



Equipment name

BLISS 60 Ton press

Origin

This machine is a W action type 60 Ton press manufactured by BLISS company in the United States and imported into Japan in 1925. It is the prototype of the press machine that produces the "one-shaped plug", which is our main product, and it is also an important equipment that supported our company's period from its inception to its growth period. It will be exhibited here to commemorate the 90th anniversary of its founding.

April 25, 2014, Techno State Co., Ltd.

My thoughts on "promoting DX"

This is Masamitsu Uehara, CEO of Techno State Co., Ltd.

Since our founding in May 1923, we have always been looking tomorrow and working on new technology development and rationalization improvement. We challenge to "evolve".

In recent years, with the rapid evolution of the automobile industry, our needs have become more sophisticated and diversified. We may say "difficult", but not easily "can't".

As a specialized manufacturer, we are working to realize efficient production by developing new software in the mold department and unifying the technical department and the production department to meet this need. We are always working to pursue rationality in the parts manufacturing process.

We will continue to study further and make efforts to meet all the needs of our customers. We look forward to your continued support and encouragement.

March 16, 2022

○ DX: Promote digital transformation

Techno State Co., Ltd. will celebrate its 100th anniversary in 2023. For us to advance the Fourth Industrial Revolution of manufacturing, which will evolve the "next" 100 years, training in the American software industry, which will transform into the IT industry and evolve virtual innovation with creative ideas, will be required. I thought it was necessary, and in 2018 I visited mainly Amazon, Microsoft, and Boeing, which represent the United States, and gained insight into cutting-edge initiatives. What we are trying to do in Japan is that DX demonstration experiments have already been repeated at convenience stores, Starbucks, Microsoft, Amazon, etc. in the city of Seattle, and mathematical analysis has also been done on the global environment.

In 2019, the following year, we will connect data through the fusion of IT and manufacturing, visualize it at IOT live with factories of production bases around the world, build a system that can grasp the production status, and share information and improve the line in both directions. We are embodying the "manufacturing cooperation system" DX that can be immediately decided. We think that "Industry 4.0" in Germany will be the direction to proceed in the "next" 100 years that we think, and we will visit leading German companies by doing so, we have spread our knowledge about Germany's "manufacturing reality" and "realization process" that "embody creativity" in contrast to "creativity" in the United States last year.

1. What is Germany's goal of "Industry 4.0"?

The First Industrial Revolution was the mechanization of factories using steam locomotives, which began in the latter half of the 18th century.

The Second Industrial Revolution was mass production by utilizing electricity in the latter half of the 19th century. The third industrial revolution is automation that combines electricity and IT, which began in the latter half of the 20th century.

The <Fourth Industrial Revolution> promoted by Germany is to create a computing power system by closely linking the advanced computing capabilities of cyber space globally through a "cyber-physical system" = sensor network. It is intended to improve the reality of the world to better operation. In "manufacturing," an intelligent production system that operates autonomously is envisioned by sensing, accumulating, and analyzing process data related to development, design, and production. In other words, it can be said that it is "realization of smart industry (factory)".

As an example, what is realized at Bosch, which we visited during the mission, is that all production line information at overseas production bases can be checked live on the monitor from a global perspective. Even for the people who work on all production lines, it is possible to get an overall picture at each site.

At KUKA, an arm robot production company, "robots" that make "robots" perform process work. Optimal production was realized by rearranging the production method and product information to be produced according to the need's information of each customer. We are building an automated system that can smoothly realize robot specification configurations, orders, production, and delivery that differ for each customer without waste.

I was able to observe the "Dynamic Cell Production System" drawn by Germany at Audi. Until now, the main production of automobiles has been the line system, which is produced according to a strictly determined process. Although there are methods such as mixed production, it is not easy to create a production line to diversify product

specifications. MES (Manufacturing Execution System) brings flexibility to the line, but its functionality is limited by the constraints of the manufacturing equipment on the production line. Therefore, it is difficult to meet the individual needs of each customer in real time. Audi autonomously selects the appropriate cell for each vehicle model and dynamically configures the process. To that end, everyone working on the production line spends three years creating a training program to experience JOBing workstations on all lines. Do not work on the same line or workstation all day long, always rotate to another workstation. Personnel rotation is also flexible. Currently, there are 7,000 employees at the Stuttgart factory. We have 2,000 nationally certified and final process inspectors.

2. Promotion strategy for "Industry 4.0"

This is because the German government announced in November 2011, "High-Tech Strategy 2020 Action."

It is one of the strategic measures that announced "Plan (execution plan for 2020 of advanced technology strategy)". Under the secretariat named "Industry 4.0 Platform", which is promoted as a joint project of "industry", "government" and "academic" and is operated by the industry association of "electricity, communication, machinery, etc." in Germany. Therefore, strategic measures are organized by working groups of "industry," "government," and "academic" to carry out activities. It is extremely practical, and there is a mechanism for sharing technical information in the field of basic research. It has a high degree of penetration and reputation for the functions of the platform. The "national view" of the German state is permeated.

