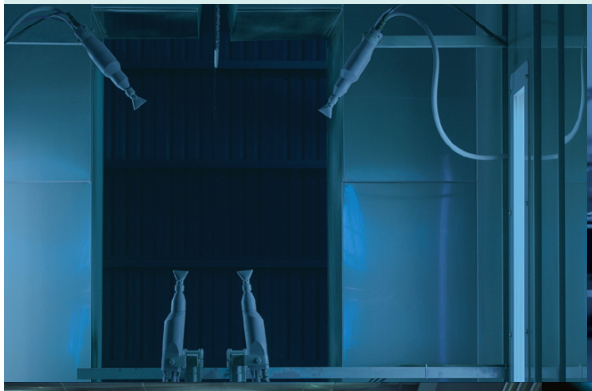
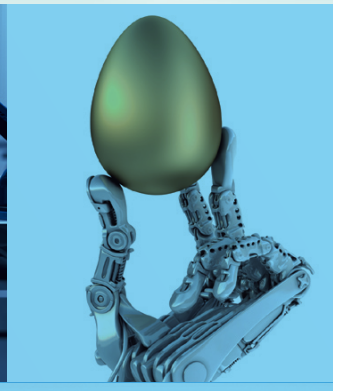
CLPA Global Activity Report Vol.3

Pioneering the Possibilities for Automation with CC-Link & CC-Link IE






Special Interview

CC-Link Partner Association and Beijing BOE Display Technology Co., Ltd.

An 8.5th-generation Factory Leading the FPD Industry in China Looks Forward to the Future Development of CC-Link and CC-Link IE

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Strengthened Cooperation between AS-International and CLPA: Joint Promotional Activities in Progress

An 8.5th-generation Factory Leading the FPD Industry in China Looks Forward to the Future Development of CC-Link and CC-Link IE

CC-Link and CC-Link IE are used in production lines for flat panel displays (FPDs) including liquid crystal displays (LCDs). Ms. Naomi Nakamura, global director of the CC-Link Partner Association (CLPA), and Mr. Haruyuki Otani, technical task force chair person of the CLPA, interviewed Mr. Cheng Chang, vice factory manager of Beijing BOE Display Technology Co., Ltd., about their actions and the latest needs for factory automation. Beijing BOE Display Technology Co., Ltd. operates the most-advanced 8.5th-generation factory in China, where the FPD industry has been growing rapidly.

Ms. Nakamura (hereinafter: N) I would like to hear about Beijing BOE Display Technology Co., Ltd. and the 8.5th-generation factory.

Mr. Cheng (hereinafter: C) Our company is one of the affiliated enterprises of BOE Technology Group (BOE). BOE has been leading the liquid crystal display industry in China from the early stages of the industry. BOE entered the LCD industry in China around 2003.After that, BOE has been steadily and continuously increasing the number of production bases; the 5th-generation factory in Beijing, the 6th-generation one in Hefei, and the 4.5th-generation one in Chengdu. The latest factory of BOE Technology Group is the 8.5th-generation factory in Beijing, which is operated by Beijing BOE Display Technology Co., Ltd. Beijing BOE Display Technology Co., Ltd. started the mass production of LCDs at the 8.5th-generation factory from September, 2011.

From touch-panel LCDs of 7 inches for mobile devices to the largest LCDs of 110 inches for large-screen televisions, various types of liquid crystal display panels are being produced in this factory. The current production capacity is 110,000 LCDs per month. We are planning to improve the manufacturing facilities to increase the production capacity to 120,000 LCDs per month.

Ms. Naomi Nakamura
Global Director
CC-Link Partner Association

Mr. Haruyuki Otani
Technical Task Force Chair Person
CC-Link Partner Association

Seamless connection with information systems is important

Mr. Otani (hereinafter: O) Would you tell us what is your company doing for the automation of production lines?

C We consider that the advancement of automation is one of the key issues for us. According to Mr. Dongsheng Wang, president of BOE Technology Group, our manufacturing technology needs to constantly innovate. Automation is the main pillar of this innovation. This is being driven by increases in employment costs. Unless we increase the rate of automation of production lines to reduce the employment costs, we would lose our competitive strength in the FPD market. The technologies of CC-Link and CC-Link IE have already been used in our production systems. Their roles will become more important in the future.

