Strengthening production systems to meet the demands of market diversification at FAW Corp. "The keys to evolution are in the hands of automation technology”

China FAW (First Automobile Works) Corp. (hereafter: China FAW) is the biggest automobile manufacturer in China. FAW Car Co., Ltd. (hereafter: FAW Car), an affiliated company of China FAW, has been aggressively adopting an automated production system to achieve both high quality and high productivity. The company, employing what they claim is the world's highest level automated production system, has demonstrated a strong commitment to CC-Link. We interviewed Mr. Wang Yuchun, one of the executives in charge of the production system, to ask about CC-Link.

Wang Yuchun
FAW Car Co., Ltd.
Deputy General Manager

Naomi Nakamura
CC-Link Partner Association
Director

FAW Car is a wholly-owned subsidiary of China FAW. It was formed in 1997 and celebrated its 15th anniversary in 2012. Currently, FAW Car produces private-label automobiles including Hongqi (its flagship and the highest class model in China), Besturn, and Oley. In addition to these, FAW Car also manufactures the Mazda 6 and 8 as part of an alliance with Mazda. FAW Car currently operates three main production factories; the 1st factory, the 2nd factory, and the Hongqi-dedicated factory. Additionally, FAW Car plans to build a new factory, the 3rd factory.

The company is trying to establish a production system that can be flexibly adopted for a complex production plan while increasing its productivity and pursuing high quality. "Recently, the demand for automobiles in the Chinese market has kept increasing, and consumers' needs are getting more and more varied. Our aim is to respond to this situation.” Mr. Wang said. He emphasizes that quality has the highest priority in the endeavour. "We pay attention to quality even when planning arrangements of equipment and staff at a factory startup. After production is started, we strictly manage our equipment, materials,

components, and staff arrangements based on our quality control system." he continued. To deliver that, FAW Car has its own unique production system, the Hongqi Production System (HPS). HPS was developed independently by FAW Car incorporating concepts inspired by its partnerships with Toyota and Mazda.

"New Energy" & "Digitalization" in the new factory

Satisfying both high productivity and high quality is a great challenge in factories. To meet this challenge, automation technology plays a significant role. "Automated systems are important when a new factory is built. Therefore, we employ state-of-the-art automated systems in our plants." said Mr. Wang. For example, 200 robots are used in the welding line of the 2nd factory, which started operation in 2010. According to him, a factory using so many robots in one process is rare in China. "Employing robots has reduced the number of staff on this process by half; however, the productivity has doubled. Reducing human operations has helped to reduce errors, which has in turn improved the quality", he said.

FAW Car will take a more advanced approach for the 3rd factory. "As we establish a new factory, we always set a theme and try to employ a new technology according to the theme to advance the whole concept of the factories. The theme for the 1st factory was "Standardized Factory", and the 2nd was "Automated Factory". For the 3rd factory we set two themes, which are "New Energy" and "Digitalized"." he said.

At the 1st factory, the operations and processes were standardized to improve the quality and productivity. The automated system employed in the 2nd factory was more advanced than in the 1st factory, improving productivity while maintaining quality. The new 3rd factory is positioned as a production base of environmentally-friendly automobiles, and energy saving is a key goal. Furthermore, FAW Car plans to computerize all the factories. "We will automate more processes using the latest technologies and, at the same time, enhance the linkage between the production equipment using network technologies. We expect this to improve the productivity and quality. Presently, we are discussing the details on how to realize these ideas. Furthermore, we will improve the information system so that the development and production departments can cooperate closely." Mr. Wang said. FAW Car will create an enhanced production system satisfying customers' needs while improving the production efficiency.

CC-Link contributes to "Digitization"

Mr. Wang says that industrial networks play important roles in advanced automation. "Our affiliates develop host information systems, and we have been actively configuring an

advanced industrial network system in cooperation with them." According to him, the factories of FAW Car employ several industrial networks of which CC-Link is the most widely used (see below).

"We first brought in CC-Link in 2004. In all of the 1st, 2nd, and Hongqi-dedicated factories, CC-Link is playing an active role. We will adopt CC-Link in the new 3rd factory too."

Mr. Wang also says that the factories of FAW Car face many issues for automation, such as linkages between production lines and between machines. To solve those issues, FAW Car will widely adopt effective automation technologies such as CC-Link. "We will need to integrate the information system and the production system to streamline the production system further. We hope vendors will suggest solutions to establish such advanced systems. The Ethernet-based integrated network "CC-Link IE", which is introduced this time, is capable of transmitting large volumes of data at the high speed of 1Gbit/s. CC-Link IE will help us establish an advanced system. We expect that CC-Link IE will also contribute to improve the reliability of production systems." he said.