This platform is different from the one created by the government for the purpose of composing "functions" by entrusting it to expert meetings, etc., and it is composed in an activity form involving "large", "medium" and "small" companies. The concept of promotion strategy is clearly permeated, and the "function" of activity support is fully utilized in a spiral. This difference is clear. There, I felt that the German government was serious and strong. To promote reforms to transform into an industrial structure that can embody various innovations in Germany, in Japan, we will forcefully promote the dispersion and concentration of large companies, which are said to be zombie companies, and specialize in diversified businesses. It is necessary to recirculate and transfer to small and medium-sized enterprises pursuing peculiarity. The Japanese corporate sense is that small and medium-sized enterprises are subcontracted to large enterprises, so the mythical idea of Japan that even if there is a misconduct in a large enterprise cannot be crushed, is not understood in Germany. The German government does not hesitate to promote the sorting cycle of large, medium, and small enterprise businesses, innovate into a "strong manufacturing industry", and "win in global competition". Policy penetration is extremely high. As a result, it will also create a new founding company with creative ideas.

The aspect that "Industry 4.0" has evolved is that "Industry 4.0" has evolved by devoting itself to measures to strengthen resilience centered on "Small and medium-sized enterprises" that are also in the German SME classification and building an innovative industrial base. Don't miss it.

"Industry 4.0" was born out of the "advanced technology strategy" that the German government has strongly promoted since 2006. It has repeated innovative research, created technological innovation, and has high competitiveness in Germany. Is to stick to. Specific medium-term scientific and technical goals are set for the next 10 to 15 years. Chancellor Angela Merkel (at that time), who advocated that innovative technology research is the driving force for revitalizing the industry and growing the German economy, was promoting her own activities. We

are devoting a drastic budget to this activity. It has been more than ten years since we continued this policy, and we have achieved high productivity and achieved the regulation of 35 hours per week from long working hours. It is truly a model for "work style reform."

Germany has a population of about 83.19 million (September 2020: German Federal Statistics Agency), and as in Japan, the declining birthrate and aging population are a problem. As the working population is declining, the realization of a "smart factory" by dividing the roles of humans and robots (AI), and the introduction of IT in office work will promote work efficiency, increase productivity, and reduce the workload. Is a requirement. Therefore, "standardization" of work has been confirmed as the most important issue to be solved while practicing "Industry 4.0". There is also a common understanding that organizing operations is also an important factor.

In Germany, the "policy core" that manufacturing is the main industry remains unchanged.

German SMEs are growing faster than large companies and are helping to lower the unemployment rate. The characteristic of companies is that they are not concentrated in cities but scattered all over the country.

Although the costs involved in attracting companies are high, the German local government can provide economic wealth to residents by providing a business environment in which profits can be earned more than the costs incurred if the company is successfully relocated. I am seriously thinking that I can do it. We also believe that the abundance gained there will lead to the development of a comfortable local environment, attracting young women, and realizing a virtuous cycle of population growth. Naturally, I am impressed with the freshness.

"Improvement of productivity" can be achieved by promoting "manufacturing reform" of {labor load reduction} by using what we learned in Germany as a trigger for "innovation". As a result, "work style reform" can be realized. After returning to Japan, I came to the idea that we would like to carry out "Industry 4.0" in a "honest" manner, just like Germans.

3. Things that I saw and remembered in Germany

- 1) It is difficult to educate children. He left home at the age of 16 and forced himself to become independent.
- 2) We are converting from a nuclear power plant to a thermal power plant. Focus on energy innovation processes to reduce CO₂ from thermal power plants
- 3) SMEs are mostly family-owned at 95%. ROA (return on assets) is large.
- 4) Since 2012, the government has been in the black and has not issued government bonds.
- 5) Pay close attention to the process of electrification of mechanical manual missions.
- 6) As a national macro policy, we are adhering to actively hiring people with disabilities for public investment, road repair, etc.

I have heard about the current state of Industry 4.0 in Germany, and to accelerate DX digital transformation at our company and realize my "thoughts" toward the realization of Industry 4.0, the "next" I was prepared to go straight on the road to 100 years with a sense of speed. In 2019 after returning to Japan, I formed a project and started "imprinting knowledge" about DX in our company.

○ Toward the realization of Industry 4.0

1. Project started

As mentioned above, I was able to observe the current state of Industry 4.0 in Germany. To realize Industry 4.0, which we consider, it is indispensable to promote DX (digital transformation). I renewed my thought that the promotion of DX, which realizes "reduction of labor load", "improvement of productivity" and "reform of working style", is an indispensable element for "manufacturing" in the future.

On the other hand, looking at the current state of "manufacturing" in Japan,

- "The ratio of manufacturing industry workers to all industries continues to decline even as the number of manufacturing industry workers has been on the rise since 2012. Behind this is the overseas expansion of domestic manufacturers. It is thought that there is a decrease in domestic production due to this. "

- "In 2020, (the number of young workers in the manufacturing industry) fell to less than 25% in both the manufacturing and non-manufacturing industries."