Furthermore, we are promoting the introduction of Computer Integrated Manufacturing (CIM), which is intended to improve production efficiency by managing all the various data generated in the manufacturing facilities. The CIM concept uses advanced technologies such as cloud computing and communication systems that connect the network of the manufacturing facilities with the host information systems so as to enable the quick-processing of vast amounts of data collected from the facilities. We will use the technologies of CC-Link and CC-Link IE for this system as well.

O What is the reason why your company is strengthening the communication system between the information system and the manufacturing facilities?

C This is because the amount of data coming from the production lines to the information system is exponentially increasing. There are two reasons for the increase. One is the growth of the factory size. The more manufacturing machines we have, the more data we have to process. The other reason is that the number of product models produced in one manufacturing facility is increasing. The trend of many models being produced in small quantities is getting more common as consumer needs diversify. Thus overall, the amount of data to be processed is increasing.

O Of course we also think that the communication between manufacturing facilities and the host information systems is an important factor. CLPA developed the "Seamless Message Protocol (SLMP)", a common protocol for connecting information systems where Ethernet is used to the CC-Link IE network of manufacturing facilities.

Using SLMP enables a simple connection between the factory and information systems' networks.

"Reliability" and "Interoperability" are mandatory

N CC-Link and CC-Link IE are already used in your company's factories. Would you tell us what features are required when your company chooses which industrial network standards to use?

C We pay attention to the following five features. The most important feature is "Reliability". If a production line stops, it causes enormous losses. The second-most important feature is "Interoperability" among devices. This is important to build networks flexibly using various different vendors' devices together. The third feature is cost efficiency and the fourth one is the data transmission speed. The last feature is the communication distance and the number of nodes that can be connected.

N How does your company evaluate CC-Link and CC-Link IE?

C We consider that CC-Link and CC-Link IE meets all these requirements. However, we hope that the data transmission speed will increase.

N The data transmission speed of CC-Link and CC-Link IE is 1 gigabit per second. This is the fastest speed among industrial network standards. Why do you need faster speed?

C We had considered that the data transmission speed was enough, but we also have to consider possible problems in the future. Many requirements for increased production data are now emerging.

For example, the size of LCD manufacturing equipment is increasing. The trend for the glass substrate size to increase has stopped, but manufacturing equipment may need to be operated at higher speeds to improve its production capacity. Thus, the amount of data to be processed will increase. Furthermore, if we produce new displays with higher levels of technology in the future, the manufacturing process will become more complex and the amount of data to be processed will increase further.

Mr. Cheng Chang
CF Factory
Vice Factory Manager
Beijing BOE Display Technology Co., Ltd.

We measure the timing of the data communication in production lines in one hundredth of a second increments. This is because the timing affects production cycle times.

O As you pointed out, we need to pay attention to the market needs for the data transmission speed.

C Our goal is that our 8.5th-generation factory will become the highest revenue producing LCD factory in the world. We consider that industrial networks are an important part of achieving this goal. CC-Link and CC-Link IE are excellent automation technologies and will be used in many other industries. We look forward to the future development of CC-Link and CC-Link IE.

● About this interview

This interview was conducted on the site of the "FPD International China 2013/ Beijing Summit" (Host: China Optics and Optoelectronics Manufactures Association LCD Branch and Nikkei Business Publications, Inc.), which was held in Beijing from September 10th to 11th, 2013. CLPA had a booth in this event and participated in a round-table discussion. Many key persons engaged in the manufacturing technology of the FPD industry in China and representatives of automation-related companies in Japan gathered for the conference. CLPA spoke about the benefits of CC-Link and CC-Link IE there.

Chinese leading heavy industry manufacturer working on enhancement of energy conservation achieves advanced energy management with CC-Link IE

Shanghai Heavy Machinery Plant Co., Ltd., a leading heavy industry manufacturer, is an affiliated company of Shanghai Electric Group, one of the largest government-owned corporation group in China, and built a progressive energy monitoring and control system using CC-Link IE. They strongly promote energy conservation in their factories. Ms. Naomi Nakamura, the global director of the CC-Link Partner Association (CLPA), interviewed Mr. Ye ZhiQiang, the Vice-General Manager of Shanghai Heavy Machinery Plant Co., Ltd. Ms. Nakamura asked him about their approach to energy conservation and the background of CC-Link IE's introduction in China.

