Link fieldbus network and HMI control terminals. In addition to fast and secure communications, the new system also provides full transparency for all the plant and machinery. It was all installed with a minimum of downtime, is easy to operate and has already proved robust reliable and adaptable to change.

Any objective assessment would rate the new Magnitogorsk facility as world class: a complete turnaround compared to the old set up. A key element in the project was the replacement of the antiquated wiring with a CC-Link network, and exactly the same principles can be applied to smaller scale less extreme projects throughout Europe.

## About the CLPA

The CC-Link Partner Association (CLPA) is an international organisation with over 1,500 member companies worldwide. The partners' common objective is promotion and technical development of the family of CC-Link open network technologies. Over 1,100 certified products are now available from over 240 manufacturers. CC-Link is the leading industrial fieldbus in Asia and is becoming increasingly popular in Europe and the Americas. The European headquarters is in Germany, with offices throughout the continent.

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