- "The number of elderly workers in the manufacturing industry will remain high at 920,000 in 2020." (Excerpt from the "2021 White Paper on Manufacturing")

The above three points are listed.

On the other hand, the conversion from analog to digital is indispensable for promoting DX, but according to the Ministry of Economy, Trade, and Industry's "Points of the Information and Communication White Paper for the 3rd year of Reiwa",

- Digitization (digital transformation: DX) that accompanies business model changes such as business expansion and new business expansion is not widespread.

- Japan's ICT human resources are unevenly distributed among ICT companies, and the shortage of human resources is a major issue for companies to promote DX.

The above two points have been pointed out.

To realize a "smart factory" that embodies Industry 4.0, it is necessary to promote DX within the company. However, as mentioned above, the severity is increasing due to the shortage of domestic ICT human resources and the decrease in the working population of manufacturing.

Therefore, I conducted a business environment analysis for the promotion of DX of our company and obtained the following two conclusions.

"We continue to take on the challenge of developing new high-precision and precision processing technology using press technology, heat treatment technology, welding technology, polishing technology, mold technology, etc. Highly unique development method for complex shaped products that cannot be handled by other companies. By proposing, we are now recognized as a leading company of core metal sealing and fastener parts for automotive powertrains and have secured our position as a Tier 1 company that directly deals with many major automobile manufacturers. "

"Our special feature is our technical development ability to pursue high quality and low cost with high variety and small quantity by in-house integrated production system of heat treatment, welding, caulking joining, barrel, polishing and cleaning processing based on press processing. We will promote local production in line with the

overseas expansion of automobile manufacturers, establish a four-pole production base system in Japan, Taiwan, Mexico, and Thailand. Positioning (Buzen City, Fukuoka Prefecture) as a mass production technology base, we are advancing the sophistication of domestic manufacturing technology by globally expanding the technology cultivated in Japan. "

However, on the other hand, in addition to the corona damage, semiconductor shortage, and EV conversion of automobiles after 2021, global instability factors due to the US-China supremacy and the situation in Ukraine are seen, and we can overcome these factors and secure our business. To develop into a new system, the efforts to improve productivity by extension so far are insufficient, and the existing system will be replaced in order to respond to the "cliff of 2025" that the Ministry of Economy, Trade and Industry warns. We have come to realize that it is necessary to build a new system for innovation in manufacturing methods that utilizes advanced digital technology.

Therefore, while promoting the understanding of DX through in-house education, I am planning and working on three projects to realize "reduction of labor load", "improvement of productivity" and "reform of working style".

- Development of automated system for sales quotation
- Stop due to abnormal vibration waveform of press machine & die, AE / AI system device development
- Development of mold process layout automatic design system and 3D process load analysis video simulation system (For details of the project, please [see our website.](#))

2. Business format conversion by business restructuring

In the post-Corona with Corona economy and society, we will "... replace the existing system and utilize advanced digital technology to build a new system for innovation in manufacturing methods" Utilizing the "Business Restructuring Subsidy" public offering system solicited by the Ministry of Economy, Trade and Industry, we planned to promote DX by changing the business format and were able to receive a decision to promulgate it in September 1991.

Our challenge for business restructuring is

- Reduction of defective products in the intermediate process
- Sophistication of inspection and measurement capability
- Reduction of material cost and delivery date
- A large amount of work process records and digital data of failure cases

Analyzing the above points, we are implementing the following tactics to "establish the basic infrastructure and system and take the first step toward DX" with the next one to two years as the first stage.

We would like to report on the progress on April 1, 4th year of Reiwa.

A. Composition of DX working team

The DX working team, which is the core of DX promotion, has been formed as a team of 14 people on July 1, 2021.

B. Following the decision to grant a business restructuring subsidy, the following items are being promoted.

(A) Construction of an information center with high security functions

- Construction work of the information center is currently underway toward completion in late April, 4th year of

Reiwa. The building will be equipped with advanced security controls to control access to the information center to ensure human security.

-We have already introduced an information system that protects the design and processing data of our manufactured products, and we have established measures against information leakage by connecting to a network equipped with a defense function against cyber-attacks.

(B) Introduce a production control system by on-premises operation and manage production information with digital data. Plan step-by-step cooperation with the inventory management system.

-We will abolish the manual input of production control data using office package software and digitize it.

- For the production system that inputs and manages production control data, a general-purpose package based on the requirement definition is introduced and production is performed.

We provide training to employees regarding the utilization of information.

(C) Significant reduction of defective products in intermediate processes and digitization of inspection data by introducing high-performance inspection and measuring instruments

- In place of dimensional measurement using caliper, etc., a high-performance inspection device is introduced to realize short-time measurement.

By introducing high-performance inspection equipment, we can expect to reduce the number of defective products and shorten the inspection time by trial hitting.

We have introduced high-performance inspection equipment, completed training for users, and have started some operations.

- Inspection data from high-performance inspection equipment has been digitized and partially saved. In the future, we will create a database and use it for production activities.



Information Center under construction (photographed on March 15, 2022)

○ I have reported on my feelings for DX. We will continue to report the progress of our business to everyone in a timely manner.