Ms. Nakamura (hereinafter: N) Would you tell us about your products?

Mr. Ye (hereinafter: Y) We handle thermal processing and machine processing of metal such as metallurgy, forging, and casting. That is, we have an integrated system of production from raw materials to finished products. Our main products are large-size metalwork such as turbines for power plants. We have eight factories on the property of the headquarters in the southwest area of Shanghai. Three of them are for thermal processing, four are for machine processing, and the last one is for welding.

The sales for 2011 amounted to 3.4 billion yuan. We have high shares in various fields in the Chinese market: 10% in metallurgy, 15% in forging, and 35% in casting. In addition, we have a national technology development center. I am sure that our technology is the most advanced in China.

Mr. Ye ZhiQiang
Shanghai Heavy Machinery Plant Co., Ltd.
Vice-General Manager
Technology Center Director
Senior Engineer of Professor's Degree

N I have heard that your company focuses on energy conservation in your factories.

Y In thermal processing and machine processing, a large amount of energy is essential. For example, if converted into the weight of coal, the energy consumed in our factories in 2011 reaches 180,000 tons. While the whole Shanghai Electric Group works on energy conservation, we think that our efforts on energy conservation have a huge impact because we consume the most energy in the group. This is why we focus on energy conservation.

Integrated control by CC-Link IE

N One of the specific approaches is an energy monitoring control system using CC-Link IE. Would you tell us the outline of the system?

Y This system "visualizes" the energy consumed in the factories. Integrated control allows data collection from various sensors installed on the equipment in the factories such as boilers and furnaces. (**Fig. 1**). In the "energy monitoring control center (能源监控中心)", we can promptly know the consumption of electricity, natural gas, coal gas, oxygen, and steam. At the same time, we built a system for the thermal management of boilers and furnaces used in the factories. CC-Link IE is used in the network to collect information from many sensors used in such a system.

The project was divided into two terms, and the first term has been completed. The current system has 667 nodes collecting the data. This covers about 95% of overall energy consumption in the facilities. We developed this system over two years since 2009 together with Shanghai Electric Ryoden Energy Saving and Control Technology (SERT), who handles energy control systems and FA systems. (For more information on SERT, refer to the associated article.)

Fig.1：Energy monitoring control center (能源监控中心) of Shanghai Heavy Machinery Plant Co., Ltd.

Fig.2：Considerably-miniaturized process management system for a forging furnace. The equipment on the left in the picture is the existing system with pen recorders. The terminal of the new control system using CC-Link IE is on the right in this picture.

N What impact has the introduction of this system had?

Y One of the results is that we can now analyze the status of energy utilization in more detail by implementing a function that displays data with various graphs. This function has optimized energy consumption and reduced energy costs.

A further result is that we established a system that automatically accumulates data related to working processes, leading to better control of manufacturing processes. In the existing systems, many automatic pen recording devices were used. However, in the new system, such devices were considerably miniaturized (**Fig.2**).

Evaluating "high speed" and "high reliability"

N I would like to hear your evaluation of the technology of CC-Link IE.

Y Real time information was what we placed importance on when we designed the energy control system. In response to our demand, SERT suggested the adoption of CC-Link IE, which enables high-speed data transmission. A large amount of information can be updated in a minimum of two seconds in the actual system.

The high reliability is another big advantage of CC-Link IE. I have really appreciated the reliability of CC-Link IE in the two years since the system was started.

N Thank you so much. High speed and "high reliability" are the key features of CC-Link IE that we appreciate. Would you tell us your future plans?

Y We have already started the construction for the second term. One of the important points in the second term is to enhance a consumed-power management feature. Using this feature will lead to greater energy conservation. The functions of the information processing systems will be also enhanced. Specifically, we will introduce a mechanism that continually analyzes collected data and promptly issues an alert when a measured value goes near exceeding the set threshold.