Asking the engineer on the shop floor - new technology promises a fusion of information systems while maintaining reliability; an interview

Chen Gang
FAW Car Co. Ltd.
Technical Advisor

Naomi Nakamura
CC-Link Partner Association
Director

Nakamura (hereafter: N): I understand FAW Car is one of the automobile manufacturers that has been aggressively automating its production lines?
Chen (hereafter: C): Sure, we are. We have been focusing on automation technologies since they are important to ensure both high quality and high productivity. I think our

automation level is the highest in China. There are lots of automobile manufacturers in China, however, few of them have world-class automation. Only a few companies such as FAW, Shanghai GM, and Guangzhou Honda have the system equivalent to those of the leading companies in the world, I think.

N: Can you please tell me about the current automation situation at FAW Car?

C: We have now three assembly factories; the 1st factory, the 2nd factory, and the factory dedicated to the highest-class model "Hongqi". We also have an engine manufacturing factory and a transmission manufacturing factory. The automated production system in the 1st factory is no longer the state-of-the-art. However, we employed the latest automated system in the 2nd factory, which was built in 2010, and the Hongqi-dedicated factory. For instance, we use the world's latest manufacturing equipment in most of the main production processes. We are using 400 or more robots.

Most important point for selection, "Reliability"

N: I have heard that some management issues about production bases are getting raised in China, such as increasing staff cost especially in urban areas. Do you think automation technologies are getting more important in solving these issues?

C: Chinese automobile manufacturers face many problems, such as ensuring both productivity and quality while reducing production costs, as they expand their production volumes. Without automation technologies, those problems would not be solved. To solve the problems which are becoming ever more complicated, automobile manufacturers need to cooperate with solution vendors strategically.

I think industrial networks have much to contribute to develop automated systems. Various industrial network standards have already been established. As we create a system, we must consider which standard we should select or which standards we should combine from them. We pay attention to five points when comparing standards, which are 1) reliability, 2) openness, 3) availability and usability, 4) high market share, and 5) initial cost.

N: These five points are exactly what we emphasize when promoting CC-Link. We especially put a great value on "reliability". Specifically, the CC-Link Partner Association has worked to ensure the interoperability between devices of different vendors. For example, we have conducted strict conformance testing. Today more than 1200 CC-Link-compatible devices are on the market, and all of them have passed the strict conformance test which we administer. Therefore, devices of various manufacturers can work properly in any

combination. I believe that these activities are important for users to establish a highly reliable system.

In fact, as a result of our activities, more and more companies have adopted CC-Link, especially in Asia. In Japan, CC-Link commands about 60% of the market for industrial networks. CC-Link commands nearly 50% in South Korea and Taiwan.

C: I agree that the technology of CC-Link is excellent. So far, we have adopted industrial networks of various standards, however, nowadays we are adopting CC-Link more widely.

N: In what kind of processes is CC-Link used?

C: In the 1st factory, for example, CC-Link is used in the welding line, all assembly and the conveyor system. Only a few processes, such as painting and pressing, use networks of other standards because of the specifications of the devices installed on the lines. Since the equipment in the painting and the pressing processes is imported mainly from Europe, we have adopted western industrial networks.

CC-Link contributes to “Informatization”

N: CC-Link has evolved constantly and stably. For example, the Ethernet-based network "CC-Link IE", which was based on the technology of CC-Link, was launched in 2007. CC-Link IE can connect information systems and factory floors seamlessly, which helps optimize the whole production system. I would like to ask your opinion about such technologies.

C: I think the Ethernet-based industrial network can handle a very large amount of information. This will be a help to computerize production systems. It is getting more complicated than ever to manage the production system recently. For example, to respond to consumers' diversifying needs, automobile manufacturers have developed more and more brands and models. This trend requires a production line to manufacture more varieties of models, and the amount of information the production system needs to handle keeps increasing. As this trend continues, the need for an industrial network capable of handling a large amount of information like CC-Link IE will increase.

N: The CLPA willingly helps manufacturers which are trying to enhance their production systems. If you face any problems, we would like you to feel free to ask us for help.

C: Actually, we are setting up our own training center for production engineers. There, we

will provide training programs related to industrial networks such as CC-Link. We might ask you for help with that.

N: We would love to help you then. Thank you so much for today's interview.