Ms. Naomi Nakamura
Global Director of CC-Link Partner Association

N I think that new CC-Link- and CC-Link IE-compatible devices are required to achieve these enhanced functions. The CLPA is always working with our partners to increase the capabilities of CC-Link- and CC-Link IE-compatible devices.Thank you so much for your time today.

Supporting development of the Chinese systems market

Shanghai Electric Ryoden Energy Saving and Control Technology (SERT), which co-developed the energy monitoring control system of Shanghai Heavy Machinery Plant Co., Ltd., joined the board of directors of the CLPA activity in September, 2012. Mr. Yuji Watanabe, the General Manager of the company, expressed his intent to contribute to the promotion of CC-Link and CC-Link IE in Asia using his experience in the Chinese market and his perspective of a system vendor.

SERT was established in February, 2011 as a joint venture company between Shanghai Electric Environmental Investment Co., Ltd., which handles environment-related business under the umbrella of Shanghai Electric Group, and the Chinese local corporation of Mitsubishi Electric. The main businesses of SERT are design and development of FA systems and energy control systems.

The board of directors of the CLPA consisted solely of FA device vendors until SERT joined. I believe that participation of SERT handling systems business has great significance for promoting CC-Link and CC-Link IE. This is because the industrial network technology used in systems is constructed according to the user needs.

In addition, we will contribute to the promotion of CC-Link and CC-Link IE in Asia, which is a key focus for the CLPA. SERT is the third foreign company on the board of directors and is based in China. We will willingly give feedback on market needs to the CLPA to strongly support the promotion of CC-Link and CC-Link IE in China.

Shanghai Heavy Machinery Plant Co., Ltd. was an early adopter of CC-Link IE and is a good example of promotion in Asia. Their CC-Link IE energy control system clearly shows that it has potential for spreading to various fields.

Mr. Yuji Watanabe
General Manager of Shanghai Electric Ryoden Energy Saving and Control Technology Co., Ltd.

Strengthened Cooperation between AS-International and CLPA: Joint Promotional Activities in Progress

The AS-International Association is a worldwide organization that is responsible for the promotion of "AS-Interface (abbreviated to AS-i) ", a sensor level network system. The AS-International Association (hereinafter AS-International) and the CC-Link Partner Association (CLPA) have started to collaborate on promotional activities. Ms. Naomi Nakamura, global director of the CLPA, interviewed Mr. Rolf Becker, CEO of AS-International, about their organization and the future expectations for this collaboration.

Ms. Nakamura (hereinafter: N) AS-Interface has already existed for more than 20 years and has an overwhelming presence at the sensor network level. Mr. Becker, can you give our readers an overview of your organization and its activities?

Mr. Becker (hereinafter: B) AS-International was founded in 1991 after a project begun by the Federal Ministry of Education and Research of Germany. Our organization is responsible for marketing of AS-i and the development of AS-i standards. Our headquarters are located in Gelnhausen near Frankfurt. We have 350 member companies worldwide and we are also represented by regional branches in countries such as Brazil, China, Japan, and the USA. The first AS-i compatible product came onto the market in 1994. AS-i has an overwhelming presence in the sensor level network market. There are more than 1,700 certified AS-i products in the market and over 25 million devices in the field.

AS-i has various excellent characteristics

N What would you say are the main reasons why AS-i has been widely used?

B One of the reasons is that AS-Interface is suitable for any fieldbus network. In general, an industrial automation system is broken down into control, field, and sensor actuator level. At the first two levels, there are several market-leading systems and each system's market share depends on the region. For example, in North and South America these are Ethernet IP and DeviceNet, in Europe Profinet and Profibus, and in Asia CC-Link IE Field and CC-Link.

AS-i is designed to be able to connect with any of these fieldbus networks. That's one of the reasons why it acquired the dominant market share at the sensor level all over the world. As well as the actual performance, AS-i also provides considerable cost benefits. I believe that many of our users chose it because of these advantages.

N Would you give us some examples?

B For example, the time and work involved in wiring can be reduced by about 40% with AS-i. As a result, associated costs for wiring can be lowered dramatically. Formerly, huge bundles of cables had to be used in a manufacturing facility. If any additional cables had to be connected, an enormous amount of work and expense were required.

However, a single cable is sufficient with AS-i. It covers the whole system and connects the slaves to the master. Thanks to its simple wiring, sensors can be repositioned easily and miswiring is physically prevented. No particular prior knowledge is needed for assembly. Hence you save installation time in this way.

To accelerate the promotion of these advantages, AS-International has been carrying out actions to secure interoperability of AS-i products. Specifically, our organization ensures that all devices of our member companies comply with the given specifications. Therefore, users can mix the AS-i products of the 350 member companies freely without any problems. Users can therefore interchange one product with another having the same function, so procurement of a replacement is easy.

Strengthened cooperation through mutual collaboration

N AS-International and the CLPA decided to collaborate on promotional activities in many areas of the world. Would you tell us what the advantages of this collaboration are for your organization?

B I would again like to stress that AS-Interface is suitable for any fieldbus network. The cooperation with the CLPA is therefore not exclusive. However, I certainly do see CC-Link and CC-Link IE as the main market leading systems. By our cooperation we can clearly inform users who use CC-Link or CC-Link IE of the advantages of the AS-i.

Both technologies complement one another. On the one hand, with AS-i, sensors and actuators can be employed by the CC-Link/CC-Link IE solution effectively. On the other hand, with CC-Link or CC-Link IE, AS-i systems can be connected to the higher level control systems.

N Although both AS-International and the CLPA have shown the benefits of our networks to our individual user communities, it is now important for us to collaborate to inform them of the advantages of the combined use of these two networks.

B There were some AS-i products with CC-Link/CC-Link IE gateway functions even before the first discussions on our cooperation in 2001. It was important to us at that time that manufacturers of products related to CC-Link, the market leading system in Asia, offered AS-i compatible products.

Therefore, we needed the cooperation of both associations and actually it brings us big advantages. The CLPA gains better access to European markets through AS-i. And AS-International gains a big step to the Asian market.

Now our cooperation is becoming more intensive. Many of our members are also CLPA members and offer CC-Link/CC-Link IE and AS-i compatible devices.

The more companies develop such products, the more comprehensive interoperability will become, and the more application options there will be for these products.

The collaboration of the two organizations is accelerating

N Exactly. CC-Link and CC-Link IE are the networks that have dominant market shares in Asia. I believe that the collaboration with CLPA will bring a big step to promote AS-i in Asia. We, the CLPA, hope that the collaboration with AS-International will increase the portfolio of CC-Link- and CC-Link IE-compatible products, especially in the area of sensors, and will lead to CC-Link and CC-Link IE being more widely used in Europe.

B We have already started our promotional activities together in the form of joint trade fair and exhibition appearances, and information brochures. Our first joint appearance at a trade fair was the Hannover Messe in April 2013 in Germany. We also exhibited jointly at the SPS IPC Drives in Parma, Italy. The next step is the System Control Fair 2013 in November 2013 in Japan, where this time AS-International will be represented on the CLPA stand.

We will also be jointly offering seminars in many areas of the world. In these seminars, we will explain the benefits CC-Link/CC-Link IE and AS-Interface can provide, how both systems work together and how a plant can be equipped in this way throughout. We have already done two seminars in China and they were very well received.

N What do you think is the next step of our collaboration?

B The demands of the various markets are very different depending on the region and this will continue to be the case for the time being. We need a wide selection of products to be able to cover all application demands.

Common specifications may be important to improve compatibility between AS-i and CC-Link/CC-Link IE. Furthermore, we will need to increase the number of products compatible with both CC-Link and AS-i not only in Europe but also in Asia. For these objectives, we will support manufacturers who develop CC-Link and AS-i compatible products by joint marketing activities.

What is and will remain very important is that plant and machine builders must see the benefit - with an integrated solution from control level through to field level. Anyhow, the most important objective must be to please the user, not ourselves.

N I really agree with you. We need to show some application examples of using AS-i and CC-Link/CC-Link IE together and what benefits this can deliver. The next step is increase the support by users and device makers. We are ready to respond to market demands and to offer further benefits to our users.

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